CR-V

1997-2000
Service Manual

How to Use This Manual

This manual contains technical information for the 1997 – 2000 CR-V. It is divided into 24 sections. The first page of each section is marked with a black tab that lines up with its corresponding thumb index tab on this page and the back cover. 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.

Each section includes:

1. A table of contents, or an exploded view index showing:
   - Parts disassembly sequence.
   - Bolt torques and thread sizes.
   - Page references to descriptions in text.
2. Disassembly/assembly procedures and tools.
3. Inspection.
4. Testing/troubleshooting.
5. Repair.
6. Adjustments.

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.

First Edition 11/99

Specifications apply to U.S.A. and Canada

HONDA MOTOR CO., LTD.
Service Publication Office

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

General Info
Specifications
Maintenance
Engine Electrical
Engine
Cooling
Fuel and Emissions
*Transaxle
*Steering
Suspension
*Brakes (Including ABS)
*Body
*Heater and Air Conditioning
*Body Electrical
*Restraints

General Information

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Chassis and Paint Codes

U.S. 1997 Model

Vehicle Identification Number

JHL RD1 8 4 * V C 000001

Manufacturer, Make and Type of Vehicle
JHL: HONDA MOTOR CO., LTD
HONDA, Multipurpose Passenger Vehicle (MPV)

Line, Body and Engine Type
RD1: CR-V/B20B4

Body Type and Transmission Type
8: 5-door/4-speed Automatic

Vehicle Grade (Series)
4: LX
5: LX (with ABS)

Check Digit

Model Year
V: 1997

Factory Code
C: Saitama Factory in Japan (Sayama)

Serial Number

Engine Number

B20B4 - 2000001

Engine Type
B20B4: 2.0 ℓ DOHC Sequential Multiport Fuel-injected engine

Serial Number

Transmission Number

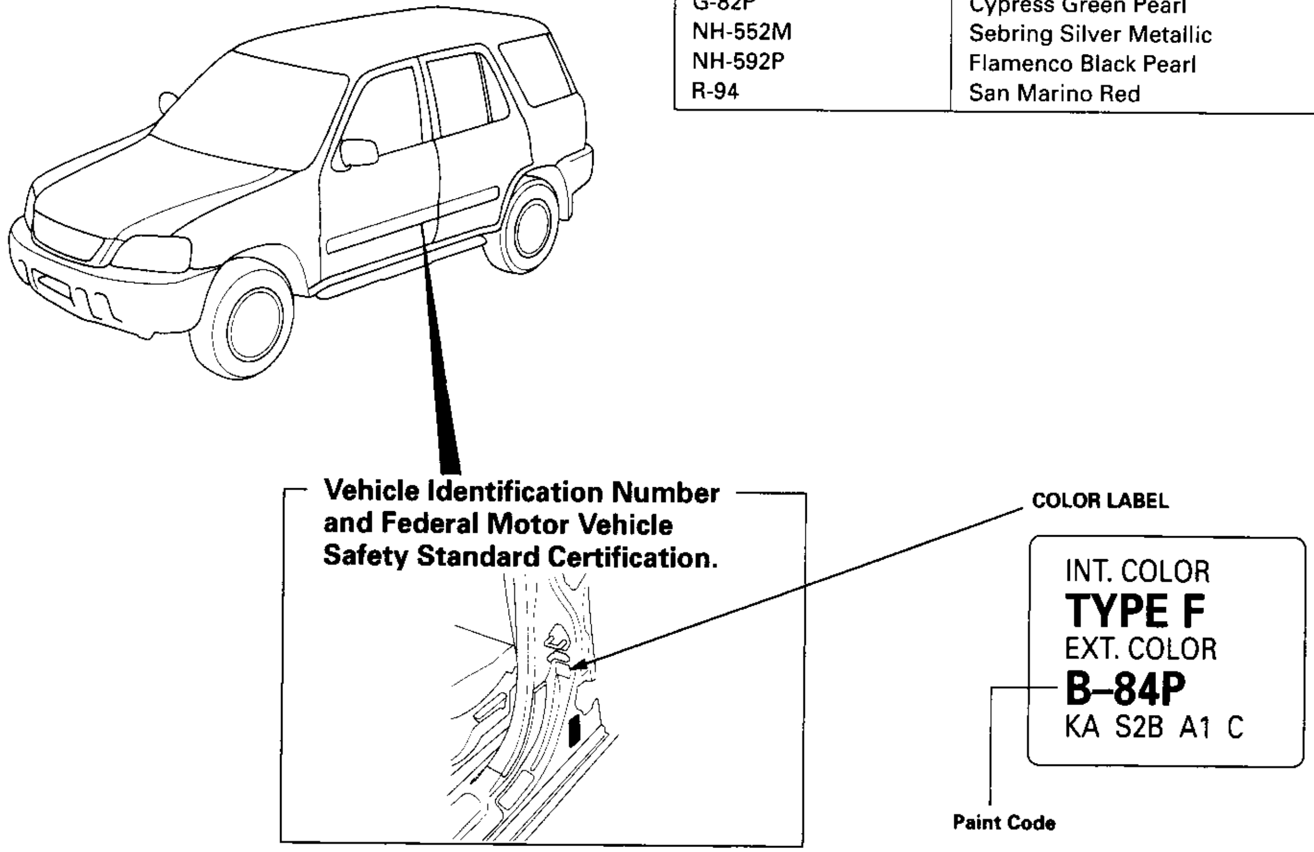
MDMA - 1000001

Transmission Type
MDMA: 4-speed Automatic
SDMA: 4-speed Automatic

Serial Number

Paint Code

Paint Code	Color
B-84P	Supermarine Blue Pearl
G-82P	Cypress Green Pearl
NH-552M	Sebring Silver Metallic
NH-592P	Flamenco Black Pearl
R-94	San Marino Red



U.S. 1998 Model

Vehicle Identification Number

JHL RD1 7 4 * W C 000001

Manufacturer, Make and Type of Vehicle
JHL: HONDA MOTOR CO., LTD
HONDA, Multipurpose Passenger Vehicle (MPV)

Line, Body and Engine Type
RD1: CR-V/B20B4
RD2: CR-V/B20B4

Body Type and Transmission Type
7: 5-door/5-speed Manual
8: 5-door/4-speed Automatic

Vehicle Grade (Series)
4: LX
6: EX

Check Digit

Model Year
W: 1998

Factory Code
C: Saitama Factory in Japan (Sayama)

Serial Number

Engine Number

B20B4 - 3000001

Engine Type
B20B4: 2.0 ℓ DOHC Sequential Multiport Fuel-injected engine

Serial Number

Transmission Number

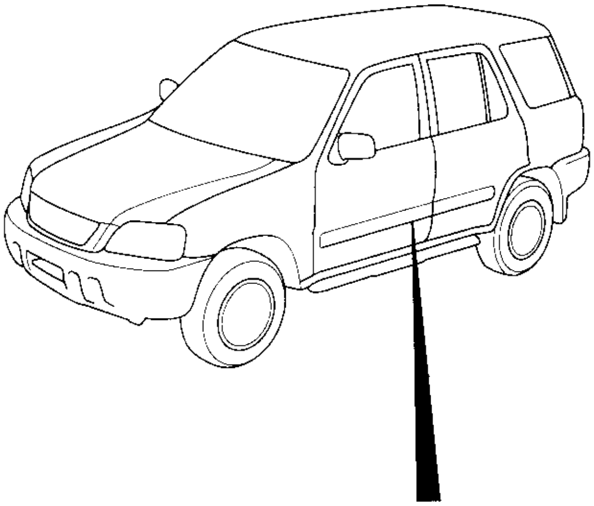
MDLA - 1000001

Transmission Type
MDLA: 4-speed Automatic
M4TA: 4-speed Automatic
SBXM: 5-speed Manual

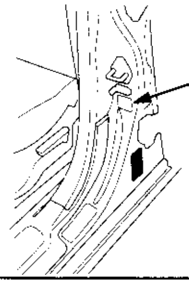
Serial Number
MDLA, SBXM: 1000001 ~
M4TA: 3000001 ~

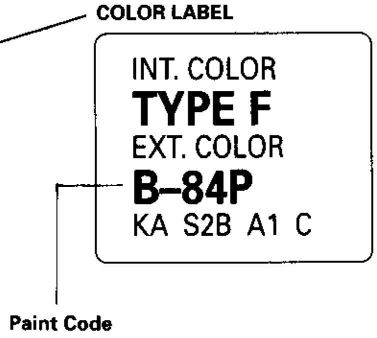
Paint Code

Paint Code	Color
B-84P	Supermarine Blue Pearl
G-82P	Cypress Green Pearl
NH-552M	Sebring Silver Metallic
NH-592P	Flamenco Black Pearl
R-94	San Marino Red



Vehicle Identification Number and Canadian Motor Vehicle Safety Standard Certification.





Chassis and Paint Codes

U.S. 1999 Model

Vehicle Identification Number

JHL RD1 7 4 * X C 000001

Manufacturer, Make and Type of Vehicle
JHL: HONDA MOTOR CO., LTD
HONDA, Multipurpose Passenger Vehicle (MPV)

Line, Body and Engine Type
RD1: CR-V/B20Z2
RD2: CR-V/B20Z2

Body Type and Transmission Type
7: 5-door/5-speed Manual
8: 5-door/4-speed Automatic

Vehicle Grade (Series)
4: LX
6: EX

Check Digit

Model Year
X: 1999

Factory Code
C: Saitama Factory in Japan (Sayama)

Serial Number

Engine Number

B20Z2 - 1000001

Engine Type
B20Z2: 2.0 ℓ DOHC Sequential Multiport Fuel-injected engine

Serial Number

Transmission Number

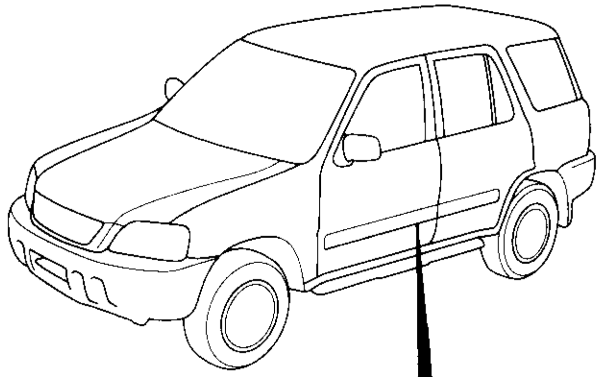
MDLA - 2000001

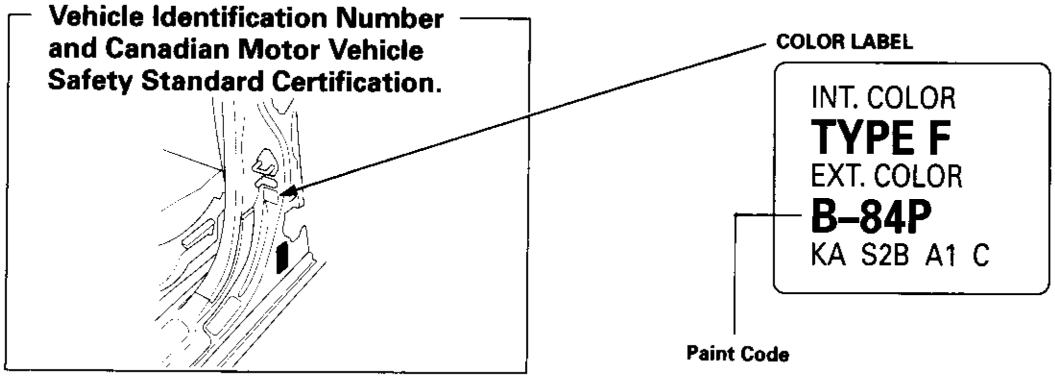
Transmission Type
MDLA: 4-speed Automatic
MDMA: 4-speed Automatic
SBXM: 5-speed Manual

Serial Number
MDLA: 2000001~
MDMA: 1000001~
SBXM: 2000001~

Paint Code

Paint Code	Color
B-84P	Supermarine Blue Pearl
B-92P	Nighthawk Black Pearl
G-95P	Clover Green Pearl
NH-578	Taffeta White
NH-552M	Sebring Silver Metallic
R-81	Milano Red





U.S. 2000 Model

Vehicle Identification Number

JHL RD1 7 4 * Y C 000001

Manufacturer, Make and Type of Vehicle

JHL: HONDA MOTOR CO., LTD HONDA, Multipurpose Passenger Vehicle (MPV)

Line, Body and Engine Type

RD1: CR-V/B20Z2
RD2: CR-V/B20Z2

Body Type and Transmission Type

7: 5-door/5-speed Manual
8: 5-door/4-speed Automatic

Vehicle Grade (Series)

4: LX
6: EX
7: SE

Check Digit

Model Year

Y: 2000

Factory Code

C: Saitama Factory in Japan (Sayama)

Serial Number

Engine Number

B20Z2 - 2000001

Engine Type

B20Z2: 2.0 ℓ DOHC Sequential Multiport Fuel-injected engine

Serial Number

Transmission Number

MDLA - 3000001

Transmission Type

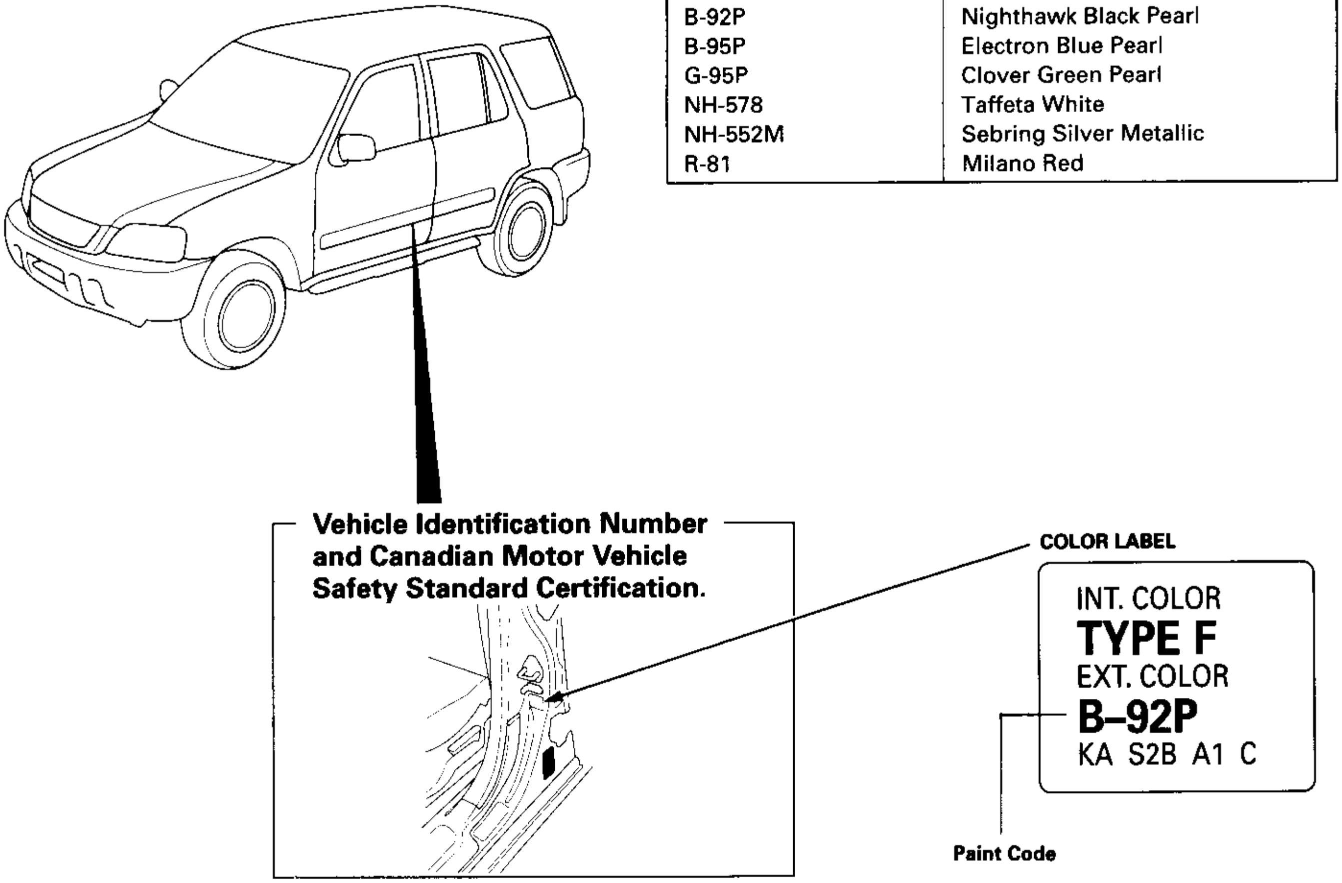
MDLA: 4-speed Automatic
MDMA: 4-speed Automatic
SBXM: 5-speed Manual

Serial Number

MDLA: 3000001~
MDHA: 2000001~
SBXM: 2000001~

Paint Code

Paint Code	Color
B-92P	Nighthawk Black Pearl
B-95P	Electron Blue Pearl
G-95P	Clover Green Pearl
NH-578	Taffeta White
NH-552M	Sebring Silver Metallic
R-81	Milano Red



Chassis and Paint Codes

Canada 1997 Model

Vehicle Identification Number

JHL RD1 8 5 * V C 800001

Manufacturer, Make and Type of Vehicle
JHL: HONDA MOTOR CO., LTD
HONDA, Multipurpose Passenger Vehicle (MPV)
Line, Body and Engine Type
RD1: CR-V/B20B4
Body Type and Transmission Type
8: 5-door/4-speed Automatic
Vehicle Grade (Series)
5: LX
Check Digit
Model Year
V: 1997
Factory Code
C: Saitama Factory in Japan (Sayama)
Serial Number

Engine Number

B20B4 - 2000001

Engine Type
B20B4: 2.0 ℓ DOHC Sequential Multiport Fuel-injected engine
Serial Number

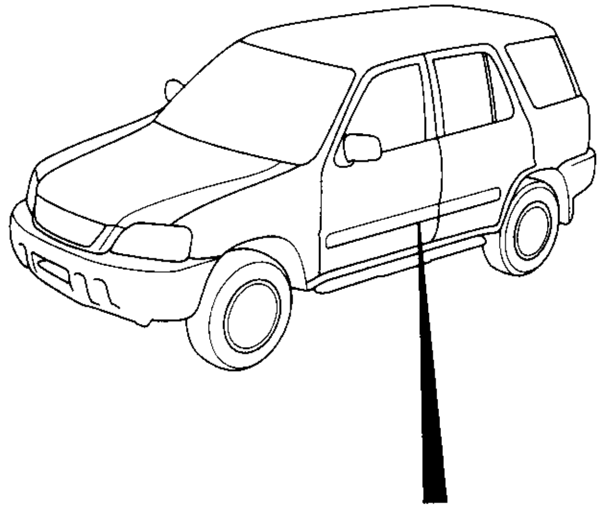
Transmission Number

MDMA - 1000001

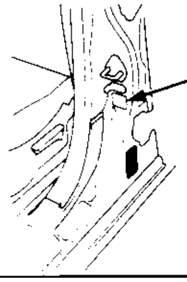
Transmission Type
MDMA: 4-speed Automatic
SDMA: 4-speed Automatic
Serial Number

Paint Code

Paint Code	Color
B-84P	Supermarine Blue Pearl
G-82P	Cypress Green Pearl
NH-552M	Sebring Silver Metallic
NH-592P	Flamenco Black Pearl
R-94	San Marino Red



Vehicle Identification Number and Canadian Motor Vehicle Safety Standard Certification.



COLOR LABEL

INT. COLOR
TYPE F
EXT. COLOR
B–84P
KC S2B C2 C

Paint Code

Canada 1998 Model

Vehicle Identification Number

JHL RD1 7 4 * W C 800001

Manufacturer, Make and Type of Vehicle
JHL: HONDA MOTOR CO., LTD
HONDA, Multipurpose Passenger Vehicle (MPV)

Line, Body and Engine Type
RD1: CR-V/B20B4

Body Type and Transmission Type
7: 5-door/5-speed Manual
8: 5-door/4-speed Automatic

Vehicle Grade (Series)
4: LX
5: EX

Check Digit

Model Year
W: 1998

Factory Code
C: Saitama Factory in Japan (Sayama)

Serial Number

Engine Number

B20B4 - 3000001

Engine Type
B20B4: 2.0 ℓ DOHC Sequential Multiport Fuel-injected engine

Serial Number

Transmission Number

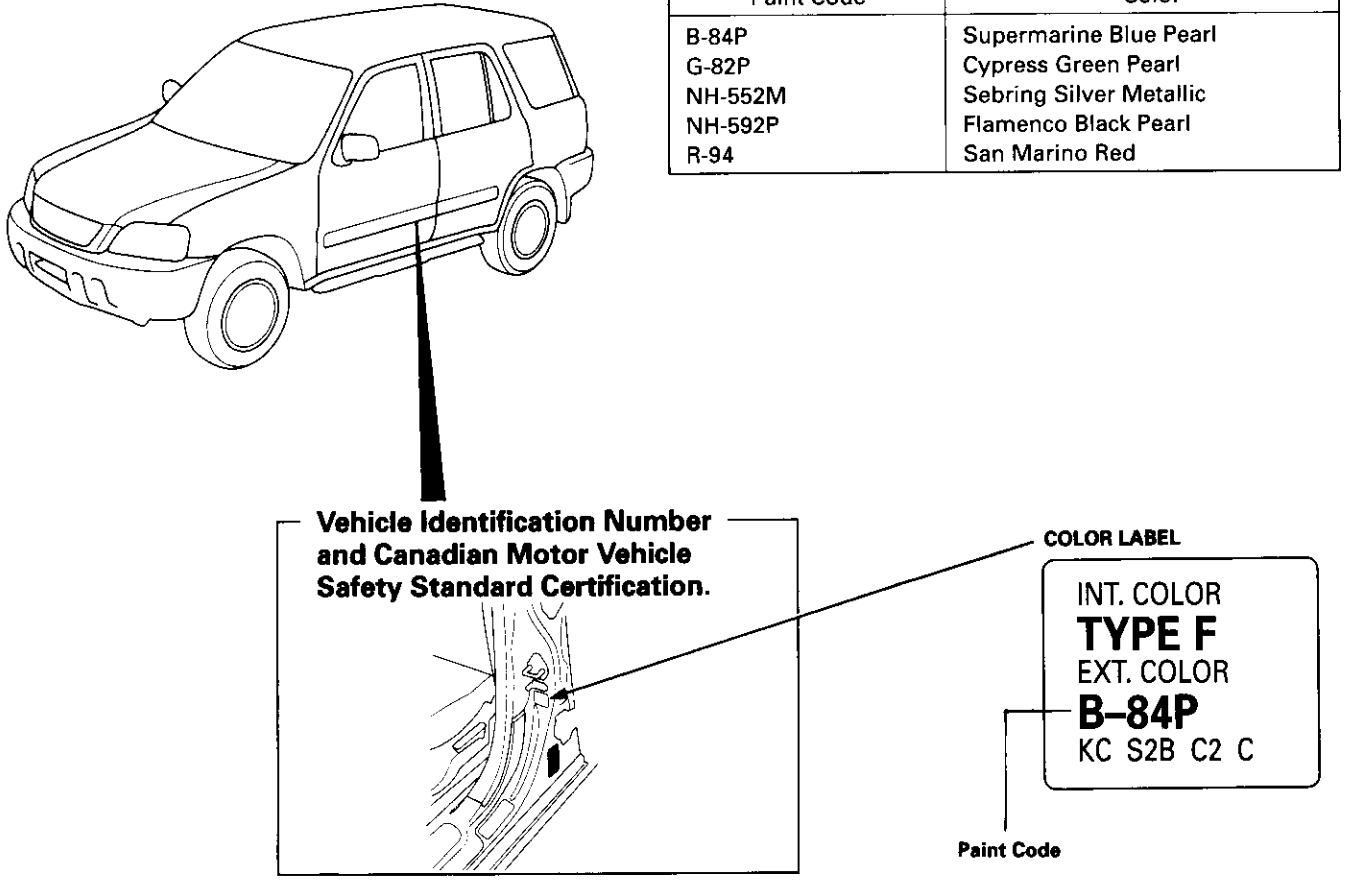
M4TA - 3000001

Transmission Type
M4TA: 4-speed Automatic
SBXM: 5-speed Manual

Serial Number
SBXM: 1000001~
M4TA: 3000001~

Paint Code

Paint Code	Color
B-84P	Supermarine Blue Pearl
G-82P	Cypress Green Pearl
NH-552M	Sebring Silver Metallic
NH-592P	Flamenco Black Pearl
R-94	San Marino Red



Chassis and Paint Codes

Canada 1999 Model

Vehicle Identification Number

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Manufacturer, Make and Type of Vehicle
JHL: HONDA MOTOR CO., LTD
HONDA, Multipurpose Passenger Vehicle (MPV)

Line, Body and Engine Type
RD1: CR-V/B20Z2

Body Type and Transmission Type
7: 5-door/5-speed Manual
8: 5-door/4-speed Automatic

Vehicle Grade (Series)
4: LX
5: EX

Check Digit

Model Year
X: 1999

Factory Code
C: Saitama Factory in Japan (Sayama)

Serial Number

Engine Number

B20Z2 - 1000001

Engine Type
B20Z2: 2.0 ℓ DOHC Sequential Multiport Fuel-injected engine

Serial Number

Transmission Number

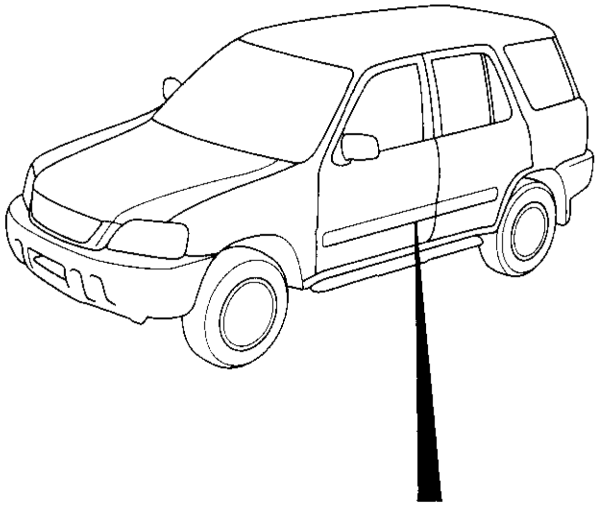
MDMA - 1000001

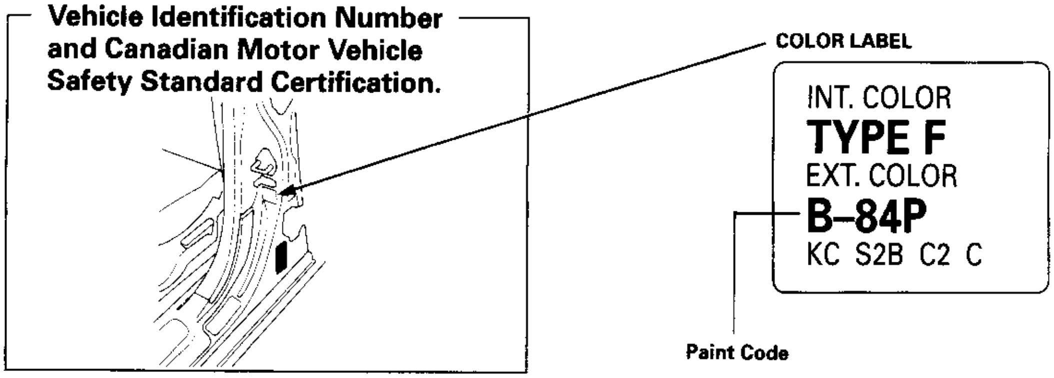
Transmission Type
MDMA: 4-speed Automatic
SBXM: 5-speed Manual

Serial Number
MDMA: 1000001~
SBXM: 2000001~

Paint Code

Paint Code	Color
B-84P	Supermarine Blue Pearl
B-92P	Nighthawk Black Pearl
G-95P	Clover Green Pearl
NH-552M	Sebring Silver Metallic
R-81	Milano Red





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HONDA, Multipurpose Passenger Vehicle (MPV)

Line, Body and Engine Type
RD1: CR-V/B20Z2

Body Type and Transmission Type
7: 5-door/5-speed Manual
8: 5-door/4-speed Automatic

Vehicle Grade (Series)
4: LX
5: EX
7: SE

Check Digit

Model Year
Y: 2000

Factory Code
C: Saitama Factory in Japan (Sayama)

Serial Number

Engine Number

B20Z2 - 2000001

Engine Type
B20Z2: 2.0 ℓ DOHC Sequential Multiport Fuel-injected engine

Serial Number

Transmission Number

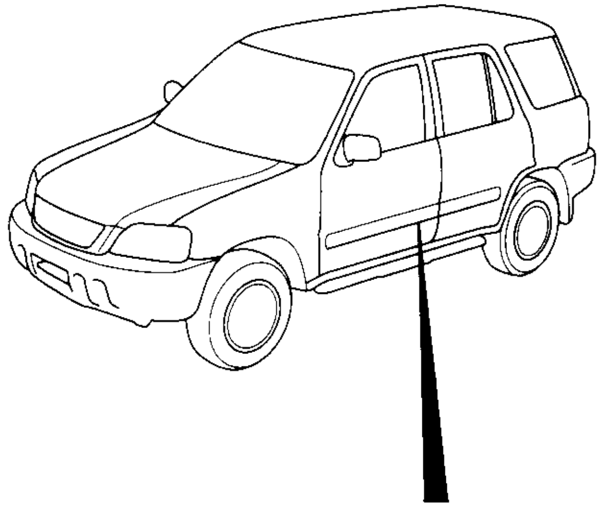
MDMA - 2000001

Transmission Type
MDMA: 4-speed Automatic
SBXM: 5-speed Manual

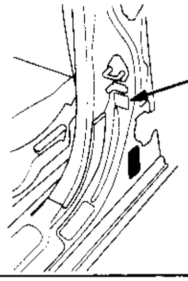
Serial Number
MDMA: 2000001~
SBXM: 2000001~

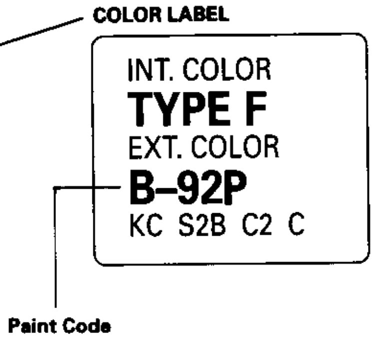
Paint Code

Paint Code	Color
B-96P	Eternal Blue Pearl
B-92P	Nighthawk Black Pearl
G-95P	Clover Green Pearl
NH-552M	Sebring Silver Metallic
R-81	Milano Red
YR-524M	Naples Gold Metallic

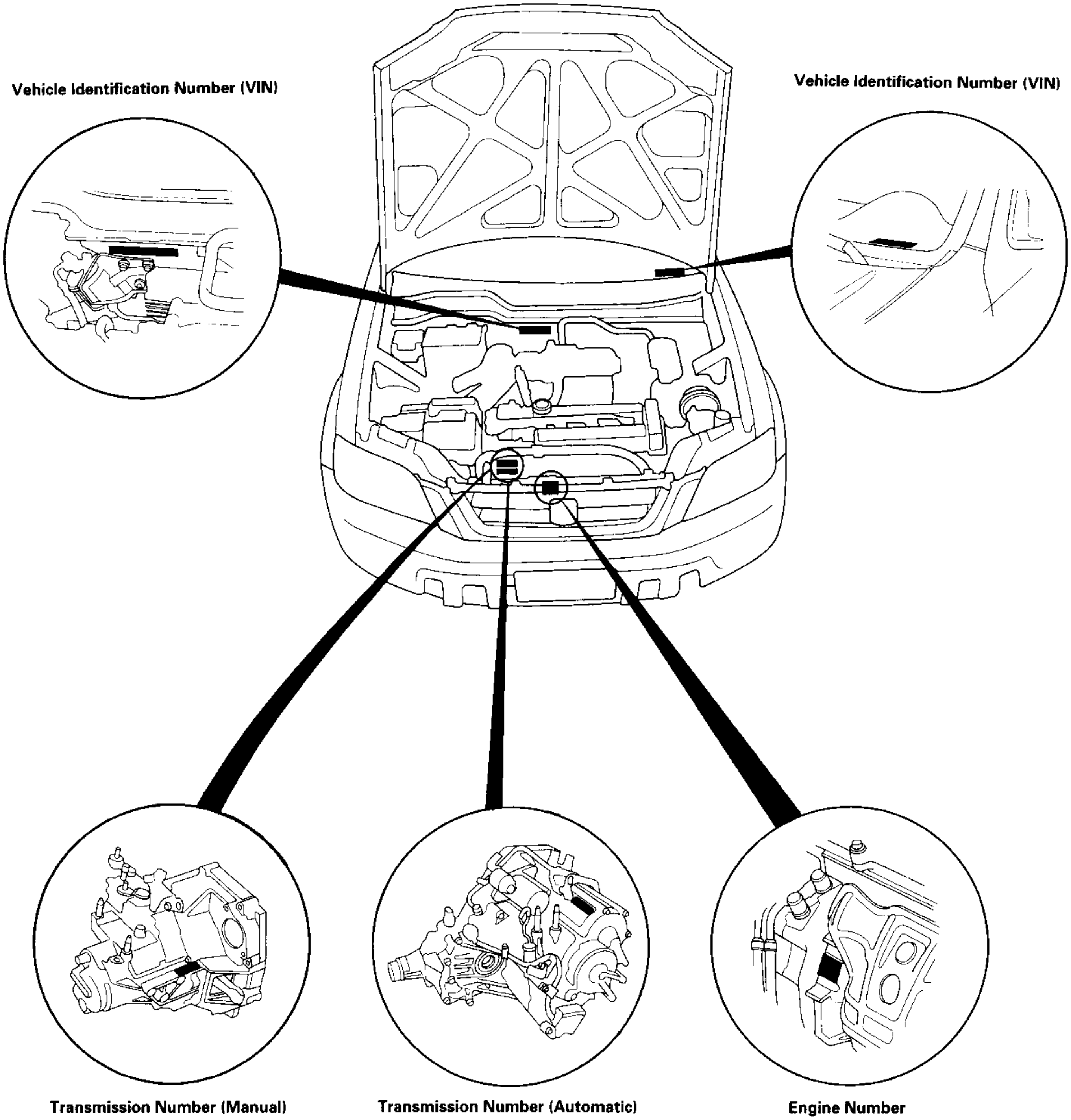


Vehicle Identification Number and Canadian Motor Vehicle Safety Standard Certification.

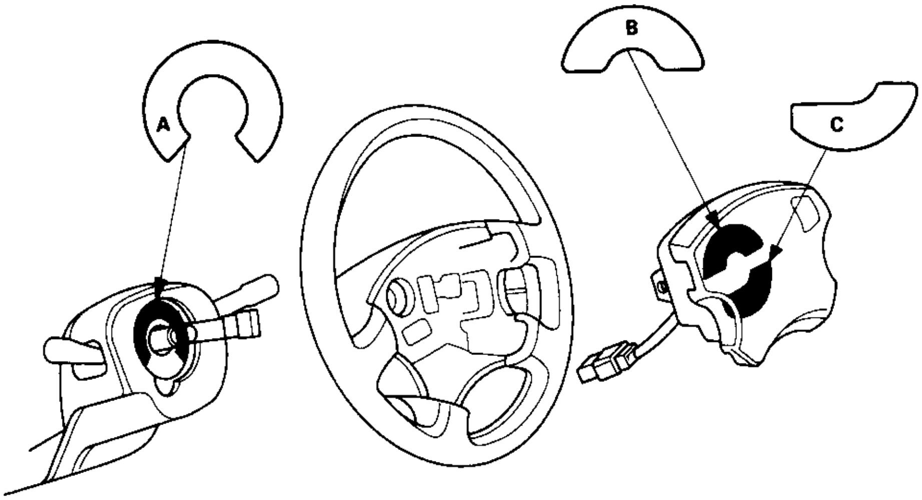




Identification Number Locations



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 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.

C: DRIVER MODULE WARNING

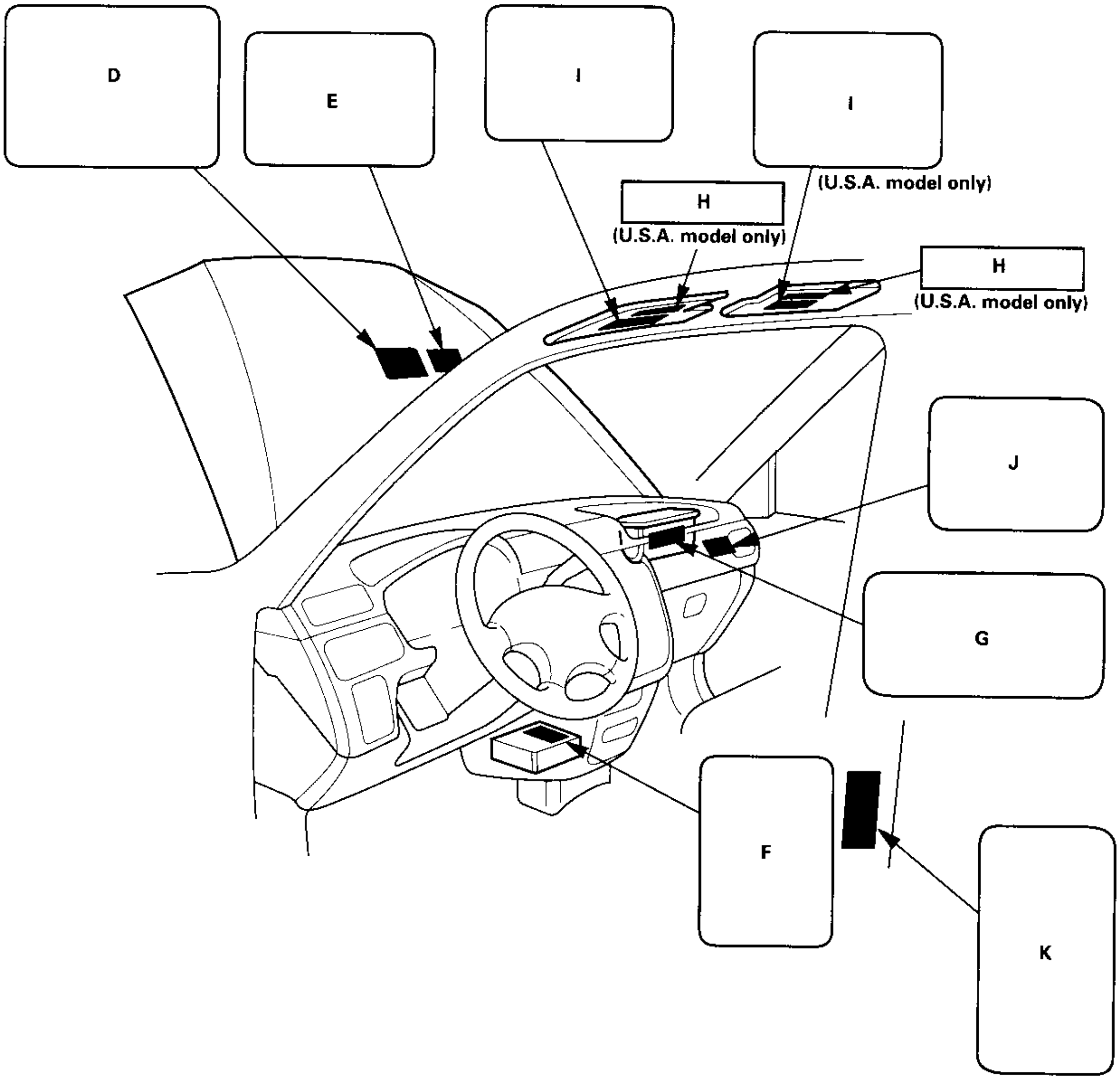
⚠ WARNING
THE AIRBAG INFLATOR IS EXPLOSIVE AND, IF ACCIDENTALLY DEPLOYED, CAN SERIOUSLY HURT OR KILL YOU.

- 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.

(cont'd)

Warning/Caution Label Locations

(cont'd)



D: 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.

E: STEERING COLUMN NOTICE (HOOD)

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

F: MONITOR NOTICE

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

G: FRONT SEAT PASSENGER AIRBAG 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 THE 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.

H: PASSENGER INFORMATION (U.S.A. model)
(U.S.A. '97 model)

AIRBAG SEE OTHER SIDE.

(U.S.A. '98 – 00 models)

AIRBAG WARNING
FLIP VISOR OVER.

I: SRS INFORMATION
(U.S.A. '97 model
Canada '97 – 00 models)

CAUTION
TO AVOID SERIOUS INJURY:
- FOR MAXIMUM SAFETY PROTECTION IN ALL TYPES OF CRASHES, YOU MUST ALWAYS WEAR YOUR SAFETY BELT.
- DO NOT INSTALL REARWARD-FACING CHILD SEATS IN ANY FRONT PASSENGER SEAT POSITION.
- DO NOT SIT OR LEAN UNNECESSARILY CLOSE TO THE AIRBAG.
- DO NOT PLACE ANY OBJECTS OVER THE AIRBAG OR BETWEEN THE AIRBAG AND YOURSELF.
- SEE THE OWNER'S MANUAL FOR FURTHER INFORMATION AND EXPLANATIONS.
- THE SRS MUST BE INSPECTED TEN YEARS AFTER IT IS INSTALLED.
- THE DATE OF INSTALLATION IS SHOWN ON THE DRIVER'S DOORJAMB.

(U.S.A. '98 – 00 models)

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.
- THE SRS MUST BE INSPECTED TEN YEARS AFTER IT IS INSTALLED.
- THE DATE OF INSTALLATION IS SHOWN ON THE DRIVER'S DOORJAMB.

J: FRONT PASSENGER AIRBAG WARNING
(U.S.A. '98 – 00 models)

WARNING
CHILDREN CAN BE KILLED OR INJURED BY THE PASSENGER AIRBAG.
THE BACK SEAT IS THE SAFEST PLACE FOR CHILDREN 12 AND UNDER.
MAKE SURE ALL CHILDREN USE SEAT BELTS OR CHILD SEATS.

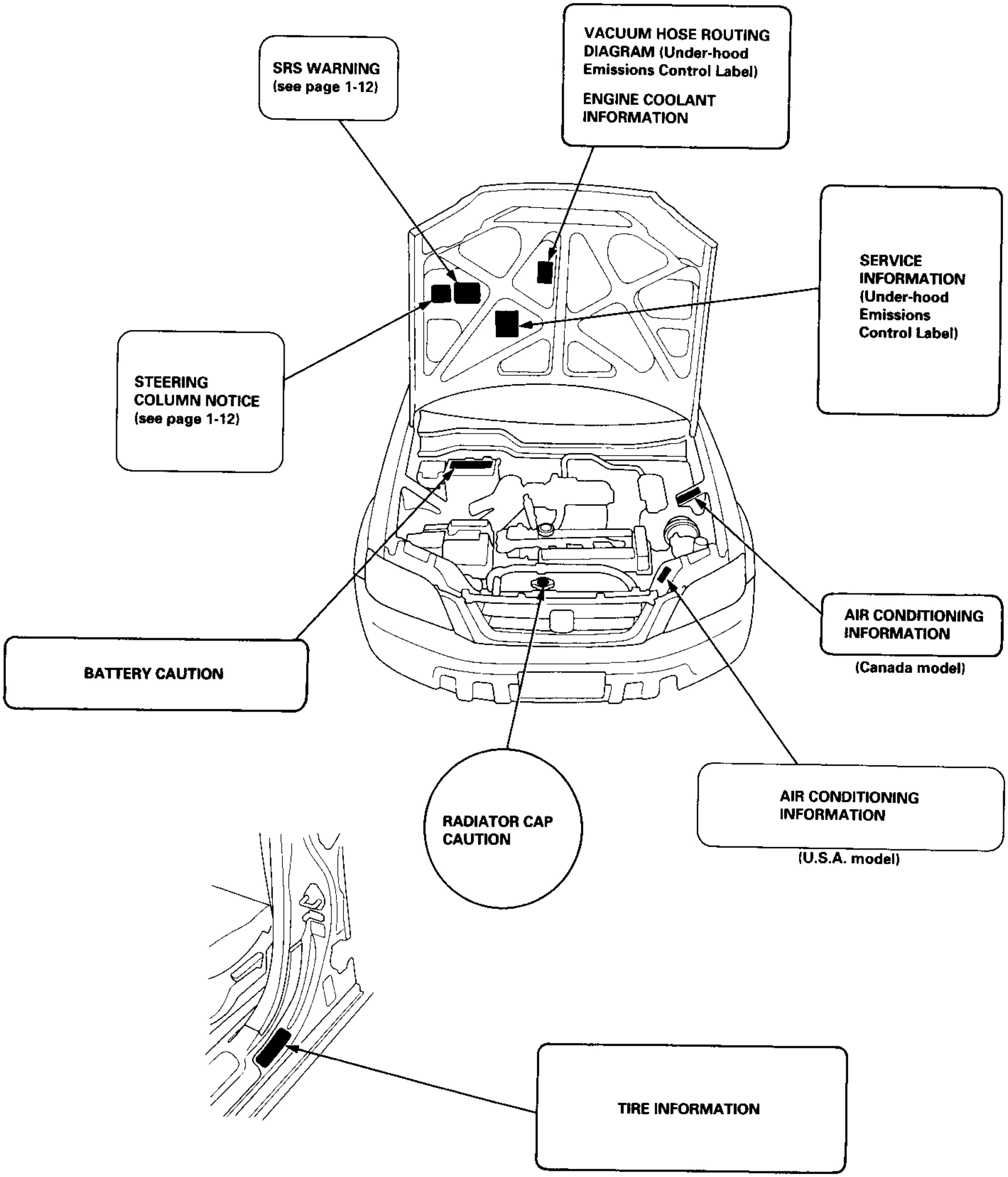
K: FRONT SEATBELT TENSIONER WARNING

WARNING
EXPLOSIVE MATERIAL INSIDE
YOU CAN BE SERIOUSLY HURT OR BURNED.
- DO NOT TAMPER OR DISASSEMBLE.
  NO SERVICEABLE PARTS INSIDE.
- REFER TO SERVICE MANUAL FOR COMPLETE INSTRUCTIONS.

(cont'd)

Warning/Caution Label Locations

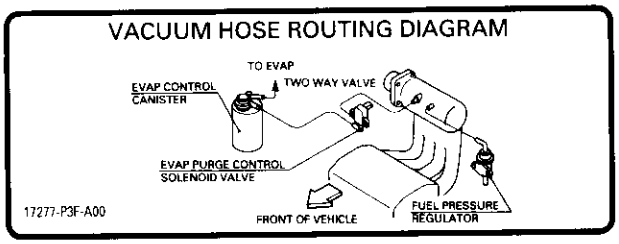
(cont'd)

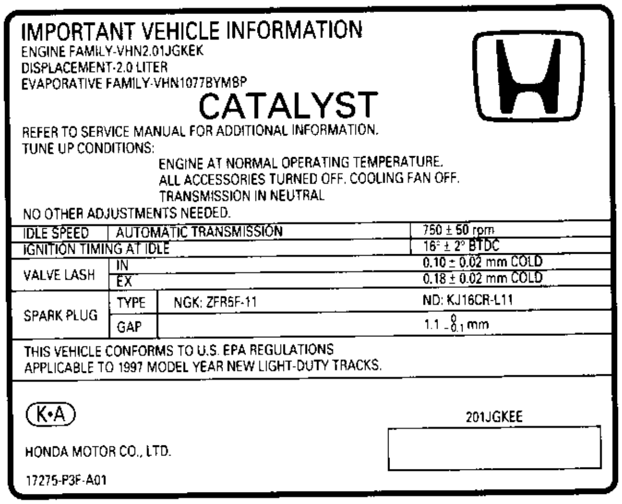


Under-hood Emissions Control Label

Emission Group Identification (1997 model)

Example:




IMPORTANT VEHICLE INFORMATION
ENGINE FAMILY-VHN2.01JGKEK
DISPLACEMENT-2.0 LITER
EVAPORATIVE FAMILY-VHN1077BYMBP

CATALYST

REFER TO SERVICE MANUAL FOR ADDITIONAL INFORMATION.
TUNE UP CONDITIONS:
ENGINE AT NORMAL OPERATING TEMPERATURE.
ALL ACCESSORIES TURNED OFF. COOLING FAN OFF.
TRANSMISSION IN NEUTRAL
NO OTHER ADJUSTMENTS NEEDED.

IDLE SPEED	AUTOMATIC TRANSMISSION		750 ± 50 rpm
IGNITION TIMING AT IDLE			16° ± 2° BTDC
VALVE LASH	IN		0.10 ± 0.02 mm COLD
	EX		0.18 ± 0.02 mm COLD
SPARK PLUG	TYPE	NGK: ZFR5F-11	ND: KJ16CR-L11
	GAP		$1.1\,^{0}_{-0.1}$ mm

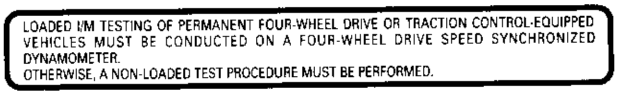
THIS VEHICLE CONFORMS TO U.S. EPA REGULATIONS
APPLICABLE TO 1997 MODEL YEAR NEW LIGHT-DUTY TRACKS.

(K•A)

201JGKEE

HONDA MOTOR CO., LTD.

17275-P3F-A01


LOADED I/M TESTING OF PERMANENT FOUR-WHEEL DRIVE OR TRACTION CONTROL-EQUIPPED VEHICLES MUST BE CONDUCTED ON A FOUR-WHEEL DRIVE SPEED SYNCHRONIZED DYNAMOMETER.
OTHERWISE, A NON-LOADED TEST PROCEDURE MUST BE PERFORMED.

50ST (50 States):
THIS VEHICLE CONFORMS TO U.S. EPA AND STATE OF CALIFORNIA REGULATIONS APPLICABLE TO 1997 MODEL YEAR NEW LIGHT DUTY TRUCKS.

49ST (49 States/Federal):
THIS VEHICLE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE TO 1997 MODEL YEAR NEW LIGHT DUTY TRUCKS.

CAL (California):
THIS VEHICLE CONFORMS TO U.S. EPA AND STATE OF CALIFORNIA REGULATIONS APPLICABLE TO 1997 MODEL YEAR NEW TLEV LIGHT DUTY TRUCKS PROVIDED THAT THIS VEHICLE IS ONLY INTRODUCED INTO COMMERCE FOR SALE IN THE STATE OF CALIFORNIA.

Engine and Evaporative Families

Engine Family: V HN 2.0 1 J G K E K

Model Year
V: 1997

Manufacturer
HN: Honda

Displacement

Class
1: Light Duty Vehicle

Fuel System and Number of Valves
J: Electronic Sequential Multiport Injection (three or more valves per cylinder)

Fuel Type
G: Gasoline

Standard
F: 49 or 50 States Tier 1
K: 49 or 50 States Tier 1
1: California Tier 1
2: California TLEV
3: California LEV
4: California ULEV

Catalyst
E, F, G, H: Three Way Catalyst

OBD
K – T: OBD Equipped

Evaporative Family: V HN 1 077 B Y M B P

Model Year
V: 1997

Manufacturer
HN: Honda

Storage System
1: Canister

Canister Working Capacity (grams)

Canister Configuration
A: Plastic Housing (Closed Bottom)
B: Plastic Housing (Open Bottom)

Fuel System
Y: Fuel Injection

Fuel Tank
M: Metal

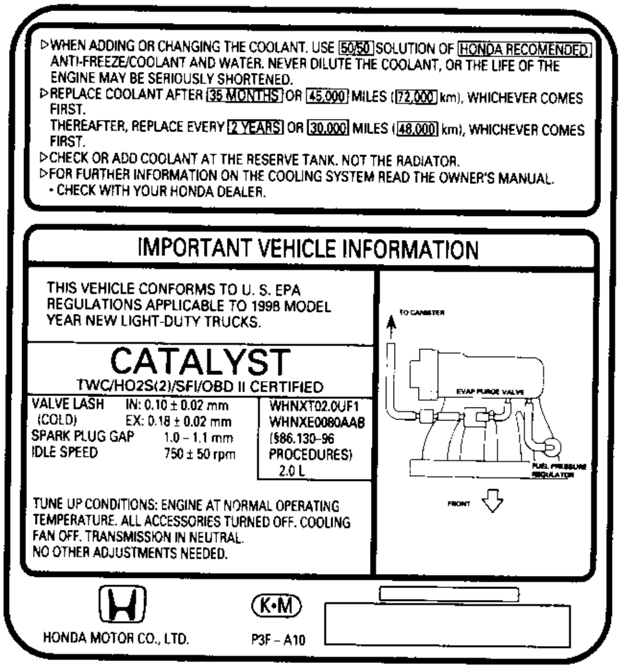
Standard
A: Current Evap
B: Enhanced Evap

Wild Card

Under-hood Emissions Control Label

Emission Group Identification (1998 model)

Example:



▷WHEN ADDING OR CHANGING THE COOLANT. USE 50/50 SOLUTION OF HONDA RECOMENDED ANTI-FREEZE/COOLANT AND WATER. NEVER DILUTE THE COOLANT, OR THE LIFE OF THE ENGINE MAY BE SERIOUSLY SHORTENED.

▷REPLACE COOLANT AFTER 35 MONTHS OR 45,000 MILES (72,000 km), WHICHEVER COMES FIRST.
THEREAFTER, REPLACE EVERY 2 YEARS OR 30,000 MILES (48,000 km), WHICHEVER COMES FIRST.

▷CHECK OR ADD COOLANT AT THE RESERVE TANK. NOT THE RADIATOR.

▷FOR FURTHER INFORMATION ON THE COOLING SYSTEM READ THE OWNER'S MANUAL.
- CHECK WITH YOUR HONDA DEALER.

IMPORTANT VEHICLE INFORMATION

THIS VEHICLE CONFORMS TO U. S. EPA REGULATIONS APPLICABLE TO 1998 MODEL YEAR NEW LIGHT-DUTY TRUCKS.

CATALYST
TWC/HO2S(2)/SFI/OBD II CERTIFIED

VALVE LASH (COLD) IN: 0.10 ± 0.02 mm
EX: 0.18 ± 0.02 mm
SPARK PLUG GAP 1.0 – 1.1 mm
IDLE SPEED 750 ± 50 rpm

WHNXT02.0UF1
WHNXE0080AAB
(§86.130-96 PROCEDURES)
2.0 L

TUNE UP CONDITIONS: ENGINE AT NORMAL OPERATING TEMPERATURE. ALL ACCESSORIES TURNED OFF. COOLING FAN OFF. TRANSMISSION IN NEUTRAL.
NO OTHER ADJUSTMENTS NEEDED.

HONDA MOTOR CO., LTD.
K•M
P3F – A10

50ST (50 States):
THIS VEHICLE CONFORMS TO U.S. EPA AND STATE OF CALIFORNIA REGULATIONS APPLICABLE TO 1998 MODEL YEAR NEW LIGHT DUTY TRUCKS.

49ST (49 States/Federal):
THIS VEHICLE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE TO 1998 MODEL YEAR NEW LIGHT DUTY TRUCKS.

CAL (California):
THIS VEHICLE CONFORMS TO U.S. EPA AND STATE OF CALIFORNIA REGULATIONS APPLICABLE TO 1998 MODEL YEAR NEW TLEV LIGHT DUTY TRUCKS PROVIDED THAT THIS VEHICLE IS ONLY INTRODUCED INTO COMMERCE FOR SALE IN THE STATE OF CALIFORNIA.

Engine and Evaporative Families

Engine Family: W HNX T 02.0 UF1

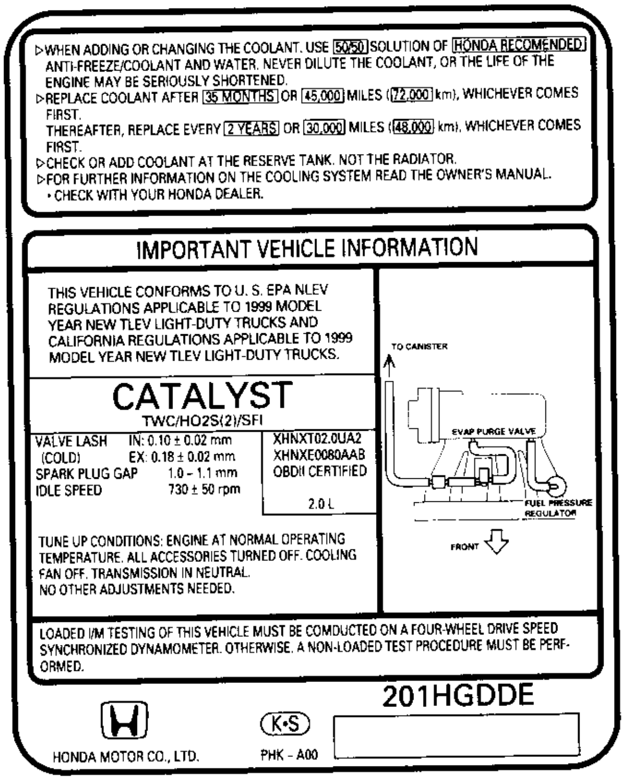
Model Year
W: 1998
Manufacturer Subcode
HNX: HONDA
Family Type
V: LDV
T: LDT
Displacement
Sequence Characters

Evaporative Family: W HNX E 0080 AAB

Model Year
W: 1998
Manufacturer Subcode
HNX: HONDA
Family Type
E: EVAP
R: EVAP/ORVR
Canister Work Capacity
Sequence Characters

Emission Group Identification (1999 model)

Example:



▷WHEN ADDING OR CHANGING THE COOLANT. USE 50/50 SOLUTION OF HONDA RECOMENDED ANTI-FREEZE/COOLANT AND WATER. NEVER DILUTE THE COOLANT, OR THE LIFE OF THE ENGINE MAY BE SERIOUSLY SHORTENED.
▷REPLACE COOLANT AFTER 35 MONTHS OR 45,000 MILES (72,000 km), WHICHEVER COMES FIRST.
THEREAFTER, REPLACE EVERY 2 YEARS OR 30,000 MILES (48,000 km), WHICHEVER COMES FIRST.
▷CHECK OR ADD COOLANT AT THE RESERVE TANK. NOT THE RADIATOR.
▷FOR FURTHER INFORMATION ON THE COOLING SYSTEM READ THE OWNER'S MANUAL.
• CHECK WITH YOUR HONDA DEALER.

IMPORTANT VEHICLE INFORMATION

THIS VEHICLE CONFORMS TO U. S. EPA NLEV REGULATIONS APPLICABLE TO 1999 MODEL YEAR NEW TLEV LIGHT-DUTY TRUCKS AND CALIFORNIA REGULATIONS APPLICABLE TO 1999 MODEL YEAR NEW TLEV LIGHT-DUTY TRUCKS.

CATALYST
TWC/HO2S(2)/SFI

VALVE LASH (COLD)	IN: 0.10 ± 0.02 mm EX: 0.18 ± 0.02 mm	XHNXT02.0UA2 XHNXE0080AAB OBDII CERTIFIED
SPARK PLUG GAP	1.0 – 1.1 mm	
IDLE SPEED	730 ± 50 rpm	2.0 L

TUNE UP CONDITIONS: ENGINE AT NORMAL OPERATING TEMPERATURE. ALL ACCESSORIES TURNED OFF. COOLING FAN OFF. TRANSMISSION IN NEUTRAL.
NO OTHER ADJUSTMENTS NEEDED.

LOADED I/M TESTING OF THIS VEHICLE MUST BE COMDUCTED ON A FOUR-WHEEL DRIVE SPEED SYNCHRONIZED DYNAMOMETER. OTHERWISE. A NON-LOADED TEST PROCEDURE MUST BE PERFORMED.

201HGDDE

HONDA MOTOR CO., LTD.

K•S
PHK – A00

50 State TLEV + NLEV (Unrestricted)

THIS VEHICLE CONFORMS TO U.S. EPA NLEV REGULATIONS APPLICABLE TO 1999 MODEL YEAR NEW TLEV LIGHT DUTY TRUCKS AND CALIFORNIA REGULATIONS APPLICABLE TO 1999 MODEL YEAR NEW LIGHT DUTY TRUCKS.

Engine and Evaporative Families

Engine Family: X HNX T 02.0 UA2

Model Year
X: 1999
Manufacturer Subcode
HNX: HONDA
Family Type
V: LDV
T: LDT
Displacement
Sequence Characters

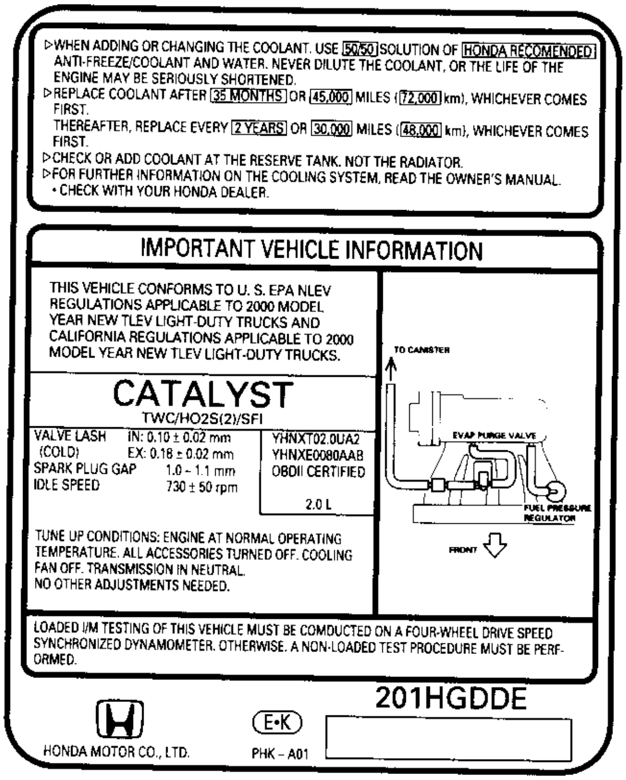
Evaporative Family: X HNX E 0080 AAB

Model Year
X: 1999
Manufacturer Subcode
HNX: HONDA
Family Type
E: EVAP
R: EVAP/ORVR
Canister Work Capacity
Sequence Characters

Under-hood Emissions Control Label

Emission Group Identification (2000 model)

Example:



▷WHEN ADDING OR CHANGING THE COOLANT. USE 50/50 SOLUTION OF HONDA RECOMENDED ANTI-FREEZE/COOLANT AND WATER. NEVER DILUTE THE COOLANT, OR THE LIFE OF THE ENGINE MAY BE SERIOUSLY SHORTENED.

▷REPLACE COOLANT AFTER 35 MONTHS OR 45,000 MILES (72,000 km), WHICHEVER COMES FIRST.
THEREAFTER, REPLACE EVERY 2 YEARS OR 30,000 MILES (48,000 km), WHICHEVER COMES FIRST.

▷CHECK OR ADD COOLANT AT THE RESERVE TANK. NOT THE RADIATOR.

▷FOR FURTHER INFORMATION ON THE COOLING SYSTEM, READ THE OWNER'S MANUAL.
• CHECK WITH YOUR HONDA DEALER.

IMPORTANT VEHICLE INFORMATION

THIS VEHICLE CONFORMS TO U. S. EPA NLEV REGULATIONS APPLICABLE TO 2000 MODEL YEAR NEW TLEV LIGHT-DUTY TRUCKS AND CALIFORNIA REGULATIONS APPLICABLE TO 2000 MODEL YEAR NEW TLEV LIGHT-DUTY TRUCKS.

CATALYST

TWC/HO2S(2)/SFI

VALVE LASH (COLD) IN: 0.10 ± 0.02 mm
EX: 0.18 ± 0.02 mm
SPARK PLUG GAP 1.0 – 1.1 mm
IDLE SPEED 730 ± 50 rpm

YHNXT02.0UA2
YHNXE0080AAB
OBDII CERTIFIED

2.0 L

TUNE UP CONDITIONS: ENGINE AT NORMAL OPERATING TEMPERATURE. ALL ACCESSORIES TURNED OFF. COOLING FAN OFF. TRANSMISSION IN NEUTRAL.
NO OTHER ADJUSTMENTS NEEDED.

LOADED I/M TESTING OF THIS VEHICLE MUST BE COMDUCTED ON A FOUR-WHEEL DRIVE SPEED SYNCHRONIZED DYNAMOMETER. OTHERWISE. A NON-LOADED TEST PROCEDURE MUST BE PERFORMED.

201HGDDE

HONDA MOTOR CO., LTD.

E•K
PHK – A01

50 State TLEV + NLEV (Unrestricted)

THIS VEHICLE CONFORMS TO U.S. EPA NLEV REGULATIONS APPLICABLE TO 2000 MODEL YEAR NEW TLEV LIGHT DUTY TRUCKS AND CALIFORNIA REGULATIONS APPLICABLE TO 2000 MODEL YEAR NEW LIGHT DUTY TRUCKS.

Engine and Evaporative Families

Engine Family: Y HNX T 02.0 UA2

Model Year
Y: 2000

Manufacturer Subcode
HNX: HONDA

Family Type
V: LDV
T: LDT

Displacement

Sequence Characters

Evaporative Family: Y HNX E 0080 AAB

Model Year
Y: 2000

Manufacturer Subcode
HNX: HONDA

Family Type
E: EVAP
R: EVAP/ORVR

Canister Work Capacity

Sequence Characters

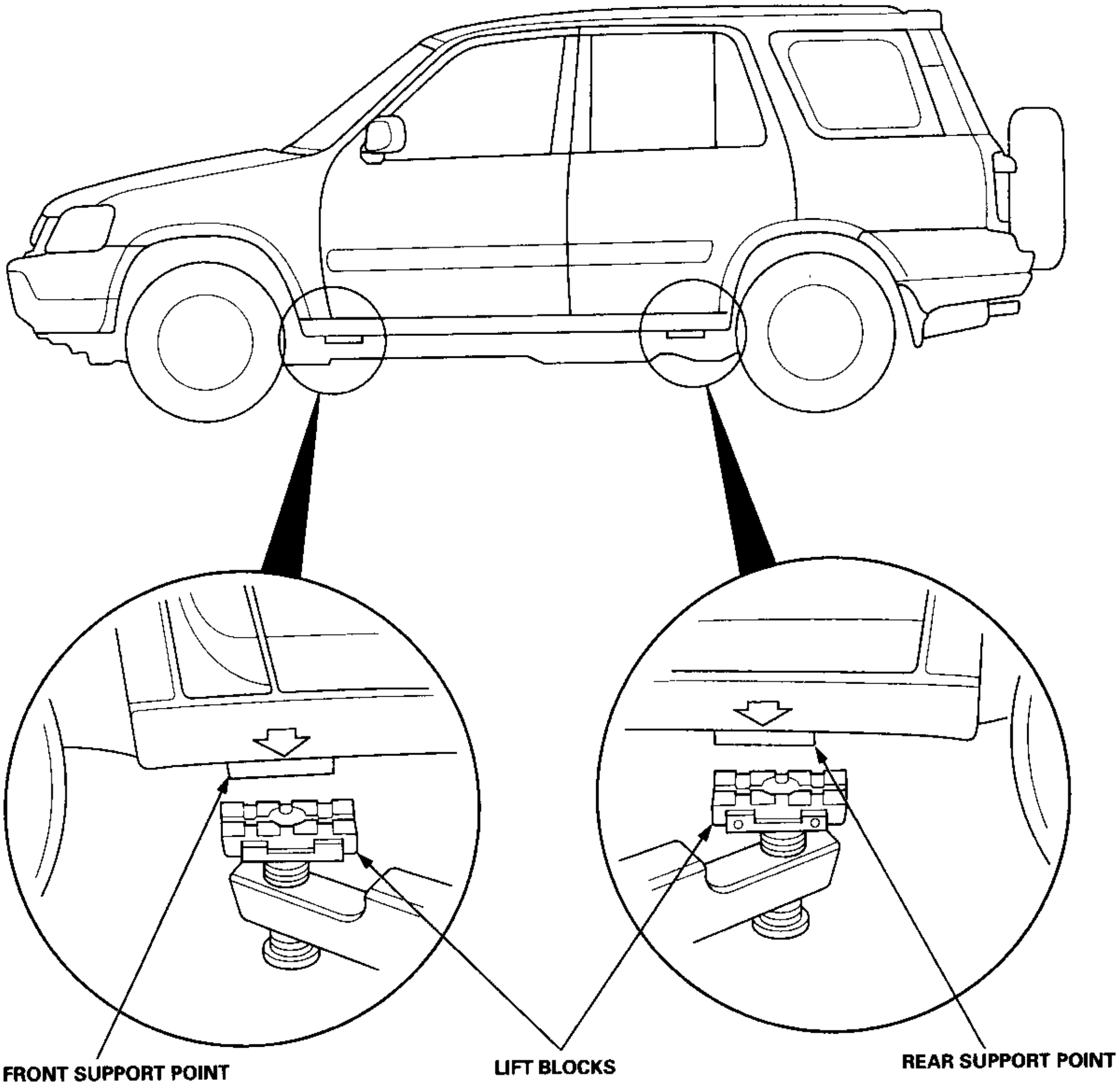
Lift and Safety Stands

⚠ WARNING When heavy rear components such as suspension, fuel tank, spare tire and tailgate are to be removed, place additional weight in the trunk before hoisting. When substantial weight is removed from the rear of the vehicle, the center of gravity may change and can cause the vehicle to tip forward on the hoist.

NOTE: Since each tire/wheel assembly weighs approximately 30 lbs (14 kg), placing the front wheels in the cargo area can assist with weight distribution.

1. Place the lift blocks as shown.
2. Raise the hoist a few inches (centimeters), and rock the vehicle to be sure it is firmly supported.
3. Raise the hoist to full height, and inspect the lift points for solid support.

NOTE: Use the same support points to support the vehicle on safety stands.



Lift and Support Points

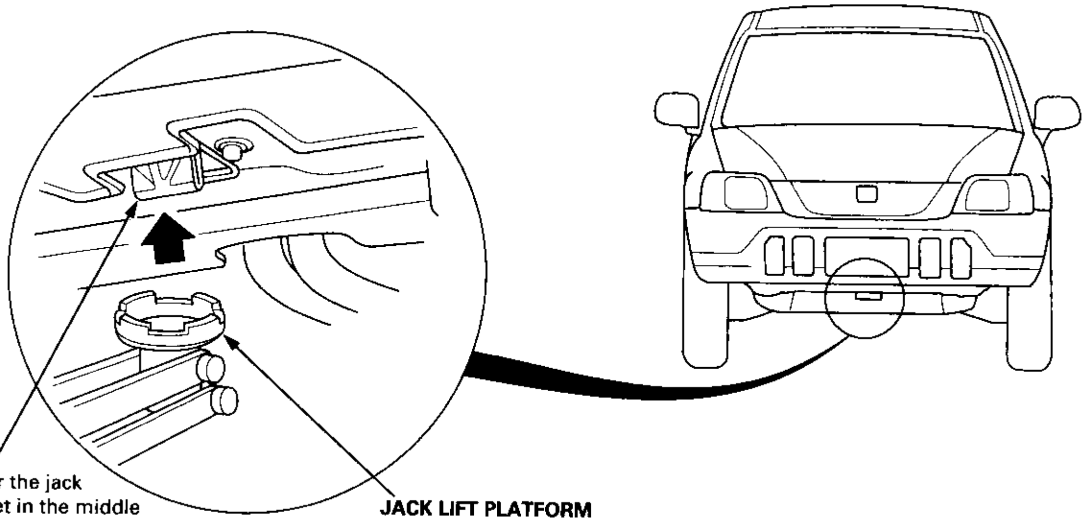
Floor Jack

1. Block the rear wheels when raising the front of the vehicle; block the front wheels when raising the rear of the vehicle.
   Place the blocks behind and ahead of the wheels.
2. Raise the vehicle high enough to insert the safety stands.
3. Adjust and place the safety stands so the vehicle will be approximately level, then lower the vehicle onto them.

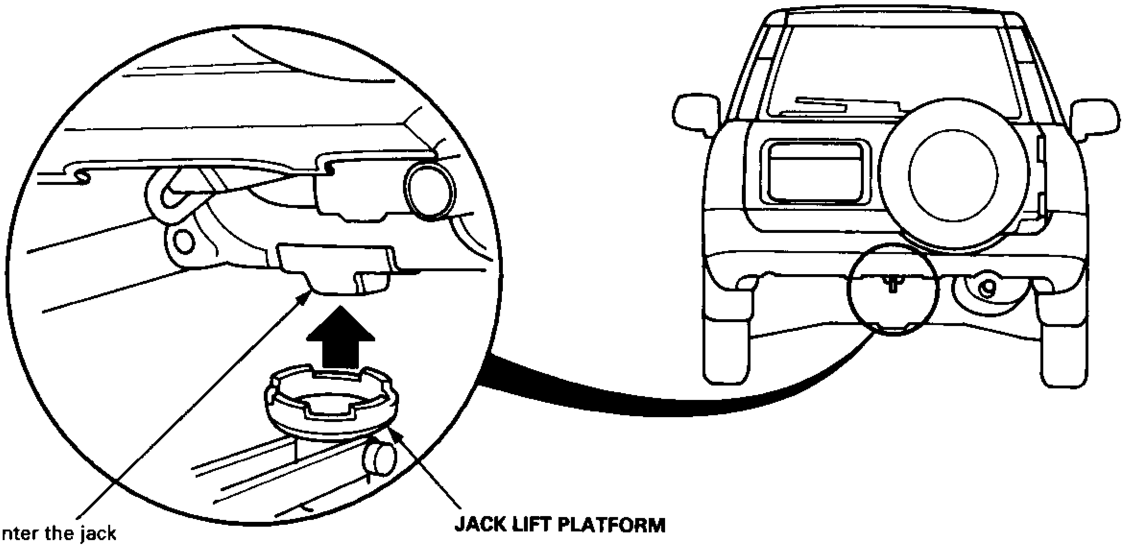
⚠ WARNING

- **Always use safety stands when working on or under any vehicle that is supported by only a jack.**
- **Never attempt to use a bumper jack for lifting or supporting the vehicle.**

Front:



Rear:



Towing

If the vehicle needs to be towed, call a professional towing service. Never tow the vehicle behind another vehicle with just a rope or chain. It is very dangerous.

Emergency Towing

There are three popular methods of towing a vehicle.

Flat-bed Equipment — The operator loads the vehicle on the back of a truck. This is the best way of transporting the vehicle.

Wheel Lift Equipment — The tow truck uses two pivoting arms that go under the tires (front or rear) and lifts them off the ground. The other two tires remain on the ground. The vehicle's suspension and body can be seriously damaged if this method of towing is attempted.

Sling-type Equipment — The tow truck uses metal cables with hooks on the ends. These hooks go around parts of the frame or suspension and the cables lift that end of the vehicle off the ground. The vehicle's suspension and body can be seriously damaged if this method of towing is attempted. This methed of towing the CR-V is unacceptable.

The only recommended way of towing the CR-V is on a flat-bed truck. Two wheel drive CR-V's may also be towed with all four wheels on the ground.

NOTICE

Towing the four-wheel drive CR-V with only two wheels on the ground will damage parts of the 4WD system. If this vehicle is damaged, it should be towed on a flat-bed truck or trailer.

If the 2 wheel drive CR-V is towed with all four wheels on the ground, do the following:

Manual Transmission

- Release the parking brake.
- Shift the transmission in Neutral.

Automatic Transmission

- Release the parking brake.
- Start the engine.
- Shift to D4 position, then N position.
- Turn off the engine.

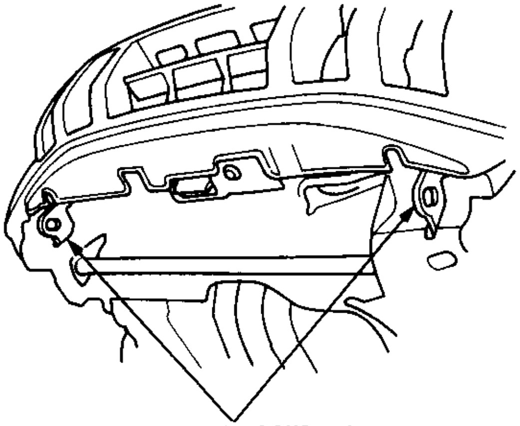
NOTICE

Improper towing preparation will damage the transmission. Follow the above procedure exactly. If you cannot shift the transmission or start the engine, the vehicle must be transported on a flat-bed truck.

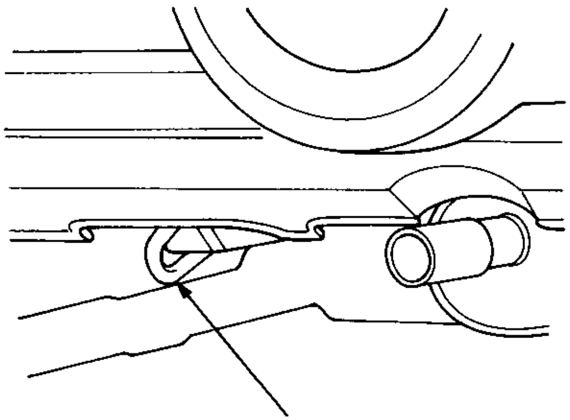
If the vehicle is towed with four wheels on the ground, it is best to tow the vehicle no farther than 50 miles (80 km), and keep the speed below 35 mph (55 km/h).

Trying to lift or tow the vehicle by the bumpers will cause serious damage. The bumpers are not designed to support the vehicle's weight.

Front:



Rear:



Service Precautions

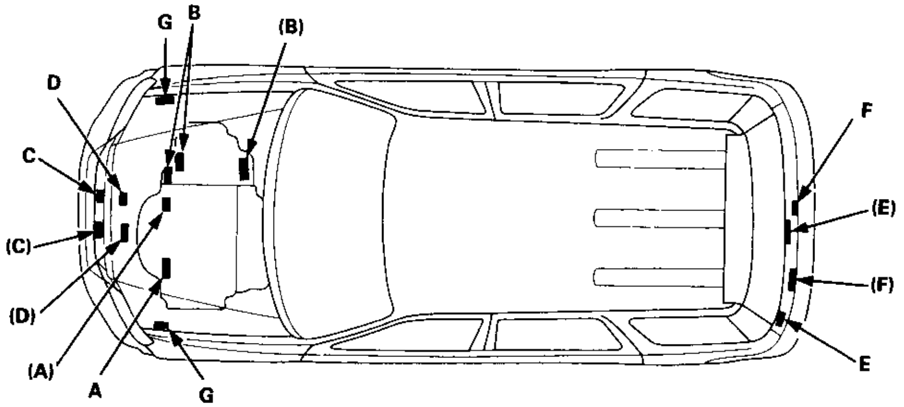
Parts Marking Locations

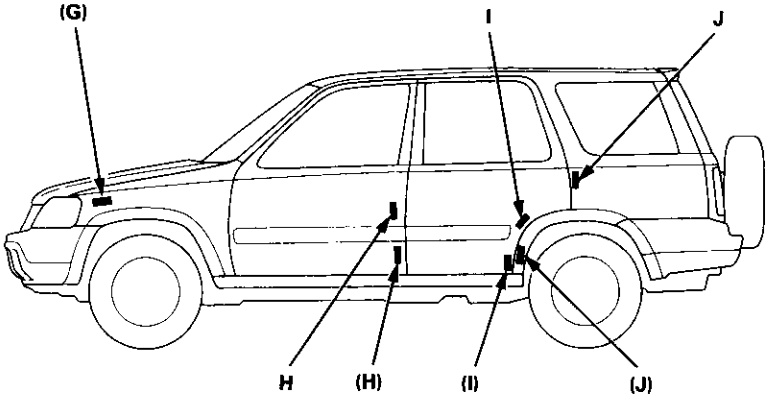
To deter vehicle theft, certain major components are marked with the vehicle identification number (VIN). Original parts will have self-adhesive labels or labels attached with a break-off bolt. Replacement body parts will have self-adhesive labels, and replacement engine and transmission parts will be stamped with a code for spare parts.

NOTE:

- Be careful not to damage the parts marking labels during body repairs. Mask the labels before repainting.
- Label location letters without parenthesis indicate original parts. Letters with parenthesis indicate replacement parts.

A, (A): Engine
B, (B): Transmission
C, (C): Front Bumper
D, (D): Hood
E, (E): Tailgate
F, (F): Rear Bumper
G, (G): Front Fenders (Left and Right)
H, (H): Front Doors (Left and Right)
I, (I): Rear Doors (Left and Right)
J, (J): Outer Side Panel (Left and Right)





Precautions for Real-time 4WD (Four-wheel Drive)

Under normal conditions, the vehicle is in 2WD (front-wheel drive). However, the system will instantly transmit appropriate driving force to the rear wheels (depending on the driving force of the front wheels and the road conditons).

The Real-time 4WD-Dual Pump System does not have a manual switch to disable the 4WD system. Whenever service work requires spinning the front or rear wheels with the engine, always lift up and support the vehicle so all four wheels are off the ground (see page 1-19).

Specifications

Standards and Service Limits 2-2
Design Specifications 2-12
Body Specifications 2-14

Standards and Service Limits

Engine Electrical — Section 4

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Ignition coil	Rated voltage V Primary winding resistance Ω at 68°F (20°C)	12 0.63 – 0.77	
Ignition wire	Resistance at 68°F (20°C) kΩ	25 max.	
	Firing order	1 – 3 – 4 – 2	
Spark plug	Type Gap	See Section 4 1.0 – 1.1 (0.039 – 0.043)	 ——
Ignition timing	At idle °BTDC	16 ± 2 (Red)	
Alternator belt*1	Deflection with 98 N (10 kgf, 22 lbf) between pulleys	8.5 – 11.5 (0.33 – 0.45) with used belt 5.5 – 8.0 (0.22 – 0.31) 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, 150 – 200) with new belt	
Alternator	Output A (at 13.5 V, hot and 6,000 alternator rpm A/T M/T Brush length	95 90 10.5 (0.41)	 —— 1.5 (0.06)
Starting motor	Output kW A/T Mica depth M/T Commutator runout Commutator O.D. Brush length Brush spring tension N (kgf, lbf)	1.1 1.0 0.5 – 0.8 (0.02 – 0.03) 0 – 0.02 (0 – 0.0008) 27.9 – 28.0 (1.0984 – 1.1024) 14.0 – 14.5 (0.55 – 0.57) 13.7 – 17.7 (1.40 – 1.80, 3.09 – 3.97)	 —— 0.2 (0.008) 0.05 (0.002) 27.0 (1.06) 9.0 (0.35) ——

*1 When using a new belt, adjust deflection to new value. Run the engine for 5 minutes then turn it off. Readjust deflection to used belt value.

Cylinder Head/Valve Train — Section 6

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Compression	250 rpm and Nominal wide open throttle Minimum kPa (kgf/cm², psi) Maximum variation	1,230 (12.5, 178) 930 (9.5, 135) 200 (2.0, 28)	
Cylinder head	Warpage Height	—— 131.95 – 132.05 (5.195 – 5.199)	0.05 (0.002) ——
Camshaft	End play Camshaft-to-holder oil clearance Total runout Cam lobe height '97, '98 models IN EX '99, '00 models IN EX	0.05 – 0.15 (0.002 – 0.006) 0.030 – 0.069 (0.0012 – 0.0027) 0.03 (0.001) max. 33.204 (1.3072) 33.528 (1.3200) 33.716 (1.3274) 33.528 (1.3200)	0.5 (0.02) 0.15 (0.006) 0.04 (0.002) —— —— —— ——
Valve	Valve clearance (Cold)* IN EX Valve stem O.D. IN EX Stem-to-guide clearance IN EX	0.08 – 0.12 (0.003 – 0.005) 0.16 – 0.20 (0.006 – 0.008) 6.580 – 6.590 (0.2591 – 0.2594) 6.550 – 6.560 (0.2579 – 0.2583) 0.02 – 0.05 (0.001 – 0.002) 0.05 – 0.08 (0.002 – 0.003)	—— —— 6.55 (0.258) 6.52 (0.257) 0.08 (0.003) 0.11 (0.004)
Valve seat	Width IN EX Stem installed height IN EX	1.25 – 1.55 (0.049 – 0.061) 1.25 – 1.55 (0.049 – 0.061) 40.765 – 41.235 (1.6049 – 1.6234) 42.765 – 43.235 (1.6837 – 1.7022)	2.0 (0.08) 2.0 (0.08) 41.485 (1.6333) 43.485 (1.7120)
Valve spring	Free length IN EX	42.36 (1.668) 44.32 (1.745)	—— ——
Valve guide	I.D. IN EX Installed height IN EX	6.61 – 6.63 (0.260 – 0.261) 6.61 – 6.63 (0.260 – 0.261) 13.75 – 14.25 (0.541 – 0.561) 15.75 – 16.25 (0.620 – 0.640)	6.65 (0.262) 6.65 (0.262) —— ——

*: Measured between the camshaft and rocker arm.

Unit of length: mm (in)

Engine Block — Section 7

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface		0.07 (0.003) max.	0.10 (0.004)
	Bore diameter		84.00 – 84.02 (3.307 – 3.308)	84.07 (3.310)
	Bore taper		———	0.05 (0.002)
Piston	Skirt O.D.*1 from bottom of skirt		83.98 – 83.99 (3.306 – 3.307)	83.97 (3.306)
	Clearance in cylinder		0.01 – 0.04 (0.0004 – 0.0016)	0.05 (0.002)
	Groove width (For ring)	Top	1.240 – 1.250 (0.0488 – 0.0492)	1.26 (0.050)
		Second	1.220 – 1.230 (0.0480 – 0.0484)	1.25 (0.049)
		Oil	2.805 – 2.825 (0.1104 – 0.1112)	2.84 (0.112)
Piston ring	Ring-to-groove clearance	Top	0.055 – 0.080 (0.0022 – 0.0031)	0.13 (0.005)
		Second	0.035 – 0.060 (0.0014 – 0.0024)	0.13 (0.005)
	Ring end gap	Top	0.20 – 0.30 (0.008 – 0.012)	0.60 (0.024)
		Second	0.40 – 0.55 (0.016 – 0.022)	0.70 (0.028)
		Oil	0.20 – 0.50 (0.008 – 0.020)	0.70 (0.028)
Piston Pin	O.D.		20.996 – 21.000 (0.8266 – 0.8268)	———
	Pin-to-piston clearance		0.010 – 0.017 (0.0004 – 0.0007)	———
Connecting rod	Pin-to-rod interference		0.015 – 0.032 (0.0006 – 0.0013)	———
	Small end bore diameter		20.968 – 20.981 (0.8255 – 0.8260)	———
	Large end bore diameter	Nominal	48.0 (1.89)	———
	End play installed on crankshaft		0.15 – 0.30 (0.006 – 0.012)	0.40 (0.016)
Crankshaft	Main journal diameter			
	No. 1, 2, 4 and 5 journals		54.976 – 55.000 (2.1644 – 2.1654)	———
	No. 3 journal		54.970 – 54.994 (2.1642 – 2.1651)	———
	Rod journal diameter		44.976 – 45.000 (1.7707 – 1.7717)	———
	Taper		0.005 (0.0002) max.	0.010 (0.0004)
	Out-of-round		0.005 (0.0002) max.	0.010 (0.0004)
	End play		0.10 – 0.35 (0.004 – 0.014)	0.45 (0.018)
	Runout		0.03 (0.001) max.	0.04 (0.002)
Bearing	Main bearing-to-journal oil clearance			
	No. 1, 2, 4 and 5 journals		0.024 – 0.042 (0.0009 – 0.0017)	0.06 (0.002)
	No. 3 journal		0.030 – 0.048 (0.0012 – 0.0019)	0.06 (0.002)
	Rod bearing-to-journal oil clearance		0.020 – 0.038 (0.0008 – 0.0015)	0.05 (0.002)

*1: '97, '98 models 15 mm (0.6 in)
'99, '00 models 20 mm (0.8 in)

Standards and Service Limits

Engine Lubrication — Section 8

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Engine oil	Capacity ℓ (US qt, Imp qt)	4.6 (4.9, 4.0) for engine overhaul 3.8 (4.0, 3.3) for oil change, including filter 3.5 (3.7, 3.1) for oil change, without filter	
Oil pump	Inner-to-outer rotor clearance Pump housing-to-outer rotor clearance Pump housing-to rotor axial clearance	0.04 – 0.16 (0.002 – 0.006) 0.10 – 0.19 (0.004 – 0.007) 0.02 – 0.07 (0.001 – 0.003)	0.20 (0.008) 0.20 (0.008) 0.15 (0.006)
Relief valve	Pressure setting at engine oil temp. 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.	

Cooling — Section 10

	MEASUREMENT	STANDARD (NEW)
Radiator	Coolant capacity ℓ (US qt, Imp qt) A/T [Including engine, heater, cooling line and reservoir] M/T Reservoir capacity: 0.6 ℓ (0.63 US qt, 0.53 Imp qt)	5.9 (6.2, 5.2) for overhaul 3.9 (4.1, 3.4) for coolant change 6.0 (6.3, 5.3) for overhaul 4.0 (4.2, 3.5) for coolant change
Radiator cap	Opening pressure kPa (kgf/cm^2, psi)	93 – 123 (0.95 – 1.25, 14 – 18)
Thermostat	Starts to open °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 – 14 (3 – 8) from actual "ON" temperature

Fuel and Emissions — Section 11

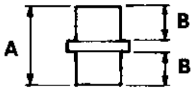
	MEASUREMENT	STANDARD (NEW)	
Pressure regulator	Pressure with regulator vacuum hose disconnected kPa (kgf/cm^2, psi) '97, '98 models '99, '00 models	 260 – 310 (2.7 – 3.2, 38 – 46) 270 – 320 (2.8 – 3.3, 40 – 47)	
Fuel tank	Capacity ℓ (US gal, Imp gal)	58 (15.3, 12.8)	
Engine	Idle speed with headlights and cooling fan off rpm	MT	AT ($\boxed{N}$ or $\boxed{P}$ position)
	'97 model '98 model '99, '00 models	—— 750 ± 50 730 ± 50	750 ± 50 750 ± 50 730 ± 50
	Fast idle rpm '97 model '98 model '99, '00 models	—— 1,500 ± 200 1,600 ± 200	1,500 ± 200 1,500 ± 200 1,600 ± 200
	Idle CO %	0.1 max.	

Unit of length: mm (in)

Clutch — Section 12

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Clutch pedal	Pedal height to floor	183 (7.20)	—
	Stroke	135 – 145 (5.31 – 5.71)	—
	Free play	7 – 22 (0.28 – 0.87)	—
	Pedal play	1 – 9 (0.04 – 0.35)	—
	Disengagement height to floor	72 (2.83) min.	—
Flywheel	Clutch surface runout	0.05 (0.002) max.	0.15 (0.006)
Clutch disc	Rivet head depth	1.2 – 1.7 (0.05 – 0.07)	0.2 (0.01)
	Thickness	8.4 – 9.1 (0.33 – 0.36)	6.0 (0.24)
Pressure plate	Warpage	0.03 (0.001) max.	0.15 (0.006)
	Diaphragm spring finger alignment	0.6 (0.02) max.	0.8 (0.03)

Manual Transmission — Section 13

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission fluid	Capacity ℓ (US qt, Imp qt)	1.7 (1.8, 1.4) for oil change 2.1 (2.2, 1.8) for overhaul	
Mainshaft	End play	0.11 – 0.18 (0.004 – 0.007)	Adjust
	Diameter of ball bearing contact area (clutch side)	27.977 – 27.990 (1.1015 – 1.1020)	27.94 (1.100)
	Diameter of needle bearing contact area	37.984 – 38.000 (1.4954 – 1.4961)	37.93 (1.493)
	Diameter of ball bearing contact area (transmission housing side)	27.987 – 28.000 (1.1018 – 1.1024)	27.94 (1.100)
	Runout	0.02 (0.001) max.	0.05 (0.002)
Mainshaft 3rd and 4th gears	I.D.	43.009 – 43.025 (1.6933 – 1.6939)	43.080 (1.6961)
	End play	0.06 – 0.21 (0.002 – 0.008)	0.3 (0.01)
	Thickness 3rd gear	34.92 – 34.97 (1.375 – 1.377)	34.8 (1.37)
	4th gear	31.42 – 31.47 (1.237 – 1.239)	31.3 (1.23)
Mainshaft 5th gear	I.D.	43.009 – 43.025 (1.6933 – 1.6939)	43.080 (1.6961)
	End play	0.06 – 0.21 (0.002 – 0.008)	0.3 (0.01)
	Thickness	30.92 – 30.97 (1.217 – 1.219)	30.8 (1.21)
Countershaft	Diameter of needle bearing contact area	36.000 – 36.015 (1.4173 – 1.4179)	35.95 (1.415)
	Diameter of ball bearing and needle bearing contact area	24.987 – 25.000 (0.9837 – 0.9843)	24.94 (0.982)
	Diameter of 1st gear contact area	36.984 – 37.000 (1.4561 – 1.4567)	36.93 (1.454)
	Runout	0.02 (0.001) max.	0.05 (0.002)
Countershaft 1st gear	I.D.	43.009 – 43.025 (1.6933 – 1.6939)	43.08 (1.696)
	End play	0.06 – 0.18 (0.002 – 0.007)	0.23 (0.009)
	Thickness	26.95 – 27.00 (1.061 – 1.063)	—
Countershaft 2nd gear	I.D.	47.009 – 47.025 (1.8507 – 1.8514)	47.08 (1.854)
	End play	0.07 – 0.14 (0.003 – 0.006)	0.18 (0.007)
	Thickness	28.92 – 28.97 (1.139 – 1.141)	—
Spacer collar (Mainshaft 4th and 5th gears)	I.D. 	31.002 – 31.012 (1.2205 – 1.2209)	31.06 (1.223)
	O.D.	37.989 – 38.000 (1.4956 – 1.4961)	37.94 (1.494)
	Length A	56.45 – 56.55 (2.222 – 2.226)	—
	B	26.03 – 26.08 (1.025 – 1.027)	26.01 (1.024)
Reverse idler gear	I.D.	20.016 – 20.043 (0.7880 – 0.7891)	20.09 (0.7909)
	Gear-to-reverse gear shaft clearance	0.036 – 0.084 (0.0014 – 0.0033)	0.160 (0.0063)
Synchro ring	Ring-to-gear clearance (ring pushed against gear)	0.85 – 1.10 (0.033 – 0.043)	0.4 (0.02)
Dual cone synchro	Clearance (ring pushed against gear)		
	Outer synchro ring-to-synchro cone	0.5 – 1.0 (0.02 – 0.04)	0.3 (0.01)
	Synchro cone-to-gear	0.5 – 1.0 (0.02 – 0.04)	0.3 (0.01)
	Outer synchro ring-to-gear	0.95 – 1.68 (0.037 – 0.066)	0.6 (0.02)
Shift fork	Finger thickness 3rd/4th shift fork	7.4 – 7.6 (0.29 – 0.30)	—
	Except above	6.2 – 6.4 (0.24 – 0.25)	—
	Fork-to-synchro sleeve clearance	0.35 – 0.65 (0.014 – 0.026)	1.0 (0.039)

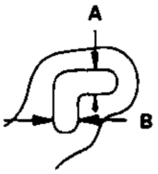
(cont'd)

Standards and Service Limits

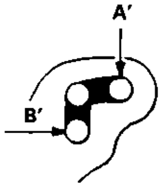
Manual Transmission (cont'd) — Section 13

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Reverse shift fork	Pawl groove width	13.0 – 13.3 (0.51 – 0.52)	——
	Fork-to-reverse idler gear clearance	0.5 – 1.1 (0.02 – 0.04)	1.8 (0.07)
	Groove width*¹ at A	7.05 – 7.25 (0.278 – 0.285)	——
	at B	7.4 – 7.7 (0.29 – 0.30)	——
	Fork-to-5th/reverse shift shaft clearance*²		
	at A′	0.05 – 0.35 (0.002 – 0.014)	0.5 (0.02)
	at B′	0.4 – 0.8 (0.02 – 0.03)	1.0 (0.04)
Shift arm A	Shift fork diameter at contact area	12.9 – 13.0 (0.508 – 0.512)	——
	Shift arm A-to-shift fork shaft clearance	0.2 – 0.5 (0.008 – 0.020)	0.6 (0.024)
Shift arm C	Shift arm C-to-shift arm B clearance	0.05 – 0.25 (0.002 – 0.01)	——
	Diameter of shift arm B contact area	12.9 – 13.0 (0.508 – 0.512)	——
Select arm	Select arm-to-shift arm A clearance	0.05 – 0.25 (0.002 – 0.01)	——
	Diameter of shift arm A contact area	7.9 – 8.0 (0.311 – 0.315)	——
Select lever	O.D.	15.941 – 15.968 (0.6276 – 0.6287)	——
	Transmission housing clearance	0.032 – 0.086 (0.0013 – 0.0034)	——
Shift lever	O.D.	15.941 – 15.968 (0.6276 – 0.6287)	——
	Shift arm cover clearance	0.032 – 0.127 (0.0013 – 0.0050)	——
Differential carrier	Pinion shaft contact area I.D.	18.010 – 18.028 (0.7091 – 0.7098)	——
	Carrier-to-pinion shaft clearance	0.027 – 0.057 (0.0011 – 0.0022)	0.1 (0.004)
	Driveshaft, intermediate shaft contact area I.D.	28.005 – 28.025 (1.1026 – 1.1033)	——
	Carrier-to-driveshaft clearance	0.025 – 0.066 (0.0010 – 0.0026)	0.12 (0.005)
	Carrier-to-intermediate shaft clearance	0.055 – 0.091 (0.0022 – 0.0036)	0.15 (0.006)
Differential pinion gear	Backlash	0.05 – 0.15 (0.002 – 0.006)	——
	I.D.	18.042 – 18.066 (0.7103 – 0.7113)	——
	Pinion gear-to-pinion shaft clearance	0.059 – 0.095 (0.0023 – 0.0037)	0.15 (0.006)
Differential tapered roller bearing preload Starting torque N·m (kgf·cm, lbf·in)		1.4 – 2.5 (14 – 26, 12 –23)	Adjust
Transfer	Diameter of roller bearing contact area		
	Transfer shaft (driven gear side)	33.984 – 34.000 (1.337 – 1.339)	33.93 (1.336)
	Transfer shaft (middle of shaft)	27.977 – 27.990 (1.101 – 1.102)	27.92 (1.099)
	Transfer drive gear	40.002 – 40.018 (1.575 – 1.576)	39.95 (1.573)
	Transfer driven gear shaft (driven gear side)	35.002 – 35.018 (1.378 – 1.379)	34.95 (1.376)
	Transfer driven gear shaft (splined side)	26.975 – 26.988 (1.062 – 1.063)	26.92 (1.060)
	Transfer gear backlash	0.06 – 0.16 (0.002 – 0.006)	Adjust
	Total starting torque N·m (kgf·cm, lbf·in)	2.68 – 3.47 (27.3 – 35.4, 23.7 – 30.7)	Adjust

*1: Measuring points



*2: Measuring points



Unit of length: mm (in)

Automatic Transmission — Section 14

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Transmission fluid	Capacity ℓ (US qt, Imp qt)	4WD	6.8 (7.2, 6.0) for overhaul 2.9 (3.1, 2.6) for fluid change	
		2WD	5.9 (6.2, 5.2) for overhaul 2.7 (2.9, 2.4) for fluid change	
Hydraulic pressure kPa (kgf/cm², psi)	Line pressure at 2,000 rpm in $\boxed{N}$ or $\boxed{P}$ position		830 – 880 (8.5 – 9.0, 120 – 130)	780 (8.0, 110)
	1st clutch pressure at 2,000 rpm in $\boxed{D_4}$ position			
	1st-hold clutch pressure at 2,000 rpm in $\boxed{1}$ position			
	2nd clutch pressure at 2,000 rpm in $\boxed{2}$ position		800 – 850 (8.2 – 8.7, 120 – 124)	760 (7.7, 110)
	3rd clutch pressure at 2,000 rpm in $\boxed{D_3}$ position ('97, '98 models), or $\boxed{D}$ position with O/D OFF indicator light ON ('99, '00 models)			
	4th clutch pressure at 2,000 rpm in $\boxed{D_4}$ position ('97, '98 models), or $\boxed{D}$ position with O/D OFF indicator light OFF ('99, '00 models)			
Stall speed rpm (Check with vehicle on level ground)			2,550	2,400 – 2,700
Clutch	Clutch initial clearance	1st	0.65 – 0.85 (0.026 – 0.033)	———
		2nd, 3rd, 4th	0.40 – 0.60 (0.016 – 0.024)	———
		1st-hold	0.5 – 0.8 (0.020 – 0.031)	———
	Clutch return spring free length	1st, 2nd, 3rd, 4th	31.1 (1.22)	29.1 (1.15)
		1st-hold	34.6 (1.36)	32.6 (1.28)
	Clutch disc thickness		1.88 – 2.00 (0.074 – 0.079)	Until grooves worn out
	Clutch plate thickness	2nd, 3rd, 4th	1.95 – 2.05 (0.077 – 0.081)	Discoloration
		1st, 1st-hold	1.55 – 1.65 (0.061 – 0.065)	Discoloration
	Clutch end plate thickness (1st)	Mark 1	2.05 – 2.10 (0.081 – 0.083)	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)	
		Mark 10	2.95 – 3.00 (0.116 – 0.118)	Discoloration
	Clutch end plate thickness (2nd, 4th)	Mark 6	2.55 – 2.60 (0.100 – 0.102)	Discoloration
		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)	
		Mark 10	2.95 – 3.00 (0.116 – 0.118)	
		Mark 11	3.05 – 3.10 (0.120 – 0.122)	
		Mark 12	3.15 – 3.20 (0.124 – 0.126)	
		Mark 13	3.25 – 3.30 (0.128 – 0.130)	
		Mark 14	3.35 – 3.40 (0.132 – 0.134)	
		Mark 15	3.45 – 3.50 (0.136 – 0.138)	
		Mark 16	3.55 – 3.60 (0.140 – 0.142)	
		Mark 17	3.65 – 3.70 (0.144 – 0.146)	Discoloration
	Clutch end plate thickness (3rd)	Mark 8	2.75 – 2.80 (0.108 – 0.110)	Discoloration
		Mark 9	2.85 – 2.90 (0.112 – 0.114)	↕
		Mark 10	2.95 – 3.00 (0.116 – 0.118)	
		Mark 11	3.05 – 3.10 (0.120 – 0.122)	
		Mark 12	3.15 – 3.20 (0.124 – 0.126)	
		Mark 13	3.25 – 3.30 (0.128 – 0.130)	
		Mark 14	3.35 – 3.40 (0.132 – 0.134)	
		Mark 15	3.45 – 3.50 (0.136 – 0.138)	
		Mark 16	3.55 – 3.60 (0.140 – 0.142)	
		Mark 17	3.65 – 3.70 (0.144 – 0.146)	Discoloration
	Clutch end plate thickness (1st-hold)	Mark 1	2.05 – 2.10 (0.081 – 0.083)	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)	
		No mark	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)	Discoloration

(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	23.980 – 23.993 (0.9441 – 0.9446)	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)	
	On mainshaft 1st gear collar	30.975 – 30.991 (1.2195 – 1.2201)	
	On countershaft (torque converter housing side)	36.004 – 36.017 (1.4175 – 1.4180)	
	On countershaft 3rd gear	35.980 – 35.996 (1.4165 – 1.4172)	
	On countershaft 4th gear	27.980 – 27.993 (1.1016 – 1.1021)	
	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)	
	On sub-shaft (transmission housing side)	25.991 – 26.000 (1.0233 – 1.0236)	
	On sub-shaft 4th gear collar	22.9935 – 23.0065 (0.9053 – 0.9058)	↓
	On reverse idler gear shaft	13.990 – 14.000 (0.5508 – 0.5512)	Wear or damage
	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)	
	On countershaft 1st gear	38.000 – 38.016 (1.4961 – 1.4967)	
	On countershaft 3rd gear	41.000 – 41.016 (1.6142 – 1.6148)	
	On countershaft 4th gear	33.000 – 33.016 (1.2992 – 1.2998)	
	On countershaft reverse gear	38.000 – 38.016 (1.4961 – 1.4967)	
	On sub-shaft 4th gear	32.000 – 32.016 (1.2598 – 1.2605)	
	On reverse idler gear	18.007 – 18.020 (0.7089 – 0.7094)	↓
	Reverse idler gear shaft holder I.D.	14.416 – 14.434 (0.5676 – 0.5683)	Wear or damage
	End play		
	Mainshaft 1st gear	0.05 – 0.16 (0.002 – 0.006)	—
	Mainshaft 2nd gear	0.05 – 0.13 (0.002 – 0.005)	—
	Mainshaft 4th gear	0.05 – 0.16 (0.002 – 0.006)	—
	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)	—
	Sub-shaft 4th gear	0.05 – 0.17 (0.002 – 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	49.50 – 49.55 (1.9488 – 1.9508)	—
	Mainshaft 4th gear collar flange thickness	4.435 – 4.525 (0.1746 – 0.1781)	Wear or damage
	Mainshaft 1st gear collar length	27.00 – 27.05 (1.063 – 1.065)	—
	Countershaft distance collar length	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)	—
		38.87 – 38.90 (1.530 – 1.531)	—
		38.92 – 38.95 (1.532 – 1.533)	—
	Countershaft 3rd gear collar length	21.15 – 21.20 (0.8327 – 0.8346)	—
	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
	Sub-shaft 4th gear collar length	24.0 – 24.1 (0.945 – 0.949)	—
	Sub-shaft 4th gear collar flange thickness	2.95 – 3.10 (0.116 – 0.122)	Wear or damage

Automatic Transmission — Section 14

Unit of length: mm (in)

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission	Mainshaft 2nd gear thrust washer thickness	3.97 – 4.00 (0.156 – 0.157)	Wear or damage
		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
	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)	
	Countershaft 3rd gear splined washer	4.95 – 5.00 (0.195 – 0.197)	
	Sub-shaft 4th gear thrust washer	2.93 – 3.00 (0.115 – 0.118)	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)
	Countershaft feed pipe O.D. (at 15 mm from end)	7.97 – 7.98 (0.3138 – 0.3142)	7.95 (0.313)
	Sub-shaft 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)	1.82 (0.072)
	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)
	Sub-shaft 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 – 0.0811)	2.095 (0.082)
ATF pump	ATF pump gear side clearance	0.03 – 0.05 (0.001 – 0.002)	0.07 (0.003)
	ATF pump gear-to-body clearance Drive	0.1050 – 0.1325 (0.004 – 0.005)	———
	Driven	0.0350 – 0.0625 (0.001 – 0.002)	———
	ATF pump driven gear I.D.	14.016 – 14.034 (0.5518 – 0.5525)	Wear or damage
	ATF pump driven gear shaft O.D.	13.980 – 13.990 (0.5504 – 0.5508)	Wear or damage
Regulator valve body	Sealing ring contact area I.D.	35.000 – 35.025 (1.3780 – 1.3782)	35.050 (1.3799)
Stator shaft	Inside of diameter of bearing contact area		
	On torque converter side	27.000 – 27.021 (1.063 – 1.064)	Wear or damage
	On ATF pump side	29.000 – 29.013 (1.1417 – 1.1422)	Wear or damage
Shifting device and parking brake control	Reverse shift fork finger thickness	5.90 – 6.00 (0.232 – 0.236)	5.40 (0.213)
	Parking brake pawl	———	Wear or other defect
	Parking gear	———	
Servo body	Shift fork shaft bore I.D.	14.000 – 14.010 (0.5512 – 0.5516)	———
	Shift fork shaft valve bore I.D.	37.000 – 37.039 (1.4567 – 1.4582)	37.045 (1.4585)
Differential carrier	Pinion shaft contact area I.D.	18.010 – 18.028 (0.709 – 0.710)	———
	Carrier-to-pinion shaft clearance	0.023 – 0.057 (0.001 – 0.002)	0.1 (0.004)
	Driveshaft/intermediate shaft contact are I.D. 2WD	26.025 – 26.045 (1.0246 – 1.0254)	———
	4WD	28.025 – 28.045 (1.103 – 1.104)	———
	Carrier-to-driveshaft clearance	0.045 – 0.086 (0.002 – 0.003)	0.12 (0.005)
	Carrier-to-intermediate shaft clearance	0.075 – 0.111 (0.003 – 0.004)	0.15 (0.006)
Differential pinion gear	Backlash	0.05 – 0.15 (0.002 – 0.006)	———
	I.D.	18.042 – 18.066 (0.7103 – 0.7113)	———
	Pinion gear-to-pinion shaft clearance	0.055 – 0.095 (0.0022 – 0.0037)	0.15 (0.006)
Set ring-to-bearing outer race clearance		0 – 0.15 (0 – 0.006)	Adjust
Transfer	Diameter of roller bearing contact area		
	Transfer shaft (transfer gear side)	38.485 – 38.500 (1.515 – 1.516)	38.43 (1.513)
	Transfer shaft (middle of shaft)	27.977 – 27.990 (1.101 – 1.102)	27.92 (1.099)
	Transfer drive gear	40.002 – 40.018 (1.575 – 1.576)	39.95 (1.573)
	Transfer driven gear shaft (driven gear side)	35.002 – 35.018 (1.378 – 1.379)	34.95 (1.376)
	Transfer driven gear shaft (splined side)	26.975 – 26.988 (1.062 – 1.063)	26.92 (1.060)
	Transfer gear backlash	0.060 – 0.160 (0.002 – 0.006)	Adjust
	Total starting torque N·m (kgf·cm, lbf·in)	2.68 – 3.47 (27.3 – 35.4, 23.7 – 30.7)	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 (0.579)	87.8 (3.457)	16.5
	Regulator valve spring B	1.8 (0.071)	9.6 (0.378)	44.0 (1.732)	11.0
	Stator reaction spring	4.5 (0.177)	35.4 (1.394)	30.3 (1.193)	1.9
	Modulator valve spring	1.4 (0.055)	9.4 (0.370)	35.0 (1.378)	10.9
	Torque converter check valve spring				
	'97 model	1.1 (0.043)	8.4 (0.331)	36.4 (1.433)	12.0
	'98 – 00 models	1.2 (0.047)	8.4 (0.331)	32.4 (1.276)	12.7
	Cooler relief valve spring	1.0 (0.039)	8.4 (0.331)	33.8 (1.331)	8.2
	Relief valve spring	1.1 (0.043)	8.6 (0.339)	37.1 (1.461)	13.4
	2nd orifice control valve spring	0.7 (0.028)	6.6 (0.260)	34.8 (1.370)	22.0
	1-2 shift valve spring	0.9 (0.035)	7.6 (0.299)	41.3 (1.626)	16.3
	2-3 shift valve spring	0.9 (0.035)	7.6 (0.299)	57.0 (2.244)	26.8
	3-4 shift valve spring	0.9 (0.035)	7.6 (0.299)	57.0 (2.244)	26.8
	1st accumulator spring	2.1 (0.083)	16.0 (0.630)	89.1 (3.508)	16.2
	4th accumulator spring B	2.3 (0.091)	10.2 (0.402)	51.6 (2.031)	13.8
	4th accumulator spring A	2.6 (0.102)	17.0 (0.669)	88.4 (3.480)	14.2
	2nd accumulator spring A	2.4 (0.094)	29.0 (1.142)	39.0 (1.535)	2.9
	3rd accumulator spring A	2.8 (0.110)	17.5 (0.689)	94.3 (3.713)	15.9
	2nd accumulator spring B	1.6 (0.063)	9.0 (0.354)	20.7 (0.815)	6.1
	3rd accumulator spring B	2.1 (0.083)	31.0 (1.220)	38.2 (1.504)	2.6
	3rd sub accumulator spring	2.7 (0.106)	17.0 (0.669)	39.0 (1.535)	6.3
	2nd accumulator spring C	2.2 (0.087)	14.5 (0.571)	68.0 (2.677)	13.9
	Lock-up shift valve spring	0.9 (0.035)	7.6 (0.299)	73.7 (2.902)	32.0
	Lock-up timing valve spring	0.9 (0.035)	8.1 (0.319)	81.4 (3.205)	47.8
	Lock-up control valve spring	0.7 (0.028)	6.6 (0.260)	38.0 (1.496)	14.1
	3-4 orifice control valve spring	0.6 (0.024)	6.6 (0.260)	37.9 (1.492)	31.6
	Servo control valve spring	1.0 (0.039)	8.1 (0.319)	52.1 (2.051)	20.8
	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 (0.240)	36.4 (1.433)	19.5

Differential (4WD) — Section 15

	MEASUREMENT	STANDARD (NEW)
Differential fluid	Capacity ℓ (US qt, Imp qt)	1.2 (1.3, 1.1) at overhaul 1.0 (1.1, 0.9) at fluid change

Steering — Section 17

	MEASUREMENT	STANDARD (NEW)
Steering wheel	Rotational play at steering wheel circumference	0 – 10 (0 – 0.39)
	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	
	'97, '98 models	10° ± 5°
	'99, '00 models	20° MAX.
Pump	Pump pressure with shut-off valve closed kPa (kgf/cm², psi)	6,900 – 7,800 (70 – 80, 995 – 1,138)
Power steering fluid	Recommended fluid	Honda power steering fluid.
	Fluid capacity ℓ (US qt, Imp qt) For overhaul	0.85 (0.90, 0.75)
	For reservoir	0.4 (0.42, 0.35)
Power steering belt*	Deflection with 98 N (10 kgf, 22 lbf) between pulleys	11.0 – 14.5 (0.43 – 0.57) with used belt 7.5 – 10.0 (0.30 – 0.40) with new belt
	Belt tension N (kgf, lbf) Measured with belt tension gauge	390 – 540 (40 – 55, 88 – 121) with used belt 740 – 880 (75 – 90, 165 – 198) 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.

Unit of length: mm (in)

Suspension — Section 18

	MEASUREMENT			STANDARD (NEW)	
Wheel alignment	Camber		Front	0°00′ ± 1°	
			Rear	−1°00′ ± 1°	
	Caster		Front	2°10′ ± 1°	
	Total toe		Front	0 ± 3 (0 ± 1/8)	
			Rear	IN 2^{+2}_{-1} (1/16 ± 1/16)	
	Front wheel turning angle		Inward wheel	37°00′ ± 2°	
			Outward wheel	31°30′ (Reference)	
Wheel bearing	End play		Front	0 – 0.05 (0 – 0.002)	
			Rear	0 – 0.05 (0 – 0.002)	
				STANDARD (NEW)	SERVICE LIMIT
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)

Brakes — Section 19

	MEASUREMENT			STANDARD (NEW)	
Parking brake lever	Play in stroke at 196 N (20 kgf, 44 lbf) lever force			To be locked when pulled: 2 – 6 notches	
Foot brake pedal	Pedal height (with floor mat removed)		M/T	155 (6 1/8)	
			A/T	161 (6 5/16)	
	Free play			1 – 5 (1/16 – 3/16)	
Master cylinder	Piston-to-pushrod clearance			0 – 0.4 (0 – 0.02)	
				STANDARD (NEW)	SERVICE LIMIT
Disc brake	Disc thickness	Front	'97, '98 models	22.9 – 23.1 (0.902 – 0.909)	21.0 (0.83)
			'99, '00 models	23.6 – 23.8 (0.929 – 0.937)	21.0 (0.83)
	Disc runout		Front	———	0.10 (0.004)
	Disc parallelism		Front	———	0.015 (0.0006)
	Pad thickness		Front	10.5 – 11.5 (0.41 – 0.45)	1.6 (0.06)
Rear brake drum	I.D.			219.9 – 220.0 (8.657 – 8.661)	221.0 (8.701)
	Lining thickness			3.9 – 4.5 (0.15 – 0.18)	2.0 (0.08)

Air Conditioning — Section 22

	MEASUREMENT		STANDARD (NEW)
Air conditioning system	Lubricant type: KEIHIN SP-10 (P/N 38897 – P13 – A01AH or 38899 – P13 – A01)		
	Lubricant capacity mℓ (fl oz, Imp oz)	Condenser	25 (5/6, 0.9)
		Evaporator	40 (1 1/3, 1.4)
		Line or hose	10 (1/3, 0.4)
		Receiver	10 (1/3, 0.4)
Compressor (KEIHIN)	Lubricant type: SP-10		
	Lubricant capacity mℓ (fl oz, Imp oz)		130^{+20}_{0} (4 $1/3^{+2/3}_{0}$, $4.6^{+0.7}_{0}$)
	Stator coil resistance at 68°F (20°C) Ω		3.05 – 3.35
	Pulley-to-pressure plate clearance		0.5 ± 0.15 (0.02 ± 0.006)
Compressor belt*	Deflection with 98 N (10 kgf, 22 lbf) between pulleys		7.5 – 10.5 (0.30 – 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		390 – 540 (40 – 55, 88 – 120) with used belt 740 – 880 (75 – 90, 170 – 200) 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.

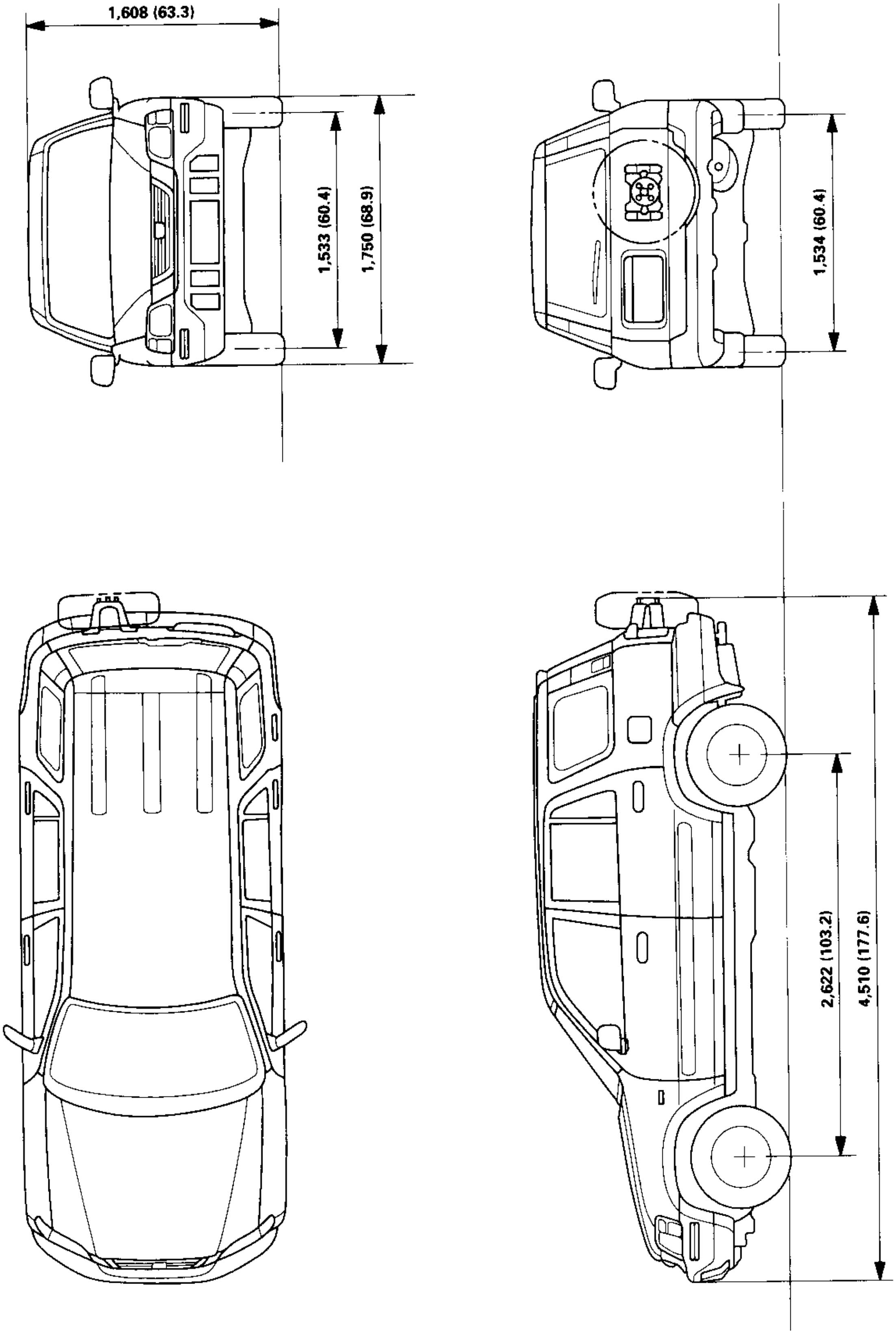
Design Specifications

	ITEM		METRIC	ENGLISH	NOTES
DIMENSIONS	Overall length		4,510 mm	177.6 in	
	Overall width		1,750 mm	68.9 in	
	Overall height		1,608 mm	63.3 in	
	Wheelbase		2,622 mm	103.2 in	
	Track	Front	1,533 mm	60.4 in	
		Rear	1,534 mm	60.4 in	
	Seating capacity		5 (five)		
WEIGHT (USA)	Gross vehicle weight rating (GVWR)		———	4,165 lbs	
WEIGHT (CANADA)	Gross vehicle weight rating (GVWR)		1,900 kg	———	
ENGINE	Type		Water-cooled, 4-stroke DOHC gasoline engine		
	Cylinder arrangement		Inline 4-cylinder, transverse		
	Bore and stroke		84.0 x 89.0 mm	3.31 x 3.50 in	
	Displacement		1,973 cm^3 (mℓ)	120 cu-in	
	Compression ratio	'97, '98 models	9.2		
		'99, '00 models	9.6		
	Valve train		Belt driven, DOHC 4 valves per cylinder		
	Lubrication system		Forced and wet sump, trochoid pump		
	Oil pump displacement at 6,000 engine rpm		50 ℓ (53 US qt, 44 Imp qt)/minute		
	Water pump displacement at 7,600 engine rpm		140 ℓ (148 US qt, 123 Imp qt)/minute		
	Fuel required		UNLEADED gasoline with 86 Pump Octane Number or Higher		
STARTER	Type		Planetary gear reduction		
	Normal output		A/T: 1.1 kW M/T: 1.0 kW		
	Nominal voltage		12 V		
	Hour rating		30 seconds		
	Direction of rotation		Clockwise as viewed from gear end		
	Weight		3.7 kg	8.2 lbs	Approx.
CLUTCH	Clutch type	M/T	Single plate dry, diaphragm spring		
		A/T	Torque converter		
	Clutch facing area	M/T	203 cm^2	31.5 sq-in	
TRANSMISSION	Transmission type	M/T	Synchronized 5-speed forward, 1 reverse		
		A/T	Electronically controlled 4-speed automatic, 1 reverse		
	Primary reduction		Direct 1 : 1		
	Type		Manual transmission		
	Gear ratio	1st	3.500		*1: '97 – 99 models *2: '00 model
		2nd	1.956		
		3rd	1.344		
		4th	1.071		
		5th	0.812		
		Reverse	3.000^{*1}, 3.461^{*2}		
	Final reduction	Gear type	Single helical gear		
		Gear ratio	4.562		
	Transfer		0.434		
	Rear differential		2.533		
	Type		Automatic transmission		
	Gear ratio	1st	2.722		
		2nd	1.516		
		3rd	1.079		
		4th	0.711		
		Reverse	1.955		
	Final reduction	Gear type	Single helical gear		
		Gear ratio	4.357		
	Transfer		0.393		

	ITEM		METRIC	ENGLISH	NOTES
AIR CONDITIONING	Cooling capacity		3,520 Kcal/h	14,000 BTU/h	
	Compressor	Type/manufacturer	Scroll/KEIHIN		
		No. of cylinder	———		
		Capacity	85.7 mℓ/rev	5.23 cu-in/rev	
		Max. speed	10,000 rpm		
		Lubricant capacity	130 mℓ	4 1/3 fl oz	
		Lubricant type	SP-10		
	Condenser	Type	Corrugated fin		
	Evaporator	Type	Corrugated fin		
	Blower	Type	Sirocco fan		
		Motor input	200 W/12 V		
		Speed control	4-speed		
		Max. capacity	440 m^3/h	15,500 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	700^{0}_{-50} g	$24.7^{0}_{-1.8}$ oz	
STEERING SYSTEM	Type		Power assisted, rack and pinion		
	Overall ratio		16.3		
	Turns, lock-to-lock		3.1		
	Steering wheel diameter		380 mm	15.0 in	
SUSPENSION	Type	Front	Independent double wishbone, coil spring with stabilizer		
		Rear	Independent double wishbone, coil spring with stabilizer		
	Shock absorber	Front and Rear	Telescopic, hydraulic nitrogen gas-filled		
WHEEL ALIGNMENT	Camber	Front	0°		
		Rear	−1°00′		
	Caster	Front	2°10′		
	Total toe	Front	0 mm	0 in	
		Rear	In 2 mm	In 1/16 in	
BRAKE SYSTEM	Type	Front	Power-assisted self-adjusting ventilated disc		
		Rear	Power-assisted self-adjusting drum		
	Pad surface area	Front	49 cm^2 x 2	7.6 sq-in x 2	
	Lining surface area	Rear	73 cm^2 x 2	11.3 sq-in x 2	Drum brake
	Parking brake	Type	Mechanical actuating, rear two wheel brakes		
TIRE	Size and pressure		See tire information label.		
ELECTRICAL	Battery		12 V – 36 AH/5 HR		
	Starter		12 V – 1.0, 1.1 kW		
	Alternator		12 V – 100 A		
	Fuses				
	In under-dash fuse/relay box		7.5 A, 10 A, 15 A, 20 A		
	In under-hood fuse/relay box		7.5 A, 10 A, 15 A, 20 A, 30 A, 40 A 100 A		
	In under-hood ABS fuse/relay box		7.5 A, 20 A, 40 A		
	Headlights		12 V – 60/55 W		
	Front turn signal lights		12 V – 21 W ('97 model), 12 V – 27 W ('98 – 00 models)		
	Front parking lights		12 V – 5 W ('97 model), 3 CP ('98 – 00 models)		
	Front side marker lights		12 V – 8 W		
	Rear side marker lights		12 V – 3 CP		
	Rear turn signal lights		12 V – 21 W		
	Brake/parking lights		12 V – 21/5 W		
	Back-up lights		12 V – 21 CP (18 W)		
	Ceiling lights (front/rear)		12 V – 8 W		
	License plate light		12 V – 8 W		
	Spotlights		12 V – 5 W		
	High mount brake light		12 V – 21 W		
	Ignition key light		12 V – 1.4 W		
	Ashtray light		12 V – 1.4 W		
	Gauge lights		12 V – 1.4 W, 3 W, 3.4 W		
	Indicator lights		12 V – 0.84 W, 1.12 W, 1.4 W, 3 W, LED		
	Illumination and pilot lights		12 V – 0.84 W, 1.4 W, LED		
	Heater illumination lights		12 V – 1.4 W		

Body Specifications

Unit: mm (in)



Maintenance

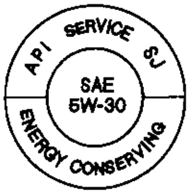
Lubrication Points 3-2
Maintenance Schedule for 1997 Model (Normal Conditions) 3-4
Maintenance Schedule for 1997 Model (Severe Conditions) 3-6
Maintenance Schedule for 1998 – 2000 Models (Normal Conditions) 3-8
Maintenance Schedule for 1998 – 2000 Models (Severe Conditions) 3-10

Lubrication Points

For the details of lubrication points and type 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 seal shown below. Make sure it says "For Gasoline Engines." SAE viscosity: See chart below.
2	Transmission	Manual	Genuine Honda MTF*1
		Automatic	Genuine Honda Premium Formula Automatic Transmission Fluid (ATF)*2
3	Rear differential		Genuine Honda CVT Fluid
4	Brake line (includes ABS line)		Genuine Honda DOT 3 Brake Fluid*3
5	Clutch Line		Brake fluid DOT 3 or DOT 4*3
6	Shift lever pivots (Manual transmission)		Grease with molybdenum disulfide
7	Release fork (Manual transmission)		Urea Grease UM264 P/N 41211 - PY5 - 305
8	Power steering gearbox		Steering grease P/N 08733 - B070E
9	Throttle cable end (Dashboard lower panel hole)		Silicone grease
10 11 12 13 14 15	Throttle cable end (Throttle link) Brake master cylinder pushrod Pedal linkage Battery terminals Fuel fill lid Clutch master cylinder pushrod		Multi-purpose grease
16 17 18 19 20	Hood hinges and hood lock Tailgate hinges Hatch glass hinges Door hinges, upper and lower Door opening detent		Honda White Lithium Grease
21 22	Caliper Piston seal, Dust seal, Caliper pin, Piston Shift cable and select cable (Manual transmission)		Silicone grease
23	Brake line joints (Front and rear wheelhouse)		Rust preventives
24	Power steering system		Genuine Honda Power Steering Fluid*4
25	Air conditioning compressor		Compressor oil: SP-10 (P/N 38897 - P13 - A01AH or 38899 - P13 - A01) For Refrigerant: HFC-134a (R-134a)

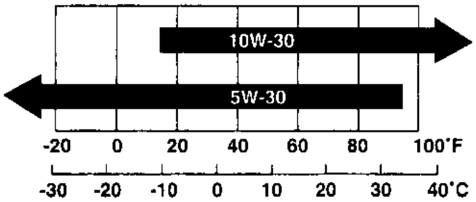
API SERVICE LABEL



API CERTIFICATION SEAL

Recommended Engine Oil

Engine oil viscosity for ambient temperature ranges



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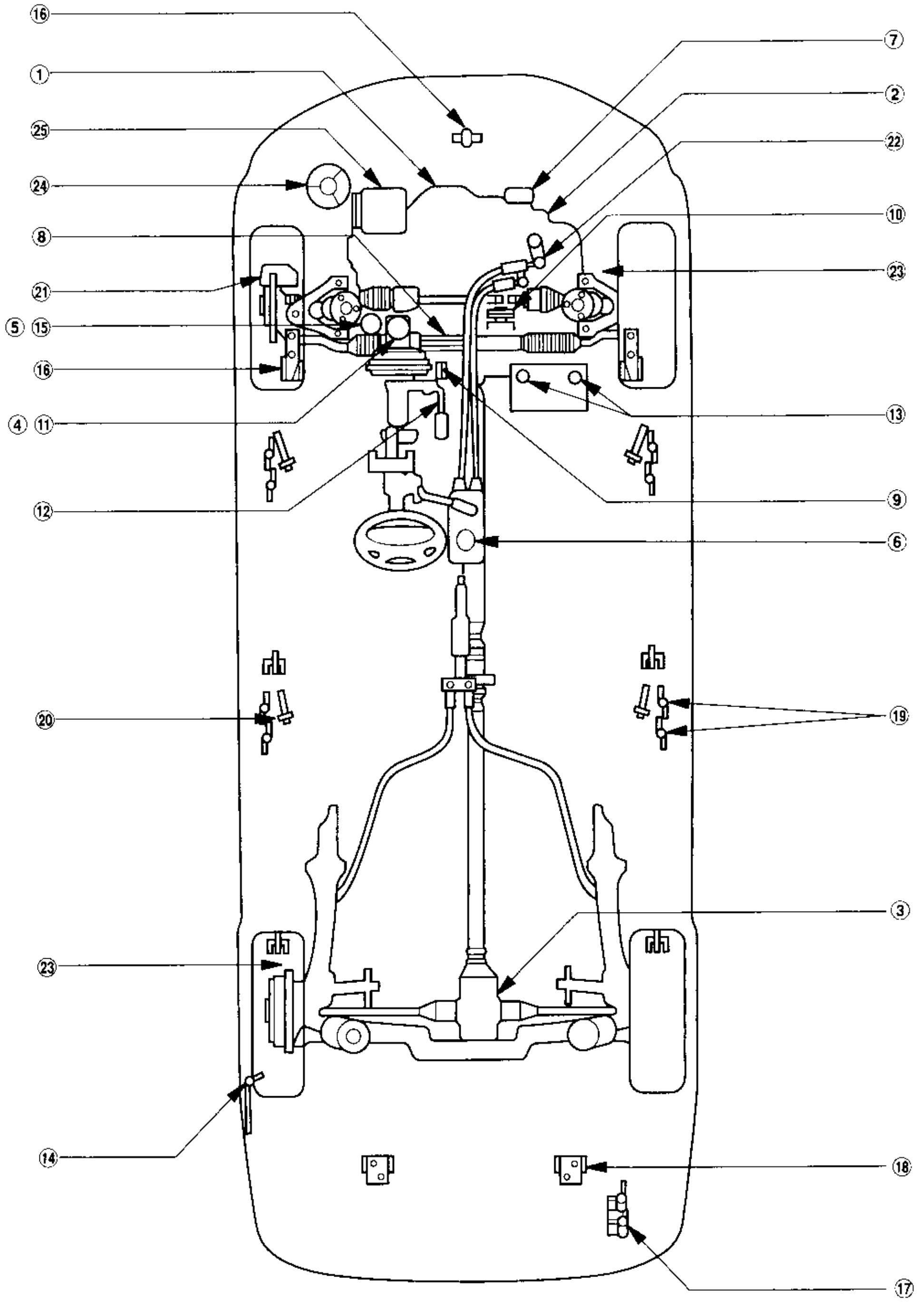
*1: Always use Genuine Honda Manual Transmission Fluid (MTF). Using motor oil can cause stiffer shifting because it does not contain the proper additives.

*2: Always use Genuine Honda Premium Formula Automatic Transmission Fluid (ATF). Using a non-Honda ATF can affect shift quality.

*3: Always use Genuine Honda DOT 3 Brake Fluid. Using a non-Honda brake fluid can cause corrosion and decrease the life of the system.

*4: Always use Genuine Honda Power Steering Fluid. Using any other type of power steering fluid or automatic transmission fluid can caused increased 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 (for 1997 Model)

Normal Conditions

Follow the Normal Conditions Maintenance Schedule if the severe driving conditions specified in the Severe Conditions Maintenance Schedule on pages 3-6 and 3-7 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: 3.8 ℓ (4.0 US qt, 3.3 Imp qt)	8-4, 5
Replace engine oil filter		●	●	●	●	●	●	●	●		8-5, 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			●		●		●		●		11-194
Inspect valve clearance		Adjust only if noisy						●		Intake 0.08 – 0.12 mm (0.003 – 0.005 in) Exhaust 0.16 – 0.20 mm (0.006 – 0.008 in) Measured between the camshaft and rocker arm when cold.	6-3, 4
Replace spark plugs			●		●		●		●	NGK: ZFR5F-11, DENSO: KJ16CR-L11 Gap: 1.0 – 1.1 mm (0.039 – 0.043 in)	4-21
Replace timing belt and inspect water pump								●		Check water pump for signs of seal leakage.	6-10, 11, 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 belt: 8.5 – 11.5 mm (0.33 – 0.45 in) P/S pump belt: 11.0 – 14.5 mm (0.43 – 0.57 in) A/C compressor belt: 7.5 – 10.5 mm (0.30 – 0.41 in)	4-34 17-14 22-69
Inspect idle speed								●		750 ± 50 rpm (in N or P position)	11-169, 170
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							●			2.9 ℓ (3.1 US qt, 2.6 Imp qt) for change with Genuine Honda Premium Formula ATF	14-161
Replace rear differential fluid							●			1.0 ℓ (1.1 US qt, 0.9 Imp qt) for change with Genuine Honda CVT Fluid	15-14
Inspect front and rear brakes		●	●	●	●	●	●	●	●	• Check the brake pad, disc thickness, and free movement. • Check the calipers for leakage.	19-4, 9, 11
Replace brake fluid				●			●			Use Genuine Honda DOT 3 brake fluid. Check that brake fluid level is between the upper and lower marks on the reservoir.	19-7
Check parking brake adjustment		●	●	●	●	●	●	●	●	Fully engaged 2 to 6 notches.	19-6
Replace air conditioning filter			●		●		●		●	Replace every 15,000 miles (24,000 km) if the vehicle is driven primarily in urban areas that have high concentrations of soot in the air from industry and diesel-powered vehicles. Replace the air conditioning filter more often if air flow from the climate control system becomes less than usual.	22-50
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.	——

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.	17-13, 23
Suspension components										Check the bolts for tightness. Check condition of ball joint boots.	18-8, 9, 19, 20
Driveshaft boots										Check condition of boots.	16-3
Brake hoses and lines (including ABS)										Check for damage or leakage.	19-4, 27
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, 14-161, 15-14, 19-7
Cooling system hoses and connections										Check all hoses for damage, leaks, and deterioration. Check for proper fan operation.	10-2, 3
Exhaust system*										Check the catalytic converter heat shield, exhaust pipe, and muffler for damage, leaks, and tightness.	9-6, 7
Fuel lines and connections*										Check for leaks. Retighten loose connections and replace any damaged parts.	11-171
Inspect supplemental restraint system		10 years after production									———

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.

For Canada models: Follow the Severe Conditions Maintenance Schedule on pages 3-6 and 3-7.

Maintenance Schedule (for 1997 Model)

Severe Conditions

Follow the Severe Conditions Maintenance Schedule if the vehicle is driven MAINLY under one or more of the Severe Driving Conditions (page 3-7):

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		Replace every 3,750 miles (6,000 km) or 6 months								Capacity for change with filter: 3.8 ℓ (4.0 US qt, 3.3 Imp qt)	8-4, 5, 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		●	●	●	●	●	●	●	●		11-194
Inspect valve clearance		Adjust only if noisy						●		Intake 0.08 – 0.12 mm (0.003 – 0.005 in) Exhaust 0.16 – 0.20 mm (0.006 – 0.008 in) Measured between the camshaft and rocker arm when cold.	6-3, 4
Replace spark plugs			●		●		●		●	NGK: ZFR5F-11, DENSO: KJ16CR-L11 Gap: 1.0 – 1.1 mm (0.039 – 0.043 in)	4-21
Replace timing belt*1 and inspect water pump								●		Check water pump for signs of seal leakage.	6-10, 11, 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 belt: 8.5 – 11.5 mm (0.33 – 0.45 in) P/S pump belt: 11.0 – 14.5 mm (0.43 – 0.57 in) A/C compressor belt: 7.5 – 10.5 mm (0.30 – 0.41 in)	4-34 17-14 22-69
Inspect idle speed								●		750 ± 50 rpm (in N or P position)	11-169, 170
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			●		●		●		●	2.9 ℓ (3.1 US qt, 2.6 Imp qt) for change with Genuine Honda Premium Formula ATF	14-161
Replace rear differential fluid					●				●	1.0 ℓ (1.1 US qt, 0.9 Imp qt) for change with Genuine Honda CVT Fluid	15-14
Inspect front and rear brakes		Inspect every 7,500 miles (12,000 km) or 6 months								• Check the brake pad, disc thickness, and free movement. • Check the calipers for leakage.	19-4, 9, 11
Replace brake fluid				●			●			Use Genuine Honda DOT 3 brake fluid. Check that brake fluid level is between the upper and lower marks on the reservoir.	19-7
Check parking brake adjustment		●	●	●	●	●	●	●	●	Fully engaged 2 to 6 notches.	19-6
Replace air conditioning filter			●		●		●		●	Replace every 15,000 miles (24,000 km) if the vehicle is driven primarily in urban areas that have high concentrations of soot in the air from industry and diesel-powered vehicles. Replace the air conditioning filter more often if air flow from the climate control system becomes less than usual.	22-50

*1: Replace the timing belt at 60,000 miles (U.S.) 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	192		
	months	12	24	36	48	60	72	84	96		
Lubricate locks and hinges		●	●	●	●	●	●	●	●	Lubricate all hinges, latches and locks.	3-2, 3
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.	17-13, 23
Suspension components										Check the bolts for tightness. Check condition of ball joint boots.	18-8, 9, 19, 20
Driveshaft boots										Check condition of boots.	16-3
Brake hoses and lines (including ABS)		●	●	●	●	●	●	●	●	Check for damage or leakage.	19-4, 27
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, 14-161, 15-14, 19-7
Cooling system hoses and connections										Check all hoses for damage, leaks, and deterioration. Check for proper fan operation.	10-2, 3
Exhaust system*										Check the catalytic converter heat shield, exhaust pipe, and muffler for damage, leaks, and tightness.	9-6, 7
Fuel lines and connections*										Check for leaks. Retighten loose connections and replace any damaged parts.	11-171
Lights and controls										Check all lighting functions.	23-81
Vehicle underbody										Check for damage and fluid leaks.	——
Inspect supplemental restraint system		10 years after production									——

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.
- Trailer towing, driving with a car-top carrier, or driving in mountainous conditions.
- Driving on muddy, dusty, or de-iced roads.

NOTE: If the vehicle is driven OCCASIONALLY under a "severe" condition, you should follow the Normal Conditions Maintenance Schedule on pages 3-4 and 3-5.

Maintenance Schedule (for 1998 – 2000 Models)

Normal Conditions

Follow the Normal Conditions Maintenance Schedule if the severe driving conditions specified in the Severe Conditions Maintenance Schedule on pages 3-10 and 3-11 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: 3.8 ℓ (4.0 US qt, 3.3 Imp qt)	8-4, 5
Replace engine oil filter		●	●	●	●	●	●	●	●		8-5, 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			●		●		●		●		11-194
Inspect valve clearance		Adjust only if noisy						●		Intake 0.08 – 0.12 mm (0.003 – 0.005 in) Exhaust 0.16 – 0.20 mm (0.006 – 0.008 in) Measured between the camshaft and rocker arm when cold.	6-3, 4
Replace spark plugs			●		●		●		●	NGK: ZFR5F-11*1, ZFR6F-11*2, DENSO: KJ16CR-L11*1, KJ2OCR-L11*2 Gap: 1.0 – 1.1 mm (0.039 – 0.043 in)	4-21
Replace timing belt* and inspect water pump								●		Check water pump for signs of seal leakage.	6-10, 11, 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 belt: 8.5 – 11.5 mm (0.33 – 0.45 in) P/S pump belt: 11.0 – 14.5 mm (0.43 – 0.57 in) A/C compressor belt: 7.5 - 10.5 mm (0.30 - 0.41 in)	4-34 17-14 22-69
Inspect idle speed*								●		MT: 750 ± 50 rpm*1 730 ± 50 rpm*2 AT: 750 ± 50 rpm (in $\boxed{N}$ or $\boxed{P}$ position)*1 730 ± 50 rpm (in $\boxed{N}$ or $\boxed{P}$ position)*2	11-169, 170
Replace engine coolant				●		●		●		Capacity for change: MT: 4.0 ℓ (4.2 US qt, 3.5 Imp qt) AT: 3.9 ℓ (4.1 US qt, 3.4 Imp qt) Check specific gravity for freezing point.	10-5
Replace transmission fluid							●			MT: 1.7 ℓ (1.8 US qt, 1.4 Imp qt) for change with Genuine Honda MTF AT: 2WD 2.7 ℓ (2.9 US qt, 2.4 Imp qt) 4WD 2.9 ℓ (3.1 US qt, 2.6 Imp qt) for change with Genuine Honda Premium Formula ATF	13-3 14-161
Replace rear differential fluid							●			1.0 ℓ (1.1 US qt, 0.9 Imp qt) for change with Genuine Honda CVT Fluid	15-14
Inspect front and rear brakes		●	●	●	●	●	●	●	●	• Check the brake pad, disc thickness, and free movement. • Check the calipers for leakage.	19-4, 9, 11
Replace brake fluid				●			●			Use Genuine Honda DOT 3 brake fluid. Check that brake fluid level is between the upper and lower marks on the reservoir.	19-7
Check parking brake adjustment		●	●	●	●	●	●	●	●	Fully engaged 2 to 6 notches.	19-6
Replace air conditioning filter			●		●		●		●	Replace every 15,000 miles (24,000 km) if the vehicle is driven primarily in urban areas that have high concentrations of soot in the air from industry and diesel-powered vehicles. Replace the air conditioning filter more often if air flow from the climate control system becomes less than usual.	22-50
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: '98 model *2: '99, '00 models

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.	17-13, 23
Suspension components										Check the bolts for tightness. Check condition of ball joint boots.	18-8, 9, 19, 20
Driveshaft boots										Check condition of boots.	16-3
Brake hoses and lines (including ABS)										Check for damage or leakage.	19-4, 27
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, 13-3, 14-161, 15-14, 19-7
Cooling system hoses and connections										Check all hoses for damage, leaks, and deterioration. Check for proper fan operation.	10-2, 3
Exhaust system*										Check the catalytic converter heat shield, exhaust pipe, and muffler for damage, leaks, and tightness.	9-6, 7
Fuel lines and connections*										Check for leaks. Retighten loose connections and replace any damaged parts.	11-171

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.

For Canada models: Follow the Severe Conditions Maintenance Schedule on pages 3-10 and 3-11.

Maintenance Schedule (for 1998 – 2000 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 3-11):

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: 3.8 ℓ (4.0 US qt, 3.3 Imp qt)	8-4, 5, 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		●	●	●	●	●	●	●	●		11-194
Inspect valve clearance		Adjust only if noisy						●		Intake 0.08 – 0.12 mm (0.003 – 0.005 in) Exhaust 0.16 – 0.20 mm (0.006 – 0.008 in) Measured between the camshaft and rocker arm when cold.	6-3, 4
Replace spark plugs			●		●		●		●	NGK: ZFR5F-11*3, ZFR6F-11*4, DENSO: KJ16CR-L11*3, KJ2OCR-L11*4 Gap: 1.0 – 1.1 mm (0.039 – 0.043 in)	4-21
Replace timing belt*, *1 and inspect water pump								●		Check water pump for signs of seal leakage.	6-10, 11, 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 belt: 8.5 – 11.5 mm (0.33 – 0.45 in) P/S pump belt: 11.0 – 14.5 mm (0.43 – 0.57 in) A/C compressor belt: 7.5 – 10.5 mm (0.30 – 0.41 in)	4-34 17-14 22-69
Inspect idle speed*								●		MT: 750 ± 50 rpm*3 730 ± 50 rpm*4 AT: 750 ± 50 rpm (in $\boxed{N}$ or $\boxed{P}$ position)*3 730 ± 50 rpm (in $\boxed{N}$ or $\boxed{P}$ position)*4	11-169, 170
Replace engine coolant				●		●		●		Capacity for change: MT: 4.0 ℓ (4.2 US qt, 3.5 Imp qt) AT: 3.9 ℓ (4.1 US qt, 3.4 Imp qt) Check specific gravity for freezing point.	10-5
Replace transmission fluid			●		●		●		●	MT: 1.7 ℓ (1.8 US qt, 1.4 Imp qt) for change with Genuine Honda MTF AT: 2WD 2.7 ℓ (2.9 US qt, 2.4 Imp qt) 4WD 2.9 ℓ (3.1 US qt, 2.6 Imp qt) for change with Genuine Honda Premium Formula ATF	13-3 14-161
Replace rear differential fluid					●				●	1.0 ℓ (1.1 US qt, 0.9 Imp qt) for change with Genuine Honda CVT Fluid	15-14
Inspect front and rear brakes		Every 7,500 miles (12,000 km) or 6 months								• Check the brake pad, disc thickness, and free movement. • Check the calipers for leakage.	19-4, 9, 11
Replace brake fluid				●			●			Use Genuine Honda DOT 3 brake fluid. Check that brake fluid level is between the upper and lower marks on the reservoir.	19-7
Check parking brake adjustment		●	●	●	●	●	●	●	●	Fully engaged 2 to 6 notches.	19-6
Replace air conditioning filter*2			●		●		●		●	Replace every 15,000 miles (24,000 km) if the vehicle is driven primarily in urban areas that have high concentrations of soot in the air from industry and diesel-powered vehicles. Replace the air conditioning filter more often if air flow from the climate control system becomes less than usual.	22-50
Clean antenna mast		●	●	●	●	●	●	●	●		23-103

*1: Replace the timing belt at 60,000 miles (U.S.) 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).

*2: Air conditioning filter should be replaced every 24,000 km (15,000 miles) if the vehicle is driven primarily in areas that have high concentrations of soot in the air from industry and diesel-powered vehicles.
It should be more often if air flow from the climate control system becomes less than usual.

*3: '98 model *4: '99, '00 models

*3: '98 model *4: '99, '00 models

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		
Lubricate all hinges, locks, and latches		●	●	●	●	●	●	●	●	Lubricate all hinges, latches, and locks.	3-2, 3
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.	17-13, 23
Suspension components										Check the bolts for tightness. Check condition of ball joint boots.	18-8, 9, 19, 20
Driveshaft boots										Check condition of boots.	16-3
Brake hoses and lines (including ABS)		●	●	●	●	●	●	●	●	Check for damage of leakage.	19-4, 27
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, 13-3, 14-161, 15-14, 19-7
Cooling system hoses and connections										Check all hoses for damage, leaks, and deterioration. Check for proper fan operation.	10-2, 3
Exhaust system*										Check the catalytic converter heat shield, exhaust pipe, and muffler for damage, leaks, and tightness.	9-6, 7
Fuel lines and connections*										Check for leaks. Retighten loose connections and replace any damaged parts.	11-171
Lights and controls										Check all lighting functions.	23-81
Vehicle underbody										Check for damage and fluid leaks.	——

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.
- Trailer towing, driving with a car-top carrier, or driving in mountainous conditions.
- Driving on muddy, dusty, or de-iced roads.

NOTE: If the vehicle is driven OCCASIONALLY under a "severe" condition, you should follow the Normal Conditions Maintenance Schedule on pages 3-8 and 3-9.

Engine Electrical

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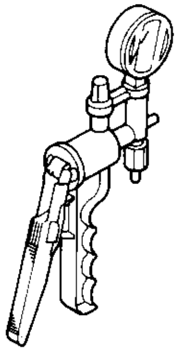
Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	A973X – 041 – XXXXX	Vacuum Pump/Gauge, 0 – 30 in.Hg.	1	4-41
*②	07JGG – 001010A	Belt Tension Gauge	1	4-34
③	07PAZ – 0010100	SCS Service Connector	1	4-16

* Included in the Belt Tension Gauge Set, T/N 07JGG – 001000A



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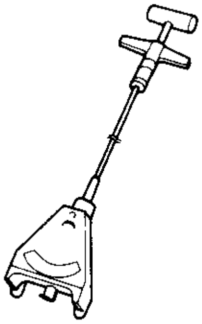

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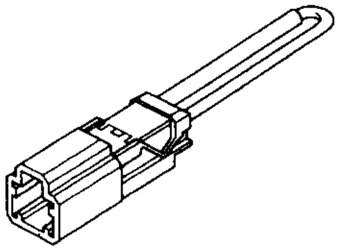

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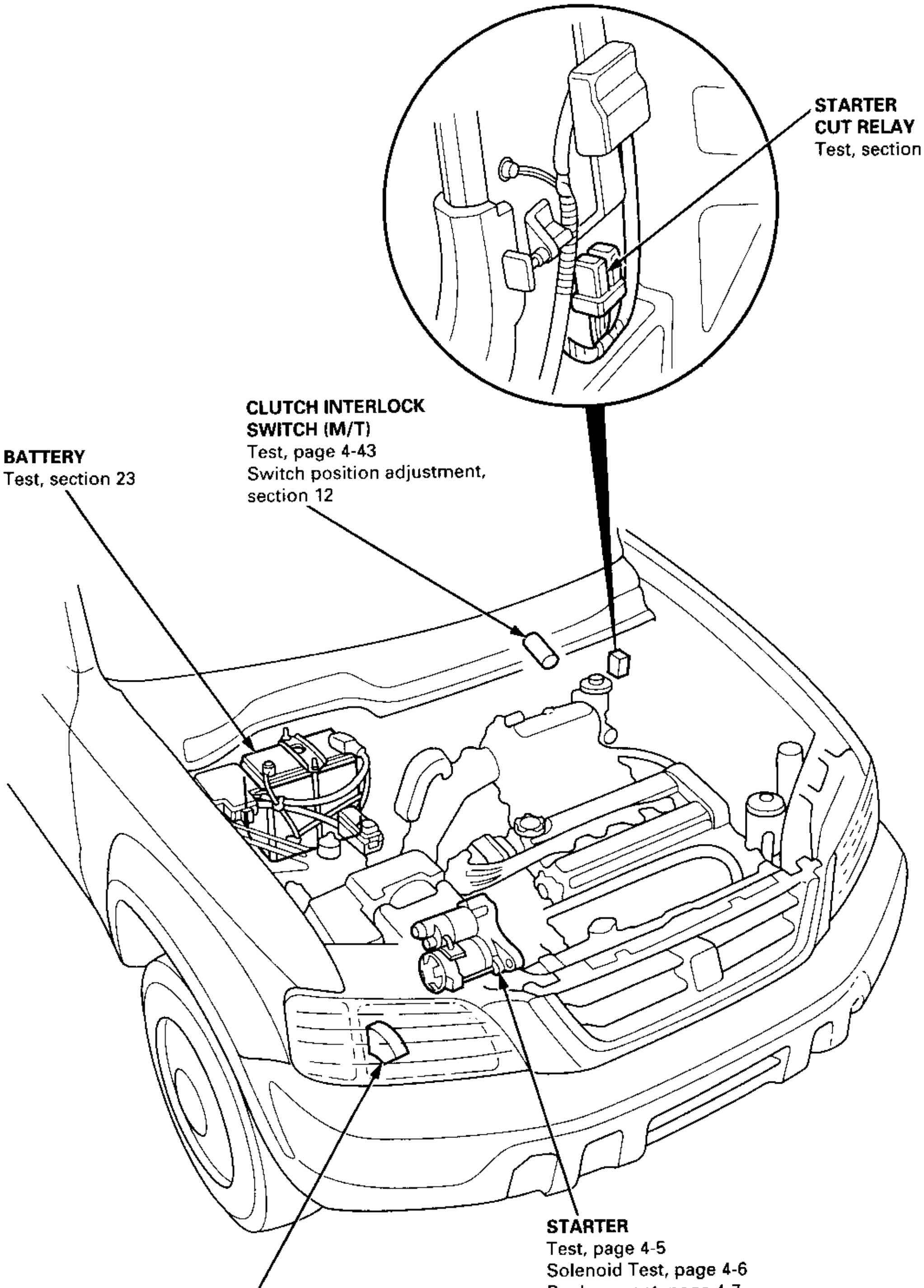
Component Location Index



STARTER CUT RELAY
Test, section 23

CLUTCH INTERLOCK SWITCH (M/T)
Test, page 4-43
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BATTERY
Test, section 23

STARTER
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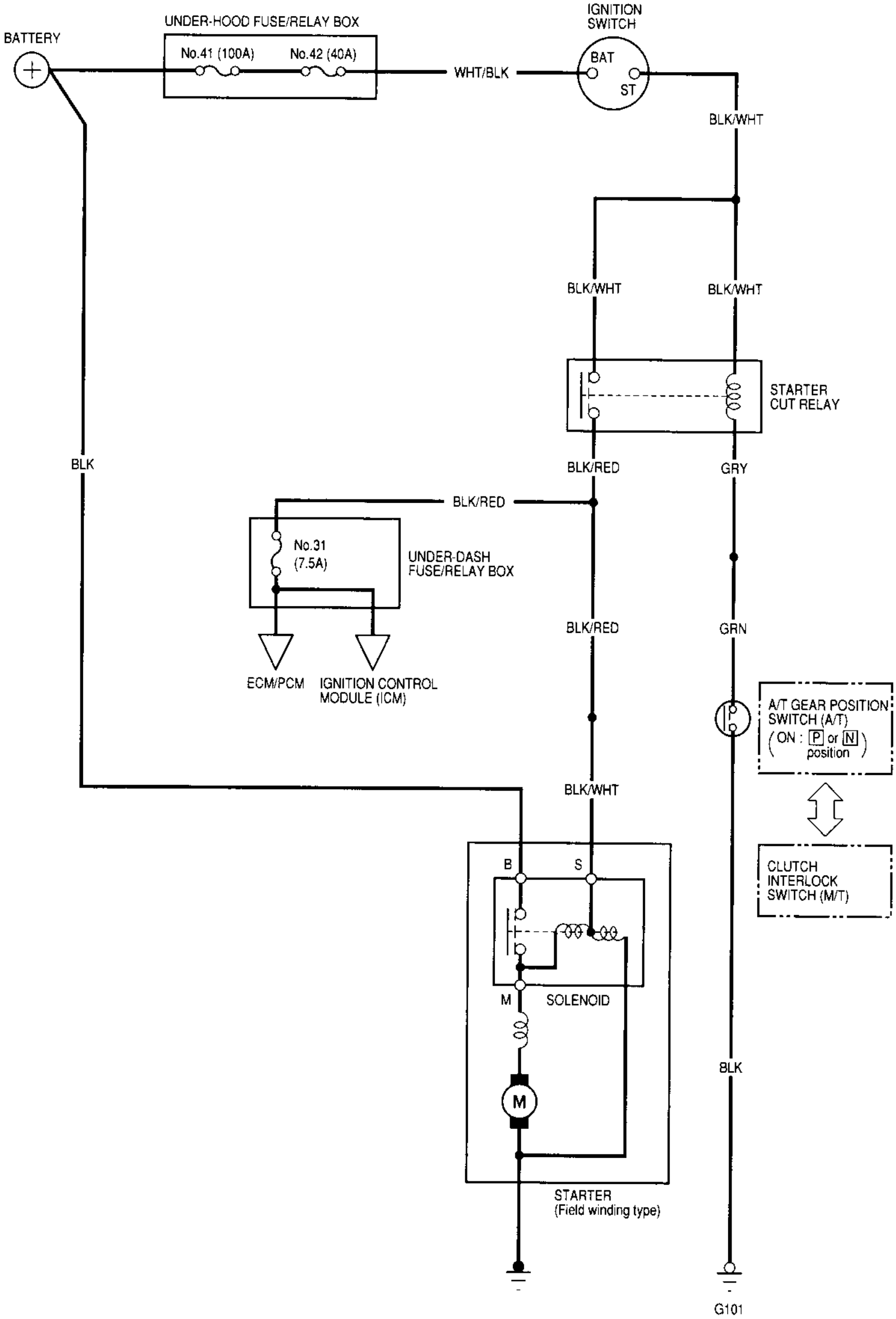
A/T GEAR POSITION SWITCH (A/T)
Test, section 14
Replacement, section 14

Starting System

Circuit Diagram



Starter Test

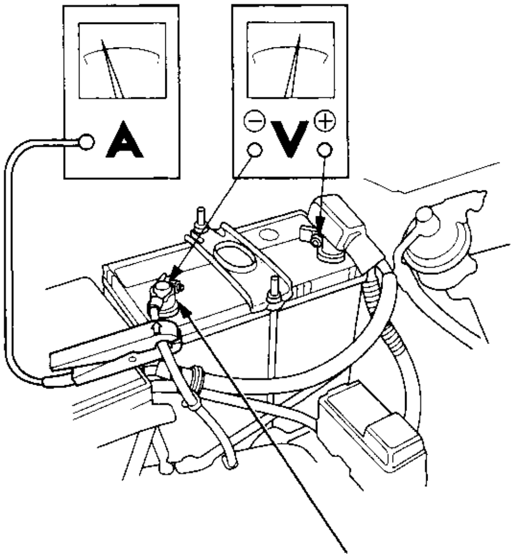
NOTE: The air temperature must be between 59 and 100°F (15 and 38°C) before testing.

Recommended Procedure:

- Use a starter system tester.
- Connect and operate the equipment in accordance with the manufacturer's instructions.
- Test and troubleshoot as described.

Alternate Procedure:

- Use the following equipment:
  - Ammeter, 0 – 400 A
  - Voltmeter, 0 – 20 V (accurate within 0.1 volt)
  - Tachometer, 0 - 1,200 rpm
- Hook up a voltmeter and ammeter as shown.

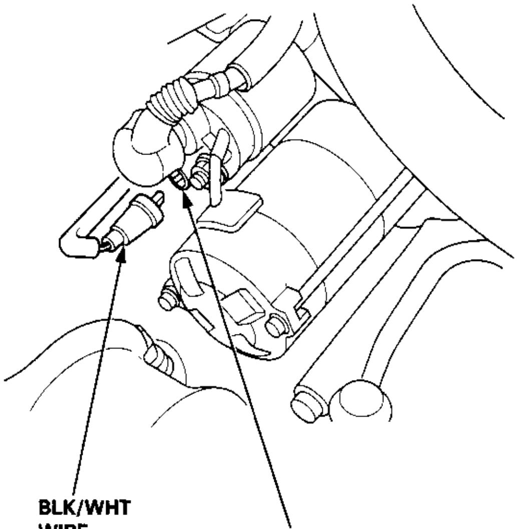


NEGATIVE TERMINAL

NOTE: After this test, or any subsequent repair, reset the ECM/PCM to clear any codes (see section 11).

Check the Starter Engagement:

1. Remove the No. 44 (15 A) fuse from the under-hood fuse/relay box.
2. Turn the ignition switch to START (III) with the shift lever in N or P position (A/T) or with the clutch pedal depressed (M/T). The starter should crank the engine.
   - If the starter does not crank the engine, go to step 3.
   - If it cranks the engine erratically or too slowly, go to "Check for Wear and Damage" on the next page.
3. Check the battery, battery positive cable, ground, starter cut relay, and the wire connections for looseness and corrosion. Test again.
   If the starter still does not crank the engine, go to step 4.
4. Unplug the connector (BLK/WHT wire and solenoid terminal) from the starter.
5. Connect a jumper wire from the battery positive (+) terminal to the solenoid terminal.
   The starter should crank the engine.



BLK/WHT WIRE

S TERMINAL

   - If the starter still does not crank the engine, remove it, and diagnose its internal problem.
   - If the starter cranks the engine, go to step 6.
6. Check the ignition switch (see section 23).
7. Check the starter cut relay (see section 23).
8. Check the A/T gear position switch (A/T) or the clutch interlock switch (M/T).
9. Check for an open in the wire between the ignition switch and starter.

(cont'd)

Starter Test (cont'd)

Check for Wear and Damage
The starter should crank the engine smoothly and steadily. If the starter engages, but cranks the engine erratically, remove it, and inspect the starter drive gear and torque converter ring gear or flywheel ring gear for damage.

Check the drive gear overrunning clutch for binding or slipping when the armature is rotated with the drive gear held. If damaged, replace the gears.

Check Cranking Voltage and Current Draw
Cranking voltage should be no less than 8.7 volts on A/T models, and 8.0 volts on M/T models.
Current draw should be no more than 230 amperes on A/T models, and 200 amperes on M/T models.

If cranking voltage is too low, or current draw too high, check for:

- dead or low battery.
- open circuit in starter armature commutator segments.
- starter armature dragging.
- shorted armature winding.
- excessive drag in engine.

Check Cranking rpm
Engine speed during cranking should be above 100 rpm.
If speed is too low, check for:

- loose battery or starter terminals.
- excessively worn starter brushes.
- open circuit in commutator segments.
- dirty or damaged helical splines or drive gear.
- defective drive gear overrunning clutch.

Check Starter Disengagement

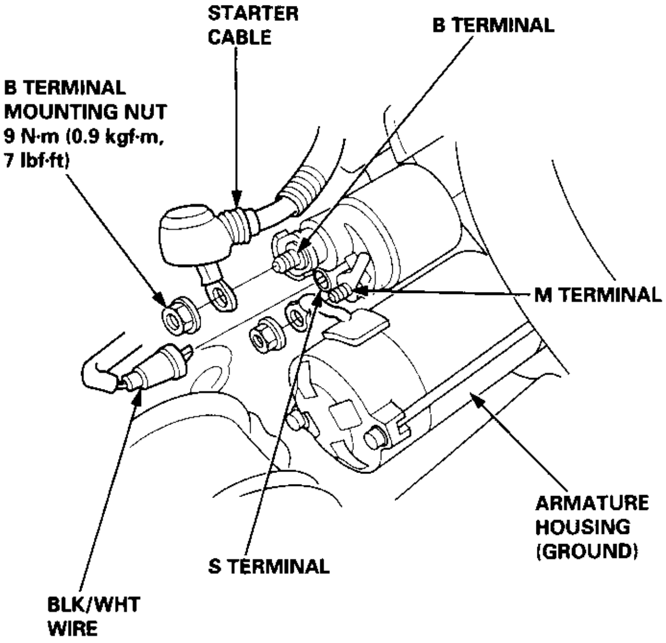
With the shift lever in N or P position (A/T) or with the clutch pedal depressed (M/T), turn the ignition switch to START (III), and release to ON (II).
The starter drive gear should disengage from the torque converter ring gear or flywheel ring gear when you release the key.

If the drive gear hangs up on the torque converter ring gear or flywheel ring gear, check for:

- solenoid plunger and switch malfunction.
- dirty drive gear assembly or damaged overrunning clutch.

Starter Solenoid Test

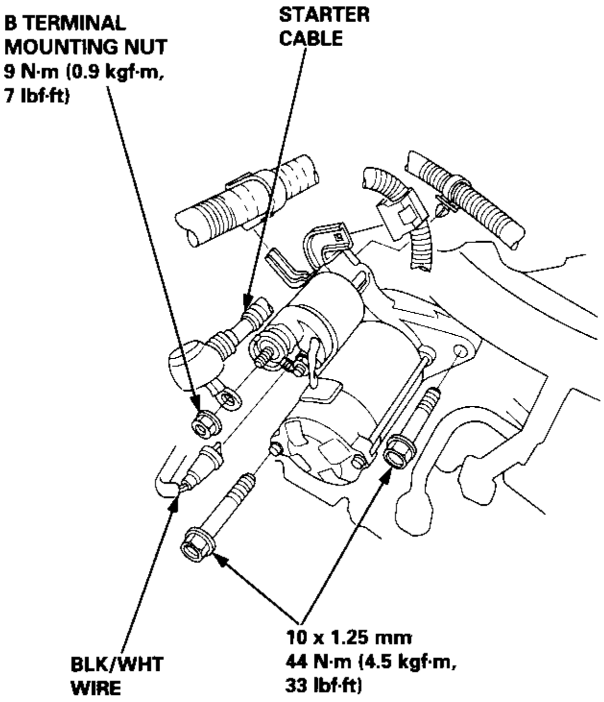
1. Check the hold-in coil for continuity between the S terminal and the armature housing (ground). The coil is OK if there is continuity.



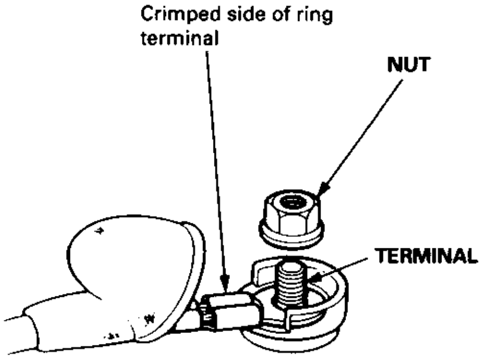
2. Check the pull-in coil for continuity between the S and M terminals. The coil is OK if there is continuity.

Starter Replacement

1. Disconnect the battery negative cable.
2. Disconnect the starter cable from the B terminal on the solenoid, then disconnect the BLK/WHT wire from the S terminal.



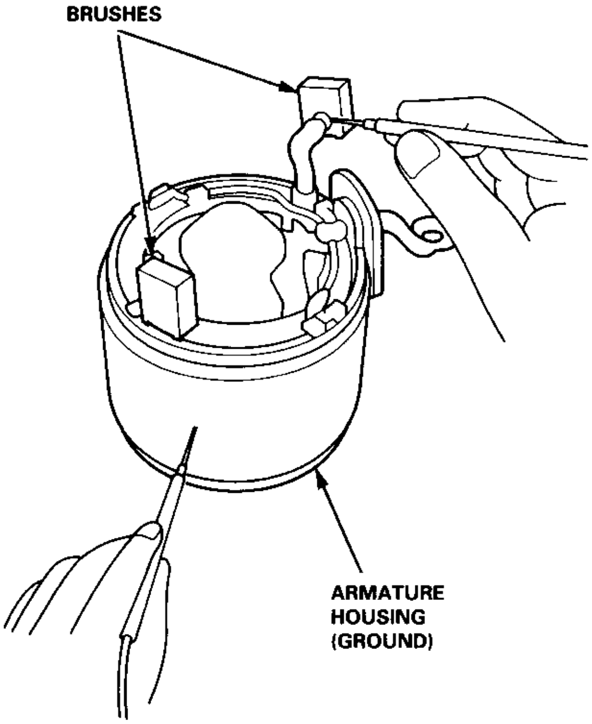
3. Remove the two bolts holding the starter, then remove the starter.
4. Install in the reverse order of removal. When installing the starter cable, make sure that the crimped side of the ring terminal is facing out.



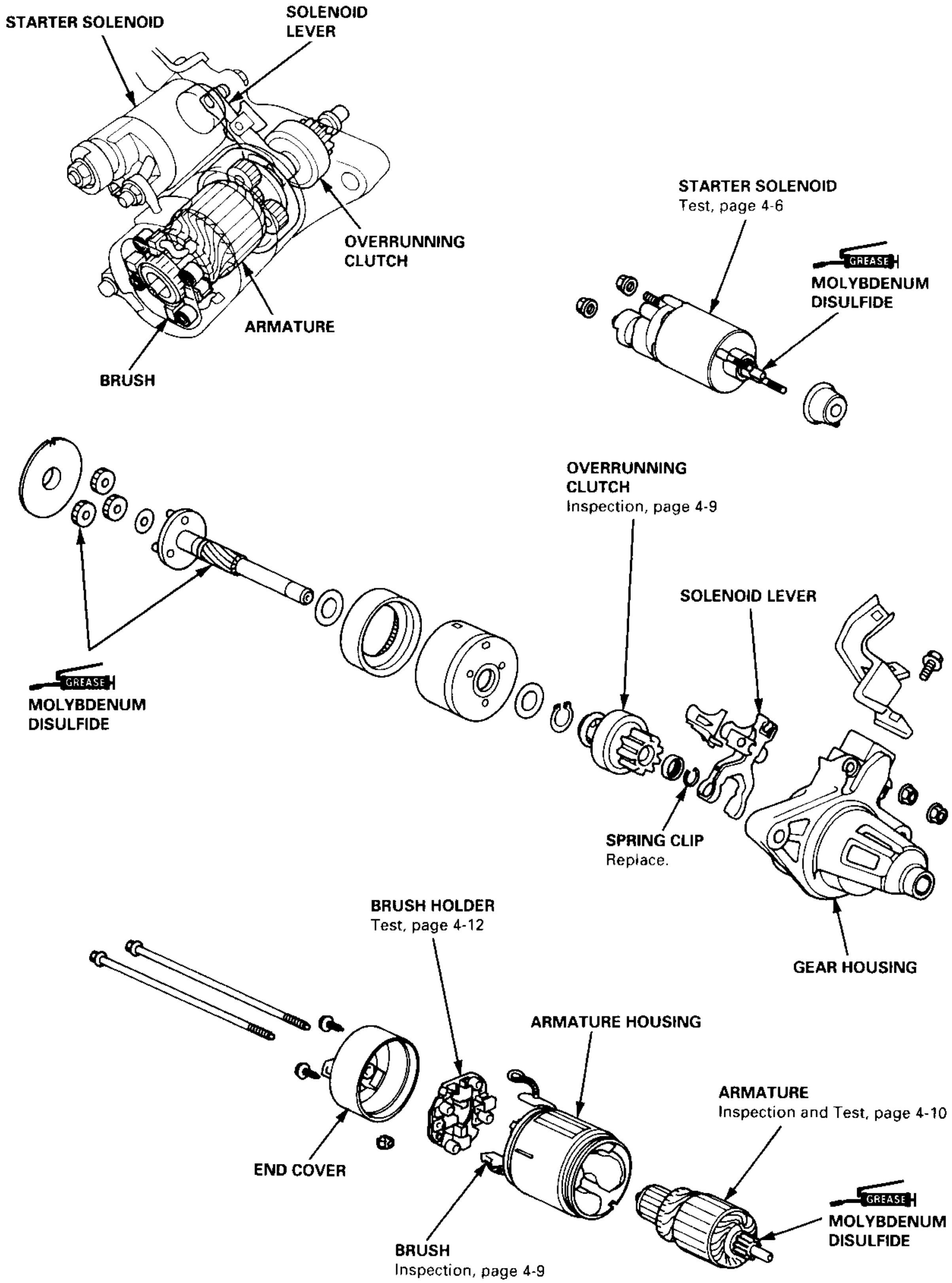
5. Connect the battery positive cable and negative cable to the battery.

Field Winding Test

1. Check for continuity between the brushes. If there's no continuity, replace the armature housing.
2. Check for continuity between each brush and the armature housing (ground). If there is continuity, replace the armature housing.



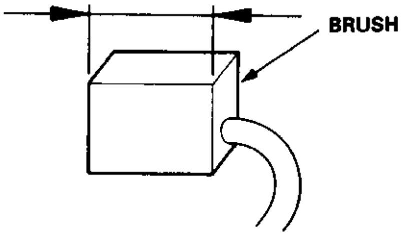
Starter Overhaul



Brush Inspection

Measure the brush length. If it is not within the service limit, replace the brush (or brush holder assembly).

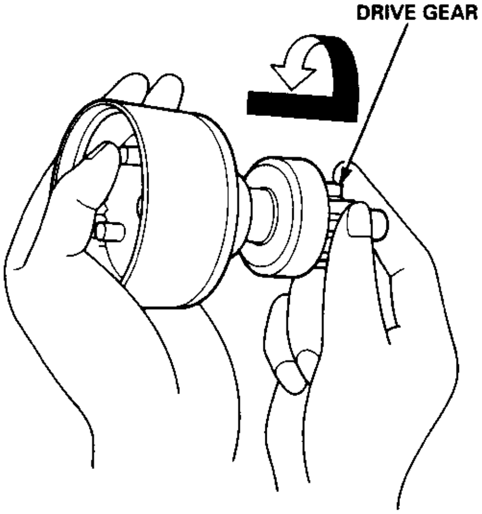
Brush Length
Standard (New): **14.0 – 14.5 mm (0.55 – 0.57 in)**
Service Limit: **9.0 mm (0.35 in)**



NOTE: To seat new brushes after installing them in their holders, slip a strip of #500 or #600 sandpaper, with the grit side up, over the commutator and smoothly rotate the armature. The contact surface of the brushes will be sanded to the same contour as the commutator.

Overrunning Clutch Inspection

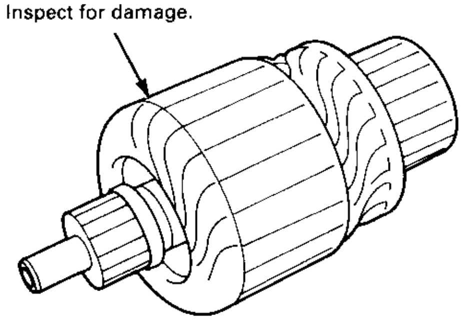
1. Slide the overrunning clutch along the shaft. Does it move freely? If not, replace it.
2. Rotate the overrunning clutch both ways. Does it lock in one direction and rotate smoothly in reverse? If it does not lock in either direction or it locks in both directions, replace it.



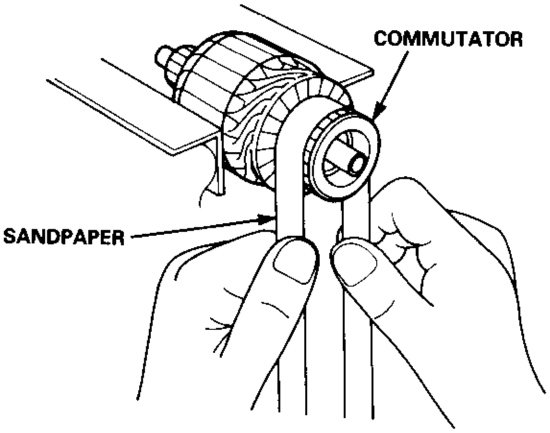
3. If the starter drive gear is worn or damaged, replace the overrunning clutch assembly; the gear is not available separately.
4. Check the condition of the torque converter ring gear or the flywheel ring gear if the starter drive gear teeth are damaged.

Armature Inspection and Test

1. Inspect the armature for wear or damage due to contact with the field winding. If there is wear or damage, replace the armature.

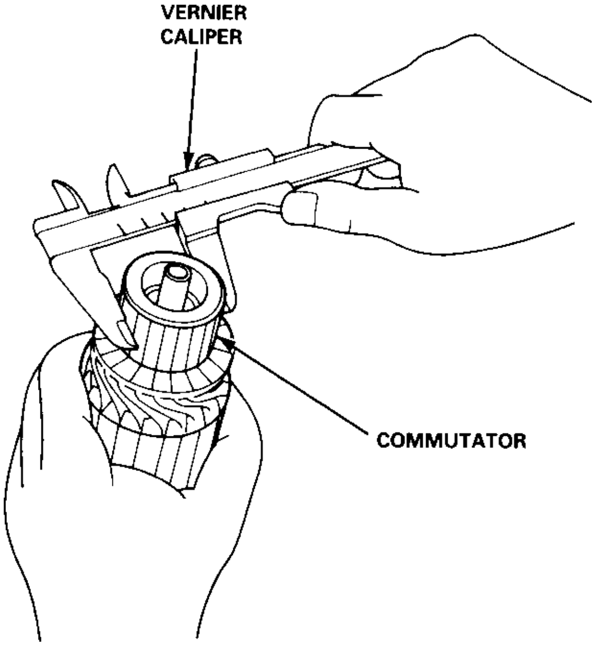


2. Check the commutator surface. If the surface is dirty or burnt, resurface with emery cloth or a lathe within the following specifications, or recondition with #500 or #600 sandpaper.



3. Check the commutator diameter. If commutator diameter is below the service limit, replace the armature.

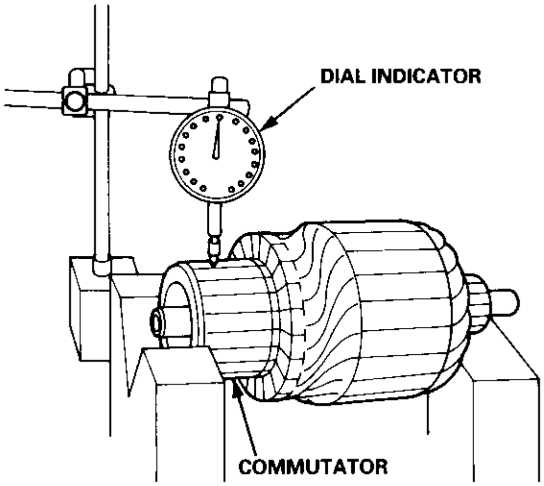
Commutator Diameter
Standard (New): 27.9 – 28.0 mm (1.09 – 1.10 in)
Service Limit: 27.0 mm (1.06 in)



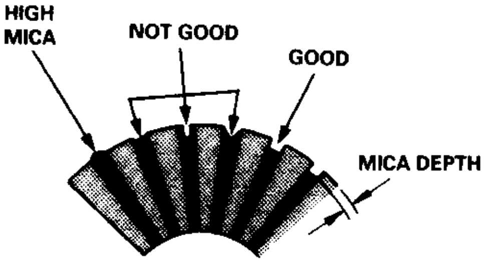
4. Measure the commutator runout.

- If the commutator runout is within the service limit, check the commutator for carbon dust or brass chips between the segments.
- If the commutator runout is not within the service limit, replace the armature.

Commutator Runout
Standard (New): 0 – 0.02 mm (0 – 0.0008 in)
Service Limit: 0.05 mm (0.002 in)

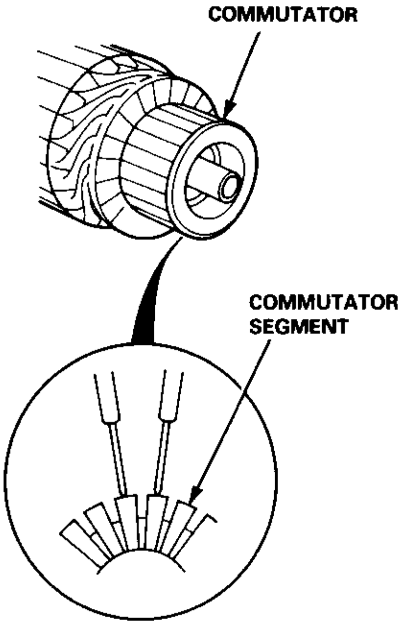


5. Check the mica depth. If necessary, undercut the mica with a hacksaw blade to achieve proper depth. If the service limit cannot be maintained, replace the armature.

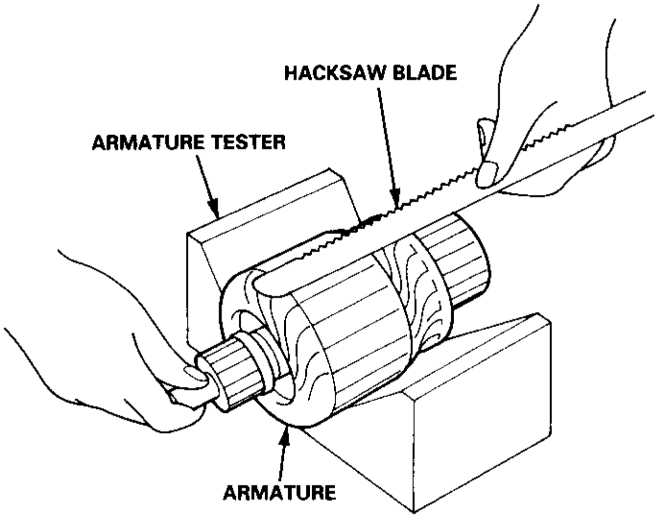


Commutator Mica Depth
Standard (New): 0.5 – 0.8 mm (0.02 – 0.03 in)
Service Limit: 0.2 mm (0.008 in)

6. Check for continuity between the segments of the commutator. If an open circuit exists between any segments, replace the armature.

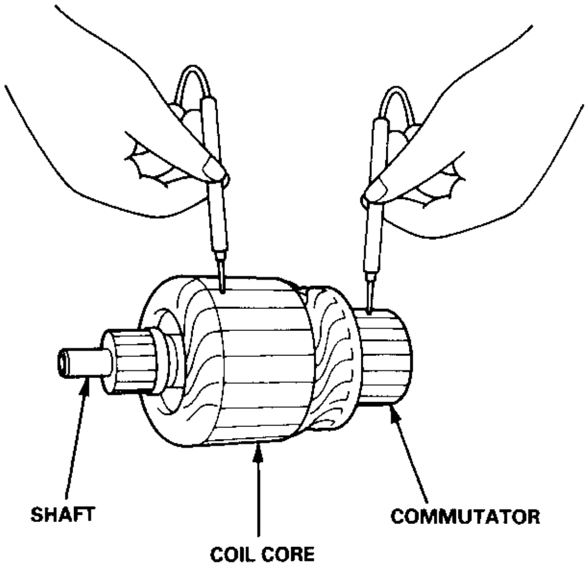


7. Place the armature on an armature tester. Hold a hacksaw blade on the armature core.



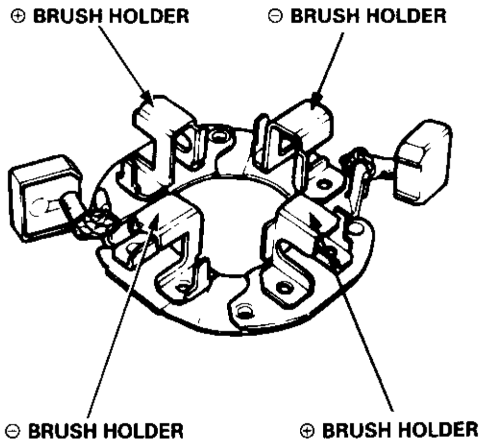
If the blade is attracted to the core or vibrates while the core is turned, the armature is shorted. Replace the armature.

8. With an ohmmeter, check that no continuity exists between the commutator and armature coil core, and between the commutator and armature shaft. If there is continuity, replace the armature.

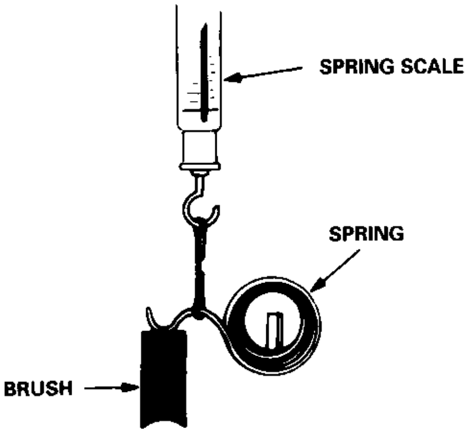


Brush Holder Test

1. Check that there is no continuity between the ⊕ and ⊖ brush holders. If there is continuity, replace the brush holder assembly.



2. Insert the brush into the brush holder, and bring the brush into contact with the commutator, then attach a spring scale to the spring. Measure the spring tension at the moment the spring lifts off the brush.

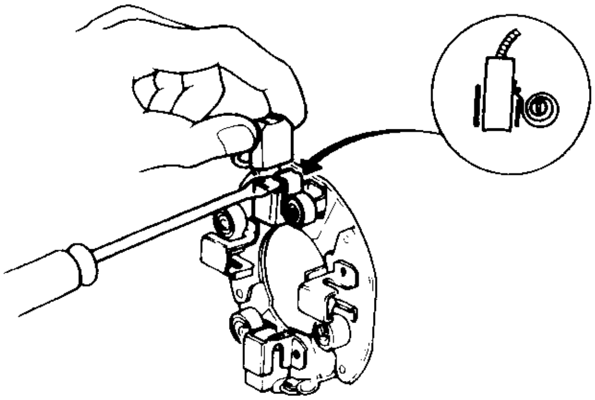


Spring Tension: **13.7 – 17.7 N**
(1.40 – 1.80 kgf, 3.09 – 4.00 lbf)

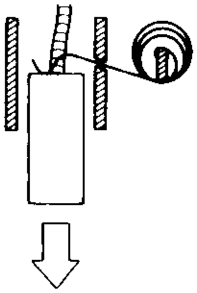
Starter Reassembly

NOTE: Use the illustration on page 4-8 as reference for reassembly.

1. Pry back each brush spring with a screwdriver, then position the brush about halfway out of its holder, and release the spring to hold it there.



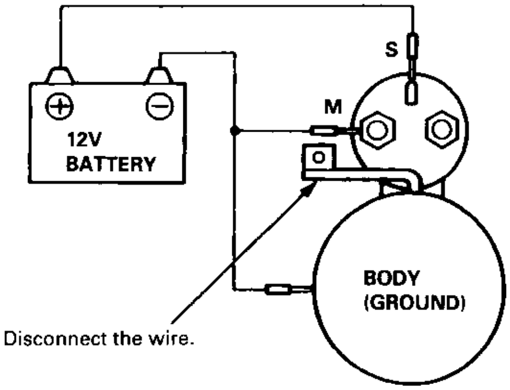
2. Install the armature in the housing. Next, pry back each brush spring again, and push the brush down until it seats against the commutator, then release the spring against the end of the brush.



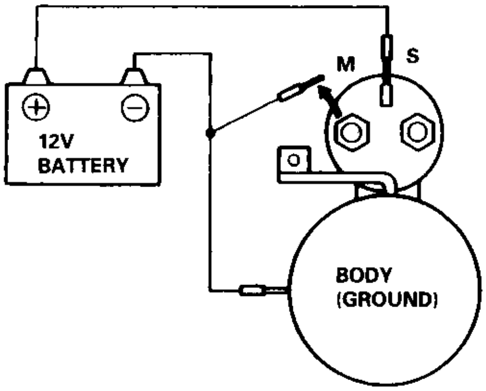
3. Install the end cover on the brush holder.

Performance Test

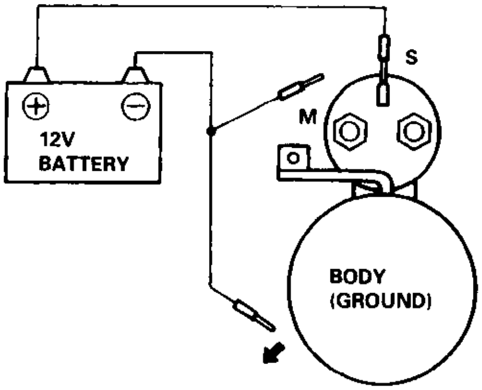
1. Disconnect the wire from terminal M.
2. Make a connection as described below using as heavy a wire as possible (preferably equivalent to the wire used for the vehicle).
3. Connect the battery as shown. If the starter pinion pops out, it is working properly. To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.



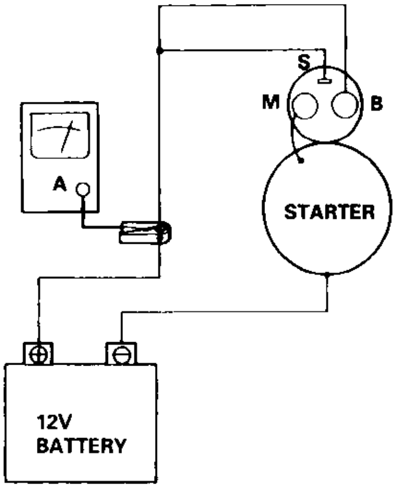
4. Disconnect the battery from the M terminal. If the pinion does not retract, the hold-in coil is working properly. To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.



5. Disconnect the battery also from the body. If the pinion retracts immediately, it is working properly. To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.



6. Clamp the starter firmly in a vise.
7. Connect the starter to the battery as described in the diagram below, and confirm that the motor starts and keeps rotating.



8. If the electric current and motor speed meet the specifications when the battery voltage is at 11.5 V, the starter is working properly.

Specifications:

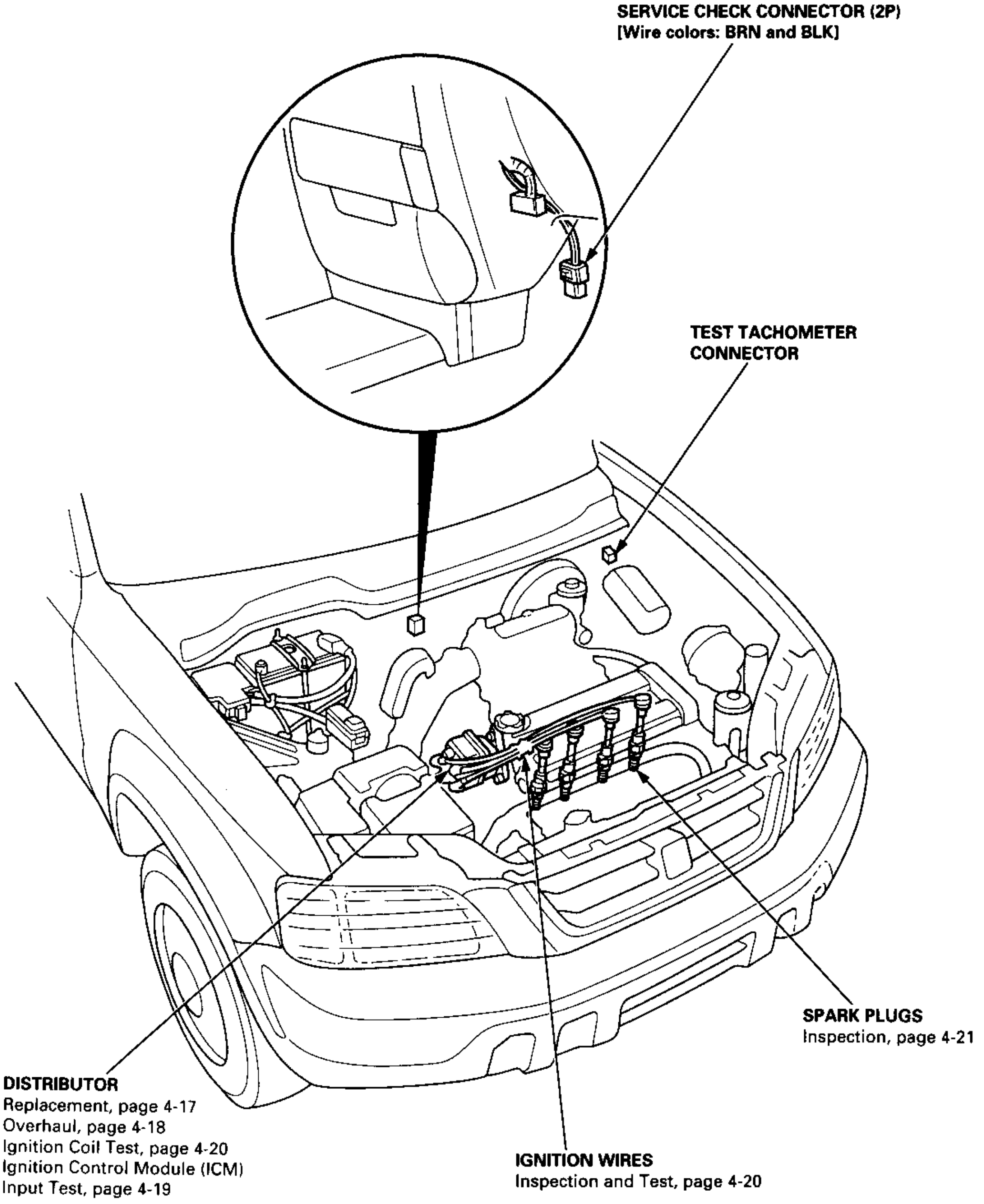
Maker	Electric current	Motor speed
DENSO	90 A or less	3,000 rpm or more

Ignition System

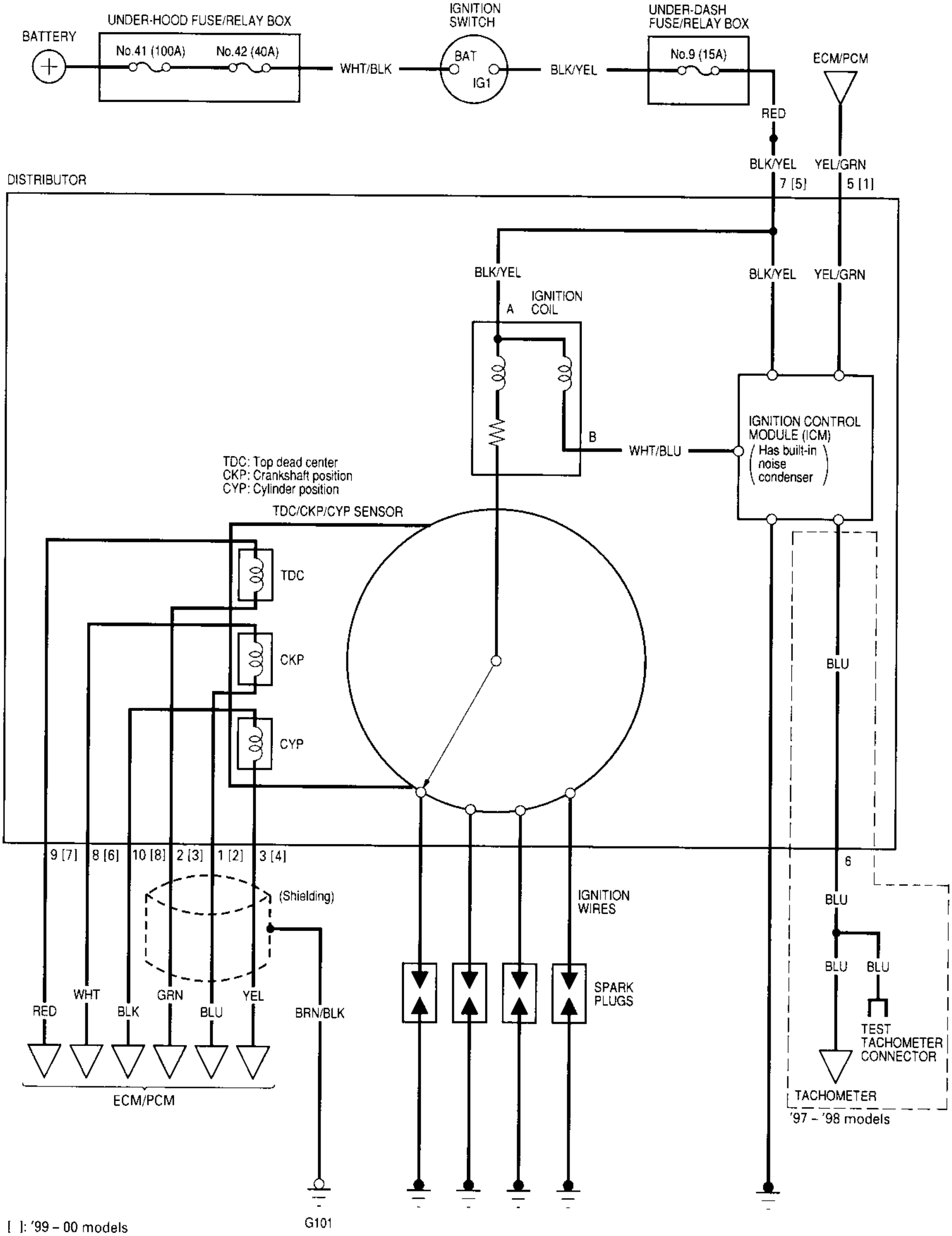
Component Location Index

IGNITION TIMING CONTROL SYSTEM

- Idle speed Inspection/Adjustment, section 11
- Inspection and Setting, page 4-16



Circuit Diagram

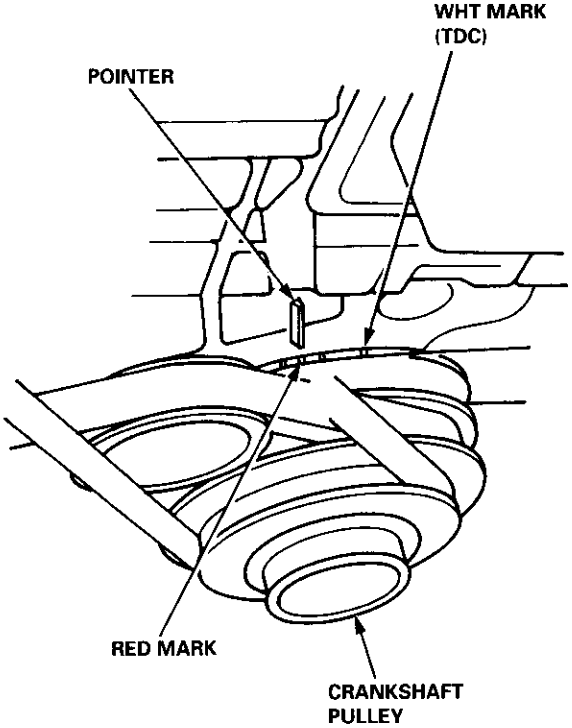


[ ]: '99 – 00 models

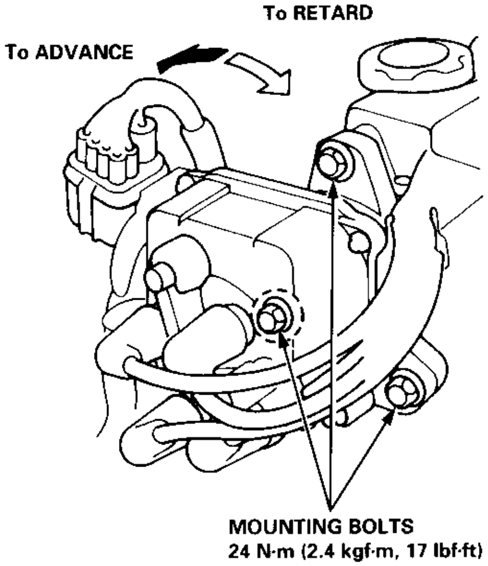
Ignition Timing Inspection and Setting

1. Check the idle speed, and adjust it if necessary (see section 11).
2. Pull out the service check connector 2P (BRN and BLK wires) from the connector holder located under the dash on the front passenger side, then connect the SCS service connector (P/N 07PAZ – 0010100) to it.
3. Start the engine. Hold the engine at 3,000 rpm with no load (A/T in N or P, M/T in neutral) until the radiator fan comes on, then let it idle.
4. Connect the timing light to the No. 1 ignition wire, then point the light toward the pointer on the timing belt cover.
5. Check the ignition timing in no load conditions: headlights, blower fan, rear window defogger, and air conditioner are not operating.

   Ignition Timing:
   M/T: 16° ± 2° BTDC (RED) idling in neutral
   A/T: 16° ± 2° BTDC (RED) idling in N or P



6. If necessary, adjust the ignition timing as follows. Loosen the distributor mounting bolts, and turn the distributor ignition (DI) housing counterclockwise to advance the timing or clockwise to retard the timing.

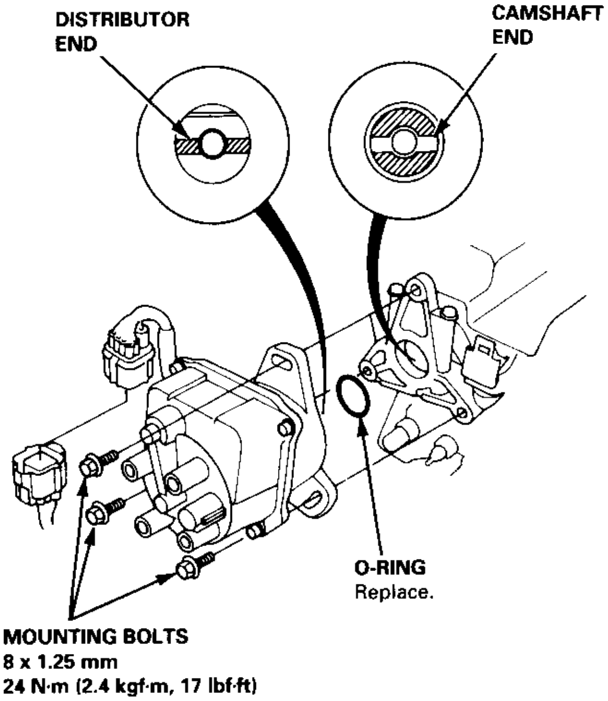


7. Tighten the distributor mounting bolts, and recheck the ignition timing.
8. Disconnect the SCS service connector from the service check connector.

Distributor Replacement

Removal:

1. Disconnect the connector from the distributor.
2. Disconnect the ignition wires from the distributor ignition (DI) cap.
3. Remove the mounting bolts from the distributor, then remove the distributor from the cylinder head.

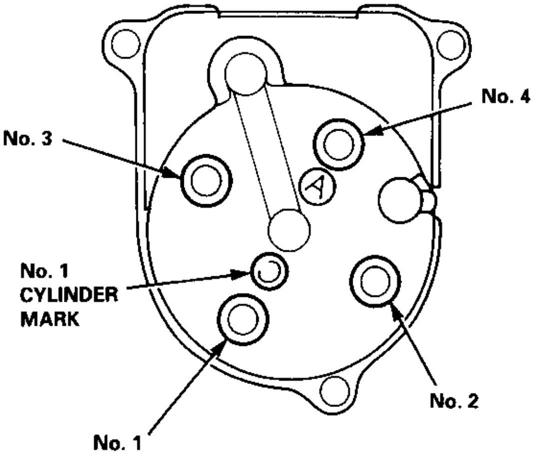


Installation:

1. Bring the No. 1 piston to compression stroke TDC.
2. Coat a new O-ring with engine oil, then install it.
3. Align the lug on the end of the distributor and its mating grooves in the camshaft end, then slip the distributor into position.

   NOTE: The lug on the end of the distributor and its mating grooves in the camshaft end are both offset to eliminate the possibility of installing the distributor 180° out of time.

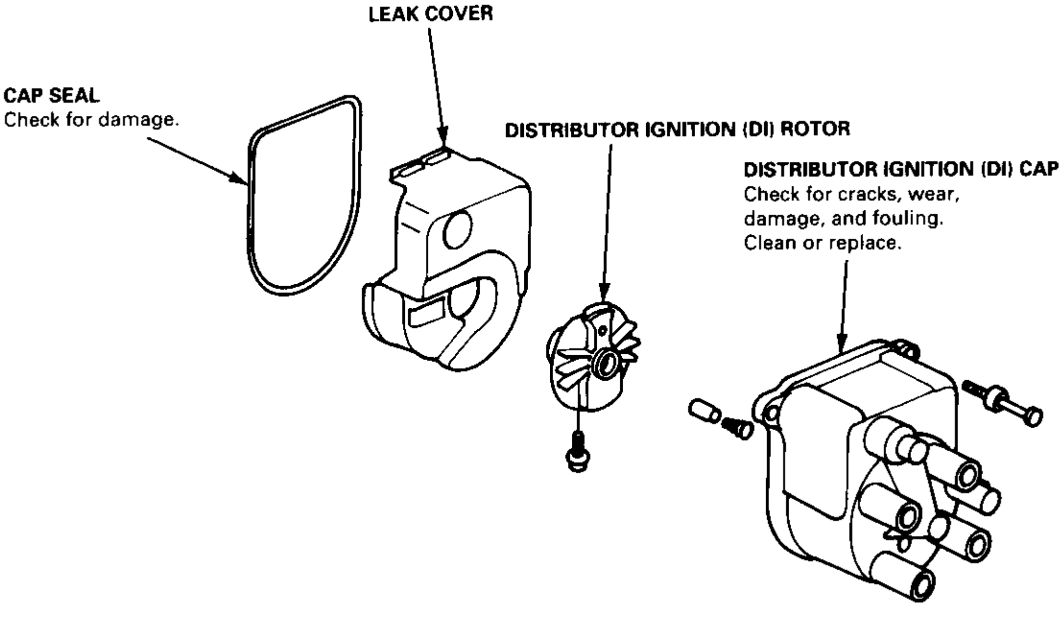
4. Install the mounting bolts, and tighten them lightly.
5. Connect the ignition wires to the distributor ignition (DI) cap as shown.

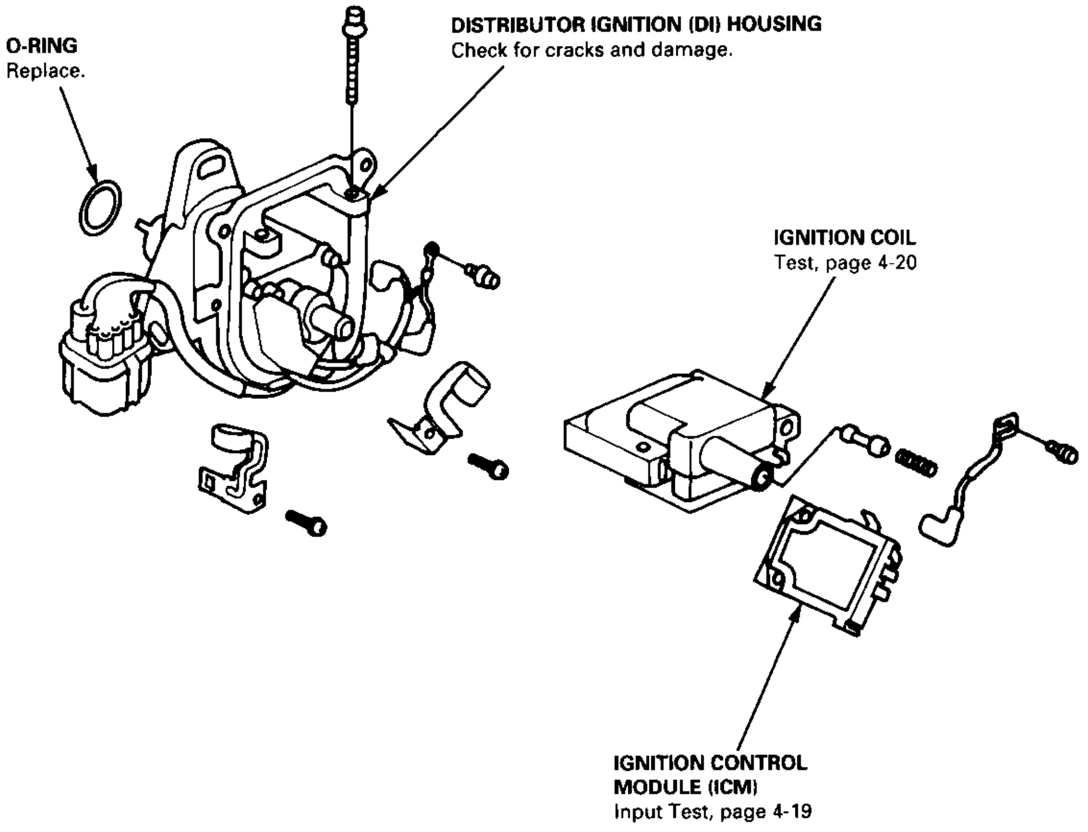


6. Connect the connector to the distributor.
7. Set the ignition timing (see previous page).
8. After setting the ignition timing, tighten the mounting bolts.

Ignition System

Distributor Overhaul



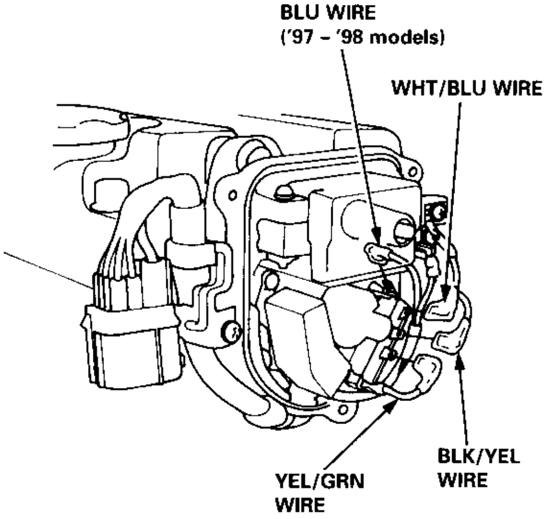


Ignition Control Module (ICM) Input Test

NOTE:

- See section 11 when the malfunction indicator lamp (MIL) comes on.
- Perform an input test for the ignition control module (ICM) after finishing the fundamental tests for the ignition system and the fuel and emissions systems.
- '97 – '98 models: The tachometer should operate normally if the ICM is OK.

1. Remove the distributor ignition (DI) cap, the distributor ignition (DI) rotor, and the leak cover.
2. Disconnect the wires from the ICM.



3. Turn the ignition switch ON (II). Check for voltage between the BLK/YEL wire and body ground. There should be battery voltage.
   - If there is no battery voltage, check the BLK/YEL wire between the ignition switch and the ICM.
   - If there is battery voltage, go to step 4.
4. Turn the ignition switch ON (II). Check for voltage between the WHT/BLU wire and body ground. There should be battery voltage.
   - If there is no battery voltage, check:
     - — ignition coil.
     - — WHT/BLU wire between the ICM and ignition coil.
   - If there is battery voltage, go to step 5.
5. '97 model: Disconnect the ECM/PCM connector A (32P). Check for continuity on the YEL/GRN wire between the ICM and ECM/PCM. There should be continuity.
   '98 – 00 models: Disconnect the ECM/PCM connector B (25P). Check for continuity on the YEL/GRN wire between the ICM and ECM/PCM. There should be continuity.
6. Check for continuity on the YEL/GRN wire to body ground. There should be no continuity.
7. Reconnect the ECM/PCM connector.
8. '97 – '98 models: Check for continuity on the BLU wire between the test tachometer connector and the ICM. There should be continuity.
9. '97 – '98 models: Check for continuity on the BLU wire to body ground. There should be no continuity.
10. If all the tests are normal, replace the ICM.

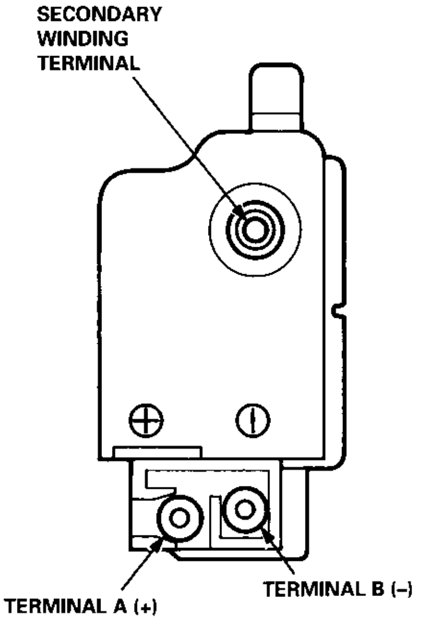
Ignition Coil Test

Using an ohmmeter, measure resistance between the terminals. If the resistance is not within specifications, replace the ignition coil.

NOTE: Resistance will vary with the coil temperature; specifications are at 68°F (20°C).

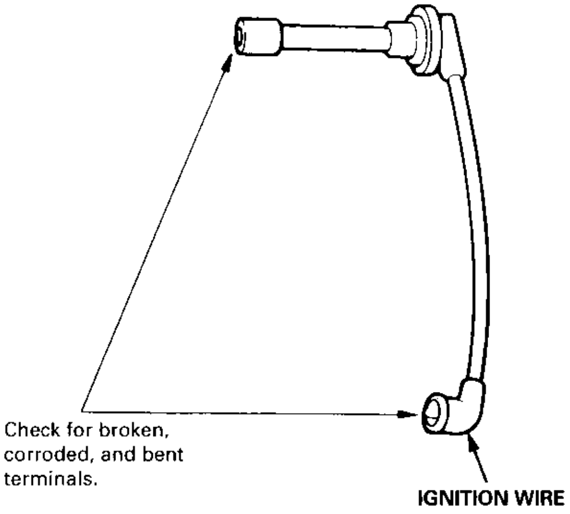
Primary Winding Resistance
(Between the A and B terminals):
0.63 – 0.77 Ω

Secondary Winding Resistance
(Between the A and secondary winding terminals):
12.8 – 19.2 kΩ



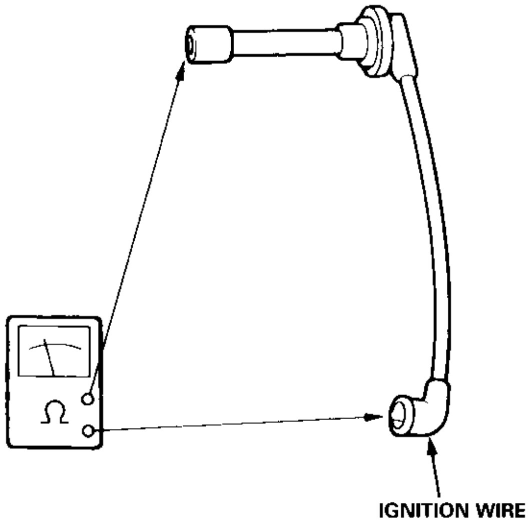
Ignition Wire Inspection and Test

1. Carefully remove the ignition wires by pulling on the rubber boots. Do not bend the wires; you might break them inside.
2. Check the condition of the ignition wire terminals. If any terminal is corroded, clean it, and if it is broken or distorted, replace the ignition wire.



3. Connect the ohmmeter probes and measure resistance.

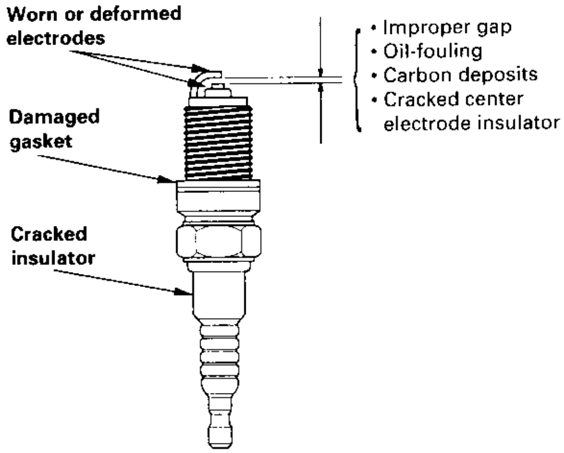
   Ignition Wire Resistance:
   25 kΩ max. at 68°F (20°C)



4. If the resistance exceeds 25 kΩ, replace the ignition wire.

Spark Plug Inspection

- Inspect the electrodes and ceramic insulator for:



Burned or worn electrodes may be caused by:

- Advanced ignition timing
- Loose spark plug
- Plug heat range too hot
- Insufficient cooling

Fouled plug may be caused by:

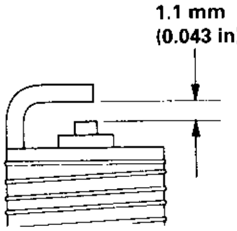
- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Plug heat range too cold
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition wires

2. Check the electrode gap.

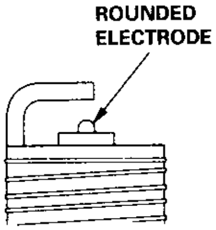
- Adjust the gap with a suitable gapping tool.

Electrode Gap

Standard	$1.1^{\;0}_{-0.1}$ mm ($0.043^{\;0}_{-0.004}$ in)



- Replace the plug if the center electrode is rounded as shown below:



Spark Plugs

'97 – '98 models:

ZFR5F-11 (NGK) KJ16CR-L11 (DENSO)

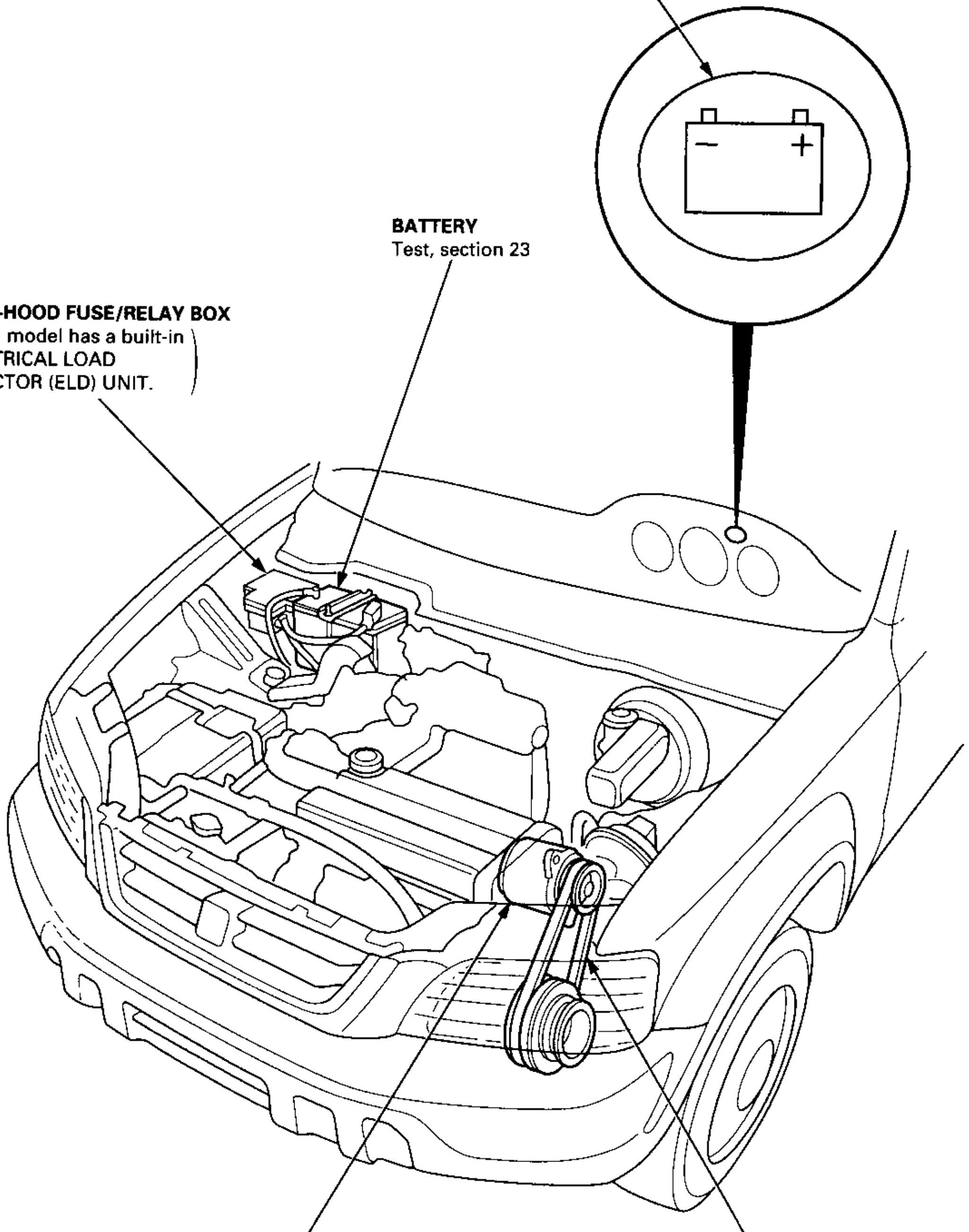
'99 – 00 models:

ZFR6F-11 (NGK) KJ20CR-L11 (DENSO)

3. 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).

Charging System

Component Location Index



CHARGING SYSTEM LIGHT
(In the gauge assembly)
Test, page 4-24

BATTERY
Test, section 23

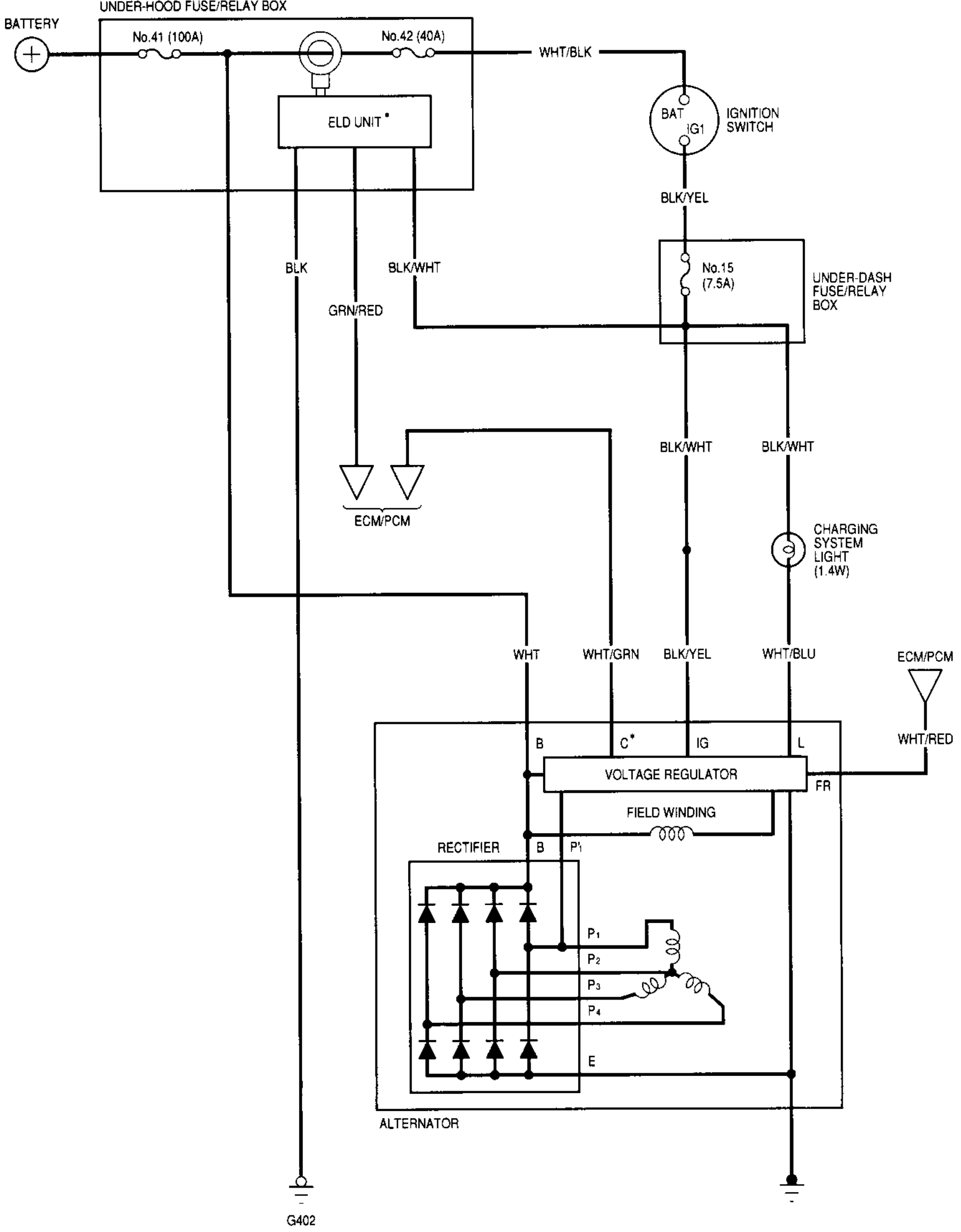
UNDER-HOOD FUSE/RELAY BOX
(U.S.A. model has a built-in ELECTRICAL LOAD DETECTOR (ELD) UNIT.)

ALTERNATOR
Troubleshooting, page 4-24
Replacement, page 4-30
Overhaul, page 4-31
Rectifier Test, page 4-32

ALTERNATOR BELT
Inspection and Adjustment, page 4-34

Circuit Diagram

* : U. S. A. model



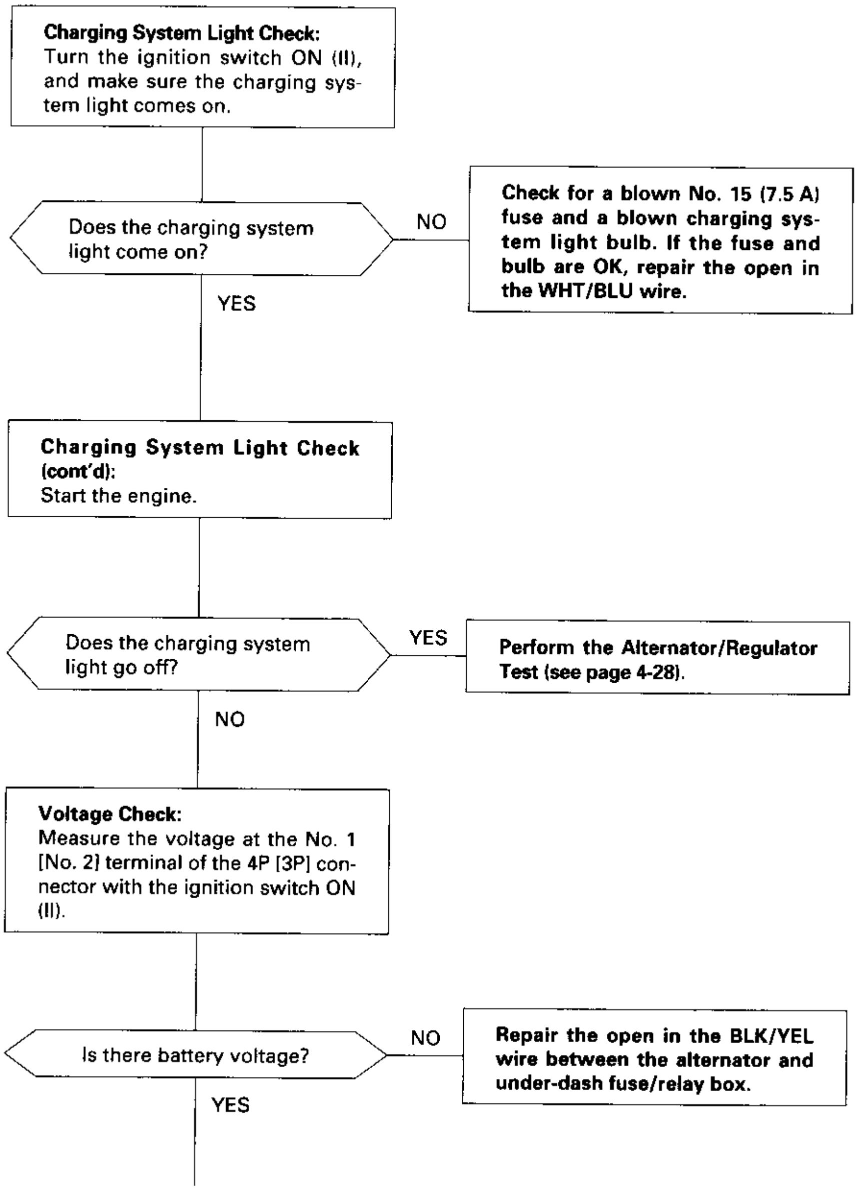
Charging System

Troubleshooting

If the charging system light does not come on or does not go off, or the battery is dead or low, test the following items in the order listed below:

1. Battery (see section 23)
2. Charging system light
3. Voltage
4. Alternator control system (U.S.A. model)
5. Alternator/regulator

Charging System Light Test



Charging System Light Check:
Turn the ignition switch ON (II), and make sure the charging system light comes on.

Does the charging system light come on?

NO — **Check for a blown No. 15 (7.5 A) fuse and a blown charging system light bulb. If the fuse and bulb are OK, repair the open in the WHT/BLU wire.**

YES

Charging System Light Check (cont'd):
Start the engine.

Does the charging system light go off?

YES — **Perform the Alternator/Regulator Test (see page 4-28).**

NO

Voltage Check:
Measure the voltage at the No. 1 [No. 2] terminal of the 4P [3P] connector with the ignition switch ON (II).

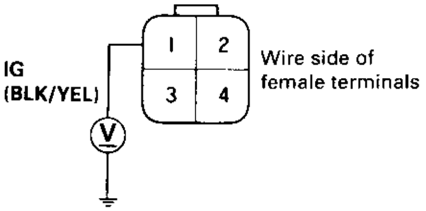
Is there battery voltage?

NO — **Repair the open in the BLK/YEL wire between the alternator and under-dash fuse/relay box.**

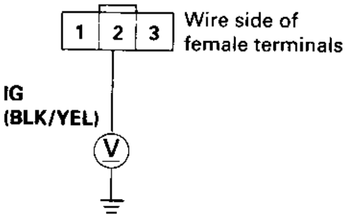
YES

(To next page)

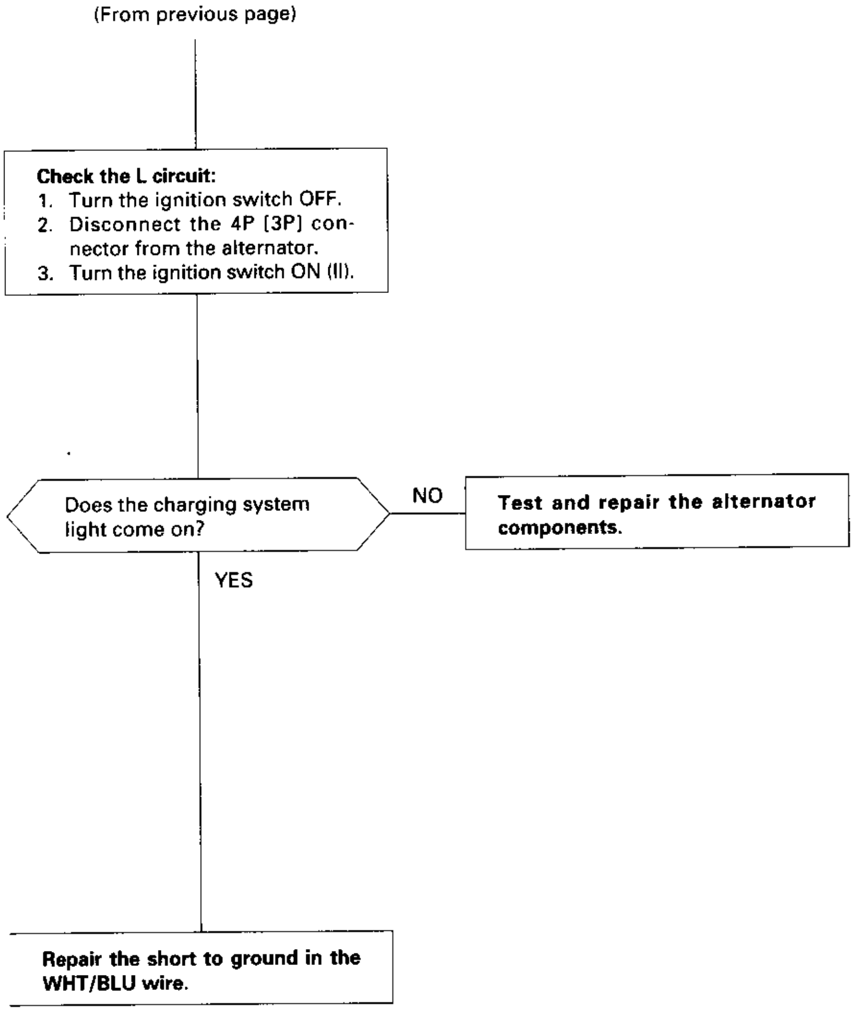
ALTERNATOR 4P CONNECTOR (U.S.A. model)



ALTERNATOR 3P CONNECTOR (Canada model)



[ ]: Canada model



(From previous page)

Check the L circuit:
1. Turn the ignition switch OFF.
2. Disconnect the 4P [3P] connector from the alternator.
3. Turn the ignition switch ON (II).

Does the charging system light come on?

Test and repair the alternator components.

Repair the short to ground in the WHT/BLU wire.

[ ]: Canada model

(cont'd)

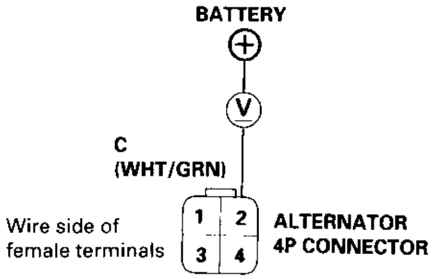
Troubleshooting (cont'd)

'97 model: Alternator Control System Test (U.S.A. model)

NOTE: Before testing, check proper operation of the ELD by checking for a DTC (see section 11).

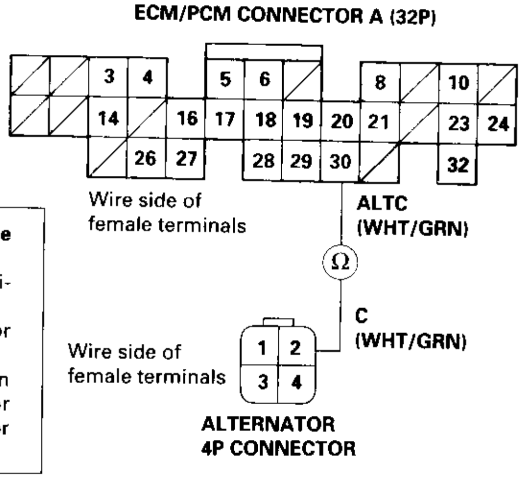
Check for a short in the circuit (ALTC line):
1. Disconnect the 4P connector from the alternator.
2. Start the engine, and turn the headlights (high beam) ON.
3. Measure voltage between the 4P connector terminal No. 2 and the positive terminal of the battery.

CAUTION: Be sure to use a voltmeter with its positive terminal connected to battery positive and its negative terminal to the 4P connector terminal No. 2.



Is there 1 V or less?

YES → **Check for an open in the wire (ALTC line):**
1. Turn the headlight and ignition switch OFF.
2. Disconnect the 32P connector from the ECM/PCM.
3. Check for continuity between the ECM/PCM 32P connector terminal No. 30 and alternator 4P connector terminal No. 2.

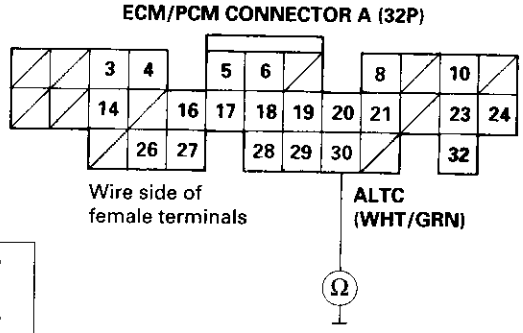


Is there continuity?

NO → **Repair open in the wire between the alternator and ECM/PCM.**

YES → **Test and repair the alternator components.**

NO → **Check for a short in the wire (ALTC line):**
1. Turn the headlight and ignition switch OFF.
2. Disconnect the 32P connector from the ECM/PCM.
3. Check for continuity between the ECM/PCM 32P connector terminal No. 30 and body ground.



Is there continuity?

NO → **Substitute a known-good ECM/PCM, and recheck.**
If prescribed voltage is now available, replace the original ECM/PCM.

YES → **Repair short in the wire between the alternator and the ECM/PCM.**

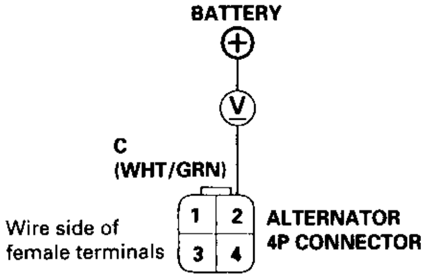
'98 – '99 models: Alternator Control System Test (U.S.A. model)

NOTE: Before testing, check proper operation of the ELD by checking for a DTC (see section 11).

Check for a short in the circuit (ALTC line):

1. Disconnect the 4P connector from the alternator.
2. Start the engine, and turn the headlights (high beam) ON.
3. Measure voltage between the 4P connector terminal No. 2 and the positive terminal of the battery.

CAUTION: Be sure to use a voltmeter with its positive terminal connected to battery positive and its negative terminal to the 4P connector terminal No. 2.

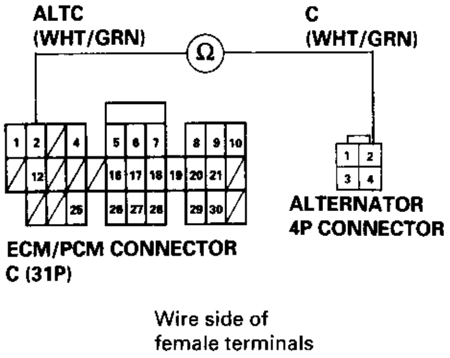


Is there 1 V or less?

YES

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

1. Turn the headlight and ignition switch OFF.
2. Disconnect the 31P connector from the ECM/PCM.
3. Check for continuity between the ECM/PCM 31P connector terminal No. 2 and alternator 4P connector terminal No. 2.



Is there continuity?

NO

Repair open in the wire between the alternator and ECM/PCM.

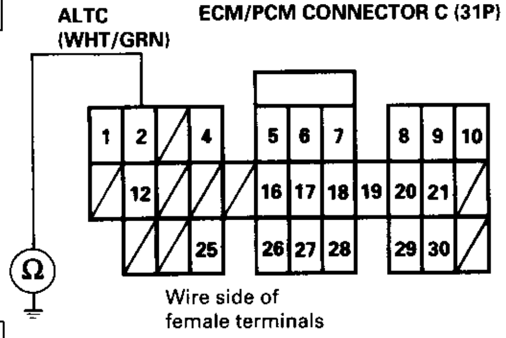
YES

Test and repair the alternator components.

NO

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

1. Turn the headlight and ignition switch OFF.
2. Disconnect the 31P connector from the ECM/PCM.
3. Check for continuity between the ECM/PCM 31P connector terminal No. 2 and body ground.



Is there continuity?

NO

Substitute a known-good ECM/PCM, and recheck. If prescribed voltage is now available, replace the original ECM/PCM.

YES

Repair short in the wire between the alternator and the ECM/PCM.

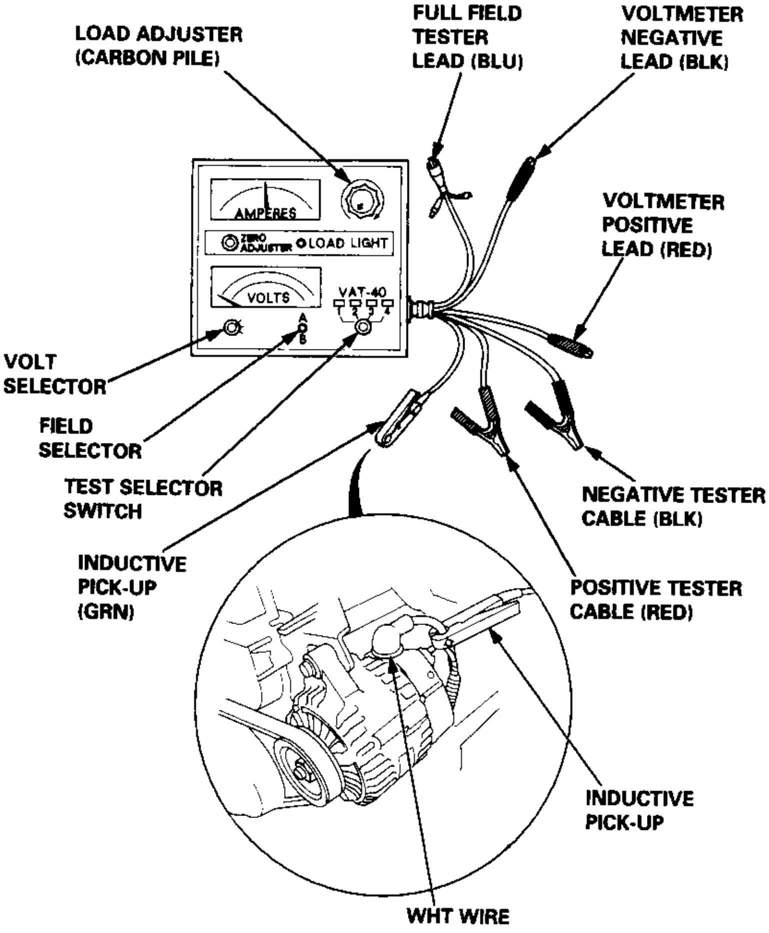
(cont'd)

Troubleshooting (cont'd)

Alternator/Regulator Test

NOTE: Make sure the battery is sufficiently charged (see section 23).

Alternator/Regulator Test:
1. Connect a Sun VAT-40 (or equivalent tester), and turn the selector switch to position 1 (starting).
2. Shift to neutral (A/T in Ⓟ or Ⓝ) position, and start the engine. Hold the engine at 3,000 rpm with no load until the radiator fan comes on, then let it idle.
3. Raise the engine speed to 2,000 rpm, and hold it there.



Is the voltage over 15.1 V?

YES → **Replace the voltage regulator.**

NO

Alternator/Regulator Test (cont'd):
1. Release the accelerator pedal, and let the engine idle.
2. Make sure all accessories are turned off. Turn the selector switch to position 2 (charging).
3. Remove the inductive pick-up, and zero the ammeter.
4. Place the inductive pick-up over the battery ground cable so that the arrow points to the battery negative terminal.
5. Raise the engine speed to 2,000 rpm, and hold it there.

Is the voltage less than 13.5 V?

YES → **Test and repair the alternator components.**

NO

Alternator/Regulator Test (cont'd):
Apply a load with a VAT-40 until the battery voltage drops to between 12 – 13.5 V.

To next page

From previous page

Is the amperage 65 A or more?

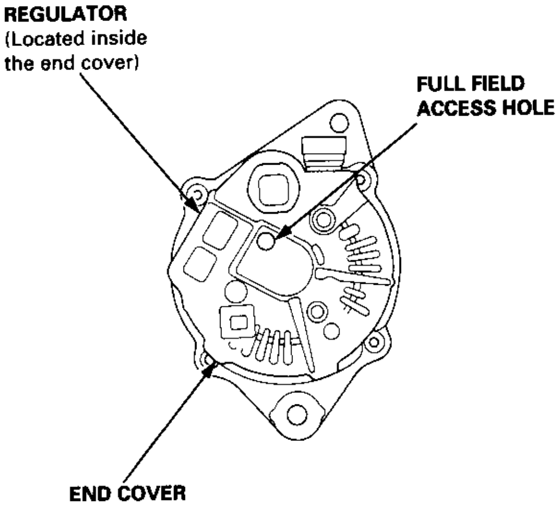
YES → **The charging system is OK.**

NO

Alternator/Regulator Test (cont'd): With the engine speed still at 2,000 rpm, full-field the alternator.

CAUTION: The voltage will rise quickly when the alternator is full-fielded. Do not allow the voltage to exceed 18 V; it may damage the electrical system.

NOTE: Attach a probe to a VAT-40 full field test lead, and insert the probe into the full field access hole at the back of the alternator. Switch the field selector to the "A (Ground)" position momentarily, and check the amperage reading.



Is the alternator output 65 A or more?

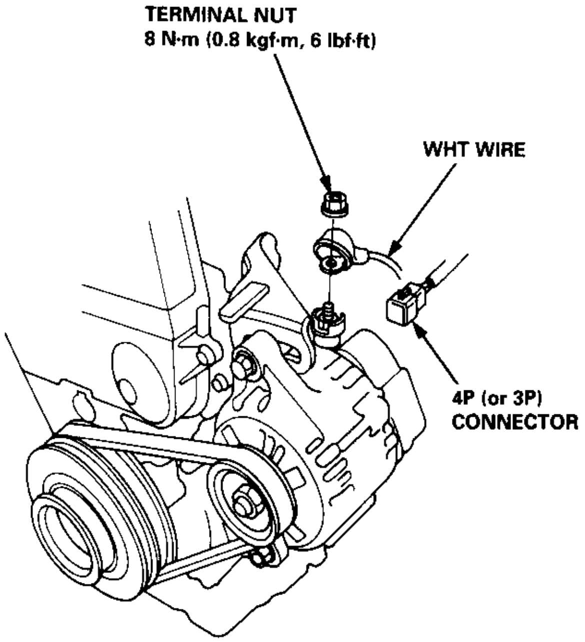
NO → **Test and repair the alternator components.**

YES

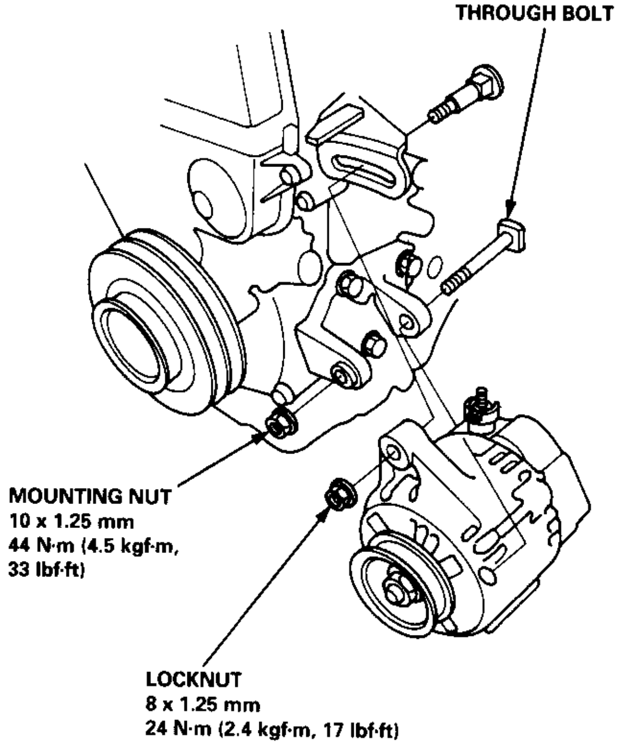
Replace the voltage regulator.

Alternator Replacement

1. Disconnect the battery negative terminal first, then the positive terminal.
2. Disconnect the 4P (or 3P) connector and WHT wire from the alternator.



3. Remove the adjusting bolt and mounting nut, then remove the alternator belt.
4. Pull out the through bolt, then remove the alternator.

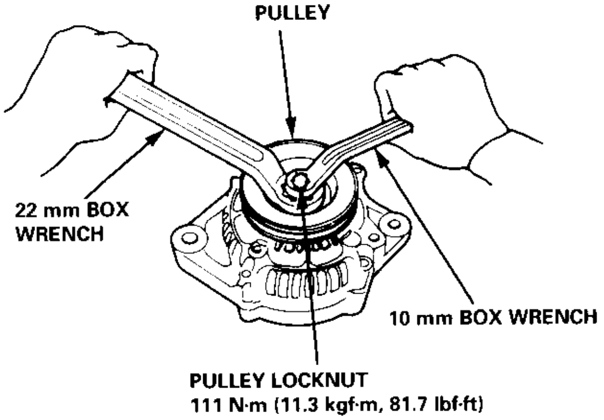


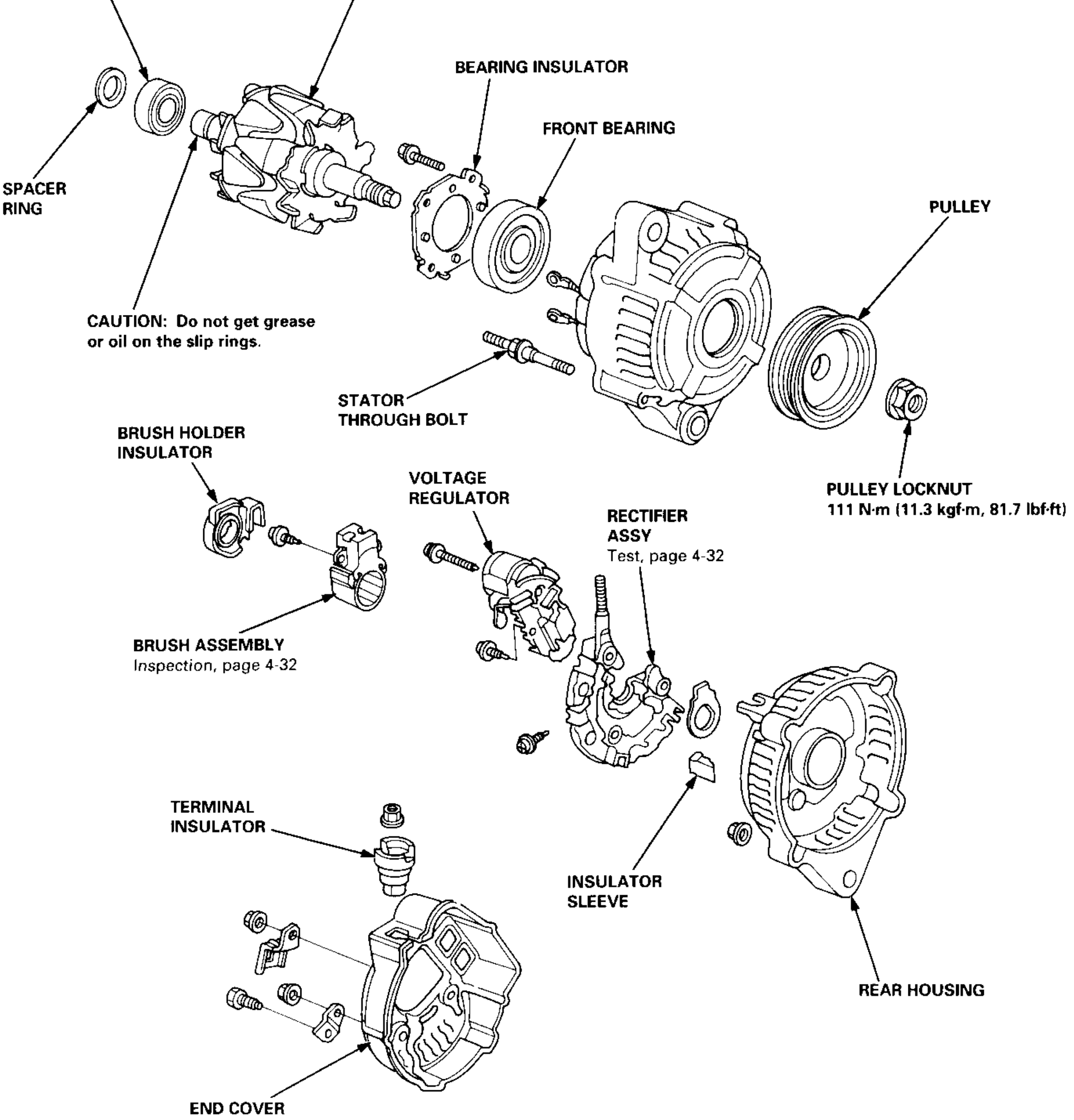
5. Install the alternator in reverse order of removal.
6. Adjust the alternator belt tension after installation (see page 4-34).

Alternator Overhaul

NOTE: Do not remove the pulley unless the front bearing needs replacement.

To loosen the pulley locknut, use the tools as shown. If necessary, use an impact wrench.

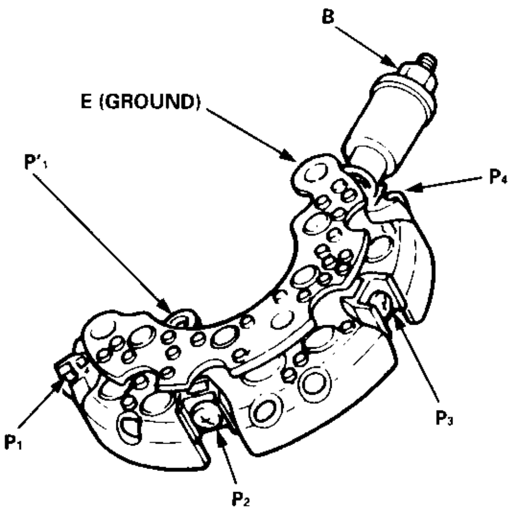




Rectifier Test

NOTE: The diodes are designed to allow current to pass in one direction while blocking it in the opposite direction. Since the alternator rectifier is made up of eight diodes (four pairs), each diode must be tested for continuity in both directions with an ohmmeter that has diode checking capability; a total of 16 checks.

1. Check for continuity in each direction between
   — the B and P terminals.
   — E (ground) and P terminals.
   All diodes should have continuity in only one direction.



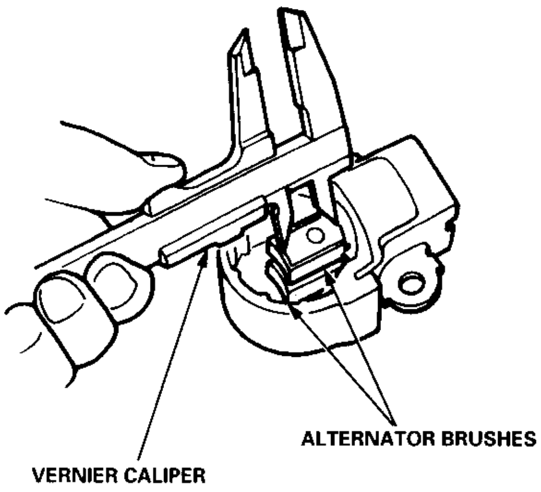
2. If any of the diodes fails, replace the rectifier assembly. (Diodes are not available separately.)

Alternator Brush Inspection

1. Remove the end cover, then take out the brush holder by removing its two screws.

2. Measure the length of the brushes with a vernier caliper.

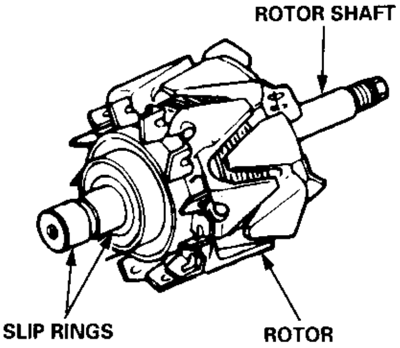
   Alternator Brush Length:
   Standard (New): 10.5 mm (0.41 in)
   Service Limit: 1.5 mm (0.06 in)



3. If the brushes are less than the service limit, replace the alternator brush assembly.

Rotor Slip Ring Test

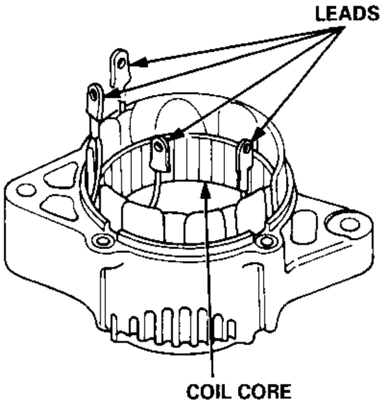
1. Check the resistance between the slip rings.
   There should be 1.8 – 3.0 ohms.
   - If resistance meets the specification, go to step 2.
   - If resistance does not meet the specification, replace the alternator.



2. Check that there is no continuity between the slip rings and the rotor or rotor shaft.
3. If the rotor fails either continuity check, replace the alternator.

Stator Test

1. Check that there is continuity between each pair of leads.



2. Check that there is no continuity between each lead and the coil core.
3. If the coil fails either continuity check, replace the alternator.

Alternator Belt Inspection and Adjustment

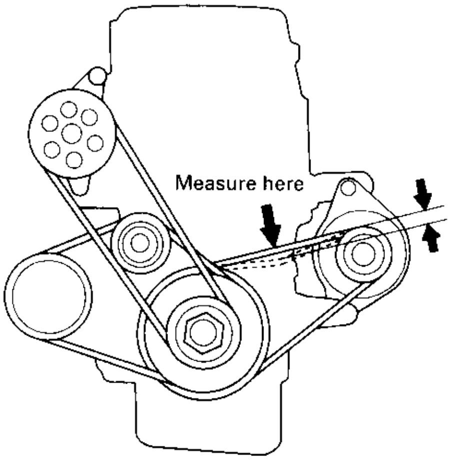
NOTE: When using a new belt, first adjust the deflection or tension to the values for the new belt, then readjust the deflection or tension to the values for the used belt after running engine for five minutes.

Deflection method:

Apply a force of 98 N (10 kgf, 22 lbf), and measure the deflection between the alternator and crankshaft pulley.

Deflection:
Used Belt: 8.5 – 11.5 mm (0.33 – 0.45 in)
New Belt: 5.5 – 8.0 mm (0.22 – 0.31 in)

NOTE: If the belt is worn or damaged, replace it.

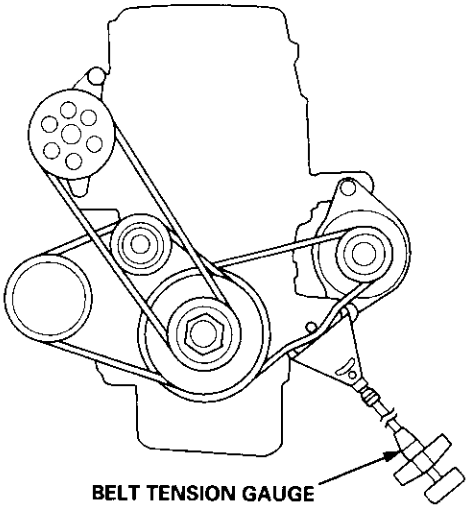


Belt tension gauge method:

Attach the belt tension gauge to the belt and measure the tension. Follow the gauge manufacturer's instructions.

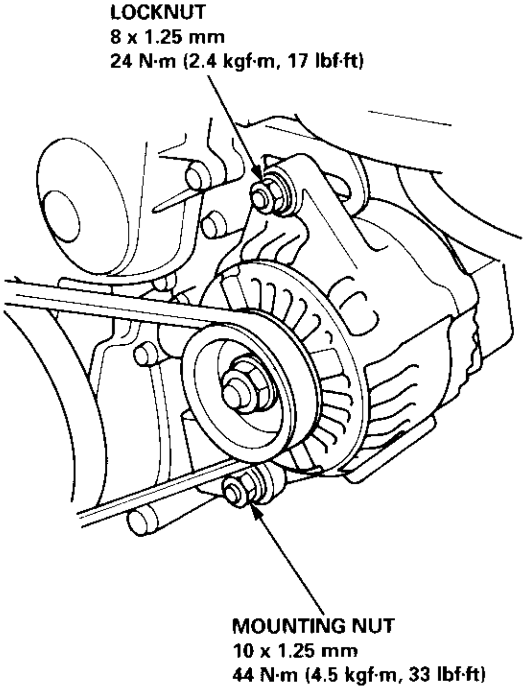
Tension:
Used Belt: 340 – 490 N (35 – 50 kgf, 77 – 110 lbf)
New Belt: 690 – 880 N (70 – 90 kgf, 150 – 200 lbf)

NOTE: If the belt is worn or damaged, replace it.



If adjustment is necessary:

1. Loosen the mounting nut and the locknut.
2. Move the alternator to obtain the proper belt tension, then retighten the nuts.

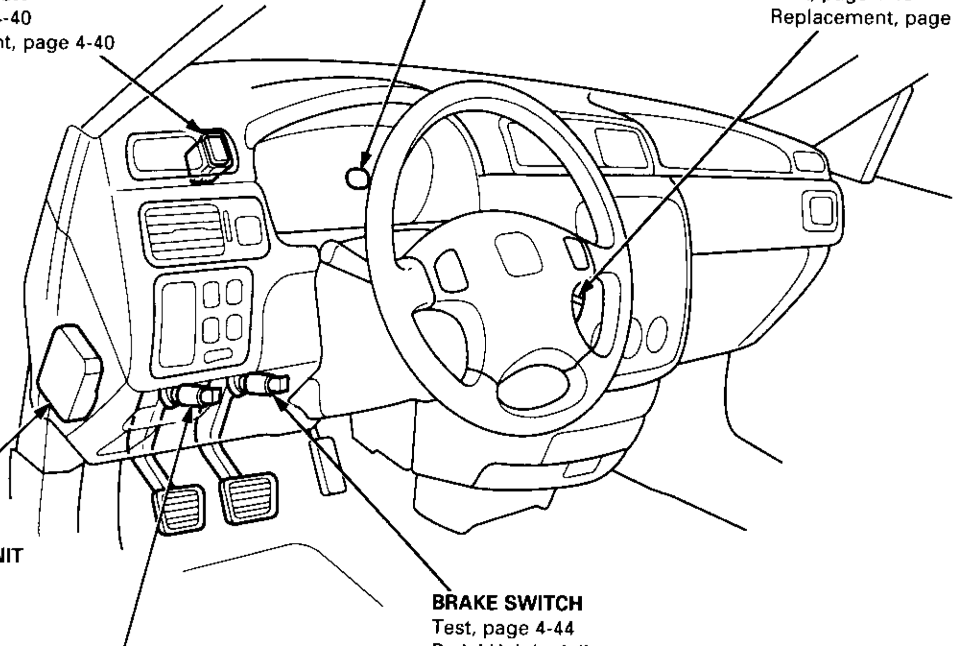


3. Recheck the deflection or tension of the belt.

   NOTE: For the power steering pump belt and A/C compressor belt adjustments, refer to section 17 and section 22.

Cruise Control

Component Location Index



CRUISE INDICATOR LIGHT
(Built into gauge assembly)
Bulb Locations, section 23

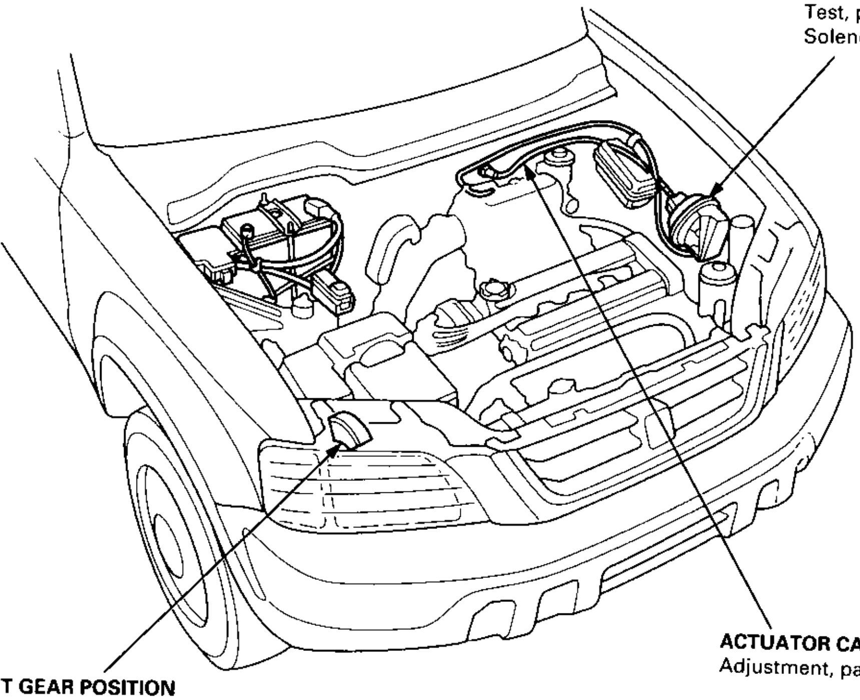
MAIN SWITCH
Test, page 4-40
Replacement, page 4-40

SET/RESUME SWITCH
Test, page 4-40
Replacement, page 4-40

CRUISE CONTROL UNIT
Input Test, page 4-38

BRAKE SWITCH
Test, page 4-44
Pedal Height Adjustment, section 19.

CLUTCH INTERLOCK SWITCH (M/T)
Test, page 4-43
Switch position adjustment, section 12

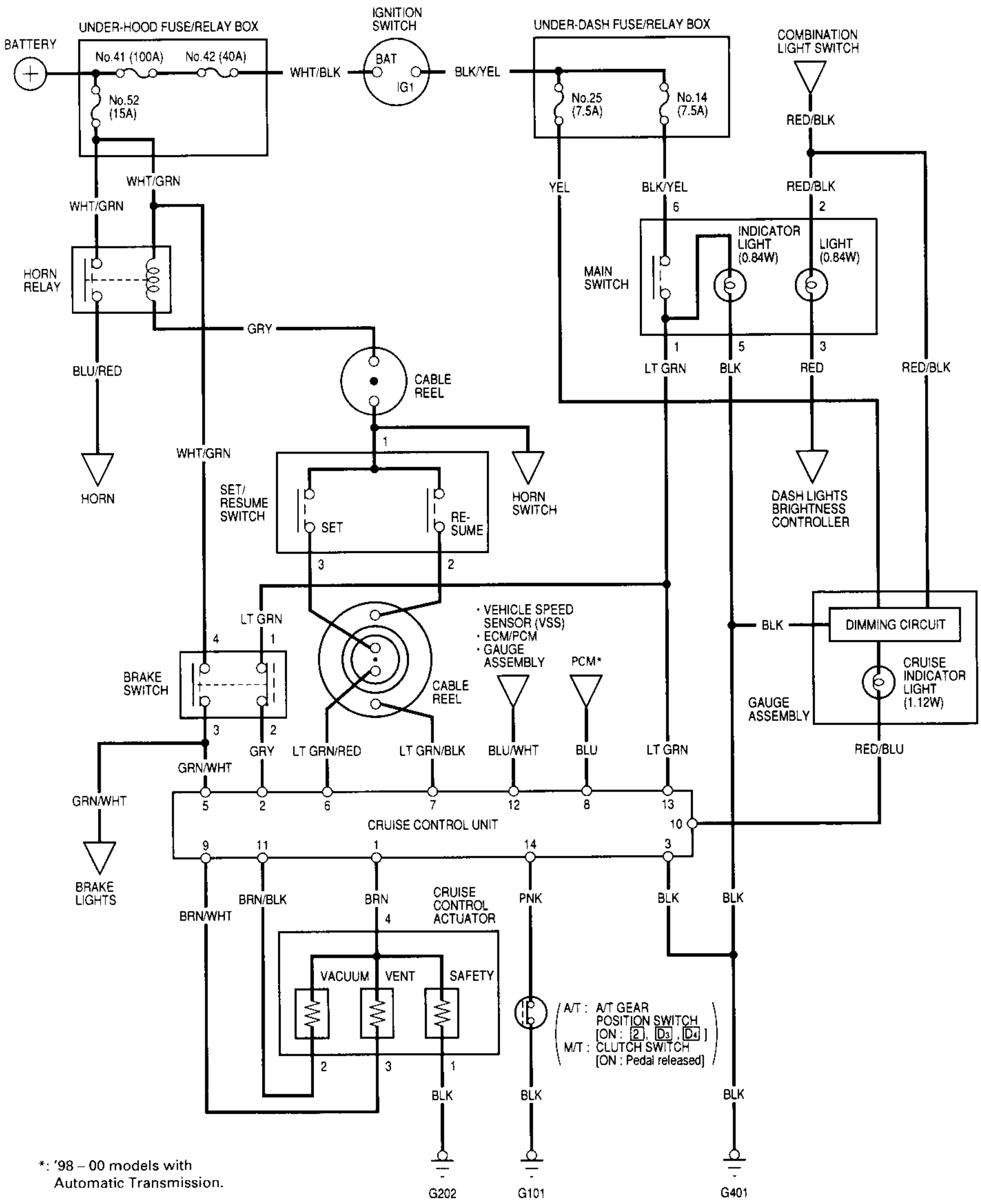


ACTUATOR ASSEMBLY and VACUUM TANK
Test, page 4-41
Solenoid Test, page 4-44

A/T GEAR POSITION SWITCH (A/T)
Test, section 14

ACTUATOR CABLE
Adjustment, page 4-43

Circuit Diagram



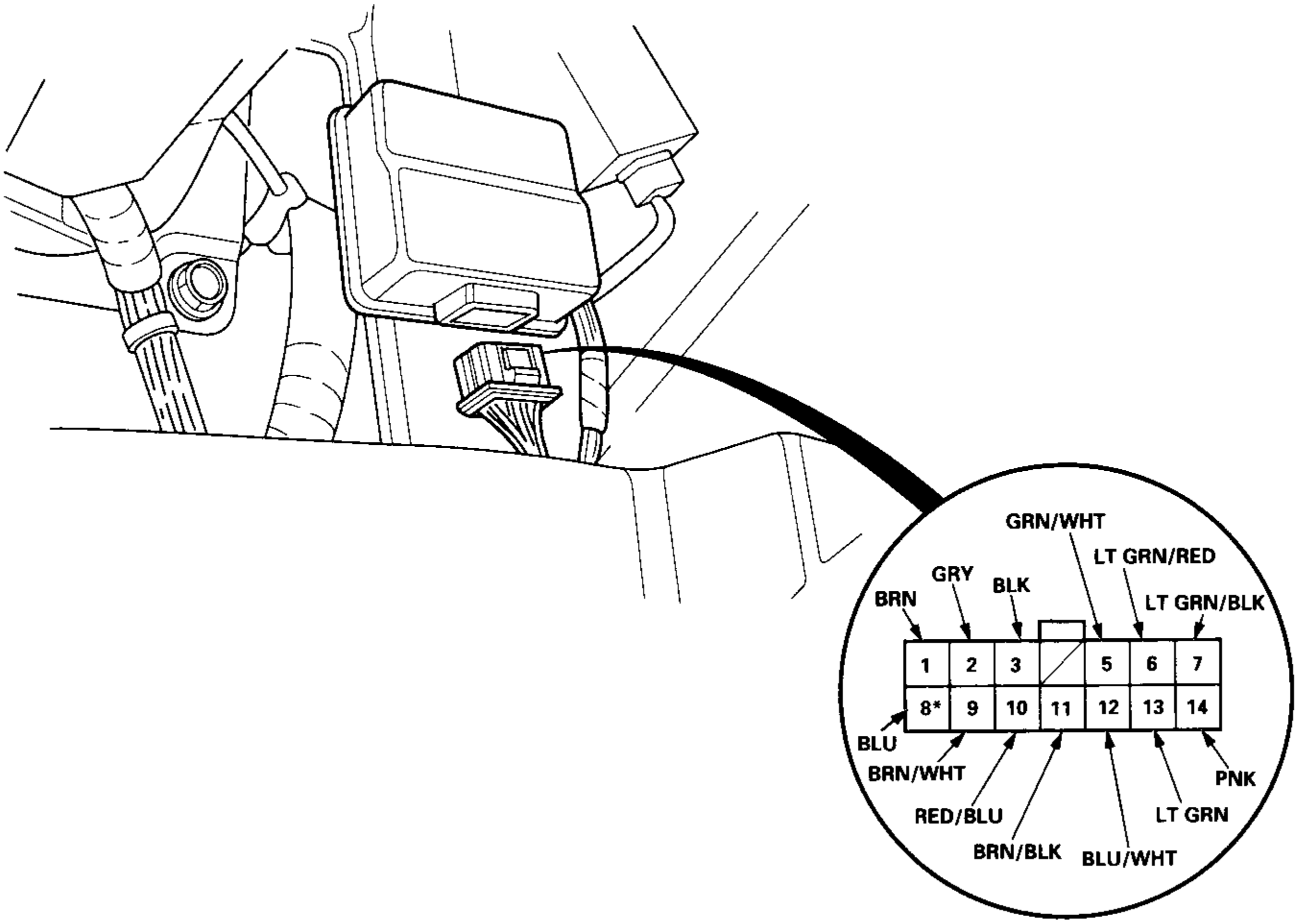
*: '98 – 00 models with Automatic Transmission.

Control Unit Input Test

SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

1. Remove the driver's dashboard lower cover and knee bolster (see section 20).
2. Disconnect the 14P connector from the control unit.
3. Inspect the connector and socket terminals to be sure they are all making good contact.

   If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
   If the terminals look OK, make the following input tests at the connector.
   — If any test indicates a problem, find and correct the cause, then recheck the system.
   — If all the input tests prove OK, the control unit must be faulty; replace it.



*: '98 - 00 models with Automatic Transmission.

Wire side of female terminals

Disconnect the 14P connector from the control unit.

Cavity	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
9	BRN/WHT	Under all conditions	Check for resistance to ground: There should be 80 – 120 Ω.	• Faulty actuator solenoid • Poor ground (G202) • An open in the wire
1	BRN	Under all conditions	Check for resistance to ground: There should be 40 – 60 Ω.	
11	BRN/BLK	Under all conditions	Check for resistance to ground: There should be 70 – 110 Ω.	
2	GRY	Ignition switch ON (II), main switch ON and brake pedal depressed, then released	Check for voltage to ground: There should be 0 V with the pedal depressed and battery voltage with the pedal released.	• Faulty brake switch • An open in the wire
3	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	• Poor ground (G401) • An open in the wire
5	GRN/WHT	Brake pedal depressed, then released	Check for voltage to ground: There should be battery voltage with the pedal depressed, and 0 V with the pedal released.	• Blown No. 52 (15 A) fuse in the under-hood fuse/relay box • Faulty brake switch • An open in the wire
6	LT GRN/ RED	Set button pushed	Check for voltage to ground: There should be battery voltage.	• Blown No. 52 (15 A) fuse in the under-hood fuse/relay box • Faulty horn relay • Faulty set/resume switch • Faulty cable reel • An open in the wire
7	LT GRN/ BLK	Resume button pushed		
10	RED/BLU	Ignition switch ON (II)	Attach to ground: Cruise indicator light in the gauge assembly should come on.	• Blown bulb • Blown No. 25 (7.5 A) fuse in the under-dash fuse/relay box • Faulty dimming circuit in the gauge assembly • An open in the wire
12	BLU/WHT	Ignition switch ON (II) and main switch ON; raise the front of the vehicle, block one wheel and rotate the other wheel slowly.	Check for voltage between the BLU/WHT ⊕ and BLK ⊖ terminals: There should be 0 – 5 V or more –0 – 5 V or more repeatedly.	• Faulty vehicle speed sensor (VSS) • An open in the wire
13	LT GRN	Ignition switch ON (II) and main switch ON	Check for voltage to ground: There should be battery voltage.	• Blown No. 14 (7.5 A) fuse in the under-dash fuse/relay box • Faulty main switch • An open in the wire
14	PNK	A/T: Shift lever in $\boxed{2}$, $\boxed{D_3}$ or $\boxed{D_4}$ M/T: Clutch pedal released	Check for continuity to ground: There should be continuity. NOTE: There should be no continuity when the shift lever is in other positions or when the clutch pedal is depressed.	• Faulty A/T gear position switch (A/T) • Faulty or misadjusted clutch switch (M/T) • Poor ground (G101) • An open in the wire

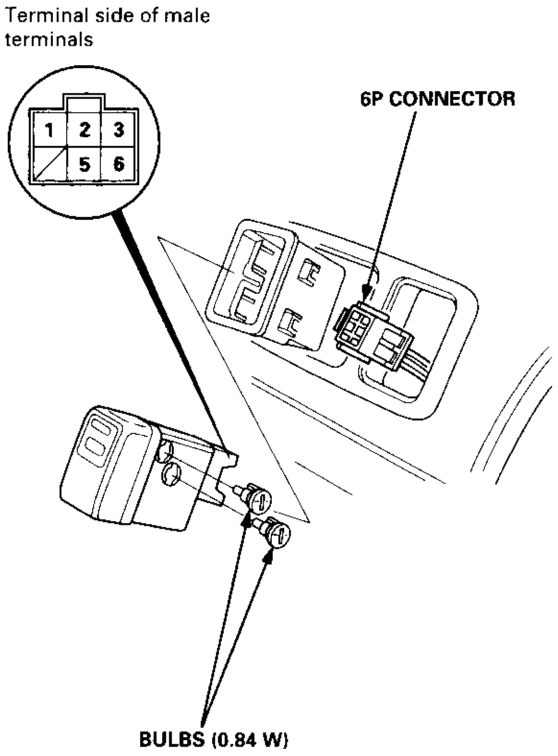
Reconnect the 14P connector to the control unit.

8*	BLU	Start the engine, turn the main switch ON, and drive the vehicle over 25 mph (40 km/h) with the cruise control set	Check for voltage to ground: There should be approx. 5 V	• Faulty cruise control unit • Short to ground

*: '98 – 00 models with Automatic Transmission.

Main Switch Test/Replacement

1. Carefully pry the switch out of the instrument panel.
2. Disconnect the 6P connector from the switch.



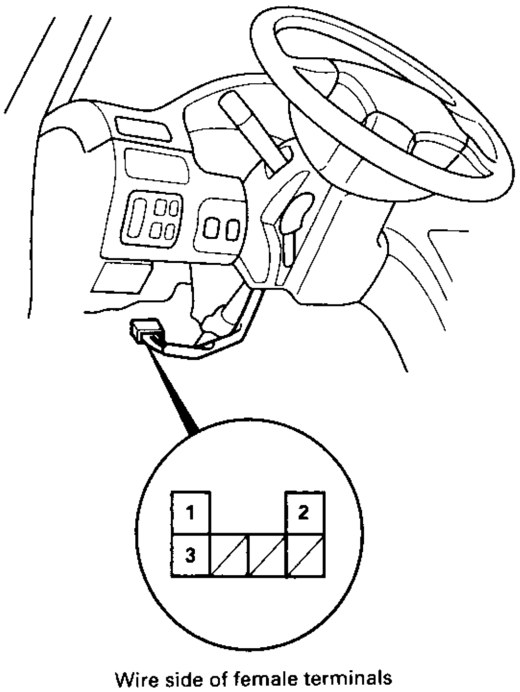
3. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal	5		1	6	3		2
OFF	○	⊙	○		○	⊙	○
ON	○	⊙	○	○	○	⊙	○

If there is no continuity, replace the switch.

Set/Resume Switch Test/Replacement

1. Disconnect the battery negative cable, then disconnect the positive cable, and wait at least three minutes.
2. Disconnect the driver's airbag and front passenger's airbag connectors (see section 24).
3. Remove the dashboard lower cover and knee bolster.
4. Disconnect the 6P connector between the cable reel sub harness and the main wire harness.

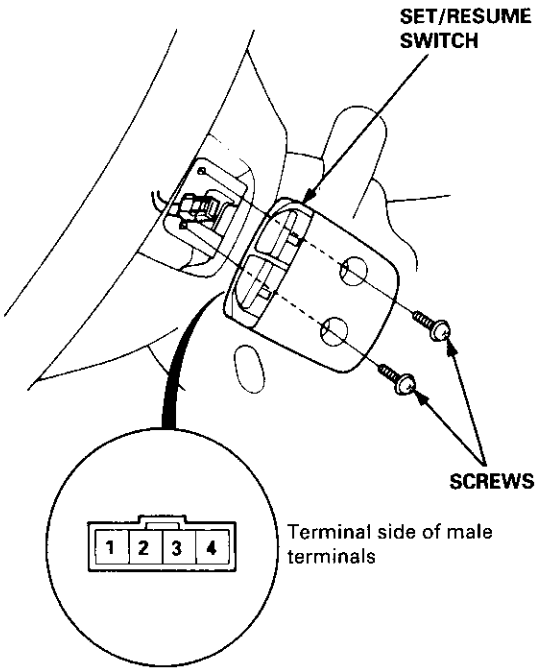


5. Check for continuity between the terminals of the 6P connector in each switch position according to the table.

Position \ Terminal	1	2	3
SET (ON)		○	○
RESUME (ON)	○		○

- If there is continuity, and it matches the table, the switch is OK.
- If there is no continuity in one or both positions, go to step 6.

6. Remove the two screws, then remove the switch.



7. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal	1	2	3
SET (ON)	○	—	○
RESUME (ON)	○	○	

- If there is continuity, and it matches the table, replace the cable reel.
- If there is no continuity in one or both positions, replace the switch.

8. If all tests prove OK, reconnect the cable reel sub-harness connector.

9. Reconnect the driver's airbag and front passenger's airbag connectors, and reinstall the access panel on the steering wheel.

10. Reconnect the battery positive cable, then the negative cable.

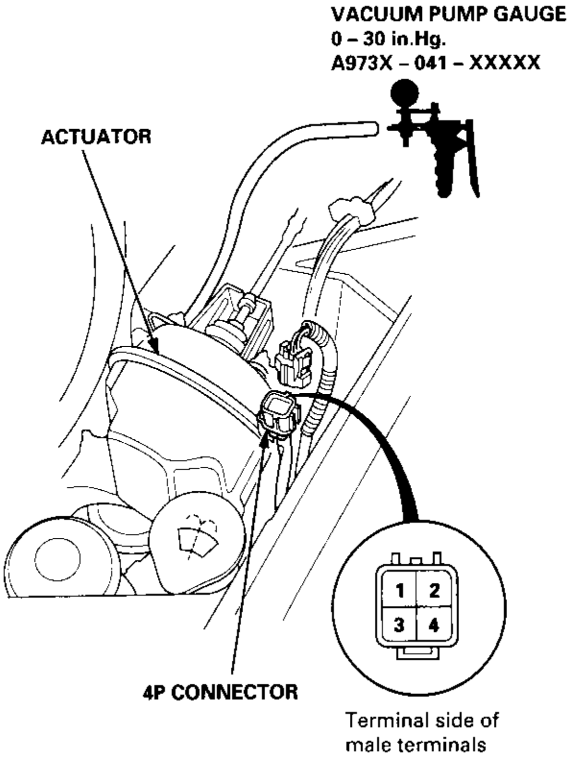
11. After connecting the airbag connectors, confirm proper system operation: Turn the ignition switch ON (II); the SRS indicator light should come on for about six seconds and then go off.

Actuator Test

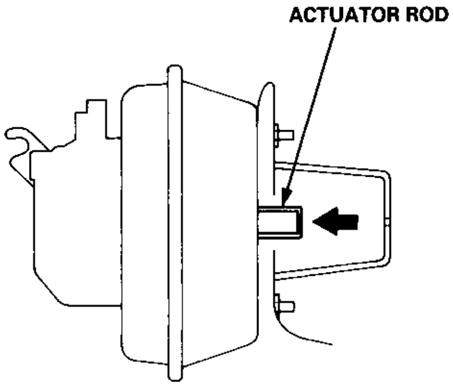
1. Disconnect the actuator cable from the actuator rod and the 4P connector.

2. Connect battery power to the No. 4 terminal and ground to the No. 1, No. 2 and No. 3 terminals.

3. Connect a vacuum pump to the vacuum hose. Then apply vacuum to the actuator.



4. The actuator rod should pull in completely. If the rod pulls in only part-way or not at all, check for a leaking vacuum line or defective solenoid.



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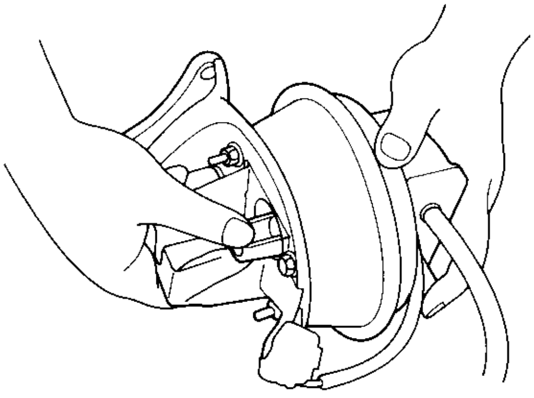
Actuator Test (cont'd)

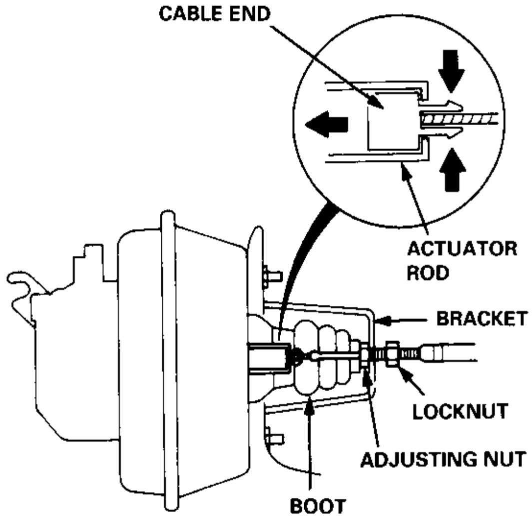
5. With voltage and vacuum still applied, try to pull the actuator rod out by hand. You should not be able to pull it out. If you can, it is defective.



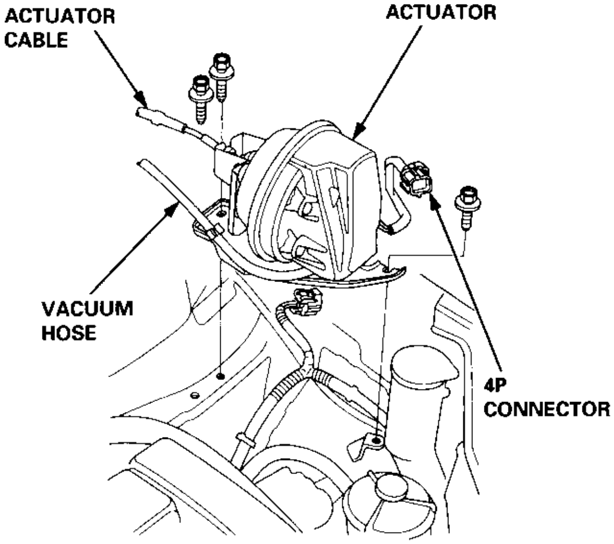
6. Disconnect ground from the No. 3 terminal. The actuator rod should return. If it does not return, but the vent hose and filter are not plugged, the solenoid valve assembly is defective.
7. Repeat steps 2 through 5, and disconnect ground from the No. 1 terminal. The actuator rod should return. If it does not return, but the vent hose and filter are not plugged, the solenoid valve assembly is defective.
8. If you replace the solenoid valve assembly, be sure to use new O-rings on each solenoid.
9. Disconnect power and ground from the 4P connector. Disconnect the vent hose from the actuator. Connect a vacuum pump to the actuator vent hose port, and apply vacuum. The actuator rod should pull in completely. If not, the vacuum valve is stuck open. Replace the actuator.

Actuator Replacement

1. Pull back the boot, and loosen the locknut. Then disconnect the cable from the bracket.
2. Disconnect the cable end from the actuator rod.



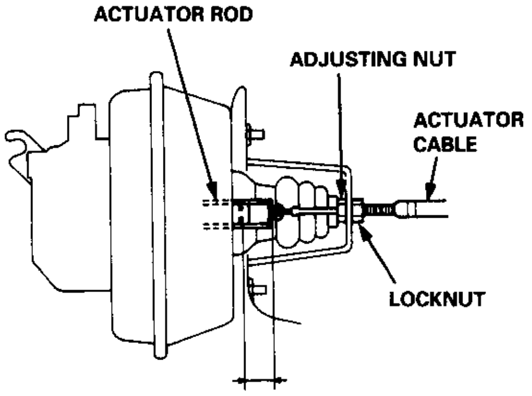
3. Disconnect the 4P connector from the actuator.
4. Disconnect the vacuum hose from the vacuum tank. Pull out the vent hose.
5. Remove the three mounting bolts and the actuator with the bracket.



6. If necessary, disconnect the cable end from the linkage over the accelerator pedal, then turn the grommet 90° in the bulkhead, and remove the cable.
7. Install in the reverse order of removal, and adjust free play at the actuator rod after connecting the cable (see page 4-43).

Actuator Cable Adjustment

1. Check that the actuator cable operates smoothly with no binding or sticking.
2. Start the engine. Hold the engine at 3,000 rpm with no load (A/T in [N] or [P] position, M/T in neutral) until the radiator fan comes on, then let it idle.
3. Measure the amount of movement of the actuator rod until the cable pulls on the accelerator lever (engine speed starts to increase). Free play should be 11 ± 1.0 mm (0.43 ± 0.04 in).



LOCKNUT FREE PLAY: 11 ± 1.0 mm (0.43 ± 0.04 in)

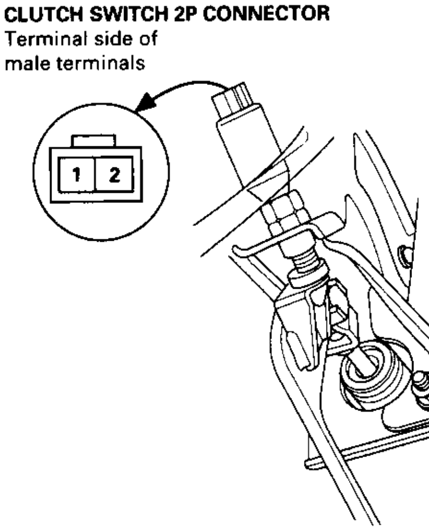
4. If free play is not within specs, loosen the locknut, and turn the adjusting nut as required.

   NOTE: If necessary, check the throttle cable free play (see section 11), then recheck the actuator rod free play.

5. Retighten the locknut, and recheck the free play.

Clutch Switch Test

1. Disconnect the 2P connector from the clutch switch.



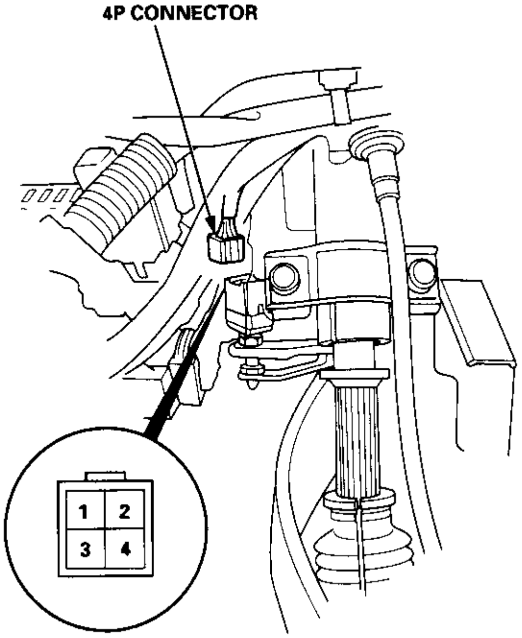
2. Remove the clutch switch.
3. Check for continuity between the terminals according to the table.

Terminal / Clutch Switch	2	3
DEPRESSED		
RELEASED	○—	—○

4. If necessary, replace the switch or adjust the pedal height (see section 12).

Brake Switch Test

1. Disconnect the 4P connector from the switch.
2. Remove the brake switch.



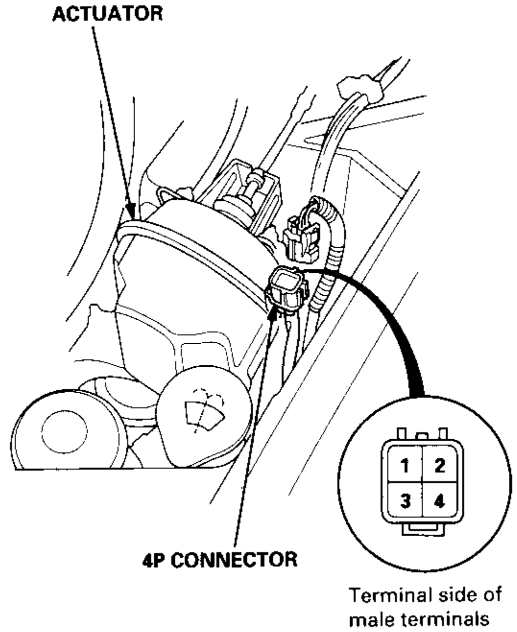
3. Check for continuity between the terminals according to the table.

Terminal Brake Switch	1	2	3	4
RELEASED	○	○		
PUSHED			○	○

4. If necessary, replace the switch or adjust pedal height (see section 19).

Actuator Solenoid Test

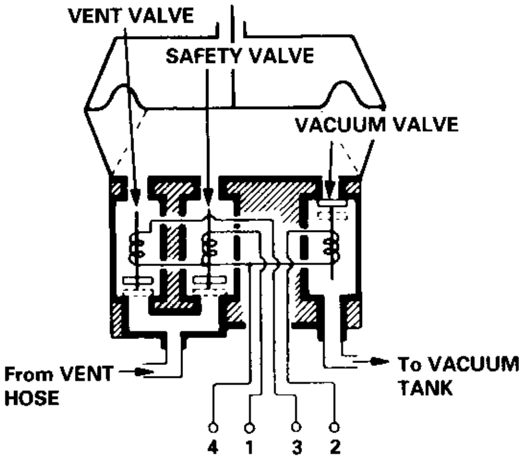
1. Disconnect the 4P connector from the actuator.



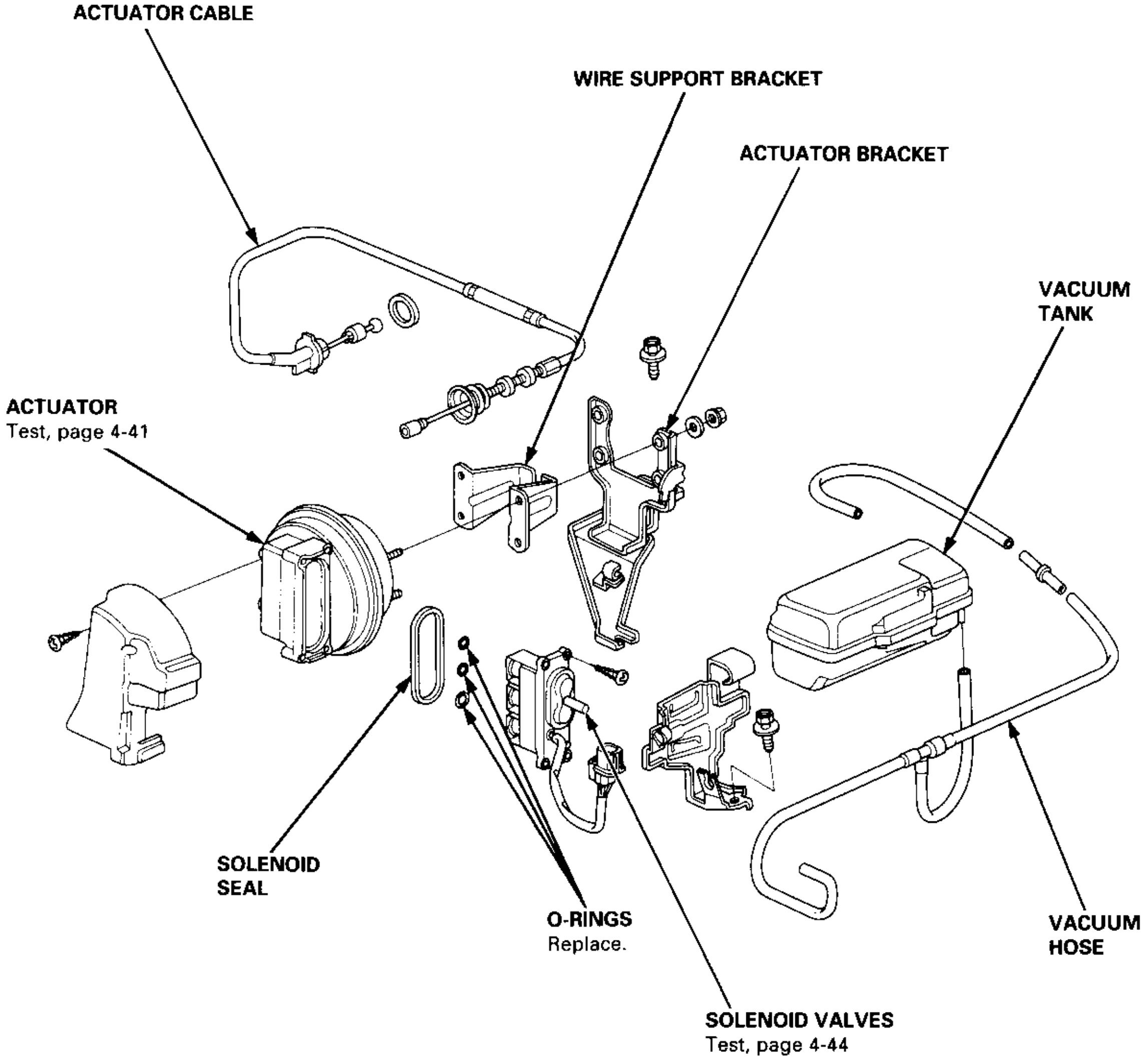
2. Check for resistance between the terminals according to the table.

Terminal Resistance (Ω)	1	2	3	4
VENT SOLENOID 40 – 60 Ω			○	○
VACUUM SOLENOID 30 – 50 Ω		○		○
SAFETY SOLENOID 40 – 60 Ω	○			○

NOTE: Resistance will vary slightly with temperature; specified resistance is at 68°F (20°C).



Actuator Disassembly



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

Engine Removal/Installation

Engine Removal/Installation

Removal 5-2

Installation 5-12

Engine Removal/Installation

Removal

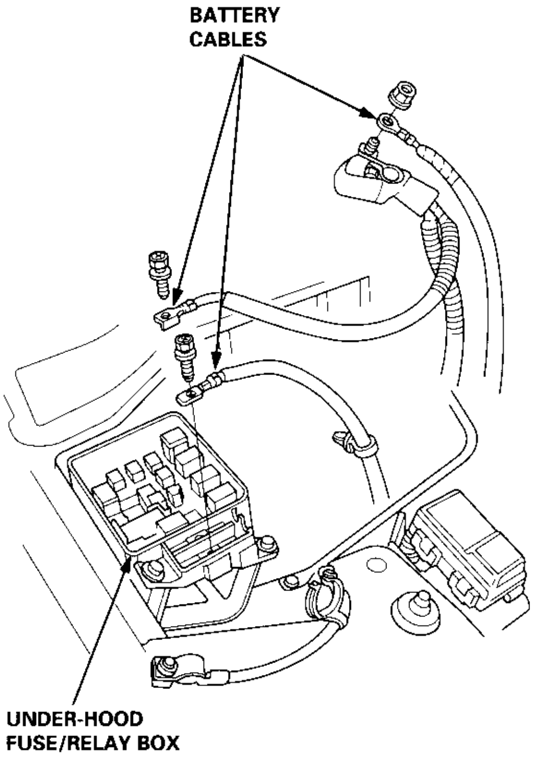
⚠ WARNING

- **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.**

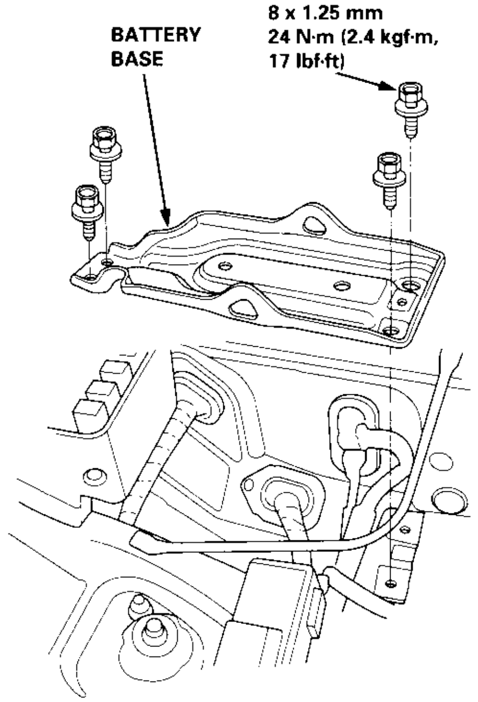
NOTE:

- 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.

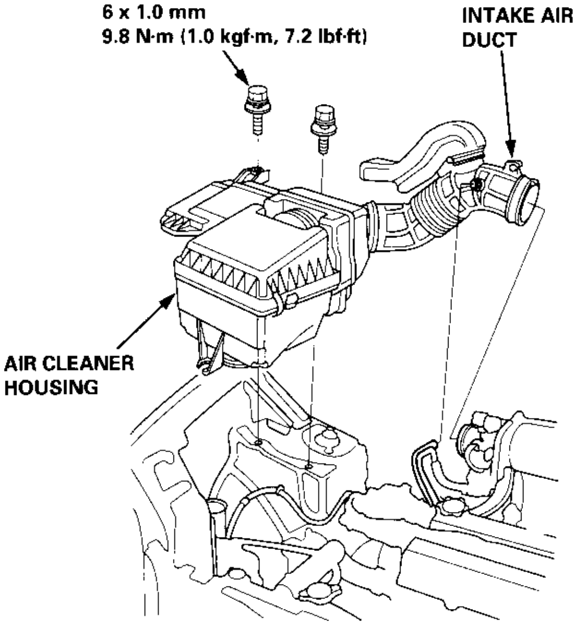
1. Secure the hood in the open position.
2. Disconnect the battery negative terminal first, then the positive terminal.
3. Disconnect the battery cables from the under-hood fuse/relay box and battery positive terminal.



4. Remove the battery and battery base.

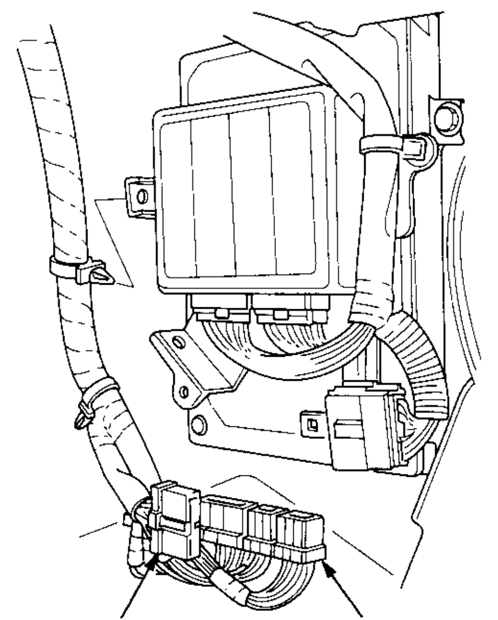


5. Remove the intake air duct and air cleaner housing.

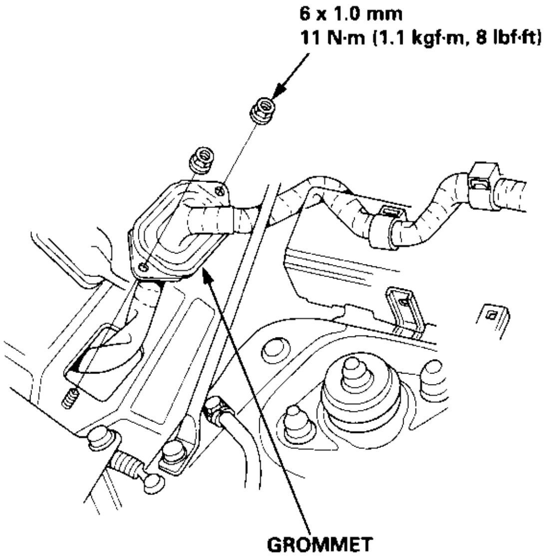


6. Disconnect the engine control module (ECM)/powertrain control module (PCM) connectors from the ECM/PCM.

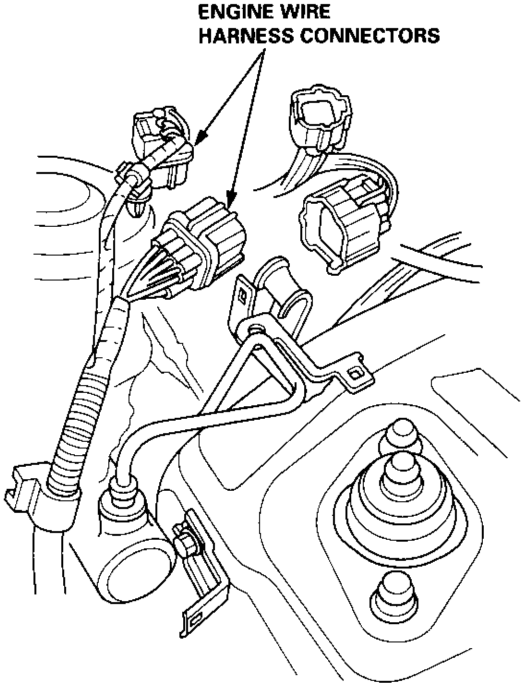
7. Disconnect the main wire harness connector.



8. Remove the grommet and wire harness clamps, then pull out the ECM/PCM connectors.



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

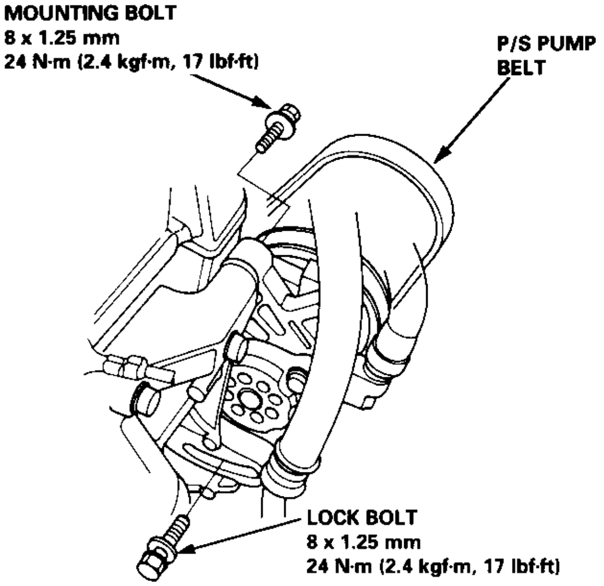


(cont'd)

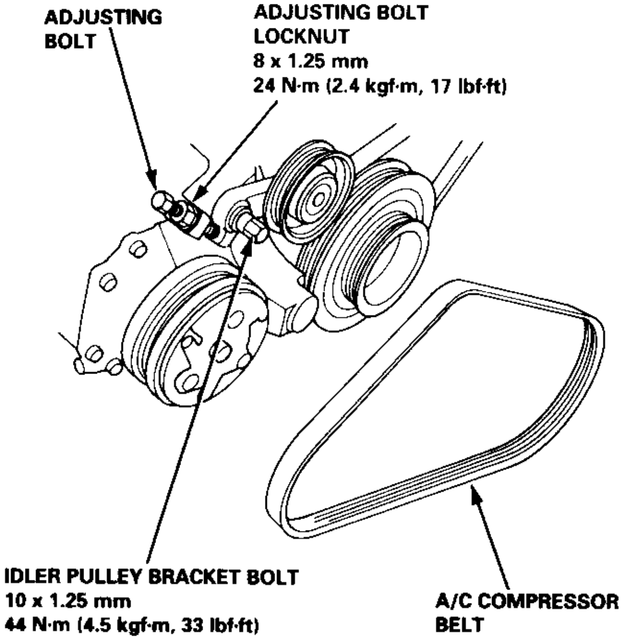
Removal (cont'd)

10. Remove the cruise control actuator (see section 4).

11. Remove the mounting bolt and lock bolt, then remove the P/S pump belt and pump.



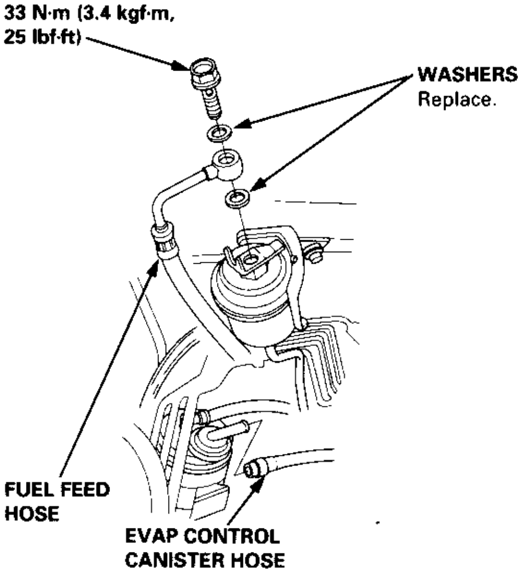
12. Loosen the idler pulley bracket bolt and adjusting bolt, then remove the air conditioning (A/C) compressor belt.



13. Relieve fuel pressure (see section 11).

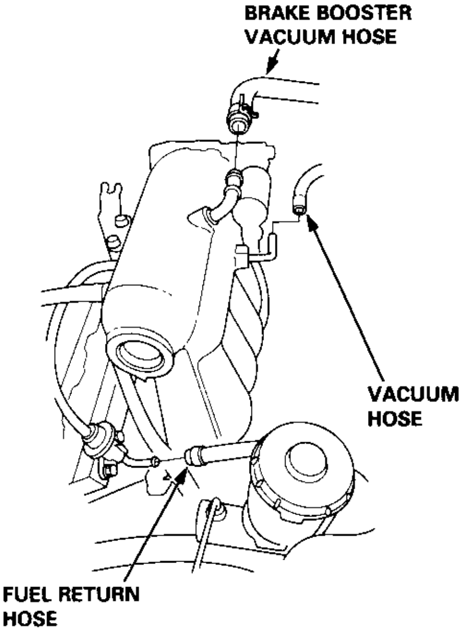
⚠ WARNING Do not smoke while working on the fuel system. Keep open flame or spark away from the work area. Drain fuel only into an approved container.

14. Remove the evaporative emission (EVAP) control canister hose and fuel feed hose.

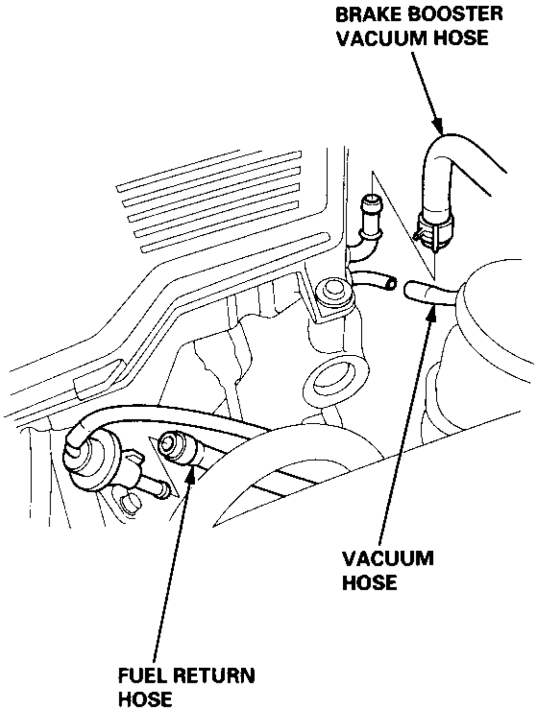


15. Remove the brake booster vacuum hose, fuel return hose and vacuum hose.

'97 – 98 models:

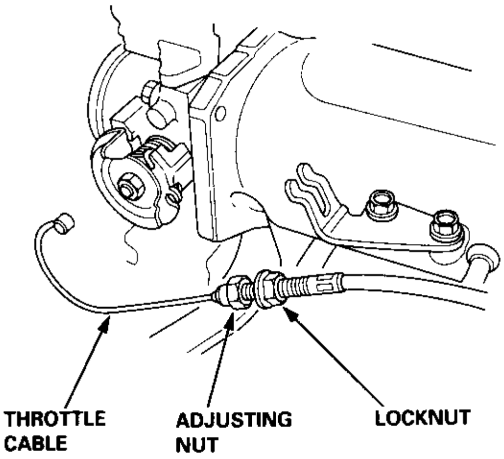


'99 – 00 models:

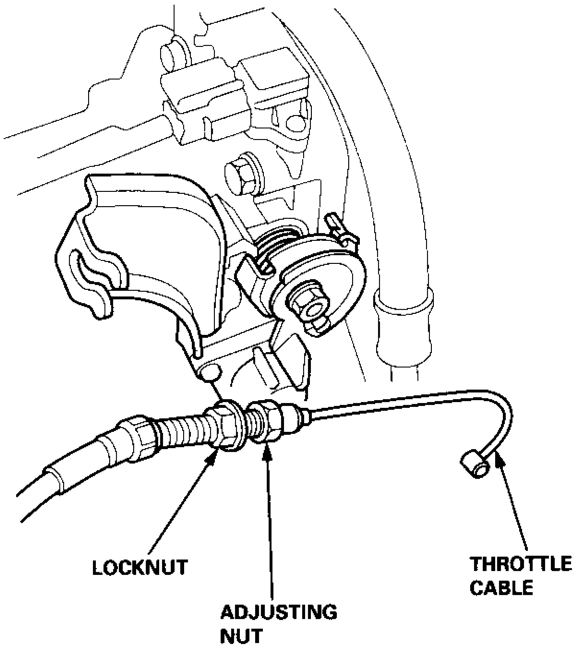


16. Remove the throttle cable by loosening the locknut, then slip the cable end out of the accelerator linkage. Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.

'97 – 98 models:



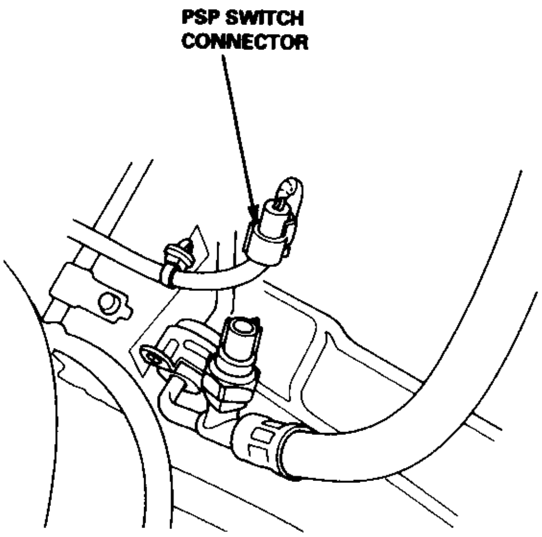
'99 – 00 models:



(cont'd)

Removal (cont'd)

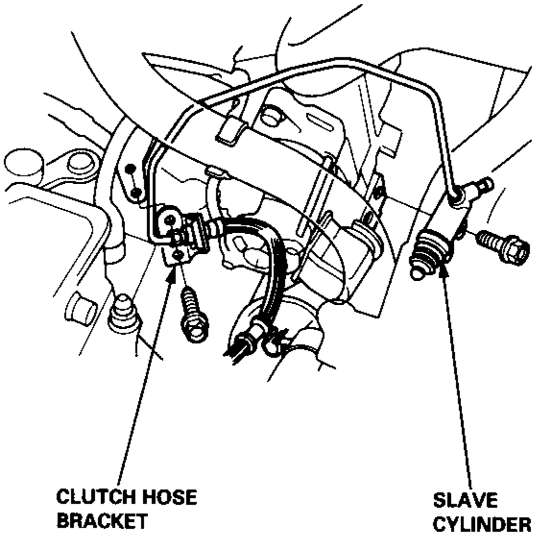
17. Disconnect the power steering pressure (PSP) switch connector, and remove the wire harness clamp.



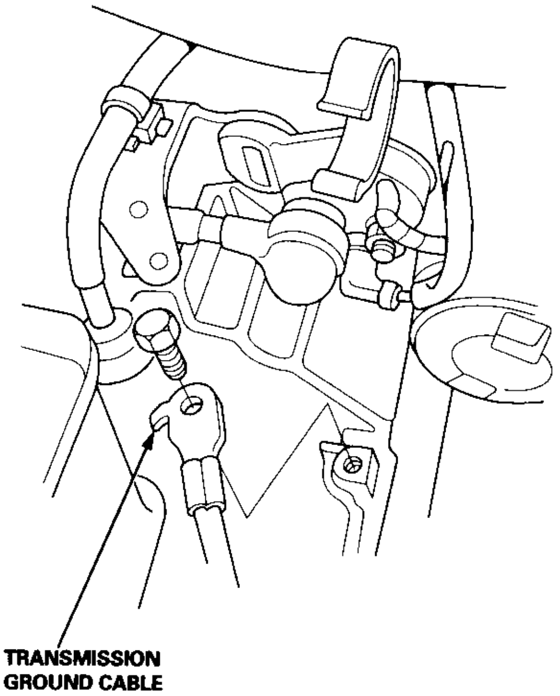
18. Remove the slave cylinder and clutch hose bracket (M/T).

NOTE:

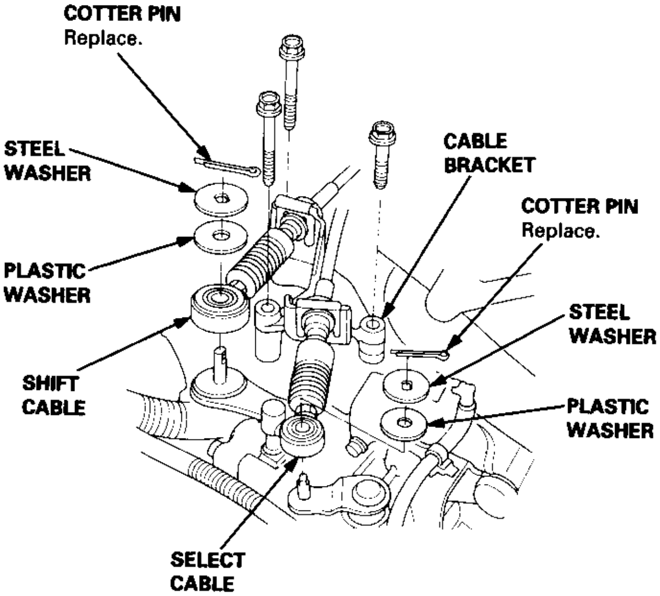
- Do not disconnect the pipe/hose assembly.
- Do not operate the clutch pedal once the slave cylinder has been removed.
- Take care not to bend the pipe/hose assembly.



19. Disconnect the transmission ground cable (M/T).



20. Remove the cotter pins, then remove the steel washers, plastic washers, shift cable, and select cable from the levers (M/T).

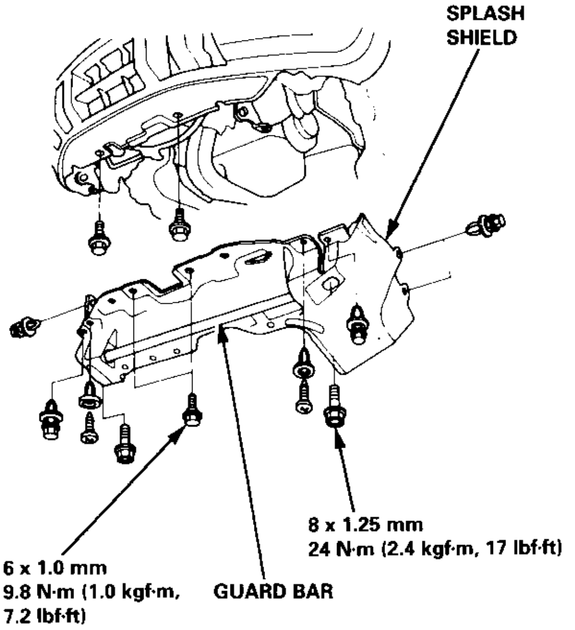


21. Remove the cable bracket from the clutch housing (M/T).

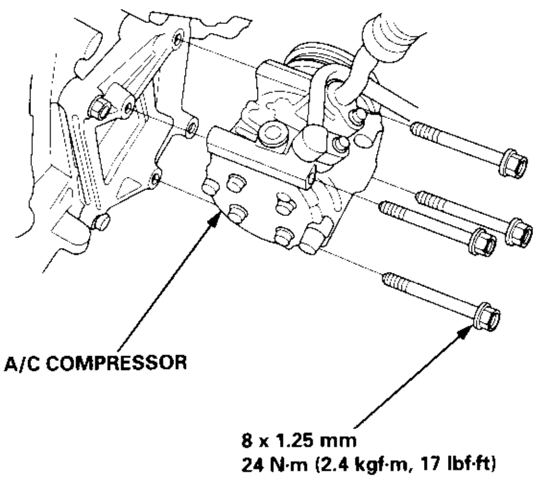
22. Remove the radiator cap.

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

23. Raise the hoist to full height.
24. Remove the front tires/wheels.
25. Remove the guard bar and splash shield.

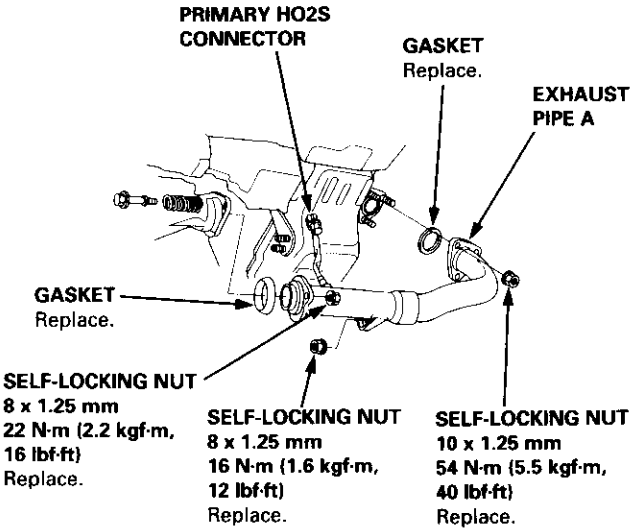


26. Loosen the drain plug in the radiator. Drain the engine coolant (see page 10-5).
27. Drain the transmission oil or fluid. Reinstall the drain plug using a new washer [see section 13 (M/T) or section 14 (A/T)].
28. Drain the engine oil. Reinstall the drain bolt using a new washer (see page 8-4).
29. Remove the A/C compressor. Do not disconnect the A/C hoses.

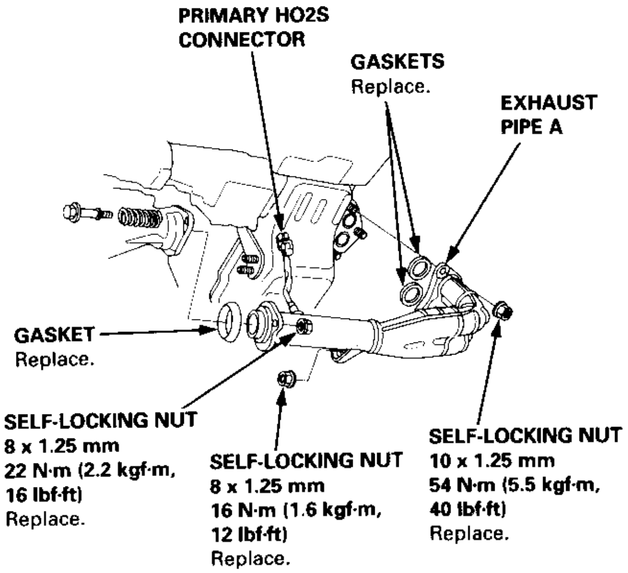


30. Disconnect the primary heated oxygen sensor (primary HO2S) connector, then remove exhaust pipe A.

'97 – 98 U.S. models (California):



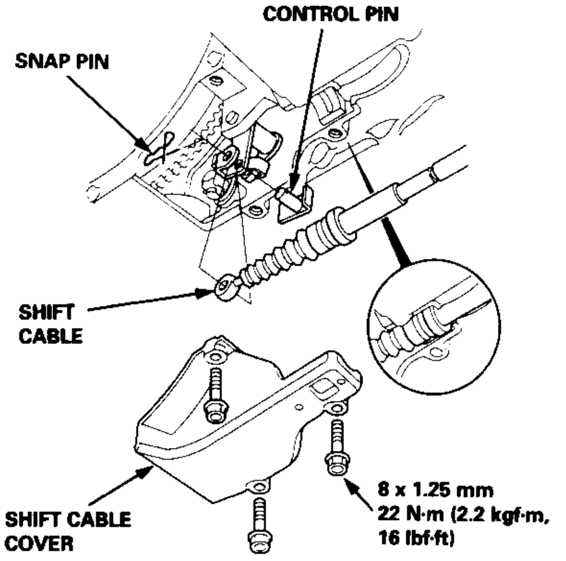
'97 – 98 U.S. models (Except California):
'99 – 00 models:



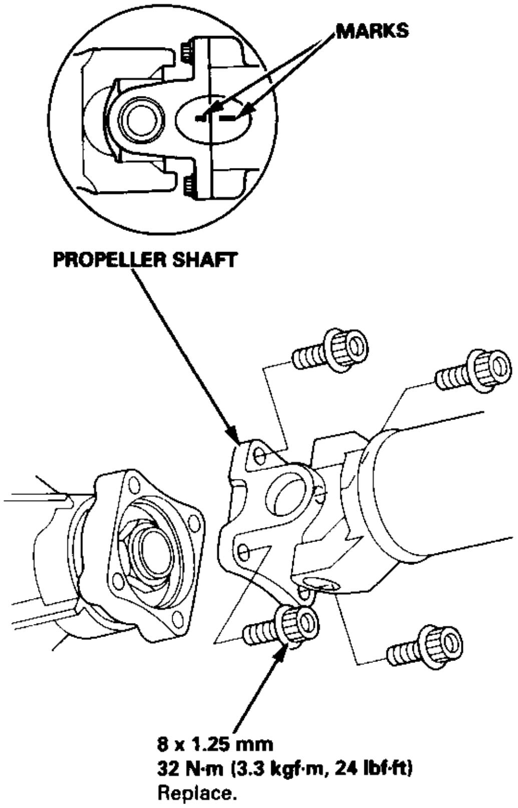
(cont'd)

Removal (cont'd)

31. Remove the shift cable. Take care not to bend the cable when removing it. Always replace any kinked cable with new one (A/T).

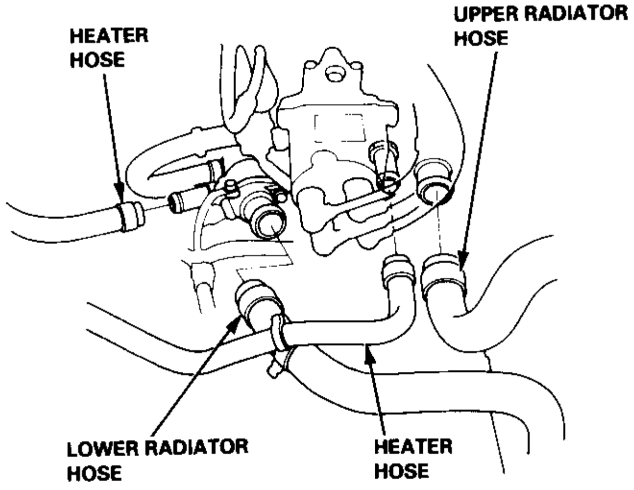


32. Remove the right damper fork (see section 18).
33. Disconnect the suspension lower arm ball joints (see section 18).
34. Remove the driveshafts (see section 16). Coat all precision-finished surface with clean engine oil. Tie plastic bags over the driveshaft ends.
35. Make marks on the transfer companion flange and propeller shaft as shown. Use these marks to set the propeller shaft in the proper position when reinstalling (4WD).
36. Remove the four bolts securing the propeller shaft, then separate the propeller shaft from the transfer companion flange (4WD).

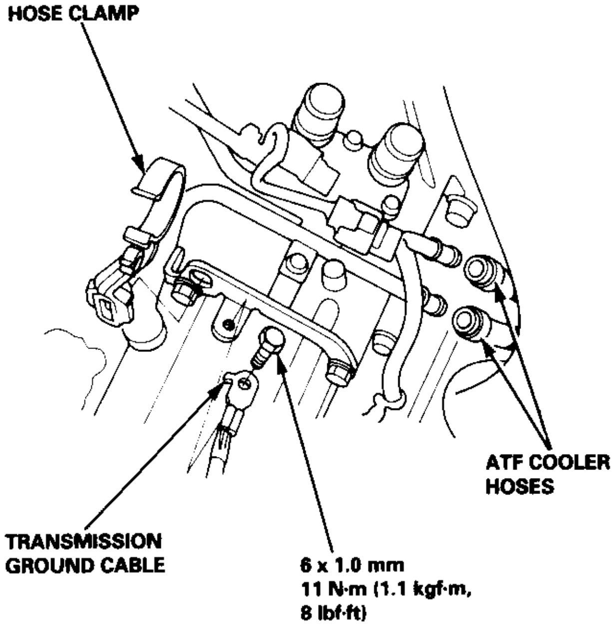


37. Lower the hoist.

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



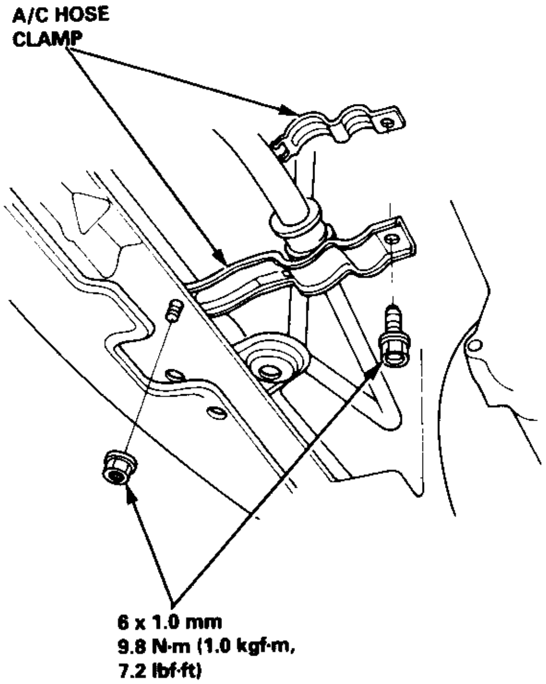
39. Remove the transmission ground cable and hose clamp (A/T).



40. Remove the ATF cooler hoses, then plug the ATF cooler hoses and lines (A/T).

41. Remove the radiator (see page 10-4).

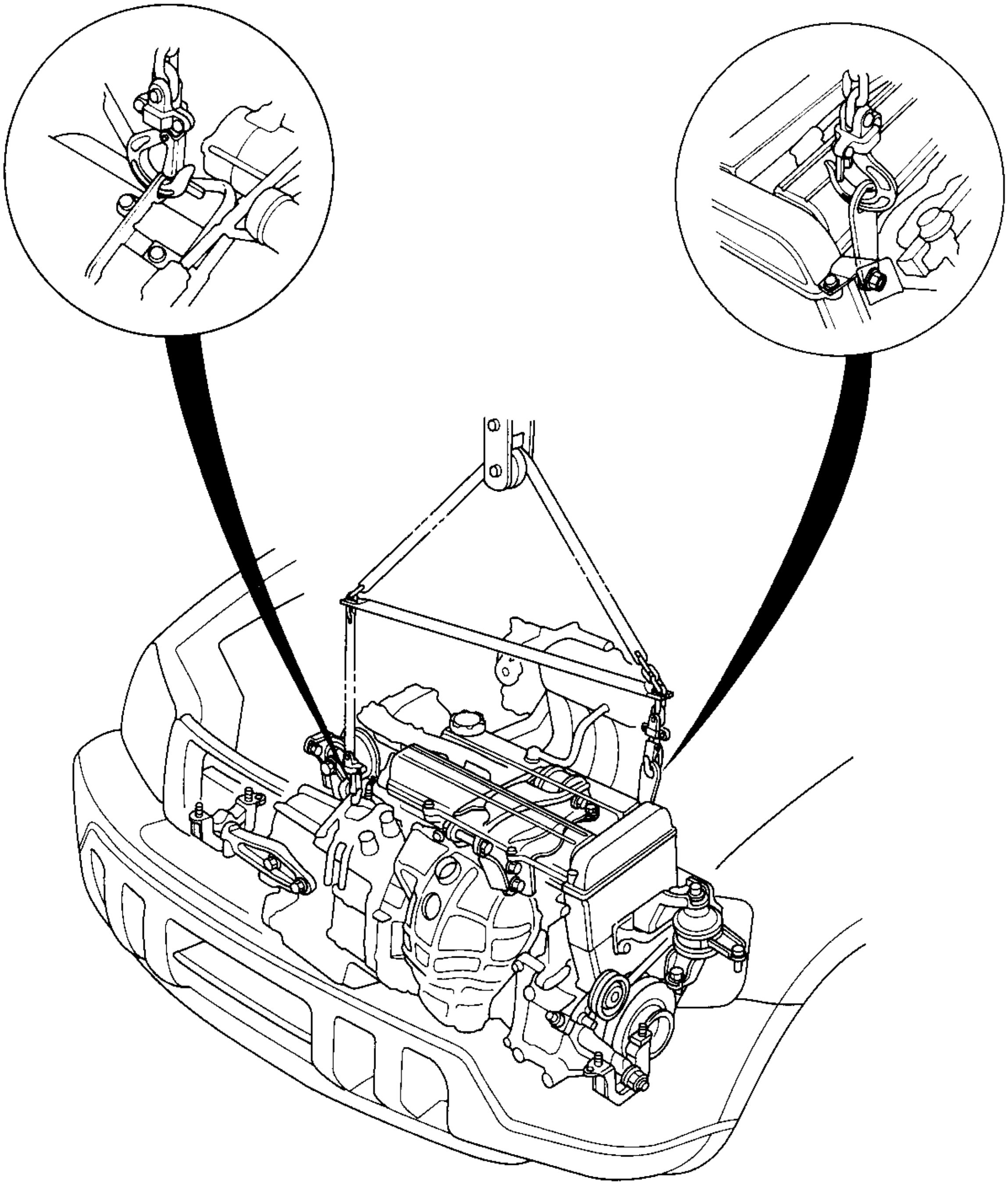
42. Remove the A/C hose clamp.



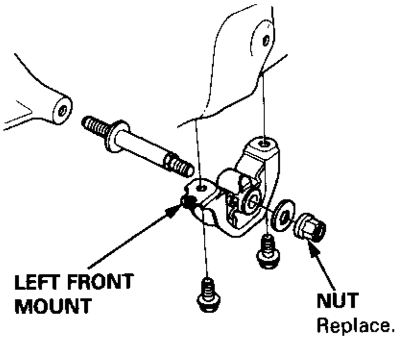
(cont'd)

Removal (cont'd)

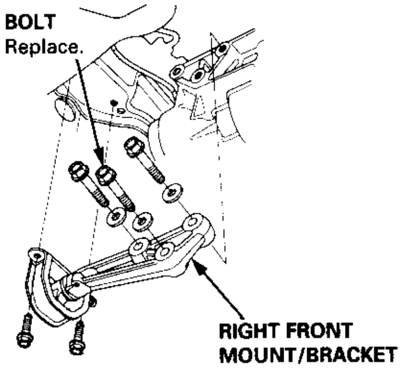
43. Attach the chain hoist to the engine.



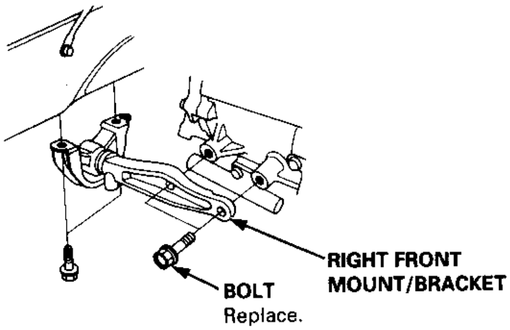
44. Remove the left and right front mounts and brackets.



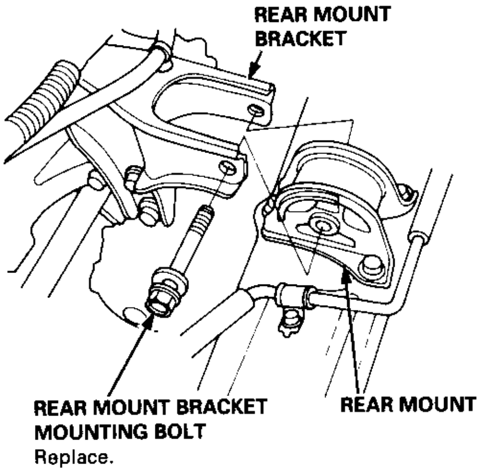
M/T:



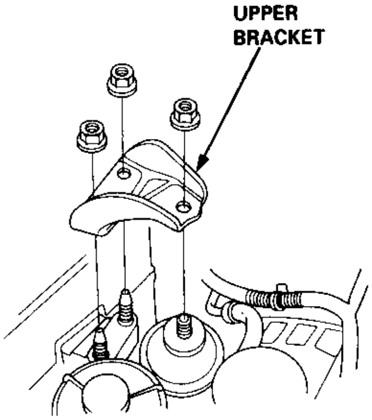
A/T:



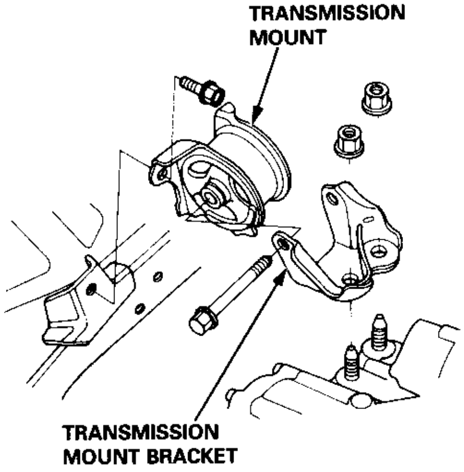
45. Remove the rear mount bracket mounting bolt.



46. Remove the upper bracket.



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



48. Check that the engine/transmission is completely free of vacuum hoses, fuel and coolant hoses, and electrical wiring.

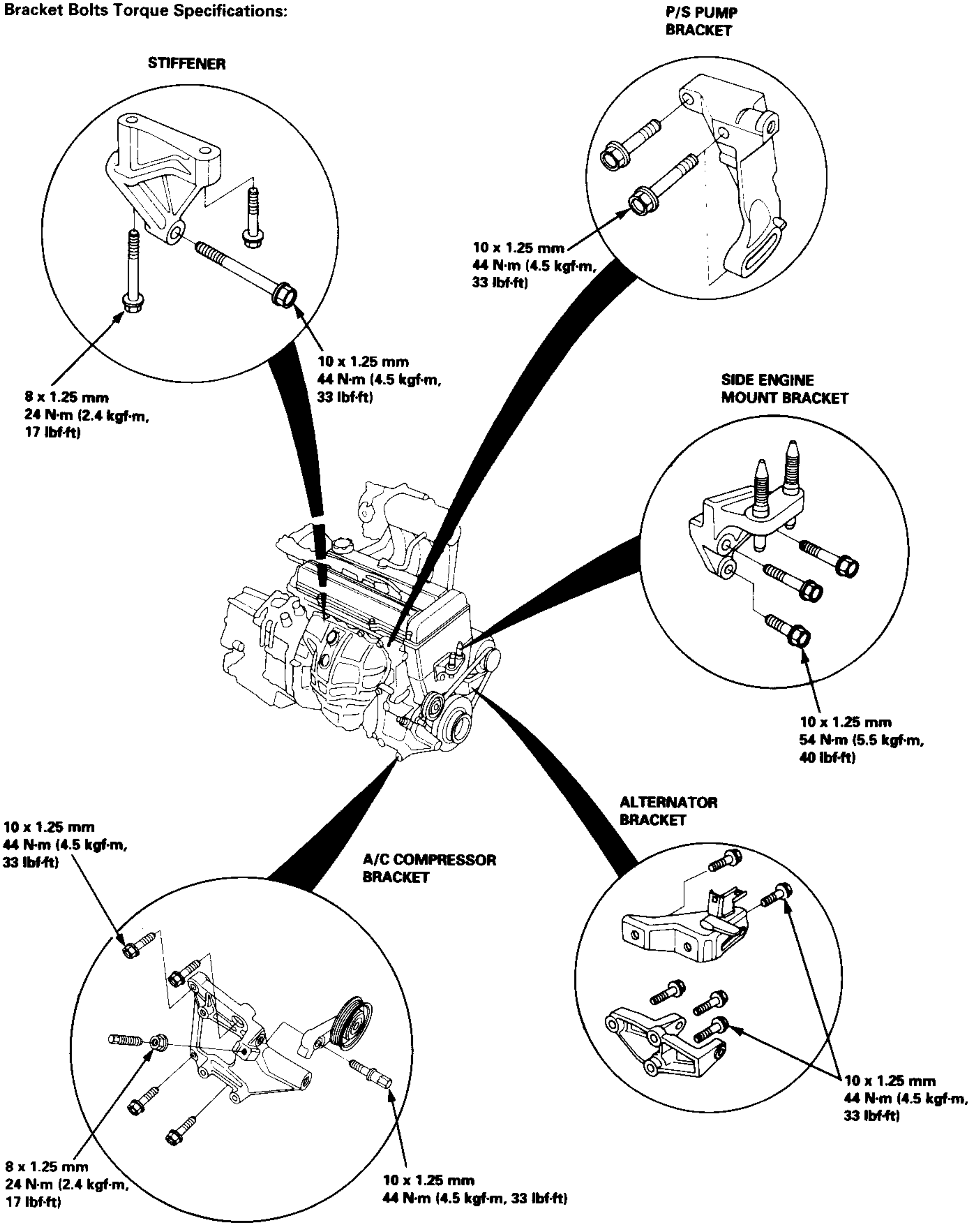
49. Slowly raise the engine approximately 150 mm (6 in). Check once again that all hoses and wires are disconnected from the engine/transmission.

50. Raise the engine all the way, and remove it from the vehicle.

Engine Removal/Installation

Installation

Bracket Bolts Torque Specifications:

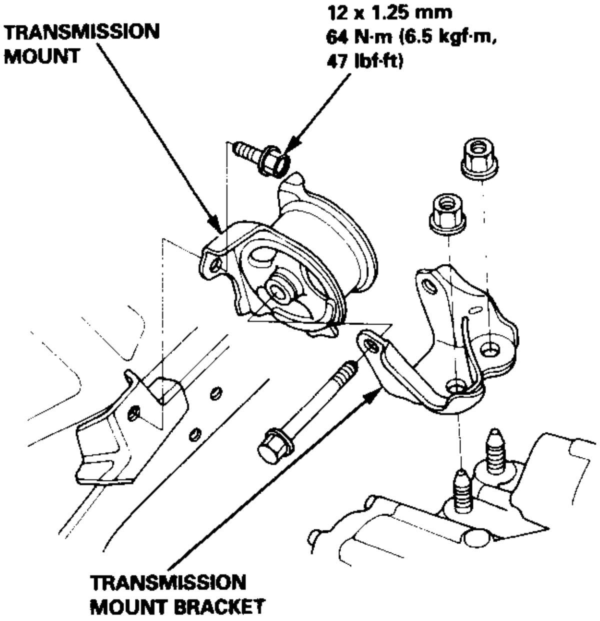


Engine Installation:

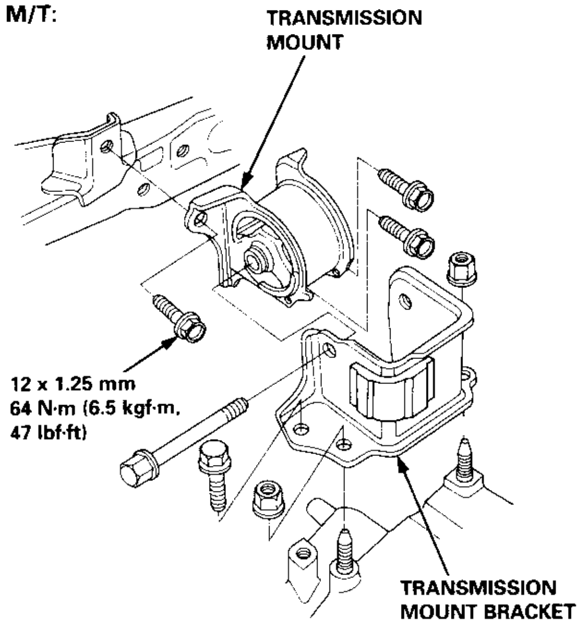
Install the engine in the reverse order of removal. Reinstall the mount bolts/nuts in the following sequence. Failure to follow these procedures may cause excessive noise and vibration, and reduce bushing life.

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

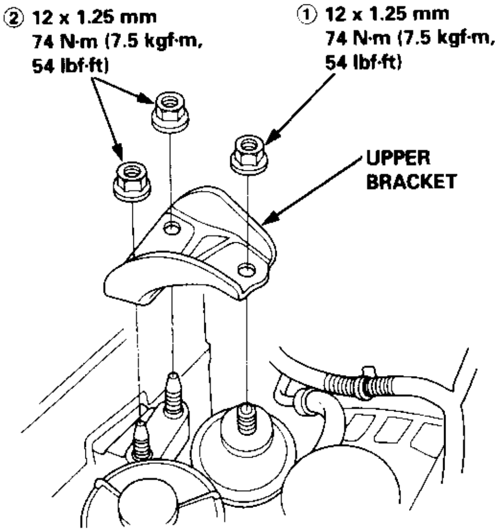
A/T:



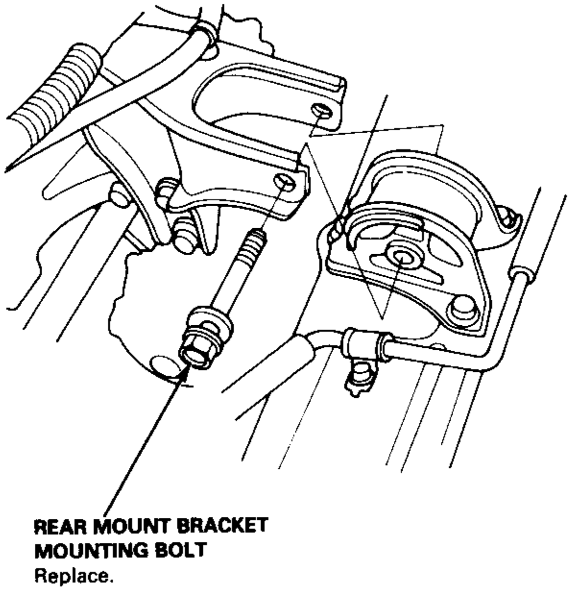
M/T:



2. Install the upper bracket, then tighten the nuts in the numbered sequence.



3. Install the rear mount bracket mounting bolt. Do not tighten the bolt.

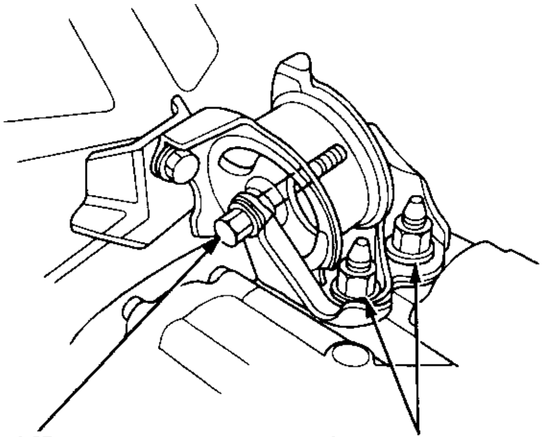


(cont'd)

Installation (cont'd)

4. Tighten the bolt/nuts on the transmission mount bracket in the numbered sequence.

A/T:

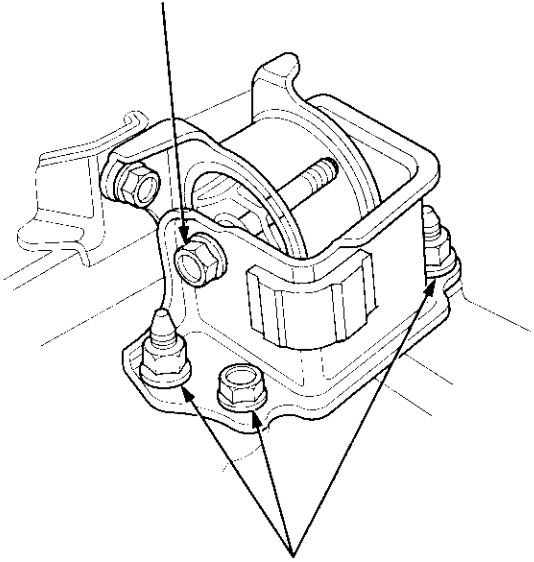


② 12 x 1.25 mm
74 N·m (7.5 kgf·m,
54 lbf·ft)

① 12 x 1.25 mm
64 N·m (6.5 kgf·m,
47 lbf·ft)

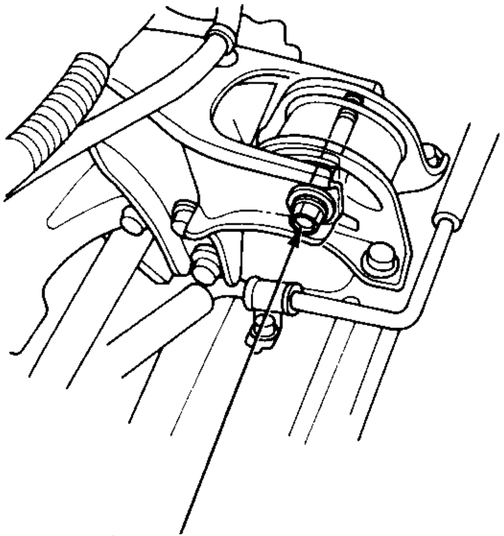
M/T:

② 12 x 1.25 mm
74 N·m (7.5 kgf·m,
54 lbf·ft)



① 12 x 1.25 mm
64 N·m (6.5 kgf·m,
47 lbf·ft)

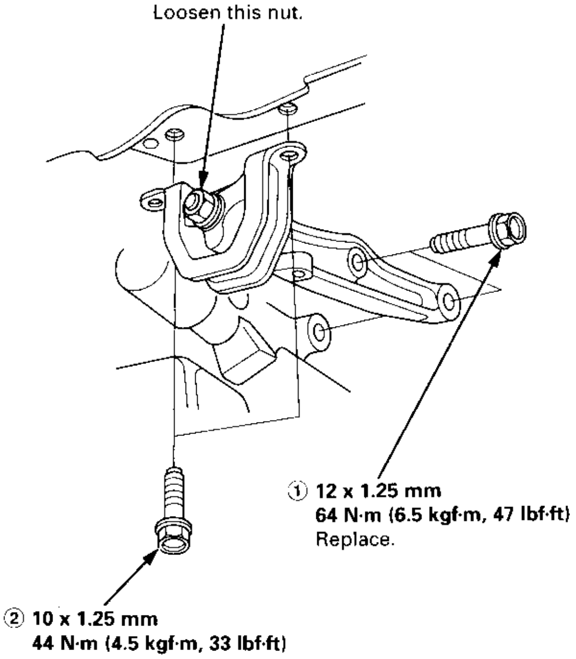
5. Tighten the rear mount bracket mounting bolt.



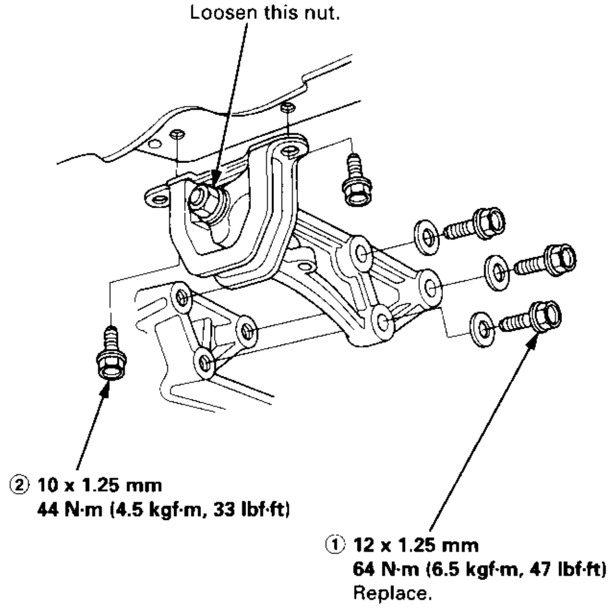
12 x 1.25 mm
59 N·m (6.0 kgf·m, 43 lbf·ft)
Replace.

6. Install the right front mount/bracket, then tighten the bolts in the numbered sequence.

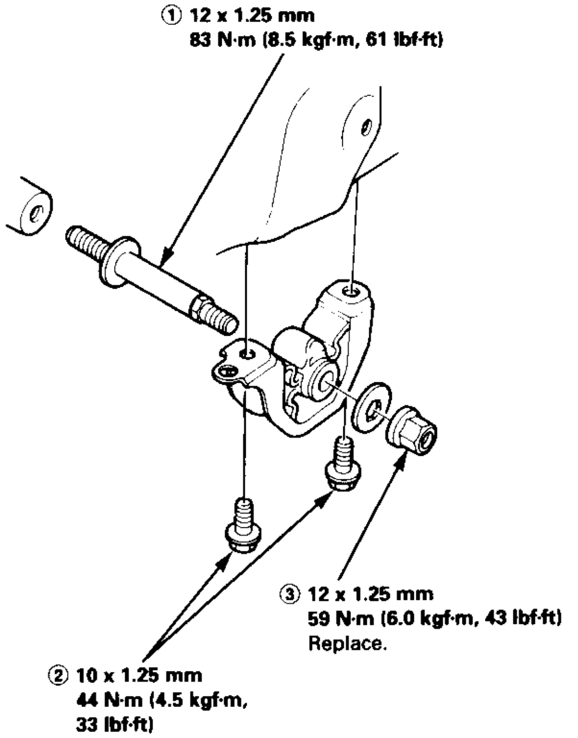
A/T:



M/T:



7. Install the left front mount, then tighten the bolts/nut in the numbered sequence.

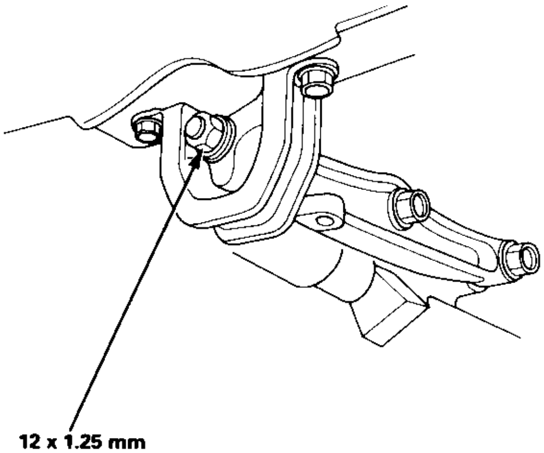


(cont'd)

Installation (cont'd)

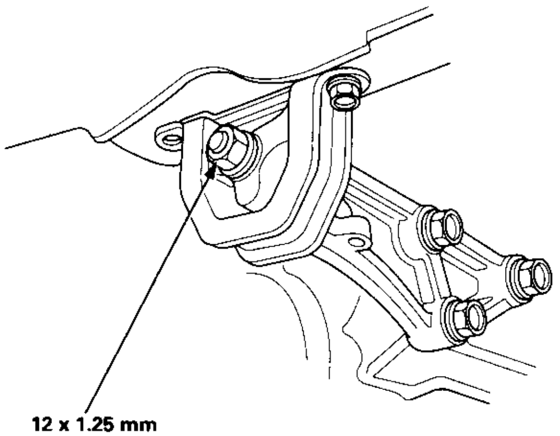
8. Tighten the nut on the right front mount.

A/T:



12 x 1.25 mm
59 N·m (6.0 kgf·m, 43 lbf·ft)
Replace.

M/T:

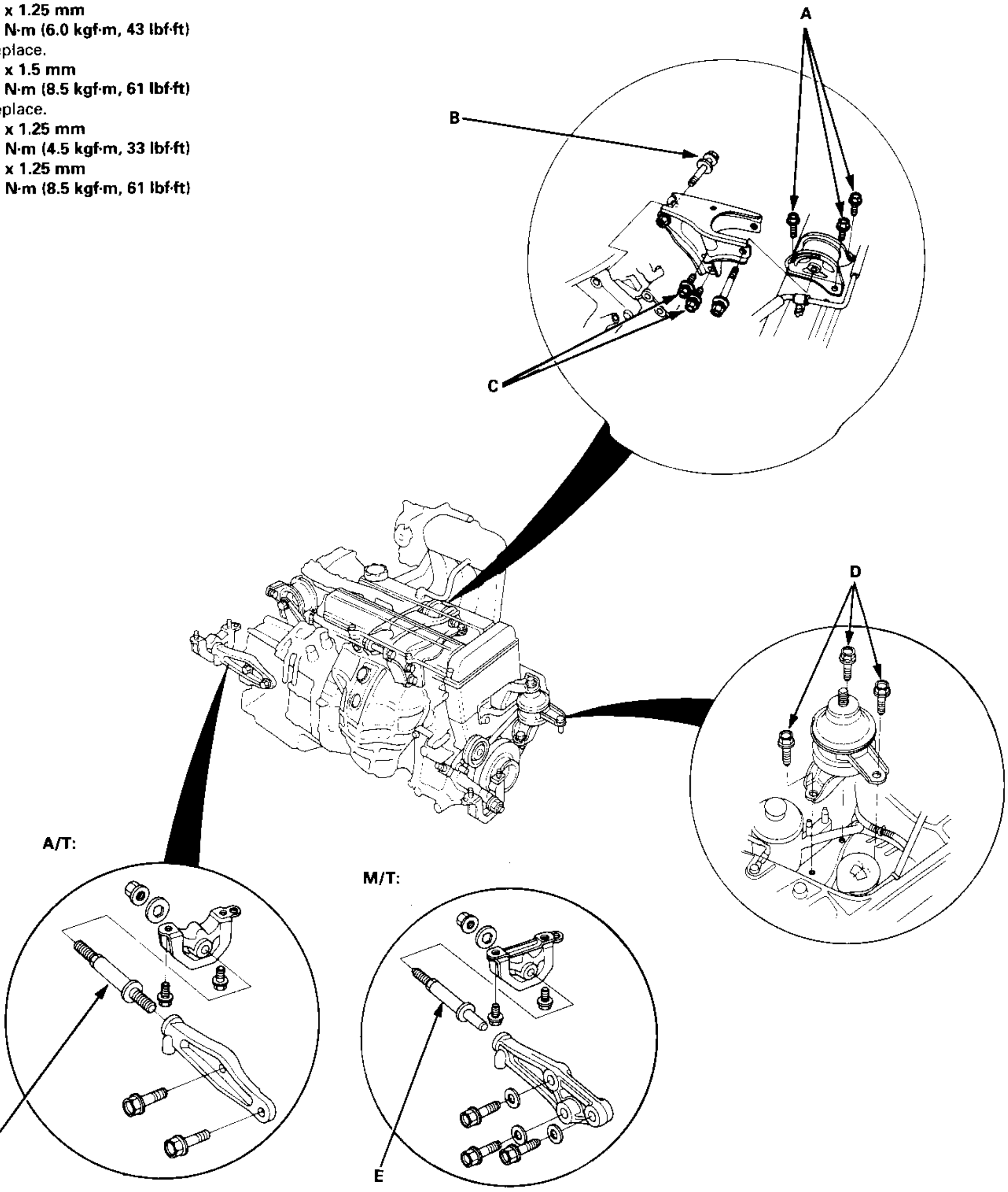


12 x 1.25 mm
59 N·m (6.0 kgf·m, 43 lbf·ft)
Replace.

9. Perform the following checks and adjustments:
   - Check that the spring clip on the ends of the driveshaft and intermediate shaft clicks into place. Use new spring clips.
   - Adjust the shift cable (see section 14).
   - Adjust the throttle cable (see section 11).
   - Refill the engine with engine oil (see page 8-4).
   - Refill the transmission with oil or fluid (see section 13 or 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.
   - Inspect for fuel leakage (see section 11).
     After assembling fuel line parts, turn on the ignition switch (do not operate the starter) so that the fuel pump operates for approximately two seconds and the fuel line pressurizes.
     Repeat this operation two or three times, and check for fuel leakage at any point in the fuel line.

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: **12 x 1.25 mm**
59 N·m (6.0 kgf·m, 43 lbf·ft)
Replace.
C: **14 x 1.5 mm**
83 N·m (8.5 kgf·m, 61 lbf·ft)
Replace.
D: **10 x 1.25 mm**
44 N·m (4.5 kgf·m, 33 lbf·ft)
E: **12 x 1.25 mm**
83 N·m (8.5 kgf·m, 61 lbf·ft)



Cylinder Head/Valve Train

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  Adjustment 6-3

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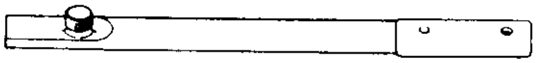
Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07JAA – 001020A	Socket, 19 mm	1	6-7
②	07JAB – 001020A	Holder Handle	1	6-7
③	07MAB – PY3010A	Pulley Holder Attachment, 50 mm, Offset	1	6-7
④	07757 – PJ1010A	Valve Spring Compressor Attachment	1	6-23, 29
⑤	07942 – 6570100	Valve Guide Driver, 6.6 mm	1	6-25, 26
⑥	07984 – 657010D	Valve Guide Reamer, 6.6 mm	1	6-27


①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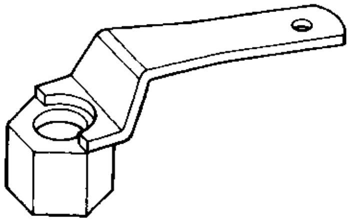
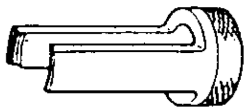

③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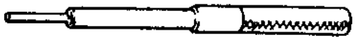
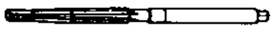
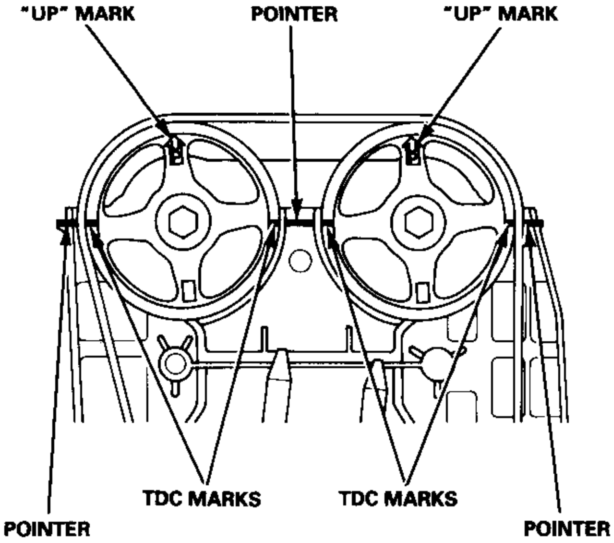

⑤


⑥

Adjustment

Adjust the valves only when the cylinder head temperature is less than 100°F (38°C).

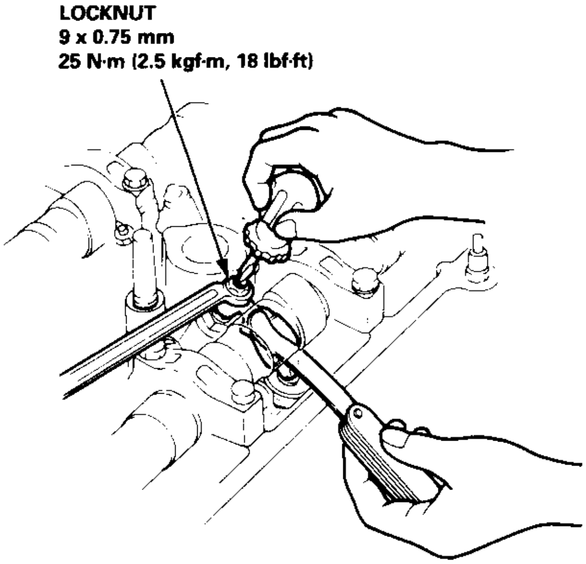
1. Remove the cylinder head cover.
2. Remove the middle cover (see page 6-11).
3. Set the No. 1 piston at TDC. The "UP" mark on the pulleys should be at the top, and the TDC marks on the pulleys should align with the pointers on the back cover.



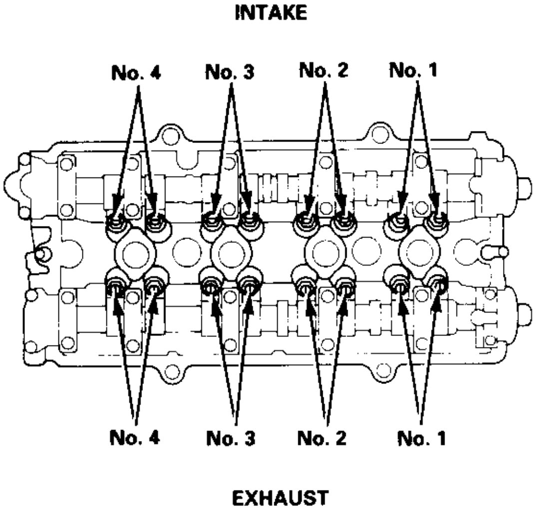
4. Adjust the valves on No. 1 cylinder.

Intake: **0.08 – 0.12 mm (0.003 – 0.005 in)**
Exhaust: **0.16 – 0.20 mm (0.006 – 0.008 in)**

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



Adjusting Screw Locations:



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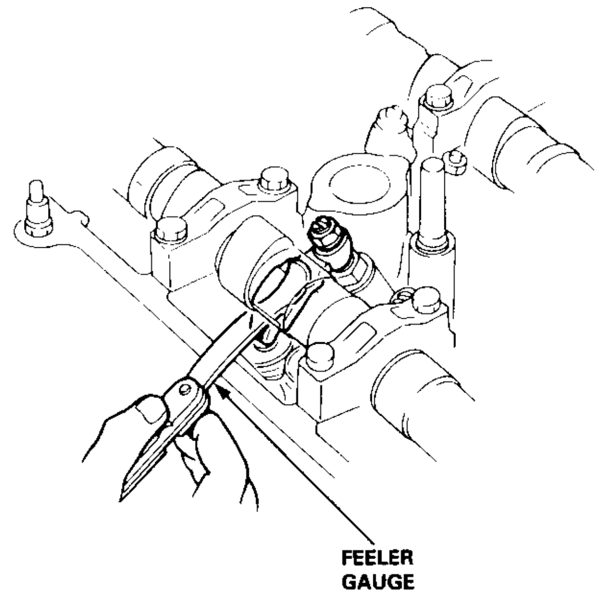
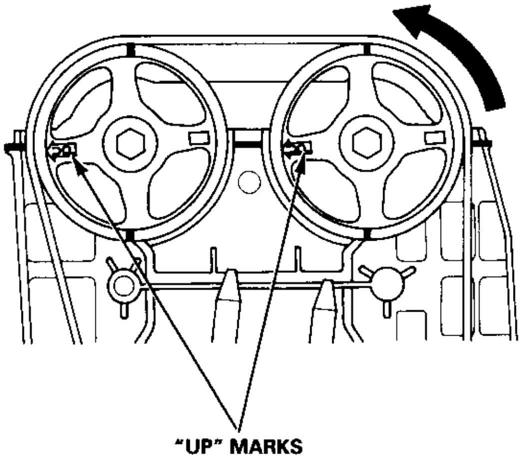
Valve Clearance

Adjustment (cont'd)

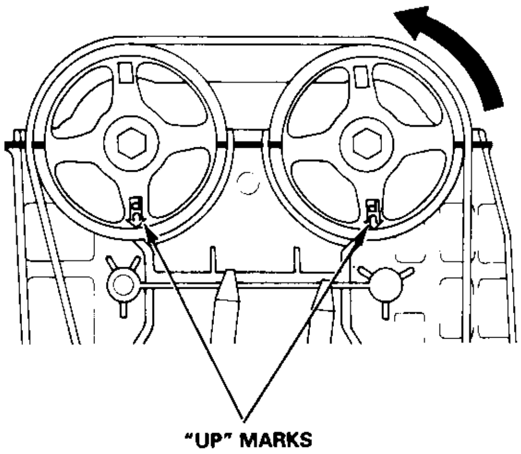
6. Tighten the locknut, and check the clearance again. Repeat the adjustment if necessary.



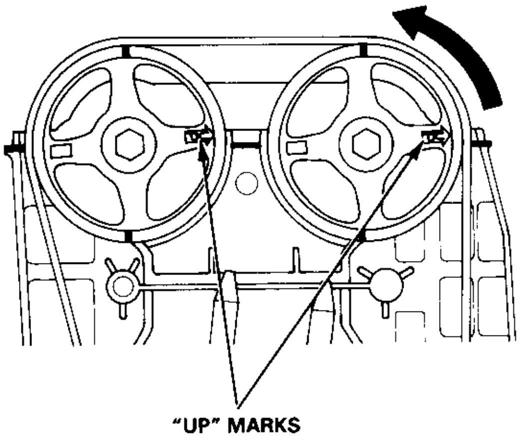
7. Rotate the crankshaft 180° counterclockwise (camshaft pulley turns 90°). The "UP" marks should be on the exhaust side. Adjust the valves on No. 3 cylinder.



8. Rotate the crankshaft 180° counterclockwise to bring No. 4 piston to TDC. The "UP" marks should be pointing straight down. Adjust the valves on No. 4 cylinder.



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



10. Install the cylinder head cover (see page 6-32).

11. Retorque the crankshaft pulley bolt (see page 6-7).

Valve Seals

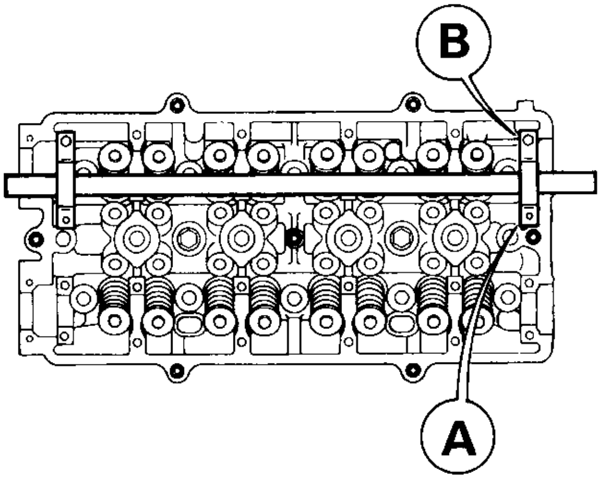
Replacement (cylinder head removal not required)

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

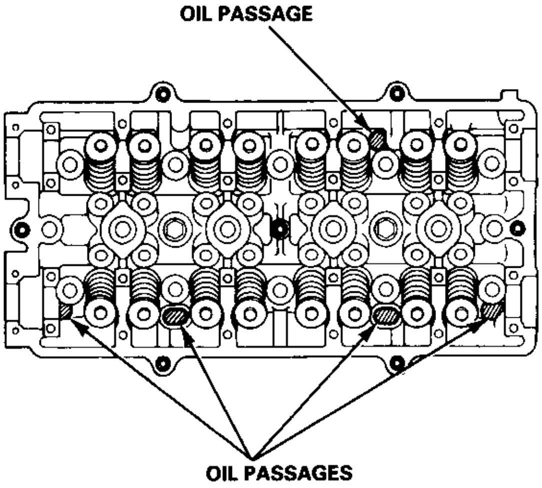
1. Turn the crankshaft so that the No. 1 and the No. 4 pistons are at top dead center (TDC).
2. Remove the cylinder head cover.
3. Remove the distributor.
4. Loosen and disconnect the timing belt from the camshaft pulleys.
5. Remove the camshaft holder bolts, then remove the camshaft holders, the camshafts and rocker arms.

Intake Valve Seals

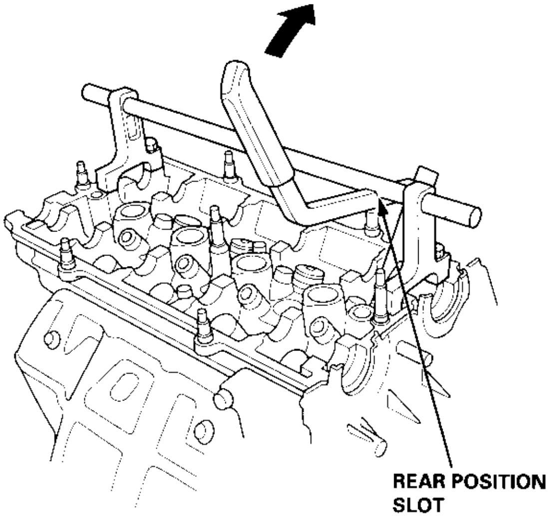
6. Using the 6 mm bolts supplied with the tool, mount the two uprights to the cylinder head at the end camshaft holders. The uprights fit as shown.
7. Insert the cross shaft through the top hole of the two uprights.



8. Select the 7/8 in. diameter long compressor attachment, and fasten the attachment to the front hole of the lever arm with the speed pin supplied.
9. Position the piston at TDC, and insert an air adaptor into the spark plug hole. Pump air into the cylinder to keep the valve closed while compressing the springs and removing the valve keepers.
10. Put shop towels over the oil passages to prevent the valve keepers from falling into the cylinder head.



11. 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 rear position slot on the lever as shown.



(cont'd)

Replacement (cylinder head removal not required) (cont'd)

12. Using an upward motion on the lever arm, compress the valve spring and remove the keepers from the valve stem. Slowly release pressure on the spring.

13. Repeat step 11 for the other valve in that cylinder.

14. Remove the valve seals (see page 6-24).

15. Install the valve seals (see page 6-29).

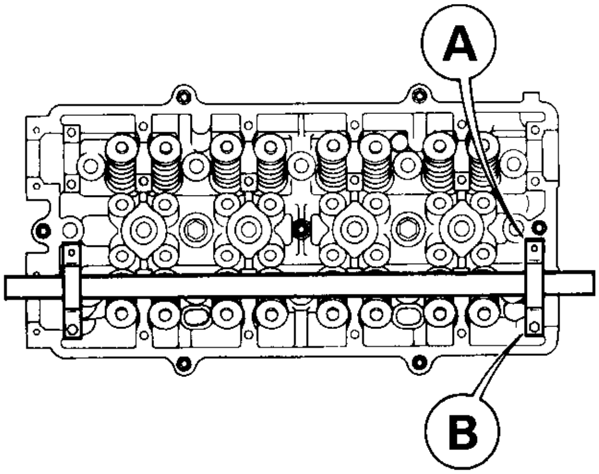
16. Install the springs, the retainers and the keepers in reverse order of removal.

17. Repeat steps 9 to 16 for the other three cylinders.

Exhaust Valve Seals

18. Using the 6 mm bolts supplied with the tool, mount the two uprights to the cylinder head at the end camshaft holders. The uprights fit as shown.

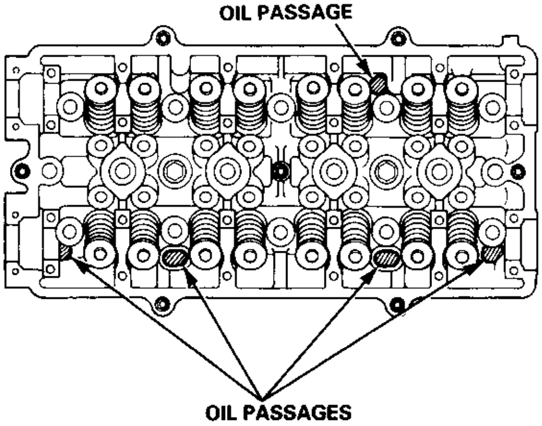
19. Insert the cross shaft through the bottom hole of the two uprights.



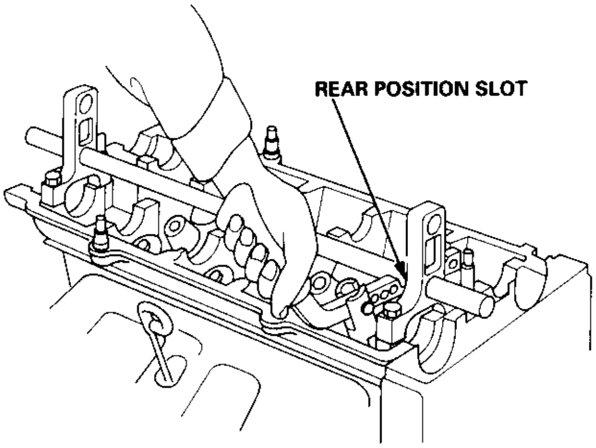
20. Select the 7/8 in. diameter short compressor attachment, and fasten the attachment to the No. 4 hole of the lever arm with the speed pin supplied.

21. Position the piston at TDC, and insert an air adaptor into the spark plug hole. Pump air into the cylinder to keep the valve closed while compressing the springs and removing the valve keepers.

22. Put shop towels over the oil passages to prevent the valve keepers from falling into the cylinder head.



23. 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 rear position slot on the lever as shown.



24. 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.

25. Repeat step 24 for the other valve in that cylinder.

26. Remove the valve seals (see page 6-24).

27. Install the valve seals (see page 6-29).

28. Install the springs, the retainers and the keepers in reverse order of removal.

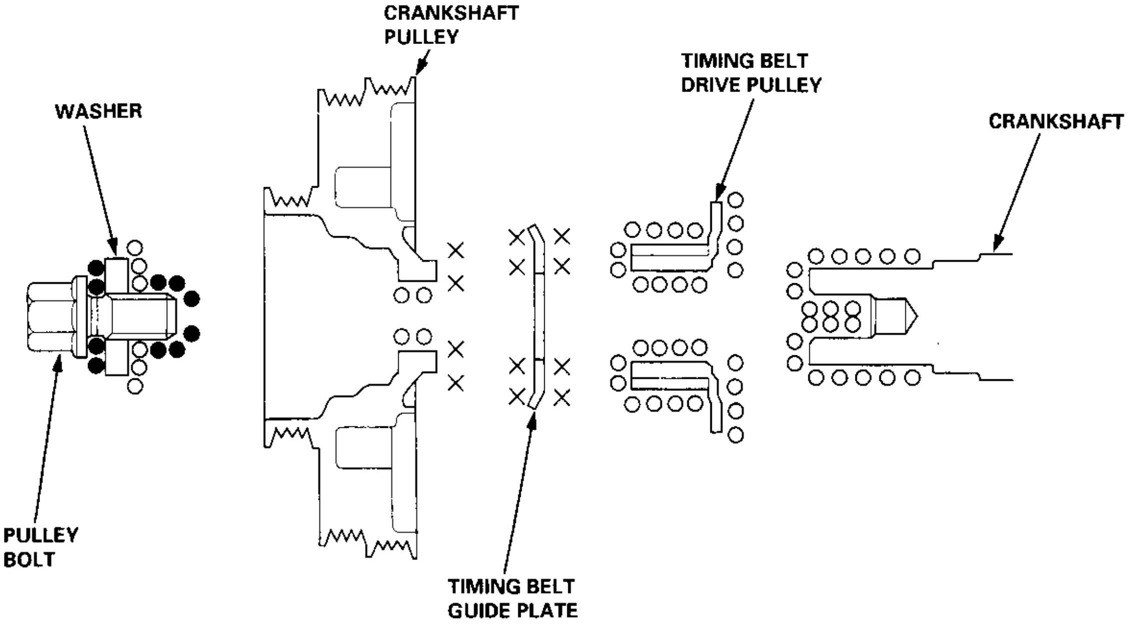
29. Repeat steps 21 to 28 on the other three cylinders.

Crankshaft Pulley and Pulley Bolt

Replacement

When installing and tightening the pulley, follow the procedure below.

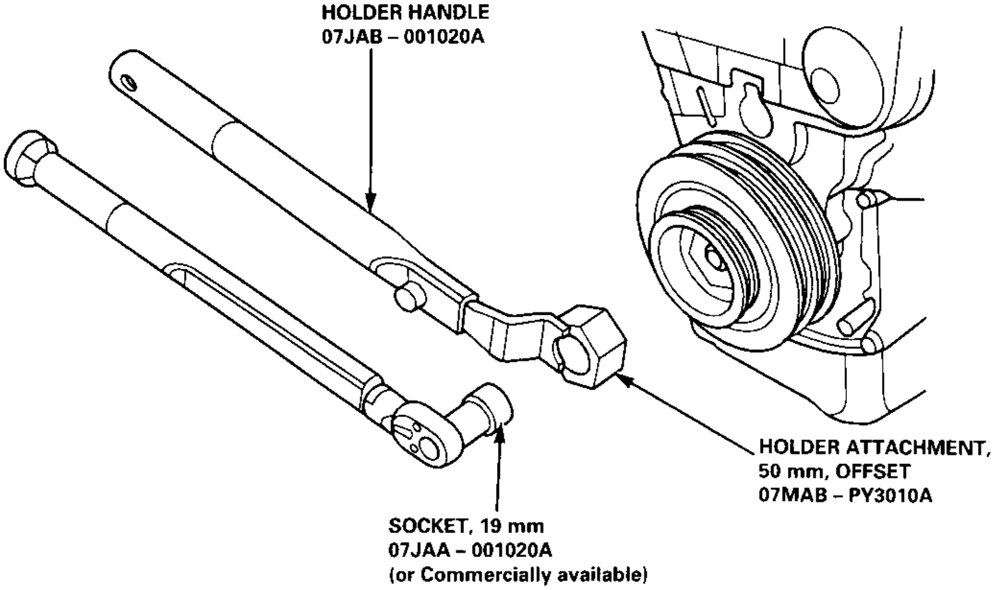
Clean, remove any oil, and lubricate points shown below.
○: Clean
x : Remove any oil
●: Lubricate



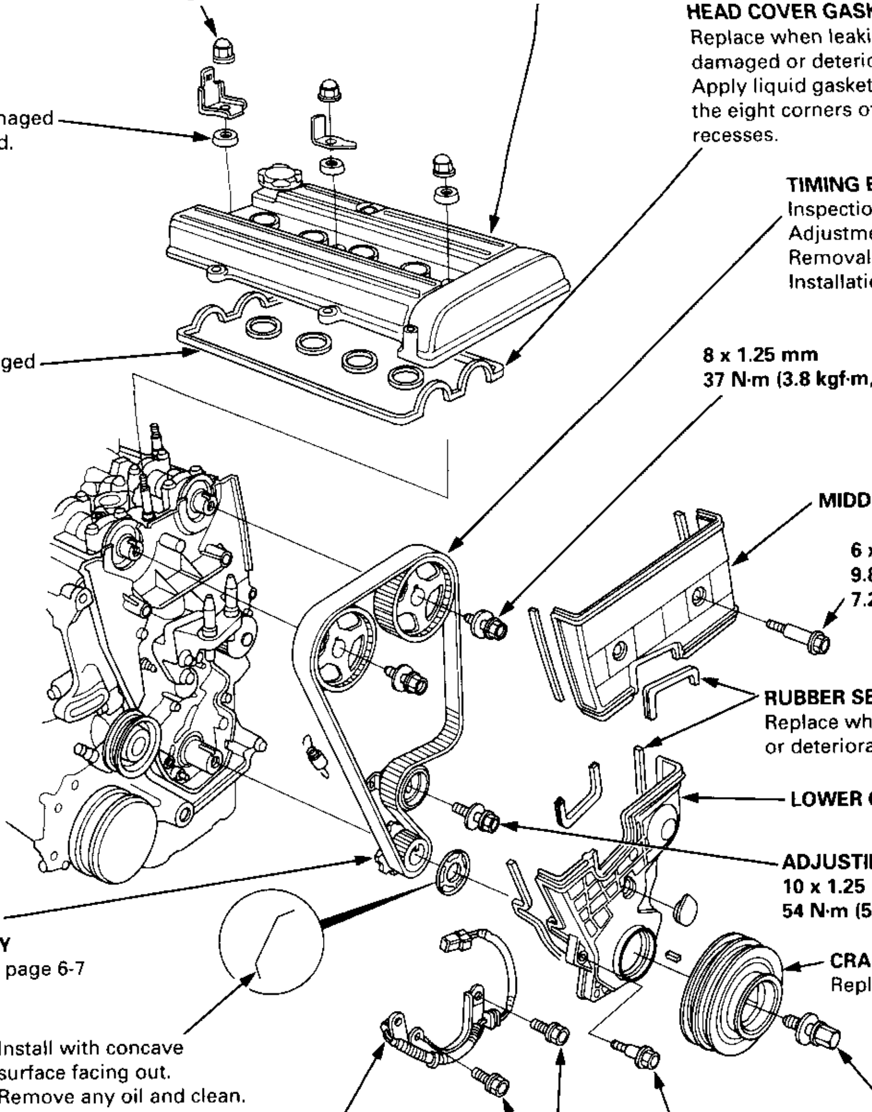
Crankshaft pulley bolt size and torque value:

14 x 1.25 mm
177 N·m (18.0 kgf·m, 130 lbf·ft)

NOTE: Do not use an impact wrench when installing.



Illustrated Index



CYLINDER HEAD COVER
Refer to page 6-32 when installing.

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

HEAD COVER GASKET
Replace when leaking, damaged or deteriorated. Apply liquid gasket at the eight corners of the recesses.

WASHER
Replace if damaged or deteriorated.

TIMING BELT
Inspection, page 6-9
Adjustment, page 6-9
Removal, page 6-10
Installation, page 6-11

RUBBER SEAL
Replace if damaged or deteriorated.

8 x 1.25 mm
37 N·m (3.8 kgf·m, 27 lbf·ft)

MIDDLE COVER

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

RUBBER SEALS
Replace when damaged or deteriorated.

LOWER COVER

ADJUSTING BOLT
10 x 1.25 mm
54 N·m (5.5 kgf·m, 40 lbf·ft)

TIMING BELT DRIVE PULLEY
Replacement, page 6-7

CRANKSHAFT PULLEY
Replacement, page 6-7

Install with concave surface facing out.
Remove any oil and clean.

CRANKSHAFT SPEED FLUCTUATION (CKF) SENSOR

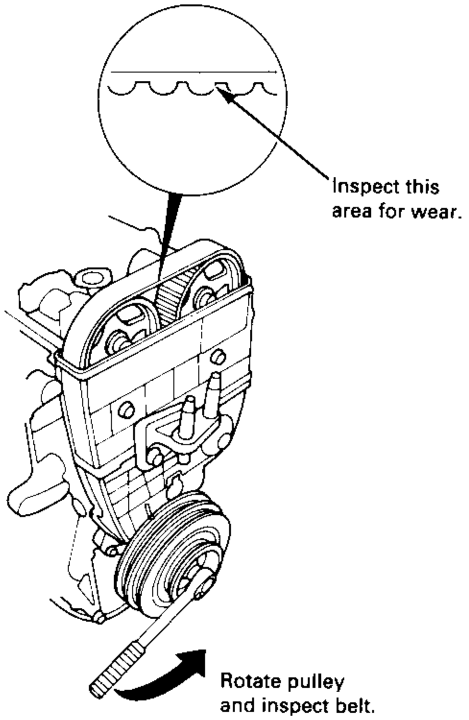
6 x 1.0 mm
11 N·m (1.1 kgf·m, 8.0 lbf·ft)

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

PULLEY BOLT
14 x 1.25 mm
177 N·m (18.0 kgf·m, 130 lbf·ft)
Replacement, page 6-7
Do not use an impact wrench when installing.

Inspection

1. Remove the cylinder head cover.
2. Inspect the timing belt for cracks and oil or coolant soaking. Replace the belt if it is oil or coolant soaked. Remove any oil or solvent that gets on the belt.



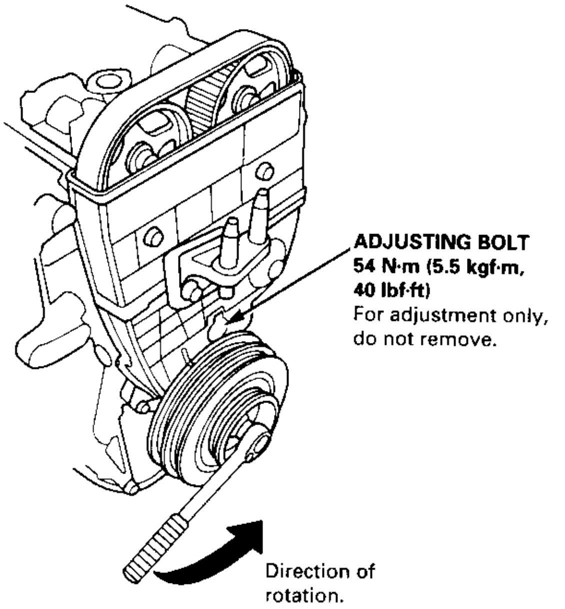
3. After inspecting, retorque the crankshaft pulley bolt to 177 N·m (18.0 kgf·m, 130 lbf·ft).
4. Install the cylinder head cover (see page 6-32).

Tension Adjustment

NOTE:

- Always adjust the timing belt tension with the engine cold.
- Always rotate the crankshaft counterclockwise when viewed from the pulley side. Rotating it clockwise may result in improper adjustment of the belt tension.

1. Remove the cylinder head cover.
2. Set the No. 1 piston at TDC (see page 6-12).
3. Rotate the crankshaft five or six revolutions to set the belt.
4. Set the No. 1 piston at TDC.
5. Loosen the adjusting bolt 1/2 turn (180°) only.



6. Rotate the crankshaft counterclockwise three teeth on the camshaft pulley.
7. Tighten the adjusting bolt to the specified torque.
8. After adjusting, retorque the crankshaft pulley bolt to 177 N·m (18.0 kgf·m, 130 lbf·ft).
9. Install the cylinder head cover (see page 6-32).

Timing Belt

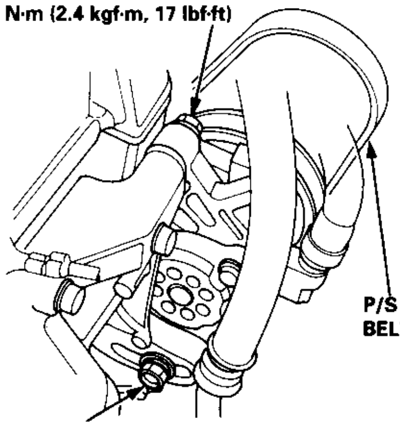
Removal

Replace the timing belt at 105,000 miles (168,000 km) according to the maintenance schedule (normal conditions/severe conditions). If the vehicle is regularly driven in either of the following conditions, replace the timing belt at 60,000 miles (U.S.A.) 100,000 km (Canada).

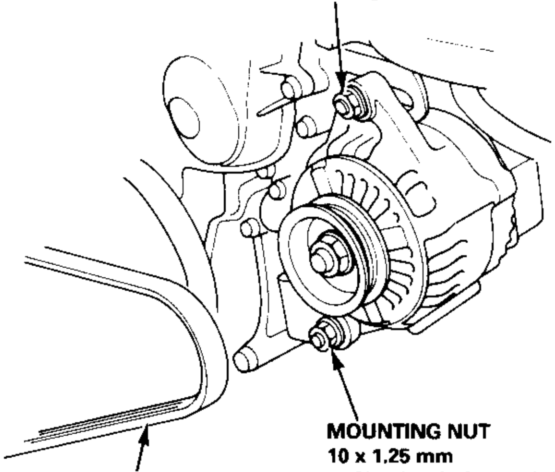
— In very high temperatures (over 110°F, 43°C).

— In very low temperatures (under –20°F, –29°C).

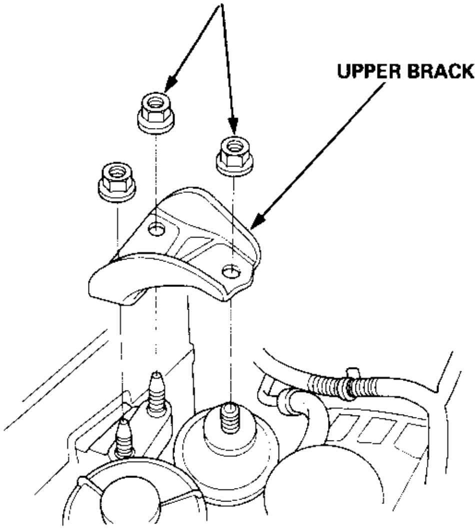
1. Turn the crankshaft pulley so the No. 1 piston is at top dead center (TDC).
2. Remove the guard bar and splash shield (see page 5-7).
3. Loosen the mounting bolt and lock bolt, then remove the power steering (P/S) pump belt.



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



6. Remove the cruise control actuator (see section 4).
7. Support the engine with a jack, then remove the upper bracket. Make sure to place a cushion between the oil pan and the jack.

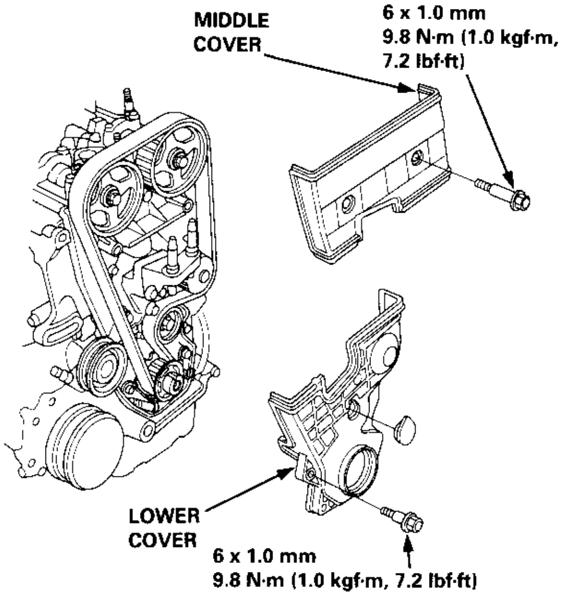


8. Remove the cylinder head cover.

   NOTE: Refer to page 6-32 when installing the cylinder head cover.

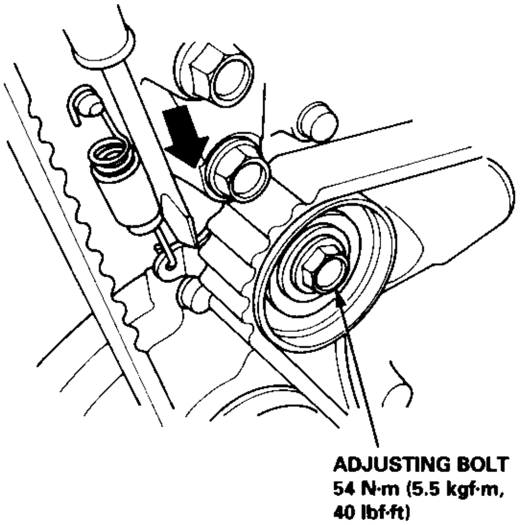
9. Remove the crankshaft pulley (see page 6-7).

10. Remove the middle cover and lower cover. Do not use these covers to store removed items.



11. Mark the direction of rotation on the timing belt.

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

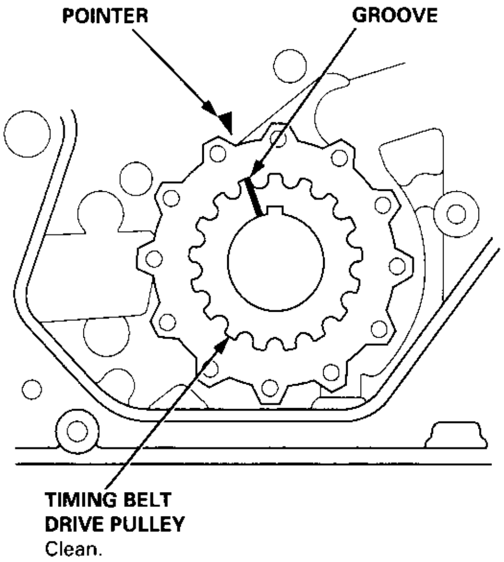


13. Remove the timing belt.

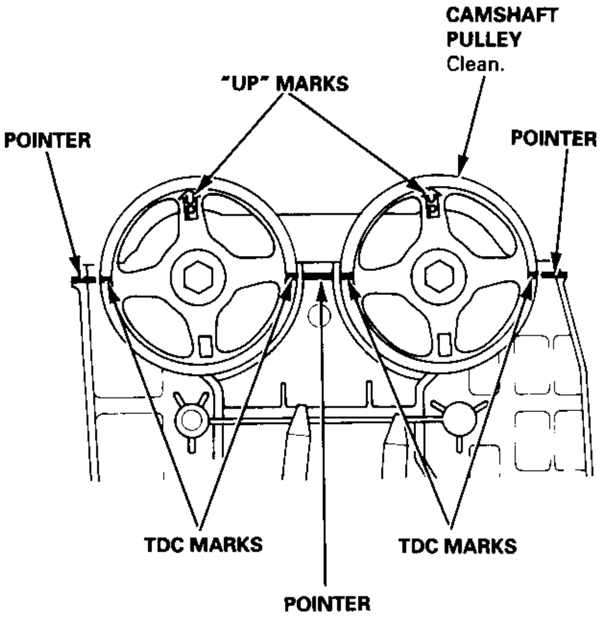
Installation

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 pulleys so that the No. 1 piston is at TDC. Align the TDC marks on the camshaft pulleys to the pointers on the back cover.



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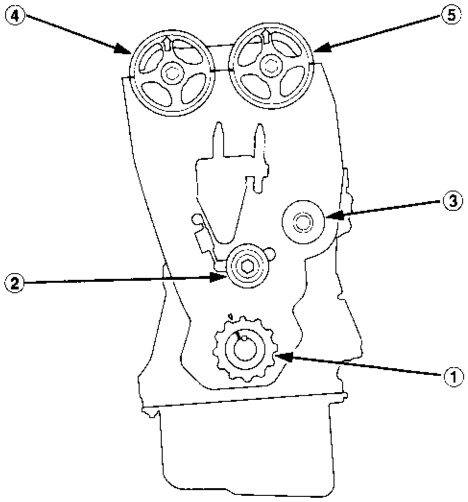
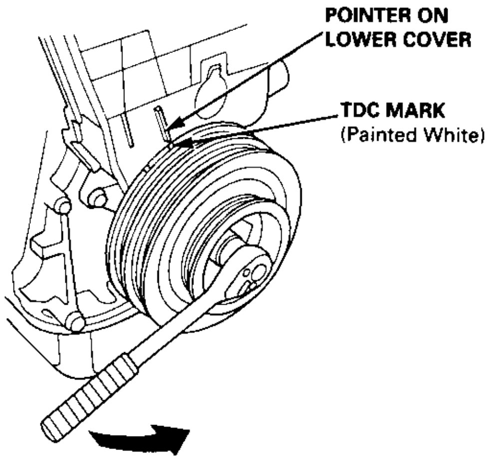
Installation (cont'd)

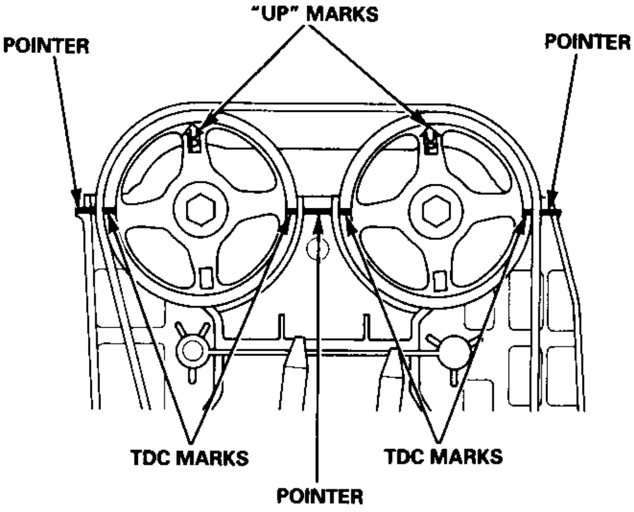
3. Install the timing belt tightly in the sequence shown. ① Timing belt drive pulley (crankshaft) → ② Adjusting pulley → ③ Water pump pulley → ④ Exhaust camshaft pulley → ⑤ Intake camshaft pulley.

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



4. Loosen and retighten the adjusting bolt to tension the timing belt.
5. Clean, then install the lower cover and middle cover.
6. Install the crankshaft pulley, then tighten the pulley bolt (see page 6-7).
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 6-9).
9. Check that the crankshaft pulley and camshaft pulleys are both at TDC.



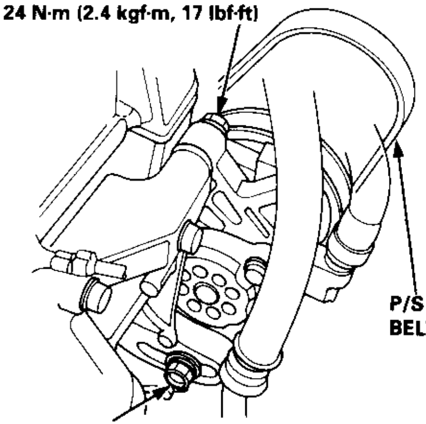


10. If the camshaft pulleys are not positioned at TDC, remove the timing belt, adjust the position following the procedure on page 6-11, then reinstall the timing belt.
11. Install the cylinder head cover (see page 6-32).
12. After installation, adjust the tension on each belt.
    - See section 4 for alternator belt tension adjustment.
    - See section 22 for A/C compressor belt tension adjustment.
    - See section 17 for P/S pump belt tension adjustment.

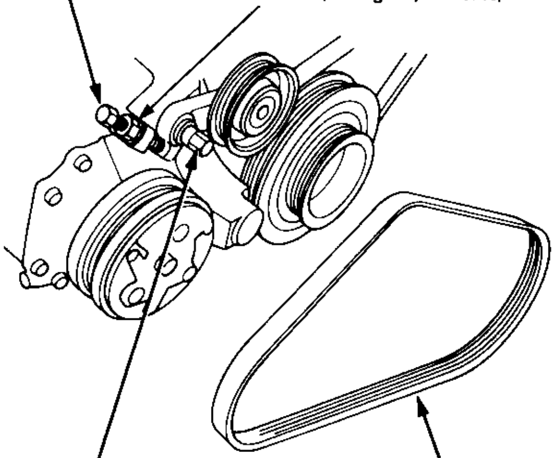
CKF Sensor

Replacement

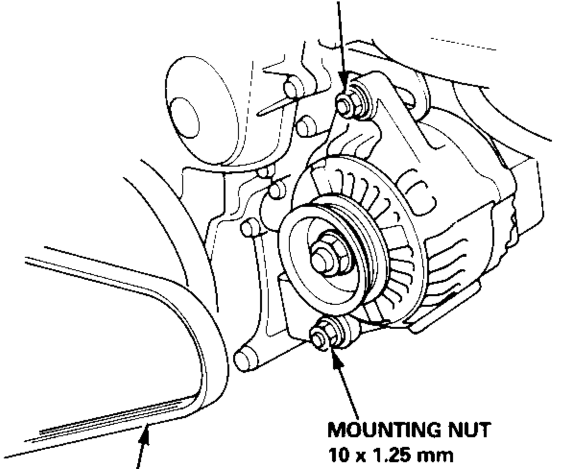
1. Remove the guard bar and splash shield (see page 5-7).
2. Loosen the lock bolt and mounting bolt, then remove the P/S pump belt.



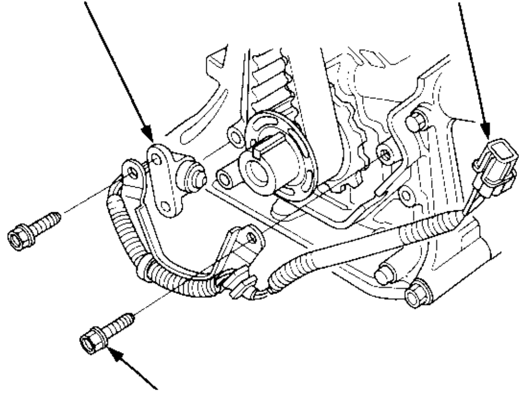
3. Loosen the adjusting bolt and idler pulley bracket bolt, then remove the A/C compressor belt.



4. Loosen the locknut and mounting nut, then remove the alternator belt.



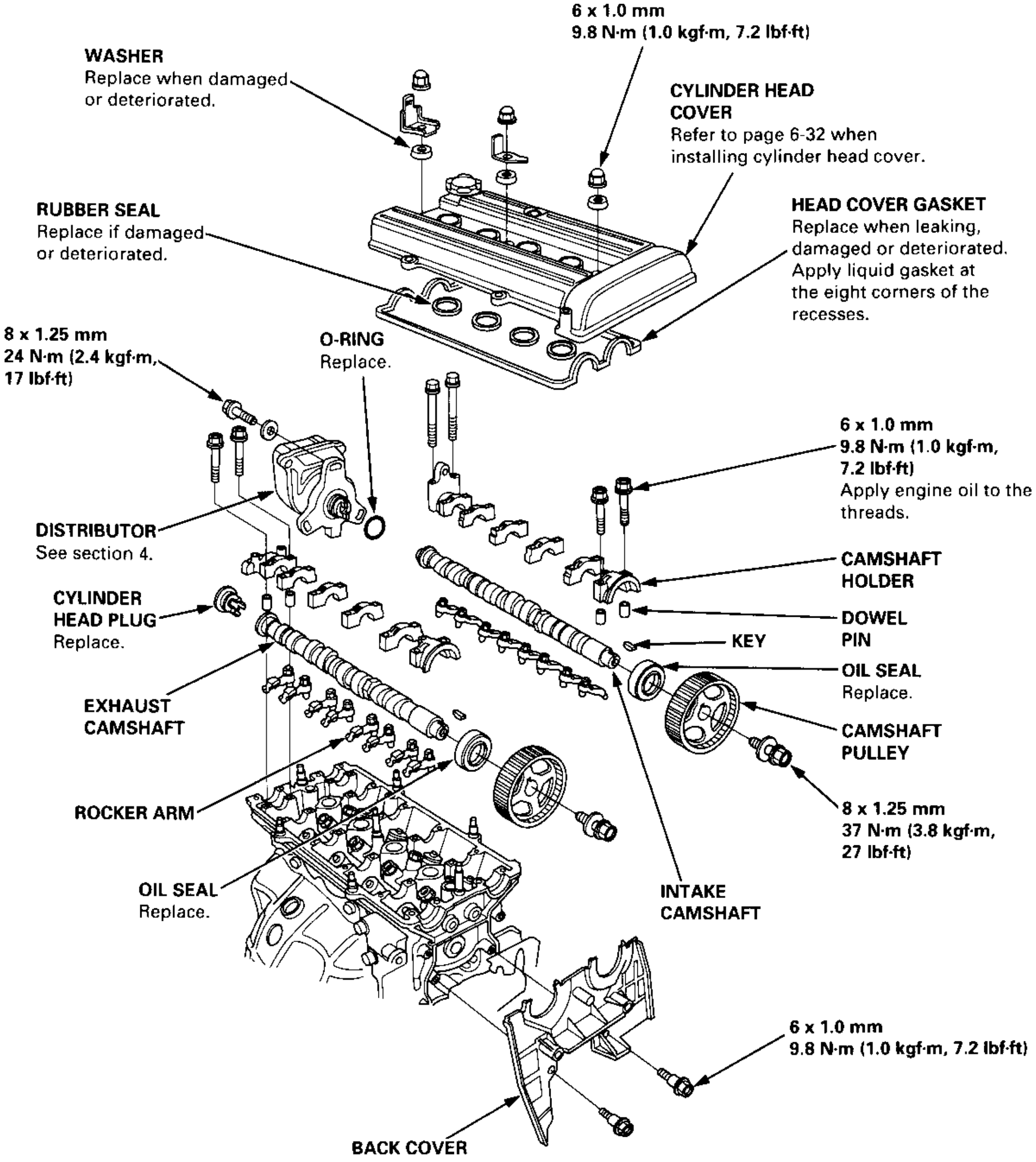
5. Remove the cylinder head cover.
6. Remove the crankshaft pulley (see page 6-7).
7. Remove the middle cover and the lower cover.
8. Disconnect the CKF sensor connector, then remove the CKF sensor.



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

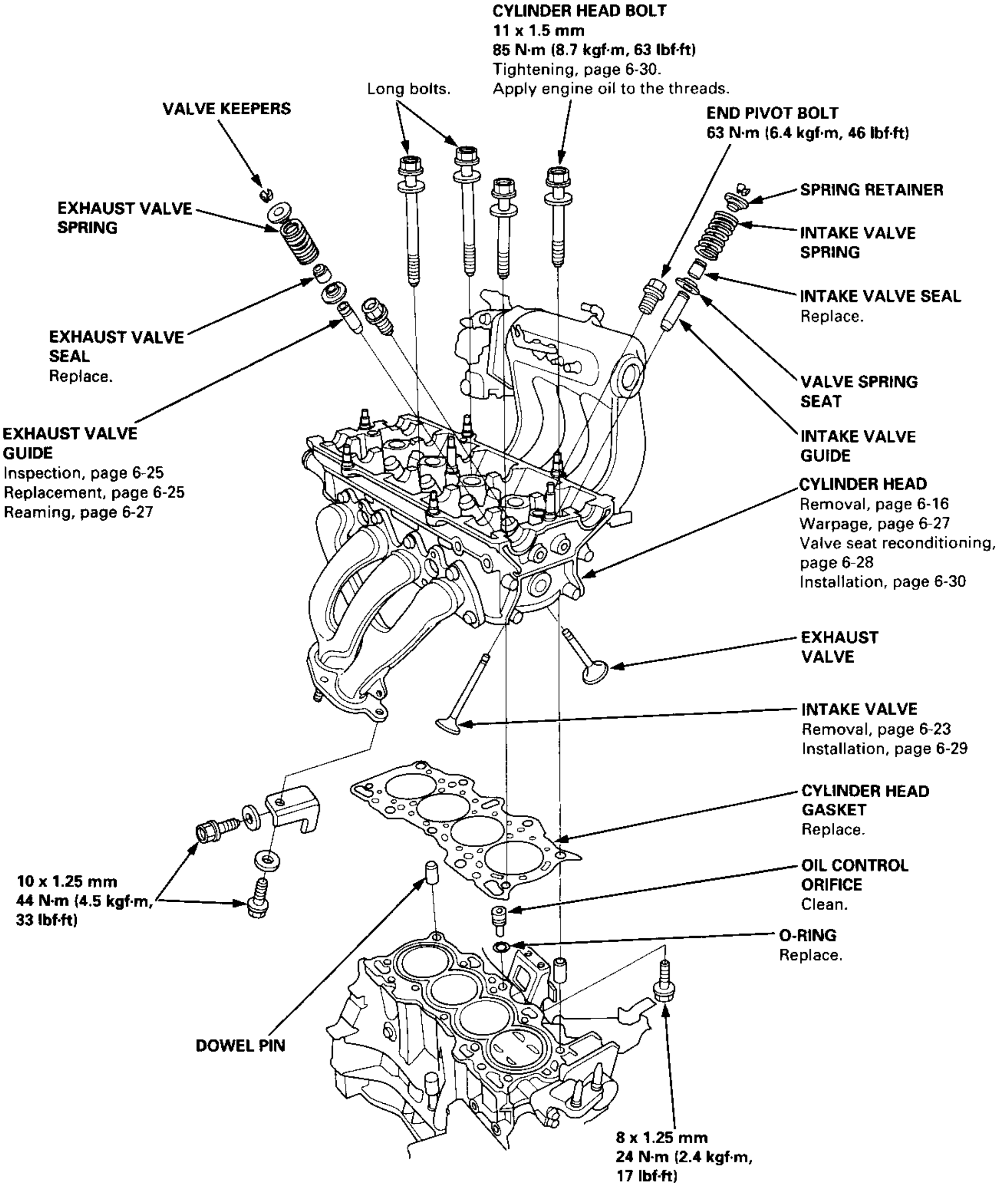
Illustrated Index

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.

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



CYLINDER HEAD BOLT
11 x 1.5 mm
85 N·m (8.7 kgf·m, 63 lbf·ft)
Tightening, page 6-30.
Apply engine oil to the threads.

Long bolts.

VALVE KEEPERS

END PIVOT BOLT
63 N·m (6.4 kgf·m, 46 lbf·ft)

SPRING RETAINER

EXHAUST VALVE SPRING

INTAKE VALVE SPRING

INTAKE VALVE SEAL
Replace.

EXHAUST VALVE SEAL
Replace.

VALVE SPRING SEAT

EXHAUST VALVE GUIDE
Inspection, page 6-25
Replacement, page 6-25
Reaming, page 6-27

INTAKE VALVE GUIDE

CYLINDER HEAD
Removal, page 6-16
Warpage, page 6-27
Valve seat reconditioning, page 6-28
Installation, page 6-30

EXHAUST VALVE

INTAKE VALVE
Removal, page 6-23
Installation, page 6-29

CYLINDER HEAD GASKET
Replace.

10 x 1.25 mm
44 N·m (4.5 kgf·m, 33 lbf·ft)

OIL CONTROL ORIFICE
Clean.

O-RING
Replace.

DOWEL PIN

8 x 1.25 mm
24 N·m (2.4 kgf·m, 17 lbf·ft)

Removal

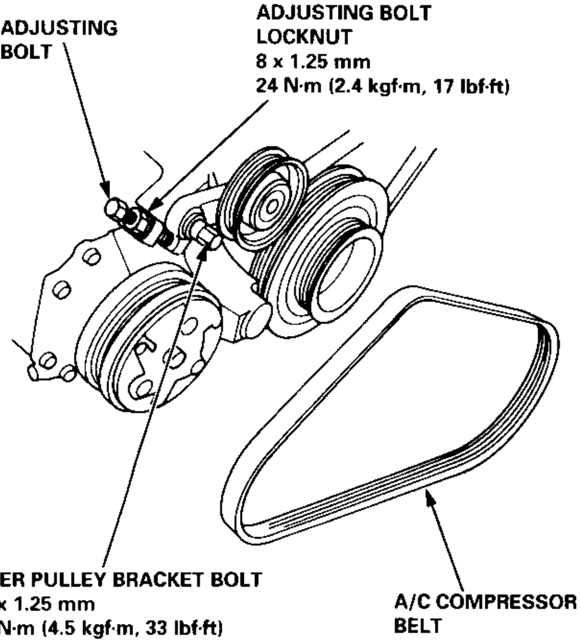
Engine removal is not required for this procedure.

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

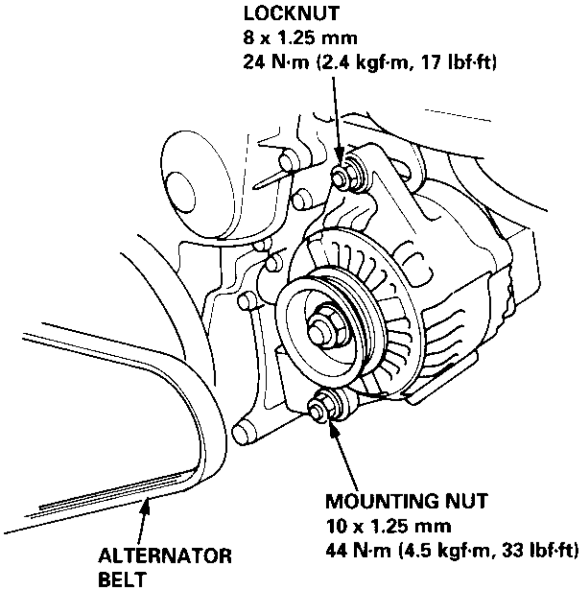
NOTE:

- 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.
- 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.

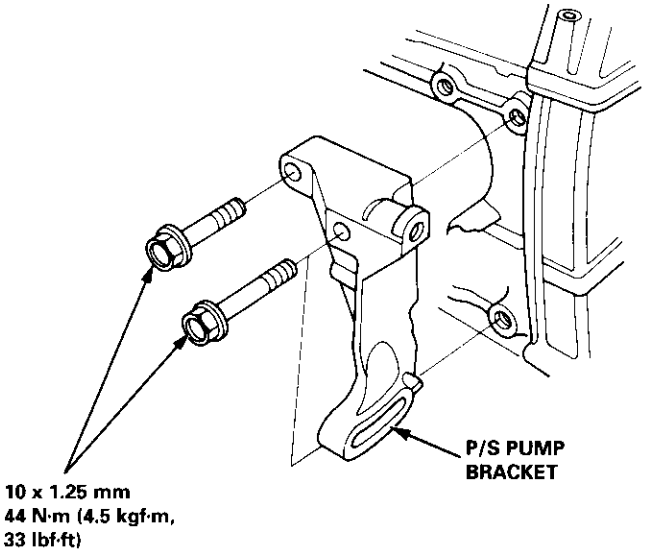
1. Disconnect the negative terminal from the battery.
2. Drain the engine coolant (see page 10-5). Remove the radiator cap to speed draining.
3. Remove the intake air duct and air cleaner housing (see page 5-2).
4. Remove the mounting bolt and lock bolt, then remove the power steering (P/S) pump belt and pump (see page 5-4).
5. Loosen the idler pulley bracket bolt and adjusting bolt, then remove the air conditioning (A/C) compressor belt.



6. Loosen the locknut and mounting nut, then remove the alternator belt.

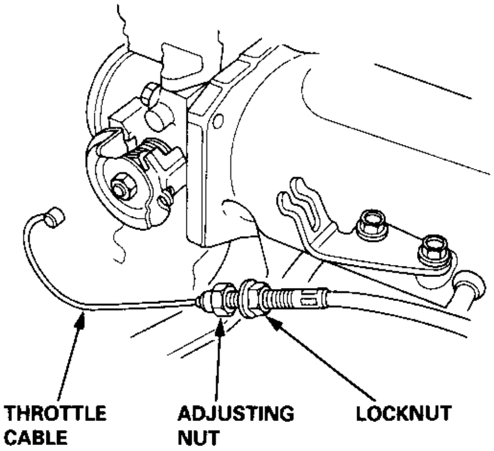


7. Remove the P/S pump bracket.

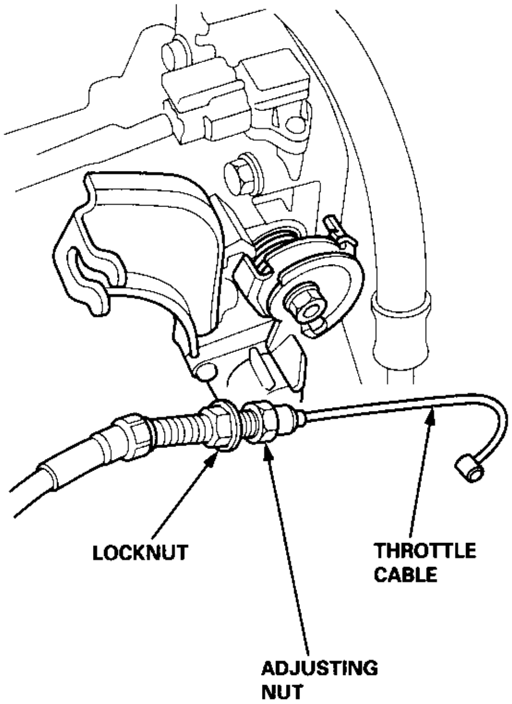


8. Remove the throttle cable by loosening the locknut, then slip the cable end out of the throttle linkage. Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.

'97 – 98 models:



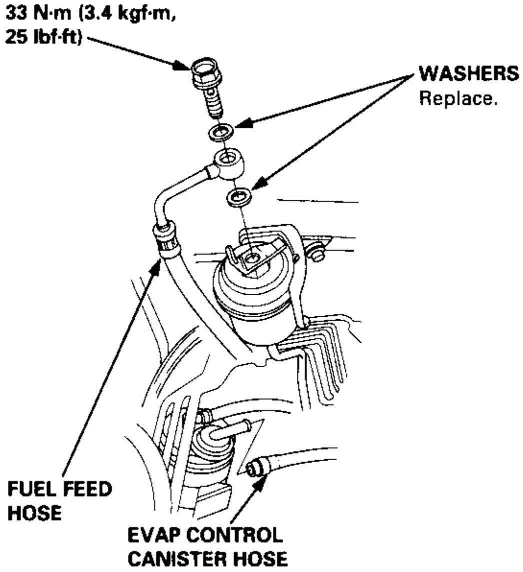
'99 – 00 models:



9. Relieve fuel pressure (see section 11).

⚠ WARNING Do not smoke while working on the fuel system. Keep open flame or sparks away from the work area. Drain fuel only into an approved container.

10. Remove the evaporative emission (EVAP) control canister hose and fuel feed hose.

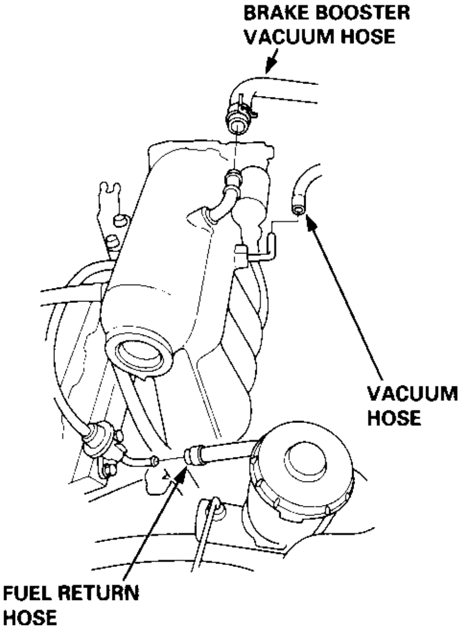


(cont'd)

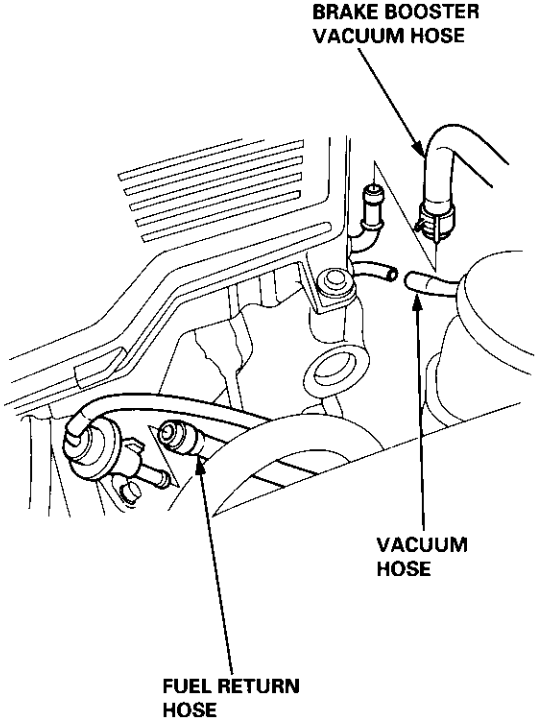
Removal (cont'd)

11. Remove the brake booster vacuum hose, fuel return hose, and vacuum hose.

'97 – 98 models:

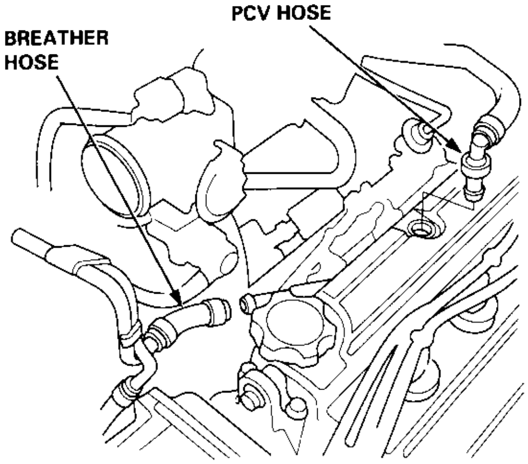


'99 – 00 models:

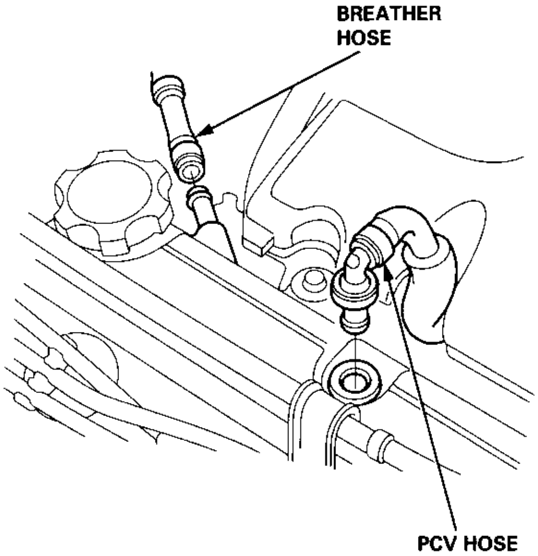


12. Remove the breather hose and positive crankcase ventilation (PCV) hose.

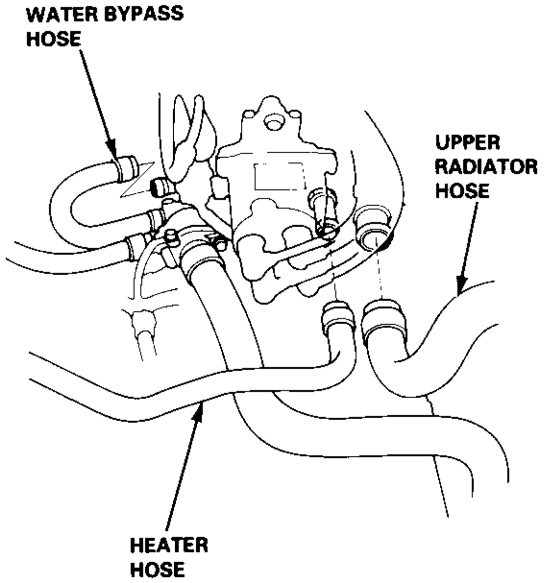
'97 – 98 models:



'99 – 00 models:



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



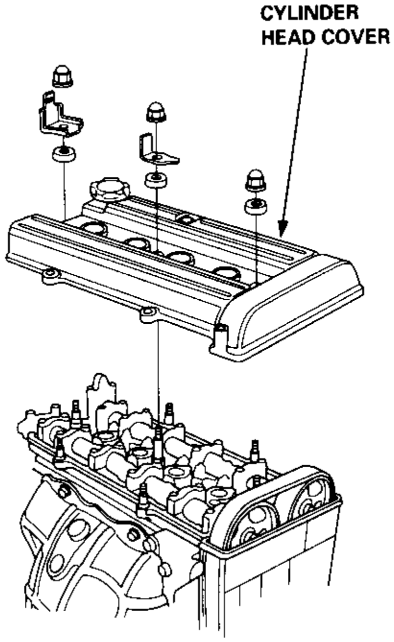
14. Remove the engine wire harness connectors and wire harness clamps from the cylinder head and the intake manifold.
   - Four fuel injector connectors
   - Engine coolant temperature (ECT) sensor connector
   - Radiator fan switch connector
   - Coolant temperature gauge sending unit connector
   - Throttle position sensor connector
   - Manifold absolute pressure (MAP) sensor connector
   - Primary heated oxygen sensor (primary HO2S) connector
   - Idle air control (IAC) valve connector
   - Distributor connector

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

16. Remove the cruise control actuator (see section 4).

17. Support the engine with a jack, then remove the upper bracket. Make sure to place a cushion between the oil pan and the jack (see page 6-10).

18. Remove the cylinder head cover.

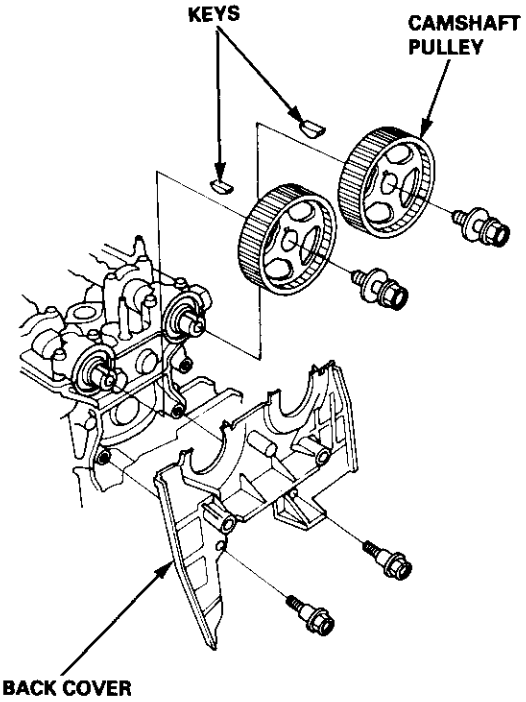


19. Inspect the timing belt (see page 6-9).

(cont'd)

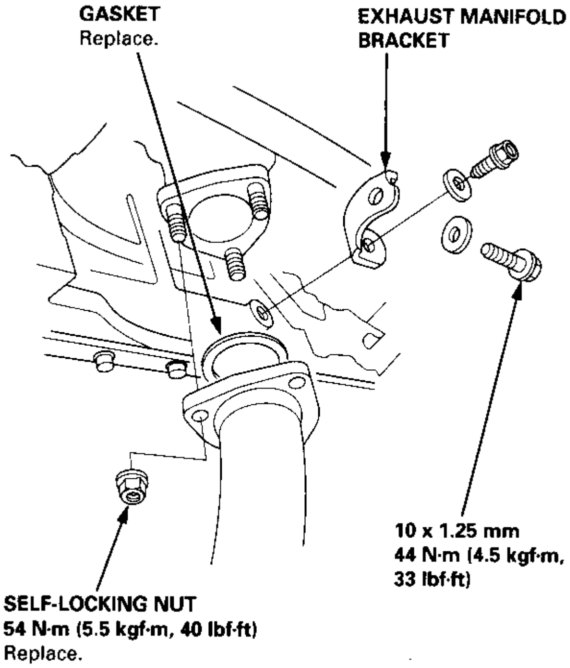
Removal (cont'd)

20. Remove the timing belt (see page 6-10).
21. Remove the camshaft pulleys and back cover.

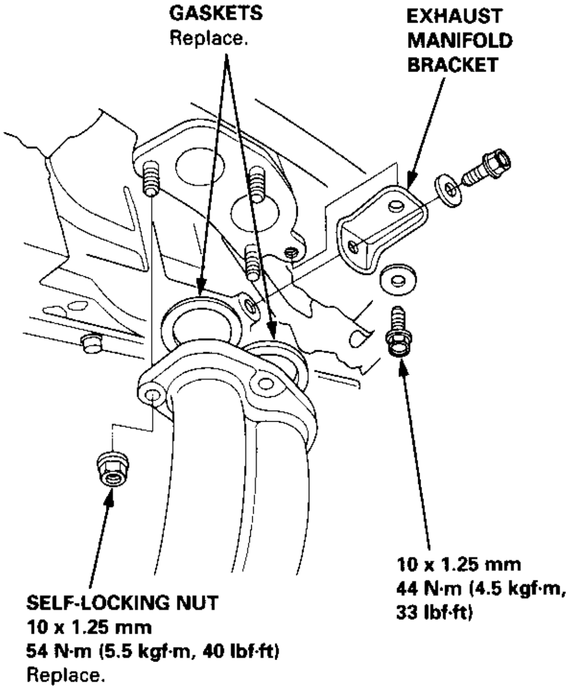


22. Remove the exhaust manifold bracket and self-locking nuts.

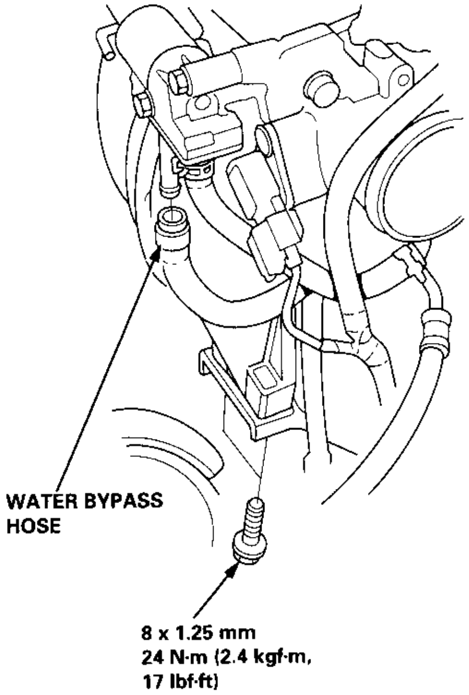
'97 – 98 U.S. models (California):



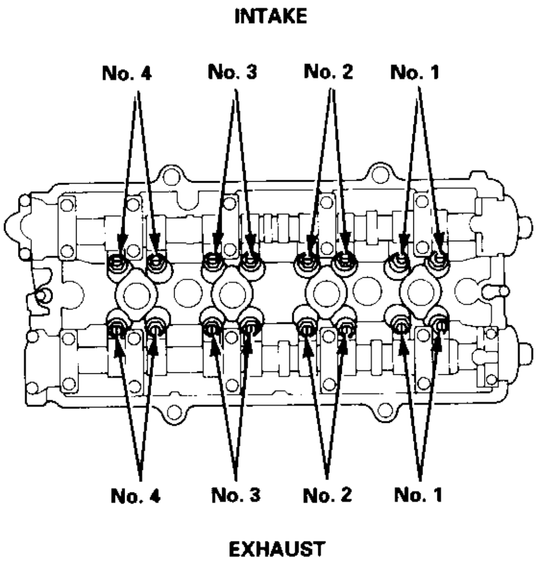
'97 – 98 U.S. models (Except California):
'99 – 00 models:



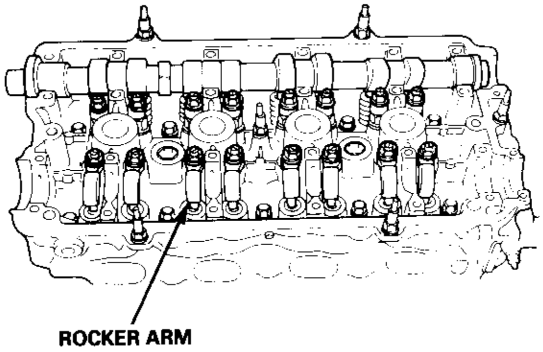
23. Remove the intake manifold mounting bolts and water bypass hose.



24. Loosen the locknuts and adjusting screws.

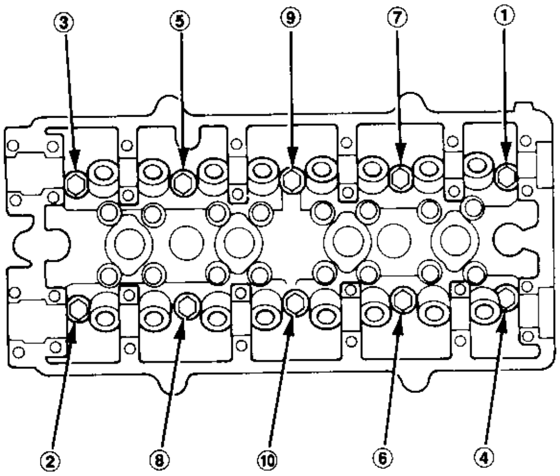


25. Remove the camshaft holder bolts, then remove the camshaft holders and rocker arms. Make note of the rocker arm positions.



26. Remove the cylinder head bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

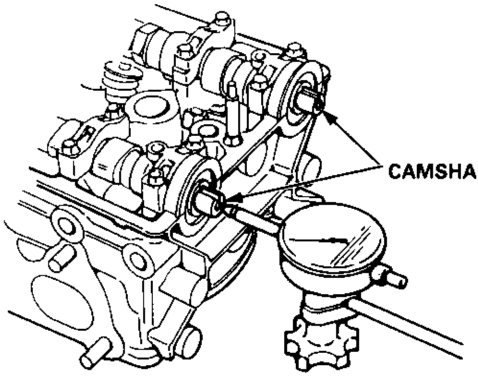
CYLINDER HEAD BOLTS LOOSENING SEQUENCE:



27. Remove the cylinder head.

Inspection

1. Loosen the adjusting screws.
2. Remove the camshaft holders.
3. Mark the rocker arms, then remove them.
4. Reinstall the camshaft and holders. Tighten the camshaft holder bolts in a crisscross pattern, beginning with the inner bolts.
   9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)
5. Seat the camshafts by pushing them toward the distributor end of the head with a screwdriver.
6. 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)

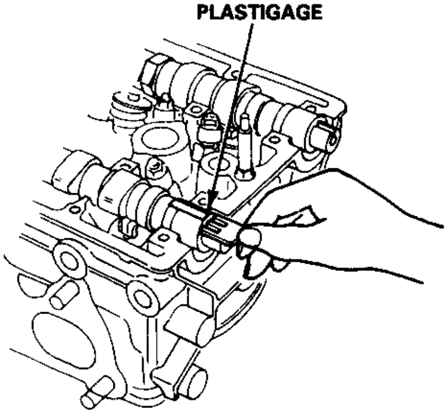


7. Unscrew the camshaft holder bolts two turns at a time, in a crisscross pattern. Then remove the camshaft holder bolts from the cylinder head.
8. Lift the camshafts out of the cylinder head, wipe them clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
9. Clean the camshaft journal surfaces in the cylinder head, then set the camshaft back in place. Place a plastigage strip across each journal.
10. Install the camshaft holders, and torque the bolts to the values and in the sequence shown on page 6-31.

    NOTE: Do not rotate the camshafts during inspection.

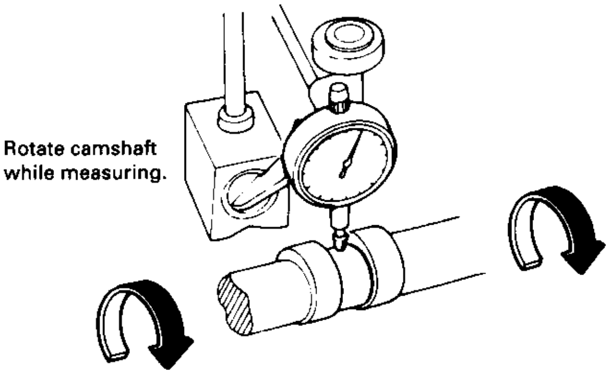
11. Remove the camshaft holders. Measure the widest portion of plastigage on each journal.

    Camshaft-to Holder Oil Clearance:
    Standard (New): 0.030 – 0.069 mm
    (0.0012 – 0.0027 in)
    Service Limit: 0.15 mm (0.006 in)



12. If 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 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)

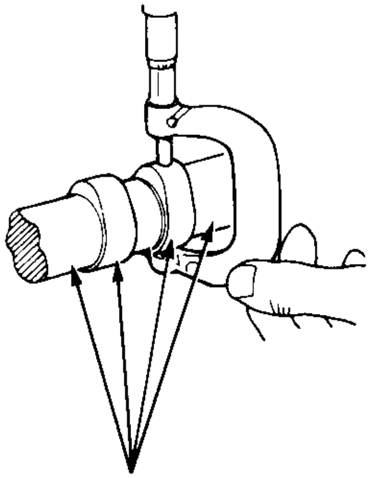


— If the total runout of the camshafts is within tolerance, replace the cylinder head.

— If the total runout is out of tolerance, replace the camshafts and recheck. If the oil clearance is still out of tolerance, replace the cylinder head.

13. Measure the cam lobe height.

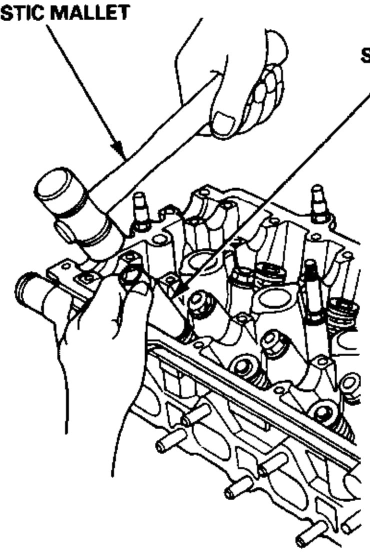
Cam Lobe Height Standard (New)
'97 – 98 models:
INTAKE: 33.204 mm (1.3072 in)
EXHAUST: 33.528 mm (1.3200 in)
'99 – 00 models:
INTAKE: 33.716 mm (1.3274 in)
EXHAUST: 33.528 mm (1.3200 in)



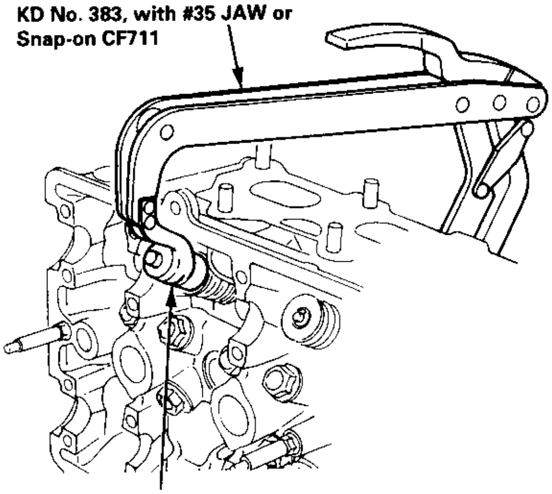
Removal

Identify the 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 keeper.



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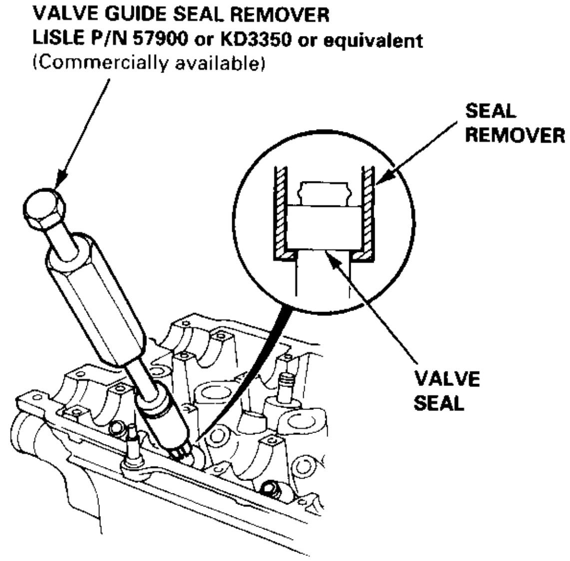
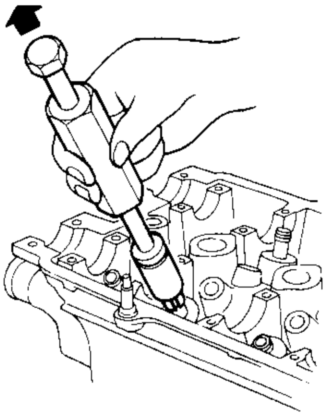
Valves, Valve Springs and Valve Seals

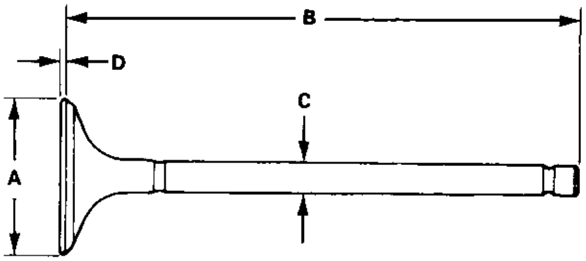
Removal (cont'd)

3. Install the valve guide seal remover.



4. Remove the valve seal.





Intake Valve Dimensions

A Standard (New):	30.85 – 31.15 mm (1.215 – 1.226 in)
B Standard (New):	103.80 – 104.10 mm (4.087 – 4.098 in)
C Standard (New):	6.580 – 6.590 mm (0.2591 – 0.2594 in)
C Service Limit:	6.55 mm (0.258 in)
D Standard (New):	1.35 – 1.65 mm (0.053 – 0.065 in)
D Service Limit:	1.15 mm (0.045 in)

Exhaust Valve Dimensions

A Standard (New):	27.85 – 28.15 mm (1.096 – 1.108 in)
B Standard (New):	104.00 – 104.30 mm (4.094 – 4.106 in)
C Standard (New):	6.550 – 6.560 mm (0.2579 – 0.2583 in)
C Service Limit:	6.52 mm (0.257 in)
D Standard (New):	1.65 – 1.95 mm (0.065 – 0.077 in)
D Service Limit:	1.45 mm (0.057 in)

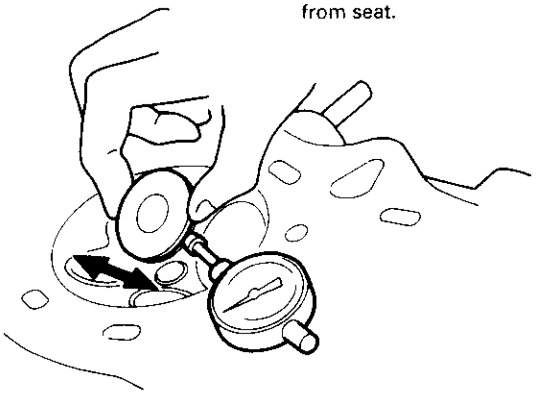
Valve Guides

Valve Movement

1. 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.

2. If the measurement is now within the service limit, reassemble using a new valve.

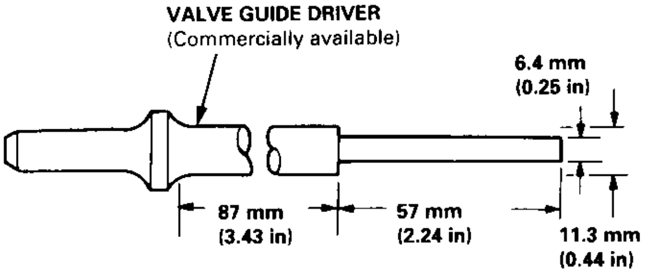
3. If the measurement still exceeds the limit, subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge.
   Take the measurements in three places along the valve stem and three places inside the valve guide.
   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)**

Replacement

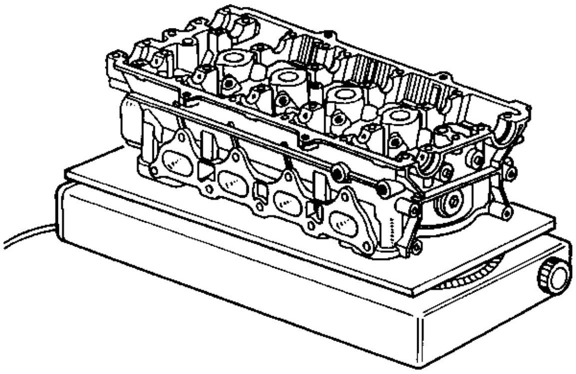
1. As illustrated below, use a commercially available air-impact valve guide driver attachment modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the special tool and a conventional hammer.



or
VALVE GUIDE DRIVER, 6.6 mm
07942 - 6570100

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. Do not get the head hotter than 300°F (150°C); excessive heat may loosen the valve seats.



CAUTION: To avoid burns, use heavy gloves when handling the heated cylinder head.

(cont'd)

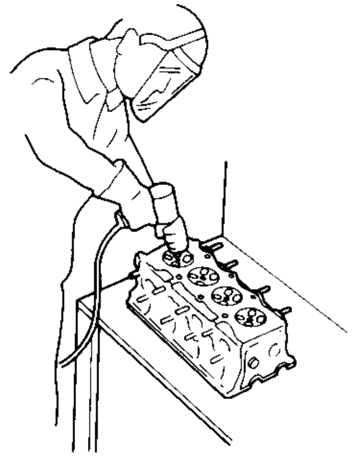
Valve Guides

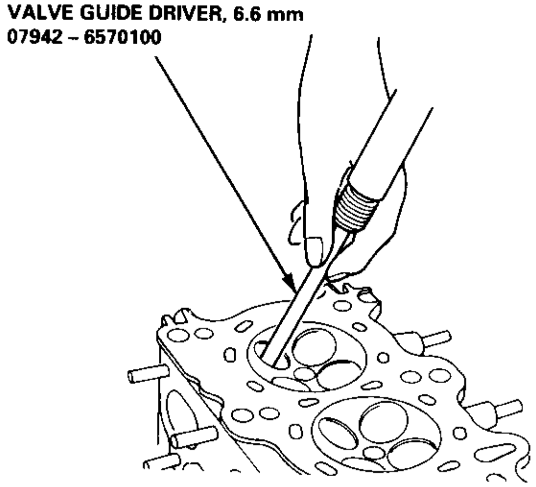
Replacement (cont'd)

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. Hold the air hammer directly in line with the valve guide to prevent damaging the driver.

   CAUTION: Always wear safety goggles or a face shield when driving valve guides.

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

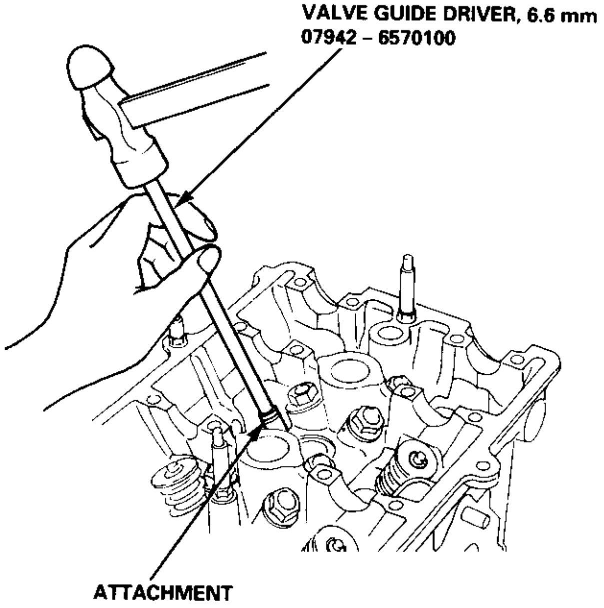




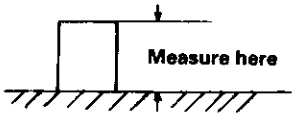
6. If a valve guide won't move, drill it out with a 8.0 mm (5/16 in) bit, then try again. Drill guides only in extreme cases; you could damage the cylinder head if the guide breaks.

7. Remove the new guide(s) from the freezer, one at a time, as you need them.

8. 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.



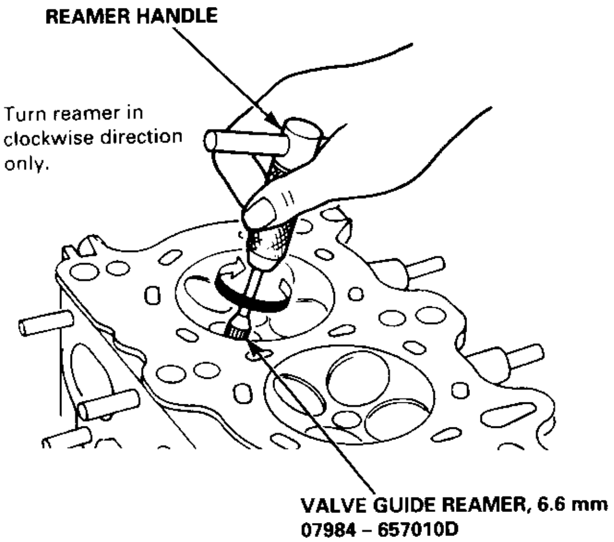
Valve Guide Installed Height:
Intake: 13.75 – 14.25 mm (0.541 – 0.561 in)
Exhaust: 15.75 – 16.25 mm (0.620 – 0.640 in)



Reaming

NOTE: For new valve guides only.

1. Coat the reamer and the 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 clearance with a valve (see page 6-25).
6. Verify that the valves slide in the intake and exhaust valve guides without exerting pressure.

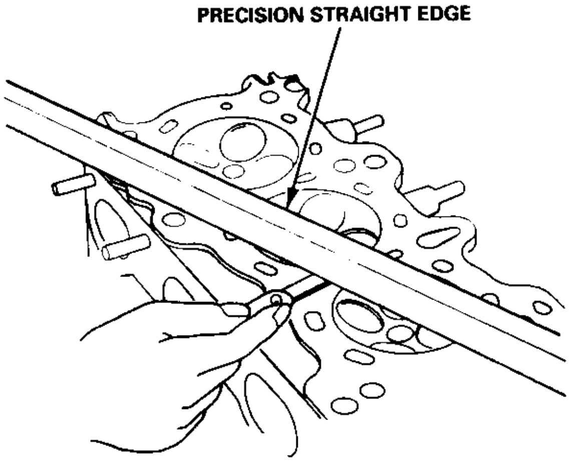


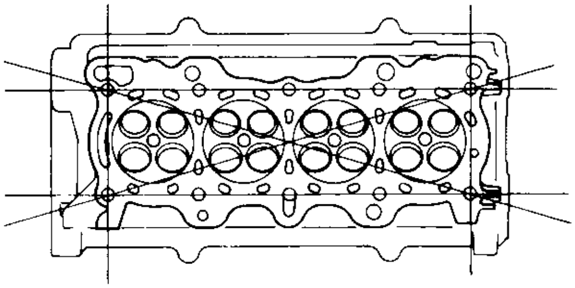
Warpage

NOTE: If camshaft-to-holder oil clearances (see page 6-22) are not within specification, the head cannot be resurfaced.

If camshaft-to-holder oil clearances are within specifications, check the head for warpage. Measure along the edges, and three ways across the center.

- 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 cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 132.0 mm (5.20 in).



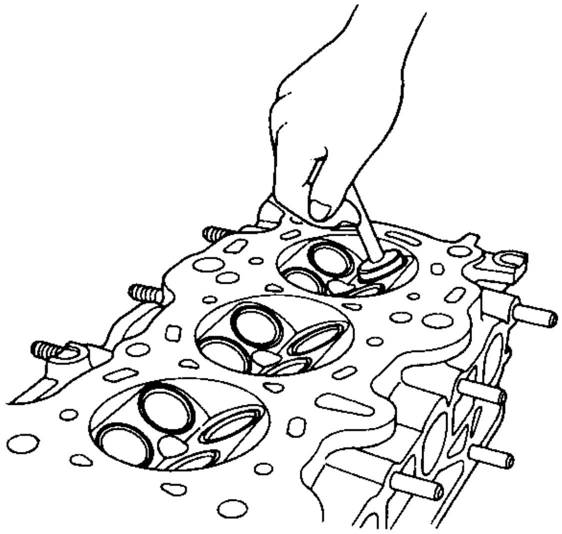


Cylinder Head Height:
Standard (New): 131.95 – 132.05 mm
(5.195 – 5.199 in)

Reconditioning

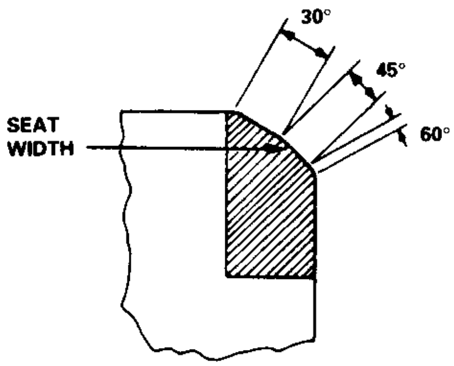
If the guides are worn (see page 6-25), replace them (see page 6-25) before reconditioning the valve seats.

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

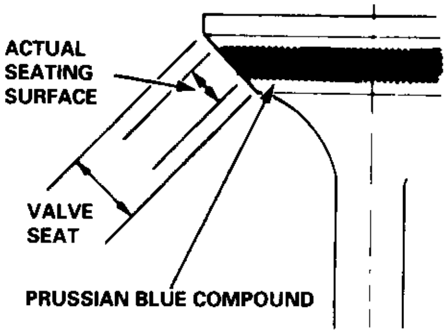


2. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
3. Bevel the upper edge of the seat with the 30° cutter and the lower edge of the seat with the 60° cutter. Check width of seat and adjust accordingly.
4. Make one more very light pass with the 45° cutter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

Valve Seat Width (Intake and Exhaust):
Standard (New): 1.25 – 1.55 mm (0.049 – 0.061 in)
Service Limit: 2.0 mm (0.08 in)



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 it and snap it closed against the seat several times.

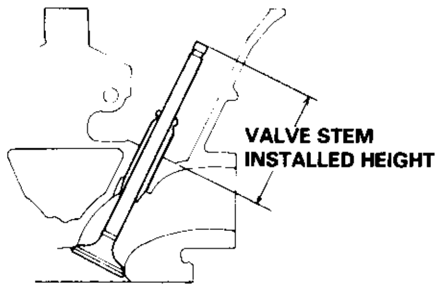


6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
   - If it is too high (closer to the valve stem), you must make a second cut with the 60° cutter to move it down, then one more cut with the 45° cutter to restore seat width.
   - If it is too low (closer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

Intake Valve Stem Installed Height:
Standard (New): 40.765 – 41.235 mm
(1.6049 – 1.6234 in)
Service Limit: 41.485 mm (1.6333 in)
Exhaust Valve Stem Installed Height:
Standard (New): 42.765 – 43.235 mm
(1.6837 – 1.7022 in)
Service Limit: 43.485 mm (1.7120 in)



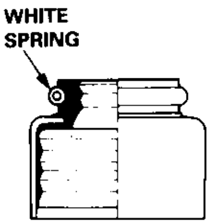
8. If valve stem installed height is over the service limit, replace the valve and recheck. If it is still over the service limit, replace the cylinder head; the valve seat in the head is too deep.

Valves, Valve Springs and Valve Seals

Installation

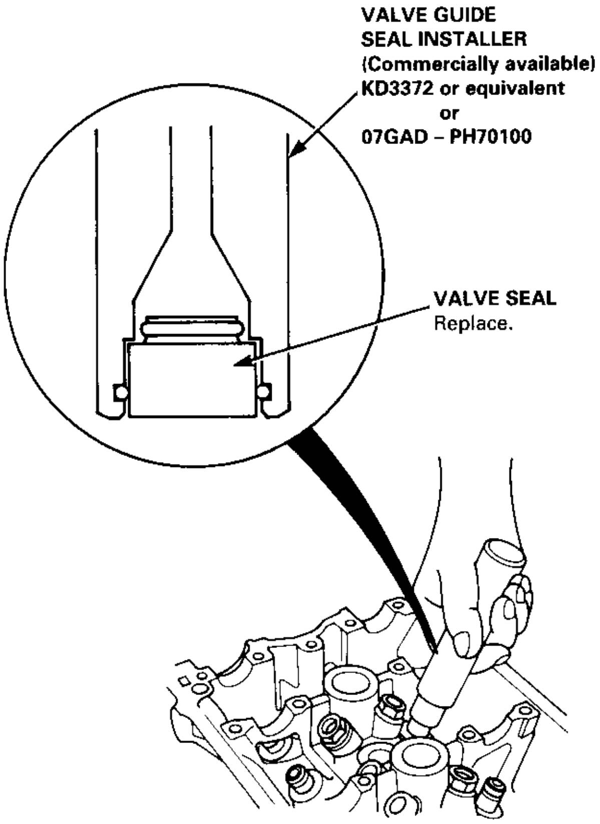
1. Coat the valve stems with oil. Insert the valves into the valve guides.
2. Check that the valves move up and down smoothly.
3. Install the spring seats on the cylinder head.
4. Install the valve seals using the special tool.

   NOTE: Exhaust and intake valve seals are not interchangeable.

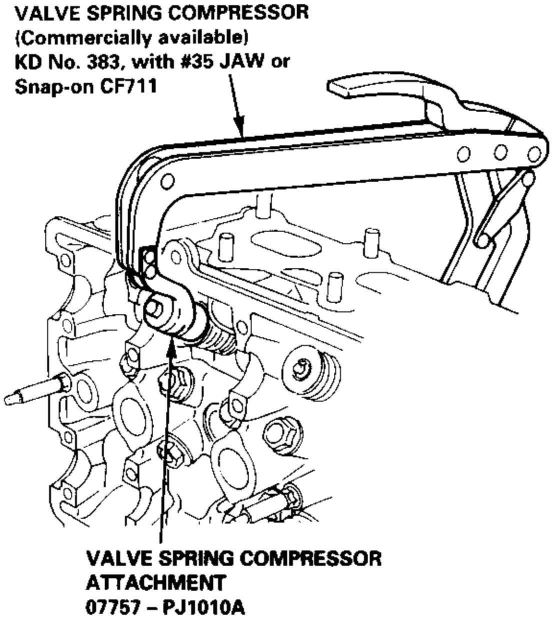


INTAKE VALVE SEAL

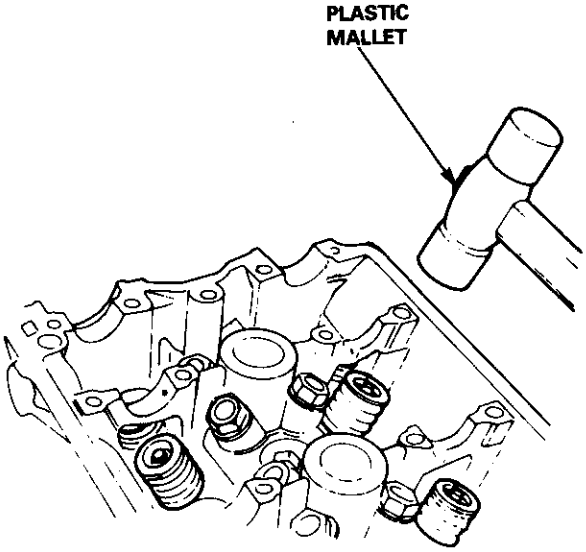
EXHAUST VALVE SEAL



5. Install the valve spring and valve retainer. Place the end of the valve spring with closely wound coils toward the cylinder head.
6. Install the valve spring compressor. Compress the spring, and install the valve keepers.



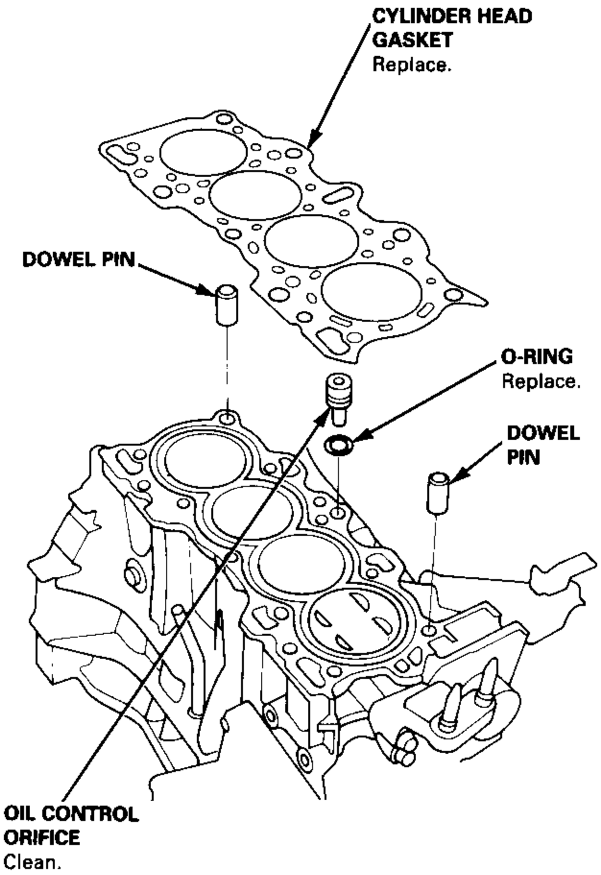
7. Lightly tap the end of each valve stem two or three times with a plastic mallet to ensure proper seating of the valve and valve keepers. Tap the valve stem only along its axis so you do not bend the stem.



Installation

Install the cylinder head in the reverse order of removal:

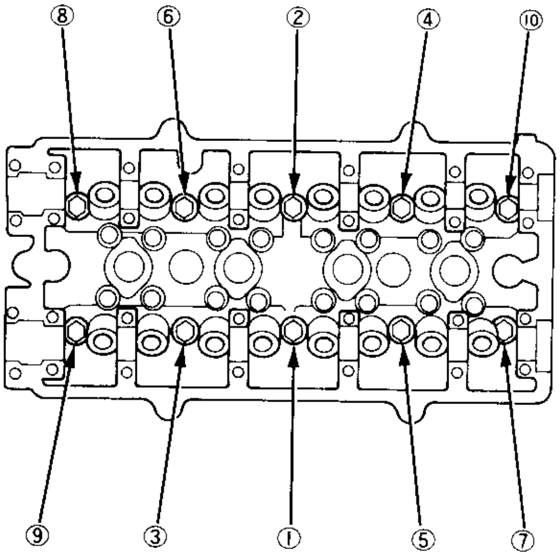
1. Clean the cylinder head and block surfaces.
2. Clean the oil control orifice. Install the cylinder head gasket, dowel pins and the oil control orifice on the cylinder block. Always use a new cylinder head gasket.



3. Apply clean engine oil to the bolt threads and under the bolt heads.
4. Tighten the cylinder head bolts in two steps. In the first step tighten all bolts, in sequence, to about 29 N·m (3.0 kgf·m, 22 lbf·ft); in the final step, tighten in the same sequence to 85 N·m (8.7 kgf·m, 63 lbf·ft).

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

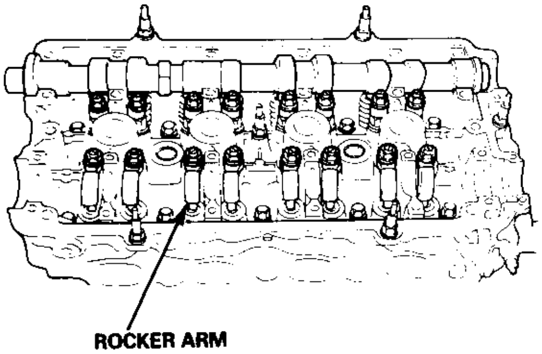
CYLINDER HEAD BOLTS TORQUE SEQUENCE:



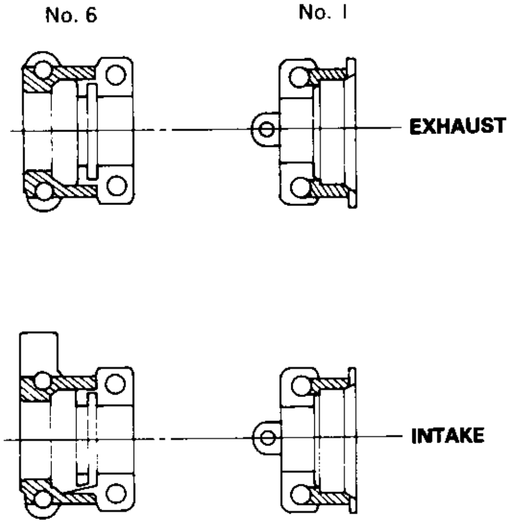
5. Tighten the intake manifold mounting bolts (see page 6-21).
6. Install the exhaust manifold bracket, and tighten the new self-locking nuts (see page 6-20).

7. Place the rocker arms on the pivots and the valve stems. Put the rocker arms in their original positions.

8. Install the camshafts, then install the oil seals with the open side (spring) facing in. Make sure that the keyways on the camshafts are facing up and the No. 1 piston is at TDC.



9. Clean and dry the cylinder head mating surfaces. Apply liquid gasket (P/N 08718 – 0001 or 08718 – 0003) to the head mating surfaces of the No. 1 and No. 6 camshaft holders on both the intake and exhaust side.



Apply liquid gasket to the shaded areas.

10. Install the camshaft holders.

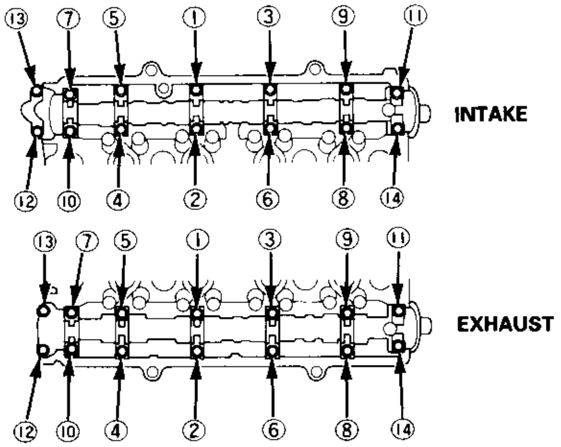
NOTE:

- "I" or "E" marks are stamped on the camshaft holders.
- The arrows marked on the camshaft holders should point at the timing belt.

11. Tighten each bolt in two steps to ensure that the rockers do not bind on the valves.

12. Wipe off the excess liquid gasket from the No. 1 and No. 6 camshaft holders with a shop towel.

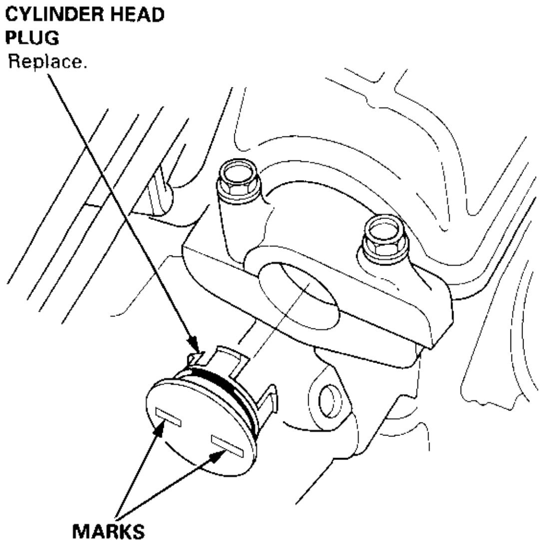
Specified torque:
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)
Apply engine oil to the bolt threads.



(cont'd)

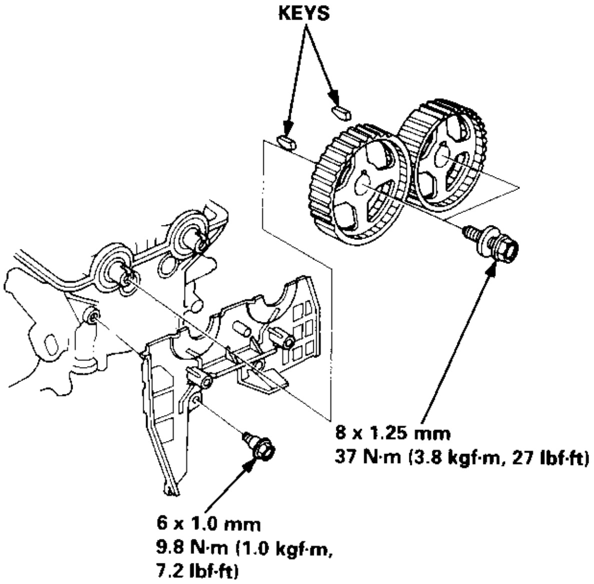
Installation (cont'd)

13. Align the marks on the cylinder head plug to the cylinder head upper surface, then install the cylinder head plug in the end of the cylinder head.



14. Install the back cover.

15. To set the camshafts at TDC position for the No. 1 piston, align the holes in the camshafts with the holes in the No. 1 camshaft holders and insert 5.0 mm pin punches in the holes. Install the keys into the camshaft grooves.



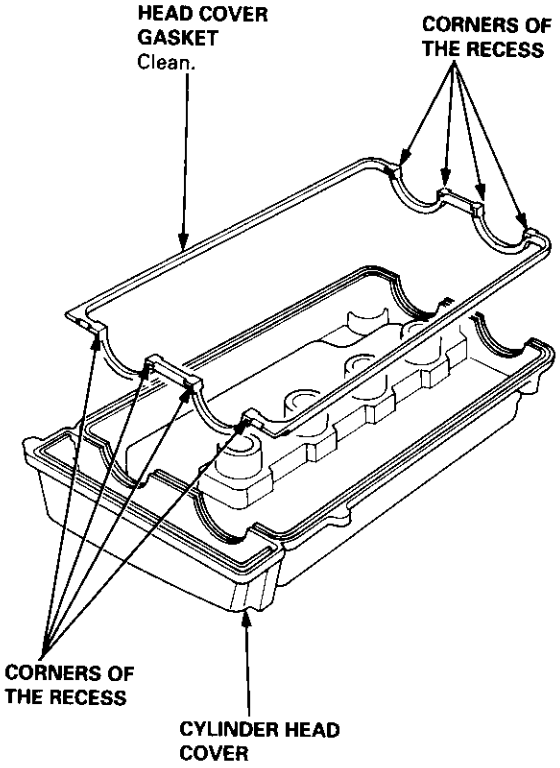
16. Push the camshaft pulleys onto the camshafts, then tighten the retaining bolts to the torque specified.

17. Install the timing belt (see page 6-11).

18. Adjust the valve clearance (see page 6-3).

19. Thoroughly clean the head cover gasket and the groove.

20. Install the head cover gasket in the groove of the cylinder head cover. Seat the head cover gasket in the recesses for the camshaft first, then work it into the groove around the outside edges. Make sure the head cover gasket is seated securely in the corners of the recesses with no gap.

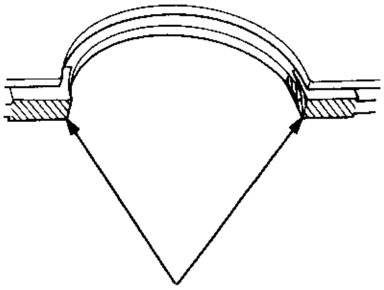


21. Check that the mating surfaces are clean and dry.

22. Apply liquid gasket, part No. 08718 – 0001 or 08718 – 0003, to the head cover gasket at the eight corners of the recesses.

NOTE:

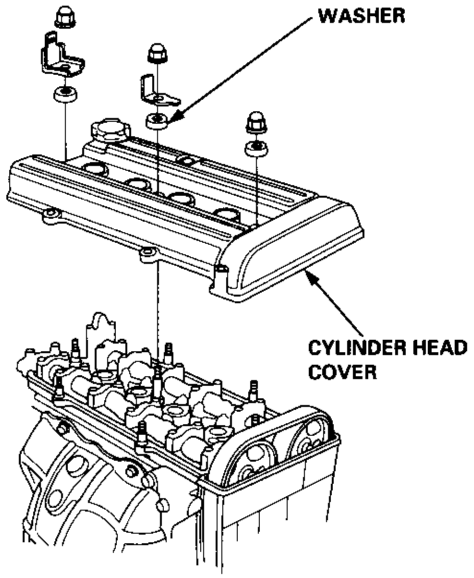
- Do not install the parts if five minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.



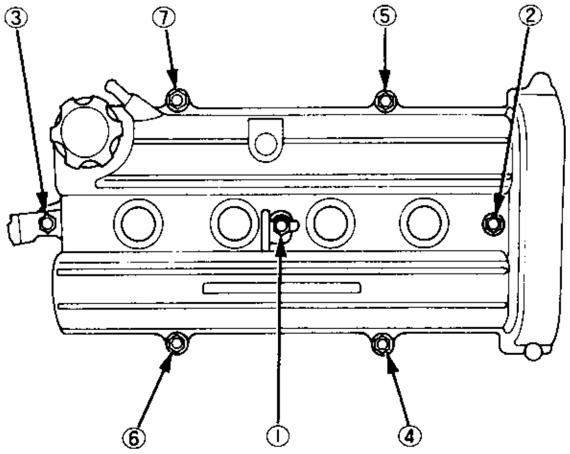
Apply liquid gasket to the shaded areas.

23. Hold the head cover gasket in the groove by placing your fingers on the camshaft holder contacting surfaces (top of the semicircles).
Once the cylinder head cover is on the cylinder head, slide the cover slightly back and forth to seat the head cover gasket.

24. Inspect the cover washers. Replace any washer that is damaged or deteriorated.



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



26. Check that all tubes, hoses and connectors are installed correctly.

Engine Block

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Special Tools

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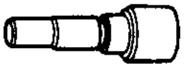
②	07HAF – PL20102	Piston Base Head	1	7-14, 15
③	07LAB – PV00100	Ring Gear Holder	1	7-5
④	07LAD – PT30101	Seal Driver	1	7-23
⑤	07LAF – PR30100	Pilot Collar	1	7-14, 15
⑥	07948 – SB00101	Seal Driver Attachment, 76 x 80 mm	1	7-19, 24
⑦	07749 – 0010000	Driver	1	7-19, 24
⑧	07973 – PE00310	Piston Pin Driver Shaft	1	7-14, 15
⑨	07973 – PE00320	Piston Pin Driver Head	1	7-14, 15
⑩	07973 – 6570500	Piston Base	1	7-14, 15
⑪	07973 – 6570600	Piston Base Spring	1	7-14, 15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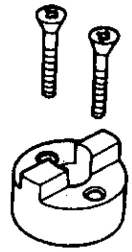
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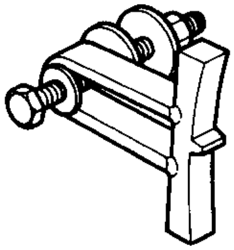
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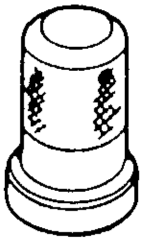
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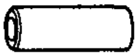
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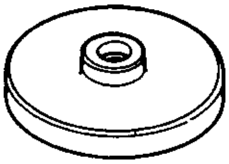
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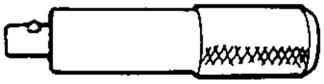
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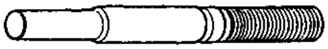
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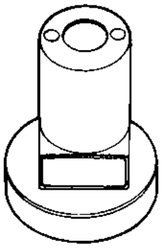
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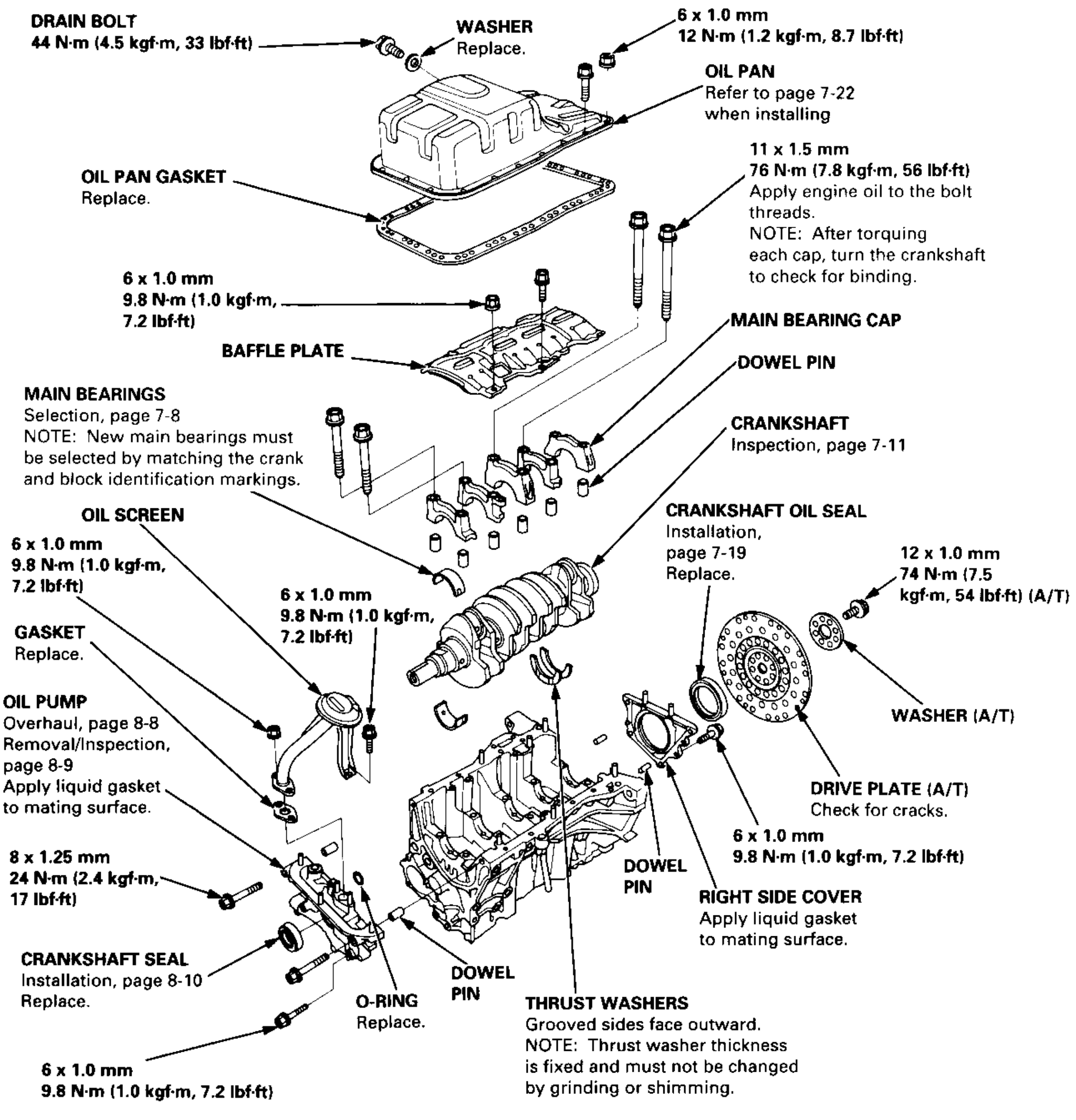
⑪

OIL Lubricate all internal parts with engine oil during reassembly.

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 the oil pan.



DRAIN BOLT
44 N·m (4.5 kgf·m, 33 lbf·ft)

WASHER
Replace.

6 x 1.0 mm
12 N·m (1.2 kgf·m, 8.7 lbf·ft)

OIL PAN
Refer to page 7-22 when installing

OIL PAN GASKET
Replace.

11 x 1.5 mm
76 N·m (7.8 kgf·m, 56 lbf·ft)
Apply engine oil to the bolt threads.
NOTE: After torquing each cap, turn the crankshaft to check for binding.

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

BAFFLE PLATE

MAIN BEARING CAP

DOWEL PIN

MAIN BEARINGS
Selection, page 7-8
NOTE: New main bearings must be selected by matching the crank and block identification markings.

CRANKSHAFT
Inspection, page 7-11

OIL SCREEN

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

CRANKSHAFT OIL SEAL
Installation, page 7-19
Replace.

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

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

GASKET
Replace.

WASHER (A/T)

OIL PUMP
Overhaul, page 8-8
Removal/Inspection, page 8-9
Apply liquid gasket to mating surface.

DRIVE PLATE (A/T)
Check for cracks.

8 x 1.25 mm
24 N·m (2.4 kgf·m, 17 lbf·ft)

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

DOWEL PIN

RIGHT SIDE COVER
Apply liquid gasket to mating surface.

CRANKSHAFT SEAL
Installation, page 8-10
Replace.

O-RING
Replace.

DOWEL PIN

THRUST WASHERS
Grooved sides face outward.
NOTE: Thrust washer thickness is fixed and must not be changed by grinding or shimming.

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

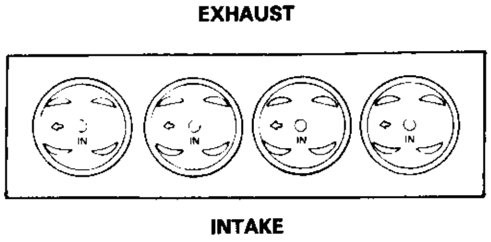
(cont'd)

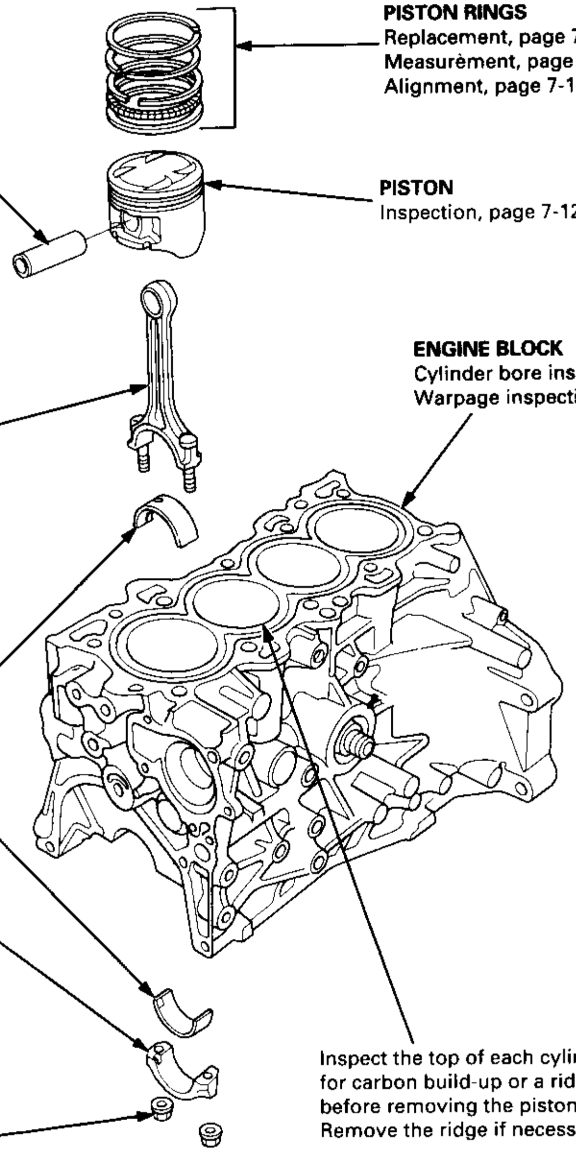
Illustrated Index (cont'd)

NOTE: New rod bearings must be selected by matching connecting rod assembly and crankshaft identification markings (see pages 7-9).

Lubricate all internal parts with engine oil during reassembly.

PISTON INSTALLATION DIRECTION:





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PISTON PIN
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PISTON
Inspection, page 7-12

ENGINE BLOCK
Cylinder bore inspection, page 7-13
Warpage inspection, page 7-13

CONNECTING ROD
End play, page 7-6
Selection, page 7-14

CONNECTING ROD BEARINGS
Clearance, page 7-8
Selection, page 7-9

CONNECTING ROD BEARING CAP
Installation, page 7-20
NOTE: Install the 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 the crankshaft to check for binding.

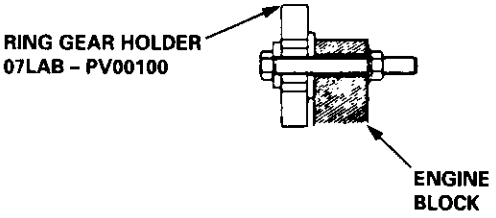
Inspect the top of each cylinder bore for carbon build-up or a ridge before removing the piston.
Remove the ridge if necessary, page 7-10

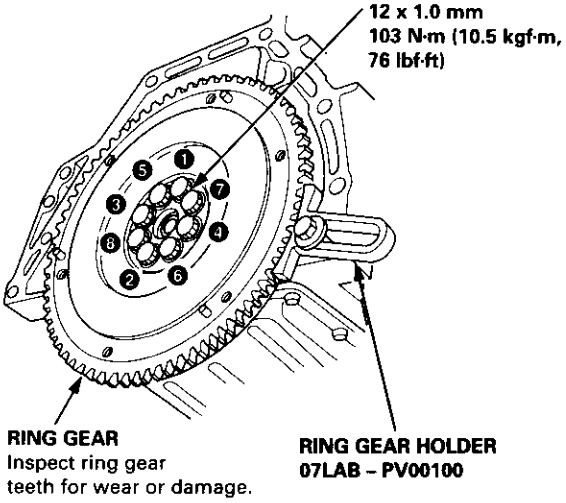
Flywheel and Drive Plate

Replacement

Manual Transmission:

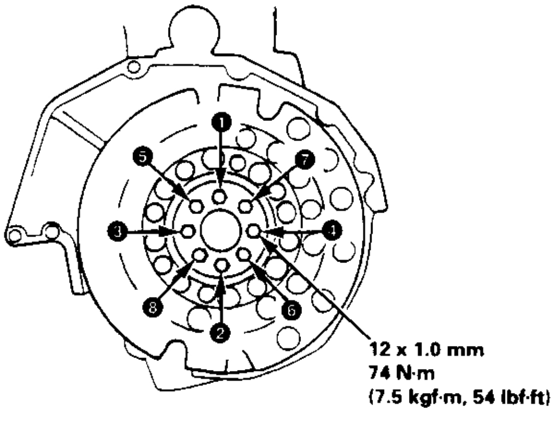
Remove the eight flywheel bolts, then separate the flywheel from the crankshaft flange. After installation, tighten the bolts in the sequence shown.





Automatic Transmission:

Remove the eight drive plate bolts, then separate the drive plate from the crankshaft flange. After installation, tighten the bolts in the sequence shown.

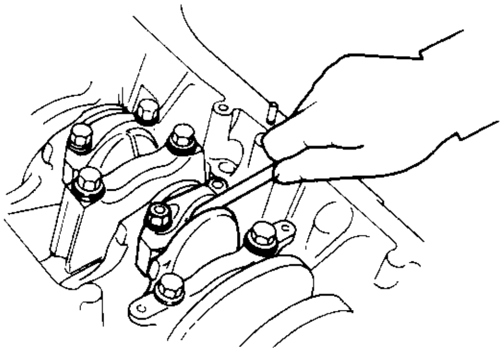


Connecting Rod and Crankshaft

End Play

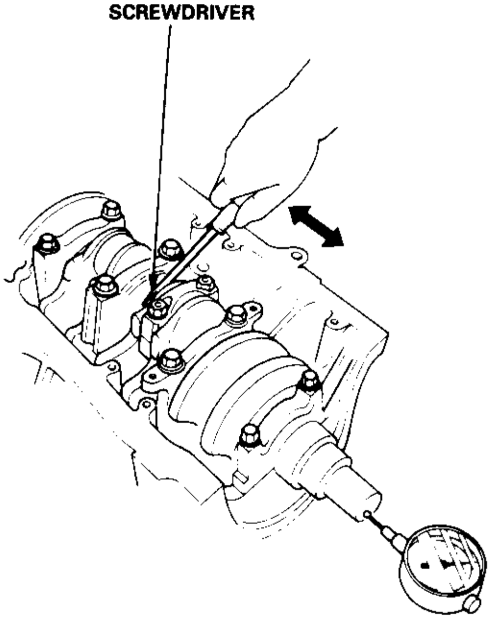
1. Measure the connecting rod end play with a feeler gauge.

   Connecting Rod End Play:
   Standard (New): 0.15 – 0.30 mm
   (0.006 – 0.012 in)
   Service Limit: 0.40 mm (0.016 in)



2. If the connecting rod end play is out-of-tolerance, install a new connecting rod.
   If it is still out-of-tolerance, replace the crankshaft (see pages 7-9 and 7-20).

3. 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; the dial reading should not exceed the 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)

4. If end play is excessive, inspect the thrust washers and thrust surface on the crankshaft. Replace parts as necessary. Thrust washer thickness is fixed and must not be changed either by grinding or shimming.

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 a strip of plastigage across each main journal.

   NOTE: If the engine is still in the vehicle 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.

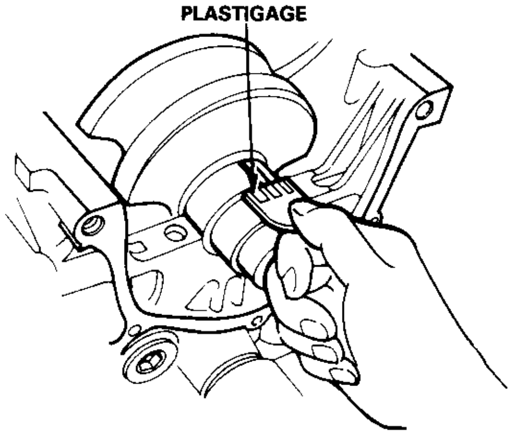
4. Reinstall the bearings and caps, then torque the bolts.

   1st step: 25 N·m (2.5 kgf·m, 18 lbf·ft)
   Final step: 76 N·m (7.8 kgf·m, 56 lbf·ft)

   NOTE: Do not rotate the crankshaft during inspection.

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

   Main Bearing-to-Journal Oil Clearance:
   Standard (New):
   No. 1, 2, 4, 5 Journals:
   0.024 – 0.042 mm (0.0009 – 0.0017 in)
   No. 3 Journal:
   0.030 – 0.048 mm (0.0012 – 0.0019 in)
   Service Limit: 0.06 mm (0.002 in)



6. If the plastigage measures too wide or too narrow, (remove the engine if it's still in the vehicle), 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. Do not file, shim, or scrape the bearings or the caps to adjust the clearance.

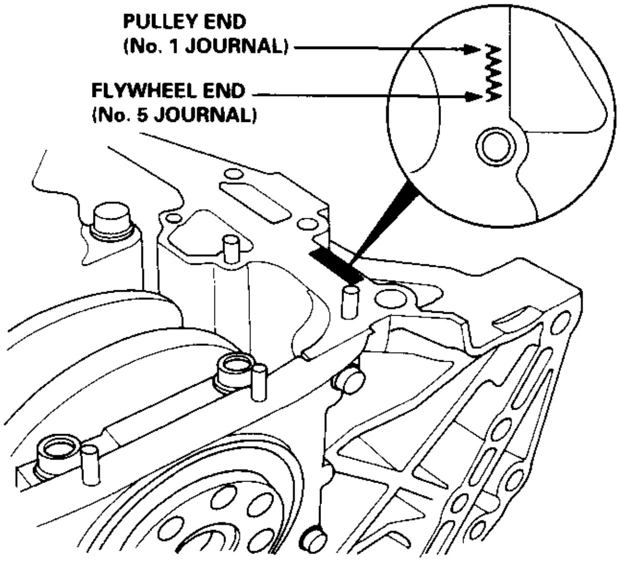
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check again. If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

Main Bearings

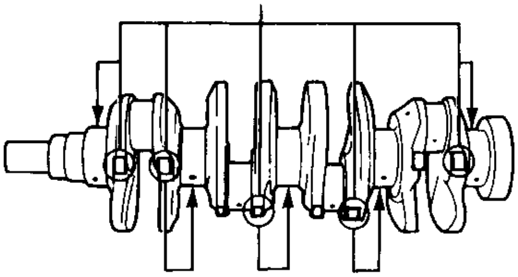
Selection

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 or bars stamped on the crank (codes for main journal size), to choose the correct bearings.
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.



Main Journal Code Locations (Numbers or Bars)



Bearing Identification
Color code is on the edge of the bearing.

→ Larger crank bore

→ Smaller bearing (thicker)

	A	B	C	D
1 or I	Red	Pink	Yellow	Green
2 or II	Pink	Yellow	Green	Brown
3 or III	Yellow	Green	Brown	Black
4 or IIII	Green	Brown	Black	Blue

↓ Smaller main journal

↓ Smaller bearing (thicker)

Connecting Rod Bearings

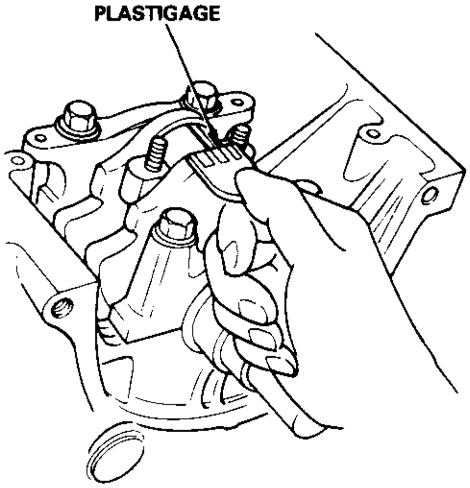
Clearance

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 the 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)



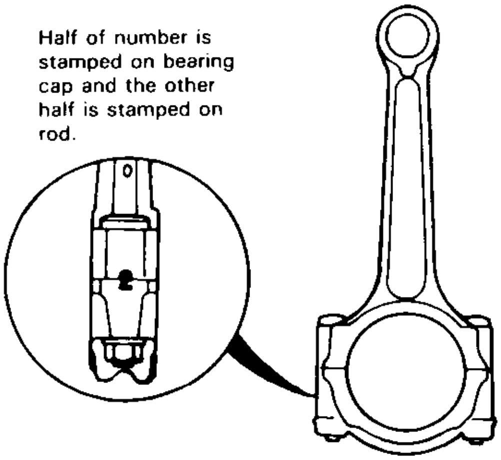
6. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust the clearance.
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. If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

Selection

Connecting Rod Code Location

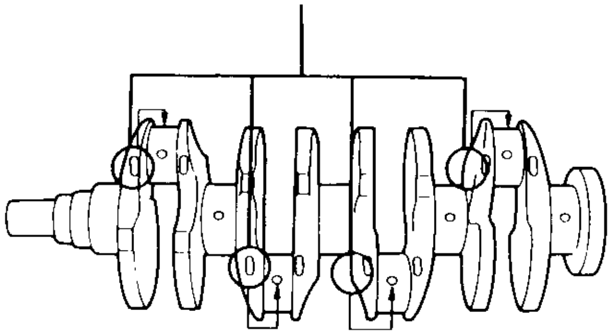
Numbers have been stamped on the side of each connecting rod as a code for the size of the big end. Use them, and the letters stamped on the crankshaft (codes for rod journal size), to choose the correct bearings.

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.



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

Connecting Rod Journal Code Locations (Letters)



Bearing Identification

Color code is on the edge of the bearing.

→ Larger big end bore

→ Smaller bearing (thicker)

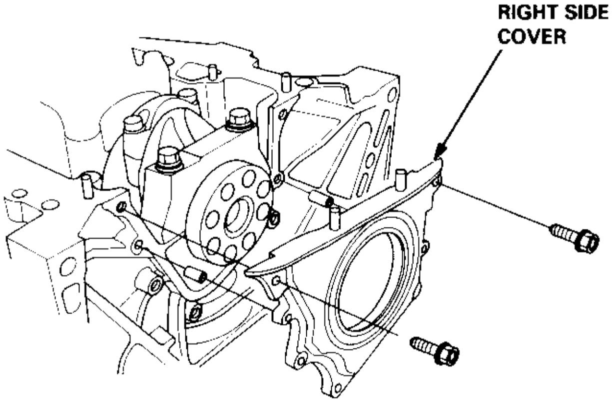
	1	2	3	4
A or I	Red	Pink	Yellow	Green
B or II	Pink	Yellow	Green	Brown
C or III	Yellow	Green	Brown	Black
D or IIII	Green	Brown	Black	Blue

↓ Smaller rod journal

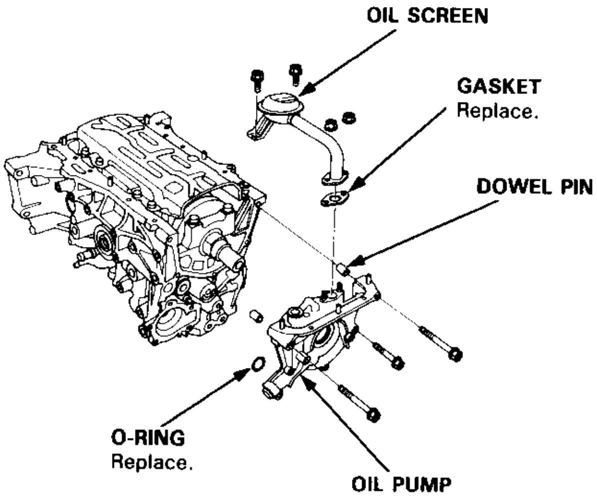
↓ Smaller bearing (thicker)

Removal

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



3. Remove the oil screen.
4. Remove the oil pump.

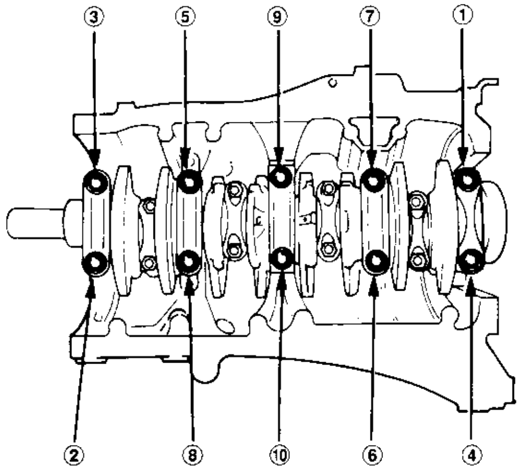


5. Remove the baffle plate.

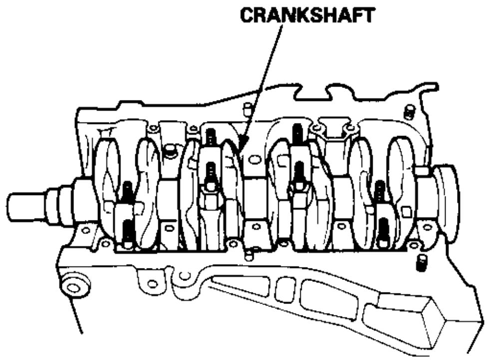
(cont'd)

Removal (cont'd)

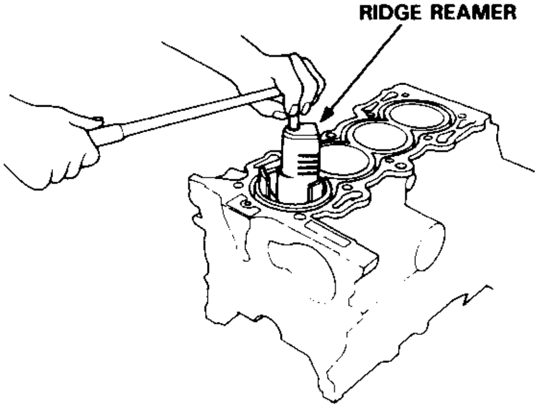
6. Remove the bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.



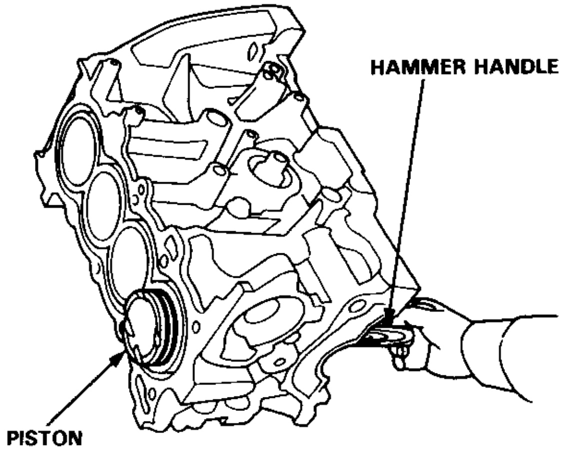
7. Remove the rod caps/bearings and main caps/bearings. Keep all caps/bearings in order.
8. Lift the crankshaft out of the engine, being careful not to damage the journals.



9. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.
10. Reinstall the main caps and bearings on the engine in proper order.
11. 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. If the ridge is not removed, it may damage the pistons as they are pushed out.



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



13. Reinstall the connecting rod bearings and caps after removing each piston/connecting rod assembly.
14. To avoid mixup on reassembly, mark each piston/connecting rod assembly with its cylinder number.

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

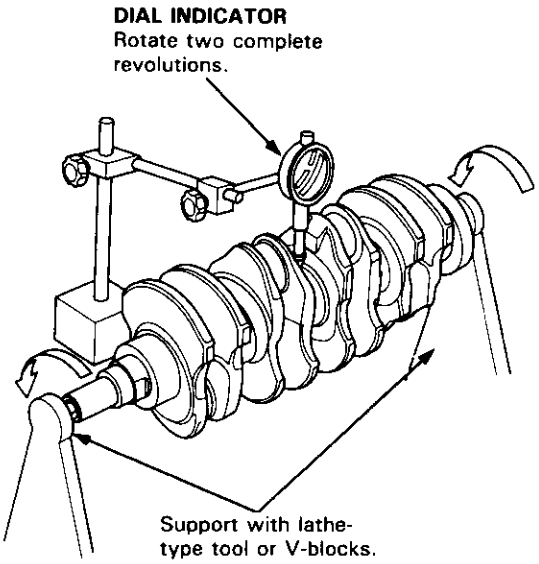
Inspection

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

Alignment

3. Measure the 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.

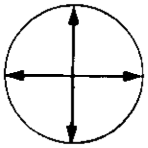
   Crankshaft Total Indicated Runout:
   Standard (New): 0.03 mm (0.001 in) max.
   Service Limit: 0.04 mm (0.002 in)

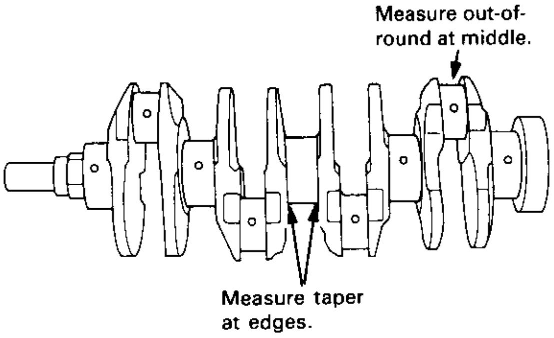


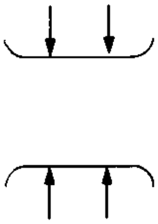
Out-of-Round and Taper

4. 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): 0.005 mm (0.0002 in) max.
   Service Limit: 0.010 mm (0.0004 in)







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

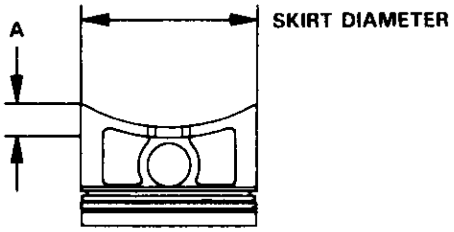
   Journal Taper:
   Standard (New): 0.005 mm (0.0002 in) max.
   Service Limit: 0.010 mm (0.0004 in)

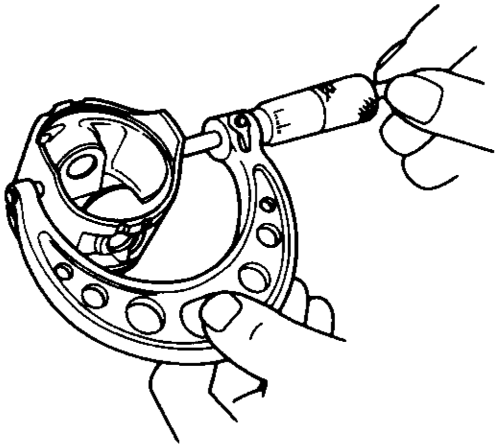
Inspection

1. Check each piston for distortion or cracks.
2. Measure the piston diameter at distance A from the bottom of the skirt.

A: '97 – 98 models 15 mm (0.6 in)
'99 – 00 models 20 mm (0.8 in)

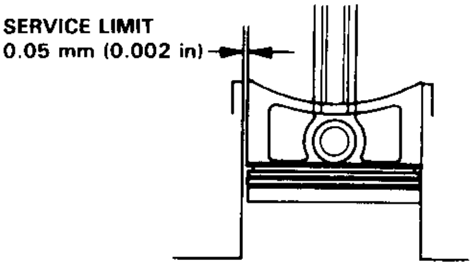
Piston Diameter:
Standard (New): 83.980 – 83.990 mm
(3.3063 – 3.3067 in)
Service Limit: 83.970 mm (3.3059 in)





3. Calculate the difference between the cylinder bore diameter (see page 7-13) and the 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)

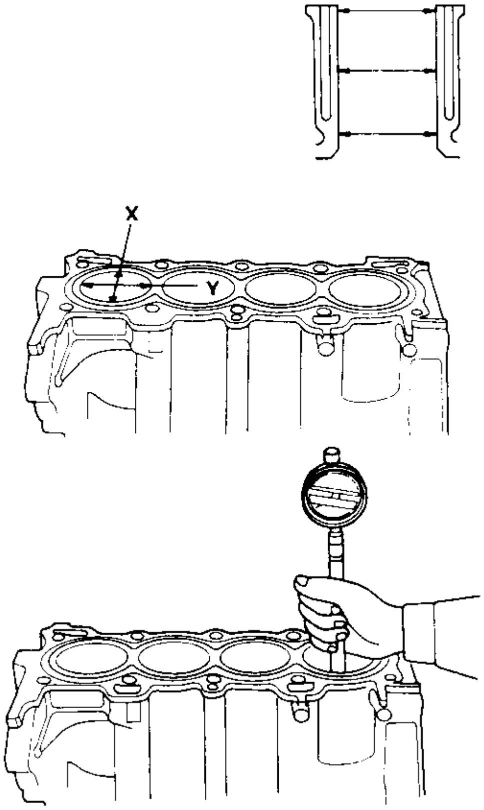


If the clearance is near or exceeds the service limit, inspect the piston and cylinder block for excessive wear.

Cylinder Block

Inspection

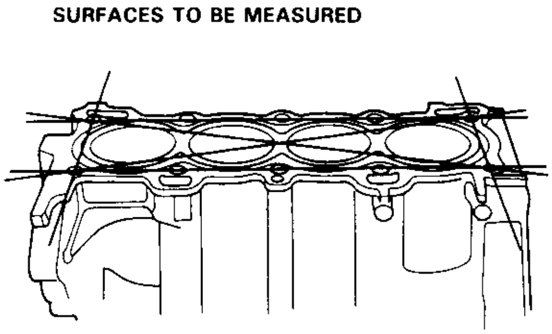
1. Measure wear and taper in directions X and Y at three levels in each cylinder. If the measurements in any cylinder are beyond the Service Limit, replace the block.



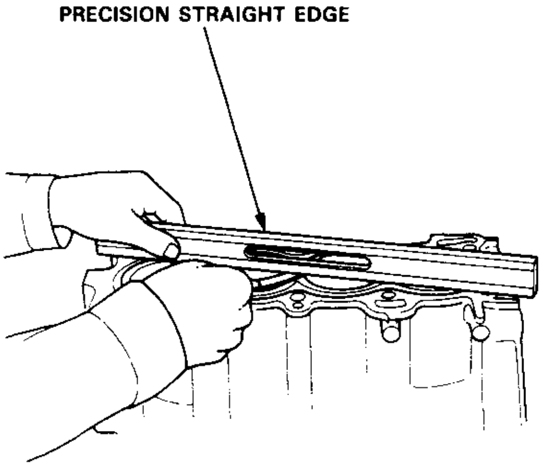
Cylinder Bore Size:
Standard (New): 84.00 – 84.02 mm
(3.307 – 3.308 in)
Service Limit: 84.07 mm (3.310 in)

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

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



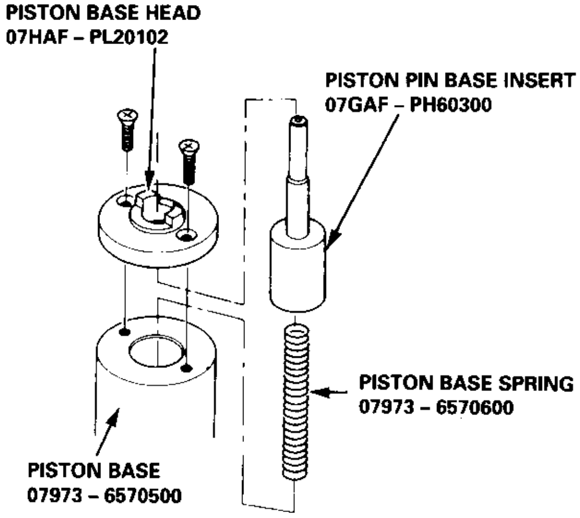
Engine Block Warpage:
Standard (New): 0.07 mm (0.003 in) max.
Service Limit: 0.10 mm (0.004 in)



Piston Pins

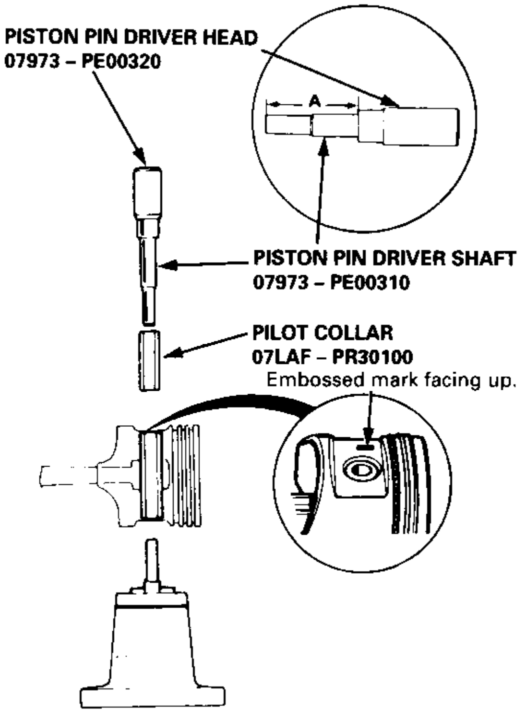
Removal

1. Assemble the Piston Pin Tools as shown.



2. Adjust the length A of the piston pin driver.

A: 49.70 mm (1.957 in)



3. Place the piston on the piston base, and press the pin out with a hydraulic press. Make sure that the recessed portion of the piston aligns with the lips on the collar.

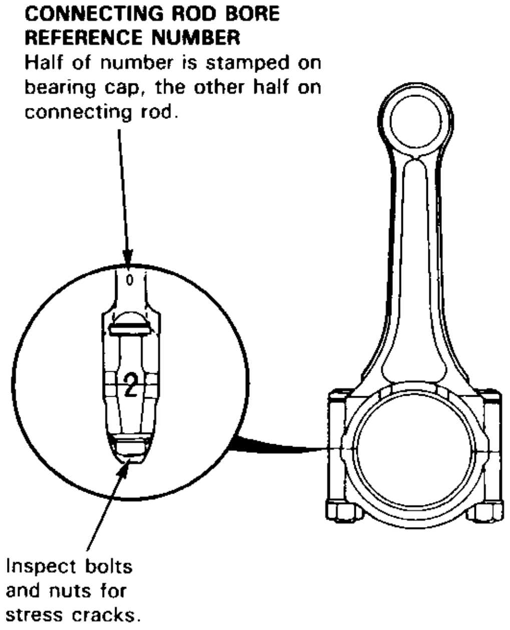
Connecting Rods

Selection

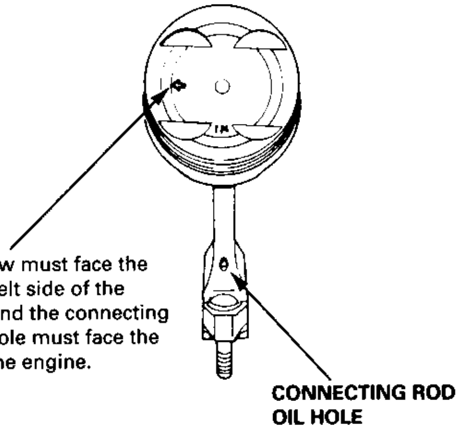
Each rod falls into one of four tolerance ranges (from 0 to + 0.024 mm (0 to + 0.0009 in), in 0.006 mm (0.0002 in) increments) depending on the size of its big end bore. It's then stamped with a number (1, 2, 3, or 4) indicating the range.
You may find any combination of 1, 2, 3, or 4 in any engine.

Normal Bore Size: 48.0 mm (1.89 in)

Inspect the connecting rod for cracks and heat damage.



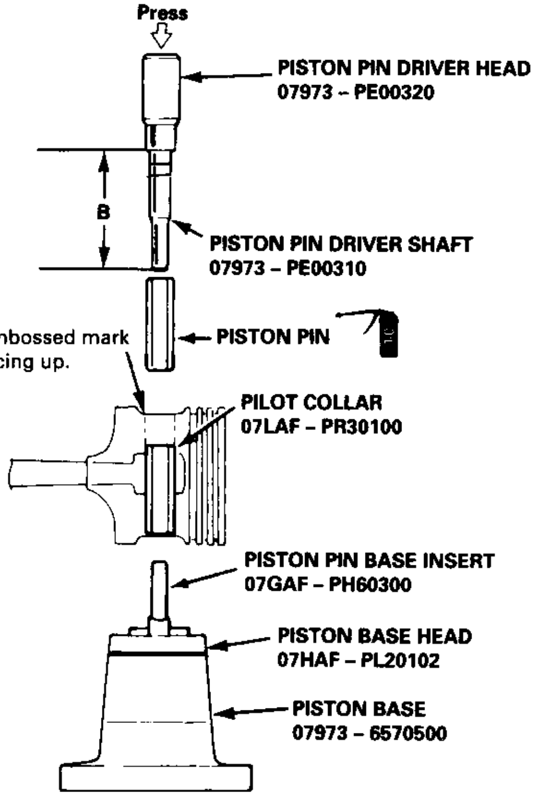
Installation



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

1. Adjust the length B of the piston pin driver and shaft.

B: 49.70 mm (1.957 in)



Embossed mark facing up.

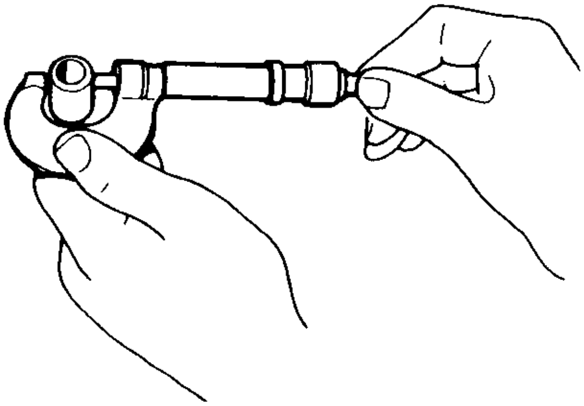
2. Place the piston on the piston base and press the pin in with a hydraulic press. Make sure that the recessed portion of the piston aligns with the lugs on the piston base head.

Piston Pins

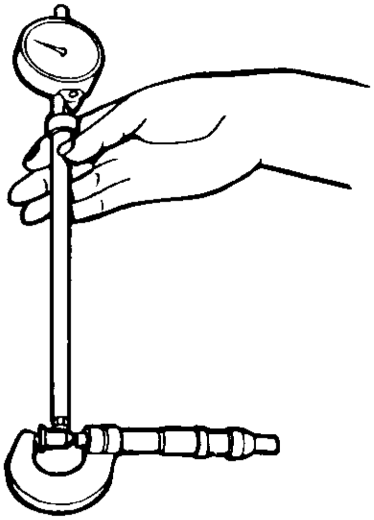
Inspection

1. Measure the diameter of the piston pin.

   Piston Pin Diameter:
   Standard (New): 20.996 – 21.000 mm
   (0.8266 – 0.8268 in)
   Oversize: 20.998 – 21.002 mm
   (0.8267 – 0.8268 in)



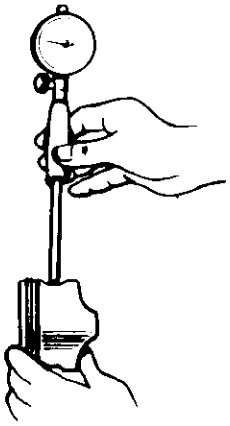
2. Zero the dial indicator to the piston pin diameter.



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

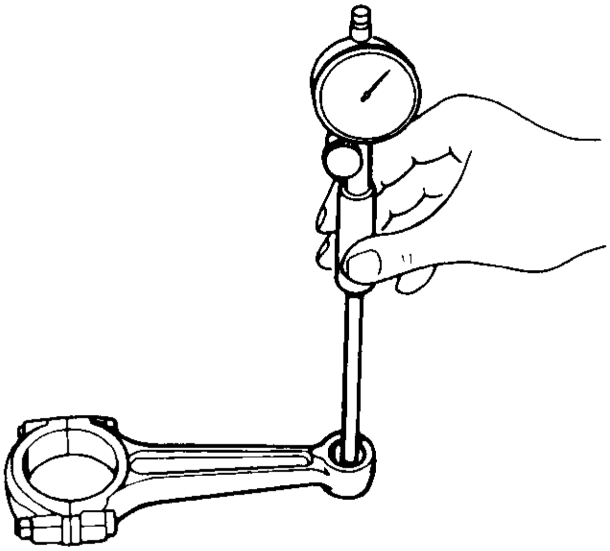
   NOTE: All replacement piston pins are oversize.

   Piston Pin-to-Piston Clearance:
   Standard (New): 0.010 – 0.017 mm
   (0.0004 – 0.0007 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)



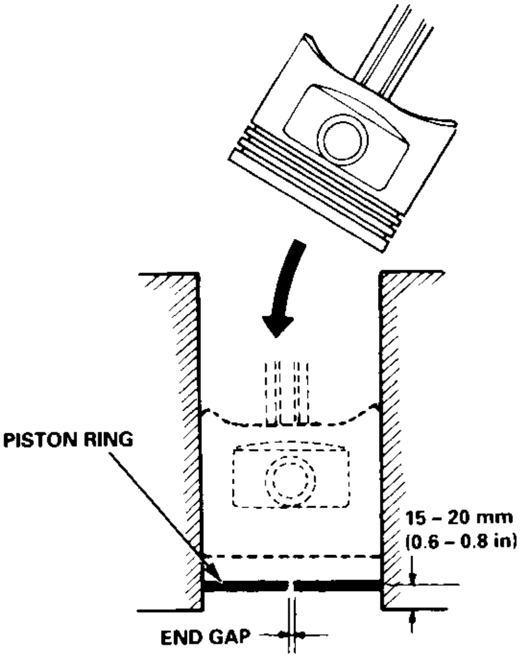
Piston Rings

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 7-13.

Piston Ring End-Gap:
Top Ring
Standard (New): **0.20 – 0.30 mm**
(0.008 – 0.012 in)
Service Limit: **0.60 mm (0.024 in)**
Second Ring
Standard (New): **0.40 – 0.55 mm**
(0.016 – 0.022 in)
Service Limit: **0.70 mm (0.028 in)**
Oil Ring
Standard (New): **0.20 – 0.50 mm**
(0.008 – 0.020 in)
Service Limit: **0.70 mm (0.028 in)**

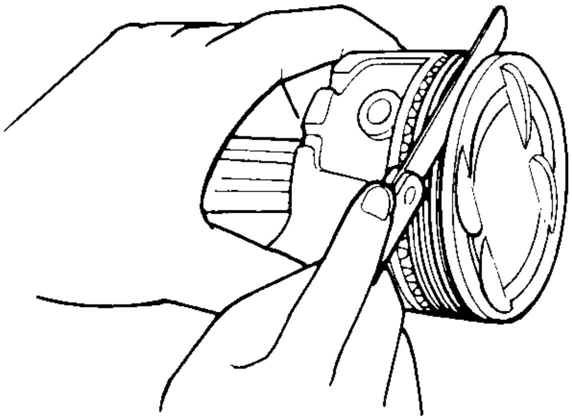


Ring-to-Groove Clearance

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

Top Ring Clearance:
Standard (New): **0.055 – 0.080 mm**
(0.0022 – 0.0031 in)
Service Limit: **0.13 mm (0.005 in)**

Second Ring Clearance:
Standard (New): **0.035 – 0.060 mm**
(0.0014 – 0.0024 in)
Service Limit: **0.13 mm (0.005 in)**



Piston Rings

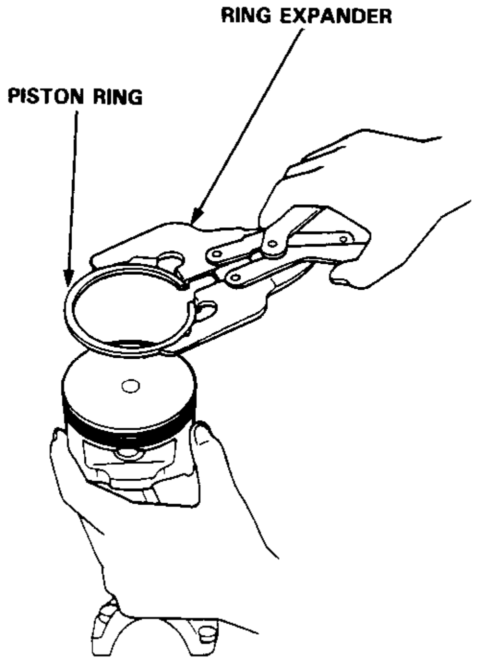
Replacement

1. Using a ring expander, remove the old piston rings.
2. Clean all the ring grooves thoroughly with a squared-off broken ring or a ring groove cleaner with a blade to fit the piston grooves.

   The top ring groove is 1.2 mm (0.042 in) wide, the second ring groove is 1.2 mm (0.042 in) wide, and the oil ring groove is 2.8 mm (0.11 in) wide. File down a blade if necessary.

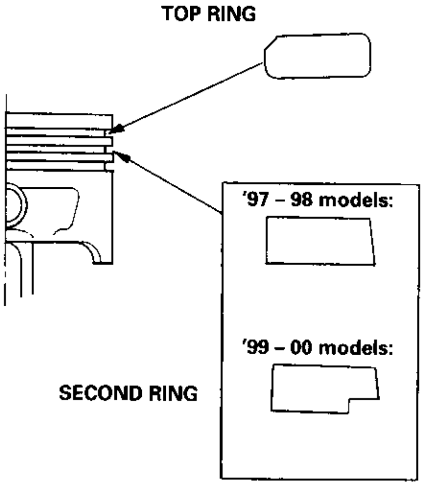
   Do not use a wire brush to clean ring lands, or cut ring lands deeper with cleaning tool.
3. Install the new rings in the proper sequence and position (shown in the right column).

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

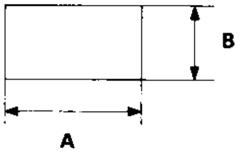


Alignment

1. Install the rings as shown.

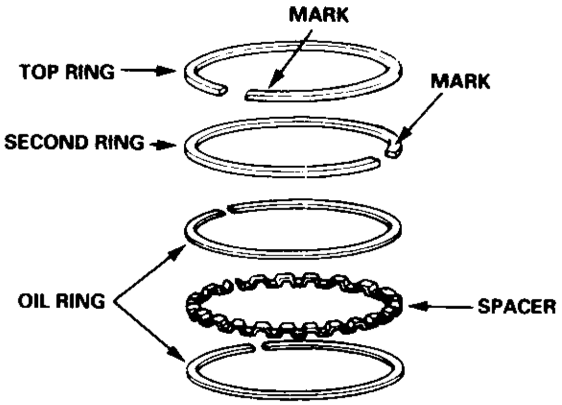


Piston Ring Dimensions:



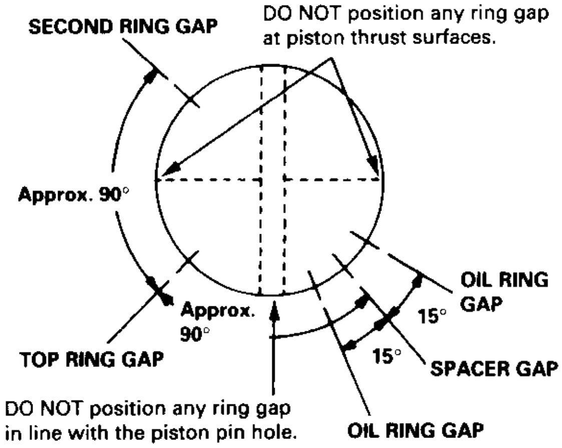
Top Ring (standard):
A: 3.1 mm (0.12 in)
B: 1.2 mm (0.05 in)
Second Ring (standard):
A: 3.4 mm (0.13 in)
B: 1.2 mm (0.05 in)

NOTE: The manufacturing marks must be facing upward.



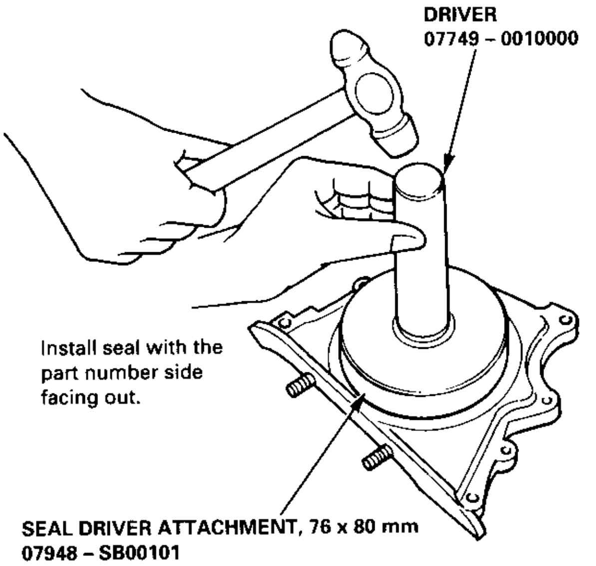
Crankshaft Oil Seal

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

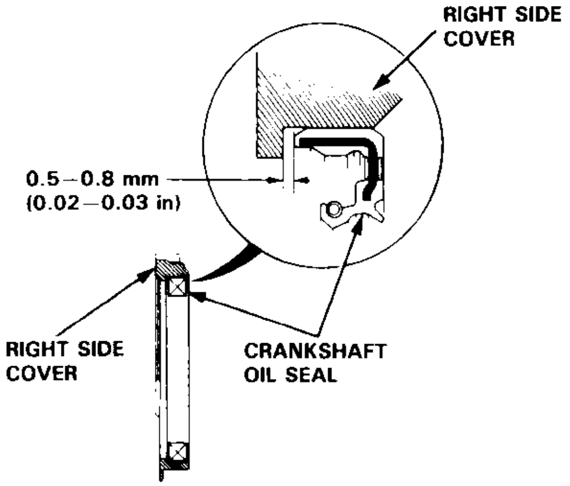


Installation

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



3. Confirm that the clearance is equal all the way around with a feeler gauge.
Clearance: 0.5 - 0.8 mm (0.02 - 0.03 in)



NOTE: Refer to pages 7-23 and 8-10 for installation of the oil pump side crankshaft oil seal.

Installation

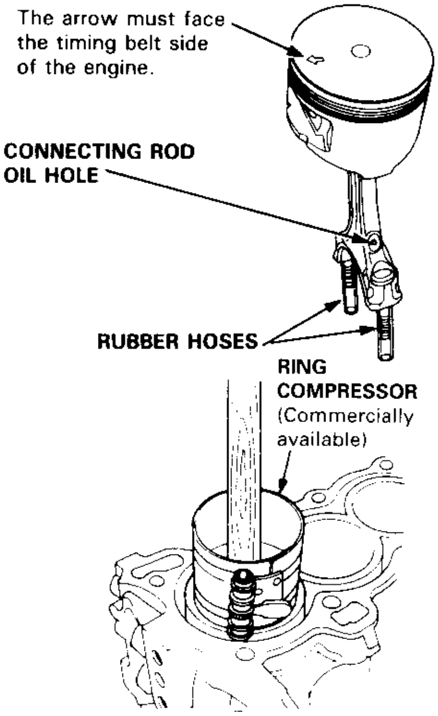
1. Apply a coat of engine oil to the ring grooves and cylinder bores.

If the crankshaft is already installed:

2. Set the crankshaft to BDC for each cylinder.
3. Remove the connecting rod caps, and slip short sections of rubber hose over the threaded ends of the connecting rod bolts.
4. Install the ring compressor, and check that the bearing is securely in place.
5. Position the piston in the cylinder, and tap it in using the wooden handle of a hammer. Maintain downward force on the ring compressor to prevent rings from expanding before entering the cylinder bore.
6. Stop after the ring compressor pops free, and check the connecting rod-to-crank journal alignment before pushing piston into place.
7. 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.

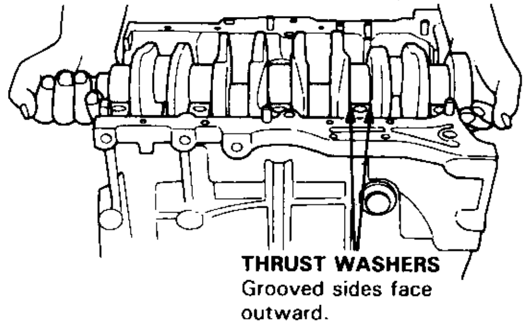
If the crankshaft is not installed:

2. Remove the rod caps and bearings, and install the ring compressor.
3. Position the piston in the cylinder, and tap it in using the wooden handle of a hammer. Maintain downward force on the ring compressor to prevent rings from expanding before entering the cylinder bore.
4. Position all the pistons at top dead center.



Installation

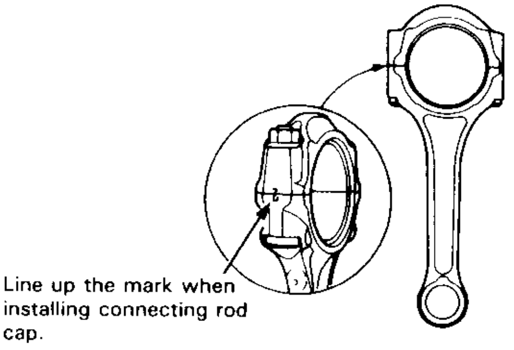
1. Apply a coat of engine oil to the main bearings and rod bearings.
2. Insert the bearing halves in the cylinder block and connecting rods.
3. Hold the crankshaft so the rod journals for cylinders No. 2 and No. 3 are straight down.
4. Lower the crankshaft into the block, seating the rod journals into connecting rods No. 2 and No. 3. Install the rod caps and nuts finger-tight.



5. Rotate the crankshaft clockwise, and seat the journals into connecting rods No. 1 and No. 4. Install the rod caps and nuts finger-tight. Install the caps so the bearing recess is on the same side as the recess in the rod.
6. Check the rod bearing clearance with plastigage (see page 7-8), then torque the capnuts.

   Torque:
   31 N·m (3.2 kgf·m, 23 lbf·ft)
   Apply engine oil to the bolt threads.

7. Install the thrust washers on the No. 4 journal.

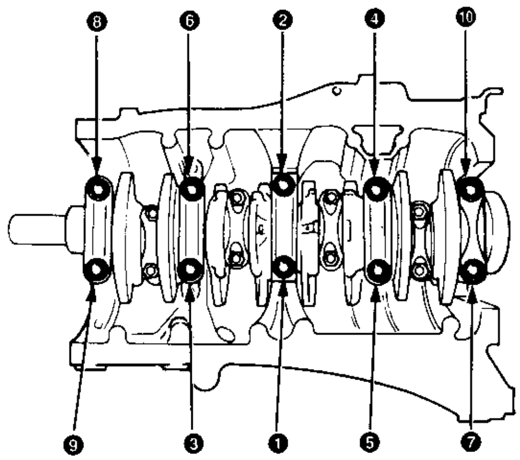


8. Coat the thrust washer surfaces and bolt threads with oil.

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

   First step: 25 N·m (2.5 kgf·m, 18 lbf·ft)
   Second step: 76 N·m (7.8 kgf·m, 56 lbf·ft)

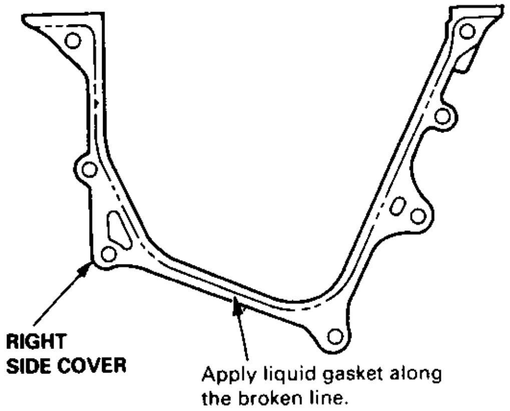
MAIN BEARING CAP BOLTS TIGHTENING SEQUENCE

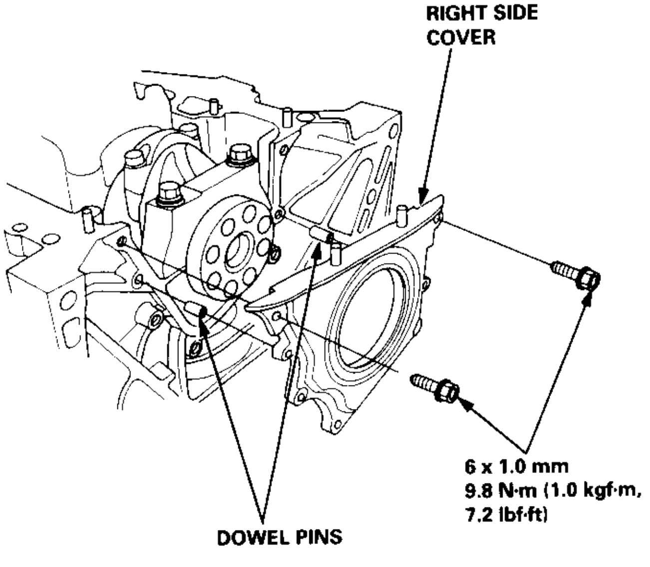


NOTE: Whenever any crankshaft or connecting rod bearing is replaced, it is necessary after reassembly to run the engine at idling speed until it reaches normal operating temperature, then continue to run it for approximately 15 minutes.

10. Clean and dry the right side cover mating surfaces.

11. Apply liquid gasket, part No. 08718 – 0001 or 08718 – 0003, evenly to the block mating surface of the right side cover and to the inner threads of the bolt holes. Install it on the cylinder block.





NOTE:
- 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.

(cont'd)

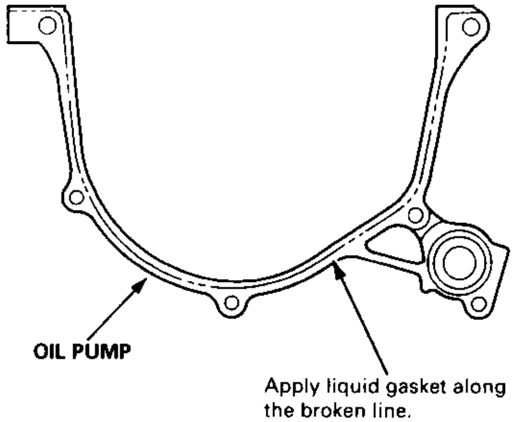
Installation (cont'd)

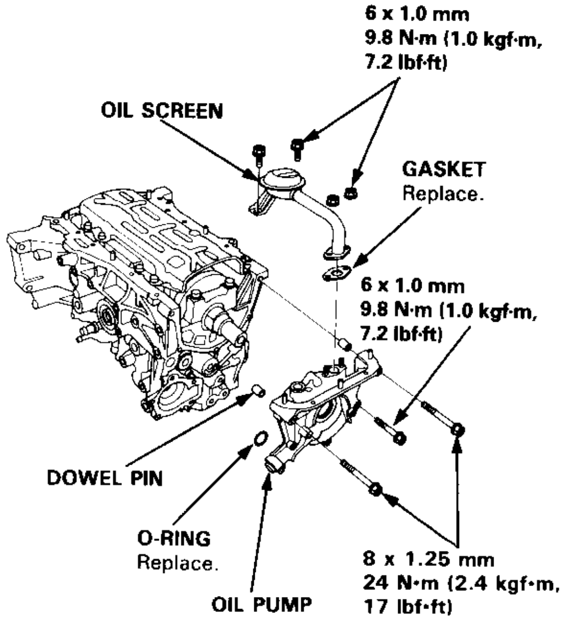
12. Apply liquid gasket to the oil pump mating surface of the block.

13. Apply a light coat of oil to the crankshaft, the lip of the seal, and the O-rings.

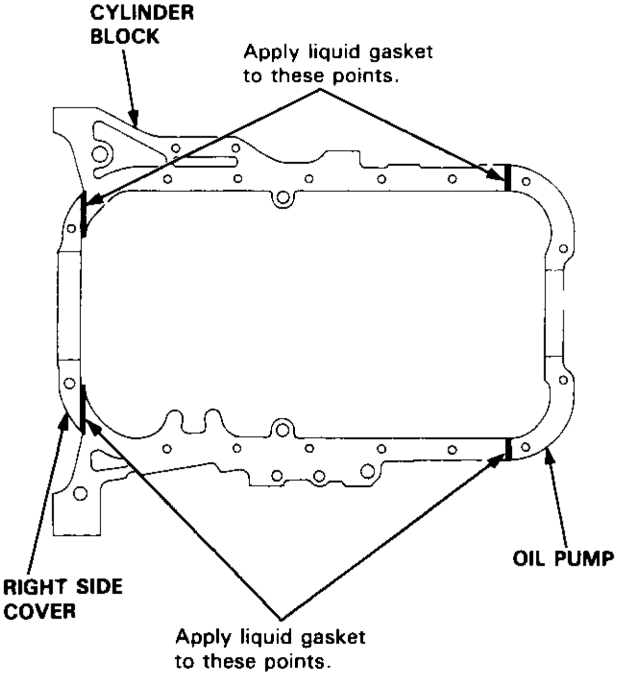
14. Apply grease to the lips of the oil seals.

15. Align the inner rotor with the crankshaft, then install the oil pump. When the pump is in place, clean any excess grease off the crankshaft, then check that the oil seal lips are not distorted.

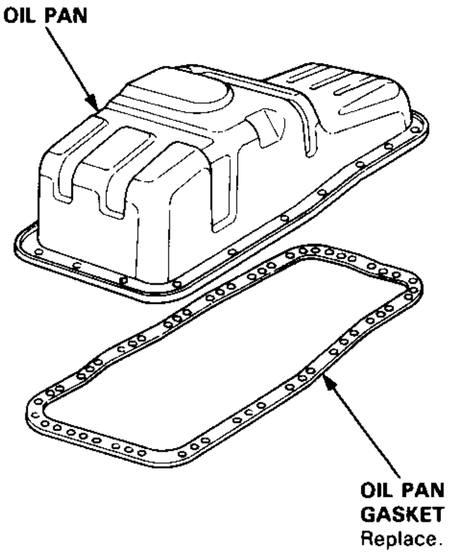




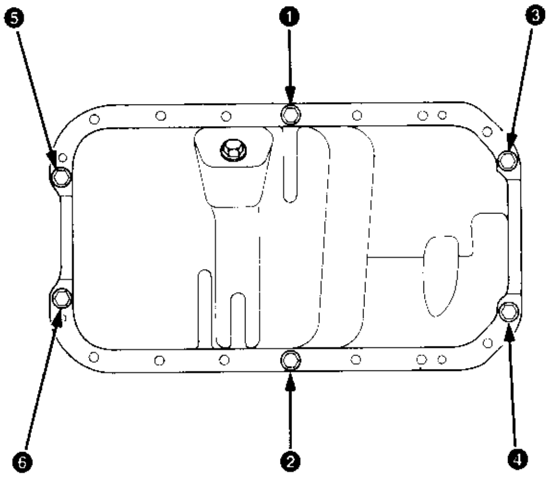
16. Apply liquid gasket on the oil pump and right side cover mating areas.



17. Install the oil pan gasket and oil pan. Wait no more than five minutes after applying liquid gasket.



18. Tighten the bolts and nuts finger tight at six points.

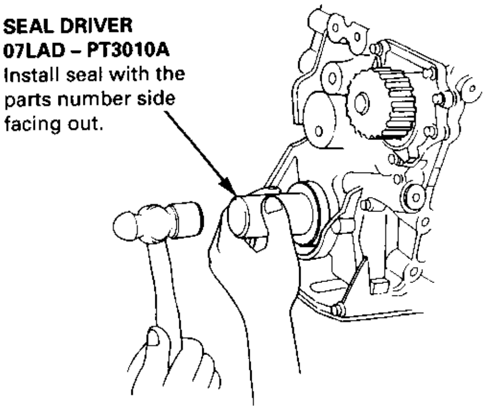


19. Tighten all bolts and nuts, starting from nut ①, clockwise in three steps. Excessive tightening can cause distortion of the oil pan gasket and oil leakage.

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

Installation

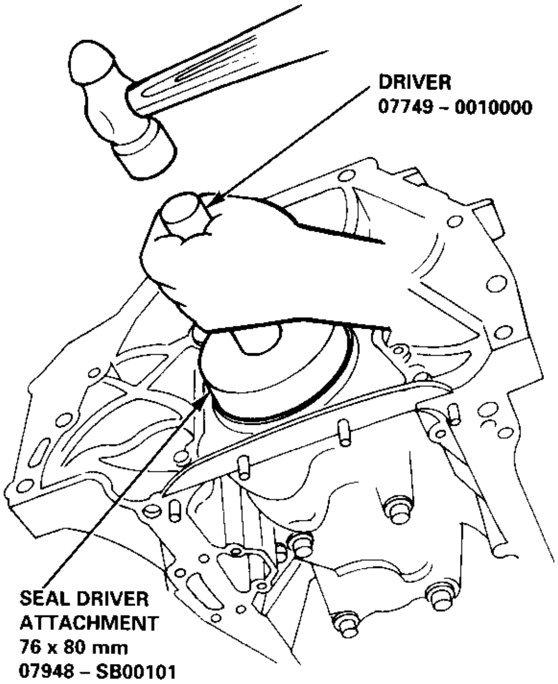
1. Dry the crankshaft oil seal housing.
2. Apply a light coat of grease to the crankshaft and to the lips of the seals.
3. Using the special tool, drive in the timing pulley-end seal until the driver bottoms against the oil pump. When the seal is in place, clean any excess grease off the crankshaft and check that the oil seal lip is not distorted.



(cont'd)

Installation (cont'd)

4. 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). Align the hole in the driver attachment with the pin on the crankshaft.



Install seal with the number side facing out.

Engine Lubrication

Special Tools 8-2
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  Inspection 8-4
  Replacement 8-4
Oil Filter
  Replacement 8-5
Oil Pressure Switch
  Testing 8-7
Oil Pressure
  Testing 8-7
Oil Pump
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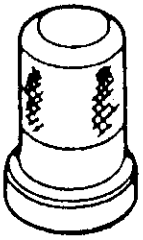
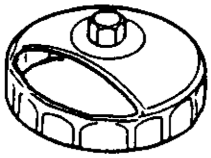
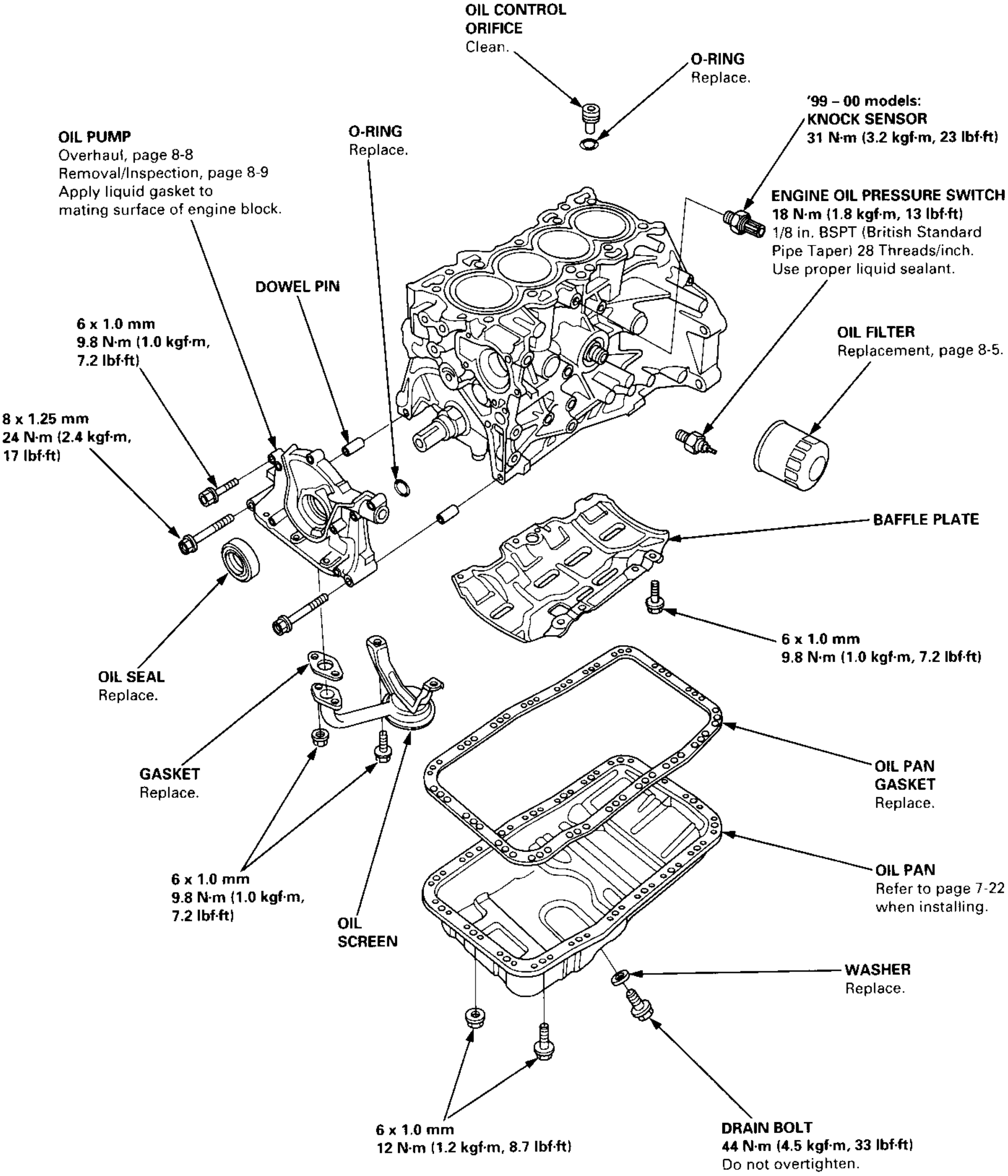
Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07LAD – PT3010A	Seal Driver	1	8-10
②	07912 – 6110001	Oil Filter Wrench	1	8-6


①


②

Illustrated Index



OIL CONTROL ORIFICE
Clean.

O-RING
Replace.

'99 – 00 models:
KNOCK SENSOR
31 N·m (3.2 kgf·m, 23 lbf·ft)

OIL PUMP
Overhaul, page 8-8
Removal/Inspection, page 8-9
Apply liquid gasket to
mating surface of engine block.

O-RING
Replace.

ENGINE OIL PRESSURE SWITCH
18 N·m (1.8 kgf·m, 13 lbf·ft)
1/8 in. BSPT (British Standard
Pipe Taper) 28 Threads/inch.
Use proper liquid sealant.

DOWEL PIN

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

OIL FILTER
Replacement, page 8-5.

8 x 1.25 mm
24 N·m (2.4 kgf·m, 17 lbf·ft)

BAFFLE PLATE

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

OIL SEAL
Replace.

GASKET
Replace.

OIL PAN GASKET
Replace.

OIL PAN
Refer to page 7-22
when installing.

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

OIL SCREEN

WASHER
Replace.

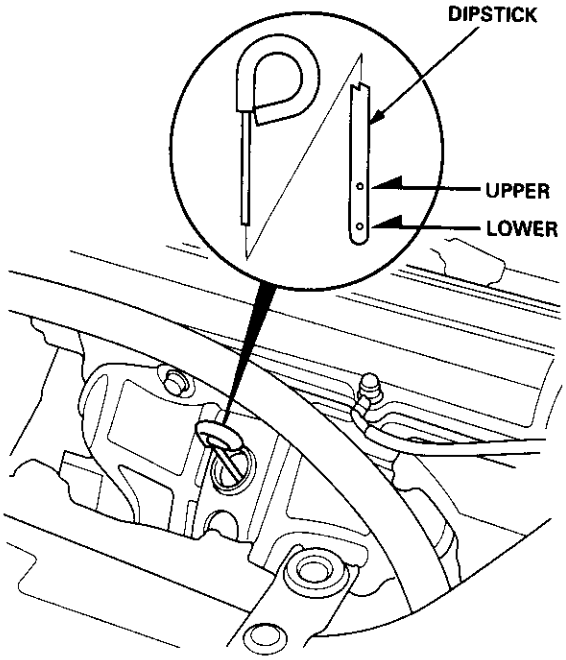
6 x 1.0 mm
12 N·m (1.2 kgf·m, 8.7 lbf·ft)

DRAIN BOLT
44 N·m (4.5 kgf·m, 33 lbf·ft)
Do not overtighten.

Engine Oil

Inspection

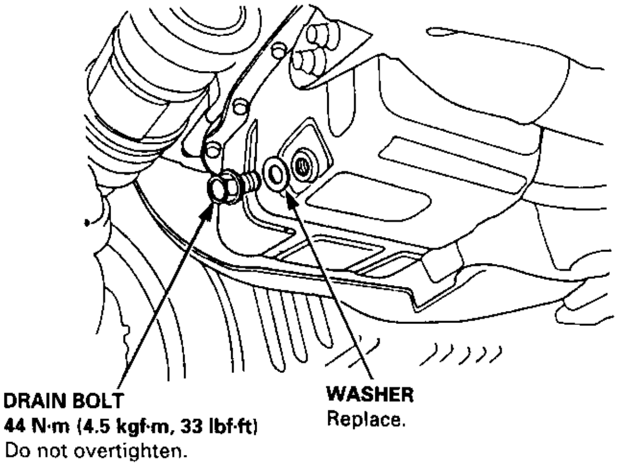
1. Park the vehicle on level ground, and turn off the engine. Allow the oil a few minutes to drain back into the oil pan so the dipstick will show the actual level.
2. Make certain that the oil level indicated on the dipstick is between the upper and lower marks. Insert the dipstick carefully to avoid bending it.
3. If the level has dropped close to the lower mark, add oil until it reaches the upper mark.



Replacement

CAUTION: Remove the drain plug 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 with the recommended oil.

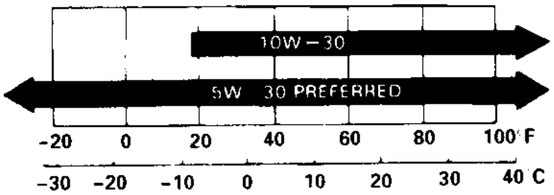
Requirement	API Service Grade: Use "Energy Conserving" SJ or "Energy Conserving II" SH grade oil. SAE 5W – 30 preferred: You can also use an oil that bears the API CERTIFICATION mark.
Capacity	3.5 ℓ (3.7 US qt, 3.1 Imp qt) at oil change. 3.8 ℓ (4.0 US qt, 3.3 Imp qt) at oil change including filter. 4.6 ℓ (4.9 US qt, 4.0 Imp qt) after engine overhaul.
Change interval	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.

Oil Filter

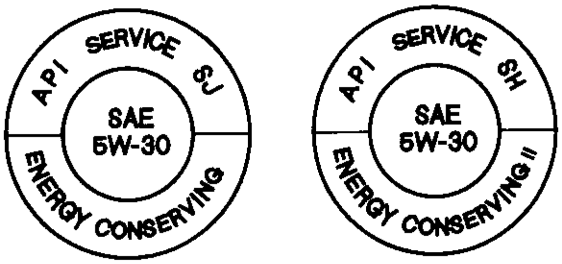
The numbers in the middle of the API Service label tell you the oil's SAE viscosity or weight. Select the oil for your vehicle according to this chart:

Ambient Temperature



An oil with a viscosity of 5 W – 30 is preferred for improved fuel economy and year-round protection in the vehicle. You may use a 10 W – 30 oil if the climate in your area is limited to the temperature range shown on the chart.

API CERTIFICATION SEAL



API SERVICE LABEL

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

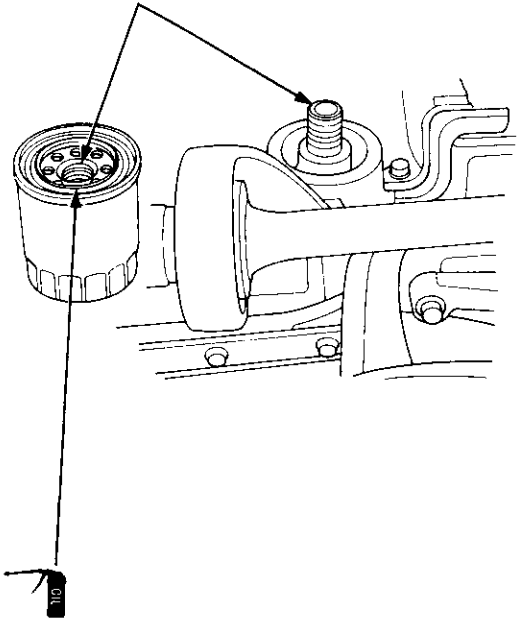
Replacement

CAUTION: After the engine has been run, the exhaust pipes will be hot; be careful when working around the exhaust manifold.

1. Remove the oil filter with the special 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 filter rubber seal.

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

Inspect threads and rubber seal surface.



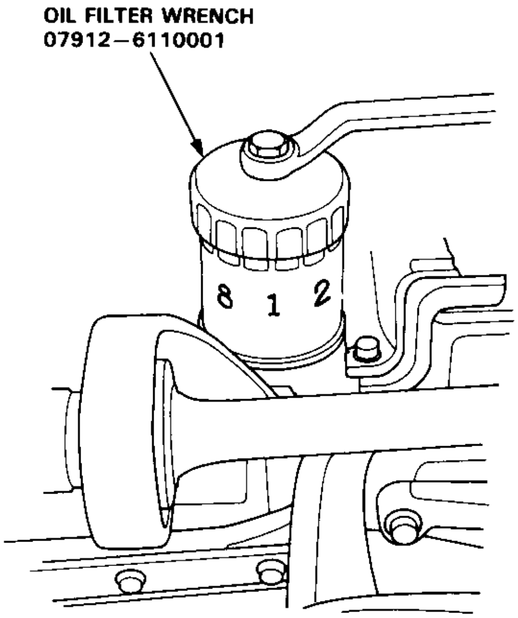
Apply oil to rubber seal before installing.

(cont'd)

Replacement (cont'd)

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

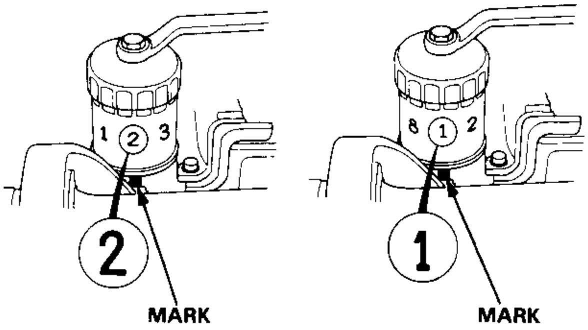
Tighten: 7/8 turn clockwise
Tightening torque: 22 N·m (2.2 kgf·m 16 lbf·ft)



Some filters have eight numbers (1 to 8) printed on the surface of the filter.

The following explains the procedure for tightening filters using these numbers.

1) Make a mark on the cylinder block 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 makes 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.

Number after tightening.

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

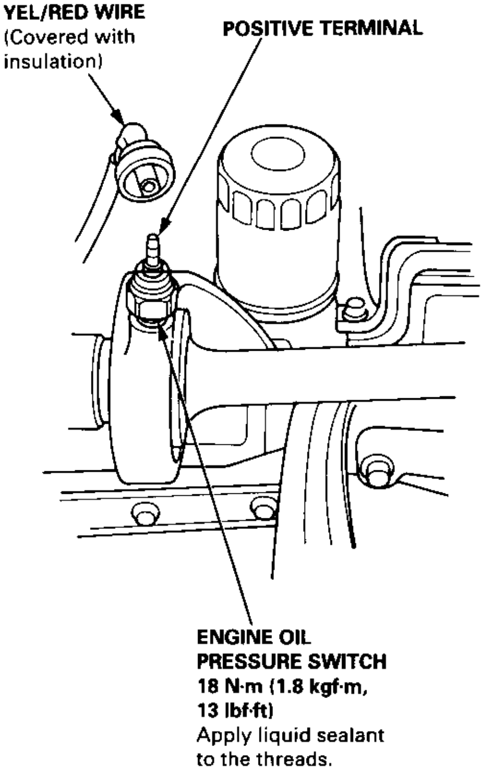
5. After installation, fill the engine with oil up to the specified level, run the engine for more than three minutes, then check for oil leakage and oil level.

CAUTION: Installation using other than the above procedure could result in serious engine damage due to oil leakage.

Oil Pressure Switch

Testing

1. Remove the YEL/RED wire from the engine oil pressure switch.
2. Check for continuity between the positive terminal and the engine (ground). There should be continuity with the engine stopped. There should be no continuity with the engine running.



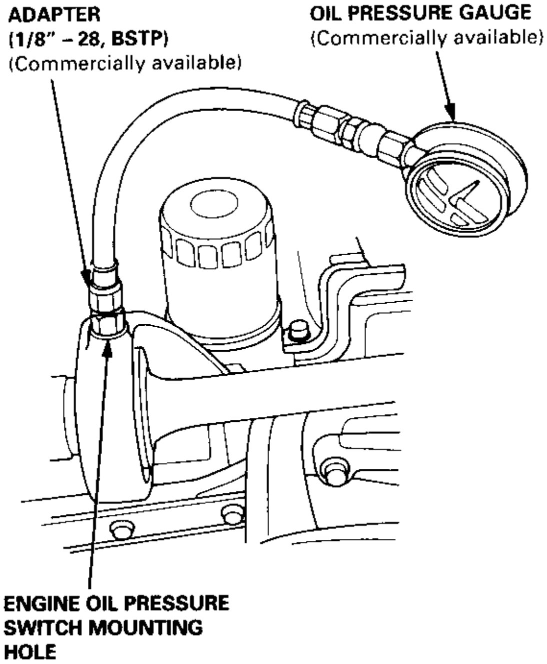
3. If the switch fails to operate, check the engine oil level. If the engine oil level is OK, check the engine oil pressure.

Oil Pressure

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.



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:

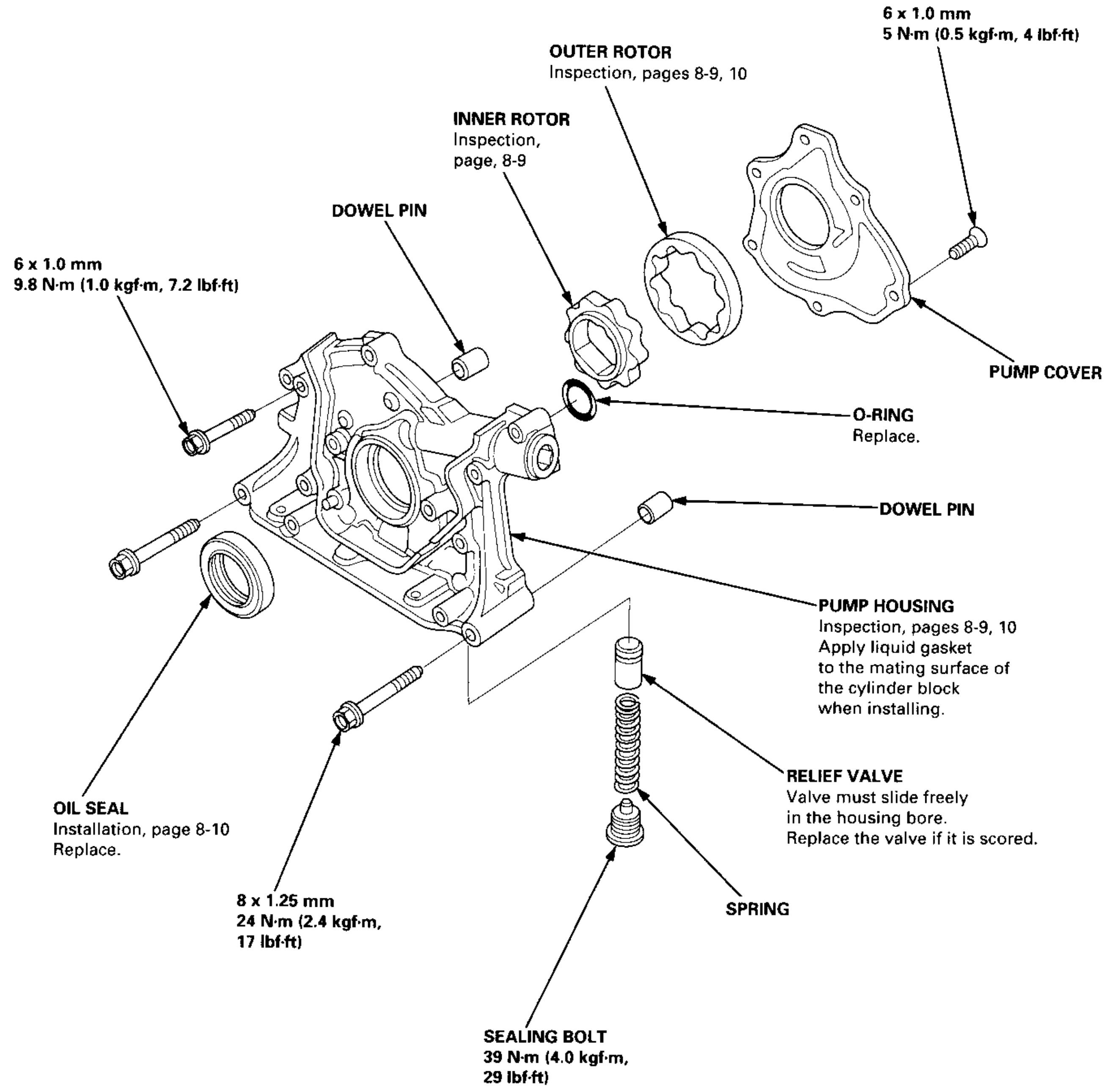
Engine Oil Temperature: 176°F (80°C)
Engine Oil Pressure:

At Idle:	**70 kPa (0.7 kgf/cm², 10 psi) minimum**
At 3,000 rpm:	**340 kPa (3.5 kgf/cm², 50 psi) minimum**

5. If oil pressure in not within specifications, inspect the oil pump (see page 8-9).

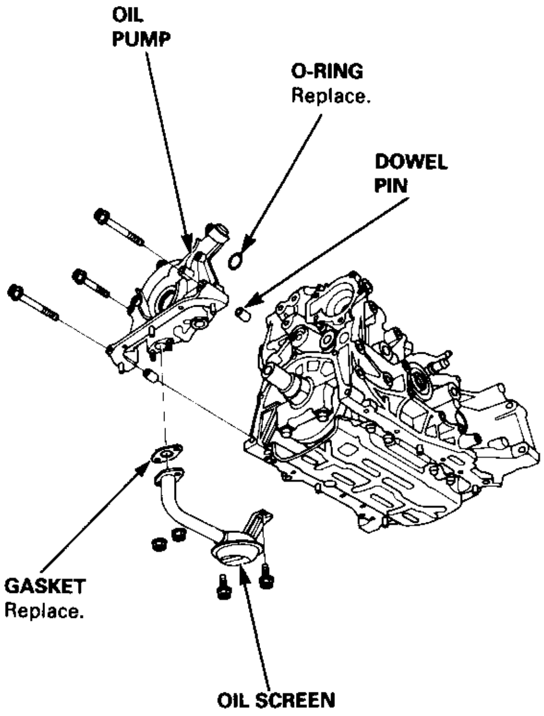
Oil Pump

Overhaul



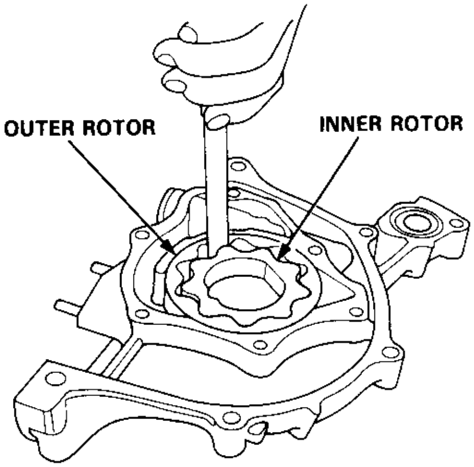
Removal/Inspection/Installation

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 middle 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.



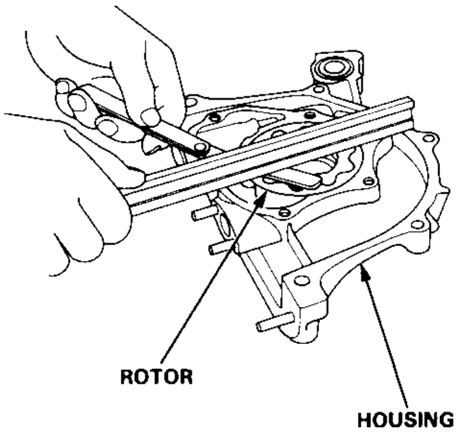
10. Remove the screws from the pump housing, then separate the housing and cover.
11. Check the inner-to-outer rotor radial clearance on the pump rotor. If the inner-to-outer rotor clearance exceeds the service limit, replace the inner and outer rotors.

Inner Rotor-to Outer Rotor Radial Clearance
Standard (New): 0.04 – 0.16 mm
(0.002 – 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): 0.02 – 0.07 mm
(0.001 – 0.003 in)
Service Limit: 0.15 mm (0.006 in)

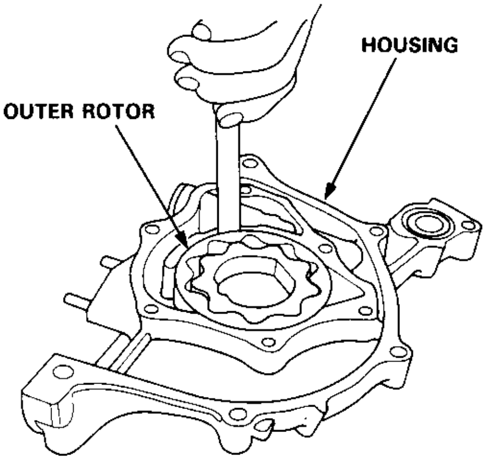


(cont'd)

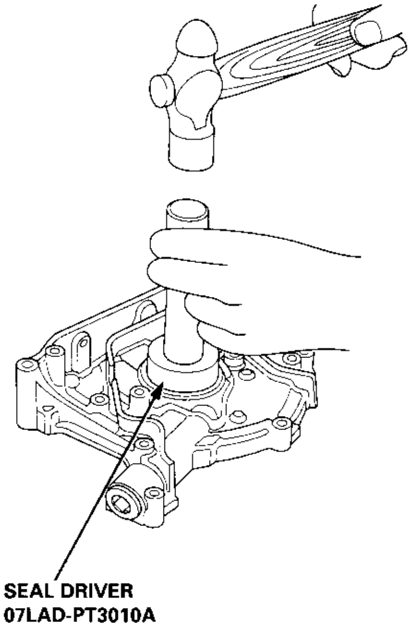
Removal/Inspection/Installation (cont'd)

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.

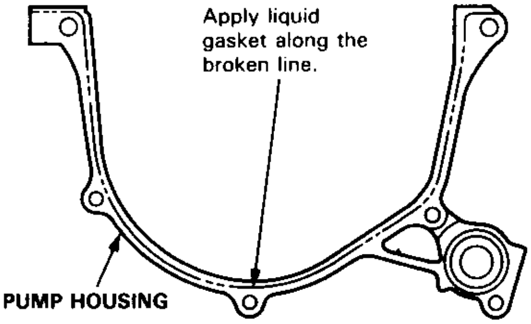
Housing-to-Outer Rotor Radial Clearance
Standard (New): 0.10 – 0.19 mm
(0.004 – 0.007 in)
Service Limit: 0.20 mm (0.008 in)



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. Gently tap in the new crankshaft oil seal until the special tool bottoms on the pump.



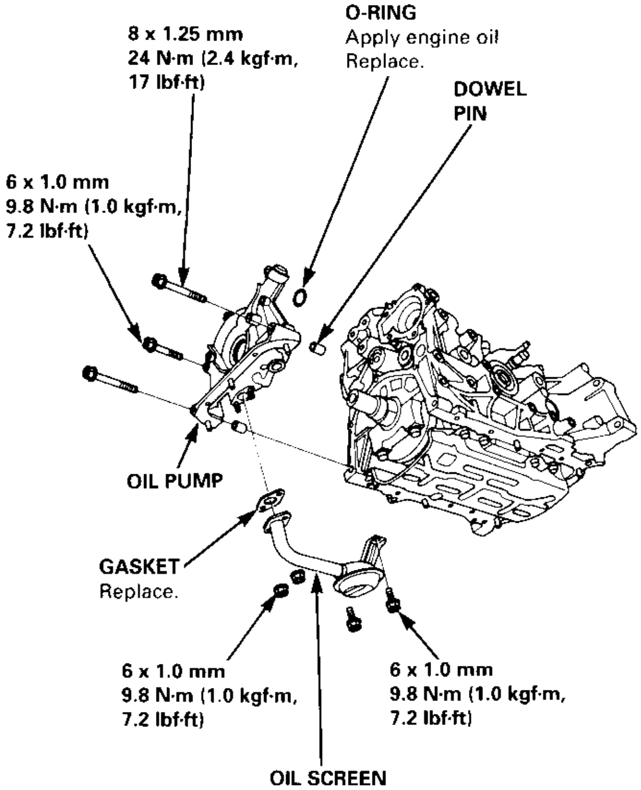
17. Reassemble the oil pump, applying liquid thread lock to the pump housing screws.
18. Check that the oil pump turns freely.
19. Apply a light coat of oil to the seal lip.
20. Clean and dry the oil pump mating surfaces.
21. Install the two dowel pins and a new O-ring on the cylinder block.
22. Apply liquid gasket, part No. 08718-0001 or 08718-0003, to the cylinder block mating surface of the oil pump. Apply the liquid gasket evenly, in a narrow bead centered on the mating surface. Do not apply liquid gasket to the O-ring grooves.
23. Apply liquid gasket to the inner threads of the bolt holes.



NOTE:

- 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.

24. Apply grease to the lip of the oil pump seal.
25. 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.
26. Install the oil screen.
27. Install the oil pan (see page 7-22).



Intake Manifold/Exhaust System

Intake Manifold
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Exhaust Manifold
  Replacement 9-4
Exhaust Pipe and Muffler
  Replacement 9-6

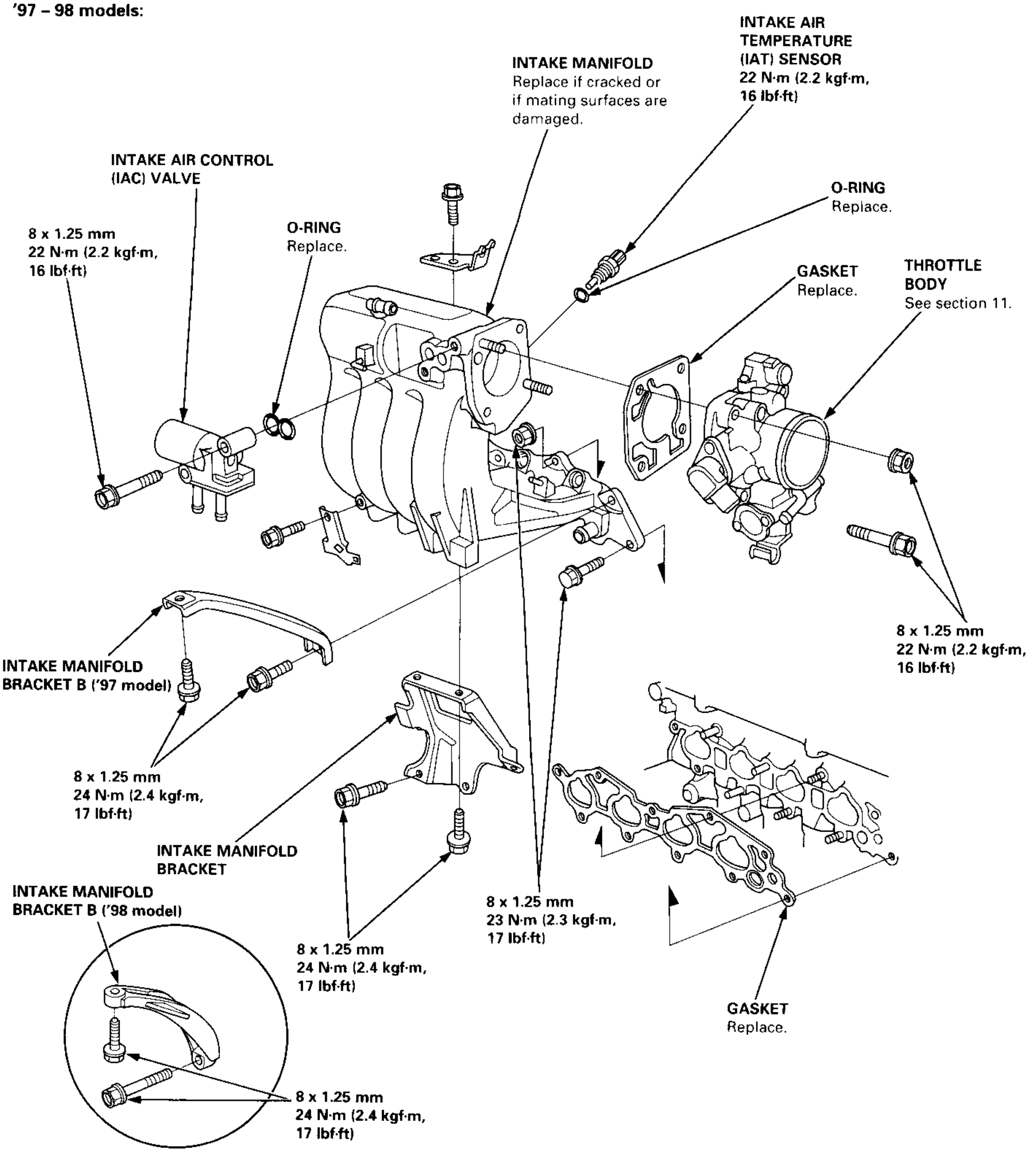
Intake Manifold

Replacement

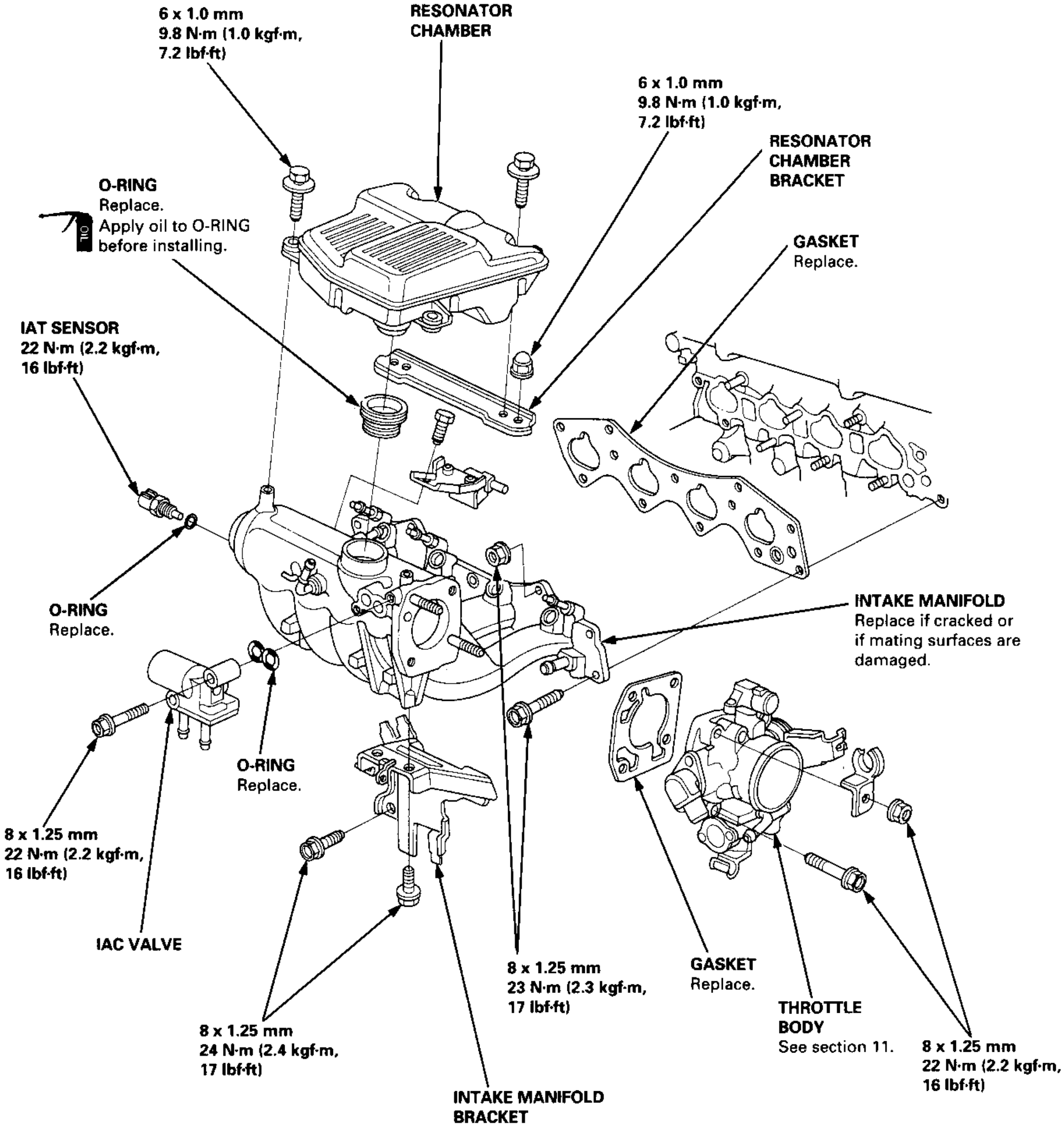
NOTE:

- Use new O-rings and gaskets when reassembling.
- Check for folds or scratches on the surface of the gasket.
- Replace with a new gasket if damaged.

'97 – 98 models:



'99 – 00 models:

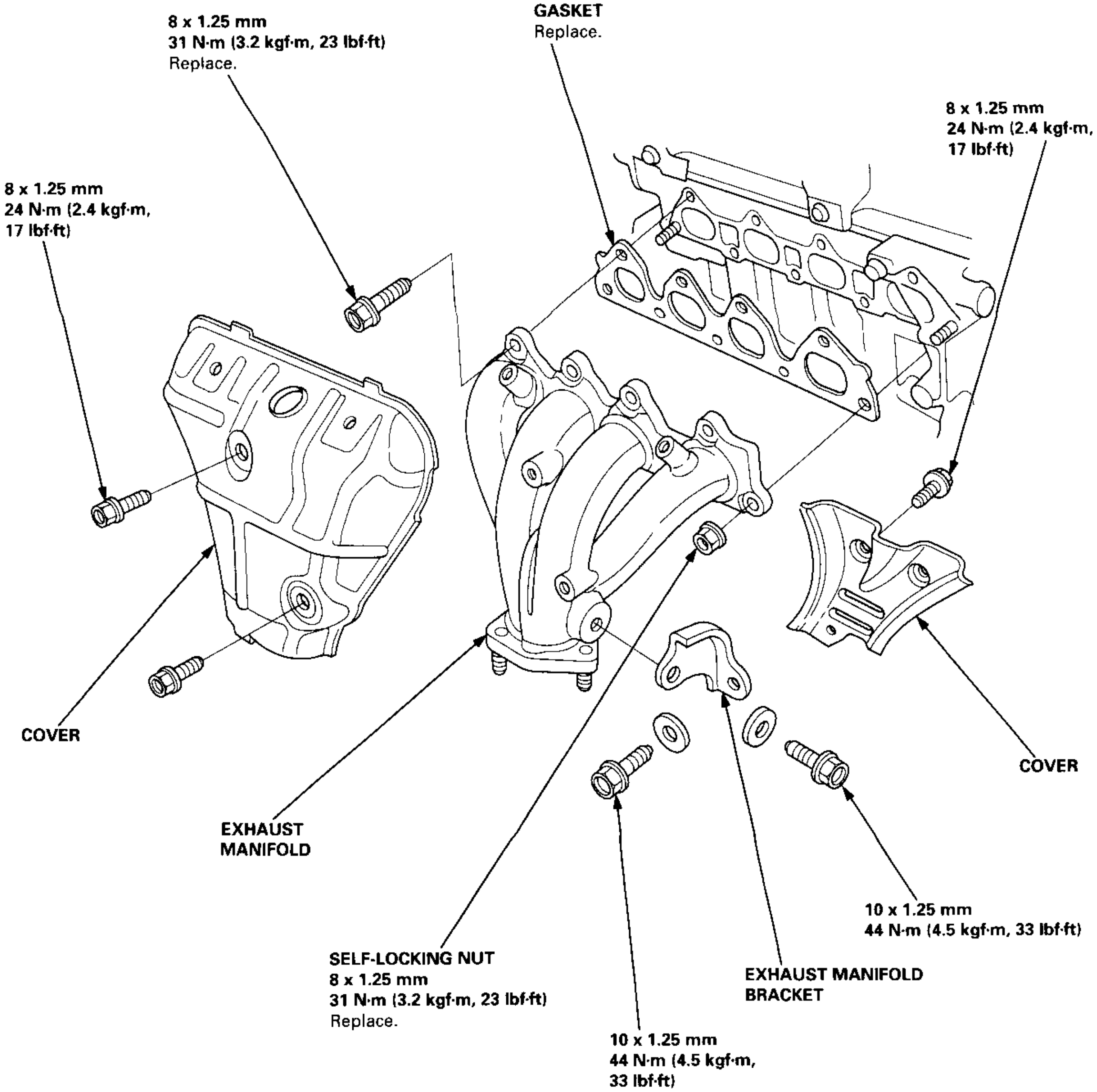

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)
RESONATOR CHAMBER
6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)
RESONATOR CHAMBER BRACKET
O-RING
Replace.
Apply oil to O-RING before installing.
OIL
GASKET
Replace.
IAT SENSOR
22 N·m (2.2 kgf·m, 16 lbf·ft)
O-RING
Replace.
INTAKE MANIFOLD
Replace if cracked or if mating surfaces are damaged.
O-RING
Replace.
8 x 1.25 mm
22 N·m (2.2 kgf·m, 16 lbf·ft)
IAC VALVE
8 x 1.25 mm
23 N·m (2.3 kgf·m, 17 lbf·ft)
GASKET
Replace.
THROTTLE BODY
See section 11.
8 x 1.25 mm
24 N·m (2.4 kgf·m, 17 lbf·ft)
8 x 1.25 mm
22 N·m (2.2 kgf·m, 16 lbf·ft)
INTAKE MANIFOLD BRACKET

Exhaust Manifold

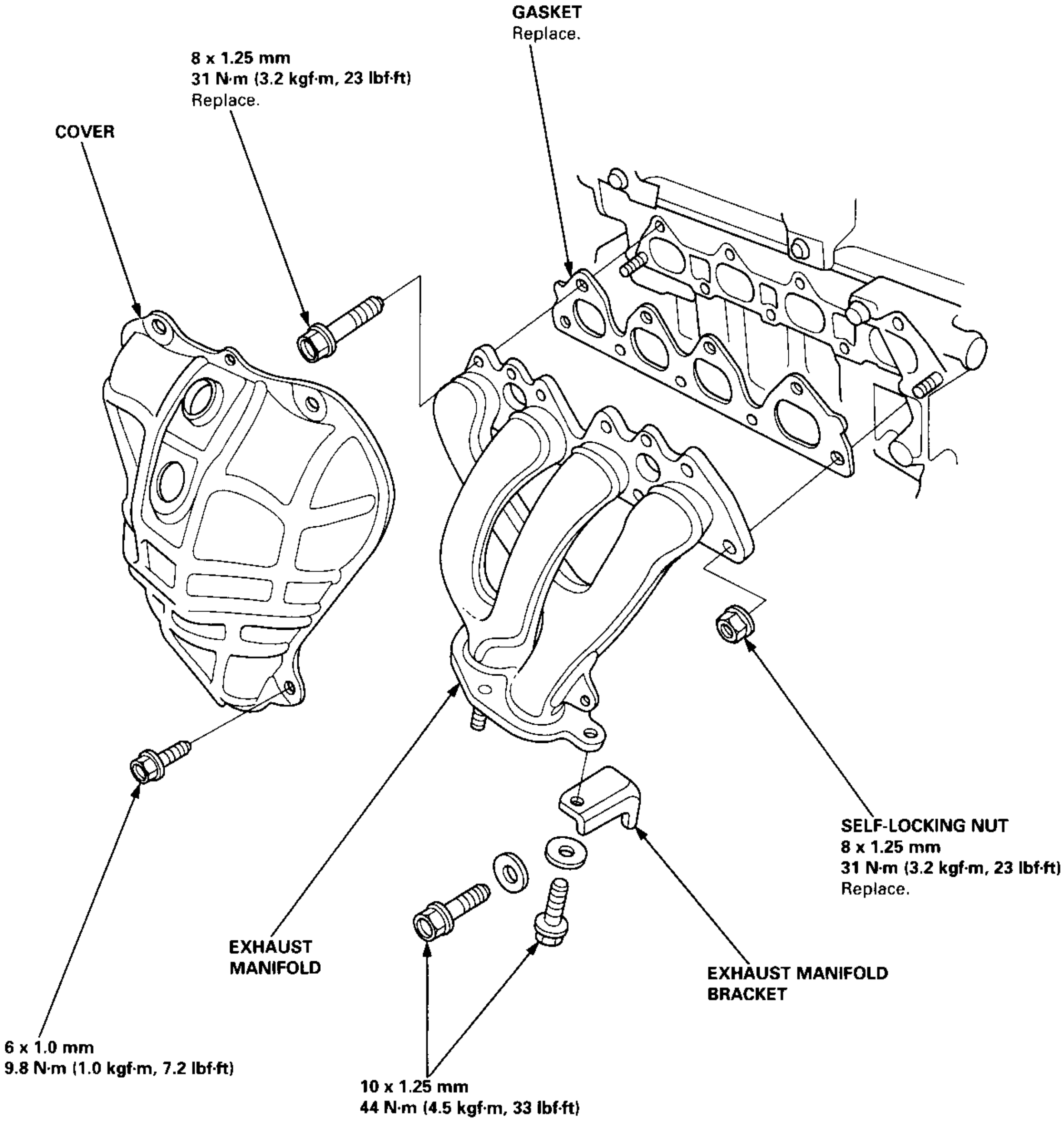
Replacement

NOTE:
- Use new gaskets and self-locking nuts when reassembling.
- Check for folds or scratches on the surface of the gasket.
- Replace with a new gasket if damaged.

'97 – 98 U.S. models (California):



'97 – 98 U.S. models (Except California):
'99 – 00 models:

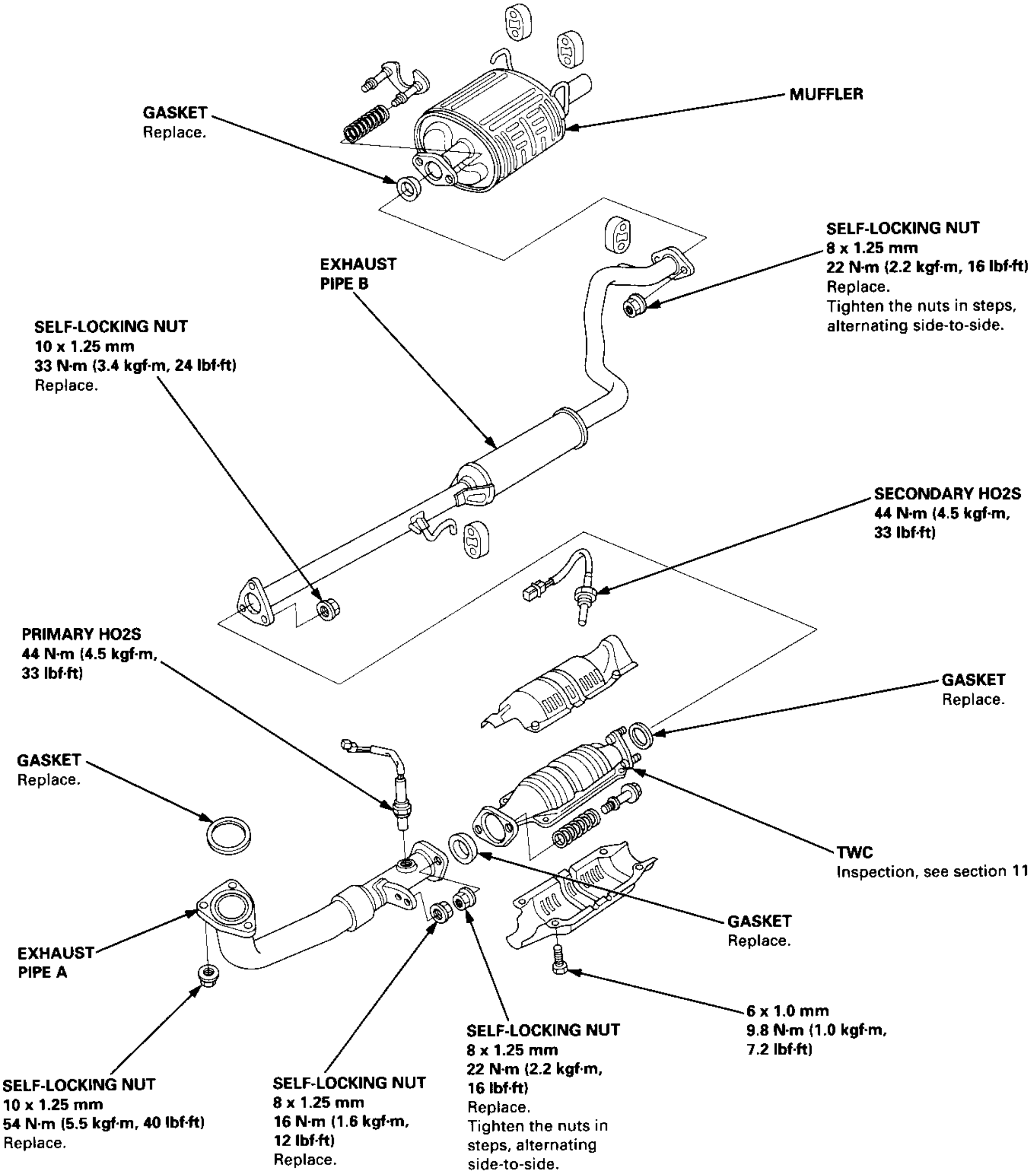


Exhaust Pipe and Muffler

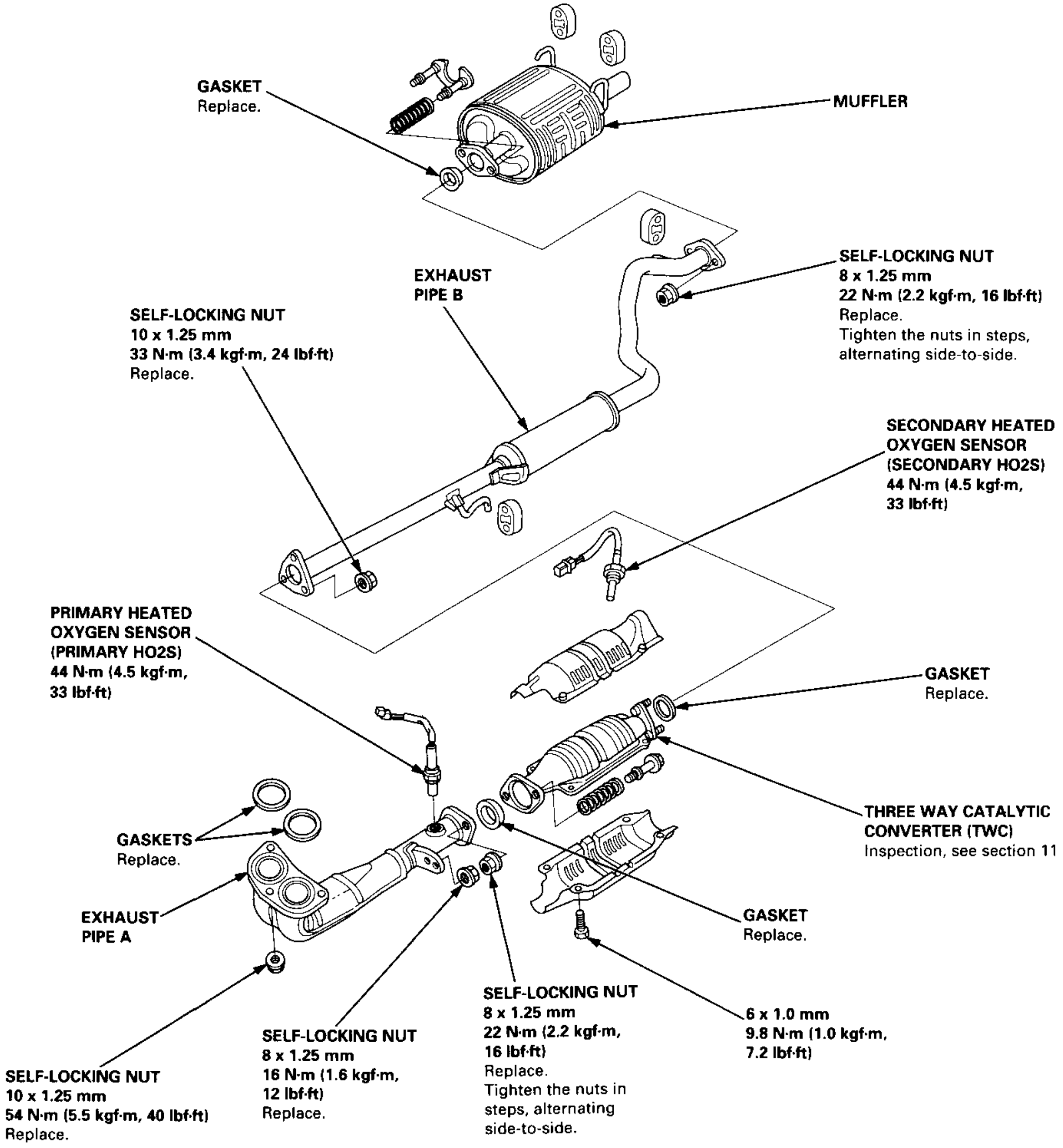
Replacement

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

'97 – 98 U.S. models (California):



'97 – 98 U.S. models (Except California):
'99 – 00 models:



Cooling

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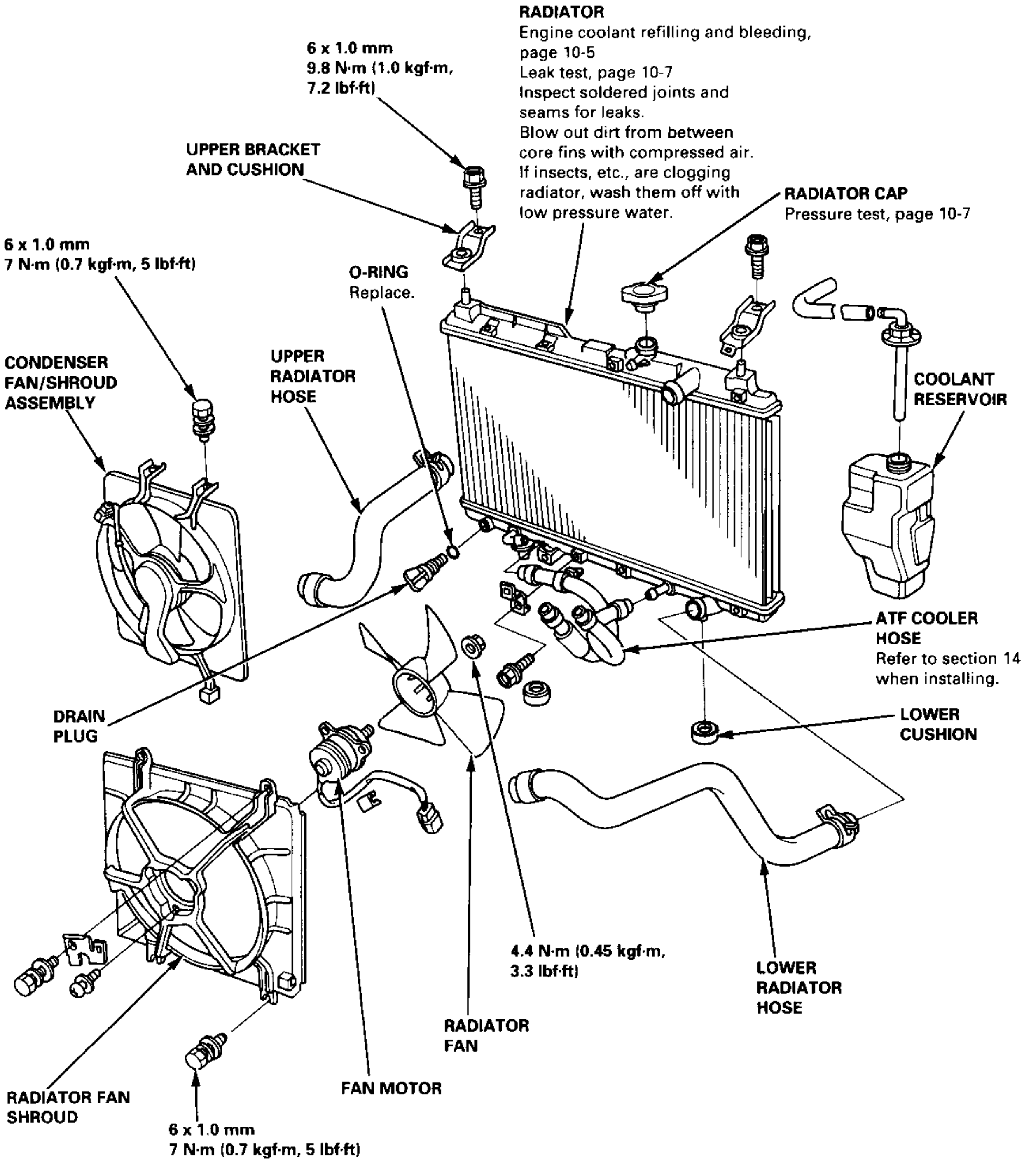
CAUTION: The system is under high pressure when the engine is hot. To avoid danger of releasing scalding engine coolant, remove the cap only when the engine is cool.

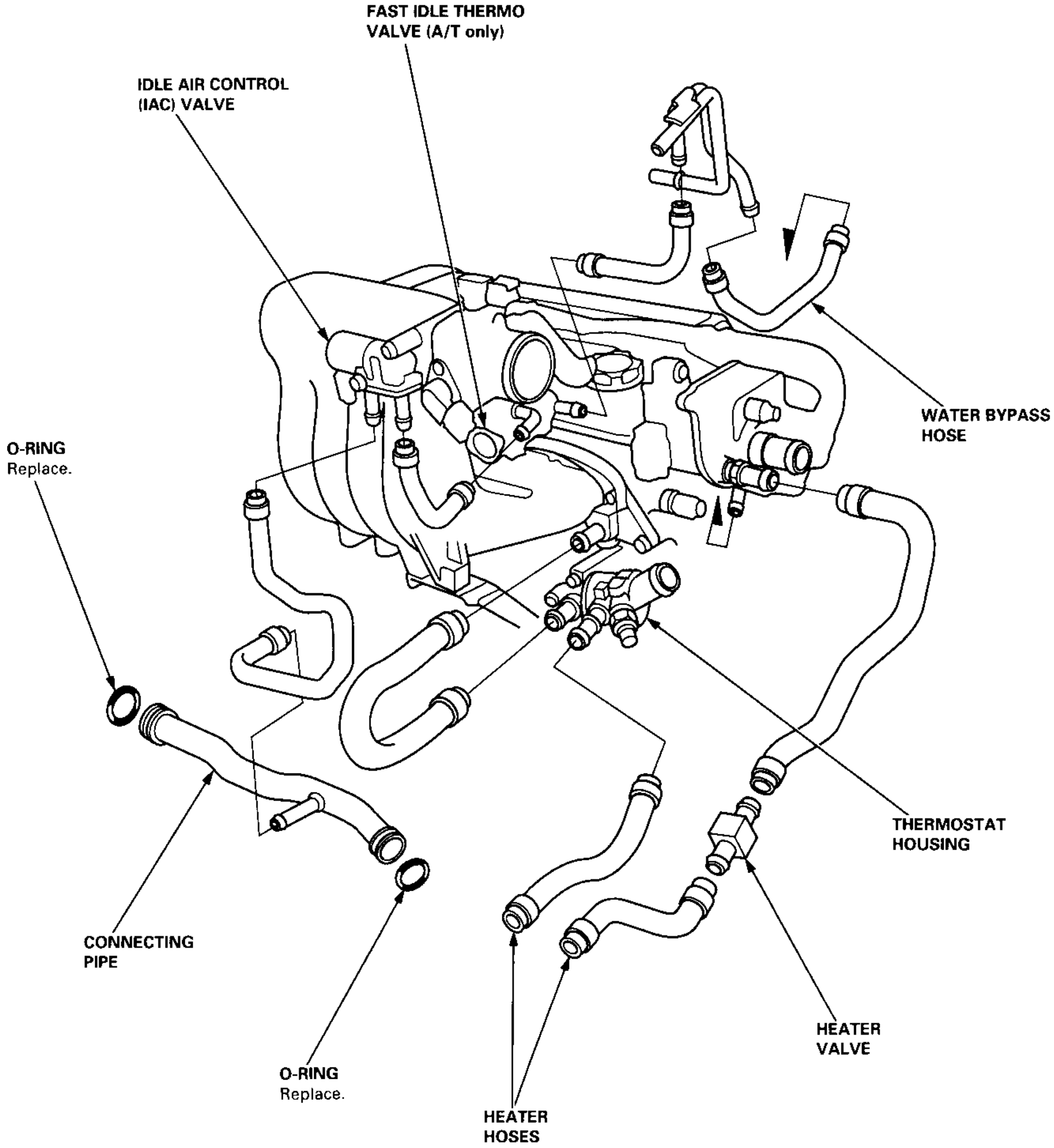
Total Cooling System Capacity [Including 0.6 ℓ (0.63 US qt, 0.53 Imp qt) for heater and reservoir]:
A/T: 5.9 ℓ (6.2 US qt, 5.2 Imp qt)
M/T: 6.0 ℓ (6.3 US qt, 5.3 Imp qt)

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

Check all cooling system hoses for damage, leaks or deterioration and replace if necessary.
Check all hose clamps and retighten if necessary.



Engine Hose Connections:



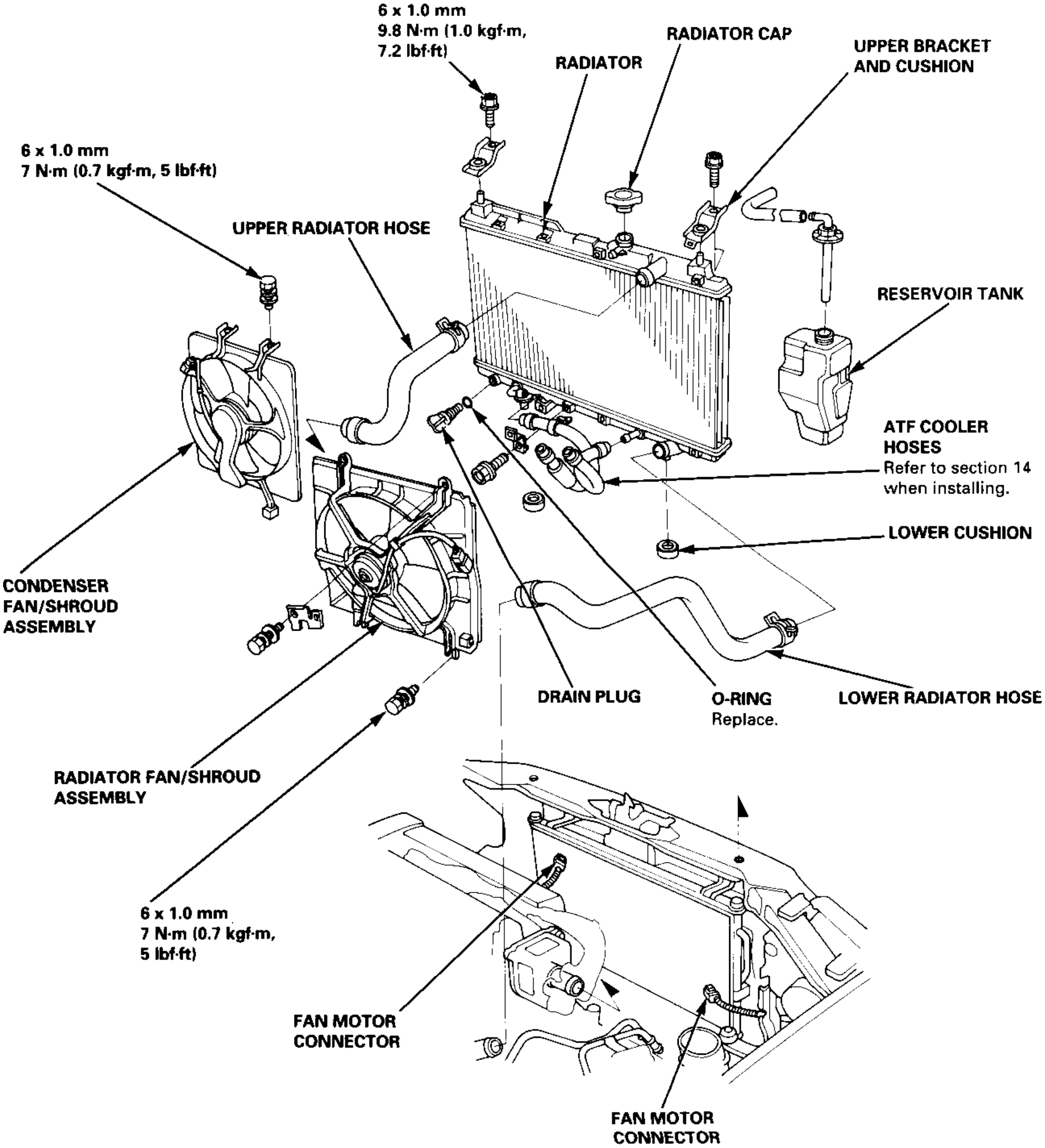
Radiator

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.
6. Install the radiator in the reverse order of removal.

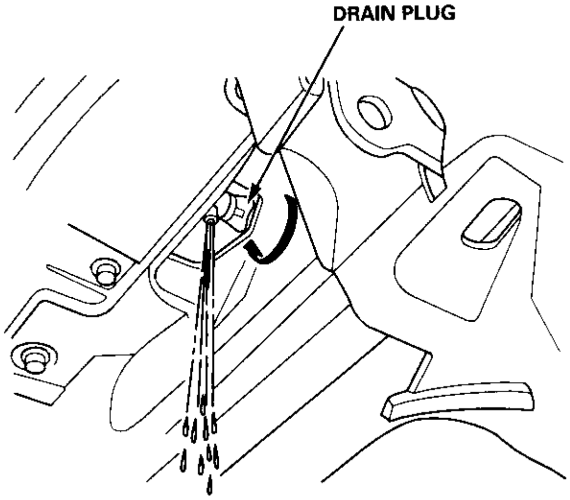
NOTE:

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

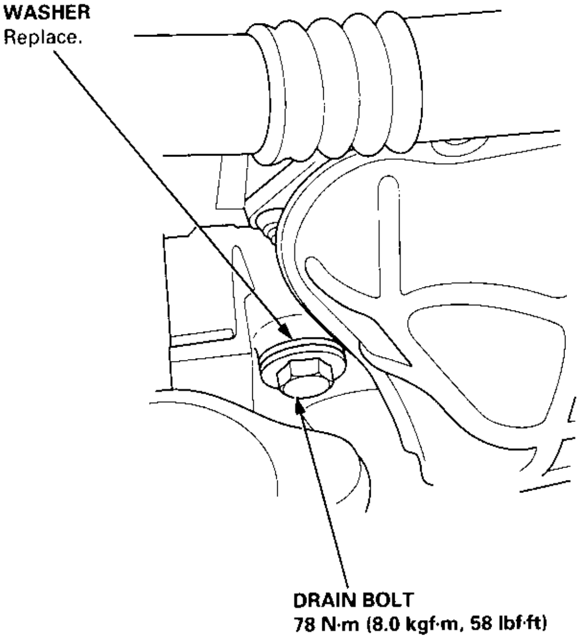


Engine Coolant Refilling and Bleeding

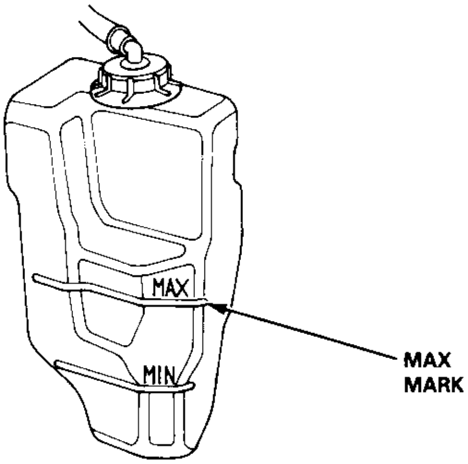
1. Slide the heater temperature control lever to maximum heat.
   Make sure the engine and radiator are cool to the touch.
2. Remove the radiator cap.
3. Loosen the drain plug, and drain the coolant.



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)

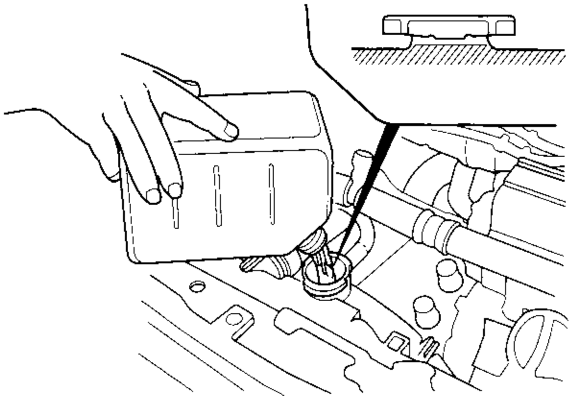
Engine Coolant Refilling and Bleeding (cont'd)

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

NOTE:
- Always use Genuine Honda Antifreeze/Coolant. Using a non-Honda coolant can result in corrosion, causing the cooling system to malfunction or fail.
- 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.
- Do not use additional rust inhibitors or anti-rust products; they may not be compatible with the coolant.

Engine Coolant Refill Capacity [including 0.6 ℓ (0.63 US qt, 0.53 Imp qt) for heater and reservoir]:
A/T: 3.9 ℓ (4.1 US qt, 3.4 Imp qt)
M/T: 4.0 ℓ (4.2 US qt, 3.5 Imp qt)

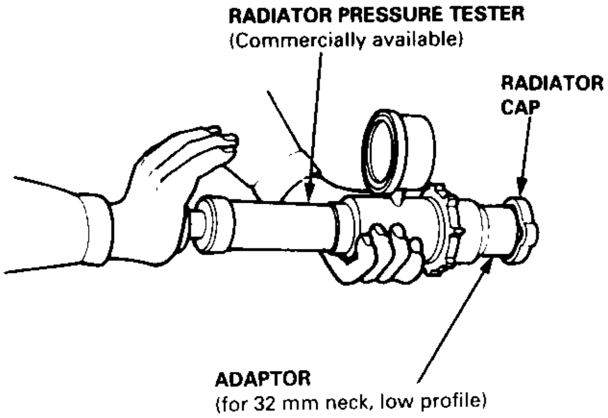
9. Pour coolant into the radiator up to the base of the filler neck. When pouring engine coolant, do not let coolant spill on any electrical parts or the paint. If any coolant spills, rinse it off immediately.



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.

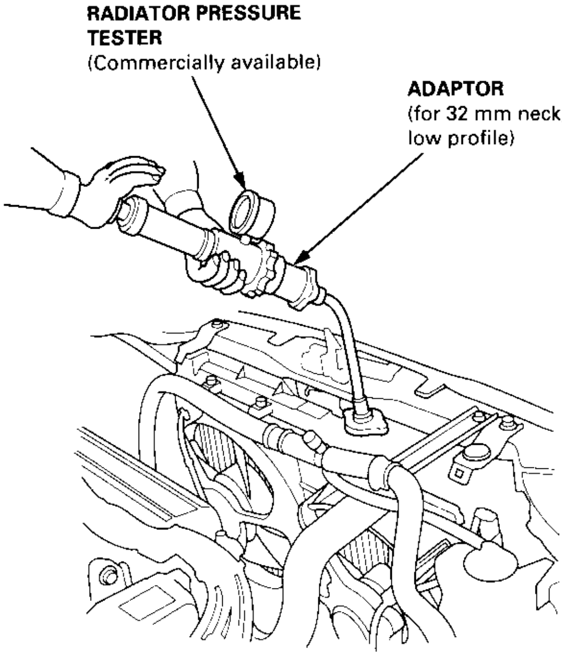
Cap Testing

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.



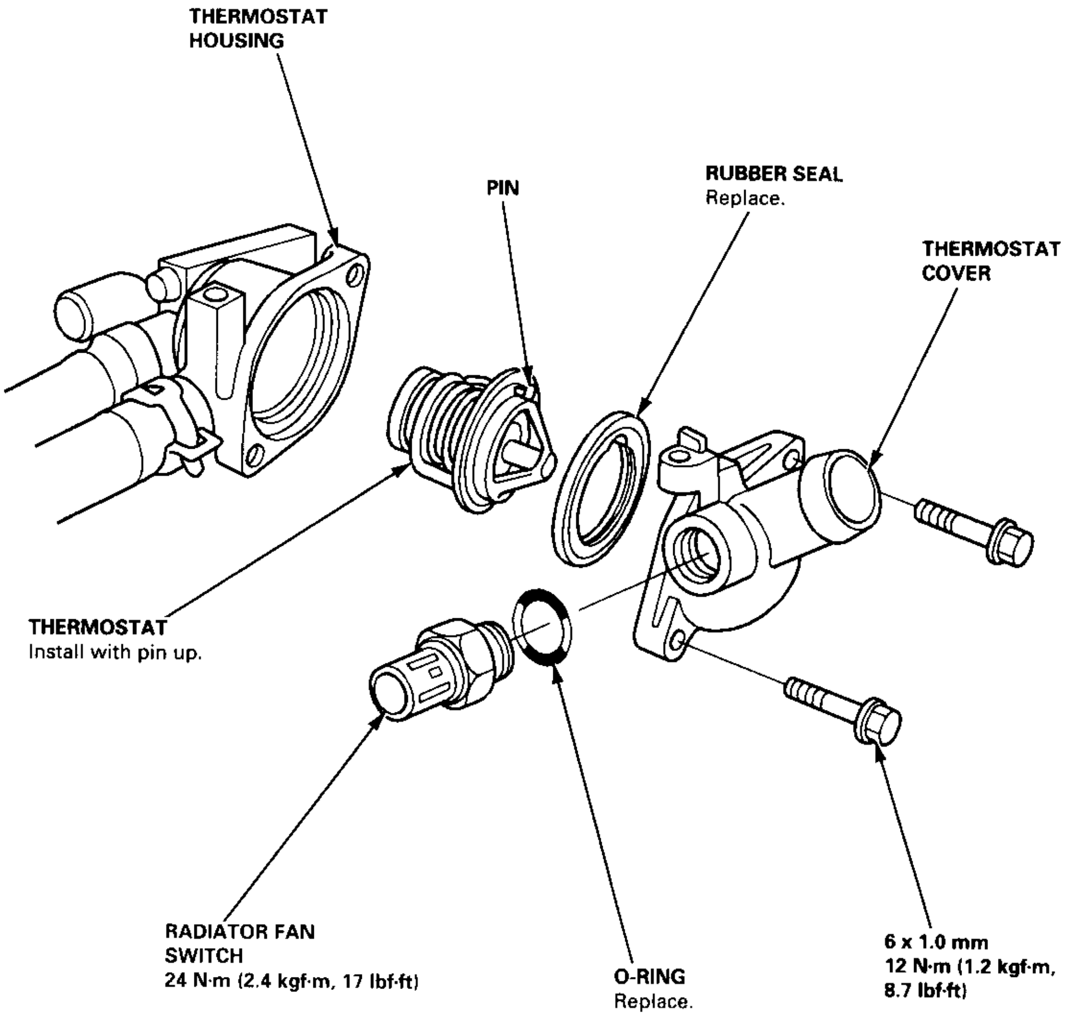
Testing

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.
5. Check for engine oil in the coolant and/or coolant in the engine oil.



Thermostat

Replacement

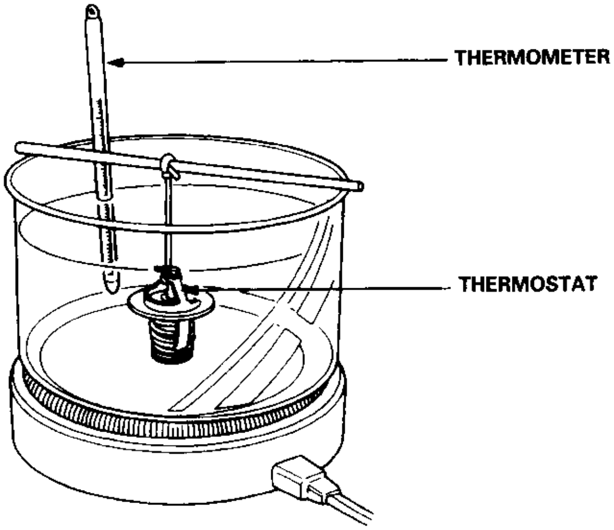


Testing

Replace the thermostat if it is open at room temperature.

To test a closed thermostat:

1. Suspend the thermostat in a container of water. Do not let the thermometer touch the bottom of the hot container.



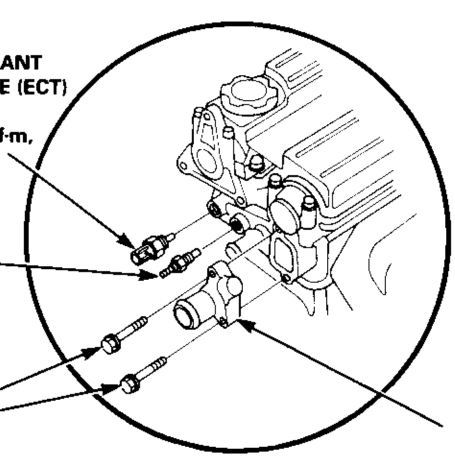
2. Heat the water, and check the temperature with a thermometer. Check the temperature at which the thermostat first opens, and at which it is fully open.
3. Measure the lift height of the thermostat when fully open.

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)**

Water Pump

Illustrated Index

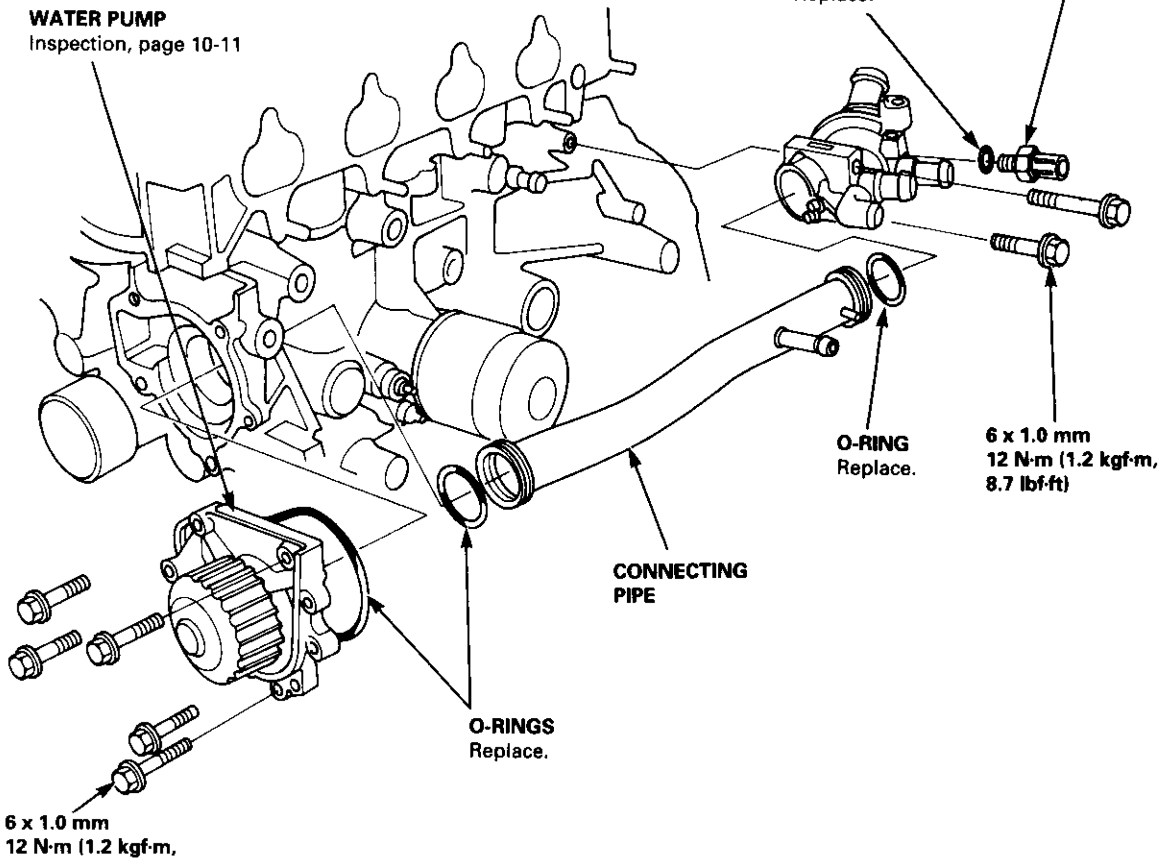


ENGINE COOLANT TEMPERATURE (ECT) SENSOR
18 N·m (1.8 kgf·m, 13 lbf·ft)

COOLANT TEMPERATURE GAUGE SENDING UNIT
9 N·m (0.9 kgf·m, 7 lbf·ft)
Apply liquid gasket to the threads.

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

WATER OUTLET COVER
Apply liquid gasket part No. 08718 - 0001 or 08718 - 0003 to the mating surface.



RADIATOR FAN SWITCH
24 N·m (2.4 kgf·m, 17 lbf·ft)

O-RING
Replace.

WATER PUMP
Inspection, page 10-11

O-RING
Replace.

6 x 1.0 mm
12 N·m (1.2 kgf·m, 8.7 lbf·ft)

CONNECTING PIPE

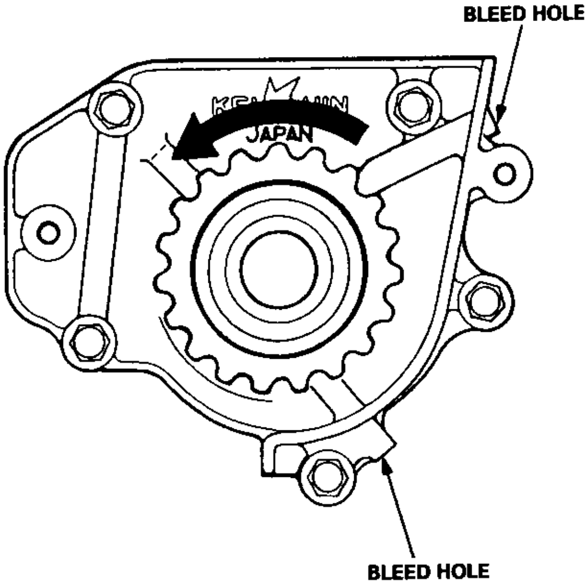
O-RINGS
Replace.

6 x 1.0 mm
12 N·m (1.2 kgf·m, 8.7 lbf·ft)

Inspection

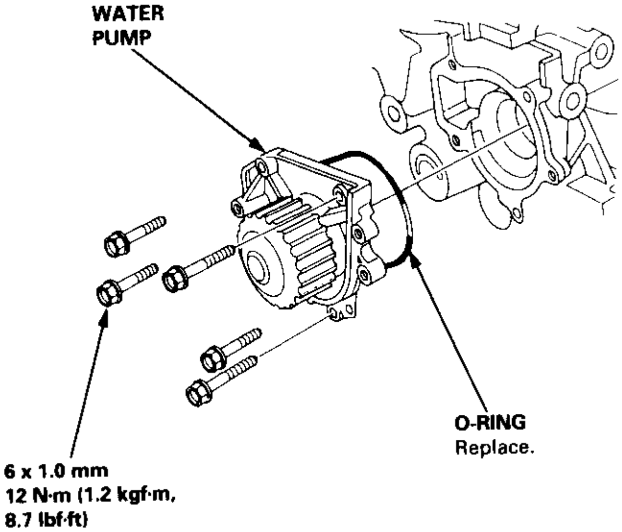
1. Remove the timing belt (see section 6).
2. Turn the water pump pulley counterclockwise. Check that it turns freely.
3. Check for signs of seal leakage.

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



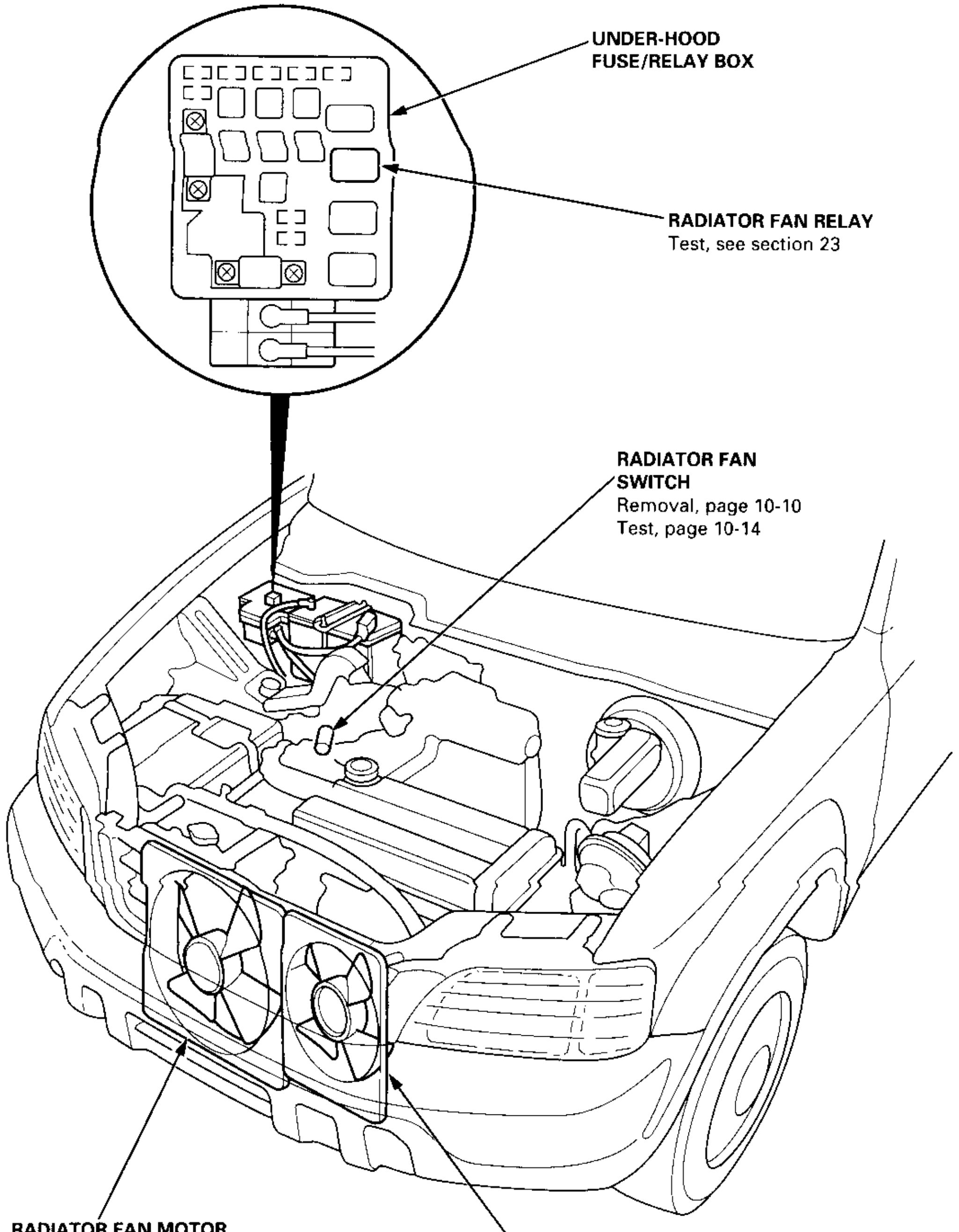
Replacement

1. Remove the timing belt (see section 6).
2. Remove the water pump by removing five bolts.
3. Inspect, repair and clean the O-ring groove and the mating surface with the cylinder block.

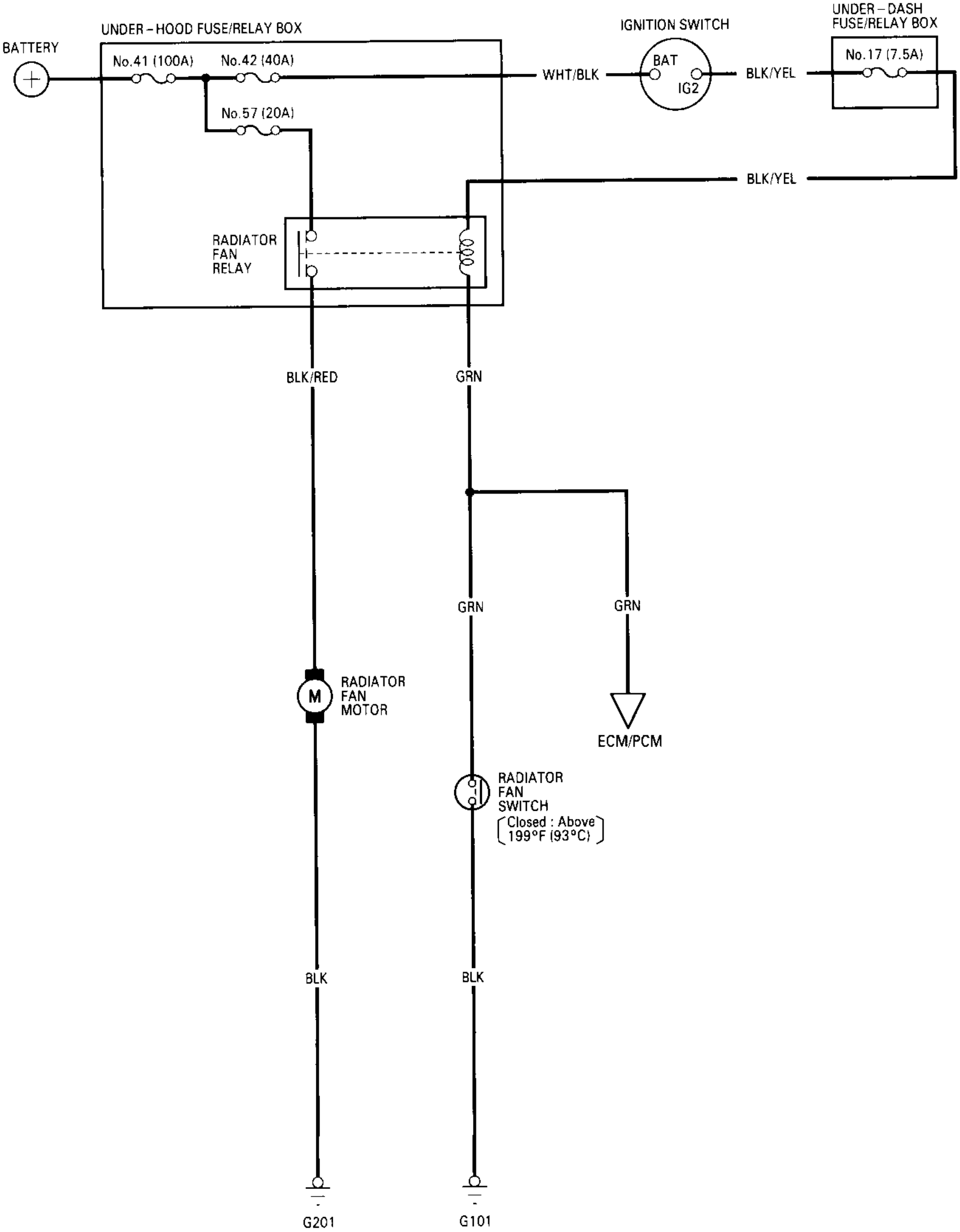


4. Install the water pump in the reverse order of removal.

Component Location Index

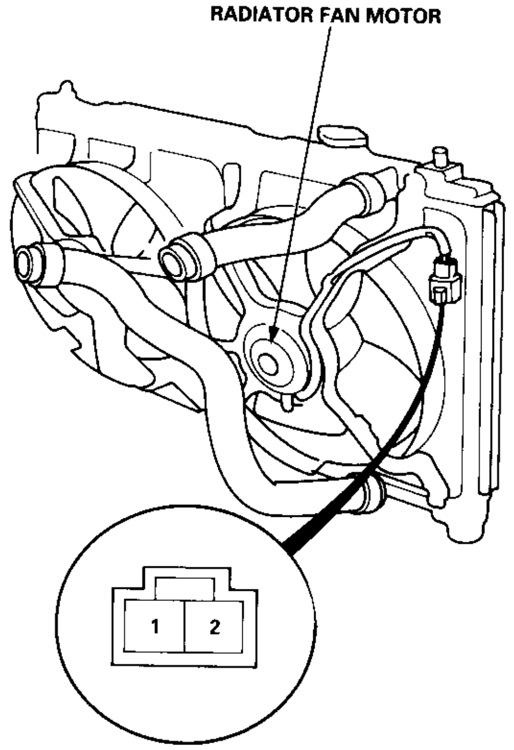


Circuit Diagram



Fan Motor Testing

1. Disconnect the 2P connector.



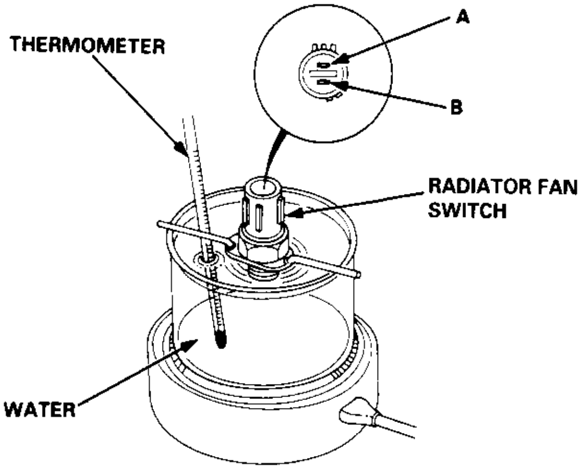
Terminal side of male terminals

2. Test the motor by connecting battery power to the No. 2 terminal and ground to the No. 1 terminal.
3. If the motor fails to run or does not run smoothly, replace it.

Radiator Fan Switch 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.

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



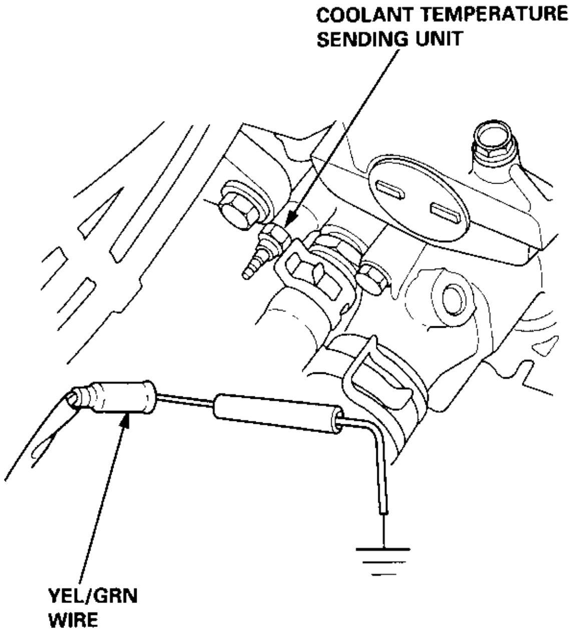
3. Heat the water, and check the temperature with a thermometer. Do not let the thermometer touch the bottom of the hot container.
4. Measure the continuity between the A and B terminals according to the table.

		Terminal	A	B
Operation		Temperature		
SWITCH	ON	196 ~ 203°F (91 ~ 95°C)	○—	—○
	OFF	5 ~ 14°F (3 ~ 8°C) lower than the temperature when it goes on		

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

Gauge Testing

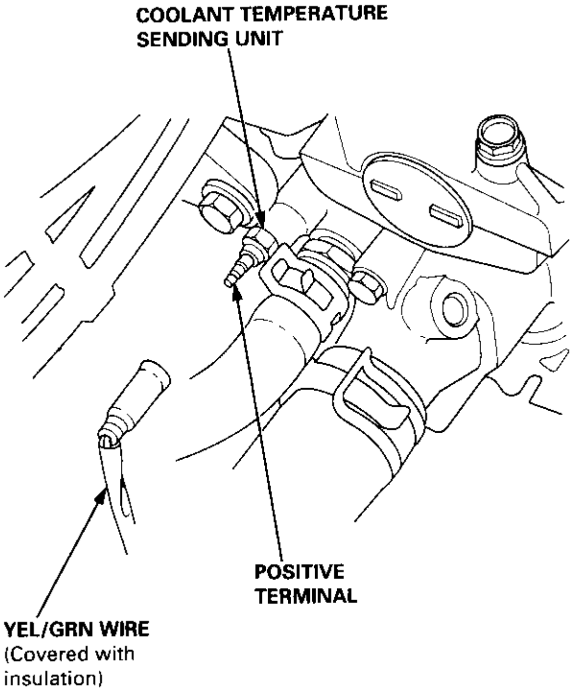
1. Check the No. 25 (7.5 A) fuse in the under-dash fuse/relay box before testing.
2. Make sure the ignition switch is OFF, then disconnect the YEL/GRN wire from the coolant temperature sending unit, and ground it with a jumper wire.



3. Turn the ignition switch ON (II). Check that the pointer of the coolant temperature gauge starts moving toward the "H" mark. Turn the ignition switch OFF before the pointer reaches "H" on the gauge dial. Failure to do so may damage the gauge.
4. If the pointer of the gauge does not move at all, check for an open in the YEL/GRN wire.
5. If the wires are OK, replace the coolant temperature gauge.
6. If the coolant temperature gauge works, test the coolant temperature sending unit.

Coolant Temperature Sending Unit Testing

1. Disconnect the YEL/GRN wire from the coolant temperature sending unit.



2. Using an ohmmeter, measure the change in resistance between the positive terminal and the engine (ground) with the engine cold and with the engine at operating temperature.

Temperature	133°F (56°C)	185 – 212°F (85 – 100°C)
Resistance (Ω)	137	46 – 30

3. If the readings are substantially different from the specifications above, inspect the coolant level and the cooling system. If the cooling system is OK, replace the sending unit.

Fuel and Emissions

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Special Tools

Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
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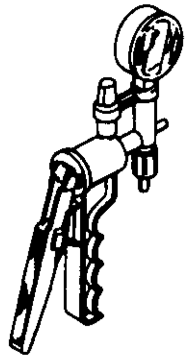
②	07JAZ – 001000B	Vacuum/Pressure Gauge, 0 – 4 in.Hg	1	11-207, 224
③	07PAZ – 0010100	SCS Service Connector	1	11-60, 83, 88, 116, 128, 200, 205
④	07SAZ – 001000A	Backprobe Set	2	11-62
⑤	07406 – 0040001	Fuel Pressure Gauge	1	11-178, 181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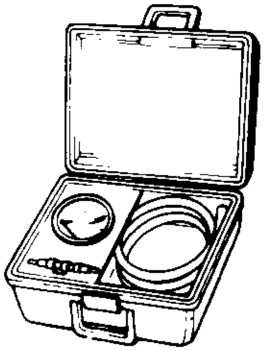
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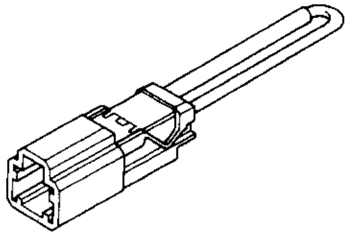
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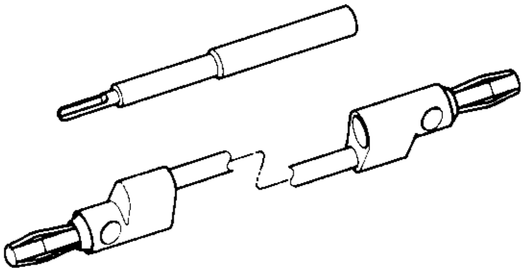
④


⑤

Component Locations

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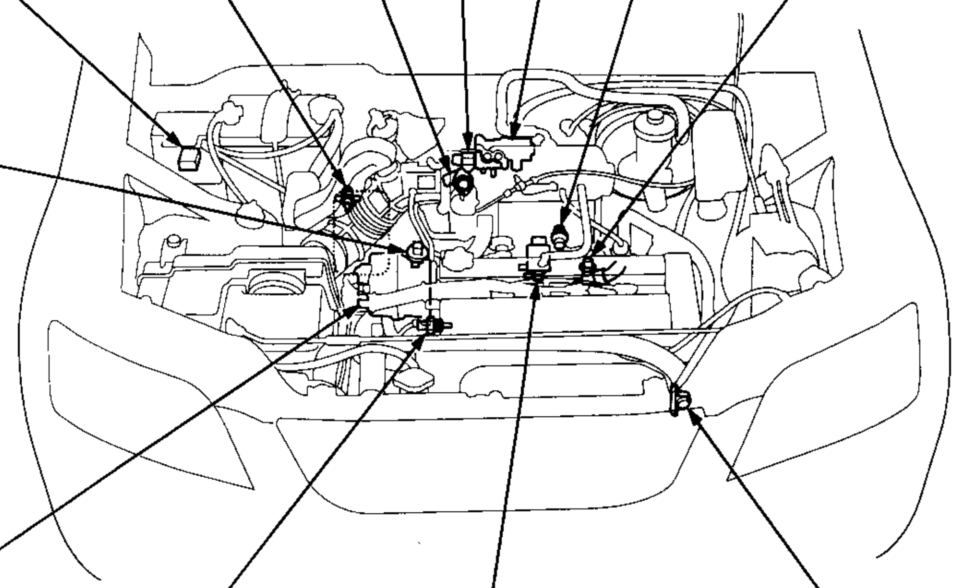

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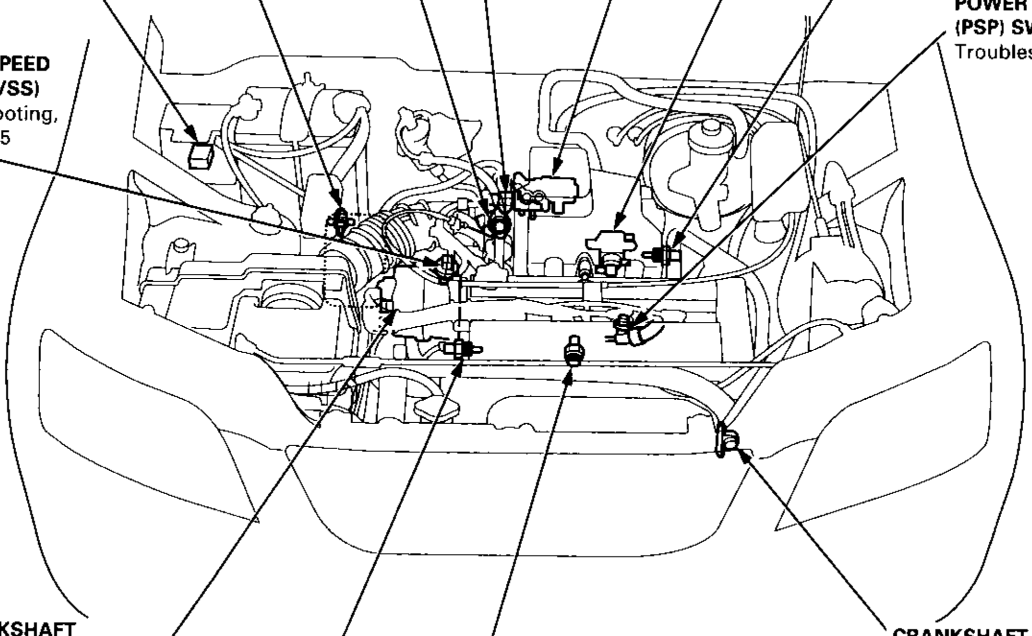

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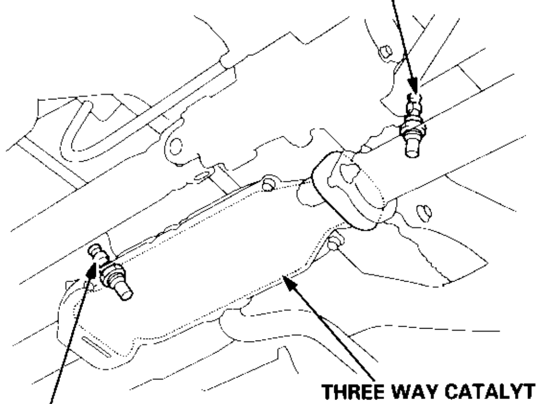

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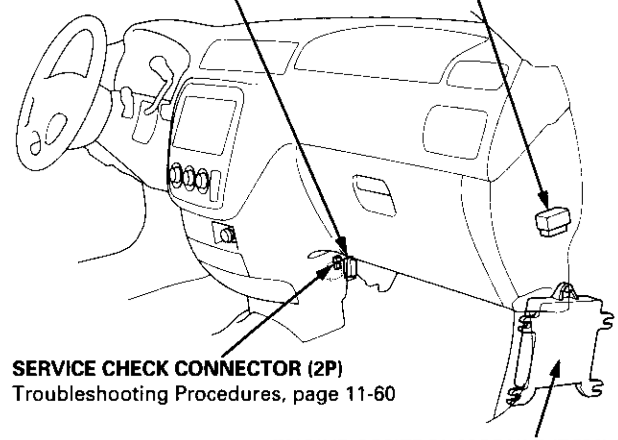

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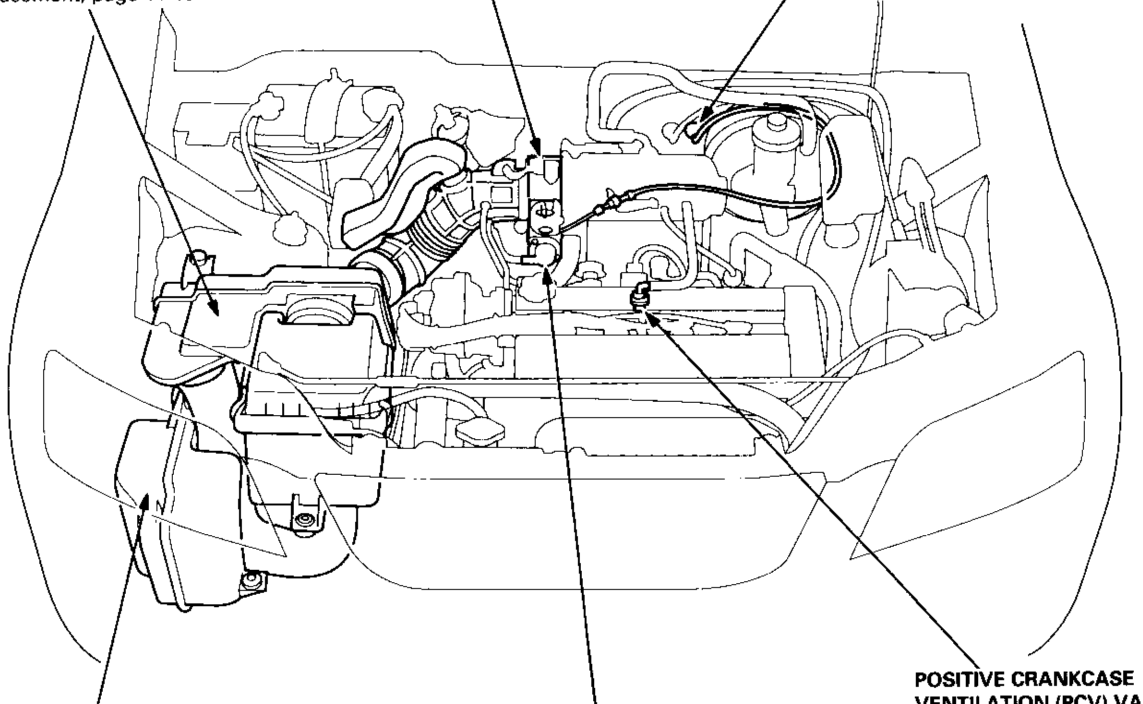

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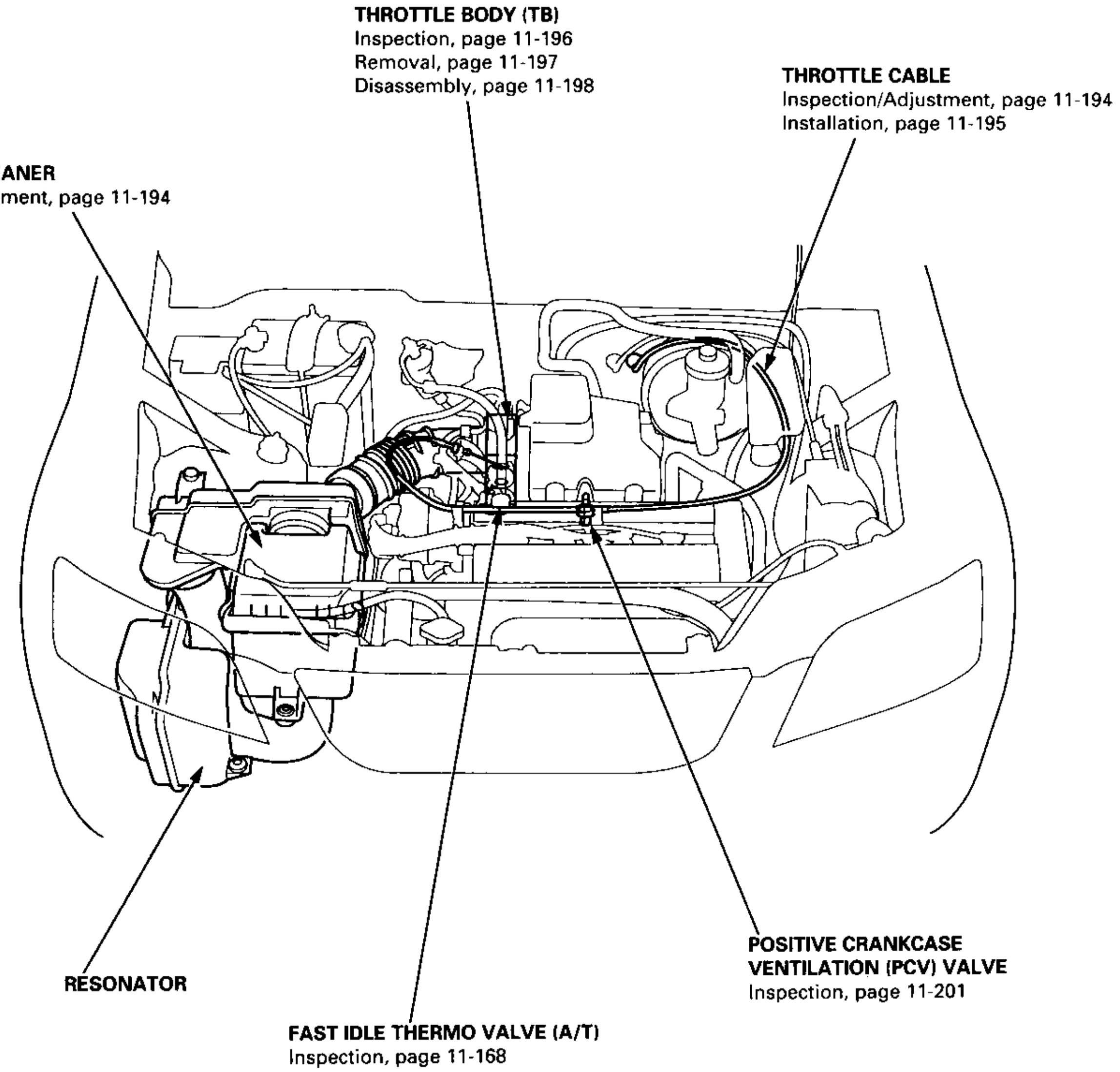

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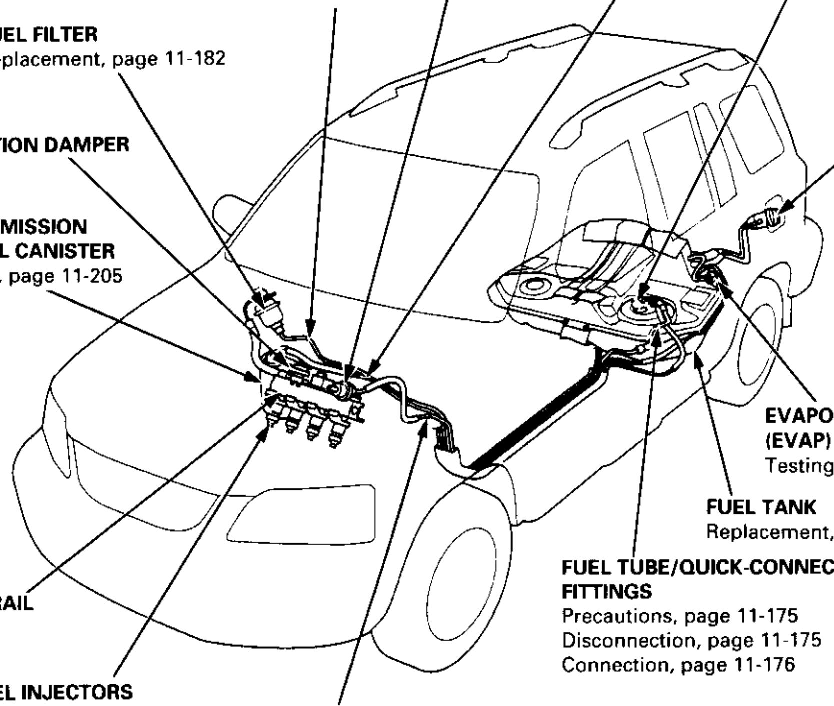

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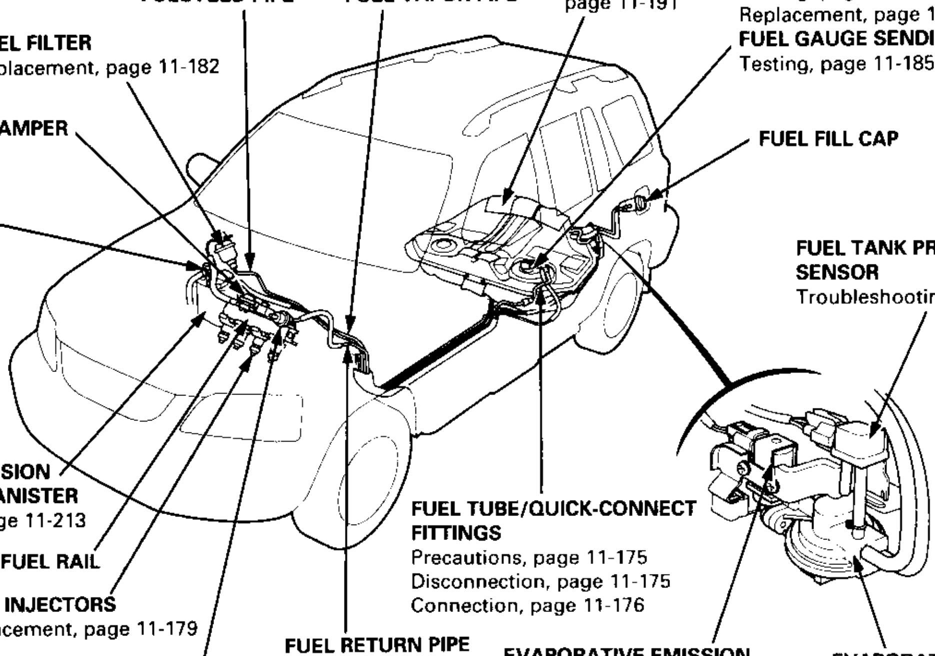

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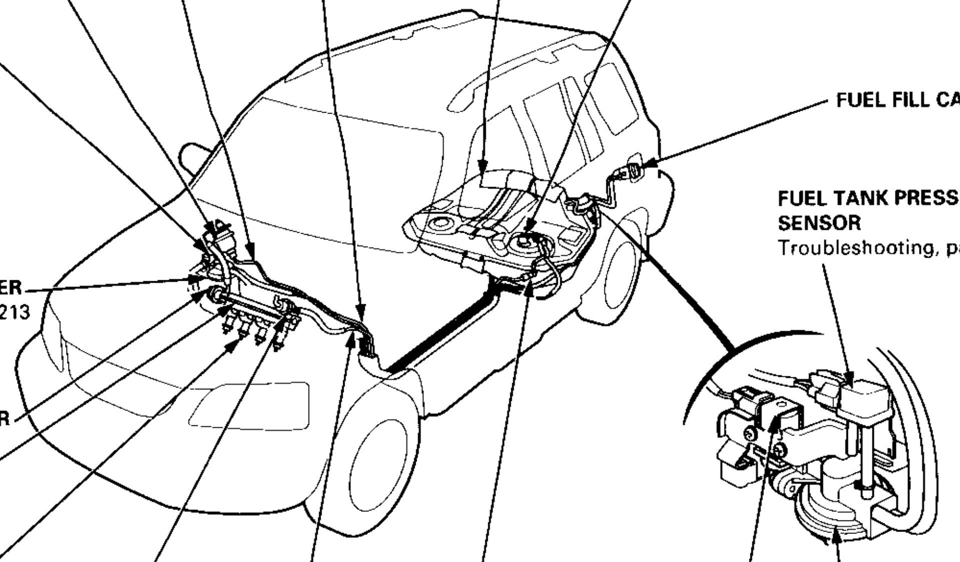

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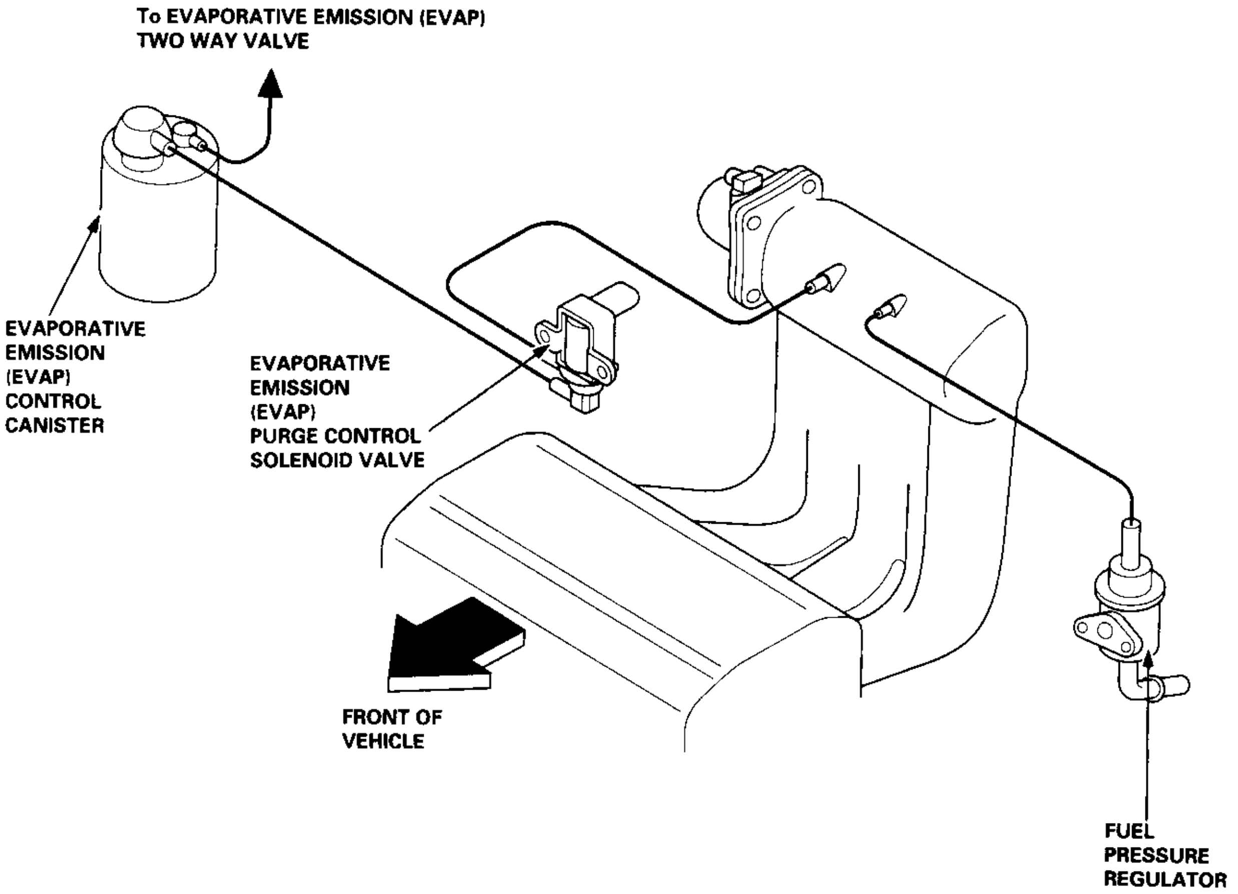

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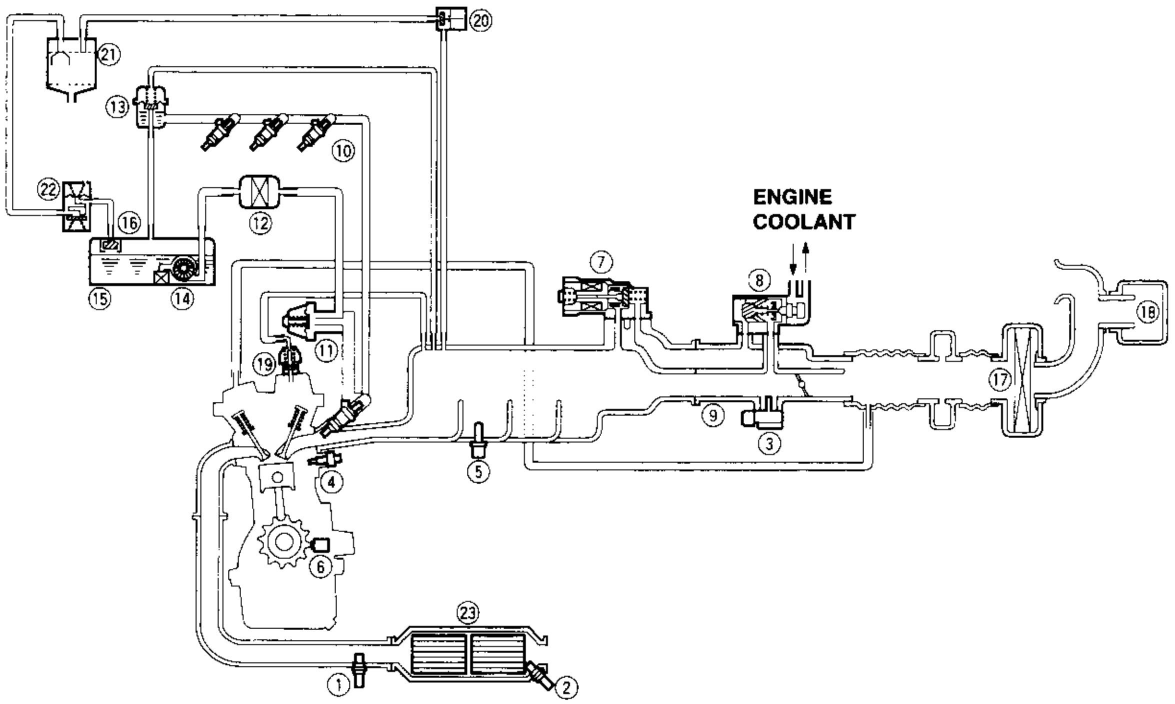
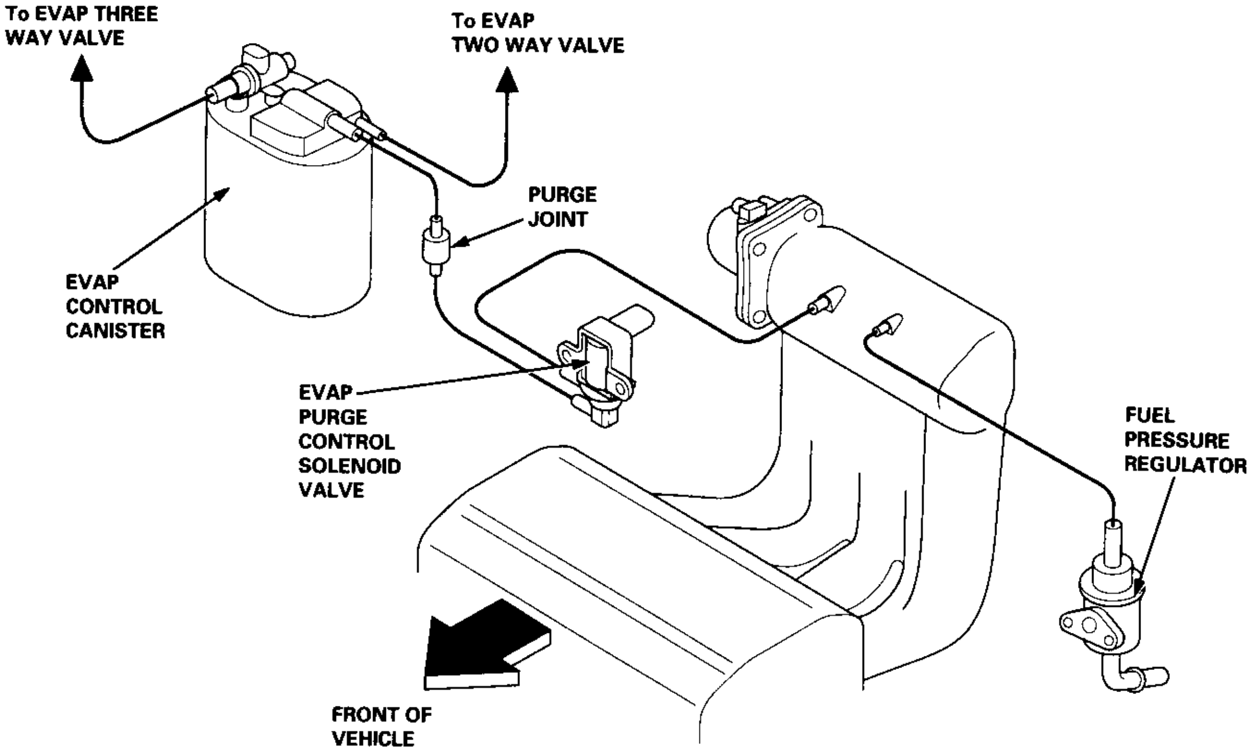


① PRIMARY HEATED OXYGEN SENSOR (PRIMARY HO2S, SENSOR 1)
② SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S, SENSOR 2)
③ MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
④ ENGINE COOLANT TEMPERATURE (ECT) SENSOR
⑤ INTAKE AIR TEMPERATURE (IAT) SENSOR
⑥ CRANKSHAFT SPEED FLUCTUATION (CKF) SENSOR
⑦ IDLE AIR CONTROL (IAC) VALVE
⑧ FAST IDLE THERMO VALVE
⑨ THROTTLE BODY (TB)
⑩ FUEL INJECTOR
⑪ FUEL PULSATION DAMPER
⑫ FUEL FILTER
⑬ FUEL PRESSURE REGULATOR
⑭ FUEL PUMP
⑮ FUEL TANK
⑯ FUEL TANK EVAPORATIVE EMISSION (EVAP) VALVE
⑰ AIR CLEANER
⑱ RESONATOR
⑲ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
⑳ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL SOLENOID VALVE
㉑ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER
㉒ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE
㉓ THREE WAY CATALYTIC CONVERTER (TWC)

'98 model:



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Vacuum Connections (cont'd)

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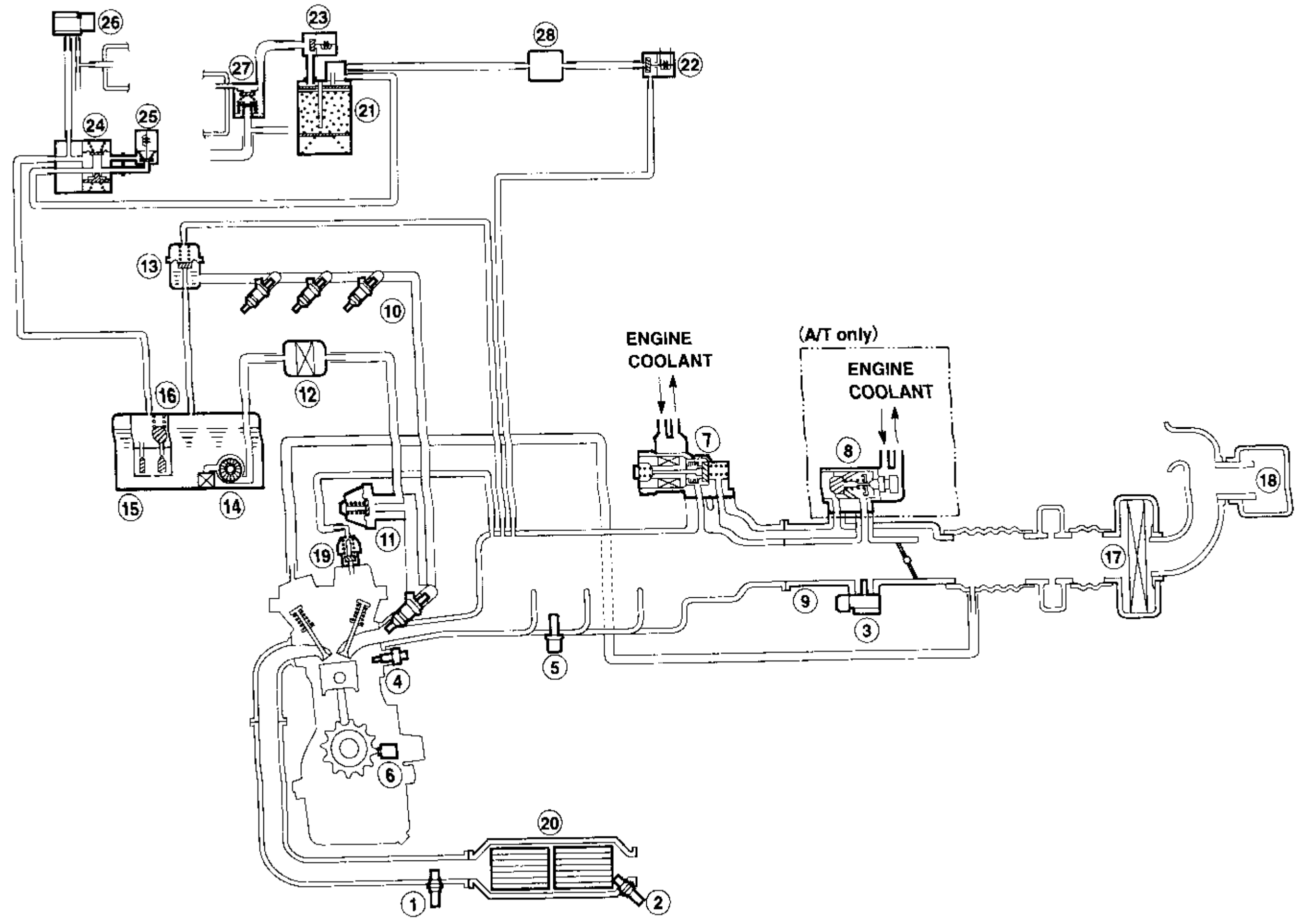
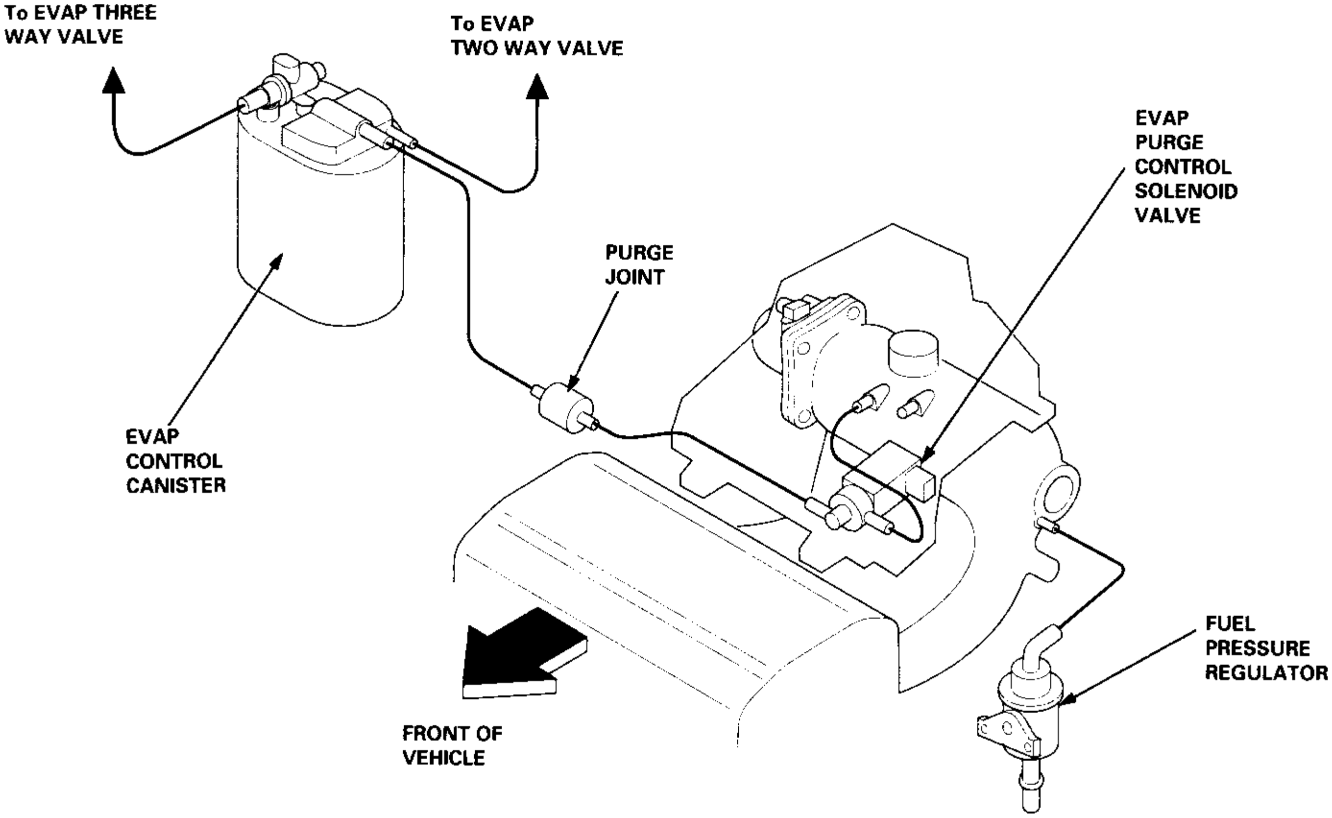


① PRIMARY HEATED OXYGEN SENSOR (PRIMARY HO2S, SENSOR 1)
② SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S, SENSOR 2)
③ MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
④ ENGINE COOLANT TEMPERATURE (ECT) SENSOR
⑤ INTAKE AIR TEMPERATURE (IAT) SENSOR
⑥ CRANKSHAFT SPEED FLUCTUATION (CKF) SENSOR
⑦ IDLE AIR CONTROL (IAC) VALVE
⑧ FAST IDLE THERMO VALVE (A/T)
⑨ THROTTLE BODY (TB)
⑩ FUEL INJECTOR
⑪ FUEL PULSATION DAMPER
⑫ FUEL FILTER
⑬ FUEL PRESSURE REGULATOR
⑭ FUEL PUMP
⑮ FUEL TANK
⑯ FUEL TANK EVAPORATIVE EMISSION (EVAP) VALVE
⑰ AIR CLEANER
⑱ RESONATOR
⑲ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
⑳ THREE WAY CATALYTIC CONVERTER (TWC)
㉑ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER
㉒ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL SOLENOID VALVE
㉓ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER VENT SHUT VALVE
㉔ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE
㉕ EVAPORATIVE EMISSION (EVAP) BYPASS SOLENOID VALVE
㉖ FUEL TANK PRESSURE SENSOR
㉗ EVAPORATIVE EMISSION (EVAP) THREE WAY VALVE
㉘ PURGE JOINT

'99 – 00 models:



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Vacuum Connections (cont'd)

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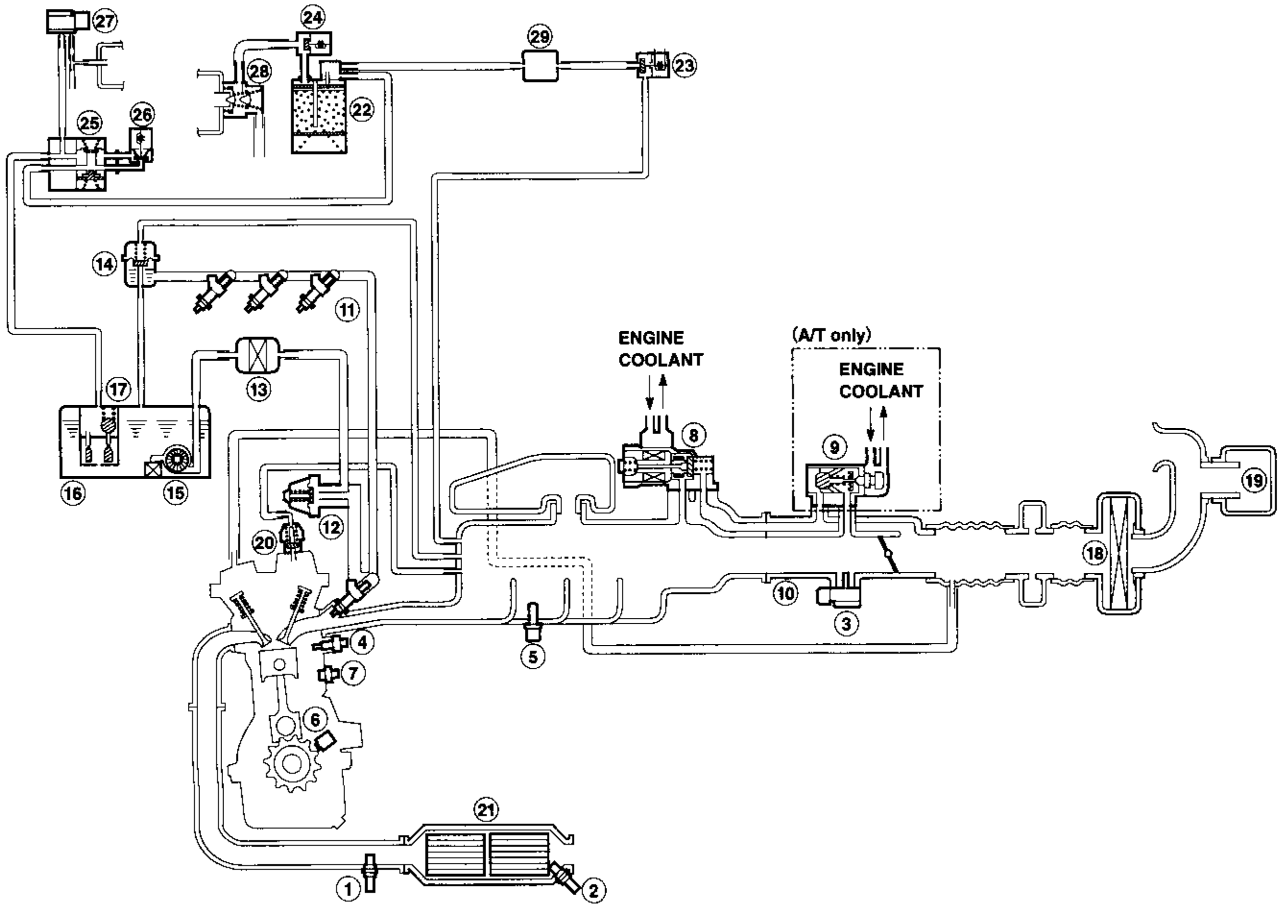
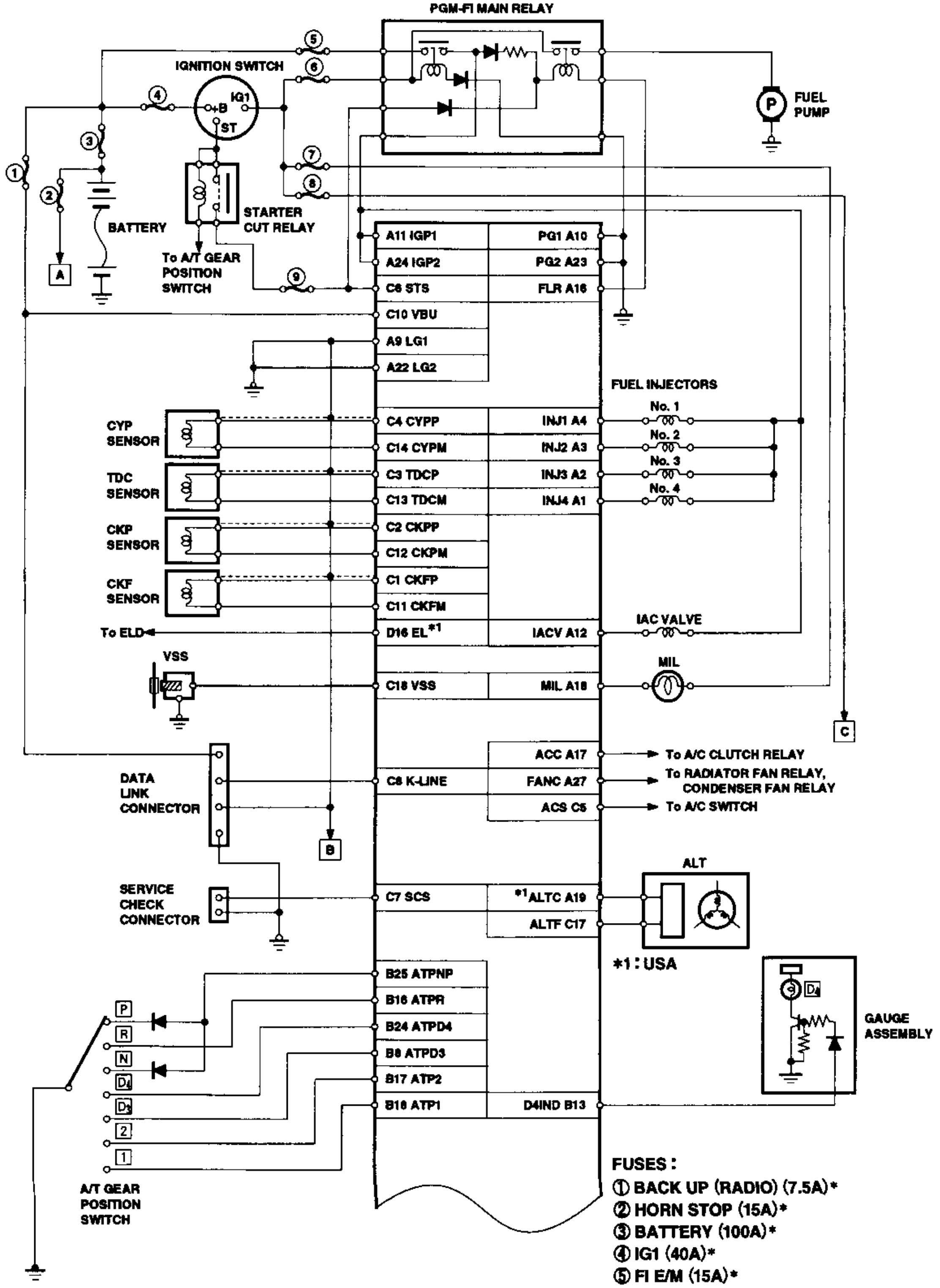


① PRIMARY HEATED OXYGEN SENSOR (PRIMARY HO2S, SENSOR 1)	⑱ AIR CLEANER
② SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S, SENSOR 2)	⑲ RESONATOR
③ MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR	⑳ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
④ ENGINE COOLANT TEMPERATURE (ECT) SENSOR	㉑ THREE WAY CATALYTIC CONVERTER (TWC)
⑤ INTAKE AIR TEMPERATURE (IAT) SENSOR	㉒ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER
⑥ CRANKSHAFT SPEED FLUCTUATION (CKF) SENSOR	㉓ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL SOLENOID VALVE
⑦ KNOCK SENSOR (KS)	㉔ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER VENT SHUT VALVE
⑧ IDLE AIR CONTROL (IAC) VALVE	㉕ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE
⑨ FAST IDLE THERMO VALVE (A/T)	㉖ EVAPORATIVE EMISSION (EVAP) BYPASS SOLENOID VALVE
⑩ THROTTLE BODY (TB)	㉗ FUEL TANK PRESSURE SENSOR
⑪ FUEL INJECTOR	㉘ EVAPORATIVE EMISSION (EVAP) THREE WAY VALVE
⑫ FUEL PULSATION DAMPER	㉙ PURGE JOINT
⑬ FUEL FILTER	
⑭ FUEL PRESSURE REGULATOR	
⑮ FUEL PUMP	
⑯ FUEL TANK	
⑰ FUEL TANK EVAPORATIVE EMISSION (EVAP) VALVE	

Electrical Connections — '97 Model



FUSES :
① BACK UP (RADIO) (7.5A)*
② HORN STOP (15A)*
③ BATTERY (100A)*
④ IG1 (40A)*
⑤ FI E/M (15A)*
⑥ No. 13 FUEL PUMP (15A)
⑦ No. 25 METER (7.5A)
⑧ No. 15 ALTERNATOR SP SENSOR (7.5A)*
⑨ No. 31 STARTER SIGNAL (7.5A)
*: In the under-hood fuse/relay box

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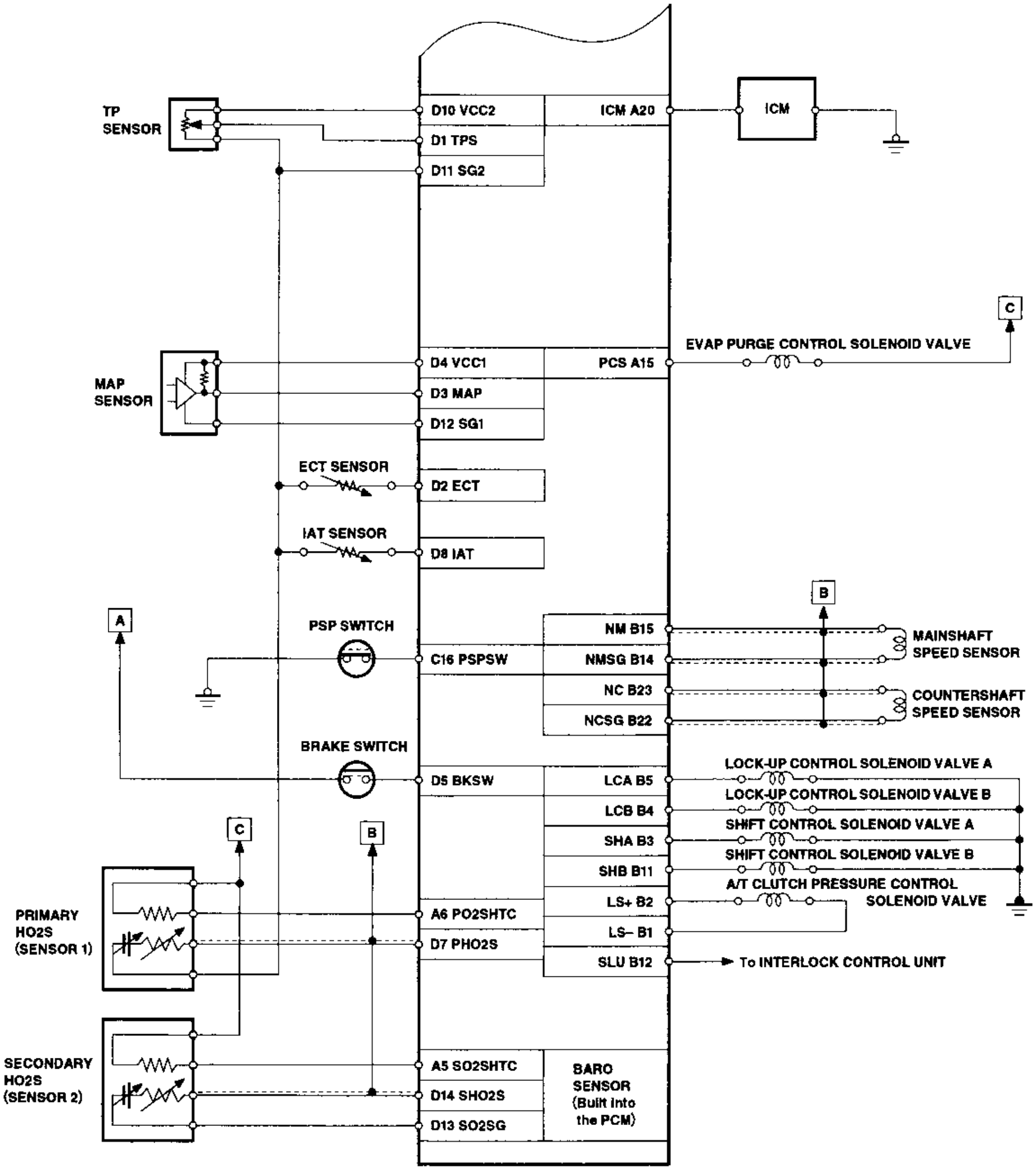
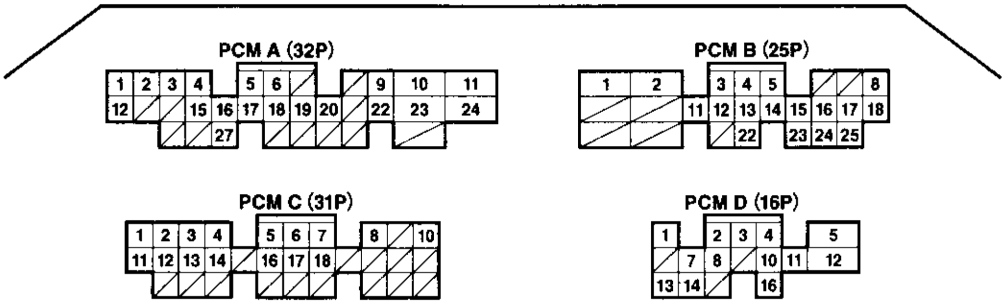
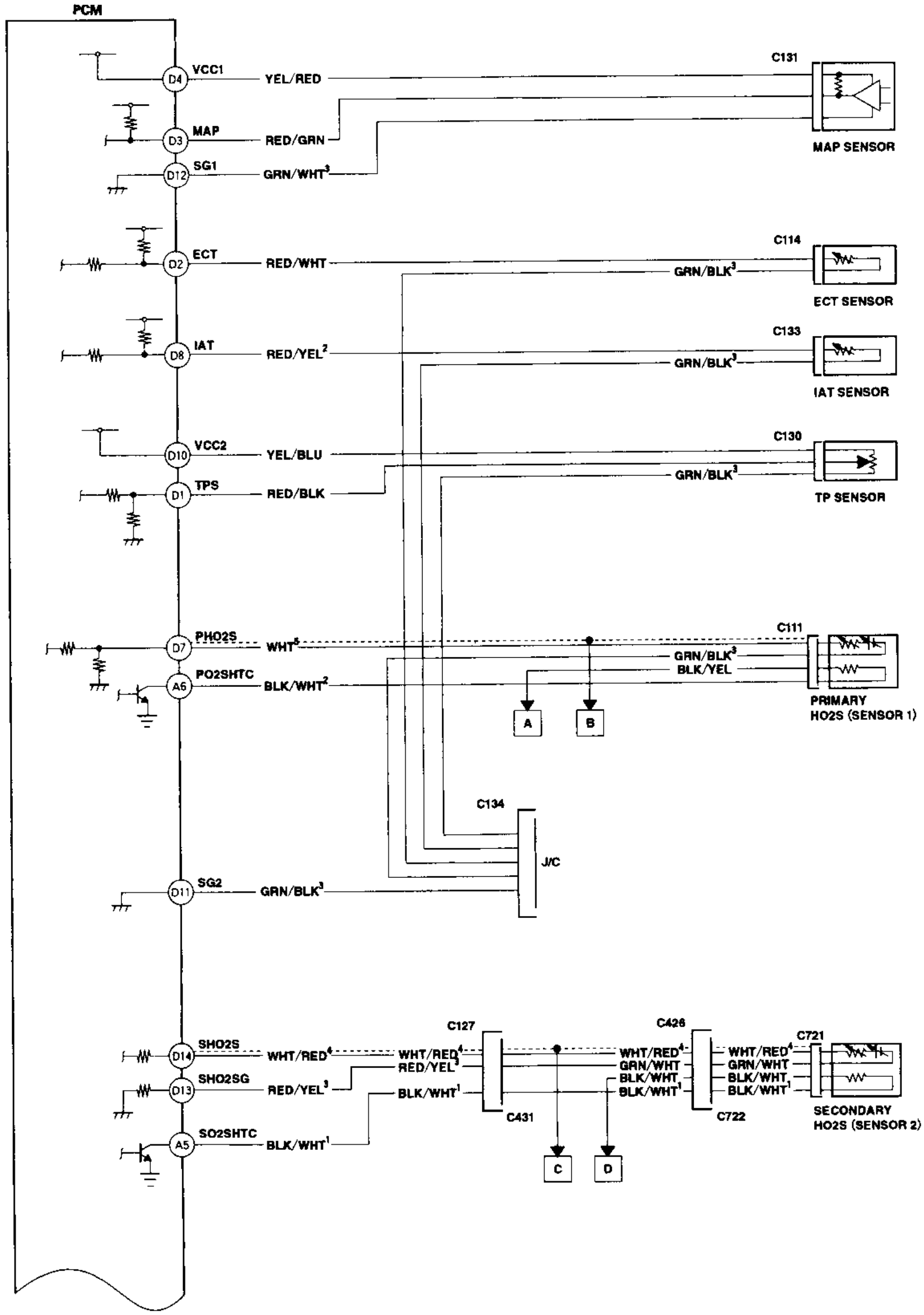
Electrical Connections — '97 Model (cont'd)



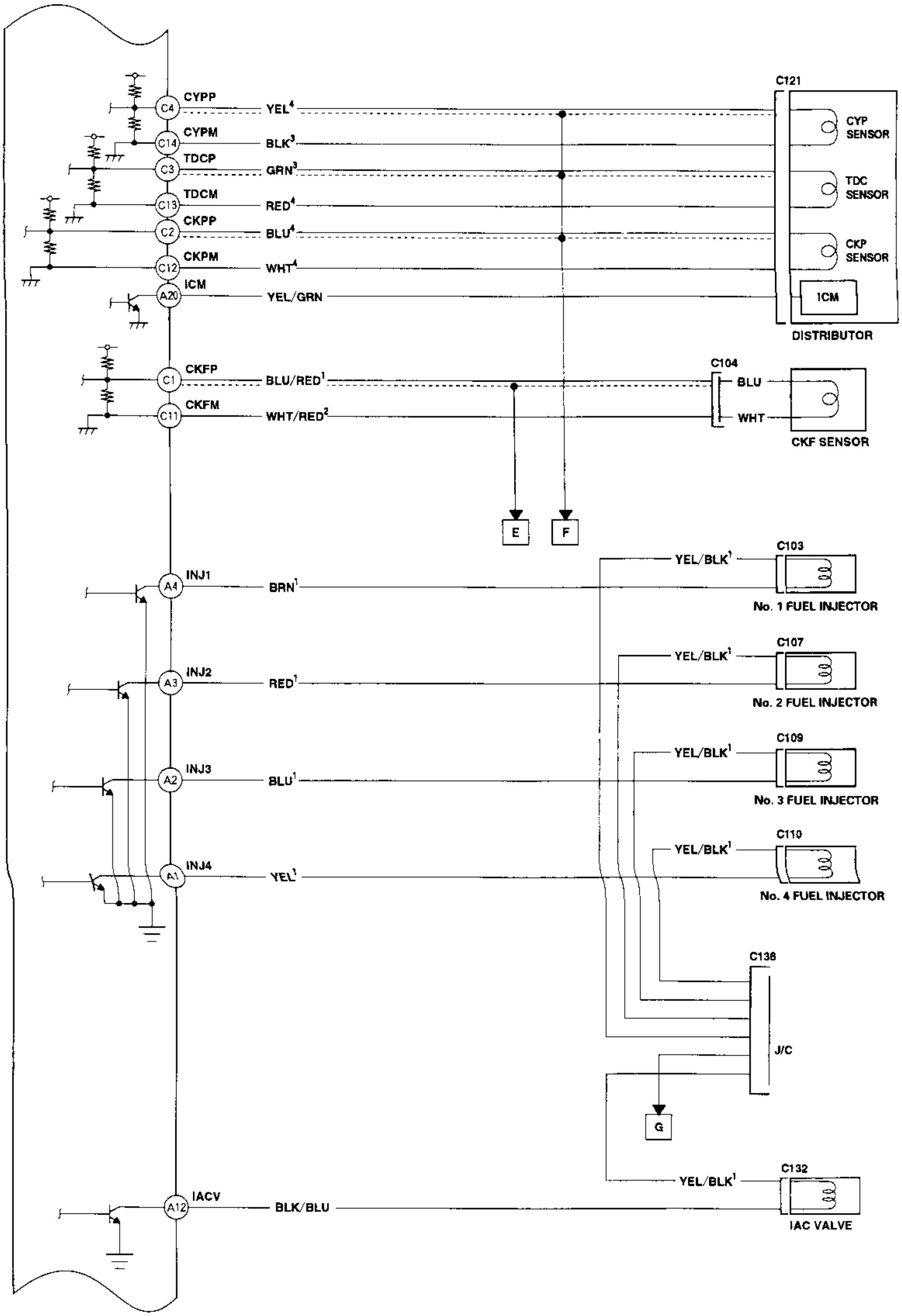


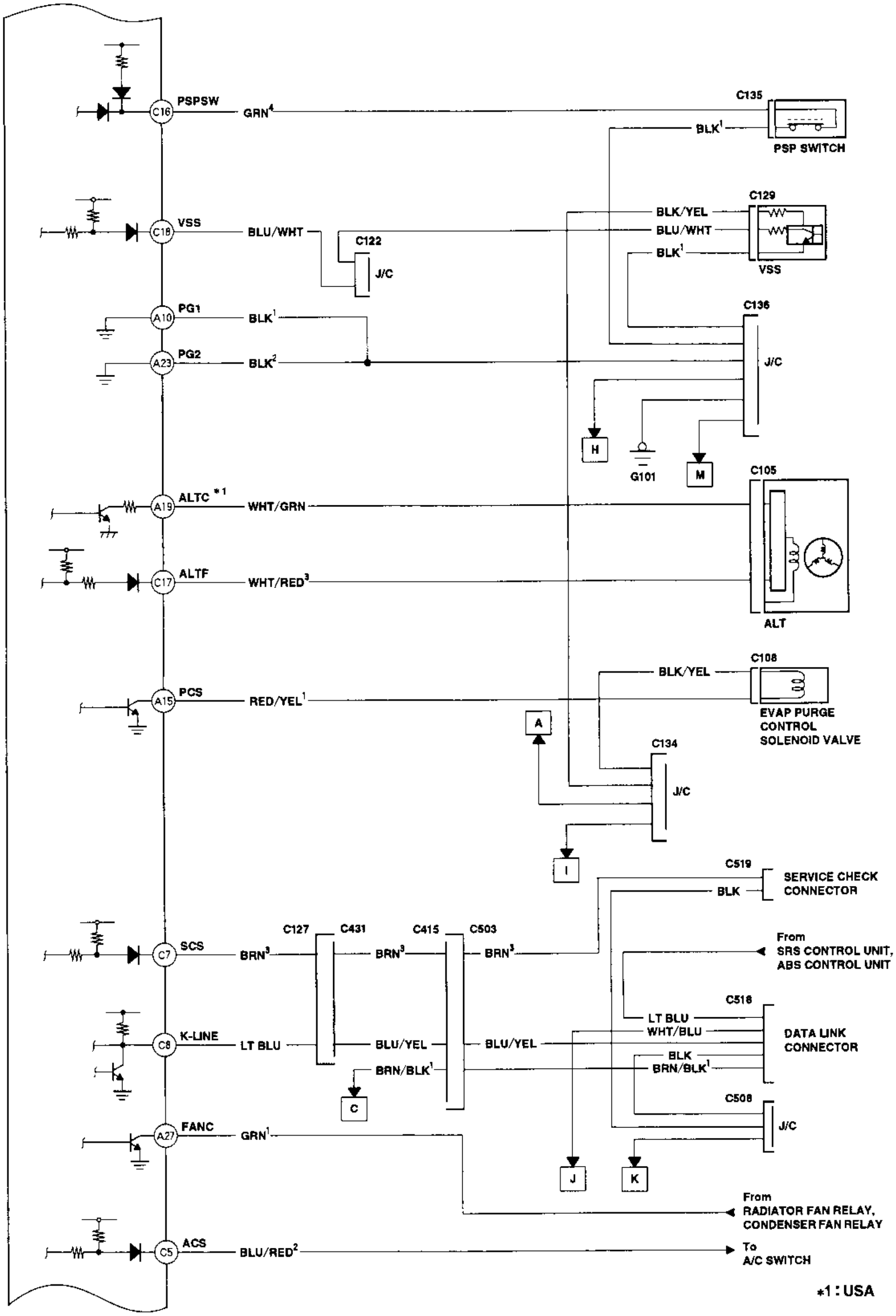
TERMINAL LOCATIONS


PCM
D4
VCC1
YEL/RED
C131
MAP SENSOR
D3
MAP
RED/GRN
D12
SG1
GRN/WHT³
D2
ECT
RED/WHT
C114
GRN/BLK³
ECT SENSOR
D8
IAT
RED/YEL²
C133
GRN/BLK³
IAT SENSOR
D10
VCC2
YEL/BLU
C130
D1
TPS
RED/BLK
GRN/BLK³
TP SENSOR
D7
PHO2S
WHT⁵
C111
GRN/BLK³
BLK/YEL
A6
PO2SHTC
BLK/WHT²
PRIMARY
HO2S (SENSOR 1)
A
B
C134
J/C
D11
SG2
GRN/BLK³
D14
SHO2S
WHT/RED⁴
C127
WHT/RED⁴
RED/YEL³
D13
SHO2SG
RED/YEL³
BLK/WHT¹
C431
C426
WHT/RED⁴
GRN/WHT
BLK/WHT
BLK/WHT¹
C722
C721
WHT/RED⁴
GRN/WHT
BLK/WHT
BLK/WHT¹
SECONDARY
HO2S (SENSOR 2)
A5
SO2SHTC
BLK/WHT¹
C
D

(cont'd)

Electrical Connections — '97 Model (cont'd)

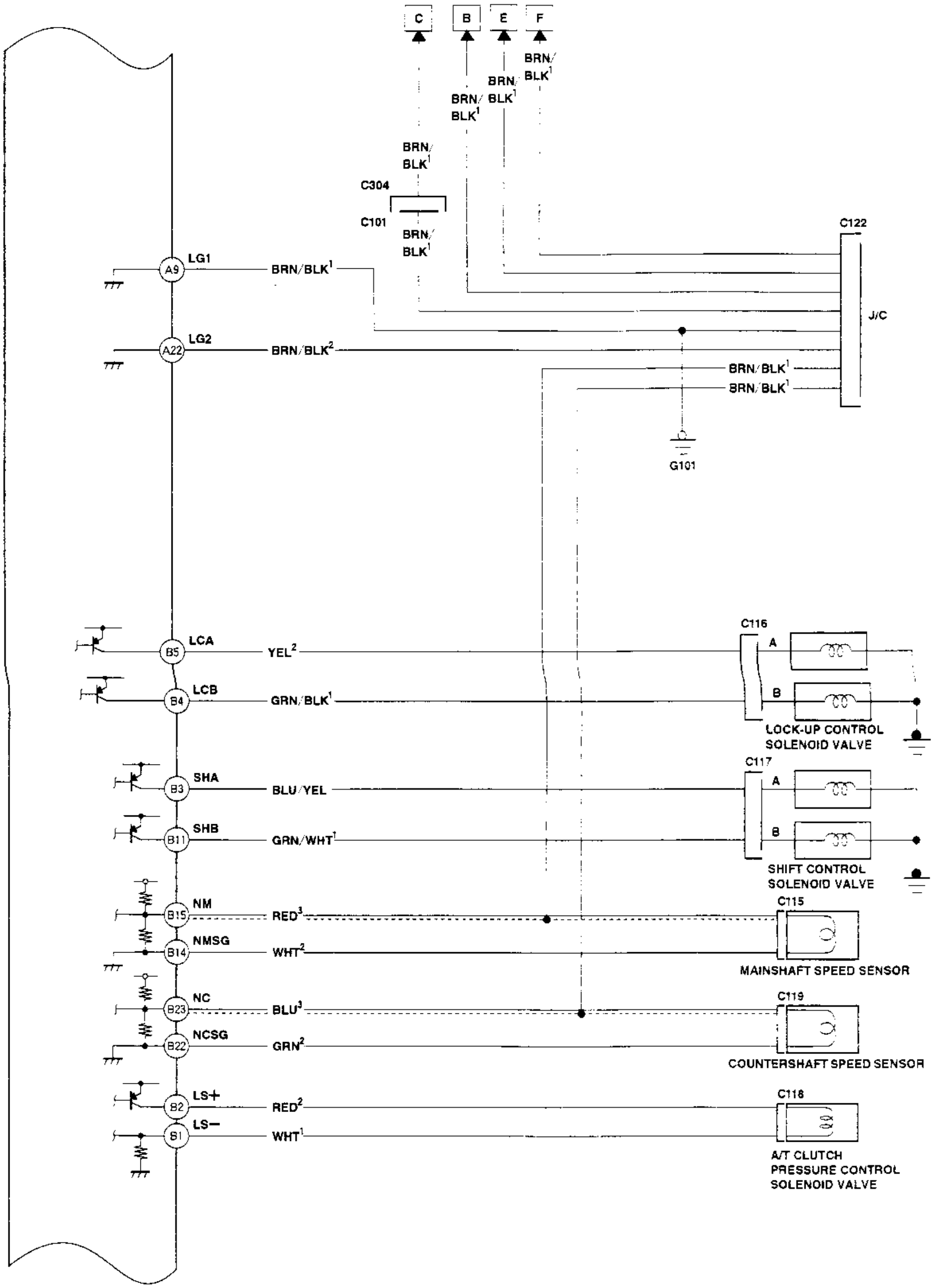


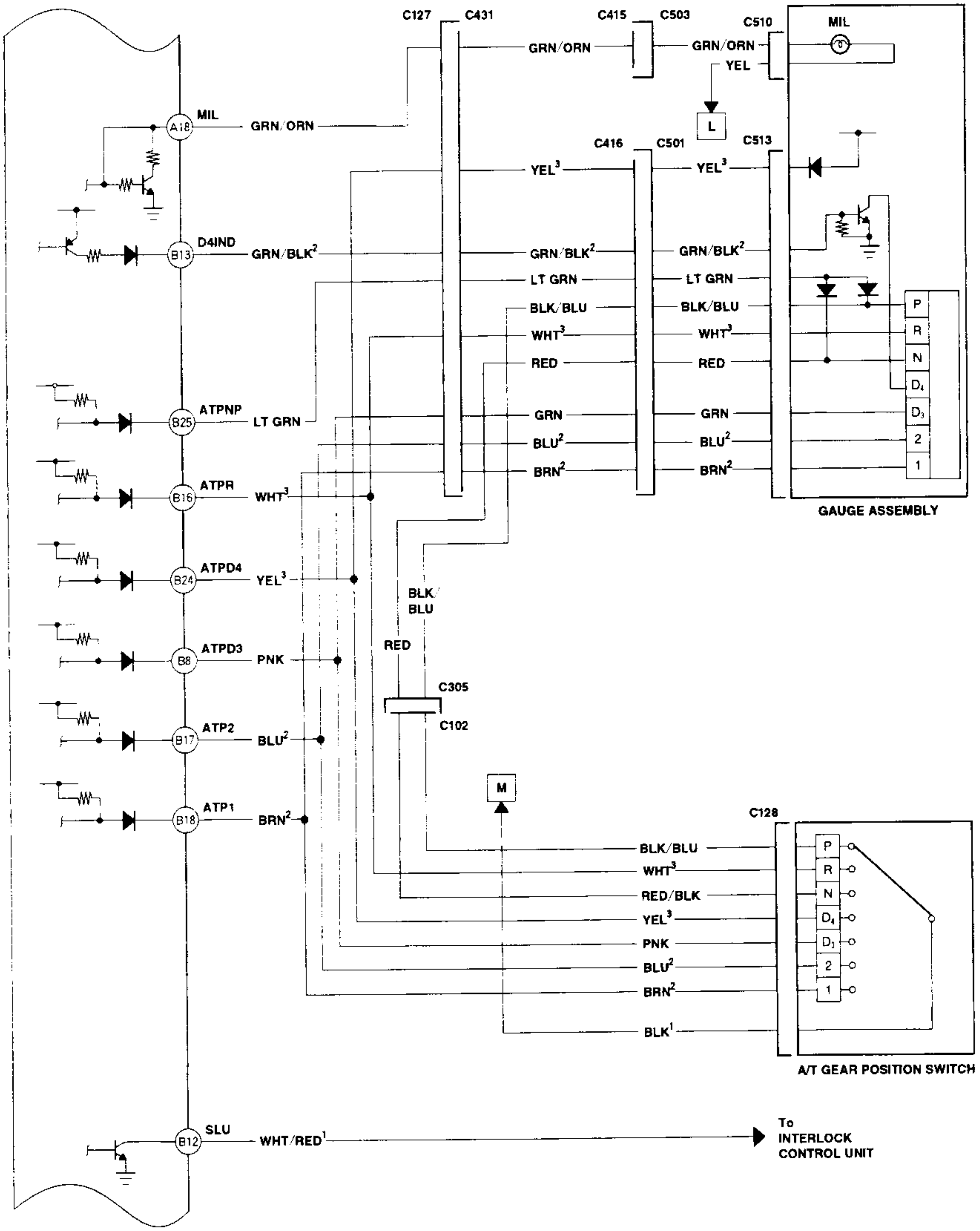

PSPSW
C16
GRN⁴
C135
BLK¹
PSP SWITCH
VSS
C18
BLU/WHT
C122
J/C
C129
BLK/YEL
BLU/WHT
BLK¹
VSS
PG1
A10
BLK¹
PG2
A23
BLK²
C136
J/C
H
G101
M
ALTC *1
A19
WHT/GRN
C105
ALTF
C17
WHT/RED³
ALT
PCS
A15
RED/YEL¹
C108
BLK/YEL
EVAP PURGE CONTROL SOLENOID VALVE
A
C134
J/C
I
C519
SERVICE CHECK CONNECTOR
BLK
SCS
C7
BRN³
C127
C431
BRN³
C415
C503
BRN³
From SRS CONTROL UNIT, ABS CONTROL UNIT
C516
K-LINE
C8
LT BLU
BLU/YEL
BLU/YEL
LT BLU
WHT/BLU
DATA LINK CONNECTOR
BLK
BRN/BLK¹
BRN/BLK¹
C
C508
J/C
FANC
A27
GRN¹
J
K
From RADIATOR FAN RELAY, CONDENSER FAN RELAY
ACS
C5
BLU/RED²
To A/C SWITCH

*1 : USA

(cont'd)

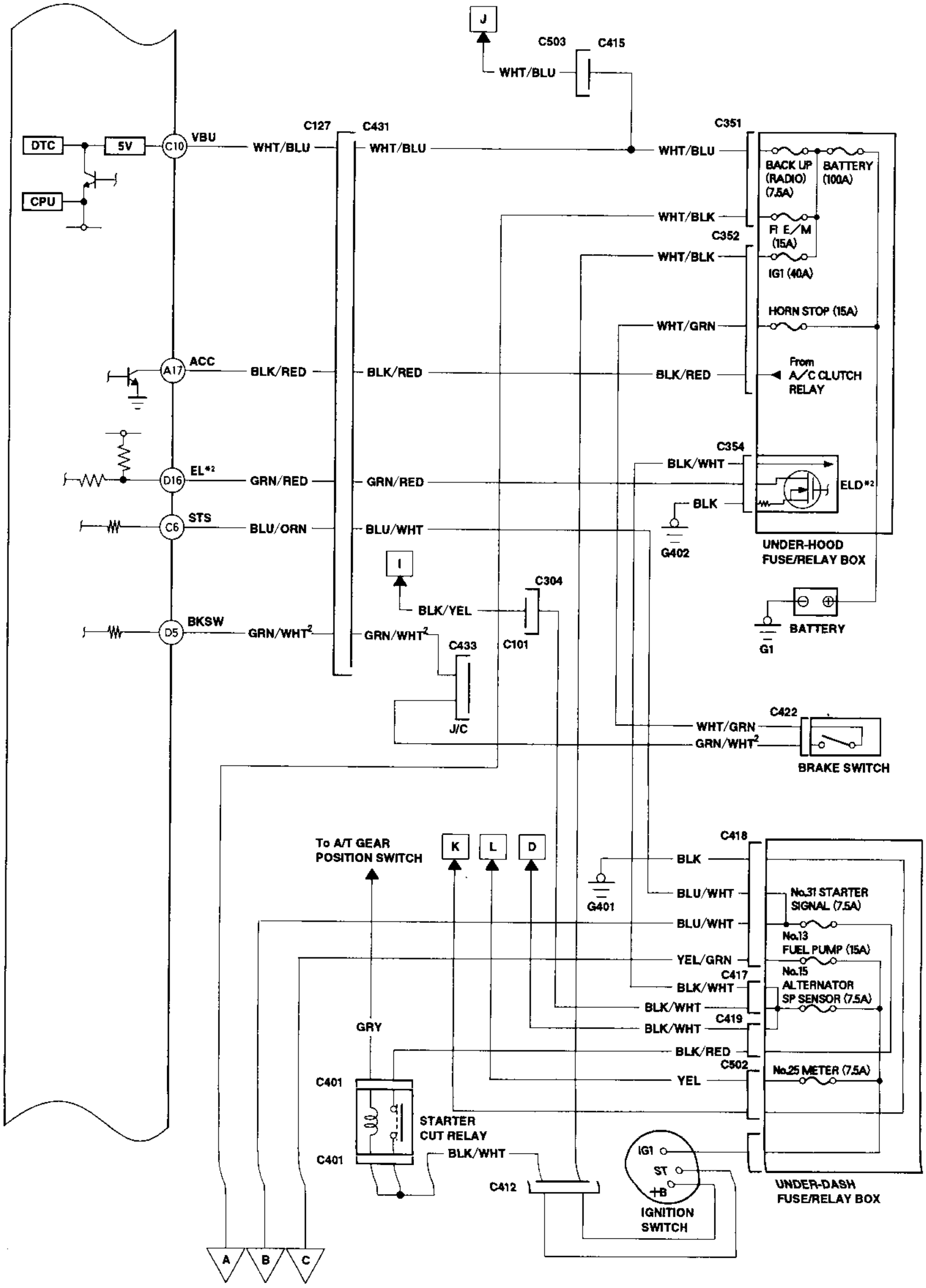
Electrical Connections — '97 Model (cont'd)




C127
C431
C415
C503
C510
MIL
GRN/ORN
GRN/ORN
YEL
L
MIL
A18
GRN/ORN
C416
C501
C513
YEL³
YEL³
D4IND
B13
GRN/BLK²
GRN/BLK²
GRN/BLK²
LT GRN
LT GRN
BLK/BLU
BLK/BLU
WHT³
WHT³
RED
RED
P
R
N
D₄
ATPNP
B25
LT GRN
GRN
GRN
D₃
BLU²
BLU²
2
BRN²
BRN²
1
ATPR
B16
WHT³
GAUGE ASSEMBLY
ATPD4
B24
YEL³
BLK/BLU
ATPD3
B8
PNK
RED
C305
C102
ATP2
B17
BLU²
M
ATP1
B18
BRN²
C128
BLK/BLU
P
WHT³
R
RED/BLK
N
YEL³
D₄
PNK
D₃
BLU²
2
BRN²
1
BLK¹
A/T GEAR POSITION SWITCH
SLU
B12
WHT/RED¹
To INTERLOCK CONTROL UNIT

(cont'd)

Electrical Connections — '97 Model (cont'd)



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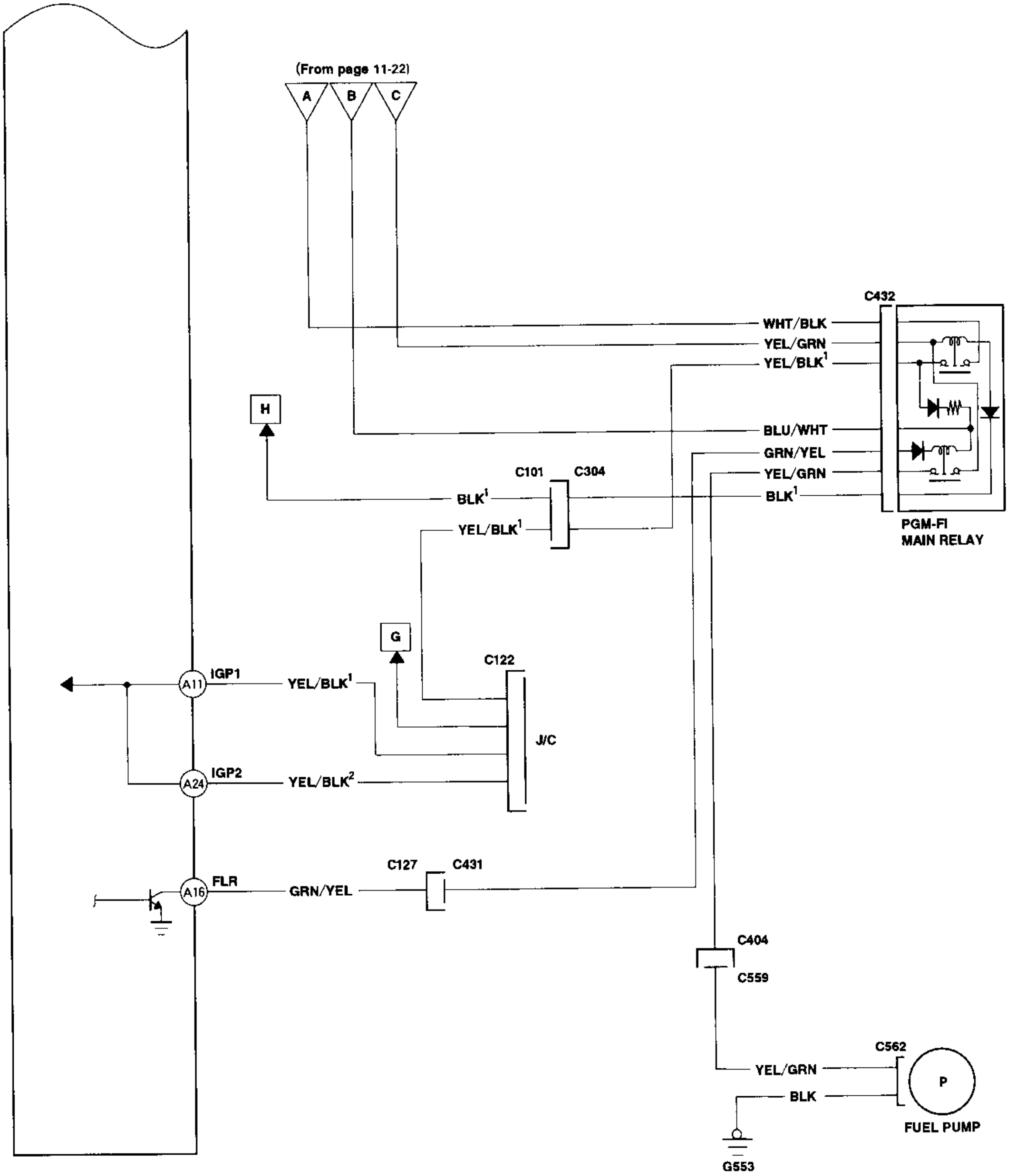
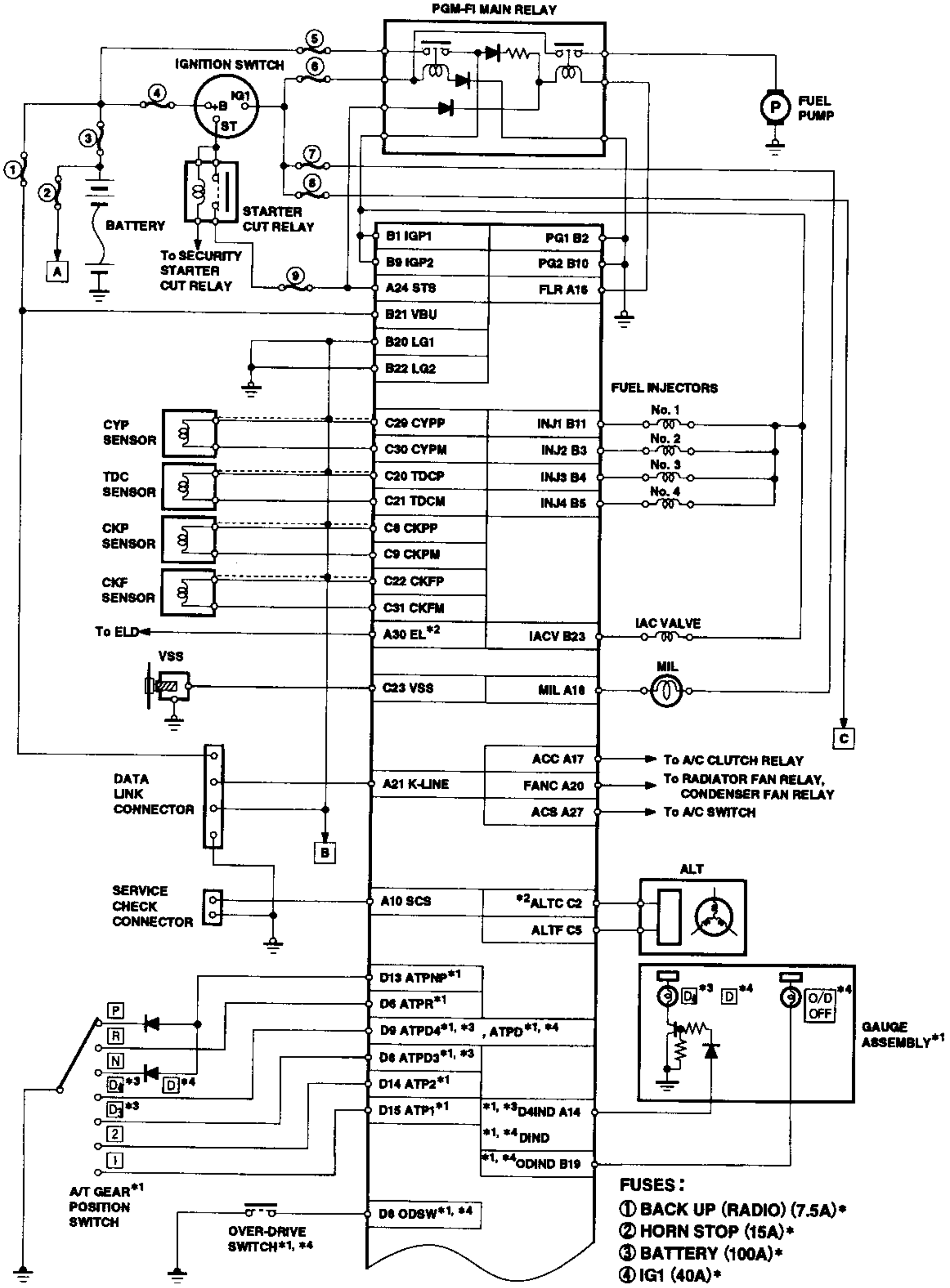
*2: USA

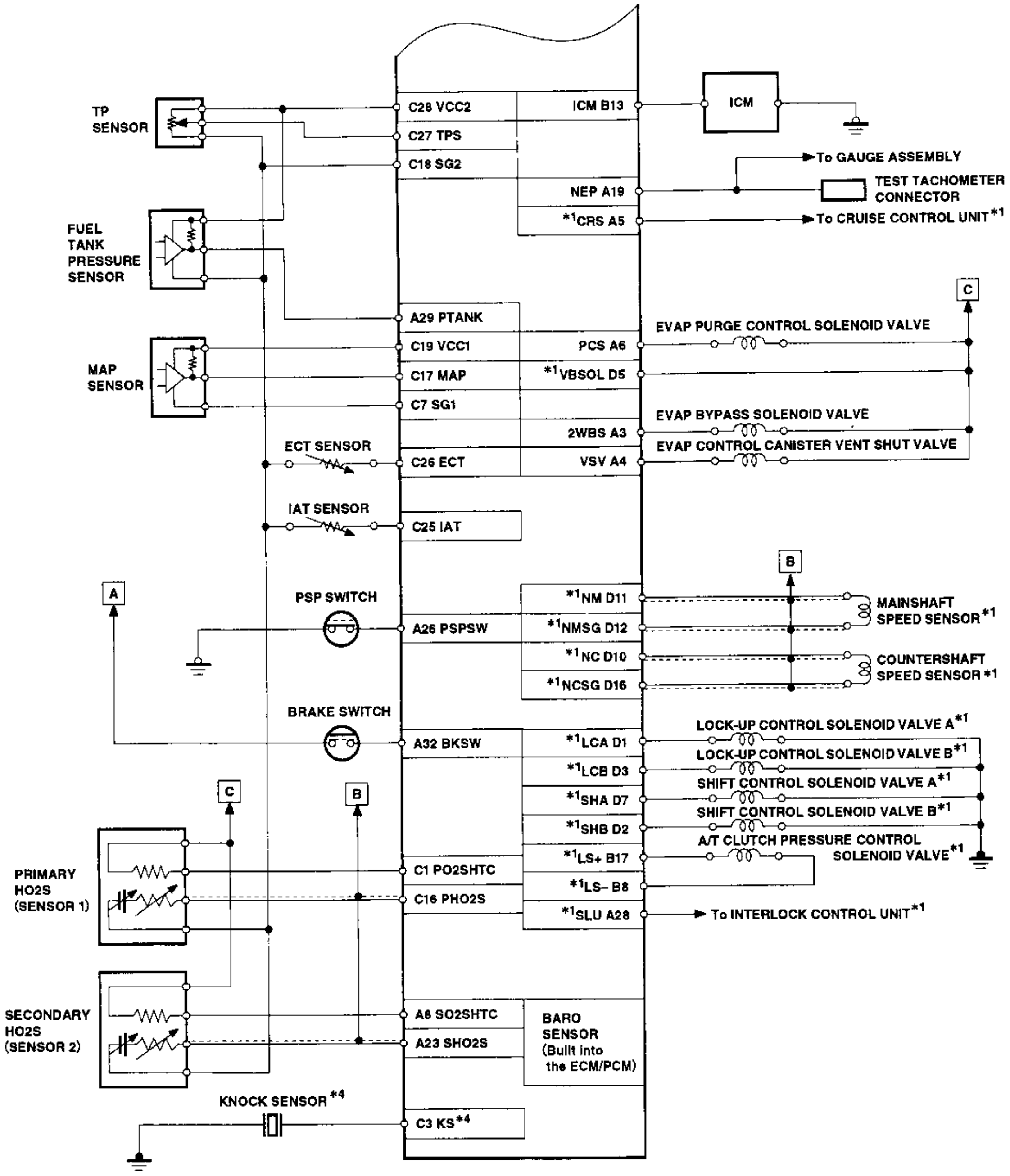

(From page 11-22)
A
B
C
C432
WHT/BLK
YEL/GRN
YEL/BLK1
BLU/WHT
GRN/YEL
YEL/GRN
BLK1
PGM-FI MAIN RELAY
H
C101
C304
BLK1
YEL/BLK1
G
C122
IGP1
A11
YEL/BLK1
J/C
IGP2
A24
YEL/BLK2
C127
C431
FLR
A16
GRN/YEL
C404
C559
C562
YEL/GRN
BLK
P
FUEL PUMP
G553

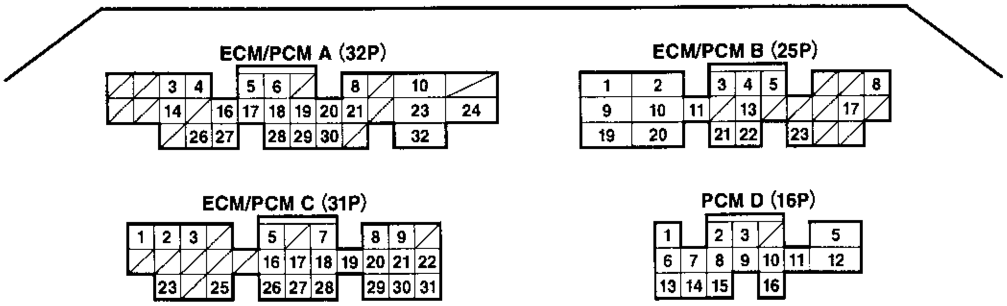
Electrical Connections — '98 - 00 Models



*1: A/T
*2: USA
*3: '98 model
*4: '99 – 00 models

FUSES :
① BACK UP (RADIO) (7.5A)*
② HORN STOP (15A)*
③ BATTERY (100A)*
④ IG1 (40A)*
⑤ FI E/M (15A)*
⑥ No. 13 FUEL PUMP (15A)
⑦ No. 25 METER (7.5A)
⑧ No. 15 ALTERNATOR SP SENSOR (7.5A)*
⑨ No. 31 STARTER SIGNAL (7.5A)
*: in the under-hood fuse/relay box

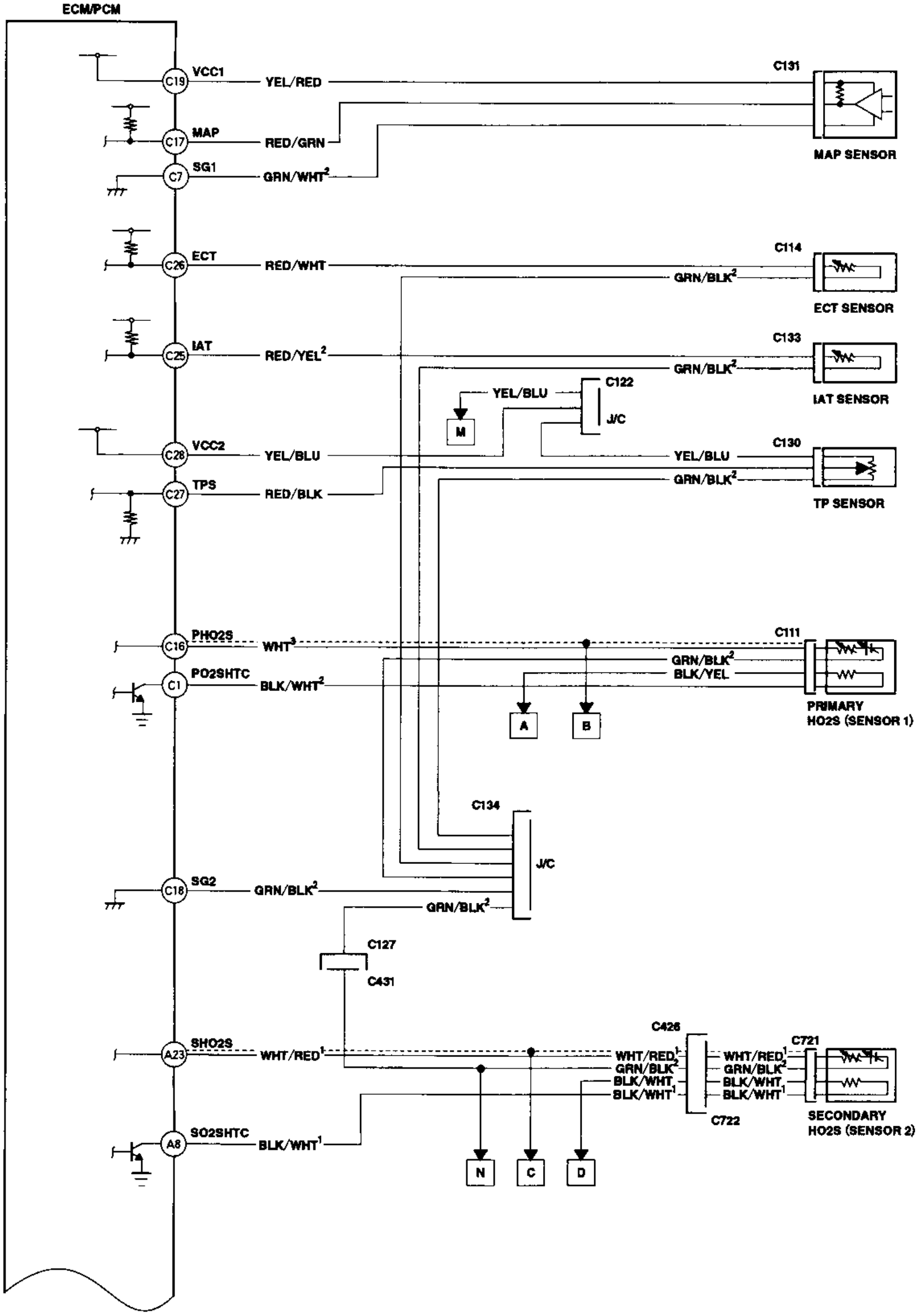


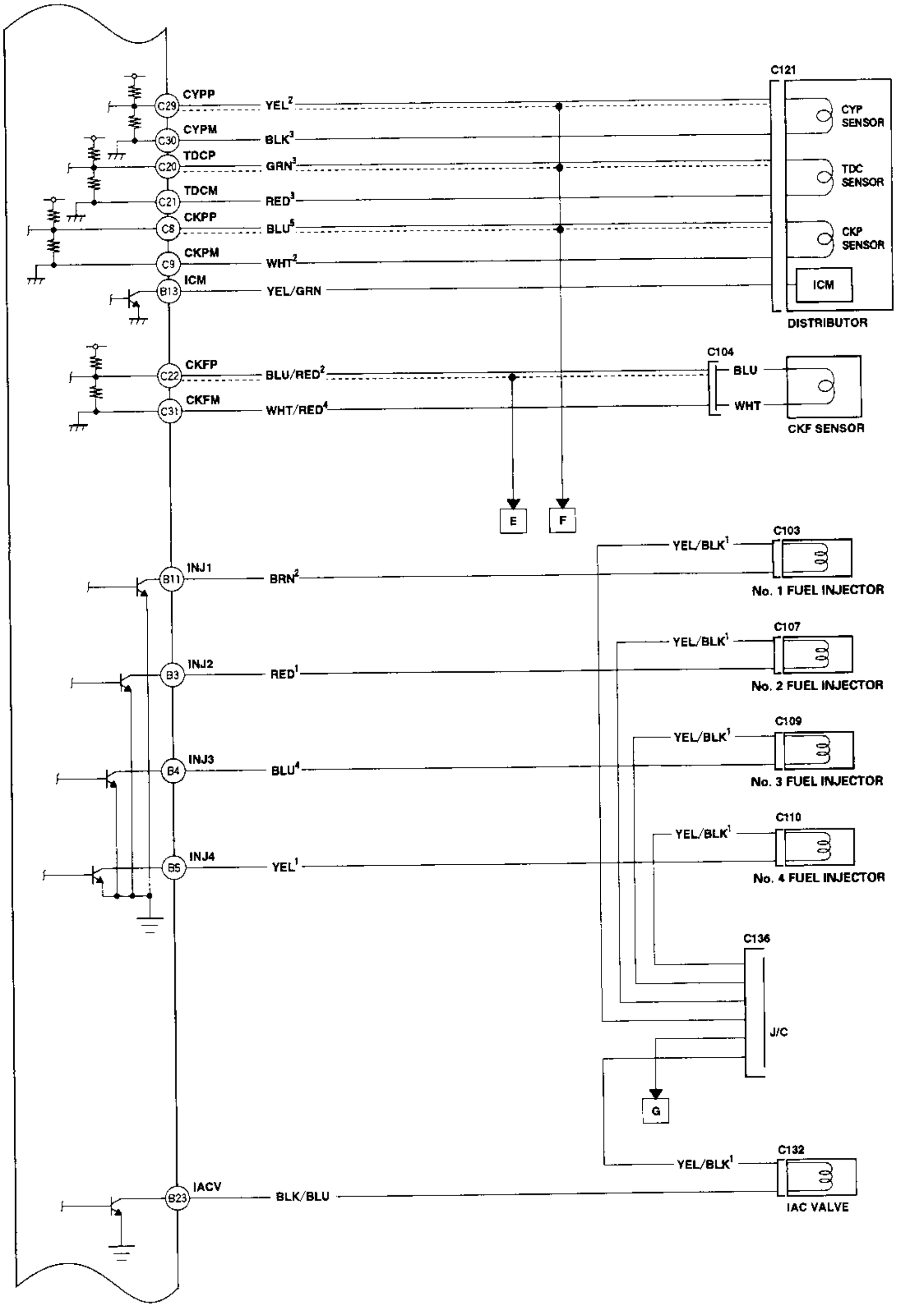


TERMINAL LOCATIONS

(cont'd)

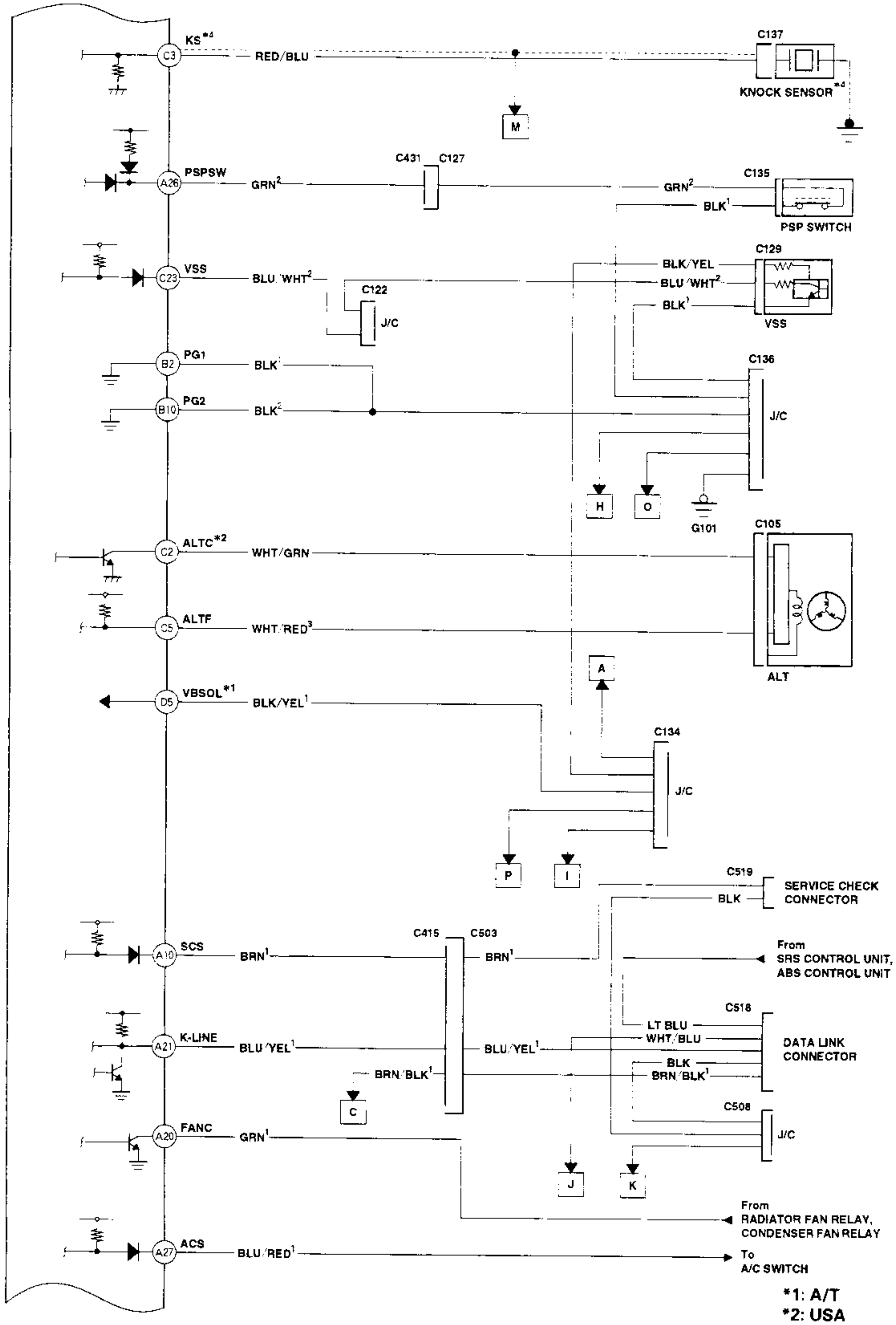
Electrical Connections — '98 - 00 Models (cont'd)



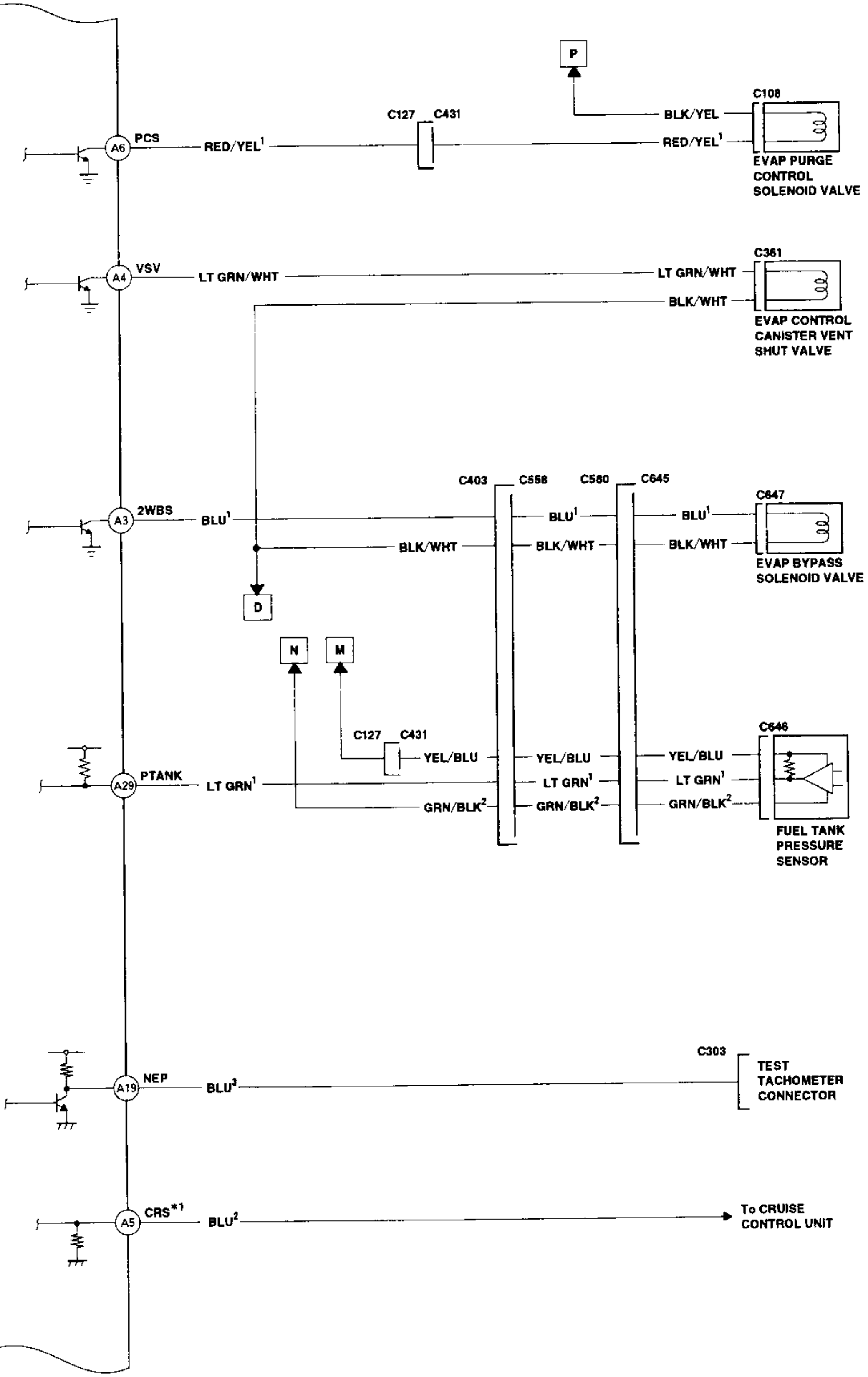

C29
CYPP
YEL2
C30
CYPM
BLK3
C20
TDCP
GRN3
C21
TDCM
RED3
C8
CKPP
BLU5
C9
CKPM
WHT2
B13
ICM
YEL/GRN
C121
CYP SENSOR
TDC SENSOR
CKP SENSOR
ICM
DISTRIBUTOR
C22
CKFP
BLU/RED2
C31
CKFM
WHT/RED4
C104
BLU
WHT
CKF SENSOR
E
F
B11
INJ1
BRN2
C103
YEL/BLK1
No. 1 FUEL INJECTOR
B3
INJ2
RED1
C107
YEL/BLK1
No. 2 FUEL INJECTOR
B4
INJ3
BLU4
C109
YEL/BLK1
No. 3 FUEL INJECTOR
B5
INJ4
YEL1
C110
YEL/BLK1
No. 4 FUEL INJECTOR
C136
J/C
G
B23
IACV
BLK/BLU
C132
YEL/BLK1
IAC VALVE

(cont'd)

Electrical Connections — '98 - 00 Models (cont'd)



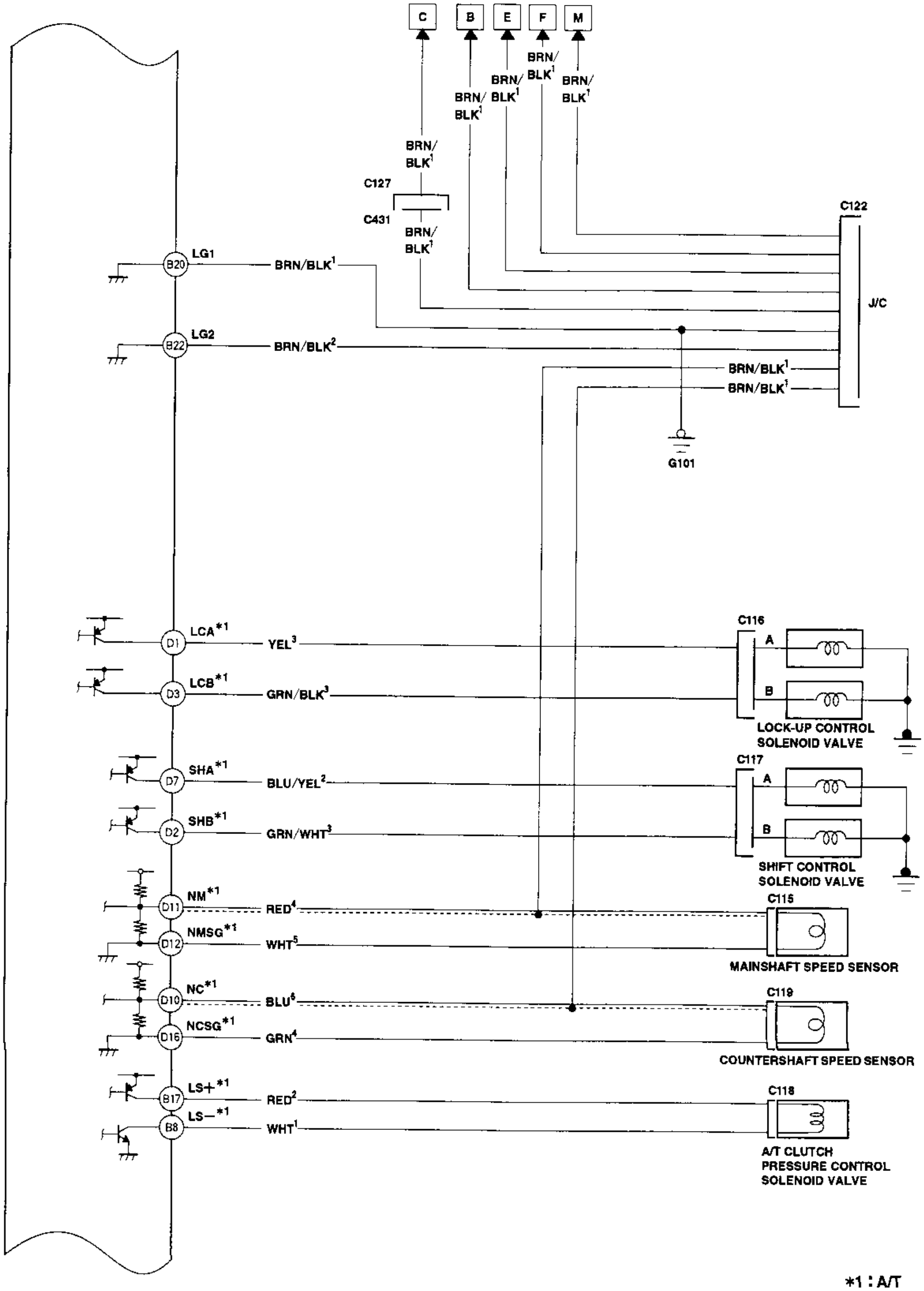
*1: A/T
*2: USA
*4: '99 - 00 models


P
C108
BLK/YEL
C127
C431
PCS
A6
RED/YEL¹
RED/YEL¹
EVAP PURGE CONTROL SOLENOID VALVE
C361
A4
VSV
LT GRN/WHT
LT GRN/WHT
BLK/WHT
EVAP CONTROL CANISTER VENT SHUT VALVE
C403
C558
C580
C645
C647
A3
2WBS
BLU¹
BLU¹
BLU¹
BLK/WHT
BLK/WHT
BLK/WHT
EVAP BYPASS SOLENOID VALVE
D
N
M
C127
C431
C646
YEL/BLU
YEL/BLU
YEL/BLU
A29
PTANK
LT GRN¹
LT GRN¹
LT GRN¹
GRN/BLK²
GRN/BLK²
GRN/BLK²
FUEL TANK PRESSURE SENSOR
C303
A19
NEP
BLU³
TEST TACHOMETER CONNECTOR
A5
CRS*¹
BLU²
To CRUISE CONTROL UNIT

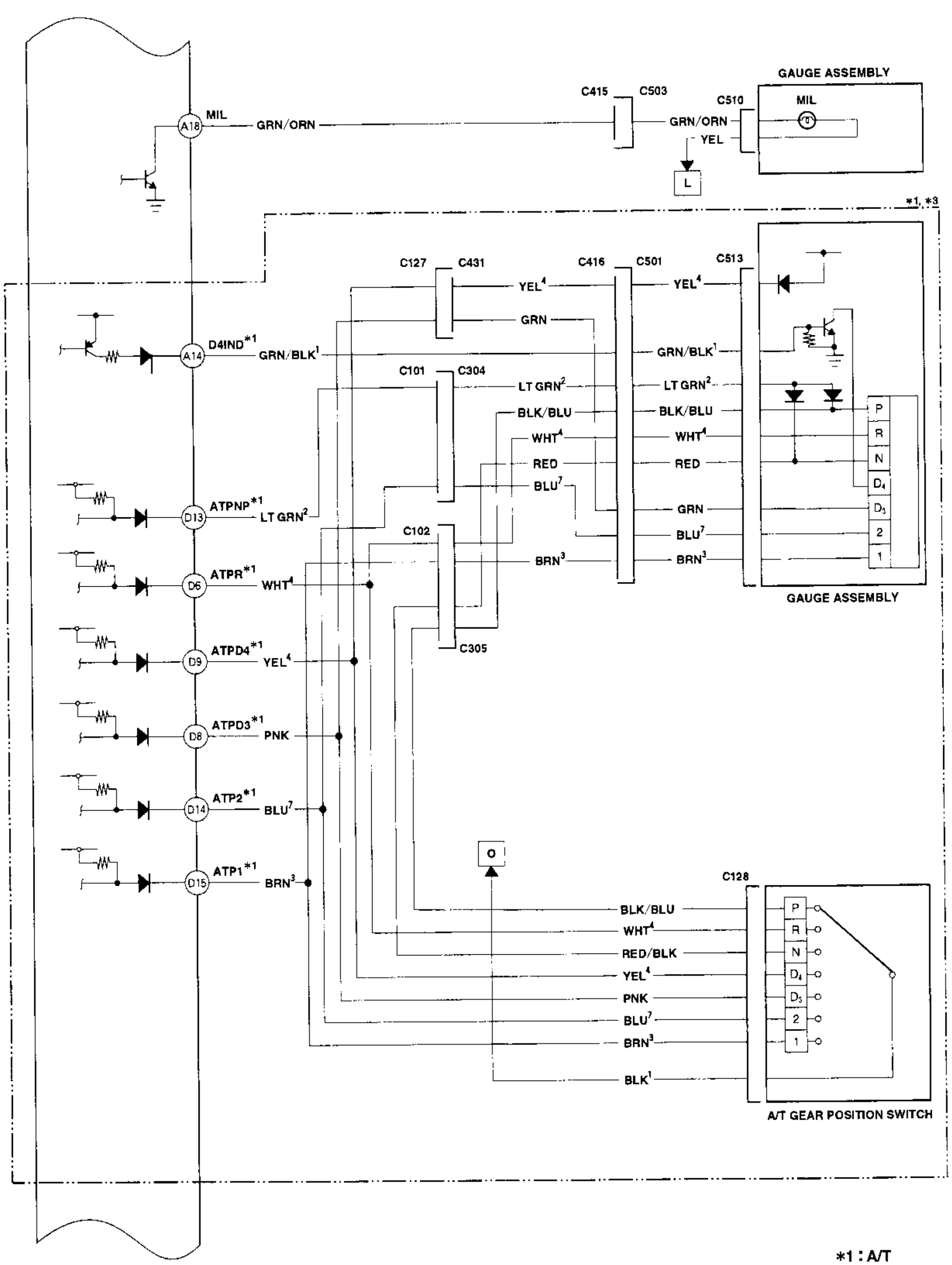
*1 : A/T

(cont'd)

Electrical Connections — '98 – 00 Models (cont'd)



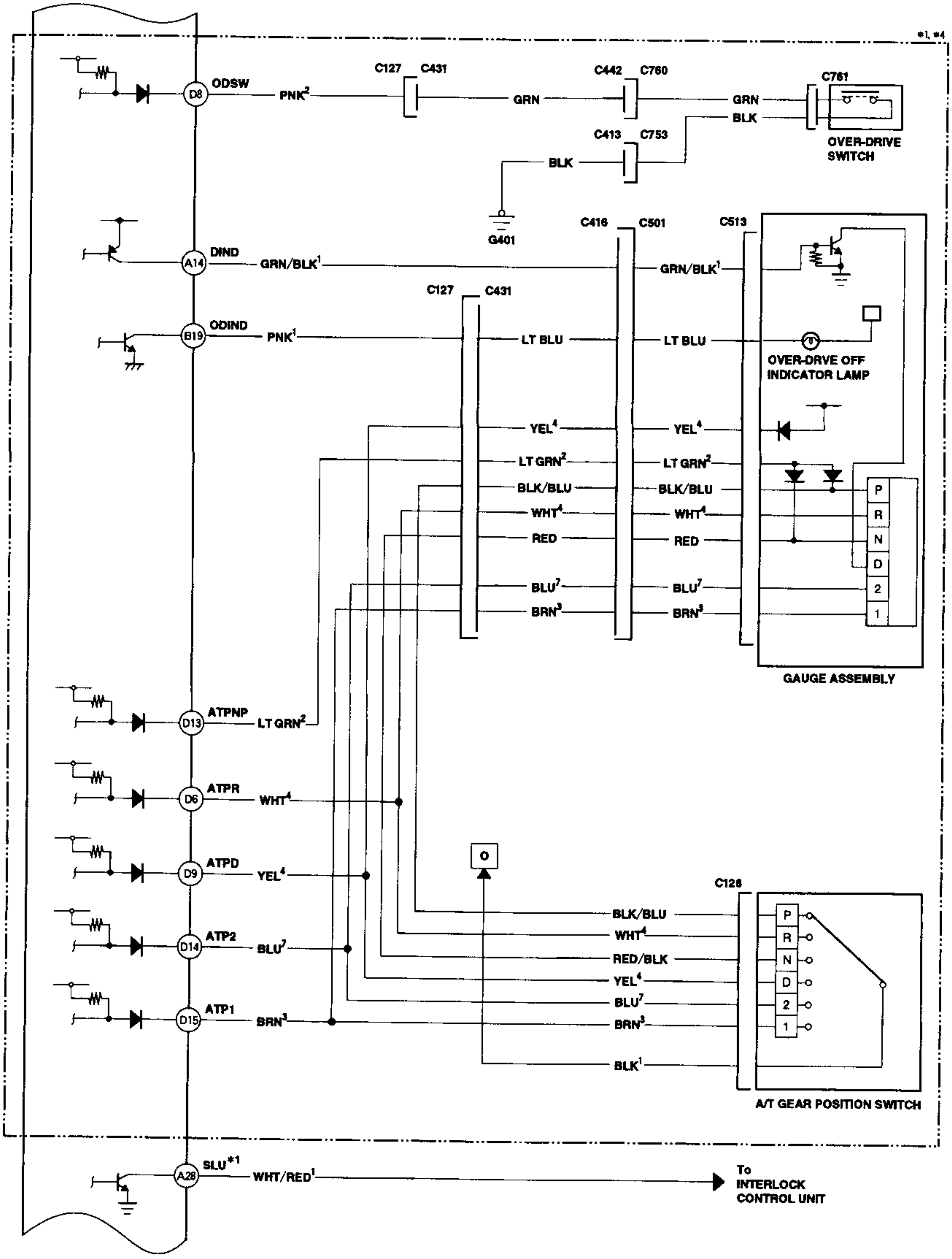
*1 : A/T



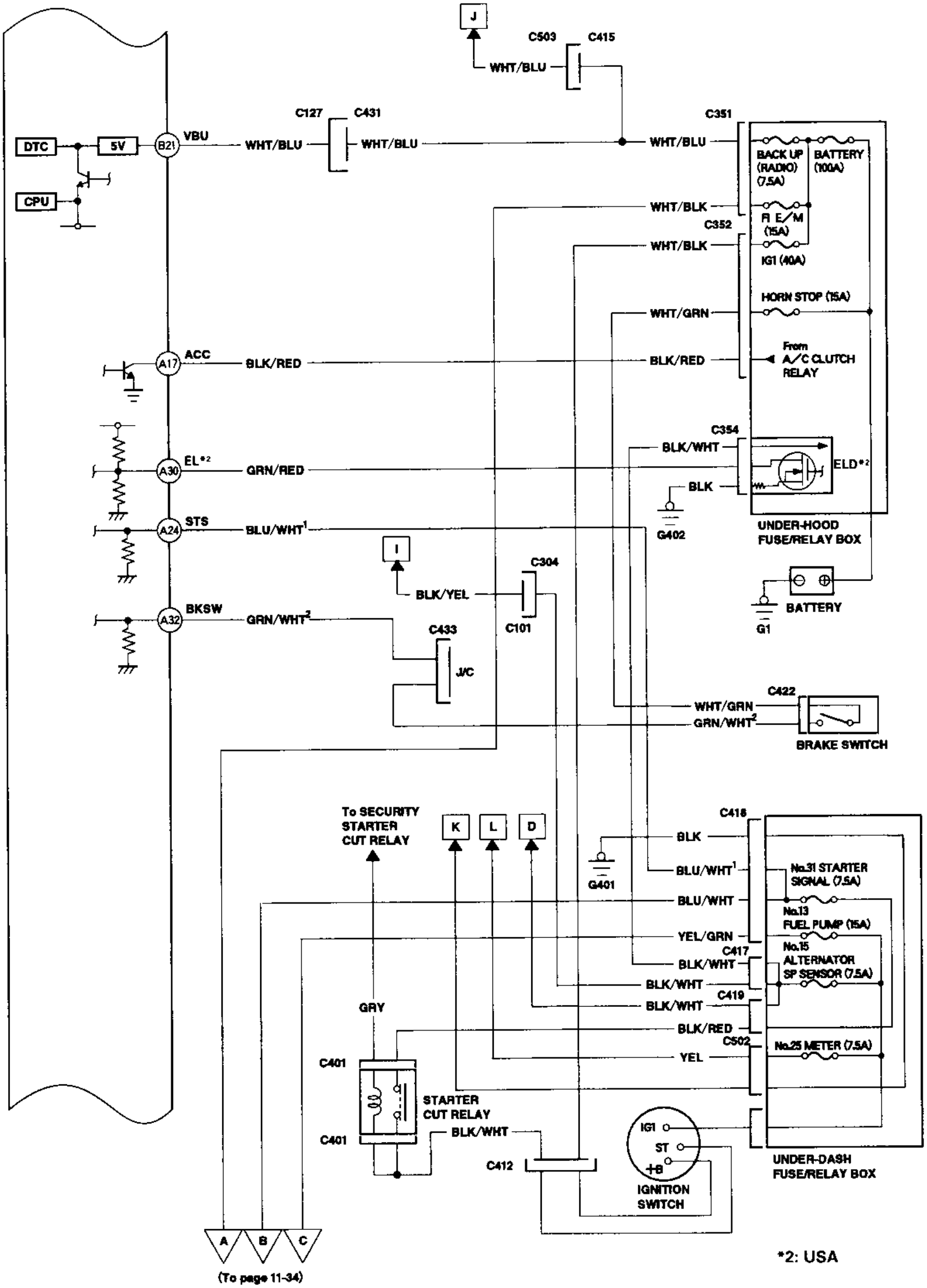
*1 : A/T
*3 : '98 model

(cont'd)

Electrical Connections — '98 – 00 Models (cont'd)



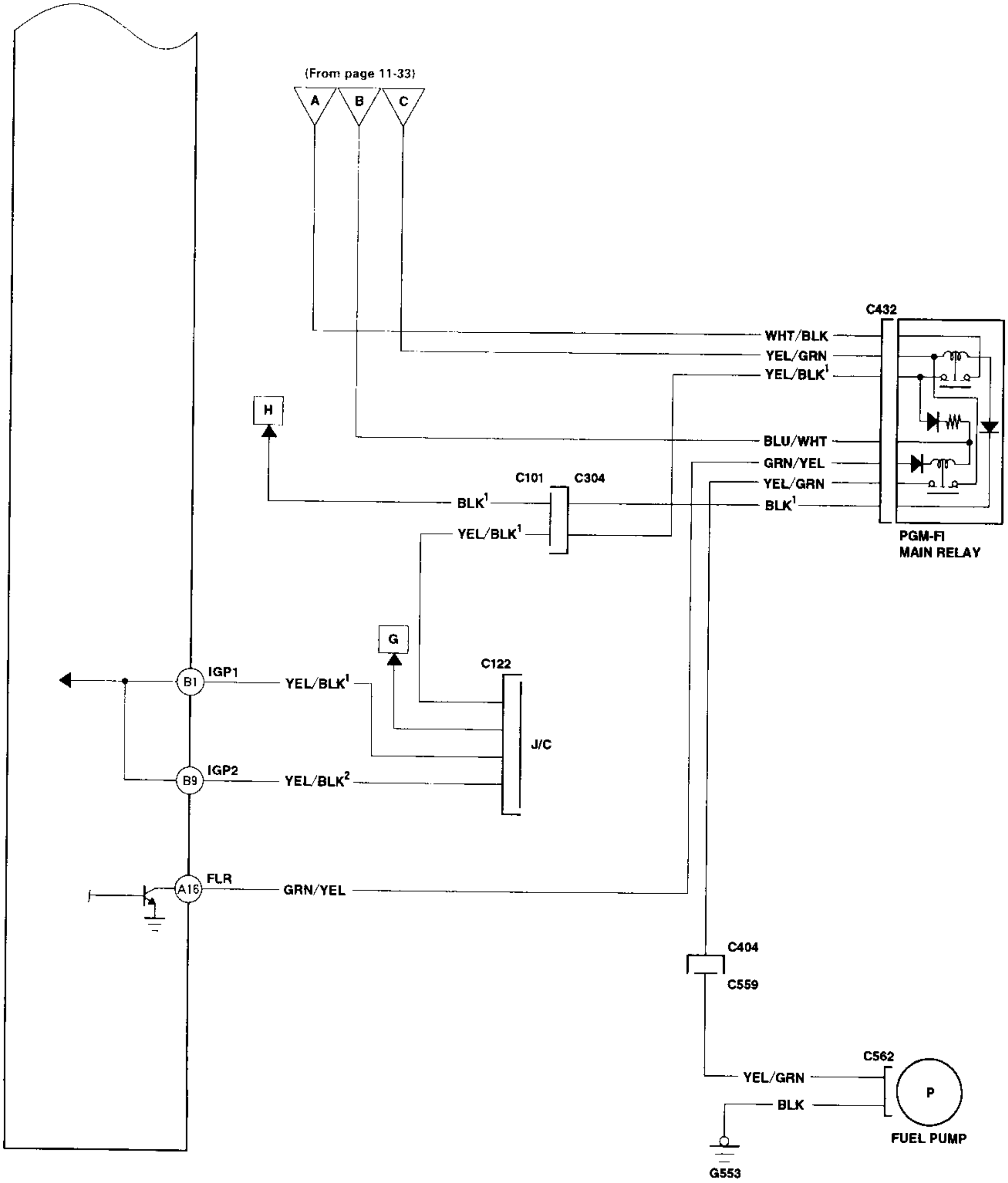
*1: A/T
*4: '99 – 00 models


J
C503
C415
WHT/BLU
C127
C431
C351
DTC
5V
B21
VBU
WHT/BLU
WHT/BLU
WHT/BLU
CPU
BACK UP (RADIO) (7.5A)
BATTERY (100A)
WHT/BLK
C352
FI E/M (15A)
WHT/BLK
IG1 (40A)
HORN STOP (15A)
WHT/GRN
A17
ACC
BLK/RED
BLK/RED
From A/C CLUTCH RELAY
C354
BLK/WHT
A30
EL*2
GRN/RED
ELD*2
BLK
G402
UNDER-HOOD FUSE/RELAY BOX
A24
STS
BLU/WHT1
I
C304
BLK/YEL
BATTERY
G1
C101
A32
BKSW
GRN/WHT2
C433
J/C
C422
WHT/GRN
GRN/WHT2
BRAKE SWITCH
To SECURITY STARTER CUT RELAY
K
L
D
C418
BLK
G401
BLU/WHT1
No.31 STARTER SIGNAL (7.5A)
BLU/WHT
No.13 FUEL PUMP (15A)
YEL/GRN
C417
No.15 ALTERNATOR SP SENSOR (7.5A)
BLK/WHT
BLK/WHT
GRY
C419
BLK/WHT
BLK/RED
C502
No.25 METER (7.5A)
C401
YEL
STARTER CUT RELAY
C401
BLK/WHT
IG1
ST
+B
C412
IGNITION SWITCH
UNDER-DASH FUSE/RELAY BOX
A
B
C
(To page 11-34)

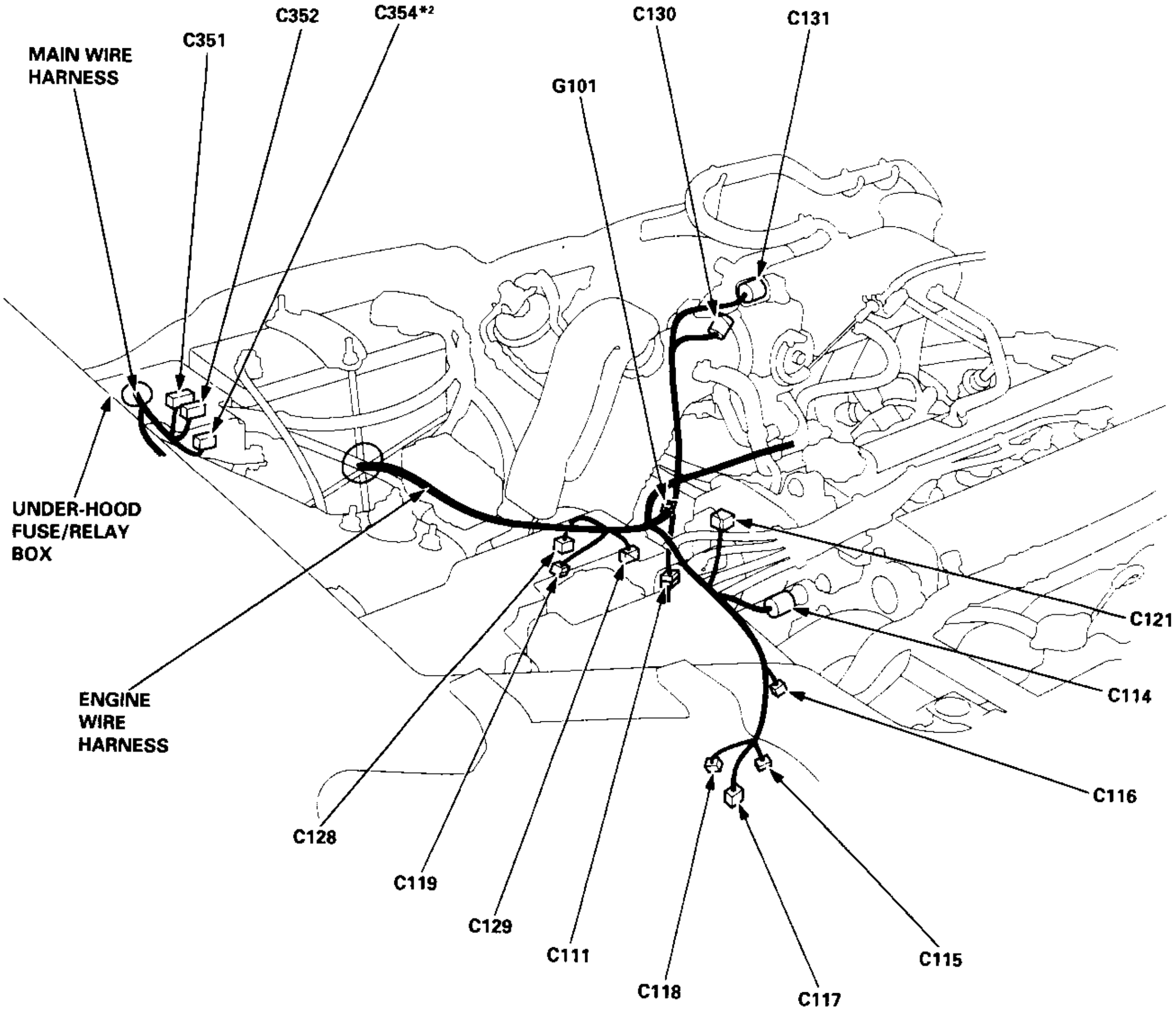
*2: USA

(cont'd)

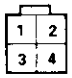
Electrical Connections — '98 - 00 Models (cont'd)



System Connectors [Engine Compartment] — '97 Model



C111

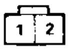


①	WHT^{5}
②	GRN/BLK^{3}
③	BLK/YEL
④	BLK/WHT^{2}

C114

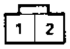
①	RED/WHT
②	GRN/BLK^{1}

C115



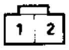
①	WHT^{2}
②	RED^{3}

C116



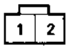
①	GRN/BLK^{1}
②	YEL^{2}

C117



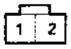
①	BLU/YEL
②	GRN/WHT^{1}

C118



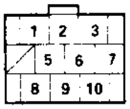
①	RED^{2}
②	WHT^{1}

C119



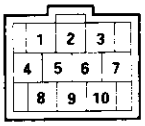
1	GRN^{2}
2	BLU^{3}

C121



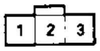
①	BLU^{4}	6	BLU
②	GRN^{3}	7	BLK/YEL
③	YEL^{4}	⑧	WHT^{4}
4	——	⑨	RED^{4}
⑤	YEL/GRN	⑩	BLK^{7}

C128



①	BLK^{1}	⑥	BLU^{2}
2	LT BLU	⑦	BRN^{2}
3	GRY	⑧	BLK/BLU
④	YEL^{3}	⑨	WHT^{3}
⑤	PNK	⑩	RED/BLK

C129



①	BLK^{1}
②	BLK/YEL
③	BLU/WHT

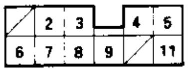
C130

①	GRN/BLK^{3}
②	RED/BLK
③	YEL/BLU

C131

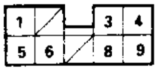
①	YEL/RED
②	GRN/WHT^{1}
③	RED/GRN

C351



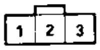
1	——	6	WHT/RED
2	WHT/BLU	⑦	WHT/BLK
3	WHT/GRN	⑧	WHT/BLU
4	BLK	9	WHT/GRN
5	WHT/RED	10	——
		11	BLU/WHT

C352



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

C354*2



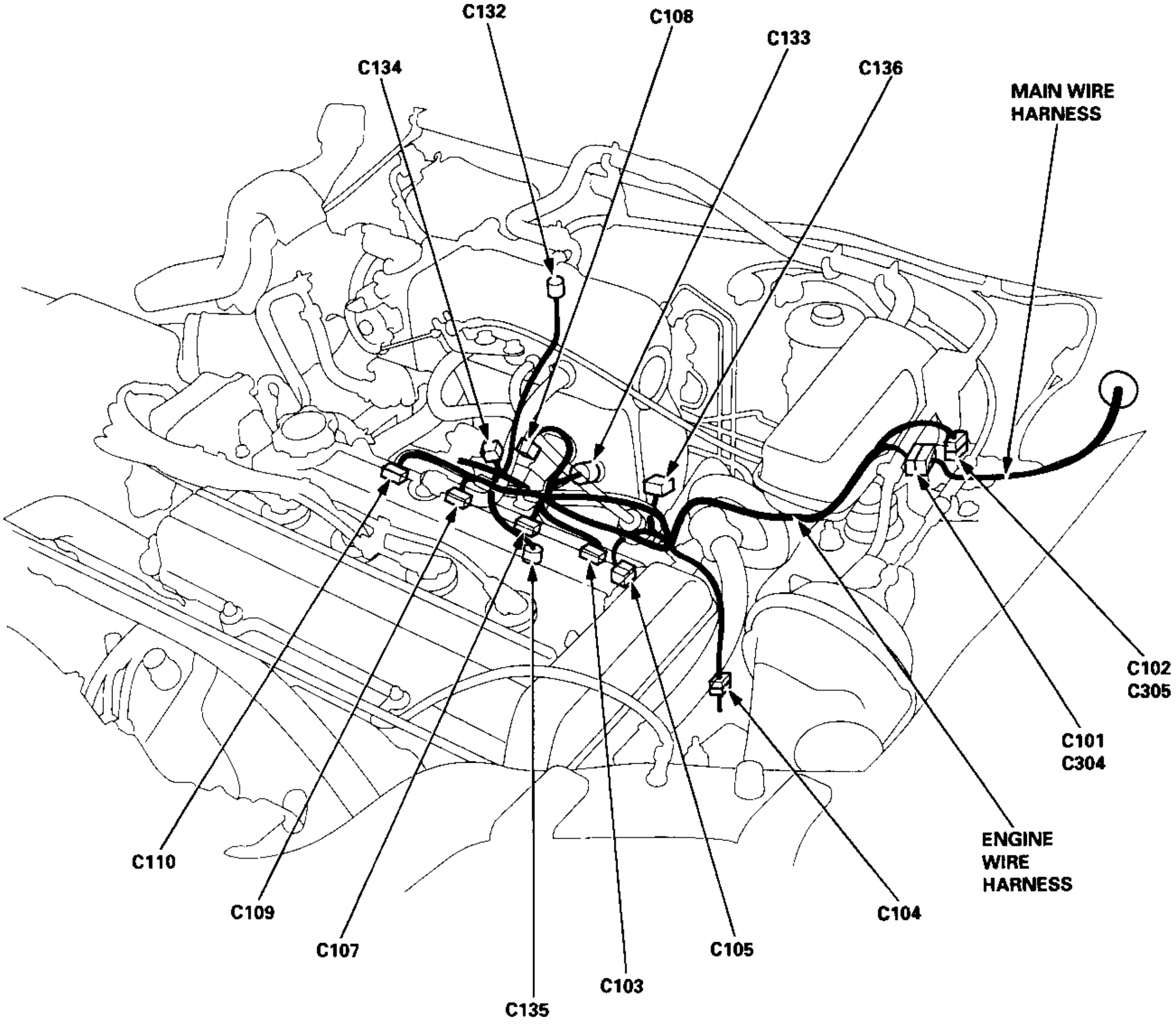
①	BLK/WHT
②	BLK
③	GRN/RED

*2: USA

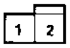
NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^{1} and YEL/BLK^{2} are not the same).
- ○: Related to Fuel and Emissions System.
- — Connector with male terminals (double outline): View from terminal side
  — Connector with female terminals (single outline): View from wire side

(cont'd)

System Connectors [Engine Compartment] — '97 Model (cont'd)

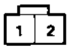


C103



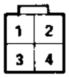
①	YEL/BLK^1
②	BRN^1

C104



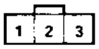
①	BLU/RED^1
②	WHT/RED^2

C105
(USA)



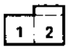
1	BKL/YEL
②	WHT/GRN
3	WHT/BLU
④	WHT/RED^3

C105
(Canada)



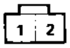
①	WHT/RED^3
2	BLK/YEL
3	WHT/BLU

C107



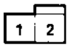
①	YEL/BLK^1
②	RED^1

C108



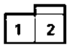
1	BLK/YEL
②	RED/YEL^1

C109



①	YEL/BLK^1
②	BLU^1

C110



①	YEL/BLK^1
②	YEL^1

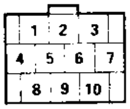
C132

①	BLK/BLU
②	YEL/BLK^1

C133

①	GRN/BLK^3
②	RED/YEL^2

C134

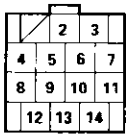


①	BLK/YEL	⑥	BLK/YEL
2	BLK/YEL	⑦	BLK/YEL
③	BLK/YEL	⑧	GRN/BLK^3
④	GRN/BLK^3	⑨	GRN/BLK^3
⑤	GRN/BLK^3	⑩	GRN/BLK^3

C135

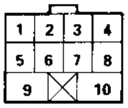
①	GRN^4
②	BLK^1

C136



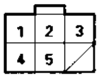
1	—	8	BLK
②	YEL/BLK^1	⑨	BLK^1
③	YEL/BLK^1	⑩	BLK^1
④	YEL/BLK^1	⑪	BLK^1
⑤	YEL/BLK^1	⑫	BLK^1
⑥	YEL/BLK^1	⑬	BLK^1
⑦	YEL/BLK^1	⑭	BLK^1

C304



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

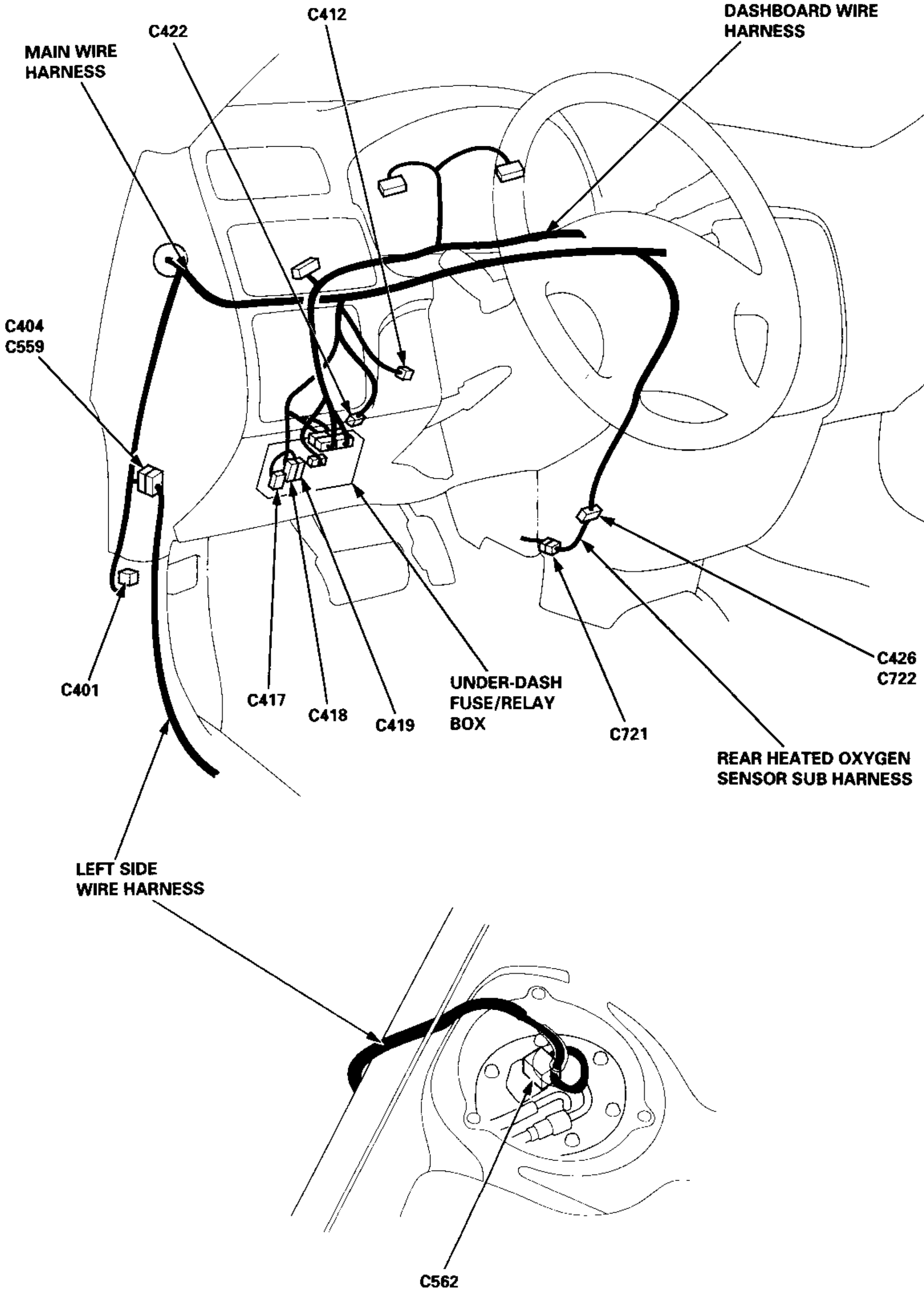
C305



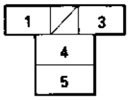
1	GRY
②	RED
3	WHT/RED
④	BLK/BLU
5	PNK
6	—

NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^1 and YEL/BLK^2 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 Connectors [Dash and Floor] — '97 Model

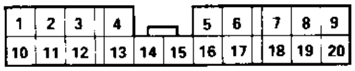


C401



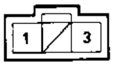
①	BLK/WHT
②	—
③	GRY
④	BLK/RED
⑤	BLK/WHT

C404



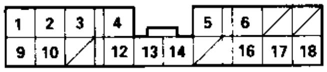
1	LT GRN/RED	⑪	YEL/GRN
2	BLU/BLK	12	WHT
3	GRN/BLK	13	WHT/GRN
4	YEL/RED	14	YEL/GRN
5	WHT/RED	15	YEL
6	GRN/WHT	16	YEL/BLK
7	YEL/BLK	17	BLU/ORN
8	YEL/RED	18	BLU/YEL
9	LT GRN	19	GRN/BLU
10	GRN/WHT	20	LT GRN/BLK

C412



①	BLK/WHT
2	—
③	WHT/BLK

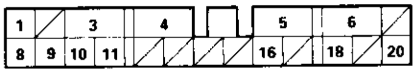
C417



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/GRN
9	RED/WHT	18	RED/GRN

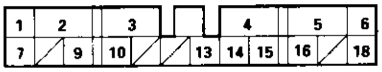
*: With ABS

C418



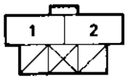
1	RED/BLU	⑪	BLU/WHT
2	—	12	—
③	BLK	13	—
4	RED/GRN	14	—
5	WHT/GRN	15	—
6	WHT/BLU	16	BLK/WHT
7	—	17	—
⑧	YEL/GRN	18	WHT/GRN
9	BLK/YEL	19	—
⑩	BLU/WHT	20	WHT/RED

C419



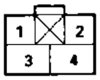
1	RED	10	YEL/RED
2	WHT/RED	11	—
3	WHT	12	—
④	BLK/RED	13	WHT/GRN
5	WHT	⑭	BLK/WHT
6	WHT/RED	15	GRN/RED
7	WHT/BLK	16	YEL
8	—	17	—
9	YEL/BLK	18	RED/GRN

C422
(without cruise control)



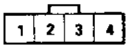
①	GRN/WHT^7
②	WHT/GRN
3	—
4	—

C422
(with cruise control)



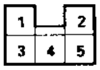
1	LT GRN
2	GRY
③	GRN/WHT^7
④	WHT/GRN

C426



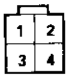
①	BLK/WHT
②	GRN/WHT
③	WHT/RED^4
④	BLK/WHT^1

C562



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

C721

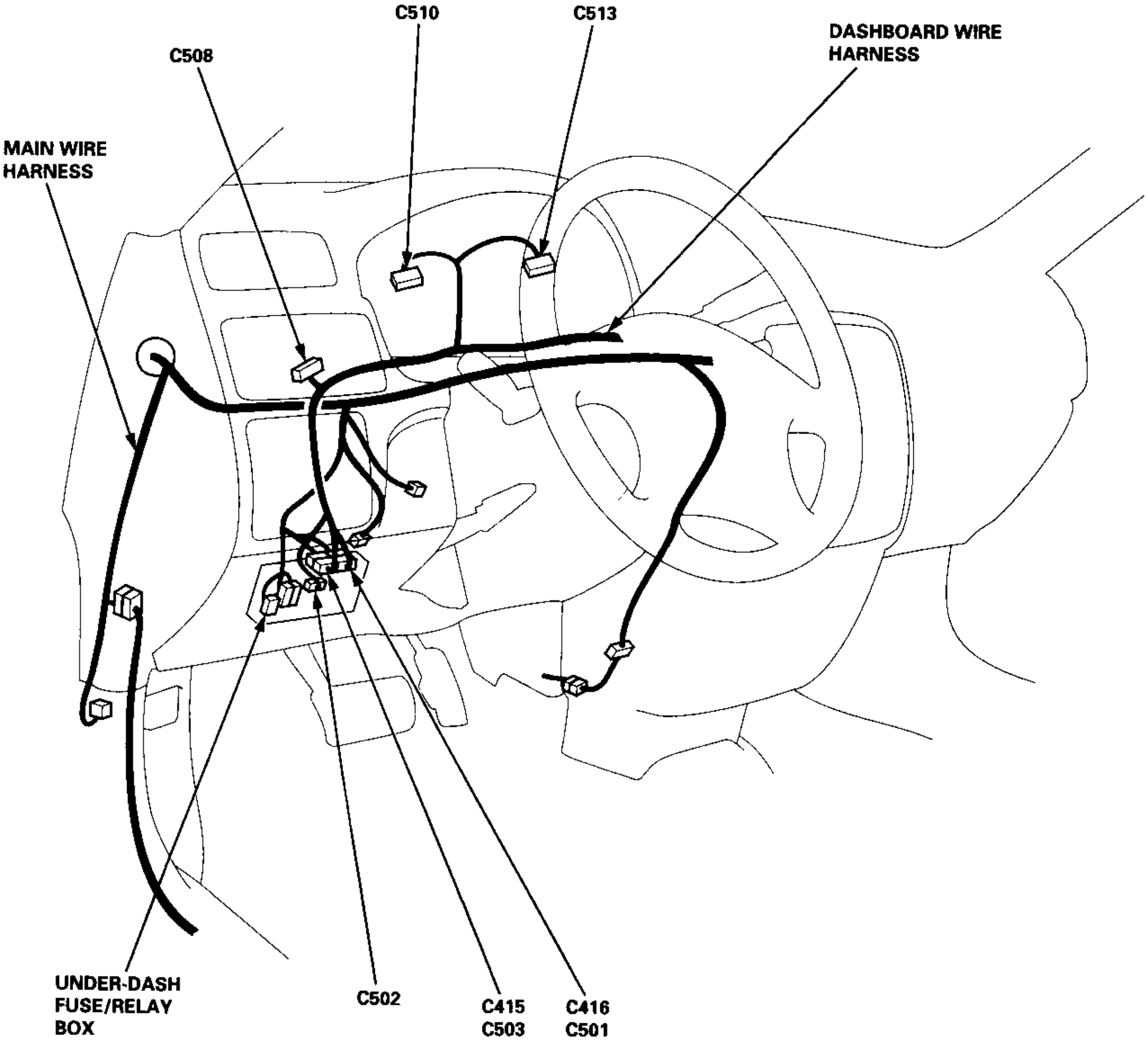


①	WHT/RED^4
②	GRN/WHT
③	BLK/WHT^1
④	BLK/WHT

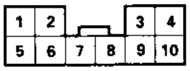
NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^1 and YEL/BLK^2 are not the same).
- ○: Related to Fuel and Emissions System.
- — Connector with male terminals (double outline): View from terminal side
  — Connector with female terminals (single outline): View from wire side

(cont'd)

System Connectors [Dash and Floor] — '97 Model (cont'd)

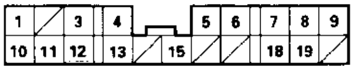


C501



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

C502

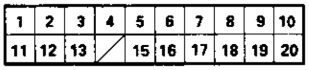


1	RED/GRN	11	YEL/BLK
2	—	12	BLK/YEL
3	WHT/BLU	13	YEL/GRN
④	BLK	14	—
5	GRN/WHT	15	RED/BLK
6	GRN/RED	16	—
7	GRN/ORN	17	—
8	BLU/YEL	18	BLK/WHT
9	GRN/YEL	19	YEL/RED
⑩	YEL	20	—

C503

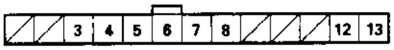
1	YEL	13	—
2	RED/BLU	⑭	WHT/BLU
3	LT GRN	⑮	BRN/BLK^{1}
4	BLU/RED	16	LT BLU
5	BLU	⑰	BRN^{3}
6	—	18	—
⑦	BLU/YEL	19	WHT/BLK
8	BLU/BLK	20	BLU
9	BLU/WHT	㉑	GRN/ORN
10	YEL/GRN	22	YEL/RED
11	YEL/GRN	23	BRN/BLK
12	—	24	RED/GRN

C508



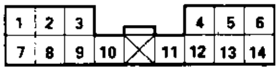
1	RED	11	RED
2	RED	12	RED
3	YEL	⑬	BLK
4	YEL	14	—
5	YEL	⑮	BLK
6	YEL	⑯	BLK
7	RED/BLK	17	BLK
8	RED/BLK	18	BLK
9	RED/BLK	19	BLK
10	RED/BLK	20	BLK

C510



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		

C513

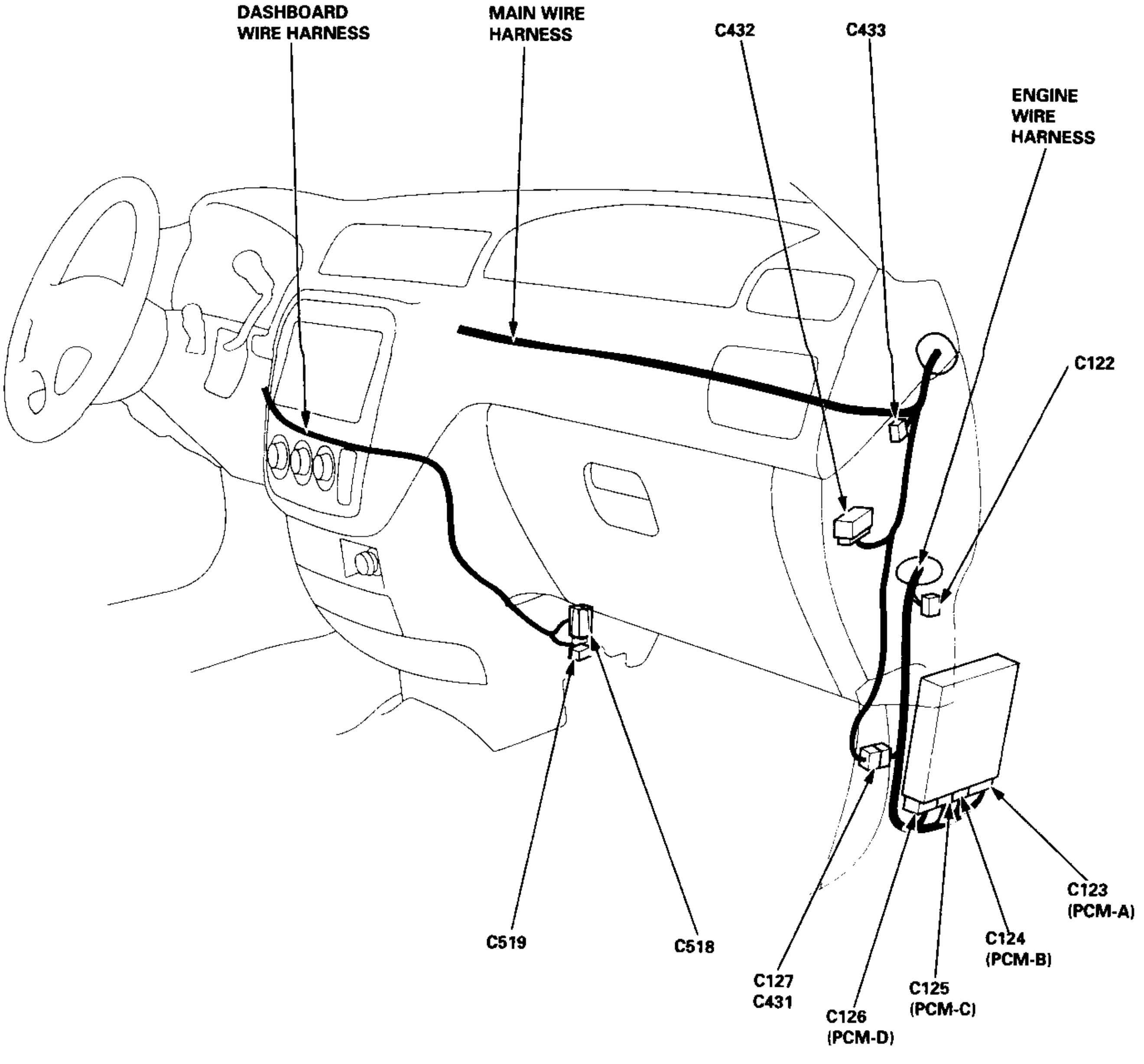


1	YEL	8	BLK
2	RED/BLK	⑨	GRN/BLK^{2}
3	RED	⑩	GRN
④	BLU^{2}	⑪	RED
⑤	BLK/BLU	⑫	WHT^{3}
⑥	BRN^{2}	13	YEL
⑦	YEL^{3}	⑭	LT GRN

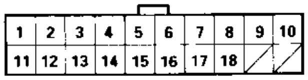
NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^{1} and YEL/BLK^{2} are not the same).
- ○: Related to Fuel and Emissions System.
- — Connector with male terminals (double outline): View from terminal side
  — Connector with female terminals (single outline): View from wire side

(cont'd)

System Connectors [Dash and Floor] — '97 Model (cont'd)

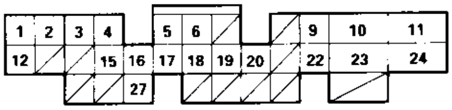


C122



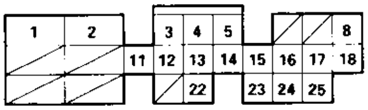
1	GRN	⑪	BRN/BLK^1
2	GRN	⑫	BRN/BLK^1
3	GRN	⑬	BRN/BLK^1
④	YEL/BLK^1	⑭	BRN/BLK^1
⑤	YEL/BLK^1	⑮	BRN/BLK^1
⑥	YEL/BLK^1	⑯	BRN/BLK^1
⑦	YEL/BLK^2	⑰	BRN/BLK^1
⑧	BLU/WHT	⑱	BRN/BLK^1
⑨	BLU/WHT	19	—
10	BLU/WHT	20	—

C123 (PCM-A)



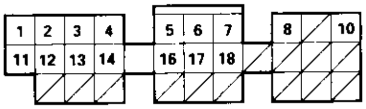
①	YEL^1	⑫	BLK/BLU	㉓	BLK^2
②	BLU^1	13	—	㉔	YEL/BLK^2
③	RED^1	14	—	25	—
④	BRN^1	⑮	RED/YEL^1	26	—
⑤	BLK/WHT^1	⑯	GRN/YEL	㉗	GRN^1
⑥	BLK/WHT^2	⑰	BLK/RED	28	—
7	—	⑱	GRN/ORN	29	—
8	—	⑲	WHT/GRN	30	—
⑨	BRN/BLK^1	⑳	YEL/GRN	31	—
⑩	BLK^1	21	—	32	—
⑪	YEL/BLK^1	㉒	BRN/BLK^2		

C124 (PCM-B)



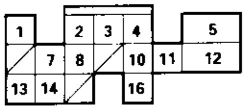
①	WHT^1	⑪	GRN/WHT^1	21	—
②	RED^2	⑫	WHT/RED^1	㉒	GRN^2
③	BLU/YEL	⑬	GRN/BLK^2	㉓	BLU^3
④	GRN/BLK^1	⑭	WHT^2	㉔	YEL^3
⑤	YEL^2	⑮	RED^2	㉕	LT GRN
6	—	⑯	WHT^3		
7	—	⑰	BLU^2		
⑧	PNK	⑱	BRN^2		
9	—	19	—		
10	—	20	—		

C125 (PCM-C)



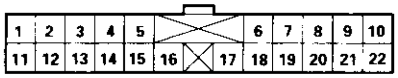
①	BLU/RED^1	⑫	WHT^4	23	—
②	BLU^4	⑬	RED^4	24	—
③	GRN^3	⑭	BLK^3	25	—
④	YEL^4	15	—	26	—
⑤	BLU/RED^2	⑯	GRN^4	27	—
⑥	BLU/ORN	⑰	WHT/RED^3	28	—
⑦	BRN^3	⑱	BLU/WHT	29	—
⑧	LT BLU	19	—	30	—
9	—	20	—	31	—
⑩	WHT/BLU	21	—		
⑪	WHT/RED^2	22	—		

C126 (PCM-D)



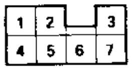
①	RED/BLK	9	—
②	RED/WHT	⑩	YEL/BLU
③	RED/GRN	⑪	GRN/BLK^2
④	YEL/RED	⑫	GRN/WHT^1
⑤	GRN/WHT^2	⑬	RED/YEL^3
6	—	⑭	WHT/RED^4
⑦	WHT^5	15	—
⑧	RED/YEL^2	⑯	GRN/RED

C127



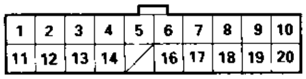
①	GRN/BLK^2	⑫	BRN^2
②	WHT/RED^4	⑬	BLU^2
③	WHT^3	⑭	BLK/WHT^1
④	LT GRN	⑮	PNK
⑤	YEL^3	⑯	GRN/RED
6	GRN	⑰	GRN/WHT^2
7	BLU/RED	18	BLU/WHT
⑧	GRN/ORN	⑲	BLK/RED
⑨	BRN^3	⑳	GRN/YEL
⑩	WHT/BLU	㉑	LT BLU
⑪	RED/YEL^3	㉒	BLU/ORN

C432



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

C433

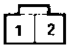


1	BLK	11	LT GRN/RED
2	BLK	12	LT GRN/RED
3	BLK	13	LT GRN/RED
4	WHT/GRN	14	LT BLU
5	WHT/GRN	15	—
6	WHT/GRN	16	LT BLU
7	BRN	⑰	GRN/WHT^2
8	BRN	18	GRN/WHT
9	BRN	⑲	GRN/WHT^2
10	WHT/BLK	20	WHT/BLK

C518

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

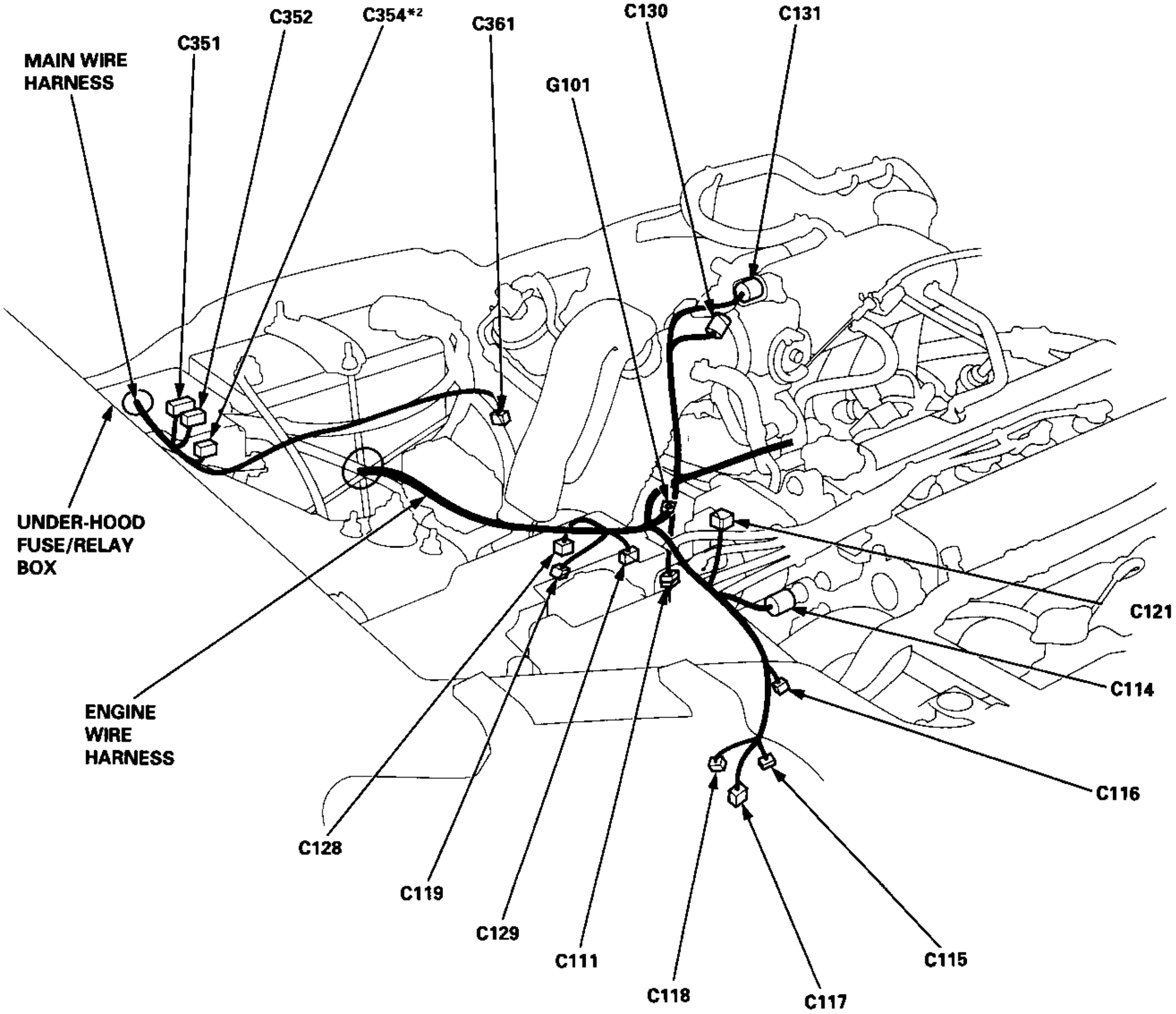
C519



①	BRN^3
②	BLK

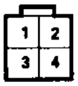
NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^1 and YEL/BLK^2 are not the same).
- ○: Related to Fuel and Emissions System.
- — Connector with male terminals (double outline): View from terminal side
  — Connector with female terminals (single outline): View from wire side

System Connectors [Engine Compartment] — '98 Model



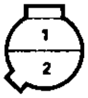
*2: USA

C111



①	WHT^{3}
②	GRN/BLK^{2}
③	BLK/YEL
④	BLK/WHT^{2}

C114

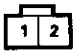


①	RED/WHT
②	GRN/BLK^{2}

C115

①	WHT^{5}
②	RED^{4}

C116

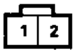


①	GRN/BLK^{3}
②	YEL^{3}

C117

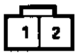
①	BLU/YEL^{2}
②	GRN/WHT^{3}

C118



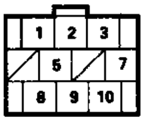
①	RED^{2}
②	WHT^{1}

C119



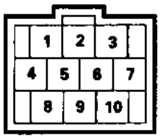
①	GRN^{4}
②	BLU^{6}

C121



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

C128



①	BLK^{1}	⑥	BLU^{7}
2	LT BLU	⑦	BRN^{3}
3	GRY	⑧	BLK/BLU
④	YEL^{4}	⑨	WHT^{4}
⑤	PNK	⑩	RED/BLK

C129

①	BLK^{1}
②	BLK/YEL
③	BLU/WHT^{2}

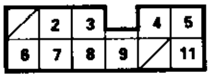
C130

①	GRN/BLK^{2}
②	RED/BLK
③	YEL/BLU

C131

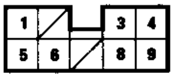
①	YEL/RED
②	GRN/WHT^{2}
③	RED/GRN

C351



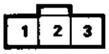
1	——	6	WHT/RED
2	WHT/BLU	⑦	WHT/BLK
3	WHT/GRN	⑧	WHT/BLU
4	BLK	9	WHT/GRN
5	WHT/RED	10	——
		11	BLU/WHT

C352



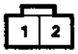
1	GRN	⑤	BLK/RED
2	——	6	BLK/YEL
3	WHT/BLK	7	——
④	WHT/BLK	⑧	WHT/GRN
		9	WHT

C354*2



①	BLK/WHT
②	BLK
③	GRN/RED

C361



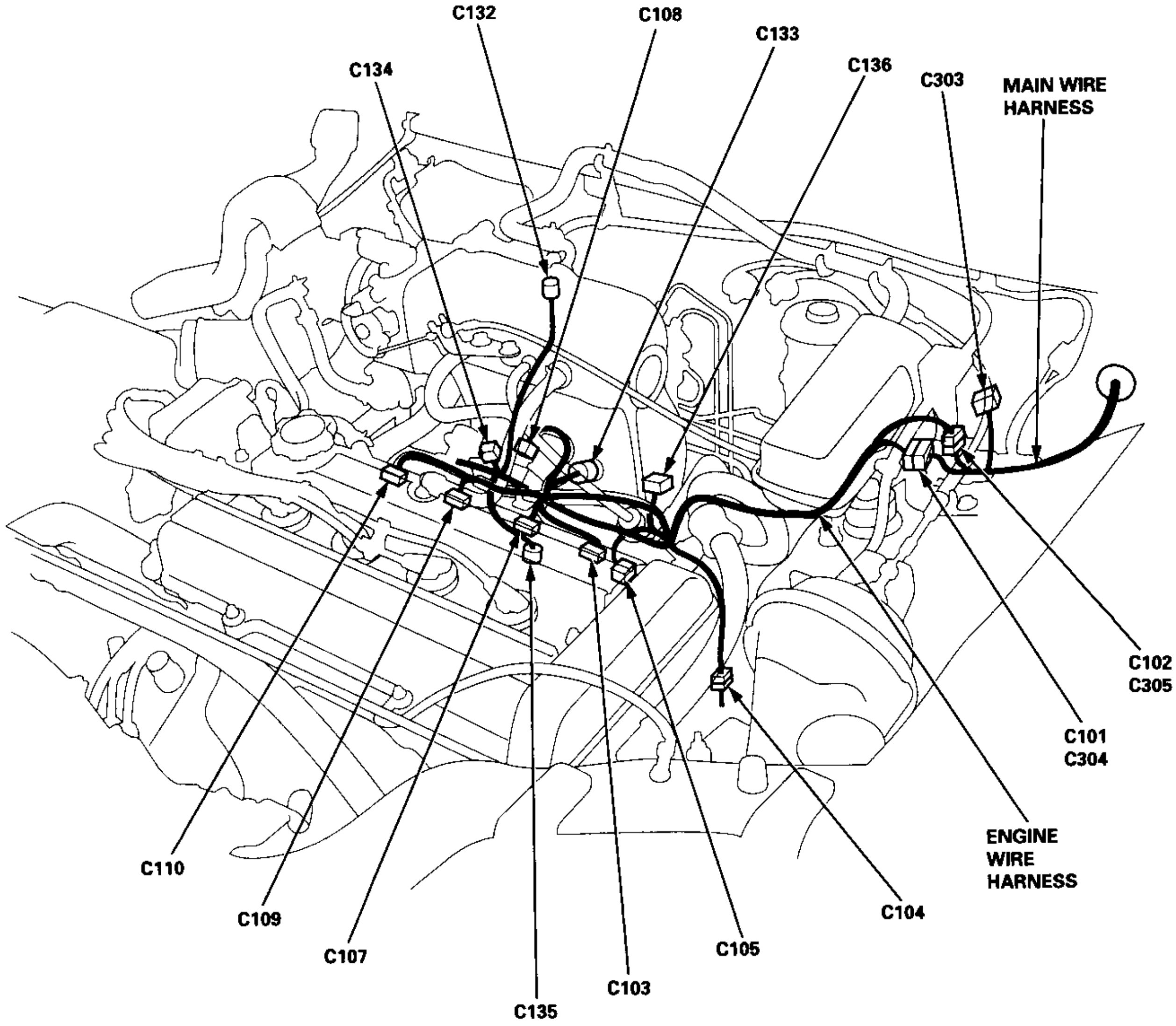
①	LT GRN/WHT
②	BLK/WHT

*2: USA

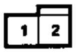
NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^{1} and YEL/BLK^{2} are not the same).
- ○: Related to Fuel and Emissions System.
- — Connector with male terminals (double outline): View from terminal side
  — Connector with female terminals (single outline): View from wire side

(cont'd)

System Connectors [Engine Compartment] — '98 Model (cont'd)



C103



①	YEL/BLK^1
②	BRN^2

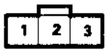
C104

①	BLU/RED^2
②	WHT/RED^4

C105
(USA)

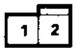
1	BLK/YEL
②	WHT/GRN
3	WHT/BLU
④	WHT/RED^3

C105
(Canada)



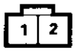
①	WHT/RED^3
2	BLK/YEL
3	WHT/BLU

C107



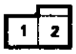
①	YEL/BLK^1
②	RED^1

C108



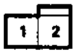
①	BLK/YEL
②	RED/YEL^1

C109



①	YEL/BLK^1
②	BLU^4

C110



①	YEL/BLK^1
②	YEL^1

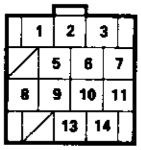
C132

①	BLK/BLU
②	YEL/BLK^1

C133

①	GRN/BLK^2
②	RED/YEL^2

C134

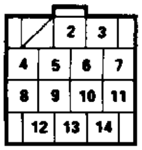


①	BLK/YEL	⑧	GRN/BLK^2
2	BLK/YEL	⑨	GRN/BLK^2
③	BLK/YEL	⑩	GRN/BLK^2
4	—	⑪	GRN/BLK^2
⑤	BLK/YEL	12	—
⑥	BLK/YEL	⑬	GRN/BLK^2
⑦	BLK/YEL	⑭	GRN/BLK^2

C135

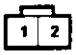
①	GRN^2
②	BLK^1

C136



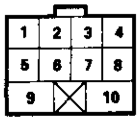
1	—	8	BLK
②	YEL/BLK^1	⑨	BLK^1
③	YEL/BLK^1	⑩	BLK^1
④	YEL/BLK^1	⑪	BLK^1
⑤	YEL/BLK^1	⑫	BLK^1
⑥	YEL/BLK^1	⑬	BLK^1
⑦	YEL/BLK^1	⑭	BLK^1

C303



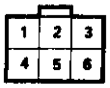
1	—
②	BLU^3

C304



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

C305

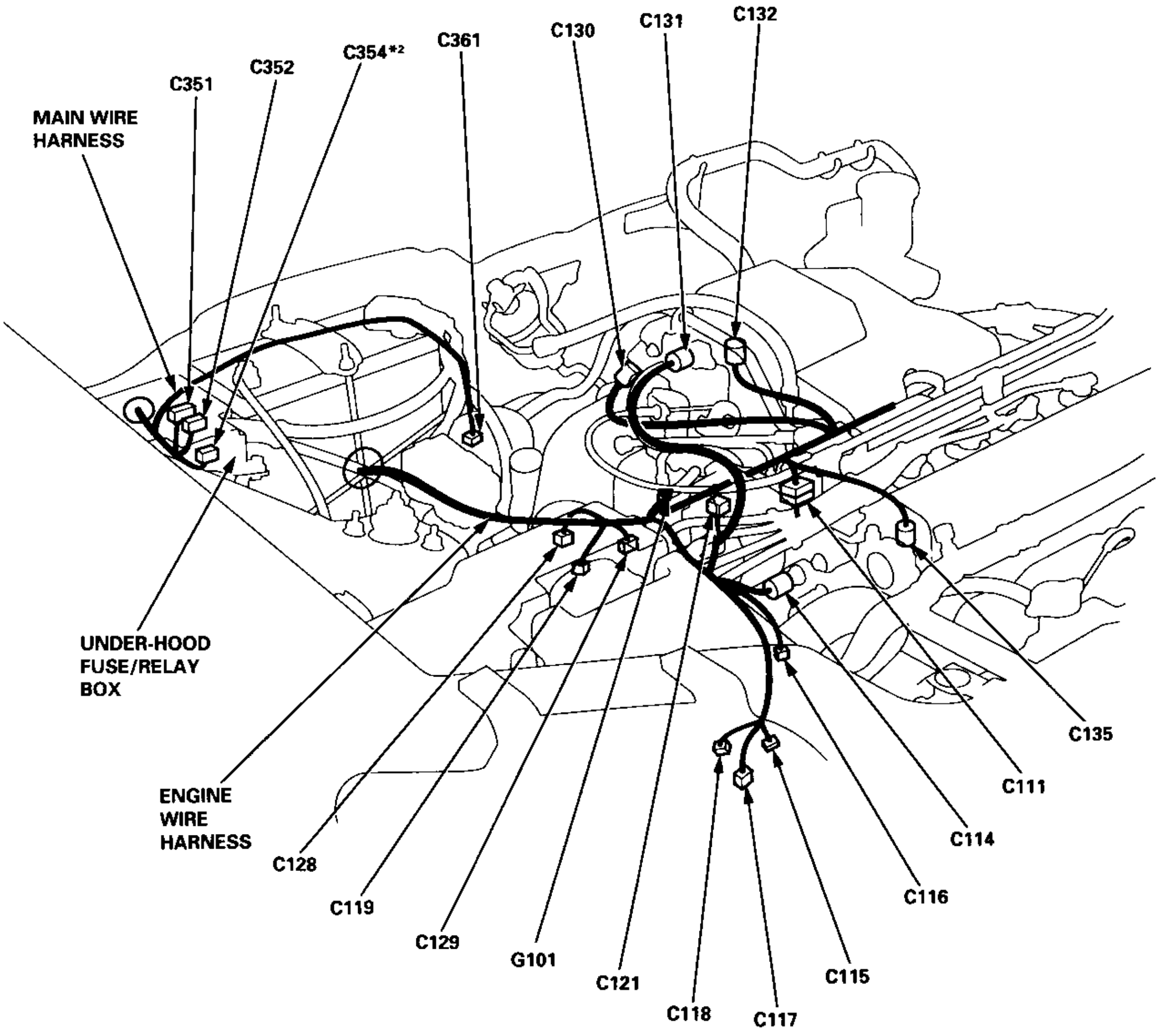


1	GRN
②	RED
③	WHT^4
④	BLK/BLU
5	PNK
⑥	BRN^3

NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^1 and YEL/BLK^2 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 Connectors [Engine Compartment] — '99 – 00 Models



*2: USA

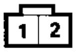
C111

①	WHT^{3}
②	GRN/BLK^{2}
③	BLK/YEL
④	BLK/WHT^{2}

C114

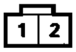
①	RED/WHT
②	GRN/BLK^{7}

C115



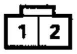
①	WHT^{5}
②	RED^{4}

C116



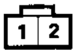
①	GRN/BLK^{3}
②	YEL^{3}

C117



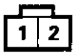
①	BLU/YEL^{7}
②	GRN/WHT^{3}

C118



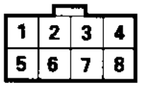
①	RED^{2}
②	WHT^{1}

C119



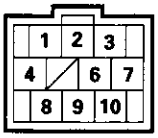
①	GRN^{4}
②	BLU^{6}

C121



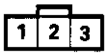
①	YEL/GRN	5	BLK/YEL
②	BLU^{5}	⑥	WHT^{2}
③	GRN^{3}	⑦	RED^{3}
④	YEL^{2}	⑧	BLK^{3}

C128



①	BLK^{1}	⑥	BLU^{7}
2	LT BLU	⑦	BRN^{3}
3	GRY	⑧	BLK/BLU
④	YEL^{4}	⑨	WHT^{4}
5	——	⑩	RED/BLK

C129



①	BLK^{1}
②	BLK/YEL
③	BLU/WHT^{2}

C130

①	GRN/BLK^{7}
②	RED/BLK
③	YEL/BLU

C131

①	YEL/RED
②	GRN/WHT^{2}
③	RED/GRN

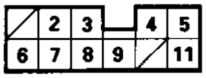
C132

①	BLK/BLU
②	YEL/BLK^{1}

C135

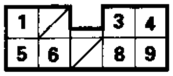
①	GRN^{2}
②	BLK^{1}

C351



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

C352

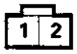


1	GRN	⑤	BLK/RED
2	——	6	BLK/YEL
3	WHT/BLK	7	——
④	WHT/BLK	⑧	WHT/GRN
		9	WHT

C354*2

①	BLK/WHT
②	BLK
③	GRN/RED

C361



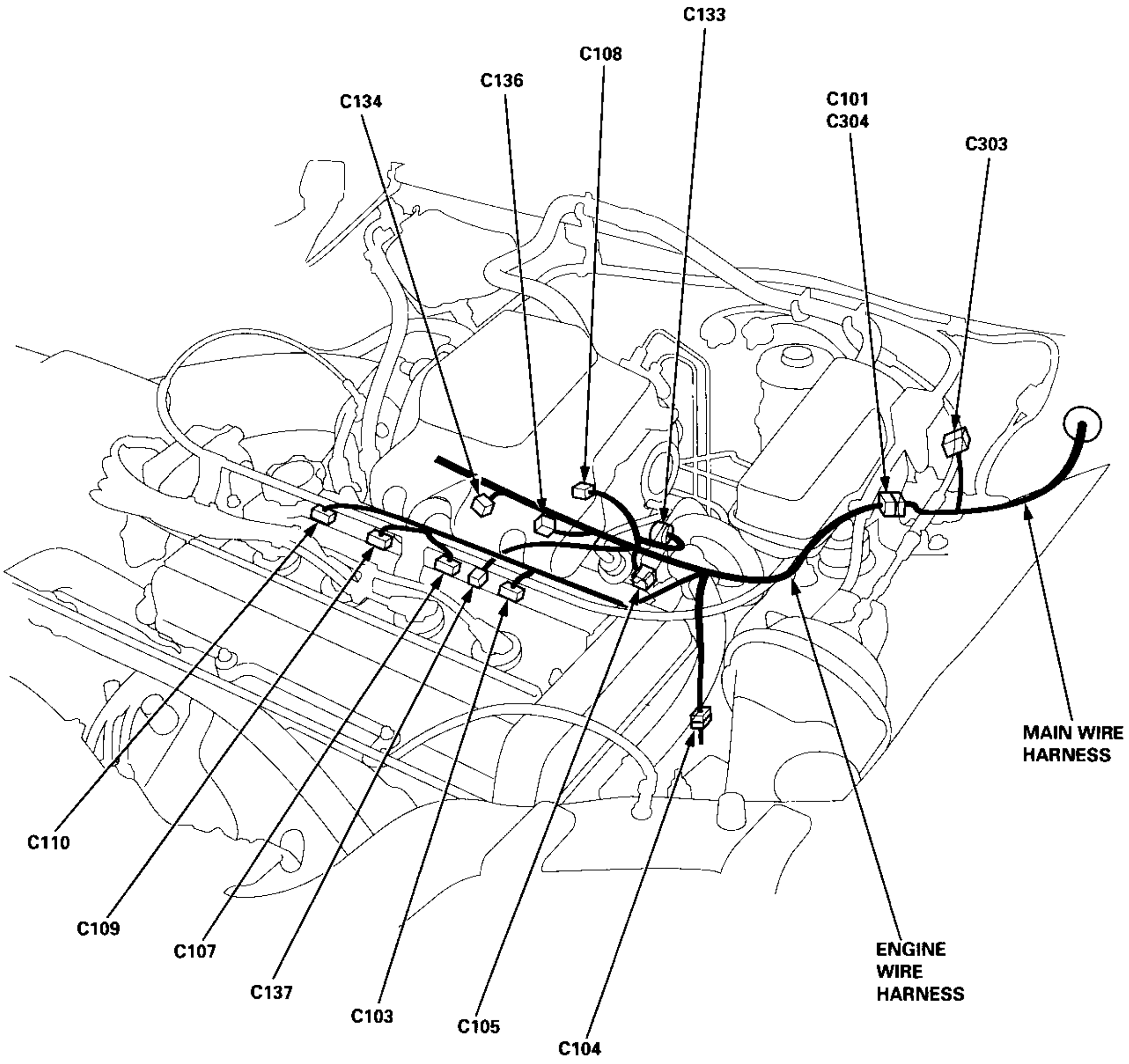
①	LT GRN/WHT
②	BLK/WHT

*2: USA

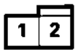
NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^{1} and YEL/BLK^{2} are not the same).
- ○: Related to Fuel and Emissions System.
- — Connector with male terminals (double outline): View from terminal side
  — Connector with female terminals (single outline): View from wire side

(cont'd)

System Connectors [Engine Compartment] — '99 – 00 Models (cont'd)

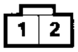


C103



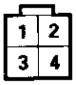
1	YEL/BLK^1
2	BRN^2

C104



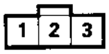
1	BLU/RED^2
2	WHT/RED^4

C105
(USA)



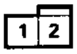
1	BLK/YEL
②	WHT/GRN
3	WHT/BLU
④	WHT/RED^3

C105
(Canada)



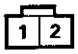
1	WHT/RED^3
2	BLK/YEL
3	WHT/BLU

C107



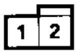
①	YEL/BLK^1
②	RED^1

C108



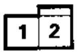
①	BLK/YEL
②	RED/YEL^1

C109



①	YEL/BLK^1
②	BLU^4

C110

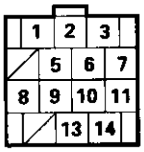


1	YEL/BLK
2	YEL

C133

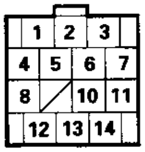
1	GRN/BLK^7
2	RED/YEL^2

C134



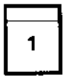
1	BLK/YEL	⑧	GRN/BLK^2
2	BLK/YEL	⑨	GRN/BLK^2
3	BLK/YEL	⑩	GRN/BLK^7
4	——	⑪	GRN/BLK^7
⑤	BLK/YEL	12	——
⑥	BLK/YEL	⑬	GRN/BLK^2
⑦	BLK/YEL	⑭	GRN/BLK^2

C136



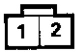
①	BLK^1	⑧	YEL/BLK^1
②	BLK^1	9	——
③	BLK^1	⑩	YEL/BLK^1
4	BLK	⑪	YEL/BLK^1
⑤	BLK^1	⑫	YEL/BLK^1
⑥	BLK^1	⑬	YEL/BLK^1
⑦	BLK^1	⑭	YEL/BLK^1

C137



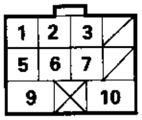
①	RED/BLU

C303



1	——
2	BLU^3

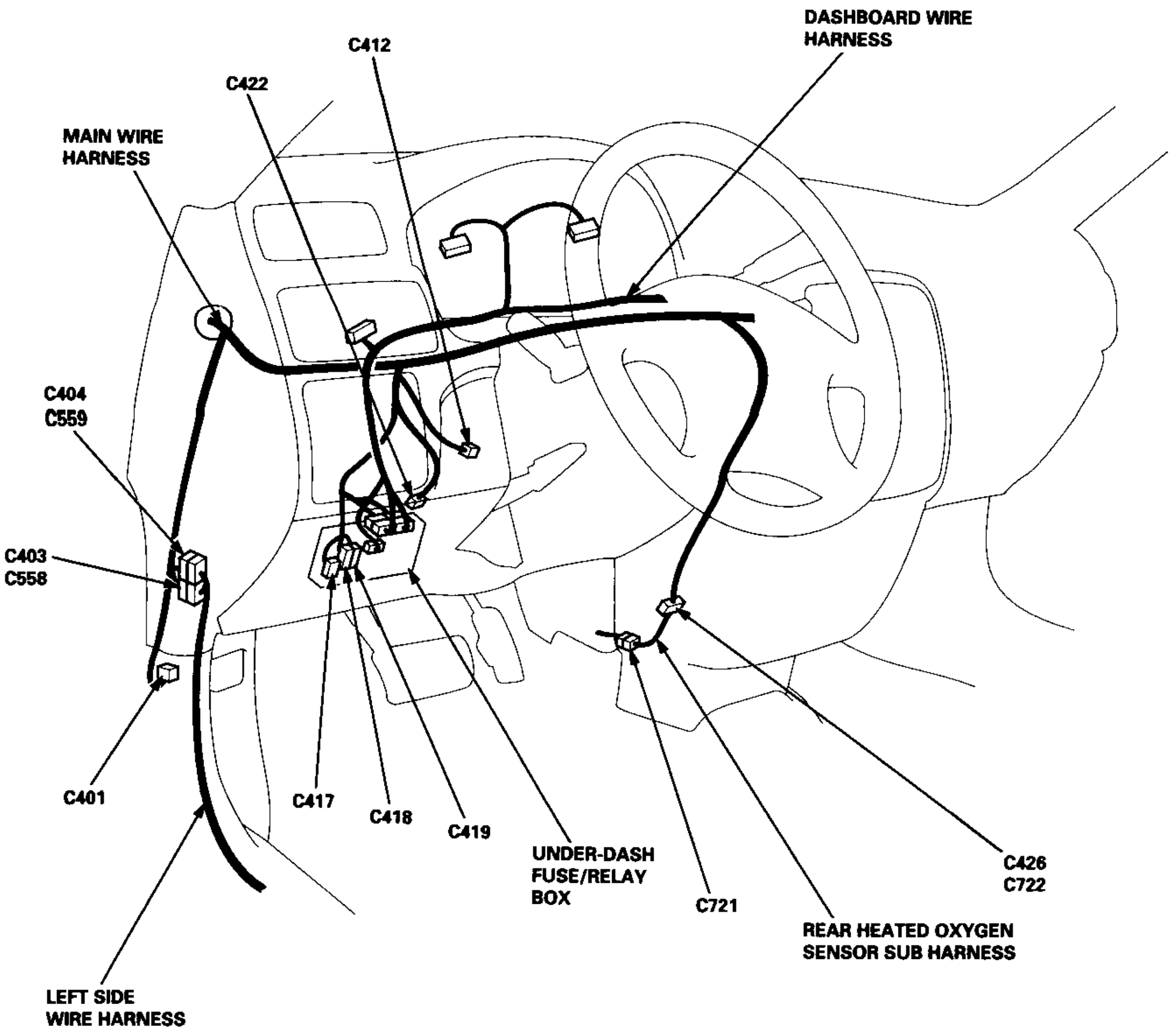
C304



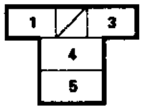
①	BLK/WHT	6	WHT/BLU
②	BLK^1	7	YEL/GRN
3	YEL/RED	8	——
4	——	9	BLK/RED
⑤	YEL/BLK^1	10	RED

NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^1 and YEL/BLK^2 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 Connectors [Dash and Floor] — '98 – 00 Models

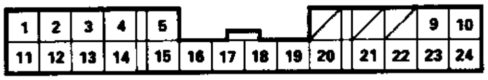


C401



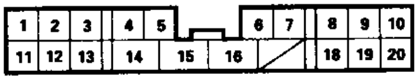
①	BLK/WHT
2	——
③	GRY
④	BLK/RED
⑤	BLK/WHT

C403



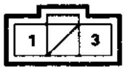
1	BLU/YEL	13	GRN/RED
2	GRN/YEL	14	BLU/RED
3	GRY	15	YEL
4	GRN/WHT	16	GRN/WHT
5	GRN/ORN	17	YEL/BLK
6	——	18	YEL/RED
7	——	19	RED/BLU
8	——	⑳	GRN/BLK^2
9	RED	㉑	BLK/WHT
10	WHT	㉒	YEL/BLU
11	GRY	㉓	LT GRN^1
12	LT BLU	㉔	BLU^1

C404



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

C412



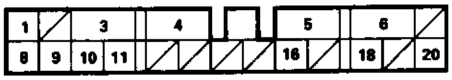
①	BLK/WHT
2	——
③	WHT/BLK

C417

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/GRN
9	RED/WHT	18	RED/GRN

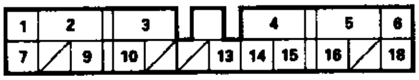
*: With ABS

C418



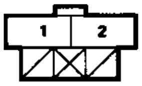
1	RED/BLU	⑪	BLU/WHT
2	——	12	——
③	BLK	13	——
4	RED/GRN	14	——
5	WHT/GRN	15	——
6	WHT/BLU	16	BLK/WHT
7	——	17	——
⑧	YEL/GRN	18	WHT/GRN
9	BLK/YEL	19	——
⑩	BLU/WHT	20	WHT/RED

C419



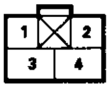
1	RED	10	YEL/RED
2	WHT/RED	11	——
3	WHT	12	——
④	BLK/RED	13	WHT/GRN
5	WHT	⑭	BLK/WHT
6	WHT/RED	15	GRN/RED
7	WHT/BLK	16	YEL
8	——	17	——
9	YEL/BLK	18	RED/GRN

C422
(without cruise control)



①	GRN/WHT^1
②	WHT/GRN
3	——
4	——

C422
(with cruise control)

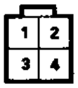


1	LT GRN
2	GRY
③	GRN/WHT^1
④	WHT/GRN

C426

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

C721



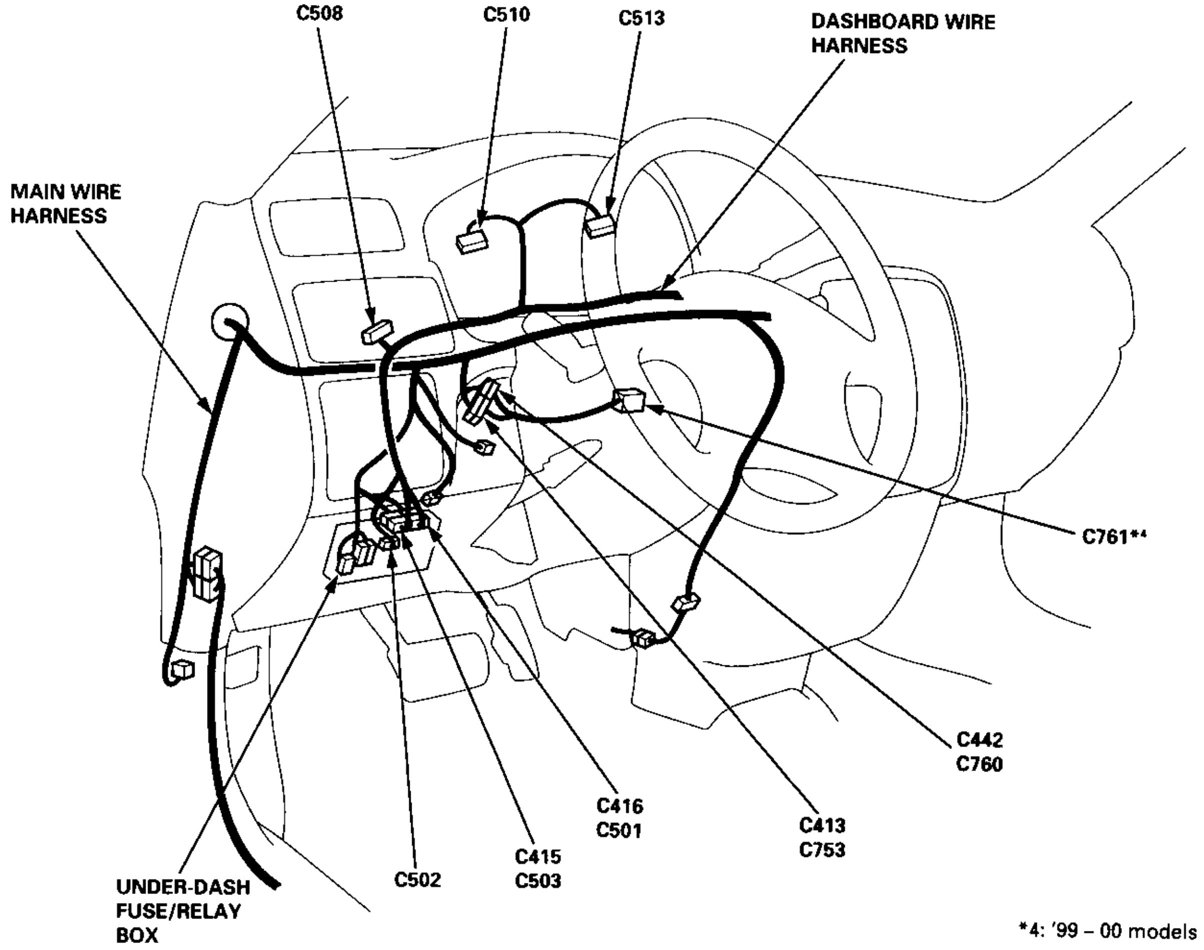
①	WHT/RED^1
②	GRN/WHT^2
③	BLK/WHT^1
④	BLK/WHT

NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^1 and YEL/BLK^2 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

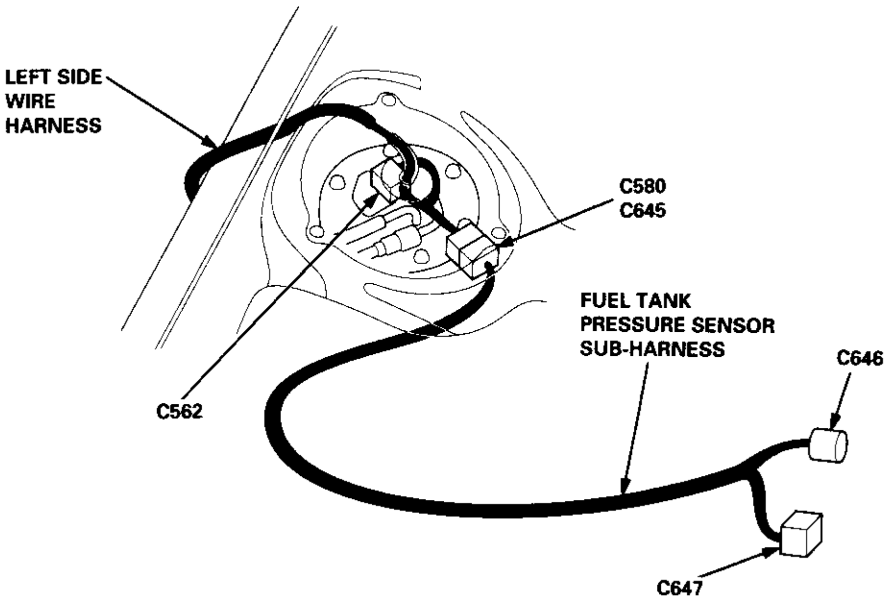
(cont'd)

System Description

System Connectors [Dash and Floor] — '98 – 00 Models (cont'd)



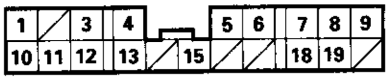
*4: '99 – 00 models



C501

①	YEL^{4}	⑥	LT GRN^{2}
②	GRN LT BLU^{*4}	7	YEL
		⑧	BLK/BLU
③	BLU^{7}	⑨	WHT^{4}
④	BRN^{3}	⑩	RED
⑤	GRN/BLK^{1}		

C502

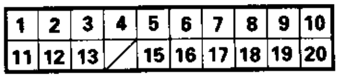


1	RED/GRN	11	YEL/BLK
2	——	12	BLK/YEL
3	WHT/BLU	13	YEL/GRN
④	BLK	14	——
5	GRN/WHT	15	RED/BLK
6	GRN/RED	16	——
7	GRN/ORN	17	——
8	BLU/YEL	18	BLK/WHT
9	GRN/YEL	19	YEL/RED
⑩	YEL	20	——

C503

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

C508

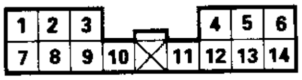


1	RED	11	RED
2	RED	12	RED
3	YEL	⑬	BLK
4	YEL	14	——
5	YEL	⑮	BLK
6	YEL	⑯	BLK
7	RED/BLK	17	BLK
8	RED/BLK	18	BLK
9	RED/BLK	19	BLK
10	RED/BLK	20	BLK

C510

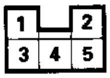
1	——	8	BLU
2	——	9	——
3	YEL/RED	10	——
④	YEL	11	——
⑤	GRN/ORN	12	RED
6	RED/GRN	13	RED/BLK
7	GRN/RED		

C513



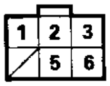
1	YEL	8	BLK
2	RED/BLK	⑨	GRN/BLK^{1}
3	RED	⑩	GRN BLU^{7*4}
④	BLU^{7} BRN^{3*4}	⑪	RED
⑤	BLK/BLU	⑫	WHT^{4}
⑥	BRN^{3} LT BLU^{*4}	13	YEL
		⑭	LT GRN^{2}
⑦	YEL^{4}		

C562



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

C580

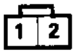


①	BLU^{1}
②	LT GRN^{1}
③	BLK/WHT
4	——
⑤	YEL/BLU
⑥	GRN/BLK^{7}

C646

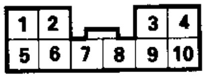
①	YEL/BLU
②	GRN/BLK^{2}
③	LT GRN^{1}

C647



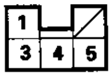
①	BLK/WHT
②	BLU^{1}

C753



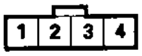
1	GRN	6	WHT/BLK
2	GRN/BLK	7	YEL/BLU
3	BLU/YEL	8	WHT/BLK
4	BLU	9	BLU/BLK
5	LT GRN/RED	⑩	BLK

C760



①	GRN
2	——
3	RED
4	YEL/BLK
5	YEL

C761^{*4}



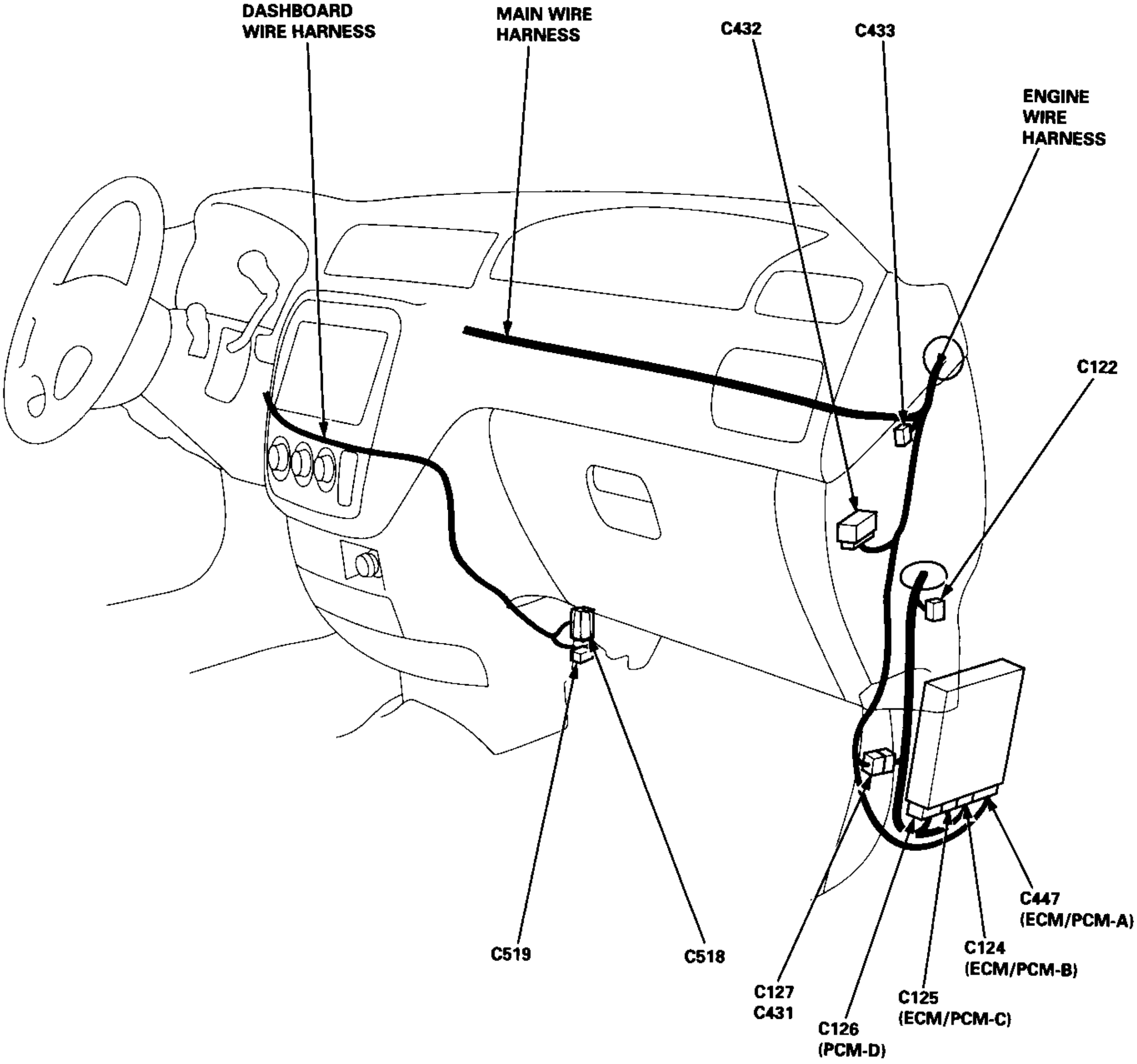
①	GRN
②	BLK
3	WHT/BLK
4	BLK

*4: '99 – 00 models

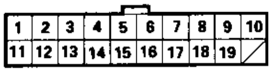
NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^{1} and YEL/BLK^{2} are not the same).
- ○: Related to Fuel and Emissions System.
- — Connector with male terminals (double outline): View from terminal side
  — Connector with female terminals (single outline): View from wire side

(cont'd)

System Connectors [Dash and Floor] — '98 - 00 Models (cont'd)

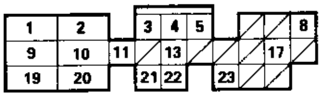


C122



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

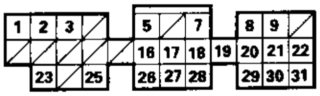
C124 (ECM/PCM-B)



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

*1: A/T
*4: '99 - 00 models

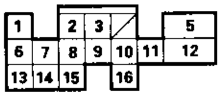
C125 (ECM/PCM-C)



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

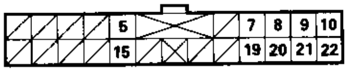
*4: '99 model

C126 (PCM-D)*1



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

C127*3



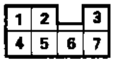
1	——	12	——
2	——	13	——
3	——	14	——
4	——	⑮	PNK
⑤	YEL^4	16	——
6	——	17	——
7	GRN	18	——
⑧	GRN/BLK^2	⑲	BLU/WHT^2
⑨	GRN^2	⑳	YEL/BLU
⑩	WHT/BLU	㉑	RED/YEL^1
11	——	㉒	BRN/BLK^1

C127*4

①	LT GRN^2	12	GRY
②	WHT^4	⑬	RED/BLK
③	BLK/BLU	⑭	BLU^7
④	BRN^3	⑮	PNK^2
⑤	YEL^4	⑯	PNK^{1*}
6	——	17	——
7	GRN	18	——
⑧	BRN/BLK^2	⑲	BLU/WHT^2
⑨	GRN	⑳	YEL/BLU
⑩	WHT/BLU	㉑	RED/YEL^1
⑪	PNK^1	㉒	BRN/BLK^1

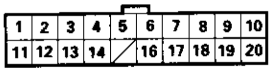
*: With cruise control

C432



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

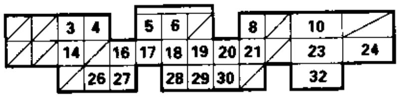
C433



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

*1: A/T
*3: '98 model
*4: '99 – 00 models

C447 (ECM/PCM-A)



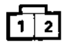
1	——	13	——	25	——
2	——	⑭	GRN/BLK^{1*1}	㉖	GRN^2
③	BLU^1	15	——	㉗	BLU/RED^1
④	LT GRN/WHT	⑯	GRN/YEL	㉘	WHT/RED^{2*1}
⑤	BLU^{2*1}	⑰	BLK/RED	㉙	LT GRN^1
⑥	RED/YEL^1	⑱	GRN/ORN	㉚	GRN/RED
7	——	⑲	BLU^3	31	——
⑧	BLK/WHT^1	⑳	GRN^1	㉜	GRN/WHT^1
9	——	㉑	BLU/YEL^1		
⑩	BRN^1	22	——		
11	——	㉓	WHT/RED^1		
12	——	㉔	BLU/WHT^1		

*1: A/T

C518

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

C519



①	BRN^1
②	BLK

NOTE:
- Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK^1 and YEL/BLK^2 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

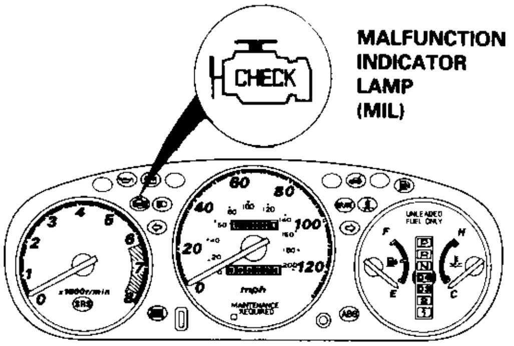
Troubleshooting Procedures

I. How To Begin Troubleshooting

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

A. When the MIL has come on:

1. Connect the Honda PGM Tester or an OBD II scan tool to the 16P Data Link Connector (DLC) located behind the right side of the center console.
2. Turn the ignition switch ON (II).
3. Check the DTC and note it. Also check and note the freeze frame data.
   Refer to the Diagnostic Trouble Code Chart and begin troubleshooting.



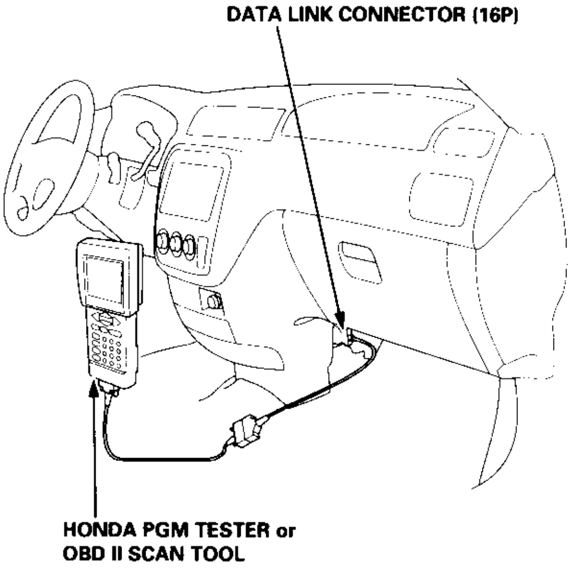
NOTE:

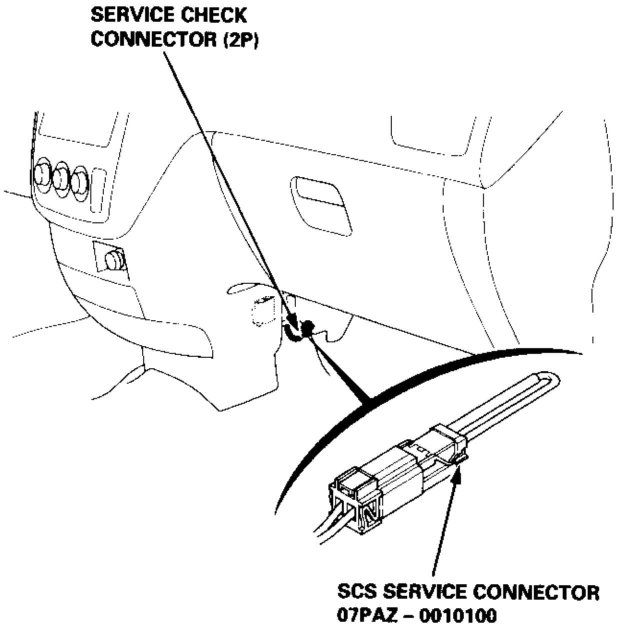
- See the OBD II scan tool or Honda PGM Tester user's manuals for specific operating instructions.
- The scan tool or tester can read the Diagnostic Trouble Codes (DTC), freeze frame data, current data, and other Engine Control Module (ECM)/Powertrain Control Module (PCM) data.
- Freeze frame data indicates 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 11-64.

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 behind the right side of the center console.) Turn the ignition switch ON (II).

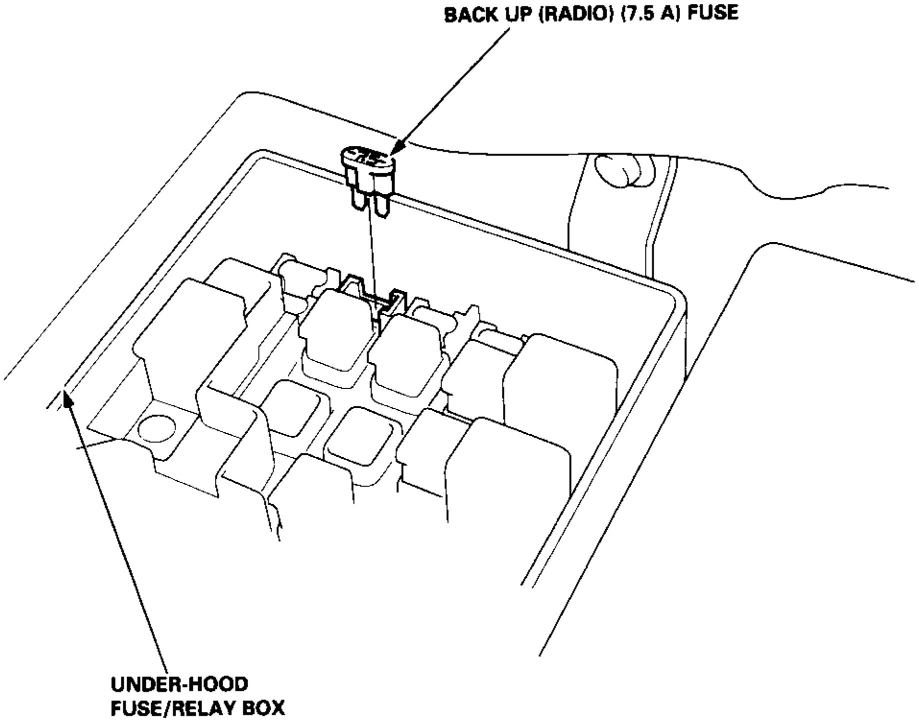




II. Engine Control Module (ECM)/Powertrain Control Module (PCM) Reset Procedure

Either of the following actions will reset the ECM/PCM.

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



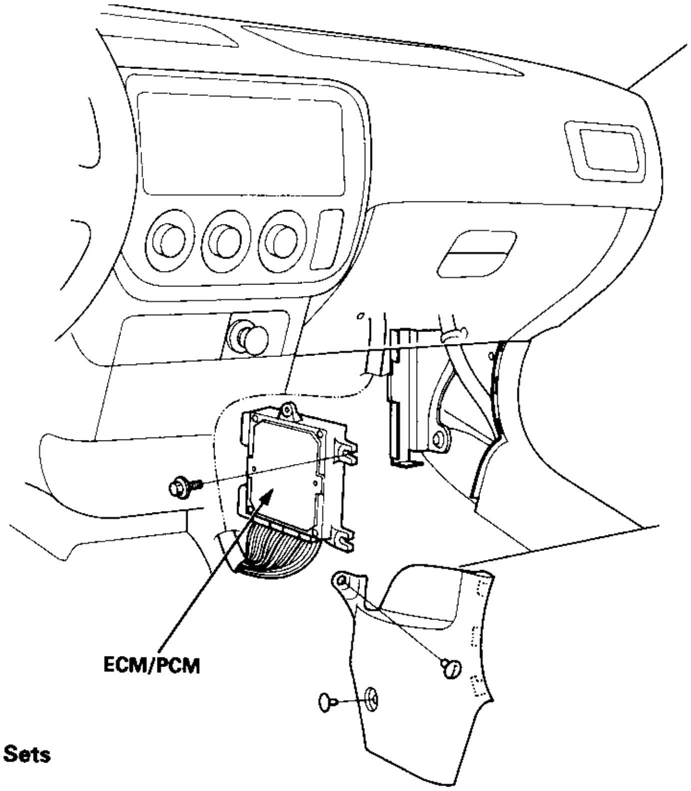
III. Final Procedure (this procedure must be done after any troubleshooting)

1. Remove the SCS Service Connector if it is connected. If the SCS service connector is connected, and there are no DTCs stored in the ECM/PCM, the MIL will stay on when the ignition switch is turned ON (II).
2. Do the ECM/PCM Reset Procedure.
3. Turn the ignition switch OFF.
4. Disconnect the OBD II scan tool or Honda PGM Tester from the Data Link Connector (16P).

(cont'd)

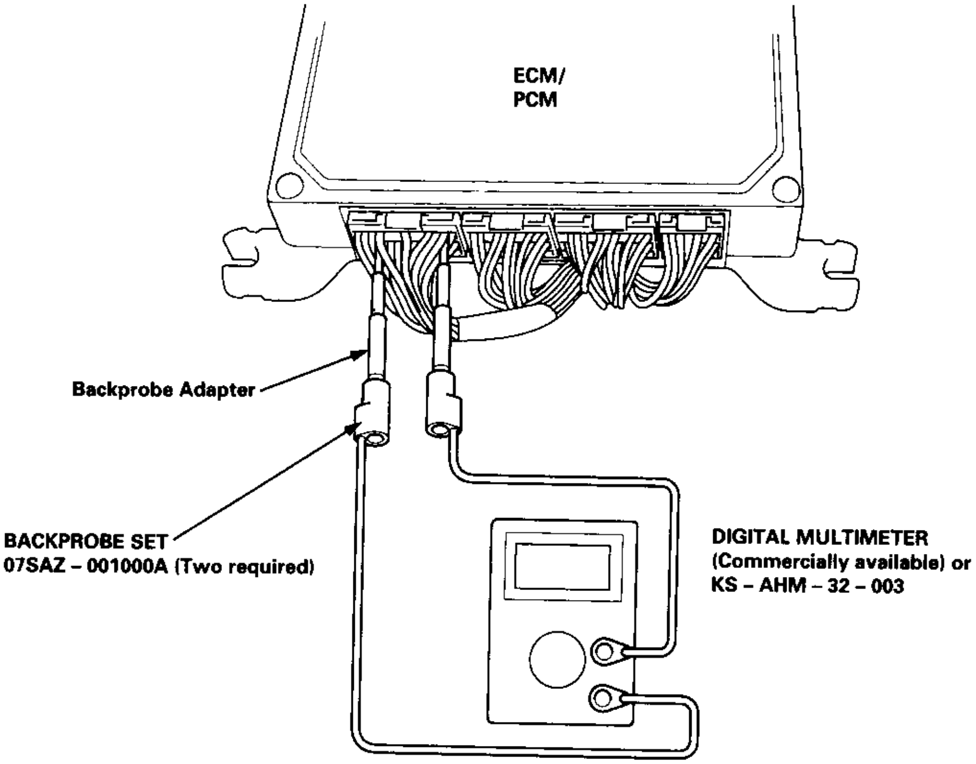
Troubleshooting Procedures (cont'd)

If the inspection for a particular code requires voltage or resistance checks at the ECM/PCM connectors, remove the right kick panel. Unbolt the ECM/PCM, 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.



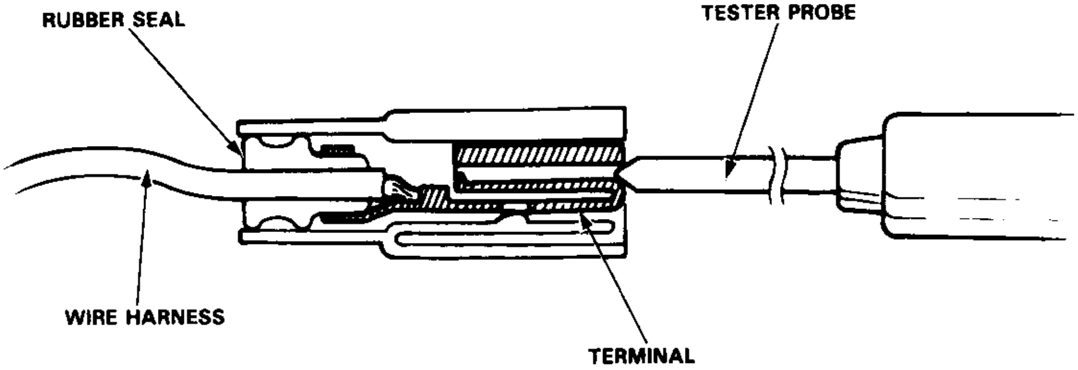
How to Use the Backprobe Sets

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 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 11-60.
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	4, 2, 3, 5, 20, 15, 1
Hard starting	2, 4, 12, 17, 14, 19
Cold fast idle too low	7, 8, 9, 6, 17
Cold fast idle too high	7, 8, 9, 11, 10
Idle speed fluctuates	9, 7, 8, 11, 10
Misfire or rough running	Troubleshoot for misfire on pages 11-126, 127
Low power	2, 10, 11, 13, 17, 18, 20
Engine stalls	2, 4, 12, 7, 20, 9, 5, 16

Other Probable Causes for an engine that will not start:

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

Probable Cause List (For the DTC Chart, see page 11-75.)

Probable Cause	Page	System
1	11-82	Engine Control Module (ECM)/Powertrain Control Module (PCM)
2	11-178	Fuel pressure
3	11-187	PGM-FI main relay
4	Section 4	Ignition system
5	11-131, 146	Crankshaft Position/Top Dead Center/Cylinder Position sensor circuit
6	11-95	Intake Air Temperature (IAT) sensor circuit
7	11-152	Idle Air Control (IAC) Valve
8	11-168	Fast idle thermo valve
9	11-169	Idle speed adjustment
10	11-196	Throttle body
11	11-194	Throttle cable
12	11-90	Manifold Absolute Pressure (MAP) sensor
13	11-103	Throttle Position (TP) sensor
14	11-137	Barometric pressure (BARO) sensor
15	Section 14	A/T gear position signal
16	11-166	Brake switch signal
17	11-194	Air Cleaner
18	11-199	Three Way Catalytic Converter (TWC)
19	11-203	Evaporative emission (EVAP) control
20	——	Contaminated fuel

ECM/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 ECM/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 position Park or neutral and the A/C and all accessories turned off.

Data	Description	Operating Value	Freeze Data
Diagnostic Trouble Code (DTC)	If the ECM/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 ECM/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 At idle speed: '97 – 98 models: 750 ± 50 rpm '99 – 00 models: 730 ± 50 rpm	YES
Vehicle Speed	The ECM/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 caused in the intake manifold by engine load and speed.	With engine stopped: Nearly the same as atmospheric pressure At idle speed: 28 – 41 kPa (210 – 310 mmHg, 8.3 – 12.2 inHg)	YES
Engine Coolant Temperature (ECT)	The ECT sensor converts coolant temperature into voltage and signals the ECM/PCM. The sensor is a thermistor whose internal resistance changes with coolant temperature. The ECM/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: approx. 163 – 212°F (73 – 100°C)	YES
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 ECM/PCM. Based on these signals, the ECM/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

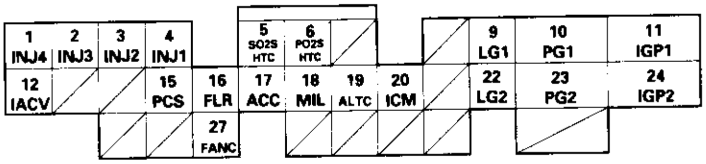
(cont'd)

Troubleshooting Procedures (cont'd)

Data	Description	Operating Value	Freeze Data
HO2S Feedback Loop Status	Loop status is indicated as "open" or "closed". Closed: Based on the HO2S output, the ECM/PCM determines the air/fuel ratio and controls the amount of injected fuel. Open: ignoring HO2S output, the ECM/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 ECM/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 ECM/PCM reduces the amount of injected fuel. This cycle keeps the air/fuel ratio close to the stoichiometric ratio when in closed loop status.	± 20%	YES
Long Term Fuel Trim	Long term fuel trim is computed from short term fuel trim and indicates changes occuring 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.	± 20%	YES
Intake Air Temperature (IAT)	The IAT sensor converts intake air temperature into voltage and signals the ECM/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 ECM/PCM. The ECM/PCM matches ignition timing to the driving conditions.	At idle speed: 16° ± 4° 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: 28 – 41% At 2,500 rpm with no load: 13 – 26%	YES

Powertrain Control Module Terminal Arrangement — '97 Model

PCM CONNECTOR A (32P)



Wire side of female terminals

PCM CONNECTOR A (32P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	YEL	INJ4 (No. 4 FUEL INJECTOR)	Drives No. 4 fuel injector.	With engine running: duty controlled
2	BLU	INJ3 (No. 3 FUEL INJECTOR)	Drives No. 3 fuel injector.	
3	RED	INJ2 (No. 2 FUEL INJECTOR)	Drives No. 2 fuel injector.	
4	BRN	INJ1 (No. 1 FUEL INJECTOR)	Drives No. 1 fuel injector.	
5	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
6	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
9	BRN/BLK	LG1 (LOGIC GROUND)	Ground for the PCM control circuit.	Less than 1.0 V at all times
10	BLK	PG1 (POWER GROUND)	Ground for the PCM power circuit.	
11	YEL/BLK	IGP1 (POWER SOURCE)	Power source for the PCM control circuit.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
12	BLK/BLU	IACV (IDLE AIR CONTROL VALVE)	Drives IACV.	With engine running: duty controlled
15	RED/YEL	PCS (EVAP PURGE CONTROL SOLENOID VALVE)	Drives EVAP purge control solenoid valve.	With engine running, engine coolant below 154°F (68°C): battery voltage With engine running, engine coolant above 154°F (68°C): duty controlled
16	GRN/YEL	FLR (FUEL PUMP RELAY)	Drives fuel pump 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 LAMP)	Drives MIL.	With MIL turned ON: 0 V With MIL turned OFF: battery voltage
19*	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
20	YEL/GRN	ICM (IGNITION CONTROL MODULE)	Sends ignition pulse.	With ignition switch ON (II): battery voltage With engine running: pulses
22	BRN/BLK	LG2 (LOGIC GROUND)	Ground for the PCM control circuit.	Less than 1.0 V at all times
23	BLK	PG2 (POWER GROUND)	Ground for the PCM power circuit.	
24	YEL/BLK	IGP2 (POWER SOURCE)	Power source for the PCM control circuit.	With ignition switch ON (II): battery voltage With engine switch OFF: 0 V
27	GRN	FANC (RADIATOR FAN CONTROL)	Drives radiator fan relay.	With radiator fan running: 0 V With radiator fan stopped: battery voltage

*: USA

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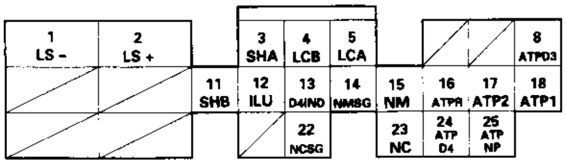
Powertrain Control Module Terminal Arrangement — '97 Model (cont'd)

PCM CONNECTOR B (25P)



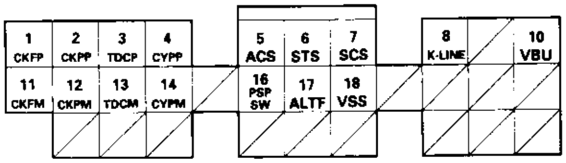
Wire side of female terminals

PCM CONNECTOR B (25P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	WHT	LS – (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE –)	Drives A/T clutch pressure control solenoid valve	With ignition switch ON (II): duty controlled
2	RED	LS + (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE +)	Drives A/T clutch pressure control solenoid valve	With ignition switch ON (II): duty controlled
3	BLU/YEL	SHA (SHIFT CONTROL SOLENOID VALVE A)	Drives shift control solenoid valve A.	In 2nd, R position, in 2nd and 3rd gear in D4, D3 position: Battery voltage In 1st gear in D4, D3 position, in 4th gear in D4 position: 0 V
4	GRN/BLK	LC B (LOCK-UP CONTROL SOLENOID VALVE B)	Drives lock-up control solenoid valve B.	With full lock-up: Battery voltage With half lock-up: duty controlled
5	YEL	LC A (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
8	PNK	ATPD3 (A/T GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In D3 position: 0 V In any other position: battery voltage
11	GRN/WHT	SHB (SHIFT CONTROL SOLENOID VALVE B)	Drives shift control solenoid valve B.	In 1st, 2nd position, in 1st and 2nd gear in D4, D3 position: Battery voltage In R position, in 3rd gear in D4, D3, in 4th gear in D4 position: 0 V
12	WHT/RED	ILU (INTERLOCK CONTROL UNIT)	Detects interlock control unit signal.	With ignition switch ON (II) and brake pedal depressed: battery voltage
13	GRN/BLK	D4 IND (D4 INDICATOR LIGHT)	Drives D4 indicator light.	With D4 indicator light turned ON: battery voltage With D4 indicator light turned OFF: 0 V
14	WHT	NMSG (MAINSHAFT SPEED SENSOR GROUND)	Ground for mainshaft speed sensor.	
15	RED	NM (MAINSHAFT SPEED SENSOR)	Detects mainshaft speed sensor signal.	With engine running: pulses
16	WHT	ATPR (A/T GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In R position: 0 V In any other position: battery voltage
17	BLU	ATP2 (A/T GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In 2nd position: 0 V In any other position: battery voltage
18	BRN	ATP1 (A/T GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In 1st position: 0 V In any other position: battery voltage
22	GRN	NCSG (COUNTERSHAFT SPEED SENSOR GROUND)	Ground for countershaft speed sensor.	
23	BLU	NC (COUNTERSHAFT SPEED SENSOR)	Detects countershaft speed sensor signal.	With ignition switch ON (II), and front wheels rotating: pulses
24	YEL	ATPD4 (A/T GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In D4 position: 0 V In any other position: battery voltage
25	LT GRN	ATPNP (A/T GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In park or neutral: 0 V In any other position: about 5 V

PCM CONNECTOR C (31P)



Wire side of female terminals

PCM CONNECTOR C (31P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	BLU/RED	CKFP (CKF SENSOR P SIDE)	Detects CKF sensor.	With engine running: pulses
2	BLU	CKPP (CKP SENSOR P SIDE)	Detects CKP sensor.	With engine running: pulses
3	GRN	TDCP (TDC SENSOR P SIDE)	Detects TDC sensor.	With engine running: pulses
4	YEL	CYPP (CYP SENSOR P SIDE)	Detects CYP sensor.	With engine running: pulses
5	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
6	BLU/ORN	STS (STARTER SWITCH SIGNAL)	Detects starter switch signal.	With starter switch ON (III): battery voltage With starter switch OFF: 0 V
7	BRN	SCS (SERVICE CHECK SIGNAL)	Detects service check connector signal (the signal causing a DTC indication)	With the connector connected: 0 V With the connector disconnected: about 5 V or battery voltage
8	LT BLU	K-LINE	Sends and receives scan tool signal.	With ignition switch ON (II): pulses
10	WHT/BLU	VBU (VOLTAGE BACK UP)	Power source for the PCM control circuit. Power source for the DTC memory	Battery voltage at all times
11	WHT/RED	CKFM (CKF SENSOR M SIDE)	Ground for CKF sensor signal.	
12	WHT	CKPM (CKP SENSOR M SIDE)	Ground for CKP sensor signal.	
13	RED	TDCM (TDC SENSOR M SIDE)	Ground for TDC sensor signal.	
14	BLK	CYPM (CKP SENSOR M SIDE)	Ground for CYP sensor signal.	
16	GRN	PSPSW (P/S PRESSURE SWITCH)	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
17	WHT/RED	ALTF (ALTERNATOR FR SIGNAL)	Detects alternator FR signal.	With fully warmed up engine running: 0 V-battery voltage (depending on electrical load)
18	BLU/WHT	VSS (VEHICLE SPEED SENSOR)	Detects VSS signal.	With ignition switch ON (II) and front wheels rotating: cycles 0 V – 5 V or battery voltage

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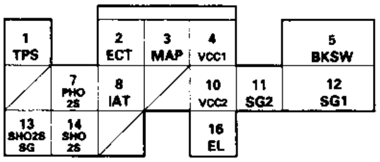
Powertrain Control Module Terminal Arrangement — '97 Model (cont'd)

PCM CONNECTOR D (16P)



Wire side of female terminals

PCM CONNECTOR D (16P)

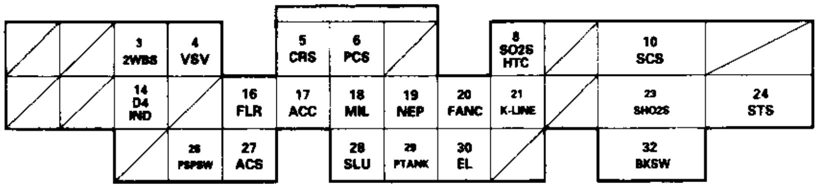
NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	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
2	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)
3	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)
4	YEL/RED	VCC1 (SENSOR VOLTAGE)	Power source for MAP sensor.	With ignition switch ON (II): about 5 V With ignition switch OFF: 0 V
5	GRN/WHT	BKSW (BRAKE SWITCH)	Detects brake switch signal.	With brake pedal released: 0 V With brake pedal depressed: battery voltage
7	WHT	PHO2S (PRIMARY HEATED OXYGEN SENSOR SENSOR 1)	Detects heated primary 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
8	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)
10	YEL/BLU	VCC2 (SENSOR VOLTAGE)	Provides sensor voltage.	With ignition switch ON (II): about 5 V With ignition switch OFF: 0 V
11	GRN/BLK	SG2 (SENSOR GROUND)	Sensor ground.	Less than 1.0 V at all times
12	GRN/WHT	SG1 (SENSOR GROUND)	Ground for MAP sensor.	Less than 1.0 V at all times
13	RED/YEL	SHO2S SG (SECONDARY HEATED OXYGEN SENSOR, SENSOR 2 GROUND)	Ground for secondary heated oxygen sensor (sensor 2).	
14	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
16*	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

*: USA

Engine/Powertrain Control Module Terminal Arrangement — '98 – 00 Models

ECM/PCM CONNECTOR A (32P)



Wire side of female terminals

ECM/PCM CONNECTOR A (32P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
3	BLU	2WBS (EVAP BYPASS SOLENOID VALVE)	Drives EVAP bypass solenoid valve.	With ignition switch ON (II): battery voltage
4	LT GRN/WHT	VSV (EVAP CONTROL CANISTER VENT SHUT VALVE)	Drives EVAP control canister vent shut valve.	With ignition switch ON (II): battery voltage
5*1	BLU	CRS (CRUISE CONTROL SIGNAL)	Shift Down signal input from cruise control unit.	When cruise control is used: pulses
6	RED/YEL	PCS (EVAP PURGE CONTROL SOLENOID VALVE)	Drives EVAP purge control solenoid valve.	With engine running, engine coolant, below 154°F (68°C): battery voltage With engine running, engine coolant, above 154°F (68°C): duty controlled
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: about 5 V or battery voltage
14*1	GRN/BLK	D4IND (D4 INDICATOR)*3 DIND (D INDICATOR)*4	Drives D4*3, D*4 indicator light.	With D4*3, D*4 indicator light turned ON: battery voltage With D4*3, D*4 indicator light turned OFF: 0 V
16	GRN/YEL	FLR (FUEL PUMP RELAY)	Drives fuel pump 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
19	BLU	NEP (ENGINE SPEED PULSE)	Outputs engine speed pulse.	With engine running: pulses
20	GRN	FANC (RADIATOR FAN CONTROL)	Drives radiator fan relay.	With radiator fan running: 0 V With radiator fan stopped: battery voltage
21	BLU/YEL	K-LINE	Sends and receives scan tool signal.	With ignition switch ON (II): pulses
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/WHT	STS (STARTER SWITCH SIGNAL)	Detects starter switch signal.	With starter switch ON (III): battery voltage With starter switch OFF: 0 V
26	GRN	PSPSW (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: about 5 V
28*1	WHT/RED	SLU (INTERLOCK CONTROL UNIT)	Drives interlock control unit.	With ignition switch ON (II) and brake pedal depressed: battery voltage
29	LT GRN	PTANK (FUEL TANK PRESSURE SENSOR)	Detects fuel tank pressure sensor signal.	With ignition switch ON (II) and fuel fill cap opened: about 2.5 V
30*5	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

*1: A/T
*2: M/T
*3: '98 model
*4: '99 – 00 models
*5: USA

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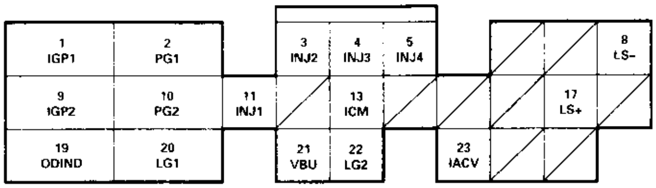
Engine/Powertrain Control Module Terminal Arrangement — '98 – 00 Models (cont'd)

ECM/PCM CONNECTOR B (25P)



Wire side of female terminals

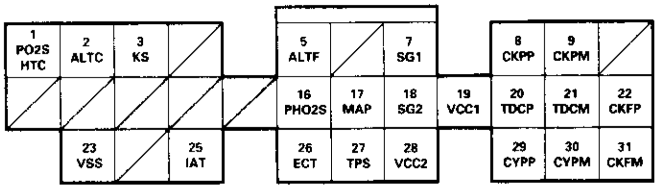
ECM/PCM CONNECTOR B (25P)

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 ECM/PCM control circuit.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
2	BLK	PG1 (POWER GROUND)	Ground for the ECM/PCM control circuit.	Less than 1.0 V at all times
3	RED	INJ2 (No. 2 FUEL INJECTOR)	Drives No. 2 fuel injector.	With engine running: duty controlled
4	BLU	INJ3 (No. 3 FUEL INJECTOR)	Drives No. 3 fuel injector.	
5	YEL	INJ4 (No. 4 FUEL INJECTOR)	Drives No. 4 fuel injector.	
8*1	WHT	LS- (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE – SIDE)	A/T clutch pressure control solenoid valve power supply negative terminal.	With ignition switch ON (II): duty controlled
9	YEL/BLK	IGP2 (POWER SOURCE)	Power source for the ECM/PCM control circuit.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
10	BLK	PG2 (POWER GROUND)	Ground for the ECM/PCM control circuit.	Less than 1.0 V at all times
11	BRN	INJ1 (No. 1 FUEL INJECTOR)	Drives No. 1 fuel injector.	With engine running: duty controlled
13	YEL/GRN	ICM (IGNITION CONTROL MODULE)	Sends ignition pulse.	With ignition switch ON (II): battery voltage With engine running: pulses
17*1	RED	LS+ (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE + SIDE)	A/T clutch pressure control solenoid valve power supply positive terminal	With ignition switch ON (II): duty controlled
19*4	PNK	ODIND (OVER-DRIVE OFF INDICATOR)	Drives OVER-DRIVE OFF indicator light.	With OVER-DRIVE OFF indicator light turned ON: 0 V With OVER-DRIVE OFF indicator light turned OFF: battery voltage
20	BRN/BLK	LG1 (LOGIC GROUND)	Ground for the ECM/PCM control circuit.	Less than 1.0 V at all times
21	WHT/BLU	VBU (VOLTAGE BACK UP)	Power source for the ECM/PCM control circuit. Power source for the DTC memory.	Battery voltage at all times
22	BRN/BLK	LG2 (LOGIC GROUND)	Ground for the ECM/PCM control circuit.	Less than 1.0 V at all times
23	BLK/BLU	IACV (IDLE AIR CONTROL VALVE)	Drives IAC valve.	With engine running: duty controlled

*1: A/T
*2: M/T
*3: '98 model
*4: '99 – 00 models

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

ECM/PCM CONNECTOR C (31P)

NOTE: Standard battery voltage is 12 V.

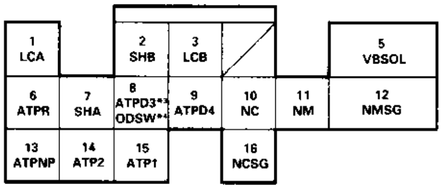
Terminal number	Wire color	Terminal name	Description	Signal
1	BLK/WHT	PO2SHTC (PRIMARY HEATED OXYGEN SENSOR HEATER CONTROL)	Drives primary heated oxygen sensor heater.	With ignition switch ON (II): battery voltage With fully warmed up engine running: duty controlled
2*5	WHT/GRN	ALTC (ALTERNATOR CONTROL)	Sends alternator control signal.	With fully warmed – up engine running: battery voltage During driving with small electrical load: 0 V
3*4	RED/BLU	KS (KNOCK SENSOR)	Detects KS signal.	With engine knocking: pulses
5	WHT/RED	ALTF (ALTERNATOR FR SIGNAL)	Detects alternator FR signal.	With fully warmed up engine running: 0 V – battery voltage (depending on electrical load)
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.	
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 wheels 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: pulses
30	BLK	CYPM (CYP SENSOR M SIDE)	Ground for CYP sensor.	
31	WHT/RED	CKFM (CKF SENSOR M SIDE)	Ground for CKF sensor signal.	

*1: A/T *3: '98 model
*2: M/T *4: '99 – 00 models
*5: USA

(cont'd)

Powertrain Control Module Terminal Arrangement — '98 – 00 Models (cont'd)

ECM/PCM CONNECTOR D (16P)



Wire side of female terminals

PCM CONNECTOR D (16P)

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1*1	YEL	LC A (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*1	GRN/WHT	SHB (SHIFT CONTROL SOLENOID VALVE B)	Drives shift control solenoid valve B.	In 1st, 2nd position, in 1st and 2nd gear in D4, D3 (D)*4 position: battery voltage In P, R, N position, in 3rd gear in D4, D3 (D)*4 position, in 4th gear in D4 (D)*4 position: 0 V
3*1	GRN/BLK	LC B (LOCK-UP CONTROL SOLENOID VALVE B)	Drives lock-up control solenoid valve B.	With full lock-up: Battery voltage With half lock-up: duty controlled
5*1	BLK/YEL	VBSOL (BATTERY VOLTAGE FOR SOLENOID VALVE)	Power source of solenoid valve.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
6*1	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*1	BLU/YEL	SHA (SHIFT CONTROL SOLENOID VALVE A)	Drives shift control solenoid valve A.	In 2nd, R position, in 2nd and 3rd gear in D4, D3 (D)*4 position: battery voltage In 1st gear in D4, D3 (D)*4 position, in 4th gear in D4 (D)*4 position, in P, N position: 0 V
8*1,*3	PNK	ATPD3 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In D3 position: 0 V In any other position: battery voltage
8*1,*4	PNK	ODSW (OVER-DRIVE SWITCH)	Detects OVER-DRIVE switch signal.	With Over-Drive OFF (O/D OFF indicator light turned ON): 0 V With Over-Drive ON (O/D OFF indicator light turned OFF): about 5 V
9*1	YEL	ATPD4*3, D*4 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In D4*3, D*4 position: 0 V In any other position: battery voltage
10*1	BLU	NC (COUNTERSHAFT SPEED SENSOR)	Detects countershaft speed sensor signals.	With ignition switch ON (II), and front wheels rotating: pulses
11*1	RED	NM (MAINSHAFT SPEED SENSOR)	Detects mainshaft speed sensor signals.	With engine running: pulses
12*1	WHT	NMSG (MAINSHAFT SPEED SENSOR GROUND)	Ground for mainshaft speed sensor.	
13*1	LT GRN	ATPNP (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*1	BLU	ATP2 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In 2nd position: 0 V In any other position: battery voltage
15*1	BRN	ATP1 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In 1st position: 0 V In any other position: battery voltage
16*1	GRN	NCSG (COUNTERSHAFT SPEED SENSOR GROUND)	Ground for countershaft speed sensor.	

*1: A/T *3: '98 model
*2: M/T *4: '99 – 00 models

Diagnostic Trouble Code (DTC) Chart

DTC (MIL indication*)	Detection Item	Probable Cause	Page
P0107 (3)	Manifold Absolute Pressure Circuit Low Input	• Open or short in MAP sensor circuit • MAP sensor • ECM/PCM	11-90
P0108 (3)	Manifold Absolute Pressure Circuit High Input	• Open in MAP sensor circuit • MAP sensor • ECM/PCM	11-92
P0111*3 (10)	Intake Air Temperature Circuit Range/Performance Problem	• IAT sensor	11-95
P0112 (10)	Intake Air Temperature Circuit Low Input	• Short in IAT sensor circuit • IAT sensor • ECM/PCM	11-96
P0113 (10)	Intake Air Temperature Circuit High Input	• Open in IAT sensor circuit • IAT sensor • ECM/PCM	11-97
P0116 (86)	Engine Coolant Temperature Circuit Range/Performance Problem	• ECT sensor • Cooling system	11-99
P0117 (6)	Engine Coolant Temperature Circuit Low Input	• Short in ECT sensor circuit • ECT sensor • ECM/PCM	11-100
P0118 (6)	Engine Coolant Temperature Circuit High Input	• Open in ECT sensor circuit • ECT sensor • ECM/PCM	11-101
P0122 (7)	Throttle Position Circuit Low Input	• Open or short in TP sensor circuit • TP sensor • ECM/PCM	11-103
P0123 (7)	Throttle Position Circuit High Input	• Open in TP sensor circuit • TP sensor • ECM/PCM	11-107
P0131 (1)	Primary Heated Oxygen Sensor *Circuit Low Voltage* (Sensor 1)	• Short in Primary HO2S (Sensor 1) *circuit* • Primary HO2S (Sensor 1) • Fuel supply system • ECM/PCM	11-110
P0132 (1)	Primary Heated Oxygen Sensor Circuit High Voltage (Sensor 1)	• Open in Primary HO2S (Sensor 1) circuit • Primary HO2S (Sensor 1) • ECM/PCM	11-113
P0133 (61)	Primary Heated Oxygen Sensor Slow Response (Sensor 1)	• Primary HO2S (Sensor 1) • Exhaust system	11-116
P0135 (41)	Primary Heated Oxygen Sensor Heater Circuit Malfunction (Sensor 1)	• Open or short in Primary HO2S (Sensor 1) heater circuit • ECM/PCM	11-121

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

**: The $\boxed{D_4}$ ($\boxed{D}$)*5 indicator light and the Malfunction Indicator Lamp (MIL) may come on simultaneously.

*1: A/T *3: '97 model *5: '99 – 00 models

*2: M/T *4: '98 model

(cont'd)

Troubleshooting

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

DTC (MIL indication)	Detection Item	Probable Cause	Page
P0137 (63)	Secondary Heated Oxygen Sensor Circuit Low Voltage (Sensor 2)	• Short in Secondary HO2S (Sensor 2) circuit • Secondary HO2S (Sensor 2) • ECM/PCM	11-117
P0138 (63)	Secondary Heated Oxygen Sensor Circuit High Voltage (Sensor 2)	• Open in Secondary HO2S (Sensor 2) circuit • Secondary HO2S (Sensor 2) • ECM/PCM	11-118
P0139 (63)	Secondary Heated Oxygen Sensor Slow Response (Sensor 2)	• Secondary HO2S (Sensor 2)	11-120
P0141 (65)	Secondary Heated Oxygen Sensor Heater Circuit Malfunction (Sensor 2)	• Open or short in Secondary HO2S (Sensor 2) heater circuit • ECM/PCM	11-121
P0171 (45)	System Too Lean	• Fuel supply system • Primary HO2S (Sensor 1) • MAP sensor • Contaminated fuel • Valve clearance • Exhaust leakage	11-124
P0172 (45)	System Too Rich	• Fuel supply system • Primary HO2S (Sensor 1) • MAP sensor • Contaminated fuel • Valve clearance	11-124
P0300*4, *5 and some of P0301 (71) P0302 (72) P0303 (73) P0304 (74)	Random Misfire	• Ignition system • Fuel supply system • MAP sensor • IAC valve • Contaminated fuel • Lack of fuel	11-126
P0301 (71) P0302 (72) P0303 (73) P0304 (74)	— Cylinder 1 — Cylinder 2 — Cylinder 3 — Cylinder 4 Misfire Detected	• Fuel injector • Fuel injector circuit • Ignition system • Low compression • Valve clearance	11-127
P0325*5 (23)	Knock Sensor (KS) Circuit Malfunction	• Open or short in Knock Sensor (KS) circuit • Knock Sensor (KS) • ECM/PCM	11-130
P0335 (4)	Crankshaft Position Sensor Circuit Low Input	• Crankshaft Position Sensor • Crankshaft Position Sensor circuit • ECM/PCM	11-131
P0336 (4)	Crankshaft Position Sensor Range/Performance	• Crankshaft Position Sensor • Timing belt skipped teeth	11-131
P0420 (67)	Catalyst System Efficiency Below Threshold	• Three Way Catalytic converter • Secondary HO2S (Sensor 2)	11-200
P0441*3 (92)	Evaporative Emission Control System Insufficient Purge Flow	• EVAP Purge Control Solenoid valve • EVAP Purge Control Solenoid valve circuit • Throttle Body (purge port) • Tubing • PCM	11-205
P0451*5	Fuel Tank Pressure Sensor Circuit Range/Performance	• Fuel Tank Pressure Sensor • ECM/PCM	11-208
P0452*4, *5 (91)	Fuel Tank Pressure Sensor Circuit Low Input	• Open or Short in Fuel Tank Pressure Sensor circuit • Fuel Tank Pressure Sensor • ECM/PCM	11-209
P0453*4, *5 (91)	Fuel Tank Pressure Sensor Circuit High Input	• Open in Fuel Tank Pressure Sensor circuit • Fuel Tank Pressure Sensor • ECM/PCM	11-211

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

**: The D4 (D)*5 indicator light and the Malfunction Indicator Lamp (MIL) may come on simultaneously.

*1: A/T *3: '97 model *5: '99 – 00 models
*2: M/T *4: '98 model

DTC (MIL indication)	Detection Item	Probable Cause	Page
P0500 (17)*2	Vehicle Speed Sensor Circuit Malfunction	• Vehicle Speed Sensor • Vehicle Speed Sensor circuit • ECM	11-135
P0501 (17)*1	Vehicle Speed Sensor Circuit Malfunction	• Vehicle Speed Sensor • Vehicle Speed Sensor circuit • PCM	11-135
P0505 (14)	Idle Control System Malfunction	• IAC valve • Throttle Body • Fast idle thermo valve*1	11-150
P0700 P0715 P0720 P0730 (70)*1 ** P0740 P0753 P0758	Automatic Transaxle	——	Section 14
P1106 (13)	Barometric Pressure Circuit Range/Performance Problem	• ECM/PCM (Baro sensor)	11-137
P1107 (13)	Barometric Pressure Circuit Low Input	• ECM/PCM (Baro sensor)	11-137
P1108 (13)	Barometric Pressure Circuit High Input	• ECM/PCM (Baro sensor)	11-137
P1121 (7)	Throttle Position Lower Than Expected	• TP sensor	11-109
P1122 (7)	Throttle Position Higher Than Expected	• TP sensor	11-109
P1128 (5)	Manifold Absolute Pressure Lower Than Expected	• MAP sensor	11-94
P1129 (5)	Manifold Absolute Pressure Higher Than Expected	• MAP sensor	11-94
P1297 (20)	Electrical Load Detector Circuit Low Input	• Electrical Load Detector • Electrical Load Detector circuit • ECM/PCM	11-138
P1298 (20)	Electrical Load Detector Circuit High Input	• Electrical Load Detector • Electrical Load Detector circuit • ECM/PCM	11-140
P1300*3 and some of P0301 (71) P0302 (72) P0303 (73) P0304 (74)	Random Misfire	• Ignition system • Fuel supply system • MAP sensor • IAC valve • Contaminated fuel • Lack of fuel	11-126

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

**: The $\boxed{D_4}$ ($\boxed{D}$)*5 indicator light and the Malfunction Indicator Lamp (MIL) may come on simultaneously.

*1: A/T *3: '97 model *5: '99 – 00 models

*2: M/T *4: '98 model

(cont'd)

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

DTC (MIL indication)	Detection Item	Probable Cause	Page
P1336 (54)	Crankshaft Speed Fluctuation Sensor Intermittent Interruption	• CKF sensor	11-142
P1337 (54)	Crankshaft Speed Fluctuation Sensor No Signal	• CKF sensor • CKF sensor circuit • ECM/PCM	11-142
P1359 (8)	Crankshaft Position/Top Dead Center Sensor/Cylinder Position Connector Disconnection	• CKP/TDC/CYP sensor circuit	11-146
P1361 (8)	Top Dead Center Sensor Intermittent Interruption	• TDC sensor	11-131
P1362 (8)	Top Dead Center Sensor No Signal	• TDC sensor • TDC sensor circuit • ECM/PCM	11-131
P1381 (9)	Cylinder Position Sensor Intermittent Interruption	• CYP sensor	11-131
P1382 (9)	Cylinder Position Sensor No Signal	• CYP sensor • CYP sensor circuit • ECM/PCM	11-131
P1456*4, *5 (90)	Evaporative Emission Control System Leak Detected (Fuel Tank System)	• Fuel fill cap • Vacuum connection • Fuel tank • Fuel tank pressure sensor • EVAP bypass solenoid valve • EVAP two way valve • EVAP control canister vent shut valve • EVAP control canister • EVAP purge control solenoid valve	11-213
P1457*4, *5 (90)	Evaporative Emission Control System Leak Detected (EVAP Control Canister System)	• Vacuum connection • EVAP control canister • Fuel tank pressure sensor • EVAP bypass solenoid valve • EVAP two way valve • EVAP control canister vent shut valve • Fuel tank • EVAP purge control solenoid valve	11-219
P1508 (14)	Idle Air Control Valve Circuit Failure	• IAC valve • IAC valve circuit • ECM/PCM	11-152
P1607 (–)	Engine Control Module/Powertrain Control Module Internal Circuit Failure A	• ECM/PCM	11-147
P1705 P1706 P1753 P1758 P1768 (70)*1 **	Automatic Transaxle	——	Section 14

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

**: The D4 (D)*5 indicator light and the Malfunction Indicator Lamp (MIL) may come on simultaneously.

*1: A/T *3: '97 model *5: '99 – 00 models

*2: M/T *4: '98 model

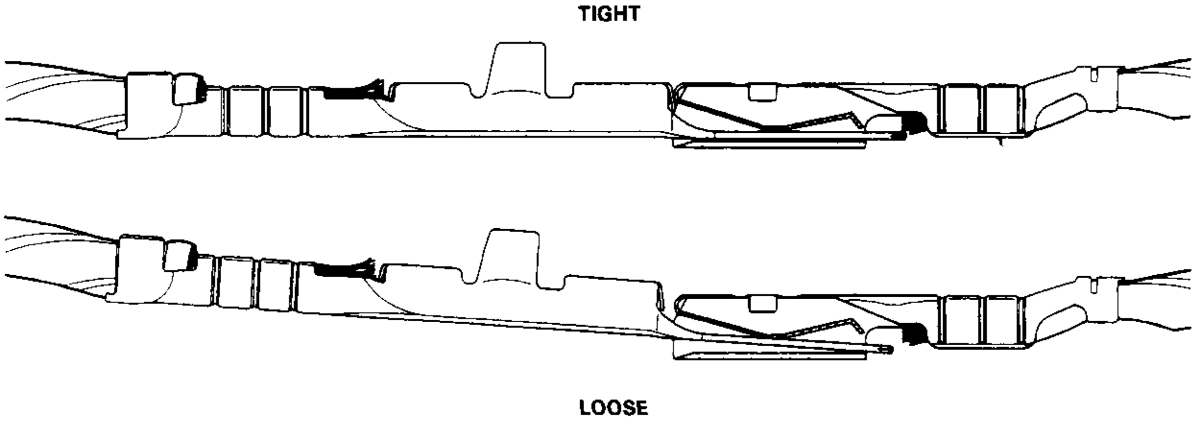
How to Read Flowcharts

A flowchart is designed to be used from start to final repair. It's like a map showing you the shortest distance. But beware: If you go off the "map" anywhere but a "stop" symbol, 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.

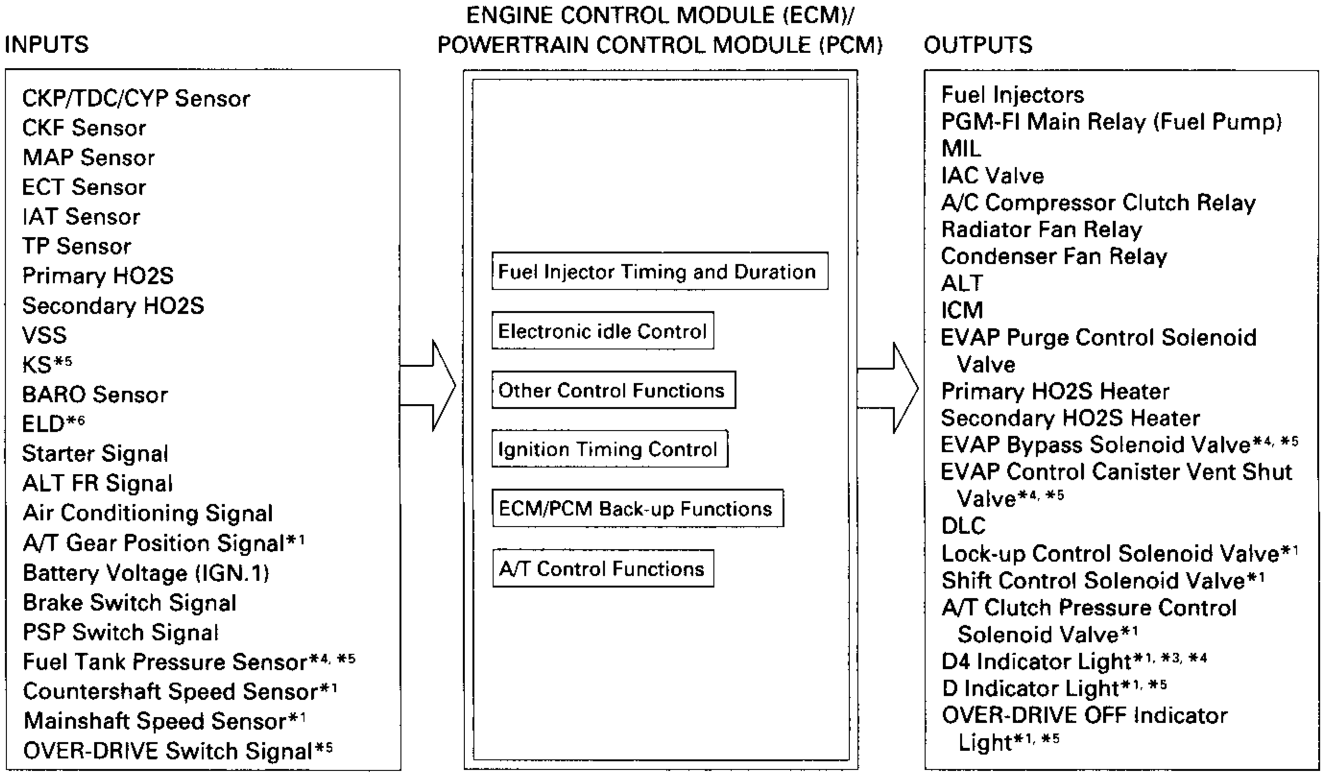
NOTE:

- 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 Engine Control Module (ECM)/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 though the flowchart. To do so will only result in confusion and, possibly, a needlessly replaced ECM/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 ECM's/PCM's), this can sometimes mean something works, but not the way it's supposed to.



PGM-FI System

System Description



INPUTS

- CKP/TDC/CYP Sensor
- CKF Sensor
- MAP Sensor
- ECT Sensor
- IAT Sensor
- TP Sensor
- Primary HO2S
- Secondary HO2S
- VSS
- KS*5
- BARO Sensor
- ELD*6
- Starter Signal
- ALT FR Signal
- Air Conditioning Signal
- A/T Gear Position Signal*1
- Battery Voltage (IGN.1)
- Brake Switch Signal
- PSP Switch Signal
- Fuel Tank Pressure Sensor*4, *5
- Countershaft Speed Sensor*1
- Mainshaft Speed Sensor*1
- OVER-DRIVE Switch Signal*5

ENGINE CONTROL MODULE (ECM)/
POWERTRAIN CONTROL MODULE (PCM)

- Fuel Injector Timing and Duration
- Electronic idle Control
- Other Control Functions
- Ignition Timing Control
- ECM/PCM Back-up Functions
- A/T Control Functions

OUTPUTS

- Fuel Injectors
- PGM-FI Main Relay (Fuel Pump)
- MIL
- IAC Valve
- A/C Compressor Clutch Relay
- Radiator Fan Relay
- Condenser Fan Relay
- ALT
- ICM
- EVAP Purge Control Solenoid Valve
- Primary HO2S Heater
- Secondary HO2S Heater
- EVAP Bypass Solenoid Valve*4, *5
- EVAP Control Canister Vent Shut Valve*4, *5
- DLC
- Lock-up Control Solenoid Valve*1
- Shift Control Solenoid Valve*1
- A/T Clutch Pressure Control Solenoid Valve*1
- D4 Indicator Light*1, *3, *4
- D Indicator Light*1, *5
- OVER-DRIVE OFF Indicator Light*1, *5

*1: A/T
*2: M/T
*3: '97 model
*4: '98 model
*5: '99 – 00 models
*6: USA

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

Fuel injector Timing and Duration
The ECM/PCM contains memories for the basic discharge durations at various engine speeds and manifold pressure. 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 ECM/PCM controls current to the IAC Valve to maintain the correct idle speed.

Ignition Timing Control

- The ECM/PCM contains memories for basic ignition timing at various engine speeds and manifold air flow rates. Ignition timing is also adjusted for engine coolant temperature.
- A knock control system was adopted which sets the ideal ignition timing for the octane rating of the gasoline used.*5

Other Control Functions

1. Starting Control
   When the engine is started, the ECM/PCM provides a rich mixture by increasing fuel injector duration.
2. Fuel Pump Control
   - When the ignition switch is initially turned on (II), the ECM/PCM supplies ground to the PGM-FI main relay that supplies current to the fuel pump for two seconds to pressurize the fuel system.
   - When the engine is running, the ECM/PCM supplies ground to the PGM-FI main relay that supplies current to the fuel pump.
   - When the engine is not running and the ignition is on, the ECM/PCM cuts ground to the PGM-FI main relay which cuts current to the fuel pump.

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 970 rpm ('97 – 98 models), 920 rpm ('99 – 00 models).
   - Fuel cut-off action also takes place when engine speed exceeds 6,500 rpm ('97 – 98 models), 6900 rpm ('99 – 00 models), regardless of the position of the throttle valve, to protect the engine from over-revving.
     With A/T model, the PCM cuts the fuel at engine speeds over 5,000 rpm when the vehicle is not moving.*2
4. A/C Compressor Clutch Relay
   When the ECM/PCM receives a demand for cooling from the air conditioning system, it delays the compressor from being energized, and enriches the mixture to assure a smooth transition to the A/C mode.
5. Evaporative Emission (EVAP) Purge Control Solenoid Valve
   When the engine coolant temperature is above 154°F (68°C), the ECM/PCM controls the EVAP purge control solenoid valve which controls vacuum to the EVAP purge control canister.
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 ECM/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 ECM/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 ECM/PCM supplies ground for the MIL and stores the DTC in erasable memory. When the ignition is initially turned on (II), the ECM/PCM supplies ground for the MIL for two seconds to check the MIL bulb condition.
4. Two Trip Detection Method
   To prevent false indications, the Two Trip Detection Method is used for the HO2S*1, fuel metering-related, idle control system, ECT sensor and EVAP control system self-diagnostic functions. When an abnormality occurs, the ECM/PCM stores it in its memory. When the same abnormality recurs after the ignition switch is turned OFF and ON (II) again, the ECM/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.
5. Two (or Three) Driving Cycle Detection Method ('97 model)
   A "Driving Cycle" consists of starting the engine, beginning closed loop operation, and stopping the engine. If misfiring that increases emissions or EVAP control system malfunction is detected during two consecutive driving cycles, or TWC deterioration is detected during three consecutive driving cycles, the ECM/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.

*1: '97 – 98 models
*2: '99 – 00 models

Powertrain Control Module (PCM) — '97 Model

NOTE: If this symptom is intermittent, check for a loose fuse No. 25 METER (7.5 A) in the under-dash fuse/relay box, a poor connection at PCM terminal A18, or an intermittent open in the GRN/ORN wire between the PCM (A18) and the gauge assembly.

The Malfunction Indicator Lamp (MIL) never comes on (even for two seconds) after ignition is turned on (II), or it's on dimly and flickers.

Turn the ignition switch ON (II).

Is the charging system light on?

NO —
- **Repair short or open in the wire between No. 25 METER (7.5 A) fuse and gauge assembly.**
- **Replace No. 25 METER (7.5 A) fuse.**

YES

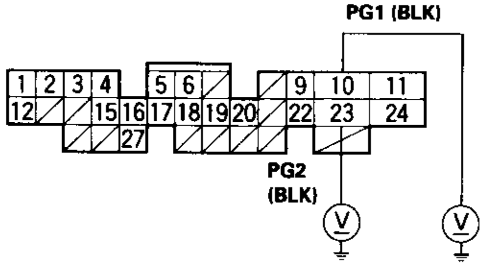
Try to start the engine.

Does the engine start?

NO —

Check for an open in the wires (PG1, PG2 lines):
1. Turn the ignition switch ON (II).
2. Measure voltage between body ground and PCM connector terminals A10 and A23 individually.

PCM CONNECTOR A (32P)



Wire side of female terminals

Is there less than 1.0 V?

NO — **Repair open in the wire(s) between PCM and G101 (located at the thermostat housing that had more than 1.0 V.**

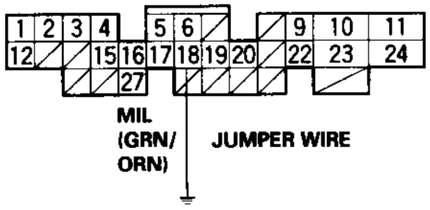
YES

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

YES

Check for an open in the wire or bulb (MIL line):
1. Turn the ignition switch OFF.
2. Connect the PCM connector terminal A18 to body ground with a jumper wire.
3. Turn the ignition switch ON (II).

PCM CONNECTOR A (32P)



Wire side of female terminals

Is the MIL on?

NO —
- **Repair open in the wires between PCM (A18) and gauge assembly.**
- **Replace the MIL bulb.**

YES

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

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.
- If this symptom is intermittent, check for:
  - — A loose FI E/M (15 A) fuse in the under-dash fuse/relay box
  - — A loose No. 13 FUEL PUMP (15 A) fuse in the under-dash fuse/relay box
  - — An intermittent short in the wire between the PCM (C7) and the service check connector
  - — An intermittent short in the wire between the PCM (A18) and the gauge assembly
  - — An intermittent short in the wire between the PCM (D4) and the MAP sensor
  - — An intermittent short in the wire between the PCM (D10) and the TP sensor.
  - — PGM-FI main relay.
- See the OBD II scan tool or Honda PGM Tester user's manuals for specific operating instructions.

Check the Diagnostic Trouble Code (DTC):
1. Connect an OBD II scan tool or Honda PGM Tester.
2. Turn the ignition switch ON (II).
3. Read the DTC with the scan tool or Honda PGM Tester.

Are any DTC(s) indicated?

YES — **Go to troubleshooting procedures (see page 11-60).**

NOTE: An open or short in the wire between the PCM (C8) and the DLC will keep the scan tool or Honda PGM Tester from communicating with the PCM. You should interpret this as no DTCs are indicated.

NO

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 —
- **— Repair open or short in wire between the PCM (C8) and Data Link Connector.**
- **— Go to troubleshooting procedures (see page 11-60).**

NO

Try to start the engine.

Does the engine start?

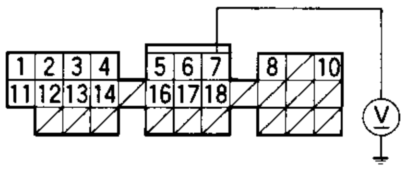
NO — A

(To page 11-84)

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 the PCM connector terminal C7 and body ground.

PCM CONNECTOR C (31P)



Wire side of female terminals

Is there approx. 5 V?

NO — **Repair short to body ground in the wire between PCM (C7) and service check connector.**

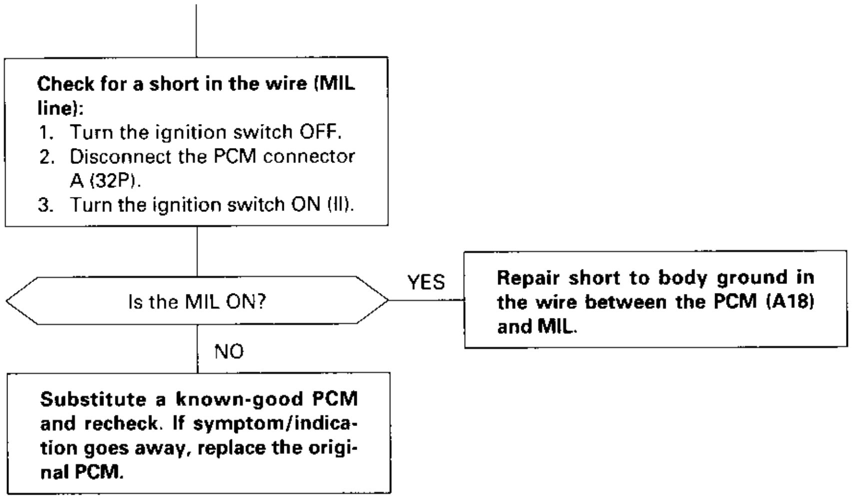
YES

(To page 11-84)

(cont'd)

Powertrain Control Module (PCM) — '97 Model (cont'd)

(From page 11-83)



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

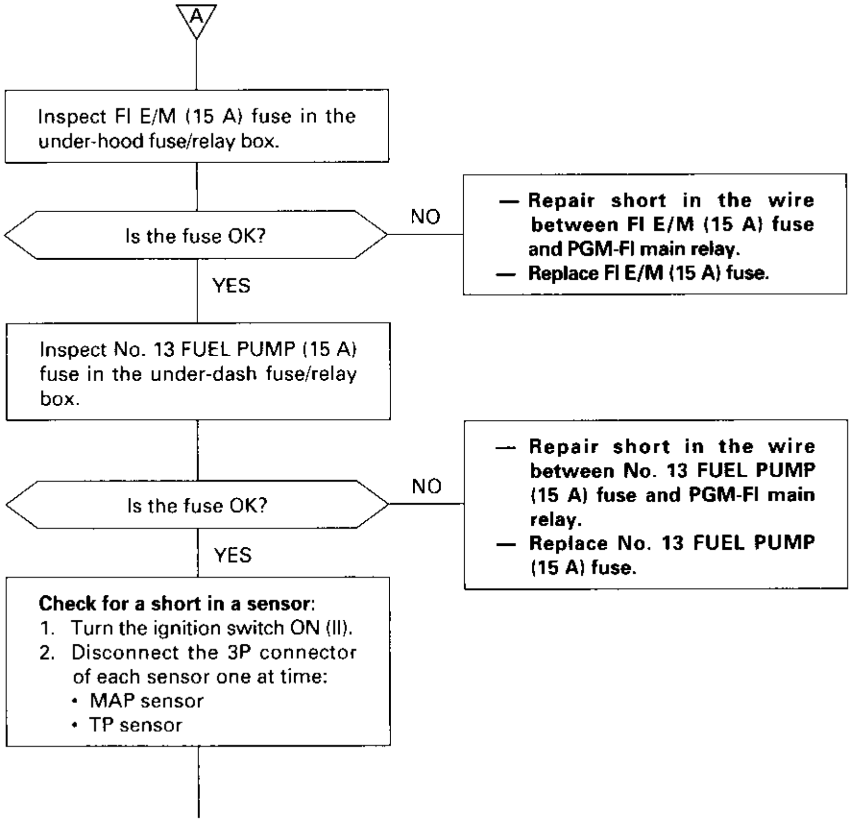
1. Turn the ignition switch OFF.
2. Disconnect the PCM connector A (32P).
3. Turn the ignition switch ON (II).

Is the MIL ON?

Repair short to body ground in the wire between the PCM (A18) and MIL.

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

(From page 11-83)



Inspect FI E/M (15 A) fuse in the under-hood fuse/relay box.

Is the fuse OK?

- **Repair short in the wire between FI E/M (15 A) fuse and PGM-FI main relay.**
- **Replace FI E/M (15 A) fuse.**

Inspect No. 13 FUEL PUMP (15 A) fuse in the under-dash fuse/relay box.

Is the fuse OK?

- **Repair short in the wire between No. 13 FUEL PUMP (15 A) fuse and PGM-FI main relay.**
- **Replace No. 13 FUEL PUMP (15 A) fuse.**

Check for a short in a sensor:

1. Turn the ignition switch ON (II).
2. Disconnect the 3P connector of each sensor one at time:
   - MAP sensor
   - TP sensor

(To page 11-85)

(From page 11-84)

Does the MIL go off?

YES → **Replace the sensor that caused the light to go out.**

NO

Check for a short in the wires (VCC lines):
1. Turn the ignition switch OFF.
2. Disconnect the PCM connector D (16P).
3. Check for continuity between body ground and PCM connector terminals D4 and D10 individually.

Is there continuity?

YES →
- **Repair short to body ground in the wire between the PCM (D4) and the MAP sensor.**
- **Repair short to body ground in the wire between the PCM (D10) and the TP sensor.**

NO

Check for an open in the wires (IGP lines):
1. Disconnect the fuel injector connectors and IAC valve connector.
2. Turn the ignition switch ON (II).
3. Measure voltage between body ground and PCM connector terminals A11 and A24 individually.

Is there battery voltage?

NO →
- **Repair open in the wire(s) between the PCM (A11, A24) and the PGM-FI main relay.**
- **Check for poor connections or loose wires at the PGM-FI main relay.**
- **Test the PGM-FI main relay (see page 11-187).**

YES

Check for an open in the wires (LG lines):
1. Turn the ignition switch OFF.
2. Reconnect all sensor connectors.
3. Reconnect the PCM connector D (16P).
4. Turn the ignition switch ON (II).
5. Measure voltage between body ground and PCM connector terminals A9 and A22 individually.

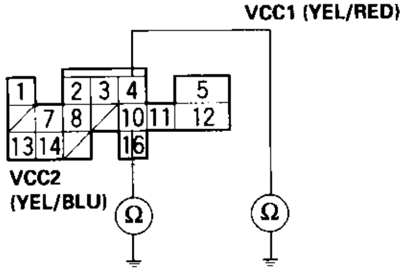
Is there less than 1.0 V?

NO → **Repair open in the wire(s) between the PCM (A9, A22) and G101 (located at the thermostat housing) that had more than 1.0 V.**

YES

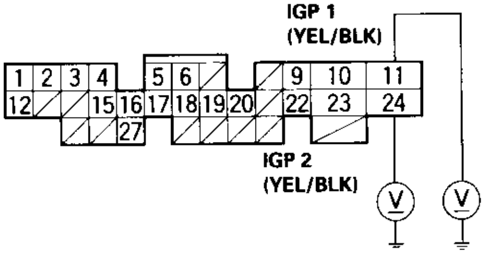
Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

PCM CONNECTOR D (16P)

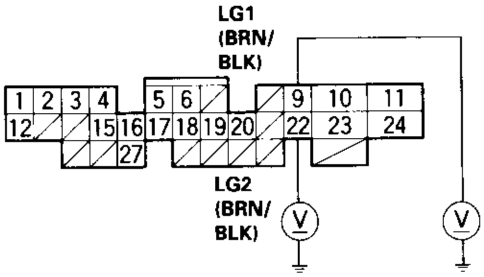


Wire side of female terminals

PCM CONNECTOR A (32P)



Wire side of female terminals



Engine Control Module/Powertrain Control Module (ECM/PCM) — '98 – 00 Models

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

NOTE:
- If this symptom is intermittent, check for:
  - A loose FI E/M (15 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 (15 A) fuse in the under-dash fuse/relay box
  - An intermittent short in the wire between the ECM/PCM (A18) and the gauge assembly
  - An intermittent short in the wire between the ECM/PCM (C19) and the MAP sensor
  - An intermittent short in the wire between the ECM/PCM (C28), the TP sensor, the EGR valve lift sensor and/or fuel tank pressure sensor
  - A faulty PGM-FI main relay

Turn the ignition switch ON (II).

Is the low oil pressure light on?

NO

- **Repair short or open in the wire between the No. 25 METER (7.5 A) fuse and the gauge assembly.**
- **Replace the No. 25 METER (7.5 A) fuse.**

YES

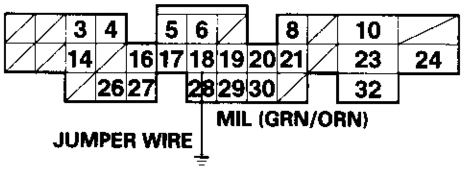
Try to start the engine.

Does the engine start?

YES

Check for an open in the wire or bulb (MIL line):
1. Turn the ignition switch OFF.
2. Connect the ECM/PCM connector terminal A18 to body ground with a jumper wire.
3. Turn the ignition switch ON (II).

ECM/PCM CONNECTOR A (32P)



Wire side of female terminals

Is the MIL on?

NO

- **Repair open in the wires between the ECM/PCM (A18) and the gauge assembly.**
- **Replace the MIL bulb.**

YES

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

NO

1. Turn the ignition switch OFF.
2. Inspect the FI E/M (15 A) fuse in the under-hood fuse/relay box.

Is the fuse OK?

NO

- **Repair short in the wire between the FI E/M (15 A) fuse and the PGM-FI main relay.**
- **Replace the FI E/M (15 A) fuse.**

YES

Inspect the No. 13 FUEL PUMP (15 A) fuse in the under-dash fuse/relay box.

Is the fuse OK?

NO

- **Repair short in the wire between the No. 13 FUEL PUMP (15 A) fuse and the PGM-FI main relay.**
- **Replace the No. 13 FUEL PUMP (15 A) fuse.**

YES

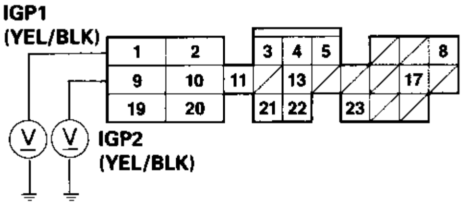
(To page 11-87)

(From page 11-86)

Check for an open in the wires (IGP lines):

1. Disconnect the fuel injector and IAC valve connectors.
2. Turn the ignition switch ON (II).
3. Measure voltage between body ground and ECM/PCM connector terminals B1 and B9 individually.

ECM/PCM CONNECTOR B (25P)



Wire side of female terminals

Is there battery voltage?

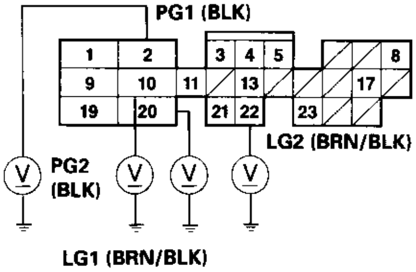
NO

- **Repair open in the wire(s) between the ECM/PCM (B1, B9) and the PGM-FI main relay.**
- **Check for poor connections or loose wires at the PGM-FI main relay.**
- **Test the PGM-FI main relay (see page 11-187).**

YES

Check for an open in the wires (PG, LG lines):

1. Reconnect the fuel injector and IAC valve connectors.
2. Measure voltage between body ground and ECM/PCM connector terminals B2, B10, B20 and B22 individually.



Is there less than 1.0 V?

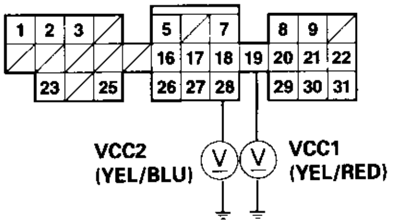
NO

Repair open in the wire(s) between the ECM/PCM and G101 (located at the thermostat housing) that had more than 1.0 V.

YES

Check for a short in the wires (VCC1, VCC2 lines):
Measure voltage between body ground and ECM/PCM connector terminals C19 and C28 individually.

ECM/PCM CONNECTOR C (31P)



Wire side of
female terminals

Is there approx. 5 V?

NO

Check for a short in a sensor:
While measuring voltage between body ground and ECM/PCM connector terminals C19 and C28 individually, disconnect the 3P connector of each sensor one at time:

- MAP sensor
- TP sensor
- Fuel tank pressure sensor

Is there approx. 5 V?

NO

Repair short in the wire between the MAP sensor, TP sensor, Fuel tank pressure sensor and the ECM/PCM (C19, C28).

YES

Replace the sensor that had approx. 5 V.

YES

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

(cont'd)

Engine Control Module/Powertrain Control Module (ECM/PCM) — '98 – 00 Models (cont'd)

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 ECM/PCM (A10) and the service check connector
  - — An intermittent short in the wire between the ECM/PCM (A18) and the gauge assembly
- See the OBD II scan tool or Honda PGM Tester user's manuals for specific operating instructions.

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

Check the Diagnostic Trouble Code (DTC):
1. Connect a scan tool or Honda PGM Tester.
2. Turn the ignition switch ON (II).
3. Read the DTC with the scan tool or Honda PGM Tester.

Are any DTC(s) indicated?

YES

Go to troubleshooting procedures. (see page 11-60)

NO

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

- **— Repair open or short in wire between the ECM/PCM (A21) and Data Link Connector.**
- **— Go to troubleshooting procedures. (see page 11-60)**

NO

Try to start the engine.

Does the engine start?

NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/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 ECM/PCM connector terminal A10.

Is there battery voltage?

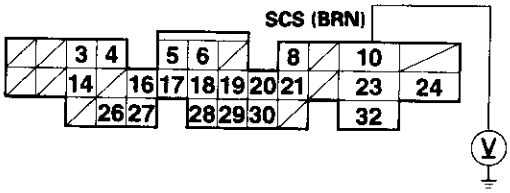
NO

Repair short to body ground in the wire between the ECM/PCM (A10) and service check connector.

YES

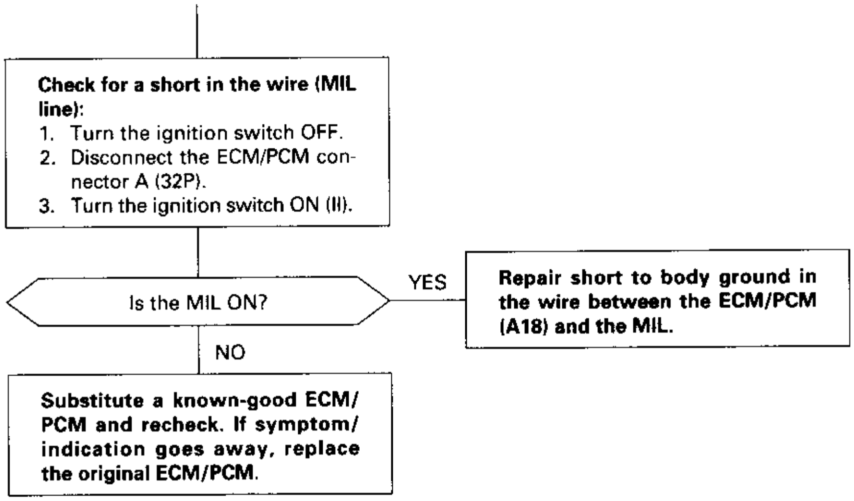
(To page 11-89)

ECM/PCM CONNECTOR A (32P)



Wire side of female terminals

(From page 11-88)



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

1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector A (32P).
3. Turn the ignition switch ON (II).

Is the MIL ON?

YES

Repair short to body ground in the wire between the ECM/PCM (A18) and the MIL.

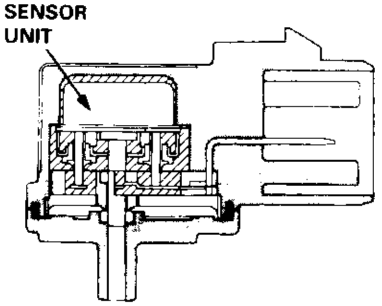
NO

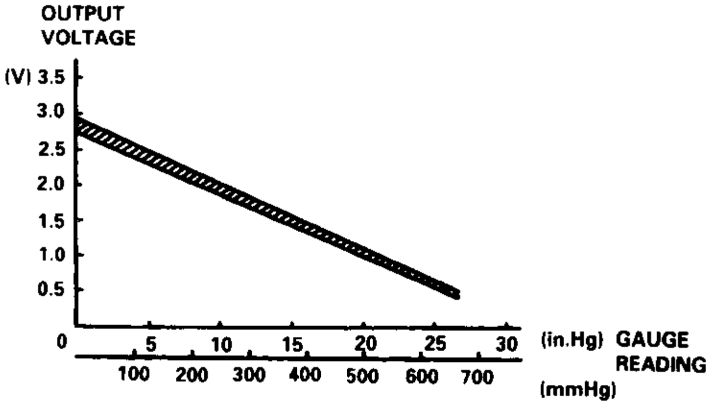
Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

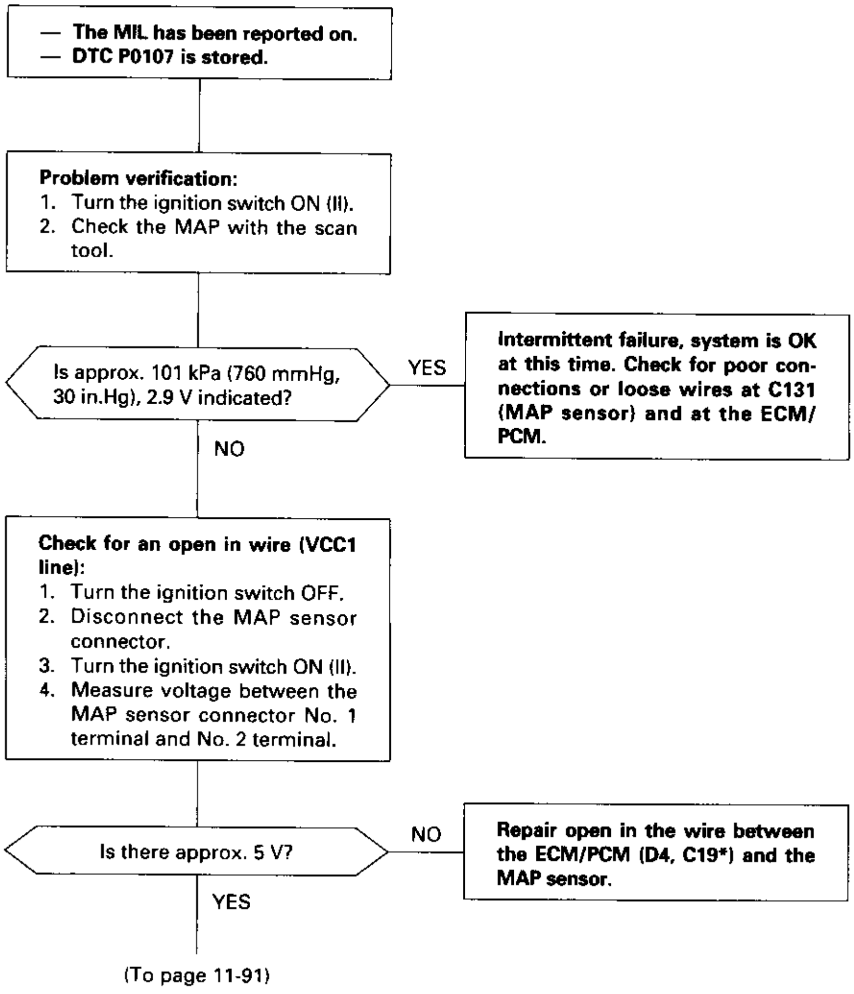
Manifold Absolute Pressure (MAP) Sensor

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

The MAP sensor converts manifold absolute pressure into electrical signals and inputs the ECM/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), 2.9 V indicated?

YES → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C131 (MAP sensor) and at the ECM/PCM.**

NO

Check for an open in wire (VCC1 line):
1. Turn the ignition switch OFF.
2. Disconnect the MAP sensor connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between the MAP sensor connector No. 1 terminal and No. 2 terminal.

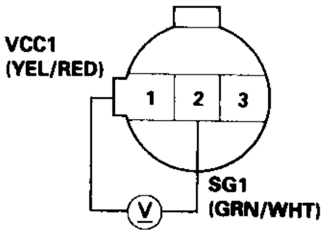
Is there approx. 5 V?

NO → **Repair open in the wire between the ECM/PCM (D4, C19*) and the MAP sensor.**

YES

(To page 11-91)

MAP SENSOR 3P CONNECTOR (C131)



Wire side of female terminals

(From page 11-90)

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

Is approx. 2 kPa (15 mmHg, 0.6 in.Hg), 0.1 V or less indicated?

NO — **Replace the MAP sensor.**

YES

Check for a short in the wire (MAP line):
1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector D (16P), (C (31P))*.
3. Check for continuity between the MAP sensor connector No. 3 terminal and body ground.

Is there continuity?

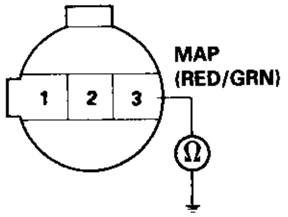
YES — **Repair short in the wire between the ECM/PCM (D3, C17*) and the MAP sensor.**

NO

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

*: '98 – 00 models

MAP SENSOR 3P CONNECTOR (C131)



Wire side of female terminals

(cont'd)

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.

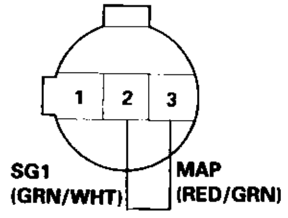
Is 101 kPa (760 mmHg, 30 in.Hg), 2.9 V or higher indicated?

NO → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C131 (MAP sensor) and the ECM/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.

MAP SENSOR 3P CONNECTOR (C131)



JUMPER WIRE

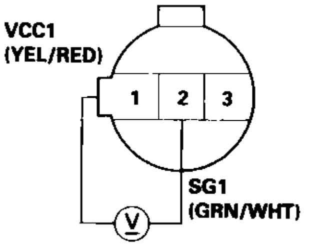
Wire side of female terminals

Is 101 kPa (760 mmHg, 30 in.Hg), 2.9 V 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?

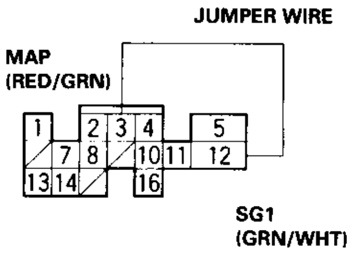
NO → **Repair open in the wire between the ECM/PCM (D12, C7*) and the MAP sensor.**

YES

('97 model)

Check for an open in the wire (MAP line):
1. Turn the ignition switch OFF.
2. Install a jumper wire on the PCM connectors between D3 and D12.
3. Turn the ignition switch ON (II).
4. Check the MAP with the scan tool.

PCM CONNECTOR D (16P)



Wire side of female terminals

Is 101 kPa (760 mmHg, 30 in.Hg), 2.9 V or higher indicated?

NO → **Repair open in the wire between the PCM (D3) and the MAP sensor.**

YES

(To page 11-93)

*: '98 – 00 models

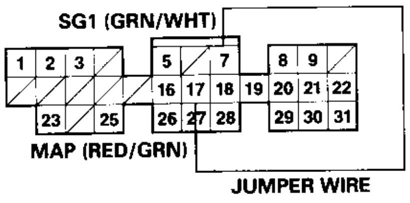
(From page 11-92)

('98 – 00 models)

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

1. Turn the ignition switch OFF.
2. Install a jumper wire on the ECM/PCM connectors between C7 and C17.
3. Turn the ignition switch ON (II).
4. Check the MAP with the scan tool.

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

Is 101 kPa (760 mmHg, 30 in.Hg), 2.9 V or higher indicated?

NO — **Repair open in the wires between the ECM/PCM (C17) and the MAP sensor.**

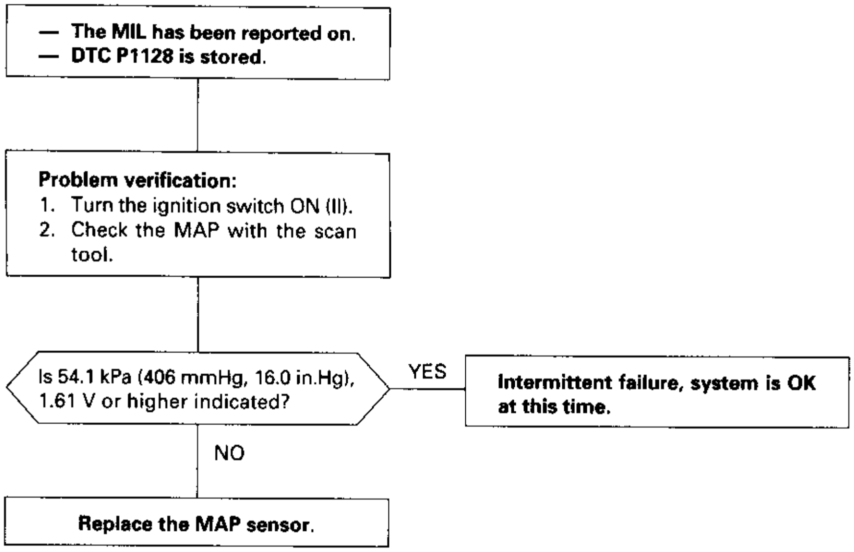
YES

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

(cont'd)

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

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



- **The MIL has been reported on.**
- **DTC P1128 is stored.**

Problem verification:

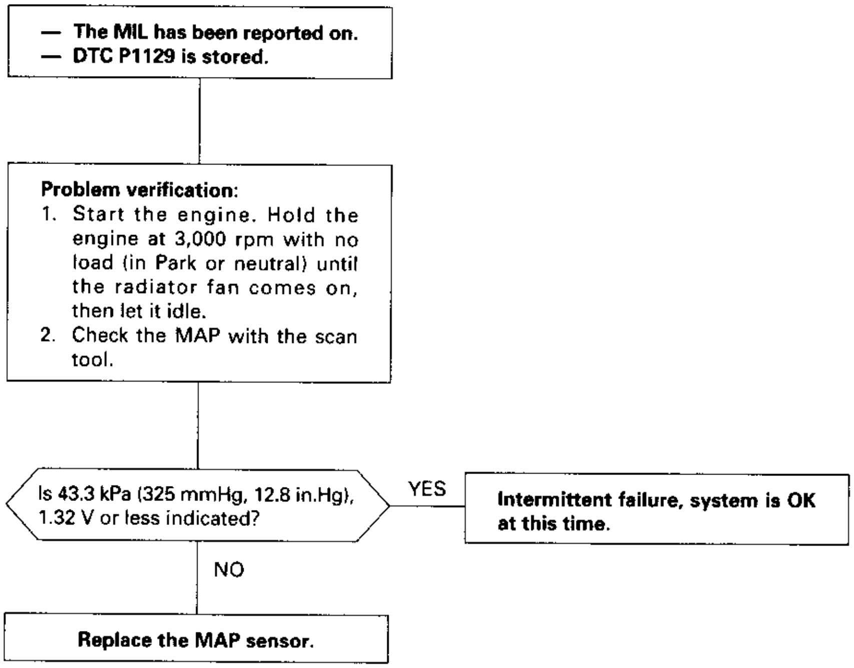
1. Turn the ignition switch ON (II).
2. Check the MAP with the scan tool.

Is 54.1 kPa (406 mmHg, 16.0 in.Hg), 1.61 V or higher indicated?

YES — **Intermittent failure, system is OK at this time.**

NO — **Replace the MAP sensor.**

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



- **The MIL has been reported on.**
- **DTC P1129 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 43.3 kPa (325 mmHg, 12.8 in.Hg), 1.32 V or less indicated?

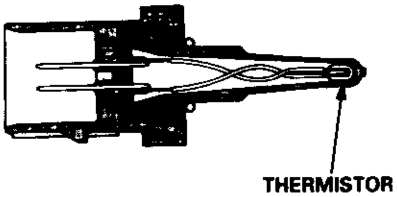
YES — **Intermittent failure, system is OK at this time.**

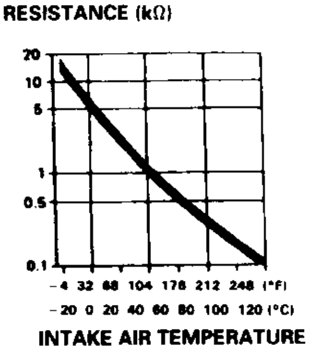
NO — **Replace the MAP sensor.**

Intake Air Temperature (IAT) Sensor

P0111 **('97 model)** The scan tool indicates Diagnostic Trouble Code (DTC) P0111: A range/performance problem in the Intake Air Temperature (IAT) Sensor circuit.

The IAT Sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the intake air temperature increases as shown below.





- **The MIL has been reported on.**
- **DTC P0111 is stored.**
- **Or from Probable Cause List.**

Problem verification:

1. Turn the ignition switch OFF.
2. Disconnect the IAT sensor 2P connector.
3. Remove the IAT sensor.
4. Reconnect the IAT sensor 2P connector.
5. Leave the IAT sensor exposed to ambient temperature.
6. Turn the ignition switch ON (II).
7. Check the IAT with the scan tool.

Is ambient temperature indicated?

NO — **Replace the IAT sensor.**

YES

Check the IAT sensor output:

1. Warm the IAT sensor with a hair dryer.
2. Check the IAT with the scan tool.

Did the IAT rise 2.0°F (1.0°C) or more from the ambient temperature?

YES — **Intermittent failure, system is OK at this time.**

NO

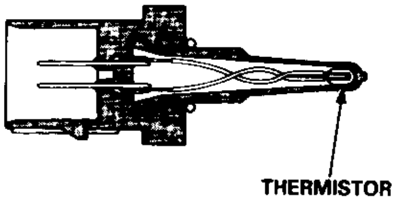
Replace the IAT sensor.

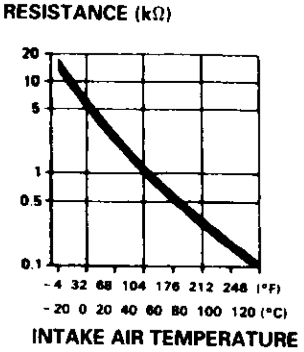
(cont'd)

Intake Air Temperature (IAT) Sensor (cont'd)

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 IAT Sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the intake air temperature increases as shown below.





— The MIL has been reported on.
— DTC P0112 is stored.
— Or from Probable Cause List.

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

Is 302°F (150°C) or higher (or H-Limit in Honda mode of PGM Tester) or 0 V indicated?

NO

Is the correct ambient temperature indicated*1?

- NO **Replace the IAT sensor.**
- YES **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C133 (IAT sensor) and at the ECM/PCM.**

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

YES

Check for a short in the IAT sensor:
1. Disconnect the IAT sensor 2P connector.
2. Check the IAT with the scan tool.

Is 302°F (150°C) or higher (or H-Limit in Honda mode of PGM Tester) or 0 V 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 ECM/PCM connector (D (16P), C (31P)*).
3. Check for continuity between the IAT sensor 2P connector terminal No. 2 and body ground.

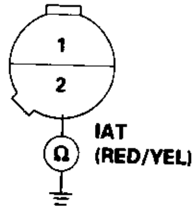
Is there continuity?

YES **Repair short in the wire between the ECM/PCM (D8, C25*) and the IAT sensor.**

NO

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

IAT SENSOR 2P CONNECTOR (C133)



Wire side of female terminals

*: '98 – 00 models

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

— The MIL has been reported on.
— DTC P0113 is stored.

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

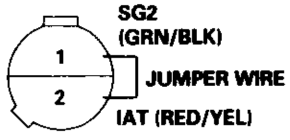
Is -4°F (-20°C) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

NO — **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C133 (IAT sensor) and at the ECM/PCM.**

YES

Check for an open in the IAT sensor:
1. Disconnect the IAT sensor 2P connector.
2. Connect the IAT sensor 2P connector terminals No. 1 and No. 2 with a jumper wire.
3. Check the intake air temperature with the scan tool.

IAT SENSOR 2P CONNECTOR (C133)



Wire side of female terminals

Is -4°F (-20°C) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

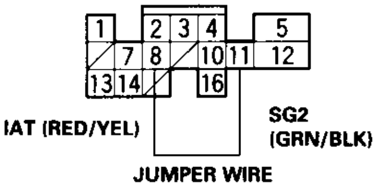
NO — **Replace the IAT sensor.**

YES

('97 model)

Check for an open in the wires (IAT, SG2 lines):
1. Turn the ignition switch OFF.
2. Connect PCM connector terminals D8 and D11 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the IAT with the scan tool.

PCM CONNECTOR D (16P)



Wire side of female terminals

Is -4°F (-20°C) or less (or L-limit in Honda mode of PGM Tester) or 5 V indicated?

NO — **Repair open in the wires between the PCM (D8, D11) and the IAT sensor.**

YES

(To page 11-98)

(cont'd)

Intake Air Temperature (IAT) Sensor (cont'd)

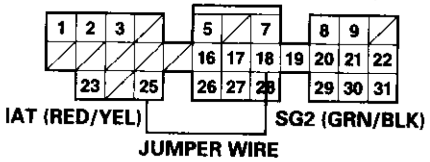
(From page 11-97)

('98 – 00 models)

Check for an open in the wires (IAT, SG2 lines):

1. Turn the ignition switch OFF.
2. Connect ECM/PCM connector terminals C18 and C25 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the IAT with the scan tool.

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

Is –4°F (–20°C) or less (or L-limit in Honda mode of PGM Tester) or 5 V indicated?

NO

Repair open in the wires between the ECM/PCM (C18, C25) and the IAT sensor.

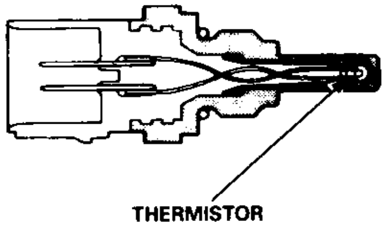
YES

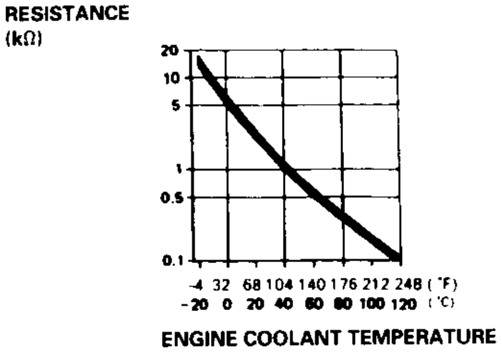
Substitute a known-good ECM/PCM and recheck. If normal IAT is indicated, replace the original ECM/PCM.

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 dependant resistor (thermistor). The resistance of the thermistor decreases as the engine coolant temperature increases as shown below.



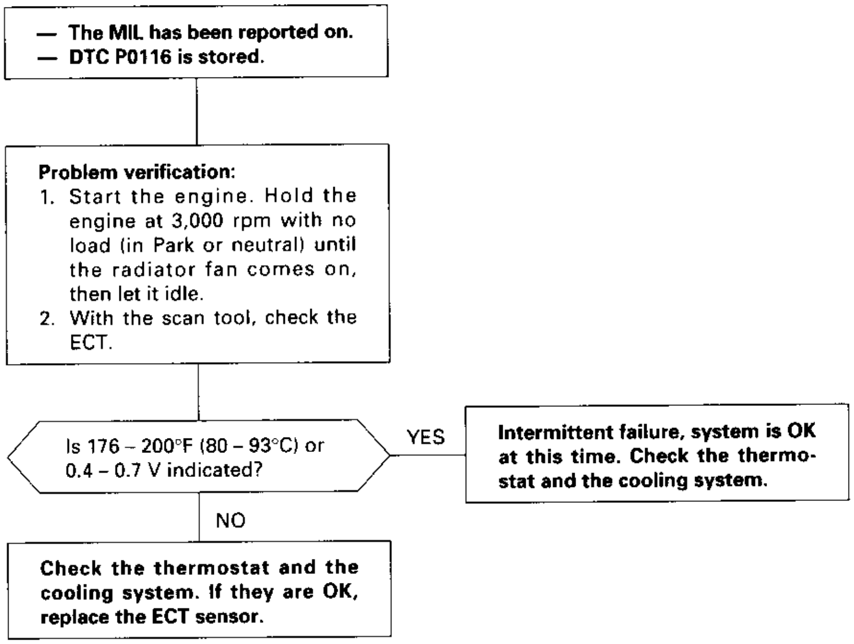


NOTE: If DTC P0117 and/or P0118 are stored at the same time as DTC P0116, troubleshoot those DTCs first, then troubleshoot DTC P0116.

Possible Cause

- ECT sensor deterioration
- Malfunction in the thermostat and cooling system

Troubleshooting Flowchart



— The MIL has been reported on.
— DTC P0116 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. With the scan tool, check the ECT.

Is 176 – 200°F (80 – 93°C) or 0.4 – 0.7 V indicated?

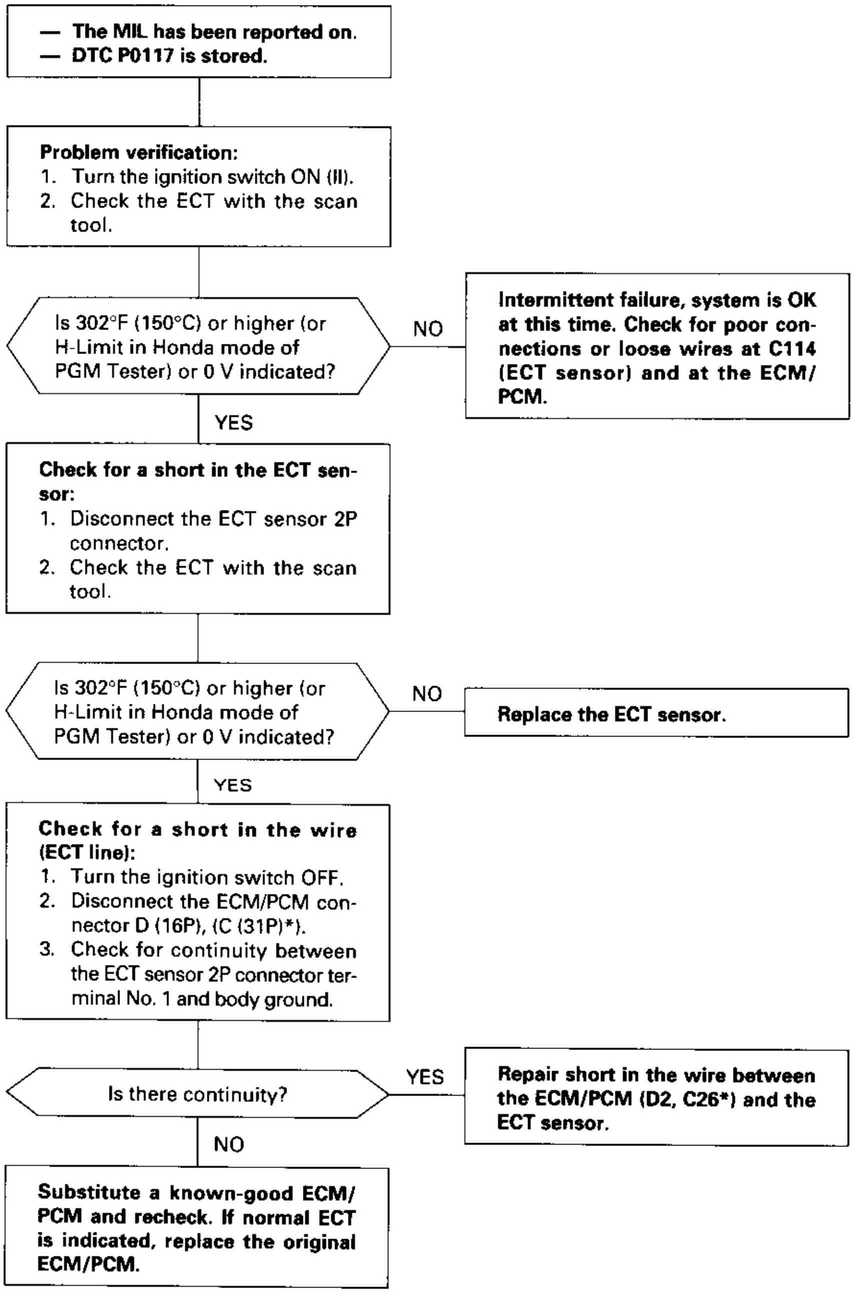
YES — **Intermittent failure, system is OK at this time. Check the thermostat and the cooling system.**

NO — **Check the thermostat and the cooling system. If they are OK, replace the ECT sensor.**

(cont'd)

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

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



— The MIL has been reported on.
— DTC P0117 is stored.

Problem verification:
1. Turn the ignition switch ON (II).
2. Check the ECT with the scan tool.

Is 302°F (150°C) or higher (or H-Limit in Honda mode of PGM Tester) or 0 V indicated?

NO → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C114 (ECT sensor) and at the ECM/PCM.**

YES ↓

Check for a short in the ECT sensor:
1. Disconnect the ECT sensor 2P connector.
2. Check the ECT with the scan tool.

Is 302°F (150°C) or higher (or H-Limit in Honda mode of PGM Tester) or 0 V indicated?

NO → **Replace the ECT sensor.**

YES ↓

Check for a short in the wire (ECT line):
1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector D (16P), (C (31P)*).
3. Check for continuity between the ECT sensor 2P connector terminal No. 1 and body ground.

Is there continuity?

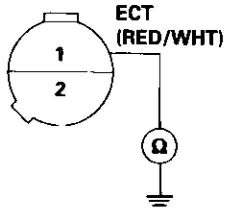
YES → **Repair short in the wire between the ECM/PCM (D2, C26*) and the ECT sensor.**

NO ↓

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

*: '98 – 00 models

ECT SENSOR 2P CONNECTOR (C114)



Wire side of female terminals

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

— The MIL has been reported on.
— DTC P0118 is stored.

Problem verification:
1. Turn the ignition switch ON (II).
2. Check the ECT with the scan tool.

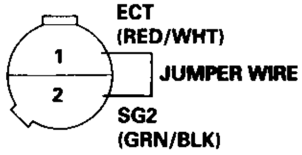
Is –4°F (–20°C) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

NO → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C114 (ECT sensor) and at the ECM/PCM.**

YES

Check for an open in the ECT sensor:
1. Disconnect the ECT sensor 2P connector.
2. Connect the ECT sensor 2P connector terminals No. 1 and No. 2 with a jumper wire.
3. Check the ECT with the scan tool.

ECT SENSOR 2P CONNECTOR (C114)



Wire side of female terminals

Is –4°F (–20°C) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

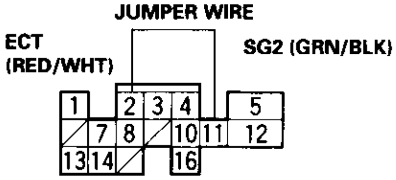
NO → **Replace the ECT sensor.**

YES

('97 model)

Check for an open in the wires (ECT, SG2 lines):
1. Turn the ignition switch OFF.
2. Connect PCM connector terminals D2 and D11 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the ECT with the scan tool.

PCM CONNECTOR D (16P)



Wire side of female terminals

Is –4°F (–20°C) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

NO → **Repair open in the wires between the PCM (D2, D11) and the ECT sensor.**

YES

(To page 11-102)

(cont'd)

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

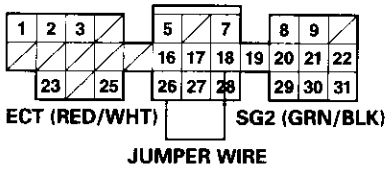
(From page 11-101)

('98 – 00 models)

Check for an open in the wires (ECT, SG2 lines):

1. Turn the ignition switch OFF.
2. Connect ECM/PCM connector terminals C18 and C26 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the ECT with the scan tool.

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

Is –4°F (–20°C) or less (or L-Limit in Honda mode of PGM Tester) or 5 V indicated?

NO

Repair open in the wires between the ECM/PCM (C18, C26) and the ECT sensor.

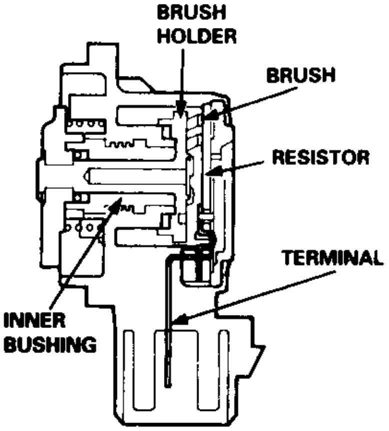
YES

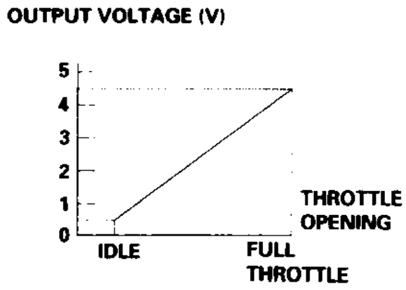
Substitute a known-good ECM/PCM and recheck. If normal ECT is indicated, replace the original ECM/PCM.

Throttle Position (TP) Sensor

P0122 The scan tool indicates Diagnostic Trouble Code (DTC) P0122: A low input (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 ECM/PCM.





'97 model:

- The MIL has been reported on.
- DTC P0122 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 turn the ignition switch OFF.
2. Turn the ignition switch ON (II).
3. 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

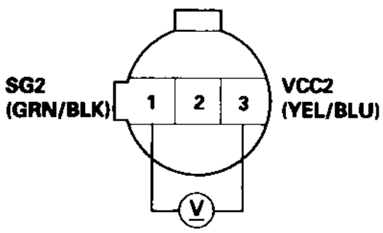
Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C130 (TP sensor) and at the PCM.

NO

Check for an open in the wire (VCC2 line):

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

TP SENSOR 3P CONNECTOR (C130)



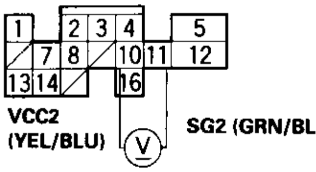
Wire side of female terminals

Is there approx. 5 V?

NO

Check for an open in wire (VCC2 line):
Measure voltage between PCM connector terminals D10 and D11.

PCM CONNECTOR D (16P)



Wire side of female terminals

Is there approx. 5 V?

YES

Repair open in the wire between PCM (D10) and TP sensor.

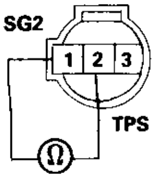
NO

Substitute a known-good PCM and recheck. If prescribed voltage is now available, replace the original PCM.

YES

Check for an open or short in TP sensor:

1. Turn the ignition switch OFF.
2. At the sensor side, measure resistance between the TP sensor 3P connector terminals No. 1 and No. 2 with the throttle fully closed.



Terminal side of male terminals

(To page 11-104)

(cont'd)

Throttle Position (TP) Sensor (cont'd)

(From page 11-103)

Is there approx. 0.5 – 0.9 kΩ?

NO — **Replace the throttle body.**

YES

Check for an open or short in the TP sensor:
Measure resistance between the TP sensor 3P connector terminals No. 2 and No. 3 with the throttle fully closed.

Is there approx. 4.5 kΩ?

NO — **Replace the throttle body.**

YES

Check for an open in the PCM (TPS line):

1. Reconnect the TP sensor 3P connector.
2. Turn the ignition switch ON (II).
3. Measure voltage between PCM connector D (16P) terminals D1 and D11.

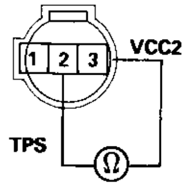
Is there approx. 0.5 V when the throttle is fully closed and approx. 4.5 V when the throttle is fully opened?

YES — **Substitute a known-good PCM and recheck. If prescribed voltage is now available, replace the original PCM.**

NO

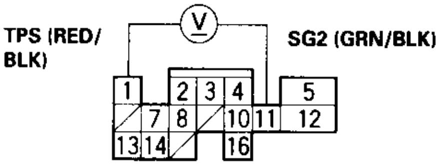
Repair short in the wire between the PCM (D1) and the TP sensor.

TP SENSOR 3P CONNECTOR



Terminal side of male terminals

PCM CONNECTOR D (16P)



Wire side of female terminals

'98 – 00 models:

— **The MIL has been reported on.**
— **DTC P0122 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 turn the ignition switch OFF.
2. Turn the ignition switch ON (II).
3. 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

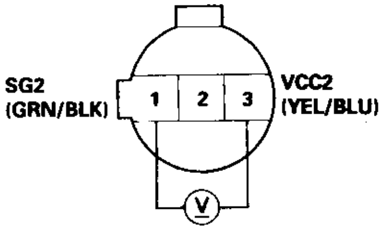
Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C130 (TP sensor) and at the ECM/PCM.

NO

Check for an open or short in the wire (VCC2 line):

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

TP SENSOR 3P CONNECTOR (C130)



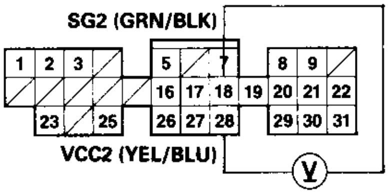
Wire side of female terminals

Is there approx. 5 V?

NO

Check for an open in wire (VCC2 line):
Measure voltage between ECM/PCM connector terminals C18 and C28.

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

Is there approx. 5 V?

YES

Repair open in the wire between the ECM/PCM (C28) and the TP sensor.

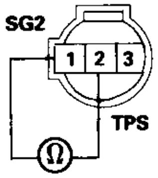
NO

Substitute a known-good ECM/PCM and recheck. If prescribed voltage is now available, replace the original ECM/PCM.

YES

Check for an open or short in TP sensor:

1. Turn the ignition switch OFF.
2. At the sensor side, measure resistance between the TP sensor 3P connector terminals No. 1 and No. 2 with the throttle fully closed.



Terminal side of male terminals

(To page 11-106)

(cont'd)

Throttle Position (TP) Sensor (cont'd)

(From page 11-105)

Is there approx. 0.5 – 0.9 kΩ?

NO — **Replace the throttle body.**

YES

Check for an open or short in the TP sensor:
Measure resistance between the TP sensor 3P connector terminals No. 2 and No. 3 with the throttle fully closed.

Is there approx. 4.5 kΩ?

NO — **Replace the throttle body.**

YES

Check for an open in the ECM/PCM (TPS line):

1. Reconnect the TP sensor connector.
2. Turn the ignition switch ON (II).
3. Measure voltage between ECM/PCM connector C (31P) terminals C18 and C27.

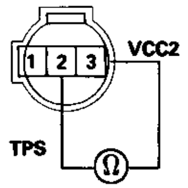
Is there approx. 0.5 V when the throttle is fully closed and approx. 4.5 V when the throttle is fully opened?

YES — **Substitute a known-good ECM/PCM and recheck. If prescribed voltage is now available, replace the original ECM/PCM.**

NO

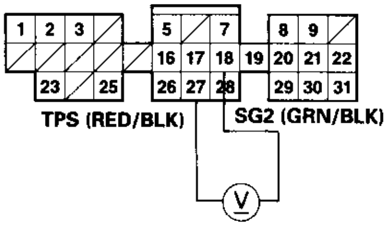
Repair short in the wire between the ECM/PCM (C18) and the TP sensor.

TP SENSOR 3P CONNECTOR



Terminal side of male terminals

ECM/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:

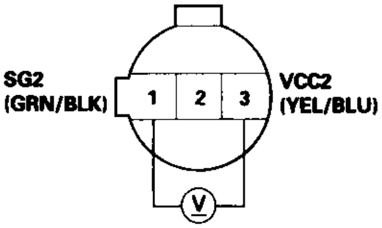
1. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on. then turn the ignition switch OFF.
2. Turn the ignition switch ON (II).
3. Check the throttle position with the scan tool.

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 C130 (TP sensor) and at the ECM/PCM.**

NO

TP SENSOR 3P CONNECTOR (C130)



Wire side of female terminals

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 wire 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

('97 model)

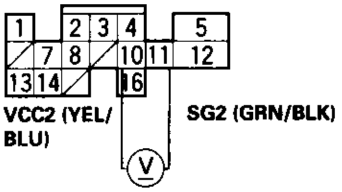
Check for an open in the wire (SG2 line):
Measure voltage between PCM connector terminals D10 and D11.

Is there approx. 5 V?

YES — **Repair open in the wire between the PCM (D11) and the TP sensor.**

NO

PCM CONNECTOR D (16P)



Wire side of female terminals

(To page 11-108)

(cont'd)

Throttle Position (TP) Sensor (cont'd)

(From page 11-107)

('98 – 00 models)

Check for an open in the wire (SG2 line):
Measure voltage between ECM/PCM connector C (31P) terminals C18 and C28.

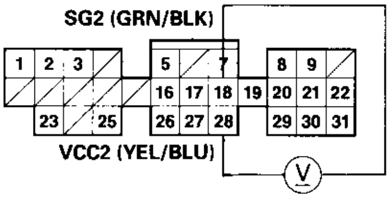
Is there approx. 5 V?

YES — **Repair open in the wire between the ECM/PCM (C18) and the TP sensor.**

NO

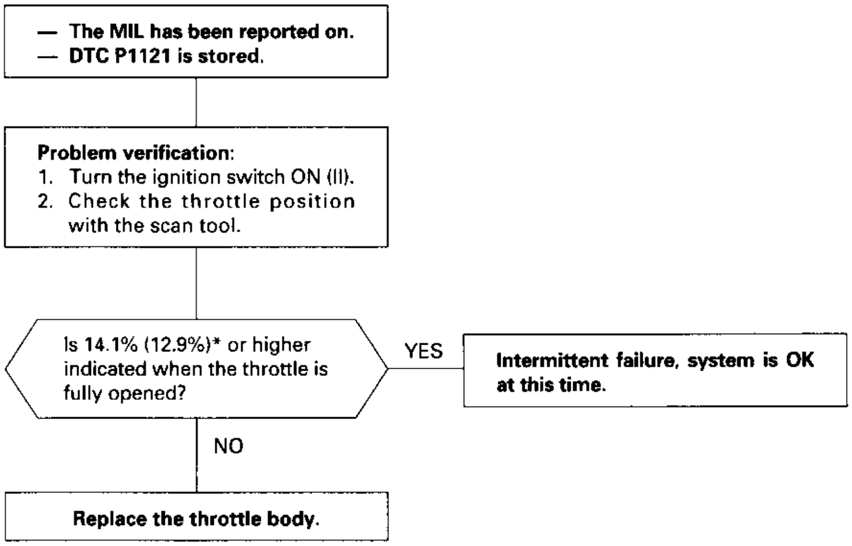
Substitute a known-good ECM/PCM and recheck. If prescribed voltage is now available, replace the original ECM/PCM.

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

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.

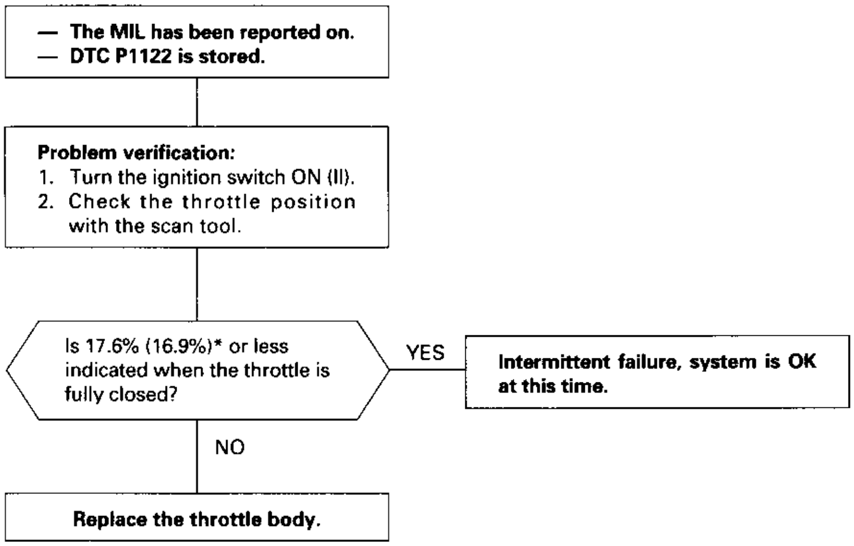
Is 14.1% (12.9%)* or higher indicated when the throttle is fully opened?

Intermittent failure, system is OK at this time.

Replace the throttle body.

*: '99 – 00 models

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 17.6% (16.9%)* or less indicated when the throttle is fully closed?

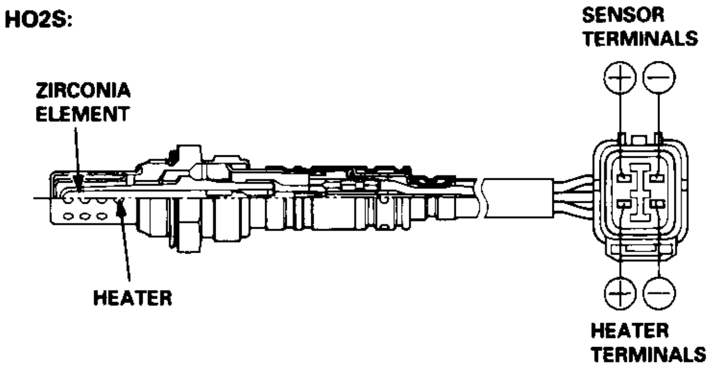
Intermittent failure, system is OK at this time.

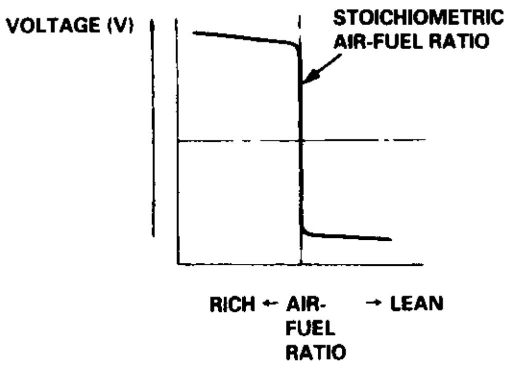
Replace the throttle body.

*: '99 – 00 models

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1)

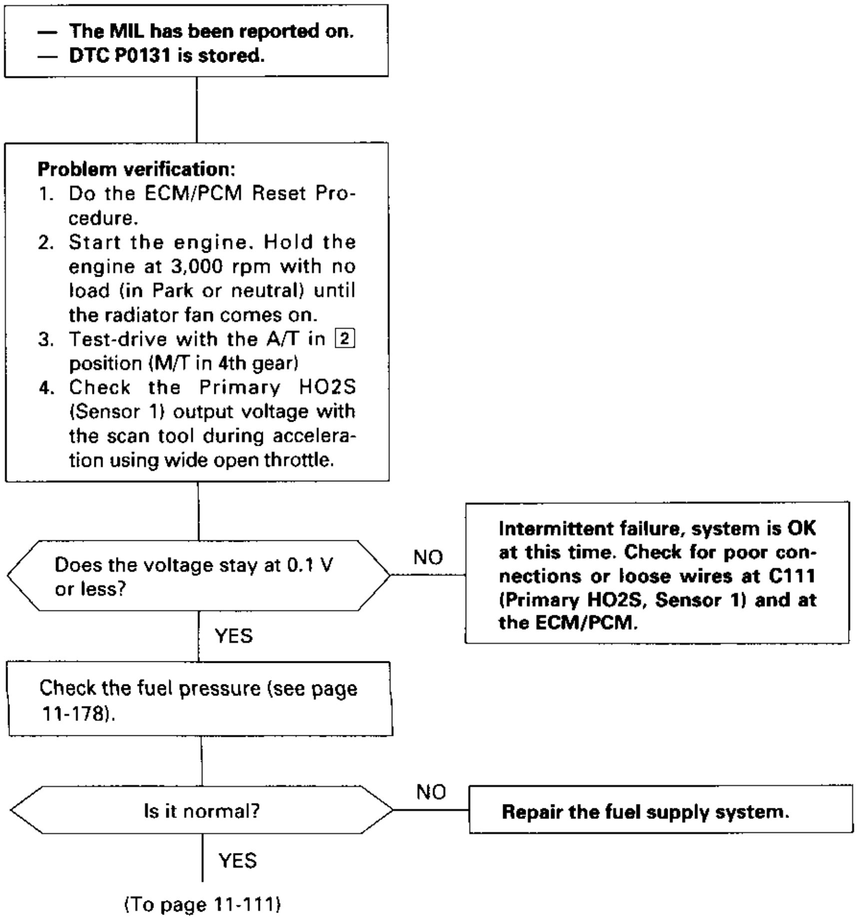
The Heated Oxygen Sensors (HO2S) detect the oxygen content in the exhaust gas and signal the ECM/PCM. In operation, the ECM/PCM receives the signals from the sensor and varies the duration during which fuel is injected. To stabilize the sensor's output, the sensor has an internal heater. The Primary HO2S (Sensor 1) is installed in exhaust pipe A.





P0131 The scan tool indicates Diagnostic Trouble Code (DTC) P0131: A low voltage problem in the Primary Heated Oxygen Sensor (HO2S) (Sensor 1) circuit.

'97 – 98 models:



— The MIL has been reported on.
— DTC P0131 is stored.

Problem verification:
1. Do the ECM/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 A/T in [2] position (M/T in 4th gear)
4. Check the Primary HO2S (Sensor 1) output voltage with the scan tool during acceleration using wide open throttle.

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 C111 (Primary HO2S, Sensor 1) and at the ECM/PCM.**

YES

Check the fuel pressure (see page 11-178).

Is it normal?

NO — **Repair the fuel supply system.**

YES

(To page 11-111)

(From page 11-110)

Check for a short in the HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the Primary HO2S (Sensor 1) 4P connector.
3. Start the engine and let it idle.
4. Check the Primary HO2S (Sensor 1) output voltage with the scan tool.

Does it stay at 0.1 V or less?

NO — **Replace the HO2S (Sensor 1).**

YES

Check for a short in the wire (PHO2S line):

1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector (D (16P), C (31P)*).
3. Check for continuity between the Primary HO2S (Sensor 1) 4P connector terminal No. 1 and body ground.

Is there continuity?

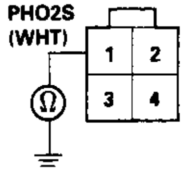
YES — **Repair short in the wire between the ECM/PCM (D7, C16*) and the Primary HO2S (Sensor 1).**

NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

*: '98 model

PRIMARY HO2S (Sensor 1) 4P CONNECTOR (C111)

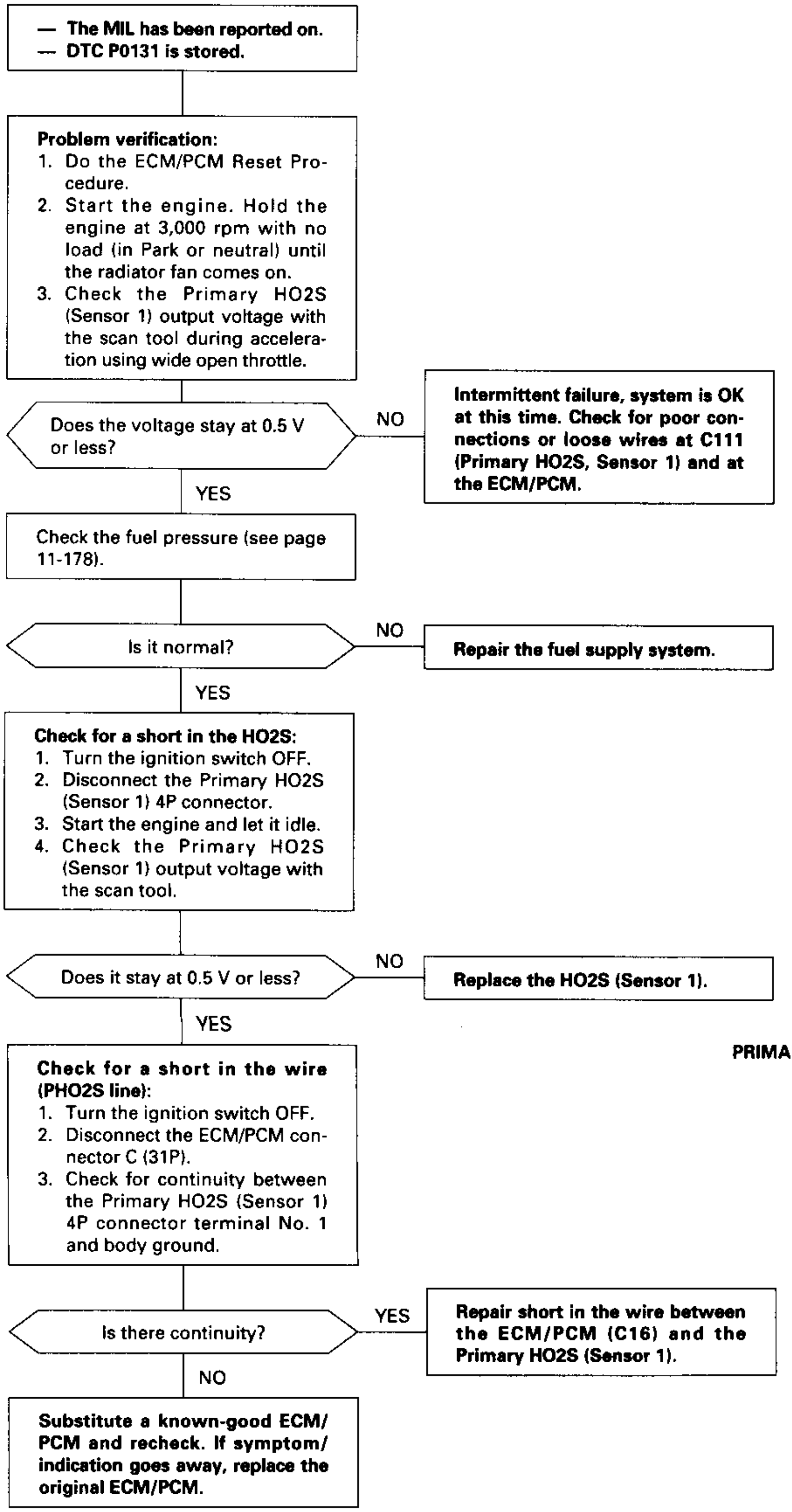


Wire side of female terminals

(cont'd)

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) (cont'd)

'99 – 00 models:



— The MIL has been reported on.
— DTC P0131 is stored.

Problem verification:
1. Do the ECM/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. Check the Primary HO2S (Sensor 1) output voltage with the scan tool during acceleration using wide open throttle.

Does the voltage stay at 0.5 V or less?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C111 (Primary HO2S, Sensor 1) and at the ECM/PCM.

YES

Check the fuel pressure (see page 11-178).

Is it normal?

NO

Repair the fuel supply system.

YES

Check for a short in the HO2S:
1. Turn the ignition switch OFF.
2. Disconnect the Primary HO2S (Sensor 1) 4P connector.
3. Start the engine and let it idle.
4. Check the Primary HO2S (Sensor 1) output voltage with the scan tool.

Does it stay at 0.5 V or less?

NO

Replace the HO2S (Sensor 1).

YES

Check for a short in the wire (PHO2S line):
1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector C (31P).
3. Check for continuity between the Primary HO2S (Sensor 1) 4P connector terminal No. 1 and body ground.

Is there continuity?

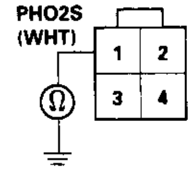
YES

Repair short in the wire between the ECM/PCM (C16) and the Primary HO2S (Sensor 1).

NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

PRIMARY HO2S (Sensor 1) 4P CONNECTOR (C111)



Wire side of female terminals

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.

'97 – 98 models:

— The MIL has been reported on.
— DTC P0132 is stored.

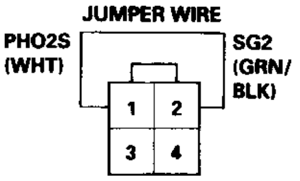
Problem verification:
1. Do the ECM/PCM Reset Procedure.
2. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on.
3. Test-drive with the A/T in [2] position (M/T in 4th gear).
4. Check the Primary HO2S (Sensor 1) output voltage with the scan 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 C111 (Primary HO2S, Sensor 1) and ECM/PCM.**

YES

Check for an open in the Primary HO2S:
1. Turn the ignition switch OFF.
2. Disconnect the Primary HO2S (Sensor 1) 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.



Wire side of female terminals

Is there 1.0 V or more?

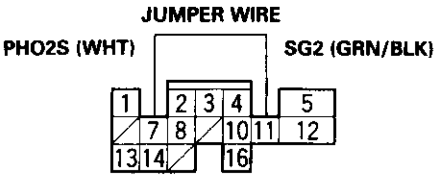
NO → **Replace the Primary HO2S.**

YES

('97 model)

Check for an open in the wires (PHO2S, SG2 lines):
1. Turn the ignition switch OFF.
2. Connect PCM connector terminals D7 and D11 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the Primary HO2S (Sensor 1) output voltage with the scan tool.

PCM CONNECTOR D (16P)



Wire side of female terminals

Is there 1.0 V or more?

NO → **Repair open in the wire between the PCM (D7 or D11) and the Primary HO2S (Sensor 1).**

YES

(To page 11-114)

(cont'd)

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) (cont'd)

(From page 11-113)

('98 model)

Check for an open in the wire (PHO2S line):

1. Turn the ignition switch OFF.
2. Connect ECM/PCM connector terminals C16 and C18 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the Primarly HO2S (Sensor 1) output voltage with the scan tool.

Is there 1.0 V or more?

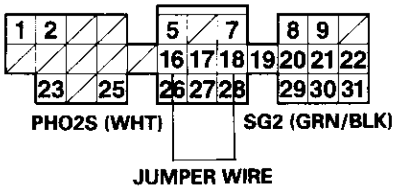
YES

Repair open in the wire between the ECM/PCM (C16) and the Primary HO2S (Sensor 1).

NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

'99 – 00 models:

- The MIL has been reported on.
- DTC P0132 is stored.

Problem verification:

1. Do the ECM/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. Check the Primary HO2S (Sensor 1) output voltage with the scan tool during deceleration using completely closed throttle.

Does the voltage stay at 1.5 V or more?

NO — **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C111 (Primary HO2S, Sensor 1) and at the ECM/PCM.**

YES

Check for an open in the Primary HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the Primary HO2S (Sensor 1) 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 1.5 V or more?

NO — **Replace the Primary HO2S.**

YES

Check for an open in the wire (PHO2S line):

1. Turn the ignition switch OFF.
2. Connect ECM/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.

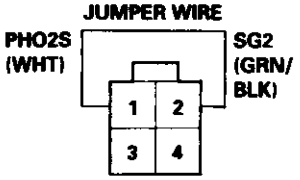
Is there 1.5 V or more?

YES — **Repair open in the wire between the ECM/PCM (C16) and the Primary HO2S (Sensor 1).**

NO

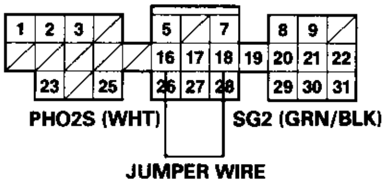
Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

PRIMARY HO2S (Sensor 1) 4P CONNECTOR (C111)



Wire side of female terminals

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

(cont'd)

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) (cont'd)

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

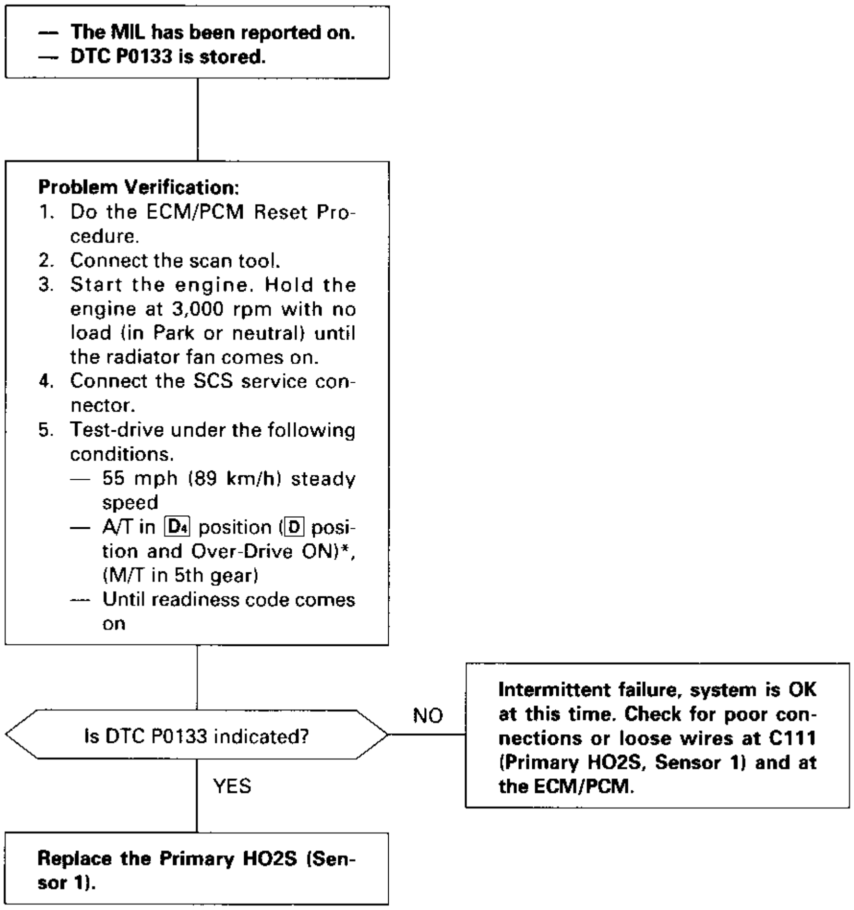
By controlling the air/fuel ratio with a Primary HO2S (Sensor 1) and a Secondary HO2S (Sensor 2), the deterioration of the Primary HO2S (Sensor 1) can be evaluated by its feedback period. When the feedback period of the HO2S exceeds a certain value during stable driving conditions, the sensor will be 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



— The MIL has been reported on.
— DTC P0133 is stored.

Problem Verification:
1. Do the ECM/PCM Reset Procedure.
2. Connect the scan tool.
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. Connect the SCS service connector.
5. Test-drive under the following conditions.
   - — 55 mph (89 km/h) steady speed
   - — A/T in $\boxed{D_4}$ position ($\boxed{D}$ position and Over-Drive ON)*, (M/T in 5th gear)
   - — Until readiness code comes on

Is DTC P0133 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C111 (Primary HO2S, Sensor 1) and at the ECM/PCM.

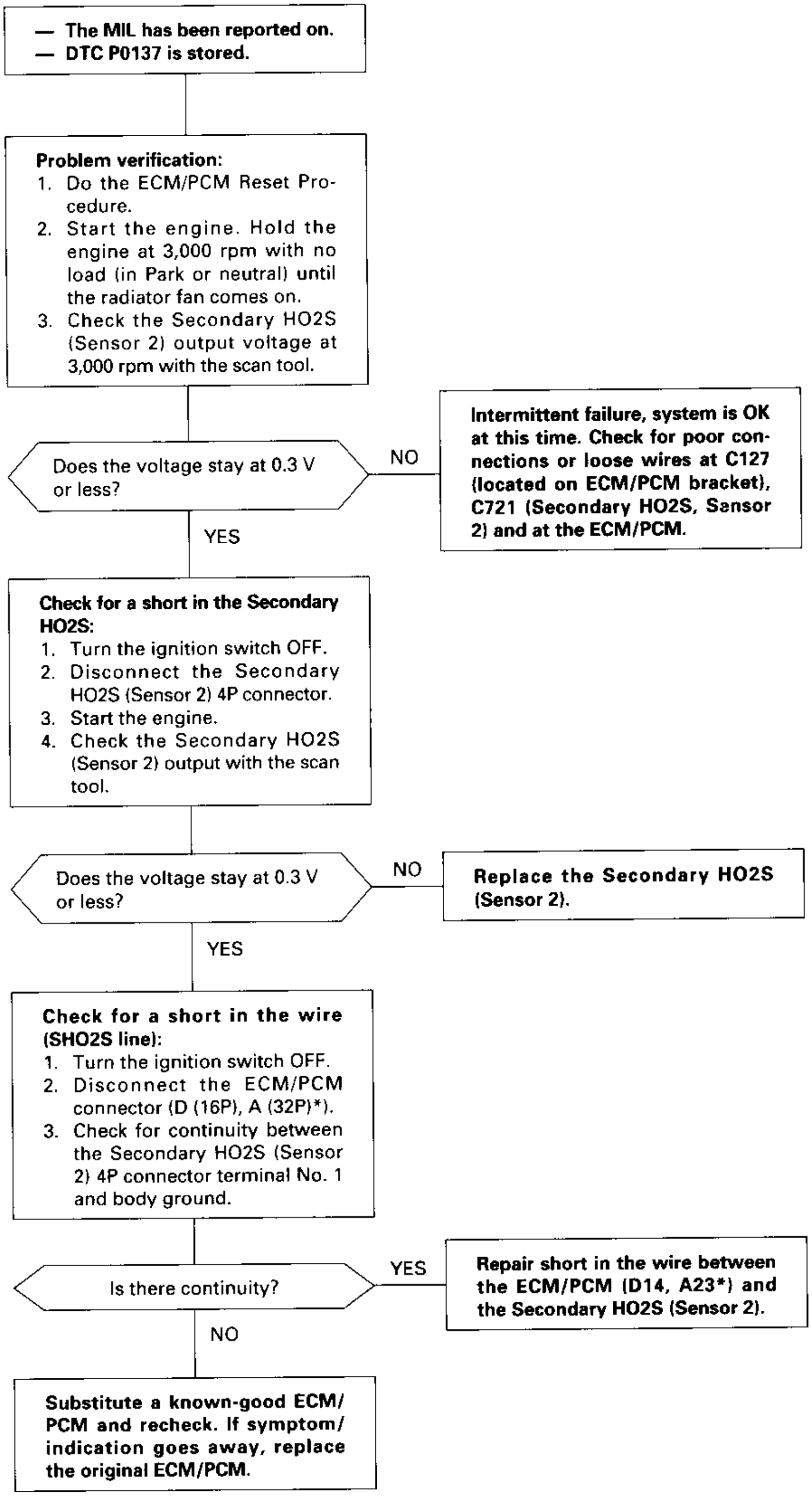
YES

Replace the Primary HO2S (Sensor 1).

*: '99 – 00 models

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.



- **The MIL has been reported on.**
- **DTC P0137 is stored.**

Problem verification:
1. Do the ECM/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. Check the Secondary HO2S (Sensor 2) output voltage at 3,000 rpm with the scan tool.

Does the voltage stay at 0.3 V or less?

NO → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C127 (located on ECM/PCM bracket), C721 (Secondary HO2S, Sensor 2) and at the ECM/PCM.**

YES ↓

Check for a short in the Secondary HO2S:
1. Turn the ignition switch OFF.
2. Disconnect the Secondary HO2S (Sensor 2) 4P connector.
3. Start the engine.
4. Check the Secondary HO2S (Sensor 2) output with the scan tool.

Does the voltage stay at 0.3 V or less?

NO → **Replace the Secondary HO2S (Sensor 2).**

YES ↓

Check for a short in the wire (SHO2S line):
1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector (D (16P), A (32P)*).
3. Check for continuity between the Secondary HO2S (Sensor 2) 4P connector terminal No. 1 and body ground.

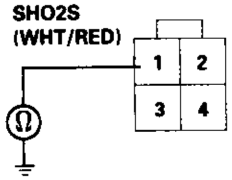
Is there continuity?

YES → **Repair short in the wire between the ECM/PCM (D14, A23*) and the Secondary HO2S (Sensor 2).**

NO ↓

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

SECONDARY HO2S (Sensor 2) 4P CONNECTOR (C721)



Wire side of female terminals

(cont'd)

*: '98 – 00 models

Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) (cont'd)

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 ECM/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. Check the Secondary HO2S (Sensor 2) output voltage at 3,000 rpm with the scan tool.

Does the voltage stay at 0.6 V or more?

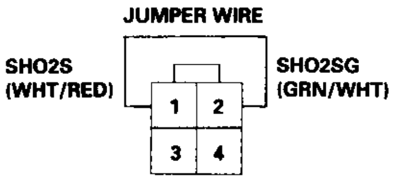
NO — **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C127 (located on ECM/PCM bracket), C721 (Secondary HO2S, Sensor 2) and at the ECM/PCM.**

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.

SECONDARY HO2S (Sensor 2) 4P CONNECTOR (C721)



Wire side of female terminals

Is there 0.6 V or more?

NO — **Replace the Secondary HO2S (Sensor 2).**

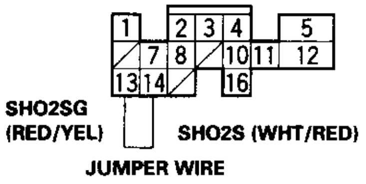
YES

('97 model)

Check for an open in the wires (SHO2S, SG2 lines):

1. Turn the ignition switch OFF.
2. Connect PCM connector terminals D14 and D13 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the Secondary HO2S (Sensor 2) output voltage with the scan tool.

PCM CONNECTOR D (16P)



Wire side of female terminals

Is there 0.6 V or more?

NO — **Repair open in the wire between the PCM (D14 or D13) and the Secondary HO2S (Sensor 2).**

YES

(To page 11-119)

(From page 11-118)

('98 – 00 models)

Check for an open in the wire (SHO2S line):

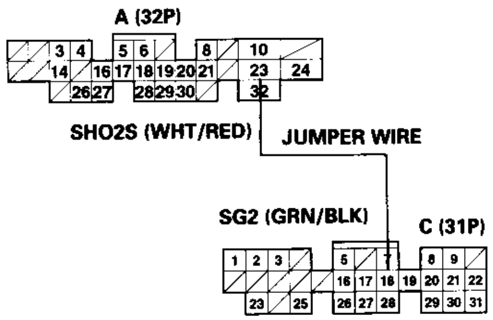
1. Turn the ignition switch OFF.
2. Connect ECM/PCM connector terminals A23 and C18 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the Secondary HO2S (Sensor 2) output voltage with the scan tool.

Is there 0.6 V or more?

NO — **Repair open in the wire between the ECM/PCM (A23) and the Secondary HO2S (Sensor 2).**

YES — **Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.**

ECM/PCM CONNECTORS

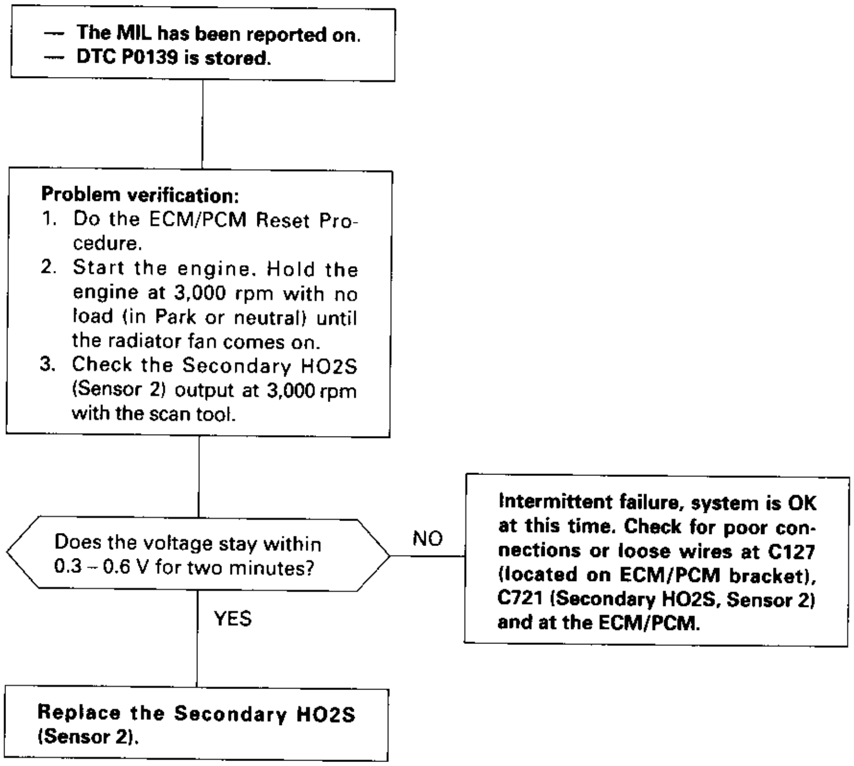


Wire side of female terminals

(cont'd)

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 ECM/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. Check the Secondary HO2S (Sensor 2) output at 3,000 rpm with the scan tool.

Does the voltage stay within 0.3 – 0.6 V for two minutes?

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C127 (located on ECM/PCM bracket), C721 (Secondary HO2S, Sensor 2) and at the ECM/PCM.

Replace the Secondary HO2S (Sensor 2).

Heated Oxygen Sensor (HO2S) Heater

P0135 The scan tool indicates Diagnostic Trouble Code (DTC) P0135: A problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) Heater circuit.

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 ECM/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 C111 (Primary HO2S, Sensor 1), C127 (located on ECM/PCM bracket), C721 (Secondary HO2S, Sensor 2)* and at the ECM/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 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 wires (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?

NO

A

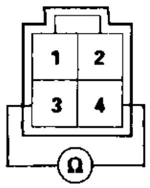
('97 model: To page 11-122) ('98 – 00 models: To page 11-123)

YES

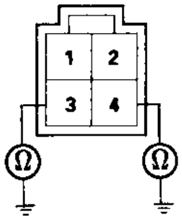
B

('97 model: To page 11-122) ('98 – 00 models: To page 11-123)

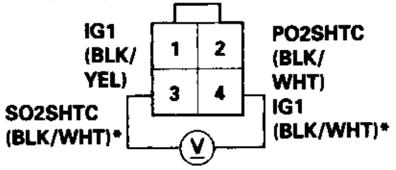
PRIMARY HO2S (Sensor 1) 4P CONNECTOR (C111), SECONDARY HO2S (Sensor 2) 4P CONNECTOR (C721)*



Terminal side of male terminals



PRIMARY HO2S (Sensor 1) 4P CONNECTOR (C111), SECONDARY HO2S (Sensor 2) 4P CONNECTOR (C721)*



Wire side of female terminals

(cont'd)

*: P0141

Heated Oxygen Sensor (HO2S) Heater (cont'd)

('97 model)

(From page 11-121)

A

Check for an open or short in the wire (IG1 line):
Measure voltage between the HO2S 4P connector terminal No. 3 (secondary: No. 4) and body ground.

Is there battery voltage?

NO → **Repair open or short in the wire between the No. 15 ALTERNATOR SP SENSOR (7.5 A) fuse and the HO2S (Primary, Secondary*).**

YES

Check for an open in the wire (PO2SHTC, SO2SHTC* line):

1. Turn the ignition switch OFF.
2. Reconnect the HO2S 4P connector.
3. Disconnect the PCM connector A (32P).
4. Turn the ignition switch ON (II).
5. Measure voltage between PCM connector terminals A6 and A10 (A5 and A10)*.

Is there 0.1 V or less?

YES → **Repair open in the wire between the PCM (A6, A5)* and the HO2S (Primary, Secondary*).**

NO

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

(From page 11-121)

B

Check for a short in the wire (PO2SHTC, SO2SHTC* line):

1. Turn the ignition switch OFF.
2. Disconnect the PCM connector A (32P).
3. Check for continuity between the PCM connector terminal A6 (A5)* and body ground.

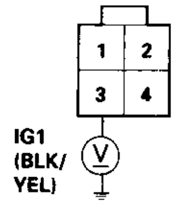
Is there continuity?

YES → **Repair short in the wire between the PCM (A6, A5*) and the HO2S (Primary, Secondary*).**

NO

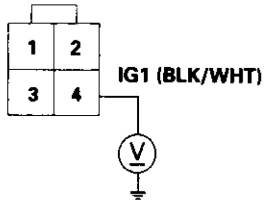
Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

PRIMARY HO2S (Sensor 1) 4P CONNECTOR (C111)



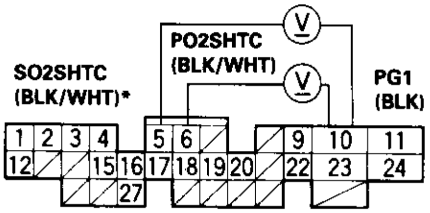
Wire side of female terminals

SECONDARY HO2S (SENSOR 2) 4P CONNECTOR (C721)*

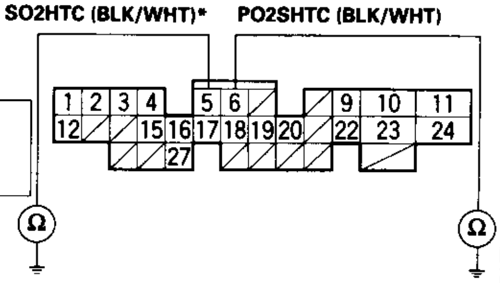


Wire side of female terminals

PCM CONNECTOR A (32P)



Wire side of female terminals



*: P0141

('98 – 00 models)

(From page 11-121)

A

Check for an open in the wires (IGP, IG1* line):
Measure voltage between the primary HO2S 4P connector terminal No. 3 (secondary HO2S: No. 4) and body ground.

Is there battery voltage?

NO → **Repair open or short in the wire between the No. 15 ALTERNATOR SP SENSOR (7.5 A) fuse and the HO2S (Primary, Secondary*).**

YES

Check for an open in the wires (PO2SHTC, SO2SHTC* line):
1. Turn the ignition switch OFF.
2. Reconnect the HO2S 4P connector.
3. Disconnect the ECM/PCM connector C (31P) (ECM/PCM connector A (32P))*.
4. Turn the ignition switch ON (II).
5. Measure voltage between ECM/PCM connector terminals B2 and C1 (B2 and A8)*.

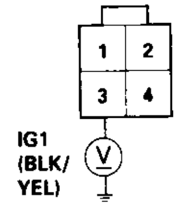
Is there 0.1 V or less?

YES → **Repair open in the wire between the ECM/PCM (C1, A8*) and the HO2S (Primary, Secondary*).**

NO

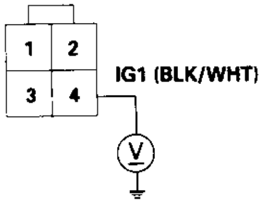
Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

PRIMARY HO2S (Sensor 1) 4P CONNECTOR (C111)



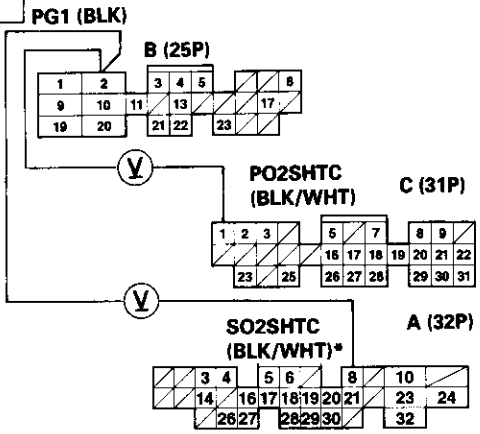
Wire side of female terminals

SECONDARY HO2S (SENSOR 2) 4P CONNECTOR (C721)*



Wire side of female terminals

ECM/PCM CONNECTORS



Wire side of female terminals

(From page 11-121)

B

Check for a short in the wires (PO2SHTC, SO2SHTC* line):
1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector C (31P) (ECM/PCM connector A (32P))*.
3. Check for continuity between ECM/PCM connector terminal C1 (A8)* and body ground.

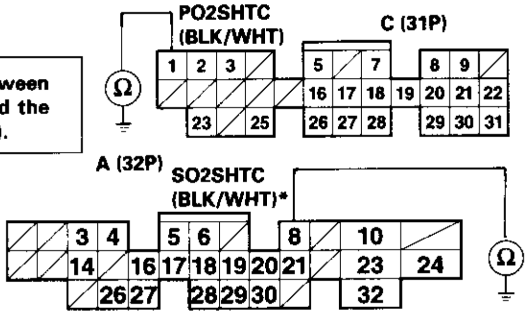
Is there continuity?

YES → **Repair short in the wire between the ECM/PCM (C1, A8*) and the HO2S (Primary, Secondary*).**

NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

ECM/PCM CONNECTORS



Wire side of female terminals

*: 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.

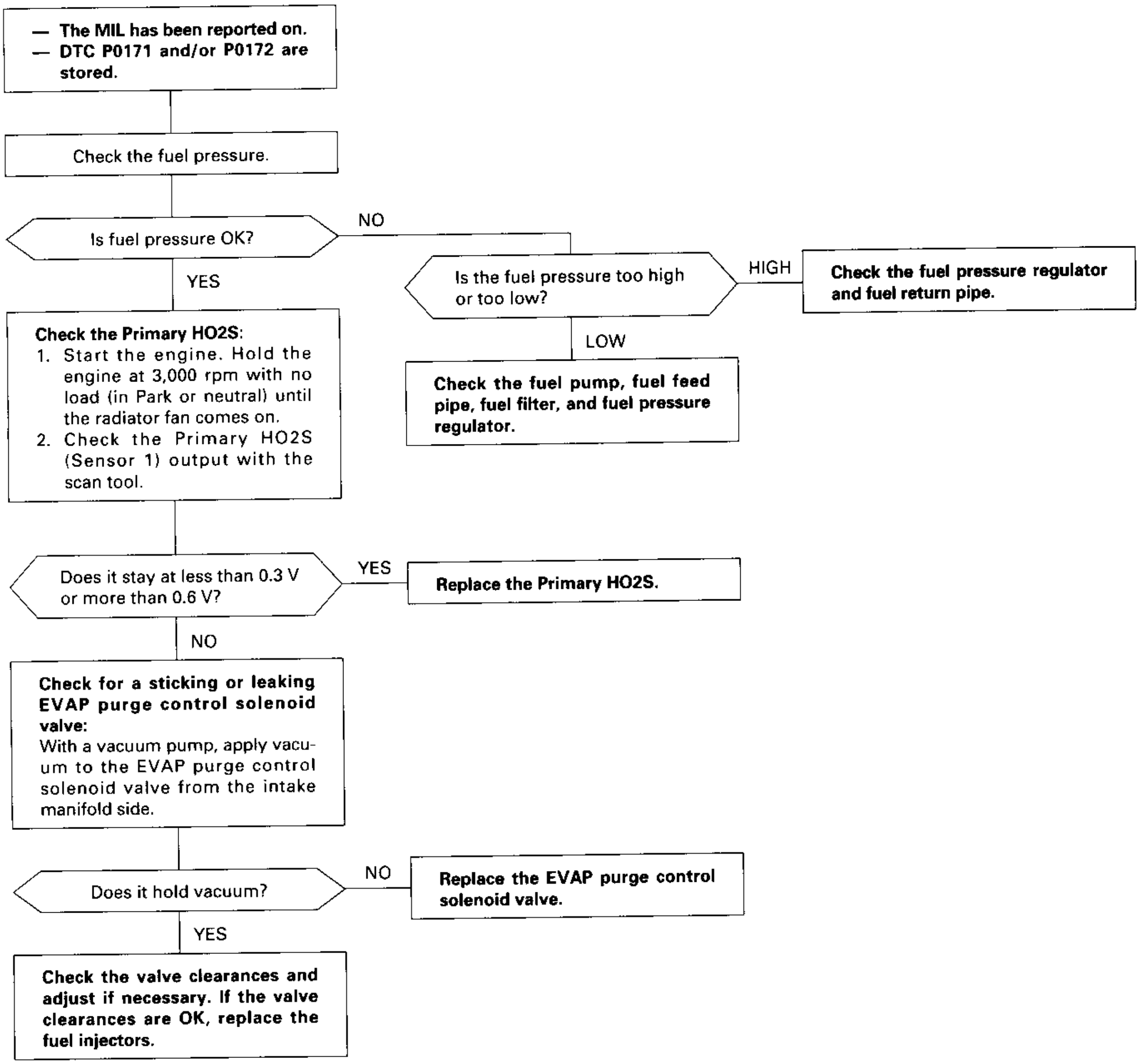
P0107, P0108, P1128, P1129: MAP Sensor
P0135: Primary HO2S (Sensor 1) Heater
P0137, P0138: Secondary HO2S (Sensor 2)
P0141: Secondary HO2S (Sensor 2) Heater
P0441*1: EVAP System Insufficient Purge Flow
P1456*2, P1457*2: EVAP System Insufficient Purge Flow

*1: '97 model
*2: '98 – 00 models

Possible Cause

DTC P0171 System too lean	• Fuel Pump insufficient flow/pressure • Fuel Feed Line clogged, leaking • Fuel Pressure Regulator stuck open • Fuel Filter clogged • Fuel Injector clogged, air leakage • Gasoline doesn't meet Owner's Manual spec. • Primary HO2S (Sensor 1) deteriorated • Valve Clearance • Exhaust leak
DTC P0172 System too rich	• Fuel Pressure Regulator clogged, stuck closed • Fuel Return Pipe clogged • Fuel Injector leaking • Gasoline doesn't meet Owner's Manual spec. • Primary HO2S (Sensor 1) deteriorated • EVAP Purge Control Solenoid Valve leaking, stuck opened • Valve Clearance

Troubleshooting Flowchart



- The MIL has been reported on.
- DTC P0171 and/or P0172 are stored.

Check the fuel pressure.

Is fuel pressure OK?

Is the fuel pressure too high or too low?

Check the fuel pressure regulator and fuel return pipe.

Check the fuel pump, fuel feed pipe, fuel filter, and fuel pressure regulator.

Check the Primary HO2S:

1. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on.
2. Check the Primary HO2S (Sensor 1) output with the scan tool.

Does it stay at less than 0.3 V or more than 0.6 V?

Replace the Primary HO2S.

Check for a sticking or leaking EVAP purge control solenoid valve:
With a vacuum pump, apply vacuum to the EVAP purge control solenoid valve from the intake manifold side.

Does it hold vacuum?

Replace the EVAP purge control solenoid valve.

Check the valve clearances and adjust if necessary. If the valve clearances are OK, replace the fuel injectors.

Random Misfire

P0300 *2, **P1300** *1 and some of **P0301 through P0304**

The scan tool indicates Diagnostic Trouble Code (DTC) P0300*2, P1300*1 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*2, P1300*1 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*2, P1300*1 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.

P0106, P1128, P1129: MAP sensor
P0171, P0172: Fuel metering
P0505: Idle Control System
P1336, P1337: CKF sensor
P1361, P1362: TDC sensor
P1381, P1382: CYP sensor
P1508: IAC valve

*1: '97 model
*2: '98 – 00 models

Possible Cause

- Fuel pump insufficient fuel pressure, amount of flow
- Fuel line clogging, blockage, leakage
- Fuel filter clogging
- Fuel pressure regulator stuck open
- Distributor malfunction
- Ignition coil wire open, leakage
- Ignition control module malfunction
- Valves carbon deposit
- Compression low
- Fuel does not meet Owner's Manual spec., lack of fuel

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 / Page / Condition	Crankshaft speed fluctuation sensor	Fuel pressure	Distributor and Ignition wires	ICM	Valve Clearance
	section 6	11-178	section 23	section 23	section 6
Only low rpm and load	③	①			②
Only accelerating		②	①	③	
Only high rpm and load	⑤	①	②	③	④
Not specification	⑤	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.

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 and/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 and/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.

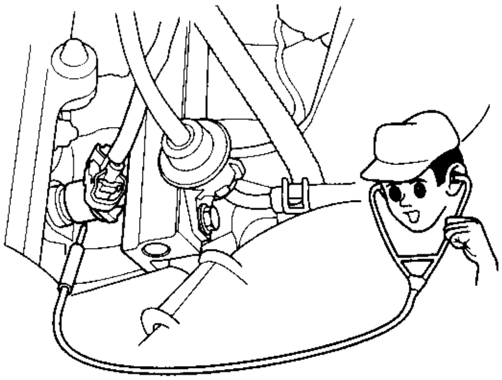
P0107, P0108, P1128, P1129: MAP sensor
P0171, P0172: Fuel supply system
P0441: EVAP insufficient purge flow
P1336, P1337: CKF sensor
P1359, P1361, P1362: TDC sensor
P1381, P1382: CYP sensor

Possible Cause
- Fuel injector clogging, fuel leakage, air leakage
- Fuel injector circuit open or shorted
- Spark plug carbon deposits, fouling, malfunction
- Ignition wires open, leaking
- Distributor malfunction
- Compression low
- Valve clearance out of specification

(cont'd)

Misfire Detected in One Cylinder (cont'd)

Troubleshooting Flowchart



The illustration shows '97 – 98 models, '99 – 00 models are similar.

- **The MIL has been reported on.**
- **DTC P0301, P0302, P0303, or P0304 is indicated.**

Check the fuel injector function: Start the engine, and listen for a clicking sound at the fuel injector in the problem cylinder.

Does it click?

NO → Check for an open or short in the harness between the ECM/PCM and the fuel injector.

Are the wires OK?

NO → **Repair open or short in the wire.**

YES →

- **Replace the fuel injector.**
- **Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.**

YES (Does it click?) →

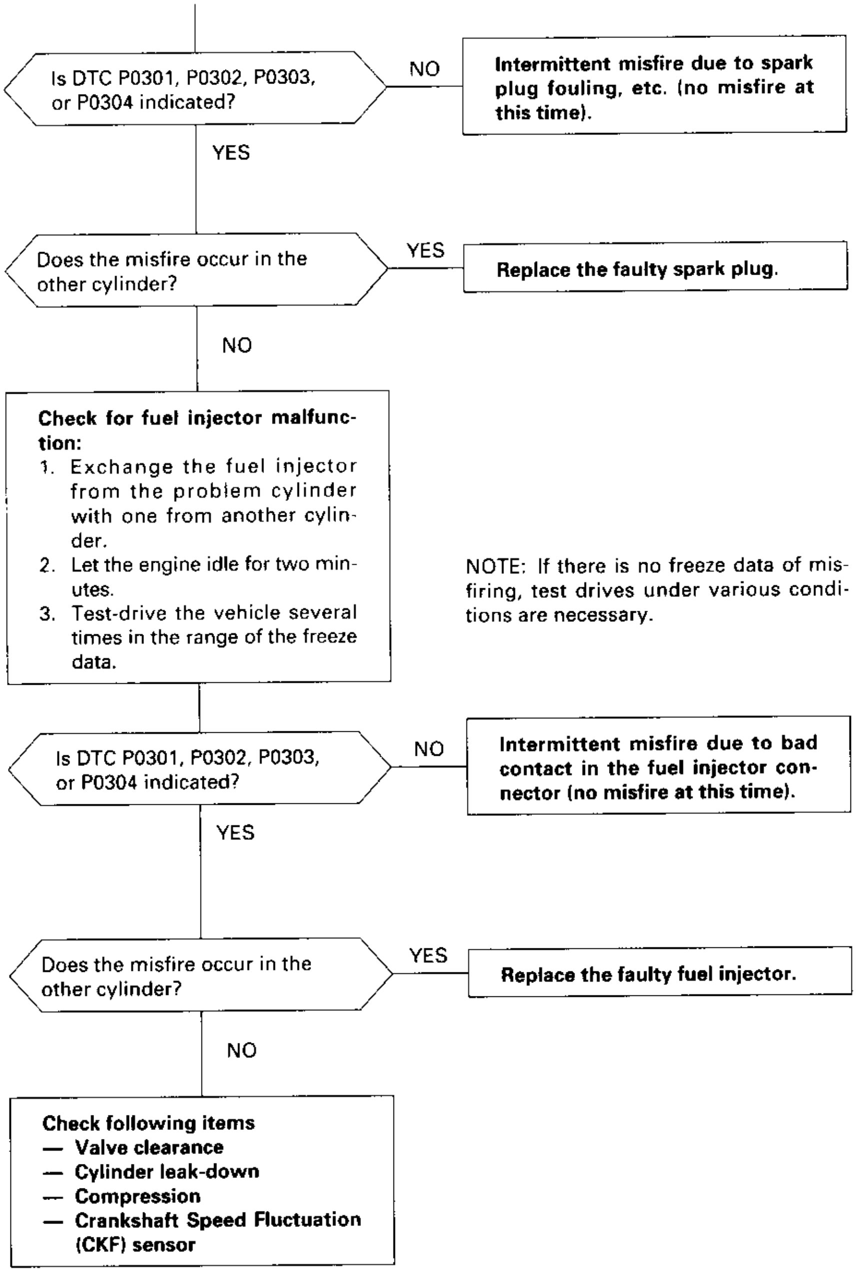
Problem verification:

1. After checking the freeze data, do the ECM/PCM Reset Procedure.
2. Exchange the spark plug from the problem cylinder with one of another cylinder.
3. Connect the SCS service connector.
4. Test-drive the vehicle several times in the range of the freeze data.

NOTE:
- If there is no freeze data of misfiring, just clear the DTC.
- If there is no freeze data of misfiring, test drives under various conditions are necessary.

(To page 11-129)

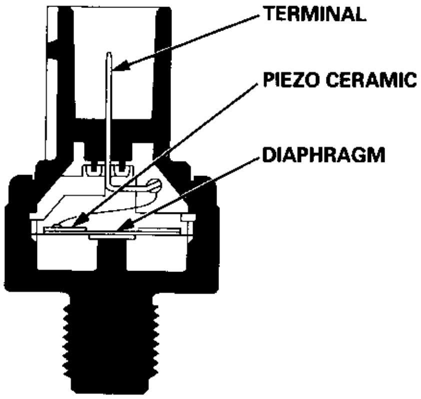
(From page 11-128)



NOTE: If there is no freeze data of misfiring, test drives under various conditions are necessary.

Knock Sensor (KS)

P0325 ('99 - 00 models) The scan tool indicates Diagnostic Trouble Code (DTC) P0325: A malfunction in the circuit of the Knock Sensor (KS).



— The MIL has been reported on.
— DTC P0325 is stored.

Problem verification:
1. Do the ECM/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. Hold the engine at 3,000 - 4,000 rpm for at least 60 seconds.

Is DTC P0325 indicated?

NO: **Intermittent failure, system is OK at this time (test drive may be necessary).**
Check for poor connections or loose wires at C137 (knock sensor (KS)) and at the ECM/PCM.

YES:

Check for a short in the wire (KS line):
1. Turn the ignition switch OFF.
2. Disconnect the knock sensor 1P connector.
3. Check for continuity between ECM/PCM connector terminals C3 and body ground.

Is there continuity?

YES: **Repair short in the wire between the ECM/PCM (C3) and the knock sensor.**

NO:

Check for an open in the wire (KS line):
Check for continuity between ECM/PCM connector terminal C3 and knock sensor connector terminal No. 1.

Is there continuity?

NO: **Repair open in the wire between the ECM/PCM (C3) and the knock sensor.**

YES:

Substitute a known-good knock sensor and recheck.

Is DTC P0325 indicated?

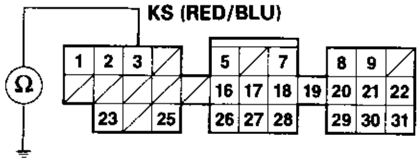
NO: **Replace the original knock sensor.**

YES:

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

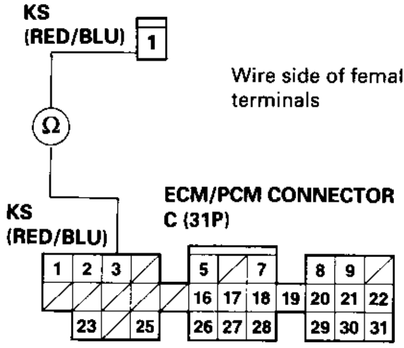
NOTE: Torque the knock sensor to 31 N·m (3.2 kgf·m, 23 lbf·ft).

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

KS 1P CONNECTOR (C137)



Wire side of female terminals

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.

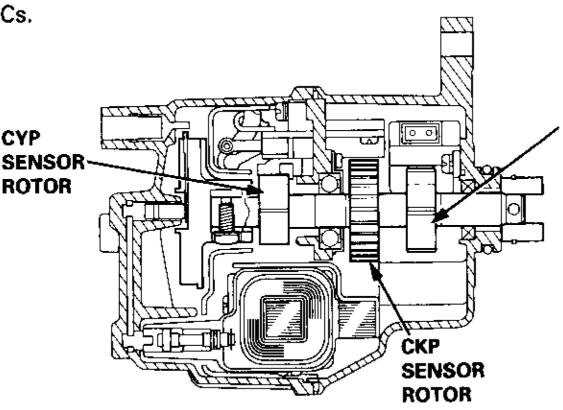
P1381 The scan tool indicates Diagnostic Trouble Code (DTC) P1381: Intermittent interruption in the Cylinder Position (CYP) sensor circuit.

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.



'97 model:

- **The MIL has been reported on.**
- **DTC P0335, P0336, P1361, P1362, P1381 and/or P1382 are stored.**

Problem verification:

1. Do the PCM Reset Procedure.
2. Start the engine.

Is DTC P0335, P0336, P1361, P1362, P1381 and/or P1382 indicated?

NO → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C121 (distributor) and at the PCM.**

YES

Check for an open in the CKP/TDC/CYP sensor:

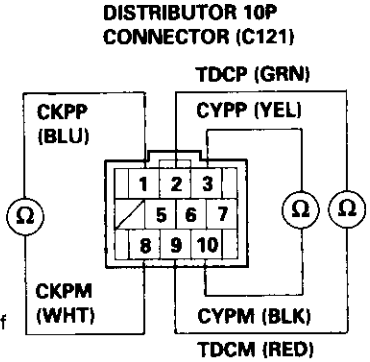
1. Turn the ignition switch OFF.
2. Disconnect the distributor 10P connector.
3. Measure resistance between the terminals of the indicated sensor (see table).

Is there 350 – 700 Ω?

NO → **Replace the distributor ignition housing (see section 4).**

YES

(To page 11-132)



Terminal side of male terminals

SENSOR	DTC	SENSOR TERMINAL	PCM TERMINAL	WIRE COLOR
CKP	P0335 P0336	1	C2	BLU
		8	C12	WHT
TDC	P1361 P1362	2	C3	GRN
		9	C13	RED
CYP	P1381 P1382	3	C4	YEL
		10	C14	BLK

(cont'd)

Crankshaft Position/Top Dead Center/Cylinder Position (CKP/TDC/CYP) Sensor (cont'd)

(From page 11-131)

Check for a short in the CKP/TDC/CYP sensor:
Check for continuity to body ground on both terminals of the indicated sensor individually (see table on page 11-131).

Is there continuity?

YES

Replace the distributor ignition housing (see section 4).

NO

Check for an open in the wires (CKP/TDC/CYP lines):

1. Reconnect the distributor 10P connector.
2. Disconnect PCM connector C (31P).
3. Measure resistance between the terminals of the indicated sensor on the PCM connector (see table on page 11-131).

Is there 350 – 700 Ω?

NO

Repair open in the indicated sensor wires (see table on page 11-131).

YES

Check for a short in the wires (CKP/TDC/CYP lines):
Check for continuity between body ground and PCM connector terminals C2, C3 and/or C4 individually.

Is there continuity?

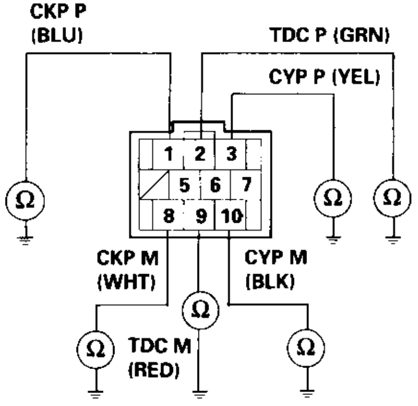
YES

Repair short in the indicated sensor wires (see table on page 11-131).

NO

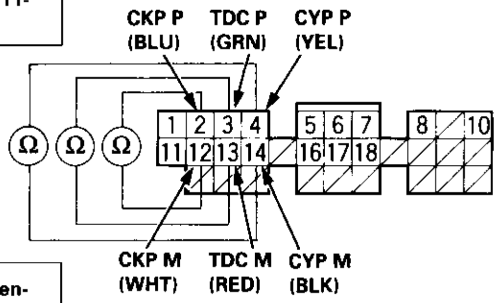
Substitute a known-good PCM, and recheck. If symptom/indication goes away, replace the original PCM.

DISTRIBUTOR 10P CONNECTOR (C121)

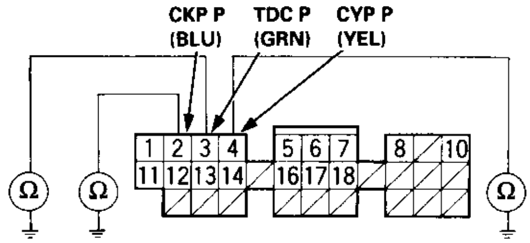


Terminal side of male terminals

PCM CONNECTORS C (31P)



Wire side of female terminals



'98 – 00 models:

- The MIL has been reported on.
- DTC P0335, P0336, P1361, P1362, P1381 and/or P1382 are stored.

Problem verification:
1. Do the ECM/PCM Reset Procedure.
2. Start the engine.

Is DTC P0335, P0336, P1361, P1362, P1381 and/or P1382 indicated?

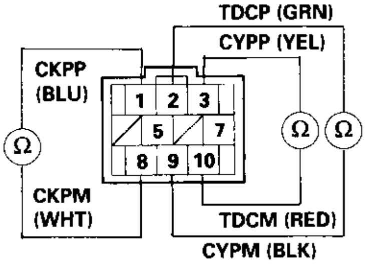
NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C121 (distributor) and at the ECM/PCM.

YES

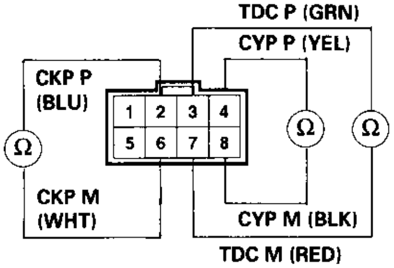
Check for an open in the CKP/TDC/CYP sensor:
1. Turn the ignition switch OFF.
2. Disconnect the distributor 10P (8P)* connector.
3. Measure resistance between the terminals of the indicated sensor (see table).

'98 model:
DISTRIBUTOR 10P CONNECTOR (C121)



Terminal side of male terminals

'99 – 00 models:
DISTRIBUTOR 8P CONNECTOR (C121)



Terminal side of male terminals

SENSOR	DTC	SENSOR TERMINAL ( ):'99 model	ECM/PCM TERMINAL	WIRE COLOR
CKP	P0335 P0336	1 (2)	C8	BLU
		8 (6)	C9	WHT
TDC	P1361 P1362	2 (3)	C20	GRN
		9 (7)	C21	RED
CYP	P1381 P1382	3 (4)	C29	YEL
		10 (8)	C30	BLK

Is there 350 – 700 Ω?

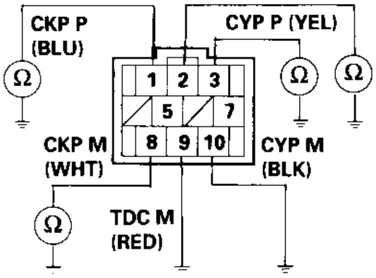
NO

Replace the distributor ignition housing (see section 4).

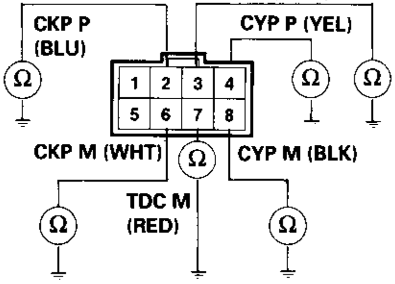
YES

Check for a short in the CKP/TDC/CYP sensor:
Check for continuity to body ground on both terminals of the indicated sensor individually (see table).

'98 model:



'99 – 00 models:



Is there continuity?

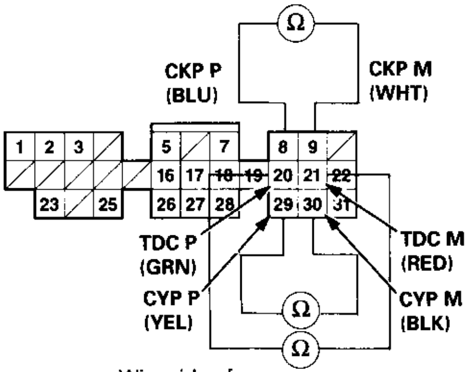
YES

Replace the distributor ignition housing (see section 4).

NO

Check for an open in the wires (CKP/TDC/CYP lines):
1. Reconnect the distributor 10P (8P)* connector.
2. Disconnect ECM/PCM connector C (31P).
3. Measure resistance between the terminals of the indicated sensor on the ECM/PCM connector (see table).

ECM/PCM CONNECTORS C (31P)



Wire side of female terminals

Is there 350 – 700 Ω?

NO

Repair open in the indicated sensor wires (see table).

YES

*: '99 – 00 models

(To page 11-134)

(cont'd)

Crankshaft Position/Top Dead Center/Cylinder Position (CKP/TDC/CYP) Sensor (cont'd)

(From page 11-133)

Check for a short in the wires (CKP/TDC/CYP lines):
Check for continuity between body ground and ECM/PCM connector terminals C8, C20 and/or C29 individually.

Is there continuity?

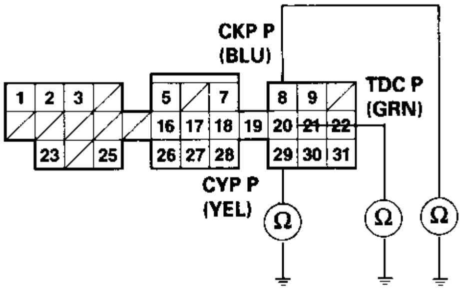
YES

Repair short in the indicated sensor wires (see table on page 11-133).

NO

Substitute a known-good ECM/PCM, and recheck. If symptom/indication goes away, replace the original ECM/PCM.

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

Vehicle Speed Sensor (VSS)

P0500*2, P0501*1 The scan tool indicates Diagnostic Trouble Code (DTC) P0500*2 or P0501*1: A range/performance in the Vehicle Speed Sensor (VSS) circuit.

*1: A/T
*2: M/T

'97 model:

— 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?

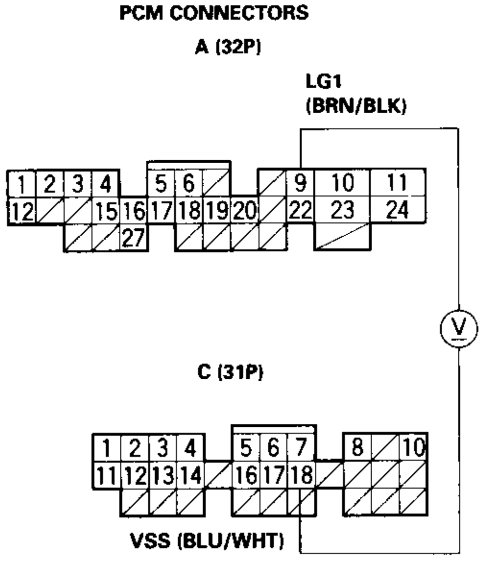
YES — **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C129 (VSS) and at the PCM.**

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 by hand.
6. Measure voltage between PCM connector terminals C18 and A9.

NOTE: Do not use the engine to turn the front wheels with the rear wheels on the ground. The 4WD system will engage and the vehicle will suddenly lurch forward.

PCM CONNECTORS



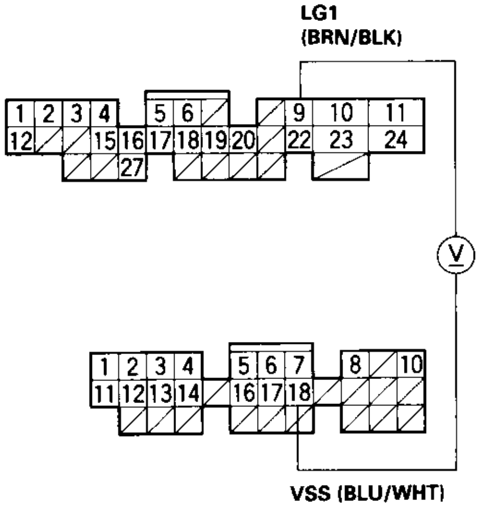
Wire side of female terminals

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 PCM connector terminals C18 and A9.



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 the PCM (C18), cruise control unit, speedometer, and VSS.**
- **Repair open in the wire between the PCM (C18) and the VSS.**
- **If wire is OK, test the VSS (see section 23).**

(cont'd)

Vehicle Speed Sensor (VSS) (cont'd)

'98 – 00 models:

— The MIL has been reported on.
— DTC P0500*2 or P0501*1 is stored.

Problem verification:
1. Test-drive the vehicle.
2. Check the vehicle speed with the scan tool.

Is the correct speed indicated?

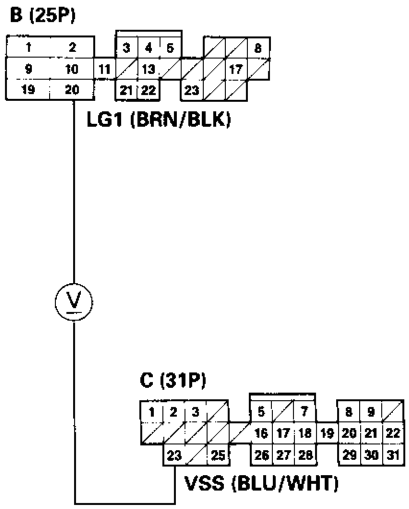
YES — **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C129 (VSS) and at the ECM/PCM.**

NO

Check for an open in the ECM/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 ECM/PCM connector terminals B20 and C23.

NOTE (4WD): Do not use the engine to turn the front wheels with the rear wheels on the ground. The 4WD system will engage and the vehicle will suddenly lurch forward.

ECM/PCM CONNECTORS



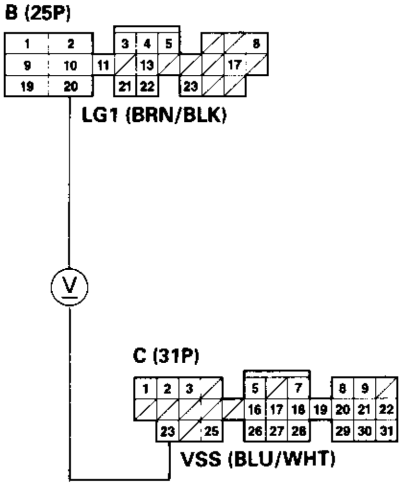
Wire side of female terminals

Does the voltage pulse between 0 V and 5 V or battery voltage?

YES — **Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.**

NO

Check for a short in the ECM/PCM:
1. Turn the ignition switch OFF.
2. Disconnect ECM/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 ECM/PCM connector terminals B20 and C23.



Does the voltage pulse between 0 V and 5 V or battery voltage?

YES — **Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.**

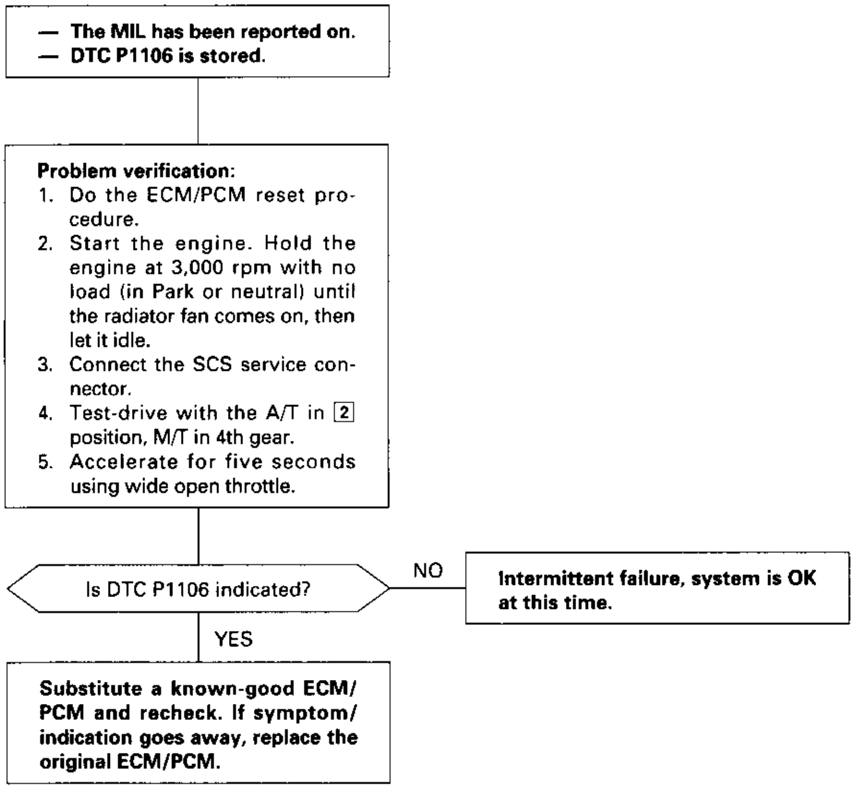
NO

— Repair short in the wire between the ECM/PCM (C23) and the VSS.
— Repair open in the wire between the ECM/PCM (C23) and the VSS.
— If wire is OK, test the VSS (see section 23).

*1: A/T
*2: M/T

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 ECM/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 A/T in [2] position, M/T in 4th gear.
5. Accelerate for five seconds using wide open throttle.

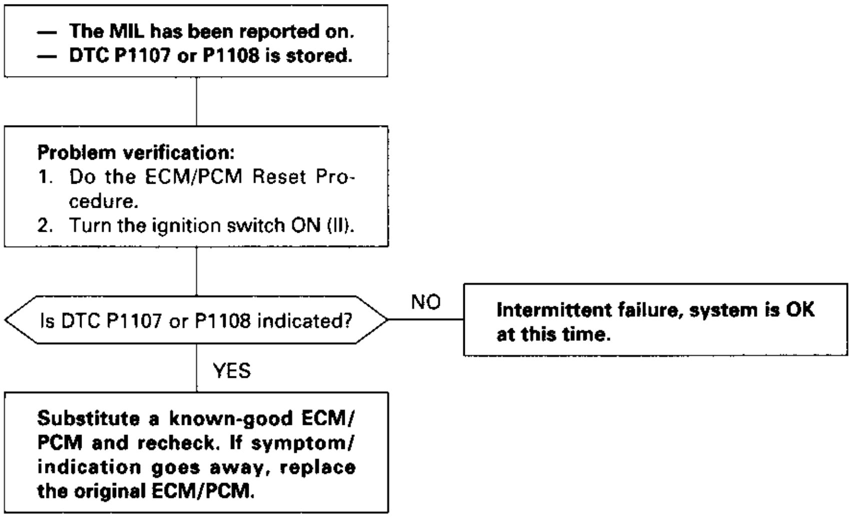
Is DTC P1106 indicated?

Intermittent failure, system is OK at this time.

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/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.



— The MIL has been reported on.
— DTC P1107 or P1108 is stored.

Problem verification:
1. Do the ECM/PCM Reset Procedure.
2. Turn the ignition switch ON (II).

Is DTC P1107 or P1108 indicated?

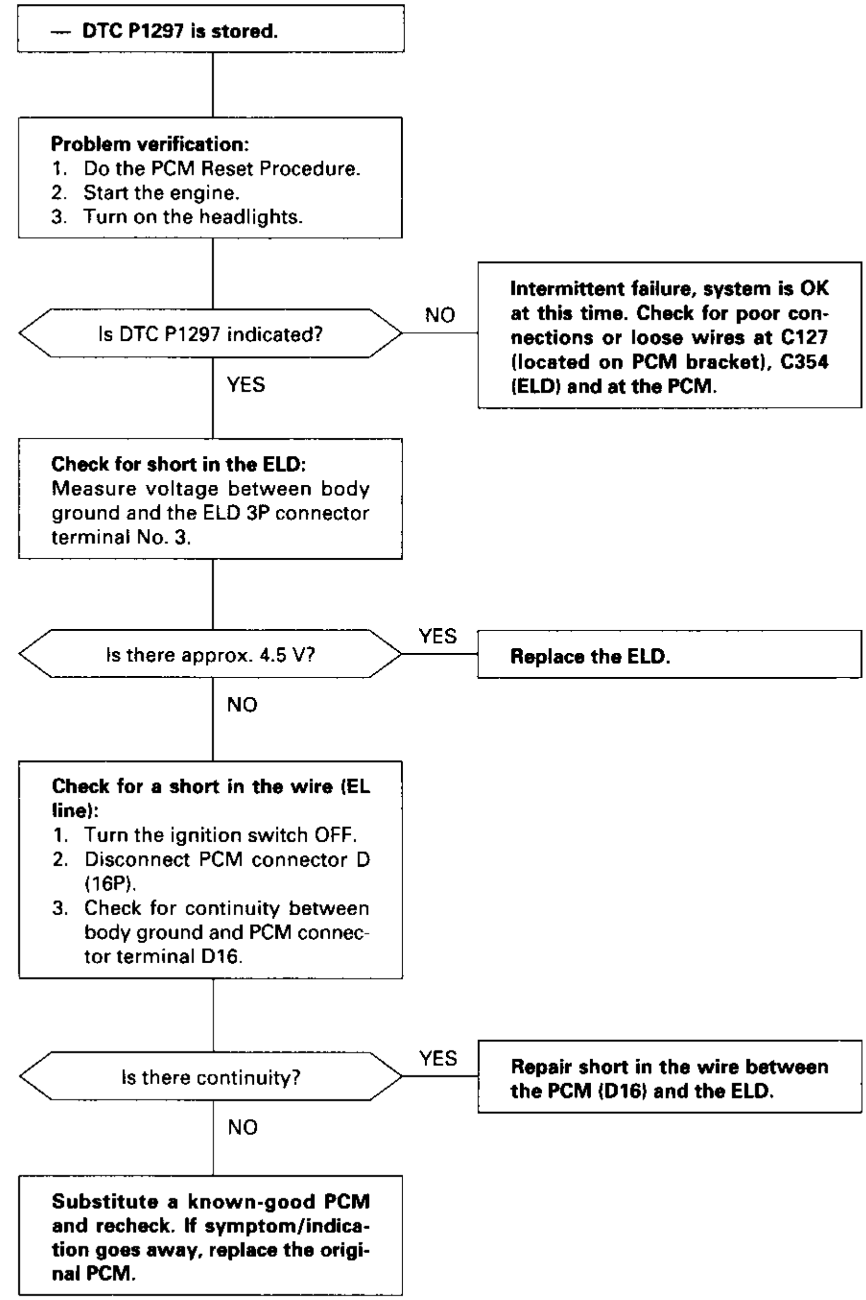
Intermittent failure, system is OK at this time.

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

Electrical Load Detector (ELD) (USA Model)

P1297 The scan tool indicates Diagnostic Trouble Code (DTC) P1297: A low voltage problem in the Electrical Load Detector (ELD) circuit.

'97 model:



— DTC P1297 is stored.

Problem verification:
1. Do the PCM Reset Procedure.
2. Start the engine.
3. Turn on the headlights.

Is DTC P1297 indicated?

NO: **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C127 (located on PCM bracket), C354 (ELD) and at the PCM.**

YES

Check for short in the ELD:
Measure voltage between body ground and the ELD 3P connector terminal No. 3.

Is there approx. 4.5 V?

YES: **Replace the ELD.**

NO

Check for a short in the wire (EL line):
1. Turn the ignition switch OFF.
2. Disconnect PCM connector D (16P).
3. Check for continuity between body ground and PCM connector terminal D16.

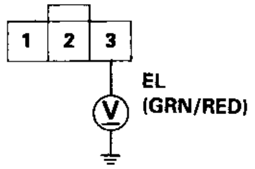
Is there continuity?

YES: **Repair short in the wire between the PCM (D16) and the ELD.**

NO

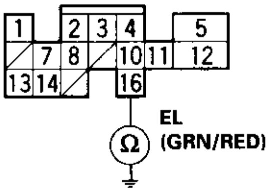
Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

ELD 3P CONNECTOR (C354)



Wire side of female terminals

PCM CONNECTOR D (16P)



Wire side of female terminals

'98 – 00 models:

— DTC P1297 is stored.

Problem verification:
1. Do the ECM/PCM Reset Procedure.
2. Start the engine.
3. Turn on the headlights.

Is DTC P1297 indicated?

NO → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C354 (ELD) and at the ECM/PCM.**

YES

Check for short in the ELD:
Measure voltage between body ground and the ELD 3P connector terminal No. 3.

Is there approx. 4.5 V?

YES → **Replace the ELD.**

NO

Check for a short in the wire (EL line):
1. Turn the ignition switch OFF.
2. Disconnect ECM/PCM connector A (32P).
3. Check for continuity between body ground and ECM/PCM connector terminal A30.

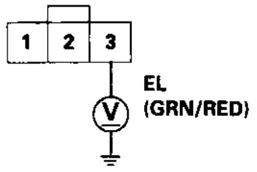
Is there continuity?

YES → **Repair short in the wire between the PCM (A30) and the ELD.**

NO

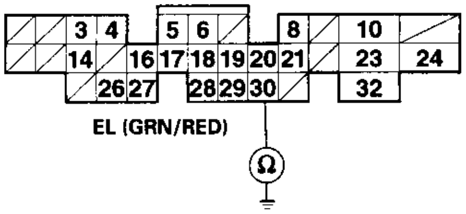
Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

ELD 3P CONNECTOR (C354)



Wire side of female terminals

ECM/PCM CONNECTOR A (32P)



Wire side of female terminals

(cont'd)

Electrical Load Detector (ELD) (USA Model) (cont'd)

P1298 The scan tool indicates Diagnostic Trouble Code (DTC) P1298: A high voltage problem in the Electrical Load Detector (ELD) circuit.

'97 model:

— DTC P1298 is stored.

Problem verification:
1. Do the PCM Reset Procedure.
2. Start the engine.
3. Turn on the headlights.

Is DTC P1298 indicated?

NO — **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C127 (located on PCM bracket), C354 (ELD) and at the PCM.**

YES

Check for an open in the wire (IG1 line):
1. Turn the ignition and headlights OFF.
2. Disconnect the ELD 3P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between body ground and the ELD 3P connector terminal No. 1.

Is there battery voltage?

NO — **Repair open in the wire between the No. 15 ALTERNATOR SP SENSOR (7.5 A) fuse in the under-dash fuse/relay box and the ELD.**

YES

Check for an open in the wire (GND line):
1. Turn the ignition switch and headlights OFF.
2. Disconnect the ELD 3P connector.
3. Check for continuity between body ground and the ELD 3P connector terminal No. 2.

Is there continuity?

NO — **Repair open in the wire between the ELD connector and G402.**

YES

Check for an open in the wire (EL line):
Check for continuity between the ELD 3P connector terminal No. 3 and PCM connector terminal D16.

Is there continuity?

NO — **Repair open in the wire between the PCM (D16) and the ELD.**

YES

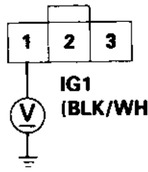
Check for a malfunction in the ELD:
1. Reconnect the ELD 3P connector.
2. Start the engine and allow it to idle.
3. While measuring voltage between PCM connector terminals D16 and A9, turn the headlights on (low).

Does the voltage drop?

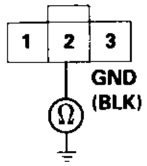
YES — **Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.**

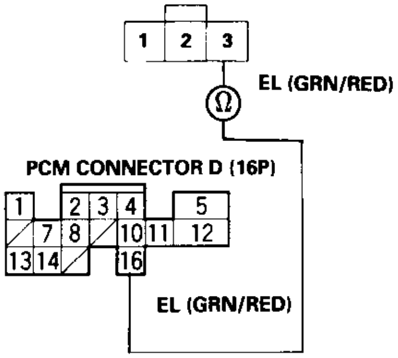
NO — **Replace the ELD.**

ELD 3P CONNECTOR (C354)



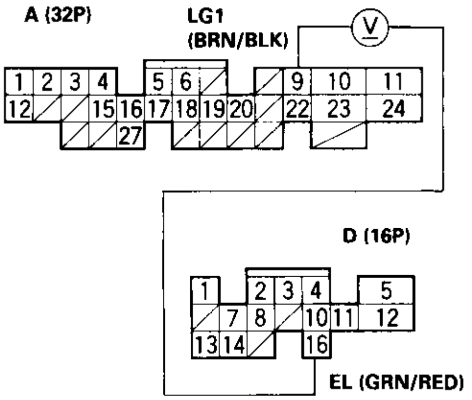
Wire side of female terminals





Wire side of female terminals

PCM CONNECTORS



Wire side of female terminals

'98 – 00 models:

— DTC P1298 is stored.

Problem verification:
1. Do the ECM/PCM Reset Procedure.
2. Start the engine.
3. Turn on the headlights.

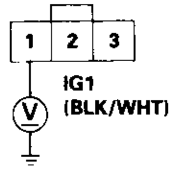
Is DTC P1298 indicated?

NO — **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C354 (ELD) and at the ECM/PCM.**

YES

Check for an open in the wire (IG1 line):
1. Turn the ignition and headlights OFF.
2. Disconnect the ELD 3P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between body ground and the ELD 3P connector terminal No. 1.

ELD 3P CONNECTOR (C354)



Wire side of female terminals

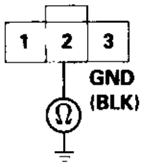
Is there battery voltage?

NO — **Repair open or short in the wire between the No. 15 ALTERNATOR SP SENSOR (7.5 A) fuse in the under-dash fuse/relay box and the ELD.**

YES

Check for an open in the wire (GND line):
1. Turn the ignition switch and headlights OFF.
2. Disconnect the ELD 3P connector.
3. Check for continuity between body ground and the ELD 3P connector terminal No. 2.

ELD 3P CONNECTOR (C354)



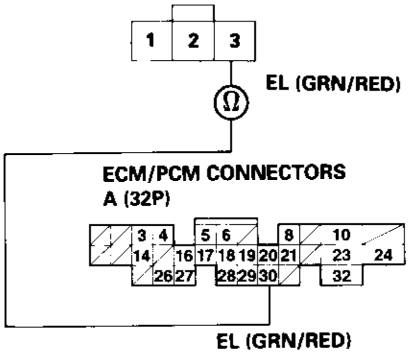
Wire side of female terminals

Is there continuity?

NO — **Repair open in the wire between the ELD connector and G402.**

YES

Check for an open in the wire (EL line): Check for continuity between the ELD 3P connector terminal No. 3 and ECM/PCM connector terminal A30.



Wire side of female terminals

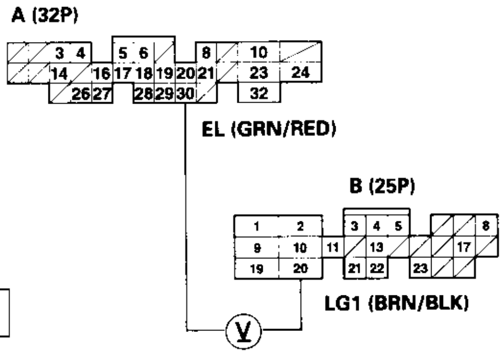
Is there continuity?

NO — **Repair open in the wire between the ECM/PCM (A30) and the ELD.**

YES

Check for a malfunction in the ELD:
1. Reconnect the ELD 3P connector.
2. Start the engine and allow it to idle.
3. While measuring voltage between ECM/PCM connector terminals A30 and B20, turn the headlights on (low).

ECM/PCM CONNECTORS



Wire side of female terminals

Does the voltage drop?

NO — **Replace the ELD.**

YES

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

Crankshaft Speed Fluctuation (CKF) Sensor

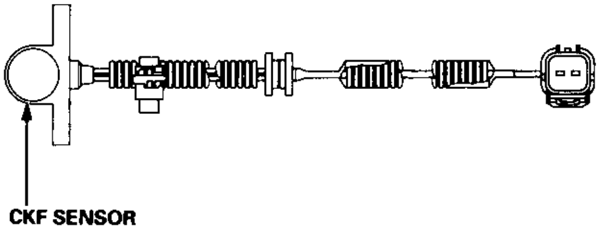
P1336 The scan tool indicates Diagnostic Trouble Code (DTC) P1336: Intermittent interruption in the Crankshaft Speed Fluctuation (CKF) sensor circuit.

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 ECM/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.

'97 model:



- **The MIL has been reported on.**
- **DTC P1336 and/or P1337 are stored.**

Problem verification:
1. Do the PCM Reset Procedure.
2. Start the engine.

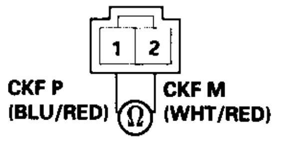
Is DTC P1336 and/or P1337 indicated?

NO → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C104 (CKF sensor) and at the PCM.**

YES ↓

Check for an open in the CKF sensor:
1. Turn the ignition switch OFF.
2. Disconnect the CKF sensor 2P connector.
3. Measure the resistance between the CKF sensor 2P connector terminals No. 1 and No. 2.

CKF SENSOR 2P CONNECTOR (C104)



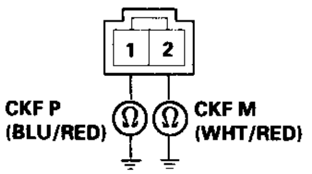
Terminal side of male terminals

Is there 1.6 – 3.2 kΩ?

NO → **Replace the CKF sensor (see section 6).**

YES ↓

Check for a short in the CKF sensor:
Check for continuity between body ground and the CKF sensor 2P connector terminals No. 1 and No. 2 individually.



Is there continuity?

YES → **Replace the CKF sensor (see section 6).**

NO ↓

(To page 11-143)

(From page 11-142)

Check for an open in the wires (CKF lines):

1. Reconnect the CKF sensor 2P connector.
2. Disconnect the PCM connector C (31P).
3. Measure resistance between PCM connector terminals C1 and C11.

Is there 1.6 – 3.2 kΩ?

NO — **Repair open in the wire between the PCM (C1, C11) and the CKF sensor.**

YES

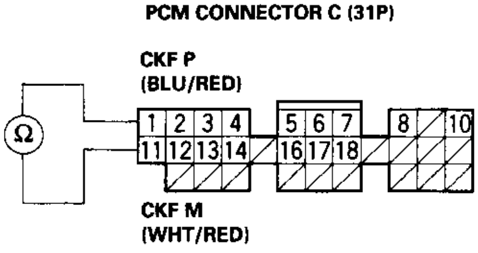
Check for a short in the wires (CKF lines):
Check for continuity between body ground and PCM connector terminal C1.

Is there continuity?

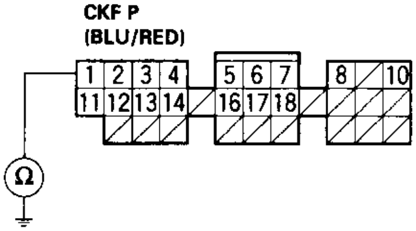
YES — **Repair short in the wire between the PCM (C1) and the CKF sensor.**

NO

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.



Wire side of female terminals



(cont'd)

Crankshaft Speed Fluctuation (CKF) Sensor (cont'd)

'98 – 00 models:

— The MIL has been reported on.
— DTC P1336 and/or P1337 are stored.

Problem verification:
1. Do the ECM/PCM Reset Procedure.
2. Start the engine.

Is DTC P1336 and/or P1337 indicated?

NO → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C104 (CKF sensor) and at the ECM/PCM.**

YES

Check for an open in the CKF sensor:
1. Turn the ignition switch OFF.
2. Disconnect the CKF sensor 2P connector.
3. Measure the resistance between the CKF sensor 2P connector terminals No. 1 and No. 2.

Is there 1.6 – 3.2 kΩ?

NO → **Replace the CKF sensor (see section 6).**

YES

Check for a short in the CKF sensor:
Check for continuity between body ground and the CKF sensor 2P connector terminals No. 1 and No. 2 individually.

Is there continuity?

YES → **Replace the CKF sensor (see section 6).**

NO

Check for an open in the wires (CKF lines):
1. Reconnect the CKF sensor 2P connector.
2. Disconnect ECM/PCM connector C (31P).
3. Measure resistance between ECM/PCM connector terminals C22 and C31.

Is there 1.6 – 3.2 kΩ?

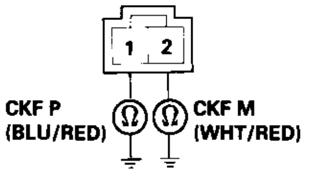
NO → **Repair open in the wire between the ECM/PCM (C22, C31) and the CKF sensor.**

YES

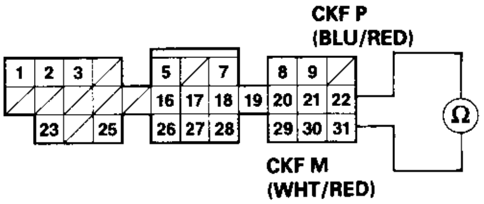
(To page 11-145)

CKF SENSOR 2P CONNECTOR (C104)

Terminal side of male terminals

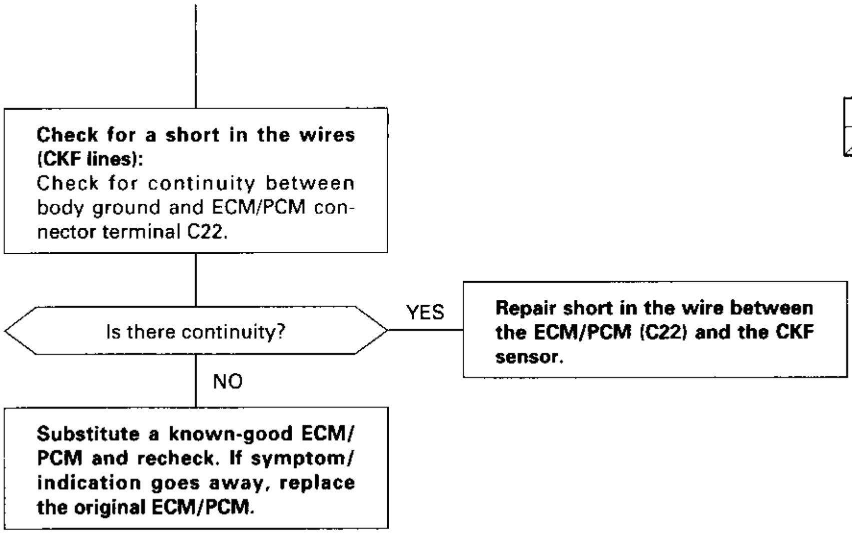


ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

(From page 11-144)



Check for a short in the wires (CKF lines):
Check for continuity between body ground and ECM/PCM connector terminal C22.

Is there continuity?

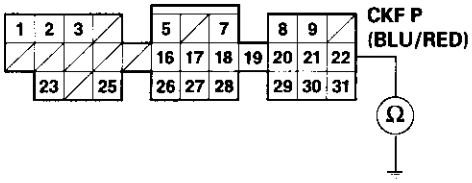
YES

Repair short in the wire between the ECM/PCM (C22) and the CKF sensor.

NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

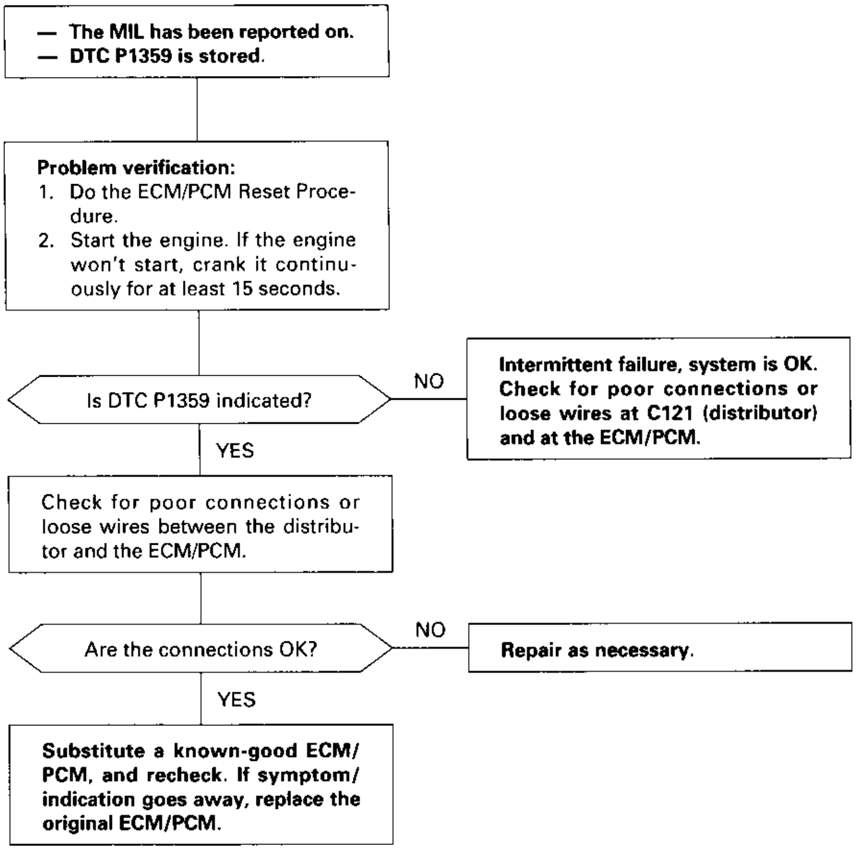
ECM/PCM CONNECTOR C (31P)



Wire side of female terminals .

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.



- **The MIL has been reported on.**
- **DTC P1359 is stored.**

Problem verification:

1. Do the ECM/PCM Reset Procedure.
2. Start the engine. If the engine won't start, crank it continuously for at least 15 seconds.

Is DTC P1359 indicated?

NO — **Intermittent failure, system is OK. Check for poor connections or loose wires at C121 (distributor) and at the ECM/PCM.**

YES — Check for poor connections or loose wires between the distributor and the ECM/PCM.

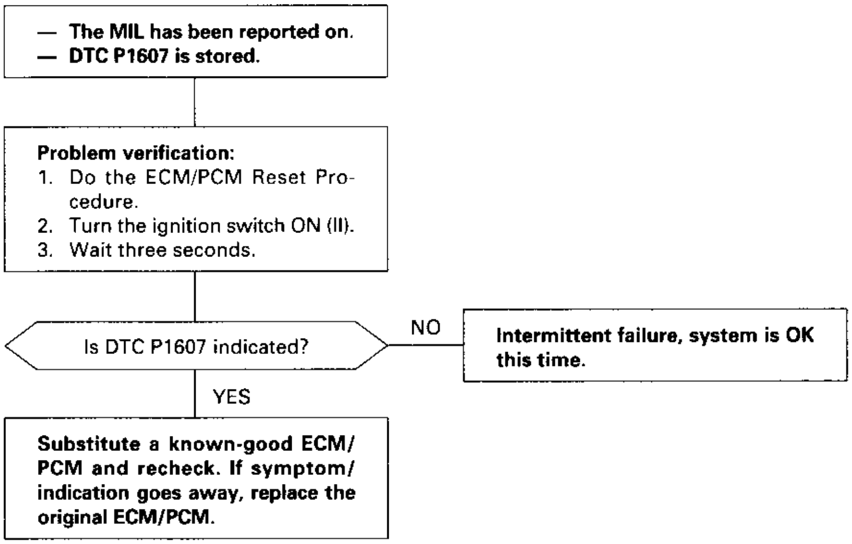
Are the connections OK?

NO — **Repair as necessary.**

YES — **Substitute a known-good ECM/PCM, and recheck. If symptom/indication goes away, replace the original ECM/PCM.**

ECM/PCM Internal Circuit

P1607 The scan tool indicates Diagnostic Trouble Code (DTC) P1607: An ECM/PCM Internal Circuit Problem.



— The MIL has been reported on.
— DTC P1607 is stored.

Problem verification:
1. Do the ECM/PCM Reset Procedure.
2. Turn the ignition switch ON (II).
3. Wait three seconds.

Is DTC P1607 indicated?

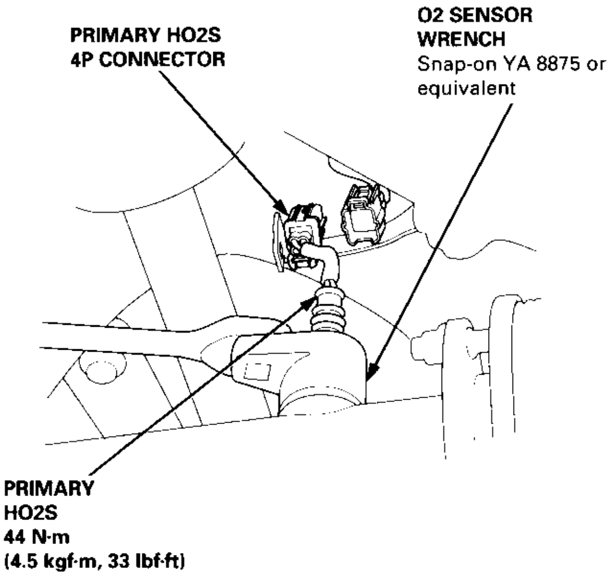
Intermittent failure, system is OK this time.

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

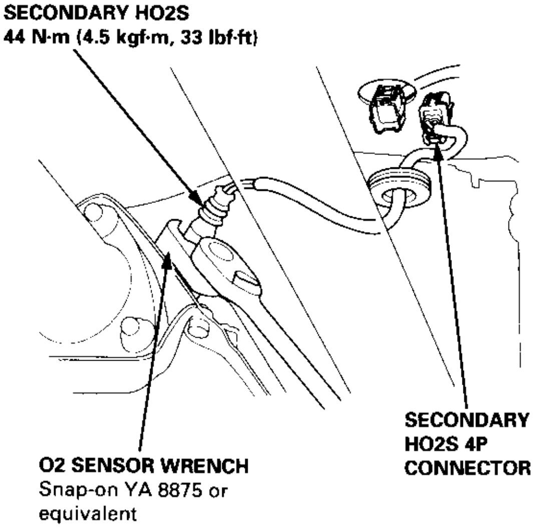
HO2S Replacement

1. Disconnect the HO2S 4P connector, and remove the HO2S.

PRIMARY HO2S:



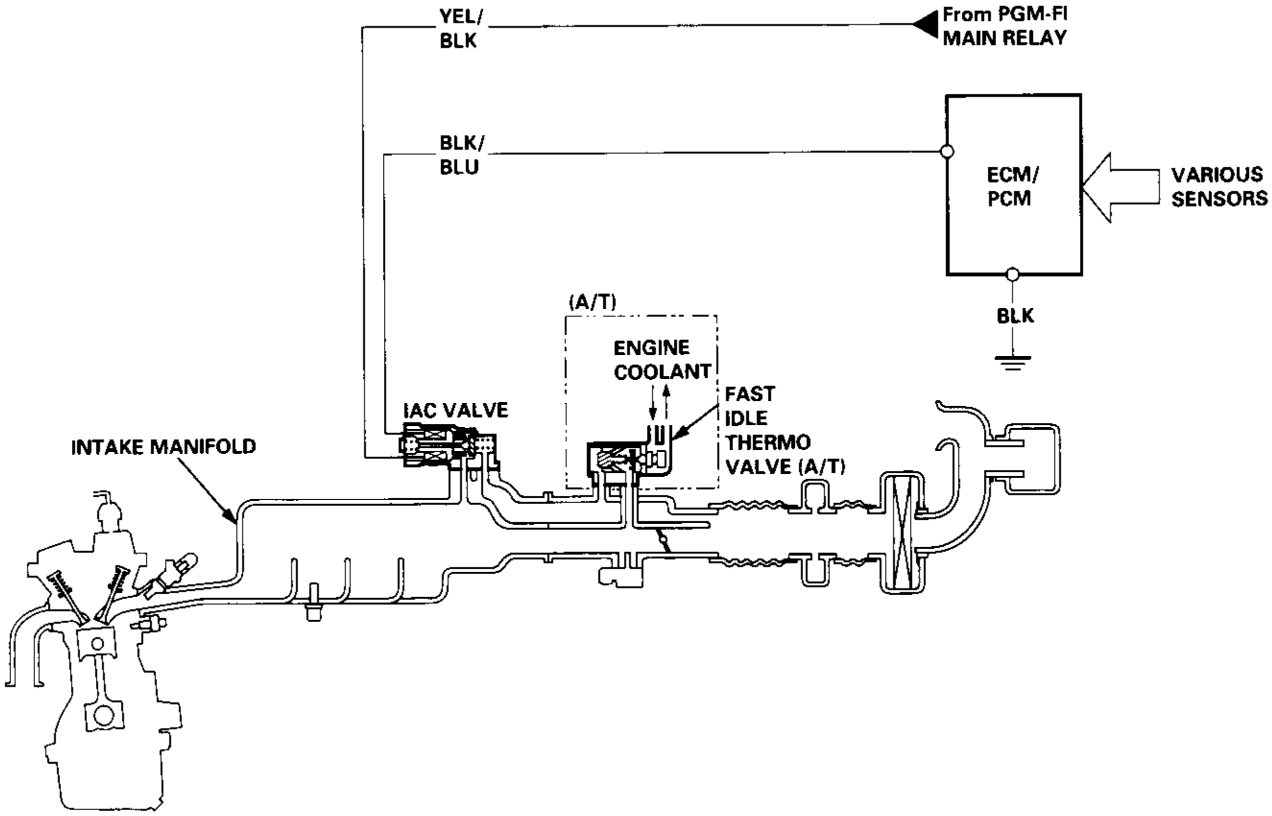
SECONDARY HO2S:



2. Install the HO2S in reverse order of removal.

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 ECM/PCM. When the IAC Valve is activated, the valve opens to maintain the proper idle speed.



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.

3. When the idle speed is out of specification and the scan tool does not indicate Diagnostic Trouble Code (DTC) P0505 or P1508, check the following items:
   - Adjust the idle speed (see page 11-169, 170)
   - Air conditioning signal (see page 11-155)
   - ALT FR signal (see page 11-159)
   - Starter switch signal (see page 11-161)
   - A/T gear position signal (see section 14)
   - PSP switch signal (see page 11-162)
   - Brake switch signal (see page 11-166)
   - Fast idle thermo valve (see page 11-168)
   - Hoses and connections
   - IAC valve and its mounting O-rings

4. If the above items are normal, substitute a known-good IAC valve and readjust the idle speed (see page 11-169, 170).

   If the idle speed still cannot be adjusted to specification (and the scan tool does not indicate DTC P0505 or P1508) after IAC valve replacement, substitute a known-good ECM/PCM and recheck. If symptom goes away, replace the original ECM/PCM.

Idle Control System

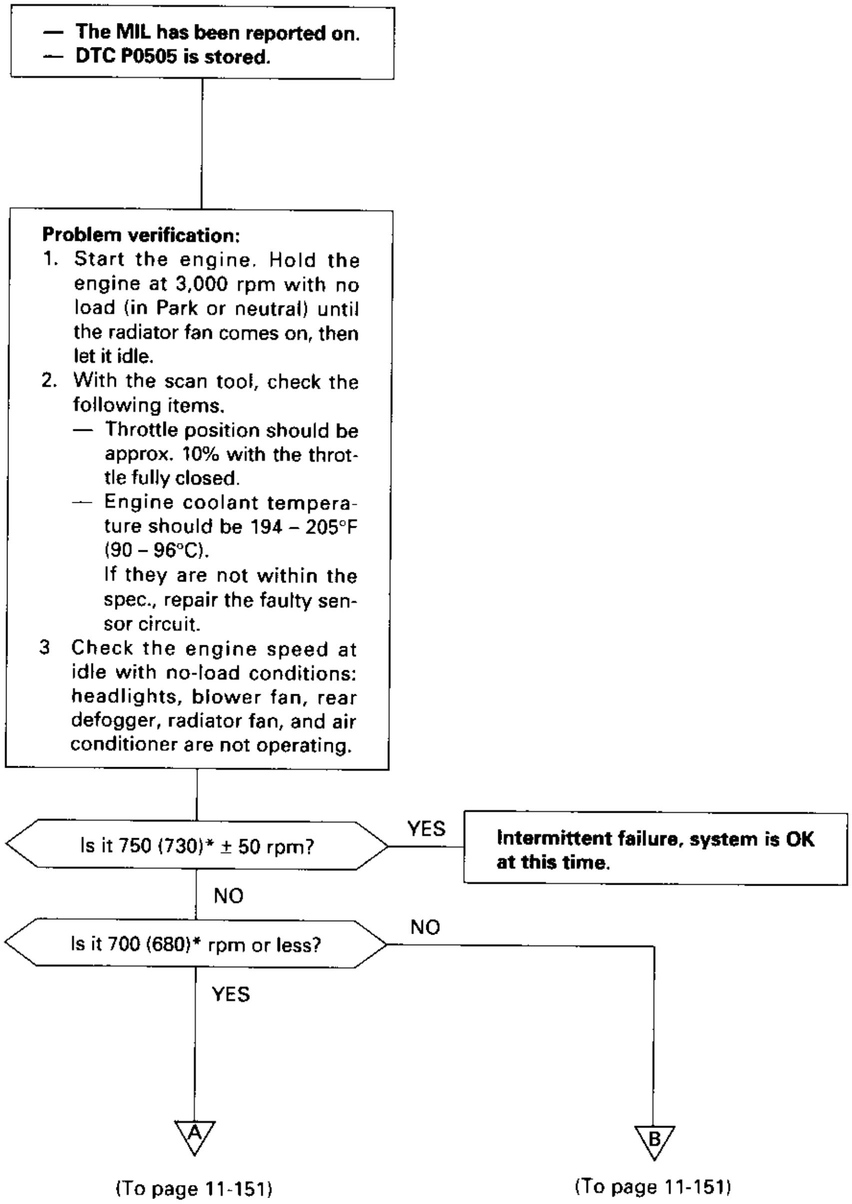
P0505 The scan tool indicates Diagnostic Trouble Code (DTC) P0505: Idle control system malfunction.

NOTE: If DTC P1508 is stored at the same time as DTC P0505, troubleshoot DTC P1508 first, then troubleshoot DTC P0505.

Possible Cause

- IAC valve mechanical malfunction
- Throttle body clogged port, improper adjustment
- Intake manifold gasket leakaging
- Intake air hose loose leakaging
- Vacuum hose leakaging
- ECT sensor incorrect output
- Throttle Position sensor incorrect output

Troubleshooting Flowchart



— The MIL has been reported on.
— DTC P0505 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. With the scan tool, check the following items.
   - — Throttle position should be approx. 10% with the throttle fully closed.
   - — Engine coolant temperature should be 194 – 205°F (90 – 96°C).

   If they are not within the spec., repair the faulty sensor circuit.
3. Check the engine speed at idle with no-load conditions: headlights, blower fan, rear defogger, radiator fan, and air conditioner are not operating.

Is it 750 (730)* ± 50 rpm?

Intermittent failure, system is OK at this time.

Is it 700 (680)* rpm or less?

*: '99 – 00 models

(From page 11-150)

A

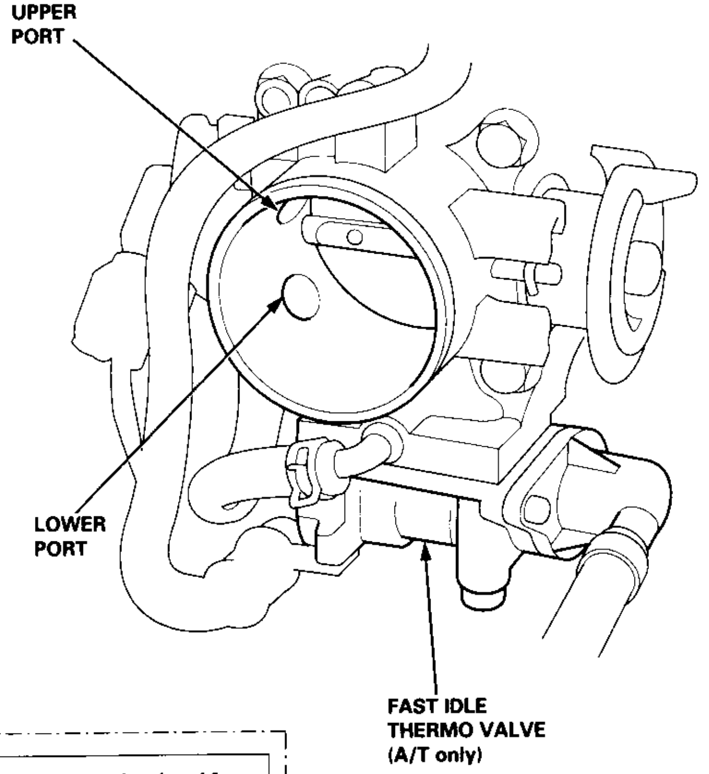
Check the IAC valve:
Disconnect the 2P connector from the IAC valve.

Does the engine speed drop or the engine stall?

NO → **Replace the IAC valve.**

YES ↓

Adjust the (base) idle speed (see page 11-169, 170). If the base idle speed cannot be adjusted, clean the ports in the throttle body.



(From page 11-150)

B

(A/T)

Check the fast idle thermo valve:
1. Turn the ignition switch OFF.
2. Remove the intake air duct from the throttle body.
3. Start the engine and let it idle.
4. Put your finger on the lower port in the throttle body.

Does the engine speed drop?

YES → **Check engine coolant level and for air in the cooling system. If OK, replace the fast idle thermo valve.**

NO ↓

Put your finger on the upper port in the throttle body.

Does the engine speed drop?

NO → **Check for vacuum leaks, make sure the throttle valve is completely closed, and repair as necessary.**

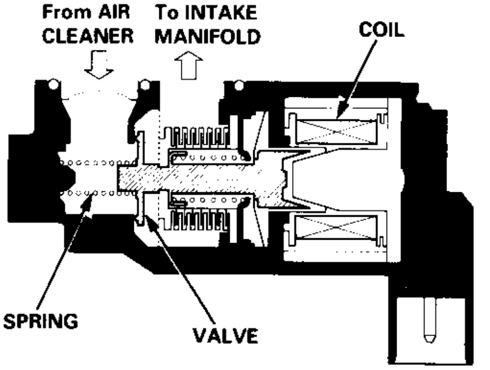
YES ↓

Adjust the idle speed (see page 11-169, 170). If the adjustment does not correct the problem, replace the IAC valve.

Idle Air Control (IAC) Valve

P1508 The scan tool indicates Diagnostic Trouble Code (DTC) P1508: A problem in the Idle Air Control (IAC) valve circuit.

The IAC Valve changes the amount of air bypassing the throttle body in response to a current signal from the ECM/PCM in order to maintain the proper idle speed.



'97 model:

— The MIL has been reported on.
— DTC P1508 is stored.

Problem verification:
1. Do the PCM Reset Procedure.
2. Start the engine, and warm it up to normal operating temperature.

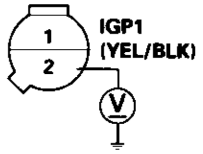
Is DTC P1508 indicated?

NO → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C132 (IAC valve) and at the PCM.**

YES ↓

Check for an open in the wire (IGP1 line):
1. Turn the ignition switch OFF.
2. Disconnect the IAC valve 2P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between body ground and the IAC valve 2P connector terminal No. 2.

IAC VALVE 2P CONNECTOR (C132)



Wire side of female terminals

Is there battery voltage?

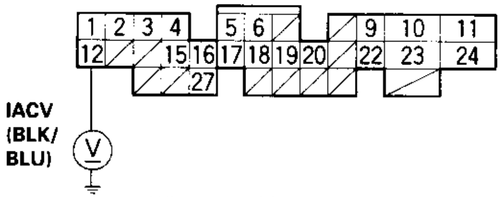
NO → **Repair open in the wire between the IAC valve and the PGM-FI main relay.**

YES ↓

Check for an open or short in the wire (IACV line):
1. Turn the ignition switch OFF and reconnect the IAC valve 2P connector.
2. Disconnect the PCM connector A (32P).
3. Turn the ignition switch ON (II).
4. Measure voltage between body ground and PCM connector terminal A12.

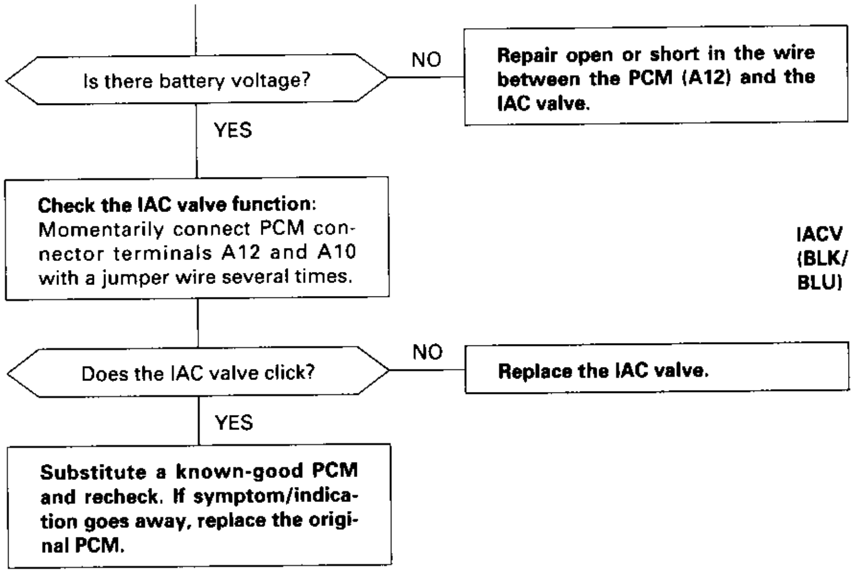
(To page 11-153)

PCM CONNECTOR A (32P)



Wire side of female terminals

(From page 11-152)



Is there battery voltage?

NO → **Repair open or short in the wire between the PCM (A12) and the IAC valve.**

YES

Check the IAC valve function: Momentarily connect PCM connector terminals A12 and A10 with a jumper wire several times.

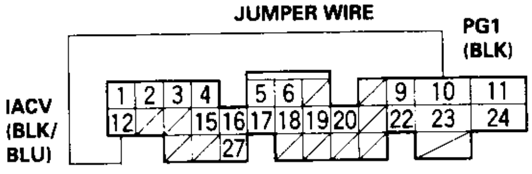
Does the IAC valve click?

NO → **Replace the IAC valve.**

YES

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

PCM CONNECTOR A (32P)



Wire side of female terminals

(cont'd)

Idle Air Control (IAC) Valve (cont'd)

'98 – 00 models:

- The MIL has been reported on.
- DTC P1508 is stored.

Problem verification:
1. Do the ECM/PCM Reset Procedure.
2. Start the engine, and warm it up to normal operating temperature.

Is DTC P1508 indicated?

NO → **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C132 (IAC valve) and at the ECM/PCM.**

YES

Check for an open in the wire (IGP1 line):
1. Turn the ignition switch OFF.
2. Disconnect the IAC valve 2P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between body ground and the IAC valve 2P connector terminal No. 2.

Is there battery voltage?

NO → **Repair open in the wire between the IAC valve and the PGM-FI main relay.**

YES

Check for an open or short in the wire (IACV line):
1. Turn the ignition switch OFF and reconnect the IAC valve 2P connector.
2. Disconnect ECM/PCM connector B (25P).
3. Turn the ignition switch ON (II).
4. Measure voltage between body ground and ECM/PCM connector terminal B23.

Is there battery voltage?

NO → **Repair open or short in the wire between the ECM/PCM (B23) and the IAC valve.**

YES

Check the IAC valve function:
Momentarily connect ECM/PCM connector terminals B23 and B2 with a jumper wire several times.

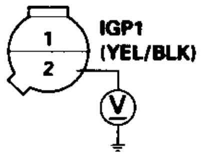
Does the IAC valve click?

NO → **Replace the IAC valve.**

YES

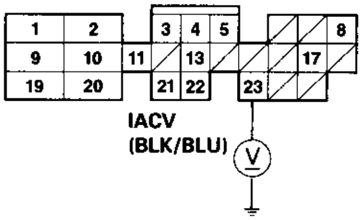
Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

IAC VALVE 2P CONNECTOR (C132)

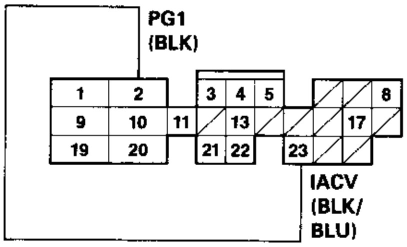


Wire side of female terminals

ECM/PCM CONNECTOR B (25P)



Wire side of female terminals



JUMPER WIRE

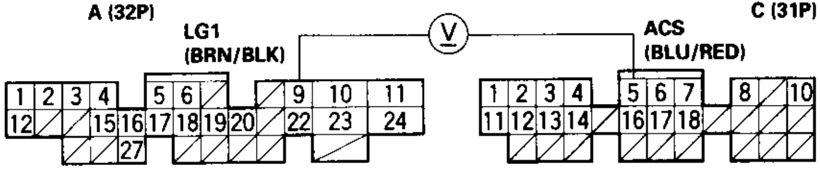
Air Conditioning Signal

This signals the ECM/PCM when there is a demand for cooling from the air conditioning system.

'97 model:

Inspection of Air Conditioning Signal.

PCM CONNECTORS



Wire side of female terminals

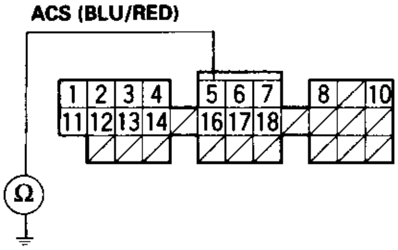
Check for a short in the wire (ACS line):
1. Turn the ignition switch OFF.
2. Disconnect the A/C pressure switch 2P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between PCM connector terminals C5 and A9.

Is there battery voltage?

NO →

Check for a short in the wire (ACS line):
1. Turn the ignition switch OFF.
2. Disconnect PCM connector C (31P).
3. Check for continuity between body ground and PCM connector terminal C5.

PCM CONNECTOR C (31P)



Wire side of female terminals

Is there continuity?

YES →

Repair short in the wire between the PCM (C5) and the A/C pressure switch.

NO ↓

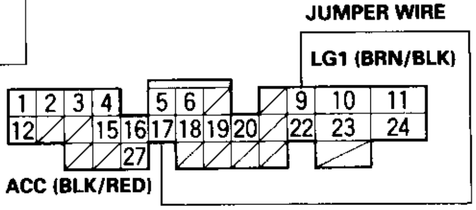
- **Substitute a known-good PCM and recheck. If prescribed voltage is now available, replace the original PCM.**
- **See the air conditioner inspection (see section 22).**

YES ↓

Check for an open in the wire (ACC line):
1. Turn the ignition switch OFF.
2. Reconnect the A/C pressure switch 2P connector.
3. Turn the ignition switch ON (II).
4. Momentarily connect PCM connector terminals A9 and A17 with a jumper wire several times.

(To page 11-156)

PCM CONNECTOR A (32P)



Wire side of female terminals

(cont'd)

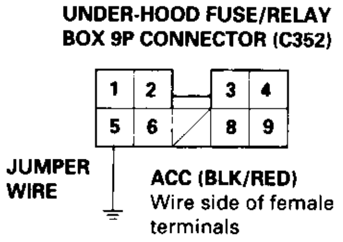
Air Conditioning Signal (cont'd)

(From page 11-155)

Is there a clicking noise from the A/C compressor clutch?

NO

Check for an open in the wire (ACC line):
Momentarily connect the under-hood fuse/relay box 9P connector terminal No. 5 to body ground with a jumper wire several times.



Is there a clicking noise from the A/C compressor clutch?

NO

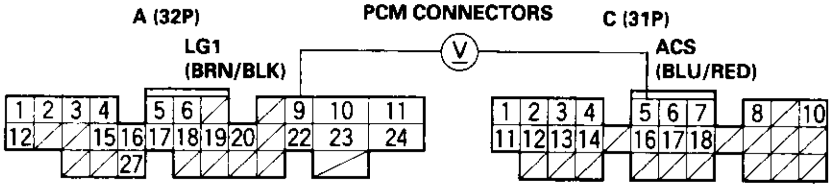
See air conditioner inspection (see section 22).

YES

Repair open in the wire between the PCM (A17) and the A/C clutch relay.

YES

Check the A/C operation:
1. Start the engine.
2. Turn the blower switch ON.
3. Turn the A/C switch ON.



Wire side of female terminals

Does the A/C operate?

YES

Air conditioning signal is OK.

NO

Check for an open in the wire (ACS line):
Measure voltage between PCM connector terminals A9 and C5.

Is there less than 1.0 V?

NO

Repair open in the wire between the PCM (C5) and the A/C switch.

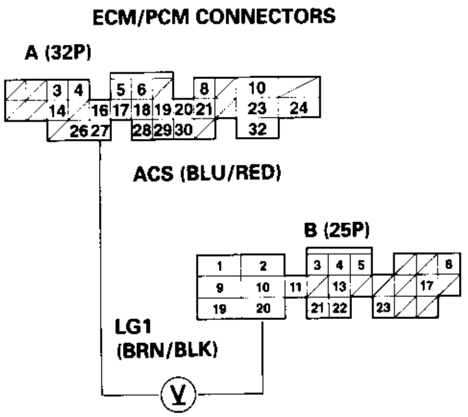
YES

- **Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.**
- **See the air conditioner inspection (see section 22).**

'98 – 00 models:

Inspection of Air Conditioning Signal.

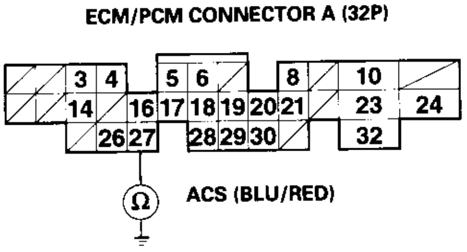
Check for a short in the wire (ACS line):
1. Turn the ignition switch OFF.
2. Disconnect the A/C pressure switch 2P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between ECM/PCM connector terminals A27 and B20.



Is there battery voltage?

NO

Check for a short in the wire (ACS line):
1. Turn the ignition switch OFF.
2. Disconnect ECM/PCM connector A (32P).
3. Check for continuity between body ground and ECM/PCM connector terminal A27.



Wire side of female terminals

Is there continuity?

YES

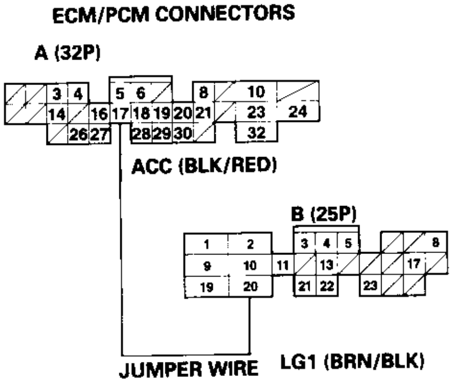
Repair short in the wire between the ECM/PCM (A27) and the A/C pressure switch.

NO

- **Substitute a known-good ECM/PCM and recheck. If prescribed voltage is now available, replace the original ECM/PCM.**
- **See the air conditioner inspection (see section 22).**

YES

Check for an open in the wire (ACC line):
1. Turn the ignition switch OFF.
2. Reconnect the A/C pressure switch 2P connector.
3. Turn the ignition switch ON (II).
4. Momentarily connect ECM/PCM connector terminals A17 and B20 with a jumper wire several times.



(To page 11-158)

(cont'd)

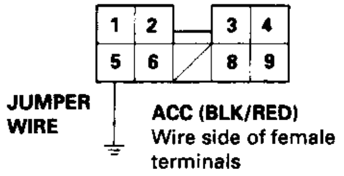
Air Conditioning Signal (cont'd)

(From page 11-157)

Is there a clicking noise from the A/C compressor clutch?

NO → **Check for an open in the wire (ACC line):**
Momentarily connect the under-hood fuse/relay box 9P connector terminal No. 5 to body ground with a jumper wire several times.

UNDER-HOOD FUSE/RELAY BOX 9P CONNECTOR (C352)



Is there a clicking noise from the A/C compressor clutch?

NO → **See air conditioner inspection (see section 22).**

YES → **Repair open in the wire between the ECM/PCM (A17) and the A/C clutch relay.**

YES (from first question) → **Check the operation of the A/C:**

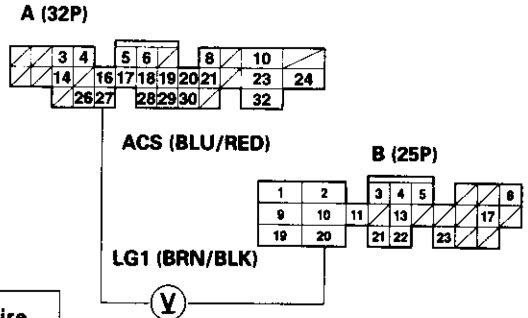
1. Start the engine.
2. Turn the blower switch ON.
3. Turn the A/C switch ON.

Does the A/C operate?

YES → **Air conditioning signal is OK.**

NO → **Check for an open in the wire (ACS line):**
Measure voltage between ECM/PCM connector terminals A27 and B20.

ECM/PCM CONNECTORS



Wire side of female terminals

Is voltage less than 1.0 V?

NO → **Repair open in the wire between the ECM/PCM (A27) and the A/C switch.**

YES →

- **Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.**
- **See the air conditioner inspection (see section 22).**

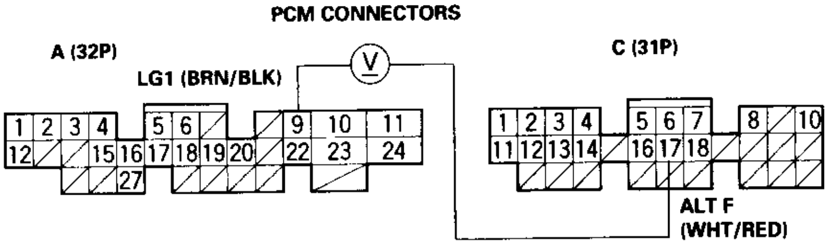
Alternator (ALT) FR Signal

This signals the ECM/PCM when the Alternator (ALT) is charging.

'97 model:

Inspection of ALT FR Signal.

Check for a short in the wire (ALT F line):
1. Disconnect the 4P (3P)* connector from the ALT.
2. Turn the ignition switch ON (II).
3. Measure voltage between PCM connector terminals C17 and A9.

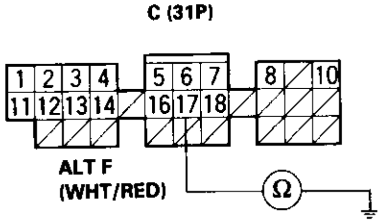


Wire side of female terminals

Is there approx. 5 V?

NO

Check for a short in the wire (ALT F line):
1. Turn the ignition switch OFF.
2. Disconnect the negative battery cable from the battery.
3. Disconnect PCM connector C (31P).
4. Check for continuity between body ground and PCM connector terminal C17.



Is there continuity?

YES

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

NO

Substitute a known-good PCM and recheck. If prescribed voltage is now available, replace the original PCM.

YES

Check the operation of the ALT:
1. Turn the ignition switch OFF.
2. Reconnect the ALT 4P (3P)* connector to the ALT.
3. 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.
4. Measure voltage between PCM connector terminals C17 and A9.

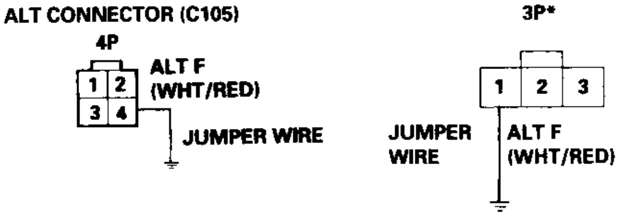
Does the voltage decrease when headlights and rear defogger are turned on?

YES

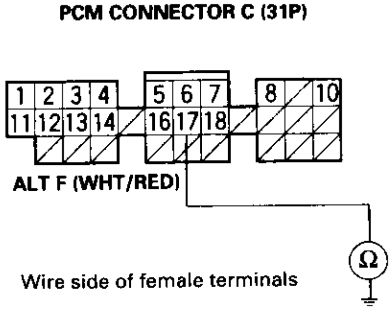
ALT FR signal is OK.

NO

Check for an open in the wire (ALT F line):
1. Turn the ignition switch OFF.
2. Disconnect the negative battery cable from the battery.
3. Disconnect PCM connector C (31P).
4. Disconnect the 4P (3P)* connector from the ALT.
5. Connect the ALT 4P (3P)* connector terminal No. 4 (No. 1)* to body ground with a jumper wire.
6. Check for continuity between body ground and PCM connector terminal C17.



Wire side of female terminals



Wire side of female terminals

Is there continuity?

NO

Repair open wire between the PCM (C17) and the ALT.

YES

See the ALT inspection (see section 23).

(cont'd)

*: Canada

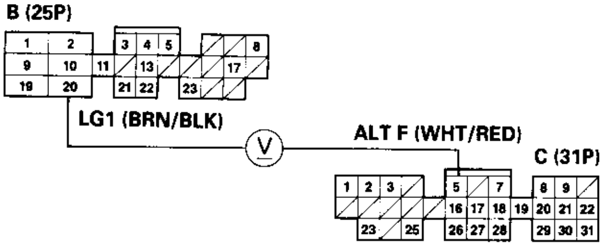
Alternator (ALT) FR Signal (cont'd)

'98 – 00 models:

Inspection of ALT FR Signal.

Check for a short in the wire (ALT F line):
1. Disconnect the 4P (3P)* connector from the ALT.
2. Turn the ignition switch ON (II).
3. Measure voltage between ECM/PCM connector terminals C5 and B20.

ECM/PCM CONNECTORS



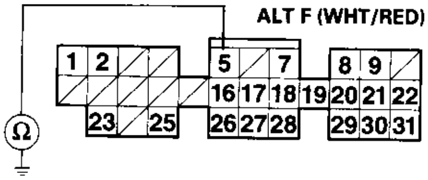
Wire side of female terminals

Is there approx. 5 V?

NO

Check for a short in the wire (ALT F line):
1. Turn the ignition switch OFF.
2. Disconnect the negative battery cable from the battery.
3. Disconnect ECM/PCM connector C (31P).
4. Check for continuity between body ground and ECM/PCM connector terminal C5.

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

Is there continuity?

YES

Repair short in the wire between the ECM/PCM (C5) and the ALT.

NO

Substitute a known-good ECM/PCM and recheck. If prescribed voltage is now available, replace the original ECM/PCM.

YES

Check the operation of the ALT:
1. Turn the ignition switch OFF.
2. Reconnect the ALT 4P (3P)* connector to the ALT.
3. 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.
4. Measure voltage between ECM/PCM connector terminals C5 and B20.

Does the voltage decrease when headlights and rear defogger are turned on?

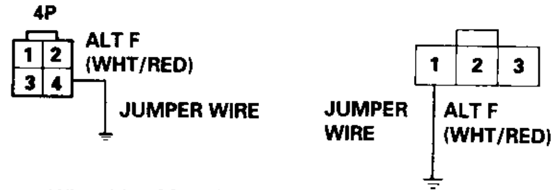
YES

ALT FR signal is OK.

NO

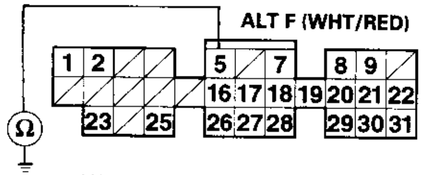
Check for an open in the wire (ALT F line):
1. Turn the ignition switch OFF.
2. Disconnect the negative battery cable from the battery.
3. Disconnect ECM/PCM connector C (31P).
4. Disconnect the 4P (3P)* connector from the ALT.
5. Connect the ALT 4P (3P)* connector terminal No. 4 (No. 1)* to body ground with a jumper wire.
6. Check for continuity between body ground and ECM/PCM connector terminal C5.

ALT CONNECTOR (C105)



Wire side of female terminals

ECM/PCM CONNECTOR C (31P)



Wire side of female terminals

Is there continuity?

NO

Repair open wire between the ECM/PCM (C5) and the ALT.

YES

See the ALT inspection (see section 4).

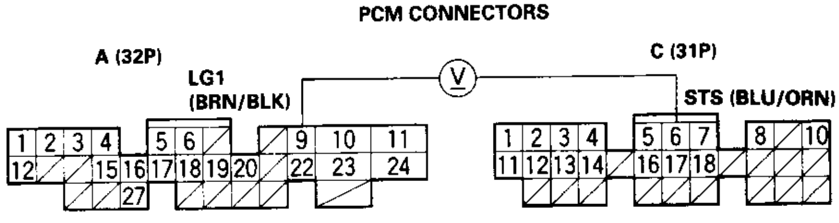
*: Canada

Starter Switch Signal

This signals the ECM/PCM when the engine is cranking.

'97 model:

NOTE: Transmission in N or P position.



Wire side of female terminals

Inspection of Starter Switch Signal.

Check for an open or short in the wire (STS line):
Measure voltage between PCM connector terminals C6 and A9 with the ignition switch in the start (III) position.

Is there battery voltage?

YES — **Starter switch signal is OK.**

NO — Inspect the No. 31 STARTER SIGNAL (7.5 A) fuse in the under-dash fuse/relay box.

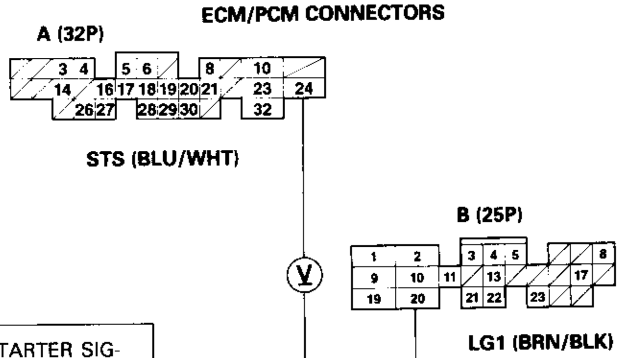
Is the fuse OK?

NO —
- **Repair short in the wire between the PCM (C6) 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 (C6) and the No. 31 STARTER SIGNAL (7.5 A) fuse.**

'98 – 00 models:

NOTE:
- M/T: Clutch pedal must be depressed.
- A/T: Transmission in N or P position.



Wire side of female terminals

Inspection of Starter Switch Signal.

Check for an open or short in the wire (STS line):
Measure voltage between ECM/PCM connector terminals A24 and B20 with the ignition switch in the start position (III).

Is there battery voltage?

YES — **Starter switch signal is OK.**

NO — Inspect the No. 31 STARTER SIGNAL (7.5 A) fuse in the under-dash fuse/relay box.

Is the fuse OK?

NO —
- **Repair short in the wire between the ECM/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 ECM/PCM (A24) and the No. 31 STARTER SIGNAL (7.5 A) fuse.**

Power Steering Pressure (PSP) Switch Signal

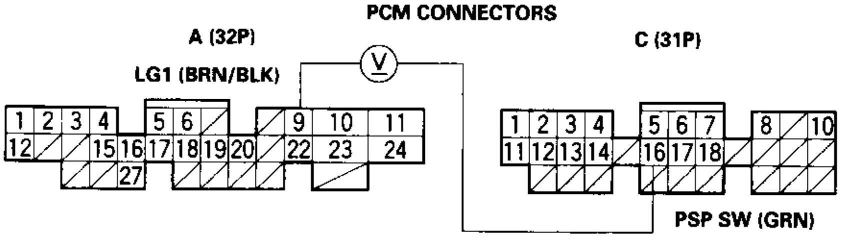
This signals the ECM/PCM when the power steering load is high.

'97 model:

Inspection of PSP switch signal.

Check for an open in the wire (PSP SW line):

1. Turn the ignition switch ON (II).
2. Measure voltage between PCM connector terminals C16 and A9.



Wire side of female terminals

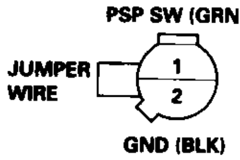
Is there less than 1.0 V?

NO

Check for an open in the wire (PSP SW line):

1. Turn the ignition switch OFF.
2. Disconnect the PSP switch 2P connector.
3. Turn the ignition switch ON (II).
4. At the harness side, connect the PSP switch 2P connector terminals No. 1 and No. 2 with a jumper wire.
5. Measure voltage between PCM connector terminals C16 and A9.

PSP SWITCH 2P CONNECTOR (C135)



Wire side of female terminals

Is there less than 1.0 V?

NO

- **Repair open in the wire between the PCM (C16) and the PSP switch.**
- **Repair open in BLK wire between the PSP switch and G101.**

YES

Replace the PSP switch.

YES

Check the operation of the PSP switch:

1. Start the engine
2. Turn the steering wheel to the full lock position*.
3. Measure voltage between PCM connector terminals C16 and A9.

Is there battery voltage?

NO

(To page 11-163)

YES

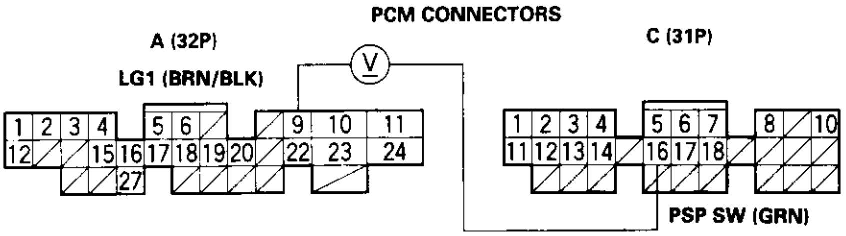
PSP switch signal is OK.

*: Do not hold the steering wheel at full lock for more than five seconds.

(From page 11-162)

Check for a short in the PSP switch:

1. Turn the ignition switch OFF.
2. Disconnect the 2P connector from the PSP switch.
3. Turn the ignition switch ON (II).
4. Measure voltage between PCM connector terminals C16 and A9.



Wire side of female terminals

Is there battery voltage?

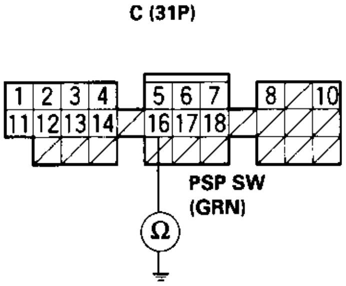
YES

Replace the PSP switch.

NO

Check for a short in the wire (PSP SW line):

1. Turn the ignition switch OFF.
2. Disconnect PCM connector C (31P).
3. Check for continuity between body ground and PCM connector terminal C16.



Is there continuity?

YES

Repair short in the wire between the PCM (C16) and the PSP switch.

NO

Substitute a known-good PCM and recheck. If prescribed voltage is now available, replace the original PCM.

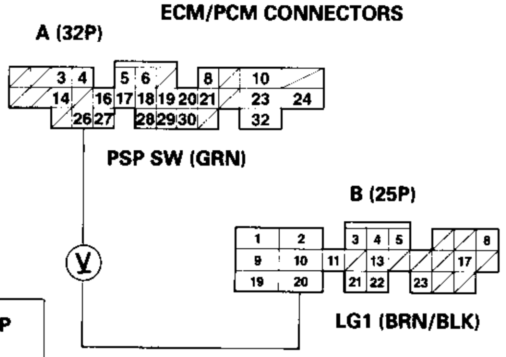
(cont'd)

Power Steering Pressure (PSP) Switch Signal (cont'd)

'98 – 00 models:

Inspection of PSP switch signal.

Check for an open in the wire (PSP SW line):
1. Turn the ignition switch ON (II).
2. Measure voltage between ECM/PCM connector terminals A26 and B20.



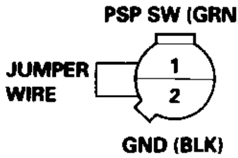
Wire side of female terminals

Is there less than 1.0 V?

NO

Check for an open in the wire (PSP SW line):
1. Turn the ignition switch OFF.
2. Disconnect the PSP switch 2P connector.
3. Turn the ignition switch ON (II).
4. At the wire side, connect the PSP switch 2P connector terminals No. 1 and No. 2 with a jumper wire.
5. Measure voltage between ECM/PCM connector terminals A26 and B20.

PSP SWITCH 2P CONNECTOR (C135)



Wire side of female terminals

Is there less than 1.0 V?

NO

- **Repair open in the wire between the ECM/PCM (A26) and the PSP switch.**
- **Repair open in BLK wire between the PSP switch and G101.**

YES

Replace the PSP switch.

YES

Check the operation of the PSP switch:
1. Start the engine
2. Turn steering wheel to the full lock position*.
3. Measure voltage between ECM/PCM connector terminals A26 and B20.

Is there battery voltage?

NO

(To page 11-165)

YES

PSP switch signal is OK.

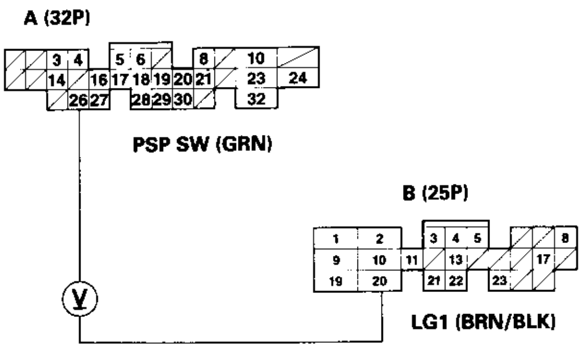
*: Do not hold the steering wheel at full lock for more than five seconds.

(From page 11-164)

Check for a short in the PSP switch:

1. Turn the ignition switch OFF.
2. Disconnect the 2P connector from the PSP switch.
3. Turn the ignition switch ON (II).
4. Measure voltage between ECM/PCM connector terminals A26 and B20.

ECM/PCM CONNECTORS



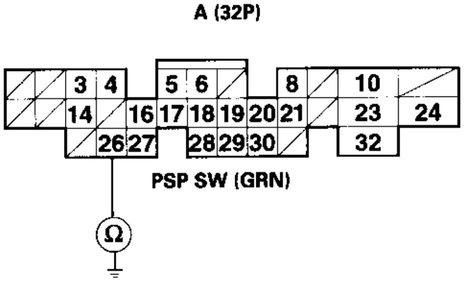
Wire side of female terminals

Is there battery voltage?

NO

Check for a short in the wire (PSP SW line):

1. Turn the ignition switch OFF.
2. Disconnect ECM/PCM connector A (32P).
3. Check for continuity between body ground and ECM/PCM connector terminal A26.



Wire side of female terminals

YES

Replace the PSP switch.

Is there continuity?

YES

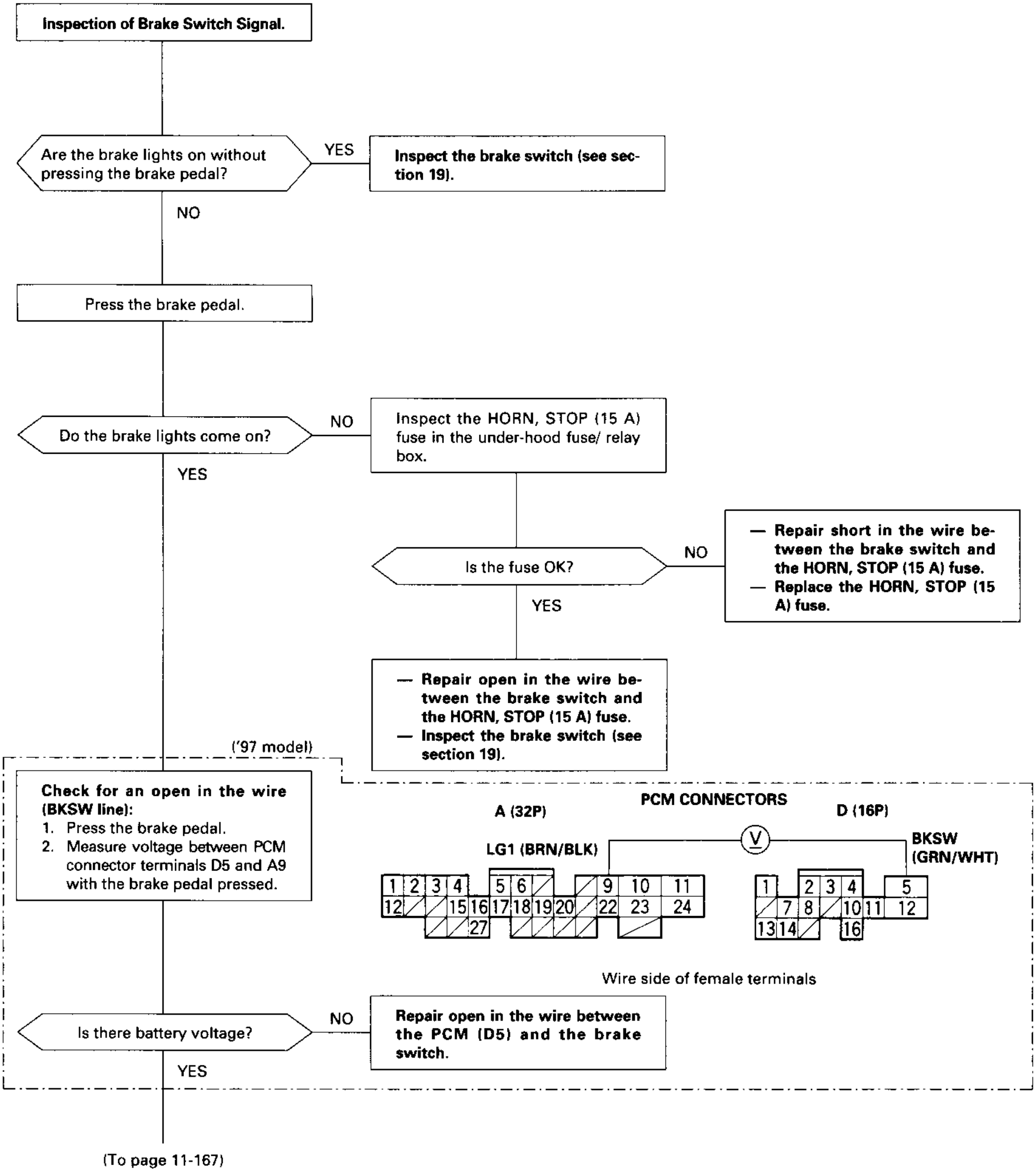
Repair short in the wire between the ECM/PCM (A26) and the PSP switch.

NO

Substitute a known-good ECM/PCM and recheck. If prescribed voltage is now available, replace the original ECM/PCM.

Brake Switch Signal

This signals the ECM/PCM when the brake pedal is depressed.



Inspection of Brake Switch Signal.

Are the brake lights on without pressing the brake pedal?

Inspect the brake switch (see section 19).

Press the brake pedal.

Do the brake lights come on?

Inspect the HORN, STOP (15 A) fuse in the under-hood fuse/ relay box.

Is the fuse OK?

- **Repair short in the wire between the brake switch and the HORN, STOP (15 A) fuse.**
- **Replace the HORN, STOP (15 A) fuse.**

- **Repair open in the wire between the brake switch and the HORN, STOP (15 A) fuse.**
- **Inspect the brake switch (see section 19).**

('97 model)

Check for an open in the wire (BKSW line):
1. Press the brake pedal.
2. Measure voltage between PCM connector terminals D5 and A9 with the brake pedal pressed.

Is there battery voltage?

Repair open in the wire between the PCM (D5) and the brake switch.

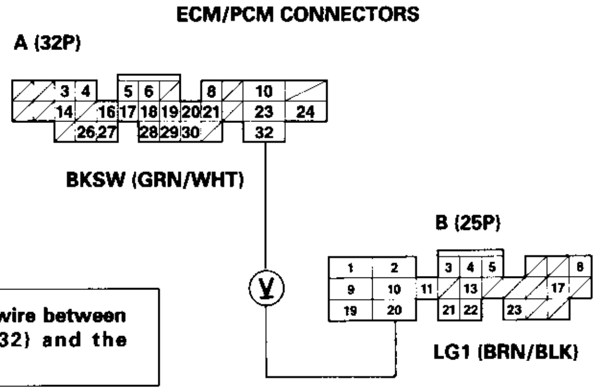
(To page 11-167)

(From page 11-166)

('98 – 00 models)

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

1. Press the brake pedal.
2. Measure voltage between ECM/PCM connector terminals A32 and B20 with the brake pedal pressed.



Wire side of female terminals

Is there battery voltage?

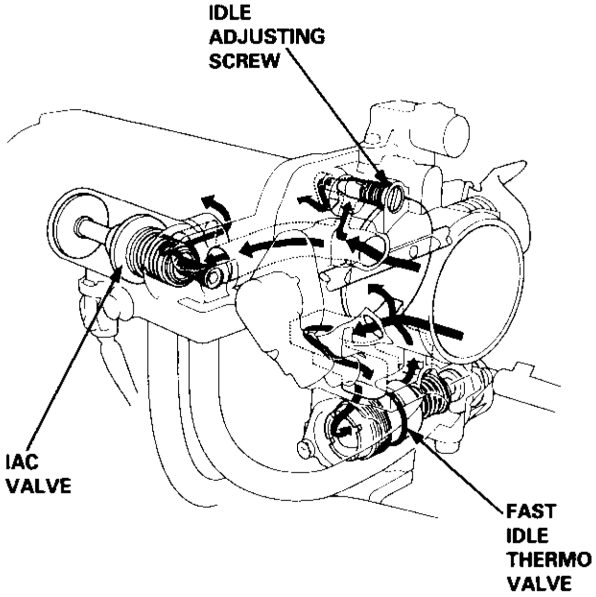
NO — **Repair open in the wire between the ECM/PCM (A32) and the brake switch.**

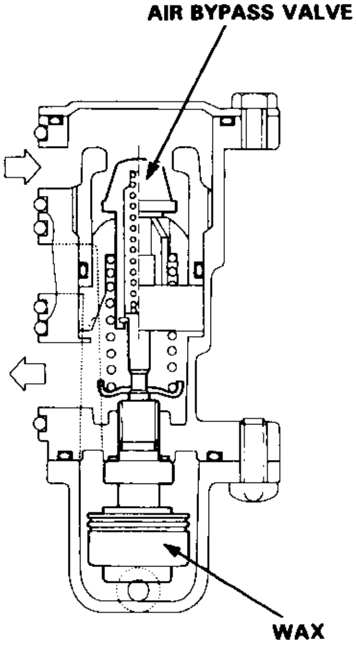
YES — **Brake switch signal is OK.**

Fast Idle Thermo Valve (A/T)

Description

To prevent erratic running when the engine is warming up, it is necessary to raise the idle speed. The fast idle thermo valve is controlled by a thermowax plunger. When the engine is cold, the engine coolant surrounding the thermowax contracts the plunger, allowing additional air to be bypassed into the intake manifold so that the engine idles faster. When the engine reaches operating temperature, the valve closes, reducing the amount of air bypassing into the intake manifold.

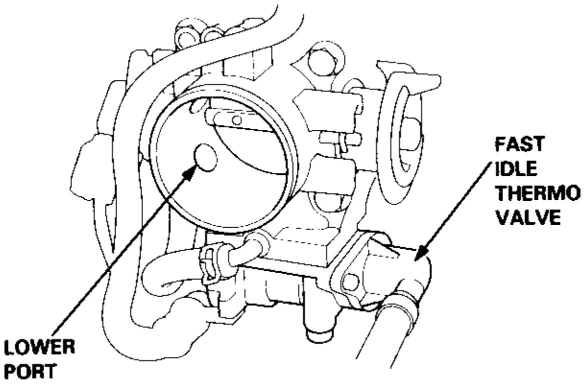




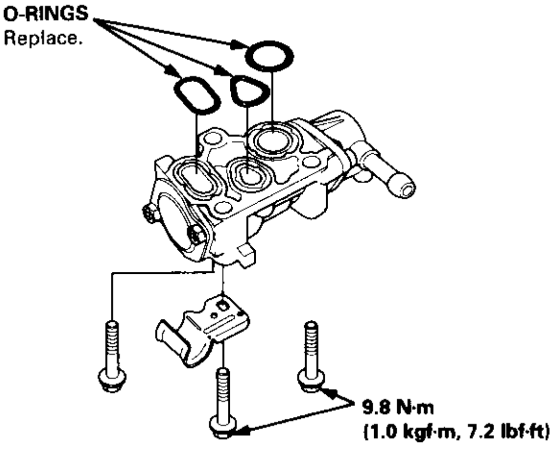
Inspection

NOTE: The fast idle thermo valve is factory adjusted; it should not be disassembled.

1. Remove the intake air duct from the throttle body.
2. Start the engine.
3. Put your finger over the lower port in throttle body, and make sure that there is air flow with the engine cold (engine coolant temperature below 86°F, 30°C).



If there is no air flow, replace the fast idle thermo valve and retest.



4. 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.
5. Check that the valve is completely closed. If the valve is leaking, the idle speed will drop when you cover the lower port. Check the engine coolant level and for air in the engine cooling system (see section 10). If the cooling system is OK, replace the fast idle thermo valve and recheck.

Idle Speed Setting

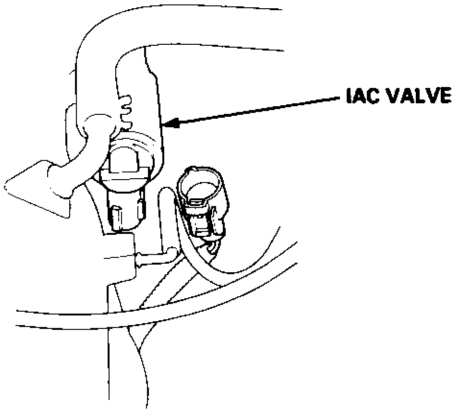
Inspection/Adjustment

'97 model:

NOTE:

- Before setting the idle speed, check the following items:
  - — The MIL has not been reported on.
  - — Ignition timing
  - — Spark plugs
  - — Air cleaner
  - — PCV system
- (Canada) Pull the parking brake lever up. Start the engine, then check that the headlights are off.

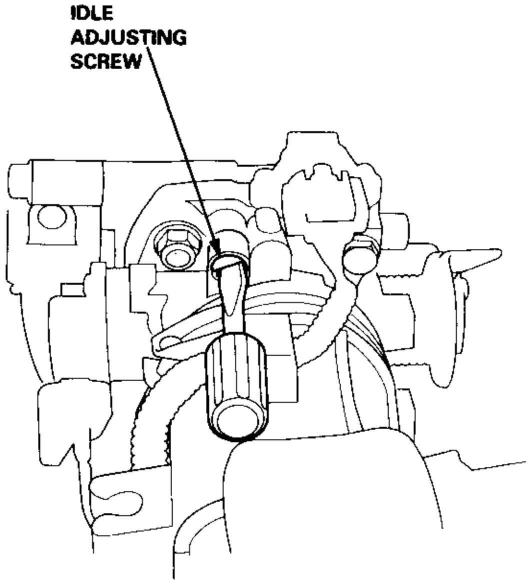
1. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
2. Connect a tachometer or a Honda PGM Tester.
3. Disconnect the 2P connector from the Idle Air Control (IAC) valve.



4. If the engine stalls, restart the engine with the accelerator pedal slightly depressed. Stabilize the rpm at 1,000, then slowly release the pedal until the engine idles.
5. Check idling in no-load conditions: headlights, blower fan, rear defogger, radiator fan, and air conditioner are not operating.

   Idle speed should be:
   480 ± 50 rpm (in Park or neutral)

   Adjust the idle speed, if necessary, by turning the idle adjusting screw.



6. Turn the ignition switch OFF.
7. Reconnect the 2P connector to the IAC valve, then remove the BACK UP (RADIO) (7.5 A) fuse in the under-hood fuse/relay box for 10 seconds to reset the PCM.
8. Restart and let the engine idle with no-load conditions for one minute, then check the idle speed.

   NOTE: (Canada) Pull the parking brake lever up. Start the engine, then check that the headlights are off.

   Idle speed should be:
   750 ± 50 rpm (in Park or neutral)

9. Let the engine idle for one minute with the headlights (Low) ON, and check the idle speed.

   Idle speed should be:
   750 ± 50 rpm (in Park or neutral)

10. Turn the headlights off. Let the engine idle for one minute with the headlights (Low) ON, heater fan switch at HI and air conditioner on, then check the idle speed.

    Idle speed should be:
    780 ± 50 rpm (in Park or neutral)

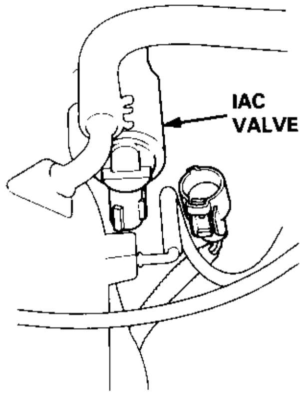
    If the idle speed is not within specification, see the symptom chart on page 11-64. (cont'd)

Idle Speed Setting (cont'd)

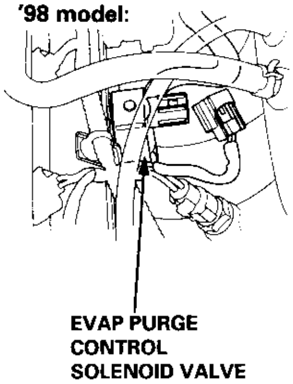
'98 – 00 models:

NOTE: Before setting the idle speed, check the following items:
— The MIL has not been reported on.
— Ignition timing
— Spark plugs
— Air cleaner
— PCV system

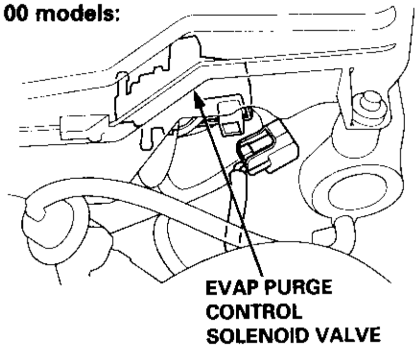
1. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
2. Connect a tachometer.
3. Disconnect the IAC valve 2P connector and the EVAP purge control solenoid valve 2P connector.



'98 model:



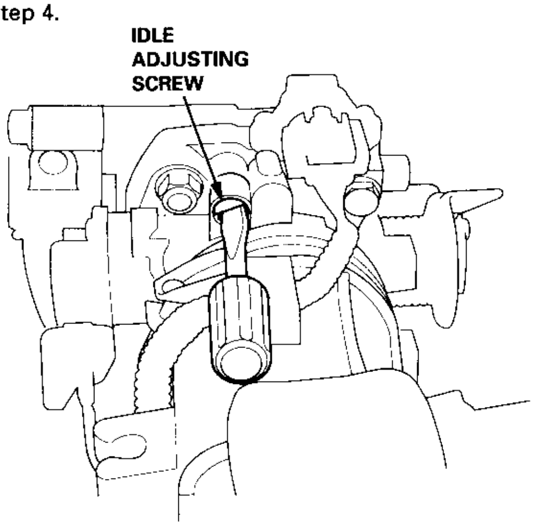
'99 – 00 models:



4. If the engine stalls, restart the engine with the accelerator pedal slightly depressed. Stabilize the rpm at 1,000, then slowly release the pedal until the engine idles.
5. Check the idle in no-load conditions: headlights, blower fan, rear defogger, radiator fan, and air conditioner are not operating.

   Idle speed should be:
   480 ± 50 rpm (in Park or neutral)

   If necessary, adjust the idle speed, by turning the idle adjusting screw.
   After adjusting the idle speed, recheck the ignition timing (see section 4). If it is out of spec, go back to step 4.

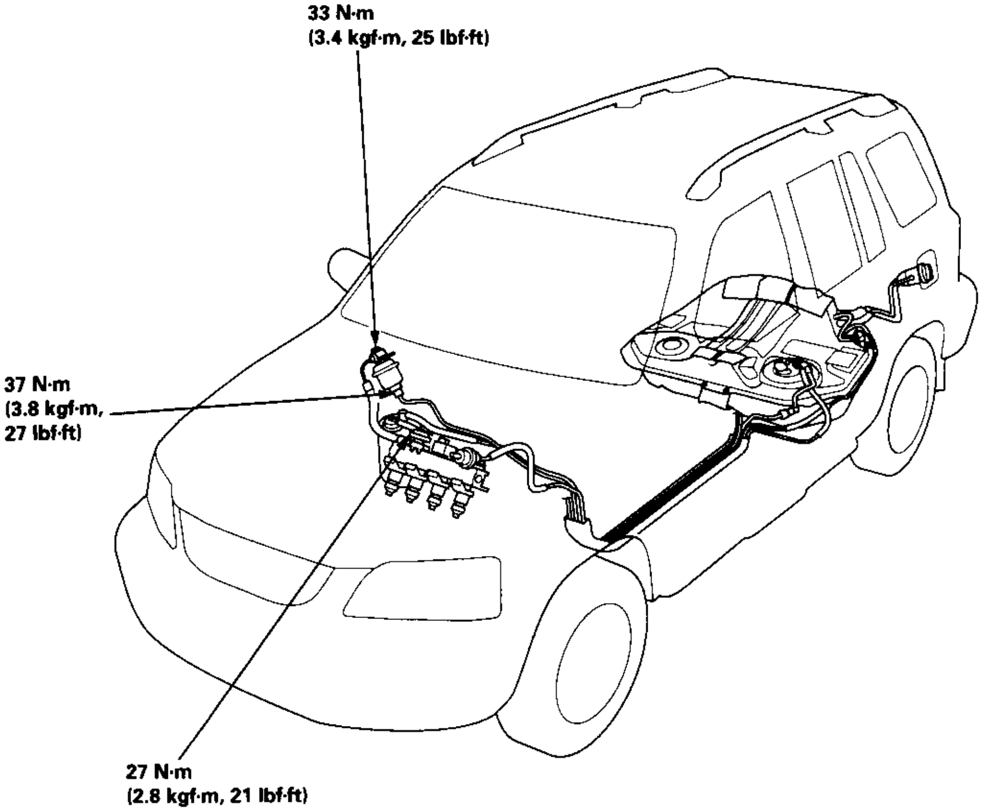


6. Turn the ignition switch OFF.
7. Reconnect the 2P connectors to the IAC valve and the EVAP purge control solenoid valve, then do the ECM/PCM reset procedure.
8. Restart and idle the engine with no-load conditions for one minute, then check the idle speed.
   Idle speed should be:
   '98 model:
   750 ± 50 rpm (in Park or neutral)
   '99 – 00 models:
   730 ± 50 rpm (in Park or neutral)
   NOTE: If the idle speed increases to 780 ± 50 rpm (770 ± 50 rpm)*, this means the EVAP system is purging the canister. To stop the purging temporarily, raise the engine speed above 1,000 rpm with the accelerator pedal, then slowly release the pedal.
   *: '99 – 00 models
9. Let the engine idle for one minute with the headlights (Low) ON, and check the idle speed.
   Idle speed should be:
   '98 model:
   750 ± 50 rpm (in Park or neutral)
   '99 – 00 models:
   730 ± 50 rpm (in Park or neutral)
10. Turn the headlights off. Let the engine idle for one minute with the heater fan switch at HI and air conditioner on, then check the idle speed.
    Idle speed should be:
    '98 model:
    780 ± 50 rpm (in Park or neutral)
    '99 – 00 models:
    770 ± 50 rpm (in Park or neutral)
    If the idle speed is not within specification, see the Symptom Chart on page 11-64.

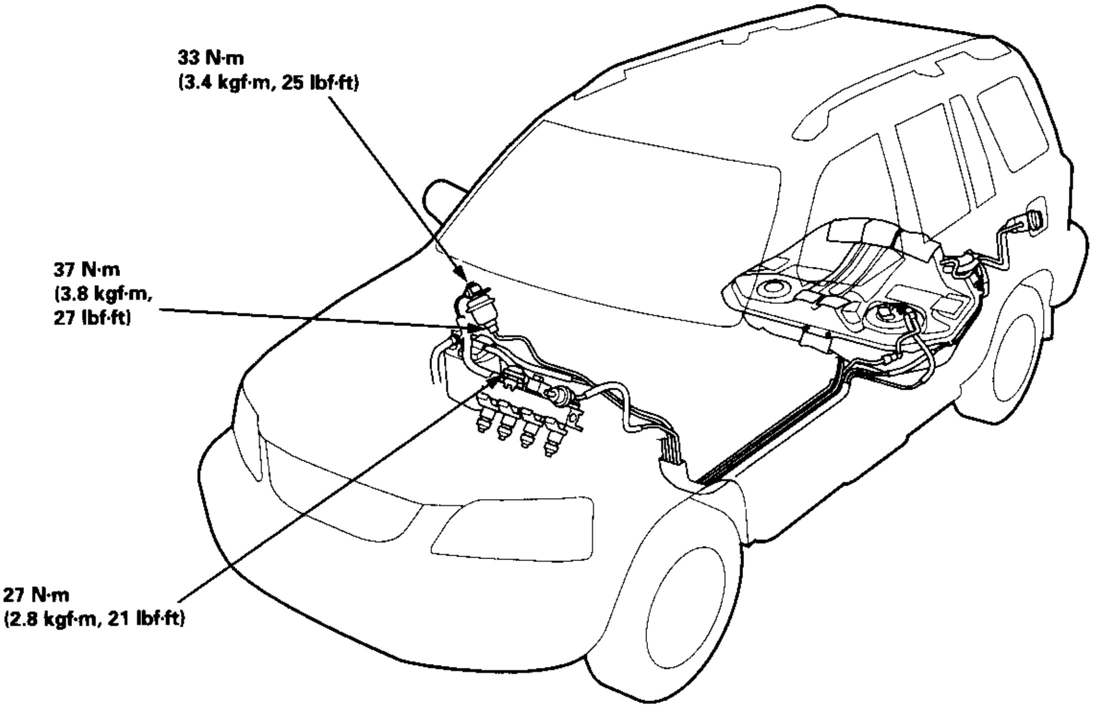
Fuel Lines

Check fuel system lines, hoses, fuel filter, and other components for damage, leaks or deterioration, and replace if necessary.

'97 model:



'98 model:



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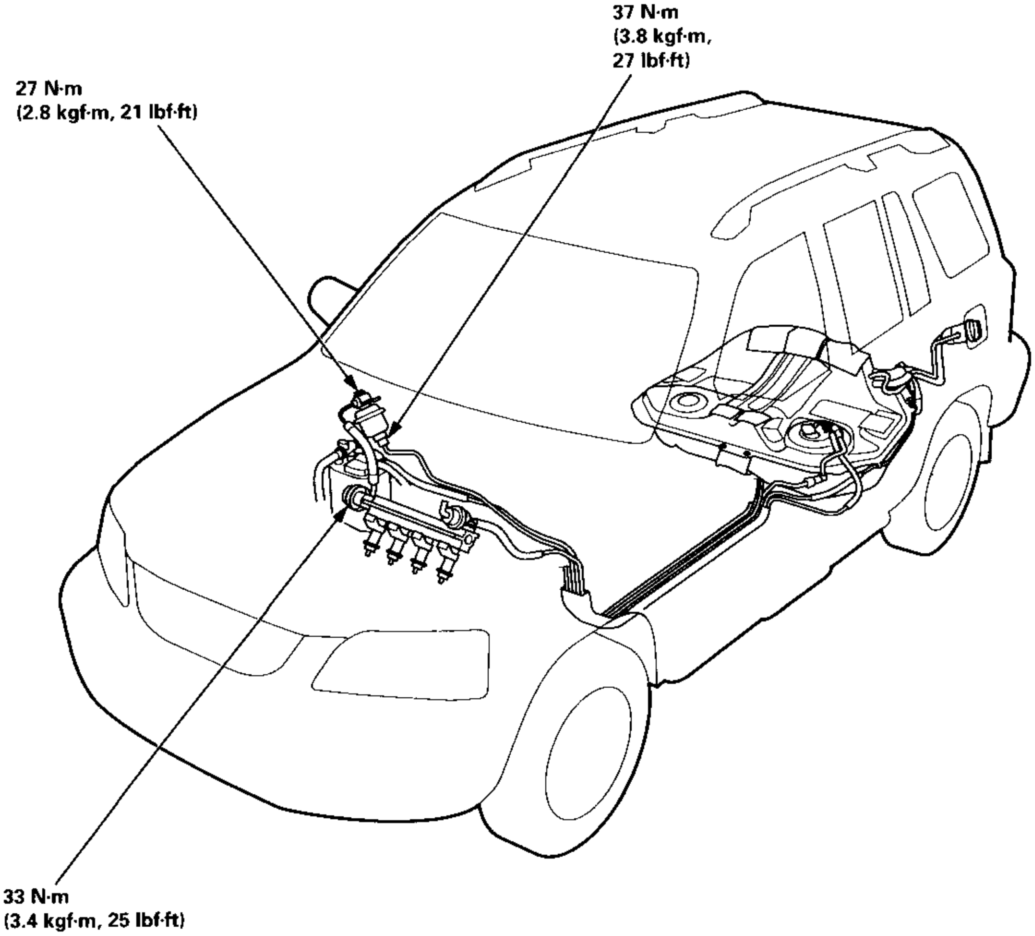
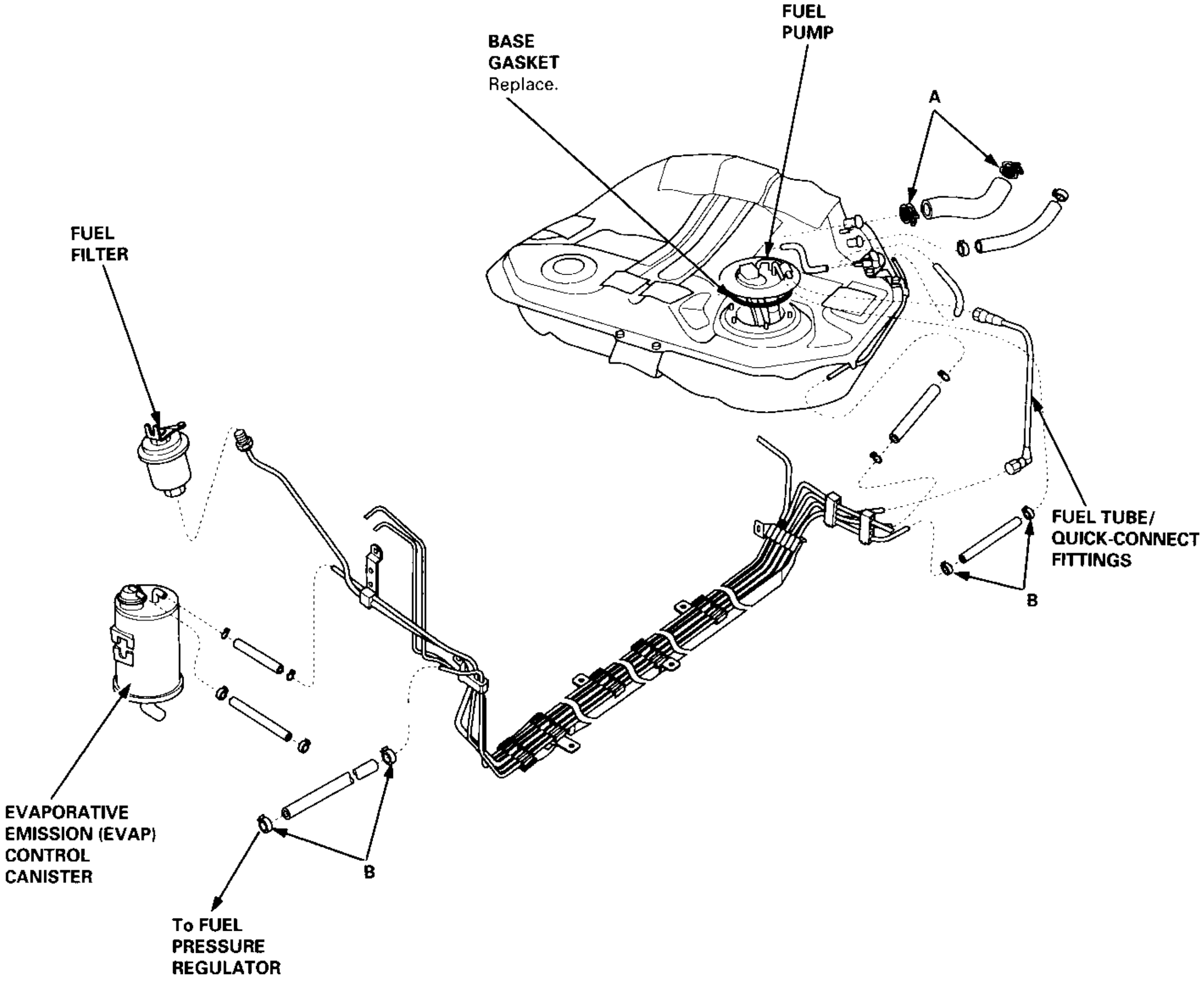
Fuel Lines (cont'd)

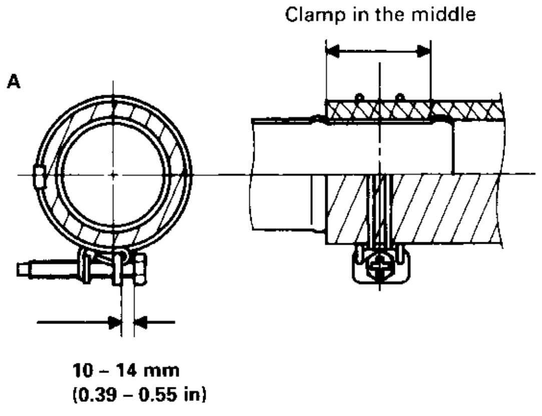
'99 – 00 models:

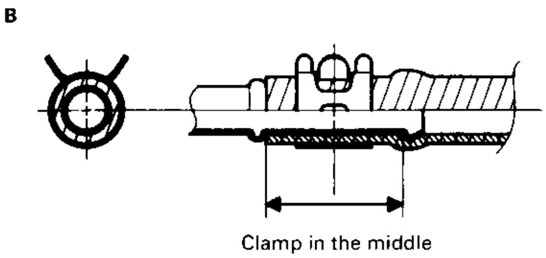


'97 model:

Check all hose clamps, and retighten if necessary.







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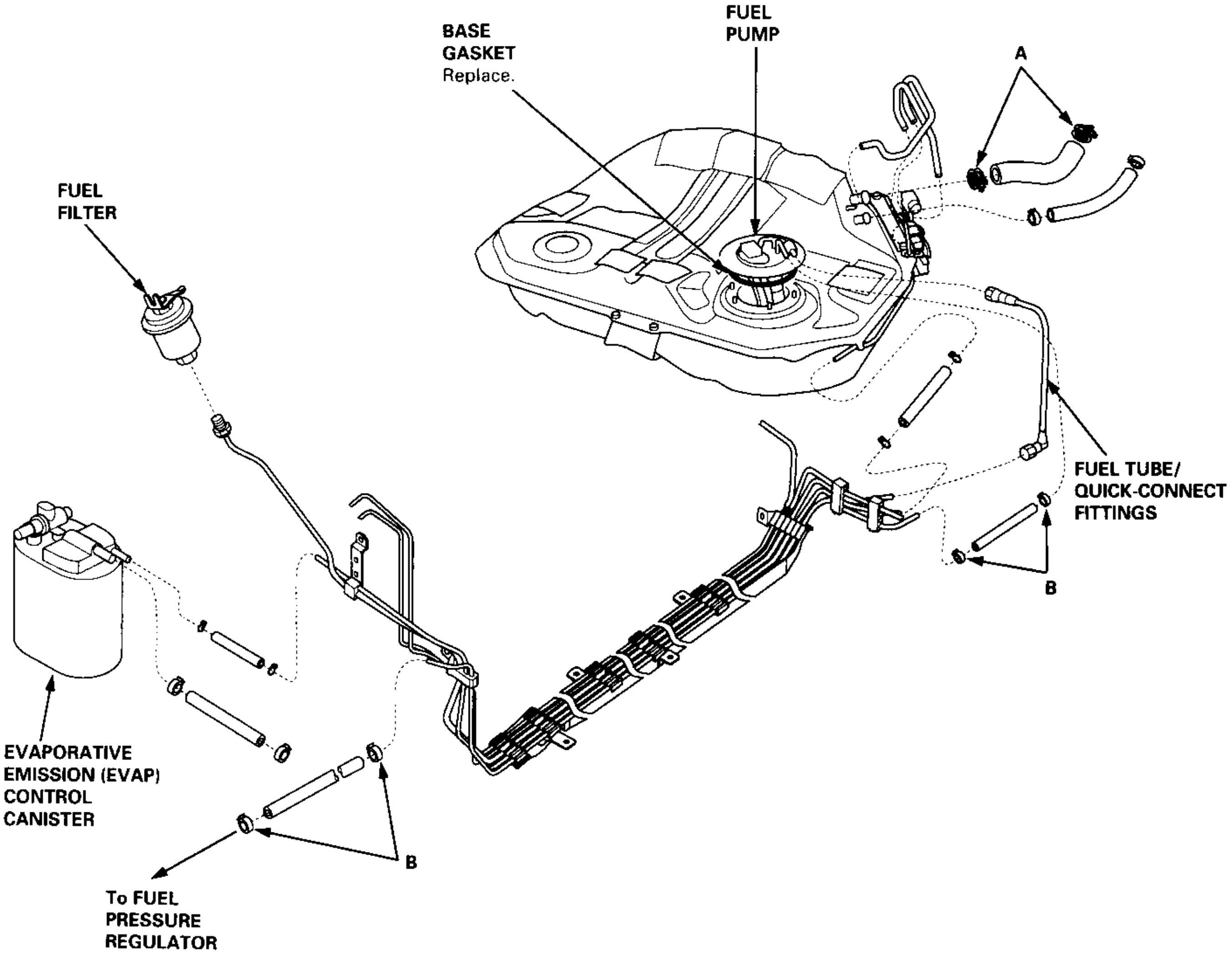
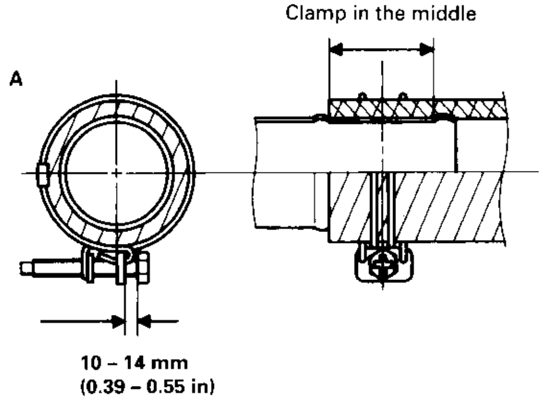
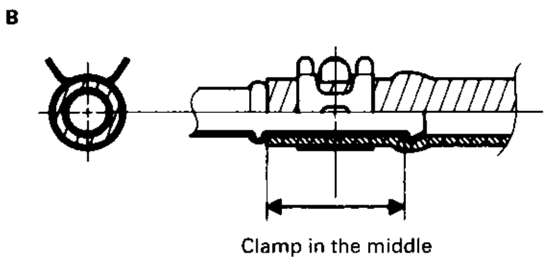
Fuel Lines (cont'd)

'98 – 00 models:

Check all hose clamps, and retighten if necessary.







Fuel Tube/Quick-Connect Fittings

Precautions

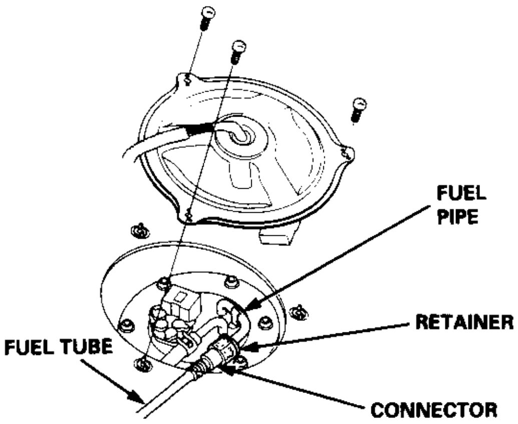
⚠ WARNING Do not smoke while working on the fuel system. Keep open flames away from your work area.

The fuel tube/quick-connect fittings assembly connects the in-tank fuel pump with the fuel feed pipe. For removing or installing the fuel pump and fuel tank, it is necessary to disconnect or connect the quick-connect fittings. Pay attention to following:

- The fuel tube/quick-connect fittings assembly is not heat-resistant; be careful not to damage it during welding or other heat-generating procedures.
- The fuel tube/quick-connect fittings assembly is not acid-proof; do not touch it with a shop towel which was used for wiping battery electrolyte. Replace the fuel tube/quick-connect fittings assembly if it came into contact with electrolyte or something similar.
- When connecting or disconnecting the fuel tube/quick-connect fittings assembly, be careful not to bend or twist it excessively. Replace it if damaged.

A disconnected quick-connect fittings can be reconnected, but the retainer on the mating pipe cannot be reused once it has been removed from the pipe. Replace the retainer when

- replacing the fuel pump.
- replacing the fuel feed pipe.
- it has been removed from the pipe.
- it is damaged.

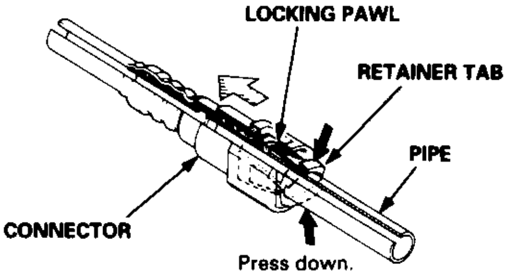


Disconnection

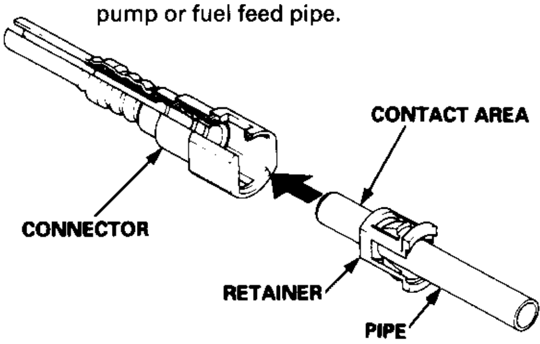
⚠ WARNING Do not smoke while working on the fuel system. Keep open flames away from your work area.

1. Disconnect the battery negative cable.
2. Remove the fuel fill cap to relieve fuel pressure in the tank.
3. Relieve fuel pressure (see page 11-178).
4. Check the fuel quick-connect fittings for dirt, and clean if necessary.
5. Hold the connector with one hand and press down the retainer tabs with the other hand, then pull the connector off.

   NOTE:
   - Be careful not to damage the pipe or other parts. Do not use tools.
   - If the connector does not move, keep the retainer tabs pressed down, and alternately pull and push the connector until it comes off easily.
   - Do not remove the retainer from the pipe; once removed, the retainer must be replaced with a new one.



6. Check the contact area of the pipe for dirt and damage.
   - If the surface is dirty, clean it.
   - If the surface is rusty or damaged, replace the fuel pump or fuel feed pipe.



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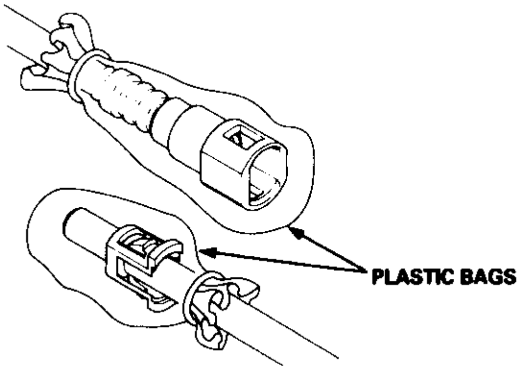
Fuel Tube/Quick-Connect Fittings (cont'd)

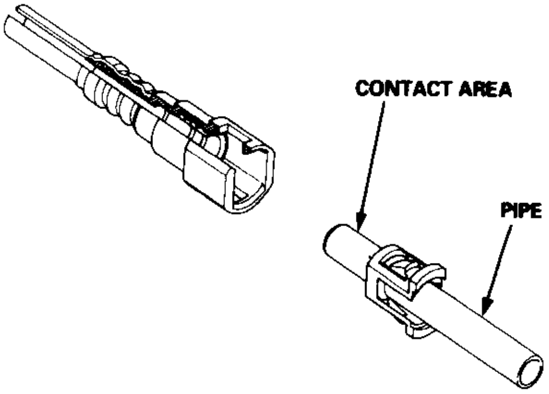
7. To prevent damage and keep out foreign matter, cover the disconnected connector and pipe end with plastic bags.



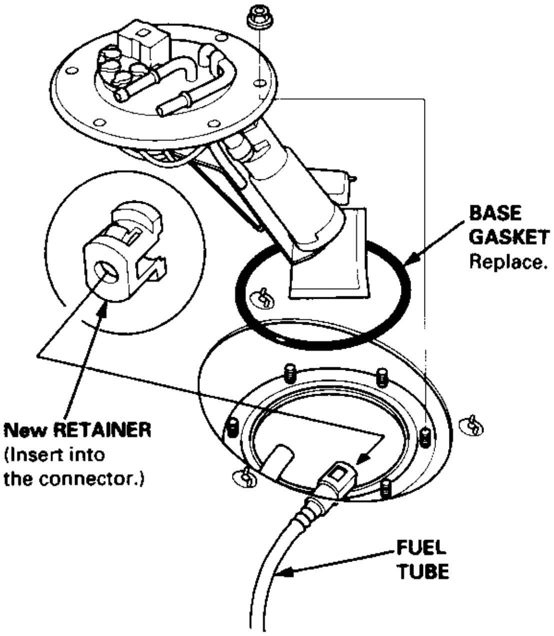
Connection

⚠WARNING Do not smoke while working on the fuel system. Keep open flames away from your work area.

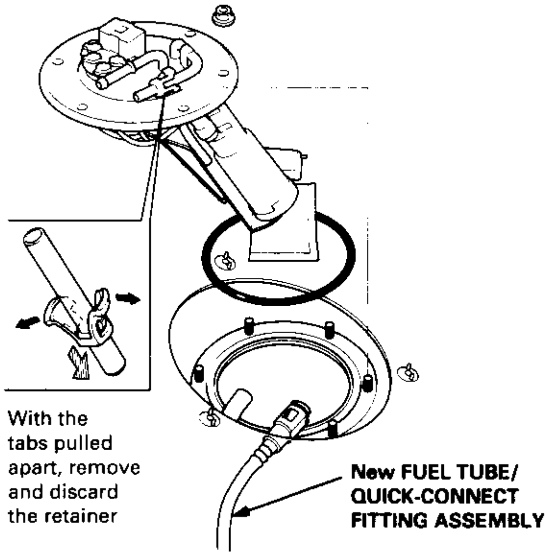
1. Check the pipe contact area for dirt and damage, and clean if necessary.



2. Insert a new retainer into the connector if the retainer is damaged, or after
   - replacing the fuel pump.
   - replacing the fuel feed pipe.
   - removing the retainer from the pipe.

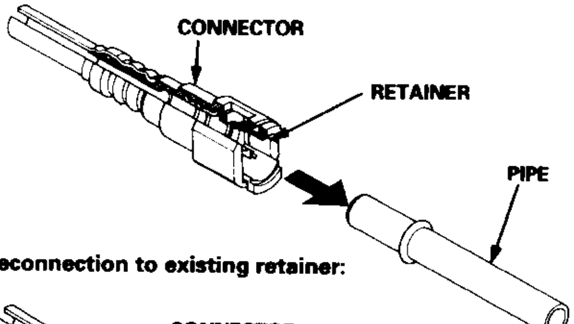


3. Before connecting a new fuel tube/quick-connect fitting assembly, remove the old retainer from the mating pipe.

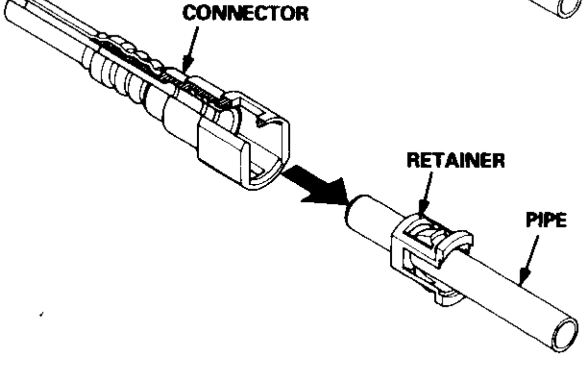


4. Align the quick-connect fittings with the pipe, and align the retainer locking pawls with the connector grooves. Then press the quick-connect fittings onto the pipe until both retainer pawls lock with a clicking sound.

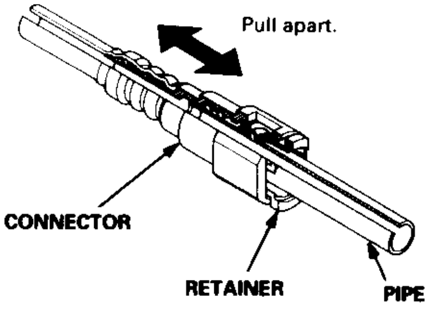
   NOTE: If it is hard to connect, put a small amount of new engine oil on the pipe end.



Reconnection to existing retainer:



5. Make sure the connection is secure and that the pawls are firmly locked into place; check visually and by pulling the connector.



6. Reconnect the battery negative cable, and turn the ignition switch ON (II). The fuel pump will run for about two seconds, and fuel pressure will rise. Repeat two or three times, and check that there is no leakage in the fuel supply system.

Fuel Supply System

System Description

The fuel supply system consists of a fuel tank, in-tank high-pressure fuel pump, PGM-FI main relay, fuel filter, fuel pressure regulator, fuel injectors, and fuel delivery and return lines. This system delivers pressure-regulated fuel to the fuel injectors and cuts the fuel delivery when the engine is not running.

Fuel Pressure

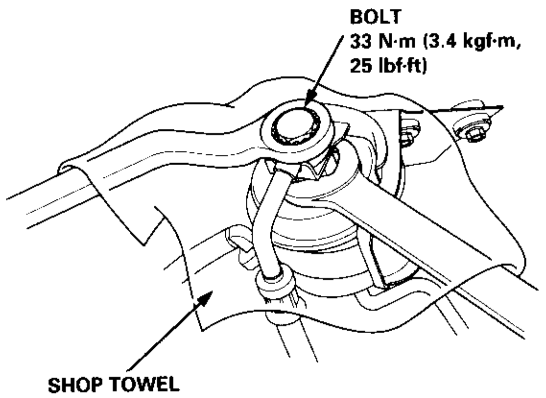
Relieving

Before disconnecting fuel pipes or hoses, release pressure from the system by loosening the 12 mm banjo bolt on the top of the fuel filter.

⚠ WARNING

- **Do not smoke while working on the fuel system. Keep open flames or sparks away from your work area.**
- **Be sure to relieve fuel pressure while the ignition switch is off.**

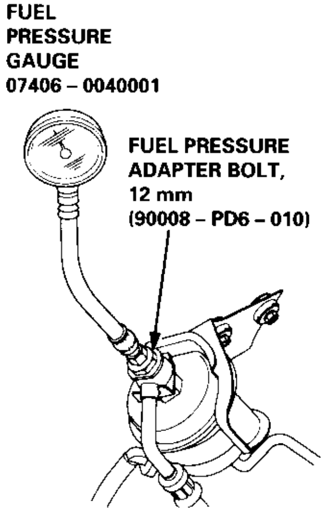
1. Write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative cable from the battery negative terminal.
3. Remove the fuel fill cap.
4. Use a box end wrench on the 12 mm banjo bolt at the fuel filter while holding the fuel filter with another wrench.
5. Place a rag or shop towel over the 12 mm banjo bolt.
6. Slowly loosen the 12 mm banjo bolt one complete turn.

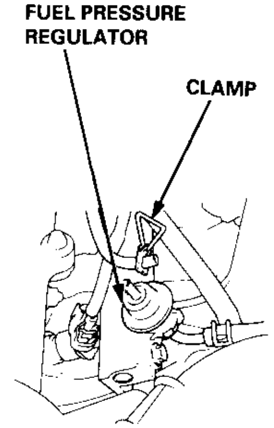


NOTE: Replace the washers whenever the 12 mm banjo bolt is loosened or removed.

Inspection

1. Relieve fuel pressure.
2. Remove the 12 mm banjo bolt on the fuel filter while holding the fuel filter with another wrench. Attach the 12 mm fuel pressure adapter bolt and the special tool.





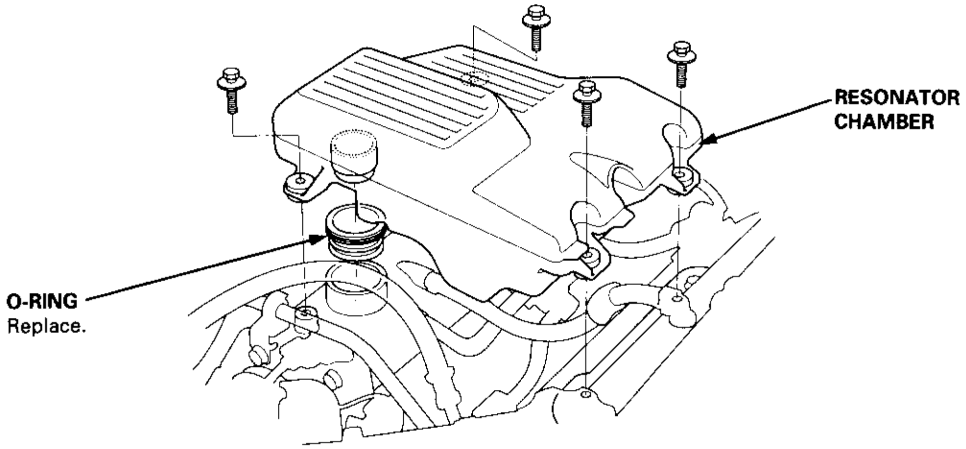
The illustration shows '97 - 98 models, '99 - 00 models are similar.

3. Start the engine. Measure the fuel pressure with the engine idling and the vacuum hose of the fuel pressure regulator disconnected from the fuel pressure regulator and pinched. If the engine will not start, turn the ignition switch on (II), wait for two seconds, turn it off, then back on again and read the fuel pressure.
   Pressure should be:
   '97 – 98 models:
   260 – 310 kPa (2.7 – 3.2 kgf/cm², 38 – 46 psi)
   '99 – 00 models:
   270 – 320 kPa (2.8 – 3.2 kgf/cm², 40 – 47 psi)
4. Reconnect vacuum hose to the fuel pressure regulator.
   Pressure should be:
   '97 – 98 models:
   210 – 250 kPa (2.1 – 2.6 kgf/cm², 30 – 37 psi)
   '99 – 00 models:
   220 – 260 kPa (2.2 – 2.7 kgf/cm², 31 – 38 psi)
   If the fuel pressure is not as specified, first check the fuel pump (see page 11-183). If the fuel pump is OK, check the following:
   - If the fuel pressure is higher than specified, inspect for:
     - Pinched or clogged fuel return hose or line.
     - Faulty fuel pressure regulator (see page 11-181).
   - If the fuel pressure is lower than specified, inspect for:
     - Clogged fuel filter.
     - Faulty fuel pressure regulator (see page 11-181).
     - Fuel line leakage.

Fuel Injectors

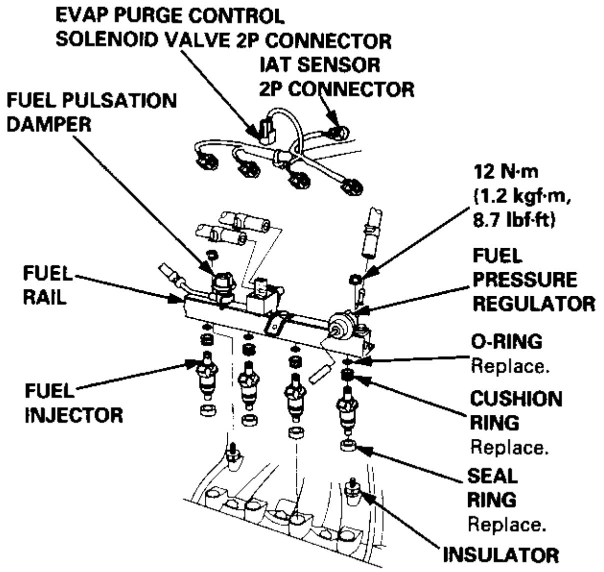
Replacement

1. Relieve the fuel pressure (see page 11-178).
2. Remove the resonator chamber ('99 – 00 models).

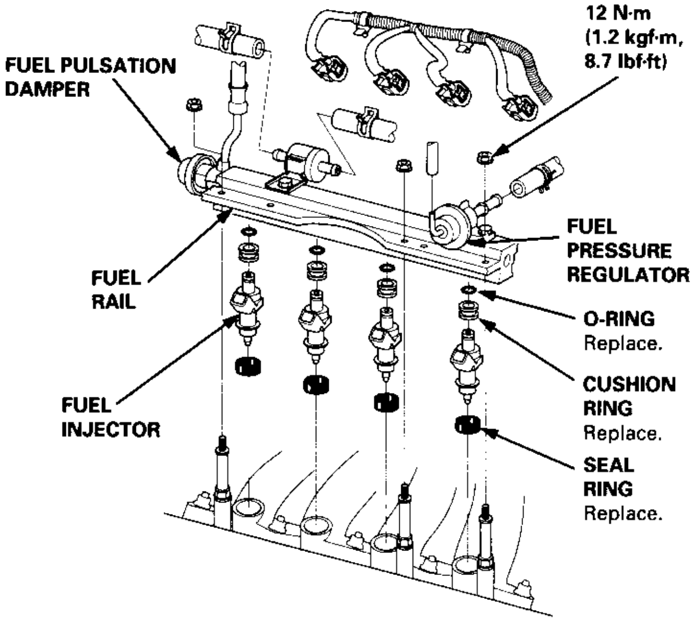


3. Disconnect the connectors from the fuel injectors, and disconnect the IAT sensor 2P connector ('97 – 98 models) and EVAP purge control solenoid valve 2P connector ('97 – 98 models).
4. Disconnect the PCV valve and the vacuum hose from the fuel pressure regulator.
   Place a shop towel over the fuel return hose, then disconnect it from the fuel pressure regulator.
5. Remove the retainer nuts on the fuel rail.
6. Disconnect the fuel rail.
7. Remove the fuel injectors from the intake manifold.

'97 – 98 models:

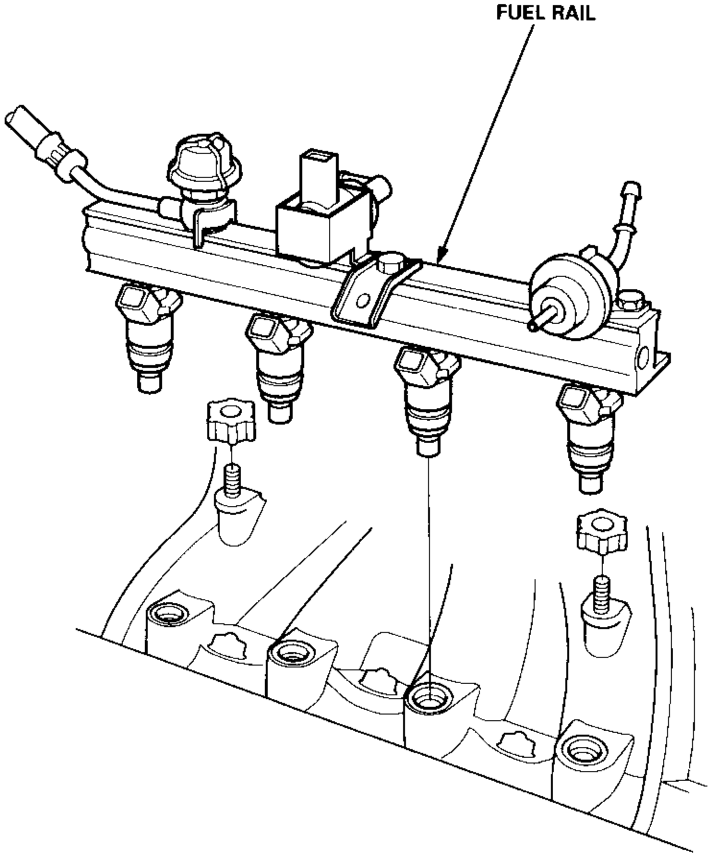


'99 – 00 models:



Fuel Injectors (cont'd)

8. Slide new cushion rings onto the fuel injectors.
9. Coat new O-rings with clean engine oil, and put them on the fuel injectors.
10. Insert the fuel injectors into the fuel rail first.
11. Coat new seal rings with clean engine oil, and press them into the intake manifold.
12. To prevent damage to the O-rings, install the fuel injectors in the fuel rail first, then install them in the intake manifold.



The illustration shows '97 – 98 models, '99 – 00 models are similar.

13. Install and tighten the retainer nuts.
14. Connect the vacuum hoses and fuel return hose to the fuel pressure regulator.
15. Connect the PCV valve.
16. Connect the connectors to the fuel injectors, the IAT sensor ('97 – 98 models), and the EVAP purge control solenoid valve ('97 – 98 models).
17. Coat a new O-ring with clean engine oil, and install the resonator chamber ('99 – 00 models).
18. Turn the ignition switch ON (II), but do not operate the starter. After the fuel pump runs for approximately two seconds, the fuel pressure in the fuel line rises. Repeat this two or three times, then check whether there is any fuel leakage.

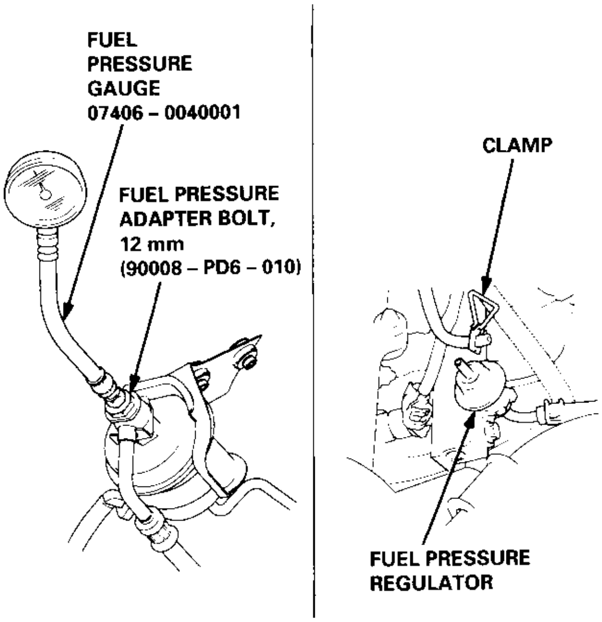
Fuel Pressure Regulator

Testing

1. Attach the special tool and the 12 mm fuel pressure adapter bolt to the fuel filter (see page 11-178).

2. Start the engine.

   Pressure should be:
   '97 – 98 models:
   260 – 310 kPa (2.7 – 3.2 kgf/cm², 38 – 46 psi)
   '99 – 00 models:
   270 – 320 kPa (2.8 – 3.3 kgf/cm², 40 – 47 psi)
   (with the fuel pressure regulator vacuum hose disconnected and pinched)



The illustration shows '97 – 98 models, '99 – 00 models are similar.

3. Reconnect the vacuum hose to the fuel pressure regulator.

4. Check that the fuel pressure rises when the vacuum hose from the fuel pressure regulator is disconnected again.

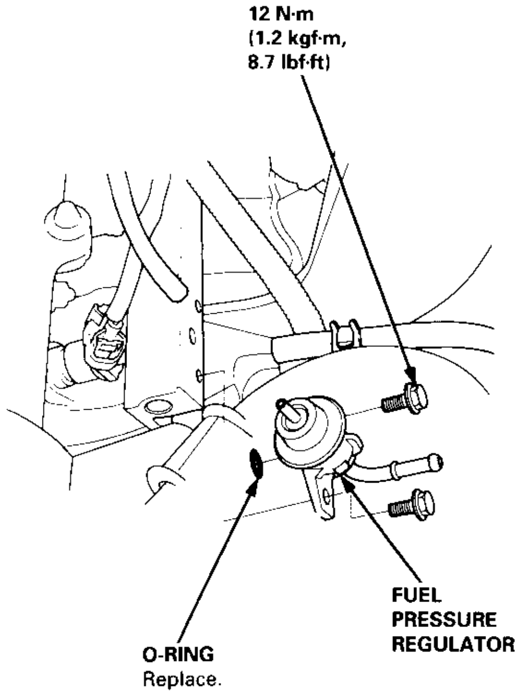
   If the fuel pressure did not rise, replace the fuel pressure regulator.

Replacement

1. Place a shop towel under the fuel pressure regulator, then relieve fuel pressure (see page 11-178).

2. Disconnect the vacuum hose and fuel return hose.

3. Remove the two 6 mm retainer bolts and the fuel pressure regulator.



The illustration shows '97 – 98 models, '99 – 00 models are similar.

4. Apply clean engine 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.

Fuel Filter

Replacement

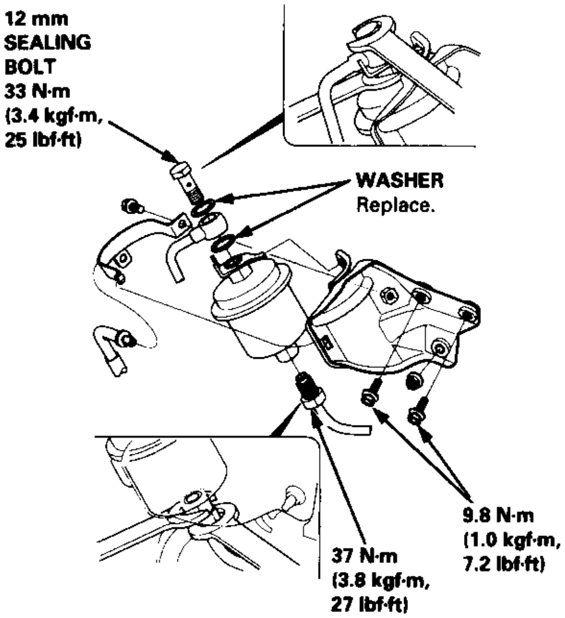
⚠ WARNING

- **Do not smoke while working on fuel system. Keep open flame away from your work area.**
- **While replacing the fuel filter, be careful to keep a safe distance between battery terminals and any tools.**

The fuel filter should be replaced whenever the fuel pressure drops below the specified value* with the fuel pressure regulator vacuum hose disconnected and pinched] after making sure that the fuel pump and the fuel pressure regulator are OK.

***: '97 – 98 models: 260 – 310 kPa (2.7 – 3.2 kgf/cm², 38 – 46 psi)**
'99 – 00 models: 270 – 320 kPa (2.8 – 3.2 kgf/cm², 40 – 47psi)

1. Place a shop towel under and around the fuel filter.
2. Relieve fuel pressure (see page 11-178).
3. Remove the engine wire harness bracket and power steering feed hose clamp.
4. Remove the banjo bolt and the fuel feed pipe while supporting the fuel filter with another wrench, as shown.
5. Remove the fuel filter clamp and fuel filter.
6. Install the new fuel filter in the reverse order of removal, and note these items:
   - When assembling, use new washers as shown.
   - Clean the flared joint of high pressure hoses thoroughly before reconnecting them.



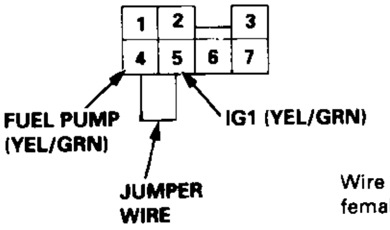
Fuel Pump

Testing

If you suspect a problem with the fuel pump, check that the fuel pump actually runs; when it is ON (II), you will hear some noise if you hold your ear to the fuel fill port with the fuel fill cap removed. The fuel pump should run for two seconds when ignition switch is first turned ON (II). If the fuel pump does not make noise, check it as follows:

1. Fold the left rear seat cushion forward, and remove the base frame cover (see section 20).
2. Remove the access panel from the floor.
3. Make sure the ignition switch is OFF, then disconnect the fuel pump 5P connector.
4. Connect the PGM-FI main relay 7P connector terminal No. 4 and No. 5 with a jumper wire.

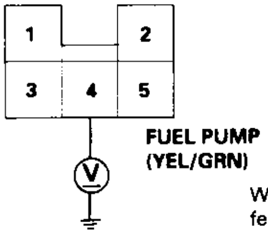
PGM-FI MAIN
RELAY 7P CONNECTOR (C432)



Wire side of
female terminals

5. Check that battery voltage is available between the fuel pump 5P connector terminal No. 4 and body ground when the ignition switch is turned ON (II).

FUEL PUMP 5P CONNECTOR (C562)

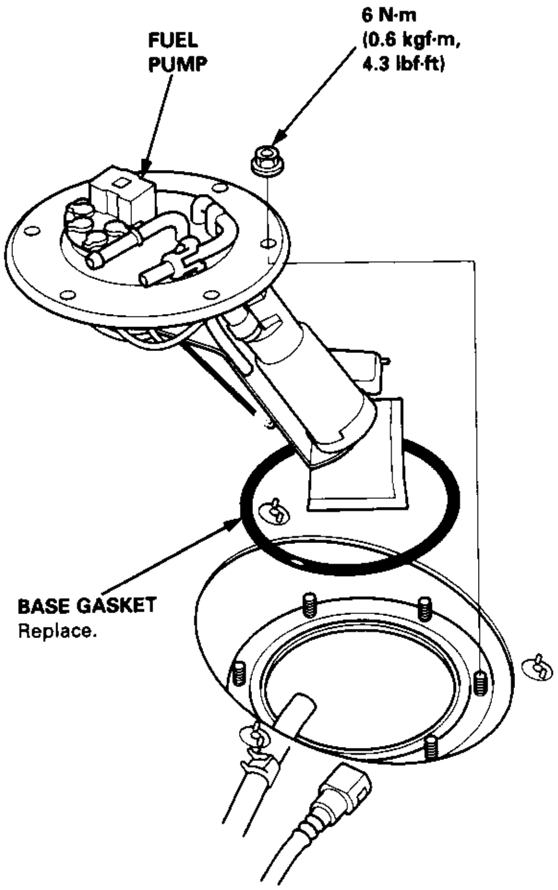


Wire side of
female terminals

- If battery voltage is available, check the fuel pump ground. If the ground is OK, replace the fuel pump.
- If there is no voltage, check the wire harness (see page 11-188).

Replacement

1. Fold the left rear seat cushion forward, and remove the base frame cover (see section 20).
2. Remove the access panel from the floor.
3. Relieve the fuel pressure (see page 11-178).
4. Disconnect the fuel lines.
5. Disconnect the 5P connector from the fuel pump.
6. Remove the fuel pump mounting nuts.



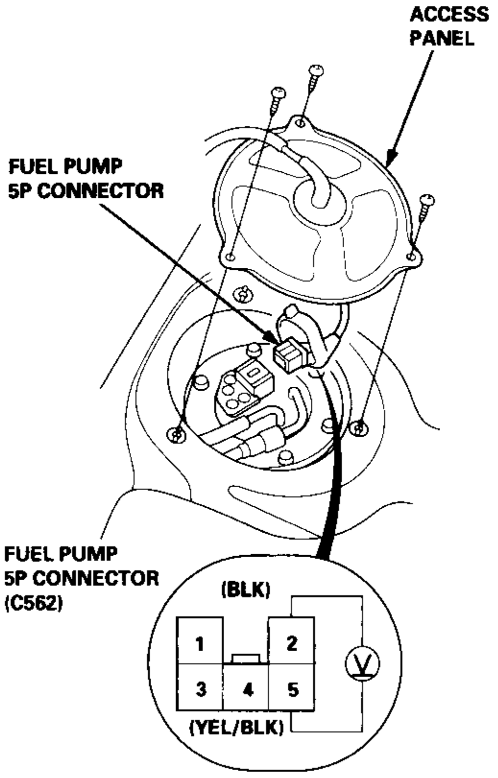
7. Remove the fuel pump from the fuel tank.
8. Install the fuel pump in the reverse order of removal.

Fuel Gauge

Testing

NOTE: Refer to section 23 for the fuel gauge system circuit diagram.

1. Check the No. 25 METER (7.5 A) fuse in the under-dash fuse/relay box before testing.
2. Fold the left rear seat cushion forward, and remove the base frame cover (see section 20).
3. Remove the access panel from the floor.
4. Disconnect the 5P connector from the fuel pump.
5. Measure voltage between the 5P connector terminals No. 2 and No. 5 with the ignition switch ON (II). There should be between 5 and 8 V.



Wire side of female terminals

- If the voltage is as specified, go to step 6.
- If the voltage is not as specified, check for:
  - — an open in the YEL/BLK or BLK wire.
  - — poor ground (G552).

6. Turn the ignition switch OFF.
7. Attach a jumper wire between the No. 2 and No. 5 terminals, then turn the ignition switch ON (II).
8. Check that the pointer of the fuel gauge starts moving toward the "F" mark. 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.

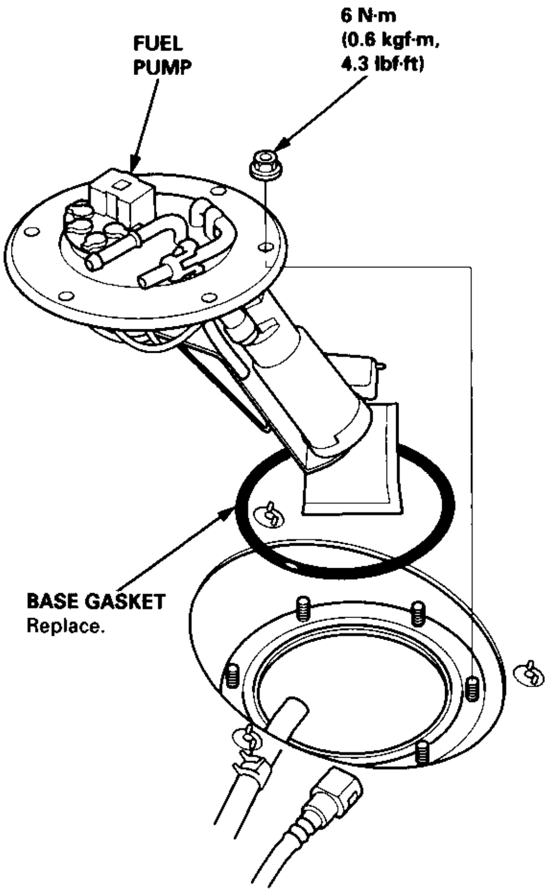
   - If the pointer of the fuel gauge does not move at all, replace the gauge.
   - If the gauge is OK, inspect the fuel gauge sending unit.

Fuel Gauge Sending Unit

Testing

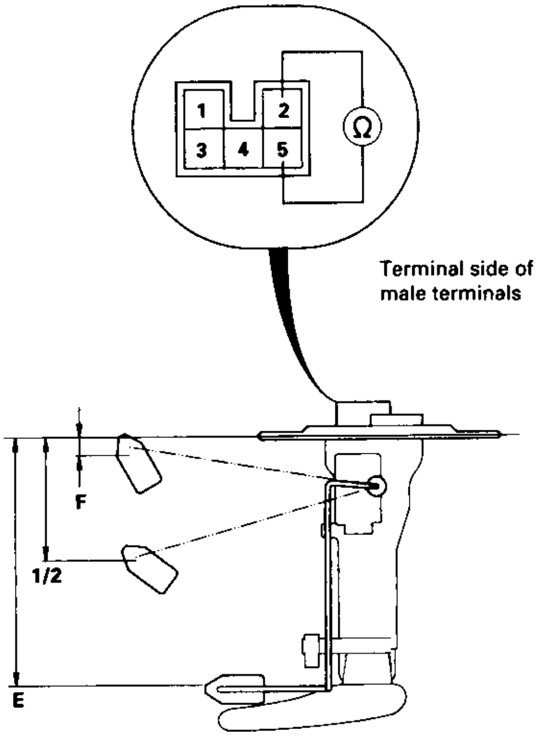
⚠ WARNING Do not smoke while working on the fuel system. Keep open flame away from your work area.

1. Fold the left rear seat cushion forward, and remove the base frame cover (see section 20).
2. Remove the access panel.
3. With the ignition switch OFF, disconnect the 5P connector from the fuel pump.
4. Relieve fuel pressure (see page 11-178).
5. Disconnect the fuel lines.
6. Remove the fuel pump.



7. Measure the resistance between the No. 2 and No. 5 terminals at E (EMPTY), 1/2 (HALF FULL) and F (FULL) by moving the float.

Float Position	E	1/2	F
Resistance (Ω)	105 – 108	29.5 – 35.5	3.5 – 5



If you do not get the above readings, replace the fuel pump.

Low Fuel Indicator System

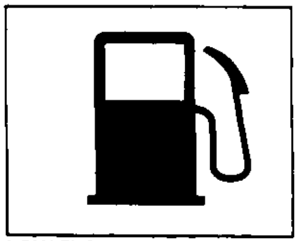
Indicator Light Testing

NOTE: Refer to section 23 for the low fuel indicator circuit diagram.

1. Check the No. 25 METER (7.5 A) fuse in the under-dash fuse/relay box before testing.
2. Park the vehicle on level ground.

⚠WARNING Do not smoke while working on the fuel system. Keep open flame away from the work area. Drain fuel only into an approved container.

3. Drain the fuel into an approved container. Then install the drain bolt with a new washer.
4. Add less than 8 ℓ (2.1 U.S. Gal, 1.8 Imp. Gal) of fuel, and turn the ignition switch ON (II). The low fuel indicator light should come on within four minutes.



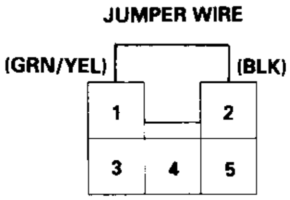
LOW FUEL INDICATOR LIGHT

- If the light comes on within four minutes, go to step 8.
- If the light does not come on within four minutes, go to step 5.

5. Remove the seat cushion (see section 20).
6. Remove the fuel tank access panel from the floor, and disconnect the 5P connector from the fuel pump.
7. Connect the No. 1 and No. 2 terminals with a jumper wire.

- If the light comes on, check the sending unit.
- If the light does not come on, check for:
  - an open in the GRN/YEL wire between the fuel unit and fuel gauge assembly.
  - blown bulb.
  - poor ground (G552).

FUEL PUMP 5P CONNECTOR (C562)



Wire side of female terminals

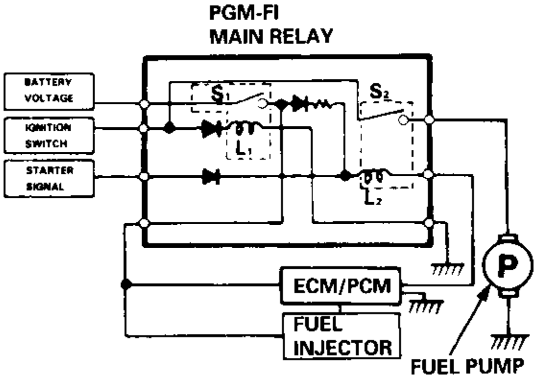
8. Add 4 ℓ of fuel (1.1 U.S. Gal, 0.9 Imp. Gal). The light should go off within four minutes.

- If the light does not go off, check for:
  - a short in the GRN/YEL wire between the fuel gauge sending unit and fuel gauge assembly.
  - faulty gauge assembly.
- If the light goes off, the low fuel indicator light is OK.

PGM-FI Main Relay

Description

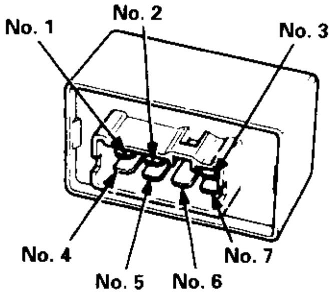
The PGM-FI main relay actually contains two individual relays. This relay is located at the passenger side of the cowl. One relay is energized whenever the ignition is on which supplies the battery voltage to the ECM/PCM, power to the fuel injectors, and power for the second relay. The second relay is energized for two seconds when the ignition is switched on, and when the engine is running, to supply power to the fuel pump.

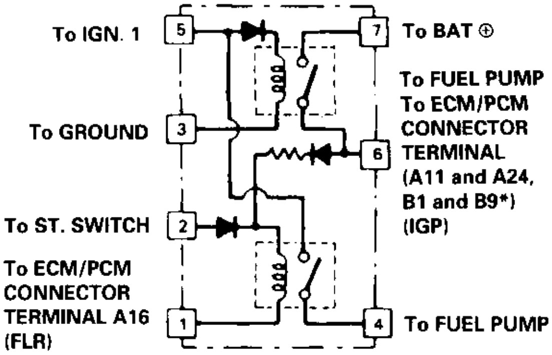


Relay Testing

NOTE: If the engine starts and continues to run, the PGM-FI main relay is OK.

1. Remove the glovebox and the passenger's dashboard lower cover (see section 20).
2. Remove the PGM-FI main relay.
3. 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.





*: '98 – 00 models

4. 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.
5. 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 there is no continuity, replace the PGM-FI main relay and retest.

(cont'd)

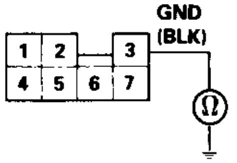
PGM-FI Main Relay (cont'd)

Troubleshooting

- **Engine will not start.**
- **Inspection of PGM-FI main relay and relay harness.**

Check for an open in the wire (GND line):
1. Turn the ignition switch OFF.
2. Disconnect the PGM-FI main relay 7P connector.
3. Check for continuity between the PGM-FI main relay 7P connector terminal No. 3 and body ground.

PGM-FI MAIN RELAY 7P CONNECTOR (C432)



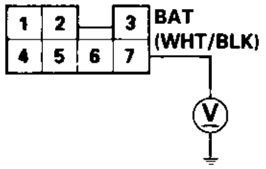
Wire side of female terminals

Is there continuity?

NO — **Repair open in the wire between the PGM-FI main relay and G101.**

YES

Check for an open or short in the wire (BAT line):
Measure voltage between the PGM-FI main relay 7P connector terminal No. 7 and body ground.

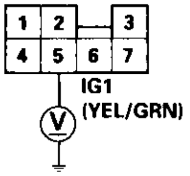


Is there battery voltage?

NO —
- **Repair open or short in the wire between the PGM-FI main relay and the FI E/M (15 A) fuse.**
- **Replace the FI E/M (15 A) fuse in the under-hood fuse/relay box.**

YES

Check for an open or short in the wire (IG1 line):
1. Turn the ignition switch ON (II).
2. Measure the voltage between the PGM-FI main relay 7P connector terminal No. 5 and body ground.

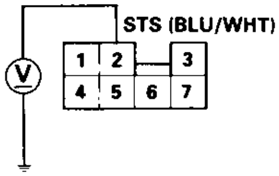


Is there battery voltage?

NO —
- **Repair open or short in the wire between the PGM-FI main relay and the No. 13 FUEL PUMP (15 A) fuse.**
- **Replace the No. 13 FUEL PUMP (15 A) fuse in the under-dash fuse/ relay box.**

YES

Check for an open or short in the wire (STS line):
1. Turn the ignition switch to the START (III) position.
   NOTE:
   - M/T: Clutch pedal must be depressed.
   - A/T: Transmission in N or P position.
2. Measure the voltage between the PGM-FI main relay 7P connector terminal No. 2 and body ground.



Is there battery voltage?

NO —
- **Repair open or short in the wire between the PGM-FI main relay and the No. 31 STARTER SIGNAL (7.5 A) fuse.**
- **Replace the No. 31 STARTER SIGNAL (7.5 A) fuse in the under-dash fuse/relay box.**

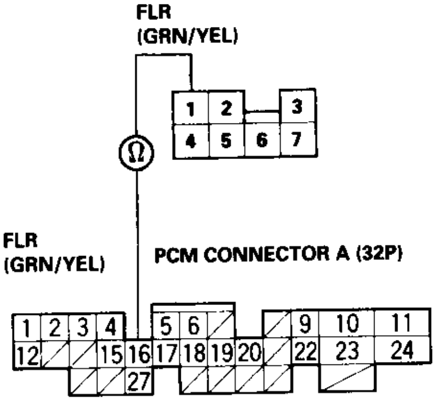
YES

('97 model: To page 11-189)
('98 – 00 models: To page 11-190)

(From page 11-188)

('97 model)

PGM-FI MAIN RELAY 7P CONNECTOR (C432)



Wire side of female terminals

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

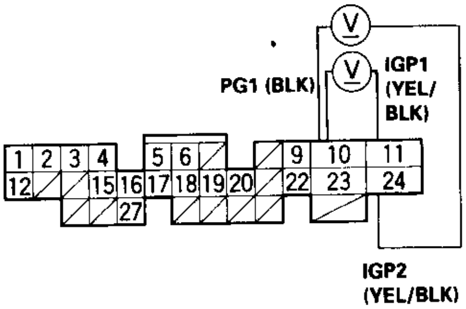
1. Turn the ignition switch OFF.
2. Disconnect the PCM connector A (32P).
3. Check for continuity between the PGM-FI main relay 7P connector terminal No. 1 and PCM connector terminal A16.

Is there continuity?

NO

Repair open in the wire between the PCM (A16) and the PGM-FI main relay.

YES



Check for an open in the wires (IGP1, IGP2 lines):

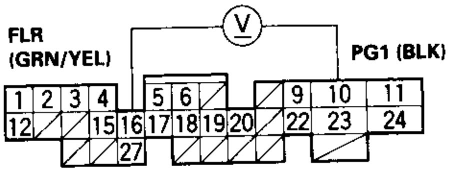
1. Reconnect the PCM connector A (32P).
2. Reconnect the PGM-FI main relay connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between PCM connector terminals A11 and A10, and between A24 and A10.

Is there battery voltage?

NO

- **Repair open in the wire between the PCM (A11, A24) and the PGM-FI main relay.**
- **Replace the PGM-FI main relay.**

YES



Check for an open in the PCM:

1. Turn the ignition switch OFF.
2. Measure voltage between PCM connector terminals A16 and A10 when the ignition switch is first turned ON (II) for two seconds.

Is there 1.0 V or less?

NO

Substitute a known-good PCM and recheck. If prescribed voltage is now available, replace the original PCM.

YES

Check the PGM-FI main relay (see page 11-187).

(cont'd)

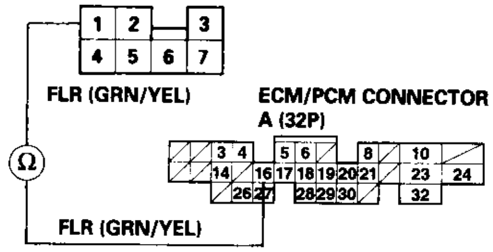
PGM-FI Main Relay (cont'd)

(From page 11-188)

('98 – 00 models)

Check for an open in the wire (FLR line):
1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector A (32P).
3. Check for continuity between the PGM-FI main relay 7P connector terminal No. 1 and ECM/PCM connector terminal A16.

PGM-FI MAIN RELAY 7P CONNECTOR (C432)



Wire side of female terminals

Is there continuity?

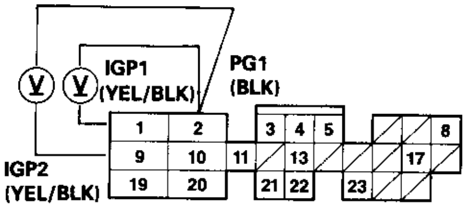
NO

Repair open in the wire between the ECM/PCM (A16) and the PGM-FI main relay.

YES

Check for an open in the wires (IGP1, IGP2 lines):
1. Reconnect the ECM/PCM connector B (25P).
2. Reconnect the PGM-FI main relay connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between ECM/PCM connector terminals B1 and B2, and between B9 and B2.

ECM/PCM CONNECTOR B (25P)



Wire side of female terminals

Is there battery voltage?

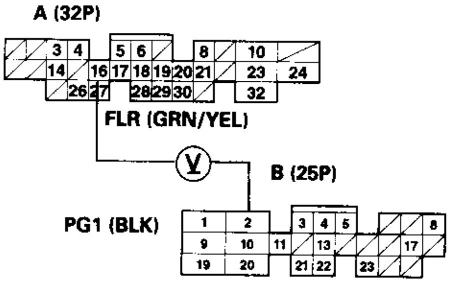
NO

- **Repair open in the wire between the ECM/PCM (B1, B9) and the PGM-FI main relay.**
- **Replace the PGM-FI main relay.**

YES

Check for an open in the ECM/PCM:
1. Turn the ignition switch OFF.
2. Measure voltage between ECM/PCM connector terminals A16 and B2 when the ignition switch is first turned ON (II) for two seconds.

ECM/PCM CONNECTORS



Wire side of female terminals

Is there 1.0 V or less?

NO

Substitute a known-good ECM/PCM and recheck. If prescribed voltage is now available, replace the original ECM/PCM.

YES

Check the PGM-FI main relay (see page 11-187).

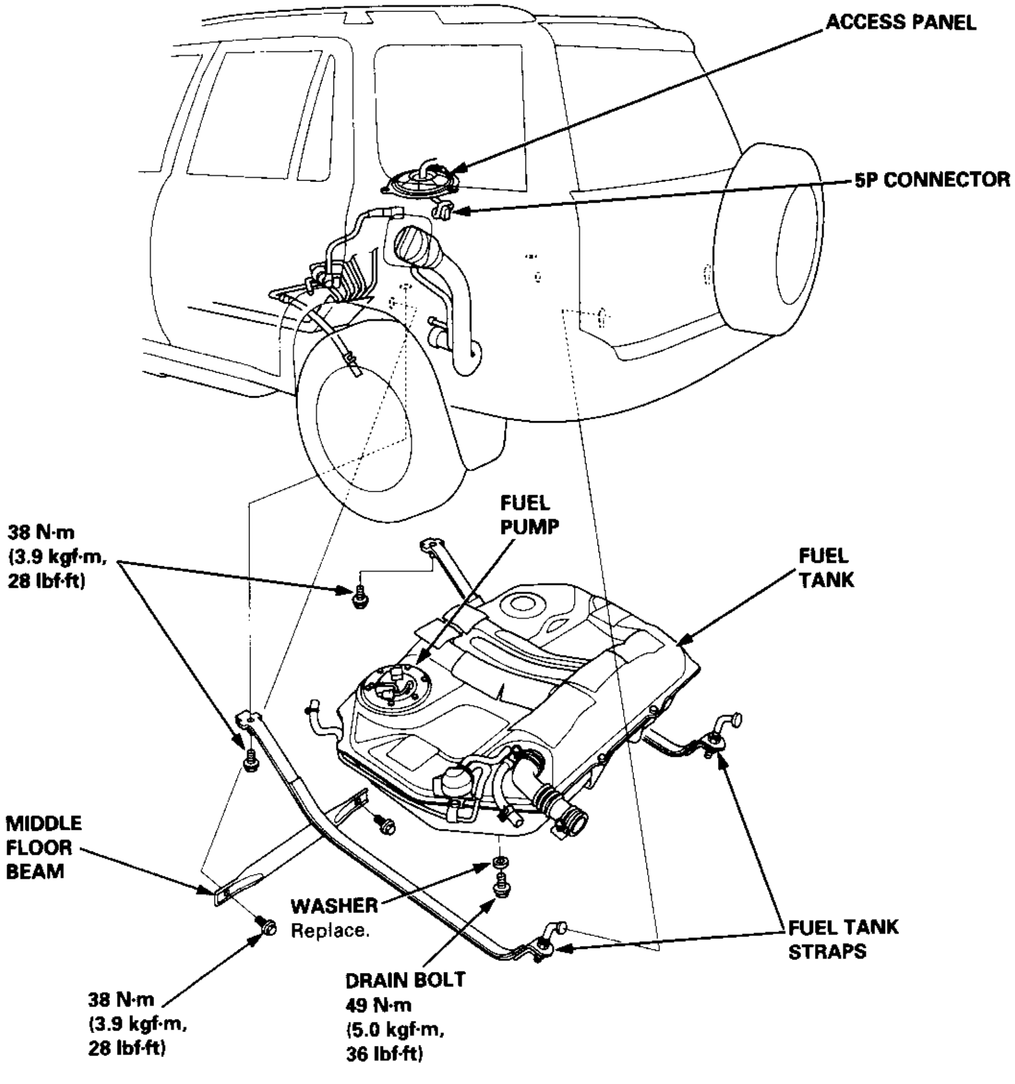
Fuel Tank

Replacement

⚠WARNING Do not smoke while working on fuel system. Keep open flame away from your work area.

1. Relieve the fuel pressure (see page 11-178).
2. Fold the left rear seat cushion forward, and remove the base frame cover (see section 20).
3. Remove the access panel from the floor.
4. Disconnect the 5P connector (C562) and 6P connector (C580) ('98 – 00 models).
5. Disconnect the fuel return hose and quick-connect fittings (see page 11-175).
6. Jack up the vehicle, and support it with jackstands.
7. Remove the middle floor beam.
8. Remove the drain bolt, and drain the fuel into an approved container.
9. Disconnect the hoses (see page 11-173, 174). Slide back the clamps, then twist hoses as you pull, to avoid damaging them.
10. Place a jack, or other support, under the tank.
11. Remove the strap nuts, and let the straps fall free.
12. Remove the fuel tank. If it sticks on the undercoat applied to its mount, carefully pry it off the mount.
13. Install the drain bolt with a new washer, then coat the drain bolt with Noxrust 124B.
    Allow the Noxrust to dry for 20 minutes.
14. Install parts in the reverse order of removal.

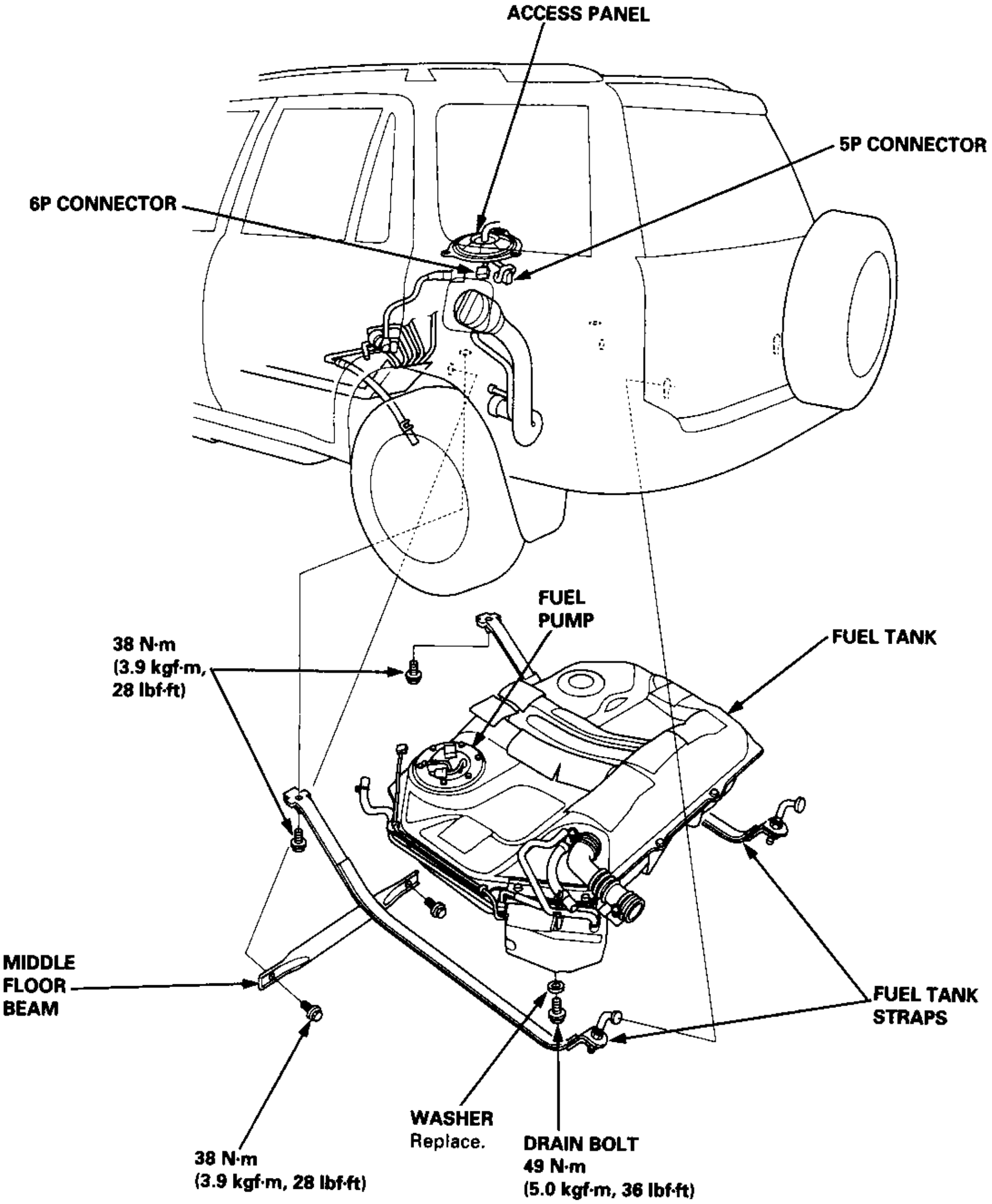
'97 model:



(cont'd)

Fuel Tank (cont'd)

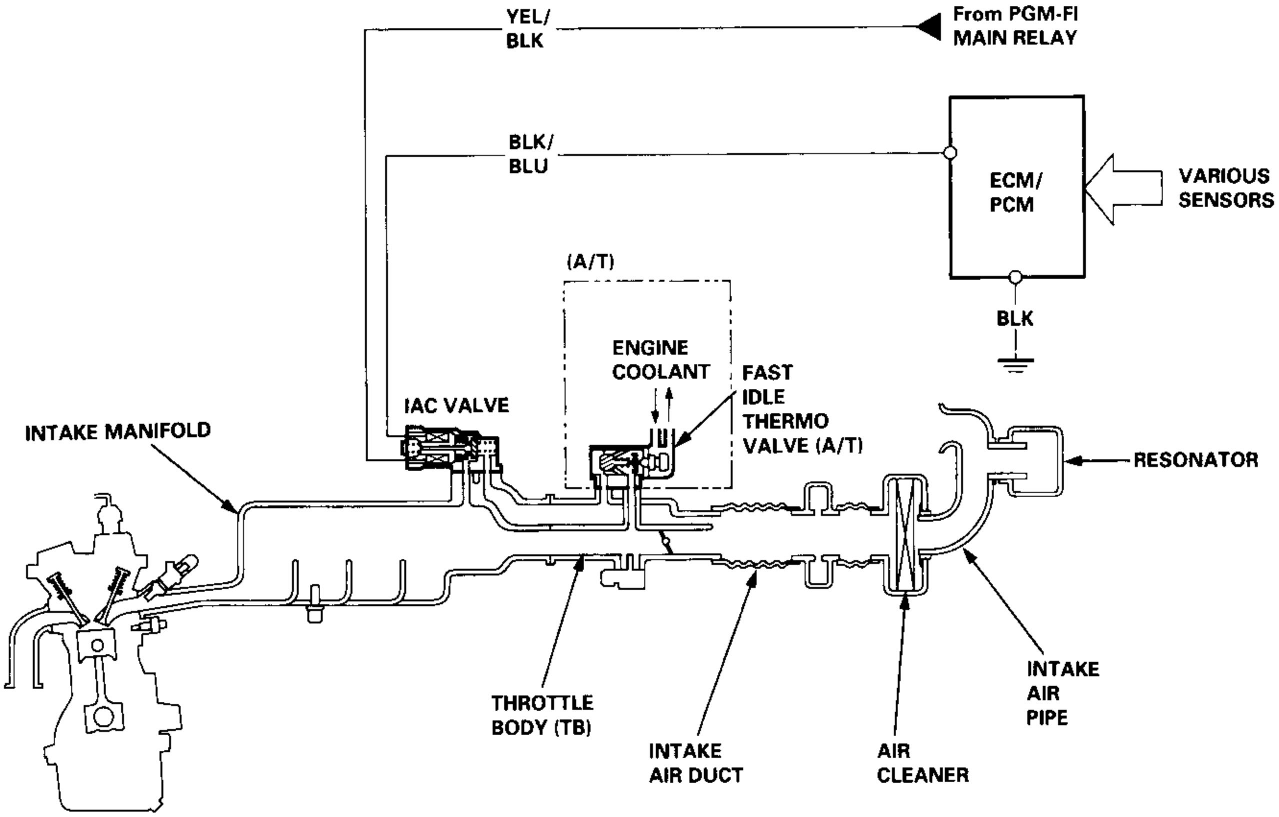
'98 – 00 models:



Intake Air System

System Description

The system supplies air for all engine needs. It consists of the intake air pipe, Air Cleaner, intake air duct, Throttle Body (TB), Idle Air Control (IAC) Valve, fast idle thermo valve, and intake manifold. A resonator in the intake air pipe provides additional silencing as air is drawn into the system.

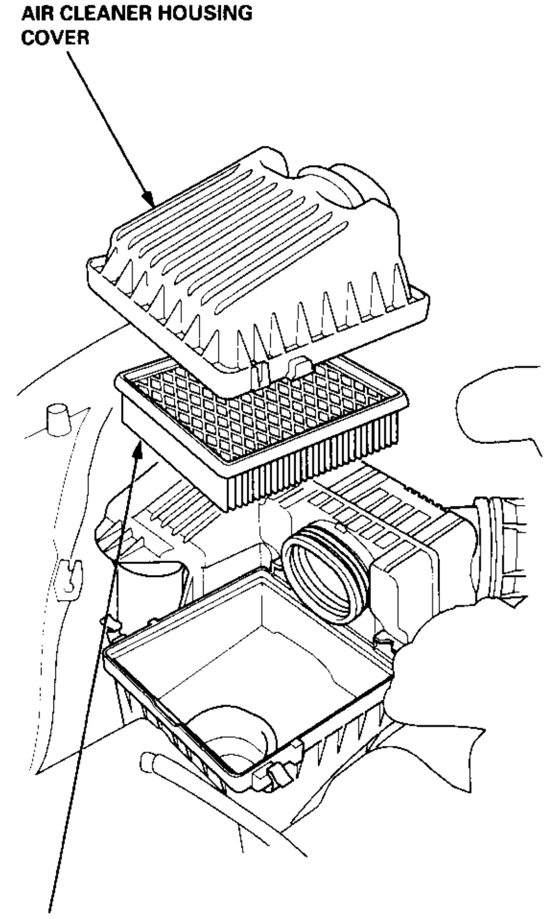


Intake Air System

Air Cleaner

Air Cleaner Element Replacement

NOTE: Do not clean the air cleaner element by blowing it off with compressed air.



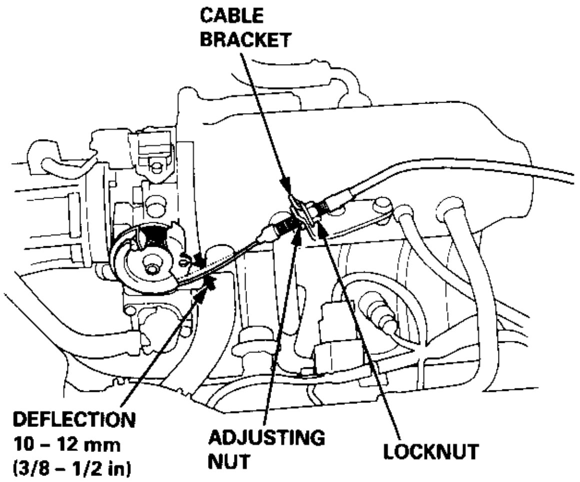
AIR CLEANER ELEMENT
Normal conditions:
Replace air cleaner element every 30,000 miles (48,000 km) or 24 months whichever comes first.
Severe conditions:
Replace air cleaner element every 15,000 miles (24,000 km) or 12 months whichever comes first.

Throttle Cable

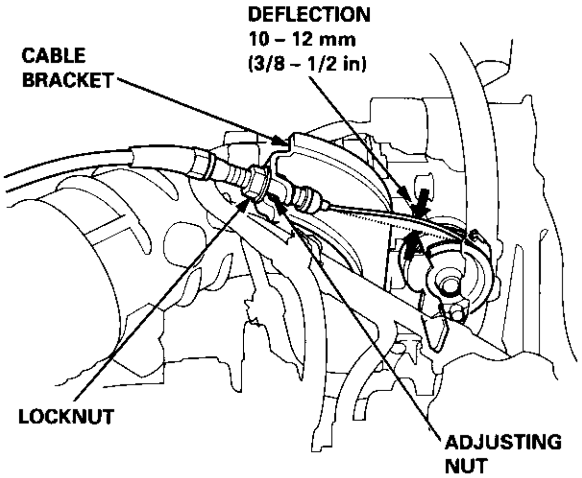
Inspection/Adjustment

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 that the throttle cable operates smoothly with no binding or sticking. Repair as necessary.
3. Check cable free play at the throttle linkage. Cable deflection should be 10 - 12 mm (3/8 - 1/2 in.).

'97 - 98 models:



'99 - 00 models:

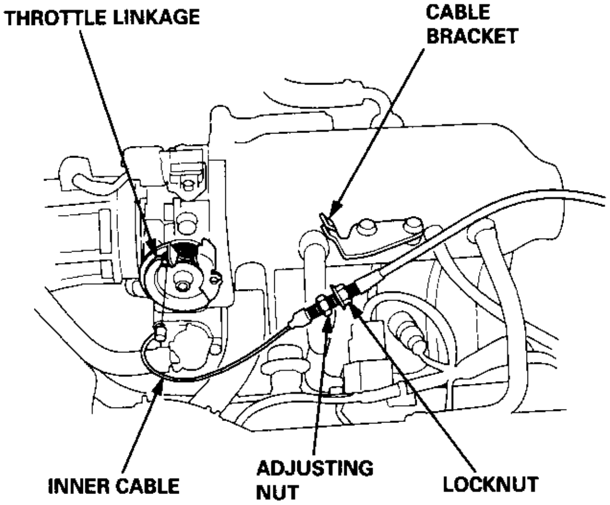


4. If deflection is not within specs, loosen the locknut, turn the adjusting nut until the deflection is as specified, then retighten the locknut.
5. With the cable properly adjusted, check the throttle valve to be sure it opens fully when you push the accelerator pedal to the floor. Also check the throttle valve to be sure it returns to the idle position whenever you release the accelerator pedal.

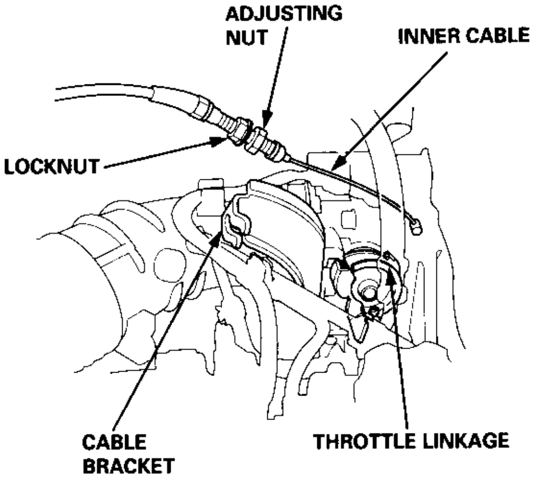
Installation

1. Open the throttle valve fully, then install the throttle cable in the throttle linkage, and install the cable housing in the cable bracket.

'97 – 98 models:

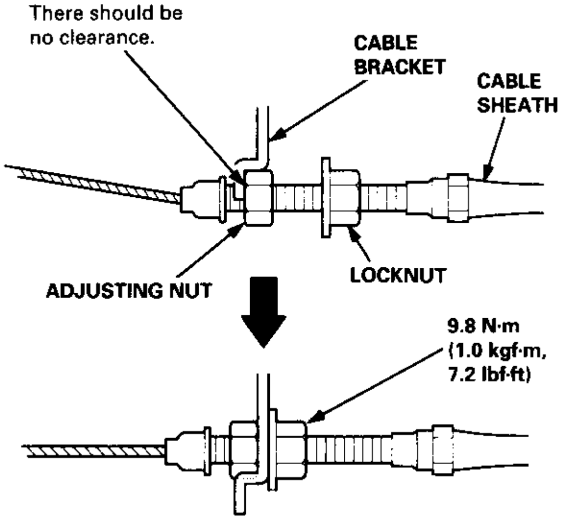


'99 – 00 models:

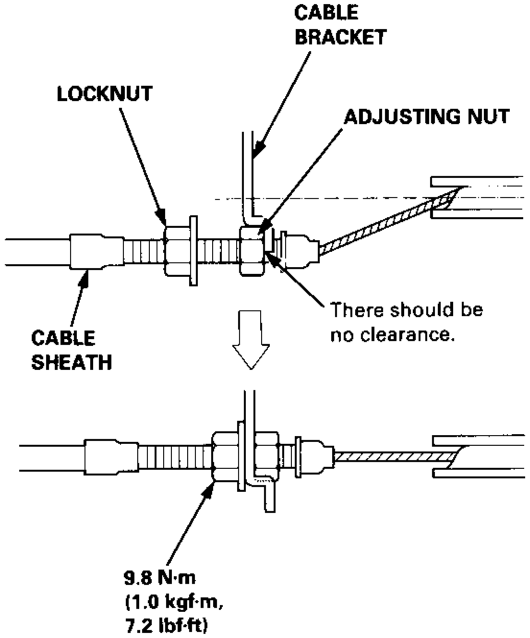


2. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
3. Hold the cable sheath, removing all slack from the cable.
4. Set the locknut on the cable bracket.
   Adjust the adjusting nut so that its free play is 0 mm.
5. Remove the cable sheath from the throttle bracket, reset the adjusting nut and tighten the locknut.

'97 – 98 models:

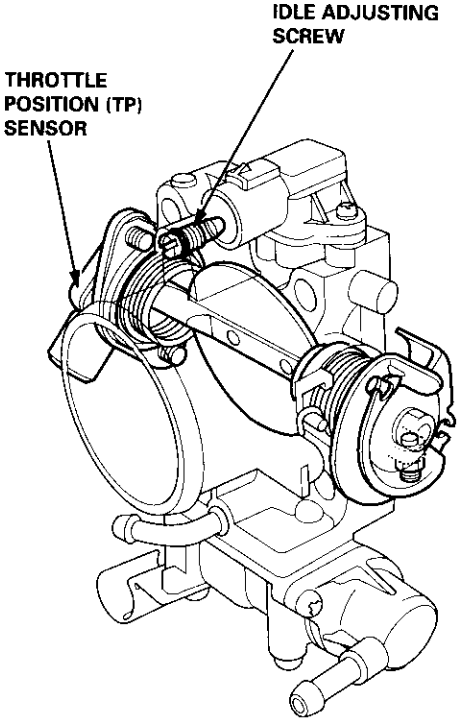


'99 – 00 models:



Throttle Body

Description
The throttle body is a single-barrel side-draft type. The lower portion of the throttle valve is heated by engine coolant from the cylinder head. The idle adjusting screw which regulates the bypass air is located on the top of the throttle body.



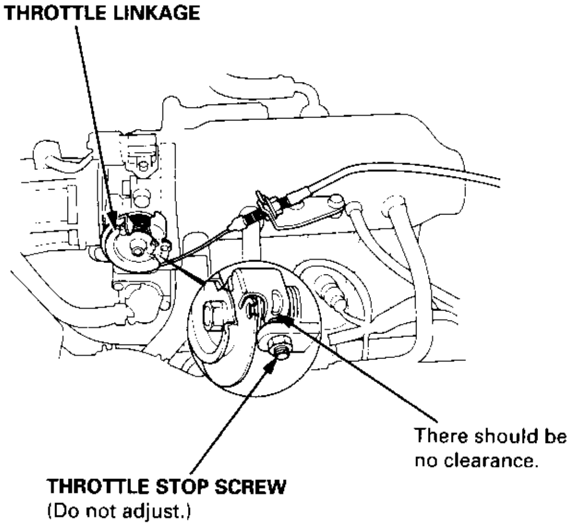
The illustration shows '97 – 98 models, '99 – 00 models are similar.

Inspection

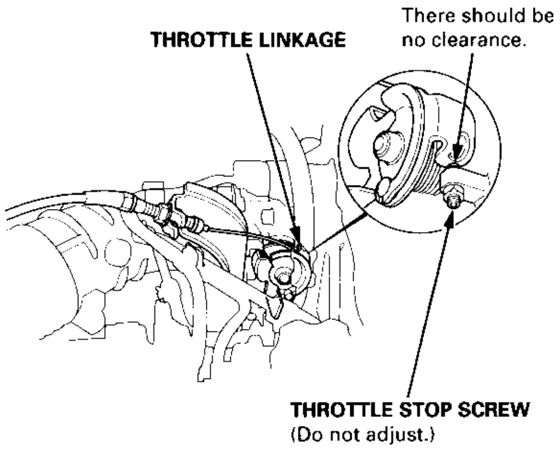
Check that the throttle cable operates smoothly without binding or sticking.

If there are any abnormalities, check for:
- Excessive wear or play in the throttle valve shaft.
- Sticky or binding throttle lever at the fully closed position.
- Clearance between throttle stop screw and throttle lever at the fully closed position.

'97 – 98 models:



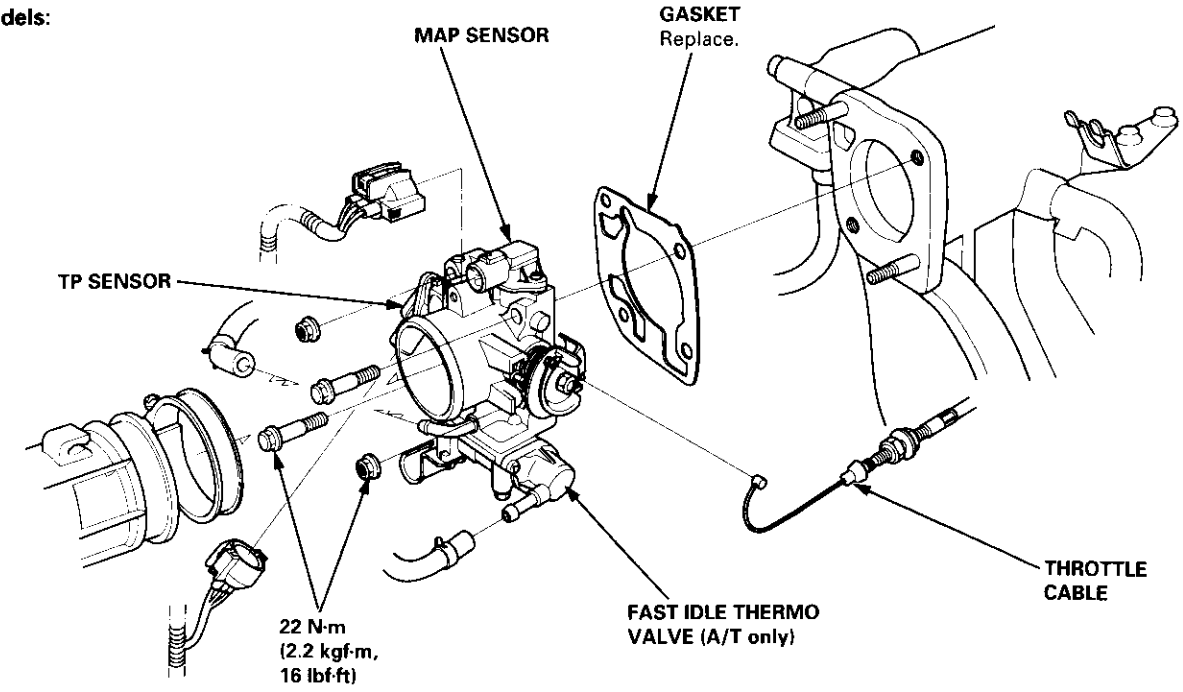
'99 – 00 models:



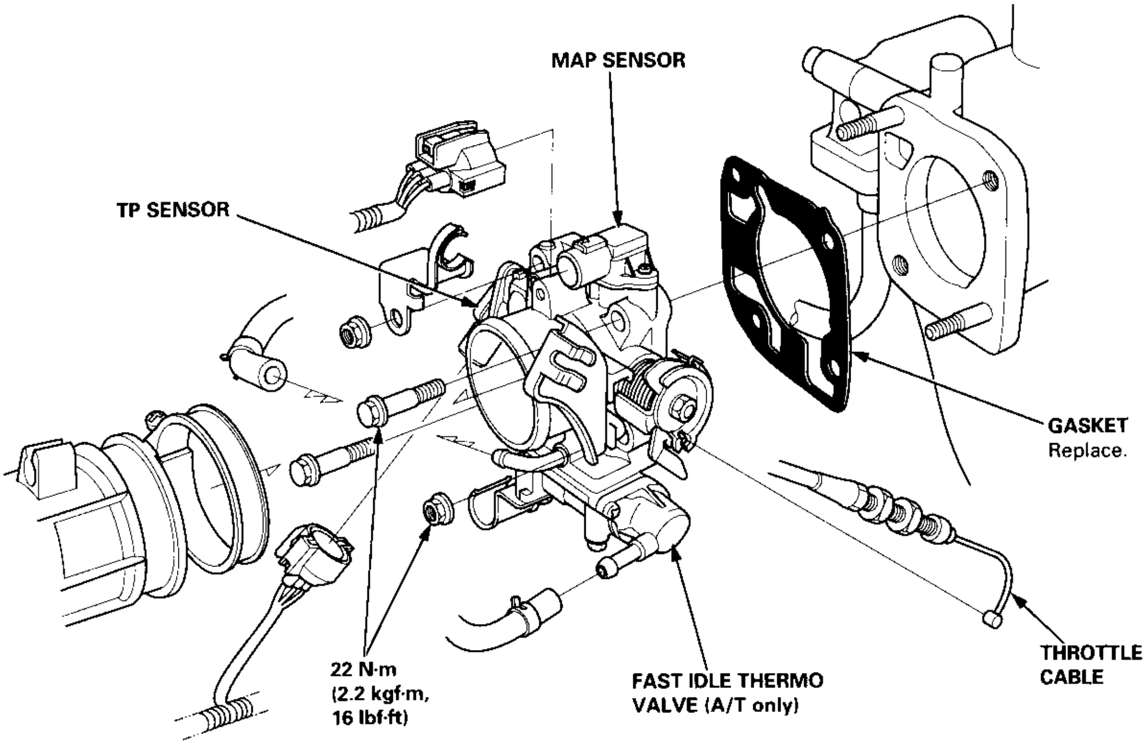
Replace the throttle body if there is excessive play in the throttle valve shaft or if the shaft is binding or sticking.

Removal

'97 – 98 models:



'99 – 00 models:



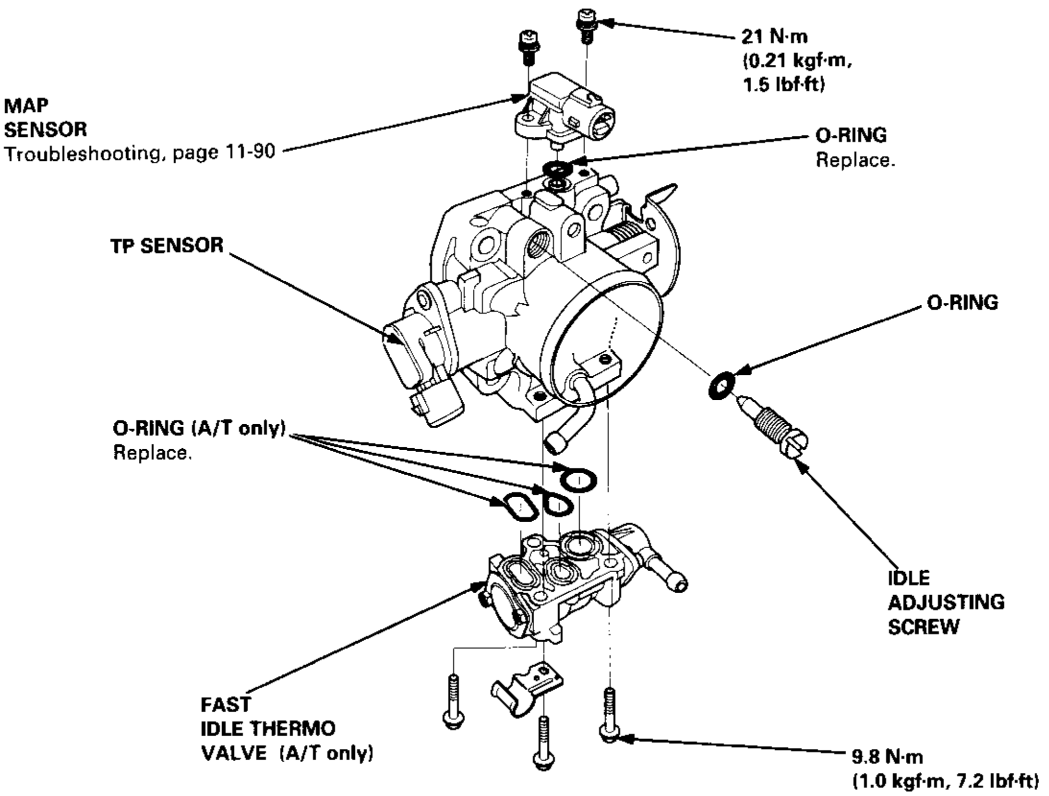
NOTE:

- Do not adjust the throttle stop screw.
- After reassembly, adjust the throttle cable (see page 11-194).
- The TP sensor is not removable.

(cont'd)

Throttle Body (cont'd)

Disassembly



The illustration shows '97 – 98 models, '99 – 00 models are similar.

System Description

The emission control system includes, a Three Way Catalytic Converter (TWC), Positive Crankcase Ventilation (PCV) system and Evaporative Emission (EVAP) Control system. The emission control system is designed to meet federal and state emission standards.

Tailpipe Emission

Inspection

⚠ WARNING **Do not smoke during this procedure. Keep any open flame away from your work area.**

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 11-169, 170).
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.

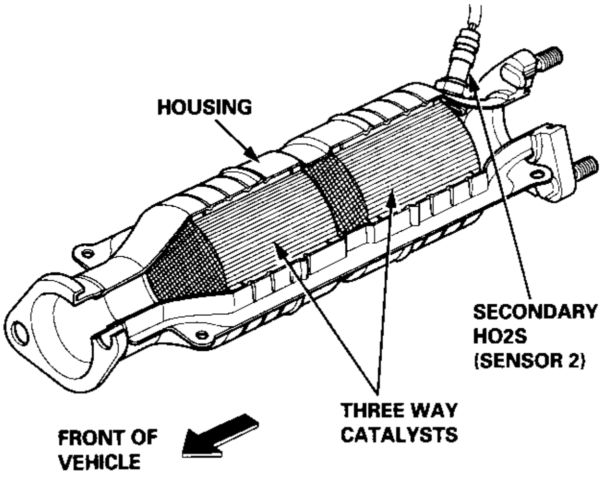
   (Canada) Pull the parking brake lever up. Start the engine, then check that the headlights are off.

   CO meter should indicate 0.1% maximum.

Three Way Catalytic Converter (TWC)

Description

Three Way Catalytic Converter (TWC):
The Three Way Catalytic Converter (TWC) is used to convert hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to carbon dioxide (CO_2), dinitrogen (N_2) and water vapor.



(cont'd)

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 three consecutive driving cycles, the MIL comes on and DTC P0420 will be stored.

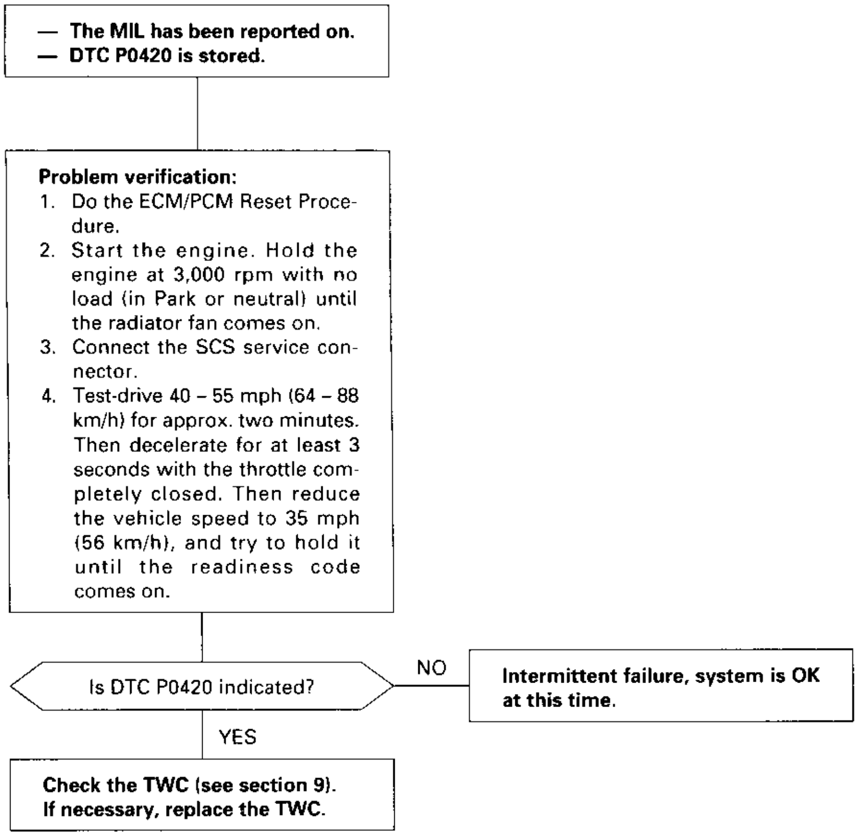
NOTE: If some of the DTCs listed below are stored at the same time as DTC P0420, troubleshoot those DTCs first, then troubleshoot DTC P0420.

P0137, P0138: Secondary HO2S (Sensor 2)
P0141: Secondary HO2S (Sensor 2) Heater

Possible Cause

- TWC Deterioration
- Exhaust system leakage

Troubleshooting Flowchart



— The MIL has been reported on.
— DTC P0420 is stored.

Problem verification:

1. Do the ECM/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. Connect the SCS service connector.
4. Test-drive 40 – 55 mph (64 – 88 km/h) for approx. two minutes. Then decelerate for at least 3 seconds with the throttle completely closed. Then reduce the vehicle speed to 35 mph (56 km/h), and try to hold it until the readiness code comes on.

Is DTC P0420 indicated?

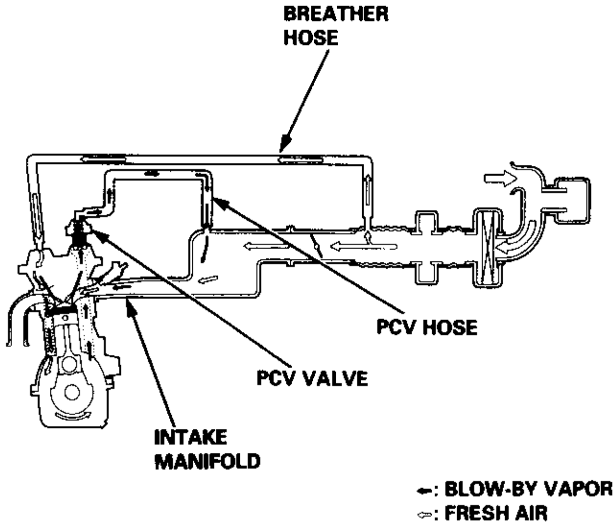
NO → **Intermittent failure, system is OK at this time.**

YES → **Check the TWC (see section 9). If necessary, replace the TWC.**

Positive Crankcase Ventilation (PCV) System

Description

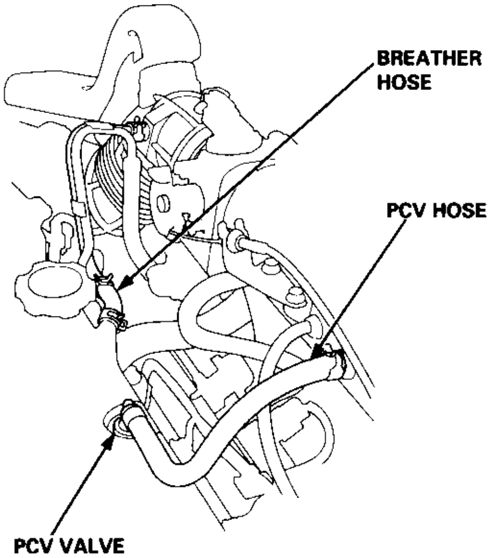
The Positive Crankcase Ventilation (PCV) system is designed to prevent blow-by gas from escaping to the atmosphere. The PCV valve contains a spring-loaded plunger. When the engine starts, the plunger in the PCV valve is lifted in proportion to intake manifold vacuum and the blow-by gas is drawn directly into the intake manifold.



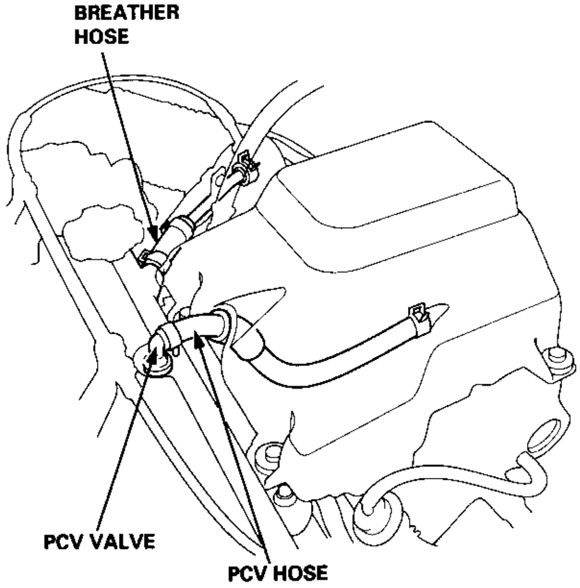
Inspection

1. Check the PCV hoses and connections for leaks and clogging.

'97 – 98 models:



'99 – 00 models:

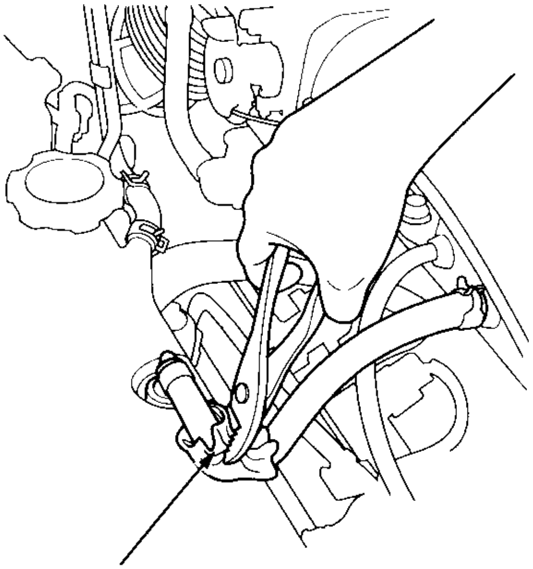


(cont'd)

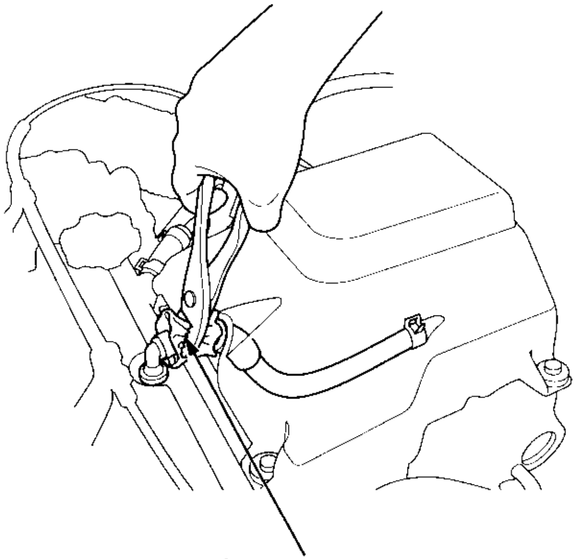
Positive Crankcase Ventilation (PCV) System (cont'd)

2. At idle, make sure there is a clicking sound from the PCV valve when the hose between the PCV valve and intake manifold is lightly pinched with your fingers or pliers.

'97 – 98 models:



'99 – 00 models:



If there is no clicking sound, check the PCV valve grommet for cracks or damage. If the grommet is OK, replace the PCV valve and recheck.

Evaporative Emission (EVAP) Controls

Description:

The evaporative emission controls are designed to minimize the amount of fuel vapor escaping to the atmosphere. The system consists of the following components:

A. **Evaporative Emission (EVAP) Control Canister**
An EVAP control canister is used for the temporary storage of fuel vapor until the fuel vapor can be purged from the EVAP control canister into the engine and burned.

B. **Vapor Purge Control System**
EVAP control canister purging is accomplished by drawing fresh air through the EVAP control canister and into a port on the intake manifold. The purging vacuum is controlled by the EVAP purge control solenoid valve.

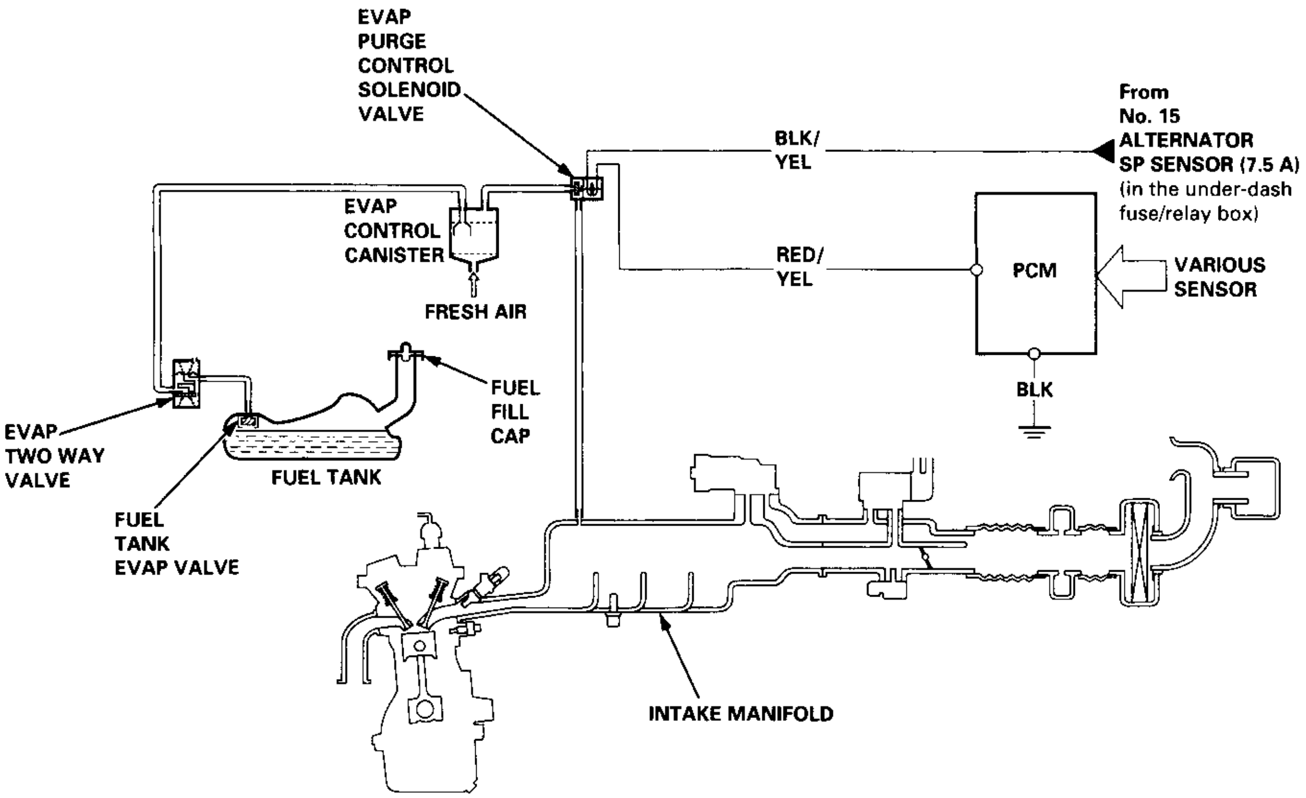
EVAP PURGE CONTROL SOLENOID VALVE DUTY CONTROLLED AFTER STARTING ENGINE

↑

ENGINE COOLANT TEMPERATURE ABOVE 154°F (68°C)

C. **Fuel Tank Vapor Control System**
When fuel vapor pressure in the fuel tank is higher than the set value of the EVAP two way valve, the valve opens and regulates the flow of fuel vapor to the EVAP control canister.

'97 model:



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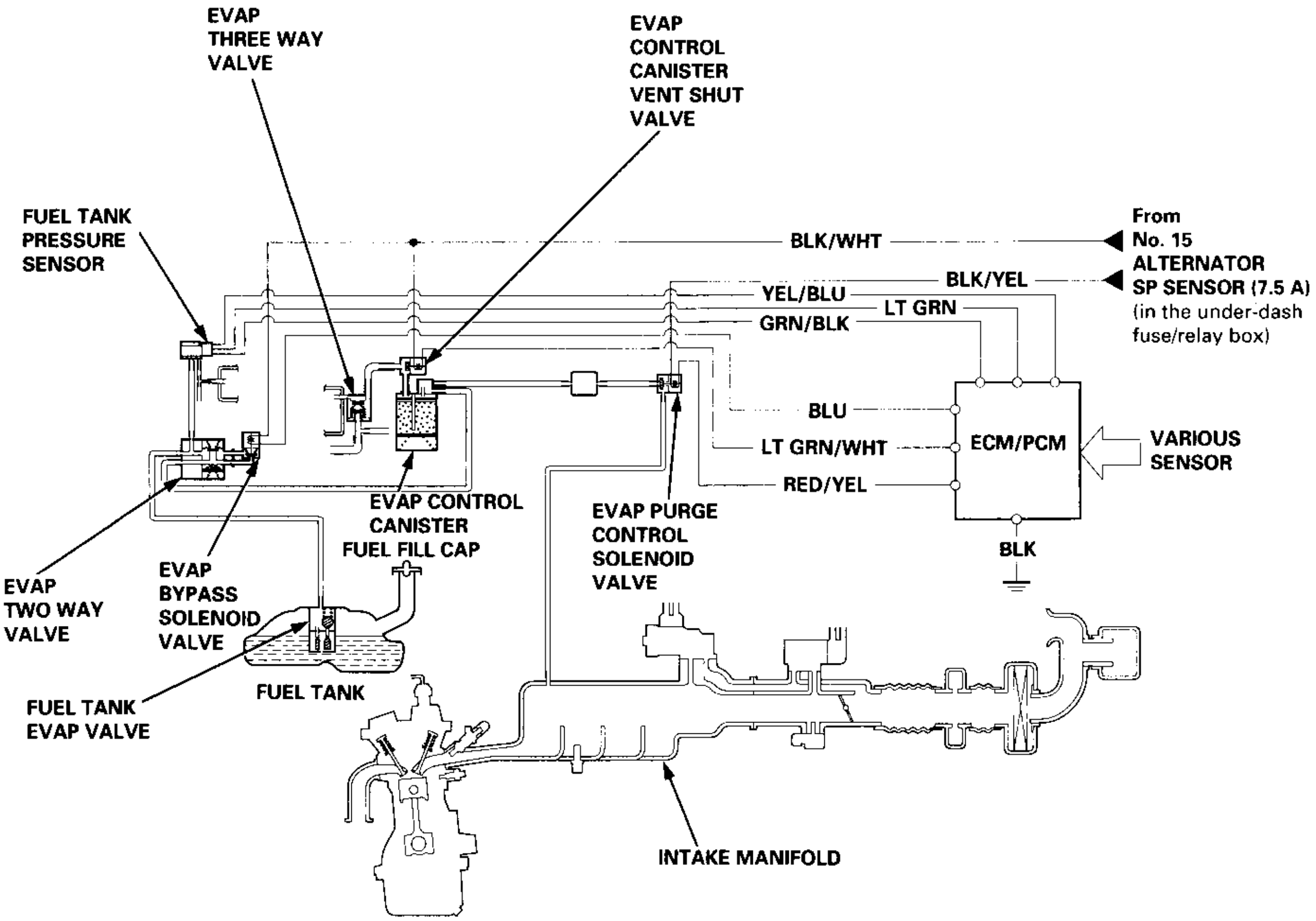
Evaporative Emission (EVAP) Controls (cont'd)

'98 – 00 models:



'97 model:

P0441 The scan tool indicates Diagnostic Trouble Code (DTC) P0441: Evaporative Emission (EVAP) control system insufficient purge flow.

Description

By monitoring the purge line vacuum with the MAP sensor, the PCM can detect insufficient EVAP control system purge flow.

Possible Cause

- EVAP Purge Control Solenoid Valve
- EVAP Purge Control Solenoid Valve Circuit
- EVAP Control Canister
- Vacuum Lines
- PCM

Troubleshooting Flowchart

— The MIL has been reported on.
— DTC P0441 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.
2. Do the PCM Reset Procedure.
3. Connect the SCS service connector.
4. Test-drive under following conditions on the road.
   — Without any electrical load
   — Transmission in $\boxed{D_3}$ or $\boxed{D_4}$ position
   — Engine speed between 1,200 – 2,400 rpm.
   — Decelerate from 50 mph (80 km/h) to 15 mph (24 km/h)

Is DTC P0441 indicated?

NO — **Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C108 (EVAP purge control solenoid valve) and at the PCM.**

YES

Check for an open in the wire (IG1 line):

1. Turn the ignition switch OFF.
2. Disconnect the EVAP purge control solenoid valve 2P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between body ground and the EVAP purge control solenoid valve 2P connector terminal No. 1.

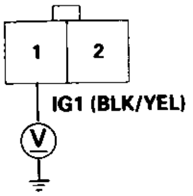
Is there battery voltage?

NO — **Repair open in the wires between the EVAP purge control solenoid valve and the No. 15 ALTERNATOR SP SENSOR (7.5 A) fuse.**

YES

(To page 11-206)

EVAP PURGE CONTROL SOLENOID VALVE 2P CONNECTOR (C108)



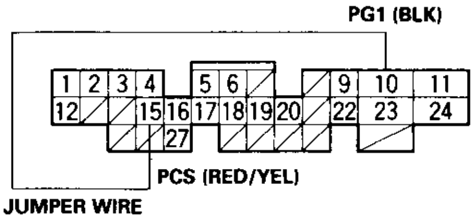
Wire side of female terminals

(cont'd)

Evaporative Emission (EVAP) Controls (cont'd)

(From page 11-205)

PCM CONNECTOR A (32P)



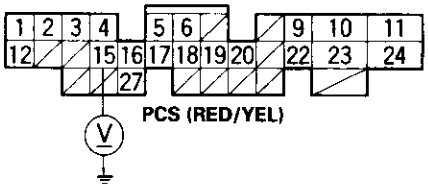
Wire side of female terminals

Check the EVAP purge control solenoid valve:
1. Reconnect the EVAP purge control solenoid valve 2P connector.
2. Connect PCM connector terminals A15 and A10 with a jumper wire.

Does the solenoid valve click when the jumper is connected?

NO

Check for an open or short in the wire (PCS line):
Measure voltage between PCM connector terminal A15 and body ground.



Is there battery voltage?

YES

Replace the EVAP purge control solenoid valve.

NO

Check for a short in the wire (PCS line):
1. Turn the ignition switch OFF.
2. Disconnect the PCM connector A (32P).
3. Disconnect the EVAP purge control solenoid valve 2P connector.
4. Check for continuity between body ground and PCM connector terminal A15.

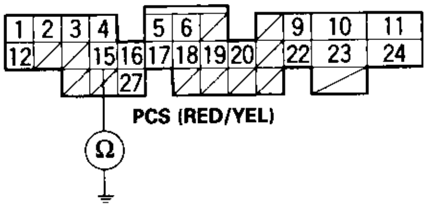
Is there continuity?

YES

Repair short in the wires between the EVAP purge control solenoid valve and the PCM (A15).

NO

Repair open in the wires between the EVAP purge control solenoid valve and the PCM (A15).



YES

Check the vacuum lines:
Check the vacuum lines of EVAP system for misrouting, leakage, breakage and clogging.

Are the vacuum lines OK?

NO

Repair or replace vacuum lines as necessary.

YES

(To page 11-207)

(From page 11-206)

Check the EVAP purge control solenoid valve:
1. Disconnect the vacuum hose from the EVAP control canister.
2. Connect the vacuum pump to the hose and apply vacuum.

Does it hold vacuum?

NO — **Replace the EVAP purge control solenoid valve.**

YES

Check the EVAP control canister:
1. Reconnect the vacuum hose to the EVAP control canister.
2. Connect a vacuum gauge to the purge air hose.
3. Connect PCM connector terminals A15 and A10 with a jumper wire.
4. Start the engine.
5. Check the vacuum.

Does vacuum appear on the gauge?

NO — **Replace the EVAP control canister.**

YES

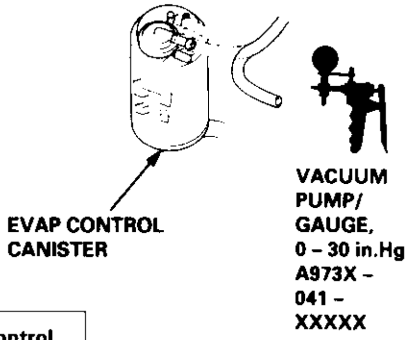
Check the EVAP two way valve (see page 11-224).

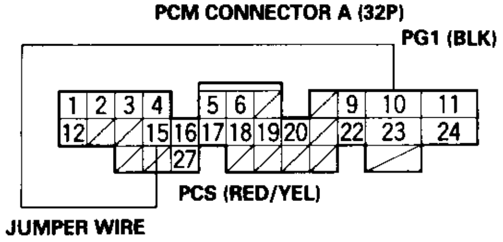
Does the EVAP two way valve work properly?

NO — **Replace the EVAP two way valve.**

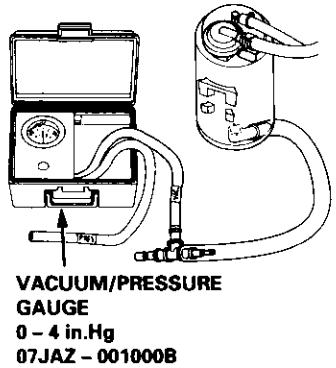
YES

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.





Wire side of female terminals



(cont'd)

Evaporative Emission (EVAP) Controls (cont'd)

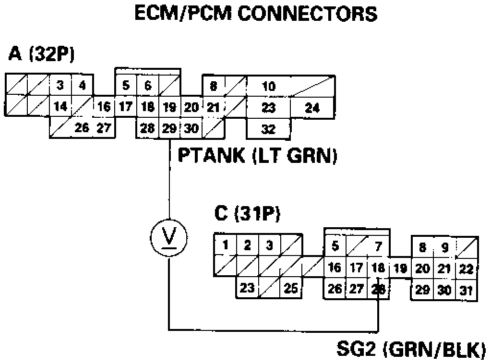
'99 – 00 models:

P0451 The scan tool indicates Diagnostic Trouble Code (DTC) P0451: The Fuel Tank Pressure sensor circuit range/performance problem.

- **The MIL has been reported on.**
- **DTC P0451 is stored.**

Check for the fuel tank pressure sensor:

1. Do the ECM/PCM Reset Procedure.
2. Remove the fuel fill cap.
3. Turn the ignition switch ON (II).
4. Monitor the FTP Sensor voltage with the Honda PGM Tester, or measure voltage between ECM/PCM connector terminals A29 and C18.



Wire side of female terminals

Is there approx. 2.5 V?

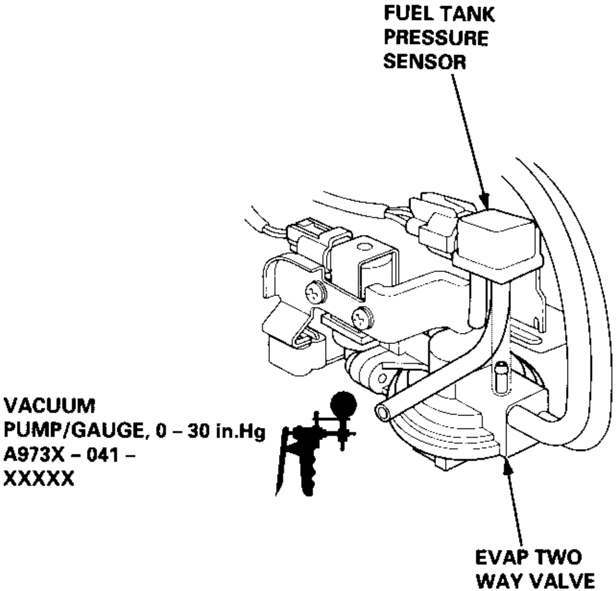
NO

Check the vacuum lines for restriction or blockage repair as necessary. If OK, replace the fuel tank pressure sensor.

YES

Check for the fuel tank pressure sensor:

1. Disconnect the hose between the EVAP two way valve and the fuel tank pressure sensor at the EVAP two way valve end.
2. Connect a vacuum pump to the open end of that hose.
3. Turn the ignition switch ON (II).
4. Monitor the FTP Sensor voltage with the Honda PGM Tester, or measure voltage between ECM/PCM connector terminals A29 and C18, and carefully apply vacuum on the hose one stroke at a time.
5. The voltage should smoothly drop from the starting approx. 2.5 V down to approx. 1.5 V. STOP applying vacuum when the voltage drops to approx. 1.5 V or damage to the fuel tank pressure sensor may occur.



Does the voltage drop to approx. 1.5 V and hold?

NO

Replace the fuel tank pressure sensor.

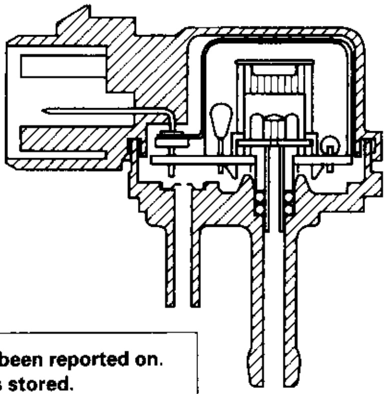
YES

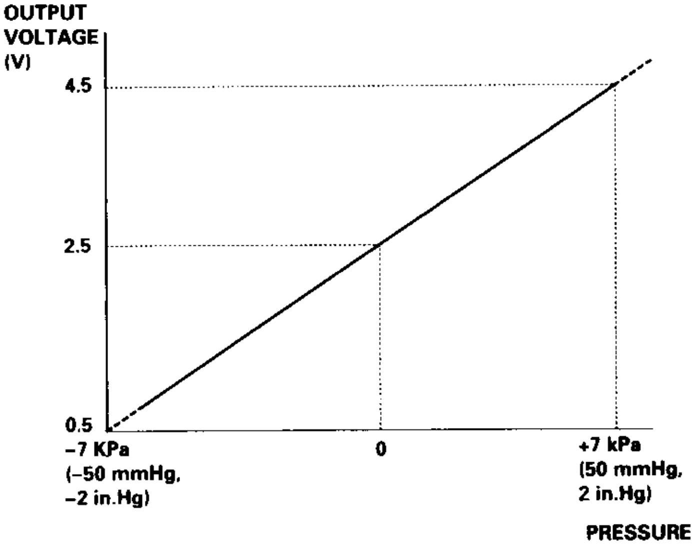
Intermittent failure, system is OK at this time. Check for poor connections or loose hose at fuel tank pressure sensor and fuel tank.

'98 – 00 models:

P0452 The scan tool indicates Diagnostic Trouble Code (DTC) P0452: A low voltage problem in the Fuel Tank Pressure sensor.

The fuel tank pressure sensor converts fuel tank absolute pressure into electrical signals and inputs the ECM/PCM.





— The MIL has been reported on.
— DTC P0452 is stored.

Check the vacuum lines:
Check the vacuum lines of the fuel tank pressure sensor for misrouting, leakage, breakage and clogging.

Are the vacuum lines OK?

NO

Repair or replace vacuum lines as necessary.

YES

Problem verification:
1. Do the ECM/PCM Reset Procedure.
2. Remove the fuel fill cap.
3. Turn the ignition switch ON (II).
4. Monitor the FTP Sensor voltage with the Honda PGM Tester, or measure voltage between body ground and ECM/PCM terminal A29.

Is there approx. 2.5 V?

YES

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C580 (located at access panel), C646 (fuel tank pressure sensor) and at the ECM/PCM.

NO

Check for an open in wire (VCC2 line):
1. Turn the ignition switch OFF.
2. Reinstall the fuel fill cap.
3. Disconnect the fuel tank pressure sensor 3P connector.
4. Turn the ignition switch ON (II).
5. Measure voltage between the fuel tank pressure sensor 3P connector No. 1 terminal and No. 2 terminal.

Is there approx. 5 V?

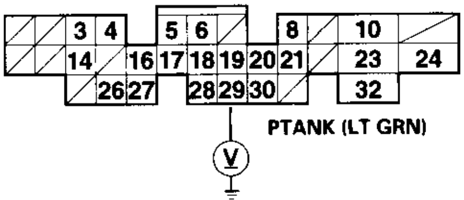
NO

Repair open in the wire between the fuel tank pressure sensor and the ECM/PCM (A29).

YES

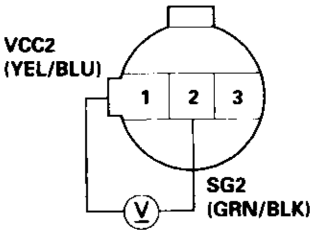
(To page 11-210)

ECM/PCM CONNECTOR A (32P)



Wire side of female terminals

FUEL TANK PRESSURE SENSOR 3P CONNECTOR (C646)



Wire side of female terminals

(cont'd)

Evaporative Emission (EVAP) Controls (cont'd)

(From page 11-209)

Check for a short in the wire (PTANK line):
Measure voltage between the fuel tank pressure sensor 3P connector No. 3 terminal and No. 2 terminal.

Is there approx. 5 V?

YES — **Replace the fuel tank pressure sensor.**

NO

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

1. Turn the ignition switch OFF.
2. Disconnect the ECM/PCM connector A (32P).
3. Check for continuity between the fuel tank pressure sensor 3P connector No. 3 terminals and body ground.

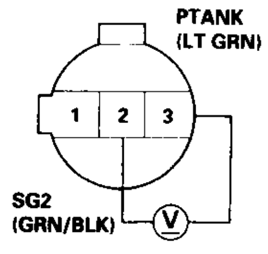
Is there continuity?

YES — **Repair short in the wire between the fuel tank pressure sensor and the ECM/PCM (A29).**

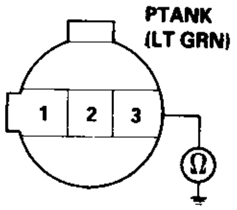
NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

FUEL TANK PRESSURE SENSOR 3P CONNECTOR (C646)

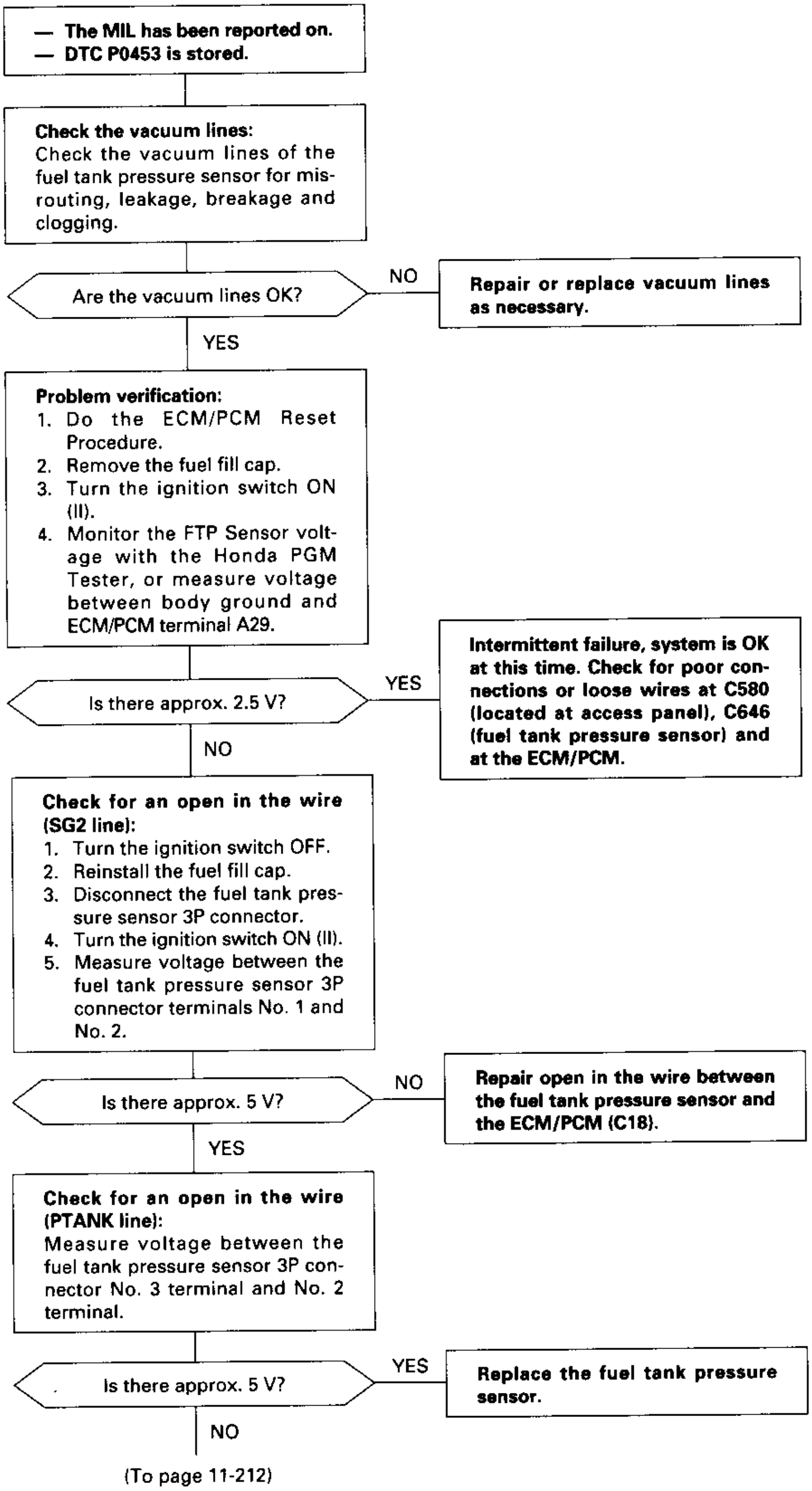


Wire side of female terminals



'98 – 00 models:

P0453 The scan tool indicates Diagnostic Trouble Code (DTC) P0453: A high voltage problem in the Fuel Tank Pressure sensor.



— The MIL has been reported on.
— DTC P0453 is stored.

Check the vacuum lines:
Check the vacuum lines of the fuel tank pressure sensor for mis-routing, leakage, breakage and clogging.

Are the vacuum lines OK?

NO

Repair or replace vacuum lines as necessary.

YES

Problem verification:
1. Do the ECM/PCM Reset Procedure.
2. Remove the fuel fill cap.
3. Turn the ignition switch ON (II).
4. Monitor the FTP Sensor voltage with the Honda PGM Tester, or measure voltage between body ground and ECM/PCM terminal A29.

Is there approx. 2.5 V?

YES

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C580 (located at access panel), C646 (fuel tank pressure sensor) and at the ECM/PCM.

NO

Check for an open in the wire (SG2 line):
1. Turn the ignition switch OFF.
2. Reinstall the fuel fill cap.
3. Disconnect the fuel tank pressure sensor 3P connector.
4. Turn the ignition switch ON (II).
5. Measure voltage between the fuel tank pressure sensor 3P connector terminals No. 1 and No. 2.

Is there approx. 5 V?

NO

Repair open in the wire between the fuel tank pressure sensor and the ECM/PCM (C18).

YES

Check for an open in the wire (PTANK line):
Measure voltage between the fuel tank pressure sensor 3P connector No. 3 terminal and No. 2 terminal.

Is there approx. 5 V?

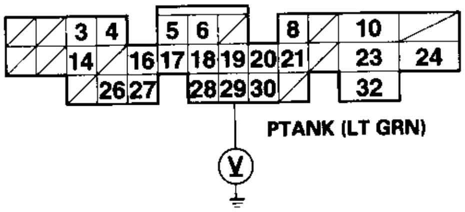
YES

Replace the fuel tank pressure sensor.

NO

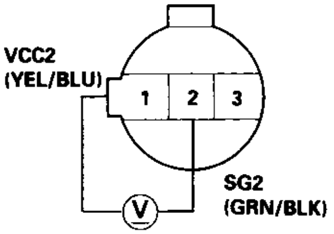
(To page 11-212)

ECM/PCM CONNECTOR A (32P)

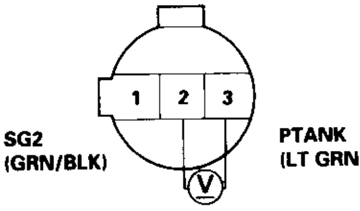


Wire side of female terminals

FUEL TANK PRESSURE SENSOR 3P CONNECTOR (C646)



Wire side of female terminals



(cont'd)

Evaporative Emission (EVAP) Controls (cont'd)

(From page 11-211)

Check for an open in the wire (PTANK line):
Measure voltage between ECM/PCM connector terminals A29 and C18.

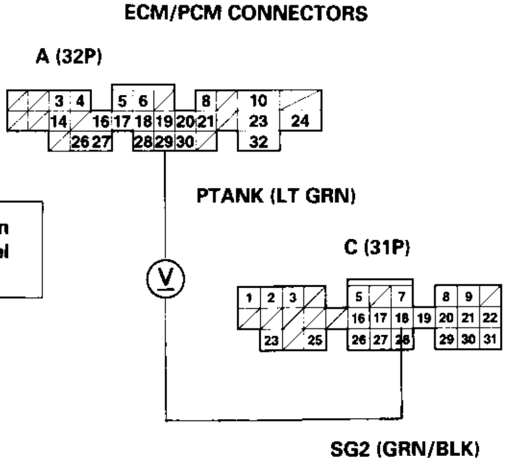
Is there approx. 5 V?

YES

Repair open in the wire between the ECM/PCM (A29) and the fuel tank pressure sensor.

NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

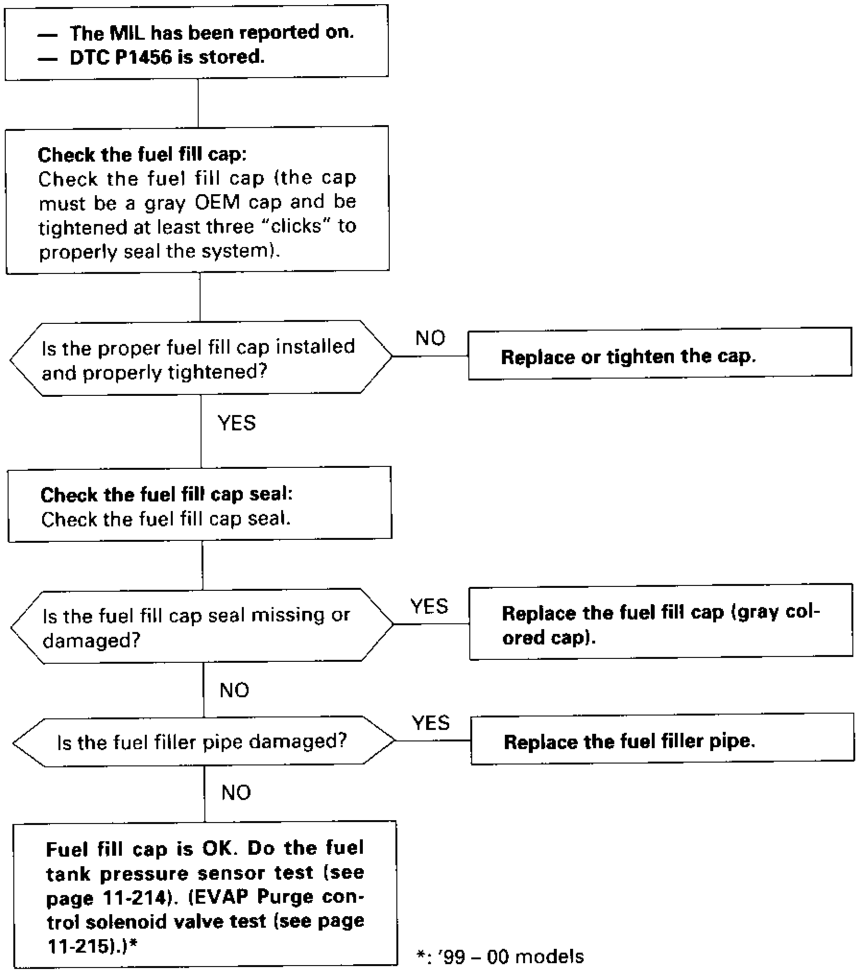


Wire side of female terminals

'98 – 00 models:

P1456 The scan tool indicates Diagnostic Trouble Code (DTC) P1456: Evaporative Emission (EVAP) control system leak detected (fuel tank system).

Troubleshooting Flowchart



— The MIL has been reported on.
— DTC P1456 is stored.

Check the fuel fill cap:
Check the fuel fill cap (the cap must be a gray OEM cap and be tightened at least three "clicks" to properly seal the system).

Is the proper fuel fill cap installed and properly tightened?

NO — **Replace or tighten the cap.**

YES

Check the fuel fill cap seal:
Check the fuel fill cap seal.

Is the fuel fill cap seal missing or damaged?

YES — **Replace the fuel fill cap (gray colored cap).**

NO

Is the fuel filler pipe damaged?

YES — **Replace the fuel filler pipe.**

NO

Fuel fill cap is OK. Do the fuel tank pressure sensor test (see page 11-214). (EVAP Purge control solenoid valve test (see page 11-215).)*

*: '99 – 00 models

(cont'd)

Evaporative Emission (EVAP) Controls (cont'd)

P1456 (cont'd)

('98 model only)

Fuel tank pressure sensor test. (The continuation of DTC P1456 troubleshooting.)

Check the fuel tank pressure sensor:
1. Remove the fuel fill cap.
2. Turn the ignition switch ON (II).
3. Monitor the FTP Sensor voltage with the Honda PGM Tester, or measure voltage between ECM/PCM connector terminals A29 and C18.

Is there approx. 2.5 V?

NO

Check the vacuum lines for restriction or blockage repair as necessary. If OK, replace the fuel tank pressure sensor.

YES

Check the fuel tank pressure sensor:
1. Turn the ignition switch OFF.
2. Disconnect the hose between the EVAP two way valve and the fuel tank pressure sensor at the EVAP two way valve end.
3. Connect a vacuum pump to the open end of that hose.
4. Turn the ignition switch ON (II).
5. Monitor the FTP Sensor voltage with the Honda PGM Tester, or measure voltage between ECM/PCM connector terminals A29 and C18, and carefully apply vacuum on the hose one stroke at a time.
6. The voltage should smoothly drop from the starting approx. 2.5 V down to approx. 1.5 V. Stop applying vacuum when the voltage drops to approx. 1.5 V or damage to the fuel tank pressure sensor may occur.

Does the voltage drop to approx. 1.5 V and hold?

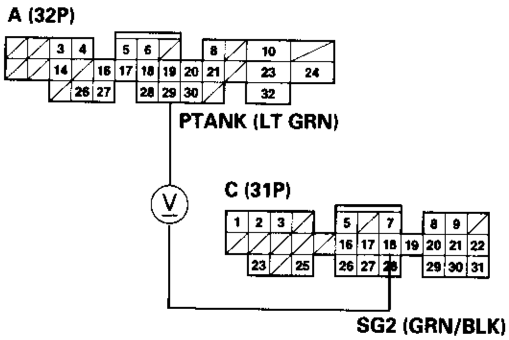
YES

Fuel tank pressure sensor is OK. Do the EVAP purge control solenoid valve test (see page 11-215).

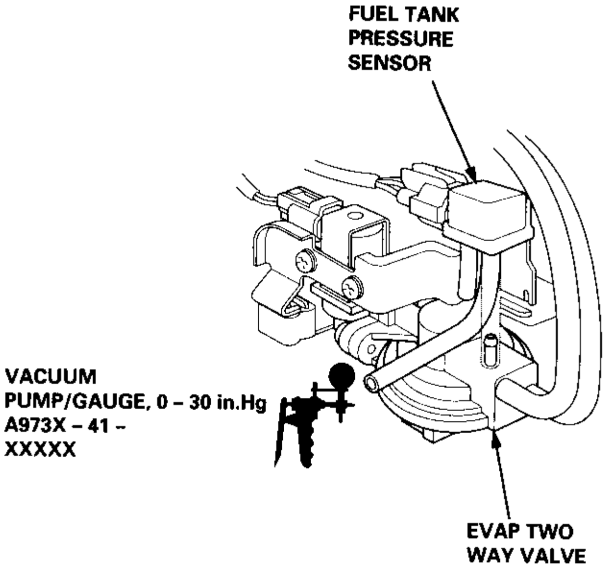
NO

Replace the fuel tank pressure sensor.

ECM/PCM CONNECTORS

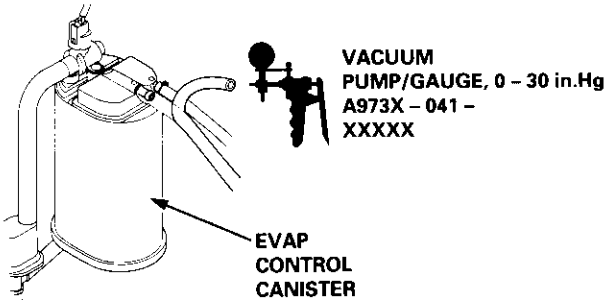


Wire side of female terminals



EVAP purge control solenoid valve test.
(The continuation of DTC P1456 troubleshooting.)

Check the EVAP purge control solenoid valve:
1. Disconnect the vacuum hose from the EVAP control canister, and connect a vacuum pump to the hose.
2. Turn the ignition switch ON (II).
3. Apply vacuum to the hose.



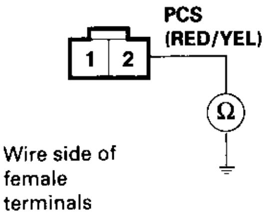
Does the valve hold vacuum?

YES — **EVAP purge control solenoid valve is OK. Do the EVAP bypass solenoid valve test (see page 11-216)**

NO

Check the EVAP purge control solenoid valve:
1. Turn the ignition switch OFF.
2. Disconnect the EVAP purge control solenoid valve 2P connector.
3. Check for continuity between the EVAP purge control solenoid valve 2P connector terminal No. 2 and body ground.

EVAP PURGE CONTROL SOLENOID VALVE 2P CONNECTOR (C108)

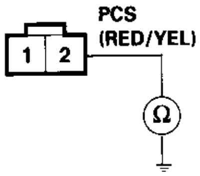


Is there continuity?

NO — **Replace the EVAP purge control solenoid valve.**

YES

Check for a short in the wire (PCS line):
1. Disconnect the ECM/PCM connector A (32P).
2. Check for continuity between the EVAP purge control solenoid valve 2P connector terminal No. 2 and body ground.



Is there continuity?

YES — **Repair short in the wire between the ECM/PCM (A6) and the EVAP purge control solenoid valve.**

NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

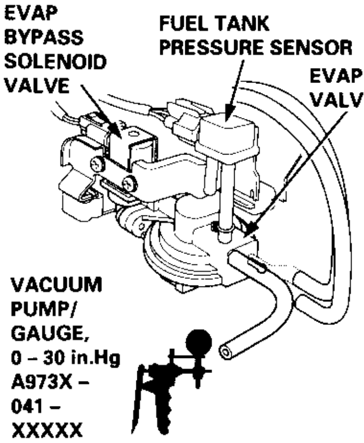
(cont'd)

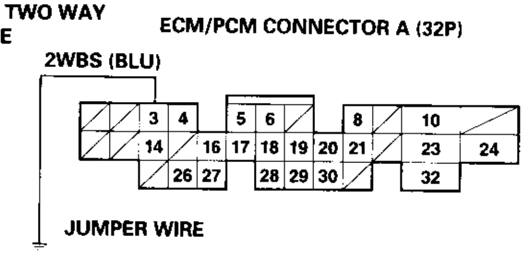
Evaporative Emission (EVAP) Controls (cont'd)

P1456 (cont'd)

EVAP bypass solenoid valve test. (The continuation of DTC P1456 troubleshooting.)

Check the EVAP bypass solenoid valve:
1. Disconnect the vacuum hose from the EVAP two way valve, and connect a vacuum pump to the hose.
2. Connect the ECM/PCM connector terminal A3 to the body ground with a jumper wire.
3. Turn the ignition switch ON (II).
4. Apply vacuum to the hose.





Wire side of female terminals

Does the valve hold vacuum?

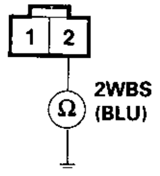
NO

EVAP bypass solenoid valve/ EVAP two way valve is OK. Do the EVAP control canister vent shut valve test (see page 11-217).

YES

Check for an open in the wire (2WBS line):
1. Turn the ignition switch OFF.
2. Disconnect the EVAP bypass solenoid valve 2P connector.
3. Check for continuity between the EVAP bypass solenoid valve 2P connector terminal No. 2 and body ground.

EVAP BYPASS SOLENOID VALVE 2P CONNECTOR (C647)



Wire side of female terminals

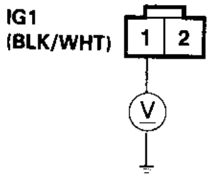
Is there continuity?

NO

Repair open in the wire between the EVAP bypass solenoid valve and ECM/PCM (A3).

YES

Check for an open in the wire (IG1 line):
1. Turn the ignition switch ON (II).
2. Measure voltage between the EVAP bypass solenoid valve 2P connector terminal No. 1 and body ground.



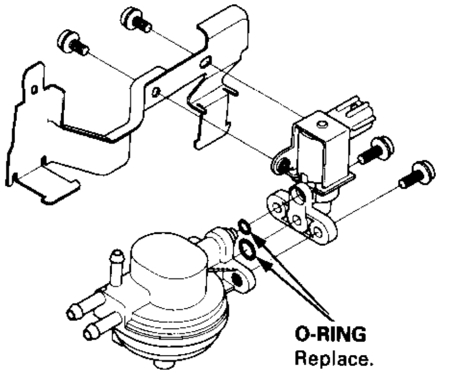
Is there battery voltage?

YES

Replace the EVAP bypass solenoid valve and O-rings.

NO

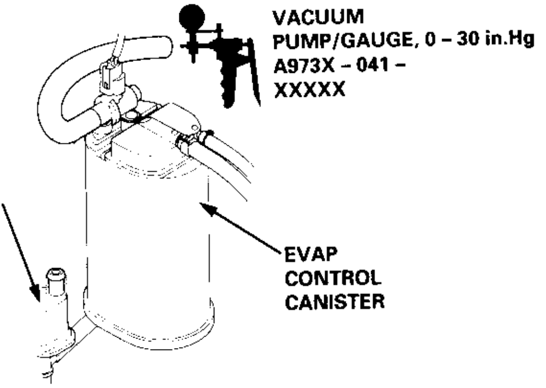
Repair open in the wire between the EVAP bypass solenoid valve and No. 15 ALTERNATOR SP SENSOR (7.5 A) fuse.



EVAP control canister vent shut valve test.
(The continuation of DTC P1456 troubleshooting.)

Check the EVAP control canister vent shut valve:

1. Disconnect the vacuum hose from the EVAP three way valve, and connect a vacuum pump to the hose.
2. Turn the ignition switch ON (II).
3. Apply vacuum to the hose.



Does the valve hold vacuum?

NO

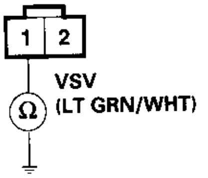
EVAP control canister vent shut valve is OK. Do the vacuum hoses and connections test (see page 11-218).

YES

Check the EVAP control canister vent shut valve:

1. Turn the ignition switch OFF.
2. Disconnect the EVAP control canister vent shut valve 2P connector.
3. Check for continuity between the EVAP control canister vent shut valve 2P connector terminal No. 1 and body ground.

EVAP CONTROL CANISTER VENT SHUT VALVE 2P CONNECTOR (C361)



Wire side of female terminals

Is there continuity?

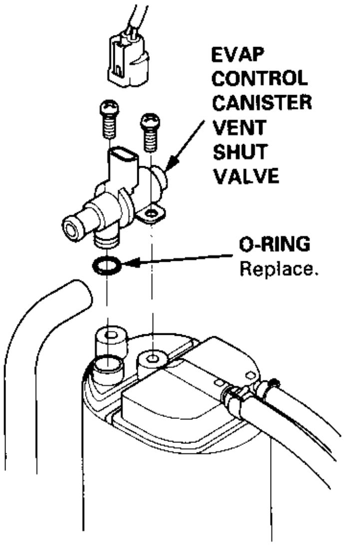
NO

Replace the EVAP control canister vent shut valve and O-ring.

YES

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

1. Disconnect the ECM/PCM connector A (32P).
2. Check for continuity between the EVAP control canister vent shut valve 2P connector terminal No. 1 and body ground.



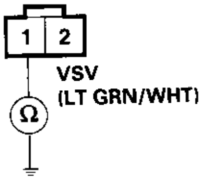
Is there continuity?

YES

Repair short in the wire between the ECM/PCM (A4) and the EVAP control canister vent shut valve.

NO

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.



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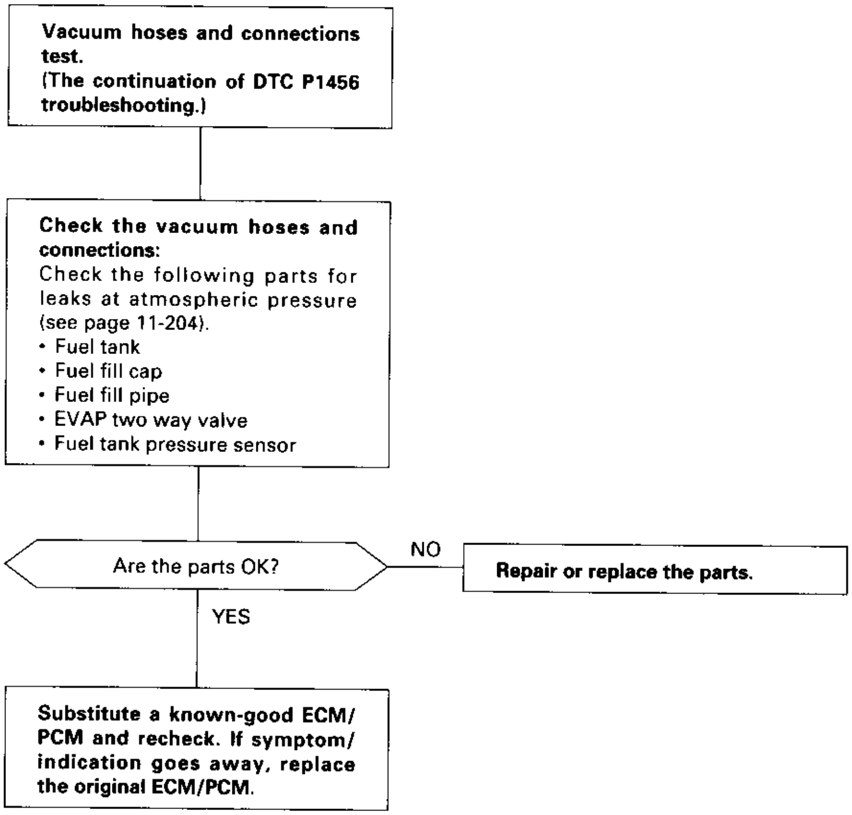
Evaporative Emission (EVAP) Controls (cont'd)

P1456 (cont'd)



Vacuum hoses and connections test.
(The continuation of DTC P1456 troubleshooting.)

Check the vacuum hoses and connections:
Check the following parts for leaks at atmospheric pressure (see page 11-204).
- Fuel tank
- Fuel fill cap
- Fuel fill pipe
- EVAP two way valve
- Fuel tank pressure sensor

Are the parts OK?

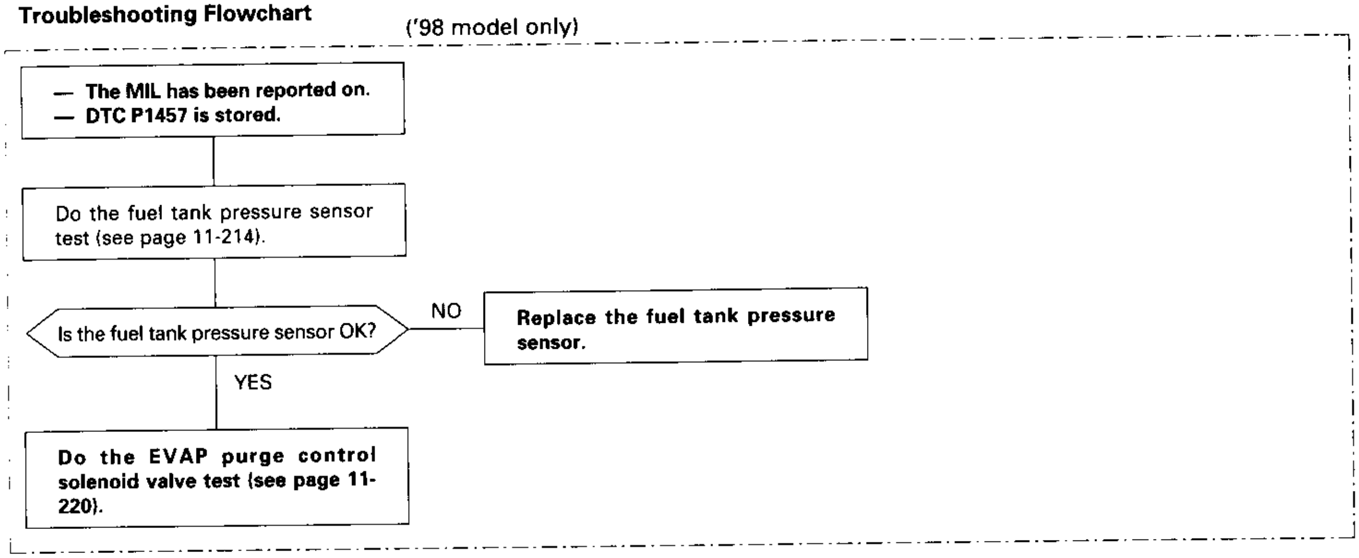
Repair or replace the parts.

Substitute a known-good ECM/PCM and recheck. If symptom/indication goes away, replace the original ECM/PCM.

'98 – 00 models:

P1457 The scan tool indicates Diagnostic Trouble Code (DTC) P1457: Evaporative Emission (EVAP) control system leak detected (EVAP control canister system).

Troubleshooting Flowchart

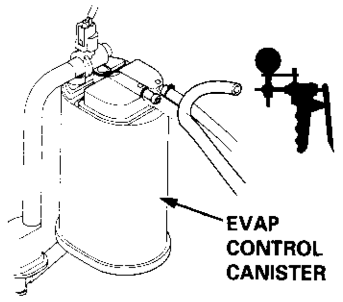


(cont'd)

Evaporative Emission (EVAP) Controls (cont'd)

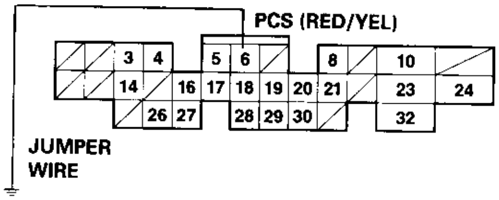
P1457 (cont'd)

— The MIL has been reported on.
— DTC P1457 is stored.
(EVAP purge control solenoid valve test.)*



Check the EVAP purge control solenoid valve:
1. Disconnect the vacuum hose from the EVAP control canister, and connect a vacuum pump to the hose.
2. Connect the ECM/PCM connector terminal A6 to the body ground with a jumper wire.
3. Turn the ignition switch ON (II).
4. Apply vacuum to the hose.

ECM/PCM CONNECTOR A (32P)



Wire side of female terminals

Does the valve hold vacuum?

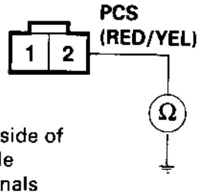
NO

EVAP purge control solenoid valve is OK. Do the EVAP bypass solenoid valve test (see page 11-221).

YES

Check for an open in the wire (PCS line):
1. Turn the ignition switch OFF.
2. Disconnect the EVAP purge control solenoid valve 2P connector.
3. Check for continuity between the EVAP purge control solenoid valve 2P connector terminal No. 2 and body ground.

EVAP PURGE CONTROL SOLENOID VALVE 2P CONNECTOR (C108)



Wire side of female terminals

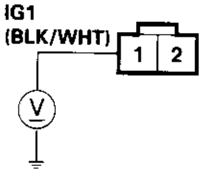
Is there continuity?

NO

Repair open in the wire between the EVAP purge control solenoid valve and the ECM/PCM (A6).

YES

Check for an open in the wire (IG1 line):
1. Turn the ignition switch ON (II).
2. Measure voltage between the EVAP bypass solenoid valve 2P connector terminal No. 1 and body ground.



Is there battery voltage?

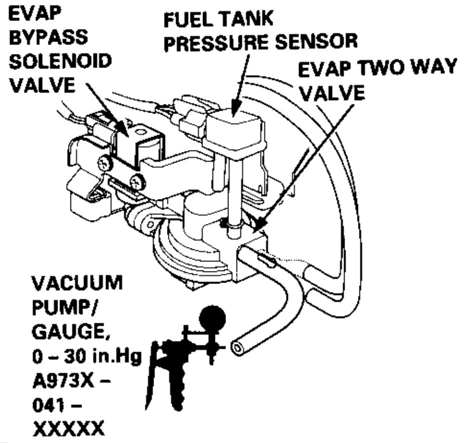
YES

Replace the EVAP purge control solenoid valve.

NO

Repair open in the wire between the EVAP purge control solenoid valve and No. 15 ALTERNATOR SP SENSOR (7.5 A) fuse.

*: Continued for '98 model



EVAP bypass solenoid valve test. (The continuation of DTC P1457 troubleshooting.)

Check the EVAP bypass solenoid valve:
1. Disconnect the vacuum hose from the EVAP two way valve, and connect a vacuum pump to the hose.
2. Turn the ignition switch ON (II).
3. Apply vacuum to the hose.

Does the valve hold vacuum?

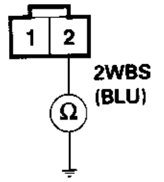
YES

EVAP bypass solenoid valve/ EVAP two way valve is OK. Do the EVAP control canister vent shut valve test (see page 11-222).

NO

Check the EVAP bypass solenoid valve:
1. Turn the ignition switch OFF.
2. Disconnect the EVAP bypass solenoid valve 2P connector.
3. Check for continuity between the EVAP bypass solenoid valve 2P connector terminal No. 2 and body ground.

EVAP BYPASS SOLENOID VALVE 2P CONNECTOR (C647)



Wire side of female terminals

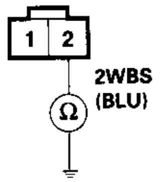
Is there continuity?

NO

Replace the EVAP bypass solenoid valve and O-rings.

YES

Check for a short in the wire (2WBS line):
1. Disconnect ECM/PCM connector A (32P).
2. Check for continuity between the EVAP bypass solenoid valve 2P connector terminal No. 2 and body ground.



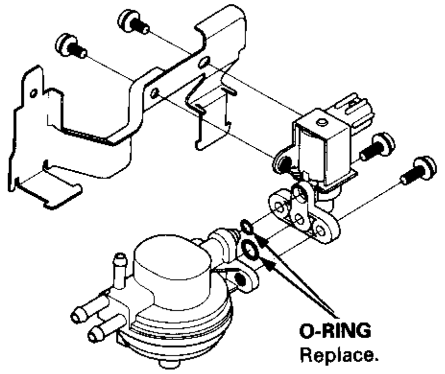
Is there continuity?

YES

Repair short in the wire between the ECM/PCM (A3) and the EVAP bypass solenoid valve.

NO

Substitute a known-good ECM/ PCM and recheck. If symptom/ indication goes away, replace the original ECM/PCM.



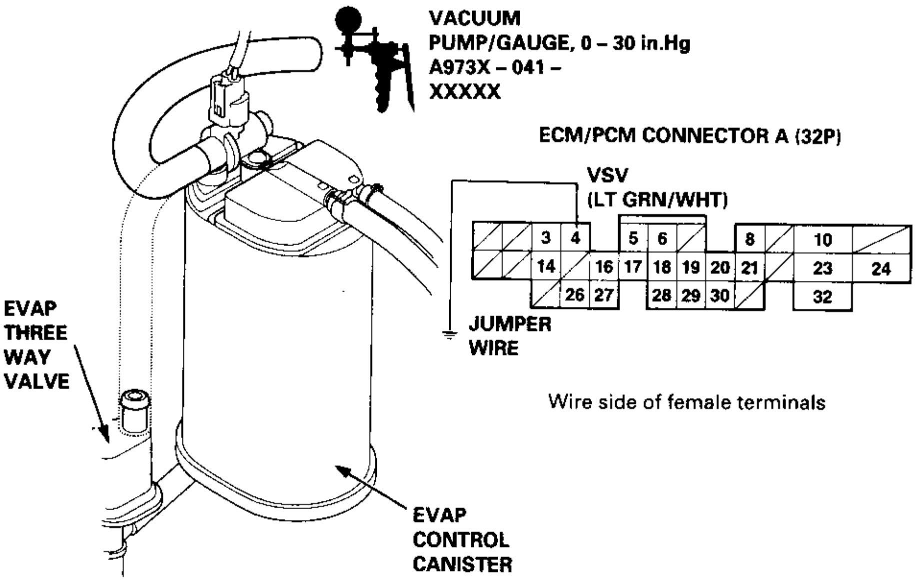
(cont'd)

Evaporative Emission (EVAP) Controls (cont'd)

P1457 (cont'd)

EVAP control canister vent shut valve test.
(The continuation of DTC P1457 troubleshooting.)

Check the EVAP control canister vent shut valve:
1. Disconnect the vacuum hose from the EVAP three way valve, and connect a vacuum pump to the hose.
2. Connect the ECM/PCM connector terminal A4 to the body ground with a jumper wire.
3. Turn the ignition switch ON (II).
4. Apply vacuum to the hose.



Wire side of female terminals

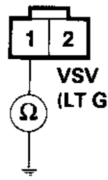
Does the valve hold vacuum?

YES — **EVAP control canister vent shut valve is OK. Do the canister system leak test (see page 11-223).**

NO

Check for an open in the wire (VSV line):
1. Turn the ignition switch OFF.
2. Disconnect the EVAP control canister vent shut valve 2P connector.
3. Check for continuity between the EVAP control canister vent shut valve 2P connector terminal No. 1 and body ground.

EVAP CONTROL CANISTER VENT SHUT VALVE 2P CONNECTOR (C361)



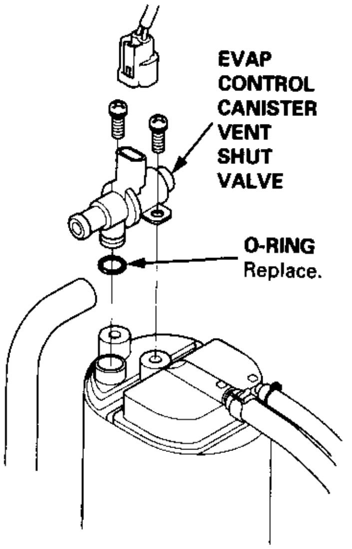
Wire side of female terminals

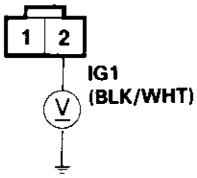
Is there continuity?

NO — **Repair open in the wire between the EVAP control canister vent shut valve and the ECM/PCM (A4).**

YES

Check for an open in the wire (IG1 line):
1. Turn the ignition switch ON (II).
2. Measure voltage between the EVAP control canister vent shut valve 2P connector terminal No. 1 and body ground.





Is there battery voltage?

YES — **Replace the EVAP control canister vent shut valve and O-ring.**

NO

Repair open in the wire between the EVAP control canister vent shut valve and No. 15 ALTERNATOR SP SENSOR (7.5 A) fuse.

Canister system leak test.
(The continuation of DTC P1457 troubleshooting.)

Check the EVAP control canister vent shut valve line and connections:

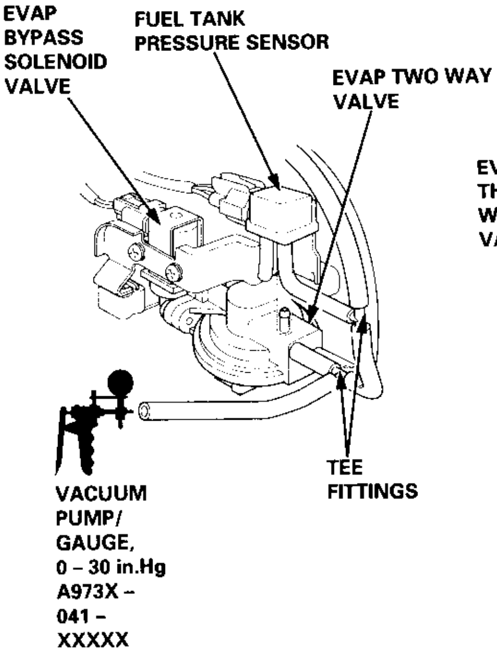
1. Turn the ignition switch OFF.
2. Connect to three-way tee fittings into the hose from the EVAP control canister to the EVAP two way valve. Connect the fuel tank pressure sensor to one of the tee fittings and the vacuum pump to the other.
3. Remove the vent hose from the EVAP control canister vent shut valve and cap the port to seal the fresh air vent for the EVAP control canister.
4. Turn the ignition switch ON (II).
5. While monitoring the FTP Sensor voltage with the Honda PGM Tester, or measuring voltage between ECM/PCM connector terminals A29 and C18 slowly pump the vacuum pump using a stroke every 1 – 2 seconds.
6. Continue to pump vacuum until that voltage drops to approx. 1.5 V.
   NOTE: Make sure that the engine coolant temperature still above 95°F (35°C) and your vacuum pump has no leak.
7. Monitor that voltage for 20 seconds.

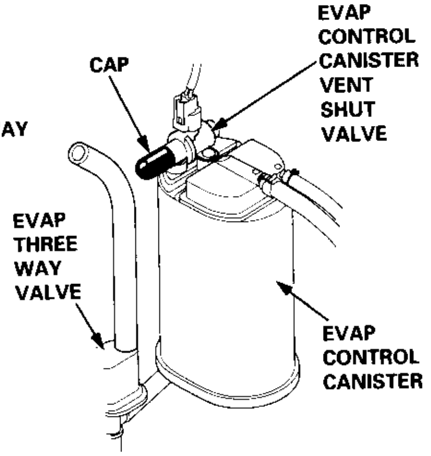
Does the voltage drop to 1.5 V and holds at least 20 seconds?

YES

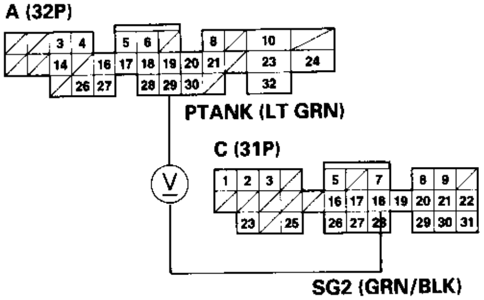
Inspect the EVAP control canister vent shut valve line and connections.

NO





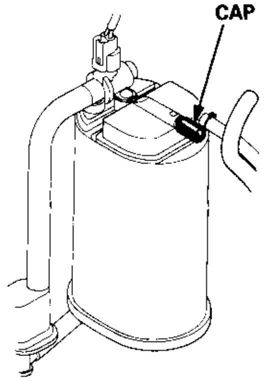
ECM/PCM CONNECTORS



Wire side of female terminals

Check the EVAP purge control solenoid valve line and connections:

1. Turn the ignition switch OFF.
2. Disconnect the purge line hose from the EVAP control canister and plug the port.
3. Turn the ignition switch ON (II).
4. While monitoring the FTP Sensor voltage with the Honda PGM Tester, or measuring voltage between ECM/PCM connector terminals A29 and C18 slowly pump the vacuum pump using a stroke every 1 – 2 seconds.
5. Continue to pump vacuum until that voltage drops to approx. 1.5 V.
   NOTE: Make sure that the engine coolant temperature still above 95°F (35°C) and your vacuum pump has no leak.
6. Monitor that voltage for 20 seconds.



Does the voltage drop to 1.5 V and holds at least 20 seconds?

YES

Inspect the EVAP purge control solenoid valve line and connections. If they are OK, do the EVAP two way valve test (see page 11-224).

NO

Replace the EVAP control canister.

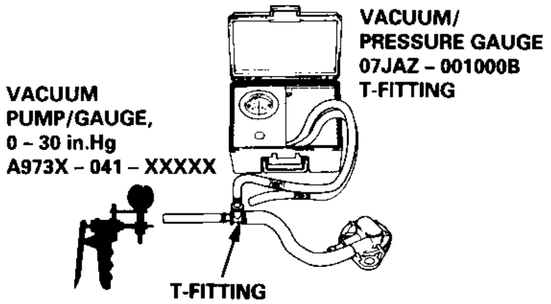
(cont'd)

Evaporative Emission (EVAP) Controls (cont'd)

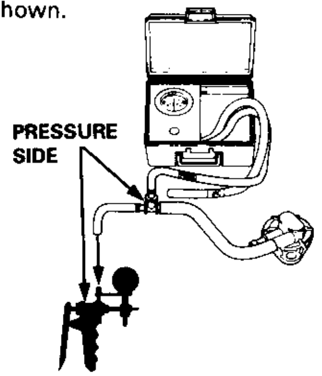
Evaporative Emission (EVAP) Two Way Valve Testing

'97 model:

1. Remove the fuel fill cap.
2. Remove the vapor line from the EVAP two way valve on the fuel tank, and connect it to a T-fitting from a vacuum gauge and a vacuum pump as shown.



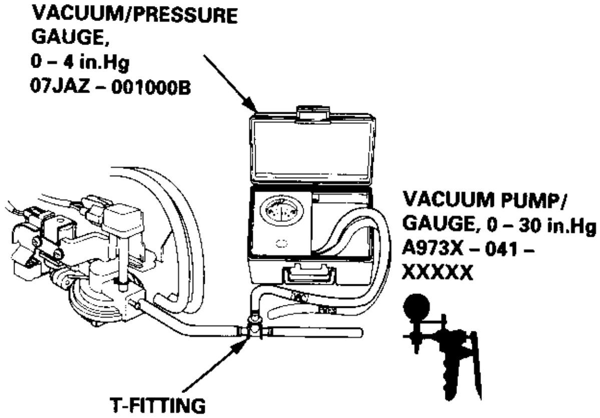
3. Apply vacuum slowly and continuously while watching the gauge. The vacuum should stabilize momentarily at 0.7 - 2.0 kPa (5 - 15 mmHg, 0.2 - 0.6 in.Hg).
   If the vacuum stabilizes (valve opens) below 0.7 kPa (5 mmHg, 0.2 in.Hg) or above 2.0 kPa (15 mmHg, 0.6 in.Hg), install a new valve and retest.
4. Move the vacuum pump hose from the vacuum fitting to the pressure fitting, and move the vacuum gauge hose from the vacuum side to the pressure side as shown.



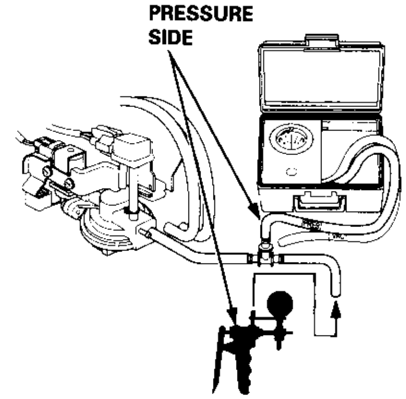
5. Slowly pressurize the vapor line while watching the gauge. The pressure should stabilize at 1.3 - 4.7 kPa (0 - 35 mmHg, 0.4 - 1.4 in.Hg).
   - If the pressure momentarily stabilizes (valve opens) at 1.3 - 4.7 kPa (10 - 35 mmHg, 0.4 - 1.4 in. Hg), the valve is OK.
   - If the pressure stabilizes below 1.3 kPa (10 mmHg, 0.4 in,Hg) or above 4.7 kPa (35 mmHg, 1.4 in.Hg), install a new valve and retest.

'98 - 00 models:

1. Remove the fuel fill cap.
2. Remove the vapor line from the EVAP two way valve (located above the EVAP control canister), and connect it to a T-fitting from vacuum gauge and vacuum pump as shown.



3. Apply vacuum slowly and continuously while watching the gauge.
   The vacuum should stabilize momentarily at 0.8 - 2.1 kPa (6 - 16 mmHg, 0.2 - 0.6 in.Hg).
   If the vacuum stabilizes (valve opens) below 0.8 kPa (6 mmHg, 0.2 in.Hg) or above 2.1 kPa (16 mmHg, 0.6 in.Hg), install a new valve and retest.
4. Move the vacuum pump hose from the vacuum fitting to the pressure fitting, and move the vacuum gauge hose from the vacuum side to the pressure side as shown.



5. Slowly pressurize the vapor line while watching the gauge.
   The pressure should stabilize momentarily above 1.0 kPa (8 mmHg, 0.3 in.Hg).
   - If the pressure momentarily stabilizes (valve opens) above 1.0 kPa (8 mmHg, 0.3 in.Hg), the valve is OK.
   - If the pressure stabilizes below 1.0 kPa (8 mmHg, 0.3 in.Hg), install a new valve and retest.

Transaxle

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Clutch

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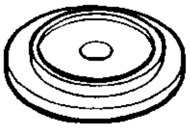
Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07JAF – PM7011A	Clutch Alignment Disc	1	12-7
②	07NAF – PR30100	Clutch Alignment Shaft	1	12-7, 8, 10, 11
③	07LAB – PV00100 or 07924 – PD20003	Ring Gear Holder	1	12-7, 9, 10, 11
④	07746 – 0010100	Attachment, 32 x 35 mm	1	12-10
⑤	07749 – 0010000	Driver	1	12-10
⑥	07936 – 3710100	Handle	1	12-7, 8, 10, 11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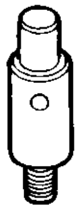
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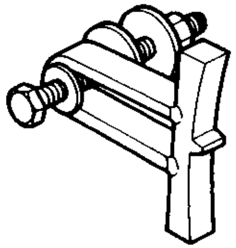
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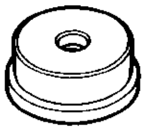
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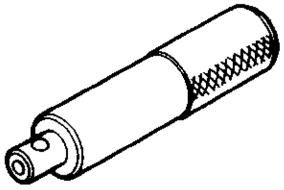
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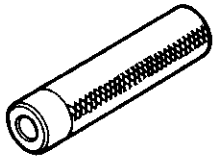
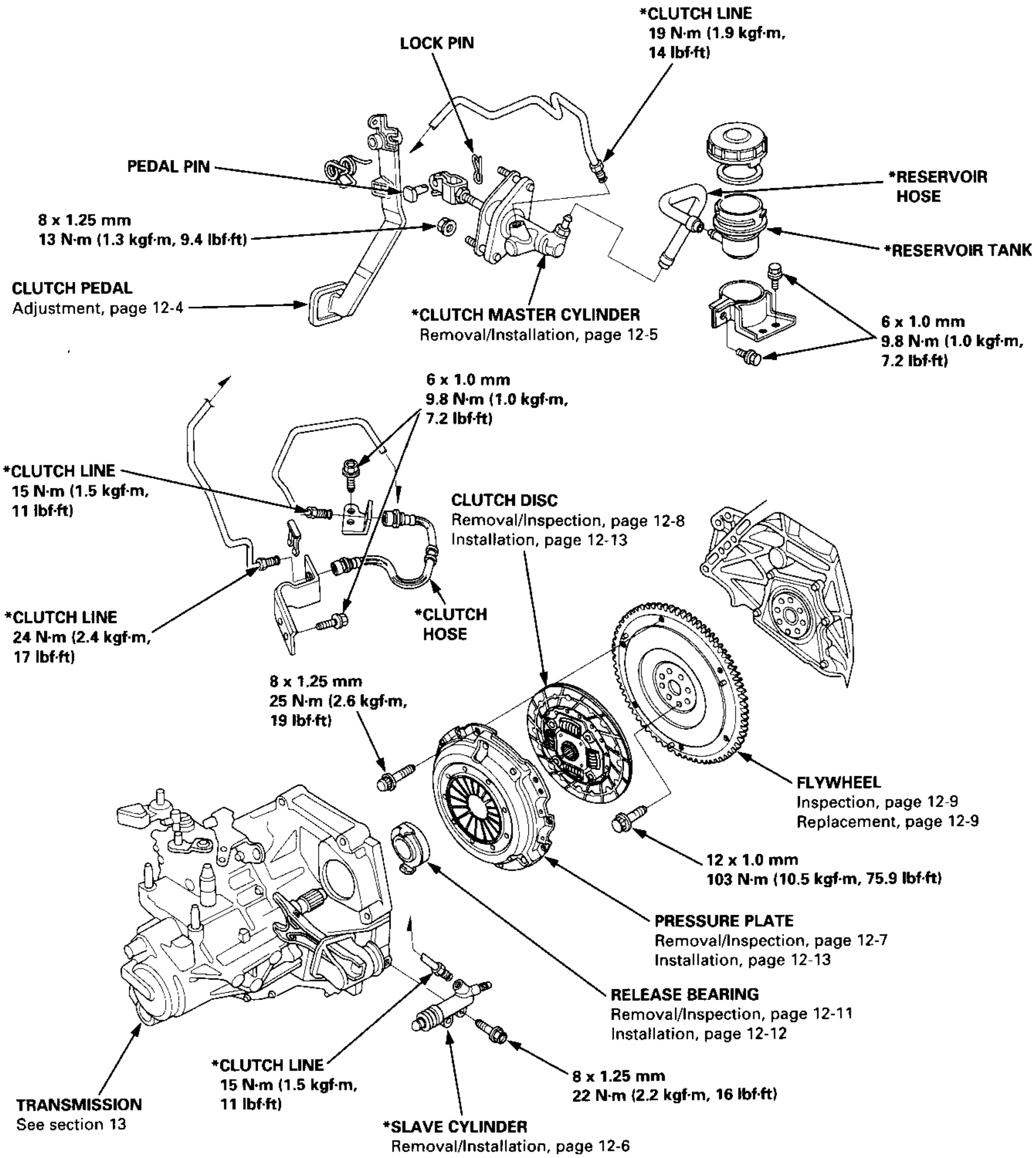

⑥

Illustrated Index

NOTE:

- Whenever the transmission is removed, clean and grease the release bearing sliding surface.
- If the parts marked * are removed, the clutch hydraulic system must be bled (see page 12-6).
- Inspect the hoses for damage, leaks, interference, and twisting.



Clutch Pedal

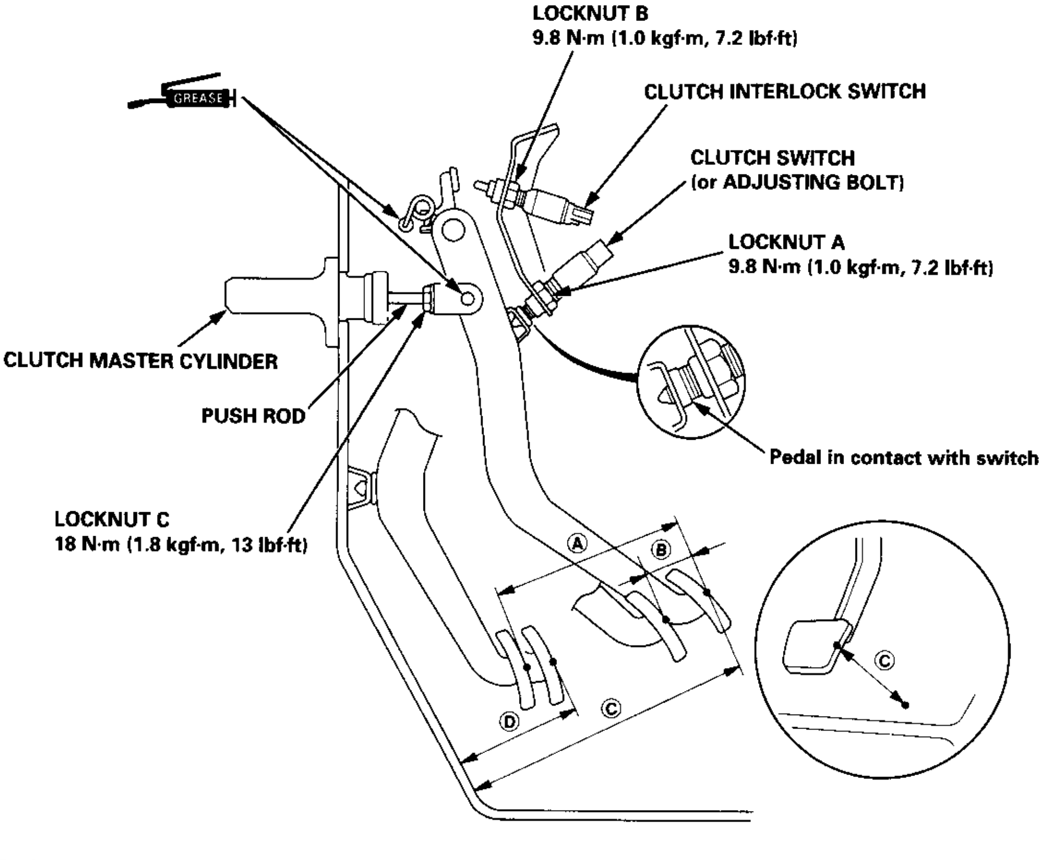
Adjustment

NOTE:

- To check the clutch interlock switch and clutch switch, see section 23.
- The clutch is self-adjusting to compensate for wear.

CAUTION: If there is no clearance between the master cylinder piston and push rod, the release bearing is held against the diaphragm spring, which can result in clutch slippage or other clutch problems.

1. Loosen locknut A, and back off the clutch switch (or adjusting bolt) until it no longer touches the clutch pedal.
2. Loosen locknut C, and turn the push rod in or out to get the specified stroke (Ⓐ) and height (Ⓒ) at the clutch pedal.
3. Tighten locknut C.
4. Thread in the clutch switch (or adjusting bolt) until it contacts the clutch pedal.
5. Turn the clutch switch (or adjusting bolt) in an additional 3/4 to 1 full turn.
6. Tighten locknut A.
7. Loosen locknut B on the clutch interlock switch.
8. Measure the clearance between the floor board and clutch pedal with the clutch pedal fully depressed.
9. Release the clutch pedal 15 - 20 mm (0.59 - 0.79 in) from the fully depressed position and hold it there. Adjust the position of the clutch interlock switch so that the engine will start with the clutch pedal in this position.
10. Tighten locknut B.



Ⓐ **(STROKE at PEDAL): 135 - 145 mm (5.31 - 5.71 in)**
Ⓑ **(TOTAL CLUTCH PEDAL FREE PLAY): 7 - 22 mm (0.28 - 0.87 in) include the pedal play 1 - 9 mm (0.04 - 0.35 in)**
Ⓒ **(CLUTCH PEDAL HEIGHT): 183 mm (7.20 in) to the floor**
Ⓓ **(CLUTCH PEDAL DISENGAGEMENT HEIGHT): 72 mm (2.83 in) minimum to the floor**

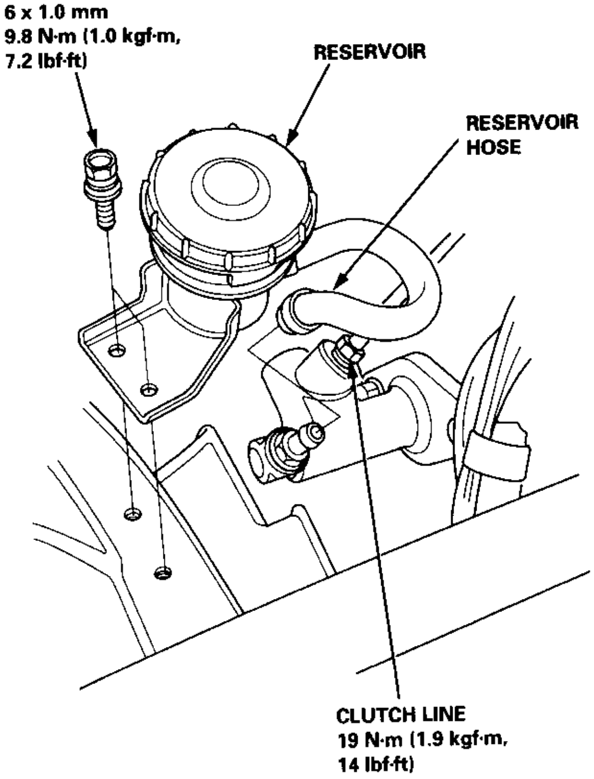
Clutch Master Cylinder

Removal/Installation

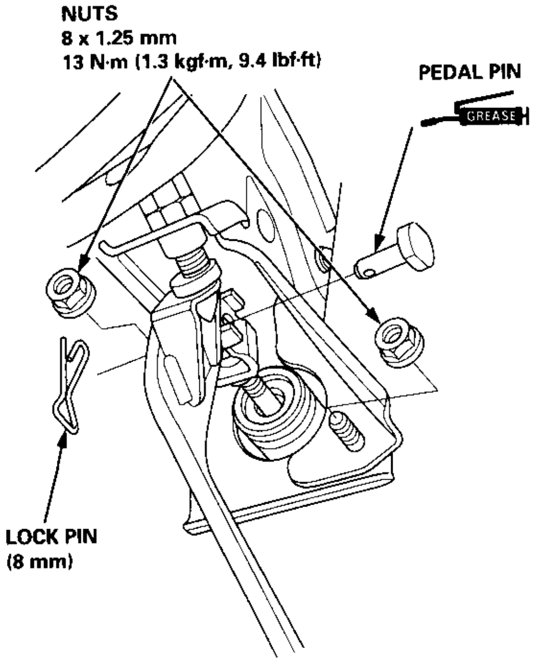
CAUTION:

- **Do not spill brake fluid on the vehicle; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.**
- **Plug the end of the clutch line and reservoir hose with a shop towel to prevent brake fluid from coming out.**

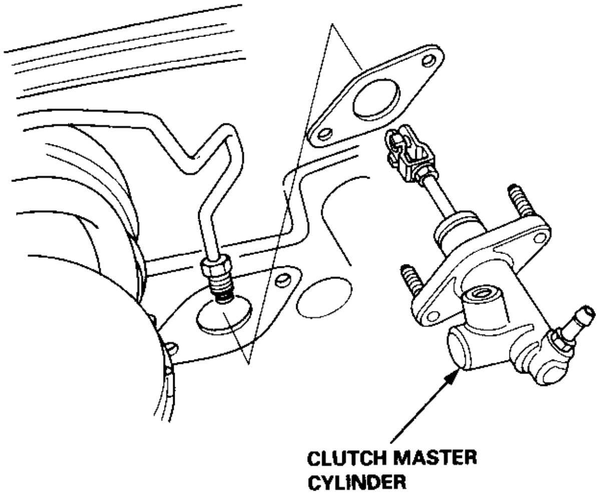
1. The brake fluid may be sucked out through the top of the master cylinder reservoir with a syringe.
2. Disconnect the clutch line and reservoir hose from the clutch master cylinder.



3. Remove the reservoir from the engine compartment bulkhead.
4. Pry out the lock pin, and pull the pedal pin out of the yoke. Remove the nuts.



5. Remove the clutch master cylinder.



6. Install the clutch master cylinder in the reverse order of removal.

   NOTE: Bleed the clutch hydraulic system (see page 12-6).

Slave Cylinder

Removal/Installation

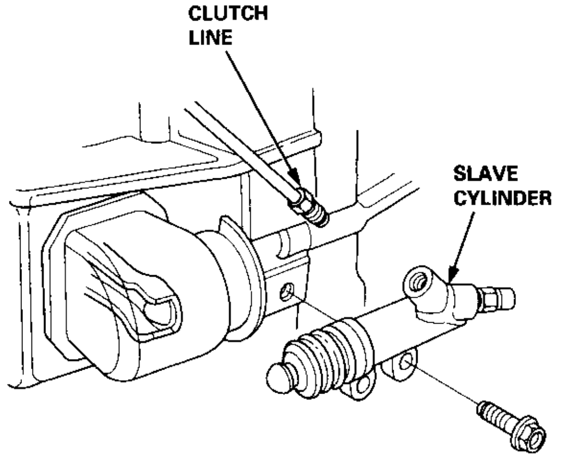
CAUTION:

- **Do not spill brake fluid on the vehicle; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.**
- **Plug the end of the clutch line with a shop towel to prevent brake fluid from coming out.**

GREASE: Super High Temp Urea Grease (P/N 08798 – 9002).

GREASE: Brake Assembly Lube or equivalent rubber grease.

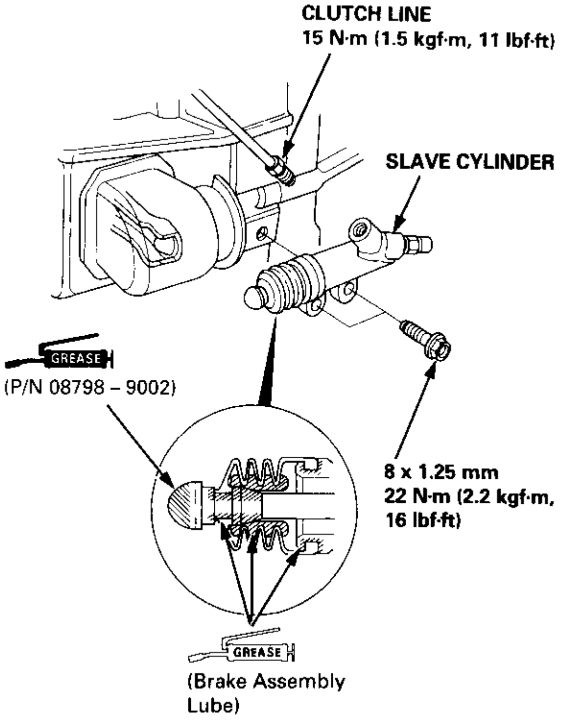
1. Disconnect the clutch line from the slave cylinder.



2. Remove the slave cylinder from the clutch housing.

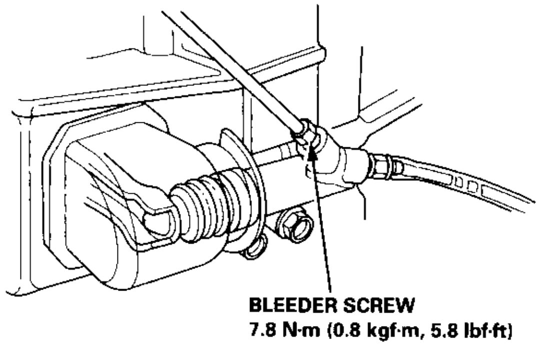
3. Install the slave cylinder in the reverse order of removal.

   NOTE: Make sure the boot is installed on the slave cylinder.



4. Bleed the clutch hydraulic system.

   - Attach a hose to the bleeder screw, and suspend the hose in a container of brake fluid.
   - Make sure there is an adequate supply of fluid at the clutch master cylinder, then slowly pump the clutch pedal until no more bubbles appear at the bleeder hose.
   - Refill the clutch master cylinder with fluid when done.
   - Always use Genuine Honda DOT3 Brake Fluid. Using a non-Honda brake fluid can cause corrosion and decrease the life of the system.
   - Confirm clutch operation, and check for leaking fluid.

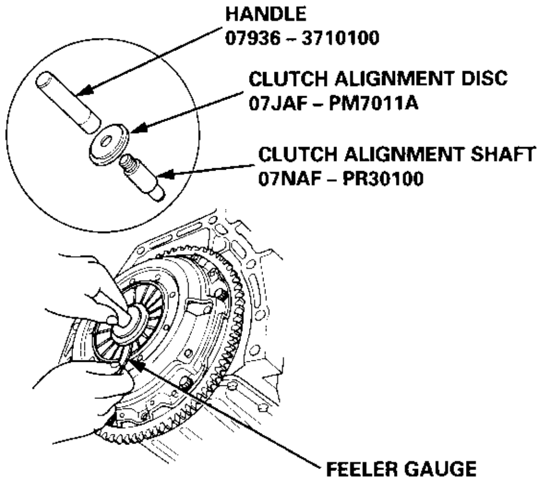


Pressure Plate

Removal/Inspection

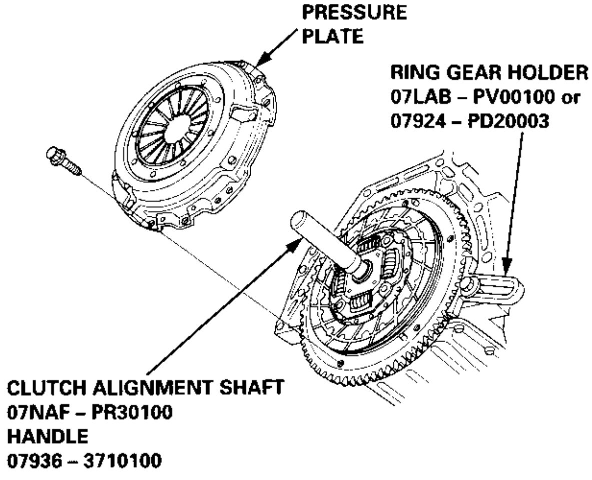
1. Check the diaphragm spring fingers for height using the special tools and a feeler gauge.

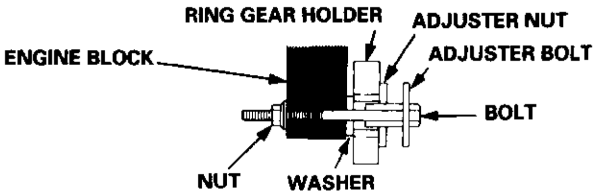
   Standard (New): 0.6 mm (0.02 in) max.
   Service Limit: 0.8 mm (0.03 in)



   If the height is more than the service limit, replace the pressure plate.

2. Install the special tools as shown.

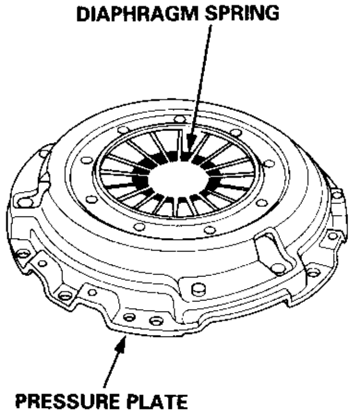




3. To prevent warping, unscrew the pressure plate mounting bolts in a crisscross pattern in several steps, then remove the pressure plate.

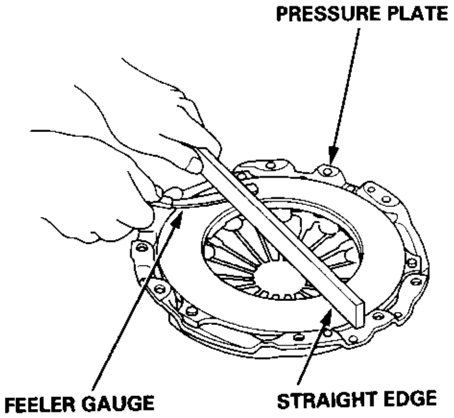
4. Inspect the pressure plate surface for wear, cracks, and burning.

5. Inspect the fingers of the diaphragm spring for wear at the release bearing contact area.



6. Inspect for warpage using a straight edge and feeler gauge. Measure across the pressure plate.

   Standard (New): 0.03 mm (0.001 in) max.
   Service Limit: 0.15 mm (0.006 in)

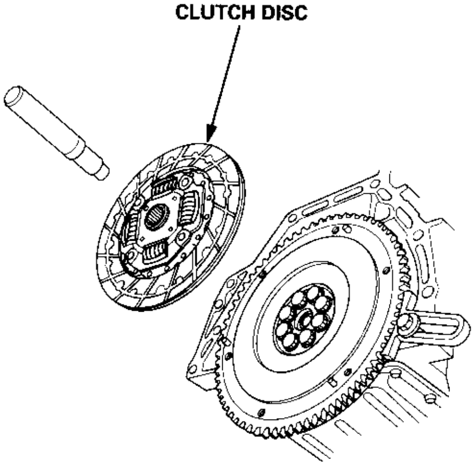


   If the warpage is more than the service limit, replace the pressure plate.

Clutch Disc

Removal/Inspection

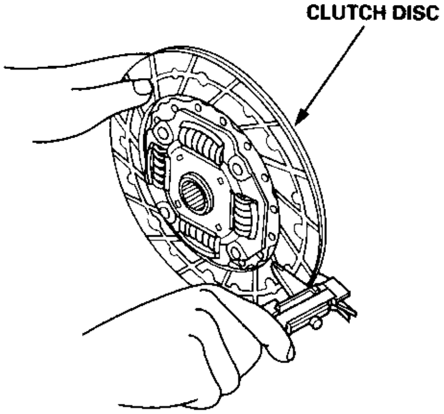
1. Remove the clutch disc and special tools.



2. Inspect the lining of the clutch disc for signs of slipping or oil. If the clutch disc is burned black or oil soaked, replace it.

3. Measure the clutch disc thickness.

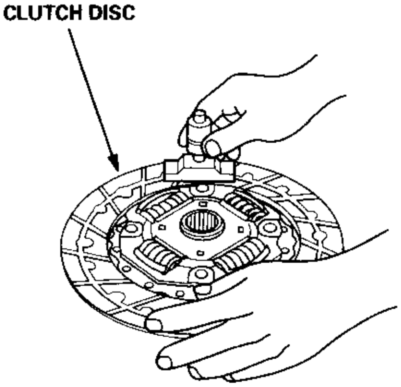
   Standard (New): 8.4 – 9.1 mm (0.33 – 0.36 in)
   Service Limit: 6.0 mm (0.24 in)

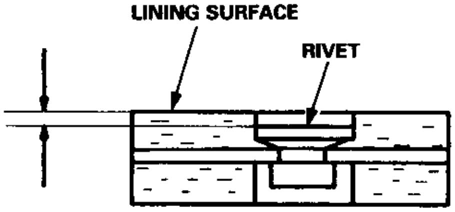


If the thickness is less than the service limit, replace the clutch disc.

4. Measure the rivet depth from the lining surface to the rivets, on both sides.

   Standard (New): 1.2 – 1.7 mm (0.05 – 0.07 in) min.
   Service Limit: 0.2 mm (0.008 in)





If the rivet depth is less than the service limit, replace the clutch disc.

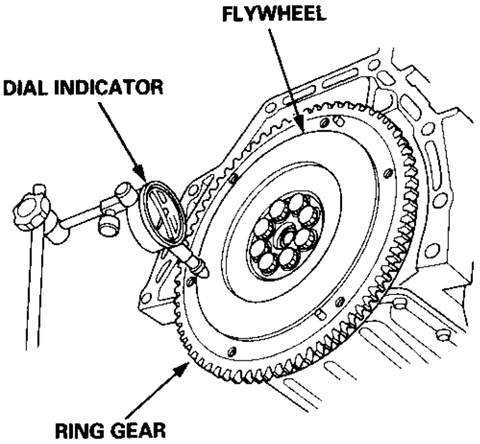
Inspection

1. Inspect the ring gear teeth for wear and damage.
2. Inspect the clutch disc mating surface on the flywheel for wear, cracks, and burning.
3. Measure the flywheel runout using a dial indicator through at least two full turns. Push against the flywheel each time you turn it to take up the crankshaft thrust washer clearance.

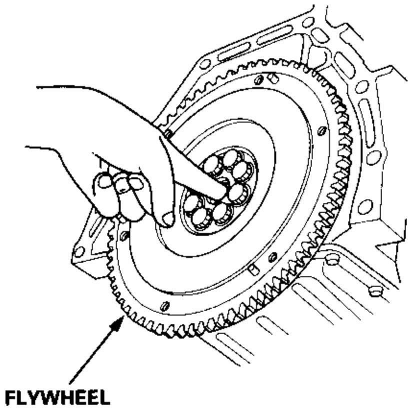
   NOTE: The runout can be measured with engine installed.

   Standard (New): 0.05 mm (0.002 in) max.
   Service Limit: 0.15 mm (0.006 in)

   If the runout is more than the service limit, replace the flywheel and recheck the runout.

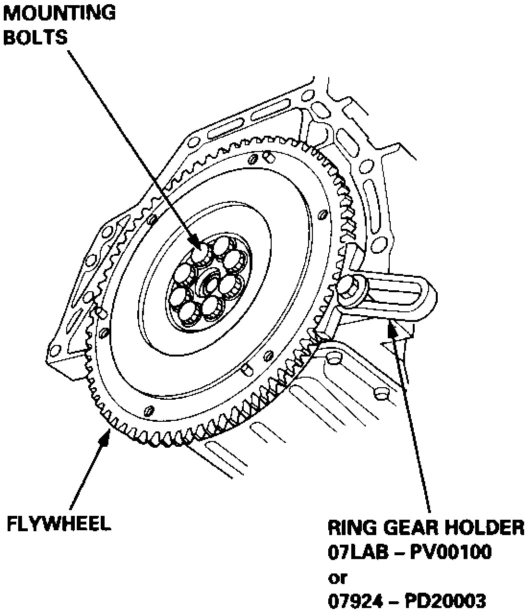


4. Turn the inner race of the flywheel bearing with your finger. The bearing should turn smoothly and quietly. Check that the bearing outer race fits tightly in the flywheel. If the race does not turn smoothly, quietly, or fit tight in the flywheel, replace the bearing.

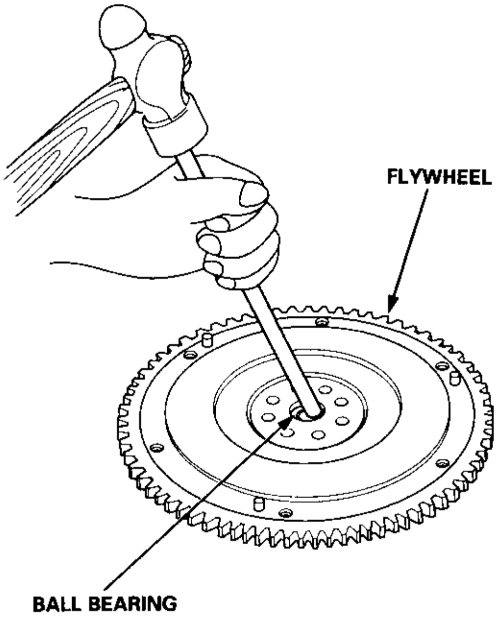


Replacement

1. Install the special tool as shown.
2. Remove the flywheel mounting bolts in a crisscross pattern in several steps, and remove the flywheel.



3. Remove the ball bearing from the flywheel.

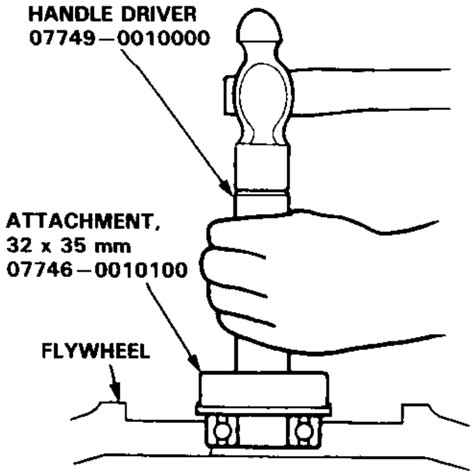


(cont'd)

Flywheel

Replacement (cont'd)

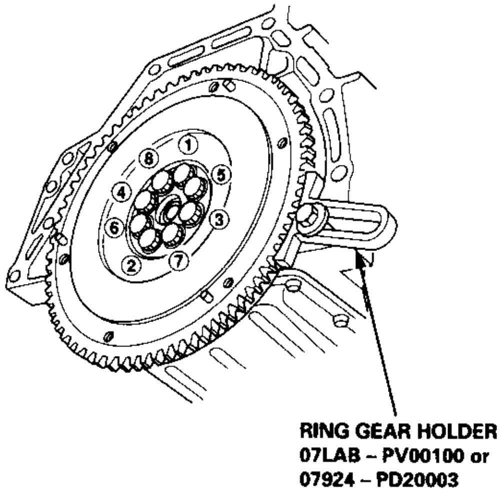
4. Drive the new bearing into the flywheel using the special tools.



5. Align the hole in the flywheel with the crankshaft dowel pin, and install the flywheel. Install the mounting bolts finger-tight.

6. Install the special tool, then torque the flywheel mounting bolts in a crisscross pattern in several steps as shown.

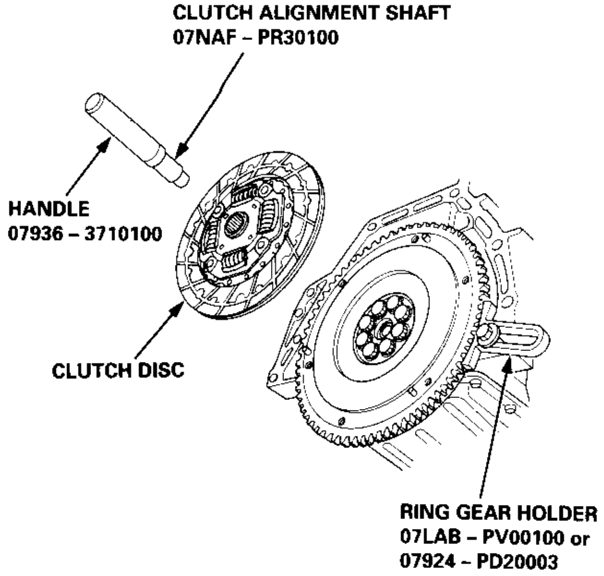
Torque:
12 x 1.0 mm
103 N·m (10.5 kgf·m, 75.9 lbf·ft)



Clutch Disc, Pressure Plate

Installation

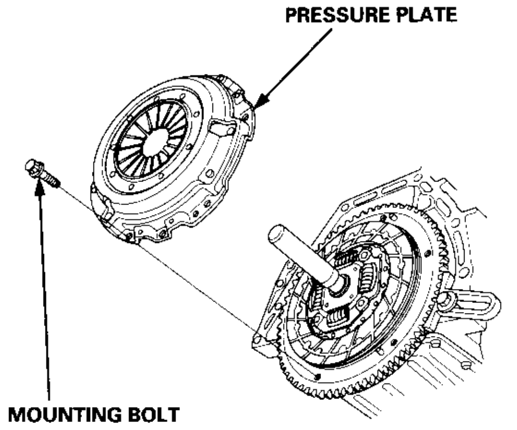
1. Install the ring gear holder.



2. Apply grease to the spline of the clutch disc, then install the clutch disc using the special tools.

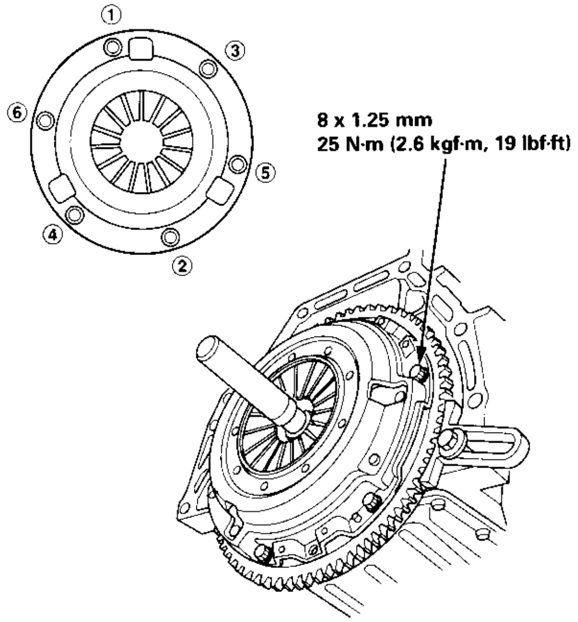
   NOTE: Use only Super High Temp Urea Grease (P/N 08798 – 9002).

3. Install the pressure plate.



Release Bearing

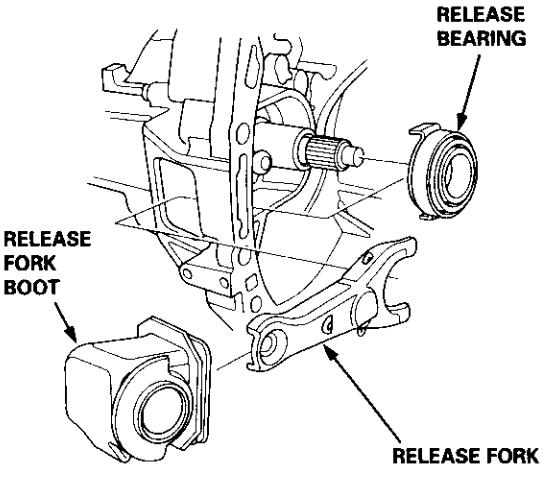
4. Torque the mounting bolts in a crisscross pattern as shown. Tighten the bolts in several steps to prevent warping the diaphragm spring.



5. Remove the special tools.
6. Check the diaphragm spring fingers for height (see page 12-7).

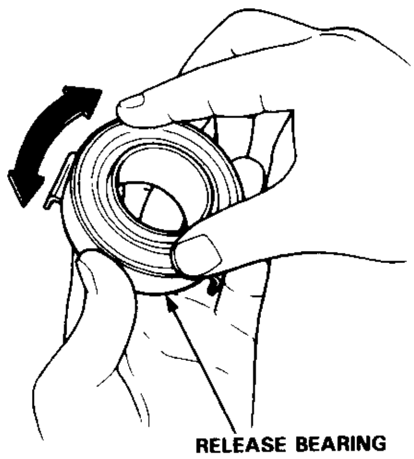
Removal/Inspection

1. Remove the release fork boot from the clutch housing.



2. Remove the release fork and release bearing from the clutch housing.
3. Check the release bearing for play by spinning it by hand.

   NOTE: The release bearing is packed with grease. Do not wash it in solvent.



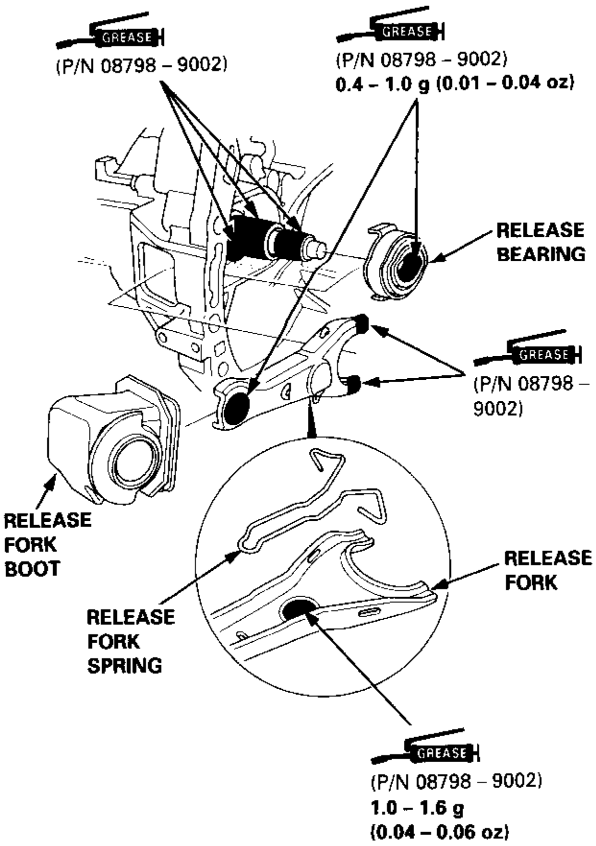
If there is excessive play, replace the release bearing with a new one.

Release Bearing

Installation

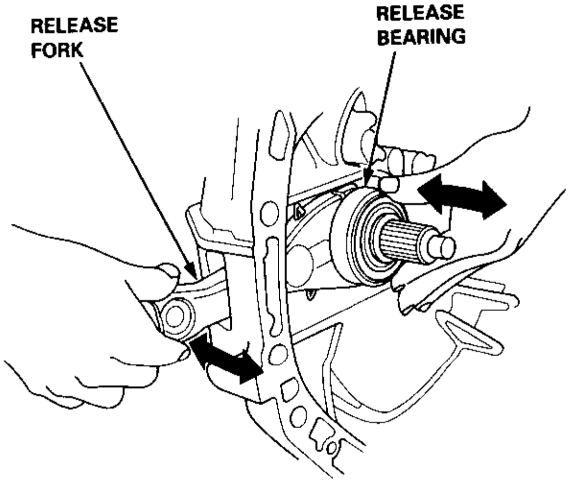
NOTE: Use only Super High Temp Urea Grease (P/N 08798 - 9002).

1. With the release fork slid between the release bearing pawls, install the release bearing on the mainshaft while inserting the release fork through the hole in the clutch housing.



2. Align the detent of the release fork with the release fork bolt, then press the release fork over the release fork bolt sequarely.

3. Move the release fork right and left to make sure that it fits properly against the release bearing, and that the release bearing slides smoothly.



4. Install the release fork boot; make sure the boot seals around the release fork and clutch housing.

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Special Tools

Special Tools

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②	07GAJ – PG20110	Mainshaft Holder	1	13-66
③	07GAJ – PG20130	Mainshaft Base	1	13-66
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⑦	07JAD – PH80400	Pilot, 28 x 30 mm	1	13-43
⑧	07LAD – PW50601	Attachment, 40 x 50 mm	1	13-39, 49
⑨	07RAB – 0020000	Companion Flange Holder	1	13-48, 54, 57, 58
⑩	07746 – 0010100	Attachment, 32 x 35 mm	1	13-18, 68
⑪	07746 – 0010300	Attachment, 42 x 47 mm	1	13-27, 34, 62
⑫	07746 – 0010400	Attachment, 52 x 55 mm	1	13-40, 51
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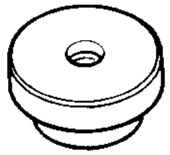
⑮	07746 – 0030100	Driver, 40 mm I.D.	1	13-27, 34,35, 49, 53
⑯	07746 – 0030300	Attachment, 30 mm I.D.	1	13-35
⑰	07746 – 0030400	Attachment, 35 mm I.D.	1	13-27, 34
⑱	07749 – 0010000	Handle	1	13-18, 27, 34, 40, 43, 49, 50, 51, 53, 61, 62, 63, 68
⑲	07947 – SD90200	Attachment	1	13-49
⑳	07979 – PJ40001	Magnet Stand Base	1	13-66

* Must be used with commercially available 3/8" – 16 Slide Hammer.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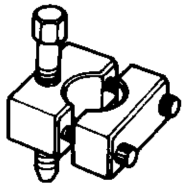
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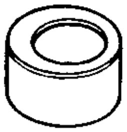
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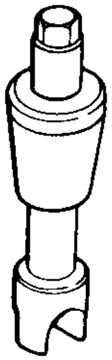
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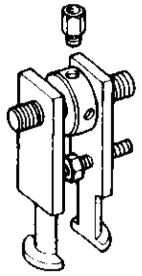
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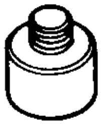
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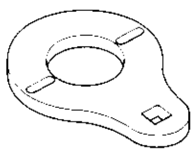
⑧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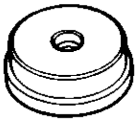
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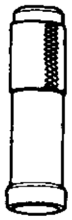
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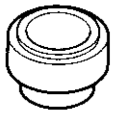
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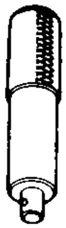
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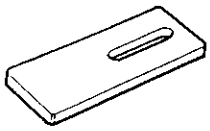
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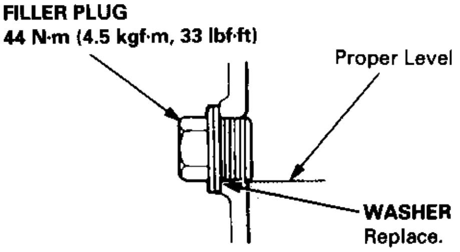
Transmission Fluid

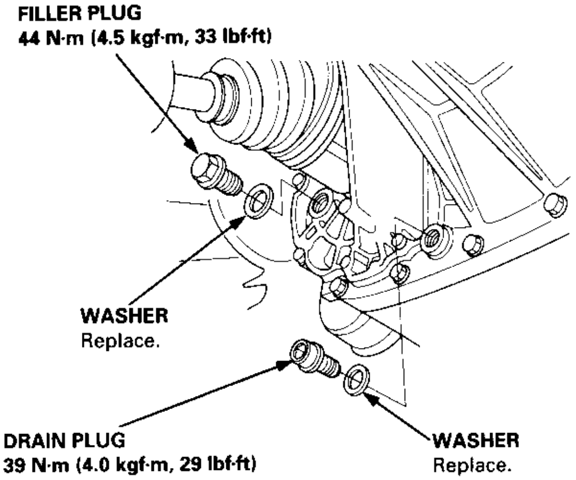
NOTE: Check the fluid with the engine OFF and vehicle on level ground.

1. Remove the filler plug, then check the level and condition of the fluid.



2. The fluid level must be up to the filler hole. If it is below the hole, add fluid until it runs out, then reinstall the filler plug with a new washer.

3. If the transmission fluid is dirty, remove the drain plug and drain the fluid.



4. Reinstall the drain plug with a new washer, and refill the transmission fluid to the proper level.

   NOTE: The drain plug washer should be replaced at every fluid change.

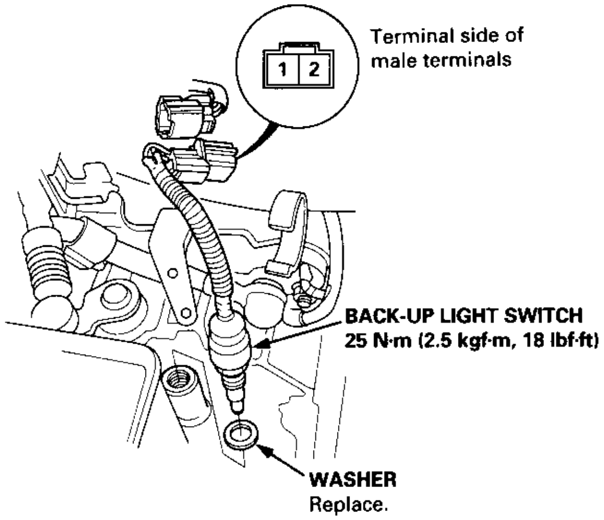
5. Reinstall the filler plug with a new washer.

   Fluid Capacity
   1.7 ℓ (1.8 US qt, 1.5 Imp qt) at oil change
   2.1 ℓ (2.2 US qt, 1.8 Imp qt) at overhaul

   Always use Genuine Honda Manual Transmission Fluid (MTF). Using motor oil can cause stiffer shifting because it does not contain the proper additives.

Test/Replacement

1. Disconnect the connectors from the switch.



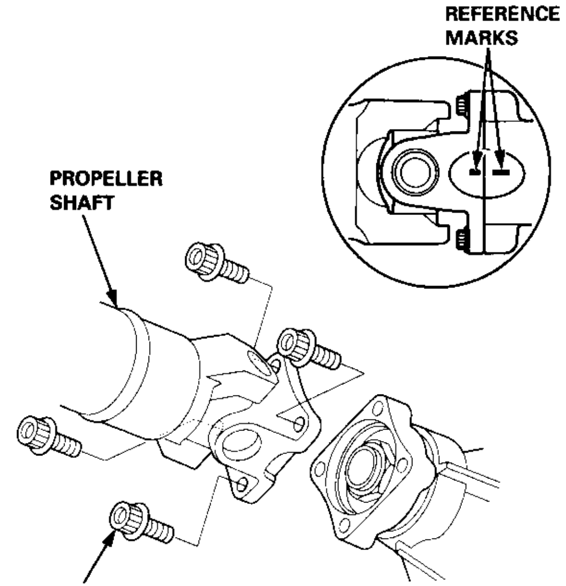
2. Check for continuity between the No. 1 and No. 2 terminals.
   - There should be continuity when the shift lever into reverse.
   - There should be no continuity when the shift lever in position except reverse.

3. If necessary, replace the switch.

Inspection

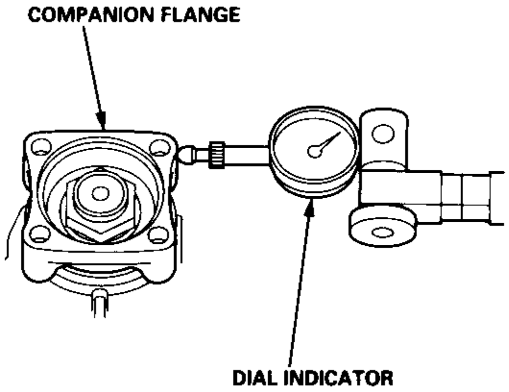
⚠WARNING Make sure lifts, jacks, and safety stands are placed properly (see section 1).

1. Raise the front of the vehicle, and support it with safety stands (see section 1).
2. Set the parking brake, and block both rear wheels securely.
3. Shift to neutral position.
4. Make a reference mark across the propeller shaft and the transfer assembly flanges.



5. Separate the propeller shaft from the transfer assembly.
6. Set a dial indicator on the transfer assembly flange, then measure the transfer gear backlash.

STANDARD: 0.06 – 0.16 mm (0.002 – 0.006 in)



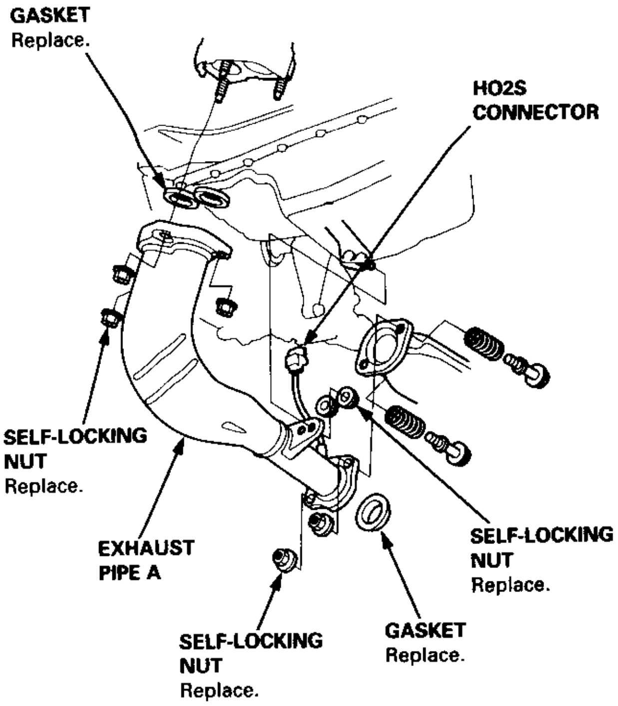
7. If the measurement is out of specification, remove the transfer assembly and adjust transfer gear backlash (see page 13-44 thru 13-61).
8. Check the transfer oil seal for damage and fluid leaks.
9. If oil seal replacement is required, remove the transfer assembly, replace the oil seal, and adjust the total starting torque (see page 13-44 thru 13-61).

   NOTE: Do not replace the oil seal when the transfer assembly is installed on the transmission.

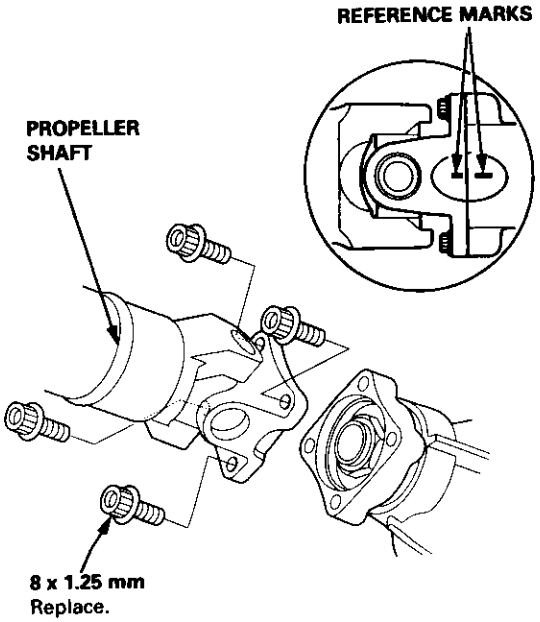
Removal

⚠ WARNING Make sure the lifts, jacks, and safety stands are placed properly (see section 1).

1. Raise the front of the vehicle, and support it with safety stands (see section 1).
2. Set the parking brake, and block both rear wheels securely.
3. Drain the manual transmission fluid. Reinstall the drain plug with a new sealing washer.
4. Disconnect the heated oxygen sensor (HO2S) connector.

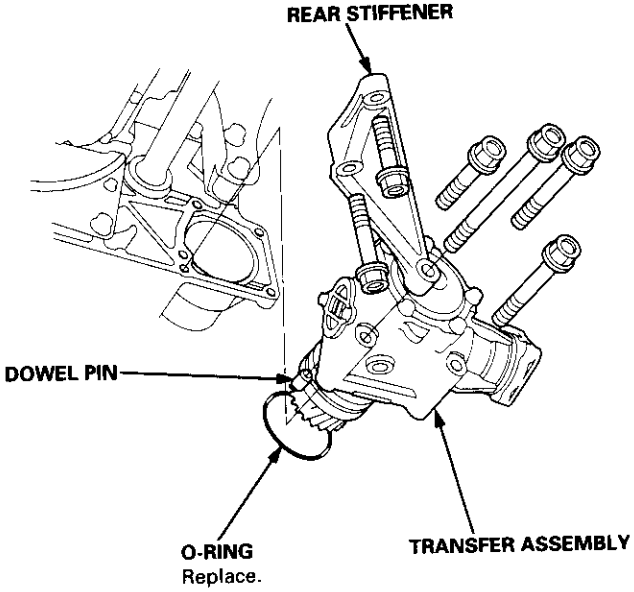


5. Remove exhaust pipe A.
6. Make reference marks across the propeller shaft and the transfer assembly flanges.



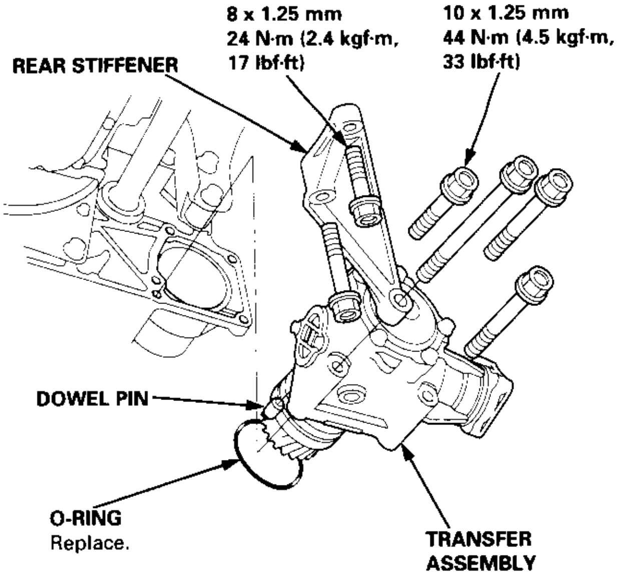
7. Separate the propeller shaft from the transfer assembly flanges.
8. Remove the rear stiffener, then remove the transfer assembly.

NOTE: While servicing the transfer assembly, do not allow dust or other foreign particles to enter the transmission.



Installation

1. Install a new O-ring on the transfer assembly.



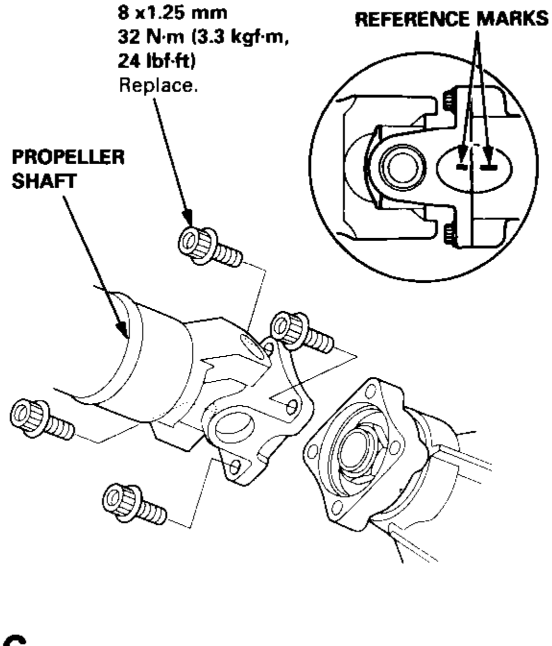
2. Clean the areas where the transfer assembly contacts the transmission with solvent or carburetor cleaner, and dry with compressed air. Then apply MTF to the contact areas.

3. Install the transfer assembly on the transmission.

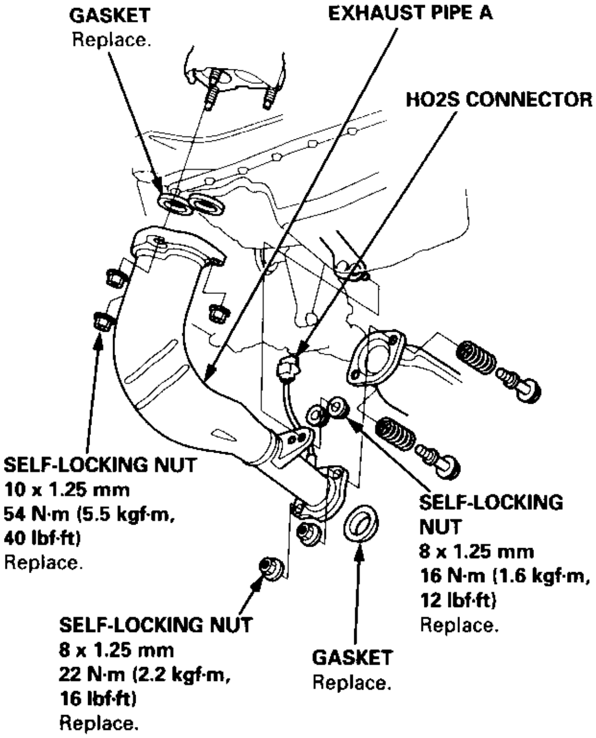
   NOTE: While installing the transfer assembly on the transmission, do not allow dust or other foreign particles to enter the transmission.

4. Install the rear stiffener.

5. Install the propeller shaft to the transfer assembly by aligning the reference marks.



6. Install the exhaust pipe A.



7. Connect the heated oxygen sensor (HO2S) connector.

8. Refill the transmission with MTF (see page 13-3).

9. Start the engine, and run it to normal operating temperature (the radiator fan comes on). Turn the engine off, and check fluid level.

Removal

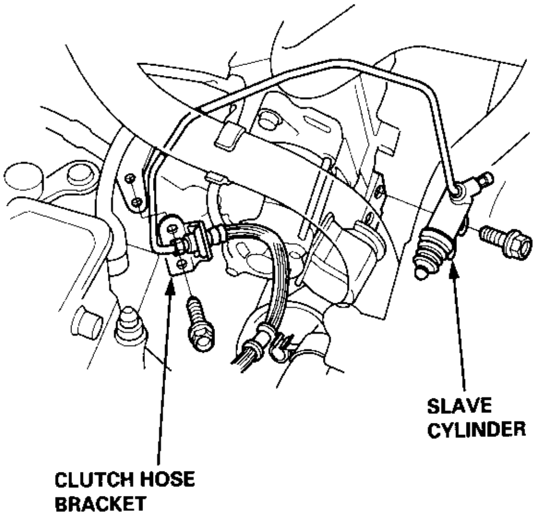
⚠ WARNING

- **Make sure jacks and safety stands are placed properly, and hoist brackets are attached to correct position on the engine.**
- **Apply parking brake and block rear wheels so vehicle will not roll off stands and fall on you while working under it.**

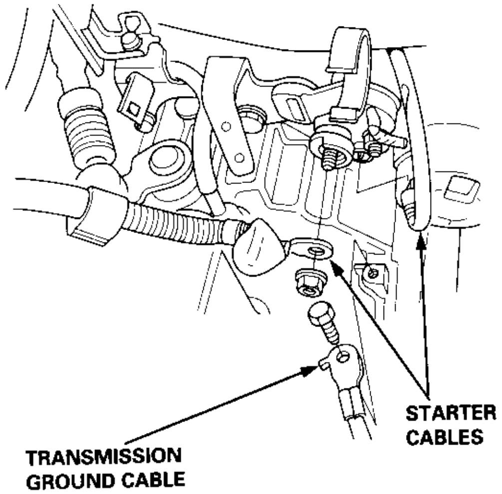
CAUTION: Use fender covers to avoid damaging painted surfaces.

1. Disconnect the negative (–) cable first, then the positive (+) cable from the battery.
2. Remove the intake air duct and air cleaner housing (see section 5).
3. Remove the slave cylinder and clutch hose bracket.

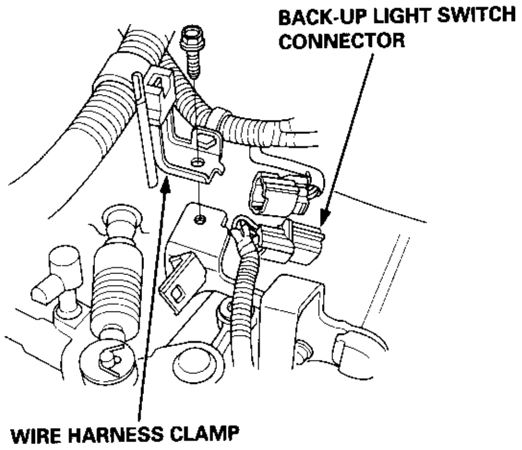
   NOTE:
   - Do not operate the clutch pedal once the slave cylinder has been removed.
   - Take care not to bend the clutch line.



4. Disconnect the starter cables and transmission ground cable.



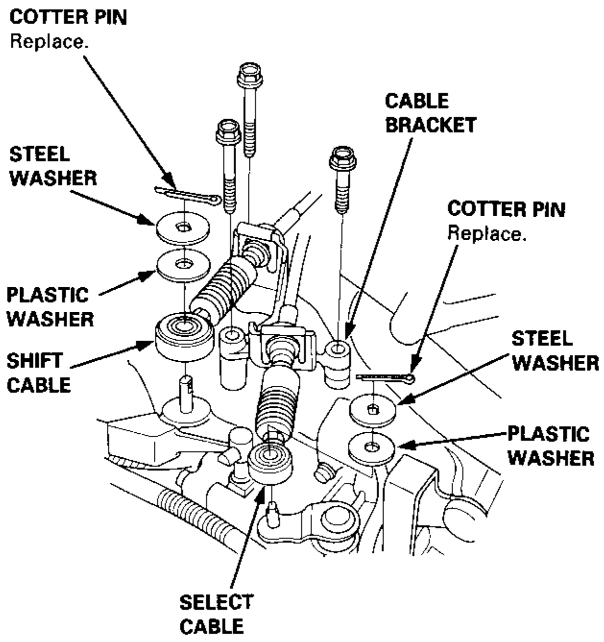
5. Disconnect the back-up light switch connector and wire harness clamp.



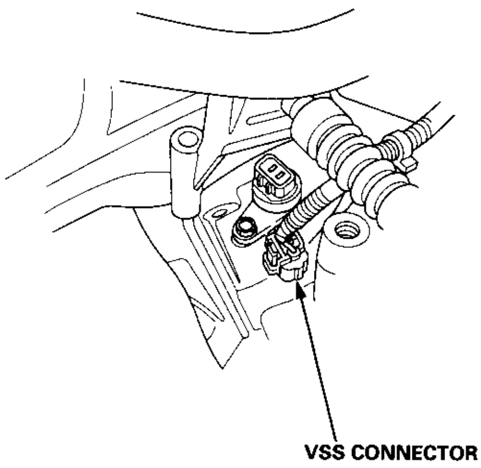
(cont'd)

Removal (cont'd)

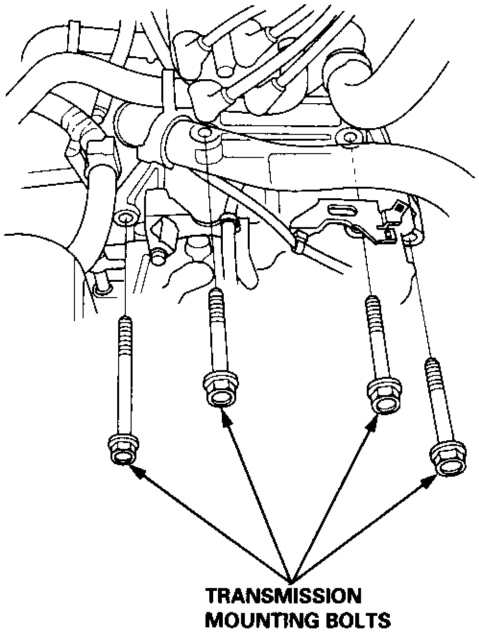
6. Remove the cotter pins, then remove the steel washers, plastic washers, shift cable, and select cable from the levers.



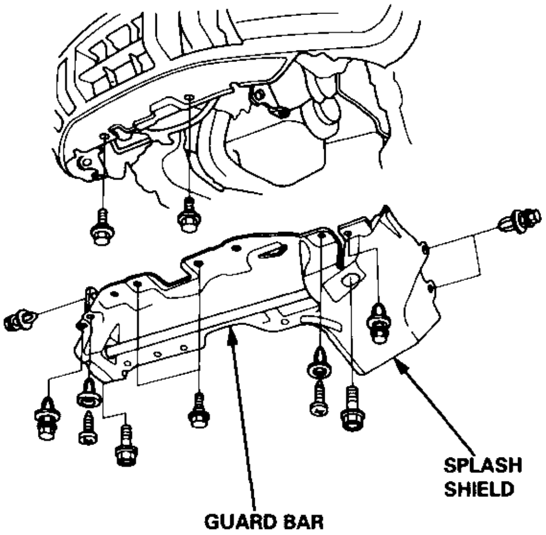
7. Remove the cable bracket from the clutch housing.
8. Disconnect the vehicle speed sensor (VSS) connector.



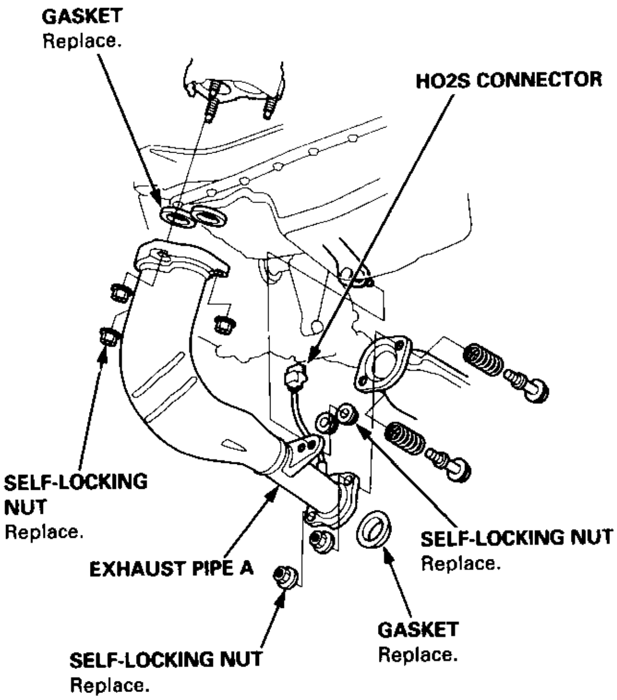
9. Remove the four upper transmission mounting bolts.



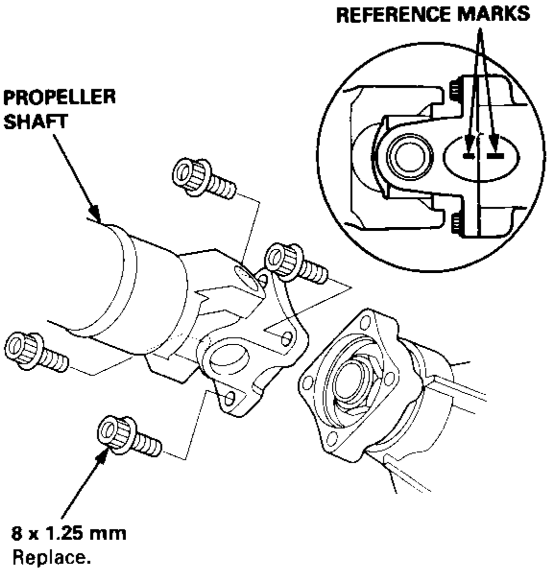
10. Drain transmission fluid (see page 13-3).
11. Remove the guard bar and the splash shield.



12. Disconnect the heated oxygen sensor (HO2S) connector, then remove the exhaust pipe A.

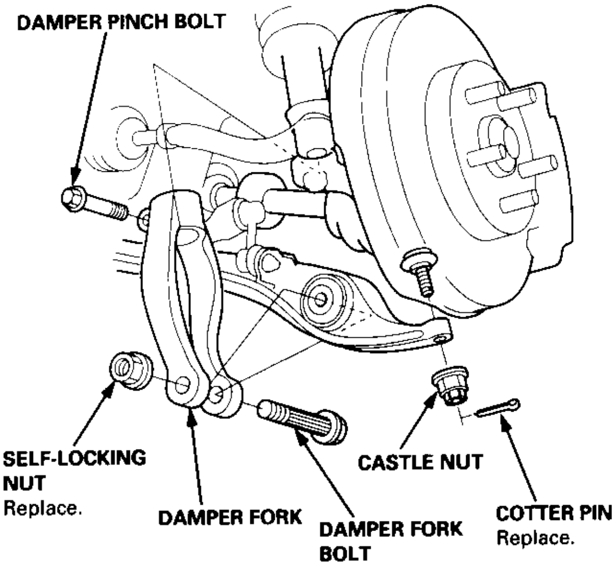


13. Mark reference marks on the joint of the transfer and the propeller shaft.

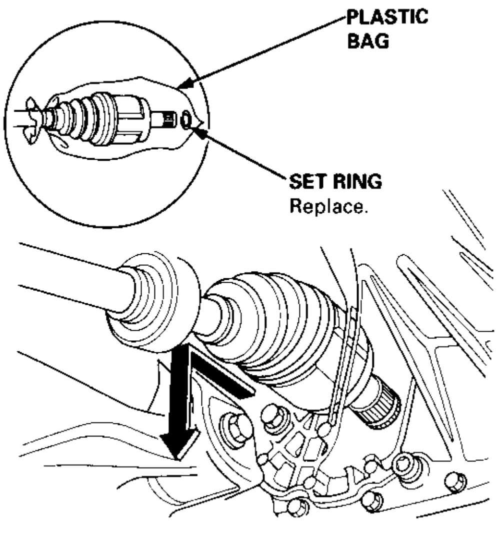


14. Separate the propeller shaft from the transfer assembly.

15. Remove the cotter pins, and castle nuts, then separate the ball joints from the lower arm (see section 18).



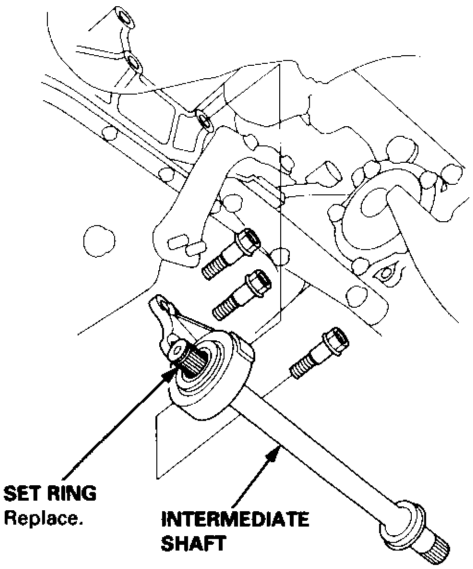
16. Remove the right damper fork bolt, then separate right damper fork and damper.
17. Pry the right driveshaft out of the differential, and pry the left driveshaft out of the intermediate shaft (see section 18).
18. Pull out the inboard joint, and remove the right and left driveshaft (see section 18).
19. Tie plastic bags over the driveshaft ends. Coat all precision finished surfaces with clean engine oil.



(cont'd)

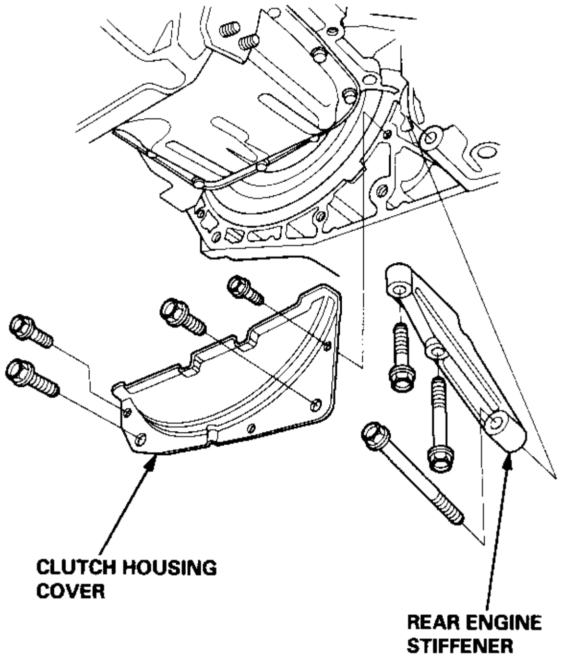
Removal (cont'd)

20. Remove the intermediate shaft.

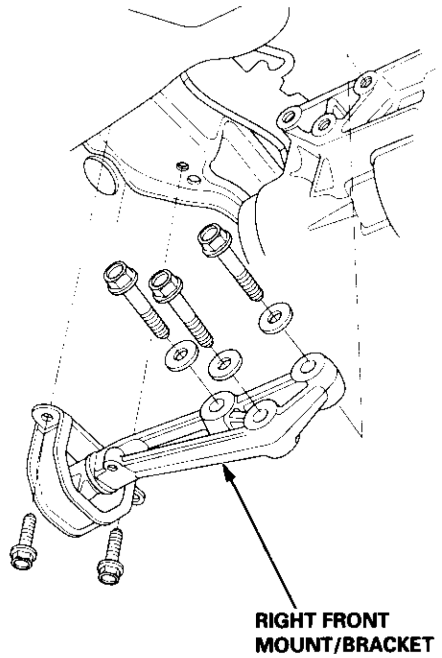


21. Tie plastic bags over the both ends of the intermediate shaft. Coat all precision finished surfaces with clean engine oil.

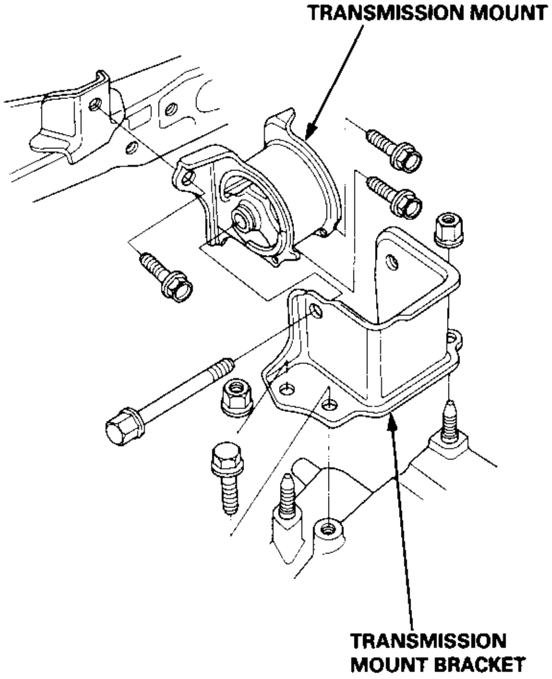
22. Remove the rear engine stiffener and clutch housing cover.



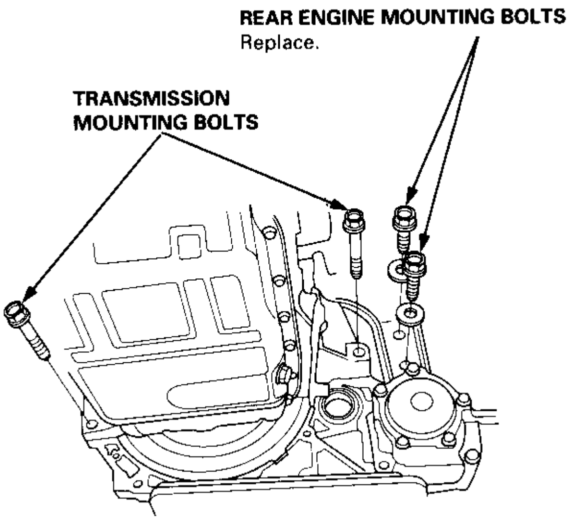
23. Remove the right front mount/bracket.



24. Place a jack under the transmission, raise it just enough to take it off of the mounts, then remove the transmission mount bracket and transmission mount.



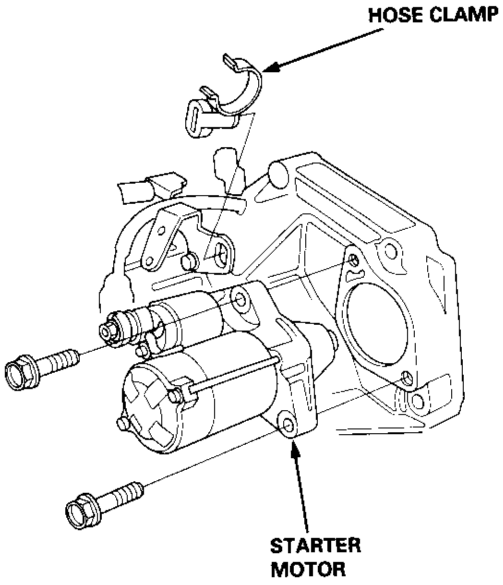
25. Remove the transmission mounting bolts and the rear engine mounting bolts.



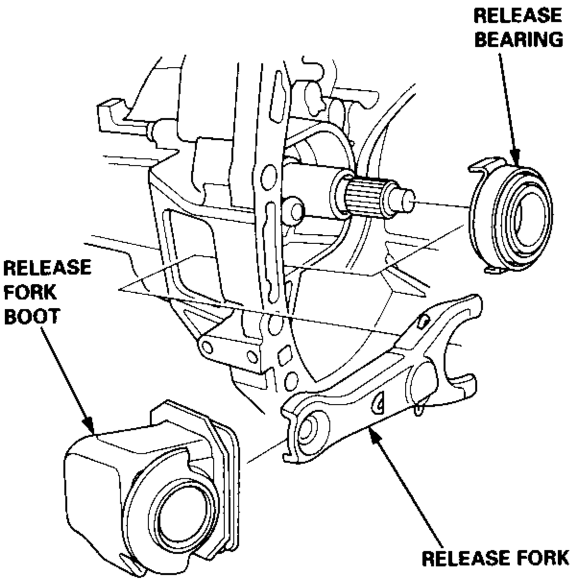
26. Pull the transmission away from the engine until it clears the mainshaft, then lower it on the transmission jack.

NOTE: Take care not to bend the clutch line.

27. Remove the starter motor and hose clamp from the transmission housing.



28. Remove the release fork boot, release bearing, and release fork from the clutch housing.



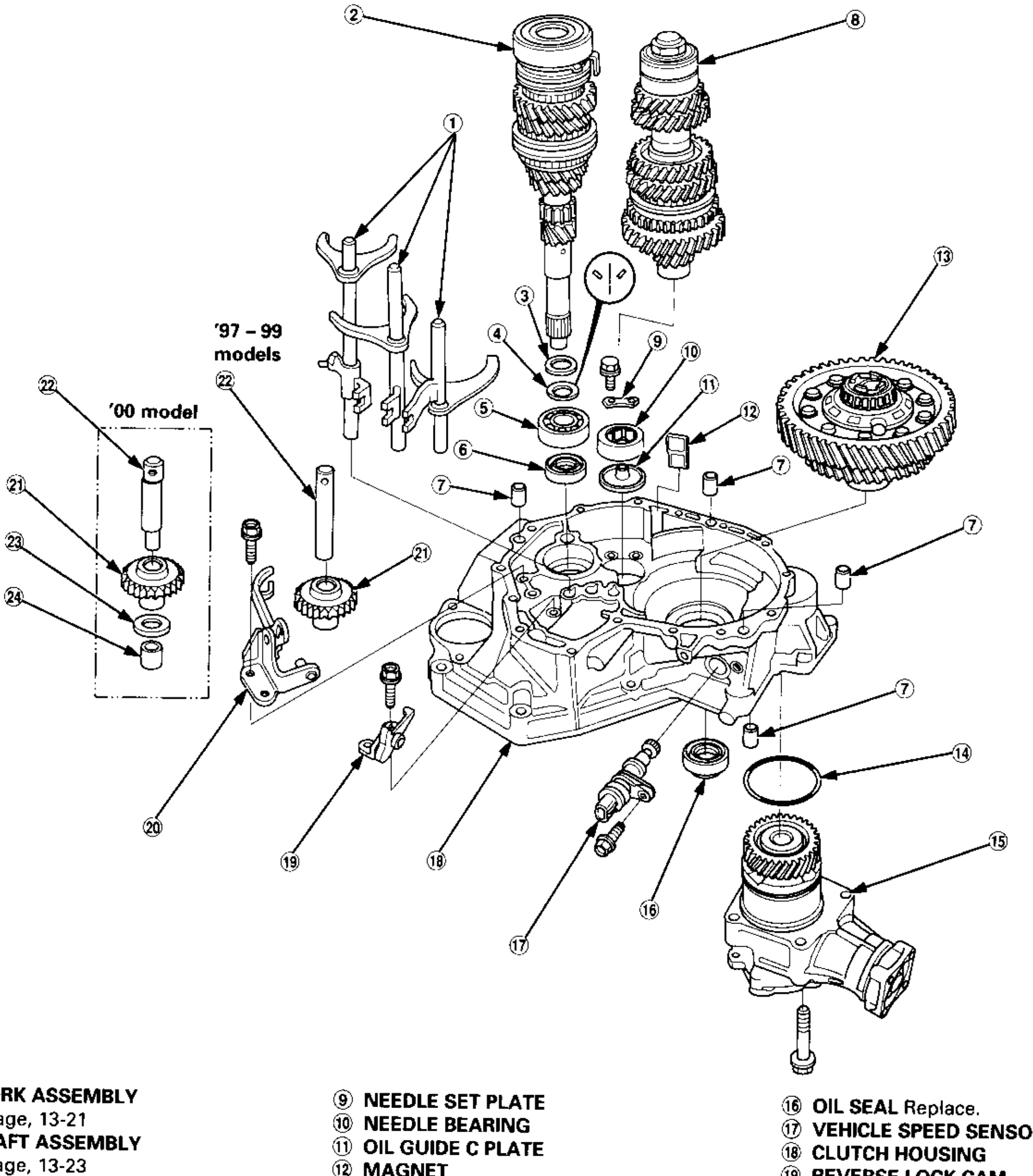
Illustrated Index

Refer to the drawing below for the transmission disassembly/reassembly.
Clean all the parts thoroughly in solvent, and dry with compressed air.

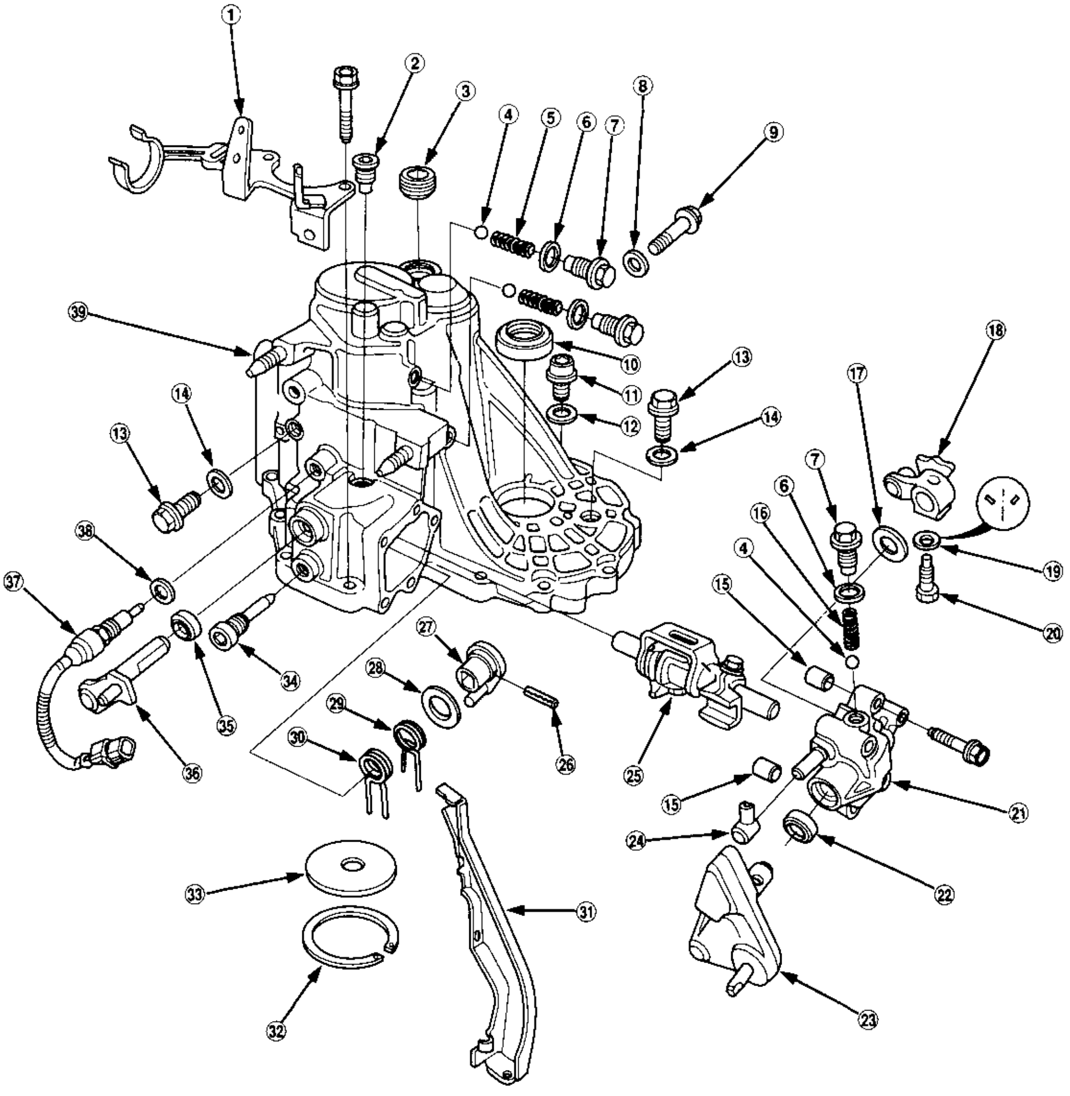
Lubricate all the parts with MTF before reassembly.

NOTE:

- This transmission uses no gaskets between the major housings; use liquid gasket (P/N 08718 – 0001 or 08718 – 0003) (see page 13-69, 71).
- Always clean the magnet ⑫ whenever the transmission housing is disassembled.
- Inspect all the bearings for wear and operation.



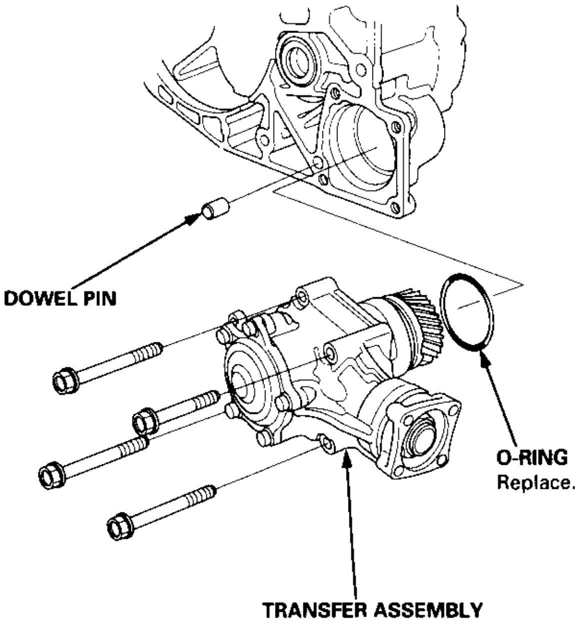
① **SHIFT FORK ASSEMBLY**
• Index page, 13-21
② **MAINSHAFT ASSEMBLY**
• Index page, 13-23
③ **28 mm WASHER**
④ **28 mm SPRING WASHER**
⑤ **BALL BEARING**
⑥ **OIL SEAL** Replace.
⑦ **14 x 20 mm DOWEL PIN**
⑧ **COUNTERSHAFT ASSEMBLY**
• Index page, 13-28
⑨ **NEEDLE SET PLATE**
⑩ **NEEDLE BEARING**
⑪ **OIL GUIDE C PLATE**
⑫ **MAGNET**
⑬ **DIFFERENTIAL ASSEMBLY**
• Index page, 13-38
⑭ **O-RING** Replace.
⑮ **TRANSFER ASSEMBLY**
• Index page, 13-44
⑯ **OIL SEAL** Replace.
⑰ **VEHICLE SPEED SENSOR**
⑱ **CLUTCH HOUSING**
⑲ **REVERSE LOCK CAM**
⑳ **REVERSE SHIFT HOLDER**
㉑ **REVERSE IDLE GEAR**
㉒ **REVERSE GEAR SHAFT**
㉓ **THRUST WASHER, 20 x 36 x 2**
㉔ **COLLER, 15 x 20 x 20**



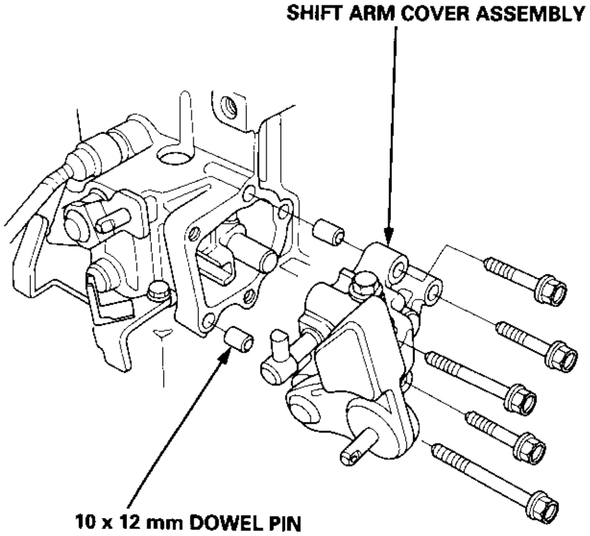
① **TRANSMISSION HANGER**
② **INTERLOCK BOLT**
③ **32 mm SEALING BOLT**
④ **STEEL BALL (5/16 in.)**
⑤ **SPRING 26.1 mm (1.03 in.)**
⑥ **WASHER** Replace.
⑦ **SET BALL SCREW**
⑧ **WASHER** Replace.
⑨ **FLANGE BOLT**
⑩ **OIL SEAL** Replace.
⑪ **DRAIN PLUG**
⑫ **WASHER** Replace.
⑬ **FILLER PLUG**
⑭ **WASHER** Replace.
⑮ **10 x 12 mm DOWEL PIN**
⑯ **SPRING 25.6 mm (1.01 in.)**
⑰ **THRUST WASHER**
⑱ **SHIFT ARM C**
⑲ **CONICAL SPRING WASHER**
⑳ **SPECIAL BOLT**
㉑ **SHIFT ARM COVER**
㉒ **OIL SEAL** Replace.
㉓ **SHIFT LEVER**
㉔ **BREATHER CAP**
㉕ **SHIFT ARM SHAFT ASSEMBLY**
㉖ **SPRING PIN** Replace.
㉗ **SELECT ARM**
㉘ **THRUST WASHER**
㉙ **5TH/REVERSE SELECT RETURN SPRING**
㉚ **SELECT RETURN SPRING**
㉛ **OIL GUTTER PLATE**
㉜ **78 mm SHIM**
㉝ **OIL GUIDE M PLATE**
㉞ **SELECT SPRING BOLT**
㉟ **OIL SEAL** Replace.
㊱ **SELECT LEVER**
㊲ **BACK-UP LIGHT SWITCH**
㊳ **WASHER** Replace.
㊴ **TRANSMISSION HOUSING**

Disassembly

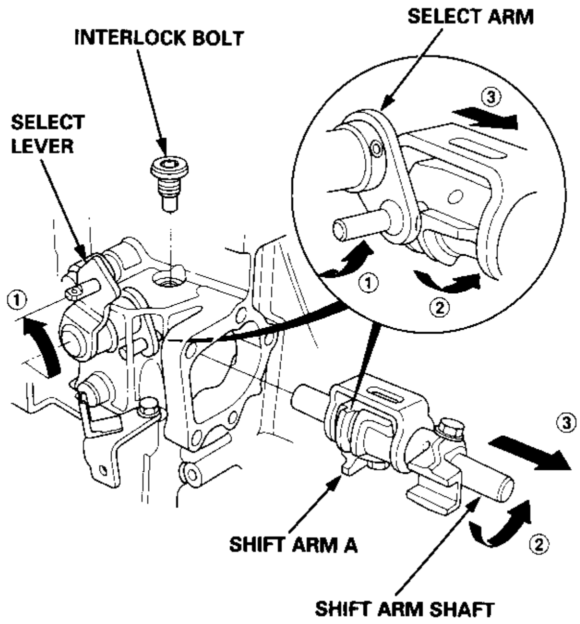
1. Remove the transfer assembly.



2. Remove the shift arm cover assembly, and wipe it clean of the sealant.



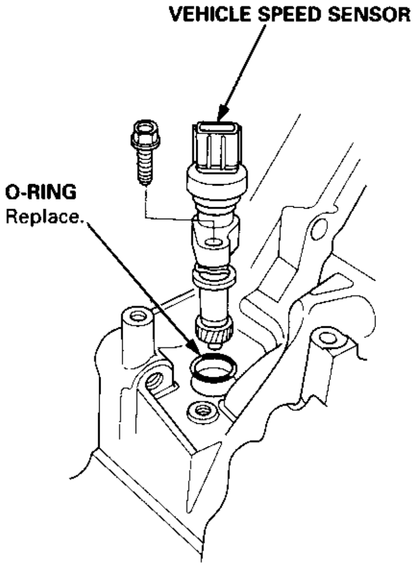
3. Remove the interlock bolt.



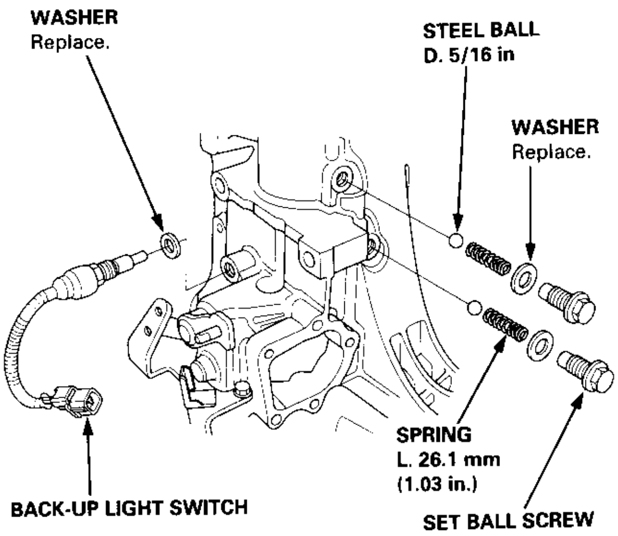
4. Turn the select lever counterclockwise, then remove the shift arm A finger from the groove of the shift forks.

5. Turn the shift arm shaft counterclockwise and remove the select arm finger from the groove of the shift arm A, then remove the shift arm shaft assembly.

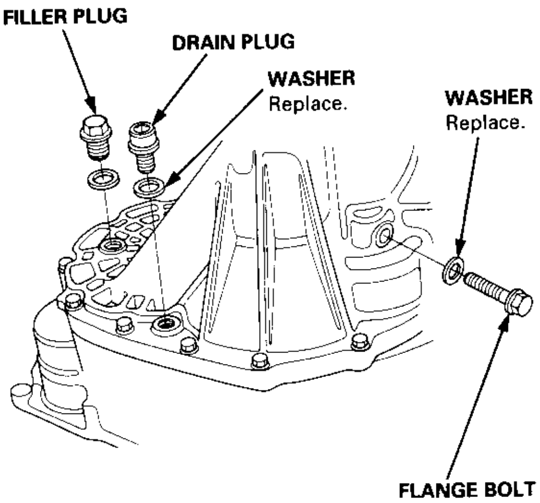
6. Remove the vehicle speed sensor (VSS).



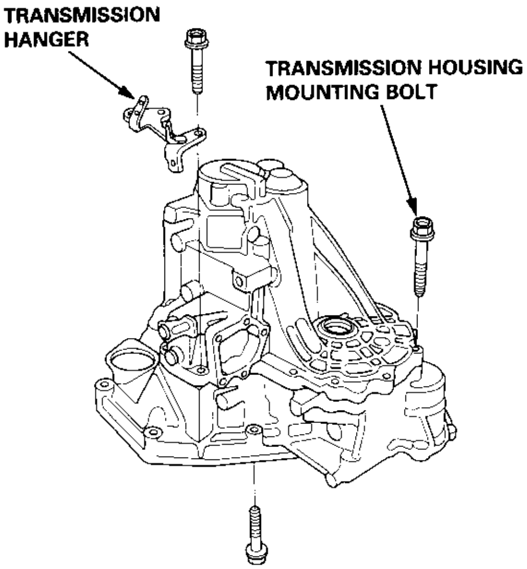
7. Remove the set ball screws, washers, springs, steel balls, and back-up light switch.



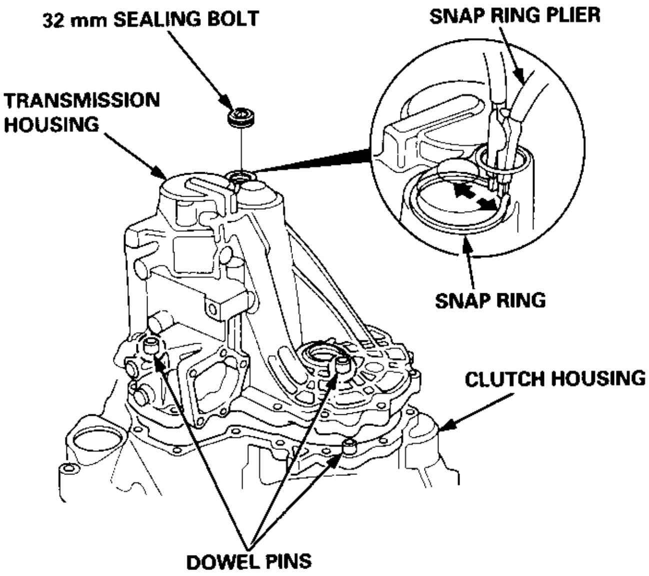
8. Remove the flange bolt, drain plug, and filler plug.



9. Remove the transmission housing mounting bolts in a crisscross pattern in several steps.



10. Remove the 32 mm sealing bolt.

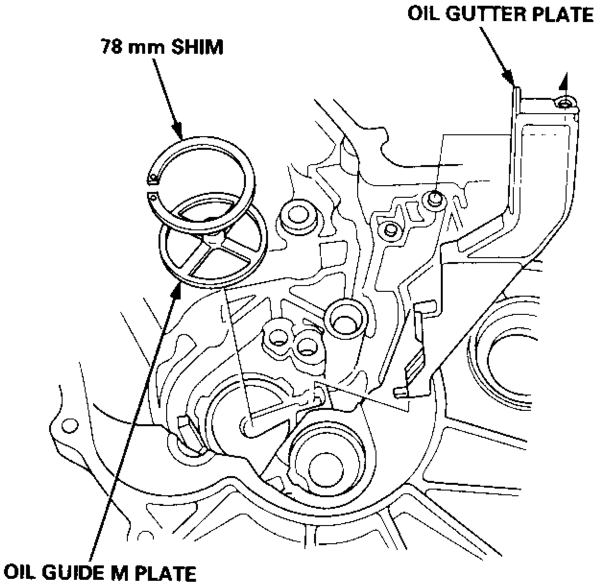


11. Expand the snap ring on the countershaft ball bearing, and remove it from the groove using a pair of snap ring plier.
12. Separate the transmission housing from the clutch housing.
13. Remove the dowel pins, and wipe it clean of the sealant.

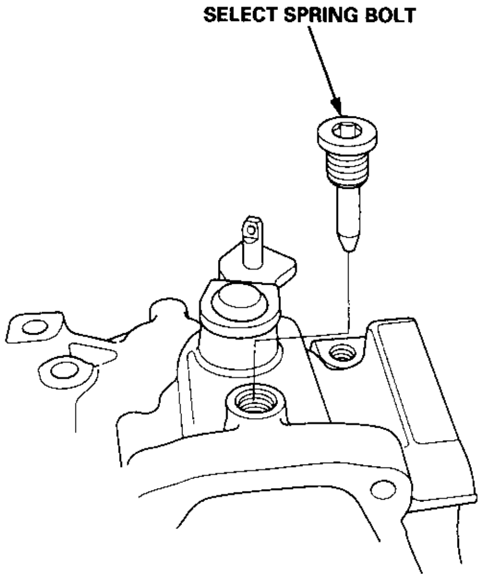
(cont'd)

Disassembly (cont'd)

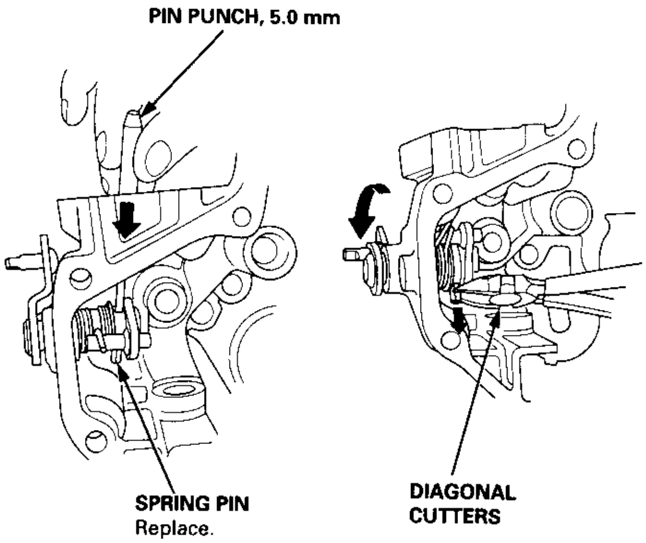
14. Remove the oil gutter plate, 78 mm shim, and oil guide M plate.



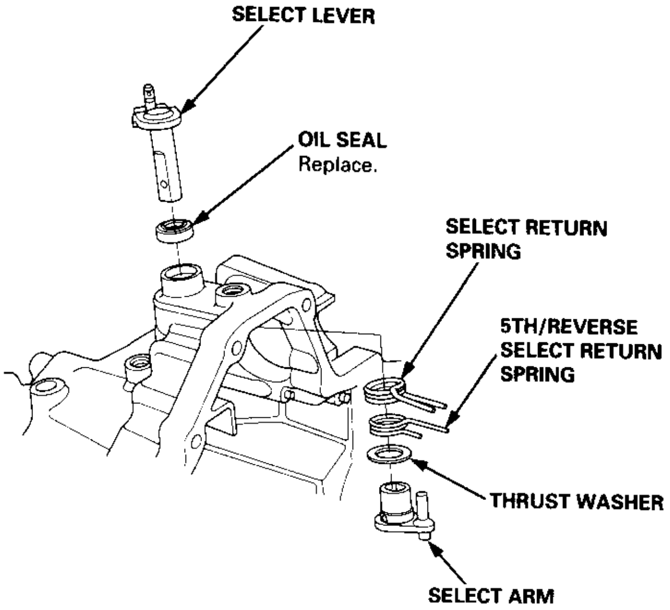
15. Remove the select spring bolt.



16. Remove the spring pin using the pin punch and a pair of diagonal cutters.

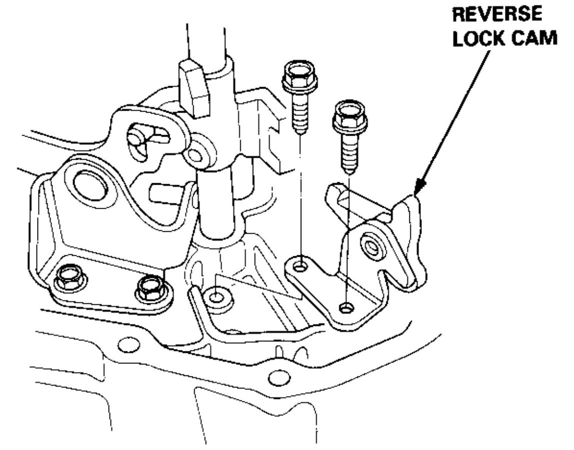


17. Remove the select lever, springs, washer, and select arm.



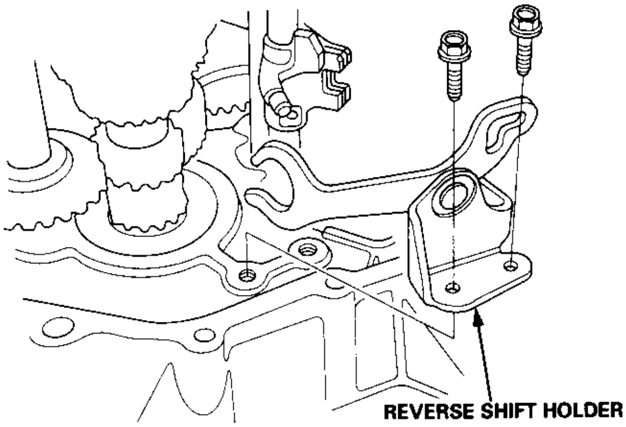
18. Remove the oil seal.

19. Remove the reverse lock cam.

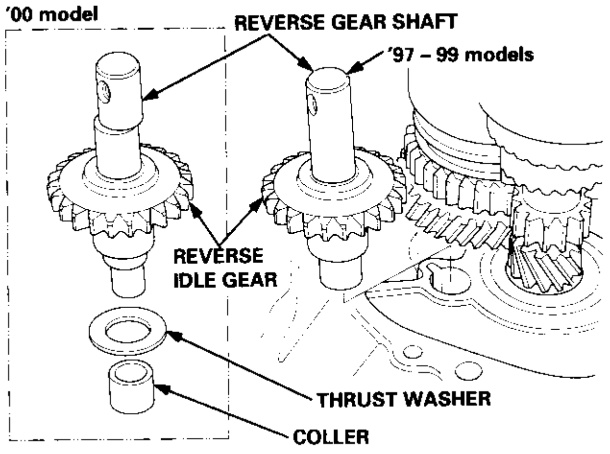


20. If necessary, check the clearance of the reverse shift holder (see page 13-20).

21. Remove the reverse shift holder.

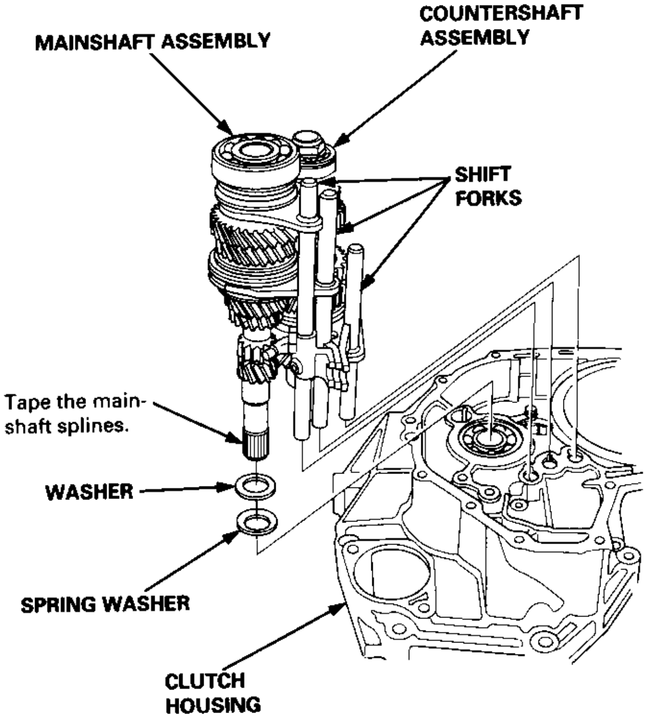


22. '97 – 99 models: Remove the reverse gear shaft and the reverse idler gear.
    '00 model: Remove the reverse gear shaft, reverse idler gear, thrust washer and the coller.

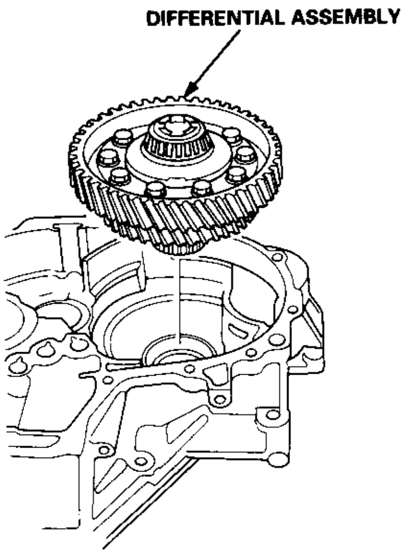


23. Remove the mainshaft and countershaft assemblies with the shift forks from the clutch housing.

    NOTE: Before removing the mainshaft and countershaft assemblies, tape the mainshaft spline to protect it.



24. Remove the differential assembly.

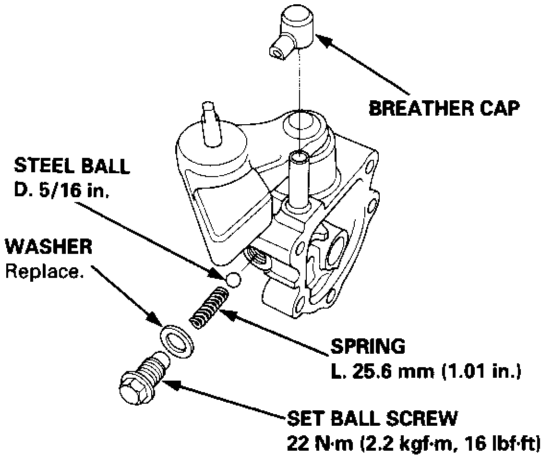


Shift Arm Cover/Shift Arm Shaft Assembly

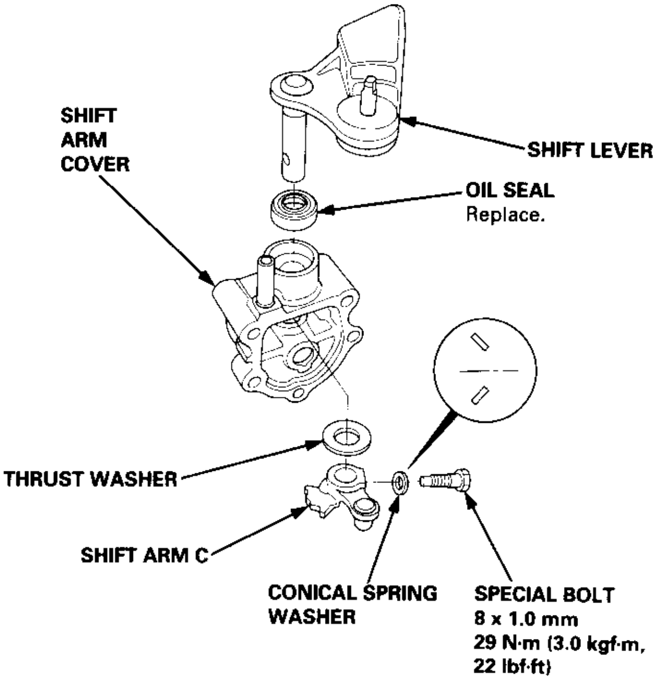
Disassembly/Reassembly

Shift Arm Cover Assembly

1. Remove the breather cap and set ball screw, washer, spring, and steel ball.



2. Remove the special bolt and conical spring washers.

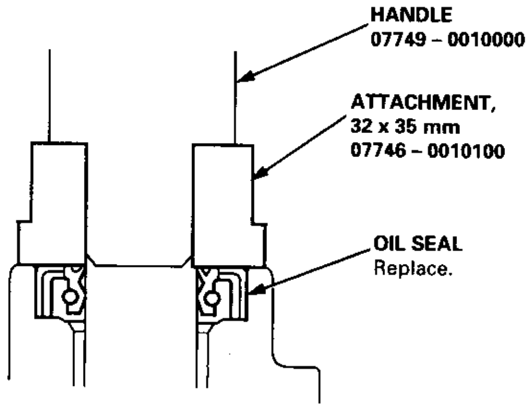


3. Remove the shift lever, shift arm C, and thrust washer from the shift arm cover.

4. Remove the oil seal.

NOTE: Install the thrust washer with the alloy surface toward shift arm cover.

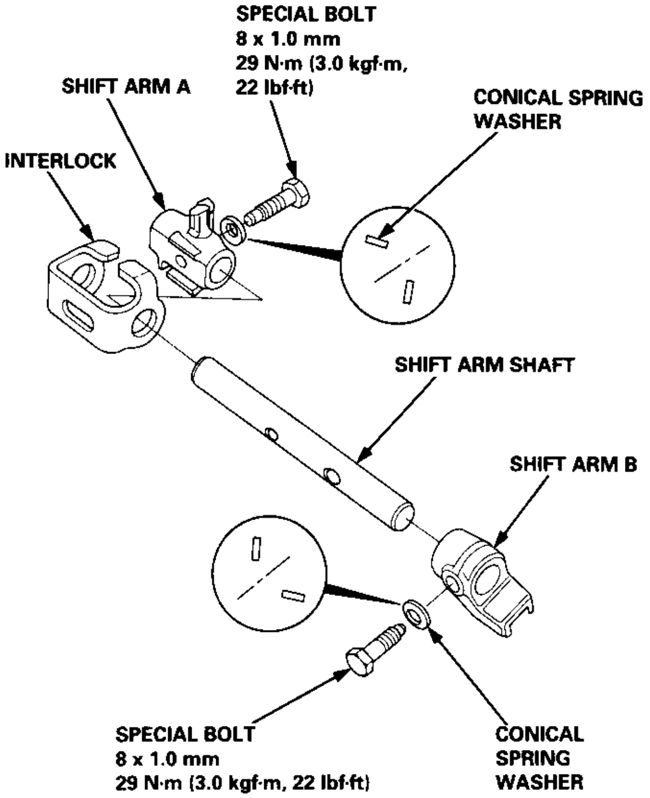
5. Install the oil seal in to the shift arm cover using the special tools.



6. Reassemble the shift arm cover in the reverse order of disassembly.

Shift Arm Shaft Assembly

1. Remove the special bolts and conical spring washers.



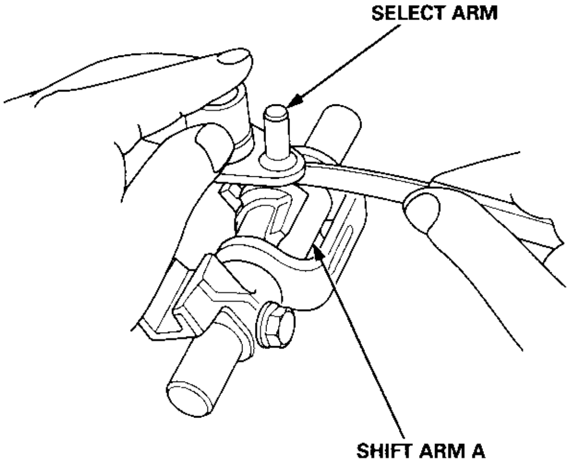
2. Remove the interlock, shift arm A, and shift arm B from the shift arm shaft.

3. Install in the reverse order of removal.

Clearance Inspection

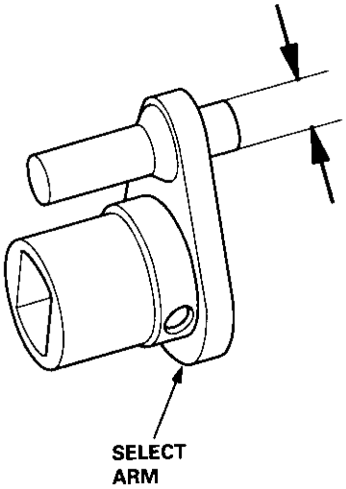
1. Measure the clearance between the shift arm A and select arm.

   Standard: **0.05 – 0.25 mm (0.002 – 0.01 in)**
   Service Limit: 0.5 mm (0.02 in)



2. If the clearance are more than the service limit, measure the diameter of the select arm pin.

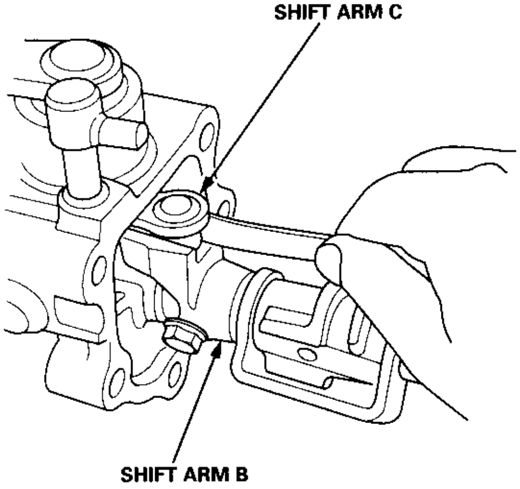
   Standard: 7.9 – 8.0 mm (0.311 – 0.315 in)



- If the diameter of the select arm pin is less than the service limit, replace the select arm with a new one.
- If the diameter of the select arm pin is within the service limit, replace the shift arm A with a new one.

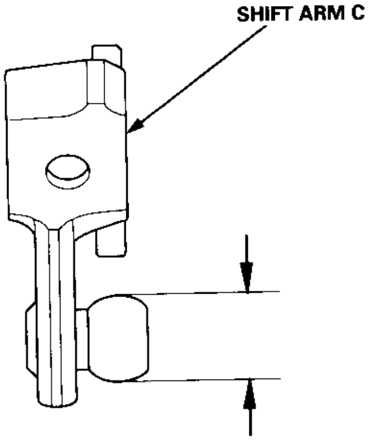
3. Measure the clearance between the shift arm B and shift arm C.

   Standard: **0.05 – 0.25 mm (0.002 – 0.01 in)**
   Service Limit: 0.5 mm (0.02 in)



4. If the clearance are more than the service limit, measure the diameter of the shift arm C.

   Standard: 12.9 – 13.0 mm (0.508 – 0.512 in)



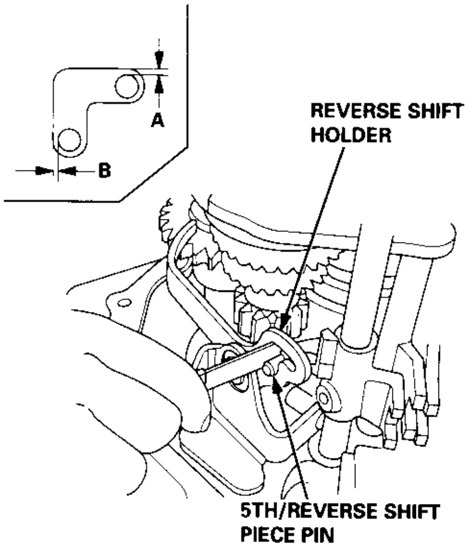
- If the diameter of the shift arm C is less than the service limit, replace the shift arm C with a new one.
- If the diameter of the shift arm C is within the service limit, replace the shift arm B with a new one.

Reverse Shift Holder

Clearance Inspection

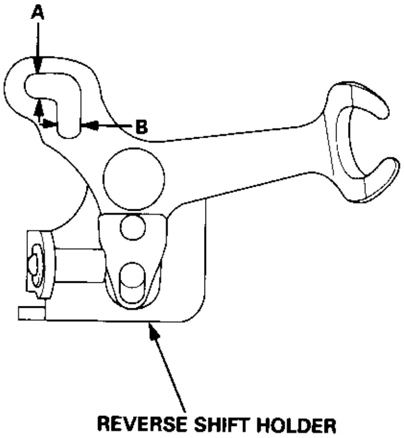
1. Measure the clearances between the reverse shift holder and 5th/reverse shift piece pin.

Standard: A: 0.05 – 0.35 mm (0.002 – 0.014 in)
B: 0.4 – 0.8 mm (0.02 – 0.03 in)
Service Limit: A: 0.5 mm (0.02 in)
B: 1.0 mm (0.04 in)



2. If the clearances are more than the service limit, measure the widths of the groove in the reverse shift holder.

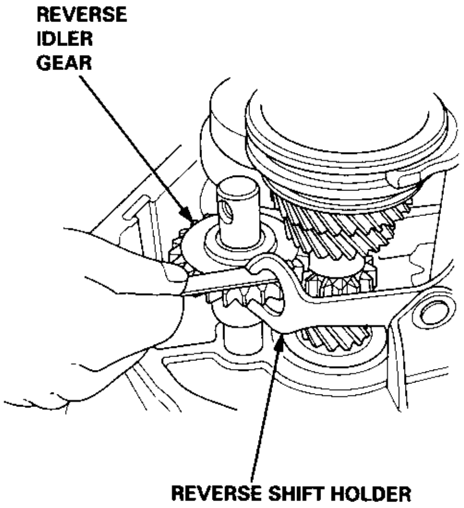
Standard: A: 7.05 – 7.25 mm (0.278 – 0.285 in)
B: 7.4 – 7.7 mm (0.29 – 0.30 in)



- If the widths of the grooves are not within the standard, replace the reverse shift holder with a new one.
- If the widths of the grooves are within the standard, replace the 5th/reverse shift piece with a new one.

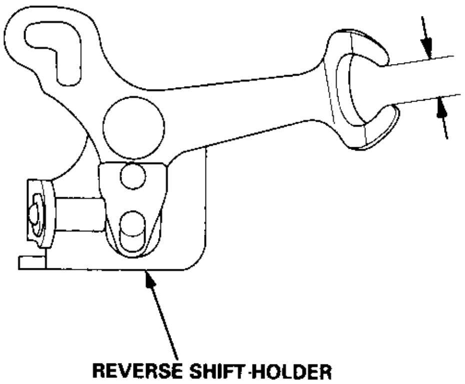
3. Measure the clearance between the reverse idler gear and reverse shift holder.

Standard: 0.5 – 1.1 mm (0.02 – 0.04 in)
Service Limit: 1.8 mm (0.07 in)



4. If the clearance is more than the service limit, measure the width of the reverse shift holder.

Standard: 13.0 – 13.3 mm (0.512 – 0.524 in)

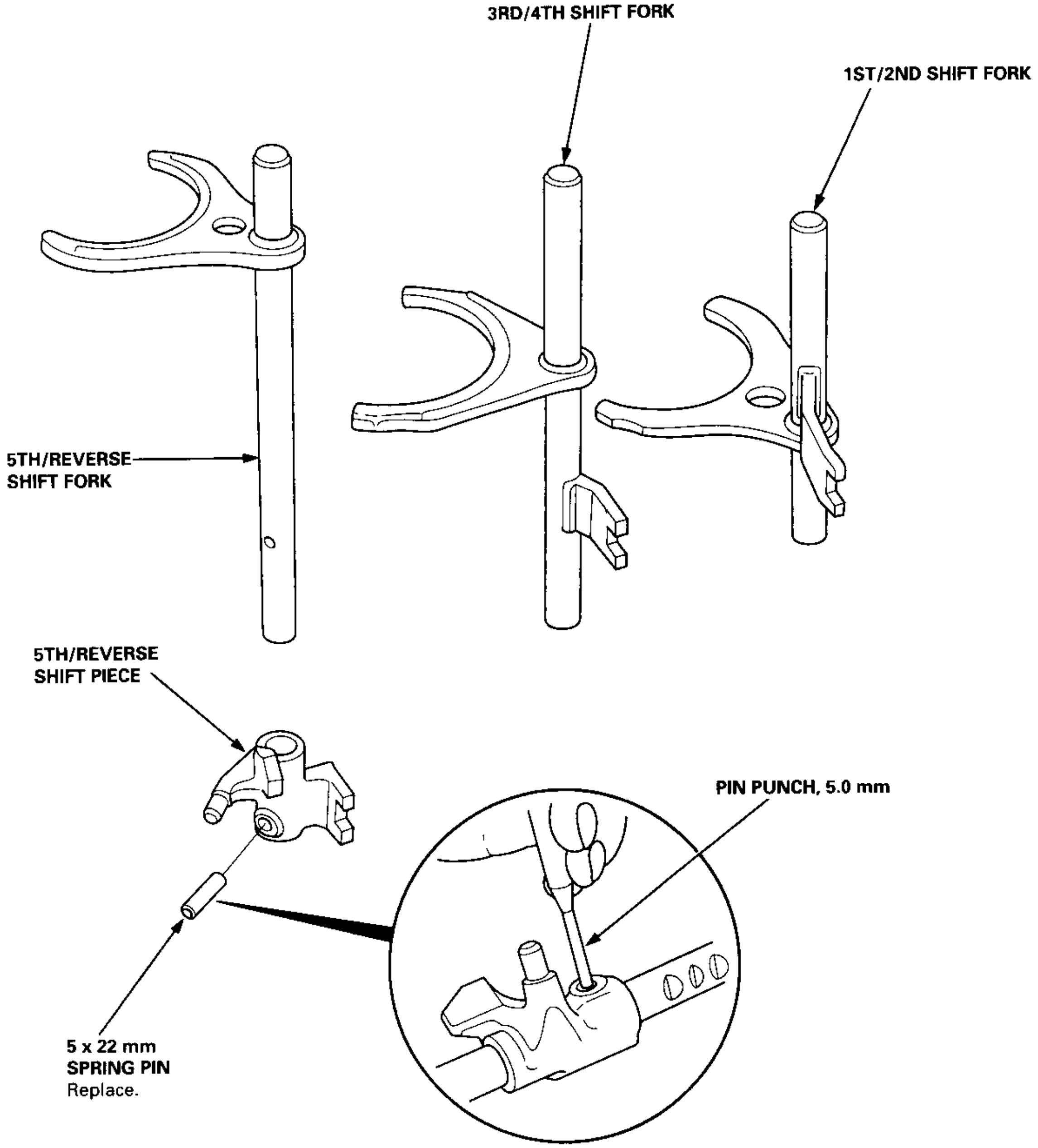


- If the width is not within the standard, replace the reverse shift holder with a new one.
- If the width is within the standard, replace the reverse idler gear with a new one.

Shift Fork Assembly

Disassembly/Reassembly

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



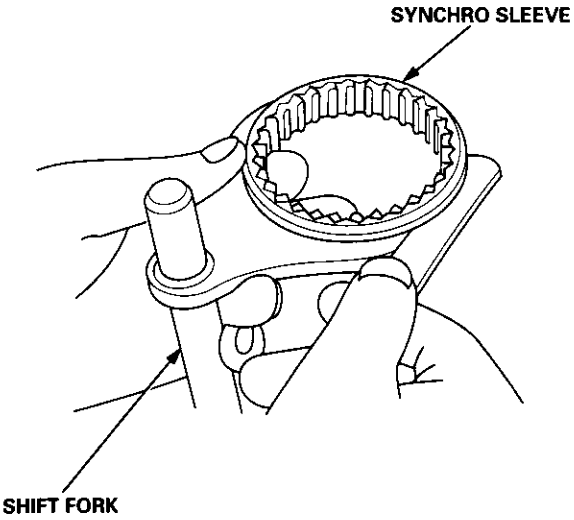
Shift Fork Assembly

Clearance Inspection

NOTE: The synchro sleeve and synchro hub should be replaced as a set.

1. Measure the clearance between each shift fork and its matching synchro sleeve.

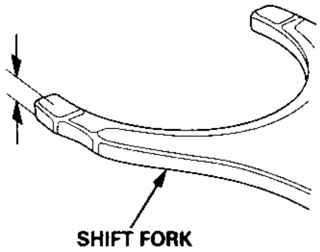
   Standard: 0.35 – 0.65 mm (0.014 – 0.026 in)
   Service Limit: 1.0 mm (0.039 in)



2. If the clearance exceeds the service limit, measure the thickness of the shift fork fingers.

Standard:

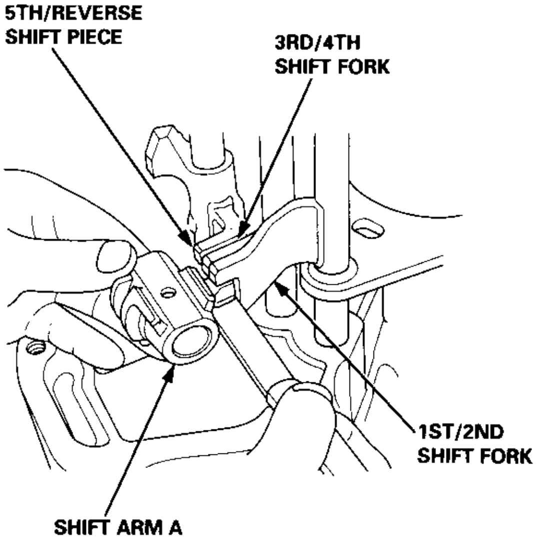
3rd/4th shift fork	7.4 – 7.6 mm (0.29 – 0.30 in)
1st/2nd shift fork 5th shift fork	6.2 – 6.4 mm (0.24 – 0.25 in)



- If the thickness of the shift fork finger is less than the standard, replace the shift fork with a new one.
- If the thickness of the shift fork finger is within the standard, replace the synchro sleeve with a new one.

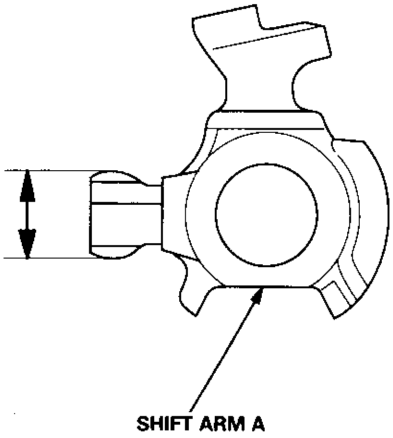
3. Measure the clearance between the shift fork and the shift arm A.

   Standard: 0.2 – 0.5 mm (0.008-0.020 in)
   Service Limit: 0.6 mm (0.024 in)



4. If the clearance exceeds the service limit, measure the width of the shift arm A.

   Standard: 12.9 – 13.0 mm (0.508 – 0.512 in)



- If the width of the shift arm A is less than the standard, replace the shift arm A with a new one.
- If the width of the shift arm A is within the standard, replace the shift fork or shift piece with a new ones.

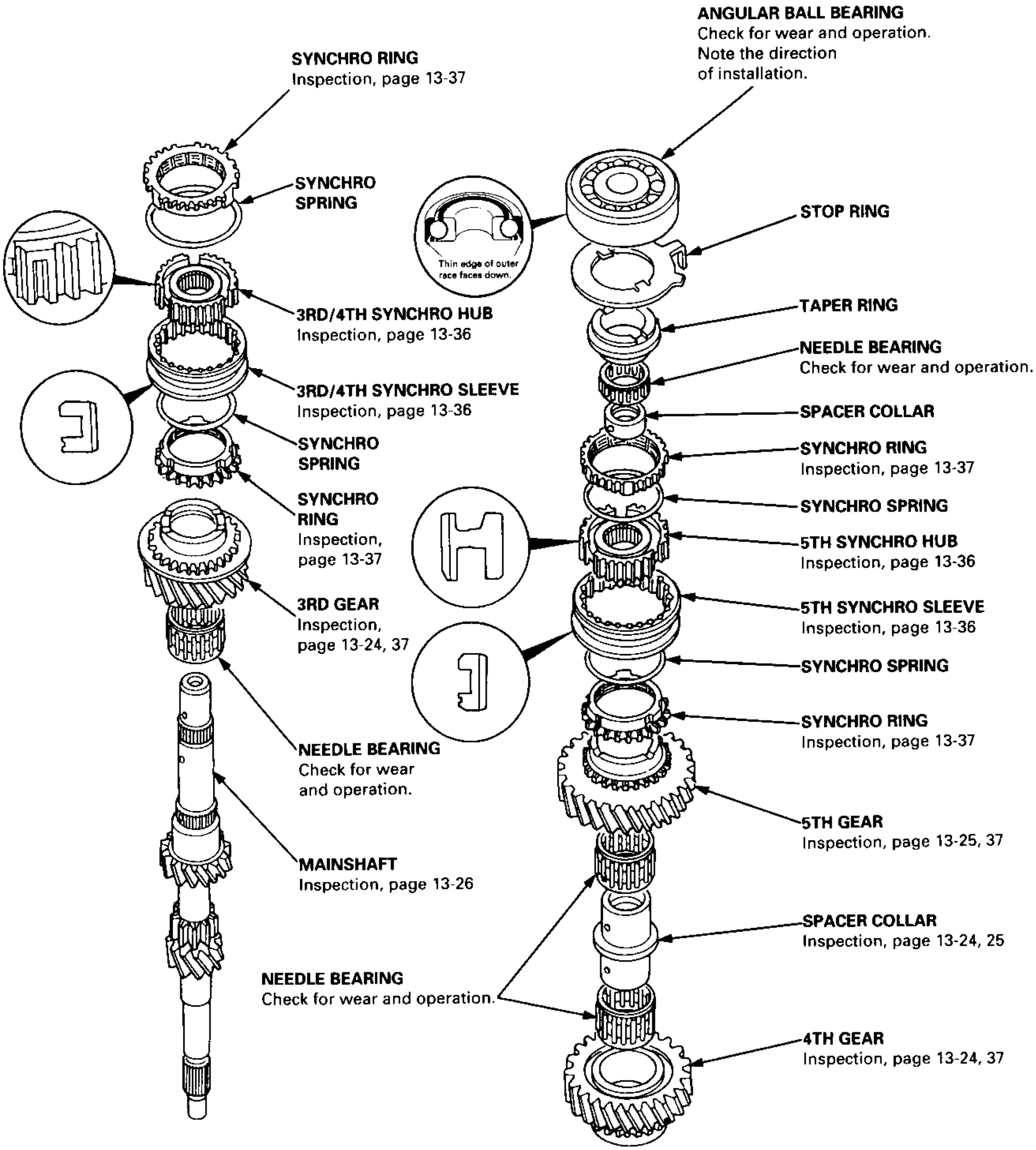
Mainshaft Assembly

Index

Note the following during reassembly:

- The 3rd/4th, and 5th synchro hubs, and the ball bearing are installed with a press.
- Install the angular ball bearing with the thin-edged outer race facing the stop ring.

Prior to reassembling, clean all the parts in solvent, dry them, and apply lubricant to any contact surfaces. The 3rd/4th and 5th synchro hubs, however, should be installed with a press before lubricating them.



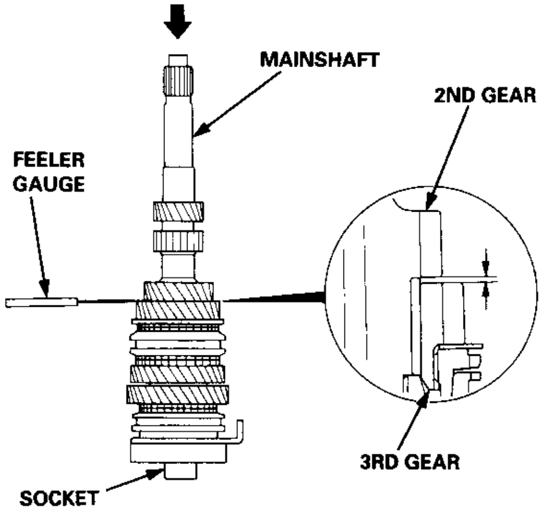
Mainshaft Assembly

Clearance Inspection

NOTE: If replacement is required, always replace the synchro sleeve and hub as a set.

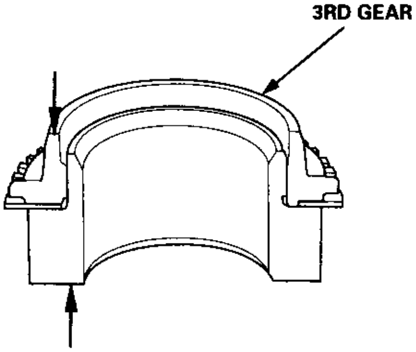
1. Support the bearing inner race with a socket, and push down on the mainshaft.
2. Measure the clearance between 2nd and 3rd gears.

Standard: **0.06 – 0.21 mm (0.002 – 0.008 in)**
Service Limit: 0.3 mm (0.01 in)



3. If the clearance is more than the service limit, measure the thickness of 3rd gear.

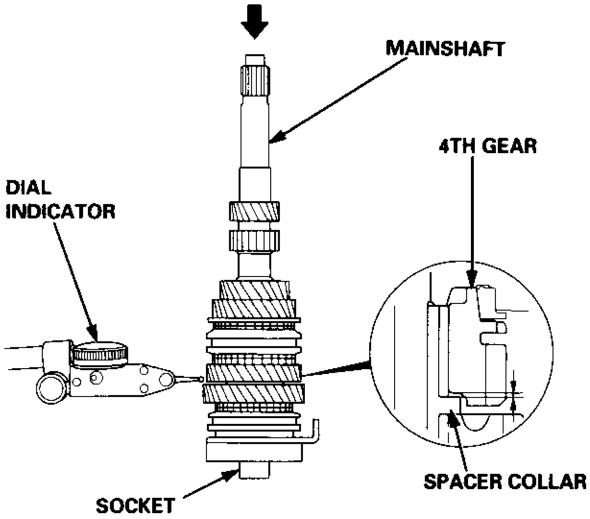
Standard: **34.92 – 34.97 mm (1.375 – 1.377 in)**
Service Limit: 34.8 mm (1.37 in)



- If the thickness of 3rd gear is less than the service limit, replace 3rd gear with a new one.
- If the thickness of 3rd gear is within the service limit, replace the 3rd/4th synchro hub with a new one.

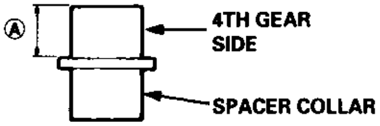
4. Measure the clearance between 4th gear and the spacer collar.

Standard: **0.06 – 0.21 mm (0.002 – 0.008 in)**
Service Limit: 0.3 mm (0.01 in)



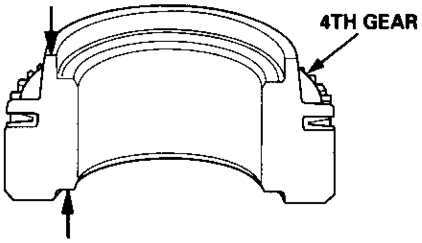
5. If the clearance is more than the service limit, measure distance Ⓐ on the spacer collar.

Standard: **26.03 – 26.08 mm (1.025 – 1.027 in)**
Service Limit: 26.01 mm (1.024 in)



6. If distance Ⓐ is less than the service limit, replace the spacer collar with a new one.
If distance Ⓐ is within the service limit, measure the thickness of 4th gear.

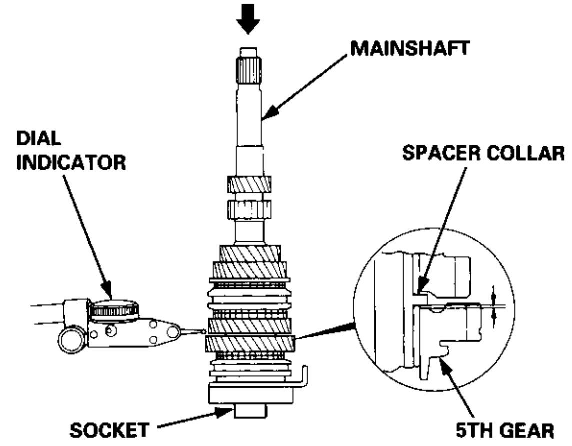
Standard: **31.42 – 31.47 mm (1.237 – 1.239 in)**
Service Limit: 31.3 mm (1.23 in)



- If the thickness of 4th gear is less than the service limit, replace 4th gear with a new one.
- If the thickness of 4th gear is within the service limit, replace the 3rd/4th synchro hub with a new one.

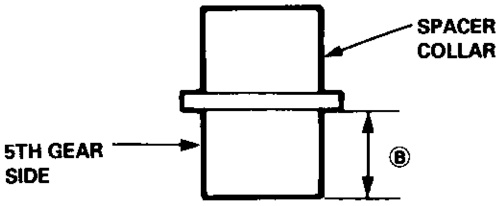
7. Measure the clearance between the spacer collar and 5th gear.

Standard: 0.06 – 0.21 mm (0.002 – 0.008 in)
Service Limit: 0.3 mm (0.01 in)



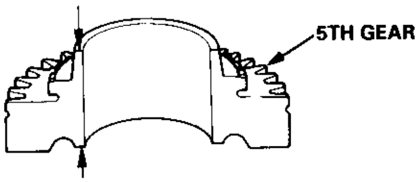
8. If the clearance is more than the service limit, measure distance Ⓑ on the spacer collar.

Standard: 26.03 – 26.08 mm (1.025 – 1.027 in)
Service Limit: 26.01 mm (1.024 in)



9. If distance Ⓑ is less than the service limit, replace the spacer collar with a new one.
If distance Ⓑ is within the service limit, measure the thickness of 5th gear.

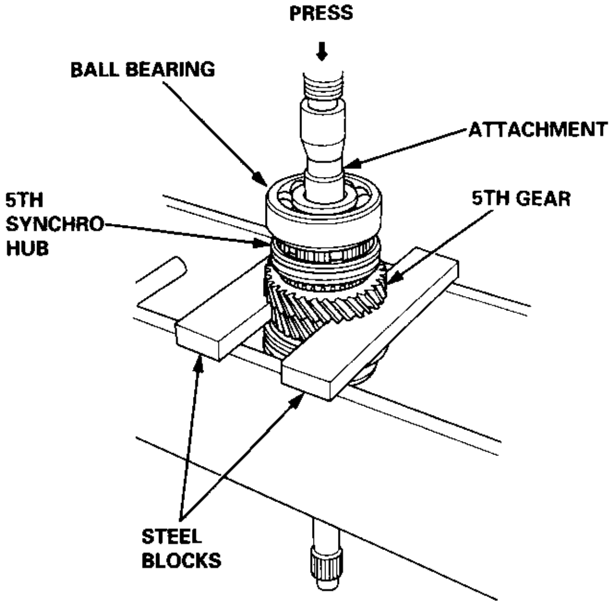
Standard: 30.92 – 30.97 mm (1.217 – 1.219 in)
Service Limit: 30.8 mm (1.21 in)



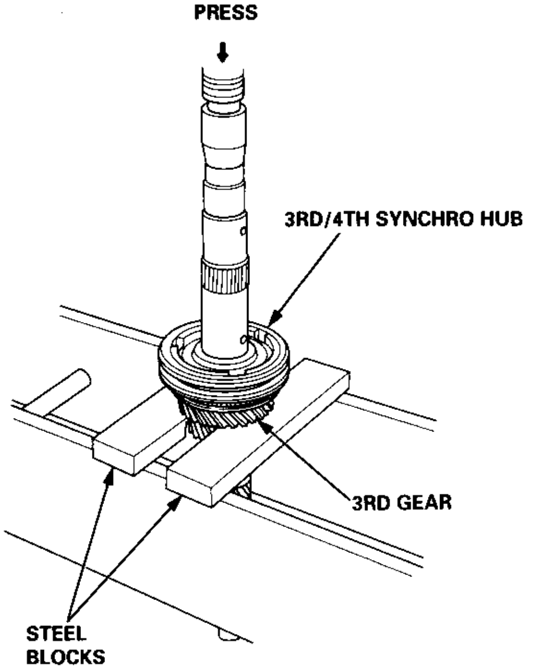
- If the thickness of 5th gear is less than the service limit, replace 5th gear with a new one.
- If the thickness of 5th gear is within the service limit, replace the 5th synchro hub with a new one.

Disassembly

1. Support 5th gear on steel blocks, and press the mainshaft out of the 5th synchro hub, as shown. Do not use a jaw-type puller, because it can damage the gear teeth.



2. In the same manner as above, support the 3rd gear on steel blocks, and press the mainshaft out of the 3rd/4th synchro hub, as shown.



Mainshaft Assembly

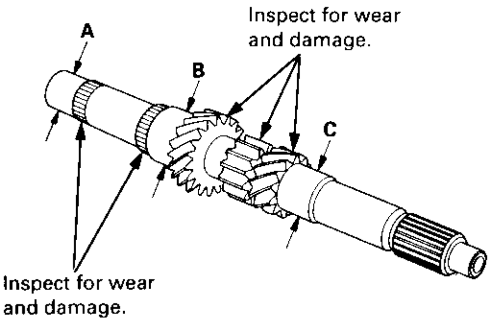
Inspection

1. Inspect the gear surface and bearing surface for wear and damage, then measure the mainshaft at points A, B, and C.

Standard:

A (Ball bearing surface):	**27.987 – 28.000 mm (1.1018 – 1.1024 in)**
B (Needle bearing surface):	**37.984 – 38.000 mm (1.4954 – 1.4961 in)**
C (Ball bearing surface):	**27.977 – 27.990 mm (1.1015 – 1.1020 in)**

Service Limit: A: 27.94 mm (1.100 in)
B: 37.93 mm (1.493 in)
C: 27.94 mm (1.100 in)



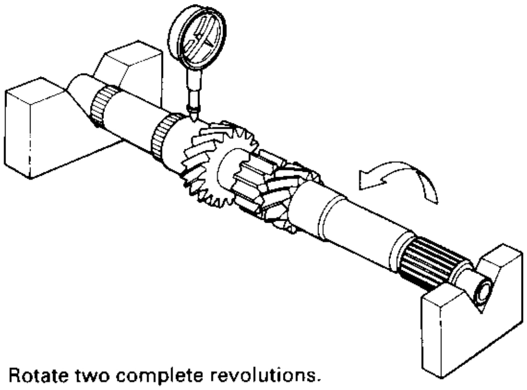
Inspect oil passages for clogging.

If any part of the mainshaft is less than the service limit, replace it with a new one.

2. Inspect for runout.

Standard: 0.02 mm (0.0008 in) max.
Service Limit: 0.05 mm (0.002 in)

NOTE: Support the mainshaft at both ends as shown.



Rotate two complete revolutions.

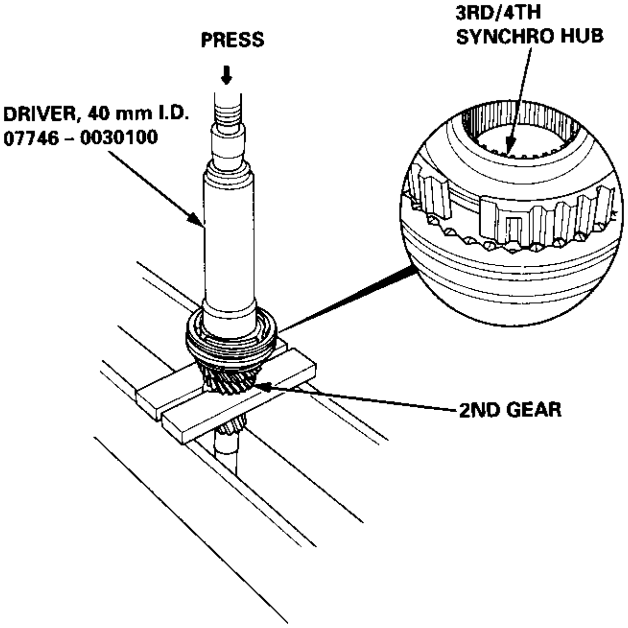
If the runout is more than the service limit, replace the mainshaft with a new one.

Reassembly

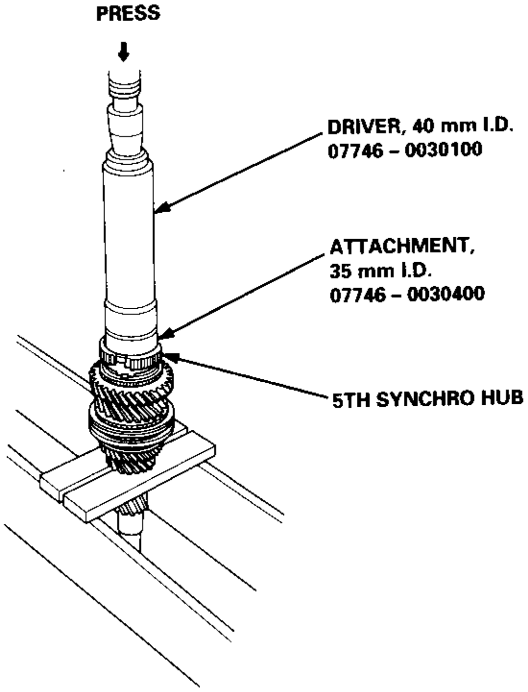
NOTE: Refer to page 13-23 for reassembly sequence.

1. Support 2nd gear on steel blocks as shown, then install the 3rd/4th synchro hub using the special tools and a press as shown.

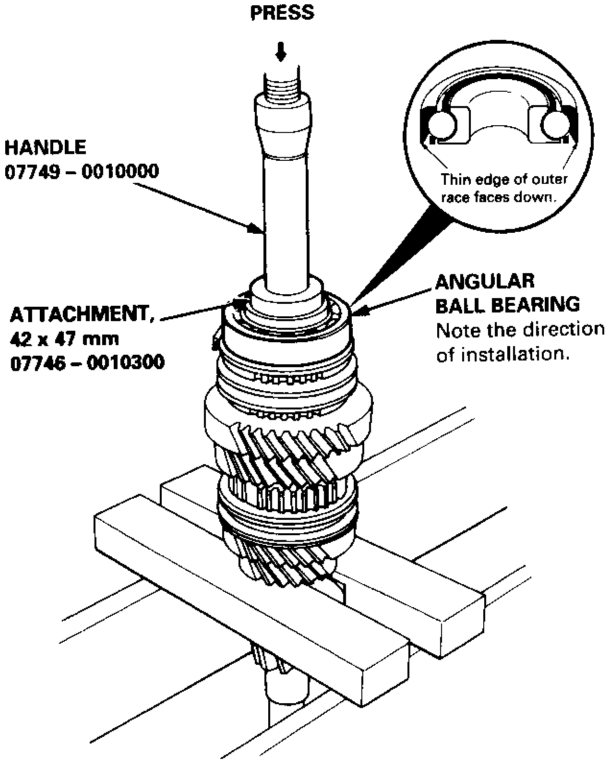
   NOTE: After installing, inspect the operation of the 3rd/ 4th synchro hub set.



2. Install the 5th synchro hub using the special tools and a press.



3. Install the angular ball bearing using the special tools and a press. Note the direction of installation.

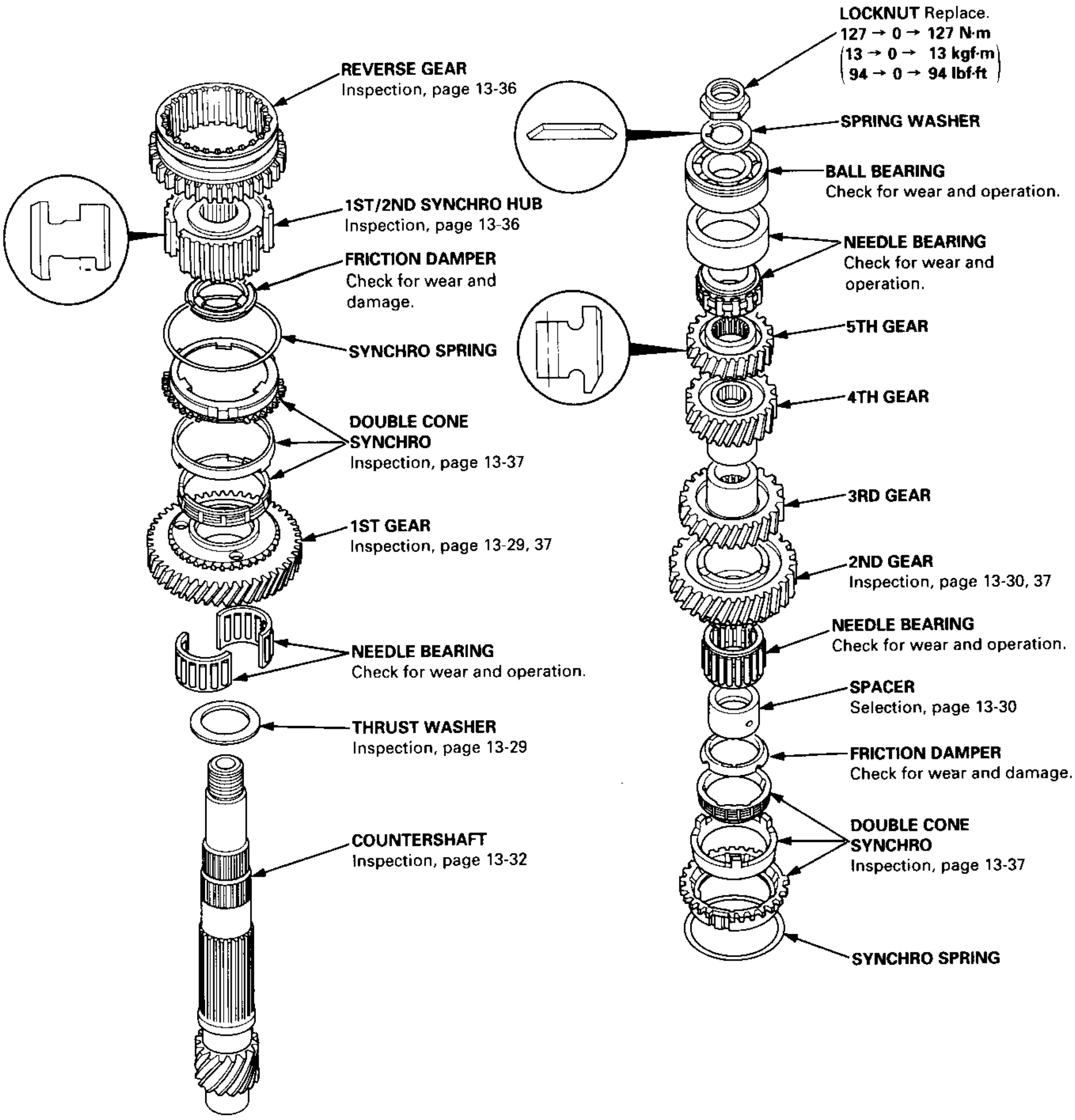


Countershaft Assembly

Index

NOTE: The 3rd, 4th, and 5th gear are installed with a press.

Prior to reassembling, clean all the parts in solvent, dry them, and apply lubricant to any contact surfaces. The 3rd, 4th, and 5th gears, however, should be installed with a press before lubricating them.

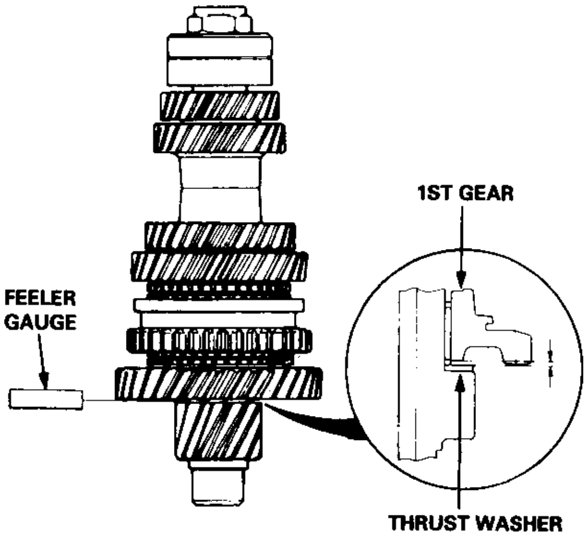


Clearance Inspection

NOTE: If replacement us required, always replace the synchro sleeve and hub as a set.

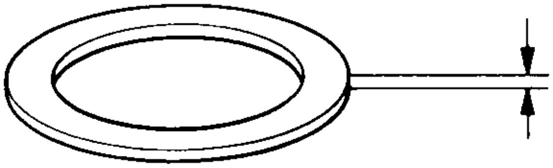
1. Measure the clearance between the 1st gear and thrust washer.

   Standard: 0.06 – 0.18 mm (0.002 – 0.007 in)
   Service Limit: 0.23 mm (0.009 in)



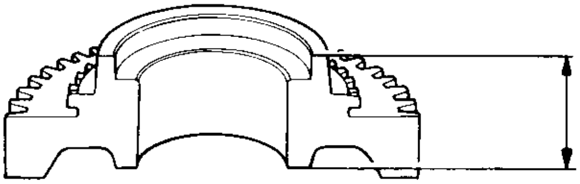
2. If the clearance is more than the service limit, measure the thickness of the thrust washer.

   Standard: 1.95 – 1.97 mm (0.077 – 0.078 in)



3. If the thickness is less than the standard, replace the thrust washer with a new one. If the thickness is within the service limit, measure the thickness of the 1st gear.

   Standard: 26.95 – 27.00 mm (1.061 – 1.063 in)



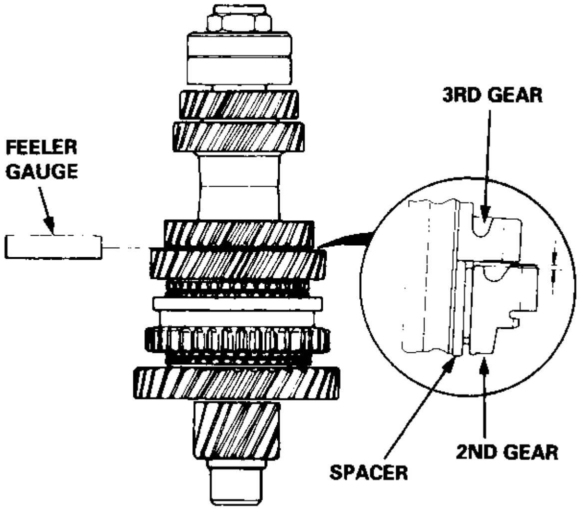
- If the thickness of 1st gear is less than the standard, replace 1st gear with a new one.
- If the thickness of 1st gear is within the standard, replace 1st/2nd synchro hub with a new one.

(cont'd)

Clearance Inspection (cont'd)

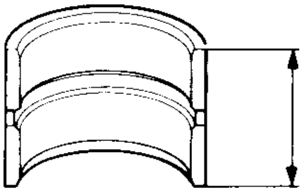
4. Measure the clearance between the 2nd gear and 3rd gear.

   Standard: 0.07 – 0.14 mm (0.003 – 0.006 in)
   Service Limit: 0.18 mm (0.007 in)



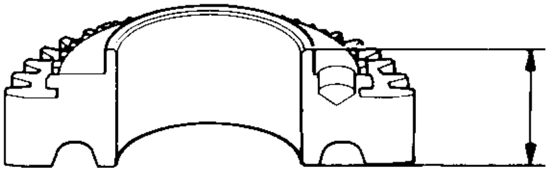
5. If the clearance is more than the service limit, measure the thickness of the spacer.

   Standard: 29.07 – 29.09 mm (1.144 – 1.145 in)



6. If the thickness is less than the standard, replace the spacer with a new one.
   If the thickness is within the standard, measure the thickness of the 2nd gear.

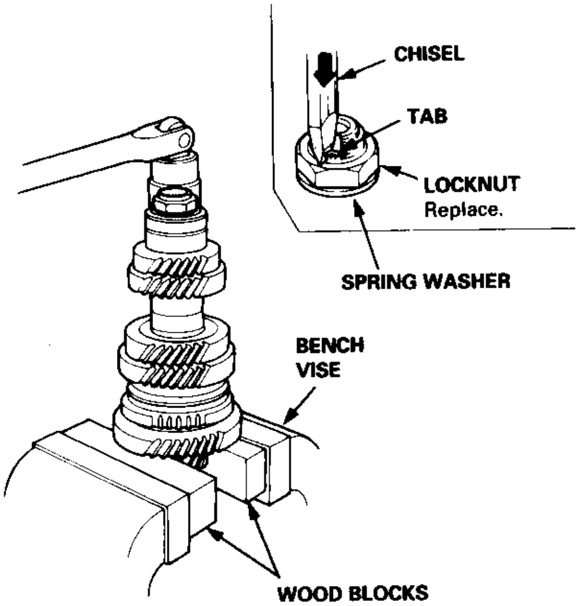
   Standard: 28.92 – 28.97 mm (1.139 – 1.141 in)



- If the thickness of 2nd gear is less than the standard, replace 2nd gear with a new one.
- If the thickness of 1st gear is within the standard, replace 1st/2nd synchro hub with a new one.

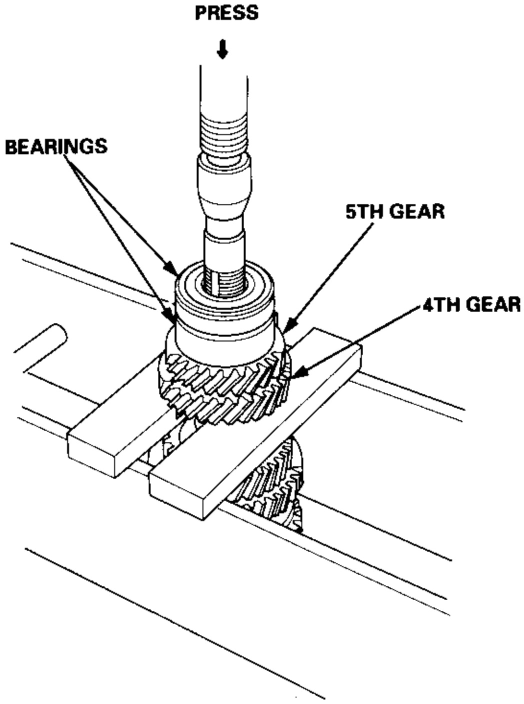
Disassembly

1. Securely clamp the countershaft assembly in a bench vise with wood blocks.

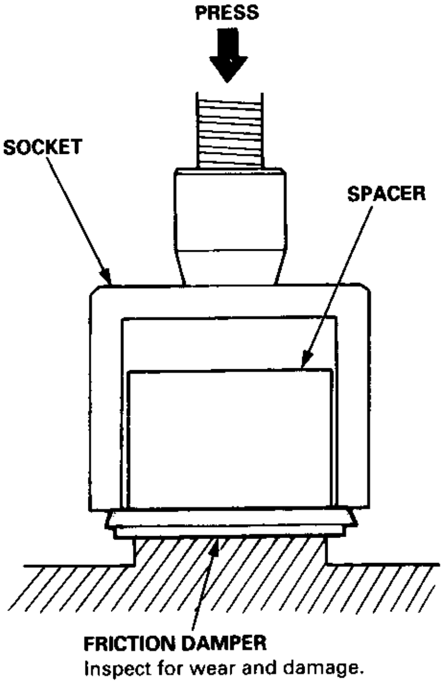


2. Raise the locknut tab from the groove in the countershaft, then remove the locknut and the spring washer.

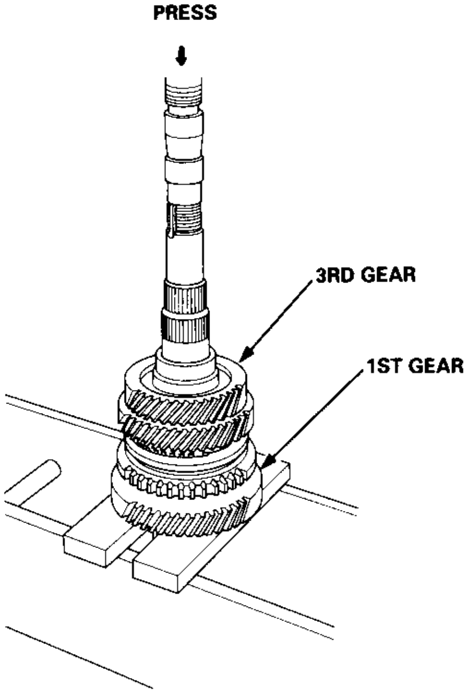
3. Remove the ball bearing using a press as shown.



4. Remove the friction damper from the spacer using a press and a socket.



5. Support 1st gear on steel blocks, and press the countershaft out of 3rd gear.

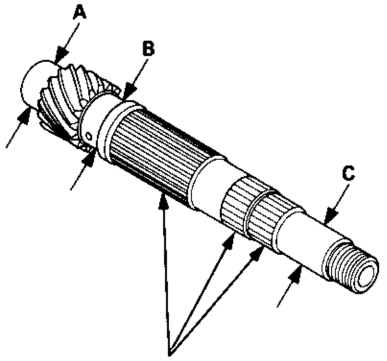


Countershaft Assembly

Inspection

1. Inspect the gear surface and bearing surface for wear and damage, then measure the countershaft at points A, B, and C.

Standard: A: 36.000 – 36.015 mm (1.4173 – 1.4179 in)
B: 36.984 – 37.000 mm (1.4561 – 1.4567 in)
C: 24.987 – 25.000 mm (0.9837 – 0.9843 in)
Service Limit: A: 35.95 mm (1.415 in)
B: 36.93 mm (1.454 in)
C: 24.94 mm (0.982 in)



Inspect for wear and damage.

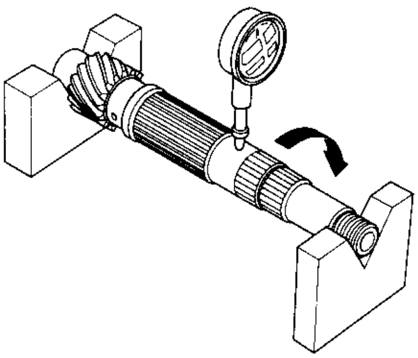
If any part of the countershaft is less than the service limit, replace it with a new one.

2. Inspect for runout.

Standard: 0.02 mm (0.0008 in) max.
Service Limit: 0.05 mm (0.002 in)

NOTE: Support the countershaft at both ends as shown.

Rotate two complete revolutions.



If the runout exceeds the service limit, replace the countershaft with a new one.

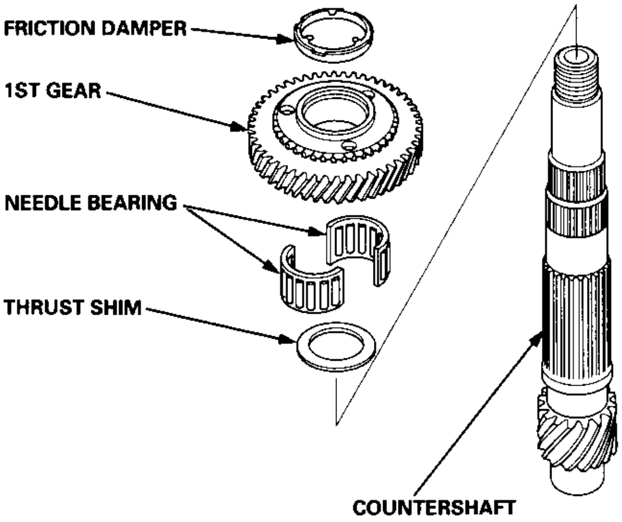
Reassembly

Note these items during reassembly:

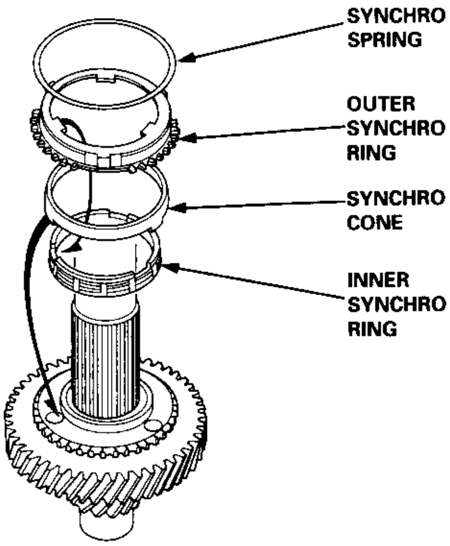
- Press the 3rd, 4th, and 5th gear on the countershaft without lubrication.
- When installing the 3rd, 4th, and 5th gears, support the shaft on steel blocks and install the gears using a press.
- Refer to page 13-28 for reassembly sequence.

1. Install the thrust shim, needle bearing, 1st gear, and friction damper.

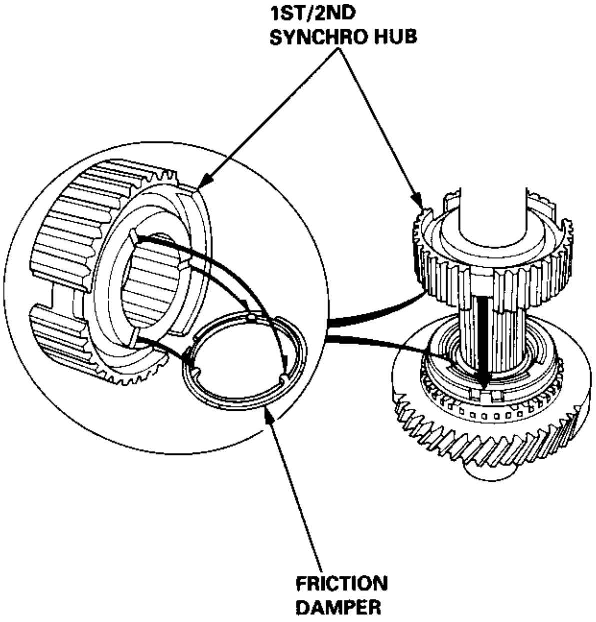
   NOTE: Reassembly the friction damper on the 1st gear before installation.



2. Install the double cone synchro.



3. Install the 1st/2nd synchro hub by align the friction damper fingers with 1st/2nd synchro hub grooves.

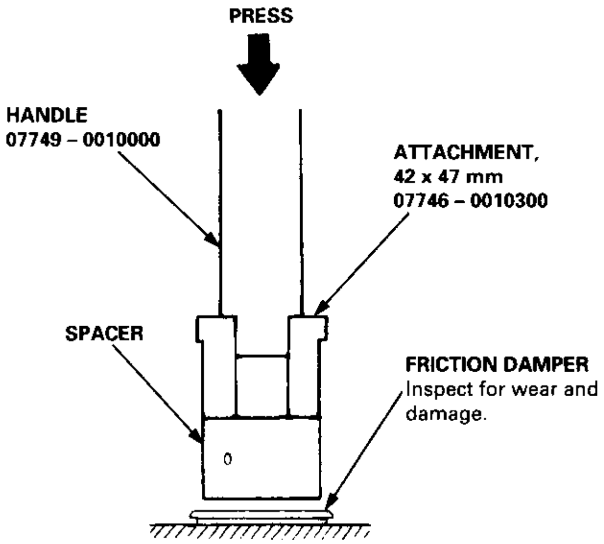


(cont'd)

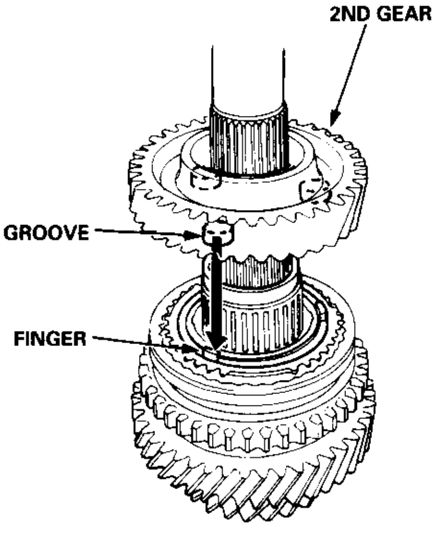
Countershaft Assembly

Reassembly (cont'd)

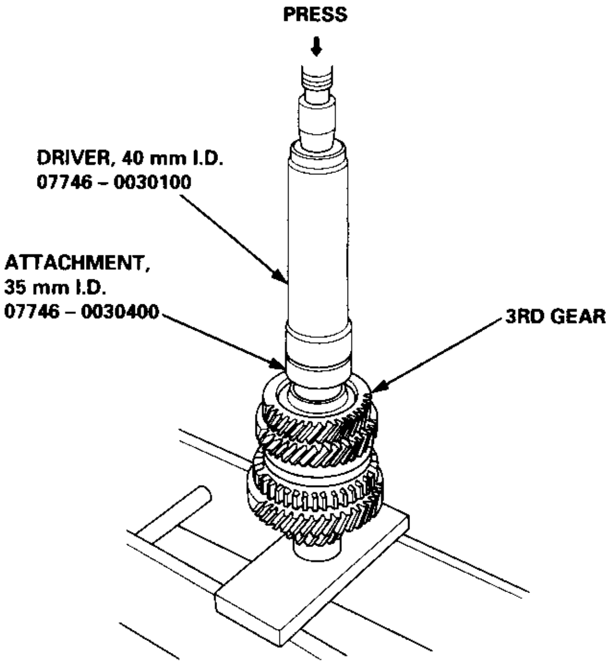
4. Reassembly the friction damper on the spacer using the special tools and a press.



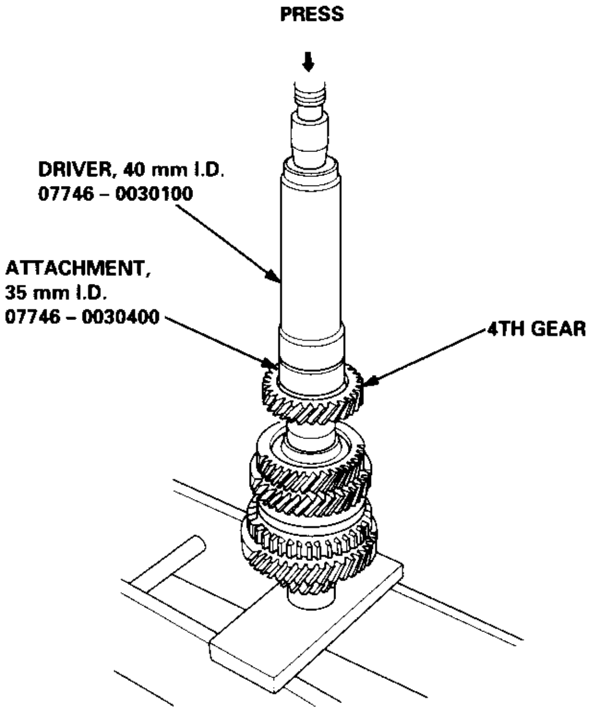
5. Install the 2nd gear by align the synchro cone the fingers with 2nd gear grooves.



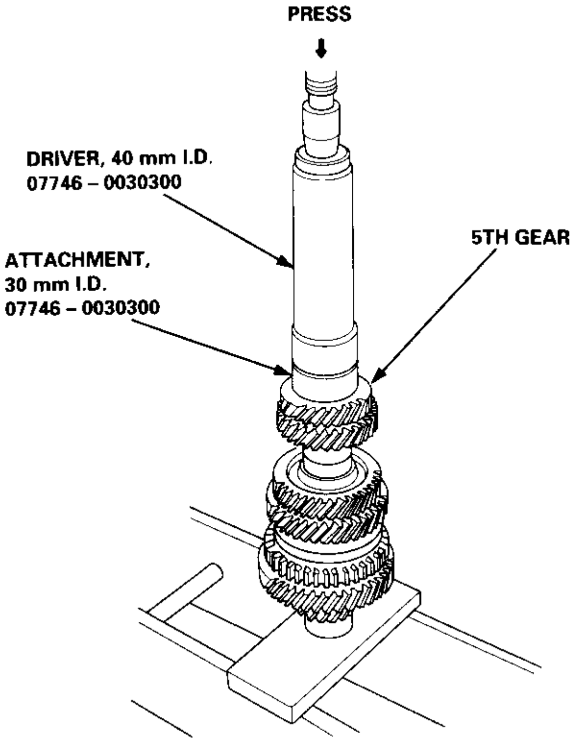
6. Support the countershaft on a steel block as shown and install 3rd gear using the special tools and a press.



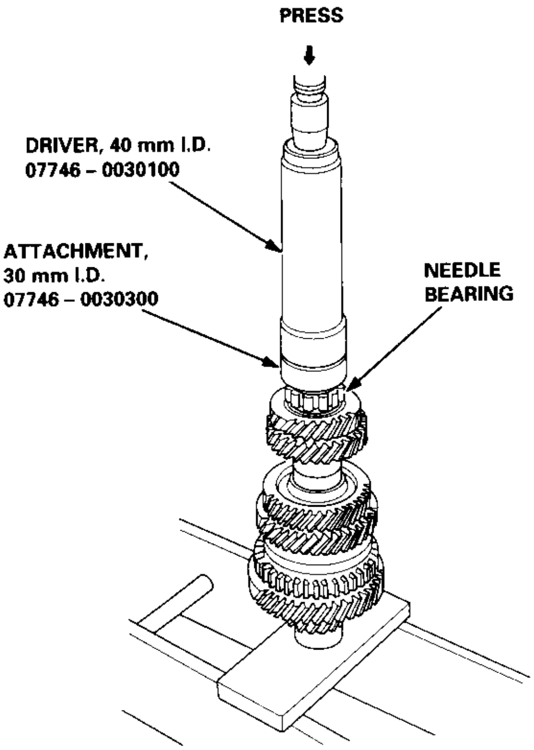
7. Install 4th gear using the special tools and a press.



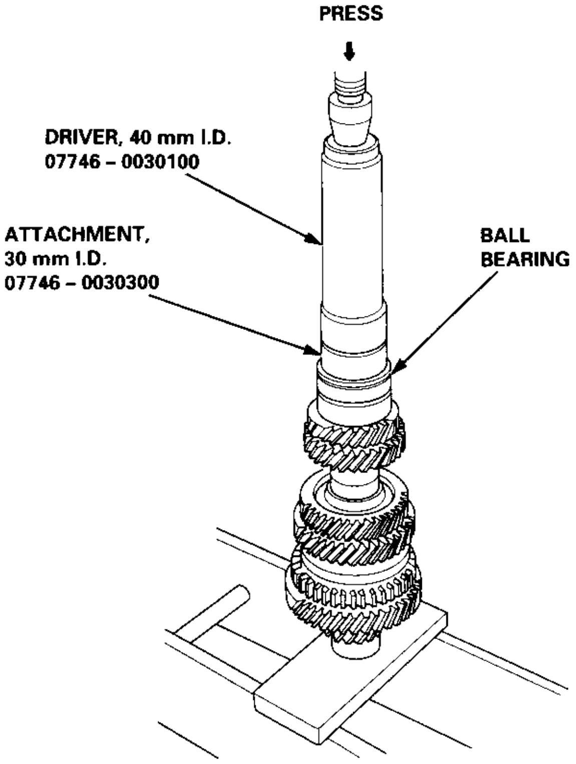
8. Install 5th gear using the special tools and a press.



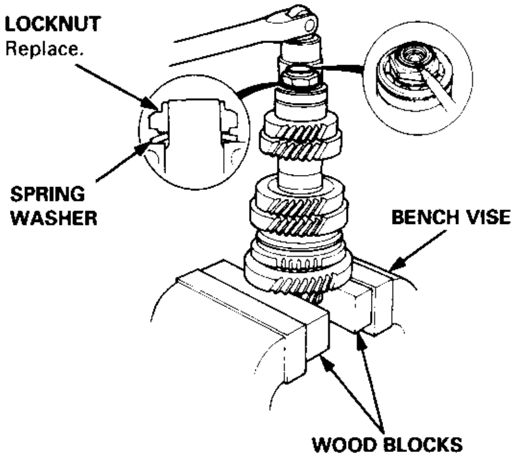
9. Install the needle bearing using the special tools and a press, then install the bearing outer race.



10. Install the ball bearing using the special tools and a press.



11. Securely clamp the countershaft assembly in a bench vise with wood blocks.



12. Install the spring washer.

13. Install the new locknut to the correct torque, then stake the locknut tab into the groove.

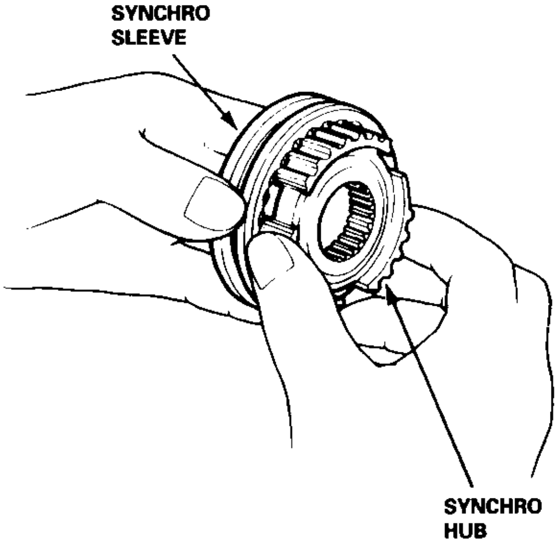
Torque: 127 → 0 → 127 N·m (13 → 0 → 13 kgf·m, 94 → 0 → 94 lbf·ft)

Synchro Sleeve, Synchro Hub

Inspection

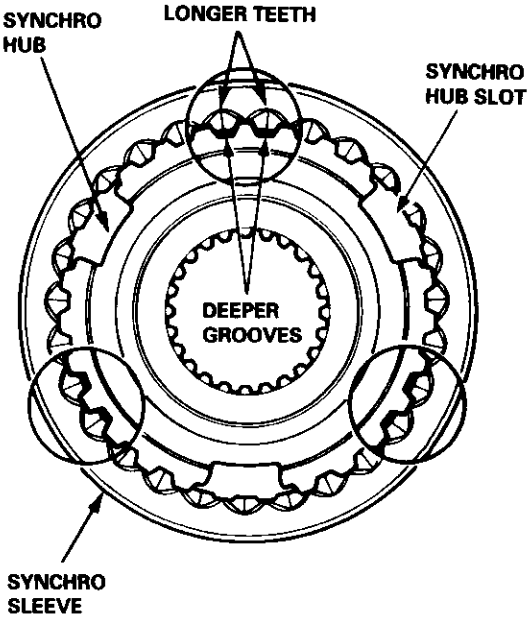
1. Inspect gear teeth on all synchro hubs and synchro sleeves for rounded off corners, which indicate wear.
2. Install each synchro hub in its mating synchro sleeve, and check for freedom of movement.

   NOTE: If replacement is required, always replace the synchro sleeve and synchro hub as a set.



Installation

When assembling the synchro sleeve and synchro hub, be sure to match the three sets of longer teeth (120 degrees apart) on the synchro sleeve with the three sets of deeper grooves in the synchro hub. Do not install the synchro sleeve with its longer teeth in the 1st/2nd synchro hub slots because it will damage the spring ring.



Synchro Ring, Gear

Inspection

1. Inspect the synchro ring and gear.

   A: Inspect the inside of the synchro ring for wear.

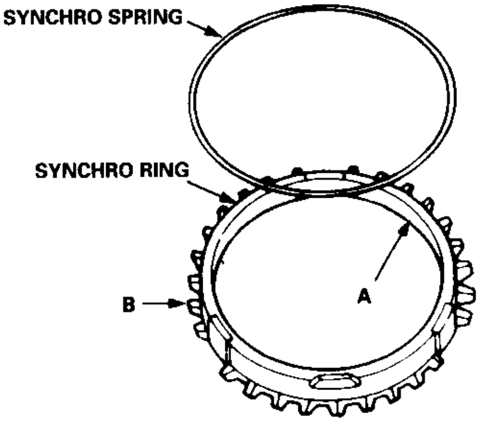
   B: Inspect the synchro sleeve teeth and matching teeth on the synchro ring for wear (rounded off).

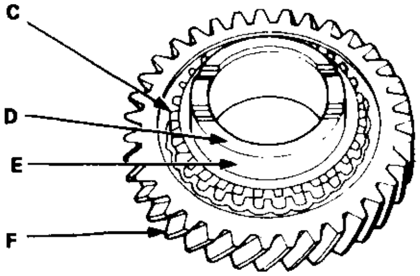
   C: Inspect the synchro sleeve teeth and matching teeth on the gear for wear (rounded off).

   D: Inspect the gear hub thrust surface for wear.

   E: Inspect the cone surface for wear and roughness.

   F: Inspect the teeth on all gears for uneven wear, scoring, galling, and cracks.





2. Coat the cone surface of the gear with oil, and place the synchro ring on the matching gear. Rotate the synchro ring, making sure that it does not slip.

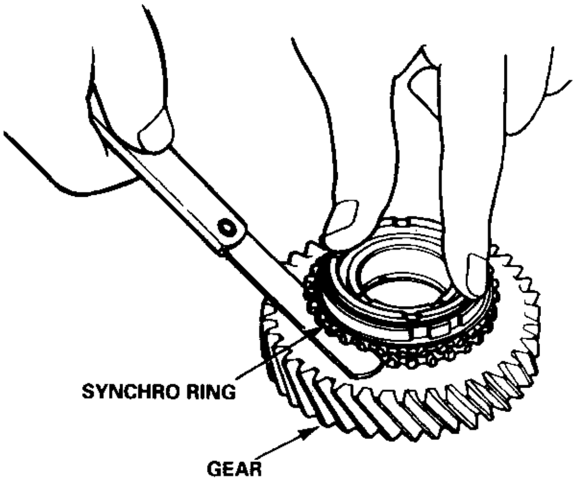
   Measure the clearance between the synchro ring and gear all the way around.

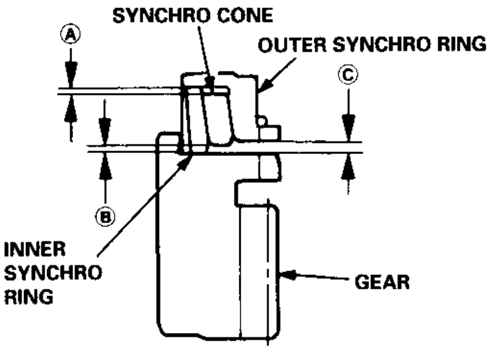
   NOTE: Hold the synchro ring against the gear evenly while measuring the clearance.

   Synchro Ring-to-Gear Clearance
   Standard: 0.85 – 1.10 mm (0.033 – 0.043 in)
   Service Limit: 0.4 mm (0.02 in)

   Double Cone Synchro-to-Gear Clearance
   Standard:
   Ⓐ: (Outer Synchro Ring to Synchro Cone)
   0.5 – 1.0 mm (0.02 – 0.04 in)
   Ⓑ: (Synchro Cone to Gear)
   0.5 – 1.0 mm (0.02 – 0.04 in)
   Ⓒ: (Outer Synchro Ring to Gear)
   0.95 – 1.68 mm (0.037 – 0.066 in)
   Service Limit:
   Ⓐ: 0.3 mm (0.01 in)
   Ⓑ: 0.3 mm (0.01 in)
   Ⓒ: 0.6 mm (0.02 in)

   If the clearance is less than the service limit, replace the synchro ring and synchro cone.





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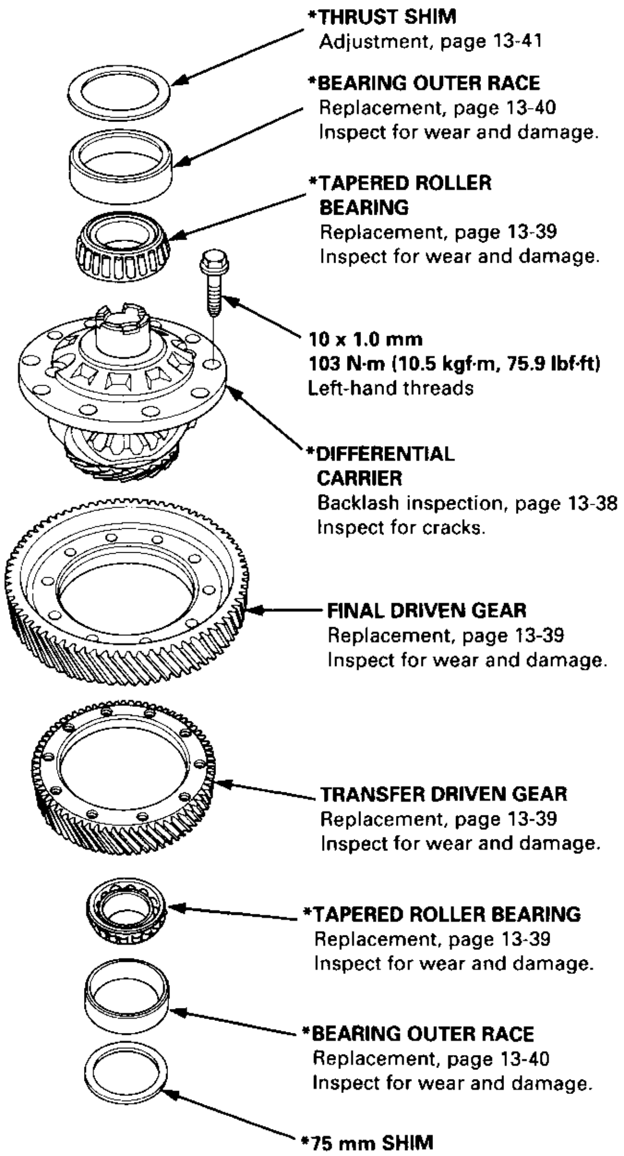
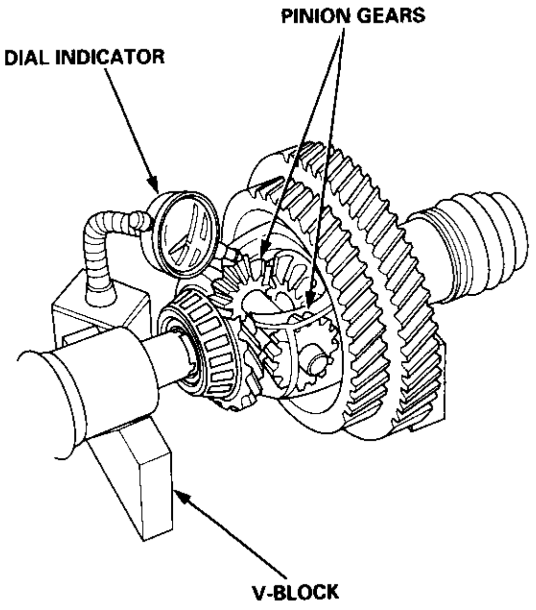
NOTE: If the * mark parts were replaced, the tapered roller bearing preload must be adjusted (see page 13-41).



Backlash Inspection

1. Place the differential assembly on V-blocks and install both axles.



2. Measure the backlash of both pinion gears.

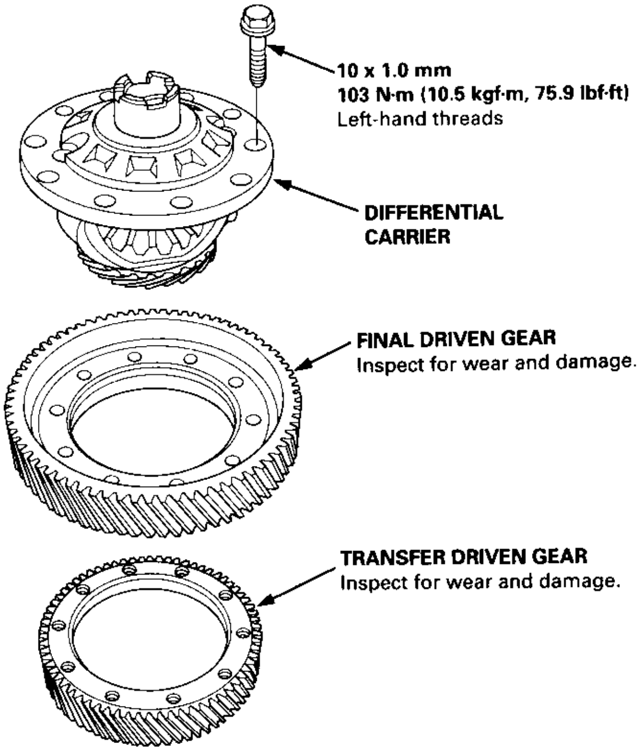
   Standard (New): 0.05 – 0.15 mm (0.002 – 0.006 in)

   If the backlash is not within the standard, replace the differential carrier.

Final Driven Gear Replacement

1. Remove the bolts in a crisscross pattern in several steps, and remove the final driven gear from the differential carrier.

   NOTE: The final driven gear bolts have left-hand threads.



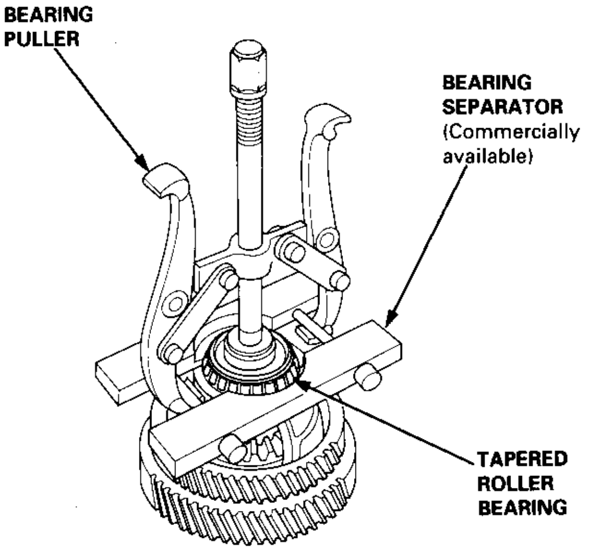
2. Install the final driven gear by tightening the bolts in a crisscross pattern in several steps.

Tapered Roller Bearing Replacement

Note these items:

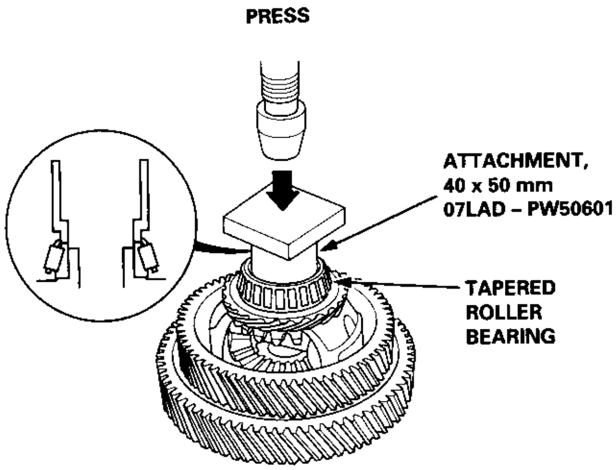
- The tapered roller bearing and bearing outer race should be replaced as a set.
- Inspect and adjust the tapered roller bearing preload whenever the tapered roller bearing is replaced.
- Check the tapered roller bearings for wear and rough rotation. If the tapered roller bearings are OK, removal is not necessary.

1. Remove the tapered roller bearings using a bearing puller and a bearing separator as shown.



2. Install new tapered roller bearings using the special tool as shown.

   NOTE: Drive the tapered roller bearings on until they bottom against the differential carrier.



Bearing Outer Race Replacement

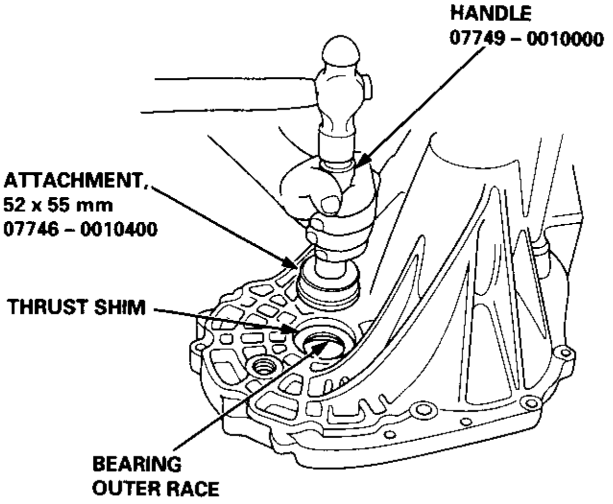
Note these items:

- The bearing outer race and tapered roller bearing should be replaced as a set.
- Inspect and adjust the tapered roller bearing preload whenever the tapered roller bearing is replaced.

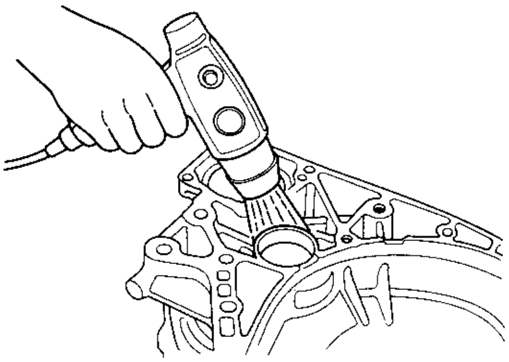
1. Remove the oil seals from the transmission housing and clutch housing (see page 13-43).

2. Drive the bearing outer race and thrust shim out of the transmission housing, or remove the bearing outer race and 75 mm shim from the clutch housing by heating the clutch housing to about 212°F (100°C) with a heat gun. Do not reuse the thrust shim if the outer race was driven out.

TRANSMISSION HOUSING:



CLUTCH HOUSING:

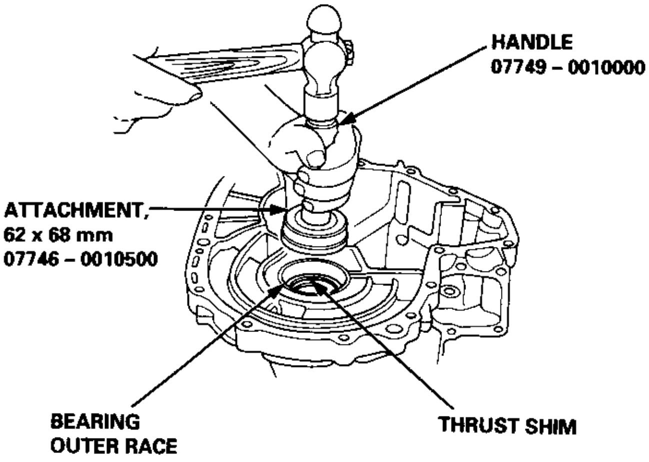


3. Install the thrust shim or 75 mm shim and the bearing outer race in the transmission housing and clutch housing using the special tools.

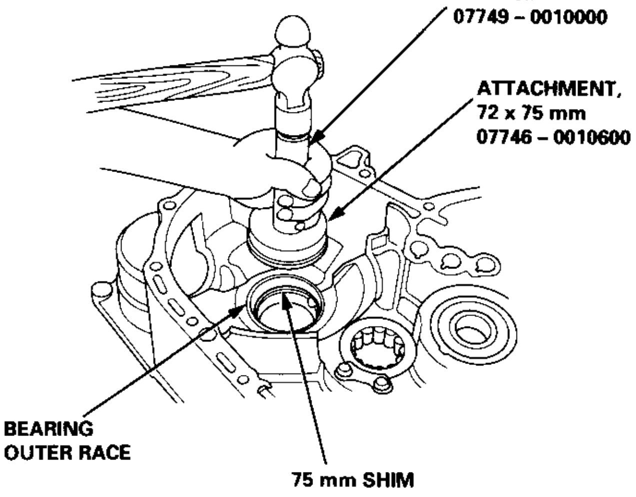
   Note these items during bearing replacement:

   - Install the bearing outer race squarely.
   - Check that there is no clearance between the bearing outer race, thrust shim or 75 mm shim and housing.

TRANSMISSION HOUSING:



CLUTCH HOUSING:



4. Install the oil seal (see page 13-43).

Tapered Roller Bearing Preload Adjustment

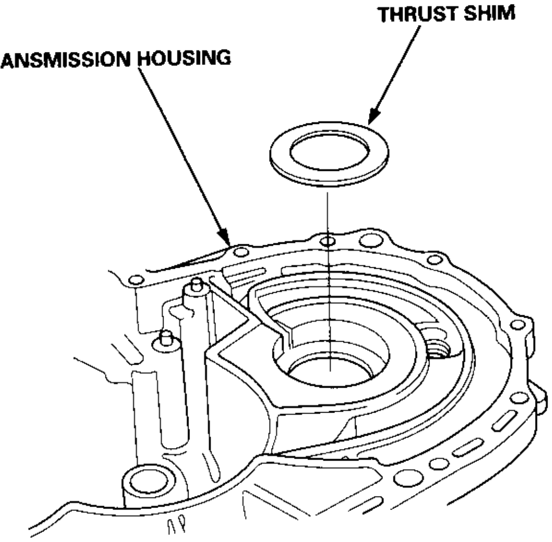
If any of the items listed below were replaced, the tapered roller bearing preload must be adjusted.

- Transmission housing
- Clutch housing
- Differential carrier
- Tapered roller bearing and bearing outer race
- Thrust shim
- 75 mm shim

1. Remove the bearing outer race and thrust shim from the transmission housing (see page 13-40).

   NOTE:
   - Do not reuse the thrust shim if the bearing outer race was driven out.
   - Let the transmission cool to room temperature if the bearing outer race was removed by heating the clutch housing.

2. Do not use more than one thrust shim to adjust the tapered bearing preload. First try the same size thrust shim that was removed. There are no shims used on the clutch housing side.



3. After installing the thrust shim, install the bearing outer race in the transmission housing (see page 13-40).

4. With the mainshaft and countershaft removed, install the differential assembly, and torque the clutch housing and transmission housing.

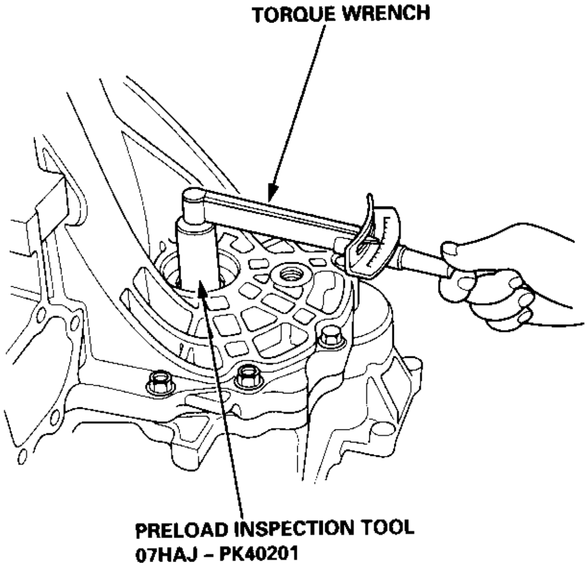
   NOTE: It is not necessary to use sealing agent between the housings.

   TORQUE: 8 x 1.25 mm: 27 N·m
   (2.8 kgf·m, 20 lbf·ft)

5. Rotate the differential assembly in both directions to seat the tapered roller bearings.

6. Measure the tapered roller bearing preload at normal room temperature. Measure the starting torque of the differential assembly in both directions with the special tool and a torque wrench.

   STANDARD: 1.4 – 2.5 N·m
   (14 – 26 kgf·cm, 12 – 23 lbf·in)



(cont'd)

Tapered Roller Bearing Preload Adjustment (cont'd)

7. If the tapered roller bearing preload is not within the standard, select the thrust shim which will give the correct tapered roller bearing preload from the following table.

   NOTE: Changing the thrust shim to the next size will increase or decrease tapered roller bearing preload about 0.3 – 0.4 N·m (3 – 4 kgf·cm, 2.6 – 3.5 lbf·in).

THRUST SHIM

	Part Number	Thickness
A	41381 – PX5 – 000	1.90 mm (0.0748 in)
B	41382 – PX5 – 000	1.93 mm (0.0760 in)
C	41383 – PX5 – 000	1.96 mm (0.0772 in)
D	41384 – PX5 – 000	1.99 mm (0.0783 in)
E	41385 – PX5 – 000	2.02 mm (0.0795 in)
F	41386 – PX5 – 000	2.05 mm (0.0807 in)
G	41387 – PX5 – 000	2.08 mm (0.0819 in)
H	41388 – PX5 – 000	2.11 mm (0.0831 in)
I	41389 – PX5 – 000	2.14 mm (0.0843 in)
J	41390 – PX5 – 000	2.17 mm (0.0854 in)
K	41391 – PX5 – 000	2.20 mm (0.0866 in)
L	41392 – PX5 – 000	2.23 mm (0.0878 in)
M	41393 – PX5 – 000	2.26 mm (0.0890 in)
N	41394 – PX5 – 000	2.29 mm (0.0902 in)
O	41395 – PX5 – 000	2.32 mm (0.0913 in)
P	41396 – PX5 – 000	2.35 mm (0.0925 in)
Q	41397 – PX5 – 000	2.38 mm (0.0937 in)
R	41398 – PX5 – 000	2.41 mm (0.0949 in)
S	41399 – PX5 – 000	2.44 mm (0.0961 in)
T	41400 – PX5 – 000	2.47 mm (0.0972 in)
AA	41873 – P16 – 000	1.66 mm (0.0654 in)
AB	41874 – P16 – 000	1.69 mm (0.0665 in)
AC	41875 – P16 – 000	1.72 mm (0.0677 in)
AD	41876 – P16 – 000	1.75 mm (0.0689 in)
AE	41877 – P16 – 000	1.78 mm (0.0701 in)
AF	41878 – P16 – 000	1.81 mm (0.0713 in)
AG	41879 – P16 – 000	1.84 mm (0.0724in)
AH	41880 – P16 – 000	1.87 mm (0.0736 in)

8. Recheck the tapered roller bearing preload.

9. How to select the correct thrust shim:
   - –1) Compare the tapered roller bearing preload you get with the thrust shim that was removed, with the specified preload of 1.4 – 2.5 N·m (14 – 26 kgf·cm, 12 – 23 lbf·in).
   - –2) If your measured tapered roller bearing preload is less than specified, subtract yours from the specified.
     If yours is more than specified, subtract the specified from your measurement.

     For example with a 2.17 mm (0.0854 in) thrust shim:

     Ⓐ specified 2.5 N·m (26 kgf·cm, 23 lbf·in)
     – you measure 0.6 N·m (6 kgf·cm, 5 lbf·in)
     1.9 N·m (20 kgf·cm, 18 lbf·in) less

     Ⓑ you measure 3.3 N·m (34 kgf·cm, 30 lbf·in)
     – specified 2.5 N·m (26 kgf·cm, 23 lbf·in)
     0.8 N·m (8 kgf·cm, 7 lbf·in) more

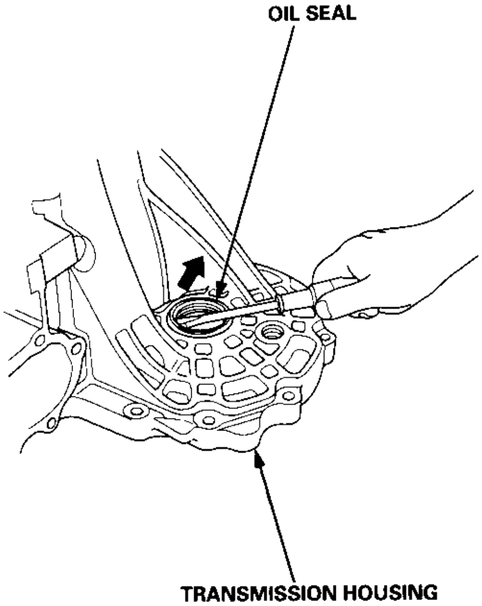
   - –3) Each shim size up or down from standard makes about 0.3 – 0.4 N·m (3 – 4 kgf·cm, 2.6 – 3.5 lbf·in) difference in tapered roller bearing preload.

     In example Ⓐ, your measured tapered roller bearing preload was 1.9 N·m (20 kgf·cm, 18 lbf·in) less than standard so you need a thrust shim five sizes thicker than standard (try the 2.32 mm (0.0913 in) thrust shim, and recheck).
     In example Ⓑ, your measurement was 0.8 N·m (8 kgf·cm, 7 lbf·in) more than standard, so you need a thrust shim two sizes thinner (try the 2.11 mm (0.0831 in) thrust shim, and recheck).

Oil Seal Replacement

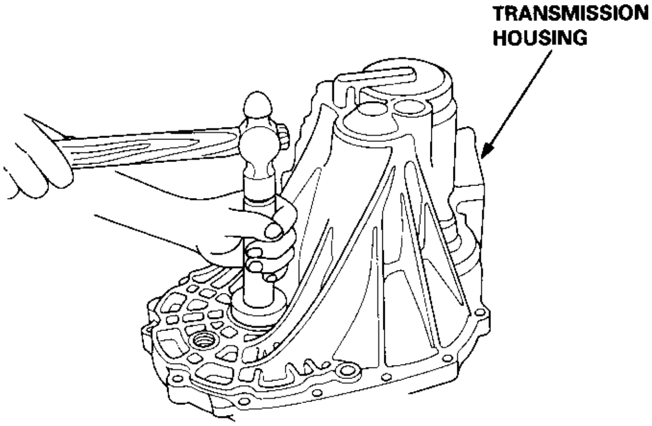
Transmission Housing:

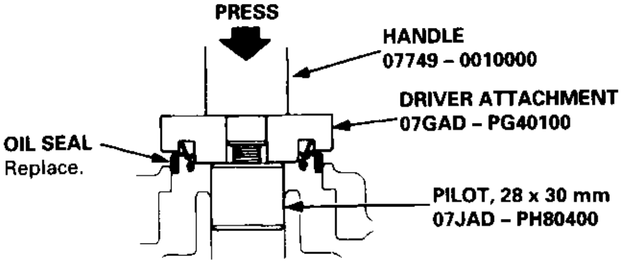
1. Remove the oil seal from the transmission housing.



2. Install the new oil seal into the transmission housing using the special tools.

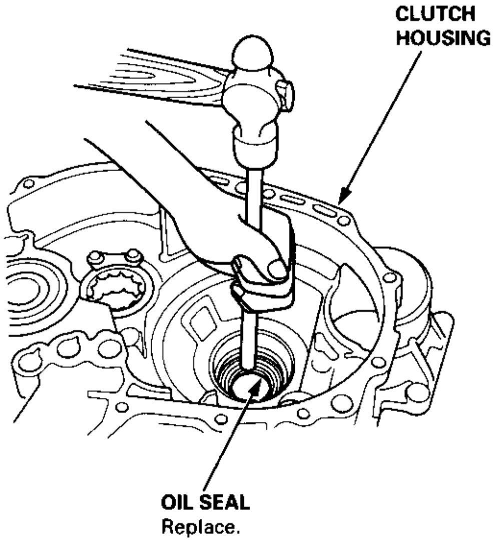
   NOTE: Install oil seal up to ±0.5 mm (±0.02 in) from transmission housing end surface.





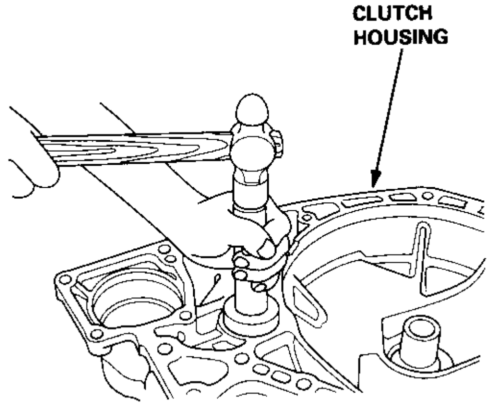
Clutch Housing:

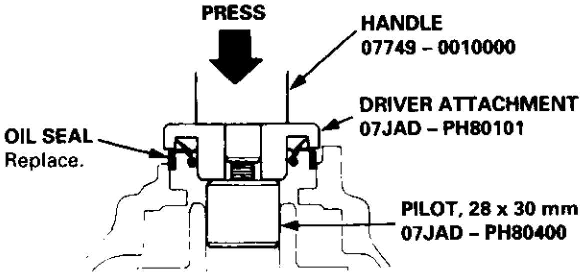
1. Remove the oil seal from the clutch housing.



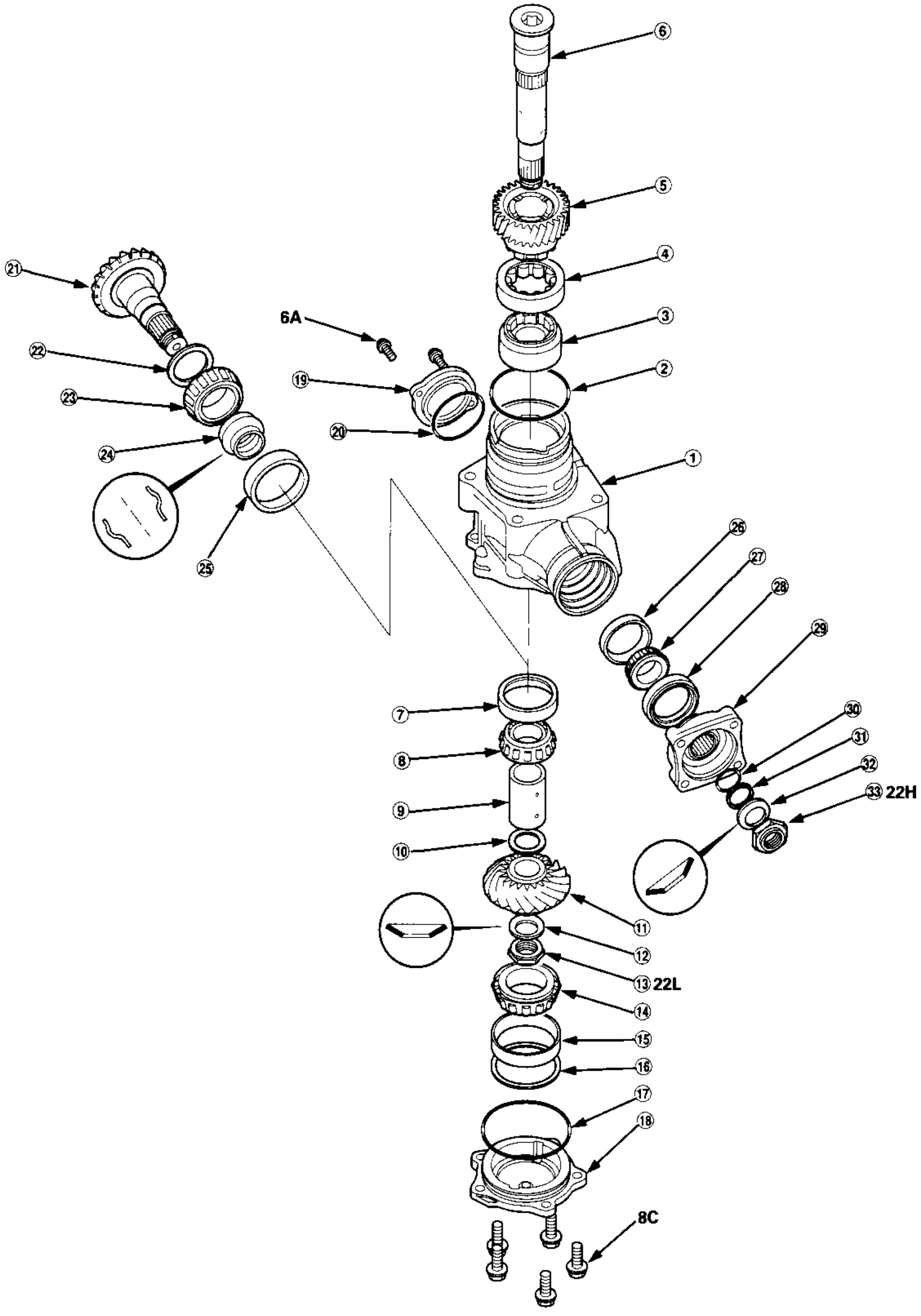
2. Install the new oil seal into the clutch housing using the special tools.

   NOTE: Install oil seal up to ±0.5 mm (±0.02 in) from transmission housing end surface.





Illustrated Index



① **TRANSFER HOUSING**
② **O-RING** Replace.
③ **DAMPER HUB**
④ **NEEDLE BEARING**
⑤ **TRANSFER DRIVEN GEAR**
⑥ **TRANSFER SHAFT**
⑦ **TAPERED ROLLER BEARING OUTER RACE**
⑧ **TAPERED ROLLER BEARING**
⑨ **TRANSFER SHAFT COLLAR**
⑩ **THRUST SHIM, 25 mm** Selective part
⑪ **TRANSFER DRIVE GEAR (HYPOID GEAR)**
⑫ **CONICAL SPRING WASHER** Replace.
⑬ **TRANSFER SHAFT LOCKNUT, 22 x 1.25 mm** Left-hand threads, replace.
⑭ **TAPERED ROLLER BEARING**
⑮ **TAPERED ROLLER BEARING OUTER RACE**
⑯ **THRUST SHIM, 68 mm** Selective part
⑰ **O-RING** Replace.
⑱ **TRANSFER COVER A**
⑲ **TRANSFER COVER B**
⑳ **O-RING** Replace.
㉑ **TRANSFER DRIVEN GEAR SHAFT (HYPOID GEAR)**
㉒ **THRUST SHIM, 35 mm** Selective part
㉓ **TAPERED ROLLER BEARING**
㉔ **TRANSFER SPACER** Replace.
㉕ **TAPERED ROLLER BEARING OUTER RACE**
㉖ **TAPERED ROLLER BEARING OUTER RACE**
㉗ **TAPERED ROLLER BEARING**
㉘ **OIL SEAL** Replace.
㉙ **COMPANION FLANGE**
㉚ **O-RING** Replace.
㉛ **BACK-UP RING**
㉜ **CONICAL SPRING WASHER** Replace.
㉝ **TRANSFER DRIVEN GEAR SHAFT LOCKNUT, 22 x 1.25 mm** Replace.

TORQUE SPECIFICATIONS

Bolt/Nut No.	Torque Value	Size	Remarks
6A	12 N·m (1.2 kgf·m, 8.7 lbf·ft)	6 x 1.0 mm	
8C	24 N·m (2.4 kgf·m, 17 lbf·ft)	8 x 1.25 mm	
22L	118 N·m (12.0 kgf·m, 86.8 lbf·ft)	22 x 1.25 mm	Transfer shaft locknut: Left-hand threads
22H	132 – 216 N·m (13.5 – 22.0 kgf·m, 97.6 – 159 lbf·ft)	22 x 1.25 mm	Transfer driven gear shaft locknut Tightening torque: depending on Total Starting Torque value

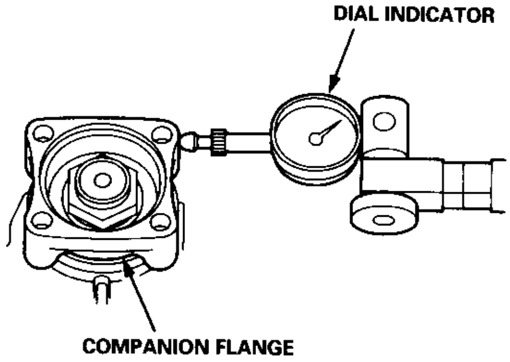
Transfer Assembly

Inspection

NOTE: To prevent damage to the transfer housing, always use soft jaws or equivalent materials between the transfer housing and the vise.

Transfer Gear (Hypoid gear) Backlash Measurement

1. Set a dial indicator on the companion flange as shown.



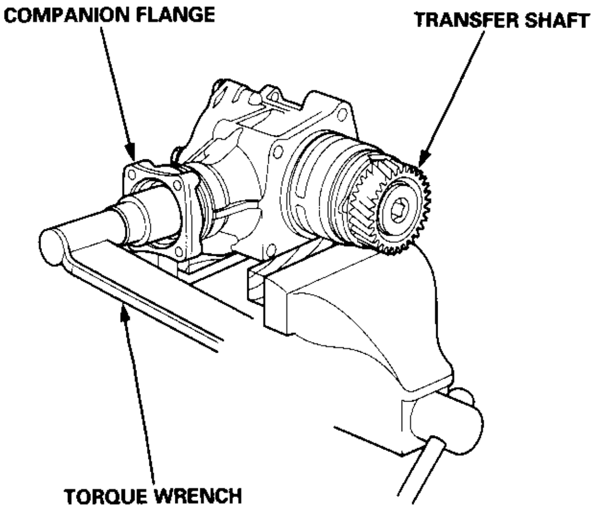
2. Measure the transfer gear backlash.

   STANDARD: 0.06 – 0.16 mm (0.002 – 0.006 in)

Total Starting Torque Measurement

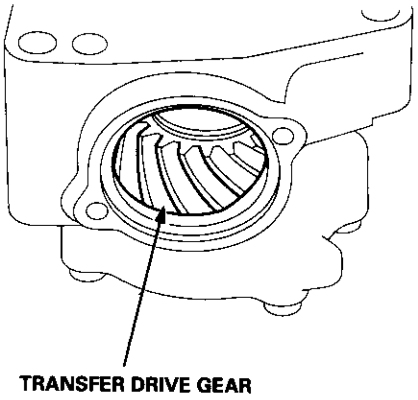
3. Rotate the companion flange several times to seat the tapered roller bearing.
4. Measure the starting torque (companion flange side) using a torque wrench.

   STANDARD:
   2.68 – 3.47 N·m
   (27.3 – 35.4 kgf·cm, 23.7 – 30.7 lbf·in)

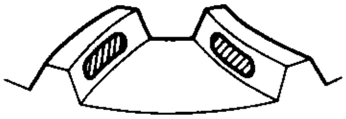


Transfer Gear (Hypoid gear) Tooth Contact Inspection

5. Remove transfer cover B, then apply Prussian Blue to both sides of the transfer gear teeth lightly and evenly.



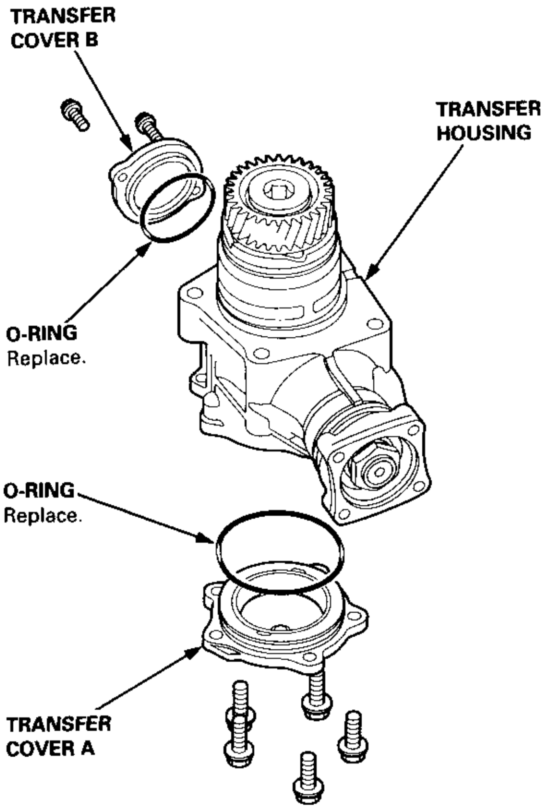
6. Rotate the companion flange in both directions until the transfer gear rotates one full turn in both directions.
7. Check the transfer gear tooth contact pattern.



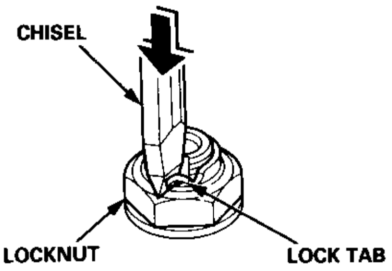
8. If the measurements or the tooth contact pattern are not within the standard, disassemble the transfer assembly, replace worn or damaged parts, and reassemble it.

Disassembly

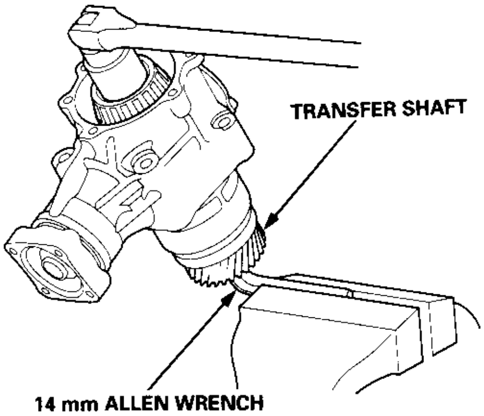
1. Remove the transfer covers A and B.



2. Cut the lock tabs of the locknut using a chisel. Keep all of the chiseled particles out of the transfer housing.

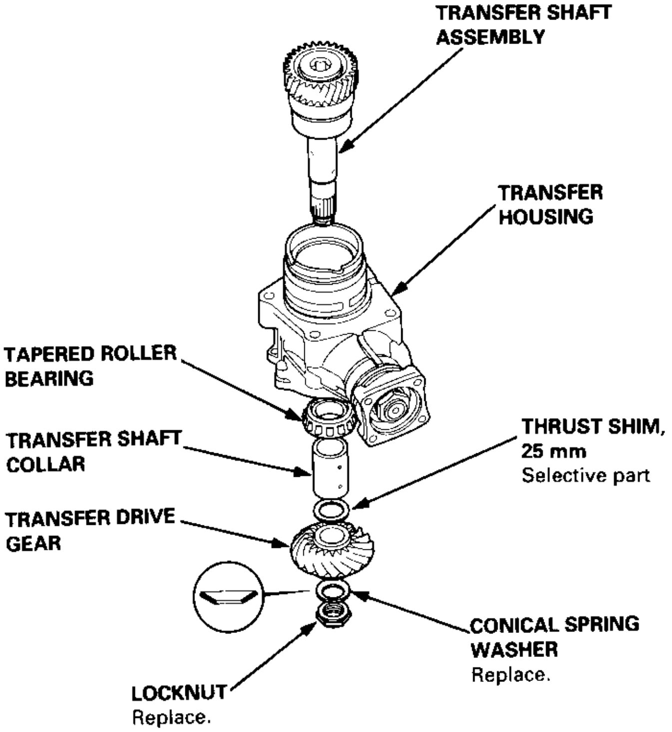


3. Hold the transfer shaft with a 14 mm Allen wrench clamped in a bench vise.



4. Loosen the transfer shaft locknut. The transfer shaft locknut has left-hand threads.

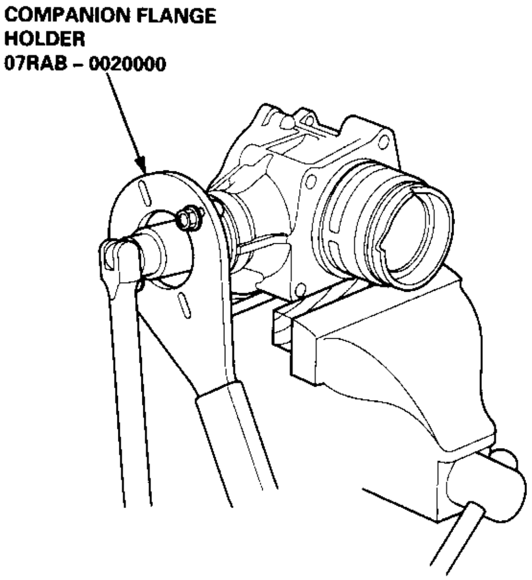
5. Remove the transfer shaft assembly, transfer drive gear, 25 mm thrust shim, transfer shaft collar, and tapered roller bearing from the transfer housing.



(cont'd)

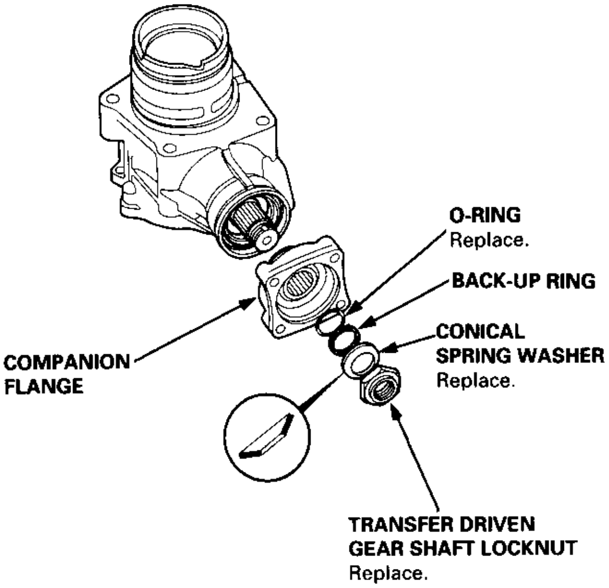
Disassembly (cont'd)

6. Secure the transfer housing in a bench vise with soft jaws.

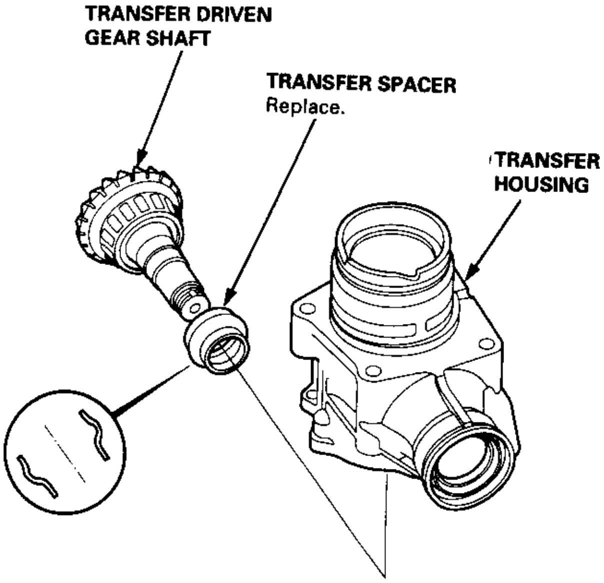


7. Install the special tool on the companion flange, then loosen the transfer driven gear shaft locknut.

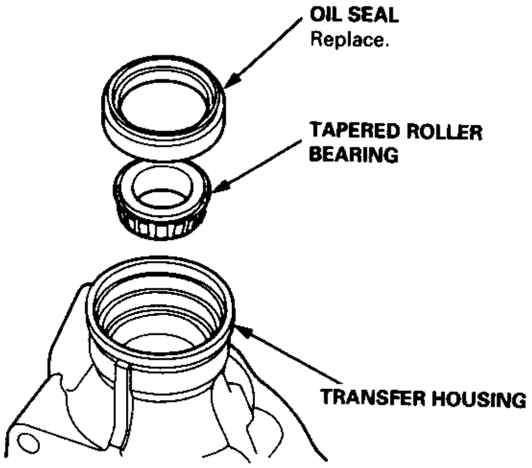
8. Remove the transfer driven gear shaft locknut, conical spring washer, back-up ring, O-ring, and companion flange.



9. Remove the transfer driven gear shaft, then remove the transfer spacer from the transfer driven gear shaft.



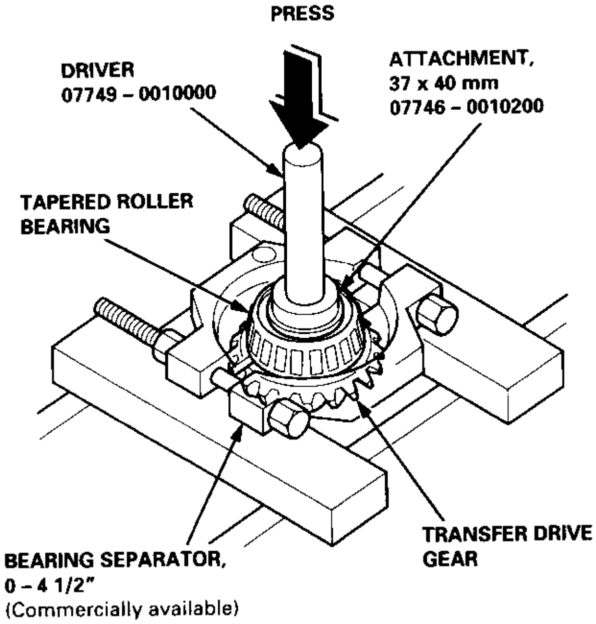
10. Remove the oil seal and the tapered roller bearing from the transfer housing.



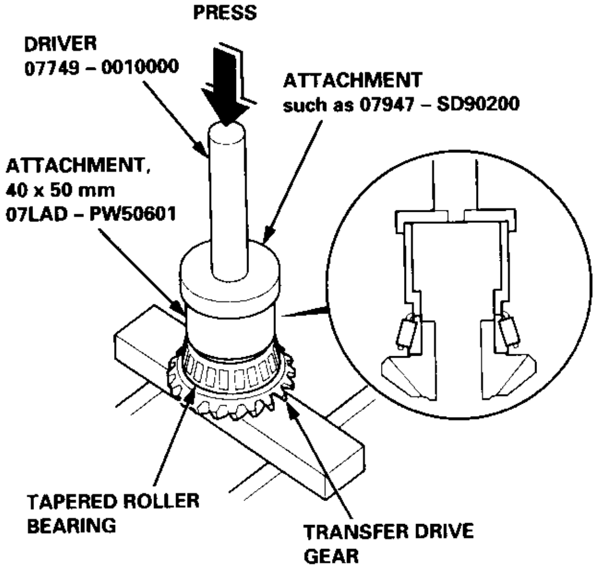
Transfer Drive Gear Bearing Replacement

NOTE: Coat all parts with MTF during reassembly.

1. Remove the tapered roller bearing from the transfer drive gear using the special tools and a press.



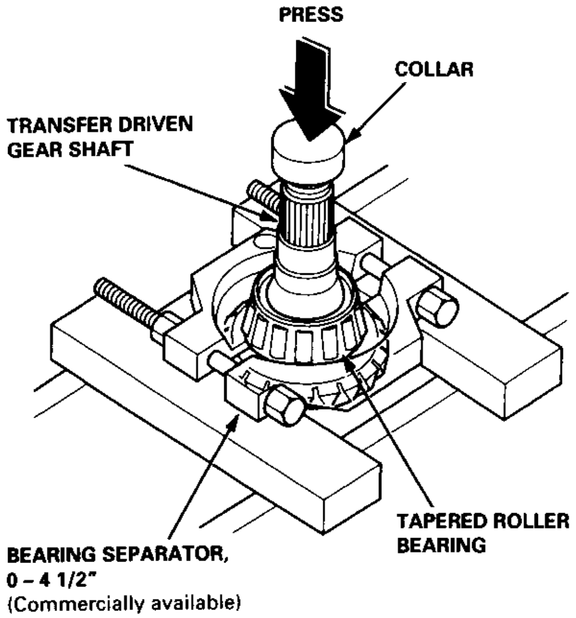
2. Install the new tapered roller bearing in the transfer drive gear using the special tools and a press.



Transfer Driven Gear Shaft Bearing Replacement

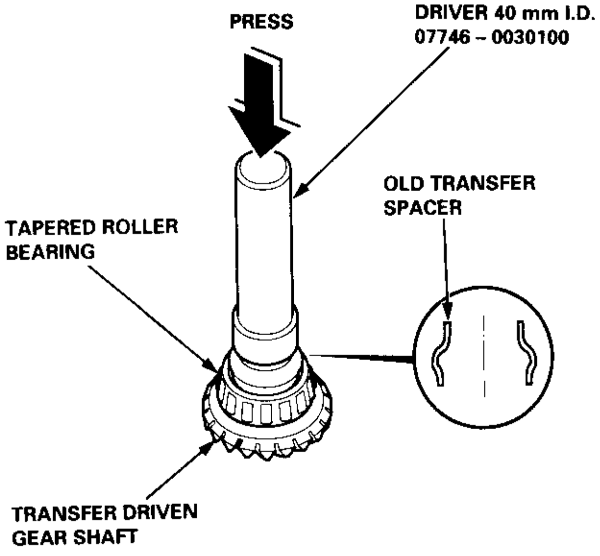
NOTE: Coat all parts with MTF during reassembly.

1. Remove the tapered roller bearing from the transfer driven gear shaft using a press and a collar.



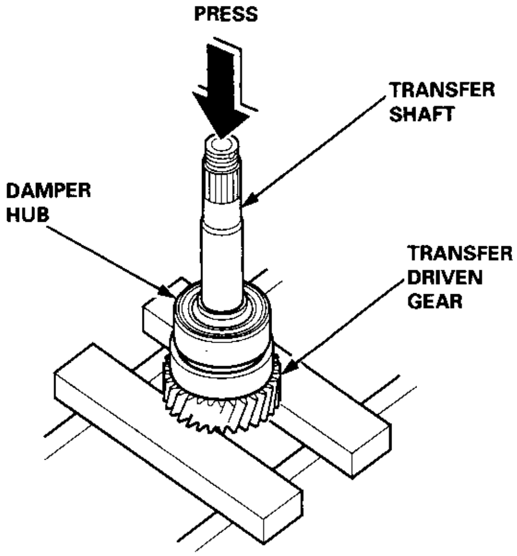
2. Install the 35 mm thrust shim on the transfer driven gear shaft.
3. Install the new tapered roller bearing on the transfer driven gear shaft using the special tools and a press.

   NOTE: Use old transfer spacer for bearing installation, then discard it.

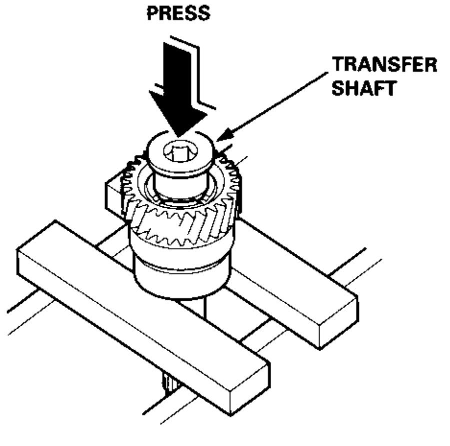


Transfer Shaft Disassembly/ Reassembly

1. Support the transfer driven gear on steel blocks, then press the transfer shaft out of damper hub.



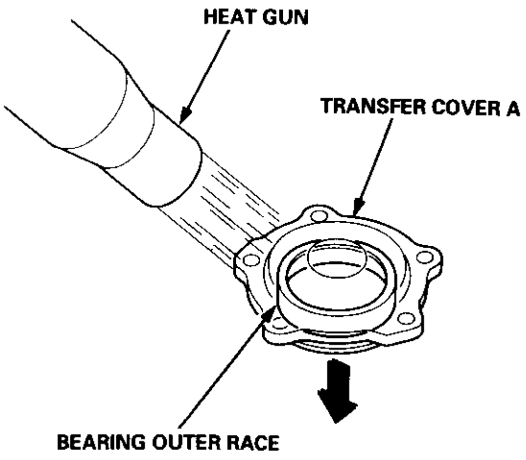
2. Align the damper hub grooves and transfer driven gear teeth, and reassemble the damper hub, needle bearing, and transfer driven gear.
3. Install the transfer shaft using a press.



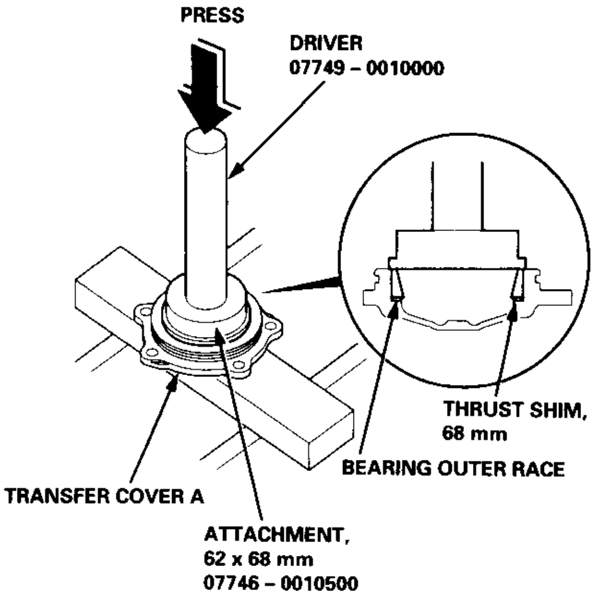
Transfer Cover A Bearing Outer Race Replacement

NOTE: Coat all parts with MTF during reassembly.

1. Remove the tapered roller bearing outer race from transfer cover A by heating the cover to almost 212°F (100°C) using a heat gun. Do not heat the cover over 212°F (100°C).



2. Install the 68 mm thrust shim in transfer cover A.

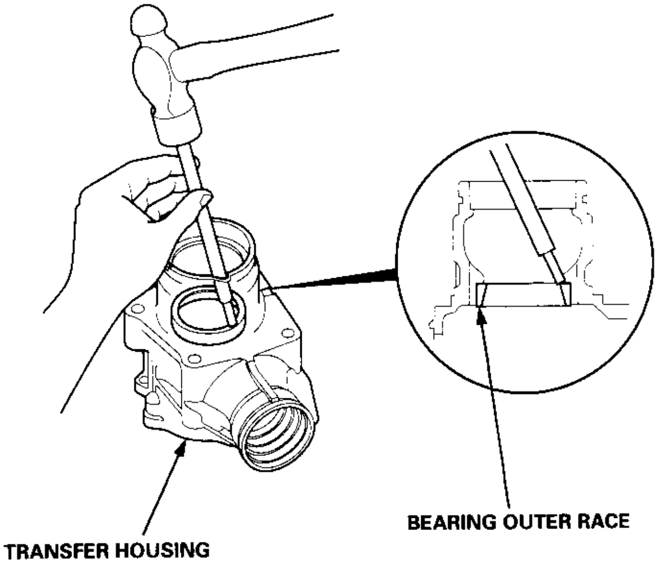


3. Install the tapered roller bearing outer race using the special tools and a press.

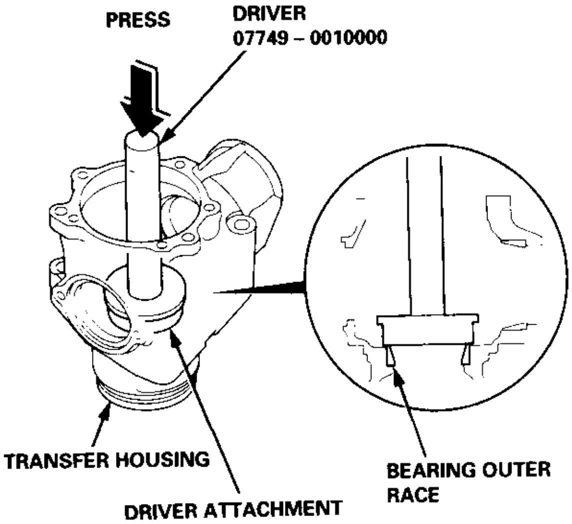
Transfer Housing Bearing Outer Race Replacement

NOTE: Coat all parts with MTF during reassembly.

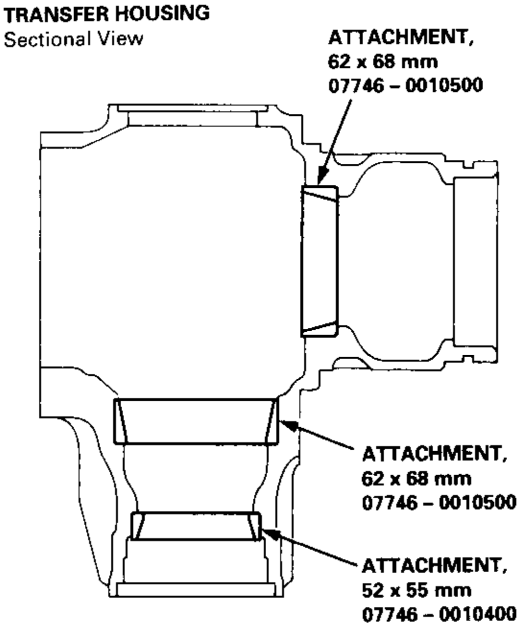
1. Remove the tapered roller bearing outer race from the transfer housing.



2. Install the new tapered roller bearing outer race using the special tools and a press.



Bearing Outer Race Locations and Special Tool Applications



Reassembly

Note these items during reassembly:

- While reassembling the transfer assembly:
  - — Check and adjust the transfer gear tooth contact.
  - — Measure and adjust the transfer gear backlash.
  - — Check and adjust the tapered roller bearing starting torque.
- Coat all parts with MTF during reassembly.
- Replace the tapered roller bearing and the bearing outer race as a set if either part is replaced.
- Replace the transfer drive gear and the transfer driven gear shaft as a set if either part is replaced.

Outline of Assembly

1. Select the 35 mm thrust shim.
   Perform this procedure if the transfer driven gear shaft or the tapered roller bearing on the transfer driven gear shaft is replaced.

2. Preassemble the parts to check and adjust transfer gear backlash and transfer gear tooth contact.

3. Disassemble the parts, then assemble the transfer driven gear shaft and its related parts.

4. Measure and adjust the starting torque of the transfer driven gear shaft tapered roller bearing.

5. Assemble the transfer shaft and its related parts.

6. Measure and adjust the total starting torque.

35 mm Thrust Shim Selection

1. Select the 35 mm thrust shim if the transfer driven gear shaft or the tapered roller bearing on the transfer driven gear shaft is replaced.

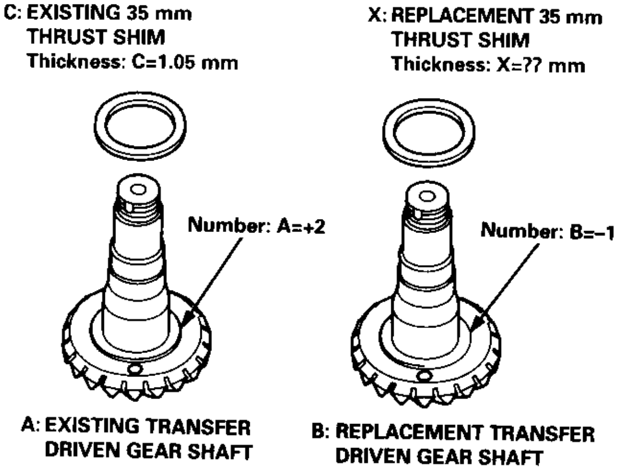
   Calculate the thickness of the 35 mm thrust shim using the formula below.

   FORMULA: $\frac{A}{100} - \frac{B}{100} + C = X$

   A: Number on the existing transfer driven gear shaft
   B: Number on the replacement transfer driven gear shaft
   C: Thickness of the existing 35 mm thrust shim
   X: Thickness needed for the replacement 35 mm thrust shim

   NOTE: The number on the transfer driven gear shaft is shown in 1/100 mm.

EXAMPLE:



$$X = \frac{A}{100} - \frac{B}{100} + C$$
$$= \frac{2}{100} - \frac{-1}{100} + 1.05$$
$$= 0.02 + 0.01 + 1.05$$
$$= 1.08 \text{ (mm)}$$

Select 35 mm thrust shim thickness of 1.08 mm (0.043 in). If the tapered roller bearing on the transfer driven gear shaft is replaced.

Measure the thickness of the replacement bearing and the existing bearing, and calculate the difference of the bearing thickness. Adjust the thickness of the existing 35 mm thrust shim by the amount of difference in bearing thickness, and select the replacement 35 mm thrust shim. Do not use more than one 35 mm thrust shim to adjust the transfer gear backlash.

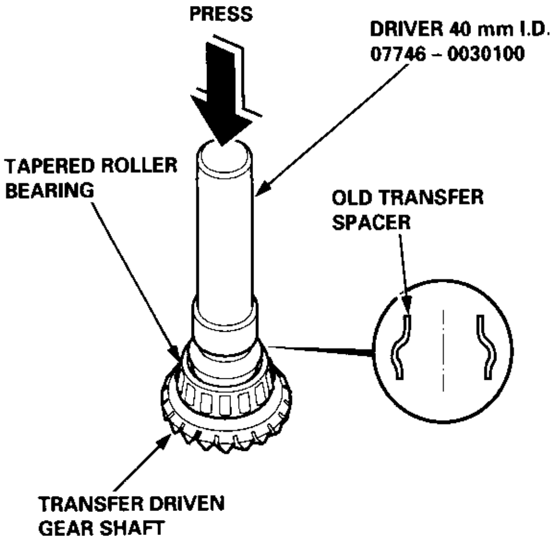
THRUST SHIM, 35 mm

Shim No.	Part Number	Thickness
A	41361 – PS3 – 000	0.72 mm (0.028 in)
B	41362 – PS3 – 000	0.75 mm (0.030 in)
C	41363 – PS3 – 000	0.78 mm (0.031 in)
D	41364 – PS3 – 000	0.81 mm (0.032 in)
E	41365 – PS3 – 000	0.84 mm (0.033 in)
F	41366 – PS3 – 000	0.87 mm (0.034 in)
G	41367 – PS3 – 000	0.90 mm (0.035 in)
H	41368 – PS3 – 000	0.93 mm (0.037 in)
I	41369 – PS3 – 000	0.96 mm (0.038 in)
J	41370 – PS3 – 000	0.99 mm (0.039 in)
K	41371 – PS3 – 000	1.02 mm (0.040 in)
L	41372 – PS3 – 000	1.05 mm (0.041 in)
M	41373 – PS3 – 000	1.08 mm (0.043 in)
N	41374 – PS3 – 000	1.11 mm (0.044 in)

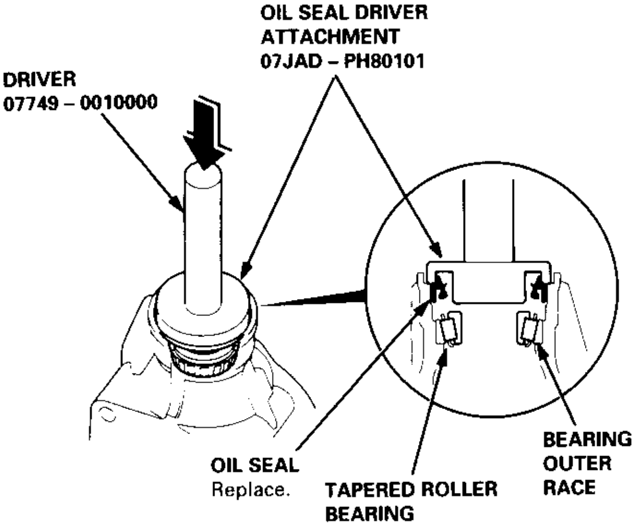
Transfer Gear Backlash Inspection and Transfer Gear Tooth Contact Inspection

2. Install the 35 mm thrust shim on the transfer driven gear shaft, then install the tapered roller bearing using the special tools and a press.

   NOTE: Use old transfer spacer for bearing installation, then discard it.

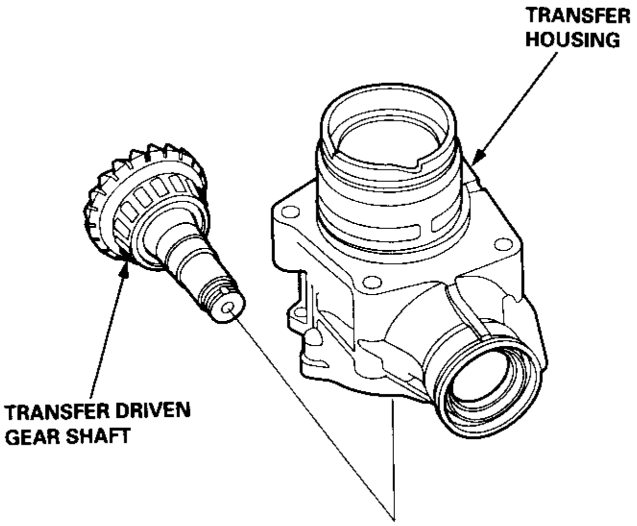


3. Install the bearing outer race, then the tapered bearing on the companion flange side of the transfer housing.

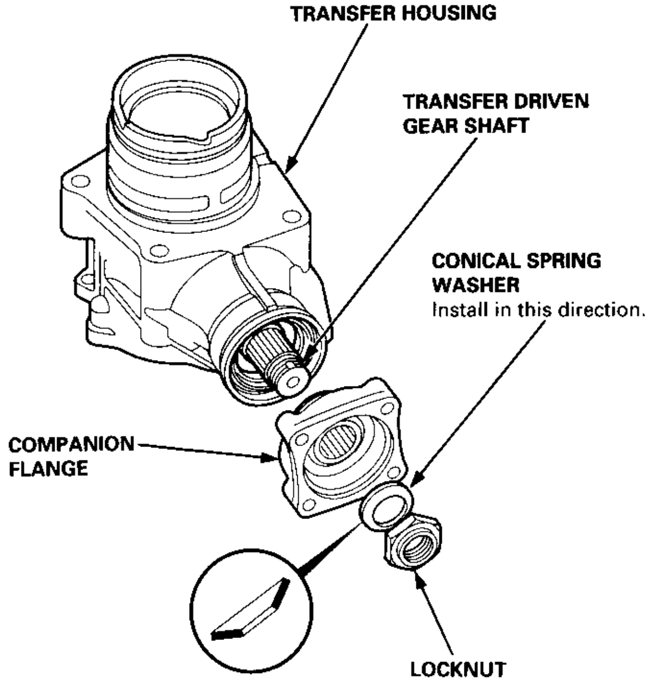


4. Install the new oil seal on the transfer housing using the special tools.

5. Install the transfer driven gear shaft in the transfer housing. Do not install the transfer spacer on the transfer driven gear shaft in this step.



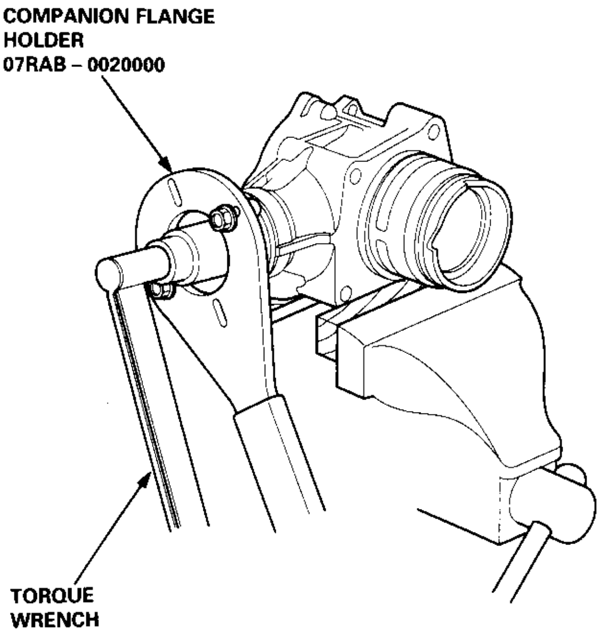
6. Install the companion flange, conical spring washer, and locknut on the transfer driven gear shaft. Do not install the O-ring and the back-up ring on the transfer gear shaft in this step.



(cont'd)

Reassembly (cont'd)

7. Secure the transfer housing in a bench vise with soft jaws, then install the special tool on the companion flange. To prevent damage to the transfer housing, always use soft jaws or equivalent materials between the transfer housing and the vise.



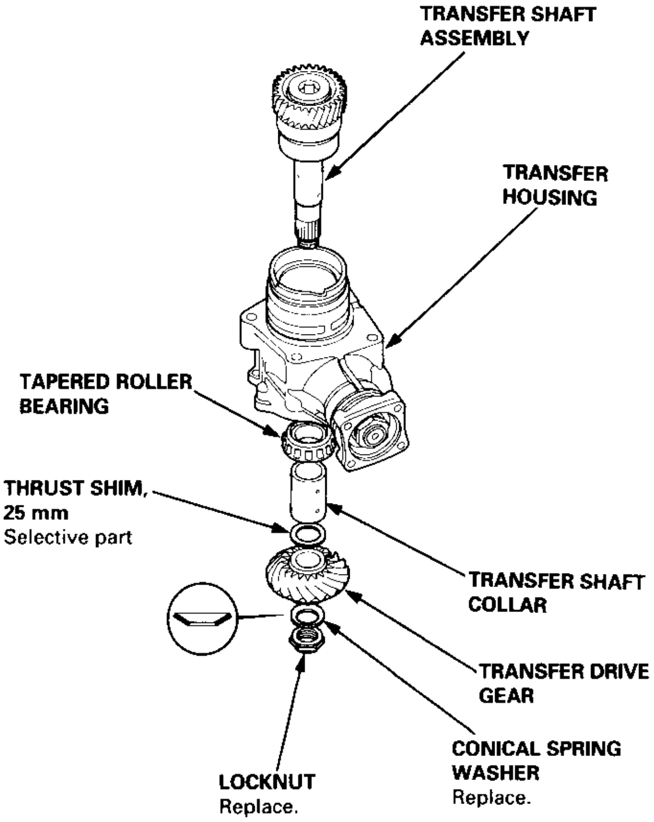
8. Tighten the locknut while measuring the starting torque so the starting torque is within 0.98 – 1.39 N·m (10.0 – 14.2 kgf·cm, 8.68 – 12.3 lbf·in).

NOTE:
- Coat the threads of the locknut, and the shaft with MTF before installing the locknut.
- Do not stake the locknut in this step.

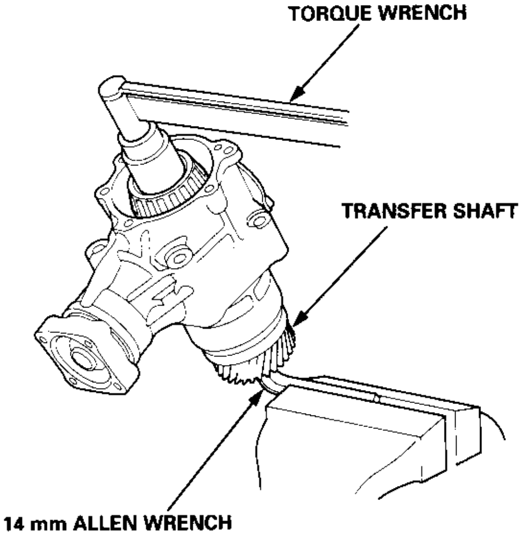
STARTING TORQUE:
0.98 – 1.39 N·m
(10.0 – 14.2 kgf·cm, 8.68 – 12.3 lbf·in)

9. Install the transfer shaft assembly in the transfer housing, then install the tapered roller bearing, transfer shaft collar, 25 mm thrust shim, transfer drive gear, conical spring washer, and locknut on the transfer shaft.

NOTE:
- Coat the threads of the locknut, and the shaft with MTF before installing the locknut.
- Do not stake the locknut in this step.



10. Hold the transfer shaft with a 14 mm Allen wrench clamped in a bench vise.



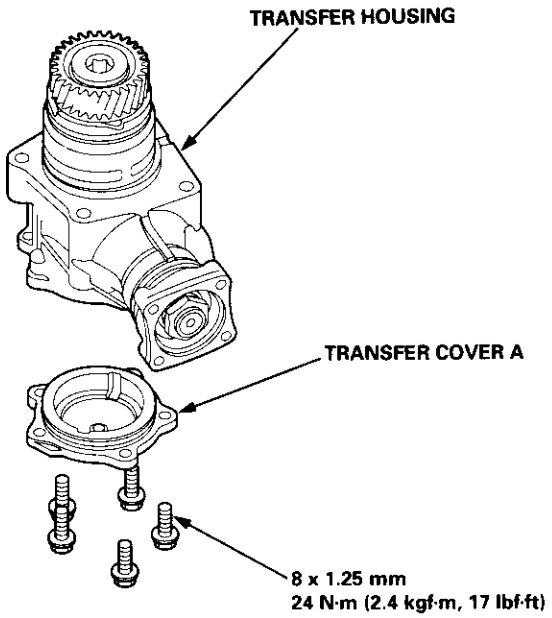
11. Tighten the transfer shaft locknut.

NOTE:

- The transfer shaft locknut has left-hand threads.
- Do not stake the locknut in this step.

TORQUE: 118 N·m (12.0 kgf·m, 86.8 lbf·ft)

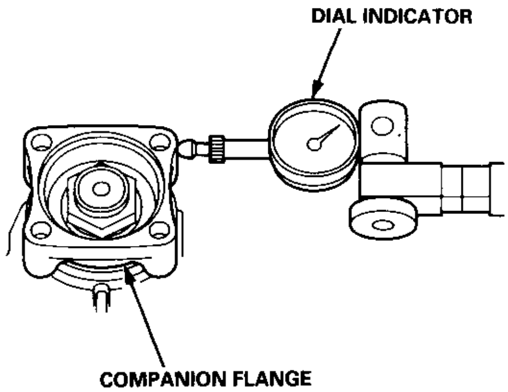
12. Temporarily install the transfer cover A without the O-ring.



13. Rotate the companion flange several times to seat the tapered roller bearing.

14. Set a dial indicator on the companion flange, then measure the transfer gear backlash.

STANDARD: 0.06 – 0.16 mm (0.002 – 0.006 in)



15. If the measurement is not within the standard, remove the transfer shaft locknut and replace the 25 mm thrust shim. Select and install a new 25 mm thrust shim, then recheck the measurement. Do not use more than one 25 mm thrust shim to adjust the transfer gear backlash.

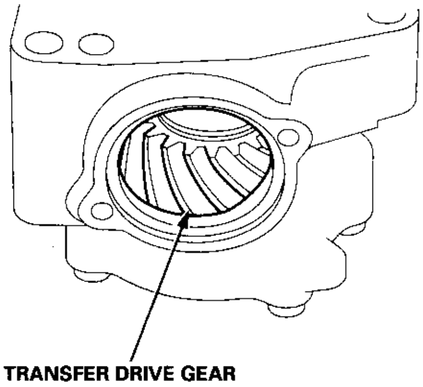
THRUST SHIM, 25 mm

Shim No.	Part Number	Thickness
1	29411 – P1C – 000	1.70 mm (0.067 in)
2	29412 – P1C – 000	1.73 mm (0.068 in)
3	29413 – P1C – 000	1.76 mm (0.069 in)
4	29414 – P1C – 000	1.79 mm (0.070 in)
5	29415 – P1C – 000	1.82 mm (0.072 in)
6	29416 – P1C – 000	1.85 mm (0.073 in)
7	29417 – P1C – 000	1.88 mm (0.074 in)
8	29418 – P1C – 000	1.91 mm (0.075 in)
9	29419 – P1C – 000	1.94 mm (0.076 in)
10	29420 – P1C – 000	1.97 mm (0.078 in)
11	29421 – P1C – 000	2.00 mm (0.079 in)
12	29422 – P1C – 000	2.03 mm (0.080 in)
13	29423 – P1C – 000	2.06 mm (0.081 in)
14	29424 – P1C – 000	2.09 mm (0.082 in)
15	29425 – P1C – 000	2.12 mm (0.083 in)
16	29426 – P1C – 000	2.15 mm (0.085 in)
17	29427 – P1C – 000	2.18 mm (0.086 in)
18	29428 – P1C – 000	2.21 mm (0.087 in)
19	29429 – P1C – 000	2.24 mm (0.088 in)

(cont'd)

Reassembly (cont'd)

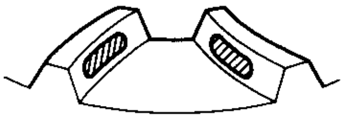
16. Apply Prussian Blue to both sides of the transfer gear teeth lightly and evenly.



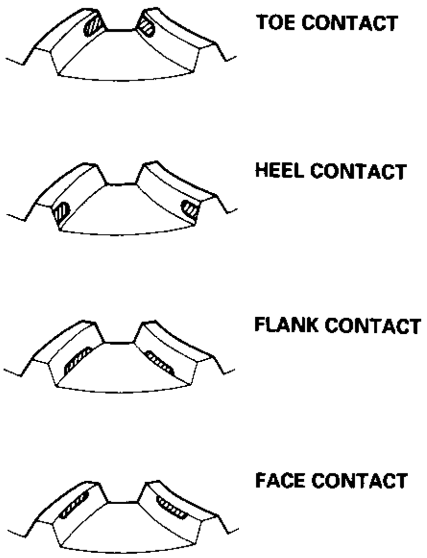
17. Rotate the companion flange in both directions until the transfer gear rotates one full turn in both directions.

18. Check the transfer gear tooth contact pattern.

CORRECT TOOTH CONTACT PATTERN



INCORRECT TOOTH CONTACT PATTERN


TOE CONTACT

HEEL CONTACT

FLANK CONTACT

FACE CONTACT

19. If the transfer gear tooth contact is incorrect, adjust the transfer gear tooth contact with a 35 mm or 25 mm thrust shim.

NOTE:
- To select a 35 mm thrust shim, refer to page 13-52.
- Do not use more than one 35 mm shim to adjust the transfer gear tooth contact.
- To select the 25 mm thrust shim, refer to page 13-55.
- Do not use more than one 25 mm shim to adjust the transfer gear tooth contact.

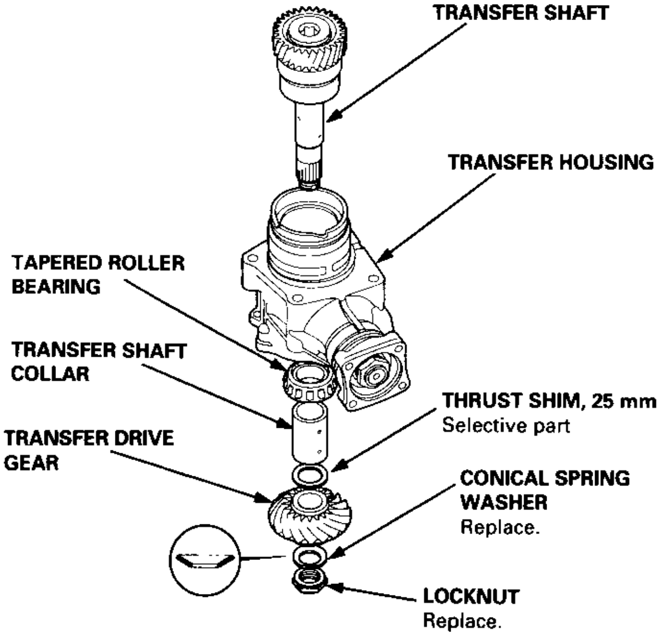
- **Toe Contact**
  Use a thicker 35 mm thrust shim to move the transfer driven gear shaft toward the transfer drive gear. Because this movement causes the transfer gear backlash to change, move the transfer drive gear away from the transfer driven gear shaft to adjust the transfer gear backlash as follows:
  - Increase the thickness of the 25 mm thrust shim.
  - Reduce the thickness of the 68 mm thrust shim by the amount of increased thickness of the 25 mm thrust shim.

- **Heel Contact**
  Use a thinner 35 mm thrust shim to move the transfer driven gear shaft away from the transfer drive gear. Because this movement causes the transfer gear backlash to change, move the transfer drive gear toward the transfer driven gear shaft to adjust the transfer gear backlash as follows:
  - Reduce the thickness of the 25 mm thrust shim.
  - Increase the thickness of the 68 mm thrust shim by the amount of reduced thickness of the 25 mm thrust shim.

- **Flank Contact**
  Use a thinner thrust shim to move the transfer drive gear toward the transfer driven gear shaft. Flank contact must be adjusted within the limits of the transfer gear backlash. If the backlash exceeds the limits, adjust as described under Heel Contact.

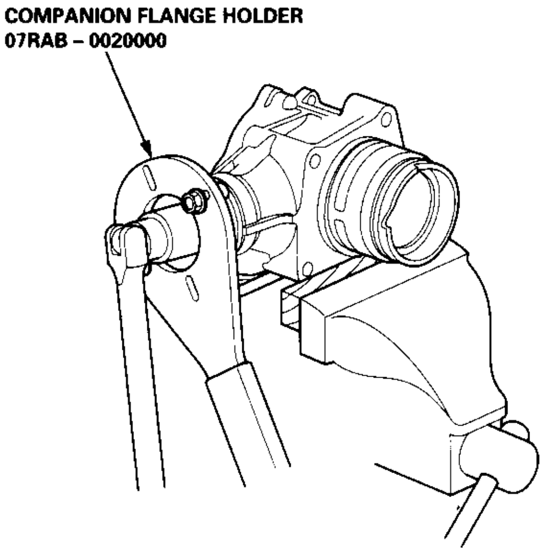
- **Face Contact**
  Use a thicker thrust shim to move the transfer drive gear away from the transfer driven gear shaft. Face contact must be adjusted within the limits of the transfer gear backlash. If the backlash exceeds the limits, adjust as described under Toe Contact.

20. Remove the parts on the transfer shaft, and remove the transfer shaft from the transfer housing.



Transfer Driven Gear Shaft Starting Torque Inspection and Adjustment

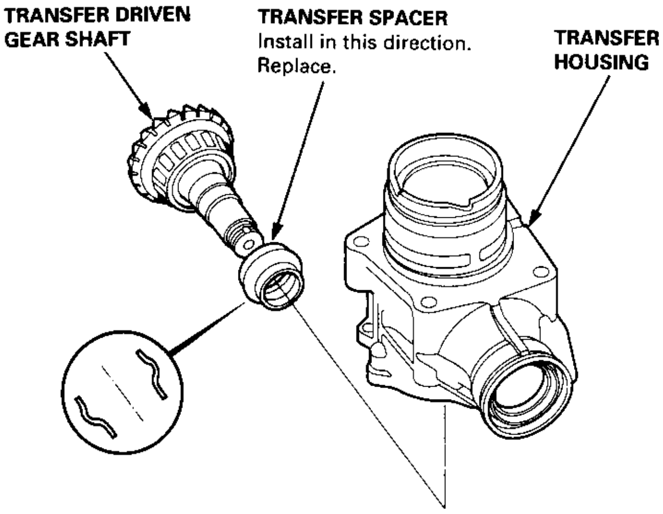
21. Secure the transfer housing in a bench vise with soft jaws.



22. Install the special tool on the companion flange, then remove the transfer driven gear shaft locknut and the conical spring washer.

23. Remove the transfer driven gear shaft and the companion flange.

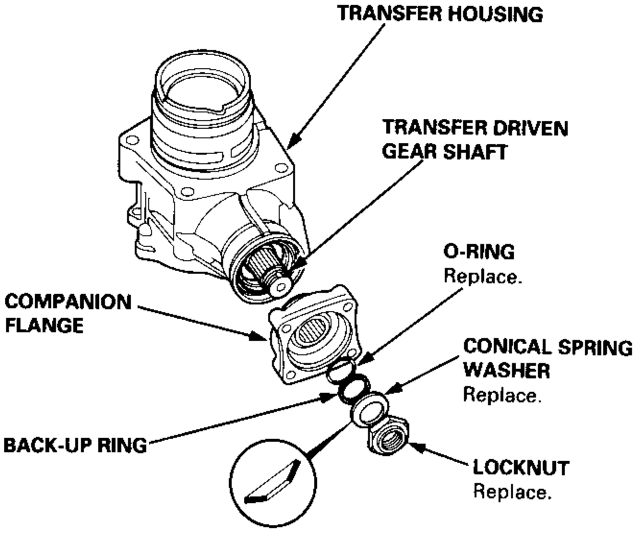
24. Install the new transfer spacer on the transfer driven gear shaft, then install them in the transfer housing.



25. Install the companion flange, O-ring, back-up ring, conical spring washer and locknut on the transfer driven gear shaft.

NOTE:

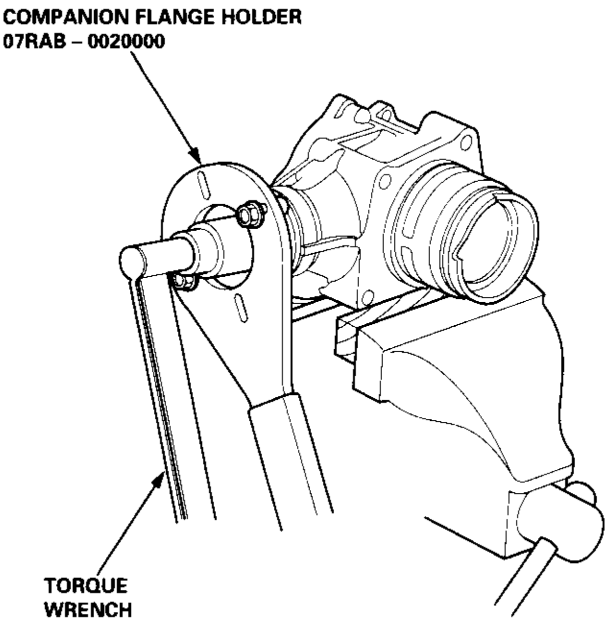
- Coat the threads of the locknut, O-ring and transfer shaft with MTF before installing the locknut.
- Install the conical spring washer in the direction shown.



(cont'd)

Reassembly (cont'd)

26. Secure the transfer housing in a bench vise with soft jaws.

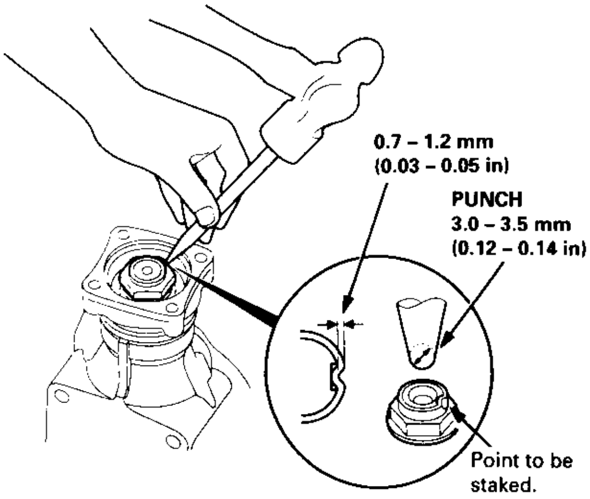


27. Install the special tool on the companion flange, then tighten the transfer driven gear shaft locknut while measuring the starting torque of the transfer driven gear shaft.

STARTING TORQUE:
0.98 – 1.39 N·m
(10.0 – 14.2 kgf·cm, 8.68 – 12.3 lbf·in)
TIGHTENING TORQUE:
132 – 216 N·m
(13.5 – 22.0 kgf·m, 97.6 – 159 lbf·ft)

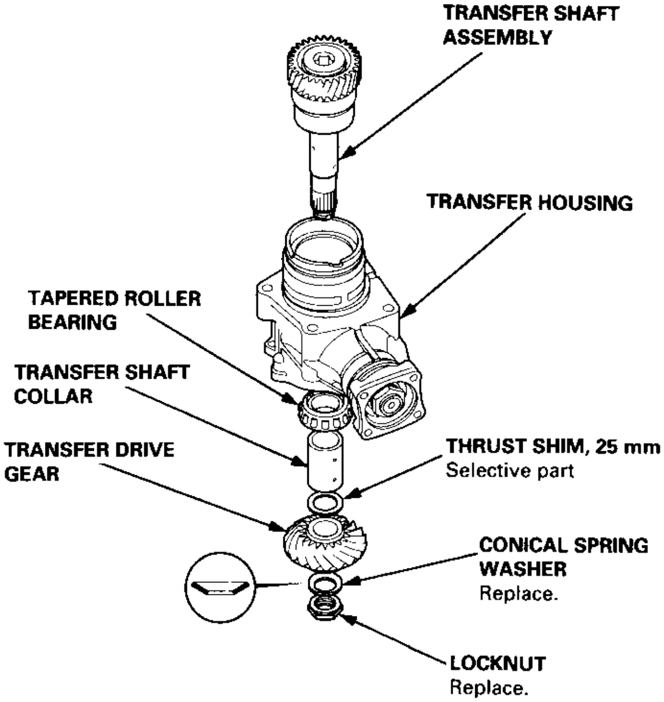
NOTE:
- Rotate the companion flange several times to seat the tapered roller bearing, then measure the starting torque.
- If the starting torque exceeds 1.39 N·m (14.2 kgf·cm, 12.3 lbf·in), replace the transfer spacer and reassemble the parts. Do not adjust the torque with the locknut loose.
- If the tightening torque exceeds 216 N·m (22.0 kgf·m, 159 lbf·ft), replace the transfer spacer and reassemble the parts.
- Write down the measurement of the starting torque: it is used to measure the total starting torque.

28. Stake the locknut into the transfer driven gear shaft using a 3.5 mm punch.



29. Install the transfer shaft assembly in the transfer housing, then install the tapered roller bearing, transfer shaft collar, 25 mm thrust shim, transfer drive gear, conical spring washer, and transfer shaft locknut on the transfer shaft.

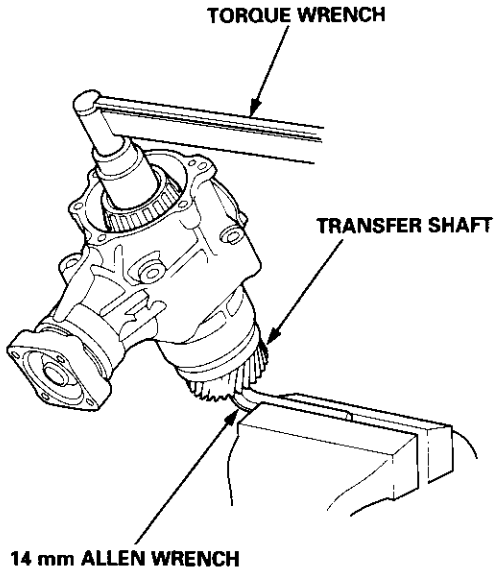
NOTE:
- Coat the threads of the locknut and transfer shaft with MTF before installing the locknut.
- Install the conical spring washer in the direction shown.



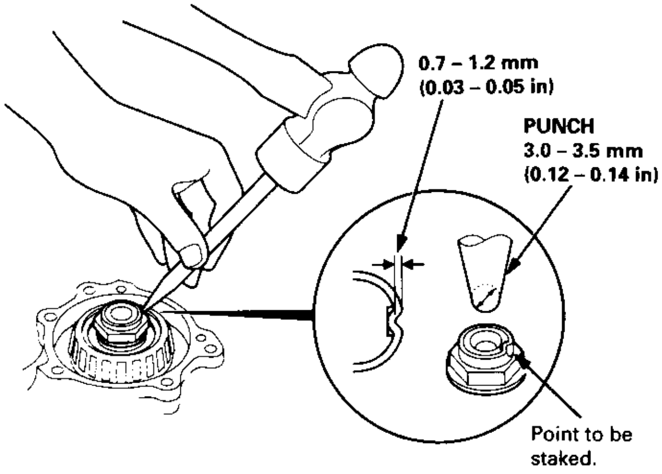
30. Hold the transfer shaft with a 14 mm Allen wrench clamped in a bench vise.

NOTE: The locknut has left-hand threads.

TORQUE: 118 N·m (12.0 kgf·m, 86.8 lbf·ft)

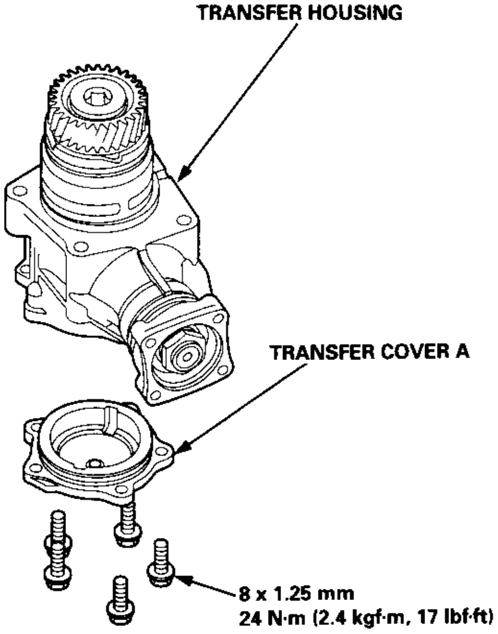


31. Stake the locknut on the transfer shaft using a 3.5 mm punch.

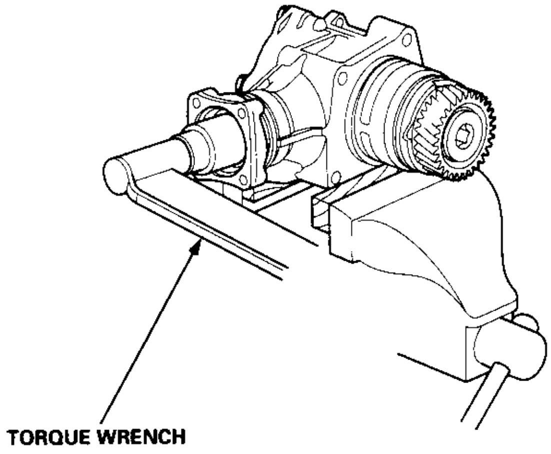


Total Starting Torque Inspection and Adjustment

32. Temporarily install transfer cover A without the O-ring.



33. Secure the transfer housing in a bench vise with soft jaws, then rotate the companion flange several times to fit the tapered roller bearing.



34. Measure the total starting torque.

TOTAL STARTING TORQUE:
1.70 – 2.08 N·m (17.3 – 21.2 kgf·cm, 15.0 – 18.4 lbf·in)
+ Transfer Driven Gear Shaft Starting Torque Value (wrote down in step 27).

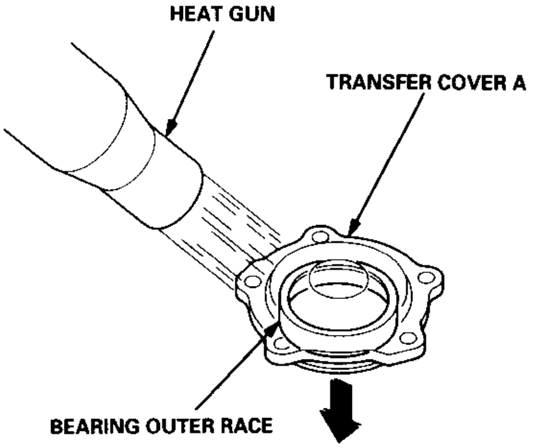
(cont'd)

Reassembly (cont'd)

35. Remove transfer cover A.

36. If the measurement is out of specification, remove the 68 mm thrust shim from transfer cover A by heating the cover to almost 212°F (100°C) using a heat gun. Do not heat the cover higher than 212°F (100°C). Let the cover cool to room temperature before adjusting the starting torque.

    If the measurement is within the specification, go to step 40.

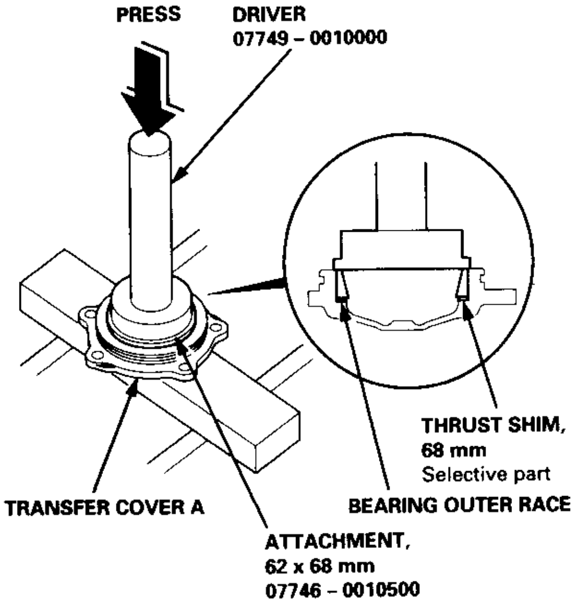


37. Select the 68 mm thrust shim.

THRUST SHIM, 68 mm

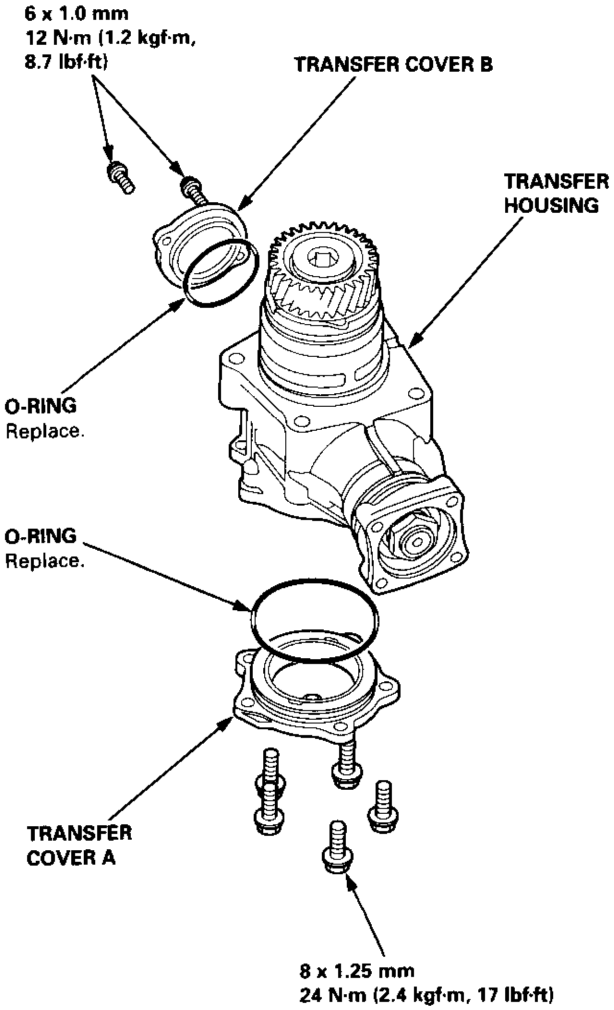
Shim No.	Part Number	Thickness
ZV	23974 – P1C – 020	1.41 mm (0.056 in)
ZW	23975 – P1C – 020	1.44 mm (0.057 in)
ZX	23976 – P1C – 020	1.47 mm (0.058 in)
ZY	23977 – P1C – 020	1.50 mm (0.059 in)
ZZ	23978 – P1C – 020	1.53 mm (0.060 in)
A	23941 – PW5 – 000	1.56 mm (0.061 in)
B	23942 – PW5 – 000	1.59 mm (0.063 in)
C	23943 – PW5 – 000	1.62 mm (0.064 in)
D	23944 – PW5 – 000	1.65 mm (0.065 in)
E	23945 – PW5 – 000	1.68 mm (0.066 in)
F	23946 – PW5 – 000	1.71 mm (0.067 in)
G	23947 – PW5 – 000	1.74 mm (0.069 in)
H	23948 – PW5 – 000	1.77 mm (0.070 in)
I	23949 – PW5 – 000	1.80 mm (0.071 in)
J	23950 – PW5 – 000	1.83 mm (0.072 in)
K	23951 – PW5 – 000	1.86 mm (0.073 in)
L	23952 – PW5 – 000	1.89 mm (0.074 in)
M	23953 – PW5 – 000	1.92 mm (0.076 in)
N	23954 – PW5 – 000	1.95 mm (0.077 in)
O	23955 – PW5 – 000	1.98 mm (0.078 in)
P	23956 – PW5 – 000	2.01 mm (0.079 in)
Q	23957 – PW5 – 000	2.04 mm (0.080 in)
R	23958 – PW5 – 000	2.07 mm (0.081 in)
S	23959 – PW5 – 000	2.10 mm (0.083 in)
T	23960 – PW5 – 000	2.13 mm (0.084 in)
U	23961 – PW5 – 000	2.16 mm (0.085 in)
V	23962 – PW5 – 000	2.19 mm (0.086 in)
W	23963 – PW5 – 000	2.22 mm (0.087 in)
X	23964 – PW5 – 000	2.25 mm (0.089 in)
Y	23965 – PW5 – 000	2.28 mm (0.090 in)
Z	23966 – PW5 – 000	2.31 mm (0.091 in)
AA	23967 – PW5 – 000	2.34 mm (0.092 in)
AB	23968 – PW5 – 000	2.37 mm (0.093 in)
AC	23969 – PW5 – 000	2.40 mm (0.094 in)
AD	23970 – PW5 – 000	2.43 mm (0.096 in)
AZ	23941 – PW8 – 000	2.46 mm (0.097 in)
BZ	23942 – PW8 – 000	2.49 mm (0.098 in)
CZ	23943 – PW8 – 000	2.52 mm (0.099 in)
DZ	23944 – PW8 – 000	2.55 mm (0.100 in)
EZ	23945 – PW8 – 000	2.58 mm (0.102 in)

38. Install the 68 mm thrust shim using the special tools.



39. After replacing the 68 mm thrust shim, recheck and make sure the total starting torque is within the specification.

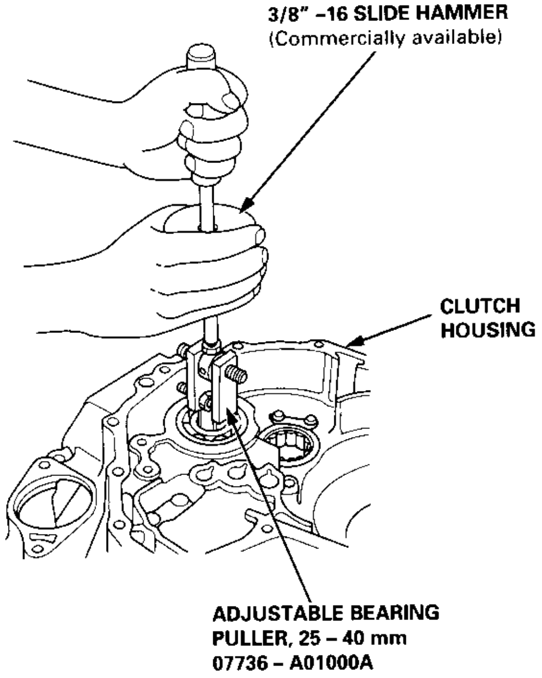
40. Coat the new O-rings with MTF, install them on transfer covers A and B, then install the covers on the transfer housing.



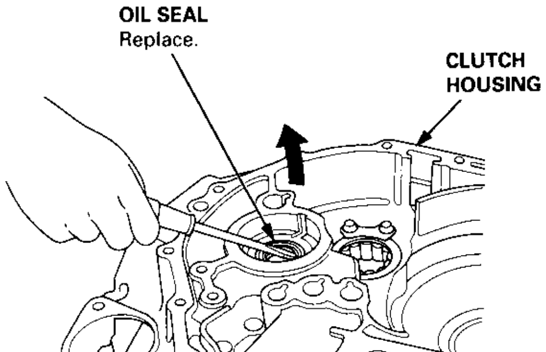
Mainshaft Bearing/Oil Seal

Replacement

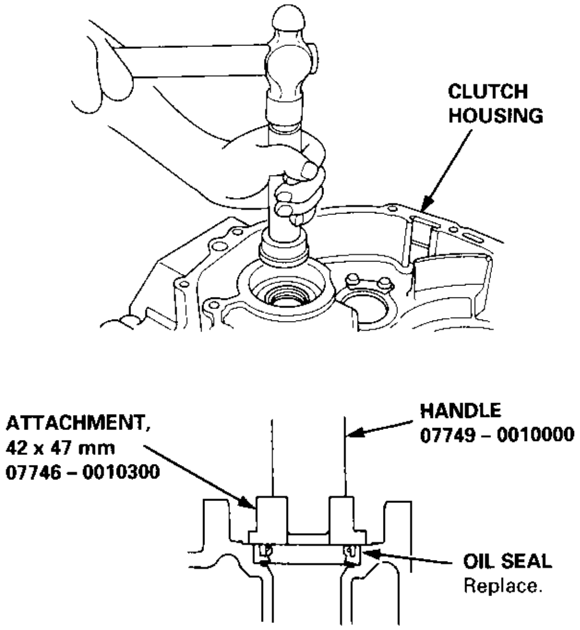
1. Remove the ball bearing using the special tool.



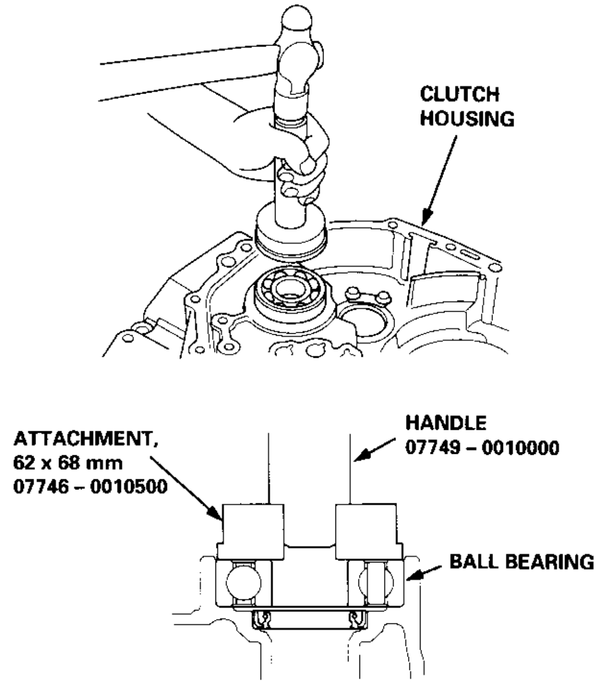
2. Remove the oil seal from the clutch housing.



3. Drive the new oil seal in from the transmission side using the special tools.



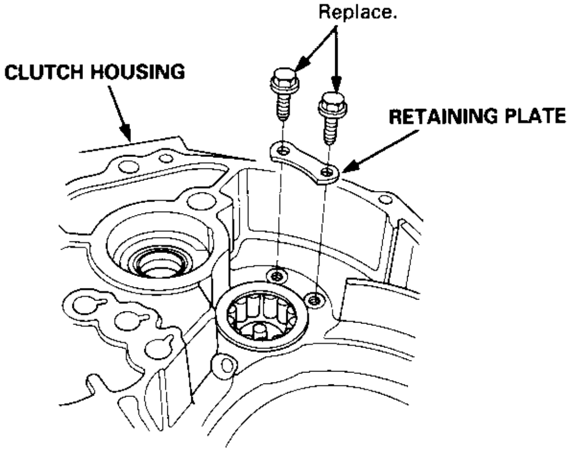
4. Drive the new ball bearing in from the transmission side using the special tools.



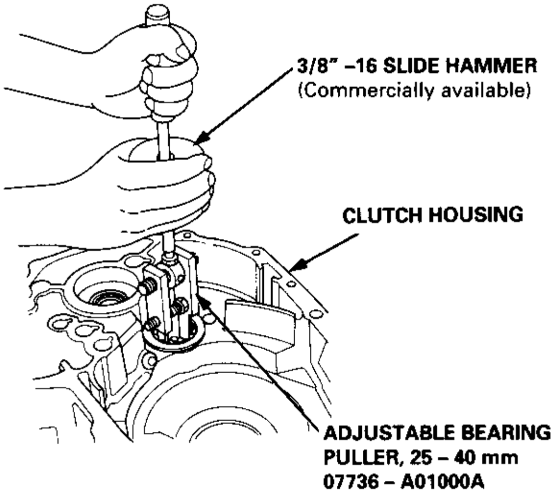
Countershaft Bearing

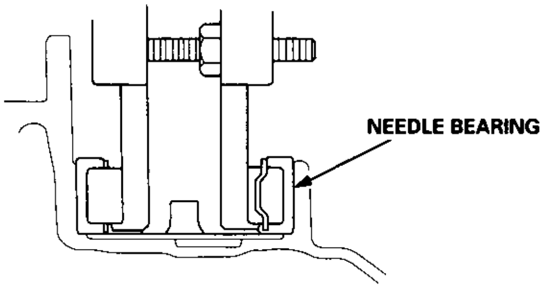
Replacement

1. Remove the retaining plate from the clutch housing.

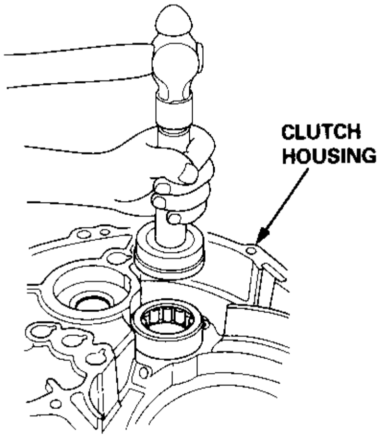


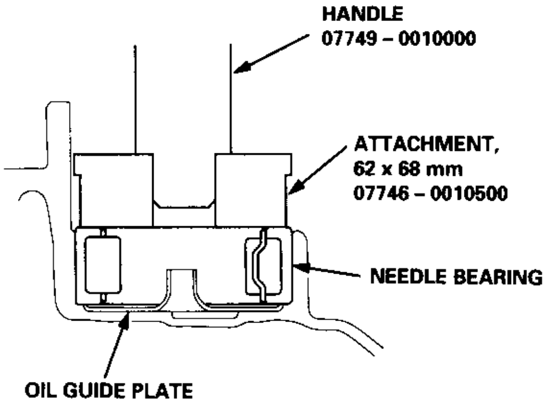
2. Remove the needle bearing using the special tool, then remove the oil guide plate.



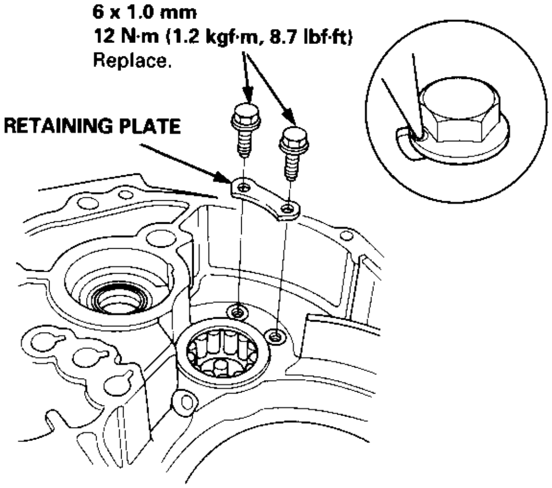


3. Position the oil guide plate.
4. Drive the needle bearing using the special tools.





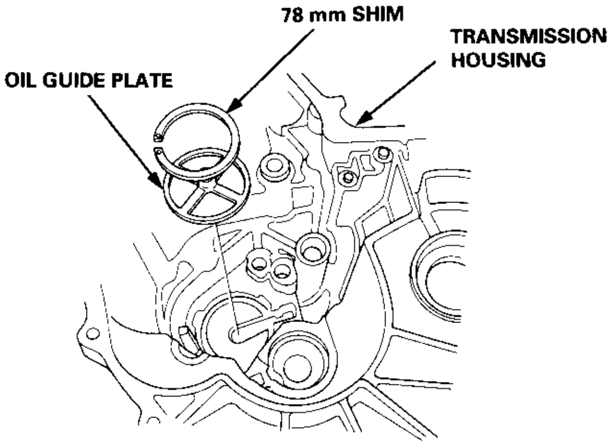
5. Install the retaining plate, and stake the bolt heads into the groove in the retaining plate.



Mainshaft Thrust Clearance

Adjustment

1. Remove the 78 mm shim and oil guide plate from the transmission housing.

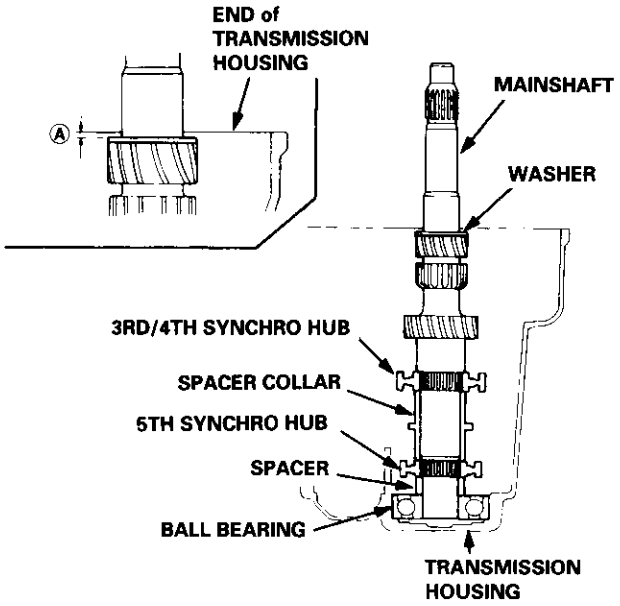


2. Install the 3rd/4th synchro hub, spacer collar, 5th synchro hub, spacer, and ball bearing on the mainshaft, then install the above assembly in the transmission housing.

3. Install the washer on the mainshaft.

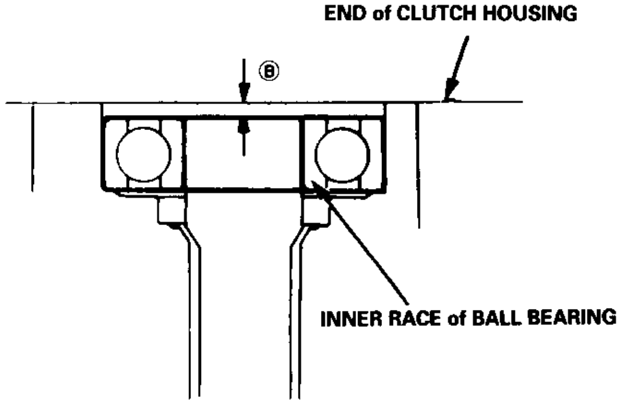
4. Measure distance Ⓐ between the end of the transmission housing and washer.

   NOTE:
   - Use a straight edge and vernier caliper.
   - Measure at three locations and average the reading.



5. Measure distance Ⓑ between the end of the clutch housing and bearing inner race.

   NOTE:
   - Use a straight edge and depth gauge.
   - Measure at three locations and average the readings.



6. Select the proper 78 mm shim from the chart by using the formula below.

   Shim Selection Formula:

   From the measurements you made in steps 4 and 5:

   -1. Add distance Ⓑ (step 5) to distance Ⓐ (step 4).

   -2. From this number, subtract 0.93 (which is the midpoint of the flex range of the clutch housing bearing spring washer).

   -3. Take this number and compare it to the available shim sizes in the chart.

   (For example)

A: 2.39	2.61
+ B: 0.22	– 0.93
= 2.61	= 1.68

   Try the 1.68 mm (0.0661 in) shim.

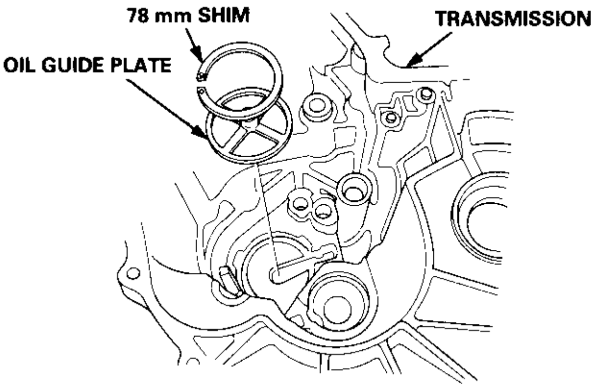
78 mm SHIM

	Part Number	Thickness
A	23941 – P16 – 000	1.20 mm (0.0472 in)
B	23942 – P16 – 000	1.23 mm (0.0484 in)
C	23943 – P16 – 000	1.26 mm (0.0496 in)
D	23944 – P16 – 000	1.29 mm (0.0508 in)
E	23945 – P16 – 000	1.32 mm (0.0520 in)
F	23946 – P16 – 000	1.35 mm (0.0531 in)
G	23947 – P16 – 000	1.38 mm (0.0543 in)
H	23948 – P16 – 000	1.41 mm (0.0555 in)
I	23949 – P16 – 000	1.44 mm (0.0567 in)
J	23950 – P16 – 000	1.47 mm (0.0579 in)
K	23951 – P16 – 000	1.50 mm (0.0591 in)
L	23952 – P16 – 000	1.53 mm (0.0602 in)
M	23953 – P16 – 000	1.56 mm (0.0614 in)
N	23954 – P16 – 000	1.59 mm (0.0626 in)
O	23955 – P16 – 000	1.62 mm (0.0638 in)
P	23956 – P16 – 000	1.65 mm (0.0650 in)
Q	23957 – P16 – 000	1.68 mm (0.0661 in)
R	23958 – P16 – 000	1.71 mm (0.0673 in)
S	23959 – P16 – 000	1.74 mm (0.0685 in)
T	23960 – P16 – 000	1.77 mm (0.0697 in)
U	23961 – P16 – 000	1.80 mm (0.0709 in)
V	23962 – P16 – 000	1.83 mm (0.0720 in)
W	23963 – P16 – 000	1.86 mm (0.0732 in)
X	23964 – P16 – 000	1.89 mm (0.0744 in)
Y	23965 – P16 – 000	1.92 mm (0.0756 in)
Z	23966 – P16 – 000	1.95 mm (0.0768 in)
AA	23967 – P16 – 000	1.98 mm (0.0780 in)
AB	23968 – P16 – 000	2.01 mm (0.0791 in)
AC	23969 – P16 – 000	2.04 mm (0.0803 in)
AD	23970 – P16 – 000	2.07 mm (0.0815 in)
AE	23971 – P16 – 000	2.10 mm (0.0827 in)
AF	23972 – P16 – 000	2.13 mm (0.0839 in)
AG	23973 – P16 – 000	2.16 mm (0.0850 in)
AH	23974 – P16 – 000	2.19 mm (0.0862 in)
AI	23975 – P16 – 000	2.22 mm (0.0874 in)
AJ	23976 – P16 – 000	2.25 mm (0.0886 in)
AK	23977 – P16 – 000	2.28 mm (0.0898 in)
AL	23978 – P16 – 000	2.31 mm (0.0909 in)
AM	23979 – P16 – 000	2.34 mm (0.0921 in)
AN	23980 – P16 – 000	2.37 mm (0.0933 in)

7. Check the thrust clearance in the manner described below.

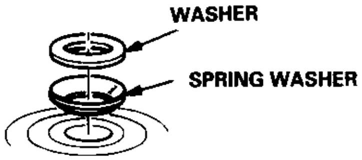
NOTE: Measurement should be made at normal room temperature.

–1. Install the 78 mm shim selected and oil guide plate in the transmission housing.



–2. Install the spring washer and washer on the ball bearing.

NOTE:
- Clean the spring washer, washer and thrust shim thoroughly before installation.
- Install the spring washer, washer and thrust shim properly.



–3. Install the mainshaft in the clutch housing.

–4. Place the transmission housing over the mainshaft and onto the clutch housing.

–5. Tighten the clutch and transmission housings with several 8 mm bolts.

NOTE: It is not necessary to use sealing agent between the housings.

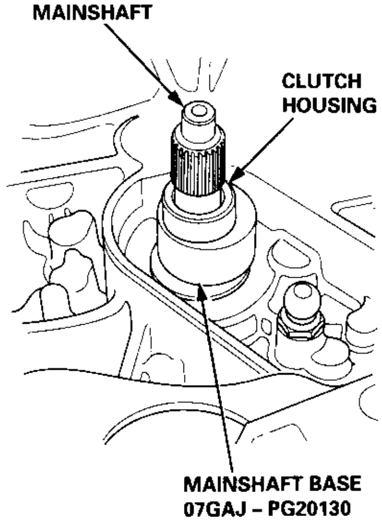
–6. Tap the mainshaft with a plastic hammer.

(cont'd)

Mainshaft Thrust Clearance

Adjustment (cont'd)

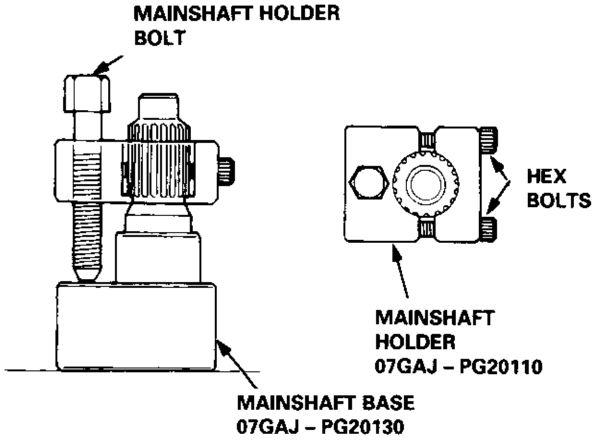
–7. Slide the mainshaft base over the mainshaft.



–8. Attach the mainshaft holder to the mainshaft as follows:

NOTE:

- Back-out the mainshaft holder bolt and loosen the two hex bolts.
- Fit the holder over the mainshaft so its lip is towards the transmission.
- Align the mainshaft holder's lip around the groove at the inside of the mainshaft splines, then tighten the hex bolts.



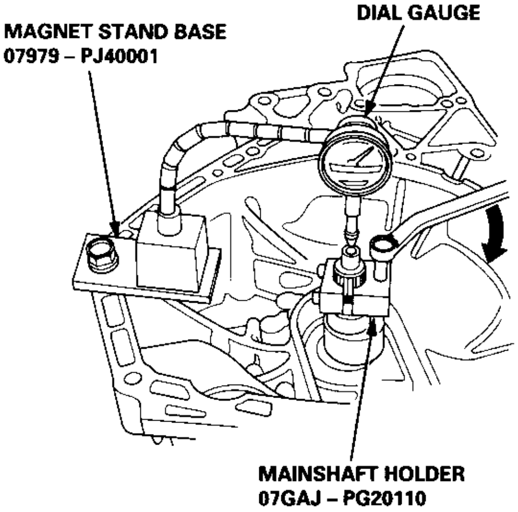
–9. Seat the mainshaft fully by tapping its end with a plastic hammer.

–10. Thread the mainshaft holder bolt in until it just contacts the wide surface of the mainshaft base.

–11. Zero a dial gauge on the end of the mainshaft.

–12. Turn the mainshaft holder bolt clockwise; stop turning when the dial gauge has reached its maximum movement. The reading on the dial gauge is the amount of mainshaft end play.

NOTE: Turning the mainshaft holder bolt more than 60 degrees after the needle of the dial gauge stops moving may damage the transmission.

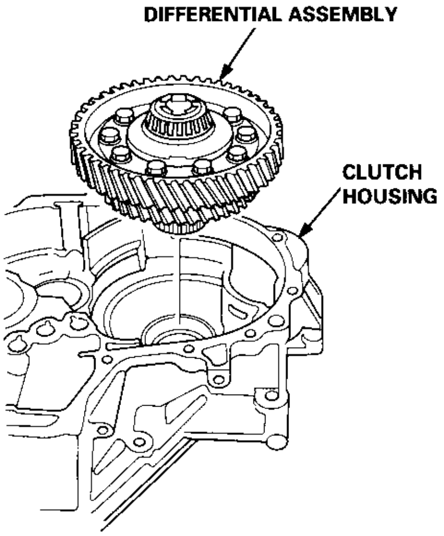


–13. If the reading is within the standard, the clearance is correct.
If the reading is not within the standard, recheck the shim thickness.

Standard: 0.11 – 0.18 mm (0.004 – 0.007 in)

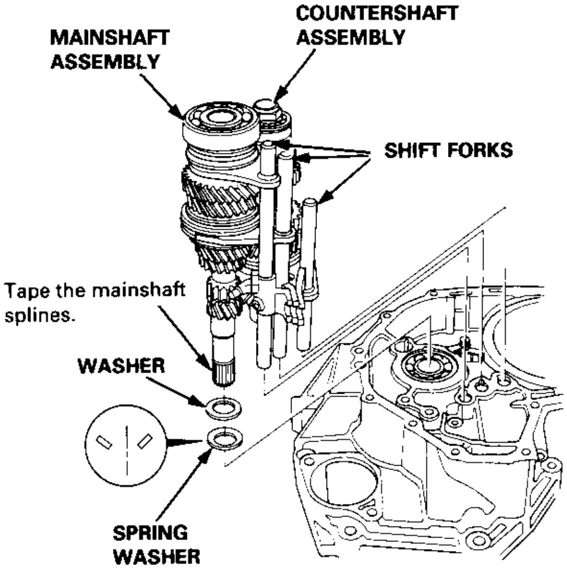
Reassembly

1. Install the differential assembly in the clutch housing.

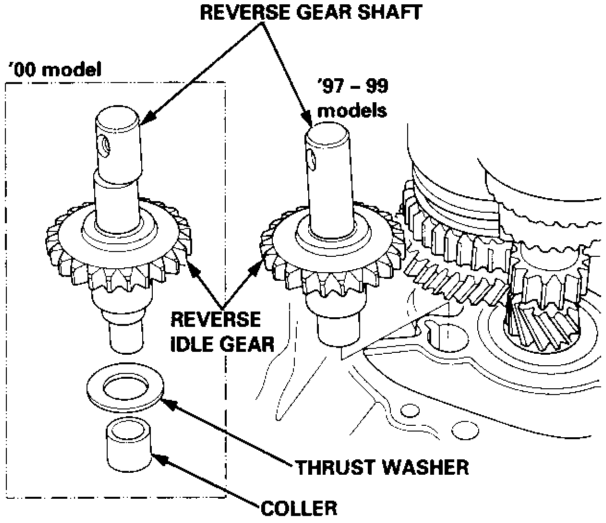


2. Install the spring washer and washer with the angle against the clutch housing as shown.

3. Tape the mainshaft splines, insert the mainshaft and countershaft into the shift forks, and install them as an assembly.

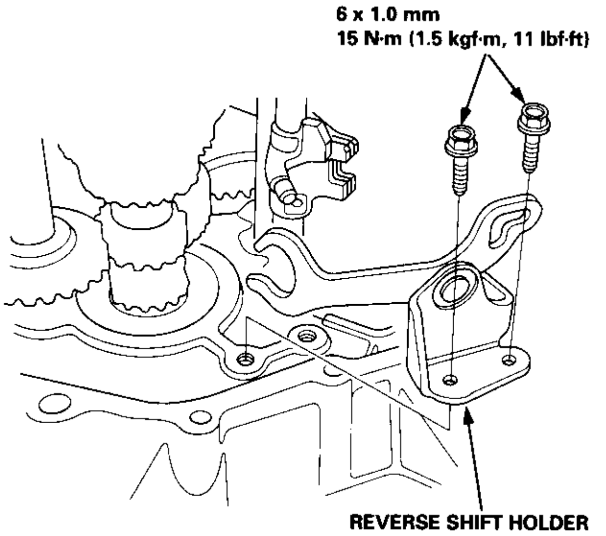


4. '97 – 99 models: Install the reverse idle gear and reverse gear shaft in the clutch housing.
   '00 model: Install the coller, thrust washer, reverse idler gear and the reverse gear shaft in the clutch housing.



NOTE: Install the reverse gear shaft ('00 model) in the direction shown.

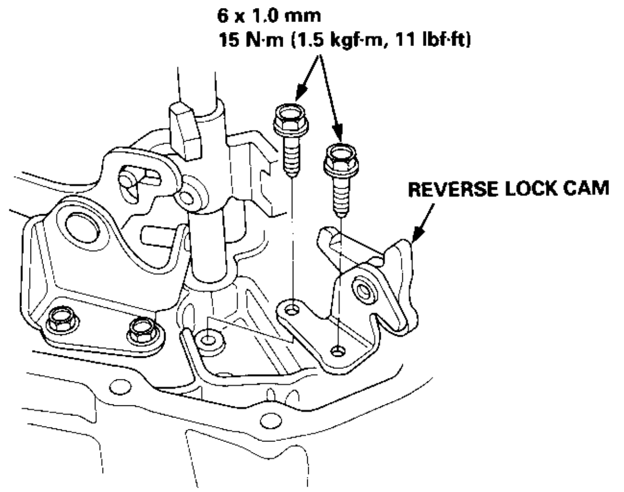
5. Install the reverse shift holder in the clutch housing with the 5th/reverse shift piece pin positioned in the slot of the reverse shift fork.



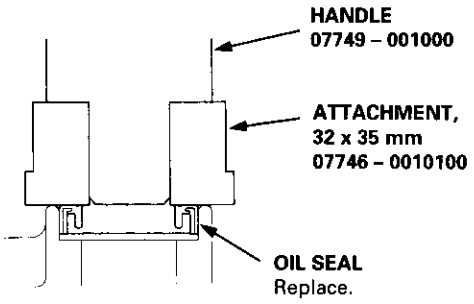
(cont'd)

Reassembly (cont'd)

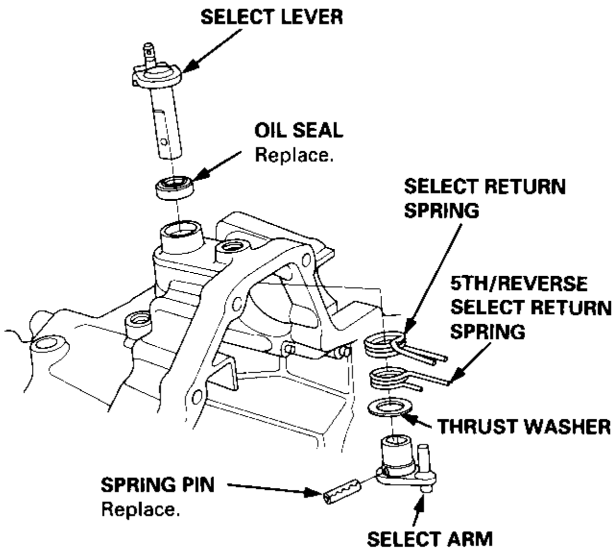
6. Install the reverse lock cam on the clutch housing.



7. Install the oil seal.

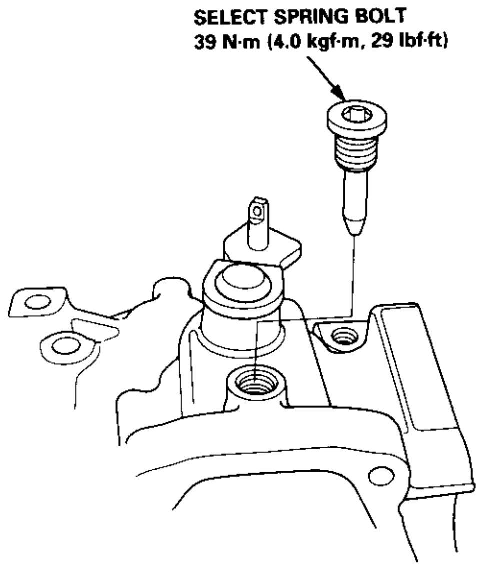


8. Install the select lever, spring washer, and springs on the select arm.



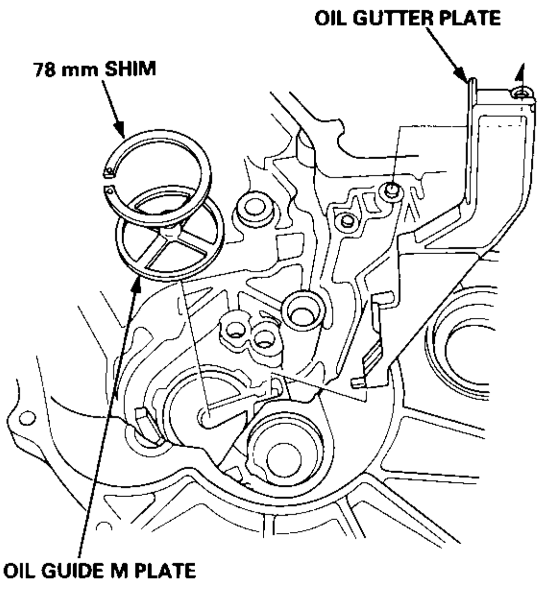
9. Install the select arm and spring pin.

10. Apply liquid gasket (P/N 08718 – 0001 or 08718 – 0003) to the select spring bolt threads, then install the select spring bolt.



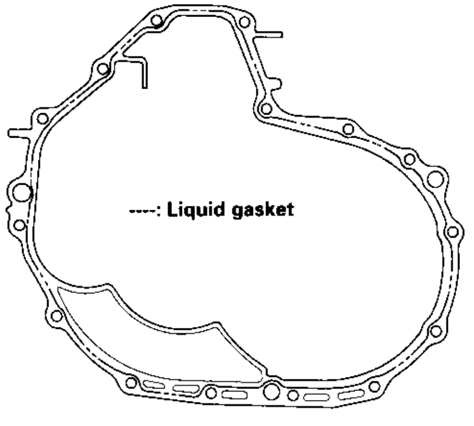
11. Install the oil guide M plate, 78 mm shim, and oil gutter plate in the transmission housing.

NOTE: Select the 78 mm shim according to the measurements made on page 13-64.



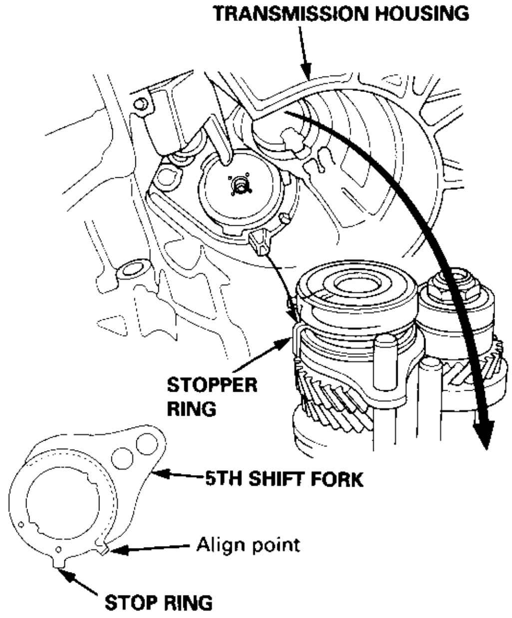
12. Apply liquid gasket to the surface of the transmission housing as shown.

    Note these items:
    - Use liquid gasket (P/N 08718 – 0001 or 08718 – 0003).
    - Remove the dirty fluid from the sealing surface.
    - Seal the entire circumference of the bolt holes to prevent fluid leakage.
    - If 20 minutes have passed after applying liquid gasket, reapply it and assemble the housings.
    - Allow it to cure at least 20 minutes after assembly before filling the transmission with MTF.

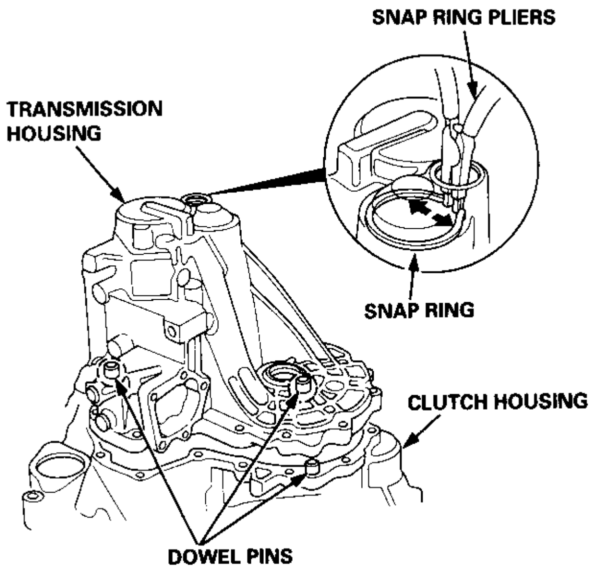


13. Install the 14 x 20 mm dowel pins.

14. Set the stopper ring as shown. Place the transmission housing over the clutch housing, being careful to line up the shafts. Be sure to align the stop ring with the 5th shift fork finger tip.

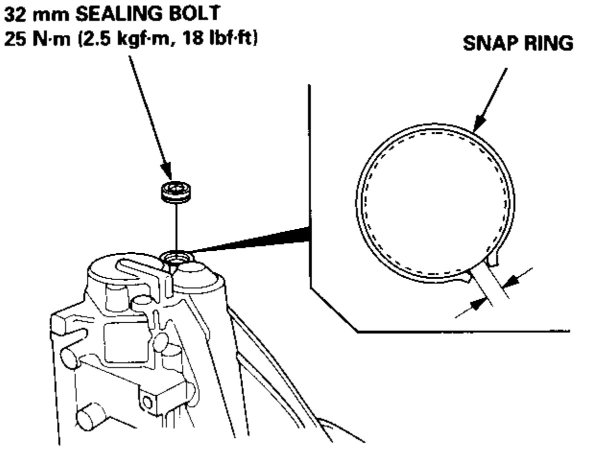


15. Lower the transmission housing with the snap ring pliers, and set the snap ring into the groove of the countershaft bearing.



16. Check that the snap ring is securely seated in the groove of the countershaft bearing.

    Dimension A as installed: 3.6 – 6.3 mm
    (0.142 – 0.248 in)

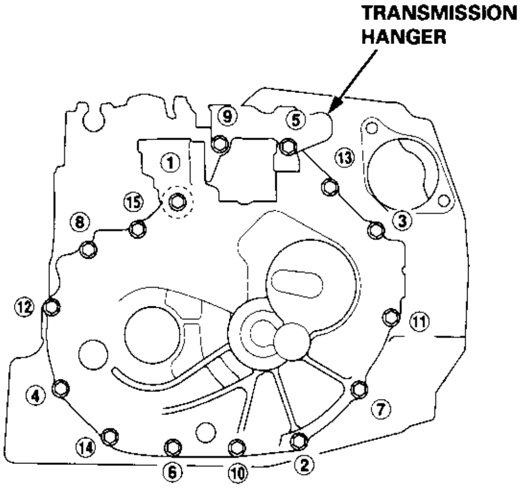


17. Apply liquid gasket (P/N 08718 – 0001 or 08718 – 0003) to the 32 mm sealing bolt threads, then install the 32 mm sealing bolt. (cont'd)

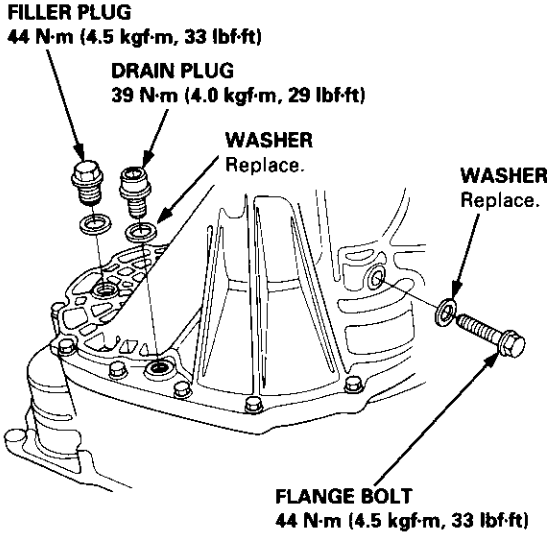
Reassembly (cont'd)

18. Install transmission hanger, then tighten the bolts in a crisscross pattern in several steps as shown.

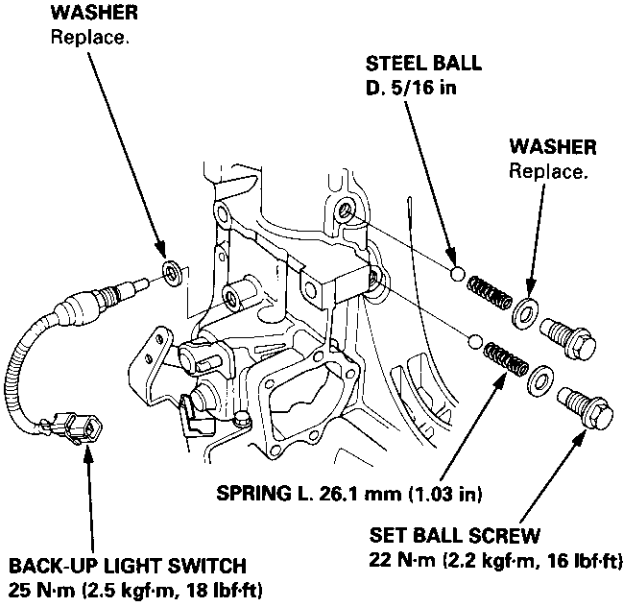
8 x 1.25 mm bolts: 27 N·m (2.8 kgf·m, 20 lbf·ft)



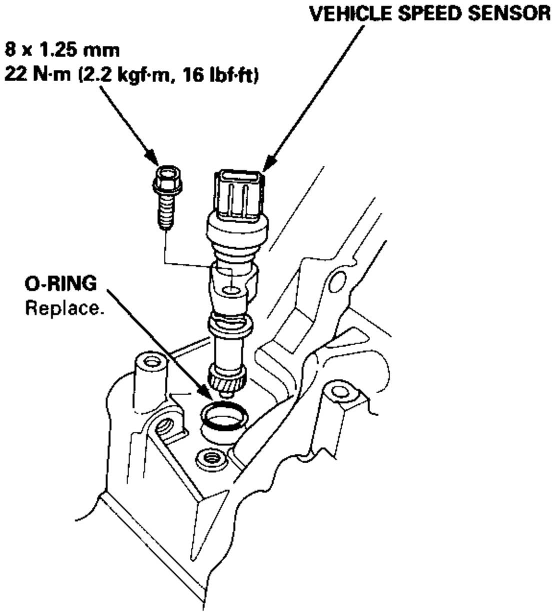
19. Install flange bolt, washers, drain plug, and filler plug.



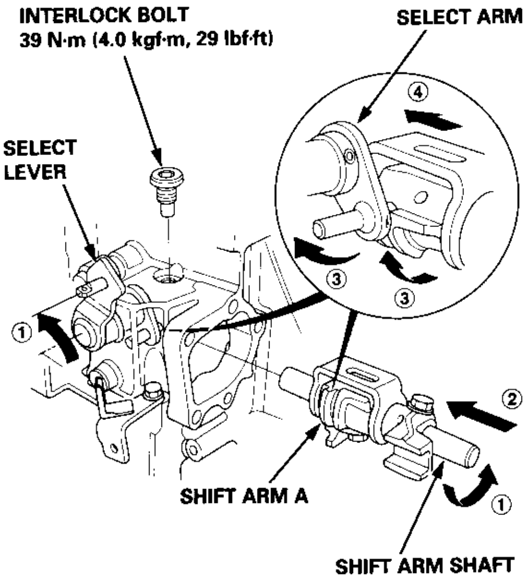
20. Install the steel balls, springs, washers, set ball screws, back-up light switch.



21. Install the vehicle speed sensor (VSS).



22. Turn the select lever and shift arm shaft counterclockwise, then insert the shift arm shaft.

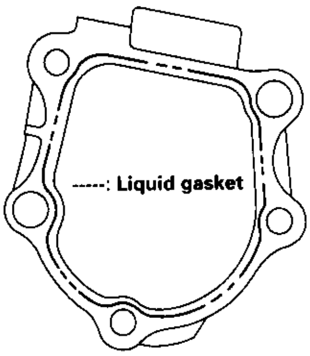


23. Align the shift arm A groove and select arm finger by turn the shift arm shaft and select lever clockwise, then install the shift arm shaft assembly.

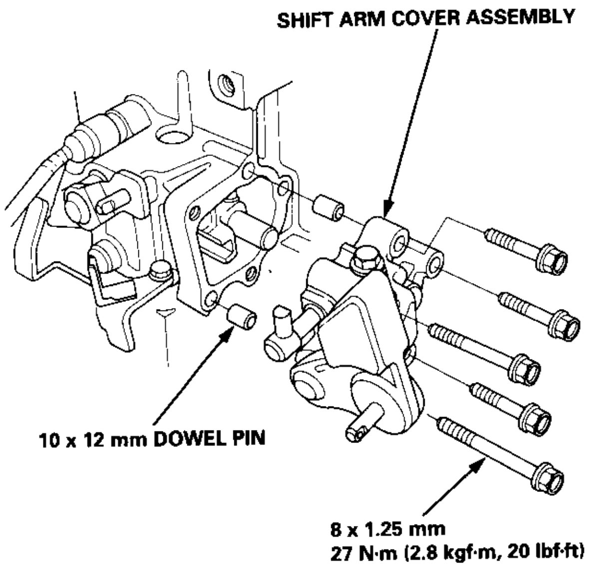
24. Apply liquid gasket (P/N 08718 - 0001 or 08718 - 0003) to the threads, then install the interlock bolt.

25. Apply liquid gasket to the surface of the shift arm cover as shown.

    Note these items:
    - Use liquid gasket (P/N 08718 - 0001 or 08718 - 0003).
    - Remove the dirty oil from the sealing surface.
    - Seal the entire circumference of the bolt holes to prevent oil leakage.
    - If 20 minutes have passed after applying liquid gasket, reapply it and assemble the housings.
    - Allow it to cure at least 20 minutes after assembly before filling the transmission with MTF.

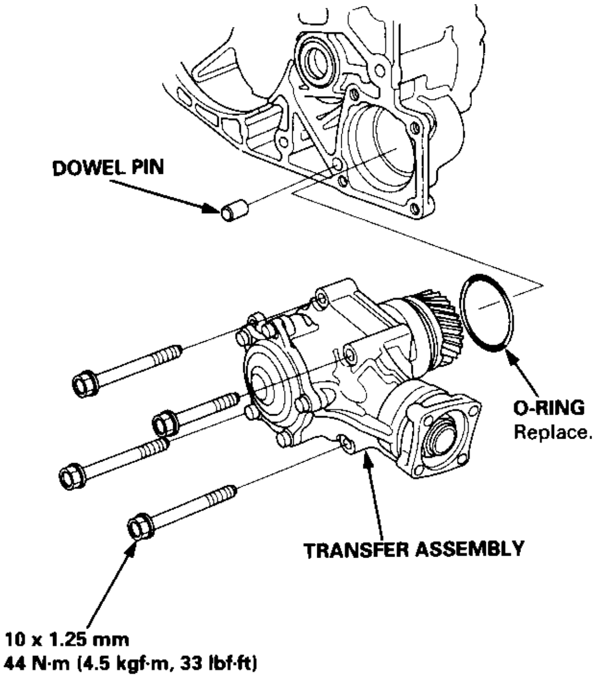


26. Install the shift arm cover assembly.



27. Install the transfer assembly.

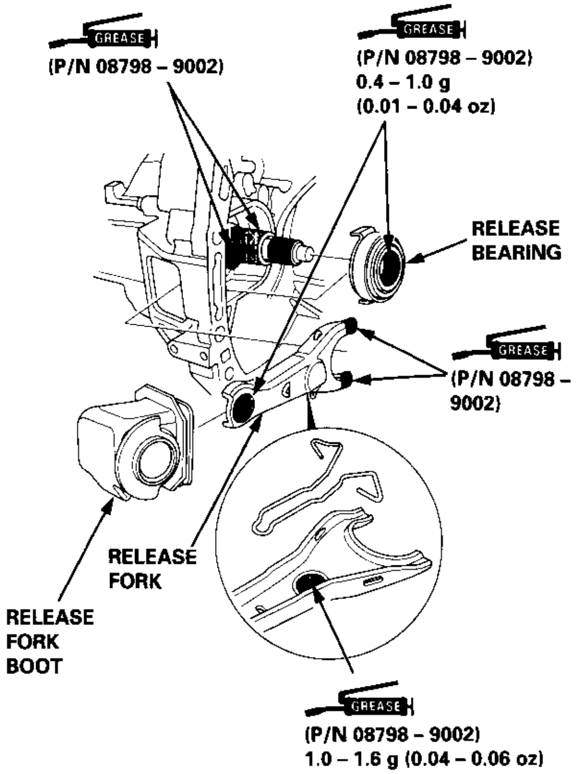
    NOTE: Lubricate MTF to the O-ring and contact areas.



Installation

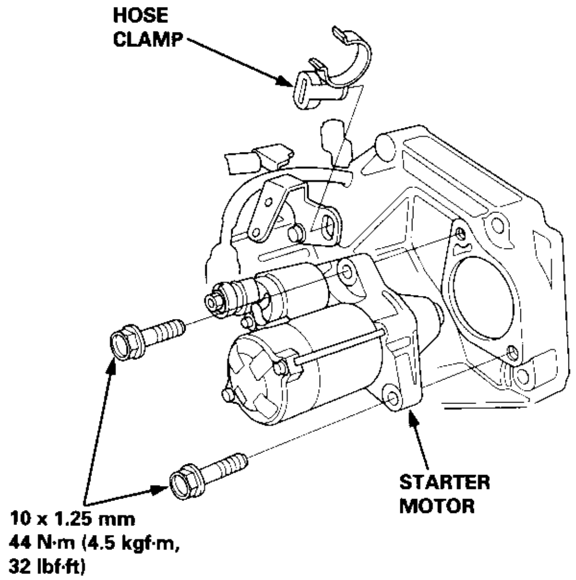
1. Check that the dowel pins are installed in the clutch housing.

2. Apply grease to the release fork and release bearing.



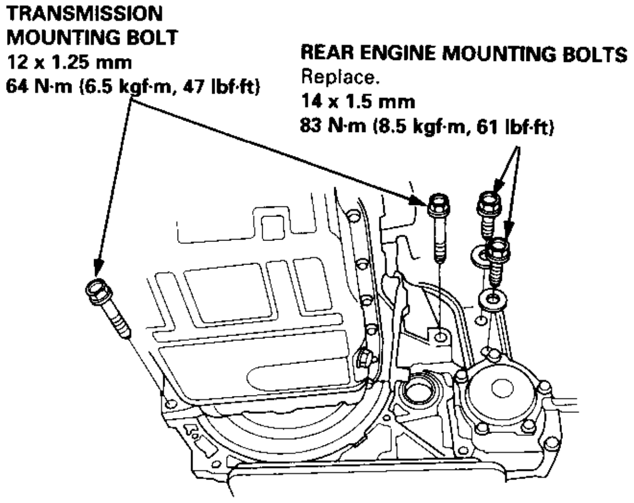
3. Install the release bearing, release fork, and release fork boot to the clutch housing.

4. Install the starter motor and hose clamp.



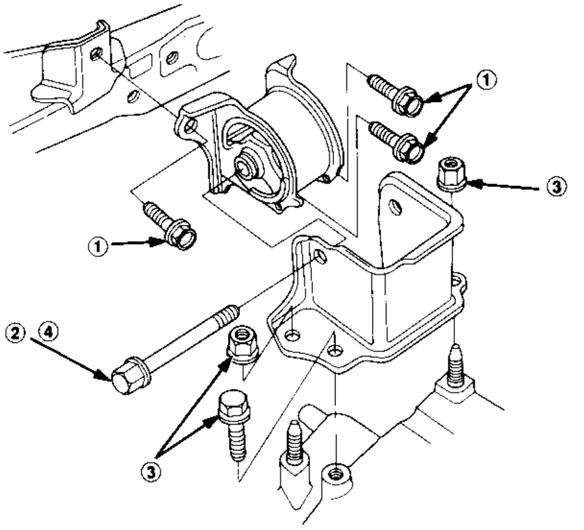
5. Place the transmission on the transmission jack, and raise it to the engine level.

6. Install the transmission mounting bolts and the rear engine mounting bolts.

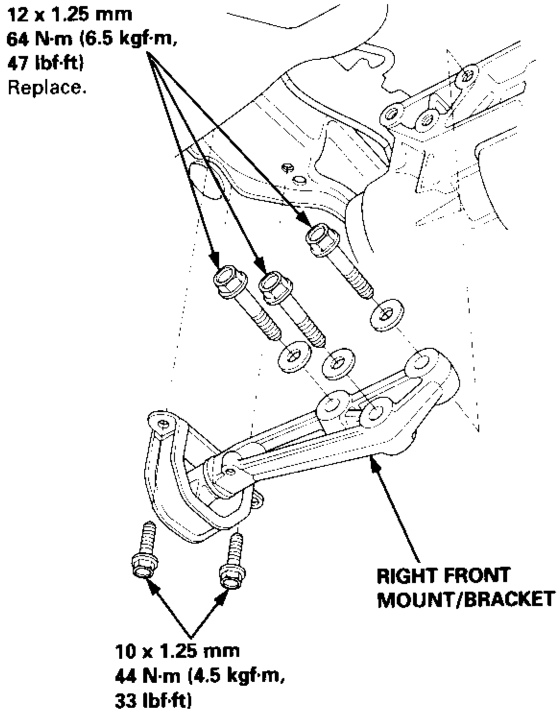


7. Rise the transmission, then install the transmission mount bracket and transmission mount.
   - Torque the mounting bolts and nuts in the sequence shown.
   - Check that the bushing are not twisted or offset.

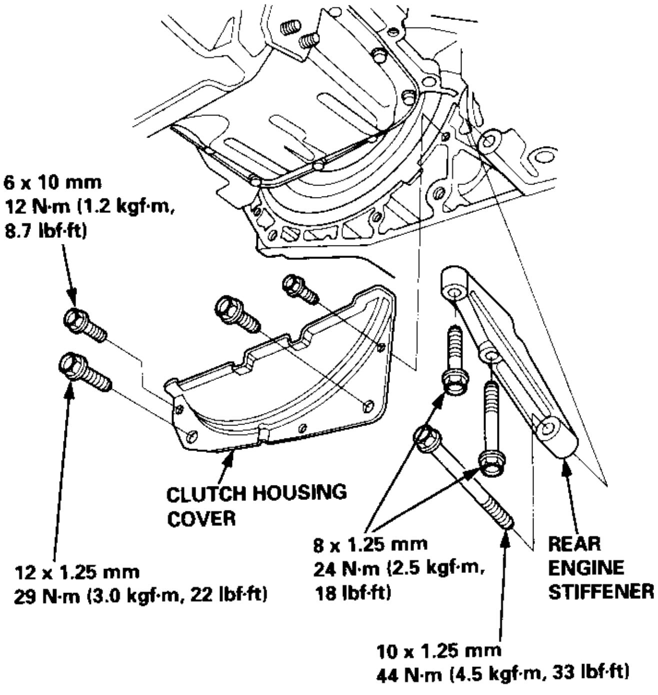
①, ③: 12 x 1.25 mm
64 N·m (6.5 kgf·m, 47 lbf·ft)
②: Temporary tightening
④: 12 x 1.25 mm
74 N·m (7.5 kgf·m, 54 lbf·ft)



8. Install the right front mount/bracket.

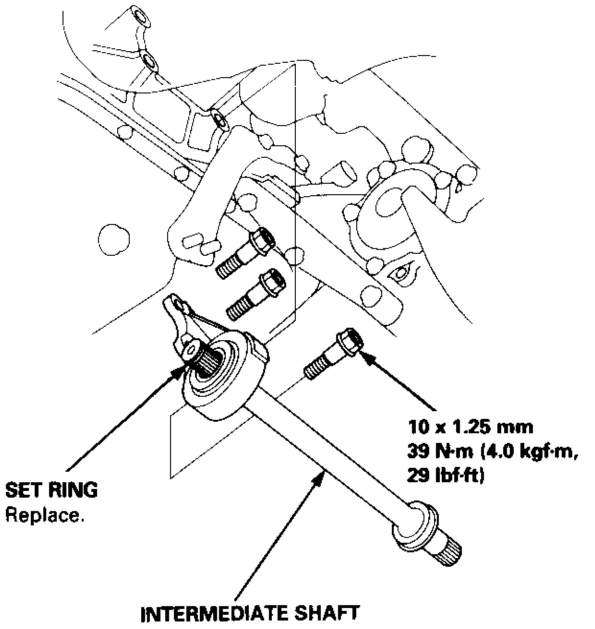


9. Install the clutch housing cover and rear engine stiffener.

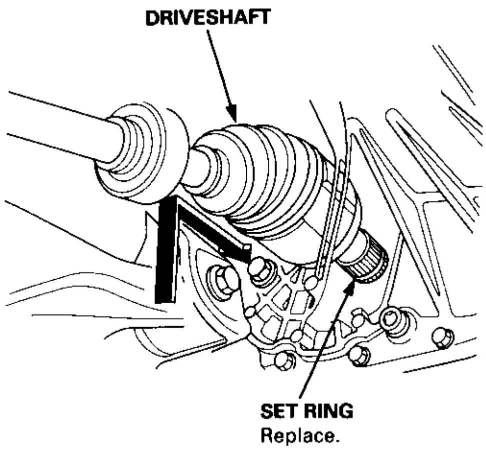


10. Pour transmission fluid of 1 liter from the driveshaft inserted hole.

11. Install the intermediate shaft (see section 18). While installing the intermediate shaft in the differential, be sure not to allow dust and other foreign particles to enter the transmission.



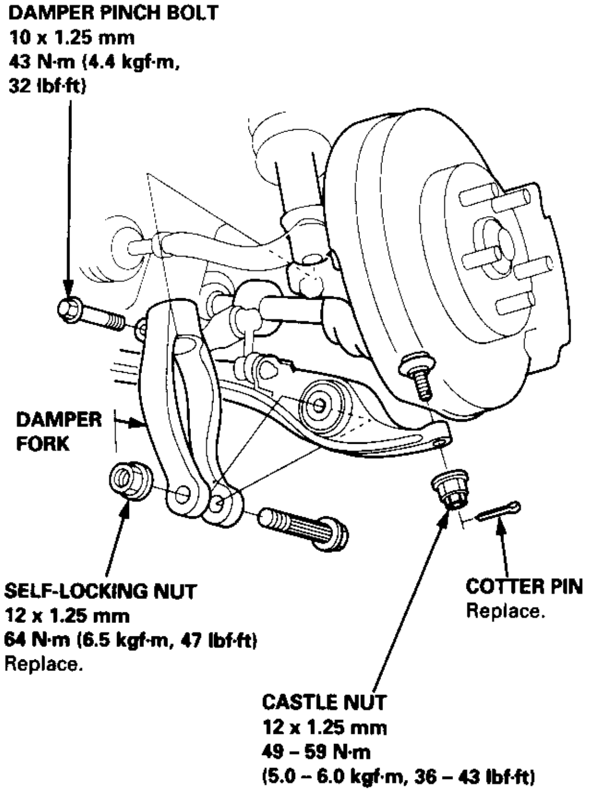
12. Install the driveshafts (see section 18). While installing the driveshaft(s) in the differential, be sure not to allow dust and other foreign particles to enter the transmission.



(cont'd)

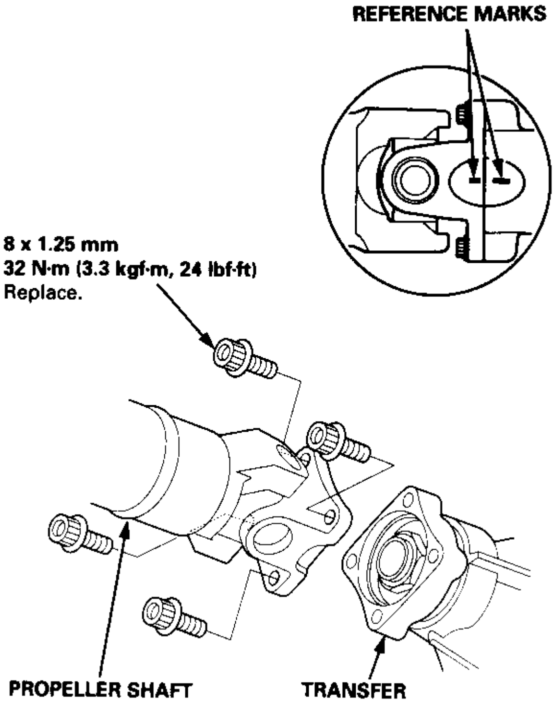
Installation (cont'd)

13. Install the ball joints onto the lower arms.

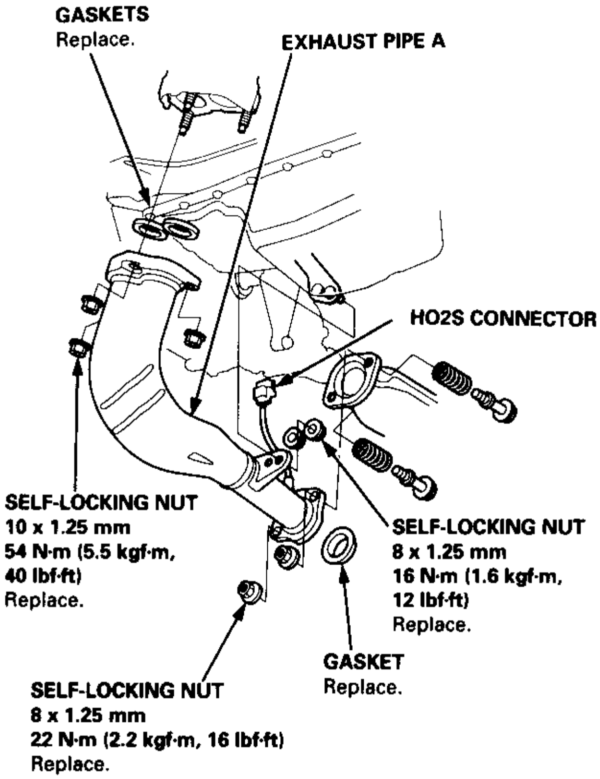


14. Install the right damper fork bolt.

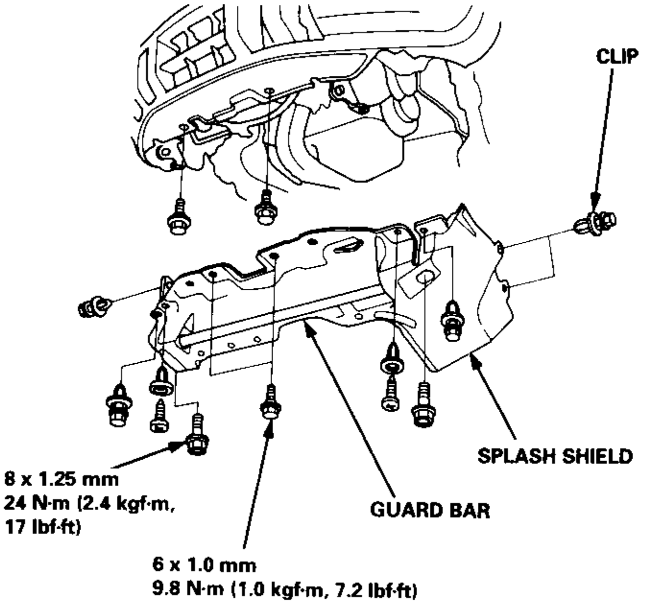
15. Install the propeller shaft to the transfer assembly by aligning the reference marks.



16. Install the exhaust pipe A, then connect the heated oxygen sensor (HO2S) connector.

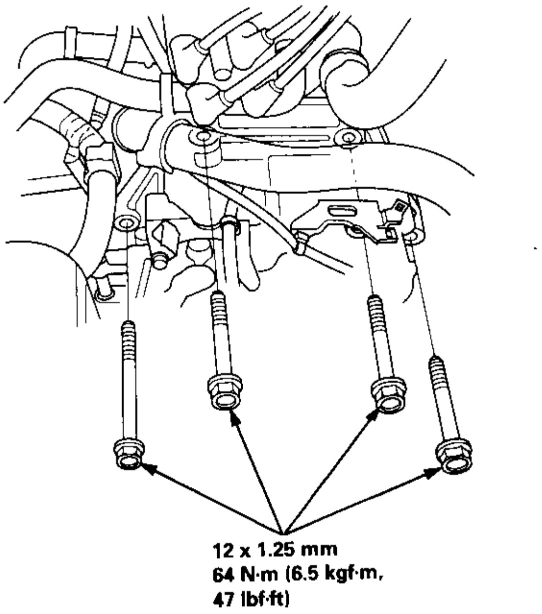


17. Install the guard bar and the splash shield.

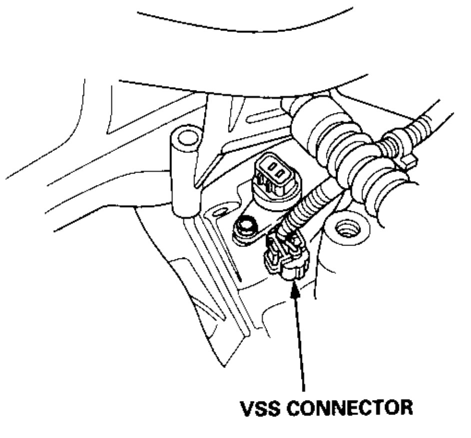


18. Refill the transmission fluid (see page 13-3).

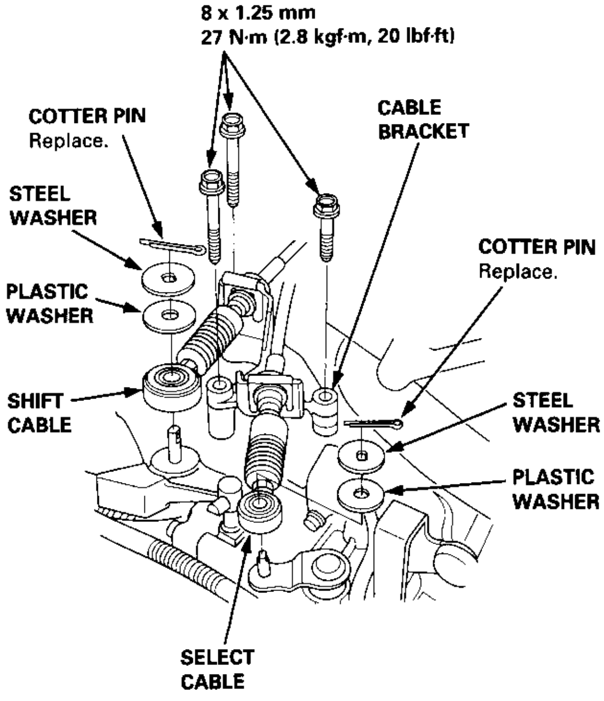
19. Install the four upper transmission mounting bolts.



20. Connect the vehicle speed sensor (VSS) connector.

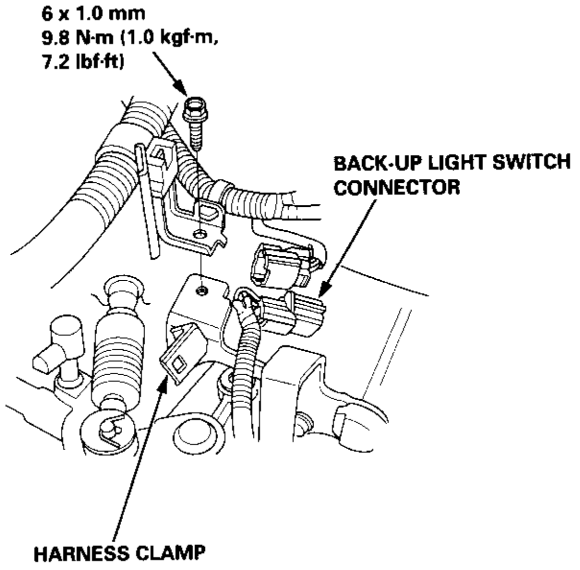


21. Install the cable bracket from the clutch housing.



22. Install the shift cable and select cable to the levers, then install plastic washers, steel washers, and cotter pins.

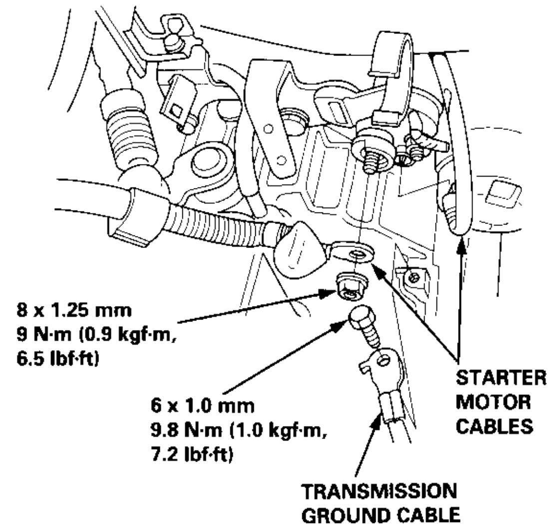
23. Connect the back-up light switch connector, and install the wire harness clamp.



(cont'd)

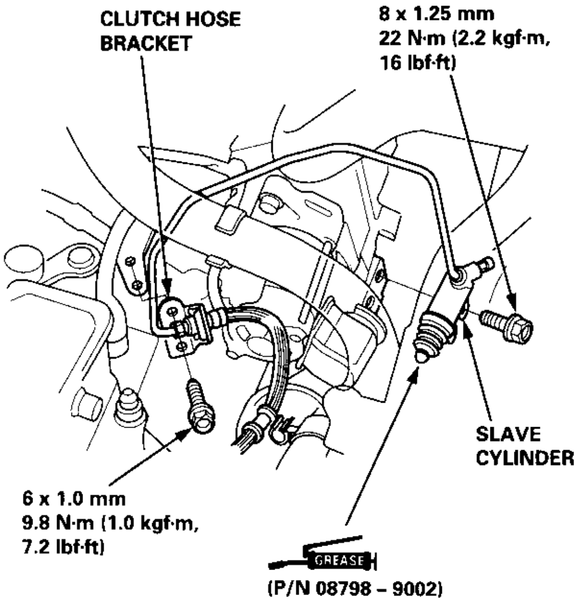
Installation (cont'd)

24. Connect the starter cables and transmission ground cable.

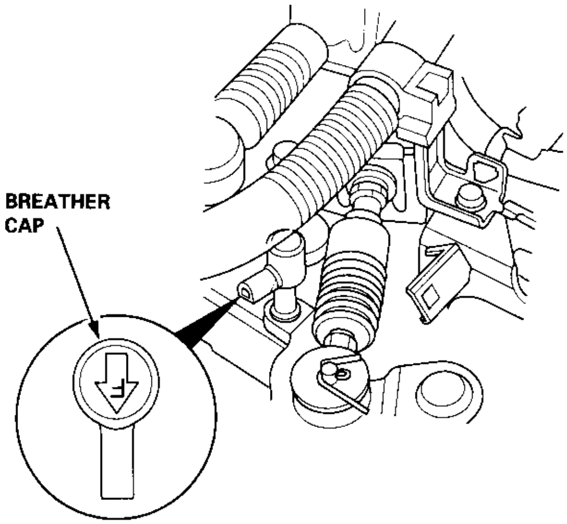


25. Apply grease to the push rod on the slave cylinder, then install the slave cylinder and clutch hose bracket.

NOTE: Use only Super High Temp Urea Grease (P/N 08798 – 9002).



26. Turn the breather cap so that the "F" mark points at the right side of the vehicle as shown.

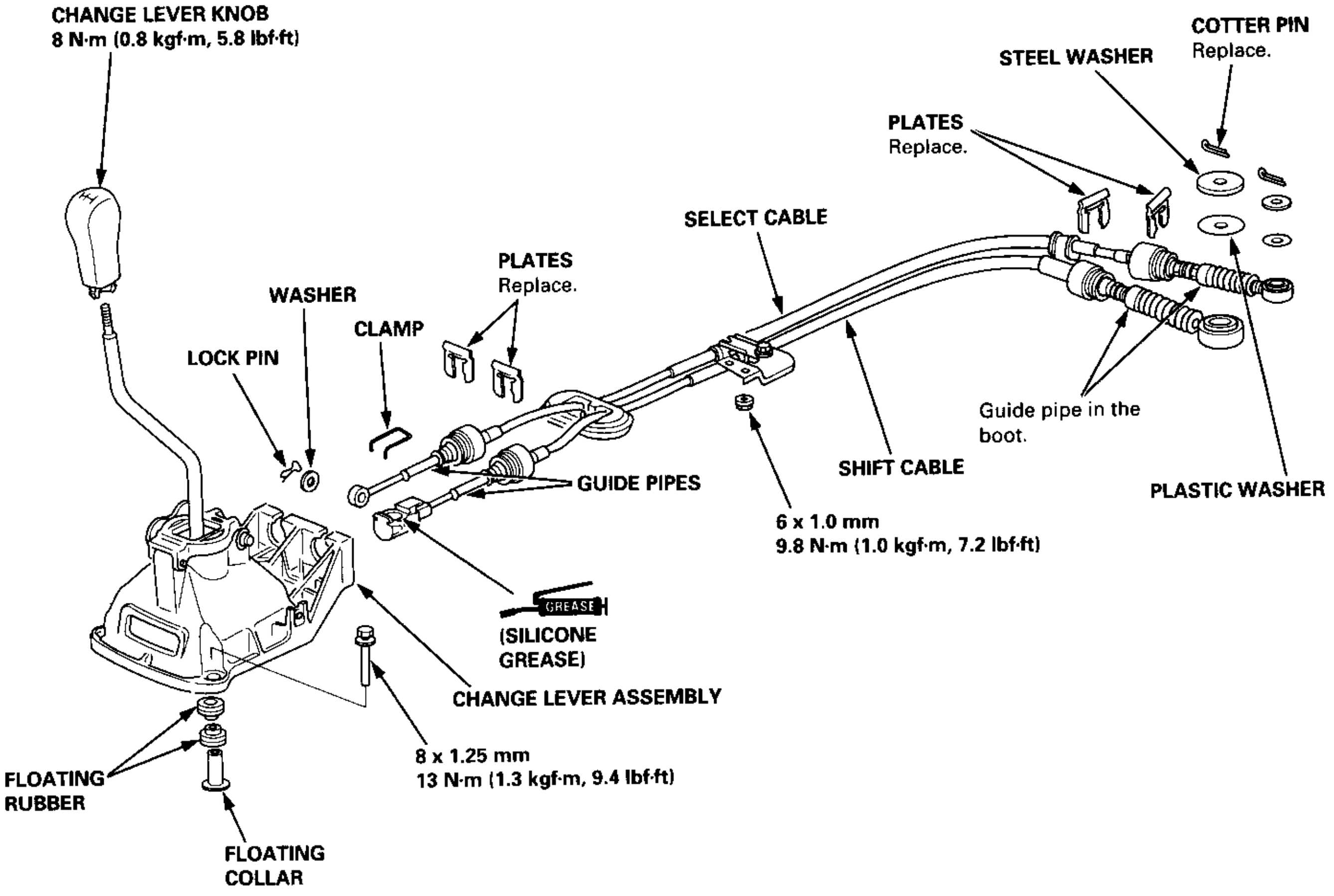


27. Install the intake air duct and air cleaner housing (see section 5).
28. Connect the positive (+) cable first, then the negative (–) cable to the battery.
29. Check the level of the transmission fluid.
30. Check the clutch operation.
31. Shift the transmission and check for smooth operation.
32. Check the front wheel alignment (see section 18).

Overhaul

Note these items:

- Inspect rubber parts for wear and damage when disassembling.
- Check that the new cotter pin is seated firmly.
- Be careful not to damage the guide pipe when removing the cables.



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Special Tools

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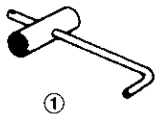
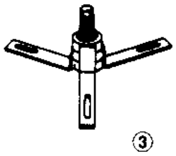
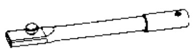
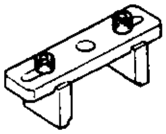
②	07GAE – PG40200 or 07GAE – PG4020A	Clutch Spring Compressor Bolt Assembly	1	14-216, 219
*③	07HAC – PK40102	Housing Puller	1	14-189
④	07JAB – 001020A	Holder Handle	1	14-236, 242, 245, 246
⑤	07JAD – PH80101	Oil Seal Driver Attachment	1	14-225, 241
⑥	07LAD – PW50601	Attachment, 40 x 50 mm	1	14-237
**⑦	07LAE – PX40100	Clutch Spring Compressor Attachment	2	14-216, 219
⑧	07MAJ – PY4011A	A/T Pressure Hose, 2210 mm	4	14-161
⑨	07MAJ – PY40120	A/T Pressure Hose Adapter	4	14-161
⑩	07PAZ – 0010100	SCS Service Connector	1	14-57
⑪	07RAB – TB4010A or 07RAB – TB4010B	Companion Flange Holder	1	14-236, 242, 245, 246
⑫	07SAZ – 001000A	Backprobe Set	2	14-58, 157
⑬	07406 – 0020400	A/T Oil Pressure Gauge Set w/Panel	1	14-161
⑭	07406 – 0070300	A/T Low Pressure Gauge w/Panel	1	14-161
***⑮	07736 – A01000B or 07736 – A01000A	Adjustable Bearing Puller, 25 – 40 mm	1	14-229, 230
⑯	07746 – 0010100	Attachment, 32 x 35 mm	1	14-211, 212
⑰	07746 – 0010200	Attachment, 37 x 40 mm	1	14-237
⑱	07746 – 0010400	Attachment, 52 x 55 mm	1	14-239
⑲	07746 – 0010500	Attachment, 62 x 68 mm	1	14-212, 227, 228, 229, 230, 238, 14-239, 249
⑳	07746 – 0010600	Attachment, 72 x 75 mm	1	14-227, 229
㉑	07746 – 0030100	Driver 40 mm I.D.	1	14-207, 223, 226, 237, 241
㉒	07746 – 0030400	Attachment, 35 mm I.D.	1	14-237, 241
㉓	07749 – 0010000	Driver	1	14-211, 212, 225, 227, 228, 229, 14-230, 237, 238, 239, 241, 249
㉔	07947 – SD90200	Seal Driver Attachment	1	14-225

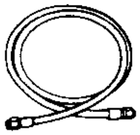
* If the top arm is too short, replace it with 07SAC – P0Z01001.
** 07HAE – PL50101 may be used to substitute one of these tools.
*** Must be used with commercially available 3/8"-16 slide hammer.

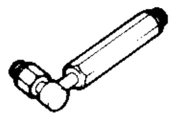


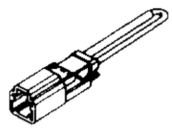


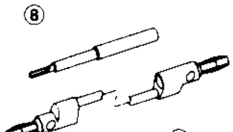


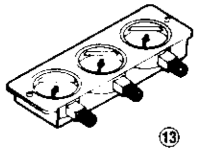


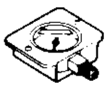


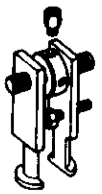












Description

General Operation

The Automatic transmission is a 3-element torque converter and triple-shaft electronically controlled unit which provides 4 speeds forward and 1 reverse speed. The unit is positioned in line with the engine.
There are two types of automatic transmission on CR-V; the four-wheel drive (4WD) model ('97 – 00), and the front-wheel drive (2WD) model ('98 – 00).

Torque Converter, Gears, and Clutches
The torque converter consists of a pump, turbine, and stator assembly in a single unit. The torque converter is connected to the engine crankshaft. These parts turn together as a unit as the engine turns. Around the outside of the torque converter is a ring gear which meshes with the starter pinion when the engine is started. The torque converter assembly serves as a flywheel while transmitting power to the transmission mainshaft.
The transmission has three parallel shafts: the mainshaft, the countershaft, and the sub-shaft. The mainshaft is in line with the engine crankshaft. The mainshaft includes the 1st, 2nd, and 4th clutches, and gears for 3rd, 2nd, 4th, reverse and 1st (3rd gear is integral with the mainshaft, while reverse gear is integral with the 4th gear). The countershaft includes the 3rd clutch and gears for 3rd, 2nd, 4th, reverse, 1st, and park. Reverse and 4th gears can be locked to the countershaft at its center, providing 4th gear or reverse, depending on which way the selector is moved. The sub-shaft includes the 1st-hold clutch and gears for 1st and 4th.
The gears on the mainshaft are in constant mesh with those on the countershaft and sub-shaft. When certain combinations of gears are engaged by the clutches, power is transmitted from the mainshaft to the countershaft to provide $\boxed{D_4}$, $\boxed{D_3}$, $\boxed{2}$, $\boxed{1}$, and $\boxed{R}$ position ('97 – 98 models), and $\boxed{D}$, $\boxed{2}$, $\boxed{1}$, and $\boxed{R}$ position ('99 – 00 models).

Electronic Control
The electronic control system consists of the Powertrain Control Module (PCM), sensors, a linear solenoid, and four solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions. The PCM is located below the dashboard, under the kick panel on the passenger's side.

Hydraulic Control
The valve bodies include the main valve body, the secondary valve body, the regulator valve body, the servo body, and the lock-up valve body. They are bolted to the torque converter housing. The main valve body contains the manual valve, the 1-2 shift valve, the 2nd orifice control valve, the CPB (Clutch Pressure Back-up) valve, the modulator valve, the servo control valve, the relief valve, and ATF pump gears. The secondary valve body contains the 2-3 shift valve, the 3-4 shift valve, the 3-4 orifice control valve, the 4th exhaust valve and the CPC (Clutch Pressure Control) valve. The regulator valve body contains the pressure regulator valve, the torque converter check valve, the cooler relief valve, and the lock-up control valve. The servo body contains the servo valve which is integrated with the reverse shift fork, and the accumulators. The lock-up valve body contains the lock-up shift valve and the lock-up timing valve. The linear solenoid and the shift control solenoid valve A/B are bolted to the outside of the transmission housing, and the lock-up control solenoid valve A/B is bolted to the outside of the torque converter housing. Fluid from the regulator passes through the manual valve to the various control valves. The clutches receive fluid from their respective feed pipes or internal hydraulic circuit.

Shift Control Mechanism
Input from various sensors located throughout the vehicle determines which shift control solenoid valve the PCM will activate. Activating a shift control solenoid valve changes modulator pressure, causing a shift valve to move. This pressurizes a line to one of the clutches, engaging that clutch and its corresponding gear. The shift control solenoid valves A and B are controlled by the PCM.

Lock-up Mechanism
In $\boxed{D_4}$ position ('97 – 98 models) and in $\boxed{D}$ position ('99 – 00 models), in 3rd and 4th, and in $\boxed{D_3}$ position in 3rd ('97 – 98 models) and in $\boxed{D}$ position with Over-Drive (O/D) is OFF (by pressing the O/D switch) in 3rd ('99 – 00 models), pressurized fluid is drained from the back of the torque converter through a fluid passage, causing the lock-up piston to be held against the torque converter cover. As this takes place, the mainshaft rotates at the same speed as the engine crankshaft. Together with hydraulic control, the PCM optimizes the timing of the lock-up mechanism. The lock-up valves control the range of lock-up according to lock-up control solenoid valves A and B, and the linear solenoid. When lock-up control solenoid valves A and B activate, the modulator pressure changes. The lock-up control solenoid valves A and B and the linear solenoid are controlled by the PCM.

(cont'd)

General Operation (cont'd)

Gear Selection

'97 - 98 Models

The shift lever has seven positions; [P] PARK, [R] REVERSE, [N] NEUTRAL, [D4] 1st through 4th ranges, [D3] 1st through 3rd ranges, [2] 2nd gear, and [1] 1st gear.

'99 - 00 Models

The shift lever has six positions; [P] PARK, [R] REVERSE, [N] NEUTRAL, [D] 1st through 4th ranges, and 1st through 3rd (when Over-Drive (O/D) is OFF) ranges, [2] 2nd gear, and [1] 1st gear.

Position	Description
[P] PARK	Front wheels locked; park pawl engaged with park gear on countershaft. All clutches released.
[R] REVERSE	Reverse; reverse selector engaged with countershaft reverse gear and 4th clutch locked.
[N] NEUTRAL	All clutches released.
[D4] DRIVE ('97 - 98) [D] DRIVE ('99 - 00) (1st through 4th)	General driving; starts off in 1st, shifts automatically to 2nd, 3rd, then 4th, depending on vehicle speed and throttle position. Downshifts through 3rd, 2nd, and 1st on deceleration to stop. The lock-up mechanism operates in 3rd and 4th gear.
[D3] DRIVE ('97 - 98) [D] DRIVE with Over-Drive (O/D) is OFF ('99 - 00) (1st through 3rd)	Used for rapid acceleration at highway speeds and general driving; starts off in 1st, shifts automatically to 2nd then 3rd, depending on vehicle speed and throttle position. Downshifts through lower gears on deceleration to stop. The lock-up mechanism comes into operation in 3rd gear.
[2] SECOND	Driving in 2nd gear; stays in 2nd gear, does not shift up and down. For engine braking or better traction starting off on loose or slippery surfaces.
[1] FIRST	Driving in 1st gear; stays in 1st gear, does not shift up. For engine braking.

Starting is possible only in [P] and [N] positions, using a slide-type, neutral-safety switch.

Automatic Transaxle (A/T) Gear Position Indicator

This indicator in the instrument panel shows which gear has been selected.

Transfer Mechanism (4WD)

The transfer mechanism consists of the transfer shaft drive gear, the transfer shaft, the transfer drive gear, the transfer driven gear shaft, and the companion flange. The transfer mechanism assembly is on the rear side of the transmission, beside the differential. The transfer shaft drive gear on the final driven gear drives the transfer shaft driven gear. Power is transmitted to the rear differential via the transfer shaft and the propeller shaft.

Clutches

The four-speed automatic transmission uses hydraulically-actuated clutches to engage or disengage the transmission gears. When the hydraulic pressure is introduced into the clutch drum, the clutch piston moves. This presses the friction discs and steel plates together, locking them so they don't slip. Power is then transmitted through the engaged clutch pack to its hub-mounted gear. When hydraulic pressure is bled from the clutch pack, the piston releases the friction discs and steel plates, and they are free to slide past each other. This allows the gear to spin independently on its shaft, transmitting no power.

1st Clutch

The 1st clutch engages/disengages 1st gear, and is located at the end of the mainshaft, just behind the end cover.
The 1st clutch is supplied hydraulic pressure by its ATF feed pipe within the mainshaft.

1st-hold Clutch

The 1st-hold clutch engages/disengages 1st-hold or [1] position, and is located at the middle of the sub-shaft. The 1st-hold clutch is supplied hydraulic pressure by its ATF feed pipe within the sub-shaft.

2nd Clutch

The 2nd clutch engages/disengages 2nd gear, and is located at the middle of the mainshaft. The 2nd clutch is joined back-to-back to the 4th clutch. The 2nd clutch is supplied hydraulic pressure through the mainshaft by a circuit connected to the internal hydraulic circuit.

3rd Clutch

The 3rd clutch engages/disengages 3rd gear, and is located at the end of the countershaft, opposite the end cover. The 3rd clutch is supplied hydraulic pressure by its ATF feed pipe within the countershaft.

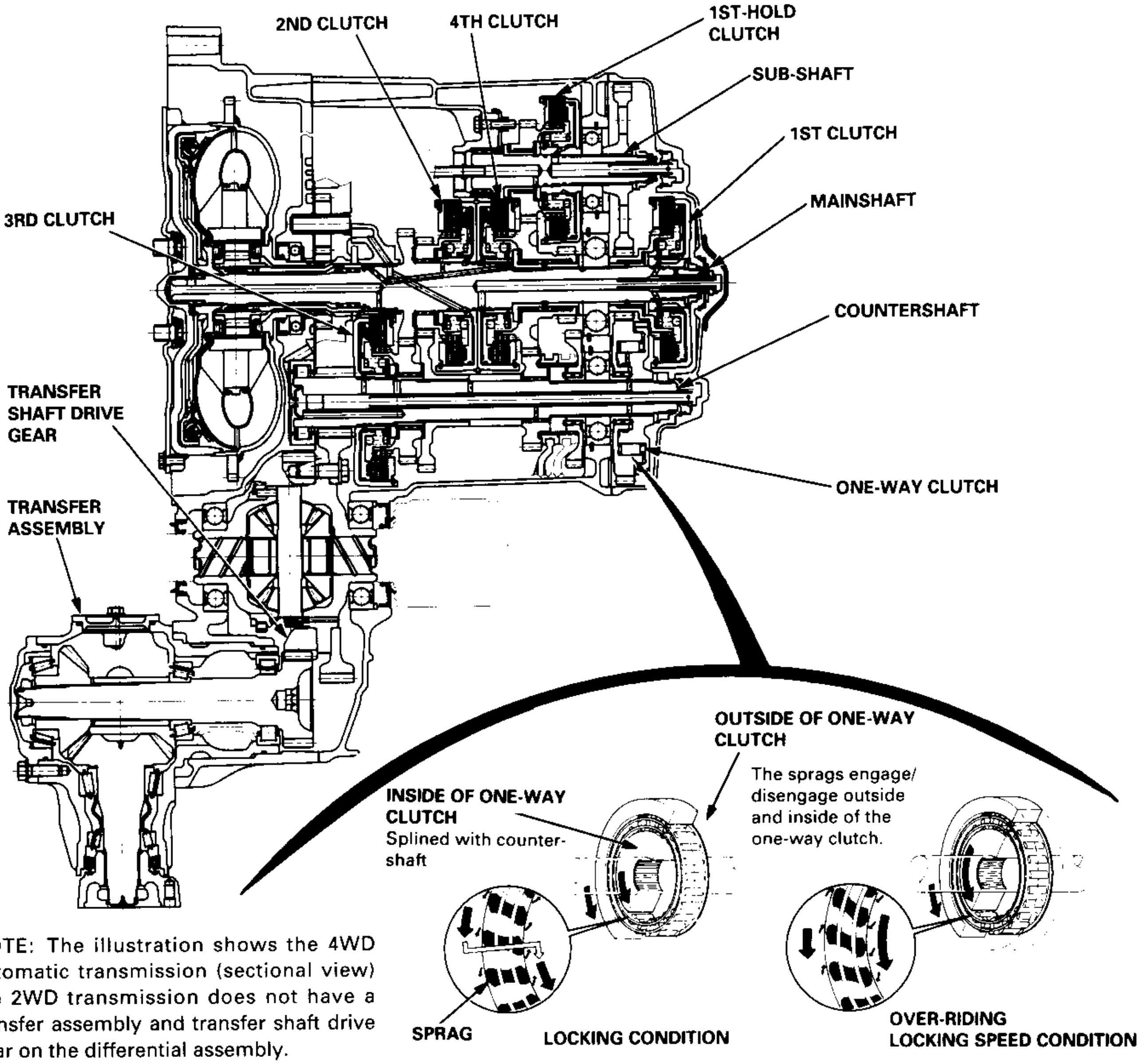
4th Clutch

The 4th clutch engages/disengages 4th gear, as well as reverse gear, and is located at the middle of the mainshaft. The 4th clutch is joined back-to-back to the 2nd clutch. The 4th clutch is supplied hydraulic pressure by its ATF feed pipe within the mainshaft.

One-way Clutch

The one-way clutch is positioned between the park gear and the countershaft 1st gear, with the park gear splined to the countershaft. The countershaft 1st gear provides the outer race surface, and the park gear provides the inner race surface. The one-way clutch locks up when power is transmitted from the mainshaft 1st gear to the countershaft 1st gear. The 1st clutch and gears remain engaged in the 1st, 2nd, 3rd, and 4th gear ranges in the $\boxed{D_4}$, $\boxed{D_3}$, $\boxed{D}$, or $\boxed{2}$ position. The one-way clutch disengages when the 2nd, 3rd, or 4th clutches/gears are applied in the $\boxed{D_4}$, $\boxed{D_3}$, $\boxed{D}$, or $\boxed{2}$ position.

This is because the increased rotational speed of the gears on the countershaft over-ride the locking "speed range" of the one-way clutch. The one-way clutch free-wheels when the 1st clutch is engaged.



NOTE: The illustration shows the 4WD automatic transmission (sectional view) the 2WD transmission does not have a transfer assembly and transfer shaft drive gear on the differential assembly.

Description

Power Flow

POSITION \ PART		TORQUE CON-VERTER	1ST-HOLD CLUTCH	1ST GEAR 1ST CLUTCH	2ND GEAR 2ND CLUTCH	3RD GEAR 3RD CLUTCH	4TH		REVERSE GEAR	PARK GEAR
							GEAR	CLUTCH		
P		○	×	×	×	×	×	×	×	○
R		○	×	×	×	×	×	○	○	×
N		○	×	×	×	×	×	×	×	×
D4 or D	1ST	○	×	○*2	×	×	×	×	×	×
	2ND	○	×	○*1	○	×	×	×	×	×
	3RD	○	×	○*1	×	○	×	×	×	×
	4TH	○	×	○*1	×	×	○	○	×	×
D3 or D with Over-Drive (O/D) is OFF	1ST	○	×	○*2	×	×	×	×	×	×
	2ND	○	×	○*1	○	×	×	×	×	×
	3RD	○	×	○*1	×	○	×	×	×	×
2		○	×	○*1	○	×	×	×	×	×
1		○	○	○	×	×	×	×	×	×

○: Operates, ×: Doesn't operate.

*1: Although the 1st clutch engages, driving power is not transmitted as the one-way clutch slips.

*2: The one-way clutch engages when accelerating, and slips when decelerating.

NOTE: D4 and D3 positions are on the '97 – '98 models; D position is on the '99 – 00 models.

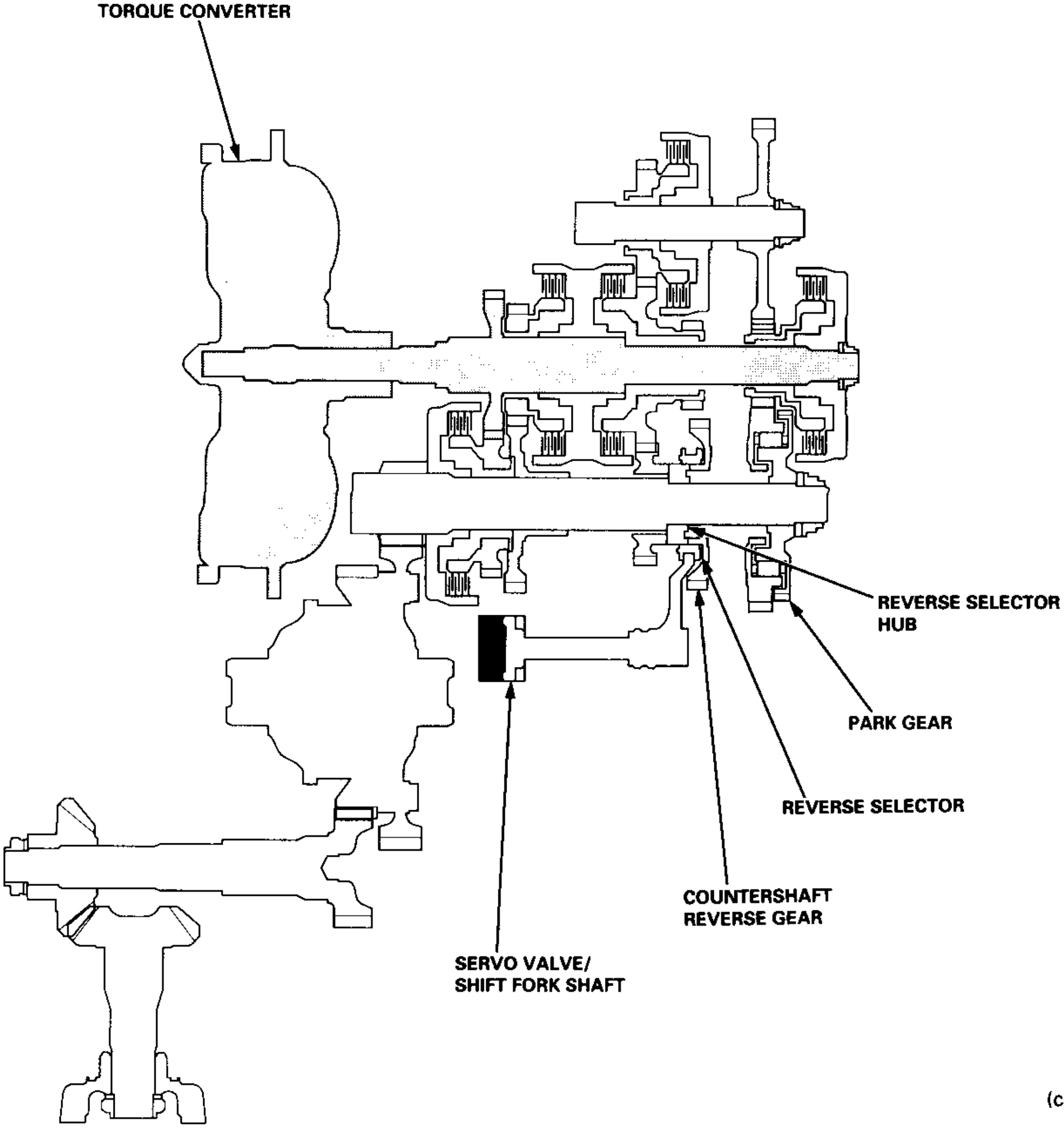
P Position

Hydraulic pressure is not applied to the clutches. Power is not transmitted to the countershaft.
The countershaft is locked by the park pawl interlocking the park gear.

N Position

Engine power transmitted from the torque converter drives the mainshaft, but hydraulic pressure is not applied to the clutches. Power is not transmitted to the countershaft. The countershaft 4th gear is engaged with the reverse selector hub and the countershaft by the reverse selector, when the shift lever is shifted in N position from D4 or D position. The countershaft reverse gear is engaged when shifted from R position.

NOTE: The illustration shows the 4WD automatic transmission; power flow of the 2WD automatic transmission is identical to the 4WD except for parts related to the transfer assembly.



(cont'd)

Power Flow (cont'd)

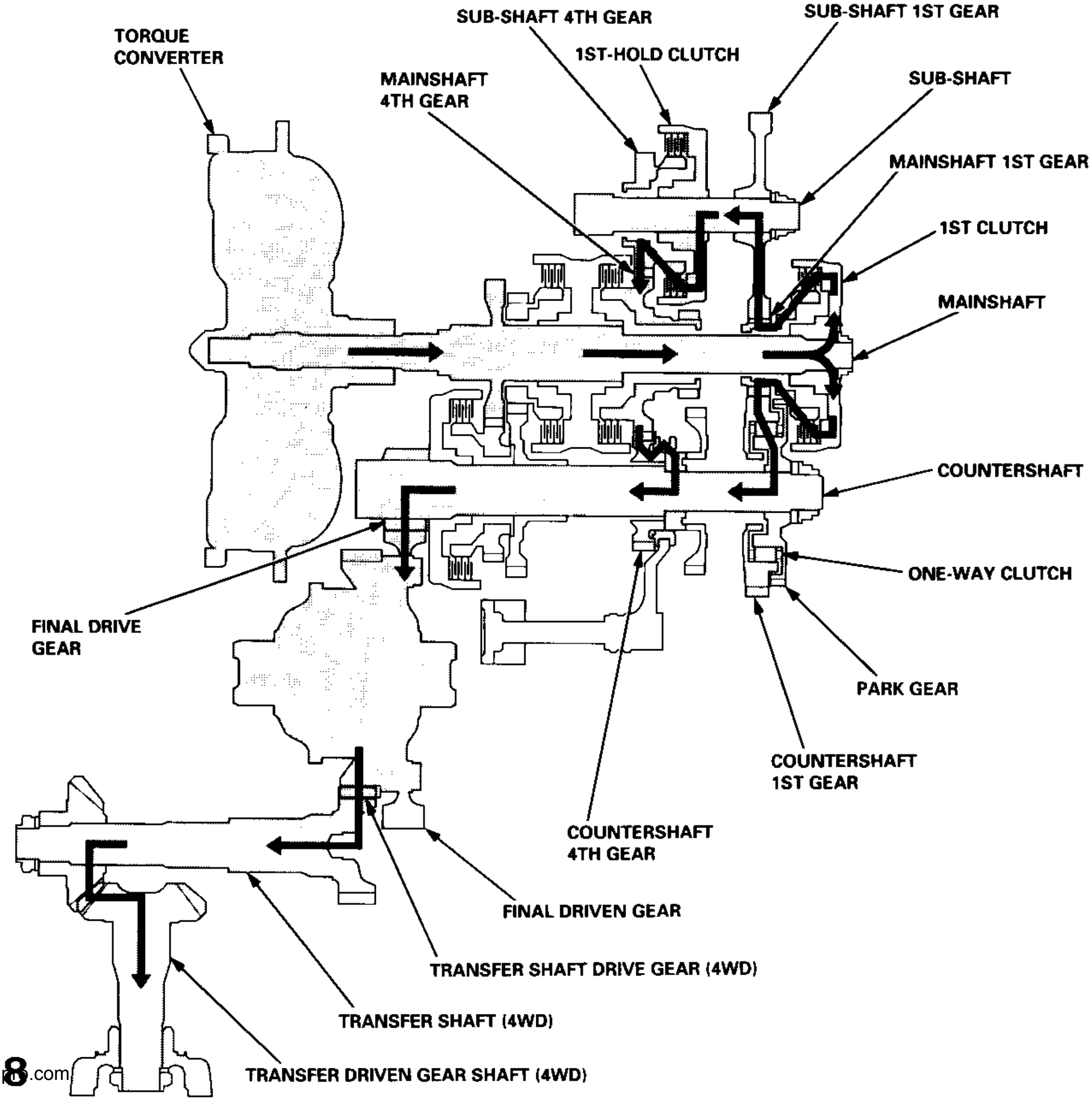
[1] Position

In [1] position, hydraulic pressure is applied to the 1st clutch and the 1st-hold clutch.

The power flow when accelerating is as follows:

1. Hydraulic pressure is applied to the 1st clutch on the mainshaft, and power is transmitted via the 1st clutch to the mainshaft 1st gear.
2. Hydraulic pressure is also applied to the 1st-hold clutch on the sub-shaft. Power transmitted to the mainshaft 1st gear is conveyed via the countershaft 1st gear to the one-way clutch, and via the sub-shaft 1st gear to the 1st-hold clutch. The one-way clutch is used to drive the countershaft, and the 1st-hold clutch drives the countershaft via the 4th gears.
3. Power is transmitted to the final drive gear, which drives the final driven gear, and the transfer shaft drive gear (4WD).
4. The transfer shaft drive gear drives the transfer shaft and the transfer driven gear shaft (4WD).

   NOTE: The illustration shows the 4WD automatic transmission; power flow of the 2WD automatic transmission is identical to the 4WD except for parts related to the transfer assembly.

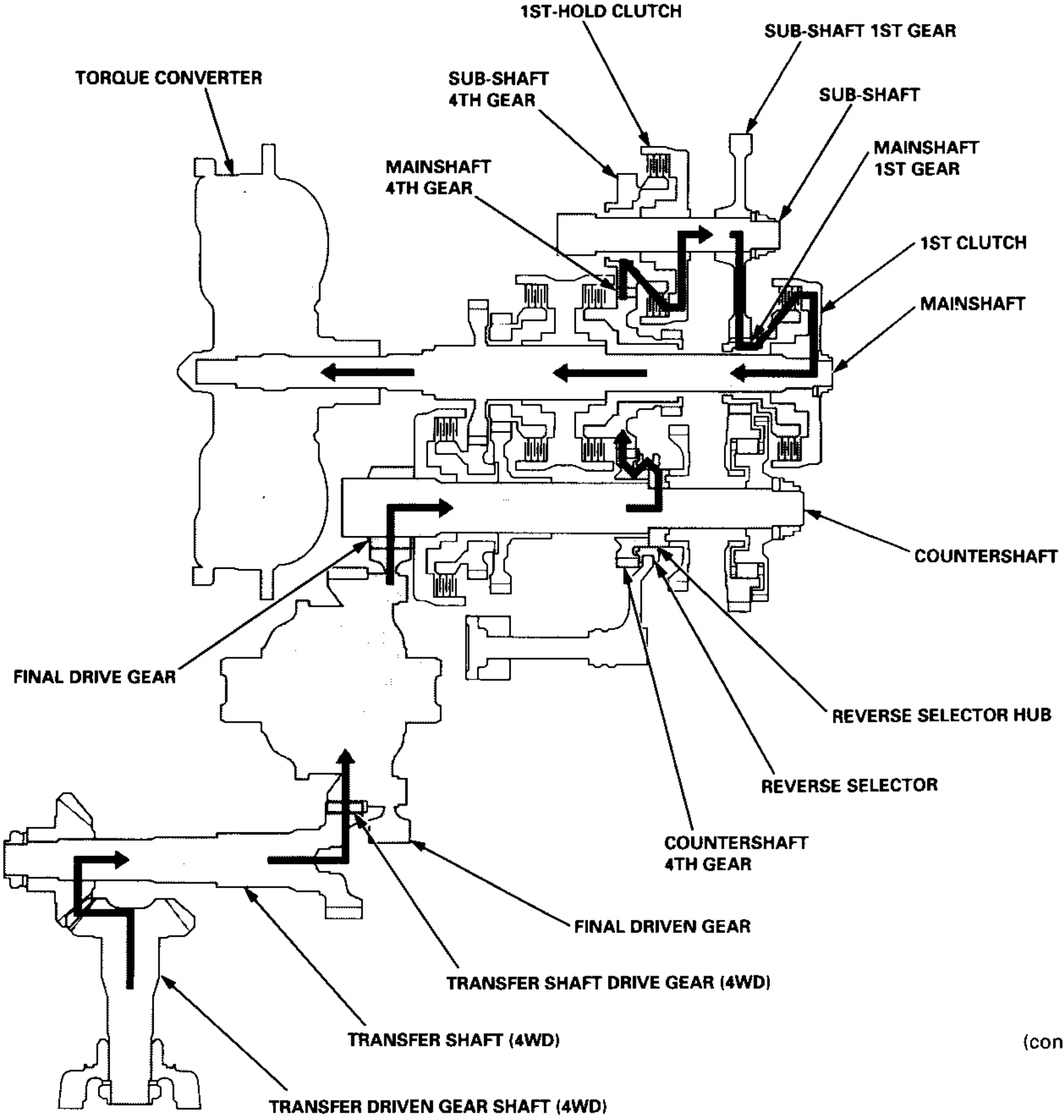


1 Position

The power flow when decelerating is as follows:

1. Rolling resistance from the road surface goes through the front wheels (and rear wheels: 4WD) to the final drive gear, then to the sub-shaft 1st gear via the 4th gear, and 1st-hold clutch which is applied during deceleration.
2. The one-way clutch is free because the application of torque is reversed.
3. The counterforce conveyed to the countershaft 4th gear turns the sub-shaft 4th gear via the mainshaft 4th gear. Since hydraulic pressure is also applied to the 1st clutch, counterforce is also transmitted to the mainshaft. As a result, engine braking can be obtained with 1st gear.

   NOTE: The illustration shows the 4WD automatic transmission; power flow of the 2WD automatic transmission is identical to the 4WD except for parts related to the transfer assembly.



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Power Flow (cont'd)

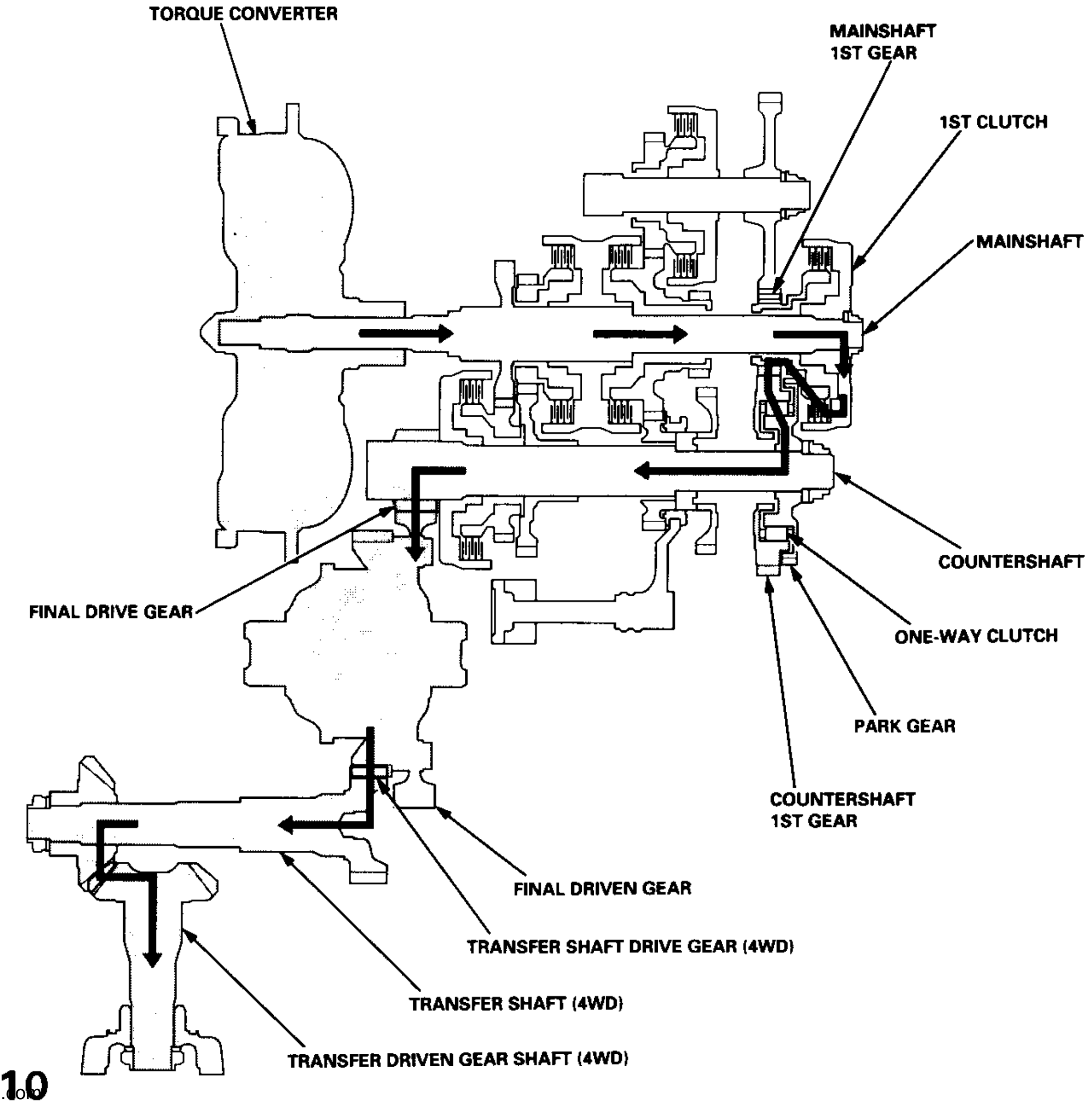
1st Gear ($\boxed{D_4}$, $\boxed{D_3}$ or $\boxed{D}$ position)

In $\boxed{D_4}$, $\boxed{D_3}$, or $\boxed{D}$ position, the optimum gear is selected from 1st, 2nd, 3rd, and 4th gears, according to conditions such as the balance between throttle opening (engine load) and vehicle speed.

1. Hydraulic pressure is applied to the 1st clutch, which rotates together with the mainshaft, and the mainshaft 1st gear rotates.
2. Power is transmitted to the countershaft 1st gear, which drives the countershaft via the one-way clutch.
3. Power is transmitted to the final drive gear, which drives the final driven gear and the transfer shaft drive gear (4WD).
4. The transfer shaft drive gear drives the transfer shaft and the transfer driven gear shaft (4WD).

NOTE:

- In $\boxed{D_4}$, $\boxed{D_3}$, $\boxed{D}$, or $\boxed{2}$ position, hydraulic pressure is not applied to the 1st-hold clutch.
- The illustration shows the 4WD automatic transmission; power flow of the 2WD automatic transmission is identical to the 4WD except for parts related to the transfer assembly.

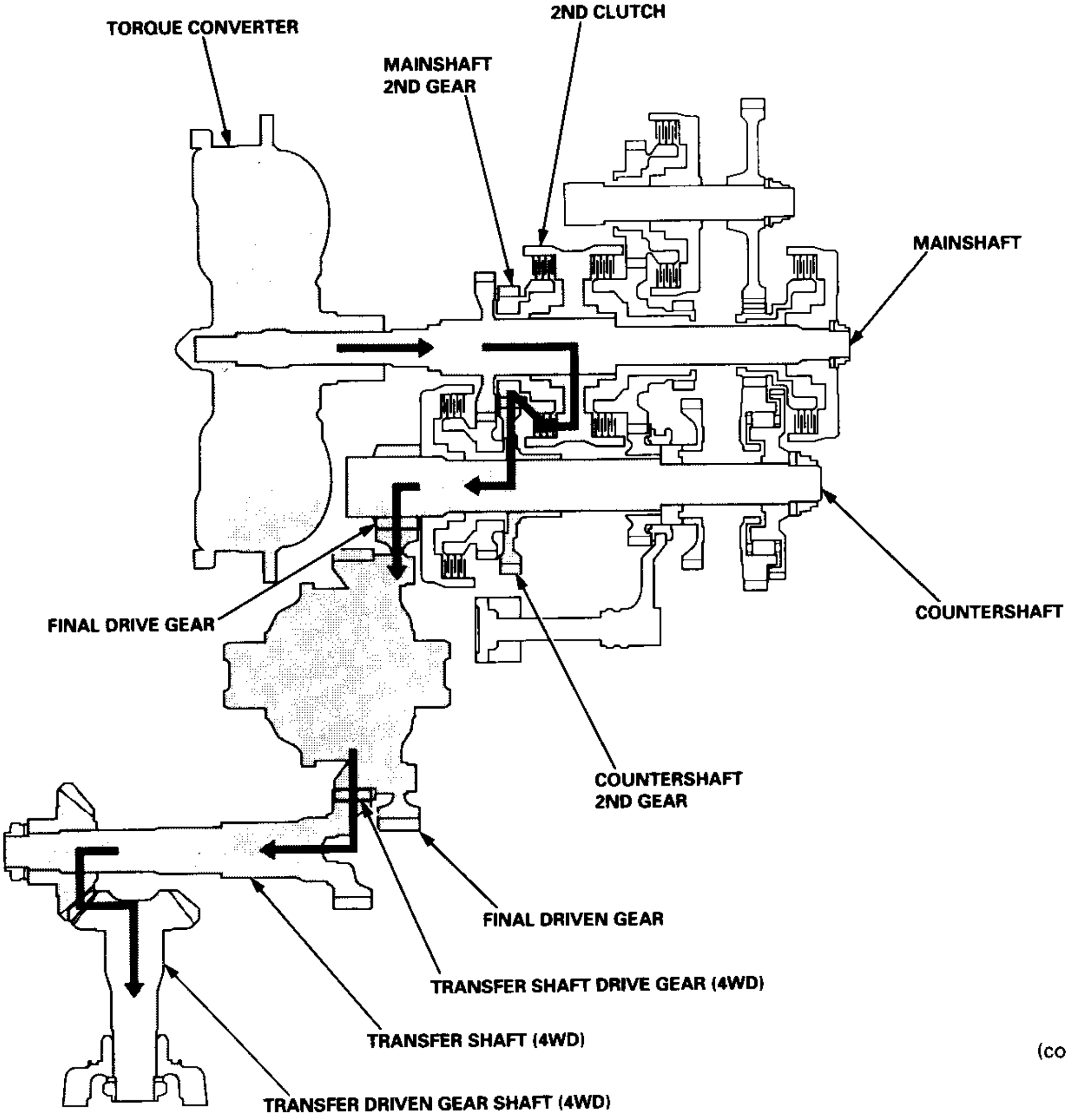


2nd Gear (D4, D3, D, or 2 position)

1. Hydraulic pressure is applied to the 2nd clutch, which rotates together with the mainshaft, and the mainshaft 2nd gear rotates.
2. Power is transmitted to the countershaft 2nd gear, which drives the countershaft.
3. Power is transmitted to the final drive gear, which drives the final driven gear and the transfer shaft drive gear (4WD).
4. The transfer shaft drive gear drives the transfer shaft and the transfer driven gear shaft (4WD).

NOTE:

- Hydraulic pressure is also applied to the 1st clutch, but since the rotation speed of 2nd gear exceeds that of 1st gear, power from 1st gear is cut off at the one-way clutch.
- The illustration shows the 4WD automatic transmission; power flow of the 2WD automatic transmission is identical to the 4WD except for parts related to the transfer assembly.



(cont'd)

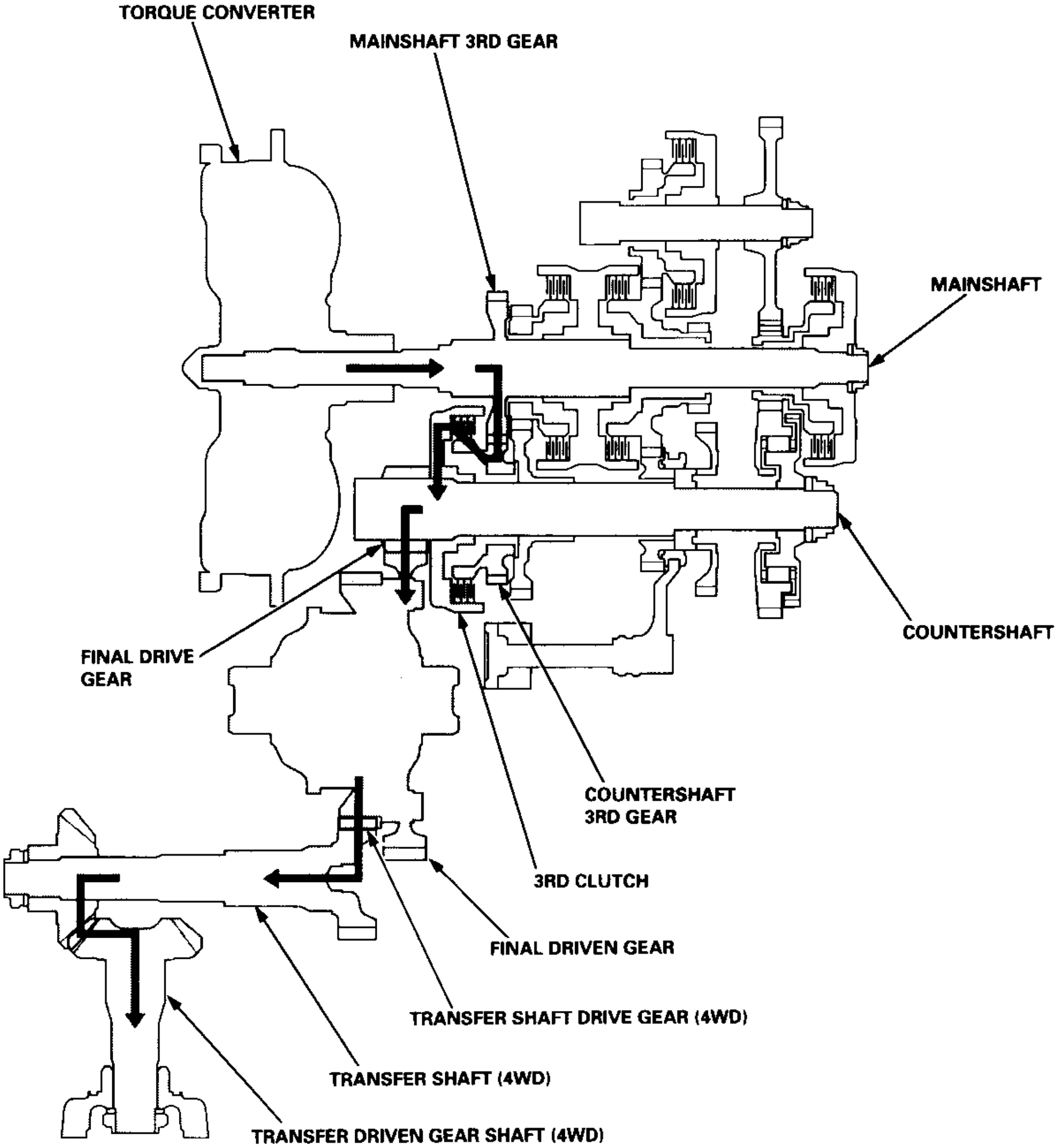
Power Flow (cont'd)

3rd Gear ($\boxed{D_4}$, $\boxed{D_3}$, or $\boxed{D}$ position)

1. Hydraulic pressure is applied to the 3rd clutch. Power from the mainshaft 3rd gear is transmitted to the countershaft 3rd gear.
2. Power is transmitted to the final drive gear, which drives the final driven gear and the transfer shaft drive gear (4WD).
3. The transfer shaft drive gear drives the transfer shaft and the transfer driven gear shaft (4WD).

NOTE:

- Hydraulic pressure is also applied to the 1st clutch, but since the rotation speed of 3rd gear exceeds that of 1st gear, power from 1st gear is cut off at the one-way clutch.
- The illustration shows the 4WD automatic transmission; power flow of the 2WD automatic transmission is identical to the 4WD except for parts related to the transfer assembly.

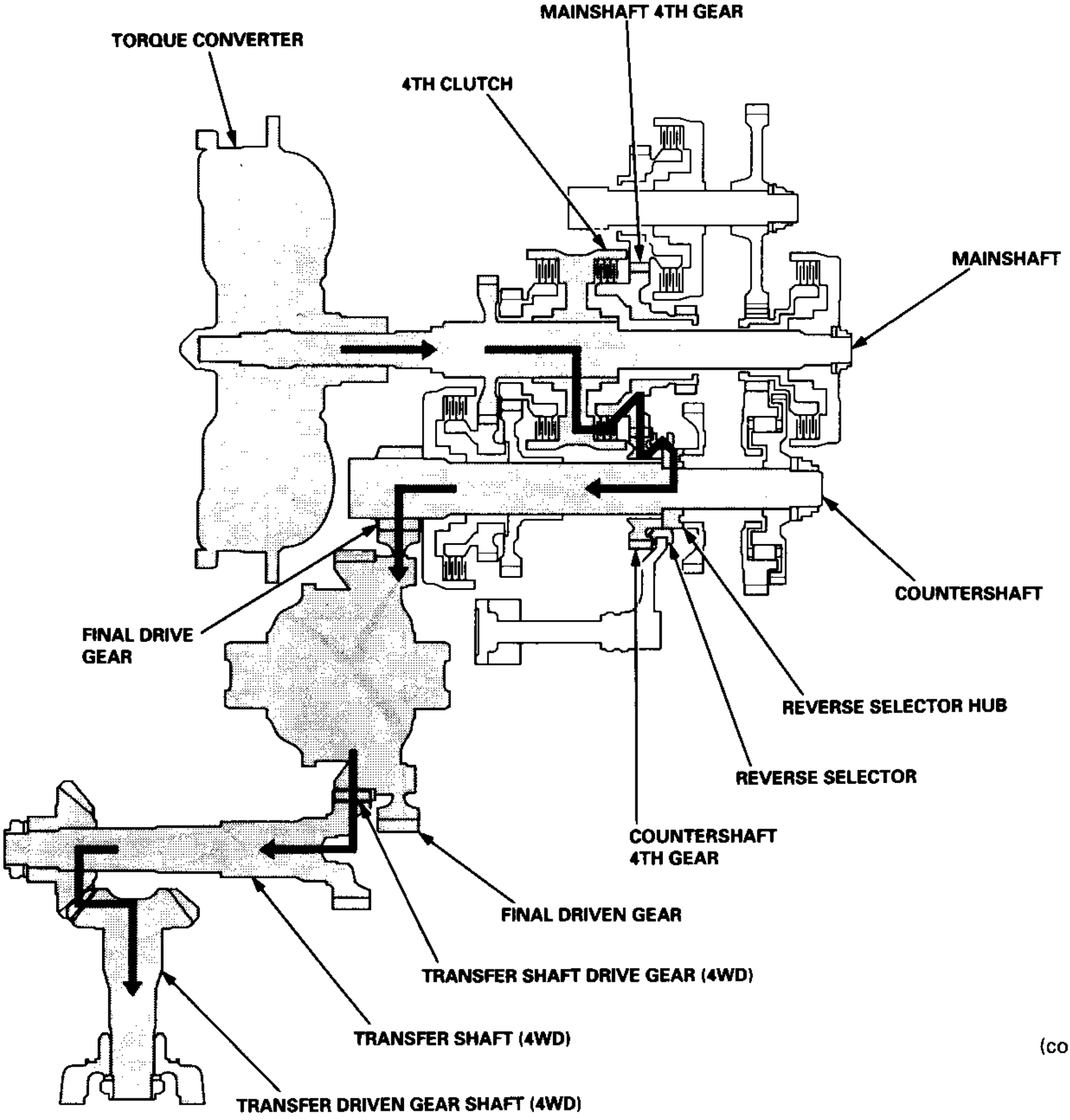


4th Gear (D4 or D position)

1. Hydraulic pressure is applied to the 4th clutch, which rotates together with the mainshaft, and the mainshaft 4th gear rotates.
2. Power is transmitted to the countershaft 4th gear, which drives the countershaft.
3. Power is transmitted to the final drive gear, which drives the final driven gear and the transfer shaft drive gear (4WD).
4. The transfer shaft drive gear drives the transfer shaft and the transfer driven gear shaft (4WD).

NOTE:

- Hydraulic pressure is also applied to the 1st clutch, but since the rotation speed of 4th gear exceeds that of 1st gear, power from 1st gear is cut off at the one-way clutch.
- The illustration shows the 4WD automatic transmission; power flow of the 2WD automatic transmission is identical to the 4WD except for parts related to the transfer assembly.



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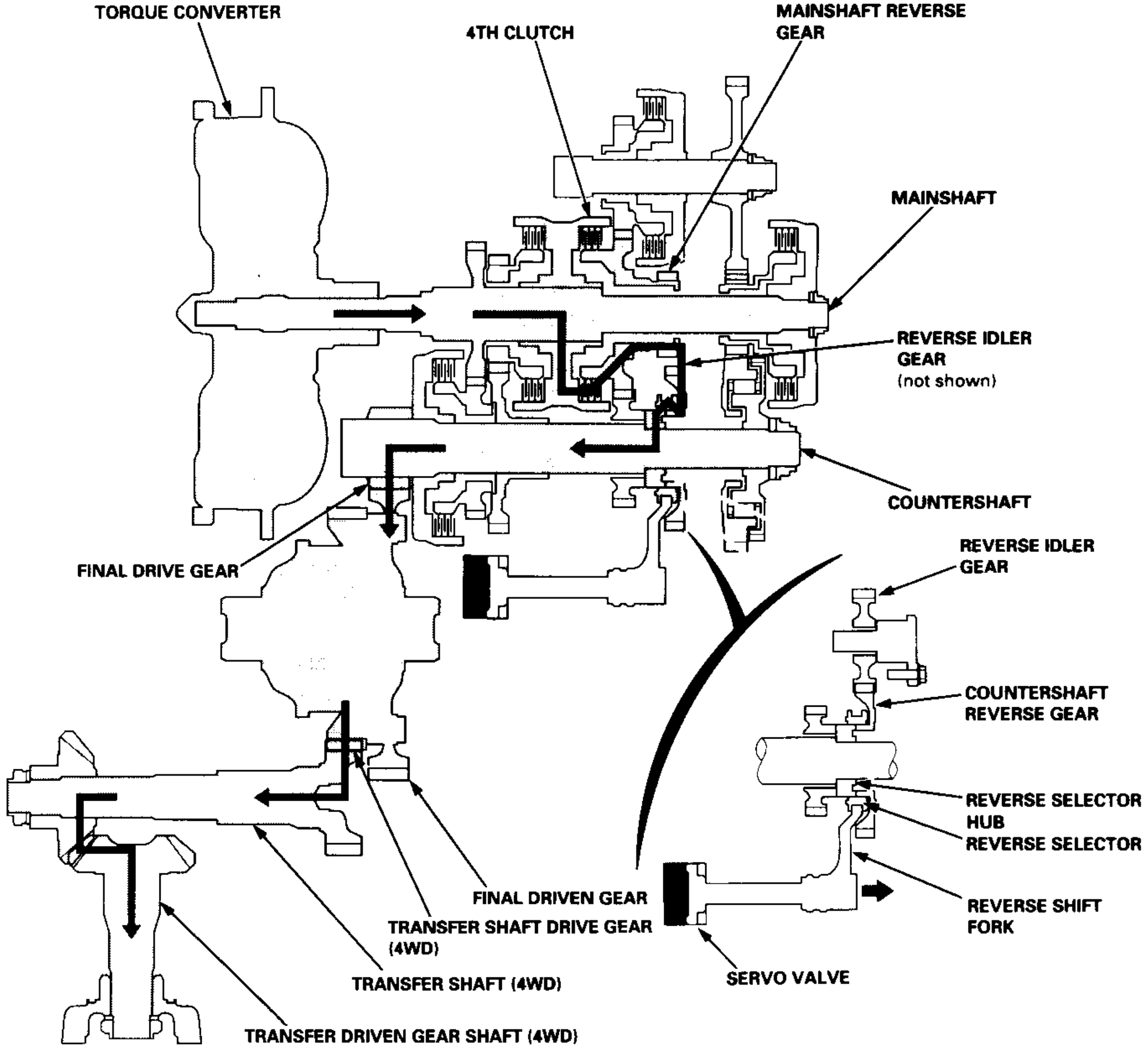
Power Flow (cont'd)

R position

1. Hydraulic pressure is switched by the manual valve to the servo valve, which moves the reverse shift fork to the reverse position. The reverse shift fork engages with the reverse selector, the reverse selector hub, and the countershaft reverse gear.
2. Hydraulic pressure is also applied to the 4th clutch. Power is transmitted from the mainshaft reverse gear via the reverse idler gear to the countershaft reverse gear.
3. Rotational direction of the countershaft reverse gear is changed via the reverse idler gear.
4. Power is transmitted to the final drive gear, which drives the final driven gear and the transfer shaft drive gear (4WD).
5. The transfer shaft drive gear drives the transfer shaft and the transfer driven gear shaft (4WD).

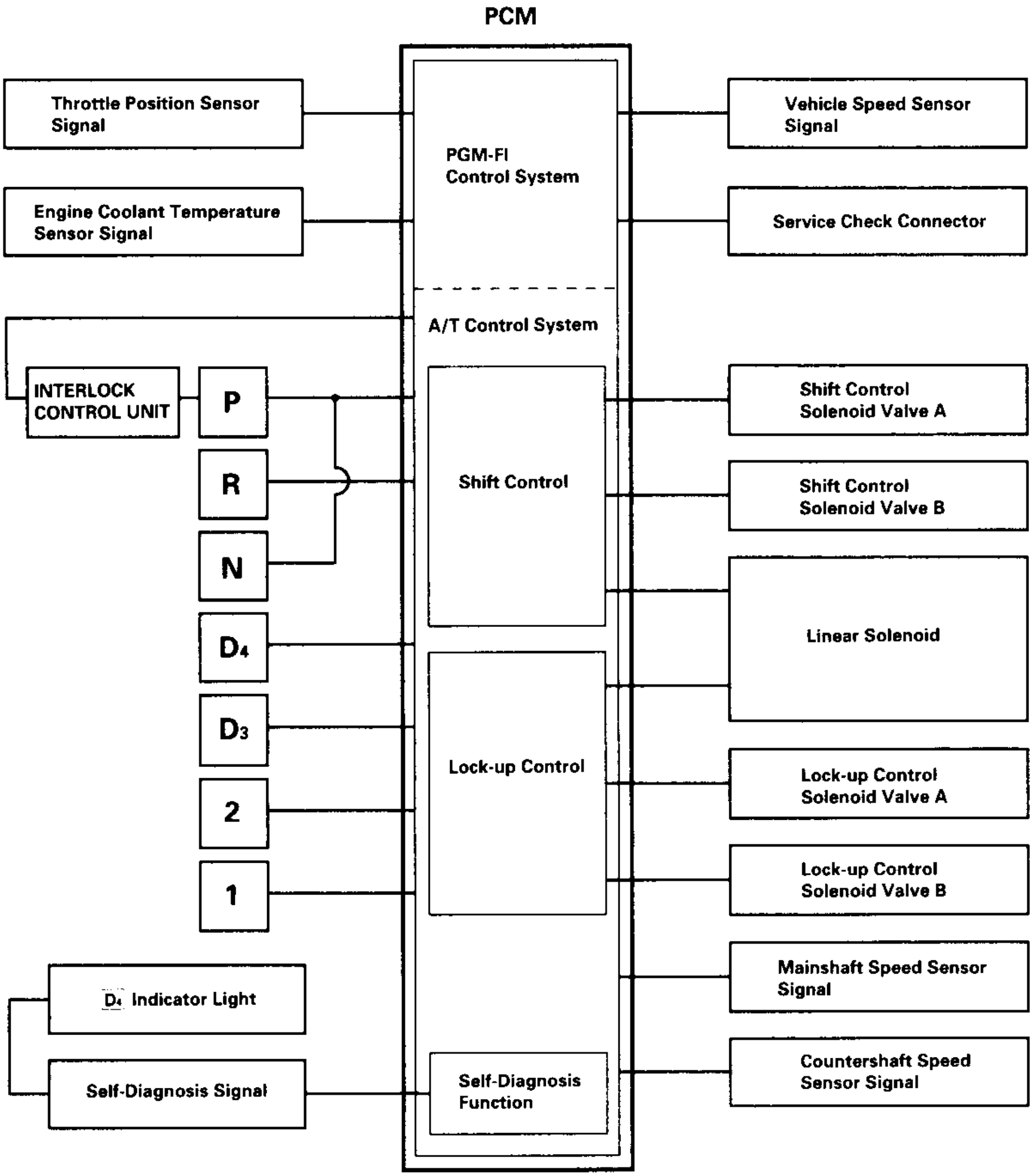
NOTE: The illustration shows the 4WD automatic transmission; power flow of the 2WD automatic transmission is identical to the 4WD except for parts related to the transfer assembly.



Electronic Control System

The electronic control system consists of a Powertrain Control Module (PCM), sensors, a linear solenoid, and four solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions. The PCM is located below the dashboard, under the kick panel on the passenger's side.

'97 – 98 Models



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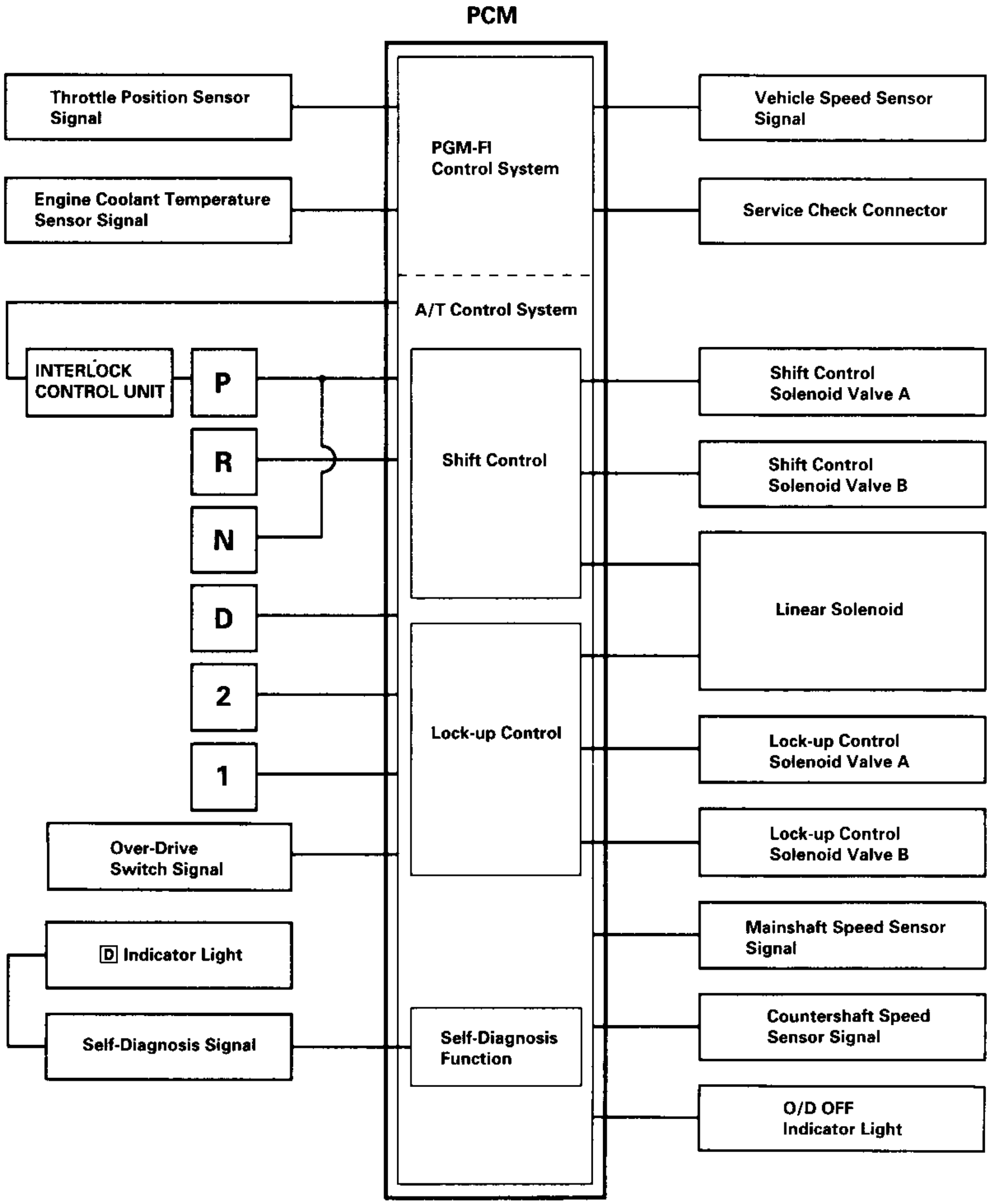
Electronic Control System (cont'd)

'99 – 00 Models



Shift Control

The PCM determines which gear should be selected by various signals sent from sensors, and actuates the shift control solenoid valves A and B to control shifting. Also, a Grade Logic Control System has been adopted to control shifting in $\boxed{D_4}$ and $\boxed{D_3}$ ('97 – 98), and $\boxed{D}$ ('99 – 00) position while the vehicle is ascending or descending a slope, or reducing speed.

Position	Gear	Shift Control Solenoid Valve A	Shift Control Solenoid Valve B
$\boxed{D_4}$, $\boxed{D_3}$, or $\boxed{D}$	1st	OFF	ON
	2nd	ON	ON
	3rd	ON	OFF
$\boxed{D_4}$ or $\boxed{D}$	4th	OFF	OFF
$\boxed{2}$	2nd	ON	ON
$\boxed{1}$	1st	OFF	ON
$\boxed{R}$*	Reverse	ON	OFF

*See page 14-37 for reverse inhibitor control description.

Lock-up Control

From sensor input signals, the PCM determines whether to turn the lock-up ON or OFF, and activates lock-up control solenoid valve A and/or B accordingly. Lock-up does not occur until the engine is warm. The combination of driving signals to lock-up control solenoid valves A and B and the linear solenoid pressure is shown in the table below.

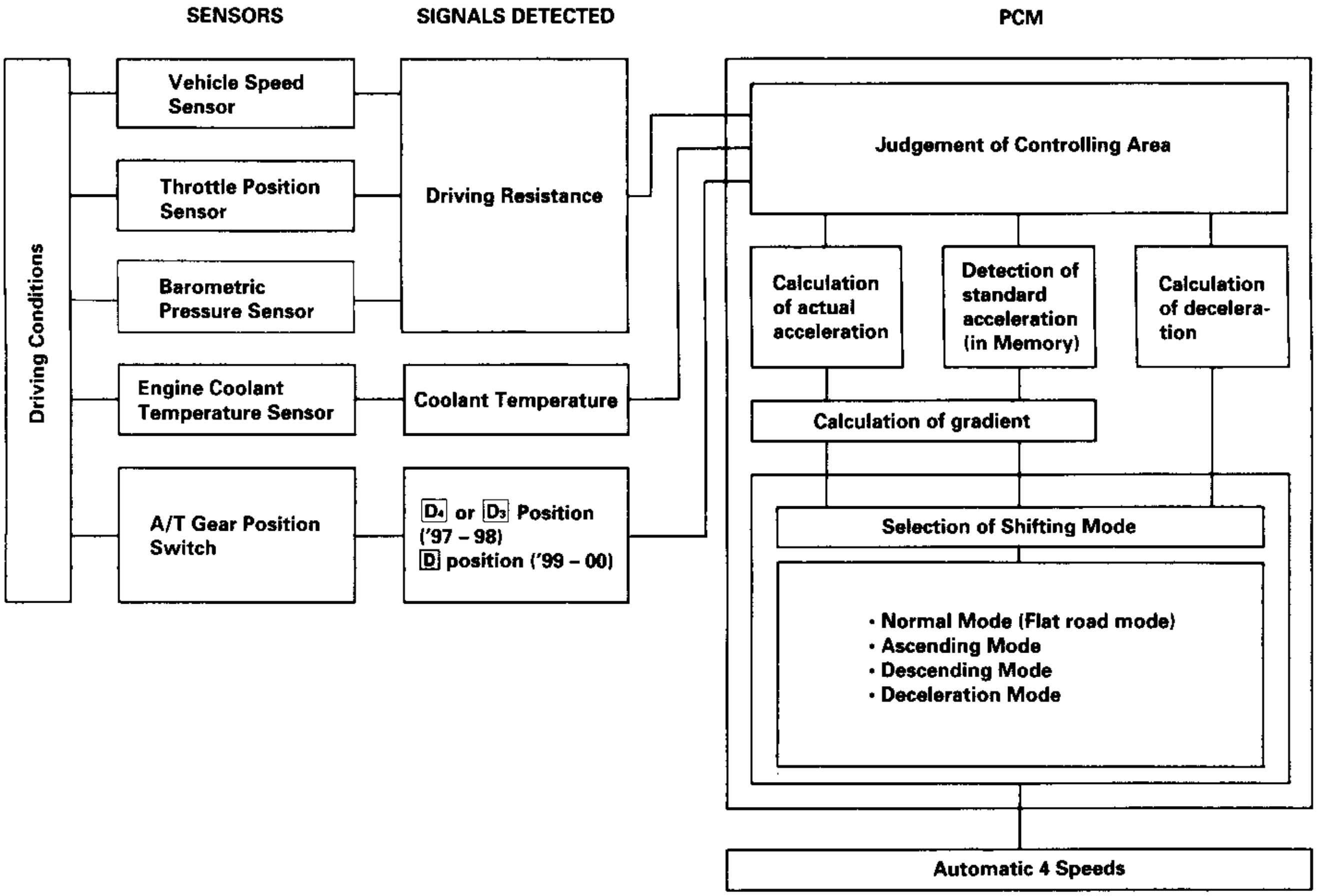
Lock-up Conditions	Lock-up Control Solenoid Valve A	Lock-up Control Solenoid Valve B	Linear Solenoid Pressure
Lock-up OFF	OFF	OFF	High
Lock-up, Half	ON	Duty operation OFF ↔ ON	Low
Lock-up, Full	ON	ON	High
Lock-up during deceleration	ON	Duty operation OFF ↔ ON	Low

(cont'd)

Electronic Control System (cont'd)

Grade Logic Control System

How it works:
The PCM compares actual driving conditions with memorized driving conditions, based on the input from the vehicle speed sensor, the throttle position sensor, the barometric pressure sensor ('98 model), the engine coolant temperature sensor, the brake switch signal, and the shift lever position signal, to control shifting while the vehicle is ascending or descending a slope, or reducing speed.

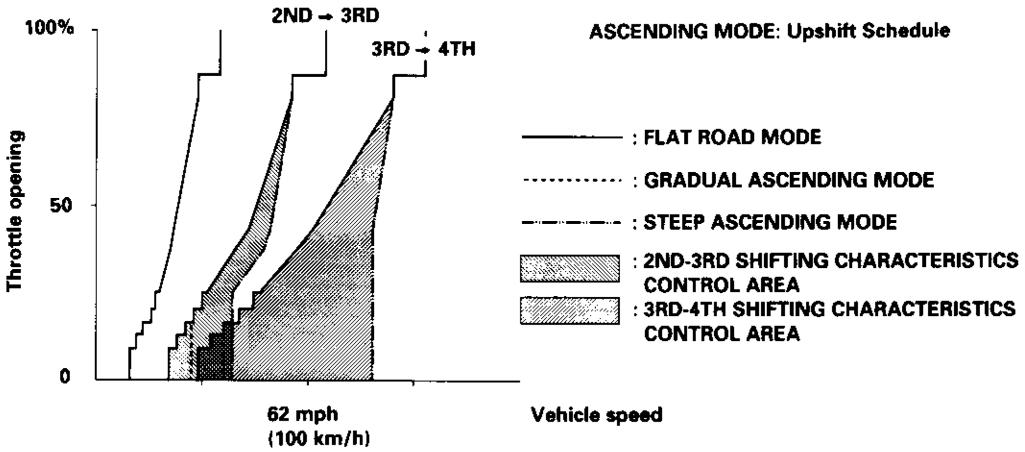


Ascending Control ('97 Model)

When the PCM determines that the vehicle is climbing a hill in $\boxed{D_4}$ and $\boxed{D_3}$ positions, the system extends the engagement area of 2nd gear and 3rd gear to prevent the transmission from frequently shifting between 2nd and 3rd gears, and between 3rd and 4th gears, so the vehicle can run smooth and have more power when needed.

NOTE:

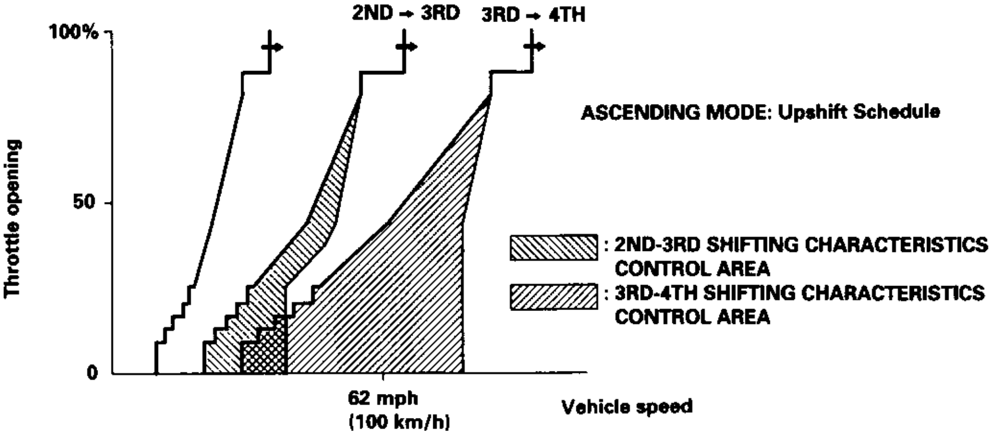
- Shift schedules stored in the PCM between 2nd and 3rd gears, and between 3rd and 4th gears, enable the PCM's fuzzy logic to automatically select the most suitable gear according to the magnitude of a gradient.
- Fuzzy logic is a form of artificial intelligence that lets computers respond to changing conditions much like a human mind would.



Ascending Control ('98 – 00 Models)

When the PCM determines that the vehicle is climbing a hill in $\boxed{D_4}$ and $\boxed{D_3}$ positions ('98 model), and in $\boxed{D}$ position ('99 – 00 models), the system extends the engagement area of 2nd gear and 3rd gear to prevent the transmission from frequently shifting between 2nd and 3rd gears, and between 3rd and 4th gears, so the vehicle can run smooth and have more power when needed.

NOTE: Shift schedules stored in the PCM between 2nd and 3rd gears, and between 3rd and 4th gears, enable to select the most suitable gear according to the magnitude of a gradient.



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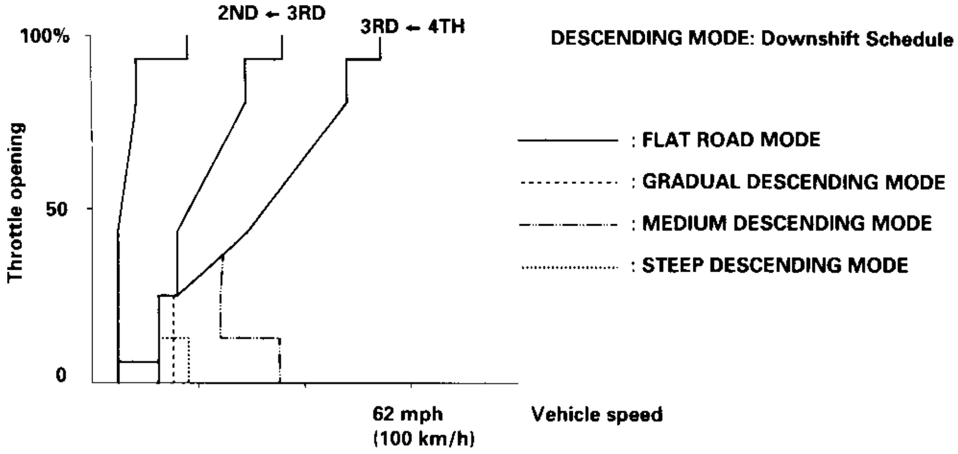
Electronic Control System (cont'd)

Descending Control

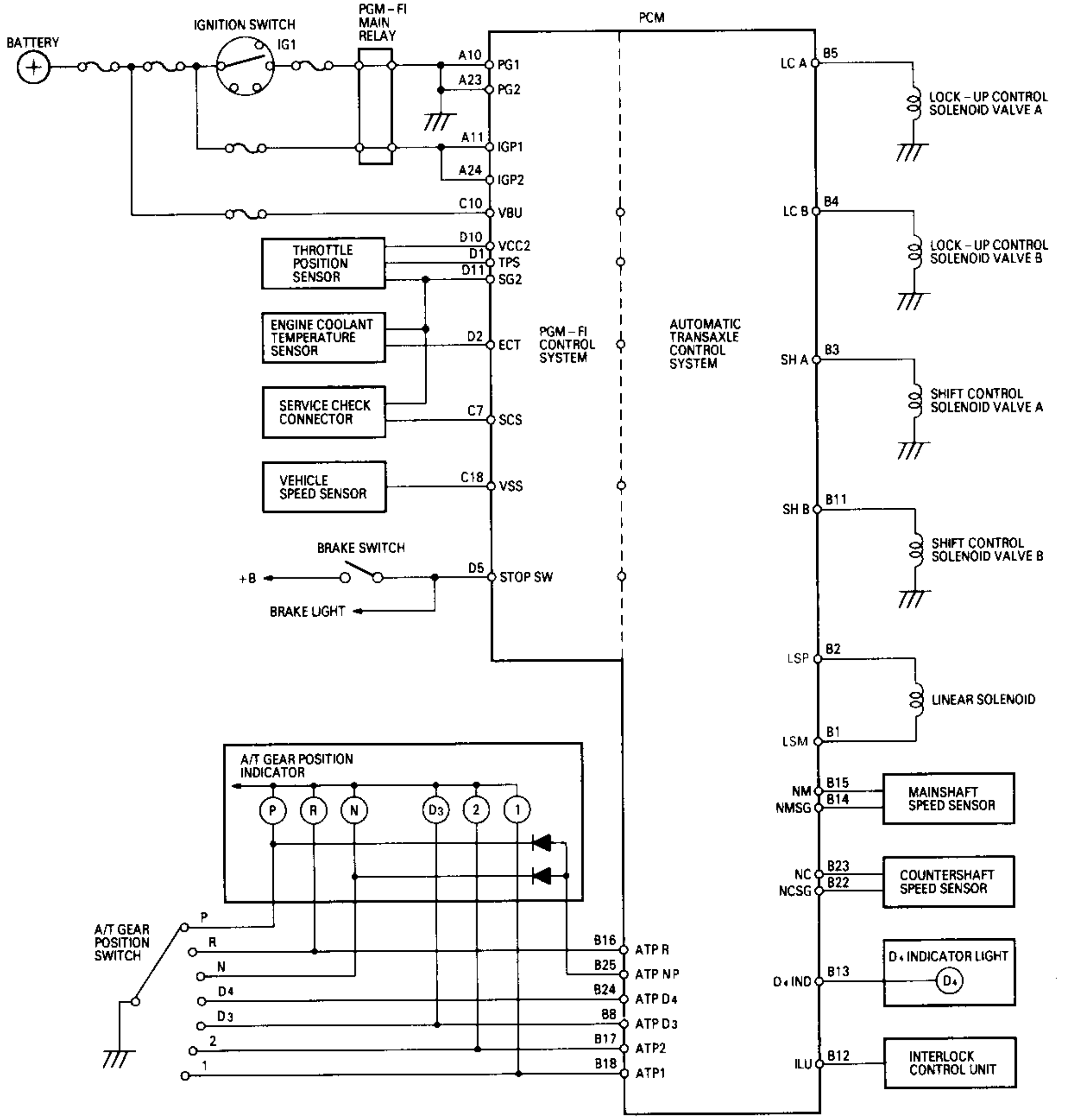
When the PCM determines that the vehicle is going down a hill in D4 and D3 positions ('97 – 98 models), and in D position ('99 – 00 models), the shift-up speed from 3rd to 4th gear and from 2nd to 3rd (when the throttle is closed) becomes faster than the set speed for flat road driving to widen the 3rd gear and 2nd gear driving areas. This, in combination with engine braking from the deceleration lock-up, achieves smooth driving when the vehicle is descending. There are three descending modes with different 3rd gear driving areas and 2nd gear driving areas according to the magnitude of a gradient stored in the PCM. When the vehicle is in 4th gear, and you are decelerating when you are applying the brakes on a steep hill, the transmission will downshift to 3rd gear. When you accelerate, the transmission will then return to higher gear.



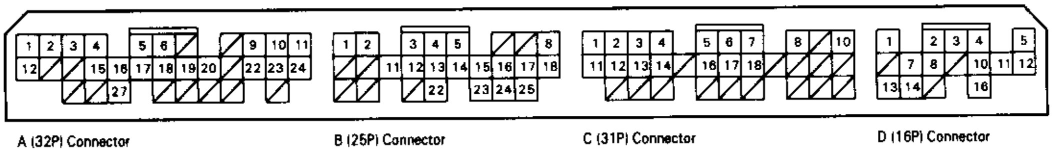
Deceleration Control

When the vehicle goes around a corner, and needs to decelerate first and then accelerate, the PCM sets the data for deceleration control to reduce the number of times the transmission shifts. When the vehicle is decelerating from speeds above 27 mph (43 km/h), the PCM shifts the transmission from 4th to 2nd earlier than normal to cope with upcoming acceleration.

Circuit Diagram and Terminal Locations-'97 Model



PCM Terminal Locations



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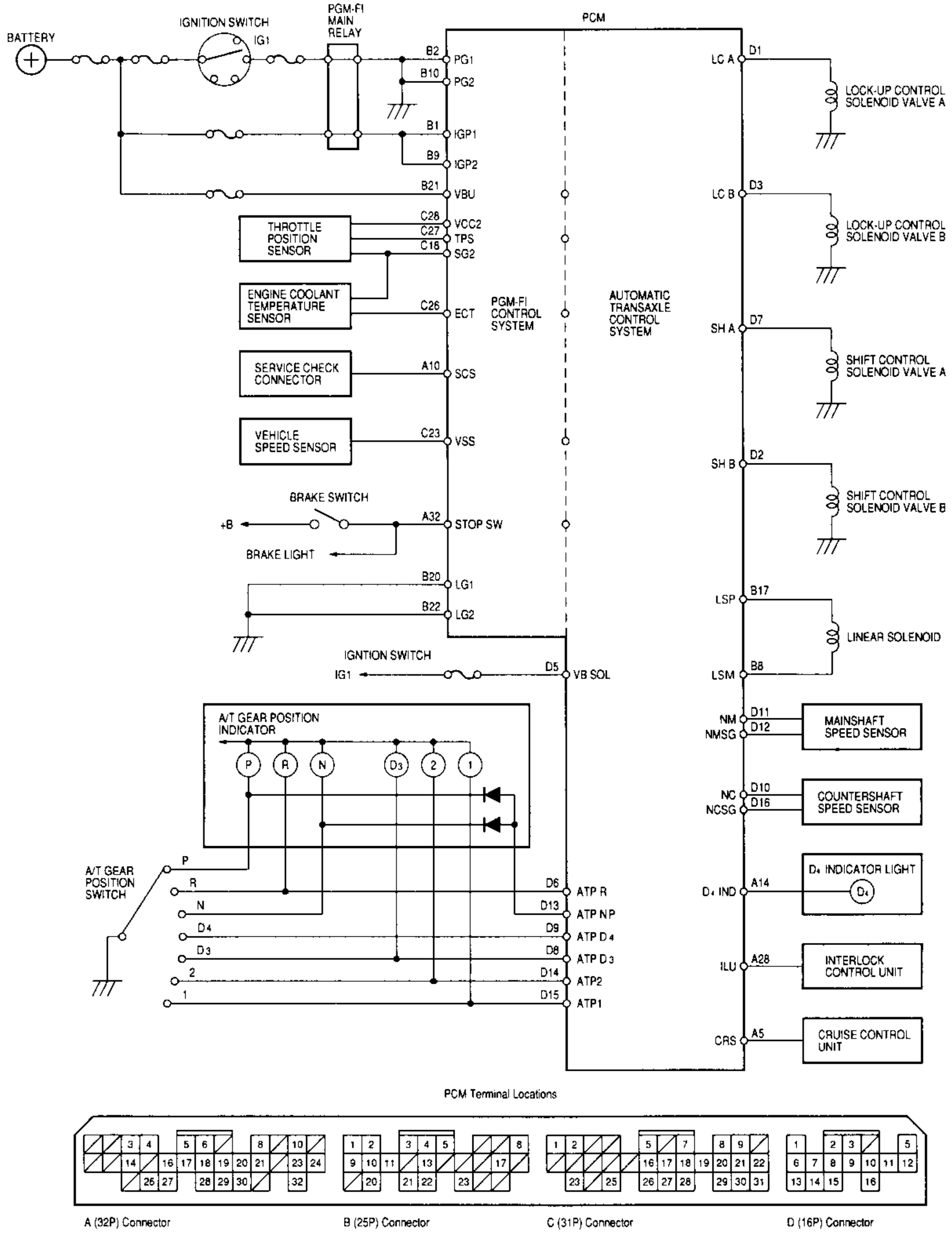
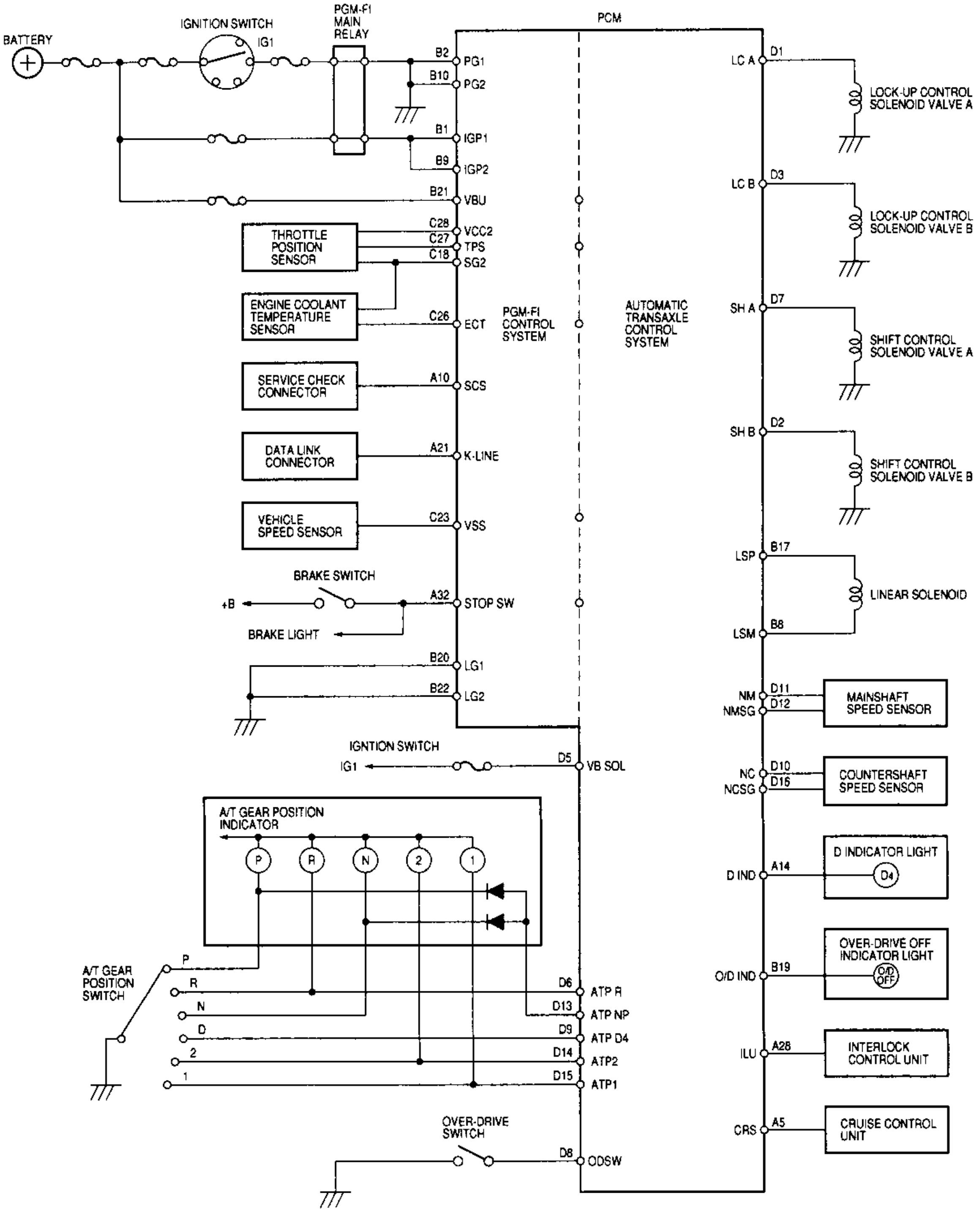
Description

Electronic Control System (cont'd)

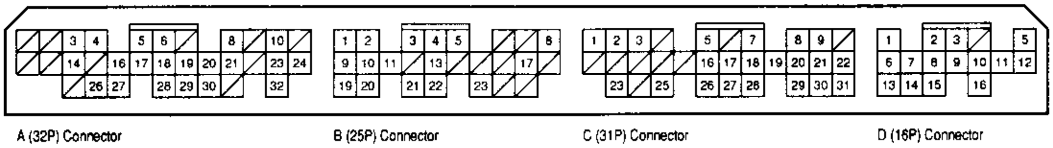
Circuit Diagram and Terminal Locations-'98 Model



Circuit Diagram and Terminal Locations-'99 – 00 Models



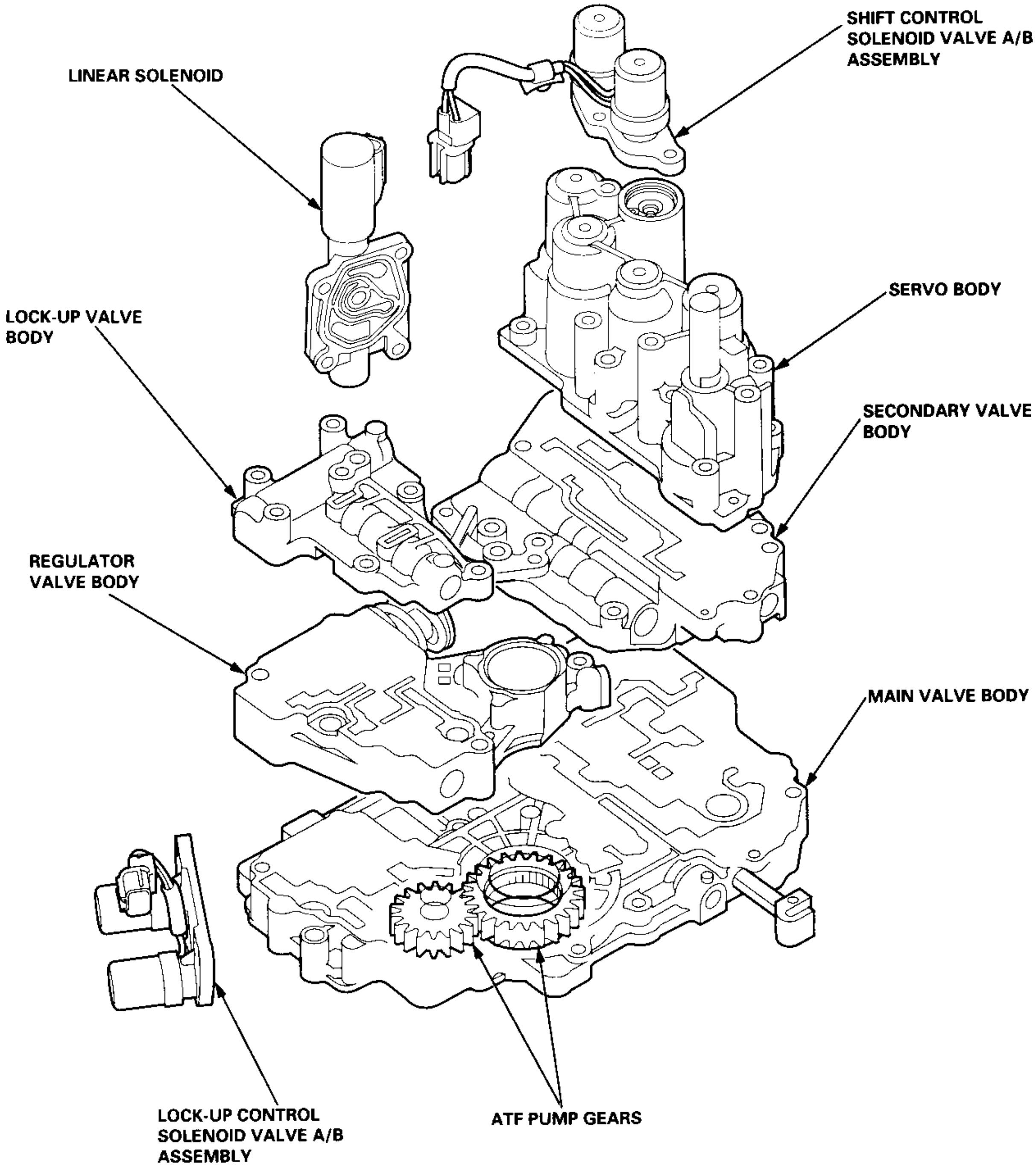
PCM Connector Terminal Locations



Description

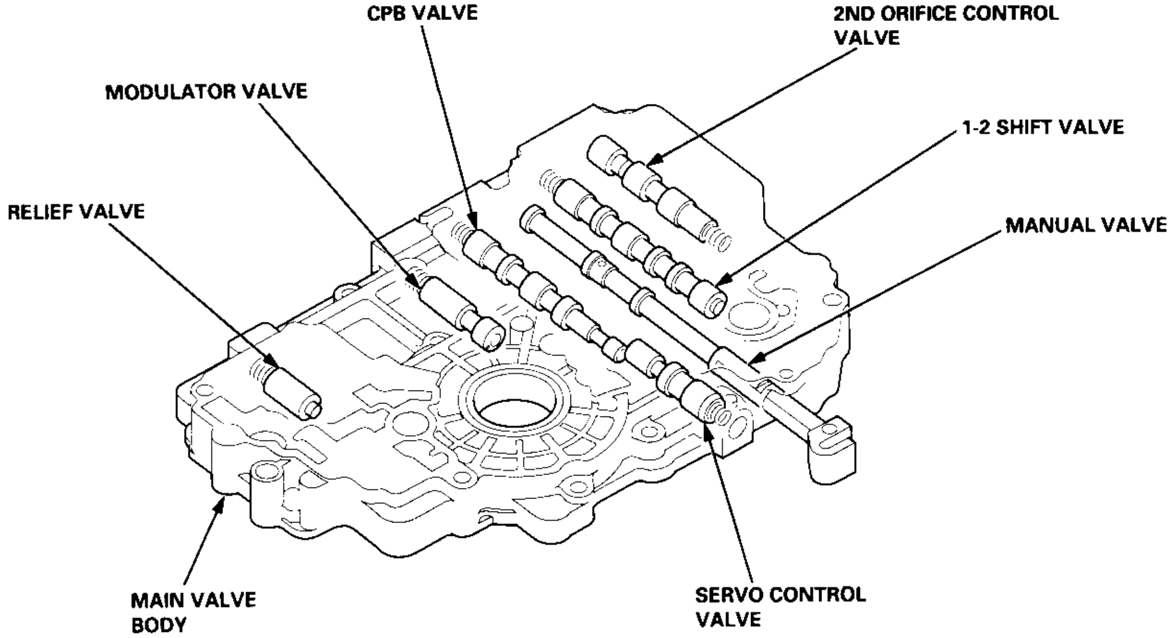
Hydraulic Control

The hydraulic control system is controlled by the ATF pump, valves, accumulators, and electronically controlled solenoids. The ATF pump is driven by splines on the end of the torque converter which is attached to the engine. Fluid from the ATF pump flows through the regulator valve to maintain specified pressure, through the main valve body, to the manual valve, directing pressure to each clutch. The valve body includes the main valve body, the regulator valve body, the lock-up valve body, the secondary valve body, the servo body, the linear solenoid, the shift control solenoid valve A/B assembly, and the lock-up control solenoid valve A/B assembly. The shift control solenoid valve A/B assembly and the linear solenoid are bolted on the outside of the transmission housing. The lock-up control solenoid valve A/B assembly is bolted on the outside of the torque converter housing.



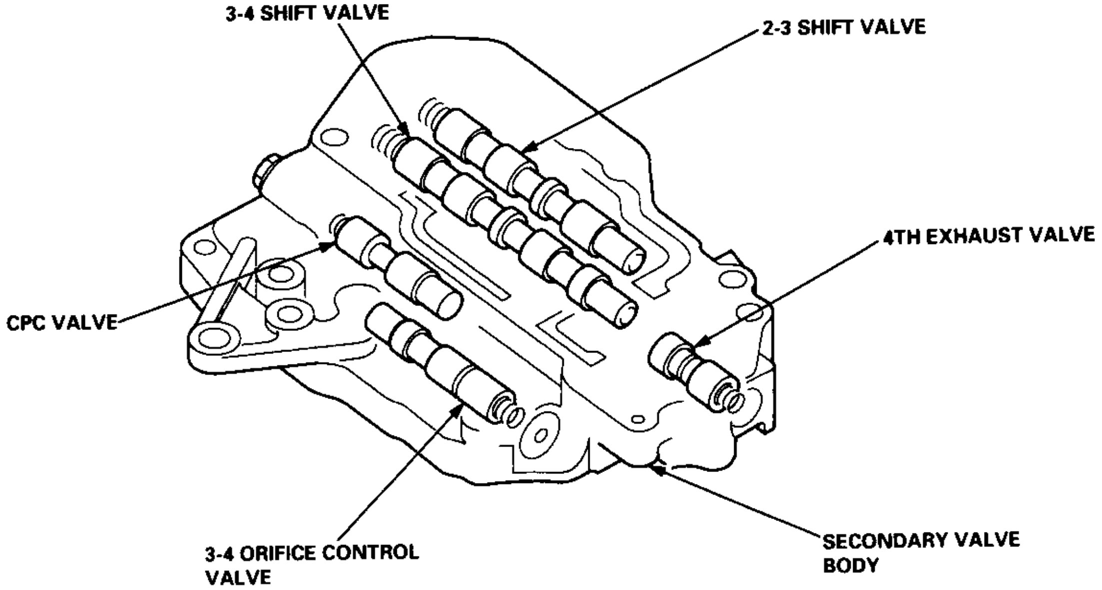
Main Valve Body

The main valve body houses the manual valve, the 1-2 shift valve, the 2nd orifice control valve, the CPB valve, the modulator valve, the servo control valve, and the relief valve. The primary functions of the main valve body are to switch fluid pressure on and off, and to control the hydraulic pressure going to the hydraulic control system.



Secondary Valve Body

The secondary valve body is located on the main valve body. The secondary valve body houses the 2-3 shift valve, the 3-4 shift valve, the 3-4 orifice control valve, the 4th exhaust valve, and the CPC valve.



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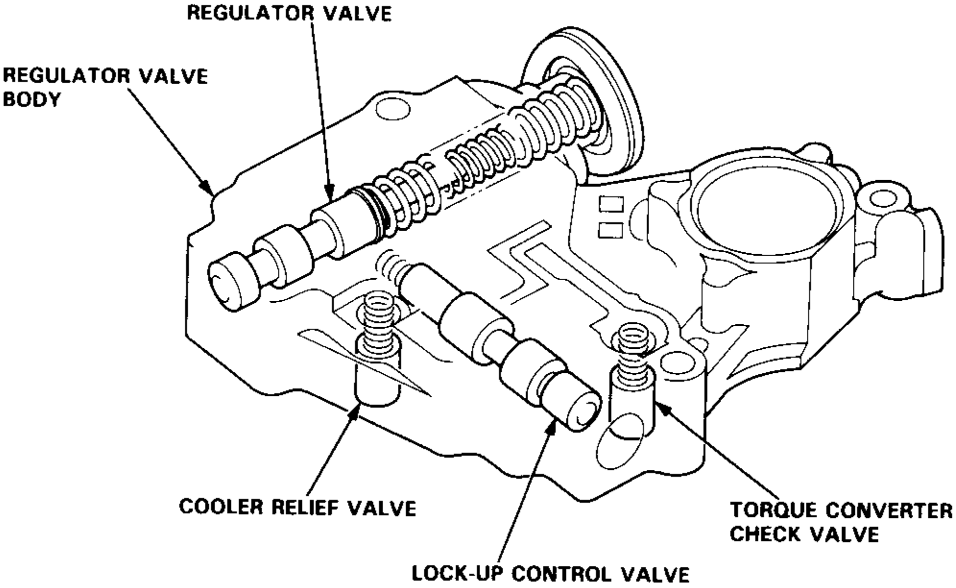
Hydraulic Control (cont'd)

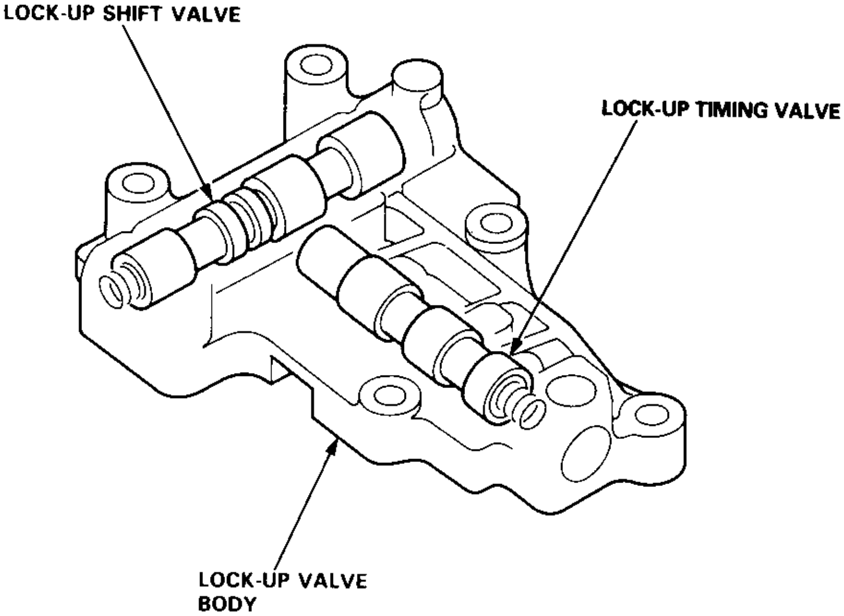
Regulator Valve Body

The regulator valve body is located on the main valve body. The regulator valve body consists of the regulator valve, the torque converter check valve, the cooler relief valve, and the lock-up control valve.



Lock-up Valve Body

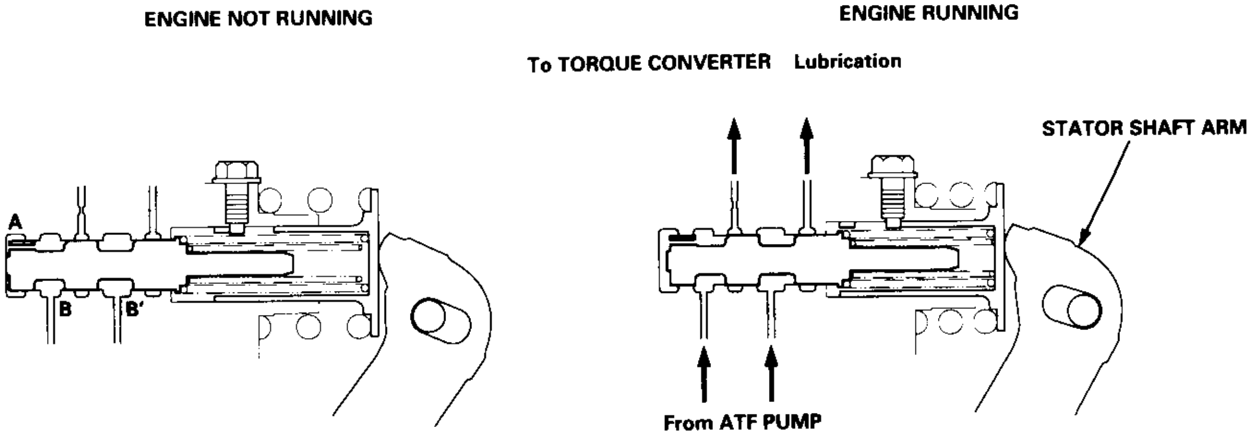
The lock-up valve body, with lock-up shift valve and lock-up timing valve, is located on the regulator valve body.



Regulator Valve

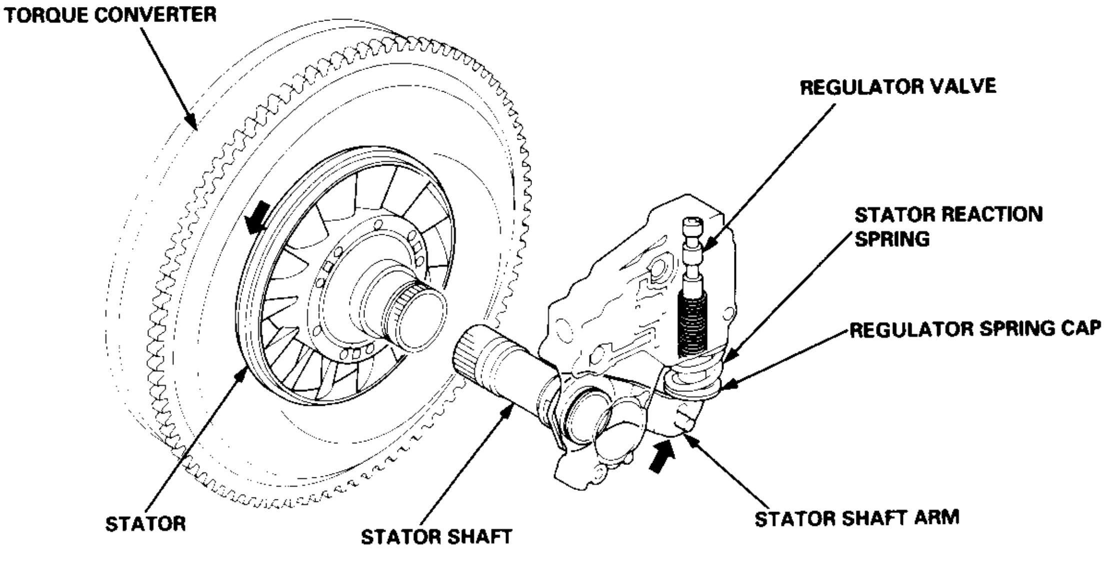
The regulator valve maintains constant hydraulic pressure from the ATF pump to the hydraulic control system, while also furnishing fluid to the lubricating system and torque converter. Fluid from the ATF pump flows through B and B'. Fluid entering from B flows through the valve orifice to the A cavity. This pressure of the A cavity pushes the regulator valve to the right side, and this movement of the regulator valve uncovers the fluid port to the torque converter and the relief valve. The fluid flows out to the torque converter and the relief valve, and the regulator valve moves to the left side. According to the level of the hydraulic pressure through B, the position of the regulator valve changes and the amount of fluid from B' through the torque converter also changes. This operation is continued, maintaining the line pressure.

NOTE: When used, "left" or "right" indicates direction on the illustration below.



Stator Reaction Hydraulic Pressure Control

Increases in hydraulic pressure according to torque are performed by the regulator valve using stator torque reaction. The stator shaft is splined to the stator in the torque converter, and its arm end contacts the regulator spring cap. When the vehicle is accelerating or climbing (Torque Converter Range), stator torque reaction acts on the stator shaft, and the stator arm pushes the regulator spring cap in the direction of the arrow in proportion to the reaction. The stator reaction spring compresses, and the regulator valve moves to increase the line pressure. Line pressure reaches its maximum when the stator torque reaction reaches its maximum.

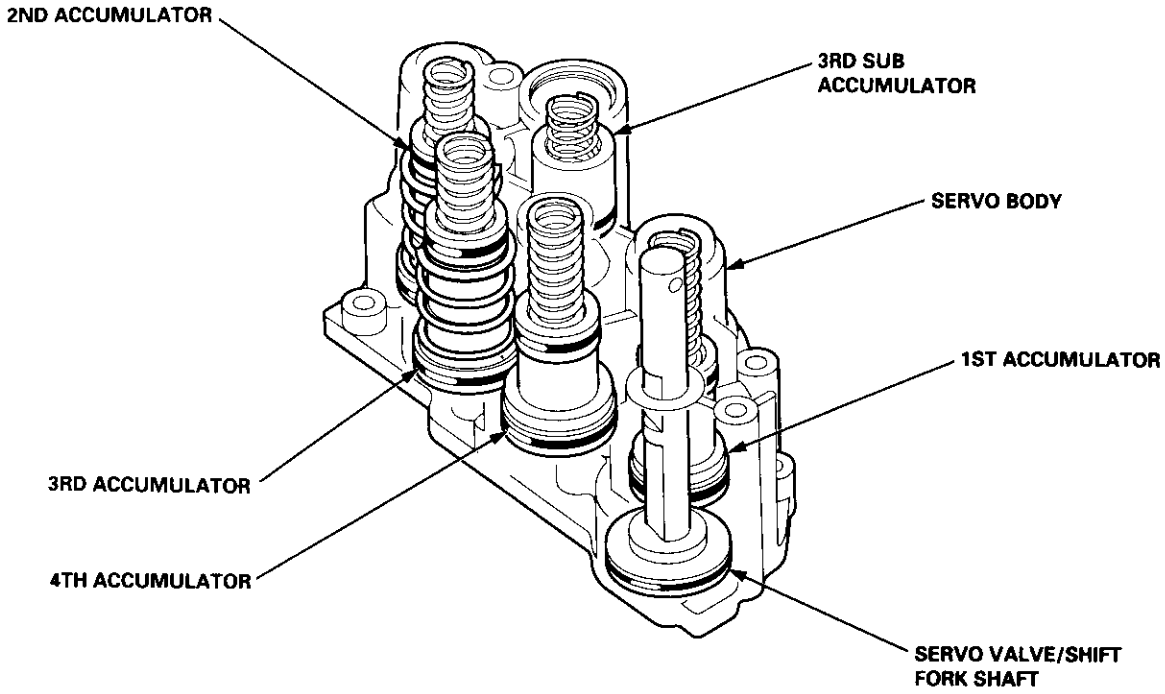


(cont'd)

Hydraulic Control (cont'd)

Servo Body

The servo body is located on the secondary valve body. The servo body contains the servo valve (which is integrated with the reverse shift fork), and the accumulators.



Hydraulic Flow

General Chart of Hydraulic Pressure

ATF Pump — Regulator Valve — Line Pressure — Modulator Pressure — Linear Solenoid
Line Pressure — Clutch Pressure
Regulator Valve — Torque Converter Pressure
Regulator Valve — Lubrication Pressure

Distribution of Hydraulic Pressure

- Regulator Valve — Torque Converter Pressure
  - Lubrication Pressure
  - To regulate Line Pressure
- Manual Valve — To select Line Pressure — Clutch Pressure
- Modulator Valve — Modulator Pressure — Shift Control Solenoid Valves
  - Lock-up Control Solenoid Valves
  - Linear Solenoid

- 1-2 Shift Valve
- 2-3 Shift Valve
- 3-4 Shift Valve

— Clutch Pressure

PORT NO.	DESCRIPTION OF PRESSURE	PORT NO.	DESCRIPTION OF PRESSURE
1	LINE	15	1ST-HOLD CLUTCH
1′	LINE	16	1ST-HOLD CLUTCH
1″	LINE	17	1ST-HOLD CLUTCH
2	LINE	18	1ST-HOLD CLUTCH
3	LINE	20	2ND CLUTCH
3′	LINE	20A	2ND ACCUMULATOR
3″	LINE	30	3RD CLUTCH
4	LINE	40	4TH CLUTCH
4′	LINE	41	4TH CLUTCH
4″	LINE	56	LINEAR SOLENOID
5	CPC	90	TORQUE CONVERTER
6	MODULATE	91	TORQUE CONVERTER
6A	MODULATE (SHIFT CONTROL SOLENOID VALVE A)	92	TORQUE CONVERTER
6B	MODULATE (SHIFT CONTROL SOLENOID VALVE B)	93	ATF COOLER
6C	MODULATE (LOCK-UP CONTROL SOLENOID VALVE A)	94	TORQUE CONVERTER
6D	MODULATE (LOCK-UP CONTROL SOLENOID VALVE B)	95	LUBRICATION
6D′	MODULATE (LOCK-UP CONTROL SOLENOID VALVE B)	96	TORQUE CONVERTER
7	LINE	97	TORQUE CONVERTER
8	LINE/CPC	99	SUCTION
9	LINE	X	DRAIN
10	1ST CLUTCH	HIX	HIGH POSITION DRAIN

(cont'd)

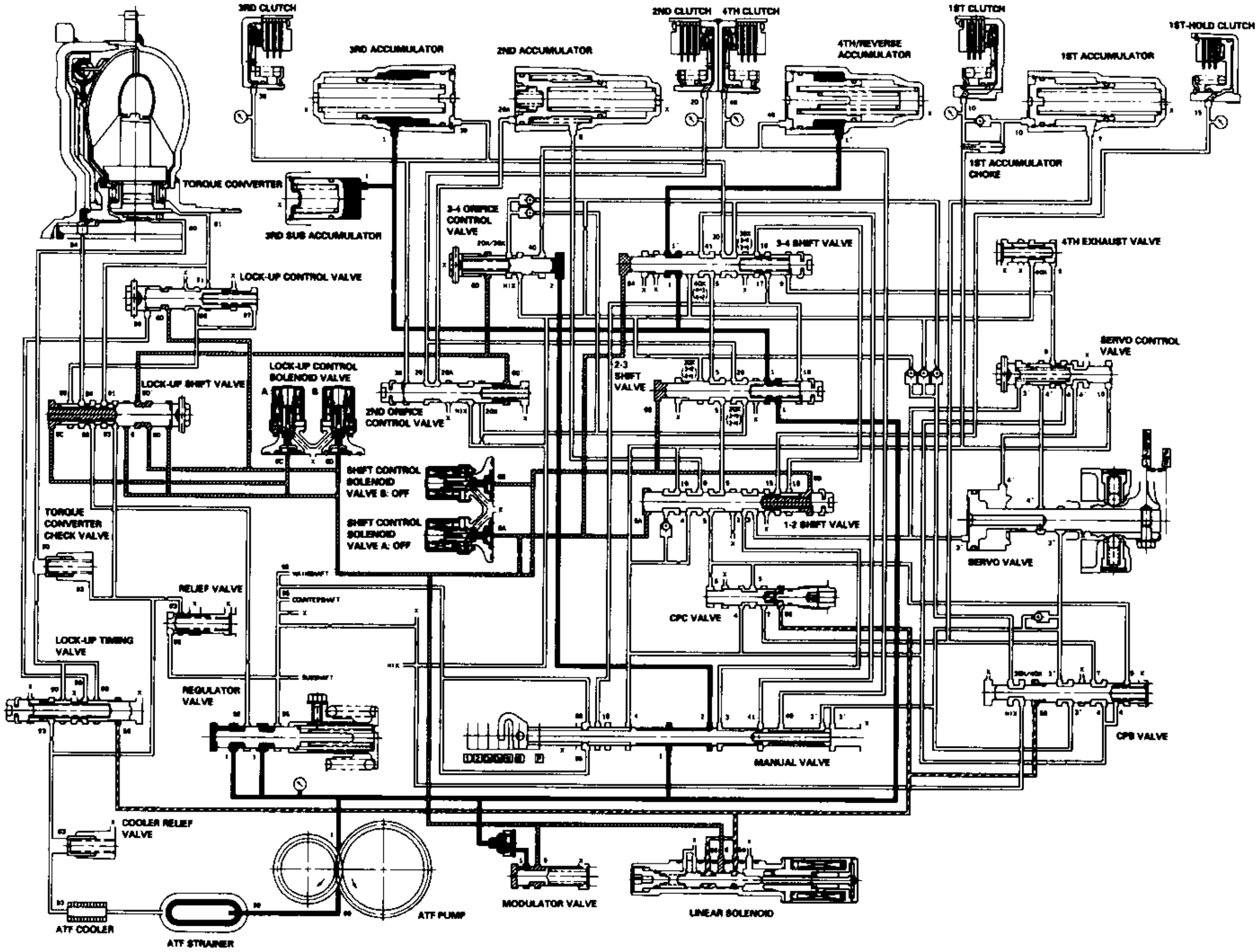
Hydraulic Flow (cont'd)

N Position

As the engine turns, the ATF pump starts to operate. Automatic transmission fluid (ATF) is drawn from (99) and discharged into (1). Then, ATF flowing from the ATF pump becomes line pressure (1). Line pressure (1) is regulated by the regulator valve. Torque converter inlet pressure (92) enters (94) of the torque converter through the lock-up shift valve and discharges into (90). The torque converter check valve prevents torque converter pressure from rising. Under this condition, hydraulic pressure is not applied to the clutches.

NOTE:

- When used, "left" or "right" indicates direction on the hydraulic circuit.
- The hydraulic circuit shows the '97 – 98 models (7 positions); the '99 – 00 models (6 positions) is similar.

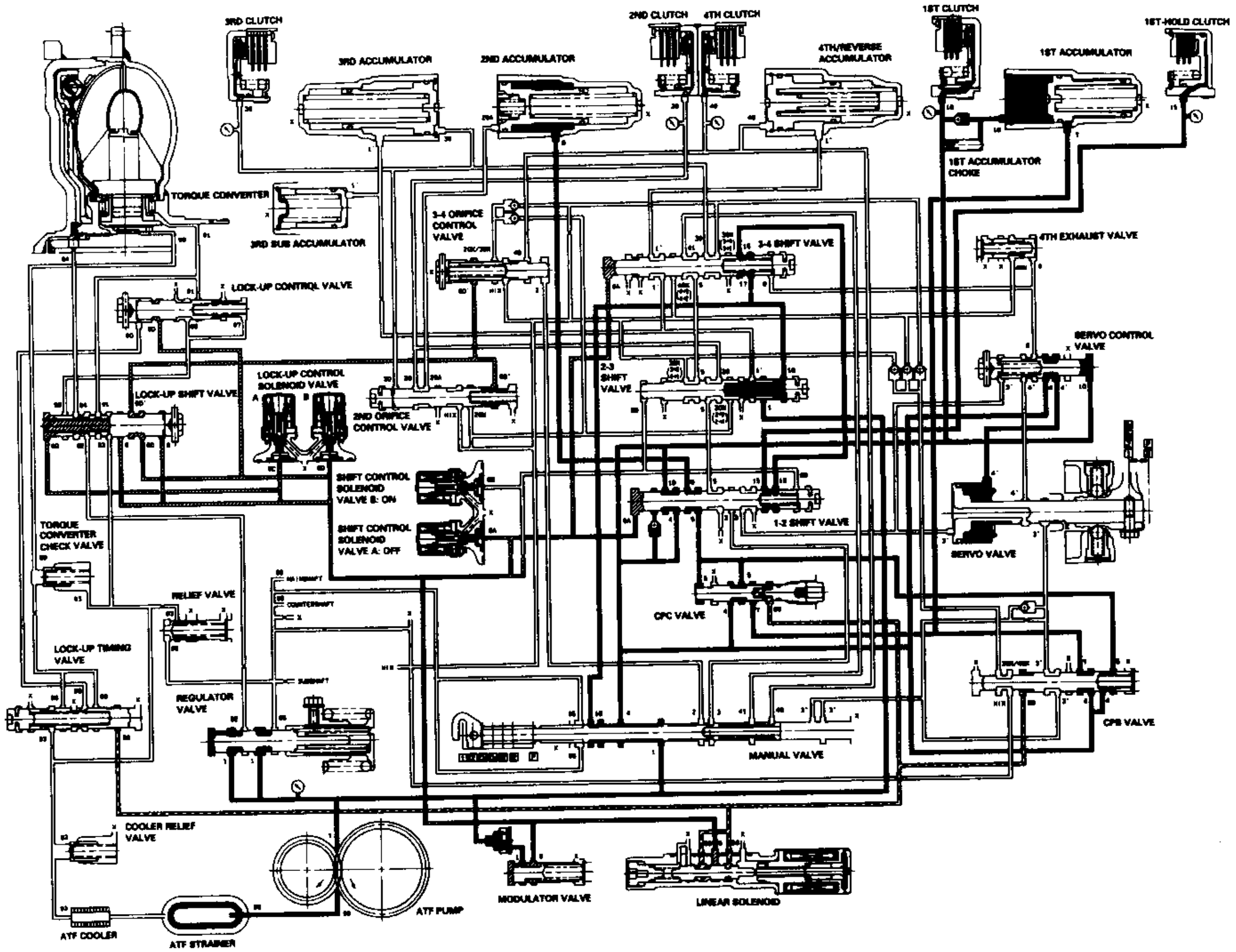


1 Position

Line pressure (1) flows to the manual valve and the modulator valve. Line pressure (1) changes to line pressure (4) and 1st-hold clutch pressure at the manual valve, and changes to modulator pressure at the modulator valve. Modulator pressure (6) flows to the left ends of the 1-2 shift valve and 3-4 shift valve because shift control solenoid valve A is turned OFF by the PCM. The 1-2 shift valve and the 3-4 shift valve are moved to the right side. Line pressure (4) becomes 1st clutch pressure (10) at the 1-2 shift valve. 1st clutch pressure (10) is applied to the 1st clutch, and the 1st clutch is engaged. 1st-hold clutch pressure (18) flows to the 1st-hold clutch via the 3-4 shift valve and the 1-2 shift valve. Power is transmitted only during deceleration through the 1st-hold clutch.

NOTE:

- When used, "left" or "right" indicates direction on the hydraulic circuit.
- The hydraulic circuit shows the '97 – 98 models (7 positions); the '99 – 00 models (6 positions) is similar.



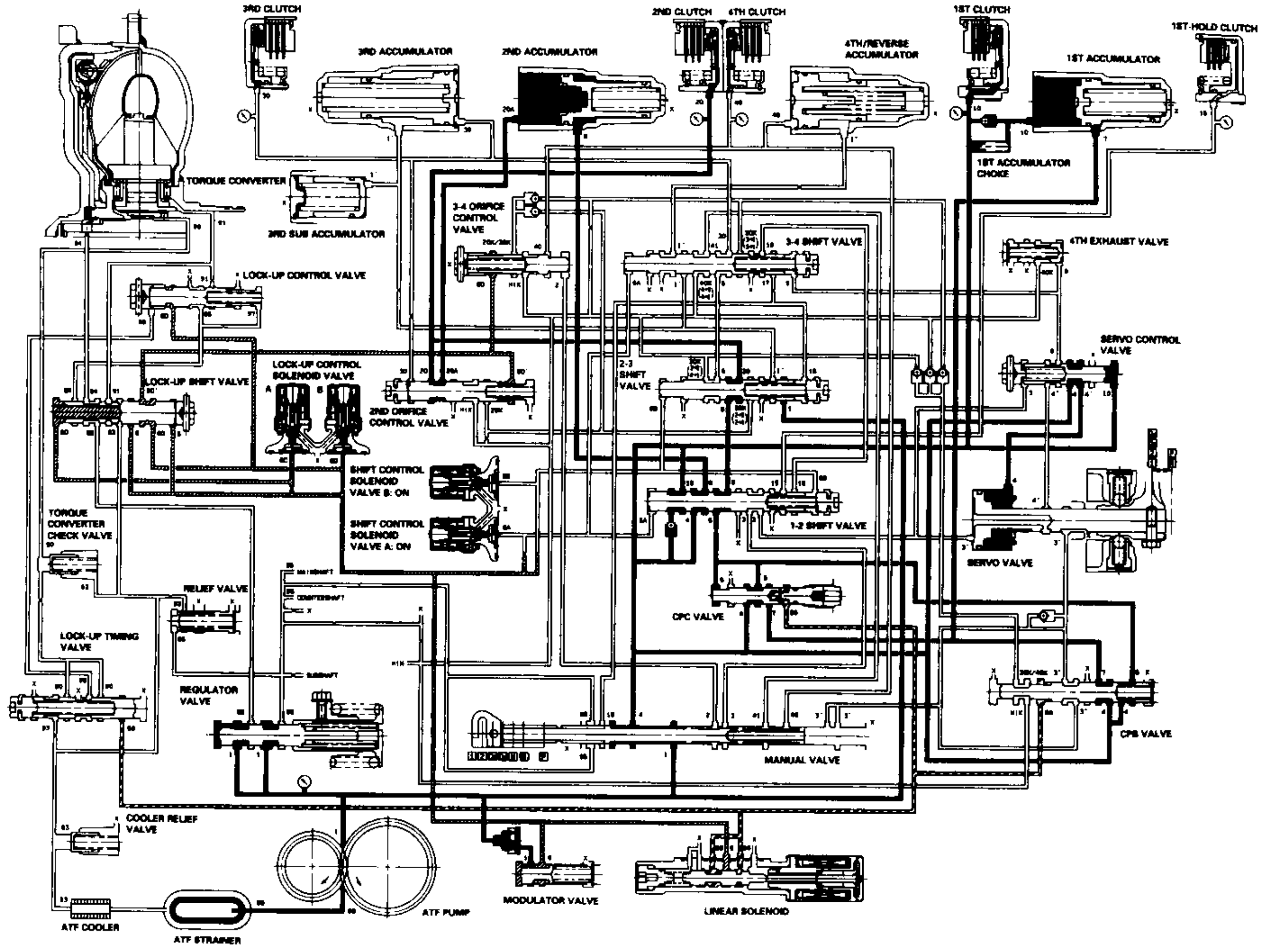
(cont'd)

Hydraulic Flow (cont'd)

[2] Position

Line pressure (1) flows to the manual valve and the modulator valve. Line pressure (1) changes to line pressure (4) at the manual valve, and changes to modulator pressure at the modulator valve. But modulator pressure (6) does not flow to each shift valve because shift control solenoid valves A and B are turned ON by the PCM. Line pressure (4) passes through the CPB valve and the CPC valve, and changes to line pressure (5), then flows to the 1-2 shift valve. Line pressure (5) from the 1-2 shift valve changes to 2nd clutch pressure (20) at the 2-3 shift valve. The 2nd clutch pressure (20) is applied to the 2nd clutch, and the 2nd clutch is engaged. Line pressure (4) passes through the 1-2 shift valve and the orifice, and changes to 1st clutch pressure. The 1st clutch pressure (10) also flows to the 1st clutch. However, no power is transmitted because of the one-way clutch.

NOTE:
- When used, "left" or "right" indicates direction on the hydraulic circuit.
- The hydraulic circuit shows the '97 – 98 models (7 positions); the '99 – 00 models (6 positions) is similar.



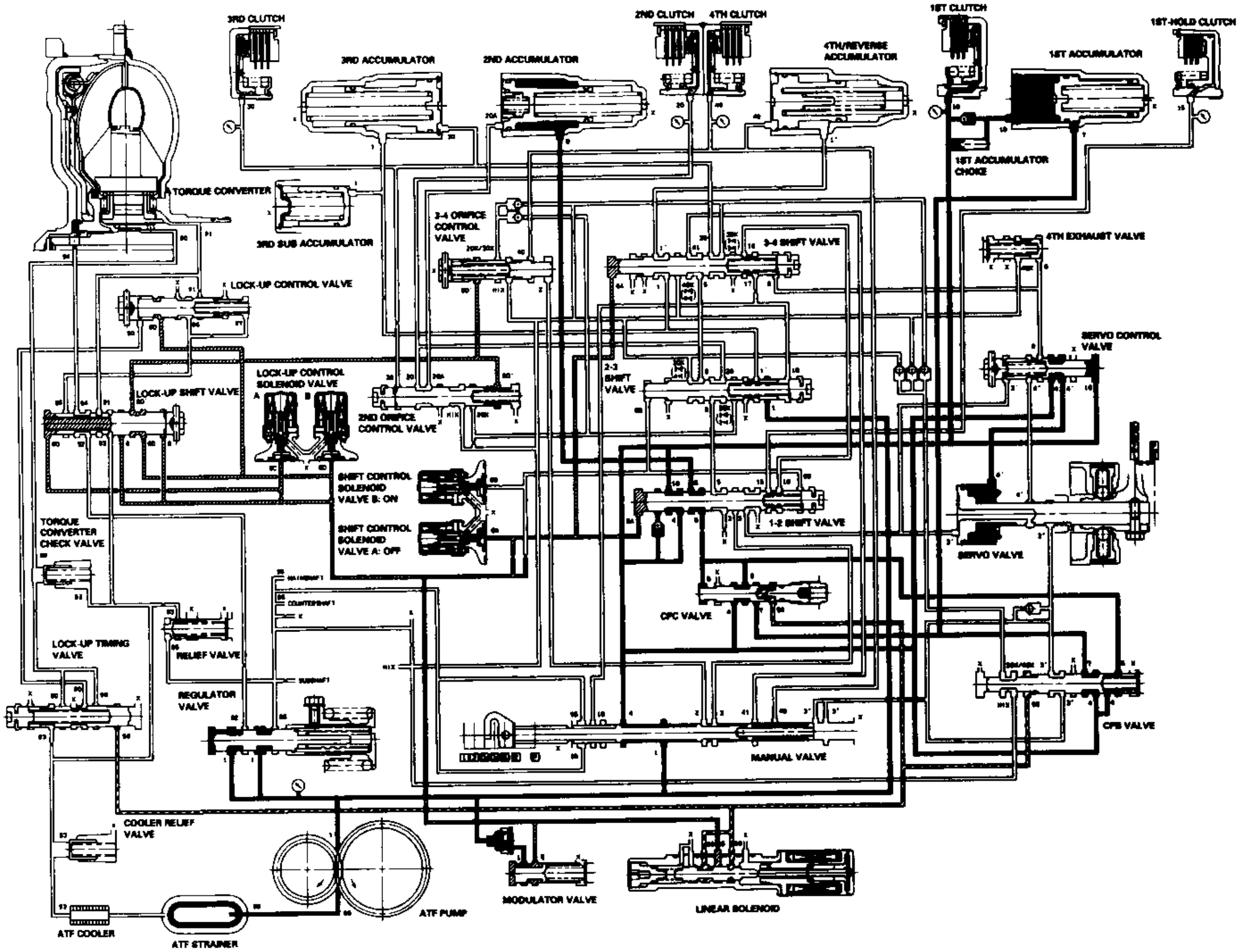
$\boxed{D_4}$ or $\boxed{D_3}$ Position ('97 – 98 Models), and $\boxed{D}$ Position ('99 – 00 Models)

1. 1st Gear

Fluid flow through the torque converter circuit is the same as in $\boxed{N}$ position. Line pressure flows to the manual valve and the modulator valve. Line pressure changes to modulator pressure (6) at the modulator valve and to line pressure (4) at the manual valve. Modulator pressure (6) flows to the left end of the 1-2 shift valve and the 3-4 shift valve because shift control solenoid valve A is turned OFF and B is turned ON by the PCM. The 1-2 shift valve is moved to the right side. Line pressure (4) changes to 1st clutch pressure (10) at the 1-2 shift valve and the orifice. The 1st clutch pressure (10) is applied to the 1st clutch and the 1st accumulator; the vehicle will move as the engine power is transmitted.

NOTE:

- When used, "left" or "right" indicates direction on the hydraulic circuit.
- The hydraulic circuit shows the '97 – 98 models (7 positions); the '99 – 00 models (6 positions) is similar.



(cont'd)

Hydraulic Flow (cont'd)

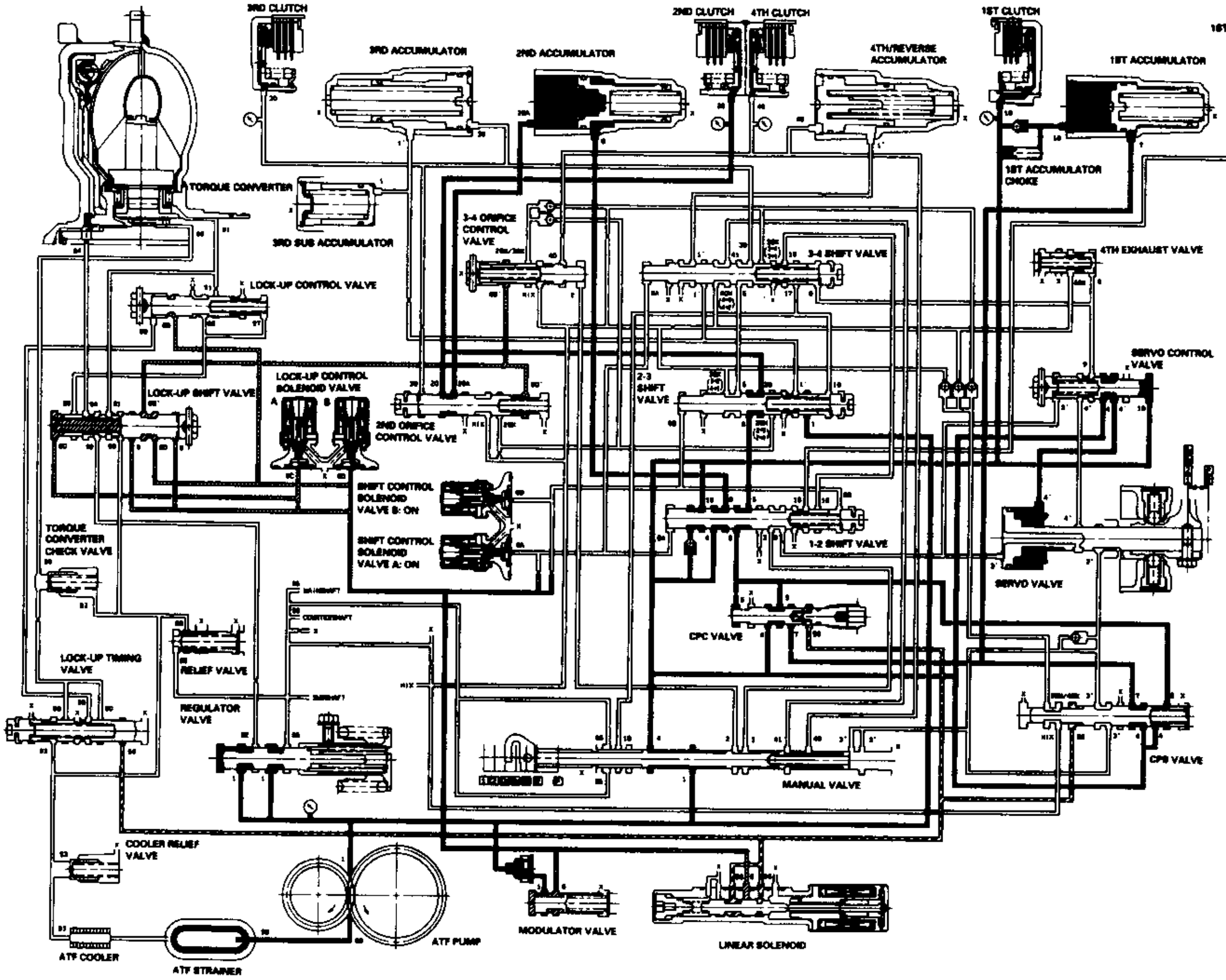
2. 2nd Gear

As the speed of the vehicle reaches the prescribed value, shift control solenoid valve A is turned ON by the PCM. Modulator pressure (6A) in the left end of the 1-2 shift valve is released by turning shift control solenoid valve A ON. The 1-2 shift valve is moved to the left side and uncovers the port to allow line pressure (5) to the 2-3 shift valve. Line pressure (5) changes to 2nd clutch pressure (20) at the 2-3 shift valve. The 2nd clutch pressure (20) is applied to the 2nd clutch, and the 2nd clutch is engaged.

Fluid flows by way of:
- Line Pressure (4) → CPB Valve – Line Pressure (5) → 1-2 Shift Valve – Line Pressure (5) → 2-3 Shift Valve
- 2nd Clutch Pressure (20) → 2nd Clutch

The hydraulic pressure also flows to the 1st clutch. However, no power is transmitted because of the one-way clutch.

NOTE:
- When used, "left" or "right" indicates direction on the hydraulic circuit.
- The hydraulic circuit shows the '97 – 98 models (7 positions); the '99 – 00 models (6 positions) is similar.



3. 3rd Gear

As the speed of the vehicle reaches the prescribed value, shift control solenoid valve B is turned OFF by the PCM. Shift control solenoid valve A remains ON. Modulator pressure (6) flows to the right end of the 1-2 shift valve and the left end of the 2-3 shift valve. The 2-3 shift valve is moved to the right side by modulator pressure (6B). The 2-3 shift valve covers the port to stop line pressure (5) to the 2nd clutch, and uncovers the 3-4 shift valve as the 2-3 shift valve is moved to the right side. Line pressure (5) becomes 3rd clutch pressure (30) at the 3-4 shift valve. The 3rd clutch pressure (30) is applied to the 3rd clutch, and the 3rd clutch is engaged.

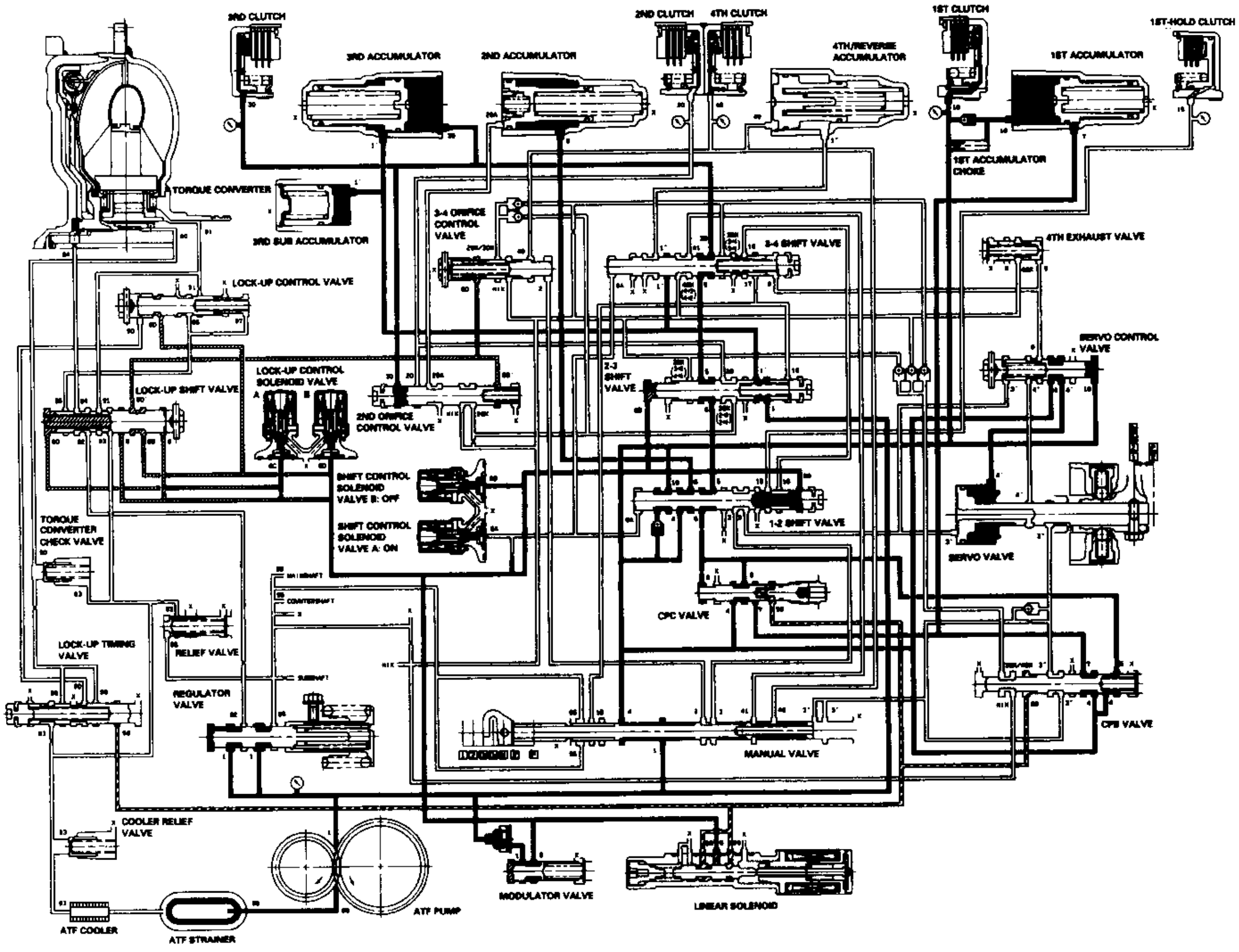
Fluid flows by way of:

- Line pressure (4) → CPB Valve – Line Pressure (5) → 1-2 Shift Valve – Line Pressure (5) → 2-3 Shift Valve
- Line Pressure (5) → 3-4 Shift Valve – 3rd Clutch Pressure (30) → 3rd Clutch

The hydraulic pressure also flows to the 1st clutch. However, no power is transmitted because of the one-way clutch.

NOTE:

- When used, "left" or "right" indicates direction on the hydraulic circuit.
- The hydraulic circuit shows the '97 – 98 models (7 positions); the '99 – 00 models (6 positions) is similar.



(cont'd)

Hydraulic Flow (cont'd)

4. **4th Gear (D_4 or D Position)**

As the speed of the vehicle reaches the prescribed value, shift control solenoid valve A is turned OFF by the PCM. Shift control solenoid valve B remains OFF. Modulator pressure (6) flows to the left end of the 1-2 shift valve and the left end of the 3-4 shift valve. Modulator pressure (6A) in the left end of the 1-2 shift valve equals modulator pressure (6B) in the right end of the 1-2 shift valve. The 1-2 shift valve remains at left side by the tension of the valve spring. The 3-4 shift valve is moved to the right side by modulator pressure (6A). The 3-4 shift valve covers the port to the 3rd clutch and uncovers the port to the 4th clutch as this valve is moved to the right side. The 4th clutch pressure (41) from the 3-4 shift valve becomes 4th clutch pressure (40) at the manual valve. The 4th clutch pressure (40) is applied to the 4th clutch, and the 4th clutch is engaged.

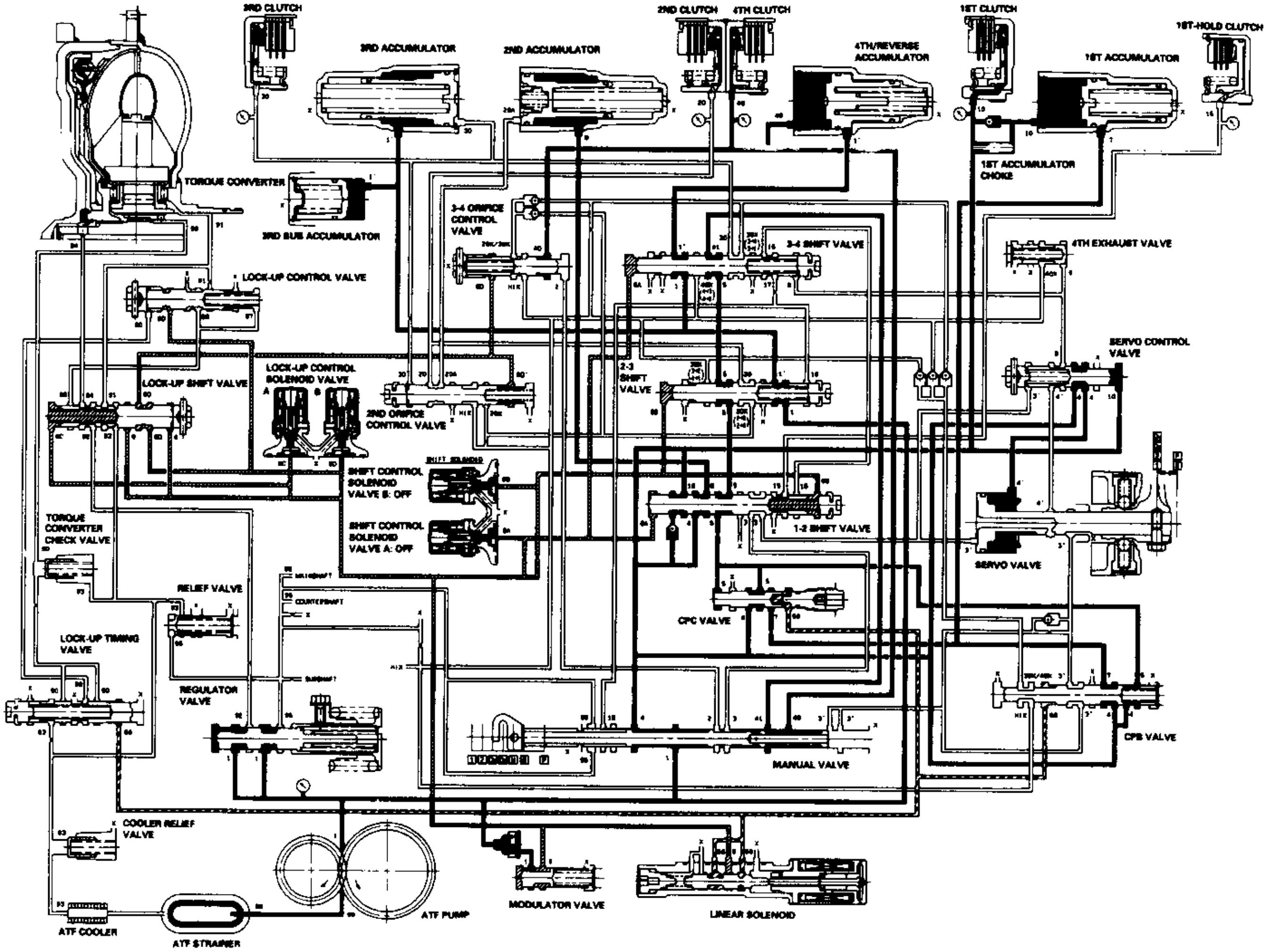
Fluid flows by way of:

- Line pressure (4) → CPB Valve – Line Pressure (5) → 1-2 Shift Valve – Line Pressure (5) → 2-3 Shift Valve
- Line Pressure (5) → 3-4 Shift Valve – 4th Clutch Pressure (41) → Manual Valve – 4th Clutch Pressure (40) → 4th Clutch

The hydraulic pressure also flows to the 1st clutch. However, no power is transmitted because of the one-way clutch.

NOTE:

- When used, "left" or "right" indicates direction on the hydraulic circuit.
- The hydraulic circuit shows the '97 – 98 models (7 positions); the '99 – 00 models (6 positions) is similar.



R Position

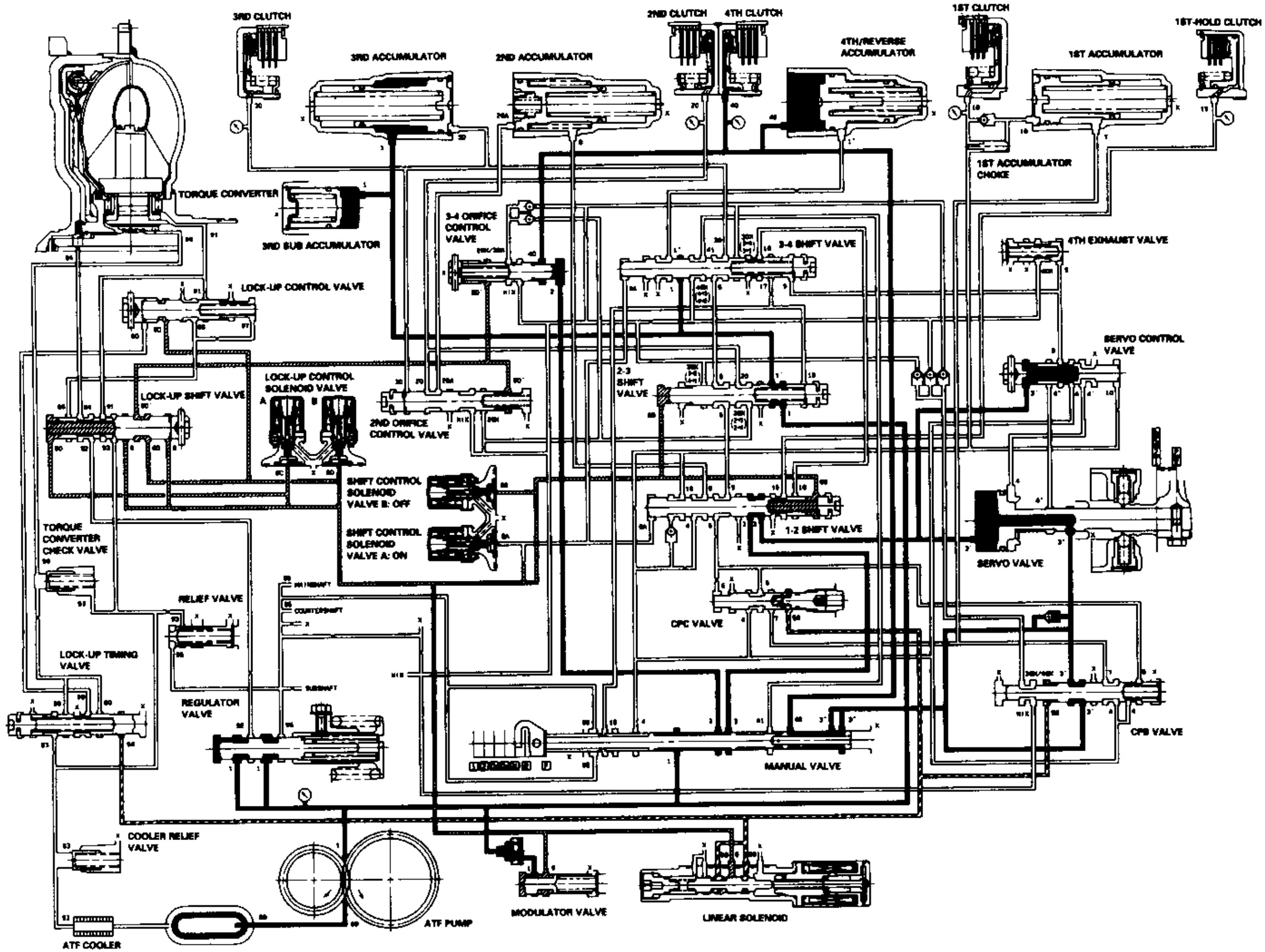
Fluid flow through the torque converter circuit is the same as in N position. Line pressure (1) changes to line pressure (3) and flows to the 1-2 shift valve. Line pressure (3) changes to line pressure (3') at the 1-2 shift valve and flows to the servo valve. The servo valve is moved to the right side (Reverse range position) and uncovers the port to allow line pressure (3") to the manual valve. Line pressure (3') from the 1-2 shift valve flows through the servo valve to the manual valve and changes to 4th clutch pressure (40). The 4th clutch pressure (40) is applied to the 4th clutch, and the 4th clutch is engaged.

Reverse Inhibitor Control

When the R position is selected while the vehicle is moving forward at speeds over 6 mph (10 km/h), the PCM outputs the 1st speed signal to shift control solenoid valves A and B; shift control solenoid valve A is turned OFF, shift control solenoid valve B is turned ON. The 1-2 shift valve is moved to the right side and covers the port to stop line pressure (3') to the servo valve. Line pressure (3') is not applied to the servo valve, and 4th clutch pressure (40) is not applied to the 4th clutch, as a result, power is not transmitted to the reverse direction.

NOTE:

- When used, "left" or "right" indicates direction on the hydraulic circuit.
- The hydraulic circuit shows the '97 – 98 models (7 positions); the '99 – 00 models (6 positions) is similar.



(cont'd)

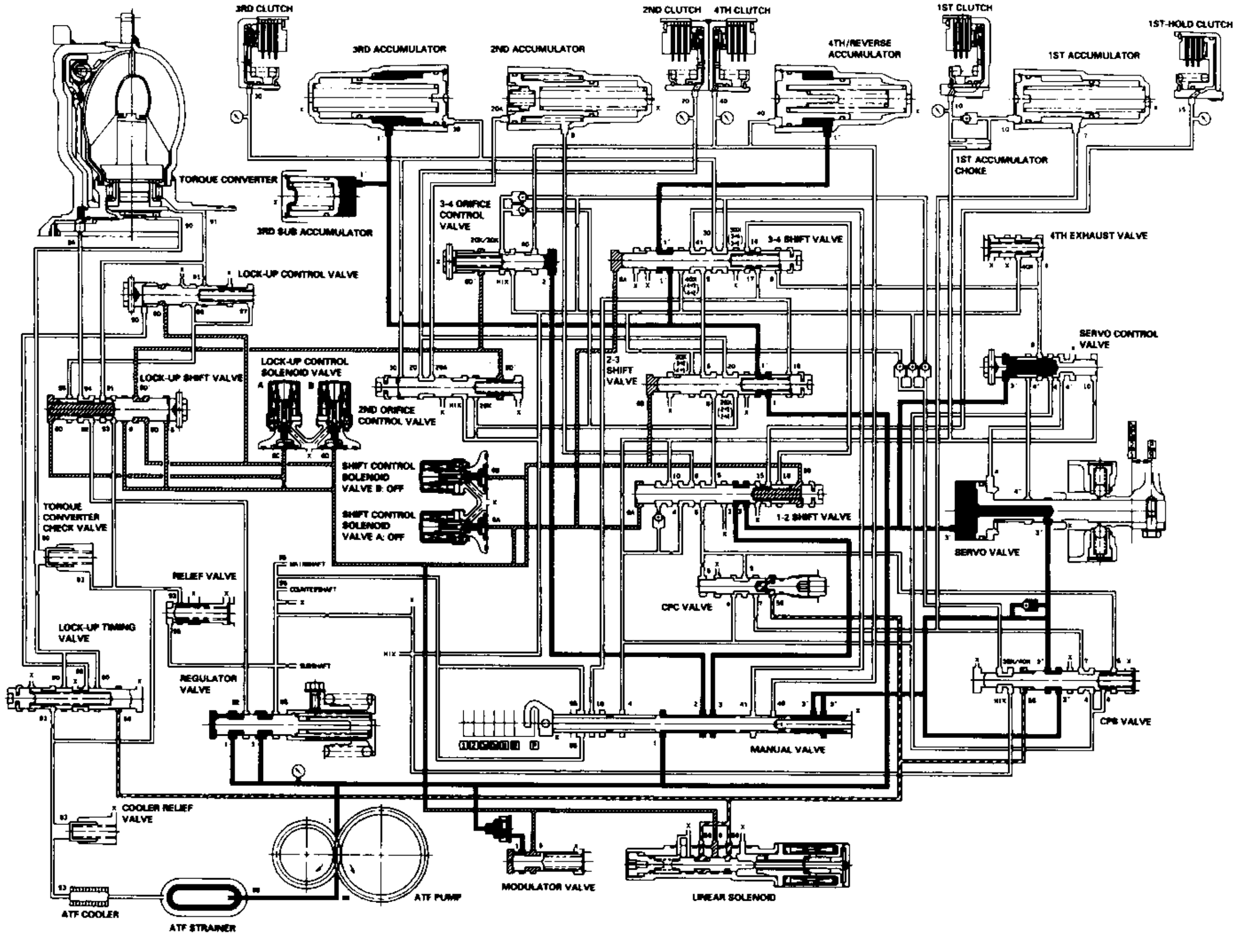
Hydraulic Flow (cont'd)

P Position

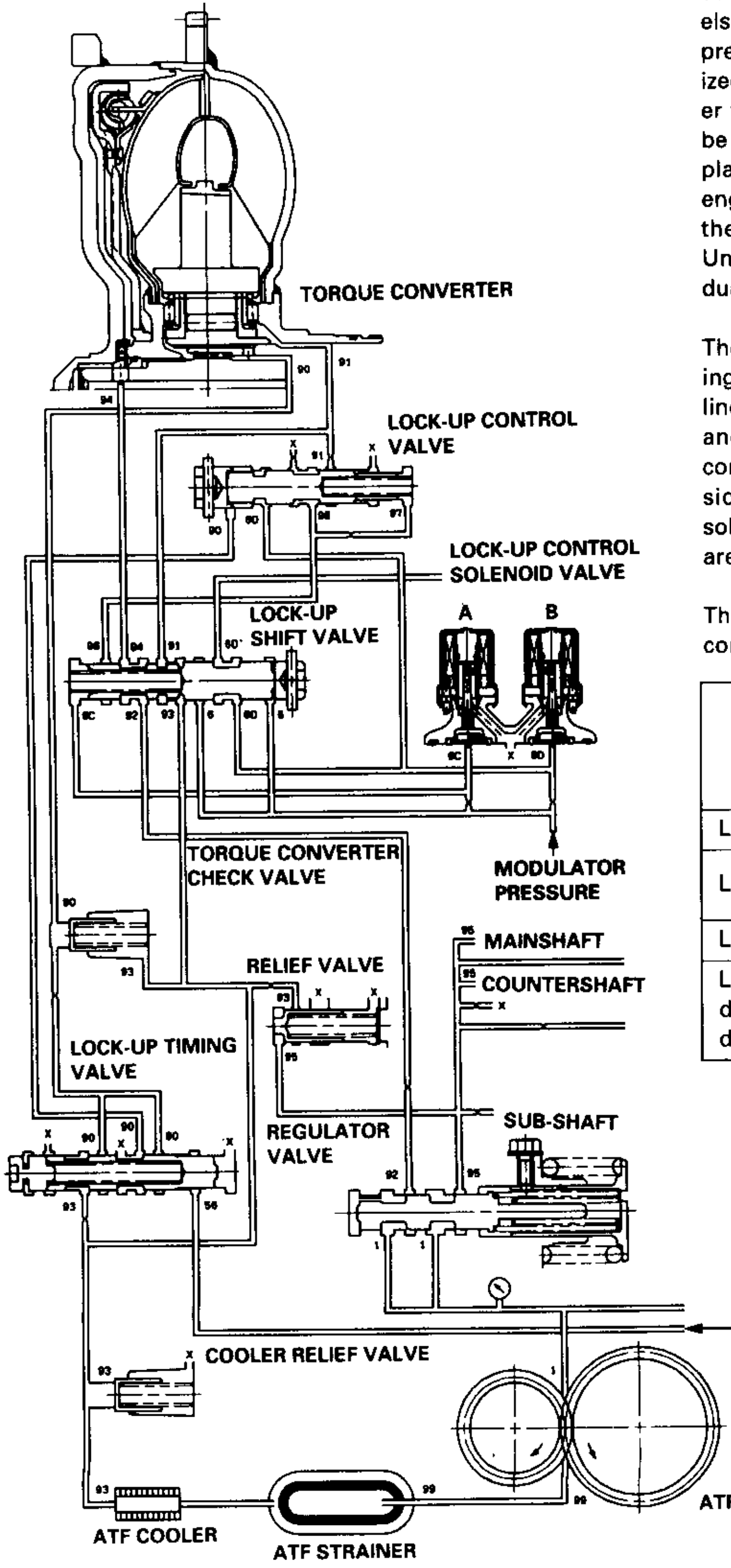
Fluid flow through the torque converter circuit is the same as in N position. Line pressure (1) changes to line pressure (3) and flows to the 1-2 shift valve. Line pressure (3) changes to line pressure (3') at the 1-2 shift valve and flows to the servo valve. The servo valve is moved to the right side (Reverse range position) and uncovers the port to allow line pressure (3") to the manual valve as in R position. Line pressure (3") from the servo valve is intercepted by the manual valve. Hydraulic pressure is not supplied to the clutches, and power is not transmitted.

NOTE:

- When used, "left" or "right" indicates direction on the hydraulic circuit.
- The hydraulic circuit shows the '97 – 98 models (7 positions); the '99 – 00 models (6 positions) is similar.



Lock-up System



In $\boxed{D_4}$ position ('97 – 98 models) and in $\boxed{D}$ position ('99 – 00 models) (3rd and 4th), and $\boxed{D_3}$ position ('97 – 98 models) and in $\boxed{D}$ position with Over-Drive (O/D) is OFF (by pressing the O/D switch) ('99 – 00 models) (3rd), pressurized fluid is drained from the back of the torque converter through a fluid passage, causing the lock-up piston to be held against the torque converter cover. As this takes place, the mainshaft rotates at the same speed as the engine crankshaft. Together with the hydraulic control, the PCM optimizes the timing of the lock-up system. Under certain conditions, the lock-up clutch is applied during deceleration, in 3rd and 4th gear.

The lock-up system controls the range of lock-up according to lock-up control solenoid valves A and B, and the linear solenoid. When lock-up control solenoid valves A and B activate, modulator pressure changes. Lock-up control solenoid valves A and B are mounted on the outside of the torque converter housing, and the linear solenoid is mounted on the transmission housing. They are controlled by the PCM.

The table below shows the lock-up conditions for lock-up control solenoid valves and linear solenoid pressure.

Lock-up Conditions	**Lock-up Control Solenoid Valve**		**Linear Solenoid Pressure**
	A	**B**	
Lock-up OFF	OFF	OFF	High
Lock-up, Half	ON	Duty operation OFF ↔ ON	Low
Lock-up, Full	ON	ON	High
Lock-up during deceleration	ON	Duty operation OFF ↔ ON	Low

(cont'd)

Description

Lock-up System (cont'd)

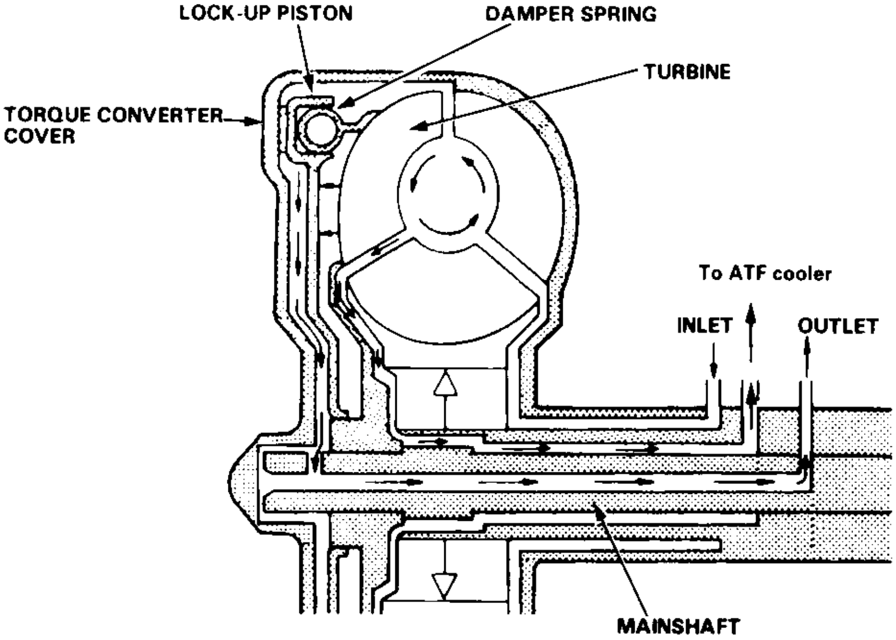
Lock-up Clutch

1. Operation (clutch on)
   With the lock-up clutch on, the fluid in the chamber between the torque converter cover and the lock-up piston is drained off, and the converter fluid exerts pressure through the piston against the torque converter cover. As a result, the converter turbine is locked to the converter cover. This bypasses the converter, placing the vehicle in direct drive.

Power flow

The power flows by way of:

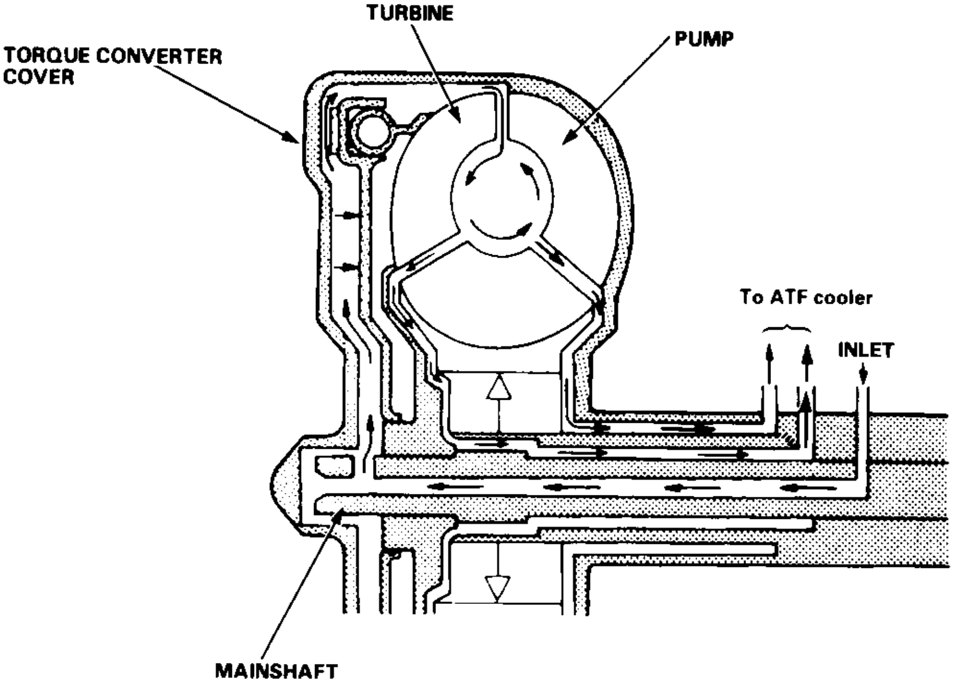
Engine
↓
Drive plate
↓
Torque converter cover
↓
Lock-up piston
↓
Damper spring
↓
Turbine
↓
Mainshaft

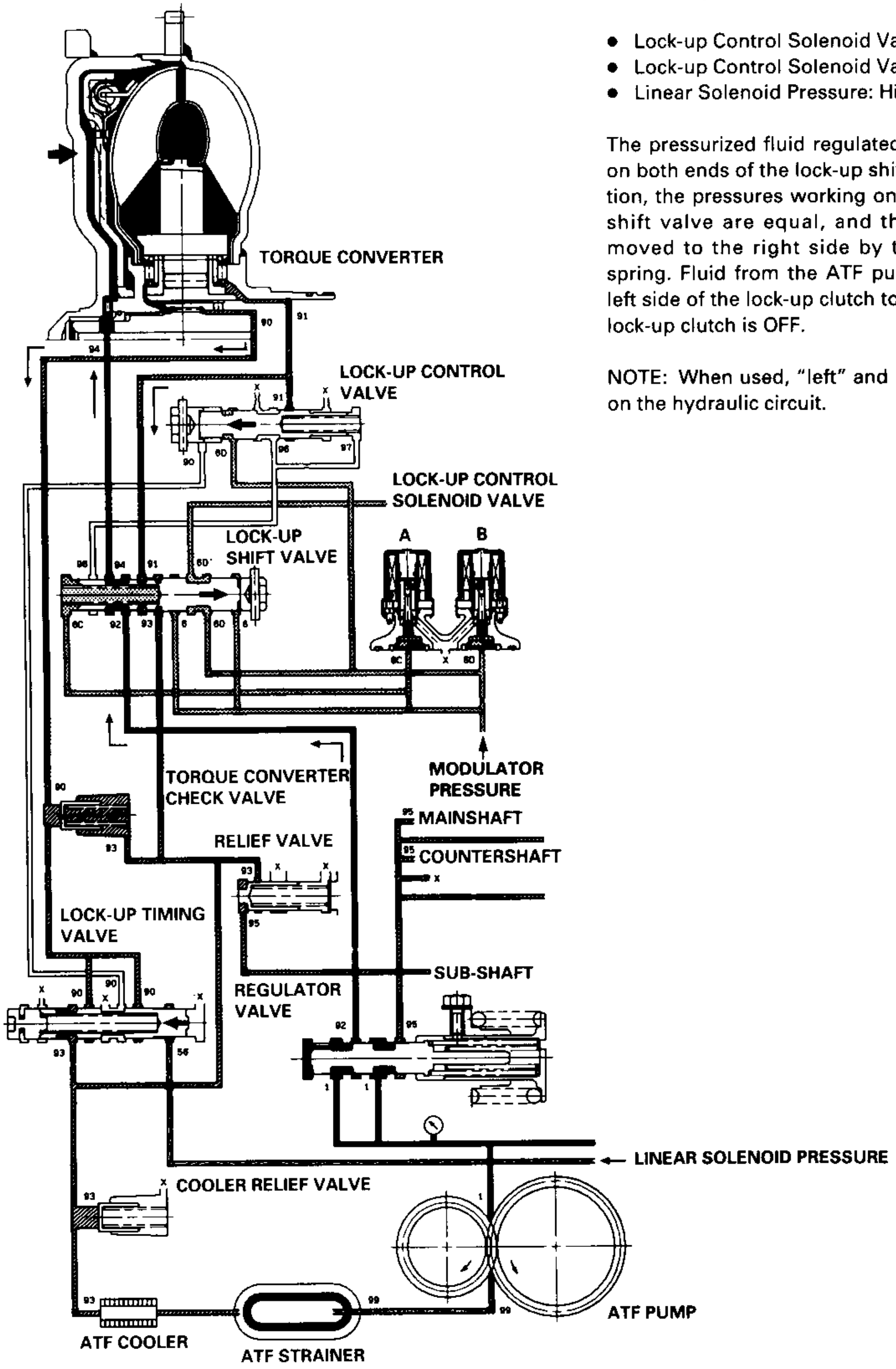


2. Operation (clutch off)
   With the lock-up clutch off, the fluid flows in the reverse of "clutch on." As a result, the lock-up piston moves away from the converter cover, and the torque converter lock-up is released.

Power flow

Engine
↓
Drive plate
↓
Torque converter cover
↓
Pump
↓
Turbine
↓
Mainshaft





No Lock-up

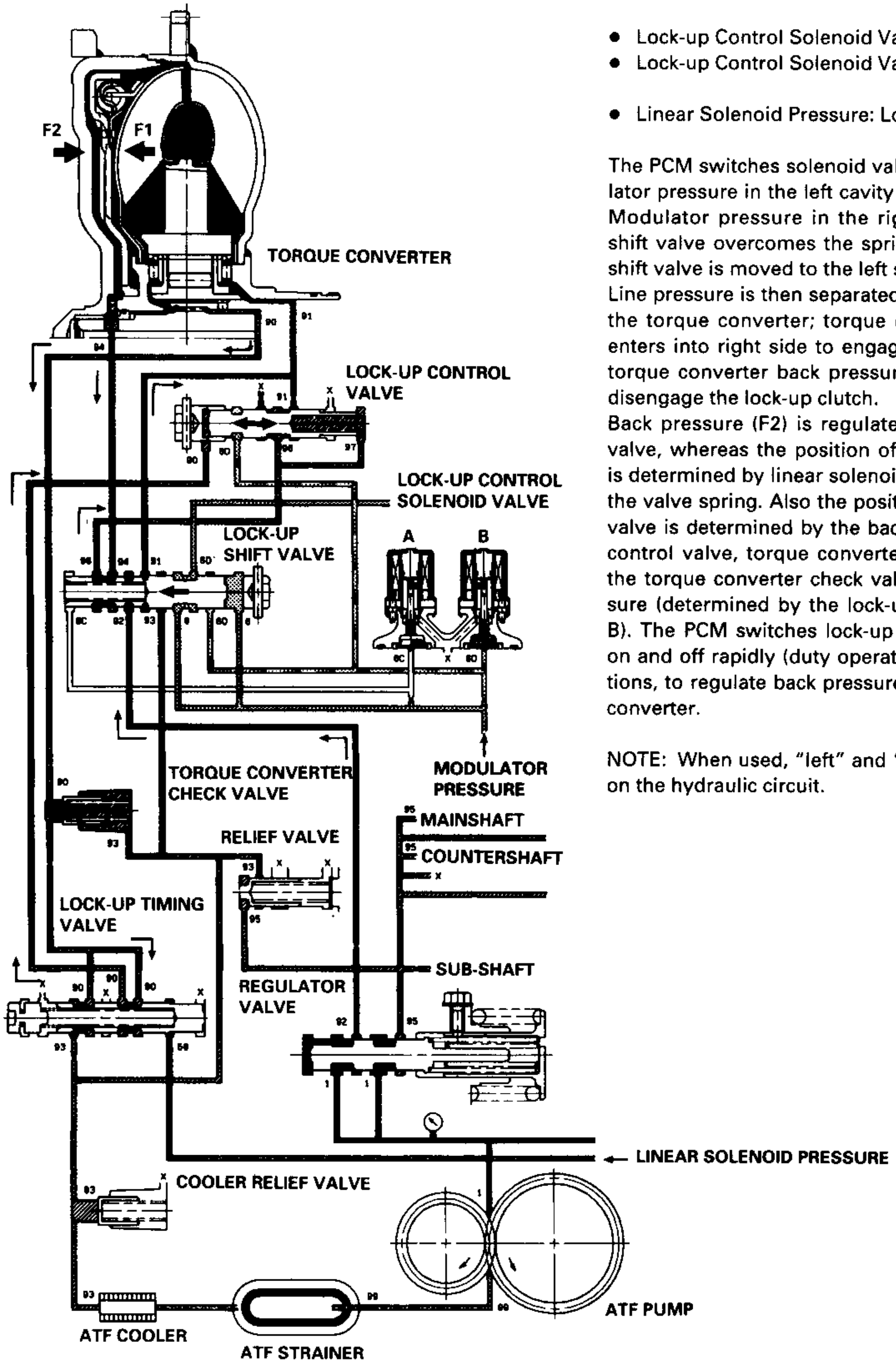
- Lock-up Control Solenoid Valve A: OFF
- Lock-up Control Solenoid Valve B: OFF
- Linear Solenoid Pressure: High

The pressurized fluid regulated by the modulator works on both ends of the lock-up shift valve. Under this condition, the pressures working on both ends of the lock-up shift valve are equal, and the lock-up shift valve is moved to the right side by the tension of the valve spring. Fluid from the ATF pump will flow through the left side of the lock-up clutch to the torque converter; the lock-up clutch is OFF.

NOTE: When used, "left" and "right" indicates direction on the hydraulic circuit.

(cont'd)

Lock-up System (cont'd)



Half Lock-up

- Lock-up Control Solenoid Valve A: ON
- Lock-up Control Solenoid Valve B: Duty Operation
  OFF ↔ ON
- Linear Solenoid Pressure: Low

The PCM switches solenoid valve A on to release modulator pressure in the left cavity of the lock-up shift valve. Modulator pressure in the right cavity of the lock-up shift valve overcomes the spring force, and the lock-up shift valve is moved to the left side.

Line pressure is then separated into the two passages to the torque converter; torque converter inner pressure enters into right side to engage the lock-up clutch, and torque converter back pressure enters into left side to disengage the lock-up clutch.

Back pressure (F2) is regulated by the lock-up control valve, whereas the position of the lock-up timing valve is determined by linear solenoid pressure and tension of the valve spring. Also the position of the lock-up control valve is determined by the back pressure of the lock-up control valve, torque converter pressure (regulated by the torque converter check valve), and modulator pressure (determined by the lock-up control solenoid valve B). The PCM switches lock-up control solenoid valve B on and off rapidly (duty operation), under certain conditions, to regulate back pressure (F2) and lock the torque converter.

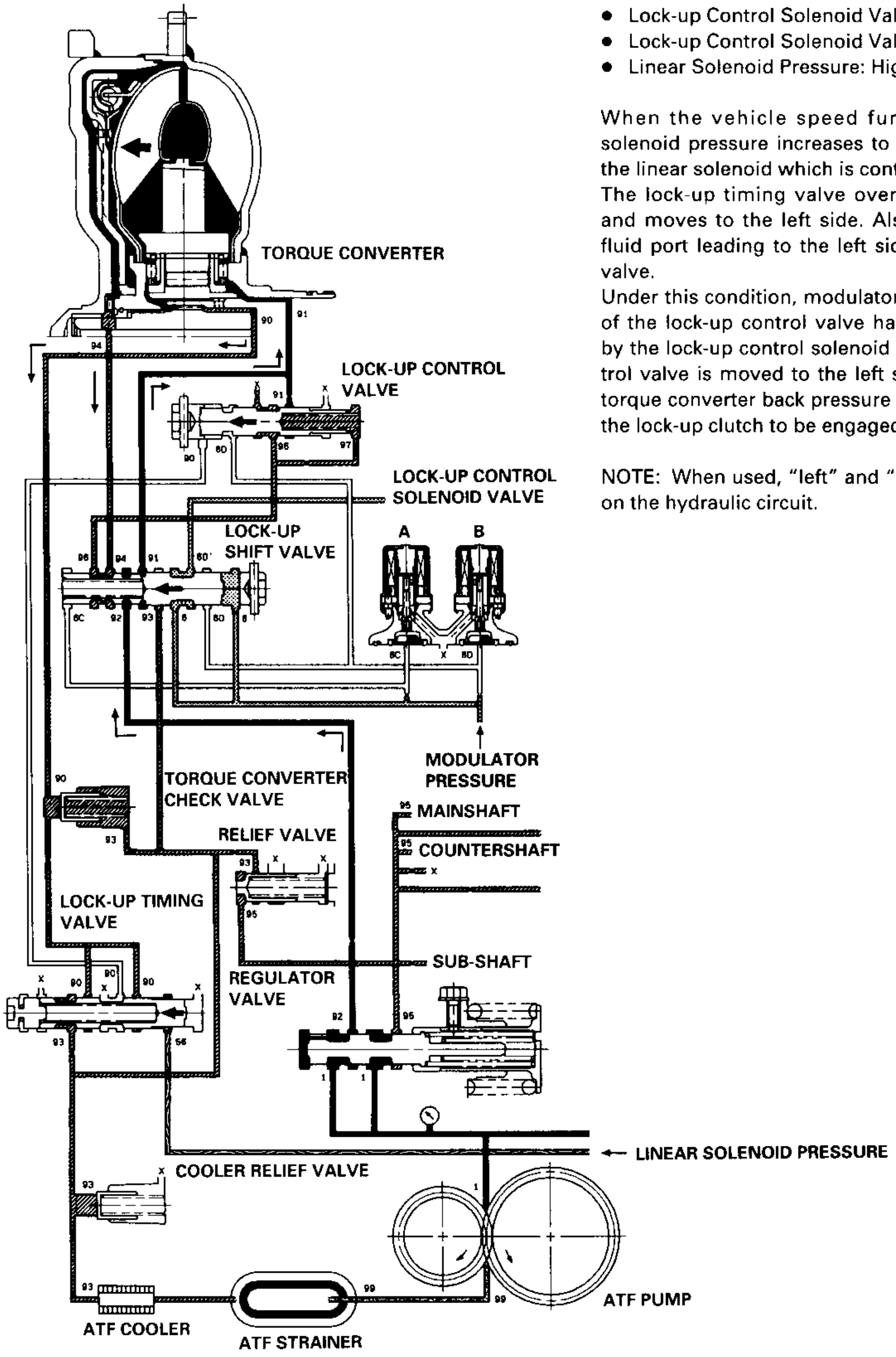
NOTE: When used, "left" and "right" indicates direction on the hydraulic circuit.

Full Lock-up

- Lock-up Control Solenoid Valve A: ON
- Lock-up Control Solenoid Valve B: ON
- Linear Solenoid Pressure: High

When the vehicle speed further increases, linear solenoid pressure increases to high in accordance with the linear solenoid which is controlled by the PCM.
The lock-up timing valve overcomes the spring force and moves to the left side. Also, this valve closes the fluid port leading to the left side of the lock-up control valve.
Under this condition, modulator pressure in the left side of the lock-up control valve had already been released by the lock-up control solenoid valve B; the lock-up control valve is moved to the left side. As this takes place, torque converter back pressure is released fully, causing the lock-up clutch to be engaged fully.

NOTE: When used, "left" and "right" indicates direction on the hydraulic circuit.



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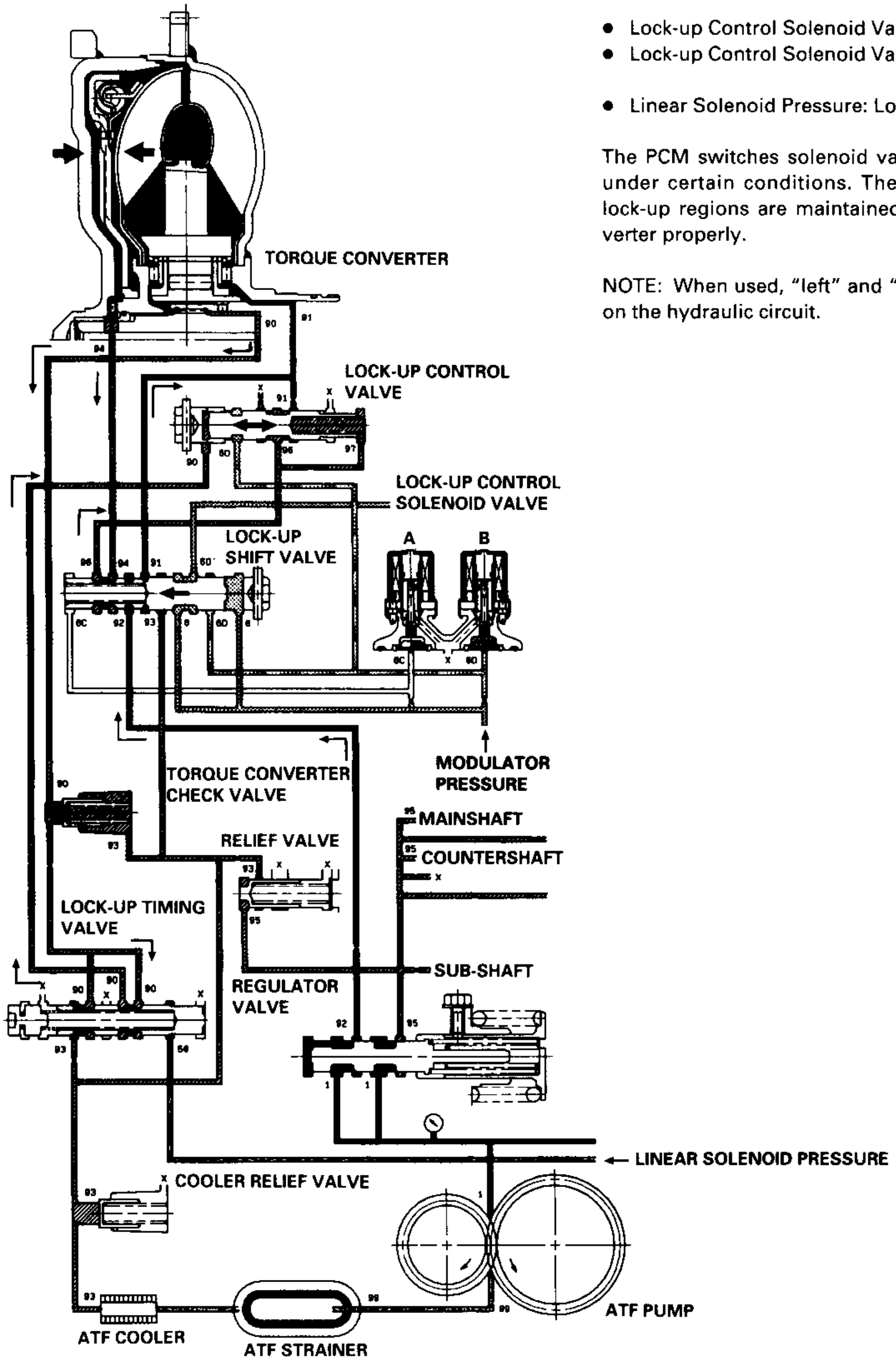
Lock-up System (cont'd)



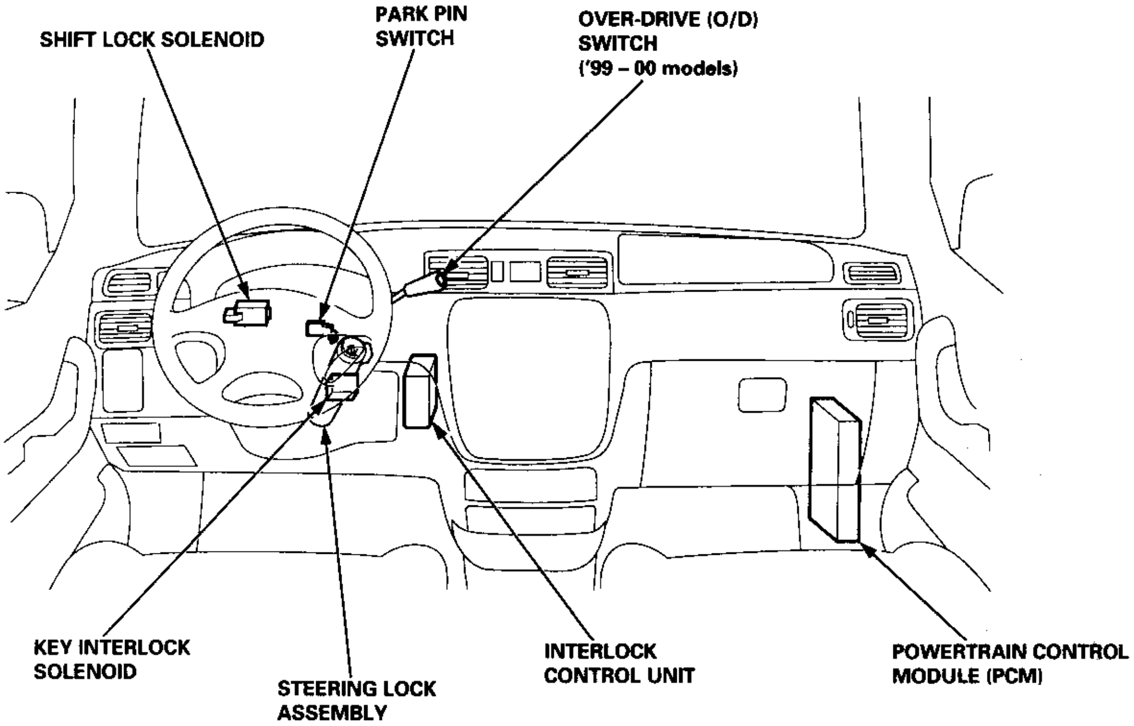
Deceleration Lock-up

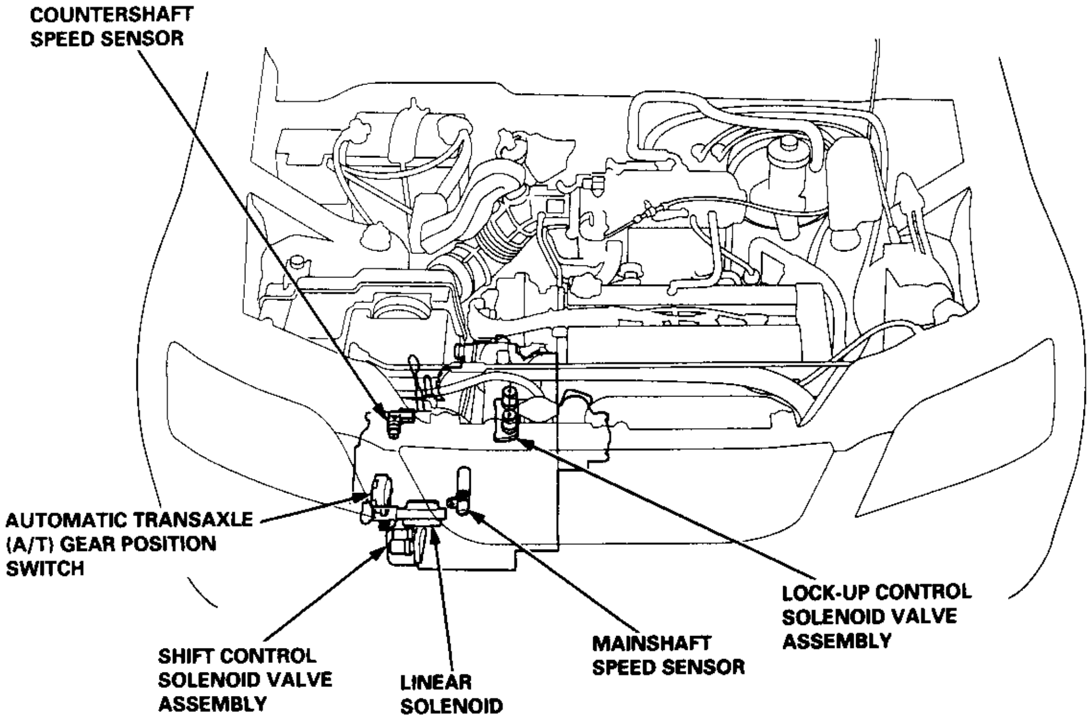
- Lock-up Control Solenoid Valve A: ON
- Lock-up Control Solenoid Valve B: Duty Operation
  OFF ↔ ON
- Linear Solenoid Pressure: Low

The PCM switches solenoid valve B on and off rapidly under certain conditions. The slight lock-up and half lock-up regions are maintained to lock the torque converter properly.

NOTE: When used, "left" and "right" indicates direction on the hydraulic circuit.

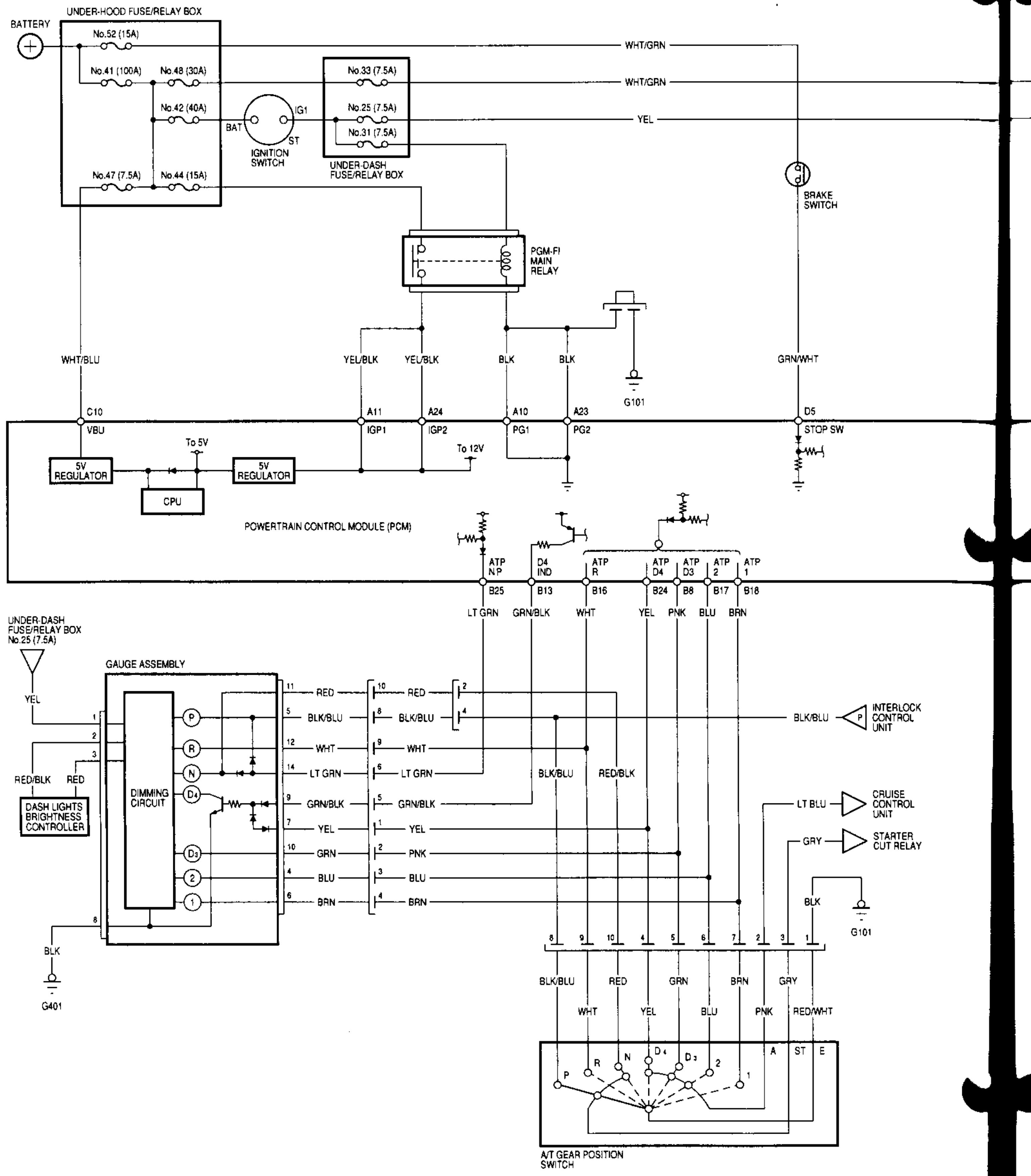
Component Locations

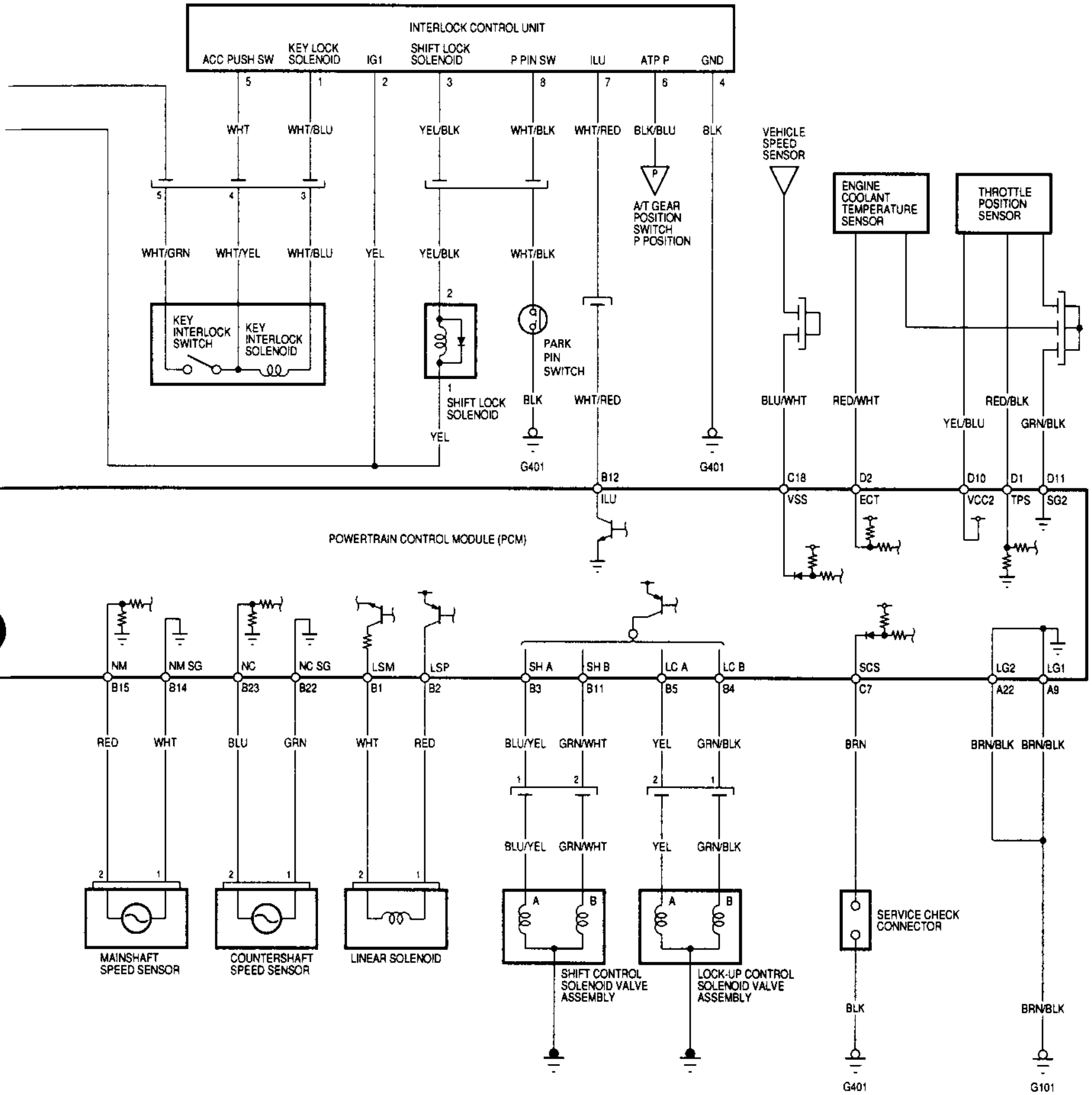




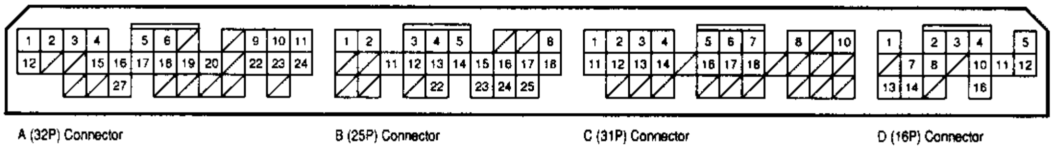
PCM Circuit Diagram (A/T Control System)

'97 Model





PCM Terminal Locations

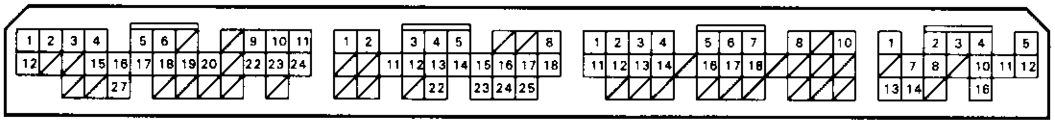


PCM Terminal Voltage/Measuring Conditions

A/T Control System — '97 Model

The PCM terminal voltage and measuring conditions are shown for the connector terminals that are related to the A/T control system. The other PCM terminal voltage and measuring conditions are described in section 11.

PCM Terminal Locations



PCM CONNECTOR A (32P)

Terminal Number	Signal	Description	Measuring Conditions/Terminal Voltage
A9	LG1	Ground (G101)	
A10	PG1	Ground (G101)	
A11	IGP1	Power supply system (under-hood Fuse 44 via main relay)	With ignition switch ON (II): Battery voltage With ignition switch OFF: 0 V
A22	LG2	Ground	
A23	PG2	Ground	
A24	IGP2	Power supply system (under-hood Fuse 44 via main relay)	With ignition switch ON (II): Battery voltage With ignition switch OFF: 0 V

PCM CONNECTOR B (25P)

Terminal Number	Signal	Description	Measuring Conditions/Terminal Voltage
B1	LSM	Linear solenoid power supply negative electrode	Ignition switch ON (II): Pulsing signal
B2	LSP	Linear solenoid power supply positive electrode	Ignition switch ON (II): Pulsing signal
B3	SHA	Shift control solenoid valve A control	In 2, R position, in 2nd and 3rd gear in D4, D3 position: Battery voltage In 1st gear in D4, D3 position, in 4th gear in D4 position: 0 V
B4	LCB	Lock-up control solenoid valve B control	With full lock-up: Battery voltage With half lock-up: Pulsing signal With no lock-up: 0 V
B5	LCA	Lock-up control solenoid valve A control	When lock-up is ON: Battery voltage With no lock-up: 0 V
B6 to B7	—	Not used	
B8	ATP D3	A/T gear position switch D3 position signal input	In D3 position: 0 V In other than D3 position: Battery voltage
B9 to B10	—	Not used	

PCM CONNECTOR B (25P) (cont'd)

Terminal Number	Signal	Description	Measuring Conditions/Terminal Voltage
B11	SHB	Shift control solenoid valve B control	In 1, 2 position, in 1st and 2nd gear in D4, D3 position: Battery voltage In R position, in 3rd gear in D4, D3,in 4th gear in D4 position: 0 V
B12	ILU	Interlock control	When ignition switch is ON (II), brake pedal depressed and accelerator pedal released: 0 V
B13	D4 IND	D4 Indicator light control	When ignition switch is first turned ON (II): 6 V or more for two seconds In D4 position: 6V or more
B14	NMSG	Mainshaft speed sensor ground	
B15	NM	Mainshaft speed sensor signal input	Depending on engine speed: Pulsing signal When engine is stopped: 0 V
B16	ATP R	A/T gear position switch R position signal input	In R position: 0 V In other than R position: Battery voltage
B17	ATP 2	A/T gear position switch 2 position signal input	In 2 position: 0 V In other than 2 position: Battery voltage
B18	ATP 1	A/T gear position switch 1 position signal input	In 1 position: 0 V In other than 1 position: Battery voltage
B19 to B21	—	Not used	
B22	NCSG	Countershaft speed sensor ground	
B23	NC	Countershaft speed sensor signal input	Depending on vehicle speed: Pulsing signal When vehicle is stopped: 0 V
B24	ATP D4	A/T gear position switch D4 position signal input	In D4 position: 0 V In other than D4 position: Battery voltage
B25	ATP NP	A/T gear position switch P and N position signals input	In P and N positions: 0 V In other than P and N positions: 5 V

PCM CONNECTOR C (31P)

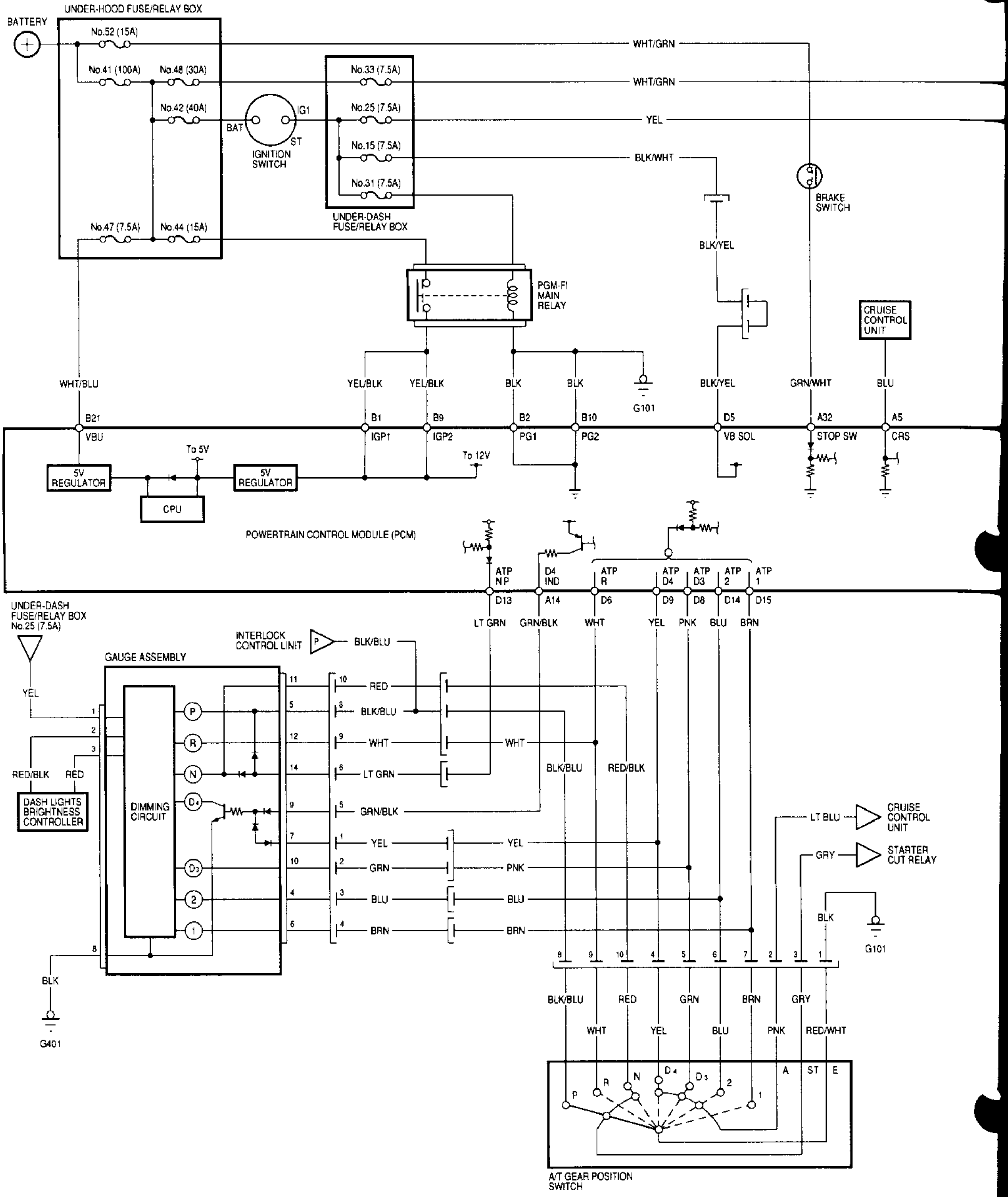
Terminal Number	Signal	Description	Measuring Conditions/Terminal Voltage
C7	SCS	Service check signal	With ignition switch ON (II) and service check connector open: 5 V With ignition switch ON (II) and service check connector connected with special tool: 0 V
C10	VBU	Back-up power system (under-hood Fuse 47)	Always battery voltage

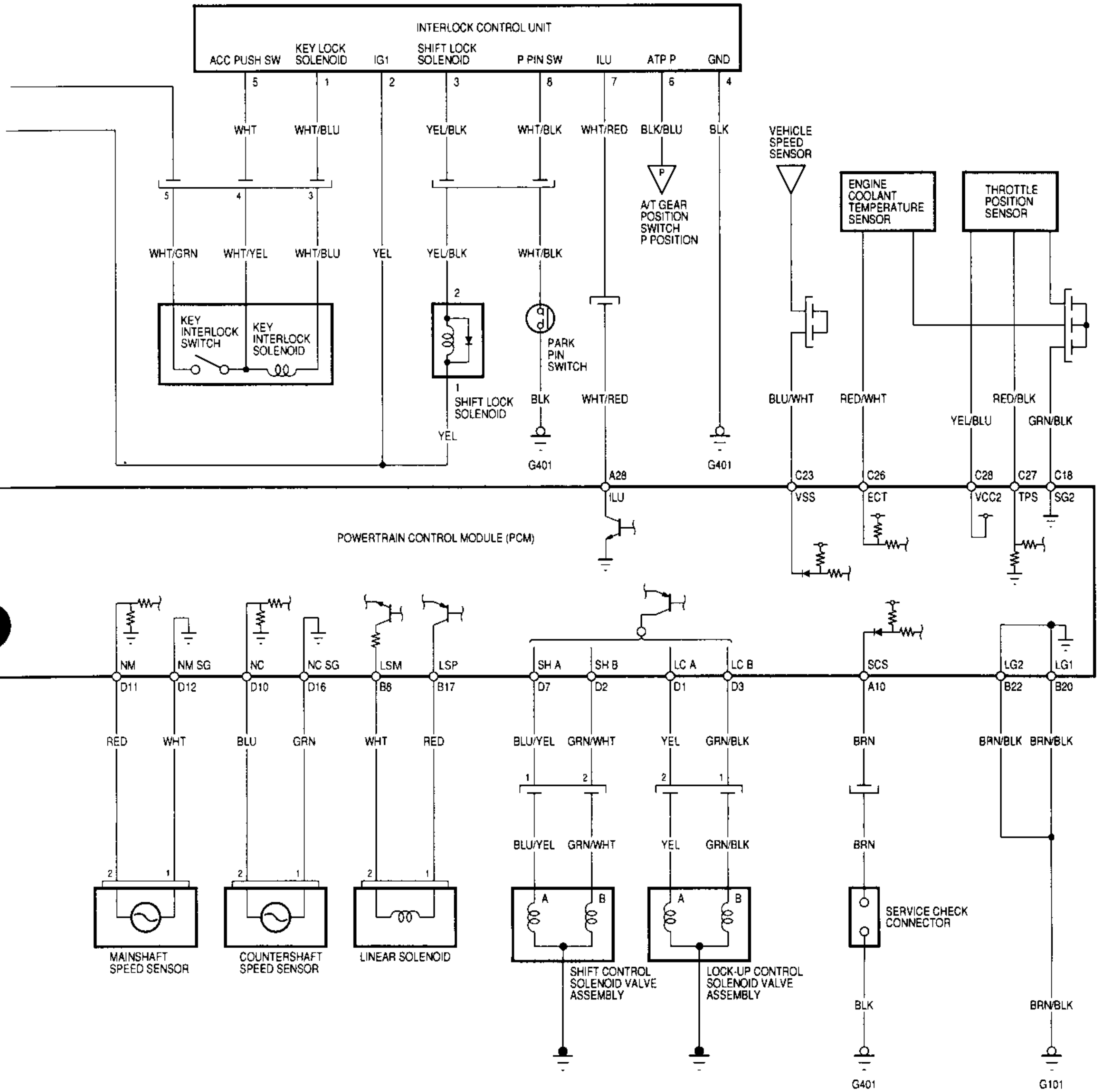
PCM CONNECTOR D (16P)

Terminal Number	Signal	Description	Measuring Conditions/Terminal Voltage
D5	STOP SW	Brake switch signal input	Brake pedal pressed: Battery voltage Brake pedal released: 0 V

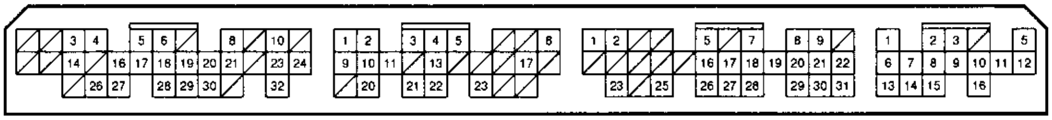
PCM Circuit Diagram (A/T Control System)

'98 Model





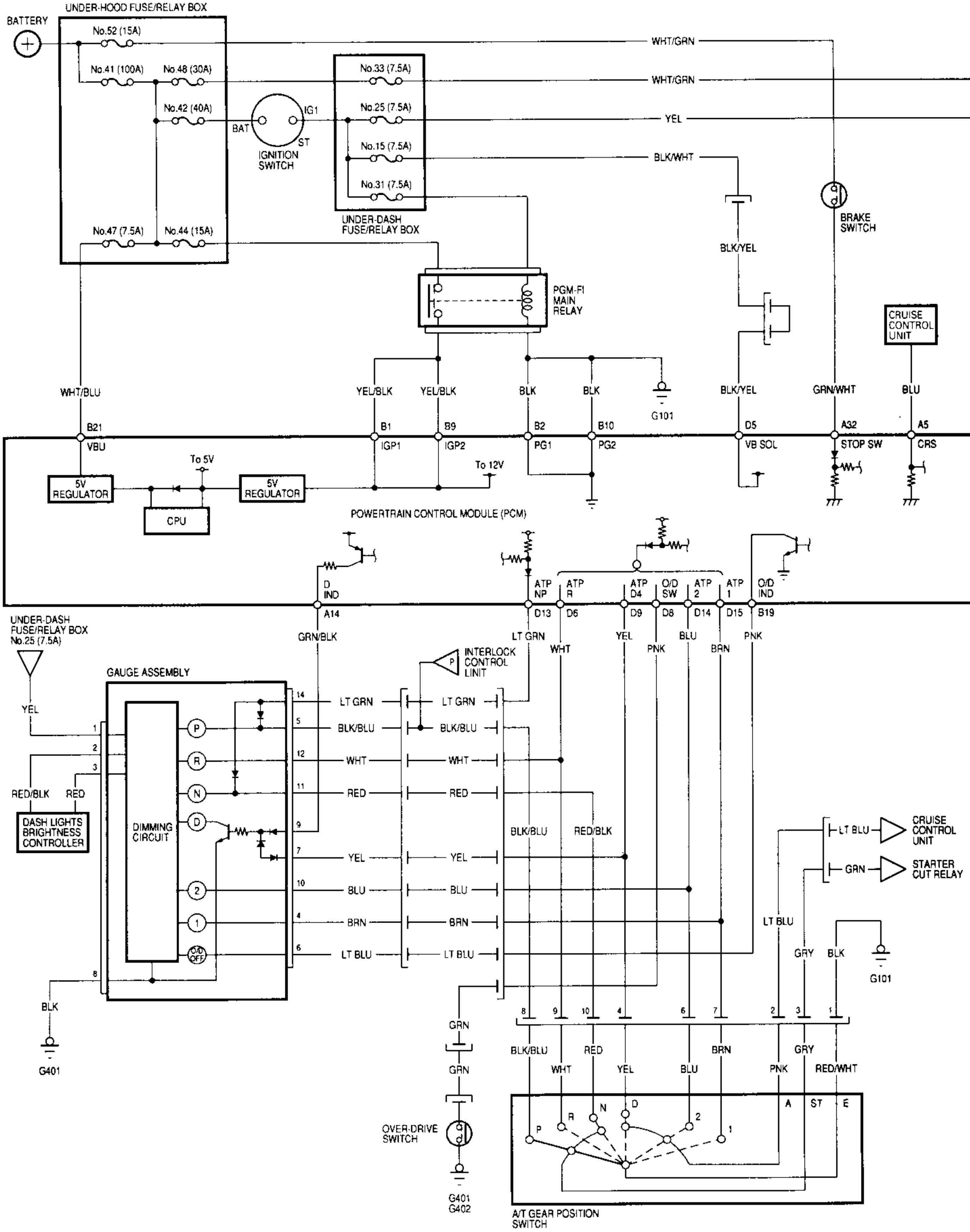
PCM Terminal Locations

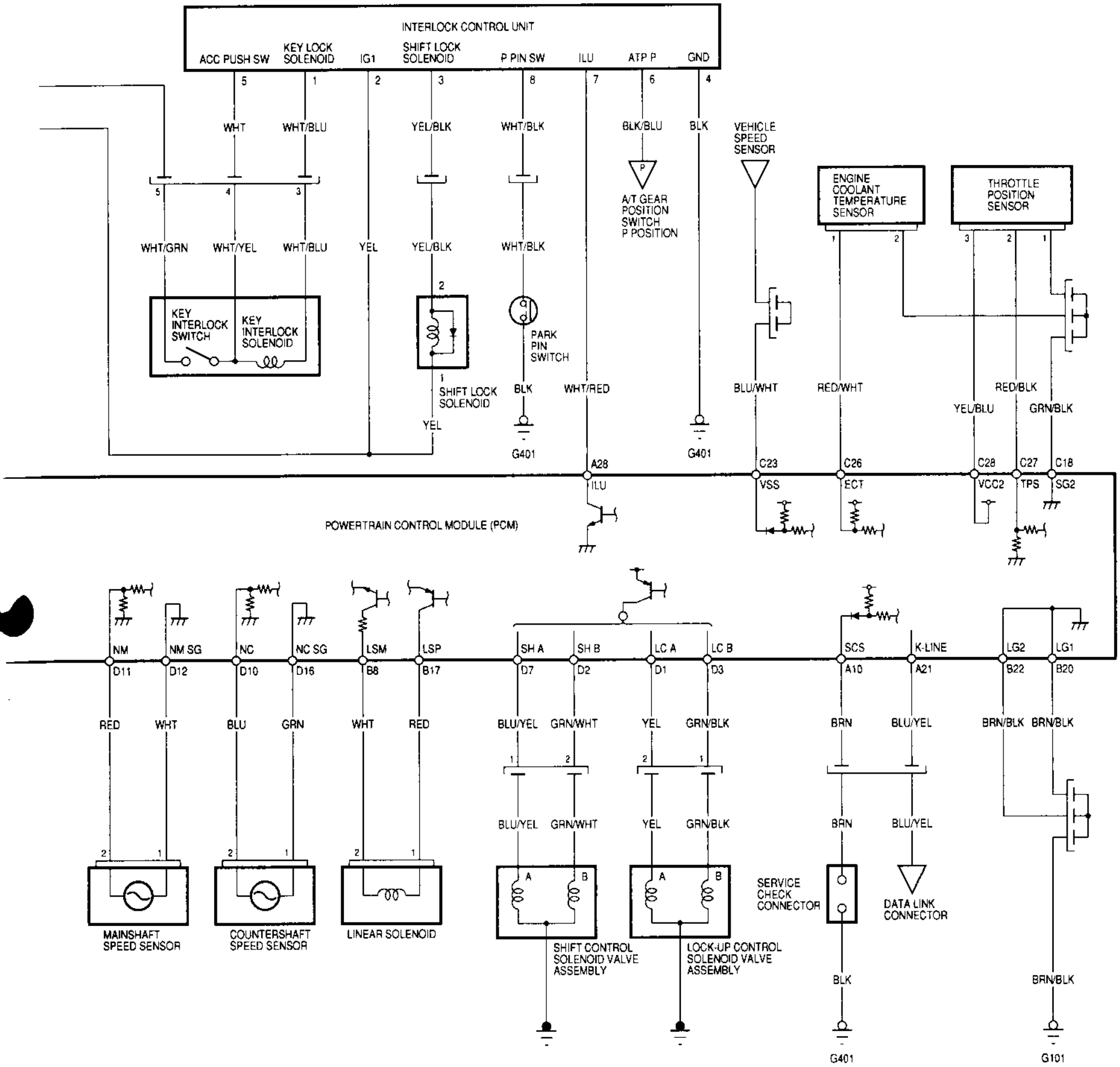


A (32P) Connector B (25P) Connector C (31P) Connector D (16P) Connector

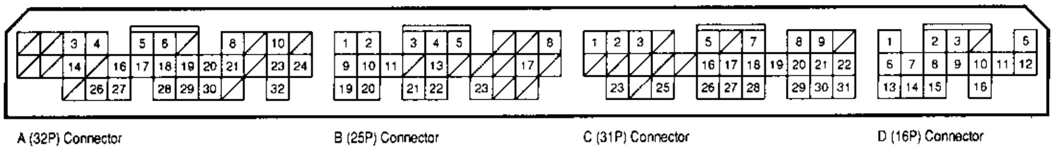
PCM Circuit Diagram (A/T Control System)

'99 – 00 Models





PCM Connector Terminal Locations

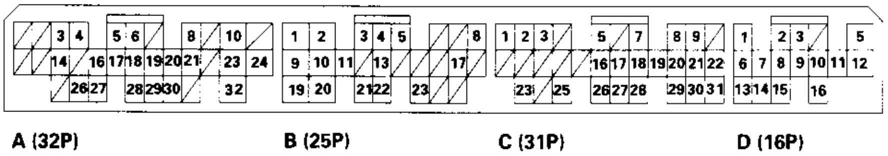


PCM Terminal Voltage/Measuring Conditions

A/T Control System — '98 – 00 Models

The PCM terminal voltage and measuring conditions are shown for the connector terminals that are related to the A/T control system. The other PCM terminal voltage and measuring conditions are described in section 11.

PCM Connector Terminal Locations



NOTE: B19 and C3 terminals are applied to '99 – 00 models.

PCM CONNECTOR A (32P)

Terminal Number	Signal	Description	Measuring Conditions/Terminal Voltage
A5	CRS	Downshift signal input from cruise control unit	When cruise control is used: Pulsing signal
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 ('98 model)	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 $\boxed{D_4}$ position: Battery voltage
A14 ('99 – 00 models)	D IND	D indicator light control (Voltage from PCM turns D light ON)	When ignition switch is first turned ON (II): Battery voltage for two seconds In $\boxed{D}$ position: Battery voltage
A28	ILU	Interlock control (Voltage from PCM)	When ignition switch ON (II), brake pedal depressed, and accelerator pedal released: Battery voltage
A32	STOP SW	Brake switch signal input	Brake pedal pressed: Battery voltage Brake pedal released: 0 V

PCM CONNECTOR B (25P)

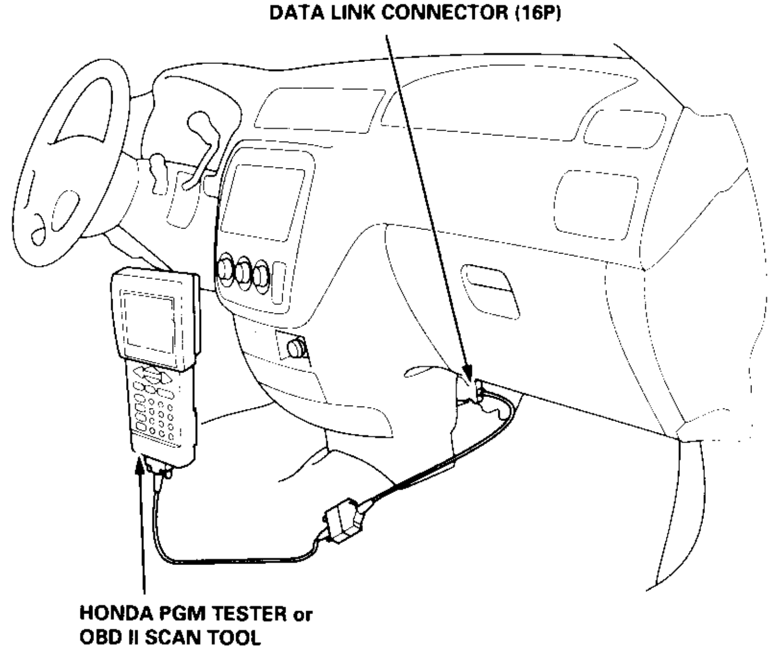
Terminal Number	Signal	Description	Measuring Conditions/Terminal Voltage
B1	IGP1	Power supply circuit from main relay via under-hood Fuse 44	With ignition switch ON (II): Battery voltage With ignition switch OFF: 0 V
B2	PG1	Ground (G101)	
B8	LSM	Linear solenoid power supply negative electrode	
B9	IGP2	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
B19 ('99 – 00 models)	O/D IND	Over-Drive (O/D) OFF indicator light control	When ignition switch is first turned ON (II): 0 V for two seconds O/D OFF indicator light ON: 0 V O/D OFF indicator light OFF: Battery voltage
B20	LG1	Ground (G101)	
B21	VBU	Back-up power supply (under-hood Fuse 47)	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: • 1, 2 and positions • D4, D3, and D positions in 1st and 2nd gear 0 V in following positions: • D4, D3, and D positions in 3rd gear • D4 and D positions 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 half lock-up conditions: Pulsing signal
D4	———	Not used	
D5	VB SOL	Power supply for solenoid valves (Under-hood Fuse 15)	With ignition switch ON (II): Battery voltage With ignition switch OFF: 0 V
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, D3, and D positions in 2nd and 3rd gear • R position 0 V in following positions: • 1 position • D4, D3, and D positions in 1st gear • D4 and D positions in 4th gear • P and N positions
D8 ('98 model)	ATP D3	A/T gear position switch D3 position input	In D3 position: 0 V In other than D3 position: Battery voltage
D8 ('99 – 00 models)	O/D SW	Over-Drive (O/D) switch signal input	When Over-Drive (O/D) is OFF (O/D OFF indicator light is ON): 0 V When Over-Drive (O/D) is ON (O/D OFF indicator light is OFF): 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
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
D14	ATP 2	A/T gear position switch 2 position input	In 2 position: 0 V In other than 2 position: Battery voltage
D15	ATP 1	A/T gear position switch 1 position input	In 1 position: 0 V In other than 1 position: Battery voltage
D16	NCSG	Countershaft speed sensor ground	

Checking the Diagnostic Trouble Code (DTC) with an OBD II Scan tool or Honda PGM Tester

When the PCM senses an abnormality in the input or output systems, the D4 ('97 – 98) or D ('99 – 00) indicator light in the gauge assembly will blink. When the 16P Data Link Connector (DLC) (located under the dash on the passenger's side) is connected to the OBD II Scan Tool or Honda PGM Tester as shown, the scan tool or tester will indicate the Diagnostic Trouble Code (DTC) when the ignition switch is turned ON(II).



If the D4 or D indicator light or the MIL has been reported on, or if a driveability problem is suspected, follow this procedure:

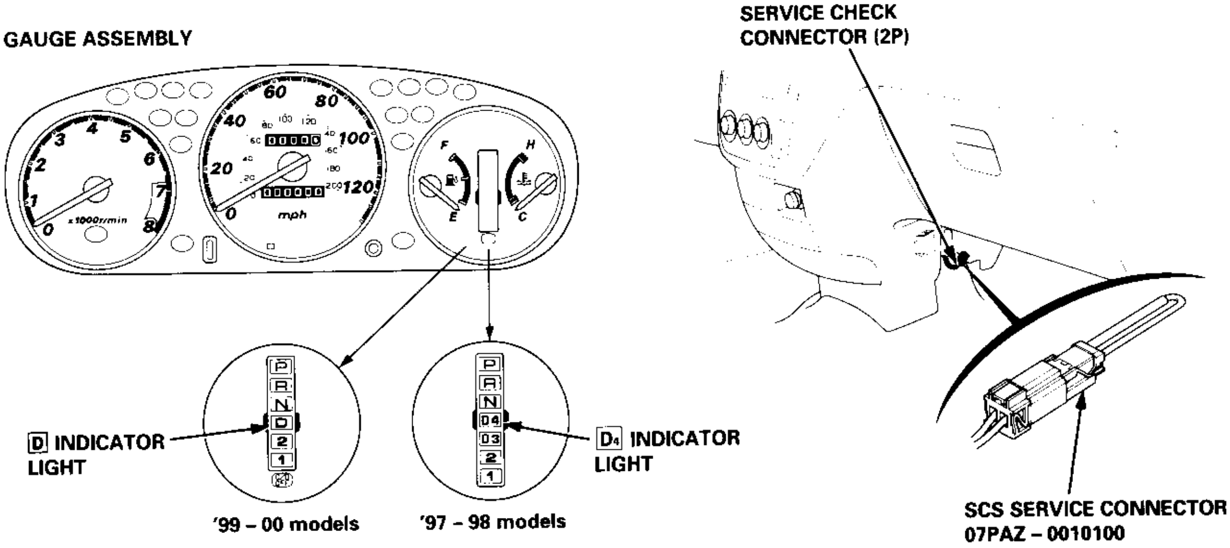
1. Connect the OBD II Scan Tool (conforming to SAE J1978) or Honda PGM Tester to the 16P DLC. (See the OBD II Scan Tool or Honda PGM Tester user's manual for specific instructions. If you are using the Honda PGM Tester, make sure it is set to the SAE DTC type).
2. Turn the ignition switch ON (II), and observe the DTC on the screen.
3. Record all fuel and emission DTCs, A/T DTCs, and freeze data.
4. If there is a fuel and emissions DTC, first check the fuel and emissions system as indicated by the DTC (except for DTC P0700). DTC P0700 means there is one or more A/T DTC, and no problems were detected in the fuel and emissions circuit of the PCM.
5. Wire down the radio station presets.
6. Reset the memory with the PGM Tester or by removing the BACK UP fuse in the under-hood fuse/relay box for more than 10 seconds.
7. Drive the vehicle for several minutes at speeds over 30 mph (50 km/hr), and then recheck for DTCs. If the A/T DTC returns, go to the Symptom-to Component Chart on pages 14-60 and 14-61 for the '97 models, and pages 14-62 and 14-63 for '98 – 00 models. If the DTC does not return, there was an intermittent problem within the circuit. Make sure all pins and terminals in the circuit are tight, and then go to step 8.
8. Reset the radio preset stations, and set the clock.

Checking the Diagnostic Trouble Code (DTC) with the Service Check Connector and Special Tool

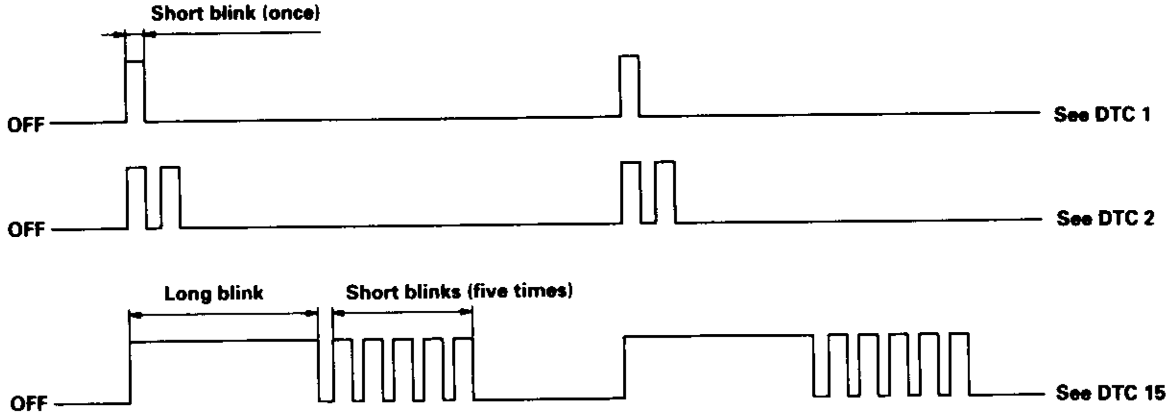
When the PCM senses an abnormality in the input or output systems, the D4 ('97 – 98) or D ('99 – 00) indicator light in the gauge assembly may blink.

When the Service Check Connector (2P) (located under the dash on the passenger side) is connected with the special tool as shown, the D4 or D indicator light will blink the Diagnostic Trouble Code (DTC) when the ignition switch is turned ON (II).

When the D4 or D indicator light has been reported on, connect the Service Check Connector (2P) to the special tool. Then turn ON (II) the ignition switch and observe the D4 or D indicator light.



Codes 1 through 9 are indicated by individual short blinks. Codes 10 and above are indicated by a series of long and short blinks. One long blink equals 10 short blinks. Add the long and short blinks together to determine the code. After determining the code, refer to the electrical system Symptom-to-Component Chart on pages 14-60 and 14-61 for the '97 model, and pages 14-62 and 14-63 for the '98 – 00 models.



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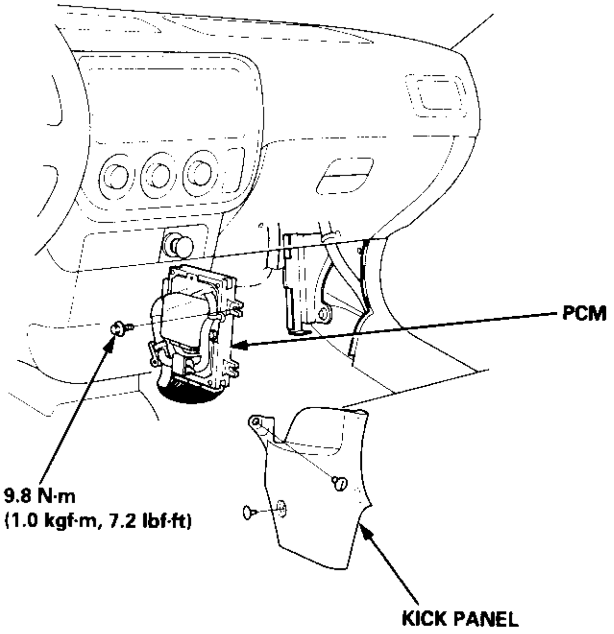
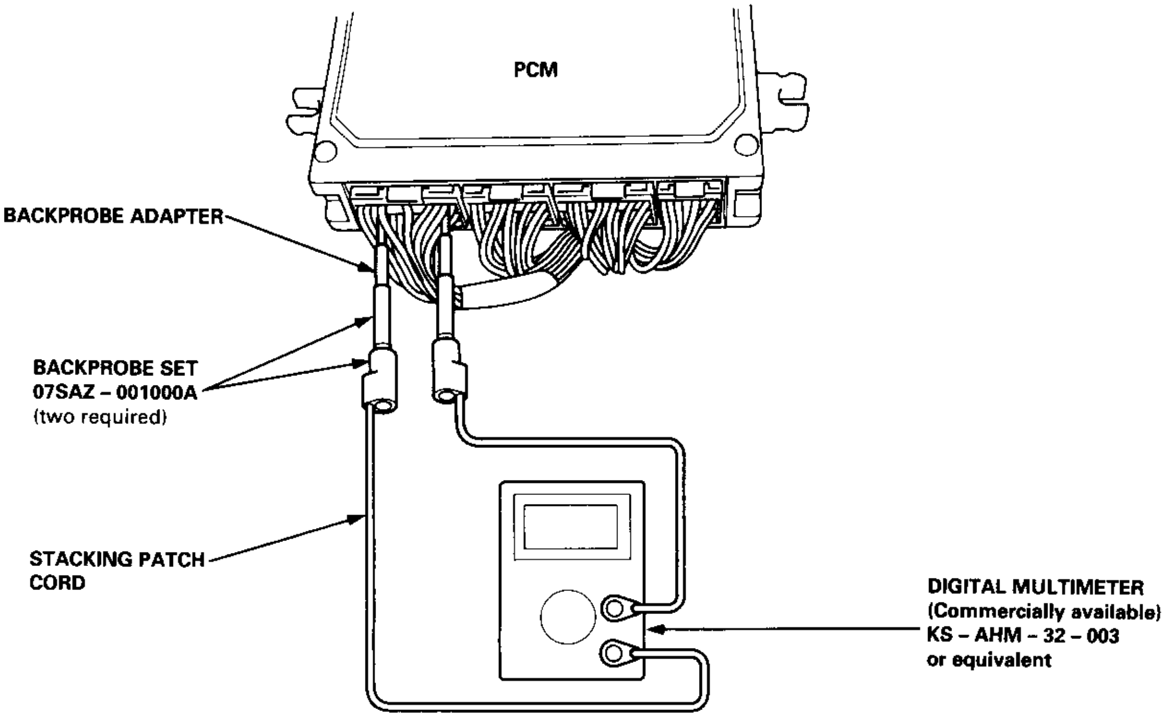
1. Remove the kick panel on the passenger's side (see section 20).
2. Remove the PCM, and turn it over.



3. Inspect the circuit on the PCM according to the troubleshooting flowchart with the special tools and a digital multimeter.

How to Use the Backprobe Set

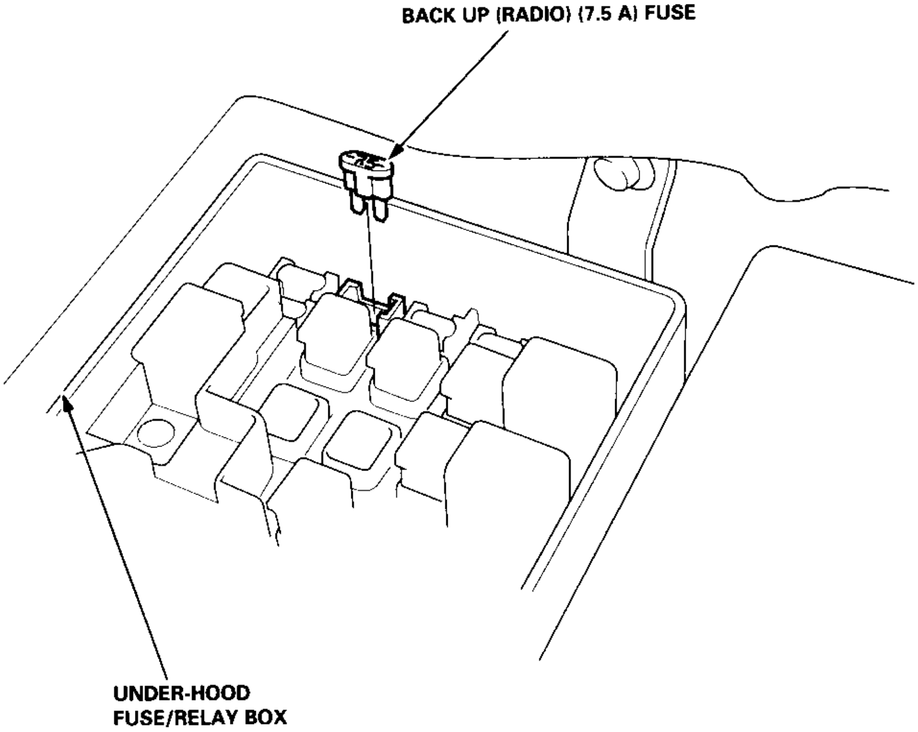
Connect the backprobe adapters to the stacking patch cords, and connect the cords to a multimeter. Using the wire insulation as a guide for the contoured tip of the backprobe adapter, gently slide the tip into the connector from the wire side until it comes in contact with the terminal end of the wire.



PCM Reset Procedure

1. Turn the ignition switch off.
2. Remove the BACK UP fuse (7.5 A) from the under-hood fuse/relay box for 10 seconds to reset the PCM.

   NOTE:
   - Disconnecting the BACK UP fuse also cancels the radio preset stations and clock setting. Make note of the radio presets before removing the fuse so you can reset them.
   - The PCM memory can also be cleared by using the OBD II Scan Tool or Honda PGM Tester.



Final Procedure

This procedure must be done after any troubleshooting.

1. Turn the ignition switch OFF.
2. Reset the PCM.
3. Disconnect the OBD II Scan Tool or Honda PGM Tester from the Data Link Connector (16P), or remove the special tool from the Service Check Connector (2P).
4. Turn the ignition switch ON (II), and set the radio presets and clock setting.
5. To verify that the problem is repaired, test-drive the vehicle for several minutes at speeds over 30 mph (48 km/h).

Symptom-to-Component Chart

Electrical System — '97 Model

DTC*	D4 Indicator Light	MIL	Detection Item	Page
P1753 (1)	Blinks	ON	Lock-up control solenoid valve A	(see page 14-64)
P1758 (2)	Blinks	ON	Lock-up control solenoid valve B	(see page 14-66)
P1705 (5)	Blinks	ON	A/T gear position switch (short to ground)	(see page 14-68)
P1706 (6)	OFF	ON	A/T gear position switch (open)	(see page 14-70)
P0753 (7)	Blinks	ON	Shift control solenoid valve A	(see page 14-72)
P0758 (8)	Blinks	ON	Shift control solenoid valve B	(see page 14-74)
P0720 (9)	Blinks	ON	Countershaft speed sensor	(see page 14-76)
P0715 (15)	Blinks	ON	Mainshaft speed sensor	(see page 14-78)
P1768 (16)	Blinks	ON	Linear solenoid	(see page 14-80)
P0740 (40)	OFF	ON	Lock-up control system	(see page 14-82)
P0730 (41)	OFF	ON	Shift control system	(see page 14-84)

DTC*: The DTC in parentheses is the code the D4 indicator light indicates when the Data Link Connector is connected to the Honda PGM Tester.

NOTE: When the OBD II Scan Tool or Honda PGM Tester indicate DTC(s) for the automatic transmission control system, the scan tool or tester indicates code P0700 simultaneously. Code P0700 means a detection of some automatic transmission problem in the PGM-FI control system.

If the self-diagnostic D4 indicator light does not blink, perform an inspection according to the table below.

Symptom	Inspection	Ref. page
D4 indicator light is on constantly (not blinking) whenever the ignition switch is ON (II).	———	14-86
D4 indicator light does not come on for two seconds after ignition switch is first turned ON (II).	———	14-87
Shift lever cannot be moved from P position with the brake pedal pressed.	Check shift lock system	14-89
Ignition key cannot be moved from ACC (I) position to LOCK (0) position with the shift lever in P position.	Check key interlock system	14-91

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.

Symptom-to-Component Chart

Electrical System — '98 - 00 Models

DTC*	D4 Indicator Light ('98) D Indicator Light ('99 - 00)	MIL	Detection Item	Page
P1753 (1)	Blinks	ON	Lock-up control solenoid valve A	(see page 14-93)
P1758 (2)	Blinks	ON	Lock-up control solenoid valve B	(see page 14-96)
P1705 (5)	Blinks	ON	A/T gear position switch (short to ground)	(see page 14-99)
P1706 (6)	OFF	ON	A/T gear position switch (open)	(see page 14-103)
P0753 (7)	Blinks	ON	Shift control solenoid valve A	(see page 14-106)
P0758 (8)	Blinks	ON	Shift control solenoid valve B	(see page 14-109)
P0720 (9)	Blinks	ON	Countershaft speed sensor	(see page 14-112)
P0715 (15)	Blinks	ON	Mainshaft speed sensor	(see page 14-114)
P1768 (16)	Blinks	ON	Linear solenoid	(see page 14-117)
P0740 (40)	OFF	ON	Lock-up control system	(see page 14-119)
P0730 (41)	OFF	ON	Shift control system	(see page 14-121)

DTC*: The DTC in the parentheses is the code the D4 or D indicator light indicates when the Data Link Connector is connected to the Honda PGM Tester.

NOTE: When the OBD II Scan Tool or Honda PGM Tester indicate DTC(s) for the automatic transmission control system, the scan tool or tester indicates code P0700 simultaneously. Code P0700 means a detection of some automatic transmission problem in the PGM-FI control system.

If the self-diagnostic $\boxed{D_4}$ or $\boxed{D}$ indicator light does not blink, perform an inspection according to the table below.

Symptom	Inspection	Ref. page
$\boxed{D_4}$ or $\boxed{D}$ indicator light does not come on for two seconds after ignition switch is first turned ON (II).	———	14-123
$\boxed{D_4}$ or $\boxed{D}$ indicator light is on constantly (not blinking) whenever the ignition switch is ON (II).	———	14-125
Shift lever cannot be moved from $\boxed{P}$ position with the brake pedal pressed.	Check shift lock system	14-126
Ignition key cannot be moved from ACC (I) position to LOCK (0) position with the shift lever in $\boxed{P}$ position.	Check key interlock system	14-129
O/D OFF indicator light does not come on for two seconds after ignition switch is first turned ON (II). ('99 – 00 models)	———	14-131
The O/D OFF indicator light is on constantly whenever the ignition switch is ON (II). ('99 – 00 models)	———	14-132
The O/D OFF indicator light does not come on even though the Over-Drive (O/D) switch is pressed in $\boxed{D}$ position. ('99 – 00 models)	Check Over-Drive (O/D) switch circuit	14-133

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.

Troubleshooting Flowchart — Lock-up Control Solenoid Valve A

- OBD II Scan Tool indicates Code P1753.
- Self-diagnosis D4 indicator light blinks once.

Possible Cause

- 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

Check and record the freeze data in case it is needed later for problem verification.

If the Honda PGM Tester is available:

Perform the lock-up control solenoid valve A test using the Honda PGM Tester.

Did the solenoid pass the test?

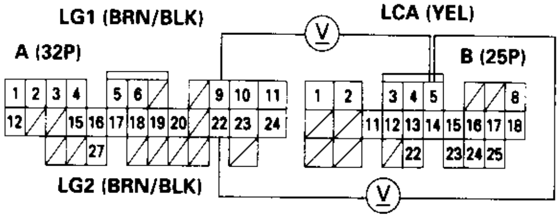
YES — **The solenoid is OK at this time. Verify that all connectors in the circuit are making good contact.**

NO

Check for a Short to Power:

1. Turn the ignition switch OFF.
2. Disconnect the A (32P) and B (25P) connectors from the PCM.
3. Turn the ignition switch ON (II).
4. Measure the voltage between the B5 and A9 or A22 terminals.

PCM CONNECTORS



Wire side of female terminals

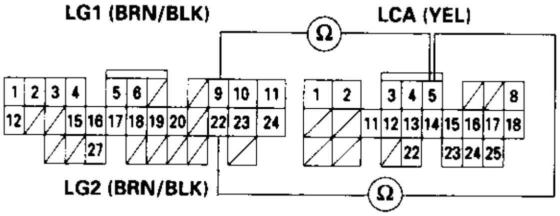
Is there voltage?

YES — **Repair short to power in the wire between the B5 terminal and the lock-up control solenoid valve A.**

NO

Measure Lock-up Control Solenoid Valve A Resistance:

1. Turn the ignition switch OFF.
2. Measure the resistance between the B5 and A9 or A22 terminals.



Is the resistance 12 – 25 Ω?

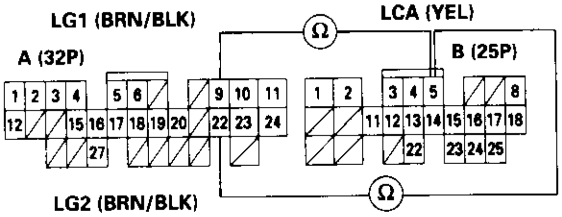
YES — **Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good solenoid valve assembly or PCM and recheck.**

NO

To page 14-65

From page 14-64

PCM CONNECTORS



Wire side of female terminals

Check Lock-up Control Solenoid Valve A for a Short Circuit:

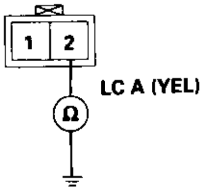
1. Disconnect the 2P connector from the lock-up control solenoid valve A/B assembly.
2. Check for continuity between the B5 and A9 or A22 terminals.

Is there continuity?

YES — **Repair short to ground in the wire between the B5 terminal and the lock-up control solenoid valve A.**

NO

LOCK-UP CONTROL SOLENOID VALVE A/B ASSEMBLY CONNECTOR



Terminal side of male terminals

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 B5 terminal and the lock-up control solenoid valve A.**

NO

Replace the lock-up control solenoid valve A/B assembly.

Troubleshooting Flowchart — Lock-up Control Solenoid Valve B

- **OBD II Scan Tool indicates Code P1758.**
- **Self-diagnosis D4 indicator light blinks twice.**

Possible Cause

- **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**

Check and record the freeze data in case it is needed later for problem verification.

Clear the PCM, and test-drive the vehicle.

Did the code return?

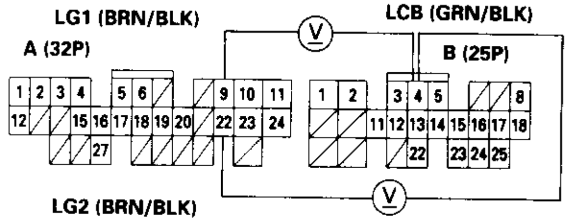
NO → **The system is OK at this time. Verify that all connectors in the circuit are making good contact.**

YES

Check for a Short to Power:

1. Turn the ignition switch OFF.
2. Disconnect the A (32P) and B (25P) connectors from the PCM.
3. Turn the ignition switch ON (II).
4. Measure the voltage between the B4 and A9 or A22 terminals.

PCM CONNECTORS



Wire side of female terminals

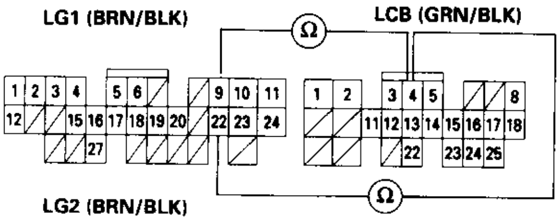
Is there voltage?

YES → **Repair short to power in the wire between the B4 terminal and the lock-up control solenoid valve B.**

NO

Measure Lock-up Control Solenoid Valve B Resistance:

1. Turn the ignition switch OFF.
2. Measure the resistance between the B4 and A9 or A22 terminals.



Is the resistance 12 – 25 Ω?

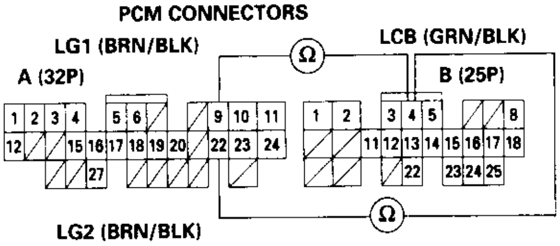
YES → **Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good solenoid valve assembly or PCM and recheck.**

NO

To page 14-67

From page 14-66

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 B4 and A9 or A22 terminals.



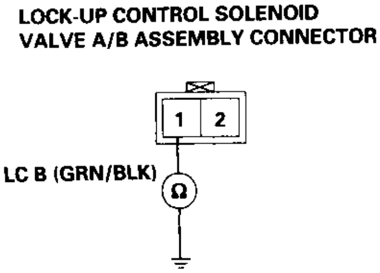
Wire side of female terminals

Is there continuity?

YES — **Repair short to ground in the wire between the B4 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.



Terminal side of male terminals

Is the resistance 12 – 25 Ω?

YES — **Check for open in the wire between the B4 terminal and the lock-up control solenoid valve B.**

NO

Replace the lock-up control solenoid valve A/B assembly.

Electrical Troubleshooting ('97 Model)

Troubleshooting Flowchart — A/T Gear Position Switch (Short)

- **OBD II Scan Tool indicates Code P1705.**
- **Self-diagnosis D4 indicator light blinks five times.**

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.

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.**

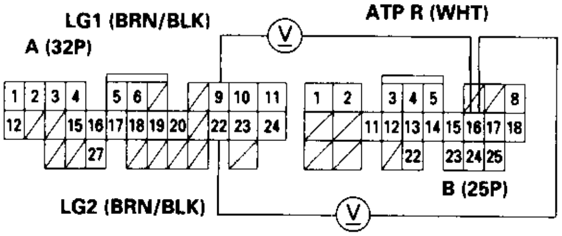
NO

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 B16 and A9 or A22 terminals.

PCM CONNECTORS



Wire side of female terminals

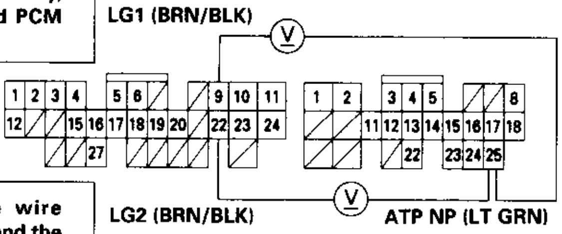
Is there battery voltage?

NO → **Check for short in the wire between the B16 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 B25 and A9 or A22 terminals.



Is there battery voltage?

NO → **Check for short in the wire between the B25 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.**

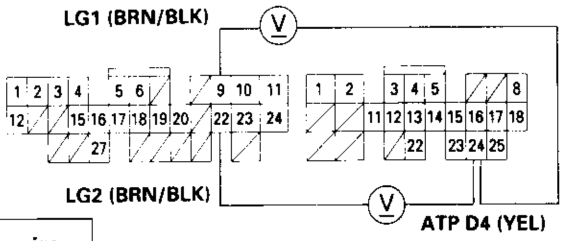
YES

To page 14-69

From page 14-68

Measure ATP D4 Voltage:
1. Shift to all positions other than D4.
2. Measure the voltage between the B24 and A9 or A22 terminals.

PCM CONNECTORS



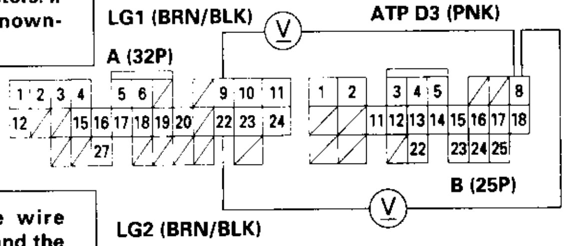
Wire side of female terminals

Is there approx. 5 V?

NO — **Check for short in the wire between the B24 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

Measure ATP D3 Voltage:
1. Shift to all positions other than D3.
2. Measure the voltage between the B8 and A9 or A22 terminals.

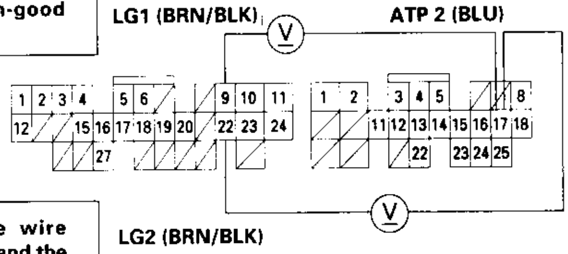


Is there battery voltage?

NO — **Check for short in the wire between the B8 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 2 Voltage:
1. Shift to all positions other than 2.
2. Measure the voltage between the B17 and A9 or A22 terminals.

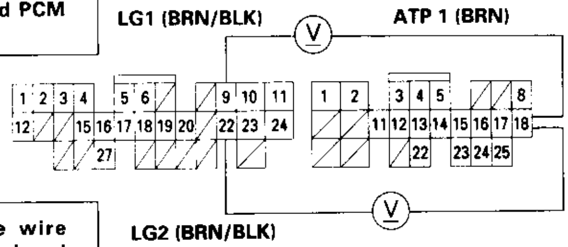


Is there battery voltage?

NO — **Check for short in the wire between the B17 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 1 Voltage:
1. Shift to all positions other than 1.
2. Measure the voltage between the B18 terminal and A9 or A22 terminals.



Is there battery voltage?

NO — **Check for short in the wire between the B18 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

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

Electrical Troubleshooting ('97 Model)

Troubleshooting Flowchart — A/T Gear Position Switch (Open)

- **OBD II Scan Tool indicates Code P1706.**
- **Self-diagnosis D4 indicator light blinks six times.**

Possible Cause

- **Disconnected A/T gear position switch connector**
- **Open in A/T gear position switch wire**
- **Faulty A/T gear position switch**

Check and record the freeze data in case it is needed later for problem verification.

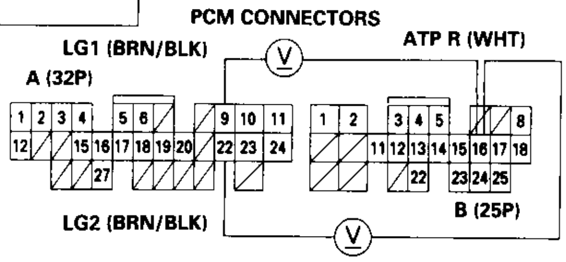
Test the A/T gear position switch (see page 14-139).

Is the switch OK?

NO — **Replace the A/T gear position switch.**

YES

Measure ATP R Voltage:
1. Turn the ignition switch ON (II).
2. Shift to R position.
3. Measure the voltage between the B16 and A9 or A22 terminals.



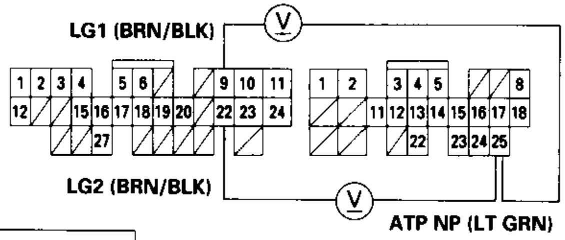
Wire side of female terminals

Is there voltage?

YES — **Repair open in the wire between the B16 terminal and the A/T gear position switch.**

NO

Measure ATP NP Voltage:
1. Shift to N or P position.
2. Measure the voltage between the B25 and A9 or A22 terminals.

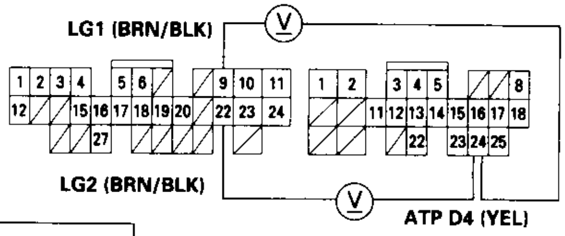


Is there voltage?

YES — **Repair open in the wire between the B25 terminal and the A/T gear position indicator or the A/T gear position switch.**

NO

Measure ATP D4 Voltage:
1. Shift to D4 position.
2. Measure the voltage between the B24 and A9 or A22 terminals.



Is there voltage?

YES — **Repair open in the wire between the B24 terminal and the A/T gear position switch.**

NO

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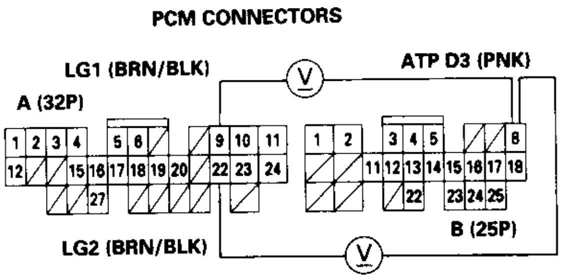
From page 14-70

Measure ATP D3 Voltage:
1. Shift to D3 position.
2. Measure the voltage between the B8 and A9 or A22 terminals.



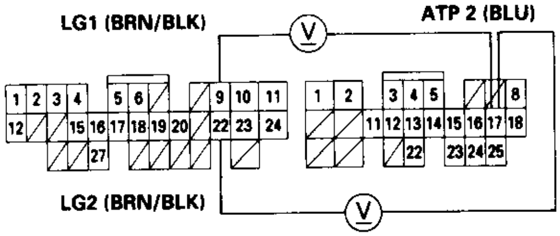
Wire side of female terminals

Is there voltage?

YES — **Repair open in the wire between the B8 terminal and the A/T gear position switch.**

NO

Measure ATP2 Voltage:
1. Shift to 2 position.
2. Measure the voltage between the B17 and A9 or A22 terminals.

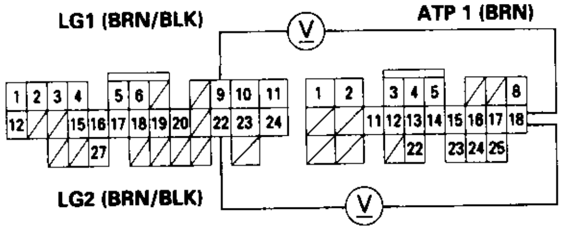


Is there voltage?

YES — **Repair open in the wire between the B17 terminal and the A/T gear position switch.**

NO

Measure ATP1 Voltage:
1. Shift to 1 position.
2. Measure the voltage between the B18 and A9 or A22 terminals.



Is there voltage?

YES — **Repair open in the wire between the B18 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.

Troubleshooting Flowchart — Shift Control Solenoid Valve A

- **OBD II Scan Tool indicates Code P0753.**
- **Self-diagnosis D4 indicator light blinks seven times.**

Possible Cause

- **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**

Check and record the freeze data in case it is needed later for problem verification.

If the Honda PGM Tester is available:

Perform the shift control solenoid valve A test using the Honda PGM Tester.

Did the solenoid pass the test?

YES

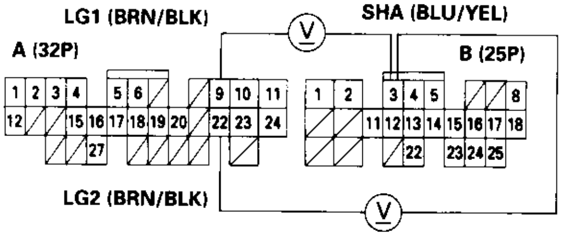
The solenoid is OK at this time. Verify that all connectors in the circuit are making good contact.

NO

Check for a Short to Power:

1. Turn the ignition switch OFF.
2. Disconnect the A (32P) and B (25P) connectors from the PCM.
3. Turn the ignition switch ON (II).
4. Measure the voltage between the B3 and A9 or A22 terminals.

PCM CONNECTORS



Wire side of female terminals

Is there voltage?

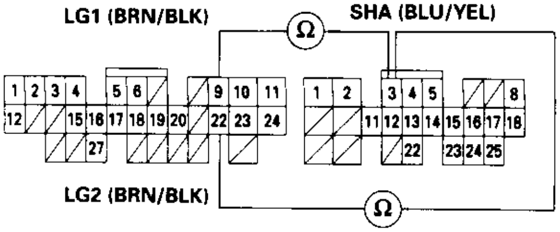
YES

Repair short to power in the wire between the B3 terminal and the shift control solenoid valve A.

NO

Measure Shift Control Solenoid Valve A Resistance:

1. Turn the ignition switch OFF.
2. Measure the resistance between the B3 and A9 or A22 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.

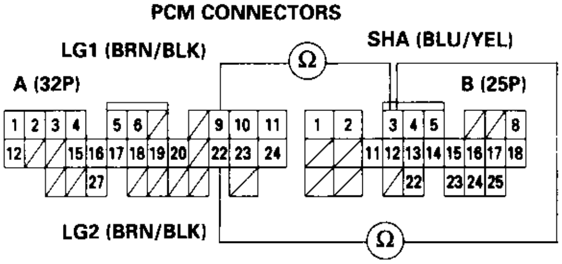
NO

To page 14-73

From page 14-72

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 B3 and A9 or A22 terminals.



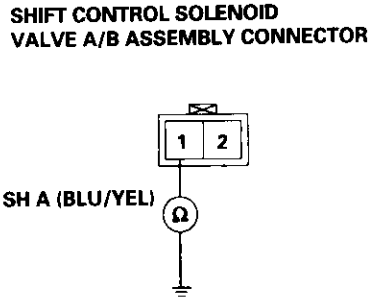
Wire side of female terminals

Is there continuity?

YES — **Repair short to ground in the wire between the B3 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.



Terminal side of male terminals

Is the resistance 12 – 25 Ω?

YES — **Check for open in the wire between the B3 terminal and the shift control solenoid valve A.**

NO

Replace the shift control solenoid valve A/B assembly.

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.

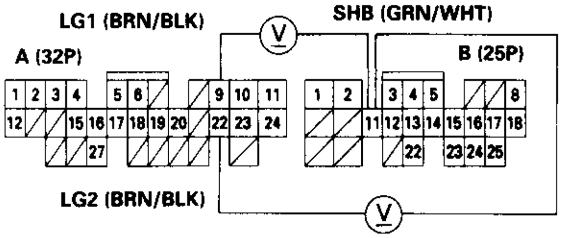
Did the solenoid pass the test?

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 A (32P) and B (25P) connectors from the PCM.
3. Turn the ignition switch ON (II).
4. Measure the voltage between the B11 and A9 or A22 terminals.

PCM CONNECTORS



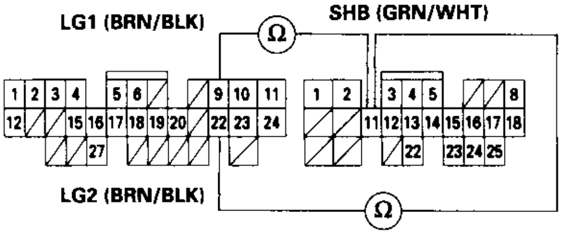
Wire side of female terminals

Is there voltage?

YES — **Repair short to power in the wire between the B11 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 B11 and A9 or A22 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 14-75

From page 14-74

Check Shift Control Solenoid Valve B for a Short Circuit:

1. Disconnect the 2P connector from the shift control solenoid valve A/B assembly.
2. Check for continuity between the B11 and A9 or A22 terminals.

Is there continuity?

YES — **Repair short to ground in the wire between the B11 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.

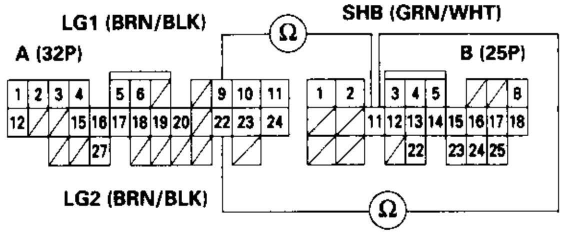
Is the resistance 12 – 25 Ω?

YES — **Check for open in the wire between the B11 terminal and the shift control solenoid valve B.**

NO

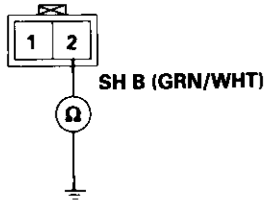
Replace the shift control solenoid valve A/B assembly.

PCM CONNECTORS



Wire side of female terminals

SHIFT CONTROL SOLENOID VALVE A/B ASSEMBLY CONNECTOR



Terminal side of male terminals

Troubleshooting Flowchart — Countershaft Speed Sensor

- **OBD II Scan Tool indicates Code P0720.**
- **Self-diagnosis D4 indicator light blinks nine times.**

Possible Cause

- **Loose or faulty connection between the PCM and vehicle harness**
- **Disconnected countershaft speed sensor connector**
- **Short or open in countershaft speed sensor wire**
- **Faulty countershaft speed sensor**

Check and record the freeze data in case it is needed later for problem verification.

If the Honda PGM Tester is available:

Connect the Honda PGM Tester, and test-drive the vehicle with the tester in Data Link or SnapShot mode. Make sure the countershaft speed sensor reads the same as the vehicle speed sensor (VSS).

Do both sensors read the same speed?

YES

The countershaft speed sensor is OK at this time. Verify that all connectors in the circuit are making good contact.

NO

Check the countershaft speed sensor installation, and check it for damage.

Is the countershaft speed sensor installed properly, and not damaged?

NO

Reinstall or replace and recheck.

YES

Measure Countershaft Speed Sensor Resistance at the Sensor Connector:

1. Disconnect the 2P connector from the countershaft speed sensor connector.
2. Measure the resistance of the countershaft speed sensor.

Is the resistance 400 – 600 Ω?

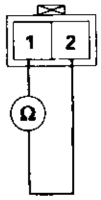
NO

Replace the countershaft speed sensor.

YES

To page 14-77

COUNTERSHAFT SPEED SENSOR CONNECTOR



Terminal side of male terminals

From page 14-76

Check Countershaft Speed Sensor for a Short Circuit:
1. Disconnect the B (25P) connector from the PCM.
2. Check for continuity between the body ground and the B23 terminal and B22 terminal individually.

Is there continuity?

YES

Repair short in the wires between the B23 and B22 terminals and the countershaft speed sensor.

NO

Measure Countershaft Speed Sensor Circuit for an Open:
1. Connect the countershaft speed sensor 2P connector.
2. Measure the resistance between the B23 and B22 terminals.

Is the resistance 400 – 600 Ω?

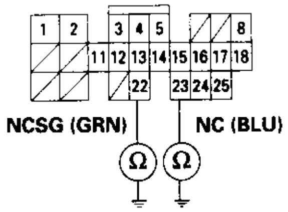
NO

Repair loose terminal or open in the wires between the B23 and B22 terminals and the countershaft speed sensor.

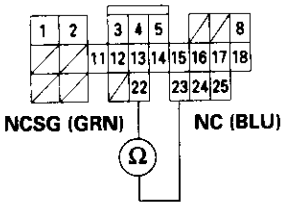
YES

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



Troubleshooting Flowchart — Mainshaft Speed Sensor

- **OBD II Scan Tool indicates Code P0715.**
- **Self-diagnosis D4 indicator light indicates Code 15.**

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.

Check and record the freeze data in case it is needed later for problem verification.

Check the mainshaft and countershaft speed sensor installation, and check the sensors for damage.

Are the mainshaft and countershaft speed sensors installed properly, and not damaged?

NO

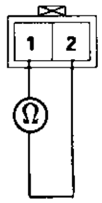
Reinstall or replace and recheck.

YES

Measure Mainshaft Speed Sensor Resistance at the Sensor Connector:

1. Disconnect the 2P connector from the mainshaft speed sensor connector.
2. Measure the resistance of the mainshaft speed sensor.

MAINSHAFT SPEED SENSOR CONNECTOR



Terminal side of male terminals

Is the resistance 400 – 600 Ω?

NO

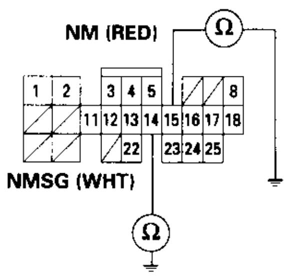
Replace the mainshaft speed sensor.

YES

Check Mainshaft Speed Sensor for a Short Circuit:

1. Disconnect the B (25P) connector from the PCM.
2. Check for continuity between body ground and B15 terminal and the B14 terminal individually.

PCM CONNECTOR B (25P)



Wire side of female terminals

Is there continuity?

YES

Repair short in the wires between the B15 and B14 terminals and the mainshaft speed sensor.

NO

To page 14-79

From page 14-78

Measure Mainshaft Speed Sensor Resistance:

1. Connect the mainshaft speed sensor 2P connector.
2. Measure the resistance between the B15 and B14 terminals.

Is the resistance 400 – 600 Ω?

YES

Run the Electrical Troubleshooting Flowchart for code P0720 (9). Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

NO

Check NM Wire Continuity:

1. Disconnect the 2P connector from the mainshaft speed sensor connector.
2. Check for continuity between the B15 terminal and the No. 2 terminal of the mainshaft speed sensor connector.

Is there continuity?

NO

Repair open in the wire between the B15 terminal and the mainshaft speed sensor.

YES

Check NMSG Wire Continuity:
Check for continuity between the B14 terminal and the No. 1 terminal of the mainshaft speed sensor connector.

Is there continuity?

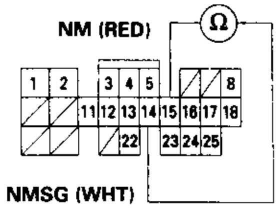
NO

Repair open in the wire between the B14 terminal and the mainshaft speed sensor.

YES

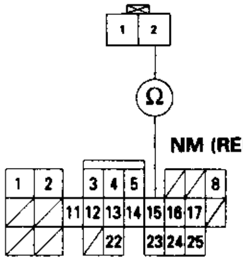
Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

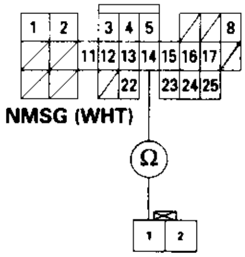
PCM CONNECTOR B (25P)



Wire side of female terminals

MAINSHAFT SPEED SENSOR CONNECTOR





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 B1 terminal and B2 terminal individually.

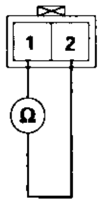
Is there continuity?

YES — **Repair short in the wires between the B1 and B2 terminals and the linear solenoid.**

NO

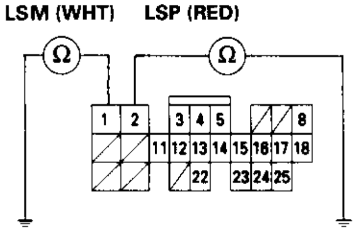
To page 14-81

LINEAR SOLENOID CONNECTOR



Terminal side of male terminals

PCM CONNECTOR B (25P)



Wire side of female terminals

From page 14-80

Check Ground Line:
1. Disconnect the A (32P) connector from the PCM.
2. Check for continuity between terminals A9 and A10 and between terminals A22 and A23.

Is there continuity?

NO

Repair loose terminal or open in the wires between terminals A9, A10, A22 and A23 and ground, and repair poor ground (G101, G401).

YES

Measure Linear Solenoid Resistance:
1. Connect the linear solenoid 2P connector.
2. Measure the resistance between the B1 and B2 terminals.

Is the resistance about 5.0 Ω?

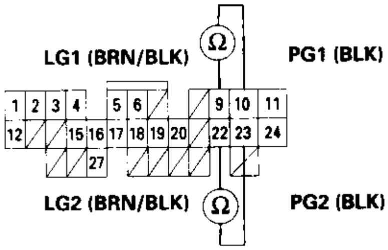
NO

Repair loose terminal or open in the wires between the B1 and B2 terminals and the linear solenoid.

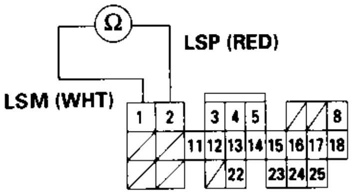
YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

PCM CONNECTOR A (32P)

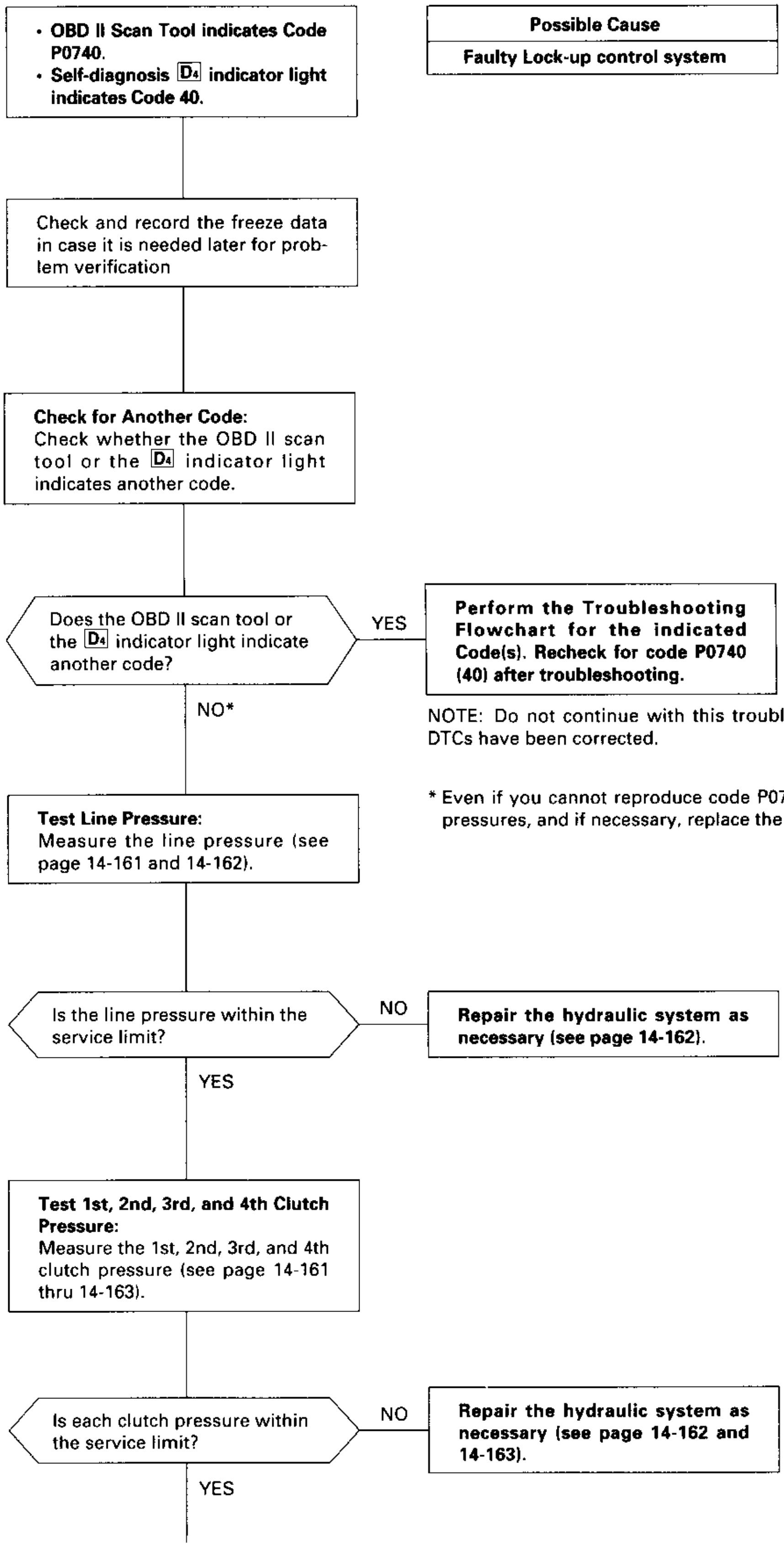


Wire side of female terminals



Electrical Troubleshooting ('97 Model)

Troubleshooting Flowchart — Lock-up Control System



Possible Cause
Faulty Lock-up control system

- **OBD II Scan Tool indicates Code P0740.**
- **Self-diagnosis D4 indicator light indicates Code 40.**

Check and record the freeze data in case it is needed later for problem verification

Check for Another Code:
Check whether the OBD II scan tool or the D4 indicator light indicates another code.

Does the OBD II scan tool or the D4 indicator light indicate another code?

YES

Perform the Troubleshooting Flowchart for the indicated Code(s). Recheck for code P0740 (40) after troubleshooting.

NOTE: Do not continue with this troubleshooting until the causes of any other DTCs have been corrected.

NO*

* Even if you cannot reproduce code P0740, test the line pressure, test the clutch pressures, and if necessary, replace the lock-up control solenoid valve assembly.

Test Line Pressure:
Measure the line pressure (see page 14-161 and 14-162).

Is the line pressure within the service limit?

NO

Repair the hydraulic system as necessary (see page 14-162).

YES

Test 1st, 2nd, 3rd, and 4th Clutch Pressure:
Measure the 1st, 2nd, 3rd, and 4th clutch pressure (see page 14-161 thru 14-163).

Is each clutch pressure within the service limit?

NO

Repair the hydraulic system as necessary (see page 14-162 and 14-163).

YES

To page 14-83

From page 14-82

Replace the Lock-up Control Solenoid Valve Assembly and Recheck:

1. Replace the lock-up control solenoid valve A/B assembly (see page 14-135).
2. Turn the ignition switch OFF and reset the PCM by removing the BACK UP (7.5 A) fuse in the under-hood fuse/relay box for more than 10 seconds.
3. Using the scan tool, check to be sure that the engine coolant temperature is 176°F (80°C) or above.
4. Drive the vehicle at 55 mph (88 km/h) constantly for more than one minute.
5. Recheck for code P0740 (40).

Does the OBD II scan tool indicate code P0740 or does the D4 indicator light indicate code 40?

NO — **The system is OK at this time.**

YES

Replace the Linear Solenoid Assembly and Recheck:

1. Replace the linear solenoid assembly (see page 14-138).
2. Turn the ignition switch OFF and reset the PCM memory by removing the BACK UP (7.5 A) fuse in the under-hood fuse/relay box for more than 10 seconds.
3. Using the scan tool, check to be sure that the engine coolant temperature is 176°F (80°C) or above.
4. Drive the vehicle at 55 mph (88 km/h) constantly for more than one minute.
5. Recheck for code P0740 (40).

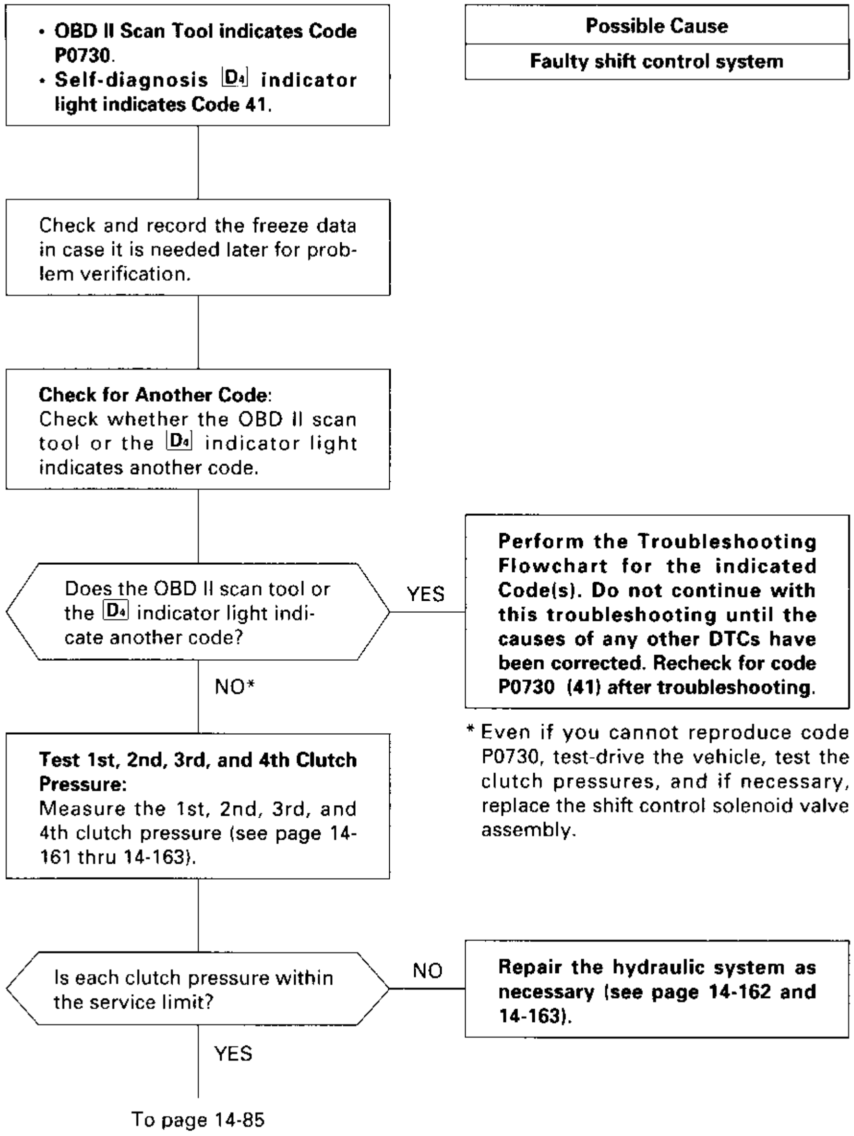
Does the OBD II scan tool indicate code P0740 or does the D4 indicator light indicate code 40?

NO — **The system is OK at this time.**

YES

Replace the transmission and torque converter assembly.

Troubleshooting Flowchart — Shift Control System



Possible Cause
Faulty shift control system

- **OBD II Scan Tool indicates Code P0730.**
- **Self-diagnosis D4 indicator light indicates Code 41.**

Check and record the freeze data in case it is needed later for problem verification.

Check for Another Code:
Check whether the OBD II scan tool or the D4 indicator light indicates another code.

Does the OBD II scan tool or the D4 indicator light indicate another code?

YES

Perform the Troubleshooting Flowchart for the indicated Code(s). Do not continue with this troubleshooting until the causes of any other DTCs have been corrected. Recheck for code P0730 (41) after troubleshooting.

NO*

Test 1st, 2nd, 3rd, and 4th Clutch Pressure:
Measure the 1st, 2nd, 3rd, and 4th clutch pressure (see page 14-161 thru 14-163).

Is each clutch pressure within the service limit?

NO

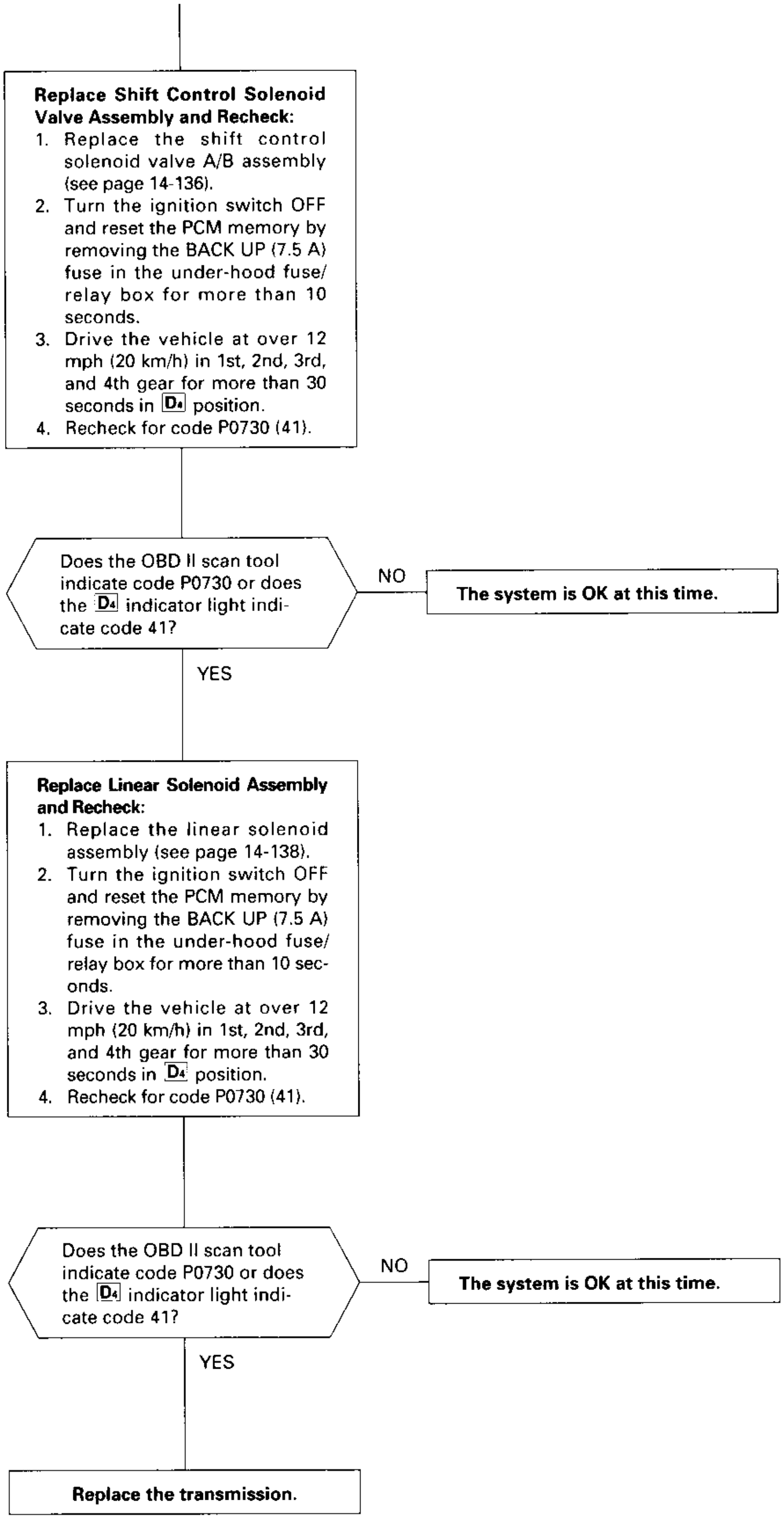
Repair the hydraulic system as necessary (see page 14-162 and 14-163).

YES

To page 14-85

* Even if you cannot reproduce code P0730, test-drive the vehicle, test the clutch pressures, and if necessary, replace the shift control solenoid valve assembly.

From page 14-84



Replace Shift Control Solenoid Valve Assembly and Recheck:

1. Replace the shift control solenoid valve A/B assembly (see page 14-136).
2. Turn the ignition switch OFF and reset the PCM memory by removing the BACK UP (7.5 A) fuse in the under-hood fuse/relay box for more than 10 seconds.
3. Drive the vehicle at over 12 mph (20 km/h) in 1st, 2nd, 3rd, and 4th gear for more than 30 seconds in $\boxed{D_4}$ position.
4. Recheck for code P0730 (41).

Does the OBD II scan tool indicate code P0730 or does the $\boxed{D_4}$ indicator light indicate code 41?

The system is OK at this time.

Replace Linear Solenoid Assembly and Recheck:

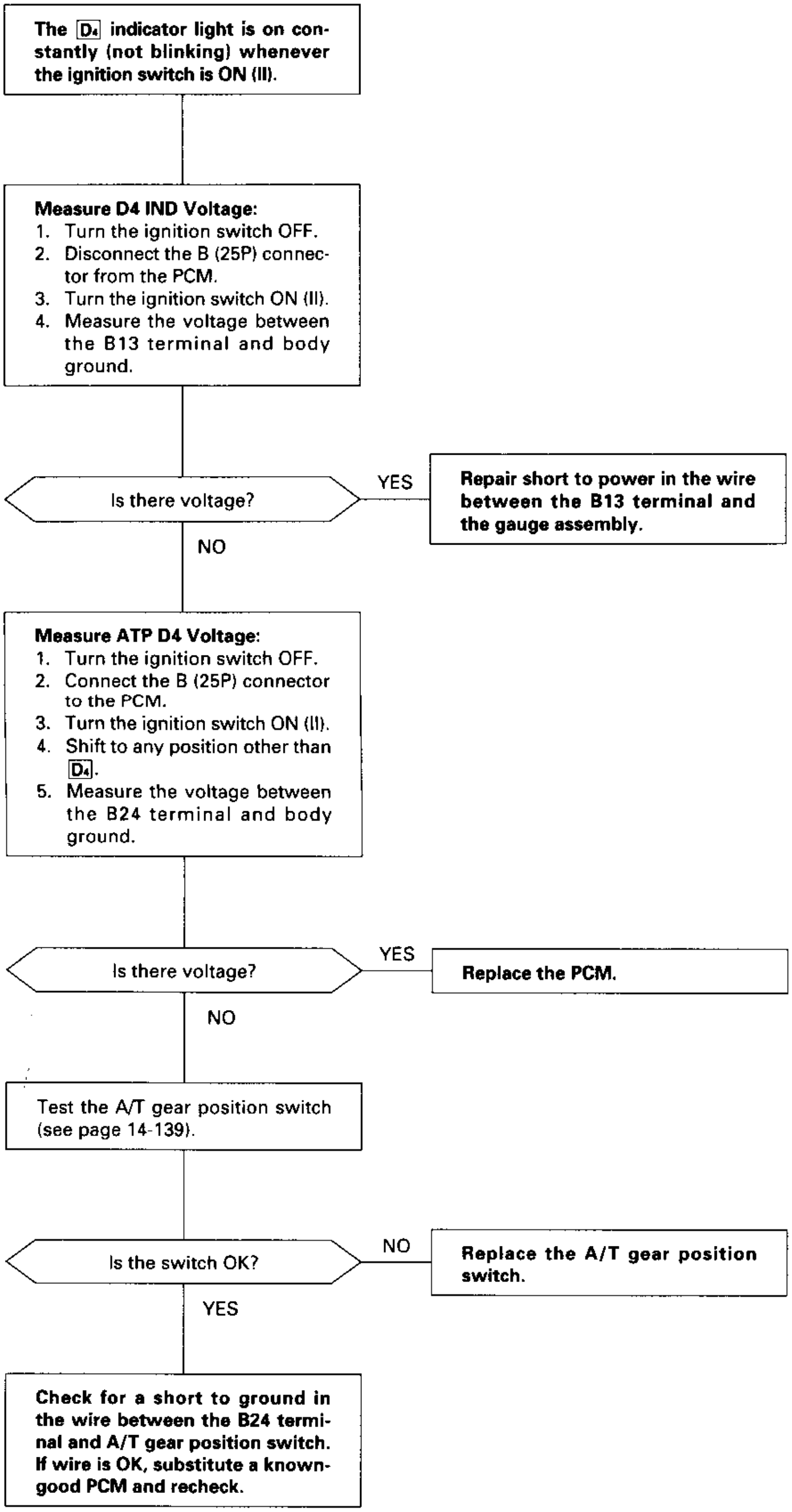
1. Replace the linear solenoid assembly (see page 14-138).
2. Turn the ignition switch OFF and reset the PCM memory by removing the BACK UP (7.5 A) fuse in the under-hood fuse/relay box for more than 10 seconds.
3. Drive the vehicle at over 12 mph (20 km/h) in 1st, 2nd, 3rd, and 4th gear for more than 30 seconds in $\boxed{D_4}$ position.
4. Recheck for code P0730 (41).

Does the OBD II scan tool indicate code P0730 or does the $\boxed{D_4}$ indicator light indicate code 41?

The system is OK at this time.

Replace the transmission.

Troubleshooting Flowchart — $\boxed{D_4}$ Indicator Light On Constantly



The $\boxed{D_4}$ 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 B (25P) connector from the PCM.
3. Turn the ignition switch ON (II).
4. Measure the voltage between the B13 terminal and body ground.

Is there voltage?

YES — **Repair short to power in the wire between the B13 terminal and the gauge assembly.**

NO

Measure ATP D4 Voltage:
1. Turn the ignition switch OFF.
2. Connect the B (25P) connector to the PCM.
3. Turn the ignition switch ON (II).
4. Shift to any position other than $\boxed{D_4}$.
5. Measure the voltage between the B24 terminal and body ground.

Is there voltage?

YES — **Replace the PCM.**

NO

Test the A/T gear position switch (see page 14-139).

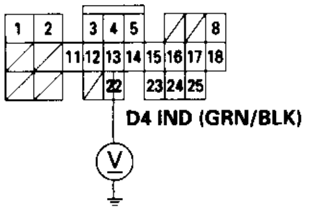
Is the switch OK?

NO — **Replace the A/T gear position switch.**

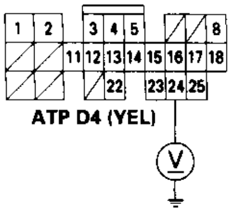
YES

Check for a short to ground in the wire between the B24 terminal and A/T gear position switch. If wire is OK, substitute a known-good PCM and recheck.

PCM CONNECTOR B (25P)



Wire side of female terminals



Troubleshooting Flowchart — $\boxed{D_4}$ Indicator Light Does Not Come On

The $\boxed{D_4}$ indicator light does not come on when the ignition switch is first turned ON (II). (It should come on for about two seconds.)

Check the Service Check Connector:
Make sure the special tool (SCS Service Connector) is not connected to the service check connector.

Is the special tool (SCS Service Connector) connected to the service check connector?

YES — **Disconnect the special tool from the service check connector and recheck.**

NO

Check the $\boxed{D_4}$ Indicator Light:
Shift to $\boxed{D_4}$ position.

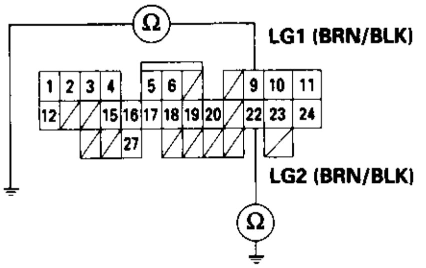
Does the $\boxed{D_4}$ indicator light come on?

YES — **Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.**

NO

Check the Ground Circuit:
1. Turn the ignition switch OFF.
2. Disconnect the A (32P) connector from the PCM.
3. Check for continuity between the A9 terminal and body ground and the A22 terminal and body ground.

PCM CONNECTOR A (32P)



Wire side of female terminals

Is there continuity?

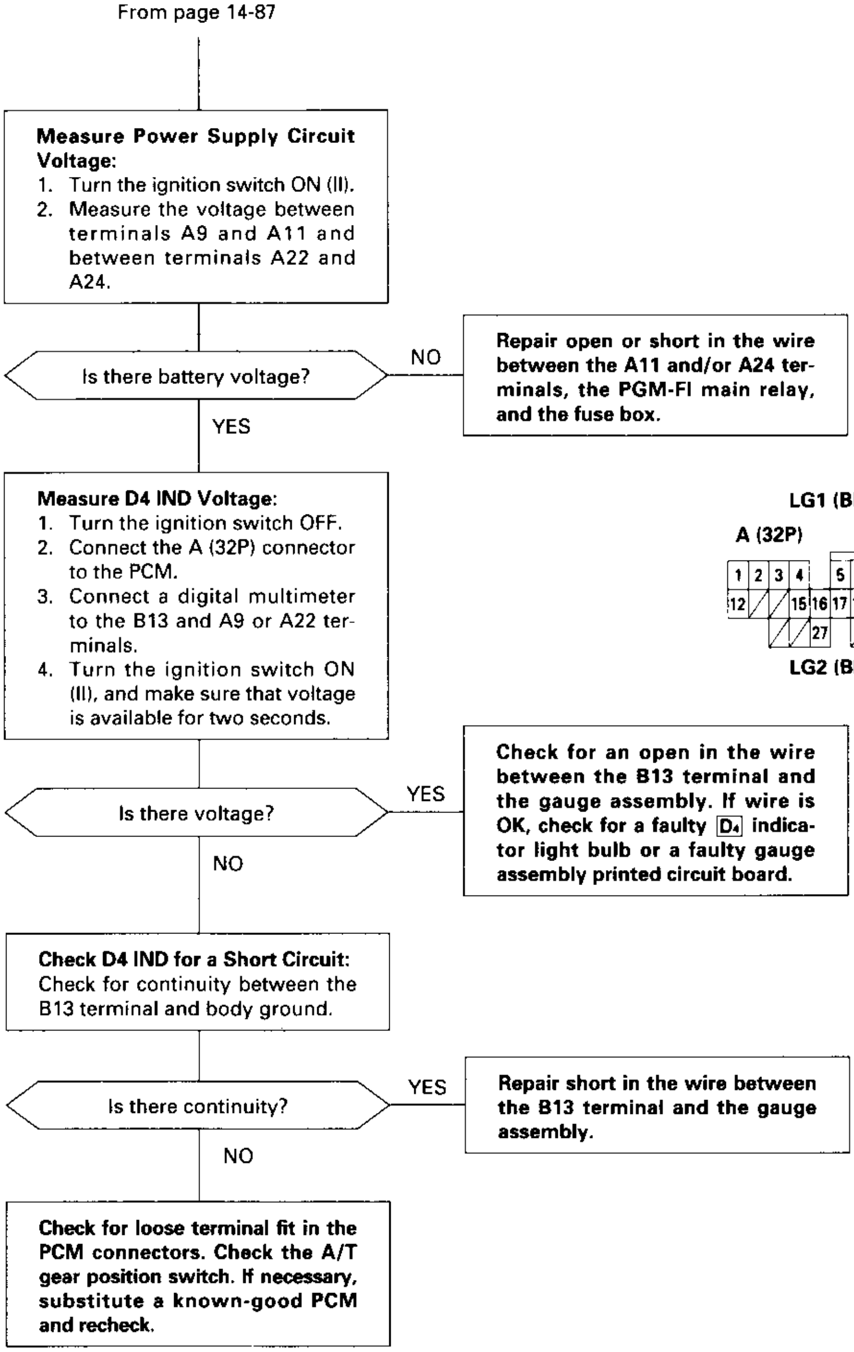
NO —
- **Repair open in the wires between the A9 or A22 terminals and G101.**
- **Repair the body ground (G101).**

YES

To page 14-88

(cont'd)

Troubleshooting Flowchart — D4 Indicator Light Does Not Come On (cont'd)



From page 14-87

Measure Power Supply Circuit Voltage:
1. Turn the ignition switch ON (II).
2. Measure the voltage between terminals A9 and A11 and between terminals A22 and A24.

Is there battery voltage?

NO — **Repair open or short in the wire between the A11 and/or A24 terminals, the PGM-FI main relay, and the fuse box.**

YES

Measure D4 IND Voltage:
1. Turn the ignition switch OFF.
2. Connect the A (32P) connector to the PCM.
3. Connect a digital multimeter to the B13 and A9 or A22 terminals.
4. Turn the ignition switch ON (II), and make sure that voltage is available for two seconds.

Is there voltage?

YES — **Check for an open in the wire between the B13 terminal and the gauge assembly. If wire is OK, check for a faulty D4 indicator light bulb or a faulty gauge assembly printed circuit board.**

NO

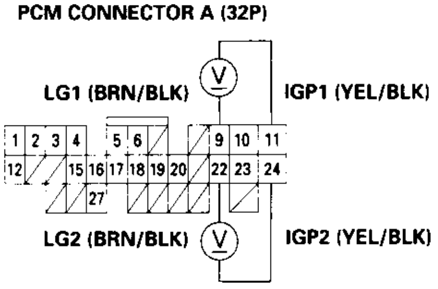
Check D4 IND for a Short Circuit:
Check for continuity between the B13 terminal and body ground.

Is there continuity?

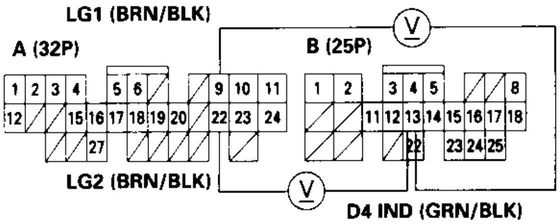
YES — **Repair short in the wire between the B13 terminal and the gauge assembly.**

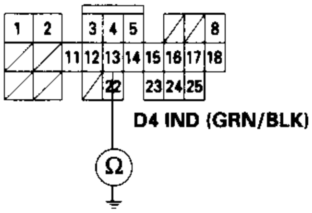
NO

Check for loose terminal fit in the PCM connectors. Check the A/T gear position switch. If necessary, substitute a known-good PCM and recheck.



Wire side of female terminals





Troubleshooting Flowchart — Interlock System - Shift Lock System

Shift lever cannot be moved from P position with the brake pedal pressed.

Check Brake Light Operation:
Press the brake pedal.

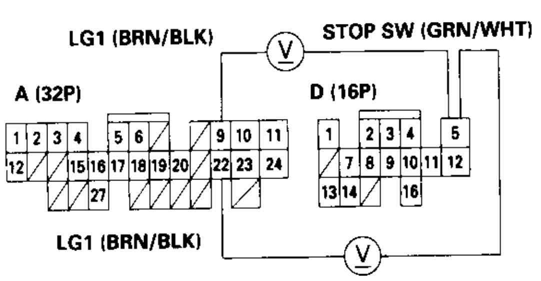
Are the brake lights ON?

NO → **Repair faulty brake switch circuit (see section 23).**

YES

Measure STOP SW Voltage:
1. Turn the ignition switch OFF.
2. Disconnect the A (32P) and D (16P) connectors from the PCM.
3. Measure the voltage between the D5 and A9 or A22 terminals with the brake pedal pressed.

PCM CONNECTORS



Wire side of female terminals

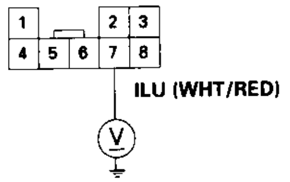
Is there battery voltage?

NO → **Repair open in the wire between the D5 terminal and the brake switch.**

YES

Measure ILU Voltage:
1. Connect the A (32P) and D (16P) connectors to the PCM.
2. Disconnect the 8P connector from the interlock control unit.
3. Turn the ignition switch ON (II).
4. Measure the voltage between the No. 7 terminal of the interlock control unit and body ground with the brake pedal pressed.

INTERLOCK CONTROL UNIT CONNECTOR (8P)



Wire side of female terminals

Is there battery voltage?

NO → **Check for an open or short in the wire between the No. 7 terminal of the interlock control unit and the B12 terminal of the PCM. If the wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.**

YES

To page 14-90

(cont'd)

Electrical Troubleshooting ('97 Model)

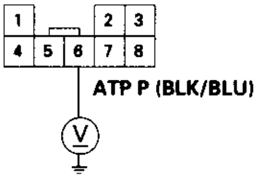
Troubleshooting Flowchart — Interlock System - Shift Lock System (cont'd)

From page 14-89

Measure ATP P Voltage:
Measure the voltage between the No. 6 terminal of the interlock control unit and body ground.

NOTE: Shift lever must be in P.

INTERLOCK CONTROL UNIT CONNECTOR (8P)



Wire side of female terminals

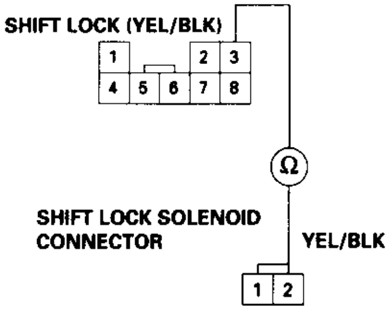
Is there voltage?

YES → **Repair open in the wire between the No. 6 terminal of the interlock control unit and the A/T gear position switch.**

NO ↓

Check Shift Lock Solenoid for an Open Circuit:

1. Turn the ignition switch OFF.
2. Disconnect the shift lock solenoid connector.
3. Check for continuity between the No. 3 terminal of the interlock control unit and the No. 2 terminal of the shift lock solenoid connector.



Wire side of female terminals

Is there continuity?

NO → **Repair open in the wire between the No. 3 terminal and the shift lock solenoid.**

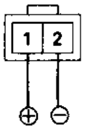
YES ↓

Check Shift Lock Solenoid Operation:

1. Connect the No. 1 terminal of the shift lock solenoid connector to the battery positive terminal, and connect the No. 2 terminal to the battery negative terminal.
2. Check the shift lock solenoid operation.

NOTE: Do not connect the No. 2 terminal to the battery positive terminal or you will damage the diode inside the shift lock solenoid.

SHIFT LOCK SOLENOID CONNECTOR (directly on solenoid)



Terminal side of male terminals

Does the shift lock solenoid operate properly?

NO → **Replace the shift lock solenoid.**

YES ↓

Check for loose terminal fit in the interlock control unit connectors. If necessary, substitute a known-good interlock control unit and recheck.

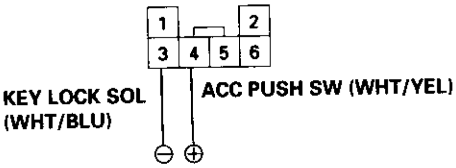
Troubleshooting Flowchart — Interlock System - Key Interlock System

Ignition key cannot be moved from ACC (I) position to LOCK (0) position while pushing the ignition key with the shift lever in P position, and the shift lever button released.

Check Key Interlock Solenoid Operation:

1. Disconnect the ignition switch connector (6P).
2. Connect the No. 4 terminal of the ignition switch 6P connector to the battery positive terminal, and connect the No. 3 terminal to the battery negative terminal.
3. Check the key interlock solenoid operation. A clicking sound should be heard.

IGNITION SWITCH 6P CONNECTOR



Wire side of female terminals

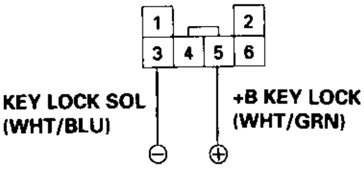
Does the key interlock solenoid operate properly?

NO — **Faulty key interlock solenoid. Replace the ignition key cylinder/steering lock assembly.**

YES

Check Key Interlock Switch Operation:

1. Connect the No. 5 terminal of the ignition switch connector to the battery positive terminal, and connect the No. 3 terminal to the battery negative terminal.
2. Turn the ignition switch to ACC (I), then push it.
3. Check the key interlock solenoid operation. A clicking sound should be heard while pushing the ignition key.



Does the key interlock solenoid operate properly?

NO — **Faulty key interlock switch. Replace the ignition key cylinder/steering lock assembly.**

YES

To page 14-92

(cont'd)

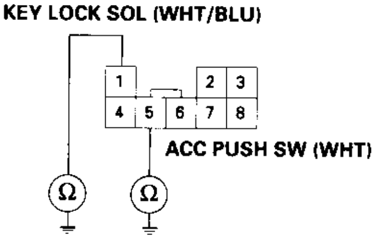
Troubleshooting Flowchart — Interlock System – Key Interlock System (cont'd)

From page 14-91

Check Key Interlock Solenoid for a Short Circuit:

1. Disconnect the interlock control unit connector.
2. Check for continuity between the No. 1 terminal and body ground and between the No. 5 terminal and body ground individually.

INTERLOCK CONTROL UNIT CONNECTOR (8P)

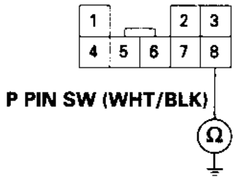


Wire side of female terminals

Is there continuity? — YES → **Repair short in the wire between the No. 1 or No. 5 terminal and the ignition switch 6P connector.**

NO

Check Park Pin Switch Operation:
Check for continuity between the No. 8 terminal and body ground.



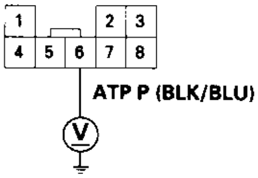
Is there continuity? — YES → **Check for short in the wire between the No. 8 terminal of the interlock control unit and the park pin switch. If wire is OK, check the park pin switch.**

NO

Measure ATP P Voltage:

1. Turn the ignition switch ON (II).
2. Measure the voltage between the No. 6 terminal and body ground.

NOTE: Shift lever must be in P.



Is there voltage? — YES → **Repair open in the wire between the No. 6 terminal and the A/T gear position switch.**

NO

Check for loose terminal fit in the interlock control unit connectors. If necessary, substitute a known-good interlock control unit and recheck.

Troubleshooting Flowchart — Lock-up Control Solenoid Valve A

Possible Cause

- **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**
- **Open in VB SOL wire**

- **OBD II Scan Tool indicates Code P1753.**
- **Self-diagnosis $\boxed{D_4}$ or $\boxed{D}$ indicator light blinks once.**

If the PGM Tester is available, retrieve the A/T Freeze Data, then clear the PCM.

Test-drive the vehicle under the same conditions the Freeze Data was recorded.

Did the code return?

NO

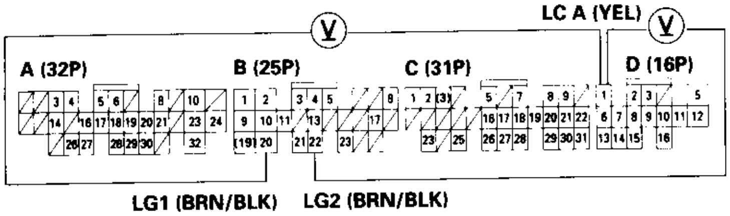
Intermittent failure. The system is OK at this time. Check the fit of the pins in all connectors affected by this code.

YES

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 D1 and B20 or B22 terminals.

PCM CONNECTORS



Wire side of female terminals

Is there voltage?

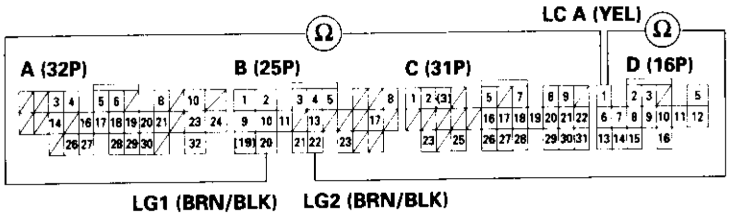
YES

Repair short to power in the wire between the D1 terminal and the lock-up control solenoid valve A.

NO

Measure Lock-up Control Solenoid Valve A Resistance:

1. Turn the ignition switch OFF.
2. Measure the resistance between the D1 and B20 or B22 terminals.



Is the resistance 12 – 25 Ω?

YES

To page 14-95

NO

To page 14-94

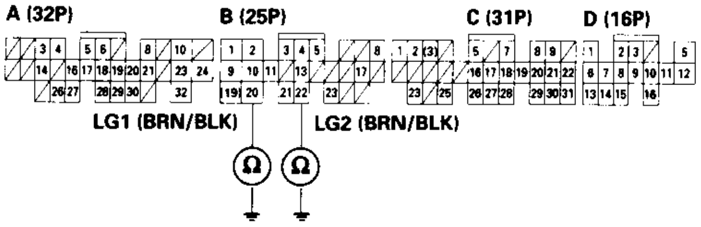
(cont'd)

Troubleshooting Flowchart — Lock-up Control Solenoid Valve A (cont'd)

From page 14-93

Check for continuity between the B20 terminal and body ground, and between the B22 terminal and body ground.

PCM CONNECTORS



Wire side of female terminals

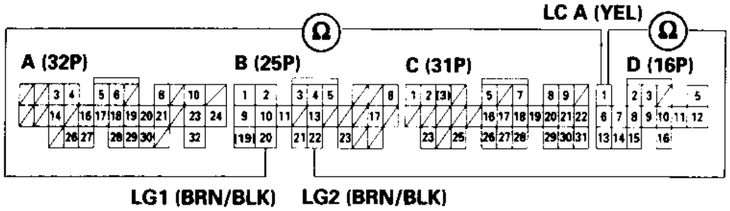
Is there continuity?

NO — Repair open in the wires between the B20 and B22 terminals and ground (G101).

YES

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.



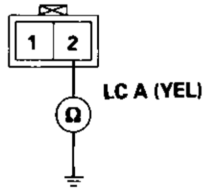
Is there continuity?

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 Connector:
Measure the resistance between the No. 2 terminal of the lock-up control solenoid valve A/B assembly connector and body ground.

LOCK-UP CONTROL SOLENOID VALVE A/B ASSEMBLY CONNECTOR



Terminal side of male terminals

Is the resistance 12 – 25 Ω?

NO — **Replace the lock-up control solenoid valve A/B assembly.**

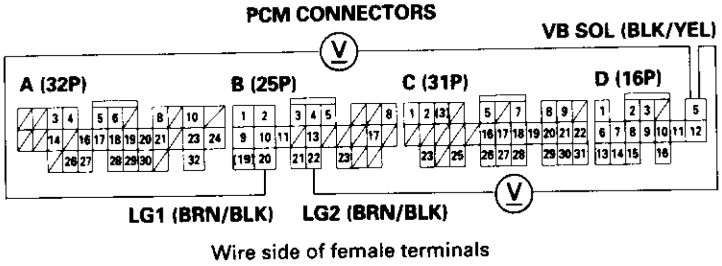
YES

Check for open in the wire between the D1 terminal and the lock-up control solenoid valve A.

From page 14-93

Measure VB SOL Voltage:

1. Turn the ignition switch ON (II).
2. Measure the voltage between the D5 and B20 or B22 terminals.



Wire side of female terminals

Is there battery voltage?

NO

Check for blown No. 15 (7.5 A) fuse in the under-dash fuse/relay box. If the fuse is OK, repair open in the wire between the D5 terminal and the under-dash fuse/relay box.

YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

Troubleshooting Flowchart — Lock-up Control Solenoid Valve B

- OBD II Scan Tool indicates Code P1758.
- Self-diagnosis $\boxed{D_4}$ or $\boxed{D}$ indicator light blinks twice.

Possible Cause
• 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 • Open in VB SOL wire

If the PGM Tester is available, retrieve the A/T Freeze Data, then clear the PCM.

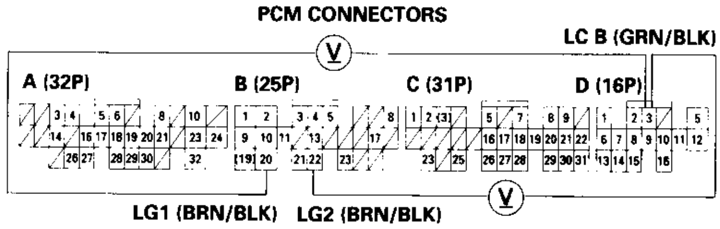
Test-drive the vehicle under the same conditions the Freeze Data was recorded.

Did the code return?

NO → **Intermittent failure. The system is OK at this time. Check the fit of the pins in all connectors affected by this code.**

YES

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 D3 and B20 or B22 terminals.



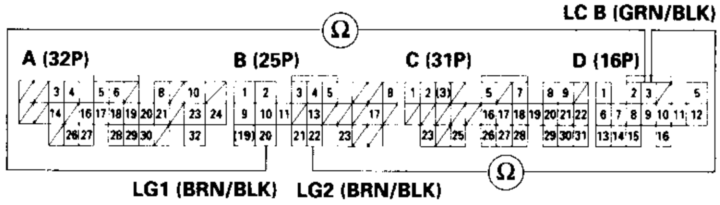
Wire side of female terminals

Is there voltage?

YES → **Repair short to power in the wire between the D3 terminal and the lock-up control solenoid valve B.**

NO

Measure Lock-up Control Solenoid Valve B Resistance:
1. Turn the ignition switch OFF.
2. Measure the resistance between the D3 and B20 or B22 terminals.



Is the resistance 12 - 25 Ω?

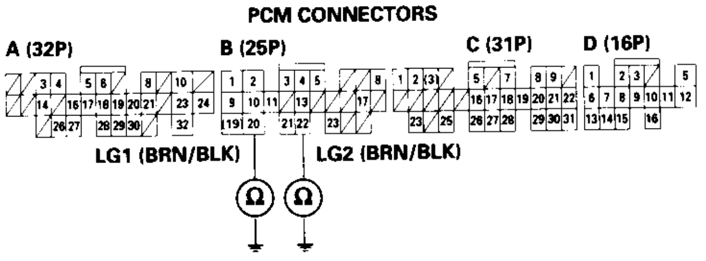
YES → To page 14-98

NO

To page 14-97

From page 14-96

Check for continuity between the B20 terminal and body ground, and between the B22 terminal and body ground.



Wire side of female terminals

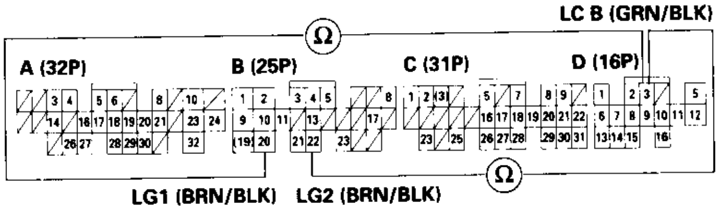
Is there continuity?

NO → **Repair open in the wires between the B20 and B22 terminals and ground (G101).**

YES

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.



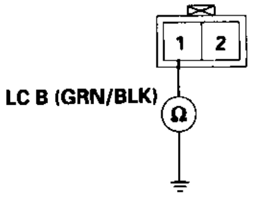
Is there continuity?

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 Connector:
Measure the resistance between the No. 1 terminal of the lock-up control solenoid valve A/B assembly connector and body ground.

LOCK-UP CONTROL SOLENOID VALVE A/B ASSEMBLY CONNECTOR



Terminal side of male terminals

Is the resistance 12 – 25 Ω?

NO → **Replace the lock-up control solenoid valve A/B assembly.**

YES

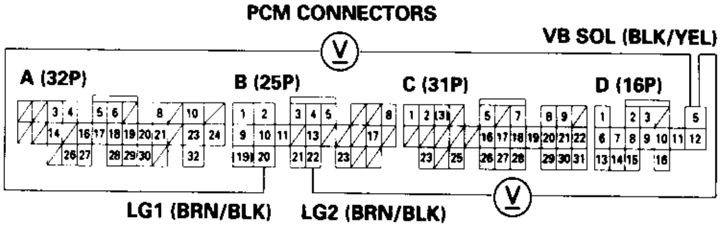
Check for open in the wire between the D3 terminal and the lock-up control solenoid valve B.

(cont'd)

Troubleshooting Flowchart — Lock-up Control Solenoid Valve B (cont'd)

From page 14-96

Measure VB SOL Voltage:
1. Turn the ignition switch ON (II).
2. Measure the voltage between the D5 and B20 or B22 terminals.



Wire side of female terminals

Is there battery voltage?

NO

Check for blown No. 15 (7.5 A) fuse in the under-dash fuse/relay box. If the fuse is OK, repair open in the wire between the D5 terminal and the under-dash fuse/relay box.

YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

Troubleshooting Flowchart — A/T Gear Position Switch (Short)

Possible Cause
• Short in A/T gear position switch wire • Faulty A/T gear position switch

NOTE: Code 1705 (5) is set when the PCM receives two gear position inputs at the same time.

- **OBD II Scan Tool indicates Code P1705.**
- **Self-diagnosis D4 or D indicator light blinks five times.**

Observe the A/T Gear Position Indicator:
1. Turn the ignition switch ON (II).
2. Observe the A/T gear position indicator, and shift 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?

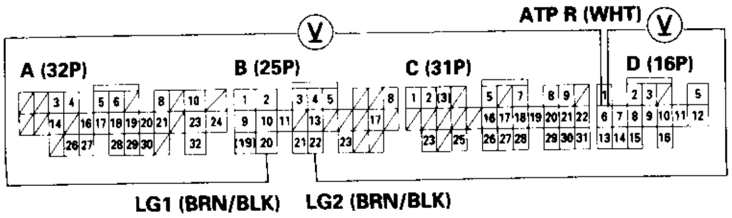
YES — **Replace the A/T gear position switch.**

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.

PCM CONNECTORS



Wire side of female 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, and check for open in the wires between the B20 and B22 terminals and body ground (G101). 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 14-100

(cont'd)

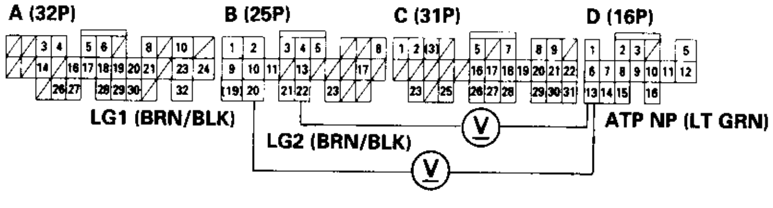
Troubleshooting Flowchart — A/T Gear Position Switch (Short) (cont'd)

From page 14-99

Measure ATP NP Voltage:

1. Shift to all positions other than P or N.
2. Measure the voltage between the D13 and B20 or B22 terminals.

PCM CONNECTORS



Wire side of female terminals

Is there 5 V?

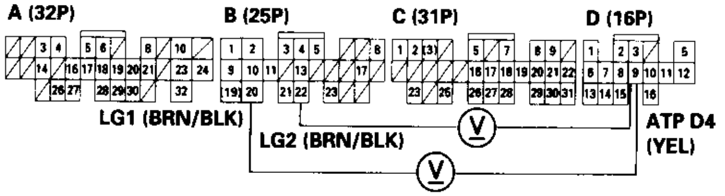
NO

Check for short in the wire between the D13 terminal and the A/T gear position switch, and in the P and N position signal 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

Measure ATP D4 Voltage:

1. Shift to all positions other than D4 ('98) or D ('99 - 00).
2. Measure the voltage between the D9 and B20 or B22 terminals.



Is there 5 V?

NO

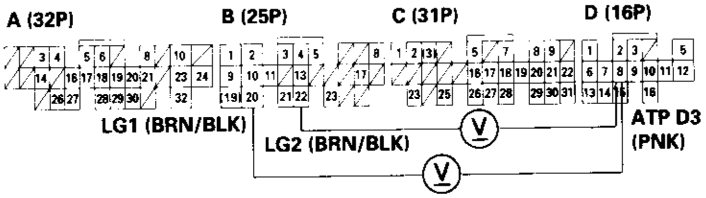
Check for short in the wire between the D9 terminal and the A/T gear position switch or A/T gear position indicator. If wires are OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

YES

To page 14-101

From page 14-100

PCM CONNECTORS



Wire side of female terminals

Measure ATP D3 Voltage ('98 model):

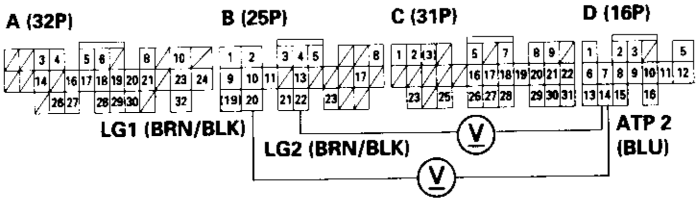
1. Shift to all positions other than $\boxed{D_3}$.
2. Measure the voltage between the D8 and B20 or B22 terminals.

Is there battery voltage?

NO

Check for short in the wire between the D8 terminal and the A/T gear position switch or A/T gear position indicator ('98). If wires are OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

YES



Measure ATP 2 Voltage:

1. Shift to all positions other than $\boxed{2}$.
2. Measure the voltage between the D14 and B20 or B22 terminals.

Is there battery voltage?

NO

Check for short in the wire between the D14 terminal and the A/T gear position switch or A/T gear position indicator. If wires are OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

YES

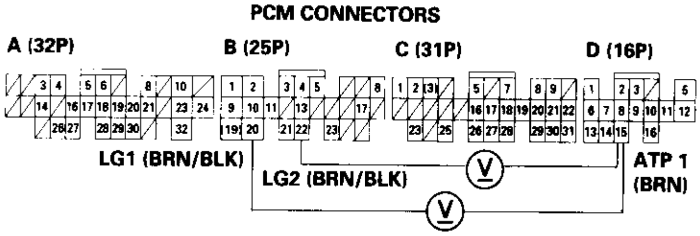
To page 14-102

(cont'd)

Troubleshooting Flowchart — A/T Gear Position Switch (Short) (cont'd)

From page 14-101

Measure ATP 1 Voltage:
1. Shift to all positions other than [1].
2. Measure the voltage between the D15 and B20 or B22 terminals.



Wire side of female terminals

Is there battery voltage?

NO

Check for short in the wire between the D15 terminal and the A/T gear position switch or A/T gear position indicator. If wires are OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck. The system should be OK at this point. If any indicators stay on when the shift lever is not in the selected position, perform this troubleshooting flowchart again.

Troubleshooting Flowchart — A/T Gear Position Switch (Open)

- **OBD II Scan Tool indicates Code P1706.**
- **Self-diagnosis $\boxed{D_4}$ or $\boxed{D}$ indicator light blinks six times.**

Possible Cause

- **Disconnected A/T gear position switch connector**
- **Open in A/T gear position switch wire**
- **Faulty A/T gear position switch**

Are any of the gear position indicators not working when you shift them?

NO → **The system is OK at this time. Check for other problems such as harness damage.**

YES

Test the A/T gear position switch (see page 14-139).

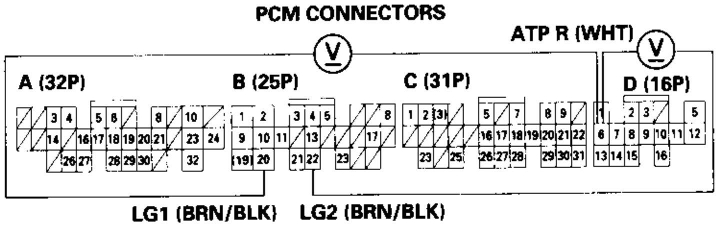
Is the switch OK?

NO → **Replace the A/T gear position switch.**

YES

Measure ATP R Voltage:

1. Turn the ignition switch ON (II).
2. Shift to $\boxed{R}$ position.
3. Measure the voltage between the D6 and B20 or B22 terminals.



Wire side of female terminals

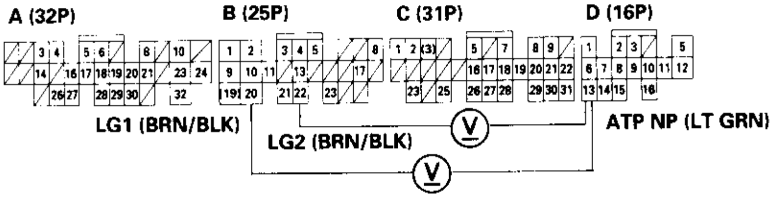
Is there voltage?

YES → **Repair open in the wire between the D6 terminal and the A/T gear position switch.**

NO

Measure ATP NP Voltage:

1. Shift to $\boxed{P}$ or $\boxed{N}$ position.
2. Measure the voltage between the D13 and B20 or B22 terminals.



Is there voltage?

YES → **Repair open in the wire between the D13 terminal and the A/T gear position switch.**

NO

To page 14-104

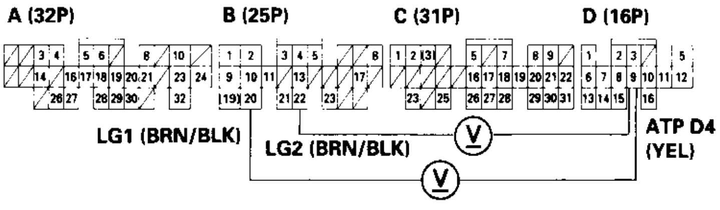
(cont'd)

Troubleshooting Flowchart — A/T Gear Position Switch (Open) (cont'd)

From page 14-103

Measure ATP D4 Voltage:
1. Shift to D4 ('98) or D ('99 – 00) position.
2. Measure the voltage between the D9 and B20 or B22 terminals.

PCM CONNECTORS



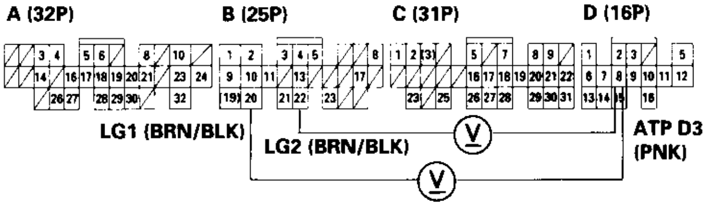
Wire side of female terminals

Is there voltage?

YES — **Repair open in the wire between the D9 terminal and the A/T gear position switch.**

NO

Measure ATP D3 Voltage ('98 model):
1. Shift to D3 position.
2. Measure the voltage between the D8 and B20 or B22 terminals.

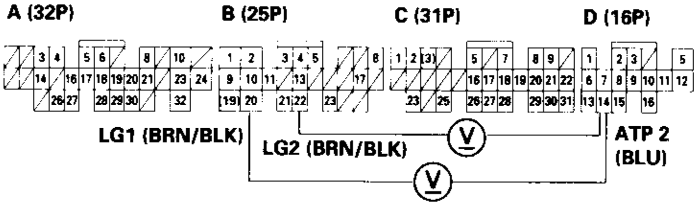


Is there voltage?

YES — **Repair open in the wire between the D8 terminal and the A/T gear position switch ('98).**

NO

Measure ATP 2 Voltage:
1. Shift to 2 position.
2. Measure the voltage between the D14 and B20 or B22 terminals.



Is there voltage?

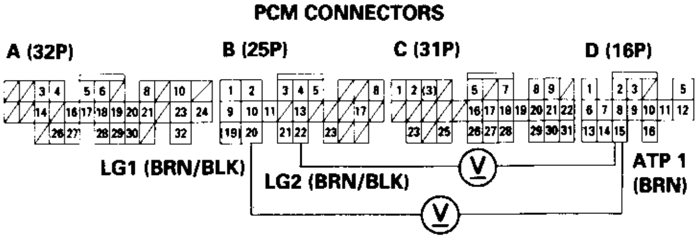
YES — **Repair open in the wire between the D14 terminal and the A/T gear position switch.**

NO

To page 14-105

From page 14-104

Measure ATP 1 Voltage:
1. Shift to $\boxed{1}$ position.
2. Measure the voltage between the D15 and B20 or B22 terminals.



Wire side of female terminals

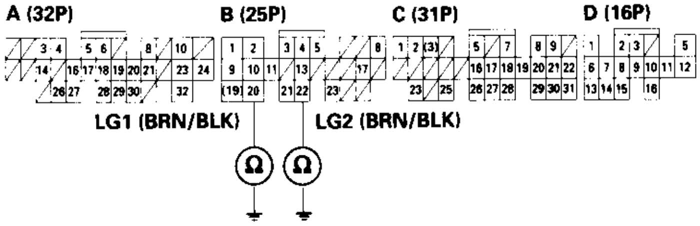
Is there voltage?

YES

Repair open in the wire between the D15 terminal and the A/T gear position switch.

NO

Check LG Wire for an Open Circuit:
1. Turn the ignition switch OFF.
2. Check for continuity between the B20 terminal and body ground, and between the B22 terminal and body ground.



Is there continuity?

NO

Repair open in the wires between the B20 and B22 terminals and body ground, and repair poor ground (G101).

YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

Troubleshooting Flowchart — Shift Control Solenoid Valve A

- **OBD II Scan Tool indicates Code P0753.**
- **Self-diagnosis $\boxed{D_4}$ or $\boxed{D}$ indicator light blinks seven times.**

Possible Cause
• 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 • Open in VB SOL wire

If the PGM Tester is available, retrieve the A/T Freeze Data, then clear the PCM.

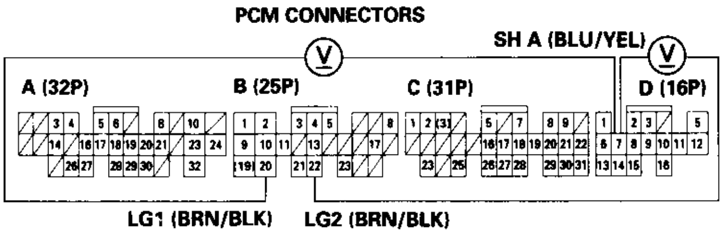
Test-drive the vehicle under the same conditions the Freeze Data was recorded.

Did the code return?

NO → **Intermittent failure. The system is OK at this time. Check the fit of the pins in all connectors affected by this code.**

YES

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 D7 and B20 or B22 terminals.



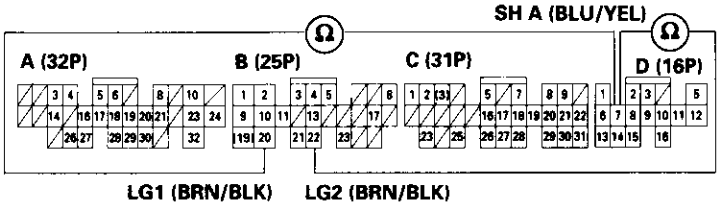
Wire side of female terminals

Is there voltage?

YES → **Repair short to power in the wire between the D7 terminal and the shift control solenoid valve A.**

NO

Measure Shift Control Solenoid Valve A Resistance:
1. Turn the ignition switch OFF.
2. Measure the resistance between the D7 and B20 or B22 terminals.



Is the resistance 12 – 25 Ω?

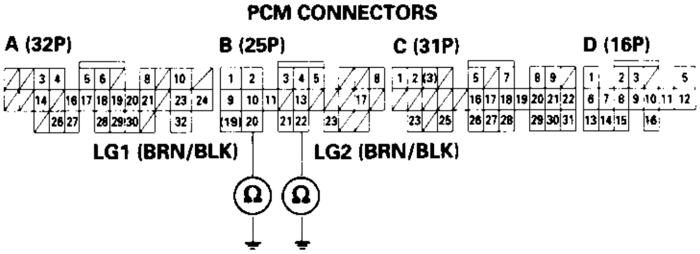
YES → To page 14-108

NO

To page 14-107

From page 14-106

Check for continuity between the B20 terminal and body ground, and between the B22 terminal and body ground.



Wire side of female terminals

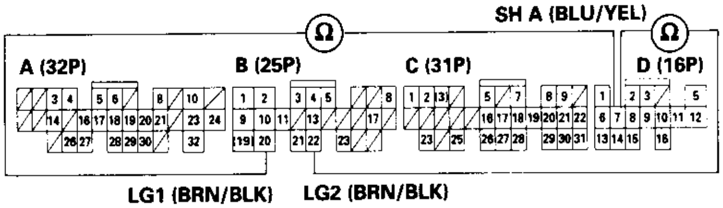
Is there continuity?

NO → **Repair open in the wires between the B20 and B22 terminals and ground (G101).**

YES

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.

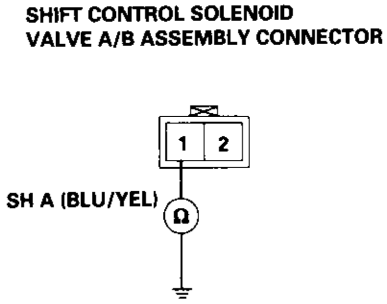


Is there continuity?

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 Connector:
Measure the resistance between the No. 1 terminal of the shift control solenoid valve A/B assembly connector and body ground.



Terminal side of male terminals

Is the resistance 12 – 25 Ω?

NO → **Replace the shift control solenoid valve A/B assembly.**

YES

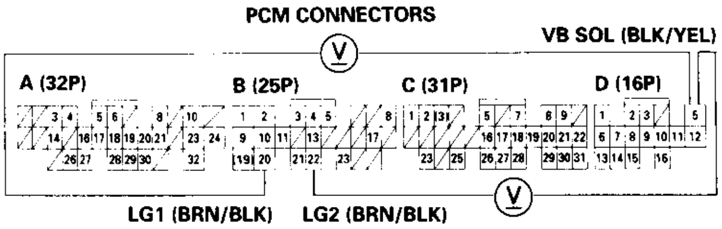
Check for open in the wire between the D7 terminal and the shift control solenoid valve A.

(cont'd)

Troubleshooting Flowchart — Shift Control Solenoid Valve A (cont'd)

From page 14-106

Measure VB SOL Voltage:
1. Turn the ignition switch ON (II).
2. Measure the voltage between the D5 and B20 or B22 terminals.



Wire side of female terminals

Is there battery voltage?

NO

Check for blown No. 15 (7.5 A) fuse in the under-dash fuse/relay box. If the fuse is OK, repair open in the wire between the D5 terminal and the under-dash fuse/relay box.

YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

Troubleshooting Flowchart — Shift Control Solenoid Valve B

- **OBD II Scan Tool indicates Code P0758.**
- **Self-diagnosis D4 or D 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** **• Open in VB SOL wire**

If the PGM Tester is available, retrieve the A/T Freeze Data, then clear the PCM.

Test-drive the vehicle under the same conditions the Freeze Data was recorded.

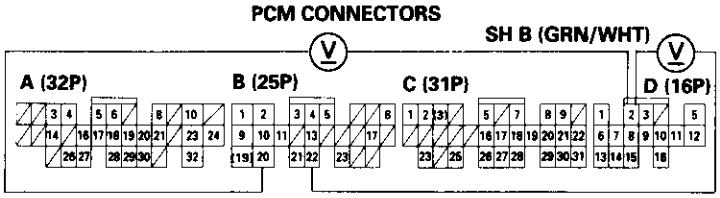
Did the code return?

NO — **Intermittent failure. The system is OK at this time. Check the fit of the pins in all connectors affected by this code.**

YES

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.



Wire side of female terminals

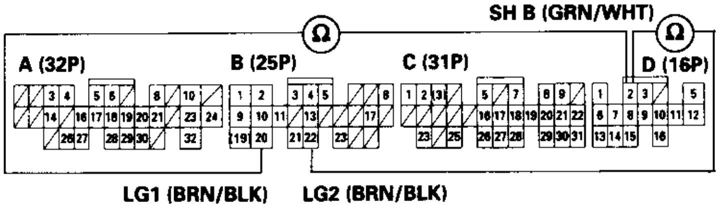
Is there voltage?

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 — To page 14-111

NO

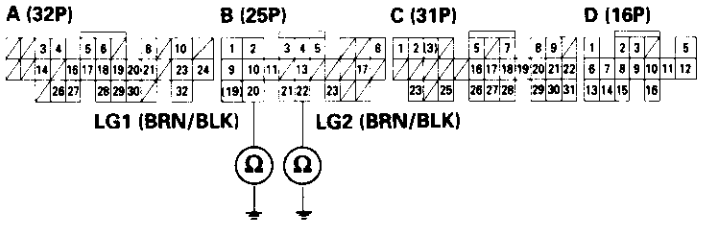
To page 14-110

(cont'd)

Troubleshooting Flowchart — Shift Control Solenoid Valve B (cont'd)

From page 14-109

PCM CONNECTORS



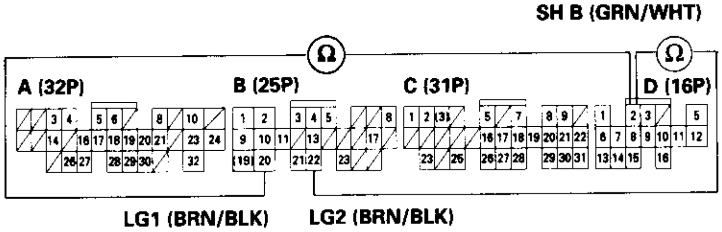
Wire side of female terminals

Check for continuity between the B20 terminal and body ground, and between the B22 terminal and body ground.

Is there continuity?

NO → **Repair open in the wires between the B20 and B22 terminals and ground (G101).**

YES



Check Shift Control Solenoid Valve B for a Short Circuit:

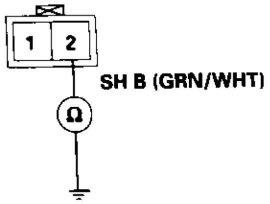
1. Disconnect the 2P connector from the shift control solenoid valve A/B assembly.
2. Check for continuity between the D2 and B20 or B22 terminals.

Is there continuity?

YES → **Repair short to ground in the wire between the D2 terminal and the shift control solenoid valve B.**

NO

SHIFT CONTROL SOLENOID VALVE A/B ASSEMBLY CONNECTOR



Terminal side of male terminals

Measure Shift Control Solenoid Valve B Resistance at the Solenoid Connector:
Measure the resistance between the No. 2 terminal of the shift control solenoid valve A/B assembly connector and body ground.

Is the resistance 12 – 25 Ω?

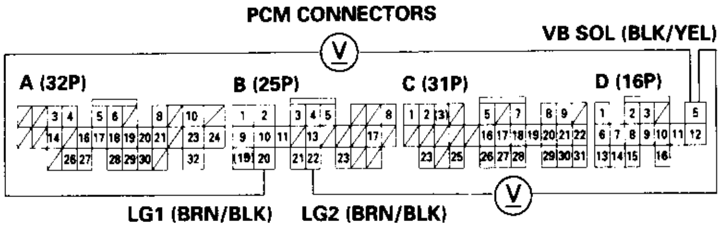
NO → **Replace the shift control solenoid valve A/B assembly.**

YES

Check for open in the wire between the D2 terminal and the shift control solenoid valve B.

From page 14-109

Measure VB SOL Voltage:
1. Turn the ignition switch ON (II).
2. Measure the voltage between the D5 and B20 or B22 terminals.



Wire side of female terminals

Is there battery voltage?

NO

Check for blown No. 15 (7.5 A) fuse in the under-dash fuse/relay box. If the fuse is OK, repair open in the wire between the D5 terminal and the under-dash fuse/relay box.

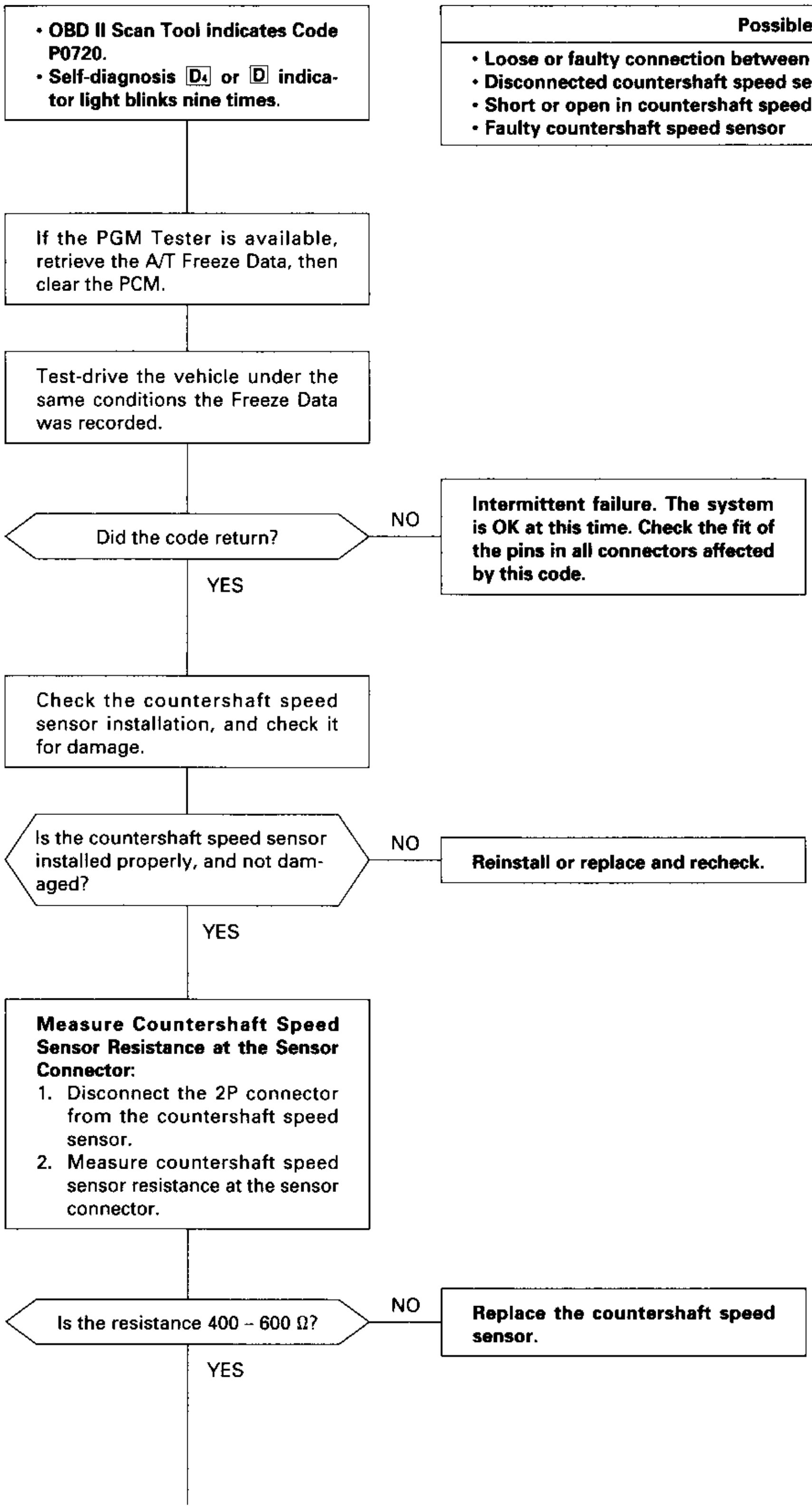
YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

Troubleshooting Flowchart — Countershaft Speed Sensor

Possible Cause

- **Loose or faulty connection between the PCM and vehicle harness**
- **Disconnected countershaft speed sensor connector**
- **Short or open in countershaft speed sensor wire**
- **Faulty countershaft speed sensor**



- **OBD II Scan Tool indicates Code P0720.**
- **Self-diagnosis D4 or D indicator light blinks nine times.**

If the PGM Tester is available, retrieve the A/T Freeze Data, then clear the PCM.

Test-drive the vehicle under the same conditions the Freeze Data was recorded.

Did the code return?

NO

Intermittent failure. The system is OK at this time. Check the fit of the pins in all connectors affected by this code.

YES

Check the countershaft speed sensor installation, and check it for damage.

Is the countershaft speed sensor installed properly, and not damaged?

NO

Reinstall or replace and recheck.

YES

Measure Countershaft Speed Sensor Resistance at the Sensor Connector:

1. Disconnect the 2P connector from the countershaft speed sensor.
2. Measure countershaft speed sensor resistance at the sensor connector.

Is the resistance 400 – 600 Ω?

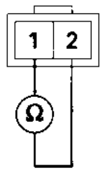
NO

Replace the countershaft speed sensor.

YES

To page 14-113

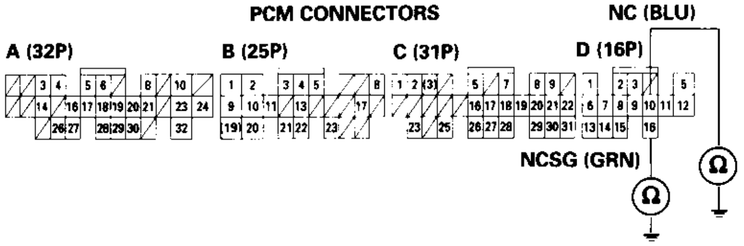
COUNTERSHAFT SPEED SENSOR CONNECTOR



Terminal side of male terminals

From page 14-112

Check Countershaft Speed Sensor for a Short Circuit:
1. Disconnect the D (16P) connector from the PCM.
2. Check for continuity between body ground and the D10 terminal and D16 terminal individually.

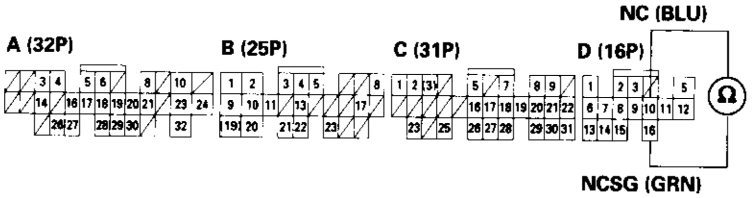


Wire side of female terminals

Is there continuity? — YES → **Repair short in the wires between the D10 and D16 terminals and the countershaft speed sensor.**

NO

Measure Countershaft Speed Sensor Circuit for an Open:
1. Connect the countershaft speed sensor connector.
2. Measure the resistance between the D10 and D16 terminals.



Is the resistance 400 – 600 Ω? — NO → **Repair loose terminal or open in the wires between the D10 and D16 terminals and the countershaft speed sensor.**

YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

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. Any problem causing irregular countershaft to mainshaft speed difference can cause this code; this can sometimes be seen in A/T Freeze Data. Freeze Data can also indicate an electrical problem in the sensor circuits if one of the sensors reads 0 mph during a test-drive.

- **OBD II Scan Tool indicates Code P0715.**
- **Self-diagnosis D4 or D indicator light indicates Code 15.**

If the PGM Tester is available, retrieve the A/T Freeze Data, then clear the PCM.

Test-drive the vehicle under the same conditions the Freeze Data was recorded.

Did the code return?

NO

Intermittent failure. The system is OK at this time. Check the fit of the pins in all connectors affected by this code.

YES

Check the mainshaft and countershaft speed sensors installation, and check them for damage.

Are the mainshaft and countershaft speed sensors installed properly, and not damaged?

NO

Reinstall or replace and recheck.

YES

Measure Mainshaft Speed Sensor Resistance at the Sensor Connector:

1. Disconnect the 2P connector from the mainshaft speed sensor.
2. Measure mainshaft speed sensor resistance at the sensor connector.

Is the resistance 400 – 600 Ω?

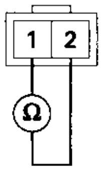
NO

Replace the mainshaft speed sensor.

YES

To page 14-115

MAINSHAFT SPEED SENSOR CONNECTOR



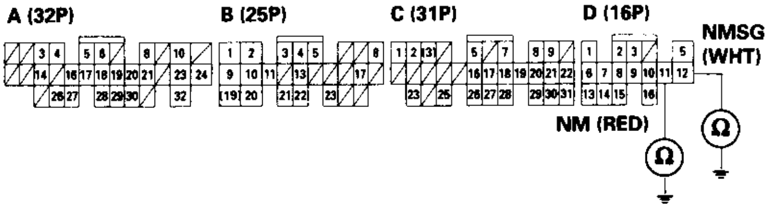
Terminal side of male terminals

From page 14-114

Check Mainshaft Speed Sensor for a Short Circuit:

1. Disconnect the D (16P) connector from the PCM.
2. Check for continuity between body ground and the D11 terminal and D12 terminal individually.

PCM CONNECTORS



Wire side of female terminals

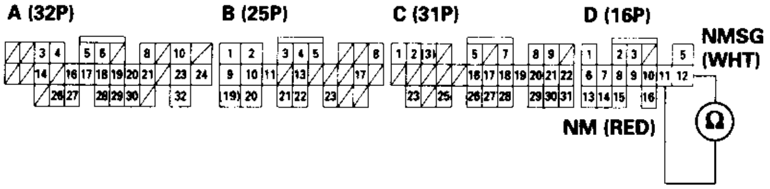
Is there continuity?

YES — **Repair short in the wires between the D11 and D12 terminals and the mainshaft speed sensor.**

NO

Measure Mainshaft Speed Sensor Resistance:

1. Connect the mainshaft speed sensor connector.
2. Measure the resistance between the D11 and D12 terminals.



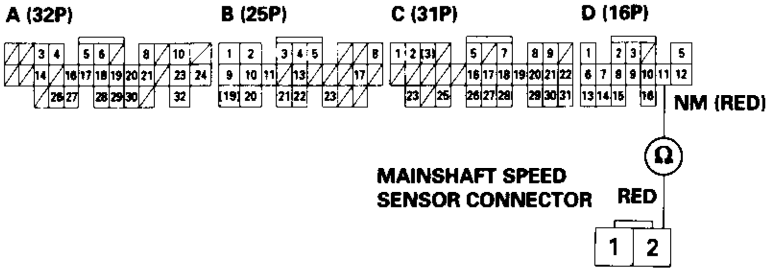
Is the resistance 400 – 600 Ω?

YES — **Run the Electrical Troubleshooting Flowchart for code P0720 (code 9). Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.**

NO

Check NM Wire Continuity:

1. Disconnect the 2P connector from the mainshaft speed sensor.
2. Check for continuity between the D11 terminal and the No. 2 terminal of the mainshaft speed sensor connector.



Wire side of female terminals

Is there continuity?

NO — **Repair open in the wire between the D11 terminal and the mainshaft speed sensor.**

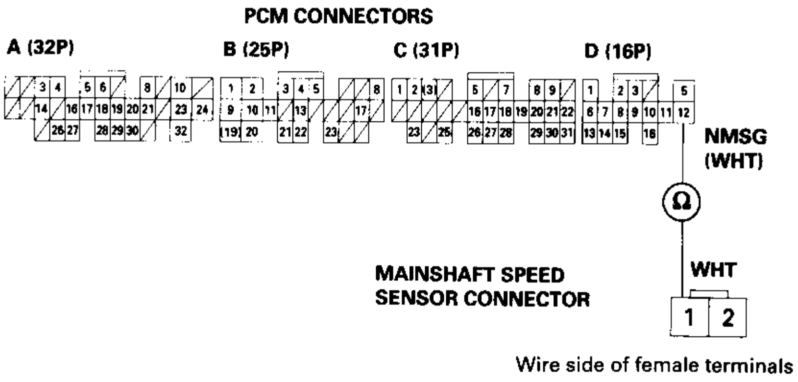
YES

To page 14-116

(cont'd)

Troubleshooting Flowchart — Mainshaft Speed Sensor (cont'd)

From page 14-115



Wire side of female terminals

Check NMSG Wire Continuity:
Check for continuity between the D12 terminal and the No. 1 terminal of the mainshaft speed sensor connector.

Is there continuity?

NO — **Repair open in the wire between the D12 terminal and the mainshaft speed sensor.**

YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

Troubleshooting Flowchart — Linear Solenoid

Possible Cause

- **Disconnected linear solenoid connector**
- **Short or open in linear solenoid wire**
- **Faulty linear solenoid**
- **Open in VB SOL wire**
- **Open in PG1 and PG2 wires or poor ground (G101).**

- **OBD II Scan Tool indicates Code P1768.**
- **Self-diagnosis $\boxed{D_4}$ or $\boxed{D}$ indicator light indicates Code 16.**

If the PGM Tester is available, retrieve the A/T Freeze Data, then clear the PCM.

Test-drive the vehicle under the same conditions the Freeze Data was recorded.

Did the code return?

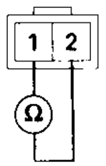
NO — **Intermittent failure. The system is OK at this time. Check the fit of the pins in all connectors affected by this code.**

YES

Measure Linear Solenoid Resistance at the Solenoid Connector:

1. Disconnect the 2P connector from the linear solenoid.
2. Measure linear solenoid resistance at the solenoid connector.

LINEAR SOLENOID CONNECTOR



Terminal side of male terminals

Is the resistance about 5 Ω?

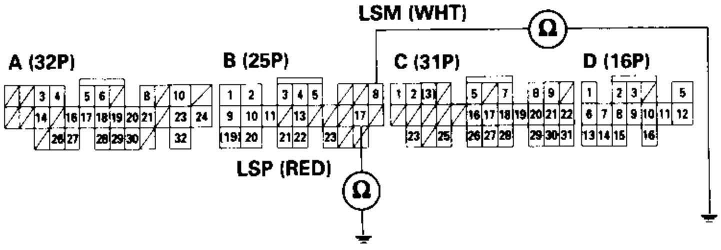
NO — **Replace the linear solenoid assembly.**

YES

Check Linear Solenoid for a Short Circuit:

1. Disconnect the B (25P) connector from the PCM.
2. Check for continuity between body ground and the B8 terminal and the B17 terminal individually.

PCM CONNECTORS



Wire side of female terminals

Is there continuity?

YES — **Repair short to ground in the wires between the B8 and B17 terminals and the linear solenoid.**

NO

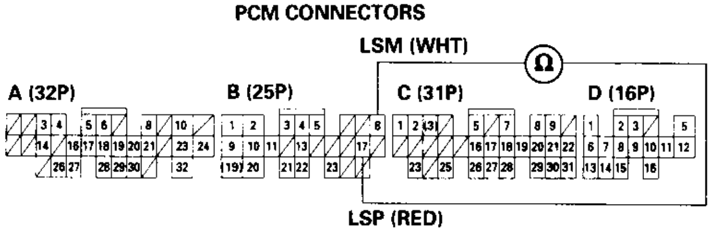
To page 14-118

(cont'd)

Troubleshooting Flowchart — Linear Solenoid (cont'd)

From page 14-117

Measure Linear Solenoid Resistance:
1. Connect the linear solenoid connector.
2. Measure the resistance between the B8 and B17 terminals.



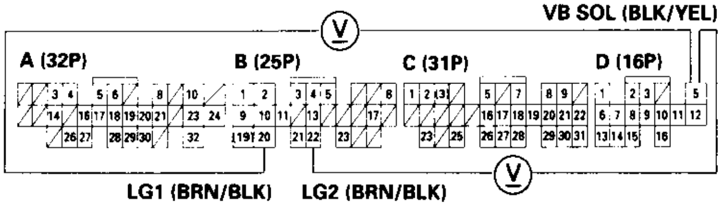
Wire side of female terminals

Is the resistance about 5 Ω?

NO — **Repair loose terminal or open in the wires between the B8 and B17 terminals and the linear solenoid.**

YES

Measure VB SOL Voltage:
1. Turn the ignition switch OFF.
2. Disconnect the D (16P) connector from the PCM.
3. Turn the ignition switch ON (II).
4. Measure the voltage between the D5 and B20 or B22 terminals.

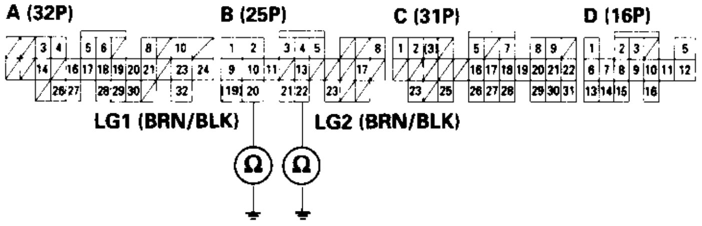


Is there battery voltage?

NO — **Check for blown No. 15 (7.5 A) fuse in the under-dash fuse/relay box. If the fuse is OK, repair open in the wire between the D5 terminal and the under-dash fuse/relay box.**

YES

Check LG Wire for an Open Circuit:
1. Turn the ignition switch OFF.
2. Check for continuity between the B20 terminal and body ground, and between the B22 terminal and body ground.



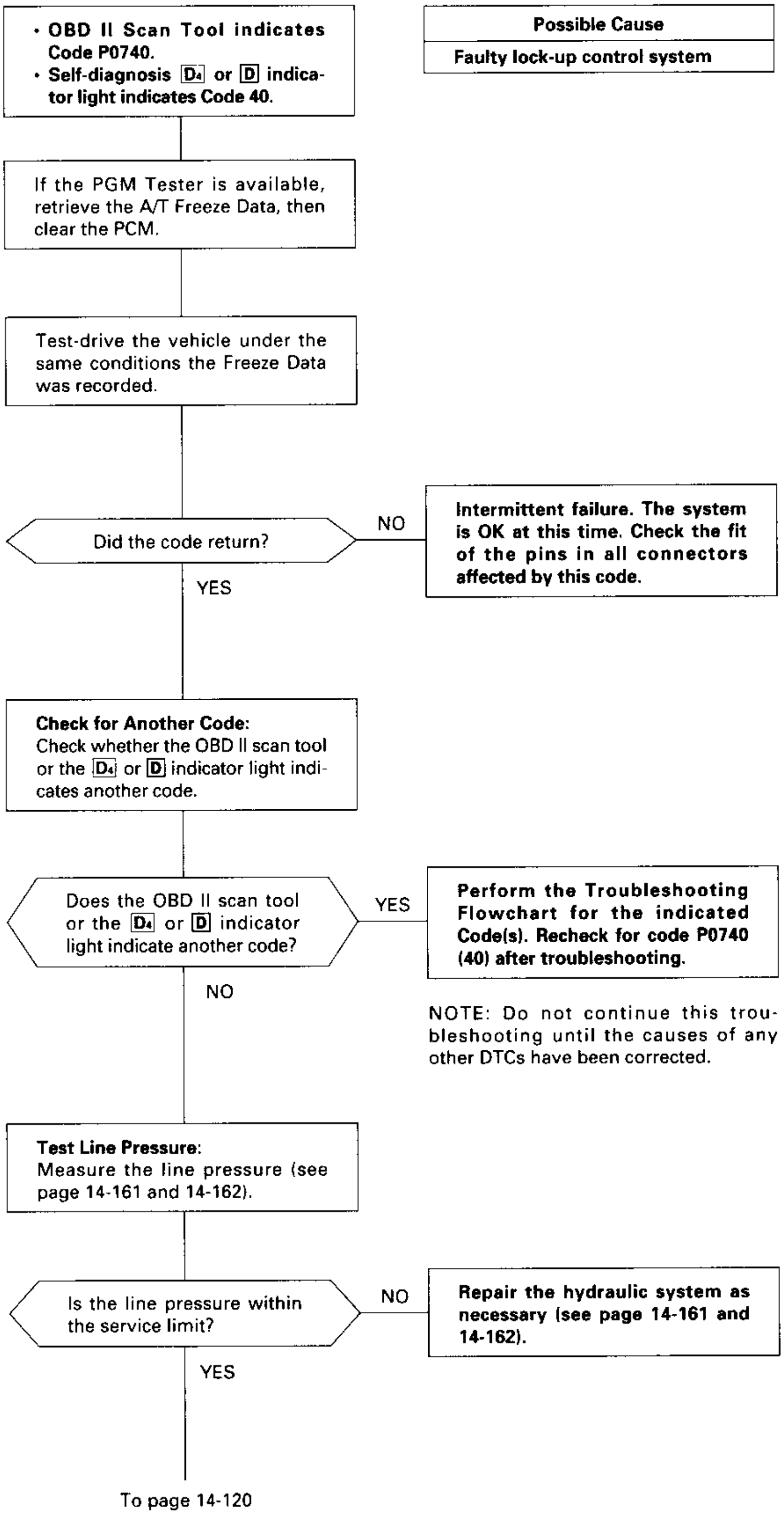
Is there continuity?

NO — **Repair open in the wires between the B20 and B22 terminals and body ground, and repair poor ground (G101).**

YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

Troubleshooting Flowchart — Lock-up Control System



- **OBD II Scan Tool indicates Code P0740.**
- **Self-diagnosis D4 or D indicator light indicates Code 40.**

Possible Cause
Faulty lock-up control system

If the PGM Tester is available, retrieve the A/T Freeze Data, then clear the PCM.

Test-drive the vehicle under the same conditions the Freeze Data was recorded.

Did the code return?

Intermittent failure. The system is OK at this time. Check the fit of the pins in all connectors affected by this code.

Check for Another Code:
Check whether the OBD II scan tool or the D4 or D indicator light indicates another code.

Does the OBD II scan tool or the D4 or D indicator light indicate another code?

Perform the Troubleshooting Flowchart for the indicated Code(s). Recheck for code P0740 (40) after troubleshooting.

NOTE: Do not continue this troubleshooting until the causes of any other DTCs have been corrected.

Test Line Pressure:
Measure the line pressure (see page 14-161 and 14-162).

Is the line pressure within the service limit?

Repair the hydraulic system as necessary (see page 14-161 and 14-162).

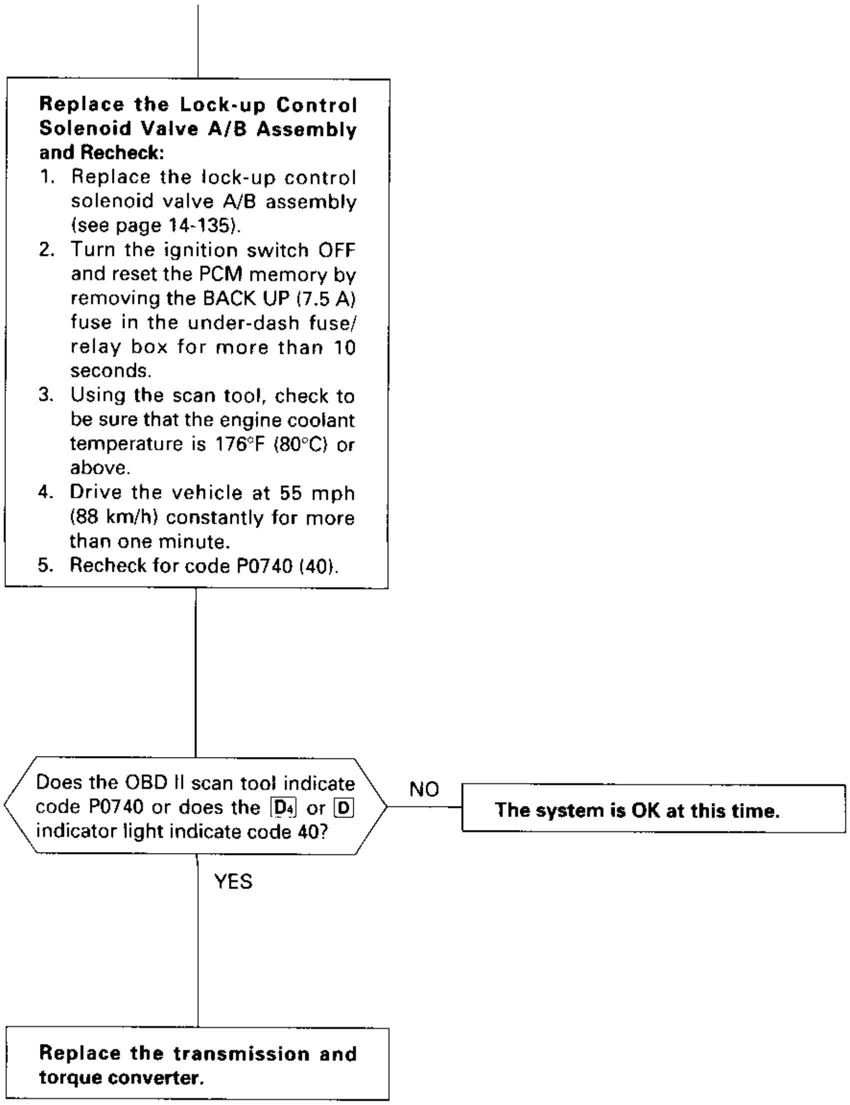
To page 14-120

(cont'd)

Electrical Troubleshooting ('98 – 00 Models)

Troubleshooting Flowchart — Lock-up Control System (cont'd)

From page 14-119



Replace the Lock-up Control Solenoid Valve A/B Assembly and Recheck:

1. Replace the lock-up control solenoid valve A/B assembly (see page 14-135).
2. Turn the ignition switch OFF and reset the PCM memory by removing the BACK UP (7.5 A) fuse in the under-dash fuse/relay box for more than 10 seconds.
3. Using the scan tool, check to be sure that the engine coolant temperature is 176°F (80°C) or above.
4. Drive the vehicle at 55 mph (88 km/h) constantly for more than one minute.
5. Recheck for code P0740 (40).

Does the OBD II scan tool indicate code P0740 or does the $\boxed{D_4}$ or $\boxed{D}$ indicator light indicate code 40?

The system is OK at this time.

Replace the transmission and torque converter.

Troubleshooting Flowchart — Shift Control System

Possible Cause
Faulty shift control system

- **OBD II Scan Tool indicates Code P0730.**
- **Self-diagnosis D4 or D indicator light indicates Code 41.**

If the PGM Tester is available, retrieve the A/T Freeze Data, then clear the PCM.

Test-drive the vehicle under the same conditions the Freeze Data was recorded.

Did the code return?

NO

Intermittent failure. The system is OK at this time. Check the fit of the pins in all connectors affected by this code.

YES

Check for Another Code:
Check whether the OBD II scan tool or the D4 or D indicator light indicates another code.

Does the OBD II scan tool or the D4 or D indicator light indicate another code?

YES

Perform the Troubleshooting Flowchart for the indicated Code(s). Recheck for code P0730 (41) after troubleshooting.

NOTE: Do not continue this troubleshooting until the causes of any other DTCs have been corrected.

NO

Measure Each Clutch Pressure:
Measure the 1st, 2nd, 3rd, and 4th clutch pressure (see page 14-161 thru 14-163).

Is each clutch pressure within the service limit?

NO

Repair the hydraulic system as necessary (see page 14-162 and 14-163).

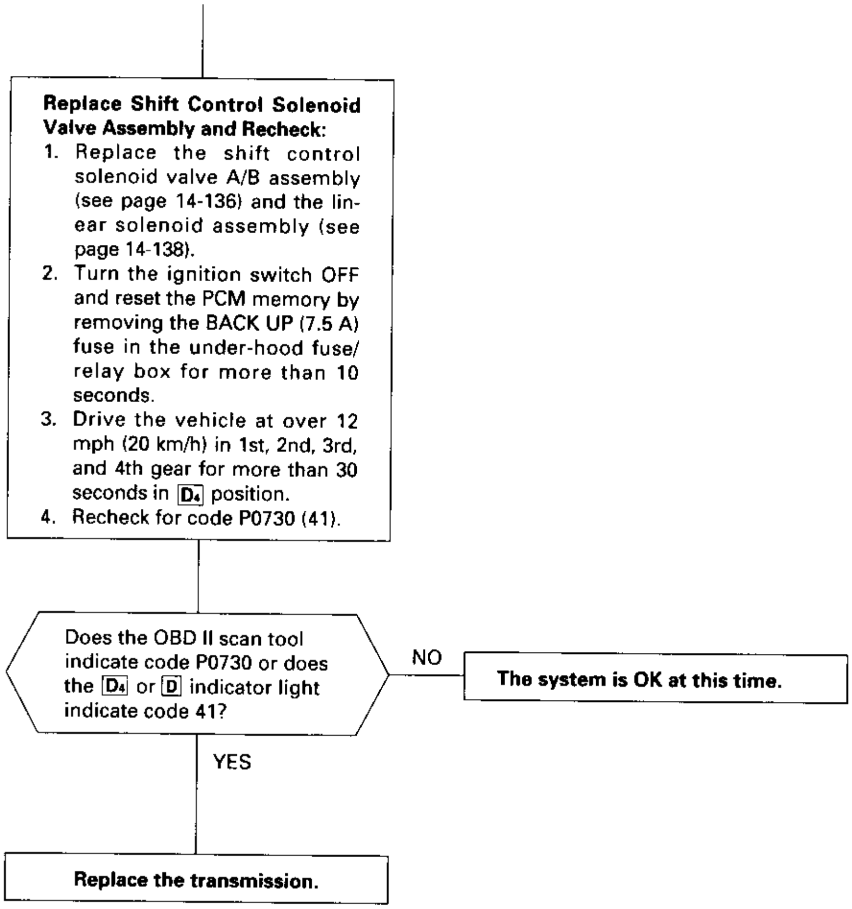
YES

To page 14-122

(cont'd)

Troubleshooting Flowchart — Shift Control System (cont'd)

From page 14-121



Replace Shift Control Solenoid Valve Assembly and Recheck:

1. Replace the shift control solenoid valve A/B assembly (see page 14-136) and the linear solenoid assembly (see page 14-138).
2. Turn the ignition switch OFF and reset the PCM memory by removing the BACK UP (7.5 A) fuse in the under-hood fuse/relay box for more than 10 seconds.
3. Drive the vehicle at over 12 mph (20 km/h) in 1st, 2nd, 3rd, and 4th gear for more than 30 seconds in $\boxed{D_4}$ position.
4. Recheck for code P0730 (41).

Does the OBD II scan tool indicate code P0730 or does the $\boxed{D_4}$ or $\boxed{D}$ indicator light indicate code 41?

The system is OK at this time.

Replace the transmission.

Troubleshooting Flowchart — $\boxed{D_4}$ or $\boxed{D}$ Indicator Light Does Not Come On

The $\boxed{D_4}$ or $\boxed{D}$ indicator light does not come on when the ignition switch is first turned ON (II). (It should come on for about two seconds and then go out.)

Check the Service Check Connector:
Make sure the special tool (SCS Service Connector) is not connected to the service check connector.

Is the special tool (SCS Service Connector) connected to the service check connector?

YES — **Disconnect the special tool from the service check connector and recheck.**

NO

Check the $\boxed{D_4}$ or $\boxed{D}$ Indicator Light:
Shift to $\boxed{D_4}$ or $\boxed{D}$ position.

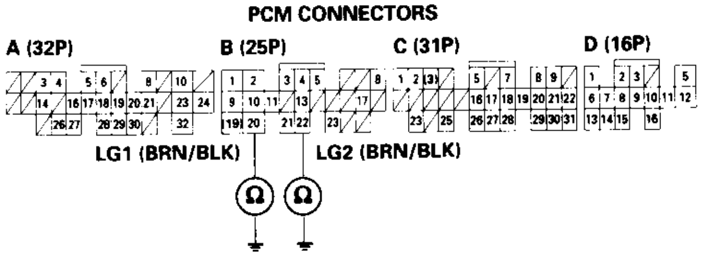
Does the $\boxed{D_4}$ or $\boxed{D}$ indicator light come on?

YES — **Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.**

NO

Check the Ground Circuit:

1. Turn the ignition switch OFF.
2. Disconnect the B (25P) connector from the PCM.
3. Check for continuity between the B20 terminal and body ground, and between the B22 terminal and body ground.



Wire side of female terminals

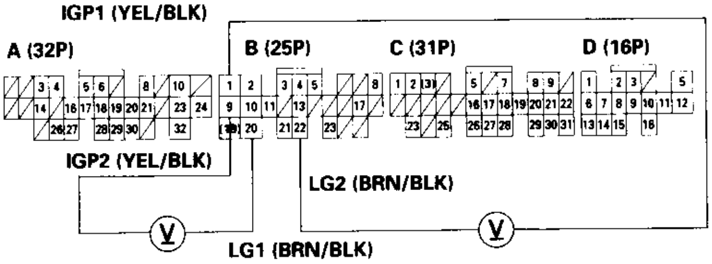
Is there continuity?

NO — **Repair open in the wires between the B20 and B22 terminals and ground (G101), and repair poor ground (G101).**

YES

Measure Power Supply Circuit Voltage:

1. Turn the ignition switch ON (II).
2. Measure the voltage between terminals B1 and B22 and between terminals B9 and B20.



Is there battery voltage?

NO — **Repair open or short in the wire between the B1 and/or B9 terminals and the PGM-FI main relay, and between the PGM-FI main relay and the under-hood fuse/relay box.**

YES

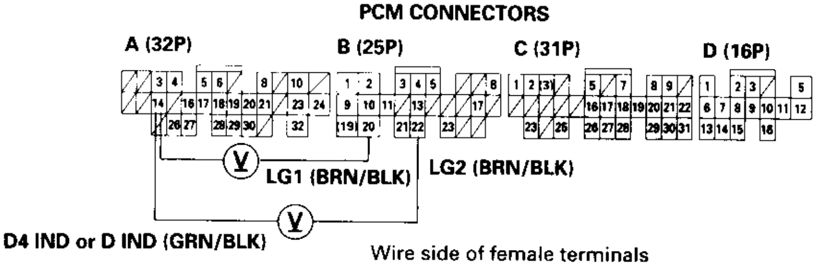
To page 14-124

(cont'd)

Troubleshooting Flowchart — $\boxed{D_4}$ or $\boxed{D}$ Indicator Light Does Not Come On (cont'd)

From page 14-123

Measure D4 IND or D IND Voltage:
1. Turn the ignition switch OFF.
2. Connect the B (25P) connector to the PCM.
3. Connect a digital multimeter to the A14 and B20 or B22 terminals.
4. Turn the ignition switch ON (II), and make sure that voltage is available for two seconds.

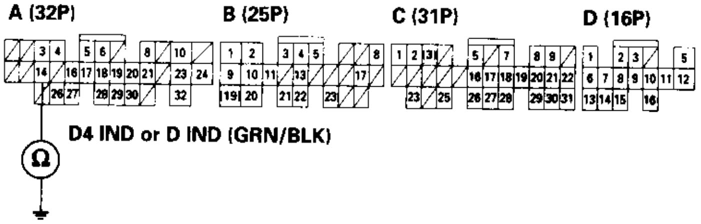


Is there voltage?

YES → **Check for open in the wire between the A14 terminal and the gauge assembly. If wire is OK, check for a faulty $\boxed{D_4}$ or $\boxed{D}$ indicator light bulb or a faulty gauge assembly printed circuit board.**

NO

Check D4 IND or D IND for a Short Circuit:
Check for continuity between the A14 terminal and body ground.



Is there continuity?

YES → **Repair short in the wire between the A14 terminal and the gauge assembly.**

NO

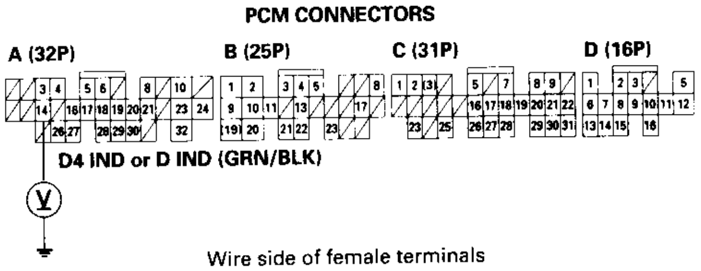
Check for loose terminal fit in the PCM connectors. Check the A/T gear position switch. If necessary, substitute a known-good PCM and recheck.

Troubleshooting Flowchart — D4 or D Indicator Light On Constantly

The D4 or D indicator light is on constantly (not blinking) whenever the ignition switch is ON (II).

Measure D4 IND or D 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.



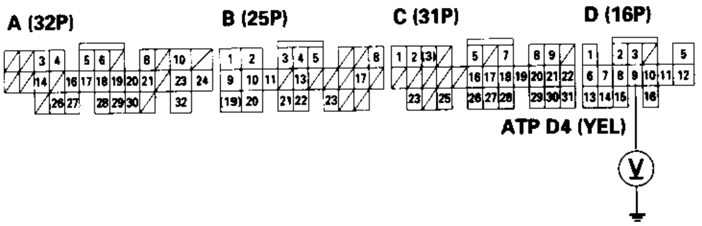
Is there voltage?

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 or D.
5. Measure the voltage between the D9 terminal and body ground.



Is there approx. 5 V?

YES — **Test the A/T gear position indicator at the gauge assembly connectors (see page 14-139 for '98 model and 14-140 for '99 – 00 models). If the A/T gear position indicator is OK, replace the PCM.**

NO

Test the A/T gear position switch (see page 14-139).

Is the switch OK?

NO — **Replace the A/T gear position switch.**

YES

Check for a short to ground in the wire between the D9 terminal and A/T gear position switch. If wire is OK, substitute a known-good PCM and recheck.

Troubleshooting Flowchart — Interlock System - Shift Lock System

NOTE: If the MIL is on, repair the PGM-FI control system (see section 11), and recheck.

Shift lever cannot be moved from the [P] position when the brake pedal is pressed.

Check Brake Light Operation:
Press the brake pedal.

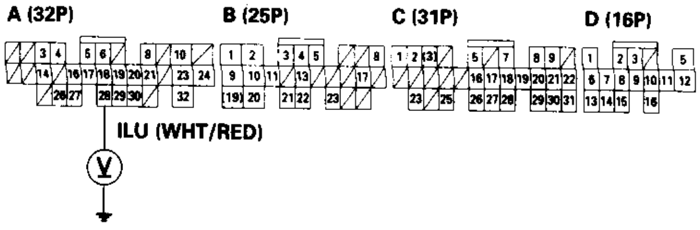
Are the brake lights ON?

NO — **Repair faulty brake switch circuit (see section 23).**

YES

Measure ILU Voltage:
1. Turn the ignition switch ON (II), and shift to [P] position.
2. Press the brake pedal, and release the accelerator pedal.
3. Measure the voltage between the A28 terminal and body ground.

PCM CONNECTORS



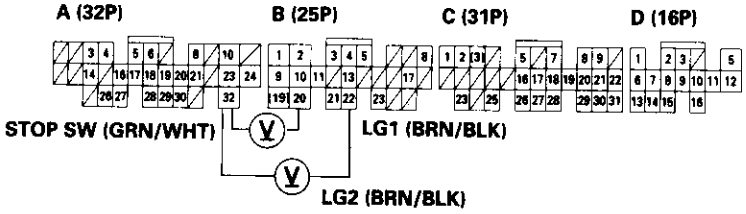
Wire side of female terminals

Is there battery voltage?

YES — **Check for an open or short in the wire between the A28 terminal and the interlock control unit, and check for loose terminal fit in the interlock control unit connector. If necessary, substitute a known-good interlock control unit and recheck.**

NO

Measure STOP SW Voltage:
1. Turn the ignition switch OFF.
2. Disconnect the A (32P) and B (25P) connectors from the PCM.
3. Measure the voltage between the A32 and B20 or B22 terminals.



Is there battery voltage?

NO — **Repair open in the wire between the A32 terminal and the brake switch.**

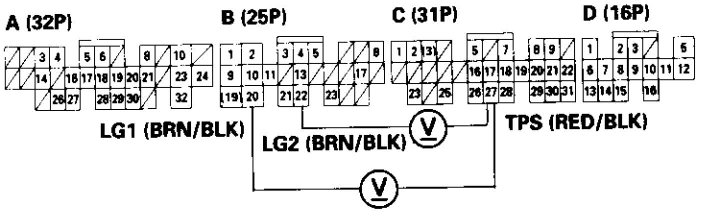
YES

To page 14-127

From page 14-126

Measure TPS Voltage:
1. Reconnect the A (32P) and B (25P) connectors to the PCM.
2. Turn the ignition switch ON (II).
3. Measure the voltage between the C27 and B20 or B22 terminals.

PCM CONNECTORS



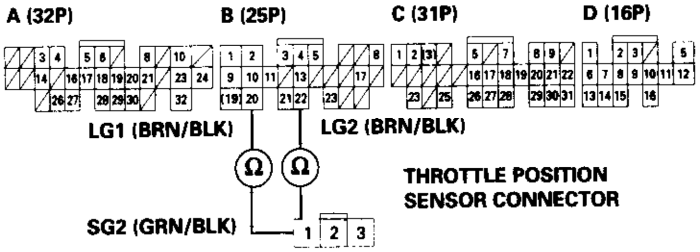
Wire side of female terminals

Is there approx. 0.5 V?

YES — To page 14-128

NO

Check Throttle Position Sensor Ground Line:
1. Turn the ignition switch OFF.
2. Disconnect the throttle position sensor connector.
3. Check for continuity between the No. 1 terminal of the throttle position sensor connector and the B20 and B22 terminal of the PCM.



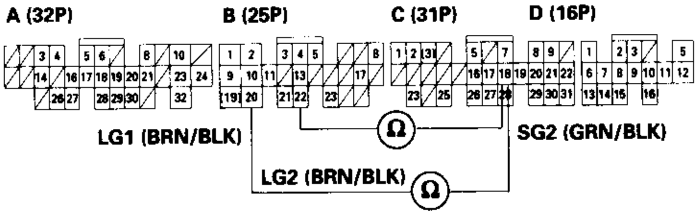
Wire side of female terminals

Is there continuity?

YES — **Reinstall the throttle position sensor correctly.**

NO

Check for continuity between the C18 and B20 or B22 terminals.



Is there continuity?

YES — **Repair open in the wire between the C18 terminal and the throttle position sensor.**

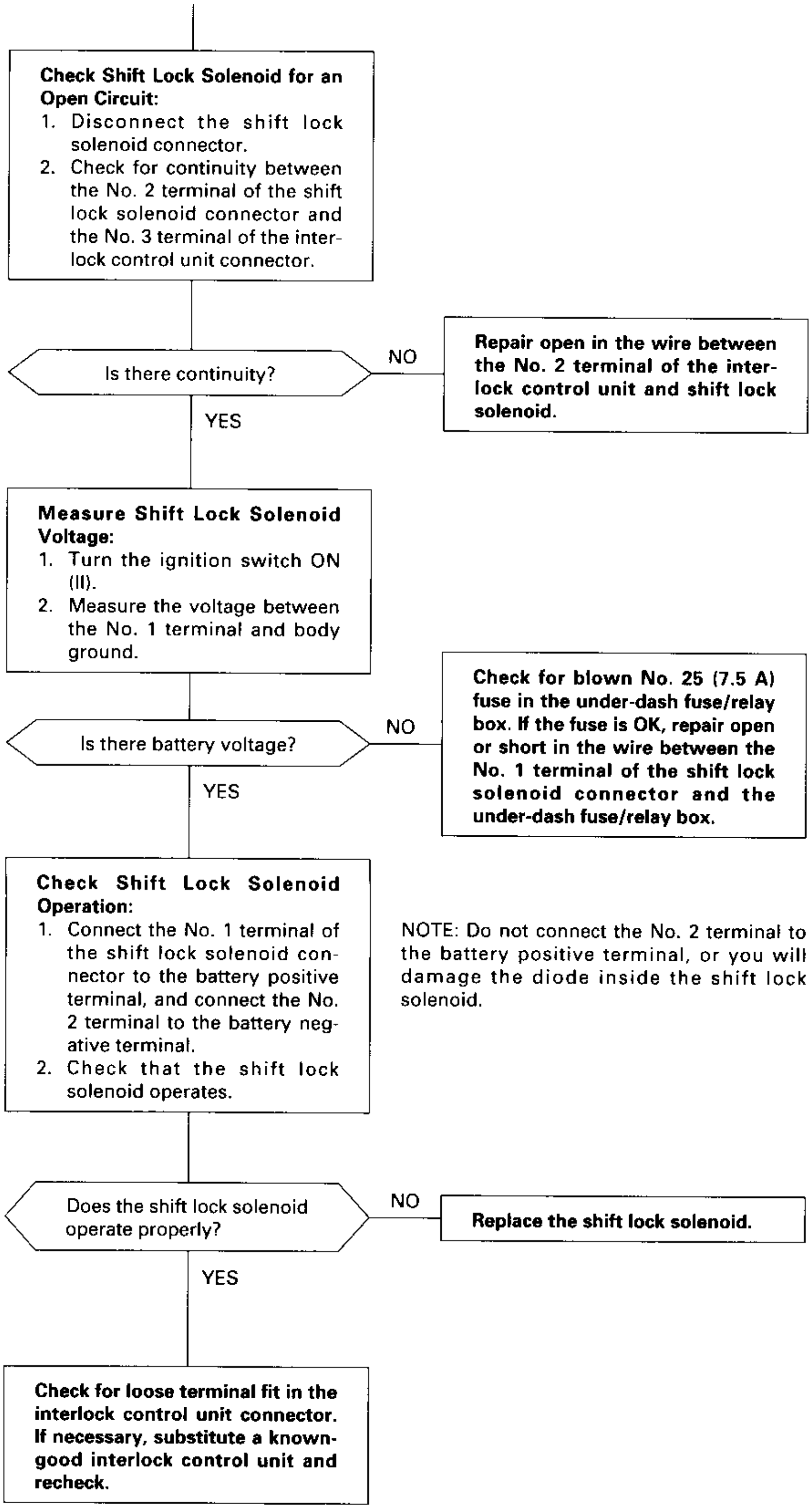
NO

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

(cont'd)

Troubleshooting Flowchart — Interlock System - Shift Lock System (cont'd)

From page 14-127



Check Shift Lock Solenoid for an Open Circuit:
1. Disconnect the shift lock solenoid connector.
2. Check for continuity between the No. 2 terminal of the shift lock solenoid connector and the No. 3 terminal of the interlock control unit connector.

Is there continuity?

NO — **Repair open in the wire between the No. 2 terminal of the interlock control unit and shift lock solenoid.**

YES

Measure Shift Lock Solenoid Voltage:
1. Turn the ignition switch ON (II).
2. Measure the voltage between the No. 1 terminal and body ground.

Is there battery voltage?

NO — **Check for blown No. 25 (7.5 A) fuse in the under-dash fuse/relay box. If the fuse is OK, repair open or short in the wire between the No. 1 terminal of the shift lock solenoid connector and the under-dash fuse/relay box.**

YES

Check Shift Lock Solenoid Operation:
1. Connect the No. 1 terminal of the shift lock solenoid connector to the battery positive terminal, and connect the No. 2 terminal to the battery negative terminal.
2. Check that the shift lock solenoid operates.

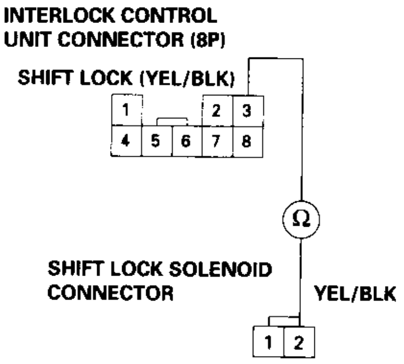
NOTE: Do not connect the No. 2 terminal to the battery positive terminal, or you will damage the diode inside the shift lock solenoid.

Does the shift lock solenoid operate properly?

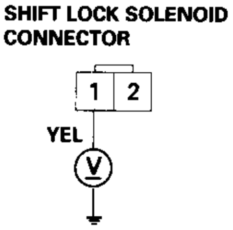
NO — **Replace the shift lock solenoid.**

YES

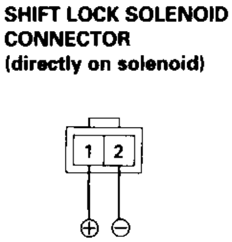
Check for loose terminal fit in the interlock control unit connector. If necessary, substitute a known-good interlock control unit and recheck.



Wire side of female terminals



Wire side of female terminals



Terminal side of male terminals

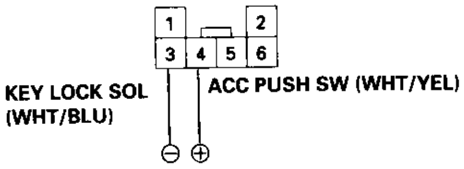
Troubleshooting Flowchart — Interlock System - Key Interlock System

Ignition key cannot be moved from ACC (I) position to LOCK (0) position while pushing it with the shift lever in P position.

Check Key Interlock Solenoid Operation:

1. Disconnect the ignition switch connector (6P).
2. Connect the No. 4 terminal of the ignition switch 6P connector to the battery positive terminal, and connect the No. 3 terminal to the battery negative terminal.
3. Check the key interlock solenoid operation. A clicking sound should be heard.

IGNITION SWITCH 6P CONNECTOR



Wire side of female terminals

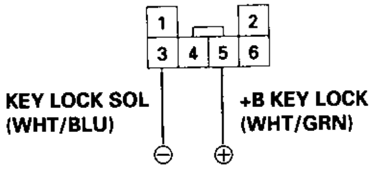
Does the key interlock solenoid operate properly?

NO — **Faulty key interlock solenoid. Replace the ignition key cylinder/ steering lock assembly.**

YES

Check Key Interlock Switch Operation:

1. Connect the No. 5 terminal of the ignition switch connector to the battery positive terminal, and connect the No. 3 terminal to the battery negative terminal.
2. Turn the ignition switch to ACC (I), then push it.
3. Check the key interlock solenoid operation. A clicking sound should be heard while pushing the ignition key.



Does the key interlock solenoid operate properly?

NO — **Faulty key interlock switch. Replace the ignition key cylinder/ steering lock assembly.**

YES

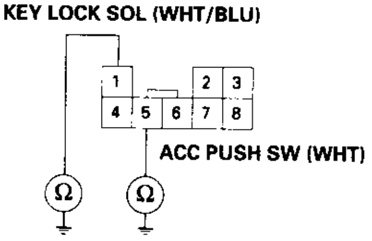
To page 14-130

(cont'd)

Troubleshooting Flowchart — Interlock System – Key Interlock System (cont'd)

From page 14-129

INTERLOCK CONTROL UNIT CONNECTOR (8P)



Wire side of female terminals

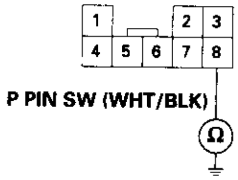
Check Key Interlock Solenoid for a Short Circuit:
1. Disconnect the interlock control unit connector.
2. Check for continuity between the No. 1 terminal and body ground and between the No. 5 terminal and body ground individually.

Is there continuity?

YES — **Repair short in the wire between the No. 1 or No. 5 terminal and the ignition switch 6P connector.**

NO

Check Park Pin Switch Operation:
Check for continuity between the No. 8 terminal and body ground.



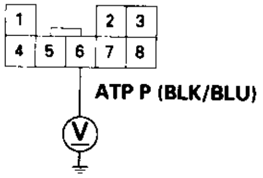
Is there continuity?

YES — **Check for short in the wire between the No. 8 terminal of the interlock control unit and the park pin switch. If wire is OK, check the park pin switch.**

NO

Measure ATP P Voltage:
1. Turn the ignition switch ON (II).
2. Measure the voltage between the No. 6 terminal and body ground.

NOTE: Shift lever must be in [P].



Is there voltage?

YES — **Repair open in the wire between the No. 6 terminal and the A/T gear position switch.**

NO

Check for loose terminal fit in the interlock control unit connectors. If necessary, substitute a known-good interlock control unit and recheck.

Troubleshooting Flowchart — O/D OFF Indicator Light Does Not Come On

The O/D OFF indicator light does not come on when the ignition switch is first turned ON (II). (It should come on for about two seconds and then go out).

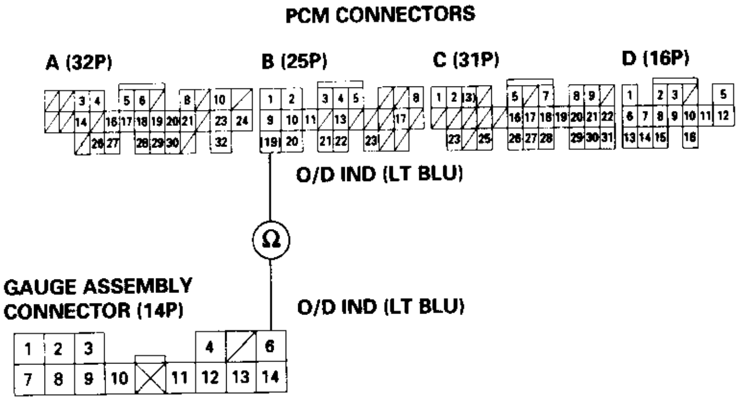
Check the O/D OFF Indicator Light:
1. Turn the ignition switch ON (II).
2. Shift to D position, and press the Over-Drive (O/D) switch.

Does the O/D OFF indicator light come on?

YES — **Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.**

NO

Check O/D IND for an Open Circuit:
1. Turn the ignition switch OFF.
2. Disconnect the B (25P) connector from the PCM.
3. Disconnect the 14P connector from the gauge assembly.
4. Check for continuity between the B19 terminal and the No. 6 terminal of the gauge assembly 14P connector.



Wire side of female terminals

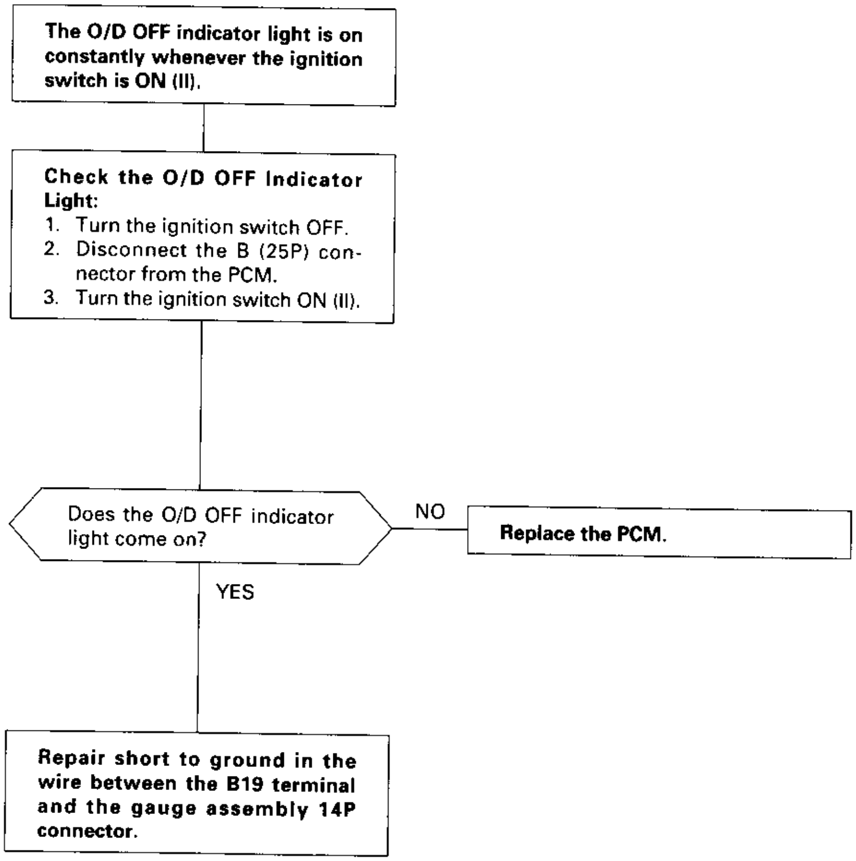
Is there continuity?

NO — **Repair open in the wire between the B19 terminal and gauge assembly 14P connector.**

YES

Check for a faulty O/D OFF indicator light bulb or a faulty gauge assembly printed circuit board.

Troubleshooting Flowchart — O/D OFF Indicator Light On Constantly



The O/D OFF indicator light is on constantly whenever the ignition switch is ON (II).

Check the O/D OFF Indicator Light:

1. Turn the ignition switch OFF.
2. Disconnect the B (25P) connector from the PCM.
3. Turn the ignition switch ON (II).

Does the O/D OFF indicator light come on?

Replace the PCM.

Repair short to ground in the wire between the B19 terminal and the gauge assembly 14P connector.

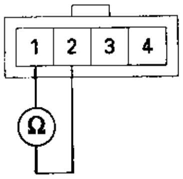
Troubleshooting Flowchart — O/D OFF Indicator Light Does Not Come On Even Though O/D Switch Is Pressed

The O/D OFF indicator light does not come on even though the Over-Drive (O/D) switch is pressed in D position. (The O/D OFF indicator light come on when the ignition switch is first turned on for two seconds, then go out.)

Check the Over-Drive (O/D) Switch at the Switch Connector:

1. Turn the ignition switch OFF.
2. Disconnect the park pin/O/D switch connector.
3. Check for continuity between the No. 1 and No. 2 terminals of the switch connector while pressing the switch, and when released it.

PARK PIN/O/D SWITCH CONNECTOR



Terminal side of male terminals

Is there continuity while pressing the switch, and no continuity when released it?

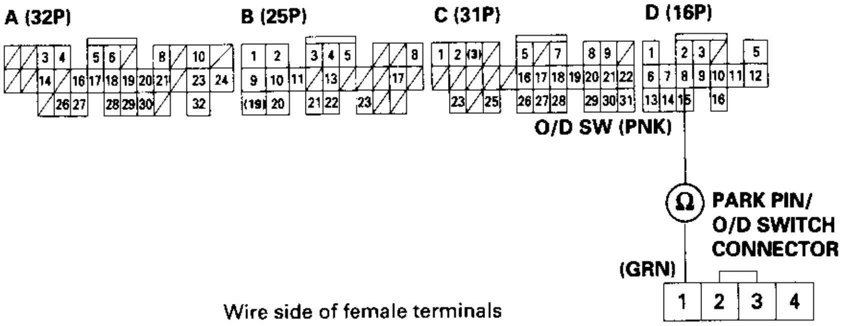
YES → **Check for loose terminal fit in the O/D switch connector. If terminals are OK, replace the O/D switch and park pin switch as a set (see page 14-151).**

NO ↓

Check O/D Switch for an Open Circuit:

1. Disconnect the D (16P) connector from the PCM.
2. Check for continuity between the D8 terminal and the No. 1 terminal of the switch connector.

PCM CONNECTORS



Wire side of female terminals

Is there continuity?

NO → **Repair open in the wire between the D8 terminal and the park pin/O/D switch connector.**

YES ↓

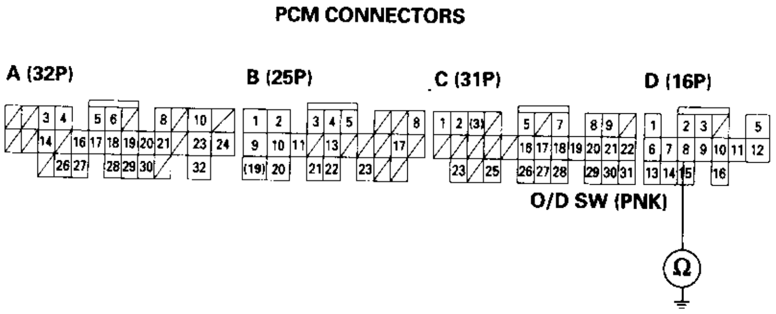
To page 14-134

(cont'd)

Troubleshooting Flowchart — O/D OFF Indicator Light Does Not Come On Even Though O/D Switch Is Pressed (cont'd)

From page 14-133

Check O/D Switch for a Short Circuit:
Check for continuity between the D8 terminal and body ground.



Wire side of female terminals

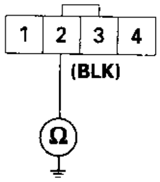
Is there continuity?

YES → **Repair short to ground in the wire between the D8 terminal and the park pin/O/D switch connector.**

NO ↓

Check O/D Switch Ground Circuit:
Check for continuity between the No. 2 terminal of the switch connector and body ground.

PARK PIN/O/D SWITCH CONNECTOR



Wire side of female terminals

Is there continuity?

NO → **Repair open in the wire between the No. 2 terminal of the park pin/O/D switch connector and ground (G401, G402), or repair poor ground (G401, 402).**

YES ↓

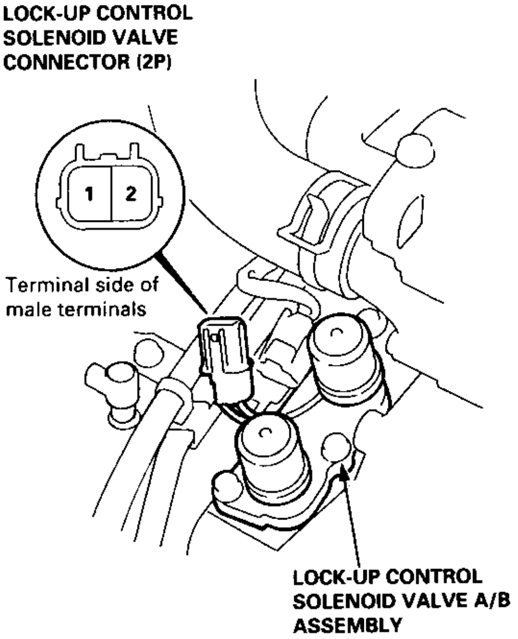
Replace the PCM.

Lock-up Control Solenoid Valve A/B Assembly

Test

1. Disconnect the 2P connector from the lock-up control solenoid valve A/B assembly.
2. Measure the resistance between the No. 2 terminal (solenoid valve A) of the connector and body ground, and between the No. 1 terminal (solenoid valve B) and body ground.

   STANDARD: 12 – 25 Ω

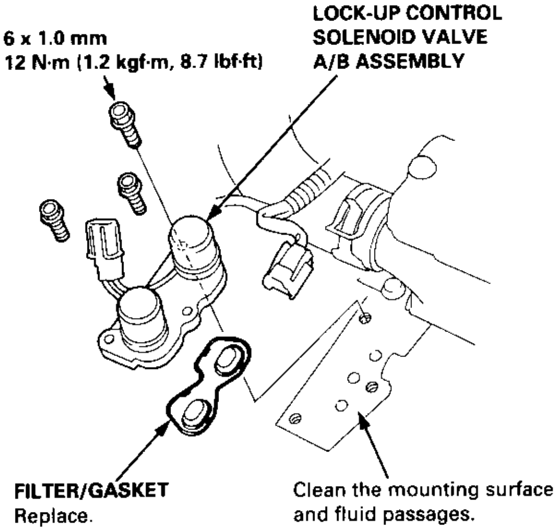


3. Replace the lock-up control solenoid valve A/B assembly if the resistance is out of specification.
4. If the resistance is within the standard, connect the No. 1 terminal of the connector to the battery positive terminal. A clicking sound should be heard. Connect the No. 2 terminal to the battery positive terminal. A clicking sound should be heard. Replace the lock-up control solenoid valve A/B assembly if no clicking sound is heard when either terminal is connected to the battery positive terminal.
5. Check the lock-up control solenoid valve fluid passages for dust or debris, and replace as an assembly, if necessary.

Replacement

NOTE: Lock-up control solenoid valves A and B must be removed/replaced as an assembly.

1. Remove the mounting bolts and the lock-up control solenoid valve A/B assembly.

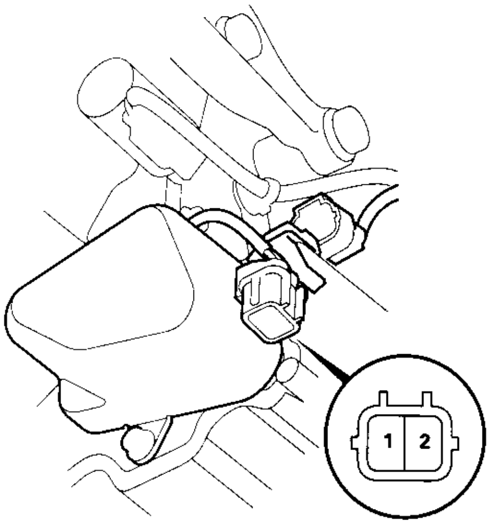


2. Clean the mounting surface and fluid passages, and install a new lock-up control solenoid valve A/B with a new filter/gasket.
3. Check the connector for rust, dirt, or oil, and reconnect it securely.

Shift Control Solenoid Valve A/B Assembly

Test

1. Disconnect the 2P connector from the shift control solenoid valve A/B assembly.



2. Measure the resistance between the No. 1 terminal (solenoid valve A) of the shift control solenoid valve connector and body ground, and between the No. 2 terminal (solenoid valve B) and body ground.

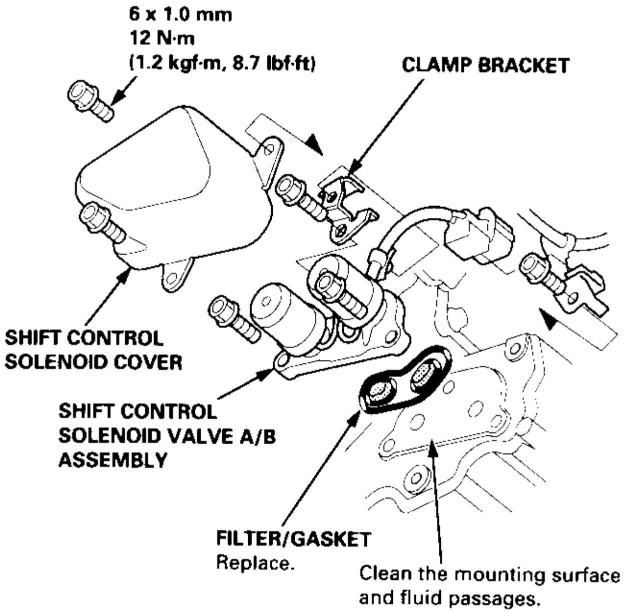
   STANDARD: 12 – 25 Ω

3. Replace the shift control solenoid valve A/B assembly if the resistance is out of specification.
4. If the resistance is within the standard, connect the No. 1 terminal of the shift control solenoid valve connector to the battery positive terminal. A clicking sound should be heard. Connect the No. 2 terminal to the battery positive terminal. A clicking sound should be heard. Replace the shift control solenoid valve A/B assembly if no clicking sound is heard when either terminal is connected to the battery positive terminal.

Replacement

NOTE: Shift control solenoid valves A and B must be removed/replaced as an assembly.

1. Remove the shift control solenoid cover.
2. Remove the mounting bolts, the clamp and the shift control solenoid valve A/B assembly, then disconnect the connector.

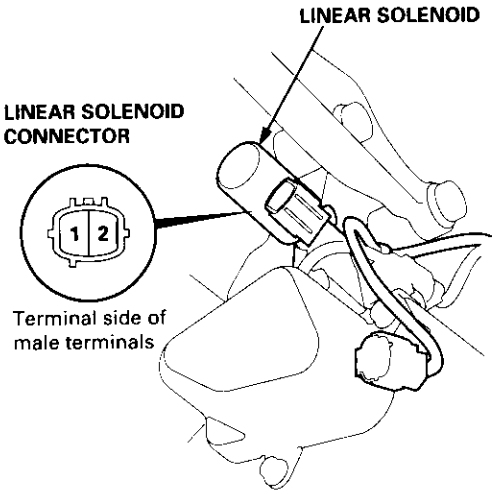


3. Clean the mounting surface and fluid passages, and install a new shift control solenoid valve A/B assembly with the clamp and a new filter/gasket.
4. Install the shift control solenoid cover.
5. Check the connector for rust, dirt, or oil, and reconnect it securely.

Linear Solenoid Assembly

Test

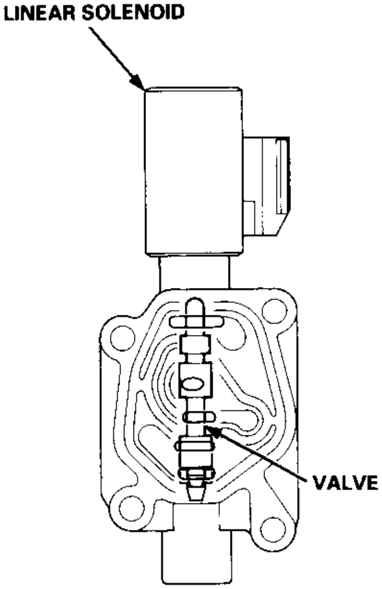
1. Disconnect the linear solenoid connector.



2. Measure the resistance between the No. 1 and the No. 2 terminals.

   STANDARD: About 5.0 Ω

3. If the resistance is out of specification, replace the linear solenoid assembly.
4. Connect the No. 1 terminal of the connector to the battery positive terminal and the No. 2 terminal to the battery negative terminal. A clicking sound should be heard.
5. If a clicking sound is not heard, remove the linear solenoid assembly.
6. Check the linear solenoid fluid passage for dust or dirt.
7. Connect the No. 1 terminal of the connector to the battery positive terminal and the No. 2 terminal to the battery negative terminal. Make sure that the valve moves.
8. Disconnect the negative battery terminal, and make sure the valve releases. You can see valve movement through the fluid passage in the mounting surface of the linear solenoid assembly.

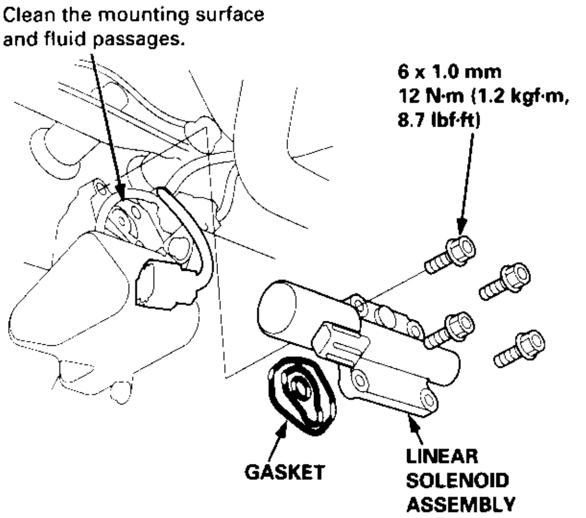


9. If the valve binds, or moves sluggishly, or if the linear solenoid does not operate, replace the linear solenoid assembly.

Linear Solenoid Assembly

Replacement

1. Remove the mounting bolts and the linear solenoid assembly.

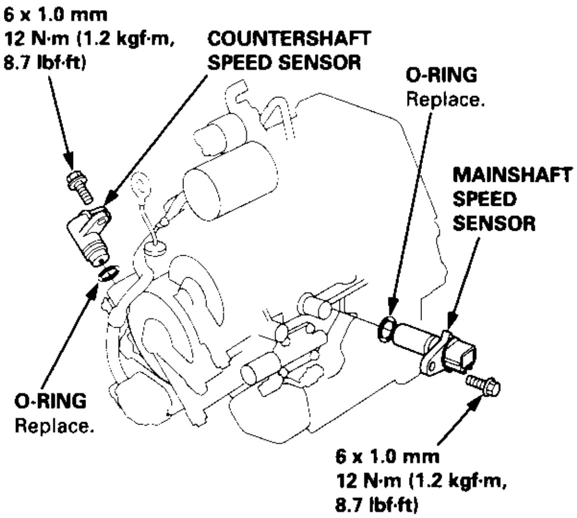


2. Clean the mounting surface and fluid passage of the linear solenoid assembly and transmission housing.
3. Install a new linear solenoid assembly with a new gasket. Do not pinch the gasket during installation, and make sure it is installed properly in the mounting groove of the linear solenoid.
4. Check the linear solenoid connector for rust, dirt, or oil, then connect it securely.

Mainshaft/Countershaft Speed Sensors

Replacement

1. Remove the 6 mm bolt and the countershaft speed sensor from the end cover.



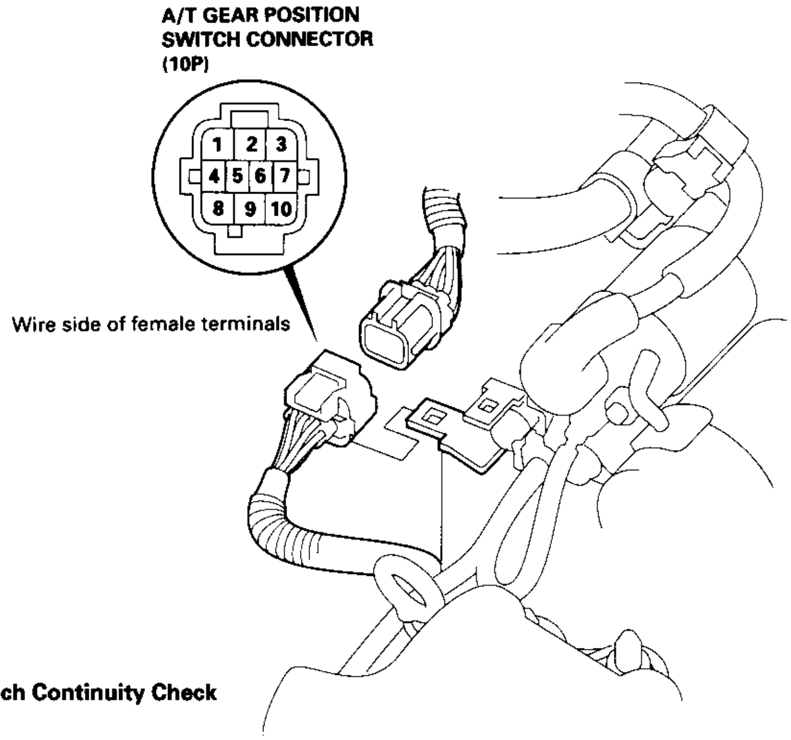
2. Remove the 6 mm bolt and the mainshaft speed sensor from the transmission housing.
3. Replace the O-ring with a new one before installing the countershaft speed sensor or the mainshaft speed sensor.

A/T Gear Position Switch

Test

1. Remove the A/T gear position switch connector from the connector bracket, then disconnect the A/T gear position switch connector (10P).

2. Check for continuity between the terminals in each switch position according to the table below.



A/T Gear Position Switch Continuity Check
'97 – 98 Models

Terminal Position	1	2	3	4	5	6	7	8	9	10
1	○						○			
2	○	○				○				
D3	○	○			○					
D4	○	○		○						
N	○		○							○
R	○								○	
P	○		○					○		

'99 – 00 Models

Terminal Position	1	2	3	4	5	6	7	8	9	10
1	○						○			
2	○	○				○				
D	○	○		○						
N	○		○							○
R	○								○	
P	○		○					○		

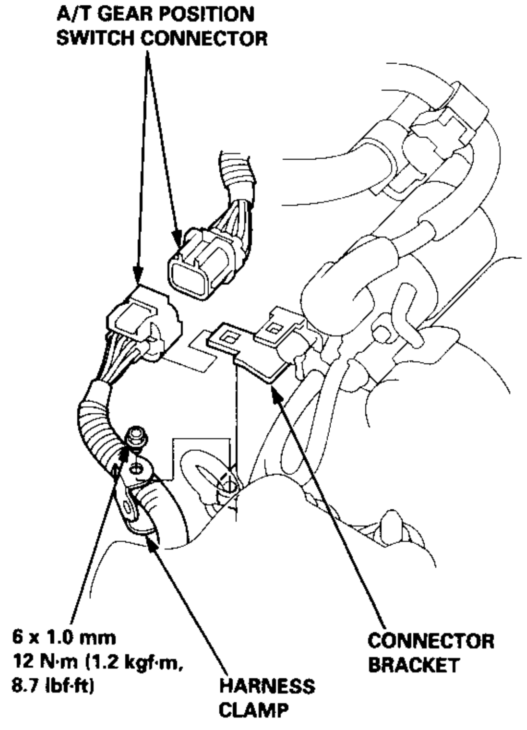
NOTE: Terminal No. 3: Neutral position switch

A/T Gear Position Switch

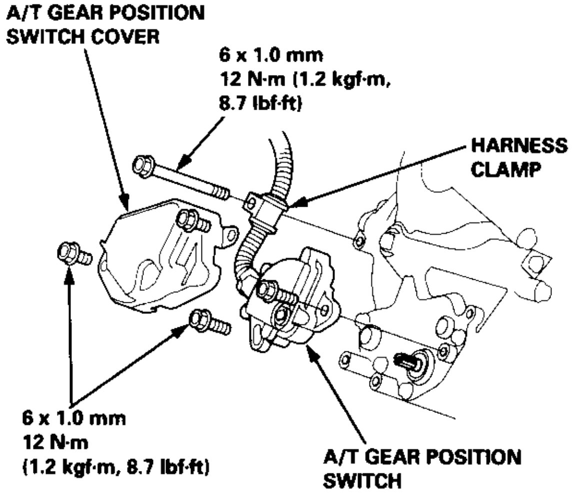
Replacement

⚠WARNING Make sure lifts, jacks, and safety stands are placed properly (see section 1).

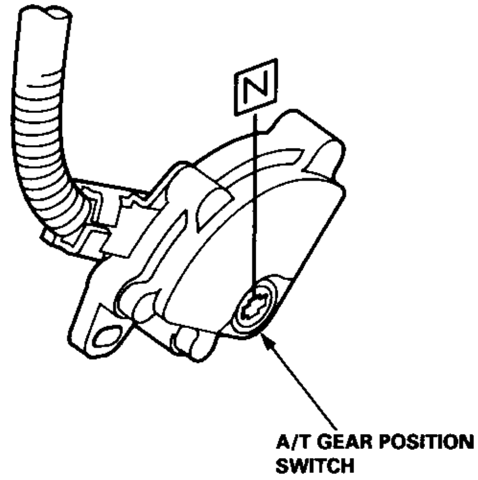
1. Raise the front of the vehicle, and support it with safety stands (see section 1).
2. Set the parking brake, and block both rear wheels securely.
3. Shift to N position.
4. Remove the A/T gear position switch connector from the connector bracket, then disconnect it.
5. Remove the A/T gear position switch harness clamp.



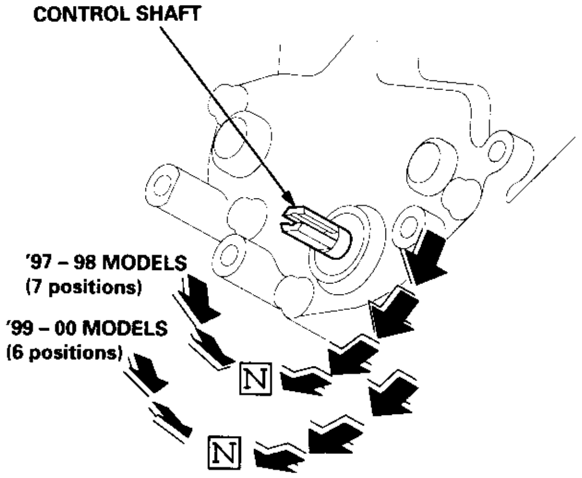
6. Remove the harness clamp from the end cover, then remove the A/T gear position switch cover and A/T gear position switch.



7. Set the A/T gear position switch to N position. The A/T gear position switch clicks in N position.



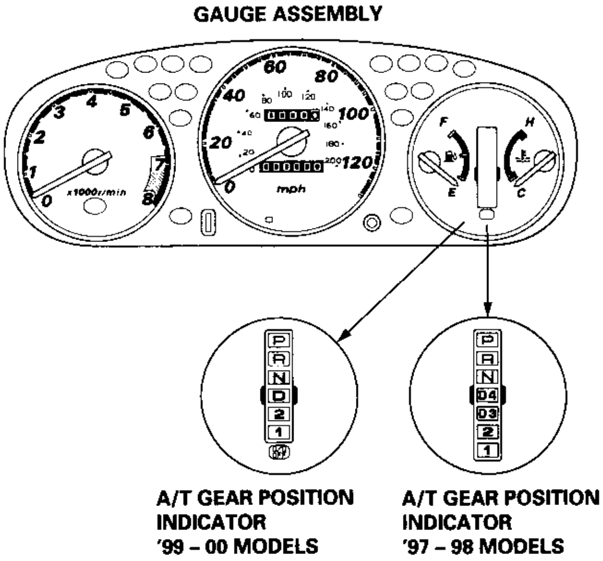
8. Set the control shaft to N position, then install the A/T gear position switch on it.



9. Install the A/T gear position switch cover and harness clamp on the end cover.

10. Connect the A/T gear position switch connector, then install it on the connector bracket.

11. Turn the ignition switch ON (II). Move the shift lever through all gears, and check the A/T gear position switch synchronization with the A/T gear position indicator.



12. Start the engine. Move the shift lever through all gears, and verify the following:

- The shift lever cannot be moved to R position from N position unless the shift lever is pulled.
- The engine will not start in any position other than N or P.
- The back-up lights come on when the shift lever is in R position.

A/T Gear Position Indicator

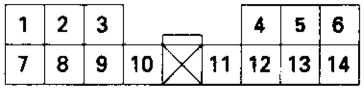
Input Test — '97 – 98 Models

1. Remove the gauge assembly from the dashboard (see section 20), and disconnect the 14P connector from the gauge assembly (see section 23).

2. Inspect the connector and socket terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the 14P connector.
  - — If a test indicates a problem, find and correct the cause, then recheck the system.
  - — If all the input tests prove OK, but the indicator is faulty, replace the printed circuit board.

GAUGE ASSEMBLY 14P CONNECTOR



Wire side of female terminals

Cavity	Wire Color	Test Condition	Test: Desired Result	Possible Cause (If result is not obtained)
1	YEL	Ignition switch ON (II)	Check for voltage to ground: There should be battery voltage.	• Blown No. 25 (7.5 A) fuse in the under-dash fuse/relay box • An open in the wire
2	RED/BLK	Combination light switch ON and dash lights brightness control dial on full bright	Check for voltage between No. 2 and No. 3 terminals: There should be battery voltage.	• Blown No. 47 (7.5 A) fuse in the under-dash fuse/relay box • Faulty combination light switch • Faulty dash light brightness controller • An open in the wire
3	RED			
4	BLU	Shift lever in $\boxed{2}$	Check for continuity to ground: There should be continuity. NOTE: There should be no continuity in any other shift lever position.	• Faulty A/T gear position switch • An open in the wire
6	BRN	Shift lever in $\boxed{1}$		
7	YEL	Shift lever in $\boxed{D_4}$		
8	BLK	Under all conditions	Check for continuity to ground: There should be continuity	• Poor ground (G401) • An open in the wire
9	GRN/BLK	Ignition switch ON (II) and shift lever in any position except $\boxed{D_4}$	Check for voltage to ground: There should be battery voltage for two seconds after the ignition switch is turned ON (II), and less than 1 V two seconds later.	• Faulty PCM • An open in the wire
10	GRN	Shift lever in $\boxed{D_3}$	Check for continuity to ground: There should be continuity. NOTE: There should be no continuity in any other shift lever position.	• Faulty A/T gear position switch • An open in the wire
11	RED	Shift lever in $\boxed{N}$		
12	WHT	Shift lever in $\boxed{R}$		
5	BLK/BLU	Shift lever in $\boxed{P}$ NOTE: Do not push the brake pedal.		
14	LT GRN	Ignition switch ON (II) and shift lever in any position except $\boxed{P}$ and $\boxed{N}$	Check for voltage to ground: There should be about 5 V.	• Faulty PCM • An open in the wire

Input Test — '99 – 00 Models

1. Remove the gauge assembly from the dashboard (see section 20), and disconnect the 14P connector from the gauge assembly (see section 23).

2. Inspect the connector and socket terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the 14P connector.
  - — If a test indicates a problem, find and correct the cause, then recheck the system.
  - — If all the input tests prove OK, but the indicator is faulty, replace the printed circuit board.

GAUGE ASSEMBLY 14P CONNECTOR

1	2	3				4	5	6
7	8	9	10	☒	11	12	13	14

Wire side of female terminals

Cavity	Wire Color	Test Condition	Test: Desired Result	Possible Cause (If result is not obtained)
1	YEL	Ignition switch ON (II)	Check for voltage to ground: There should be battery voltage.	• Blown No. 25 (7.5 A) fuse in the under-dash fuse/relay box • An open in the wire
2	RED/BLK	Combination light switch ON and dash lights brightness control dial on full bright	Check for voltage between No. 2 and No. 3 terminals: There should be battery voltage.	• Blown No. 47 (7.5 A) fuse in the under-dash fuse/relay box • Faulty combination light switch • Faulty dash light brightness controller • An open in the wire
3	RED			
4	BRN	Shift lever in $\boxed{1}$	Check for continuity to ground: There should be continuity. NOTE: There should be no continuity in any other shift lever position.	• Faulty A/T gear position switch • An open in the wire
7	YEL	Shift lever in $\boxed{D}$		
10	BLU	Shift lever in $\boxed{2}$		
6	LT BLU	Ignition switch ON (II), shift lever in $\boxed{D}$, and Over-Drive is OFF by pressing O/D switch.	Check for continuity to ground: There should be continuity.	• Faulty O/D switch • Faulty A/T gear position switch • Faulty PCM • An open in the wire
8	BLK	Under all conditions	Check for continuity to ground: There should be continuity	• Poor ground (G401) • An open in the wire
9	GRN/BLK	Ignition switch ON (II) and shift lever in any position except $\boxed{D}$	Check for voltage to ground: There should be battery voltage for two seconds after the ignition switch is turned ON (II), and less than 1 V two seconds later.	• Faulty PCM • An open in the wire
11	RED	Shift lever in $\boxed{N}$	Check for continuity to ground: There should be continuity. NOTE: There should be no continuity in any other shift lever position.	• Faulty A/T gear position switch • An open in the wire
12	WHT	Shift lever in $\boxed{R}$		
5	BLK/BLU	Shift lever in $\boxed{P}$ NOTE: Do not push the brake pedal.		
14	LT GRN	Ignition switch ON (II) and shift lever in any position except $\boxed{P}$ and $\boxed{N}$	Check for voltage to ground: There should be about 5 V.	• Faulty PCM • An open in the wire

Interlock Control Unit Input Test

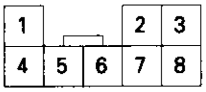
SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

1. Remove the instrument panel lower cover (see section 20).
2. Disconnect the 8P connector from the interlock control unit.
3. Inspect the connector and connector terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector.
  - If a test indicates a problem, find and correct the cause, then recheck the system.
  - If all the input tests prove OK, substitute a known-good control unit, and recheck the system. If the check is OK, the control unit must be faulty; replace it.

NOTE: If the shift lock solenoid clicks when the ignition switch is turned ON (II) while pressing the brake pedal with the shift lever in [P] position, the shift lock system is OK. If the shift lever cannot be shifted from [P] position, test the A/T gear position switch.

INTERLOCK CONTROL UNIT CONNECTOR (8P)



Wire side of female terminals

Cavity	Wire Color	Test Condition	Test: Desired Result	Possible Cause (If result is not obtained)
1	WHT/BLU	Ignition switch turned to ACC (I), ignition key pushed all the way in	Check for voltage to ground: There should be battery voltage.	• Blown No. 48 (30 A) fuse in the under-hood fuse/relay box • Blown No. 33 (7.5 A) fuse in the under-dash fuse/relay box • Faulty steering lock assembly (key interlock solenoid) • An open in the wire
2	YEL	Ignition switch ON (II)	Check for voltage to ground: There should be battery voltage.	• Blown No. 25 (7.5 A) fuse in the under-dash fuse/relay box • An open in the wire
3	YEL/BLK	Ignition switch ON (II)	Check for voltage to ground: There should be battery voltage.	• Blown No. 25 (7.5 A) fuse in the under-dash fuse/relay box • Faulty shift lock solenoid • An open in the wire
4	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	• Poor ground (G401) • An open in the wire
5	WHT	Ignition switch turned to ACC (I), ignition key pushed all the way in	Check for voltage to ground: There should be battery voltage.	• Blown No. 48 (30 A) fuse in the under-hood fuse/relay box • Blown No. 33 (7.5 A) fuse in the under-dash fuse/relay box • Faulty steering lock assembly (key interlock switch) • An open in the wire
6	BLK/BLU	Shift lever in [P]	Check for continuity to ground: There should be continuity.	• Faulty A/T gear position switch • Poor ground (G101) • An open in the wire
8	WHT/BLK	Shift lever in [P] and pulled toward steering wheel	Check for continuity to ground: There should be continuity.	• Faulty park pin switch • Short to ground
		Shift lever in [P]	Check for continuity to ground: There should be no continuity.	

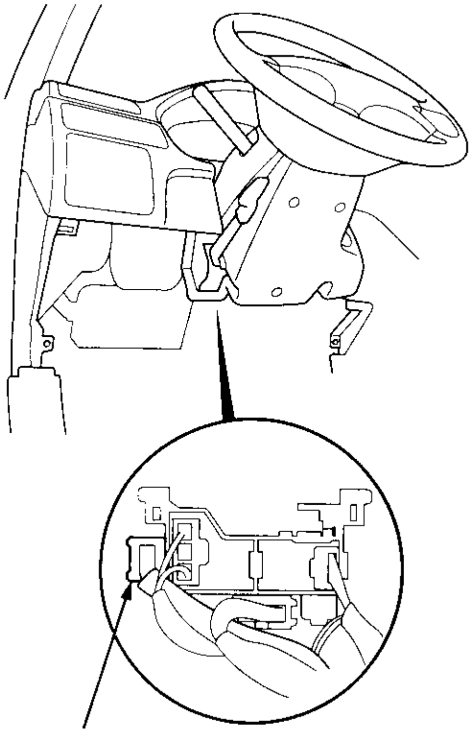
Reconnect the interlock control unit 8P connector.

7	WHT/RED	Ignition switch ON (II) and brake pedal pressed	Check for voltage to ground: There should be 1 V or less.	• Faulty brake switch • Faulty throttle position (TP) sensor • Faulty PCM • An open in the wire • Faulty interlock control unit
		Ignition switch ON (II), brake pedal and accelerator pedal pressed at the same time	Check for voltage to ground: There should be battery voltage.	

Key Interlock Solenoid Test

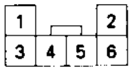
SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

1. Remove the instrument panel lower cover (see section 20).
2. Disconnect the ignition switch 6P connector at the connector holder.



3. Check for continuity between the terminals in each key position according to the table.

IGNITION SWITCH 6P CONNECTOR



Wire side of female terminals

Position	Terminal	3	4	5
Ignition switch ACC (I)	Key pushed in	○—	—○—	—○
	Key released	○—	—○	

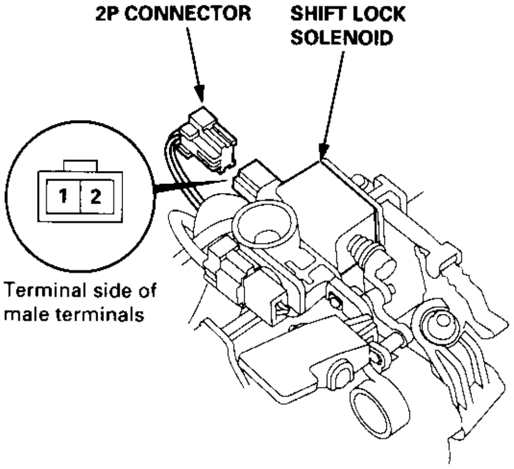
4. Check that the key cannot be removed with power connected to the No. 5 terminal and ground connected to the No. 3 terminal.
   - If the key cannot be removed, the key interlock solenoid is OK.
   - If the key can be removed, replace the steering lock assembly (the key interlock solenoid is not available separately).

Shift Lock Solenoid Test

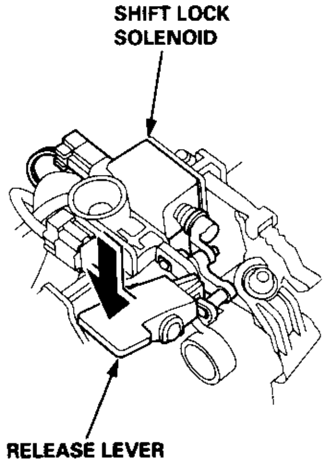
SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

1. Remove the instrument panel lower cover (see section 20).
2. Remove the steering column covers (see section 17).
3. Disconnect the shift lock solenoid 2P connector.
4. Connect the No. 1 terminal of the shift lock solenoid connector to the battery positive terminal, and connect the No. 2 terminal to the battery negative terminal.
5. Check that the shift lever can be moved from the P position. Release the battery terminals from the shift lock solenoid connector. Move the shift lever back to the P position, and make sure it locks.

   NOTE: Do not connect power to the No. 2 (–) terminal (reverse polarity) or you will damage the diode inside the solenoid.



6. Check that the shift lock releases when the release lever is pushed, and check that it locks when the release lever is released.

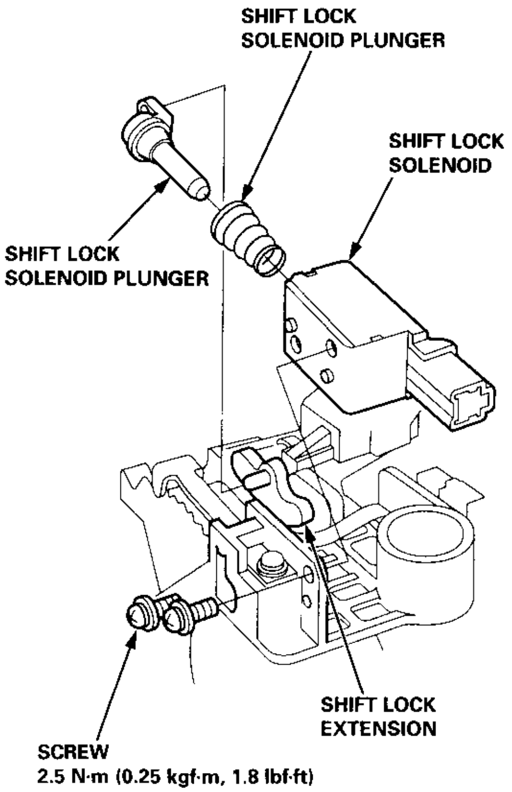


7. If the solenoid does not work, replace it.

Shift Lock Solenoid Replacement

SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

1. Remove the instrument panel lower cover (see section 20).
2. Remove the upper and lower steering column covers (see section 17).
3. Remove the flange nuts and bolts securing the steering column, then lower the steering column.
4. Disconnect the shift lock solenoid and the park pin switch connectors.
5. Remove the bolts securing the shift lever assembly, then remove the shift lever assembly.
6. Remove the screws securing the shift lock solenoid, then remove the shift lock solenoid.



7. Install the new shift lock solenoid by aligning the joint of the shift lock solenoid plunger with the tip of the shift lock extension
8. Secure the shift lock solenoid with the screws.
9. Install the shift lever assembly in the reverse order of the removal.

10 Check the operation of the shift lever and the shift lock.

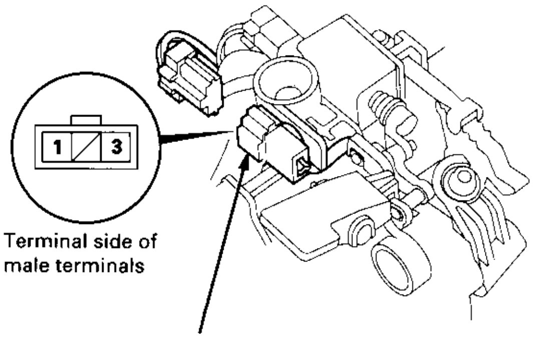
Park Pin Switch Test

SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

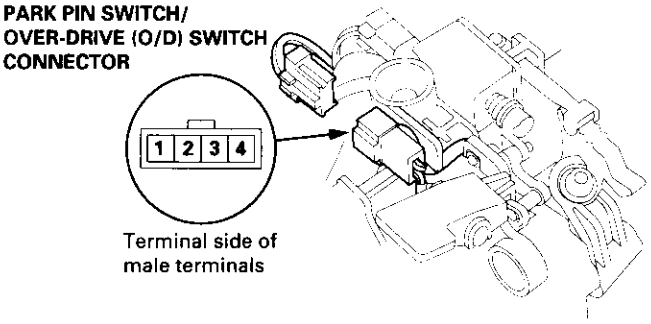
1. Remove the instrument panel lower cover (see section 20).
2. Remove the upper and lower steering column covers (see section 17).
3. Disconnect the park pin switch connector.
4. Shift the shift lever into $\boxed{P}$ position, then check for continuity between these connector terminals:
   - '97 – 98 models: No. 1 and No. 3 terminals of the park pin switch connector.
   - '99 – 00 models: No. 3 and No. 4 terminals of the park pin switch/Over-Drive (O/D) switch connector.

   There should be continuity.

'97 – 98 MODELS:



'99 – 00 MODELS:

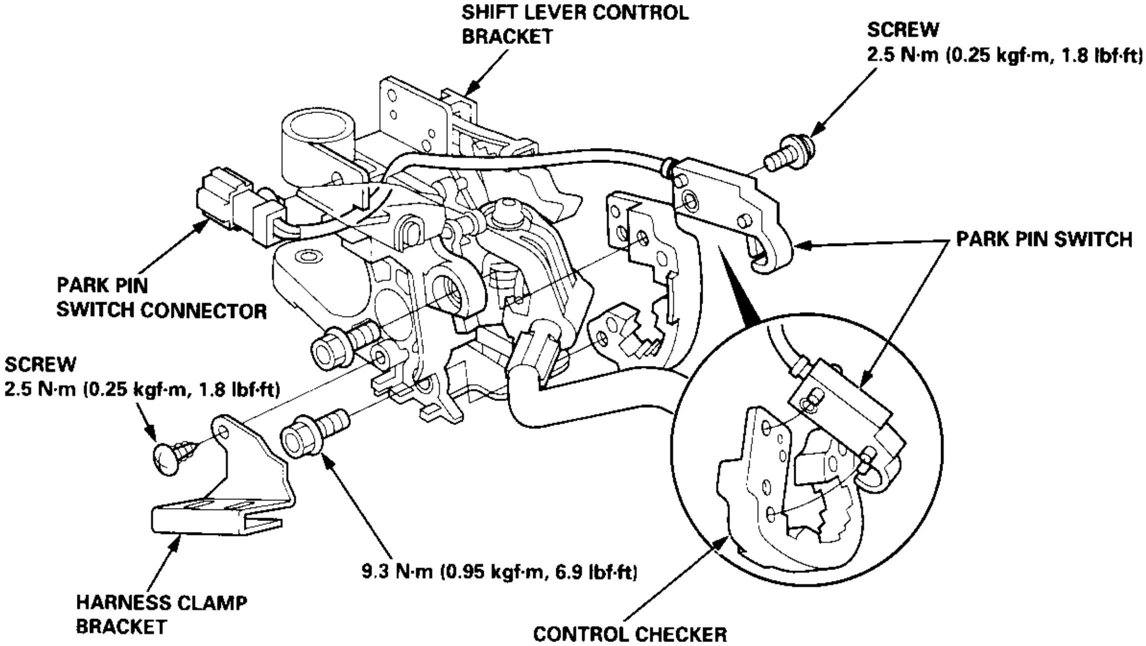


5. Shift the shift lever out of the $\boxed{P}$ position, and check for continuity between the terminals as in step 4. There should be no continuity.
6. If the park pin switch is faulty, replace it.

Park Pin Switch Replacement — '97 – 98 Models

SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

1. Remove the instrument panel lower cover (see section 20).
2. Remove the upper and lower steering column covers (see section 17).
3. Remove the flange nuts and bolts securing the steering column, then lower the steering column.
4. Disconnect the shift lock solenoid and the park pin switch connectors.
5. Remove the harness clamp bracket.
6. Remove the bolts securing the shift lever assembly, then remove the shift lever assembly.
7. Remove the screws securing the shift lock solenoid, then remove the shift lock solenoid.
8. Remove the park pin switch connector from the shift lever control bracket.
9. Remove the control checker from the shift lever control bracket.
10. Remove the park pin switch from the control checker.



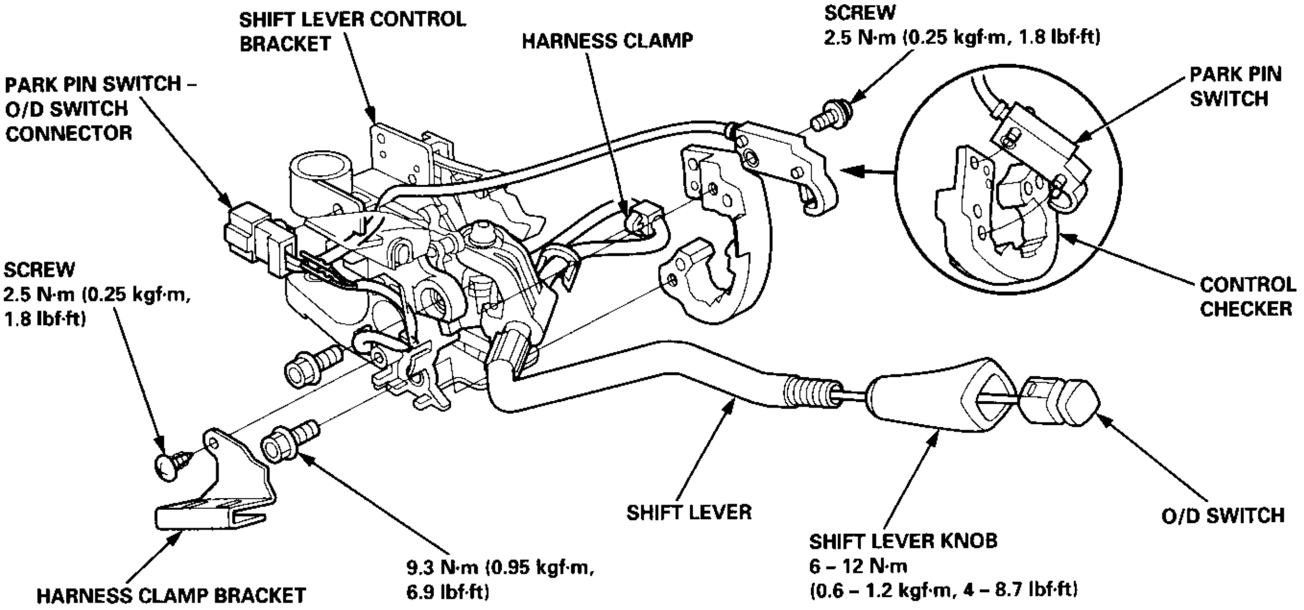
11. Install the new park pin switch on the control checker.
12. Install the control checker on the shift lever control bracket.
13. Route the park pin switch harness through the cut out of the shift lever control bracket, then install the park pin switch connector on the bracket.
14. Install the shift lock solenoid by aligning the joint of the shift lock solenoid plunger with the tip of the shift lock extension.
15. Secure the shift lock solenoid with the screws.
16. Install the shift lever assembly in the reverse order of the removal.
17. Check the operation of the shift lever and the shift lock.

Park Pin Switch – Over-Drive (O/D) Switch Replacement — '99 – 00 Models

SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

NOTE: If replacement of the park pin switch or the O/D switch is required, replace them as a set.

1. Remove the instrument panel lower cover (see section 20).
2. Remove the upper and lower steering column covers (see section 17).
3. Remove the flange nuts securing the steering column, then lower the steering column.
4. Disconnect the shift lock solenoid and the park pin switch – O/D switch connectors.
5. Remove the harness clamp bracket.
6. Remove the bolts securing the shift lever assembly, then remove the shift lever assembly.
7. Remove the screws securing the shift lock solenoid, then remove the shift lock solenoid.
8. Cut the O/D switch wires (RED and BLK), then remove the connector from the shift lever control bracket.
9. Remove the control checker from the shift lever control bracket.
10. Remove the park pin switch from the control checker.
11. Remove the shift lever knob from the shift lever, then remove the O/D switch from the shift lever knob.



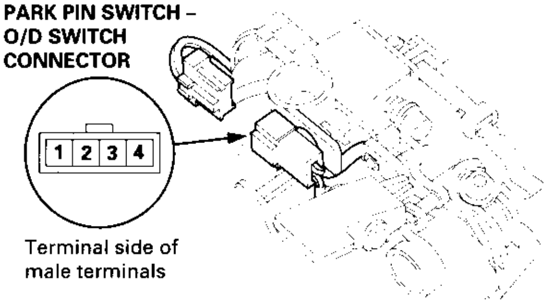
12. Route the new O/D switch wires through the shift lever knob, shift lever, and shift lever control bracket, then install the knob on the shift lever, and install the switch in the knob.
13. Install the new park pin switch on the control checker, then install the control checker on the shift lever control bracket.
14. Route the park pin switch harness through the cut out of the shift lever control bracket.
15. Install the O/D switch wire terminals in the connector cavities securely. The wire terminals can be installed in cavity No. 1 or No. 2.
16. Install the connector and the harness clamp on the bracket.
17. Install the shift lock solenoid by aligning the joint of the shift lock solenoid plunger with the tip of the shift lock extension, then secure the shift lock solenoid with the screws.
18. Install the shift lever assembly in the reverse order of removal.
19. Adjust the clearance between the O/D switch wires and the edge of the shift lever control bracket (see page 14-270).
20. Check the shift lever operation and shift lock operation.

Over-Drive (O/D) Switch ('99 – 00 Models)

Test

SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

1. Remove the instrument panel lower cover (see section 20).
2. Remove the upper and lower steering column covers (see section 17).
3. Disconnect the park pin switch – O/D switch connector.
4. Check for continuity between the No. 1 and No. 2 terminals while pressing and holding the O/D switch, and when it's released.
   There should be continuity while pressing and holding the switch, and no continuity when it's released.



5. If the O/D switch is faulty, replace it and the park pin switch as a set (see page 14-151).

Symptom-to-Component Chart

Hydraulic System

Before troubleshooting a problem on Hydraulic System, check the self-diagnosis D4 ('97 – 98) or D ('99 – 00) indicator light indication. If the D4 or D indicator light indicates a trouble code, perform the electrical troubleshooting according to the Electrical System-to-Component Chart. If the D4 or D indicator light does not indicate a trouble code and failure is not found on the electrical troubleshooting, perform the hydraulic troubleshooting following the chart.

SYMPTOM	Check these items on the PROBABLE CAUSE List	Check these items on the NOTES List
Engine runs, but vehicle does not move in any gear.	1, 2, 3, 5, 6, 7, 35, 37	K, L, R, S
Vehicle moves in 2, R, but not in D3, D4, D, or 1, position.	6, 8, 9, 10, 29, 52	C, M, O
Vehicle moves in D3, D4, D, 1, R, but not in 2 position.	6, 11, 12, 23	C, L
Vehicle moves in D3, D4, D, 2, 1, but not in R position.	4, 6, 14, 15	C, L, Q
Vehicle moves in N position.	10, 12, 13, 14, 16, 28, 32, 33, 34	C, D
Excessive idle vibration	1, 2, 18, 31, 35, 44, 46, 47	B, K, L
Poor acceleration; flares on starting off in D4, D3 position or D position		
Stall rpm high in D4, D3, D, 2, 1 position	1, 2, 3, 6, 37, 40	K, L, R
Stall rpm high in D4, D3, D, 1 position	6, 8, 10	C, D
Stall rpm high in 2 position	6, 12	C, D
Stall rpm high in R position	14	N
Stall rpm low	17, 31, 44, 46, 47	R
No shift	18, 19, 39, 47, 48	G, L
Fails to shift in D3, D4 position or D position; from 1st to 3rd gear	21, 48	
Fails to shift in D3, D4 position or D position; from 1st to 4th gear	21, 22, 47	
Erratic upshifting		
1-2 upshift, 2-3 upshift, 3-4 upshift	57	
1-2 upshift	20, 47	
2-3 upshift	21, 48	
3-4 upshift	22, 47	
Harsh upshift (1-2)	12, 18, 19, 28, 49, 50, 56, 57	C, D, E
Harsh upshift (2-3)	13, 18, 19, 23, 26, 28, 49, 50, 56, 57	C, D, E, H, L
Harsh upshift (3-4)	14, 18, 19, 24, 27, 28, 49, 50, 56, 57	C, D, E, I, L
Harsh downshift (2-1)	18, 19, 23, 42, 53, 56, 57	O
Harsh downshift (3-2)	12, 18, 19, 24, 41, 42, 54, 56, 57, 58	C, D, E, H
Harsh downshift (4-3)	13, 18, 19, 25, 41, 42, 55, 56, 57	C, D, E, I
Flares on 2-3 upshift	13, 18, 19, 23, 26, 50	E, L
Flares on 3-4 upshift	14, 18, 19, 24, 27, 50	E, L, N
Excessive shock on 2-3 upshift	13, 18, 19, 23, 26, 42, 49, 50, 57	E, L, N
Excessive shock on 3-4 upshift	14, 18, 19, 24, 27, 42, 49, 50, 57	E, L, N
Late shift from N position to D4 or D3 position, or to D position	10, 29	M
Late shift from N position to R position	4, 14, 20, 51	Q
Noise from transmission in all shift lever positions	2, 36	K, L, Q
Vehicle does not accelerate more than 31 mph (50 km/h).	17	

(cont'd)

Symptom-to-Component Chart

Hydraulic System (cont'd)

SYMPTOM	Check these items on the PROBABLE CAUSE List	Check these items on the NOTES List
Shift lever does not operate smoothly.	6, 38	P
Fails to shift; stuck in 4th gear.	18, 47, 48	
Transmission will not shift into park in [P] position.	6, 38, 61	P
Stall rpm high; all clutch pressures are in specification.	40	D, K, O
Lock-up clutch does not disengage.	18, 43, 44, 45, 46, 49, 50, 57	E, L
Lock-up clutch does not operate smoothly.	18, 40, 43, 44, 45, 46, 49, 50, 57	L
Lock-up clutch does not engage.	18, 40, 43, 44, 45, 46, 49, 50, 56, 57	E, L
Vibration in all positions.	35	
No engine braking in [1] position.	59	
Shift position indicator does not indicate any position.	6, 38, 60	

PROBABLE CAUSE			
1	Low ATF	33	Thrust washer worn/damaged
2	ATF pump worn or binding	34	Clutch clearance incorrect
3	Regulator valve stuck or regulator valve spring worn	35	Drive plate defective or transmission misassembled
4	Servo valve stuck	36	Torque converter housing or transmission housing bearing worn/damaged
5	Mainshaft worn/damaged		
6	Shift cable broken/out of adjustment	37	ATF strainer clogged
7	Final gears worn/damaged	38	Shift cable is worn where it attaches to the transmission or at the body mounts
8	One-way (sprag) clutch worn/damaged		
9	1st gears worn/damaged (2 gears)	39	Modulator valve stuck
10	1st clutch defective	40	Torque converter check valve stuck
11	2nd gears worn/damaged (2 gears)	41	Foreign material in separator plate
12	2nd clutch defective	42	CPB valve stuck
13	3rd clutch defective	43	Lock-up timing valve stuck
14	4th clutch defective	44	Lock-up shift valve stuck
15	Reverse gears worn/damaged (3 gears)	45	Lock-up control valve stuck
16	Excessive ATF	46	Lock-up clutch piston defective
17	Torque converter one-way clutch defective	47	Shift control solenoid valve A defective
18	Linear solenoid assembly defective ('98 – 00 models)	48	Shift control solenoid valve B defective
		49	Lock-up control solenoid valve A defective
19	CPC valve stuck	50	Lock-up control solenoid valve B defective
20	1-2 shift valve stuck	51	Servo control valve stuck
21	2-3 shift valve stuck	52	1st accumulator defective
22	3-4 shift valve stuck	53	Foreign material in 2nd exhaust orifice
23	2nd accumulator defective	54	Foreign material in 3rd exhaust orifice
24	3rd accumulator defective	55	Foreign material in 4th exhaust orifice
25	4th accumulator defective	56	Mainshaft speed sensor defective
26	2nd orifice control valve stuck	57	Countershaft speed sensor defective
27	3-4 orifice control valve stuck	58	3rd sub accumulator defective
28	Foreign material in main orifice	59	1st-hold clutch defective
29	Foreign material in 1st orifice	60	A/T gear position switch defective or out of adjustment
30	Foreign material in reverse orifice		
31	Engine output low	61	Park gear mechanism defective
32	Needle bearing worn/damaged		

The following symptom can be caused by improper repair or assembly	Check these items
Vehicle creeps in N position.	• Improper clutch clearance • Improper gear clearance
Vehicle does not move in D3, D4, or D position.	One-way (sprag) clutch installed upside down
Transmission locks up in P position.	• Park lever installed upside down • Shift fork bolt not installed
Excessive drag in transmission.	• ATF pump binding and seizure Use proper tools when replacing the ATF pump gears, and be careful not to damage the ATF pump when torque down the main valve body. • Check that the shift fork bolt is installed on the shift fork shaft.
Excessive vibration, rpm related.	Torque converter not fully seated in ATF pump
Noise only with wheels moving.	Reverse selector hub installed upside down
Mainshaft oil seal pops out.	• Mainshaft oil seal improperly installed • Install the mainshaft oil seal flush with the torque converter housing. If the mainshaft oil seal is installed into the torque converter housing until it bottoms, it will block the fluid return passage and result in damage.
Various shifting problems.	• Springs improperly installed • Valves improperly installed
Harsh upshift.	Check valve balls not installed

(cont'd)

Symptom-to-Component Chart

Hydraulic System (cont'd)

NOTES	
A	See flushing procedure, page 14-264 and 265.
B	Set idle rpm in gear to specified idle speed. If still no good, adjust motor mounts as outlined in engine section of this manual.
C	If the large clutch piston O-ring is broken, inspect the piston groove for rough machining.
D	If the clutch pack is seized or is excessively worn, inspect the other clutches for wear, and check the orifice control valves, CPC valve, and linear solenoid for free movement.
E	If the linear solenoid is stuck, inspect the clutches for wear.
G	If the 1-2 shift valve is stuck closed, the transmission will not upshift. If stuck open, the transmission has no 1st gear.
H	If the 2nd orifice control valve is stuck, inspect the 2nd and 3rd clutch packs for wear.
I	If the 3-4 orifice control valve is stuck, inspect the 3rd and 4th clutch packs for wear.
J	If the clutch pressure control valve is stuck closed, the transmission will not shift out of 1st gear.
K	Improper alignment of main valve body and torque converter housing may cause ATF pump seizure. The symptoms are mostly an rpm-related ticking noise or a high-pitched squeak.
L	If the ATF strainer is clogged with particles of steel or aluminum, inspect the ATF pump and differential pinion shaft. If both are OK and no cause for the contamination is found, replace the torque converter.
M	If the 1st clutch feed pipe guide in the end cover is scored by the mainshaft, inspect the ball bearing for excessive movement in the transmission housing. If OK, replace the end cover as it is dented. The O-ring under the guide is probably worn.
N	• Replace the mainshaft if the bushing for the 4th feed pipe is loose or damaged. If the 4th feed pipe is damaged or out of round, replace the end cover. • Replace the mainshaft if the bushing for the 1st feed pipe is loose or damaged. If the 1st feed pipe is damaged or out of round, replace it.
O	A worn or damaged sprag clutch is mostly a result of shifting the transmission in $\boxed{D_3}$, $\boxed{D_4}$, or $\boxed{D}$ position while the wheels rotate in reverse, such as rocking the vehicle in snow.
P	Inspect the frame for collision damage.
Q	Inspect for damage and wear: 1. Reverse selector gear teeth chamfers. 2. Engagement teeth chamfers of countershaft 4th and reverse gear. 3. Shift fork for scuff marks in center. 4. Differential pinion shaft for wear under pinion gears. 5. Bottom of 3rd clutch for swirl marks. Replace items 1, 2, 3, and 4 if worn or damaged. If transmission makes a clicking, grinding, or whirring noise, also replace mainshaft 4th gear, reverse idler gear, and countershaft 4th gear in addition to 1, 2, 3, or 4. If differential pinion shaft is worn, overhaul differential assembly, replace ATF strainer, and thoroughly clean transmission, flush torque converter, cooler, and lines. If bottom of 3rd clutch is swirled and transmission makes gear noise, replace the countershaft and final driven gear.
R	Be very careful not to damage the torque converter housing when replacing the main ball bearing. You may also damage the ATF pump when you torque down the main valve body. This will result in ATF pump seizure if not detected. Use the proper tools.
S	Install the main seal flush with the torque converter housing. If you push it into the torque converter housing until it bottoms out, it will block the fluid return passage and result in damage.

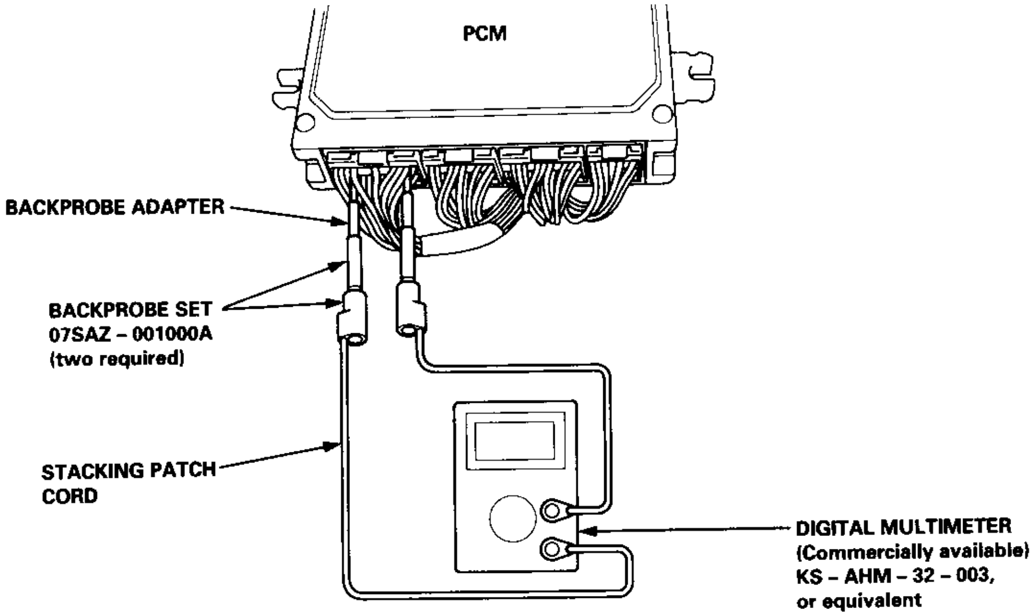
Road Test

NOTE: Warm up the engine to normal operating temperature (the radiator fan comes on).

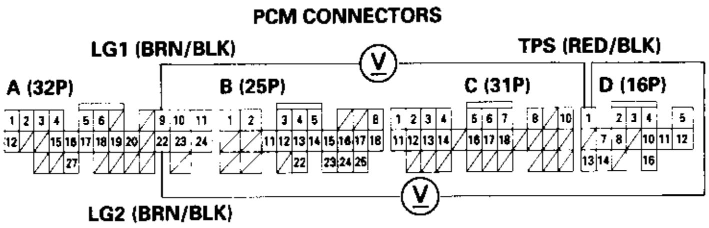
1. Before testing, check the transmission fluid level, see page 14-160.
2. Apply the parking brake and block the wheels. Start the engine, then shift to $\boxed{D_4}$ ('97 – 98) or $\boxed{D}$ ('99 – 00) position while pressing the brake pedal. Press the accelerator pedal and release it suddenly. The engine should not stall.
3. Repeat same test in $\boxed{D_3}$ position ('97 – 98 models).
4. Test-drive the vehicle on a flat road in the $\boxed{D_4}$ or $\boxed{D}$ position. Check that the shift points occur at approximate speeds shown on a flat road. Also check for abnormal noise and clutch slippage.

   Throttle position sensor voltage represents the throttle opening. Monitor it with the Honda PGM Tester or as follows:

   a. Unbolt the PCM for road testing; refer to page 14-58.
   b. Set the digital multimeter to check throttle position sensor voltage between these terminals on the PCM:
      - '97 Model: Between terminals D1 (+) and A9 (–) or A22 (–)
      - '98 – 00 Models: Between terminals C27 (+) and B20 (–) or B22 (–)

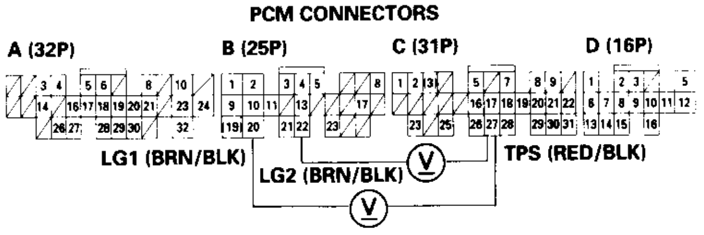


'97 Model:



Wire side of female terminals

'98 – 00 Models:



Wire side of female terminals

(cont'd)

(cont'd)

D4 or D Position:

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 – 33	21 – 25
	km/h	15 – 19	32 – 37	45 – 53	34 – 40
Throttle position sensor voltage: 2.25 V	mph	22 – 26	43 – 49	62 – 68	68 – 74
	km/h	35 – 41	69 – 79	99 – 108	109 – 118
Fully-opened throttle, Throttle position sensor voltage: 4.5 V	mph	37 – 43	69 – 77	101 – 111	90 – 101
	km/h	60 – 69	111 – 124	163 – 179	145 – 163

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 – 23	18 – 21	6 – 10 (3rd → 1st)	
	km/h	31 – 36	29 – 34	10 – 15 (3rd → 1st)	
Fully-opened throttle, Throttle position sensor voltage: 4.5 V	mph	88 – 99	86 – 96	57 – 64	26 – 32
	km/h	142 – 159	138 – 154	92 – 103	42 – 51

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.

4. Accelerate to about 35 mph (57 km/h) so the transmission is in 4th, then shift from D4 or D position to 2 position. The vehicle should immediately begin slowing down from engine braking.

5. Check for abnormal noise and clutch slippage in the following positions.

   1 (1st Gear) Position
   Accelerate from a stop at full throttle. Make sure there is no abnormal noise or clutch slippage.
   Upshifts should not occur with the shift lever in this position.
   2 (2nd Gear) Position
   Accelerate from a stop at full throttle. Make sure there is no abnormal noise or clutch slippage.
   Upshifts and downshifts should not occur with the shift lever in this position.
   R (Reverse) Position
   Accelerate from a stop at full throttle, and check for abnormal noise and clutch slippage.

6. Test in P (Park) 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.

Stall Speed

Test

CAUTION:

- **To prevent transmission damage, do not test stall speed for more than 10 seconds at a time.**
- **Do not shift the lever while raising the engine speed.**
- **Be sure to remove the pressure gauge before testing stall speed.**

1. Before testing, check the transmission fluid level, see page 14-160.
2. Engage the parking brake and block all four wheels.
3. Connect the tachometer, and start the engine.
4. Make sure the A/C switch is OFF.
5. After the engine has warmed up to normal operating temperature (the radiator fan comes on), shift into $\boxed{2}$ position.
6. Fully press the brake pedal and accelerator for 6 to 8 seconds, and note engine speed.
7. Allow 2 minutes for cooling, then repeat the test in $\boxed{1}$, $\boxed{D_4}$ ('97 – 98), $\boxed{D}$ ('99 – 00), and $\boxed{R}$ positions. Stall speed should be the same in $\boxed{D_4}$, $\boxed{D}$, $\boxed{2}$, $\boxed{1}$, and $\boxed{R}$ positions.

   Stall Speed rpm:
   Specification: 2,550 rpm
   Service Limit: 2,400 – 2,700 rpm

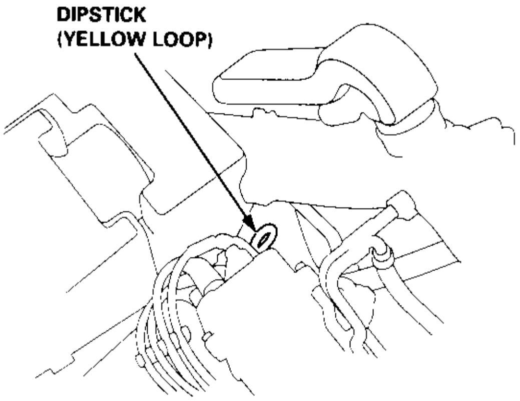
TROUBLE	PROBABLE CAUSE
Stall rpm high in $\boxed{D_4}$, $\boxed{D}$, $\boxed{2}$, $\boxed{1}$ and $\boxed{R}$ positions	• ATF pump output is low • Clogged ATF strainer • Pressure regulator valve stuck closed • Slipping clutch
Stall rpm high in $\boxed{1}$ position	Slippage of 1st clutch, 1st-hold clutch, or 1st gear one-way clutch
Stall rpm high in $\boxed{2}$ position	Slippage of 2nd clutch
Stall rpm high in $\boxed{D_4}$ or $\boxed{D}$ position	Slippage of 1st clutch or 1st gear one-way clutch
Stall rpm high in $\boxed{R}$ position	Slippage of 4th clutch
Stall rpm low in $\boxed{D_4}$, $\boxed{D}$, $\boxed{2}$, $\boxed{1}$, and $\boxed{R}$ positions	• Engine output low • Torque converter one-way clutch slipping

Fluid Level

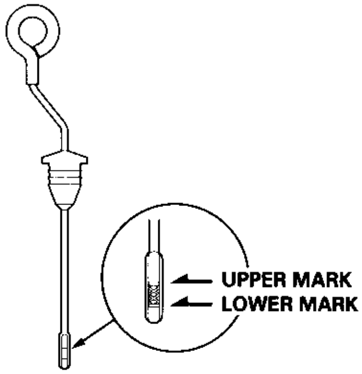
Checking

NOTE: Keep all foreign particles out of the transmission.

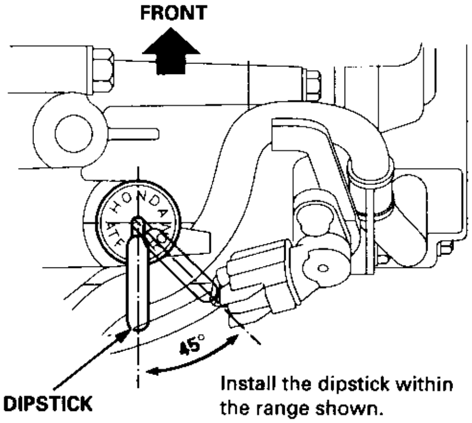
1. Warm up the engine to normal operating temperature (the radiator fan comes on).
2. Park the vehicle on level ground. Turn off the engine.
3. Remove the dipstick (yellow loop) from the transmission, and wipe it with a clean cloth.
4. Insert the dipstick into the transmission.



5. Remove the dipstick and check the fluid level. It should be between the upper and lower marks.



6. If the level is below the lower mark, pour the recommended fluid into the filler hole to bring it to the upper mark. Always use Genuine Honda Premium Formula Automatic Transmission Fluid (ATF). Using a non-Honda ATF can affect shift quality.
7. Insert the dipstick back into the transmission in the direction shown.



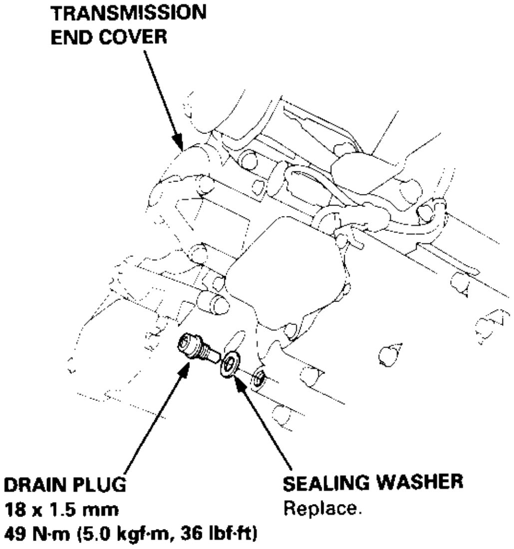
Install the dipstick within the range shown.

Changing

NOTE: Keep all foreign particles out of the transmission.

1. Bring the transmission up to operating temperature (the radiator fan comes on) by driving the vehicle. Park the vehicle on level ground, turn the engine off, then remove the drain plug.

   NOTE: If a cooler flusher is to be used, see page 14-264 and 14-265.



2. Reinstall the drain plug with a new sealing washer, then refill the transmission with the recommended fluid to the upper mark on the dipstick. Always use Genuine Honda Premium Formula Automatic Transmission Fluid (ATF). Using a non-Honda ATF can affect shift quality.

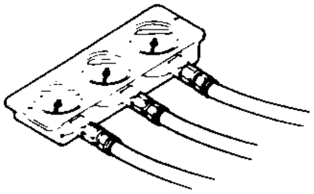
   Automatic Transmission Fluid Capacity:
   4WD:
   2.9 ℓ (3.1 US qt, 2.6 Imp qt) at change
   6.8 ℓ (7.2 US qt, 6.0 Imp qt) at overhaul
   2WD:
   2.7 ℓ (2.9 US qt, 2.4 Imp qt) at change
   5.9 ℓ (6.2 US qt, 5.2 Imp qt) at overhaul

WARNING

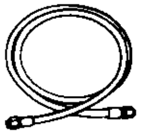
- **While testing, be careful of the rotating wheels.**
- **Make sure lifts, jacks, and safety stands are placed properly (see section 1).**

1. Before testing, be sure the transmission fluid is filled to the proper level.
2. **4WD:**
   Raise the vehicle (see section 1).
   2WD:
   Raise the front of the vehicle, and make sure it is securely supported. Set the parking brake, and block both rear wheels securely.
3. Allow all four wheels (4WD) or front wheels (2WD) to rotate freely.
4. Warm up the engine (the radiator fan comes on), then stop it and connect the tachometer.
5. Connect the oil pressure gauges to each inspection hole securely, and do not allow dust or other foreign particles to enter the inspection holes.

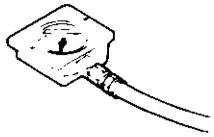
   TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)



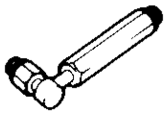
A/T OIL PRESSURE GAUGE SET W/PANEL
07406 – 0020400



A/T PRESSURE HOSE, 2210 mm
07MAJ – PY4011A
(4 Required)



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



A/T PRESSURE HOSE ADAPTER
07MAJ – PY40120
(4 Required)

6. Measure the following pressure:
   - Line Pressure 14-162
   - 1st, 1st-hold Clutch Pressure 14-162
   - 2nd, 3rd and 4th Clutch Pressure 14-163
7. Install new sealing washers and the sealing bolts in the inspection holes, and tighten to the specified torque.

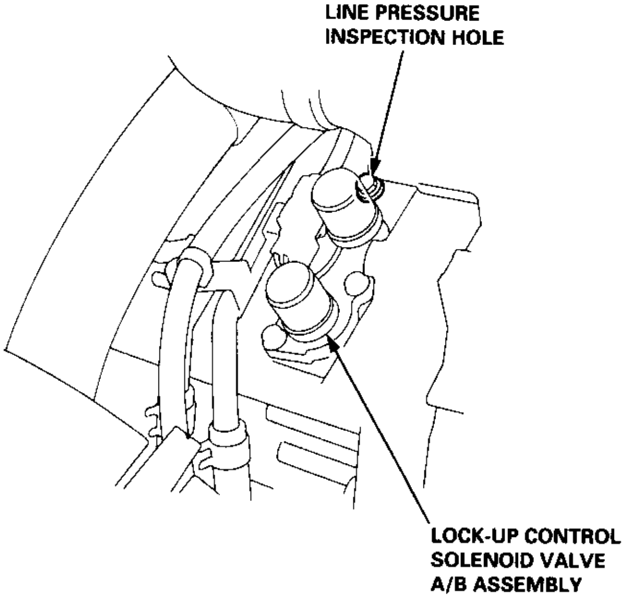
   TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

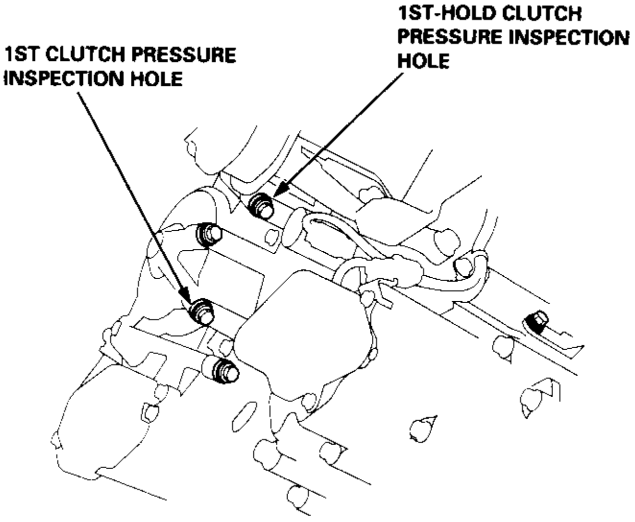
(cont'd)

(cont'd)

Line Pressure, 1st Clutch, 1st-hold Clutch Pressure Measurement

1. Start the engine, and shift to N or P position.
2. Run the engine at 2,000 rpm, then measure line pressure. Higher pressure may be indicated if measurements are made in shift lever positions other than N or P position.
3. Shift to D_4 ('97 – 98) or D ('99 – 00) position and hold the engine at 2,000 rpm, then measure 1st clutch pressure.
4. Shift to 1 position and hold the engine at 2,000 rpm, then measure 1st-hold clutch pressure.





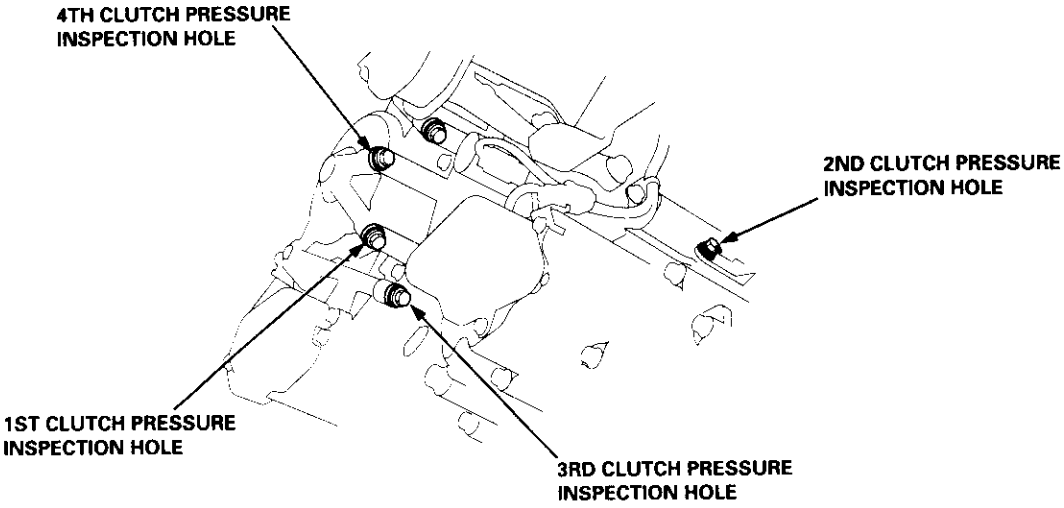
PRESSURE	SHIFT LEVER POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
Line	N or P	No (or low) line pressure	Torque converter, ATF pump, pressure regulator, torque converter check valve	830 – 880 kPa (8.5 – 9.0 kgf/cm², 120 – 130 psi)	780 kPa (8.0 kgf/cm², 110 psi)
1st Clutch	D_4 ('97 – 98) D ('99 – 00)	No or low 1st pressure	1st Clutch		
1st-hold Clutch	1	No or low 1st-hold pressure	1st-hold Clutch		

2nd, 3rd, and 4th Clutch Pressure Measurement
'97 – 98 Models:

1. Start the engine, and shift to $\boxed{2}$ position.
2. Run the engine at 2,000 rpm, then measure 2nd clutch pressure.
3. Shift to $\boxed{D_3}$ position, and hold the engine at 2,000 rpm, then measure 3rd clutch pressure.
4. Shift to $\boxed{D_4}$ position, and hold the engine at 2,000 rpm, then measure 4th clutch pressure.
5. Shift to $\boxed{R}$ position, and hold the engine at 2,000 rpm, then measure 4th clutch pressure.

'99 – 00 Models:

1. Start the engine, and shift to $\boxed{2}$ position.
2. Run the engine at 2,000 rpm, then measure 2nd clutch pressure.
3. Shift to $\boxed{D}$ position, and turn the Over-Drive (O/D) OFF by pressing the O/D switch (O/D OFF indicator light comes on).
4. Hold the engine at 2,000 rpm, then measure 3rd clutch pressure.
5. Turn the Over-Drive ON by pressing the O/D switch (O/D OFF indicator light goes out), and hold the engine at 2,000 rpm, then measure 4th clutch pressure.
6. Shift to $\boxed{R}$ position, and hold the engine at 2,000 rpm, then measure 4th clutch pressure.



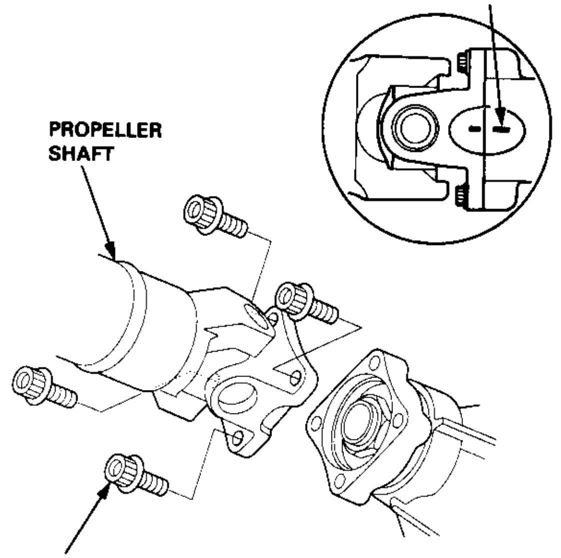
PRESSURE	SHIFT LEVER POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
2nd Clutch	$\boxed{2}$	No or low 2nd pressure	2nd Clutch	800 – 850 kPa (8.2 – 8.7 kgf/cm², 120 – 124 psi)	760 kPa (7.7 kgf/cm², 110 psi)
3rd Clutch	$\boxed{D_3}$ ('97 – 98) $\boxed{D}$ with Over-Drive is OFF ('99 – 00)	No or low 3rd pressure	3rd Clutch		
4th Clutch	$\boxed{D_4}$ ('97 – 98) $\boxed{D}$ ('99 – 00)	No or low 4th pressure	4th Clutch		
	$\boxed{R}$		Servo Valve or 4th Clutch		

Transfer

Inspection

⚠ WARNING Make sure lifts, jacks, and safety stands are placed properly (see section 1).

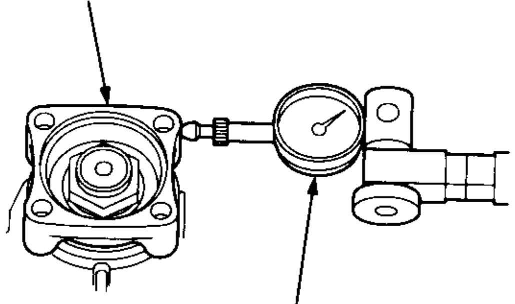
1. Raise the front of the vehicle, and make sure it is supported securely.
2. Set the parking brake, and block both rear wheels securely.
3. Shift to N position.
4. Make a reference mark across the propeller shaft and the transfer assembly flanges.
5. Separate the propeller shaft from the transfer assembly.



8 x 1.25 mm
32 N·m (3.3 kgf·m, 24 lbf·ft)
Replace.

6. Set a dial indicator on the transfer assembly flange, then measure the transfer gear backlash.

STANDARD: 0.06 – 0.16 mm (0.002 – 0.006 in)



7. If the measurement is out of standard, remove the transfer assembly and adjust transfer gear backlash (see page 14-232 thru 14-249).
8. Check for fluid leaks between the mating faces of transfer cover A and cover B.
9. If there is a fluid leak, remove the cover, and replace the O-ring.
10. Check for fluid leaks between the mating face of the transfer assembly and transmission.
11. If there is a fluid leak, remove the transfer assembly, and replace the O-ring.
12. Check the transfer oil seal for damage and fluid leaks.
13. If oil seal replacement is required, remove the transfer assembly, replace the oil seal, and adjust the total starting torque (see page 14-232 thru 14-249).

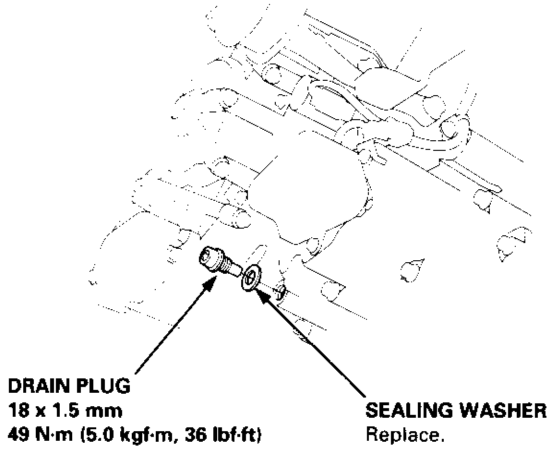
NOTE: Do not replace the oil seal with the transfer assembly on the transmission.

Transfer Assembly

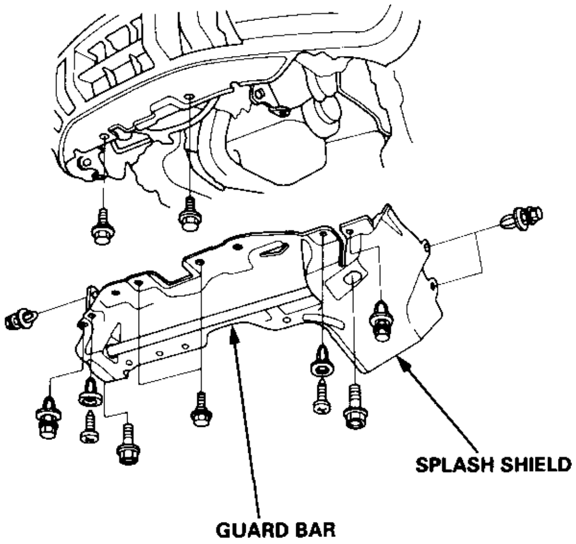
Removal

WARNING Make sure the lifts, jacks, and safety stands are placed properly (see section 1).

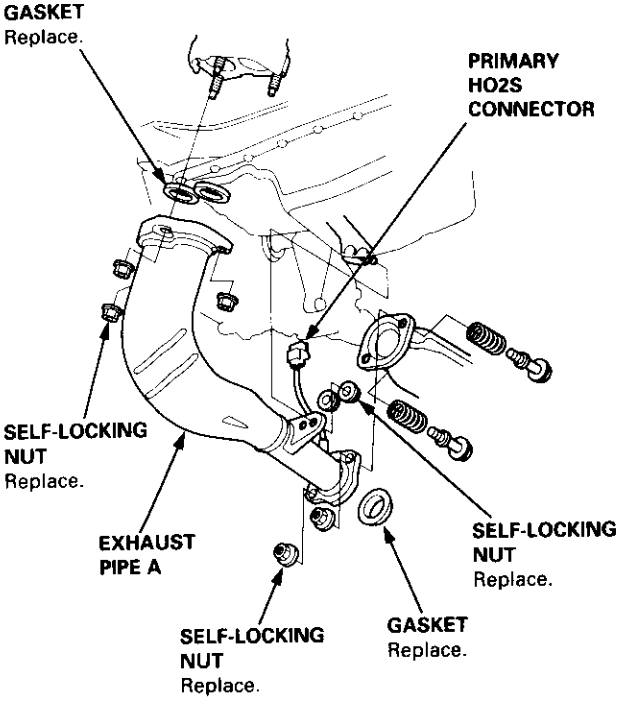
1. Raise the front of the vehicle, and make sure it is supported securely.
2. Set the parking brake, and block both rear wheels securely.
3. Drain the automatic transmission fluid (ATF). Reinstall the drain plug with a new sealing washer.



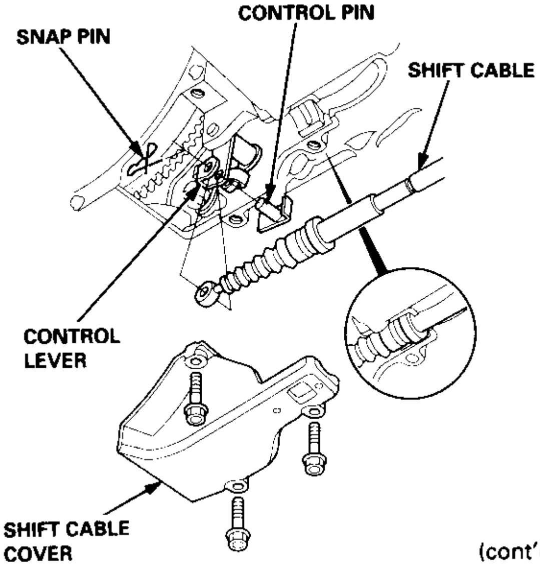
4. Remove the guard bar and the splash shield.



5. Disconnect the primary heated oxygen sensor (Primary HO2S) connector.
6. Remove exhaust pipe A.



7. Remove the shift cable cover.
8. Remove the snap pin and control pin, then separate the shift cable from the control lever. Do not bend the shift cable excessively.



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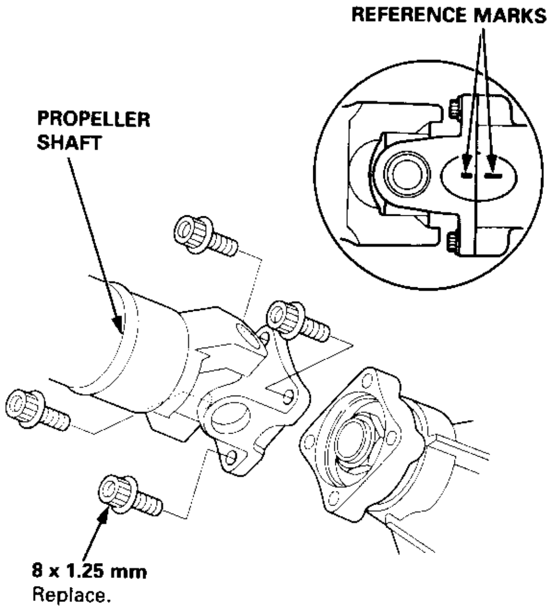
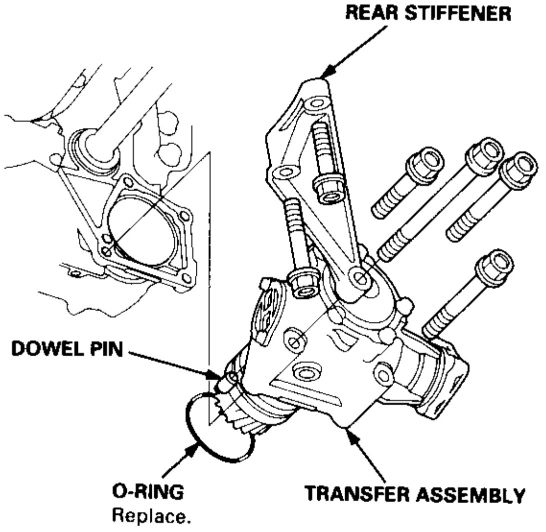
Removal (cont'd)

9. Make reference marks across the propeller shaft and the transfer assembly flanges.
10. Separate the propeller shaft from the transfer assembly flanges.



11. Remove the rear stiffener, then remove the transfer assembly.

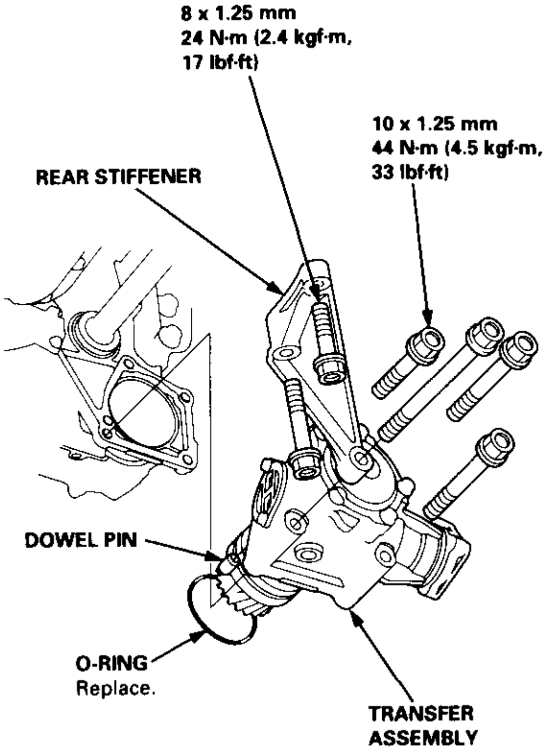
    NOTE: While servicing the transfer assembly, do not allow dust or other foreign particles to enter the transmission.



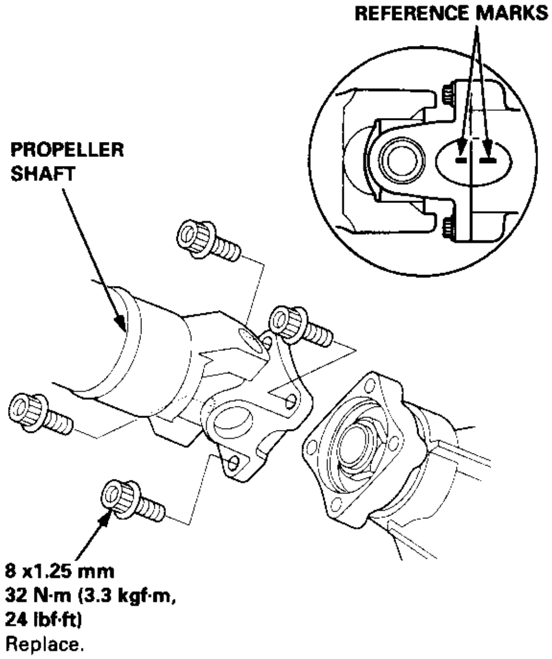
Installation

1. Install a new O-ring on the transfer assembly.
2. Clean the areas where the transfer assembly contacts the transmission with solvent or carburetor cleaner, and dry with compressed air. Then apply ATF to the contact areas.
3. Install the transfer assembly on the transmission.

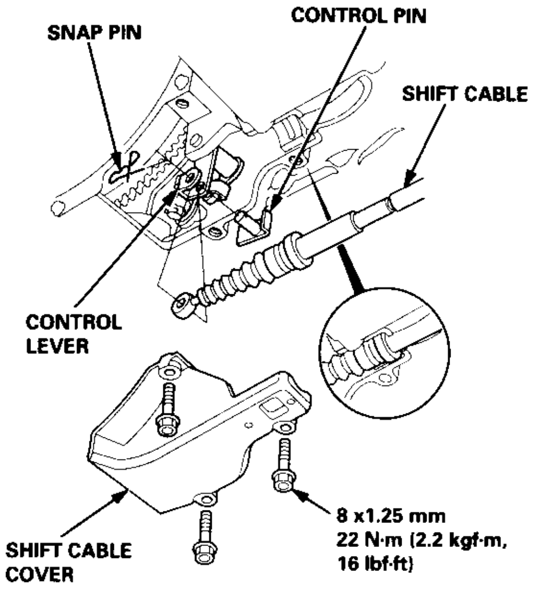
   NOTE: While installing the transfer assembly, do not allow dust or other foreign particles to enter the transmission.
4. Install the rear stiffener.



5. Install the propeller shaft to the transfer assembly by aligning the reference marks.



6. Install the shift cable with the control pin, then secure it with the snap pin. Do not bend the shift cable excessively.
7. Install the shift cable cover.



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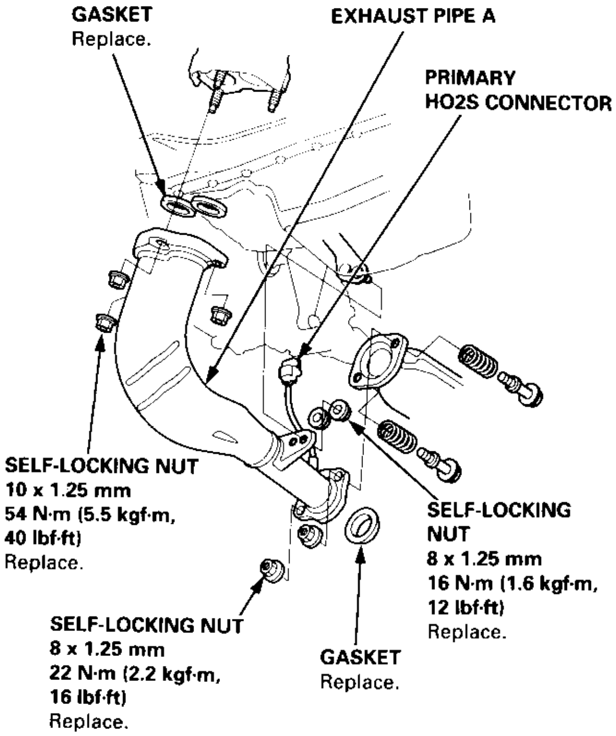
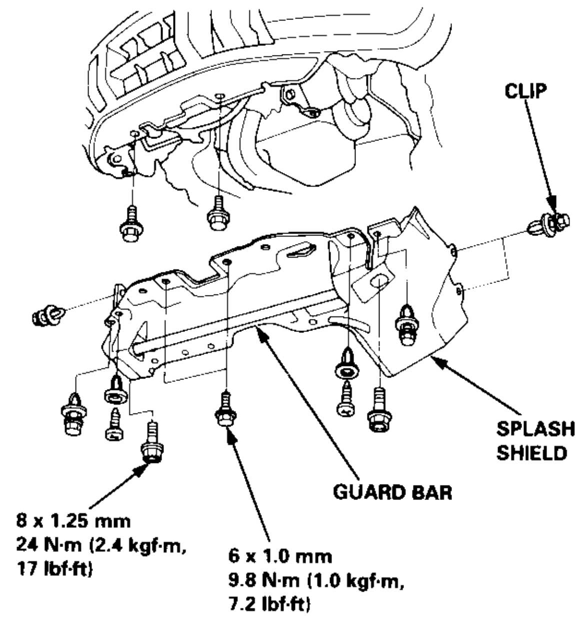
Installation (cont'd)

8. Install the exhaust pipe A.
9. Connect the primary heated oxygen sensor (Primary HO2S) connector.



10. Install the splash shield and the guard bar.



11. Refill the transmission with ATF (see page 14-161).
12. Start the engine, and run it to normal operating temperature (the radiator fan comes on). Turn the engine off and check ATF level.

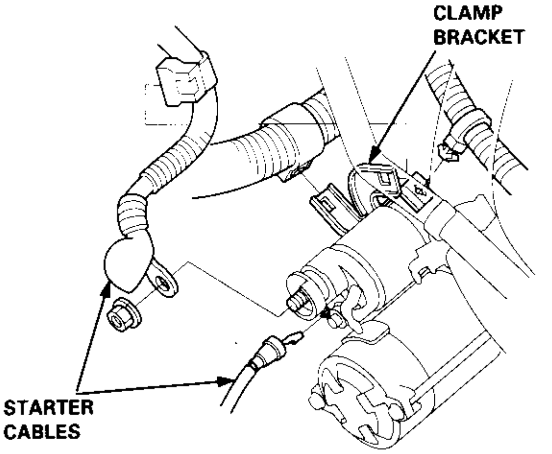
Removal

⚠ WARNING

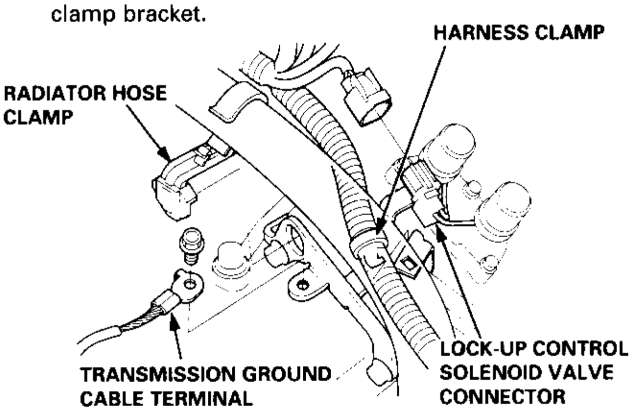
- **Make sure lifts, jacks, and safety stands are placed properly, and hoist brackets are attached to the correct position on the engine (see section 1).**
- **Apply the parking brake and block the rear wheels, so vehicle will not roll off the stands and fall on you while working under it.**

NOTE: Use fender covers to avoid damaging painted surfaces.

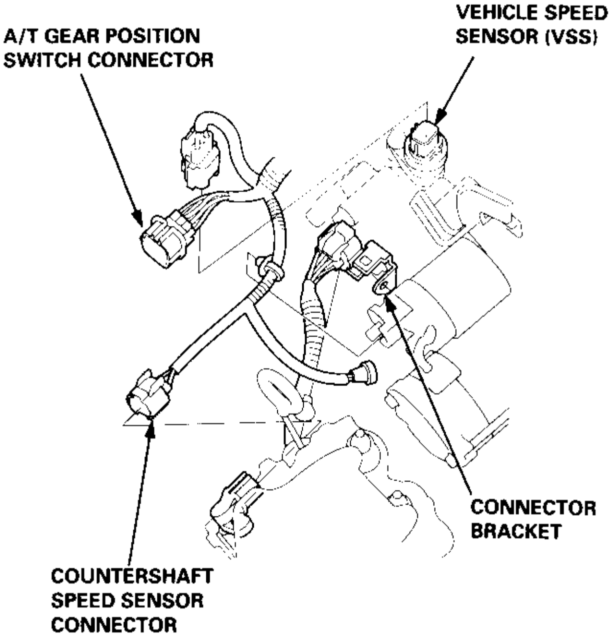
1. Disconnect the negative terminal, then disconnect the positive terminal from the battery.
2. Remove the intake air duct and the air cleaner housing assembly.
3. Remove the starter cables. Remove the harness clamp from the clamp bracket.



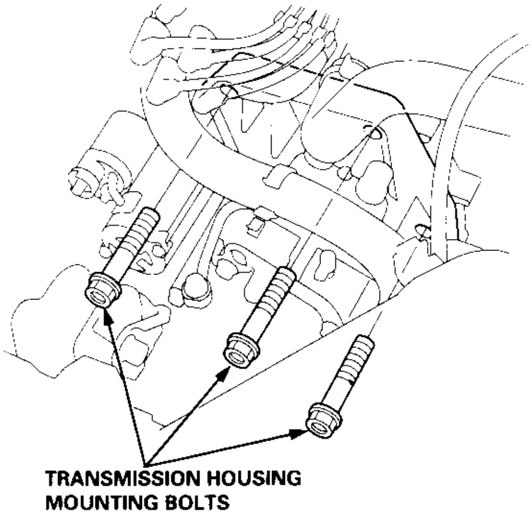
4. Remove the transmission ground cable terminal and the radiator hose clamp from the transmission hanger.
5. Disconnect the lock-up control solenoid valve connector, then remove the harness clamp from the clamp bracket.



6. Disconnect the vehicle speed sensor (VSS), the countershaft speed sensor, and the A/T gear position switch connectors.



7. Remove the transmission housing mounting bolts.



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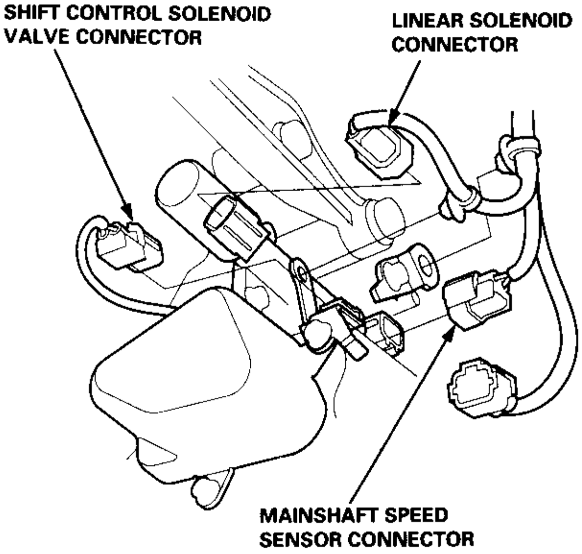
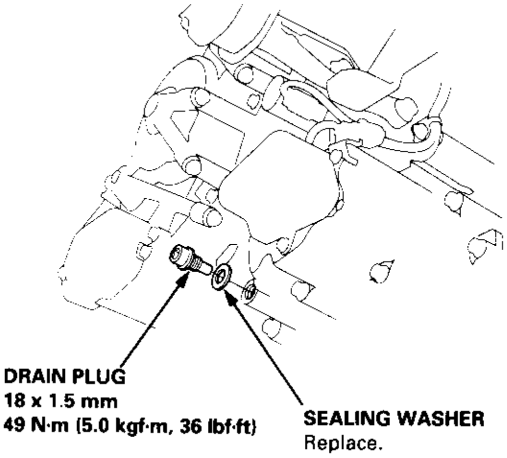
Removal (cont'd)

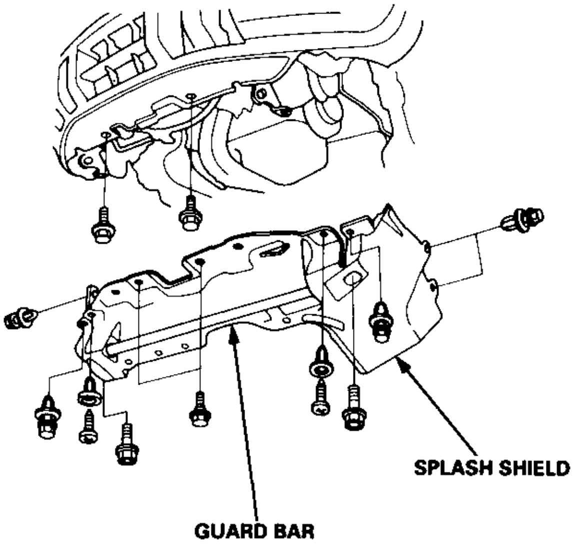
8. Disconnect the mainshaft speed sensor, the shift control solenoid valve, and the linear solenoid connectors.



9. Remove the drain plug, and drain the automatic transmission fluid (ATF). Reinstall the drain plug with a new sealing washer.

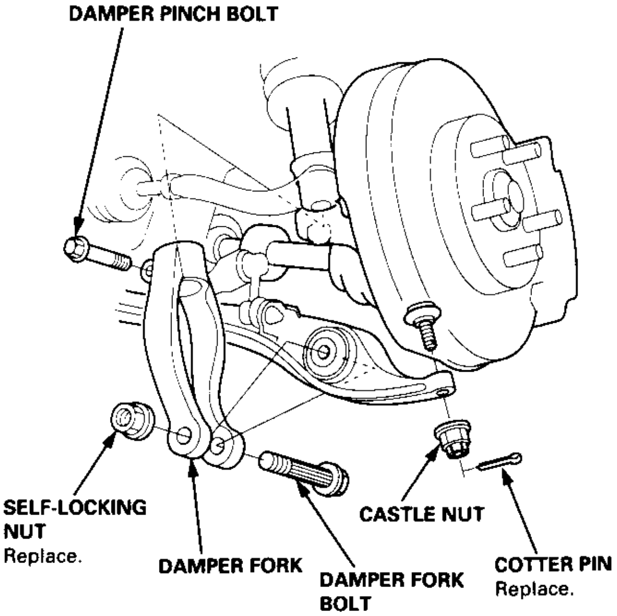


10. Remove the guard bar and the splash shield.

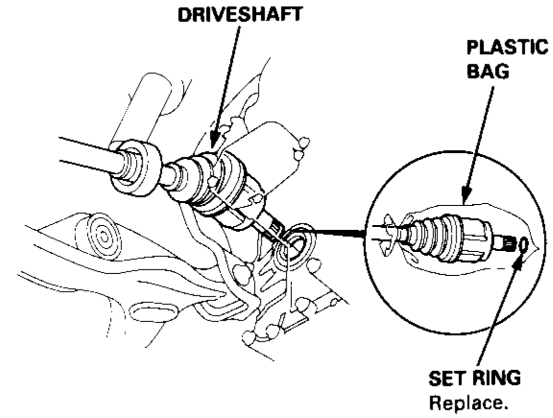


11. Remove the cotter pins and castle nuts, then separate the ball joints from the lower arms (see section 18).

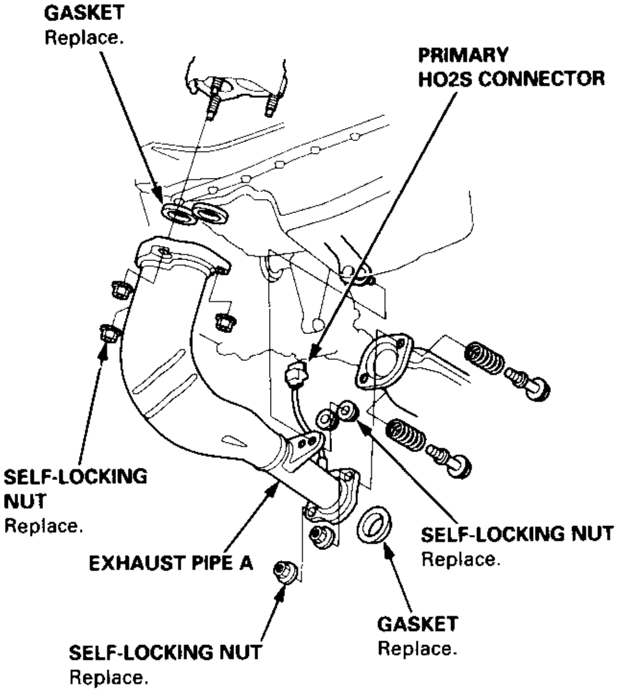
12. Remove the right damper fork bolt, then separate right damper fork and damper.



13. Pry the right driveshaft out of the differential, and pry the left driveshaft out of the intermediate shaft (see section 16).
14. Pull out the inboard joint, and remove the right and left driveshaft (see section 18).
15. Tie plastic bags over the driveshaft ends. Coat all precision finished surfaces with clean engine oil.

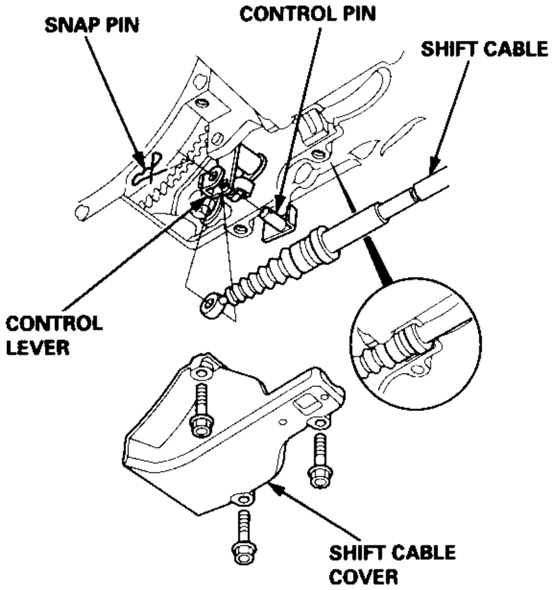


16. Disconnect the primary heated oxygen sensor (Primary HO2S) connector.
17. Remove exhaust pipe A.

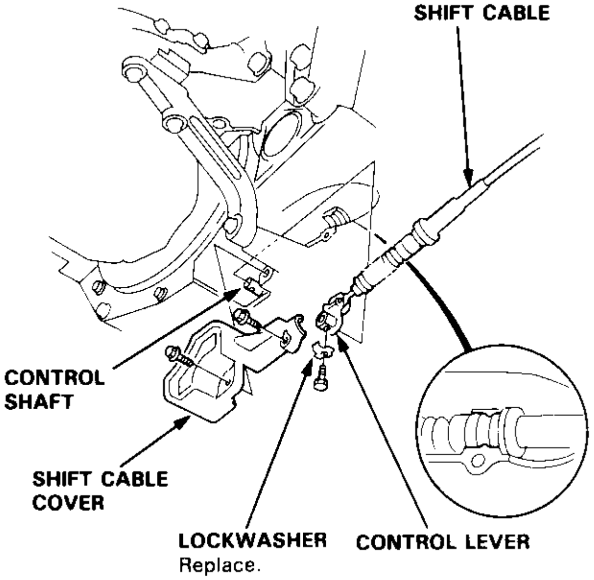


18. Remove the shift cable cover.
19. Remove the shift cable.

4WD:
Remove the snap pin and control pin, then separate the shift cable from the control lever. Do not bend the shift cable excessively.



2WD:
Remove the control lever, then separate the shift cable from the control shaft. Do not bend the shift cable excessively.

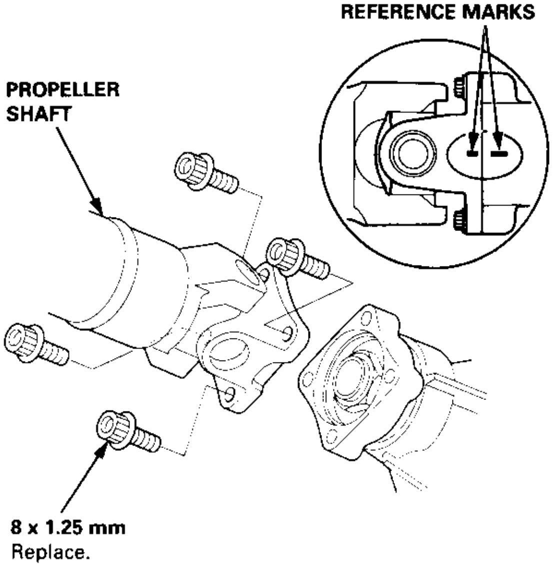


(cont'd)

Removal (cont'd)

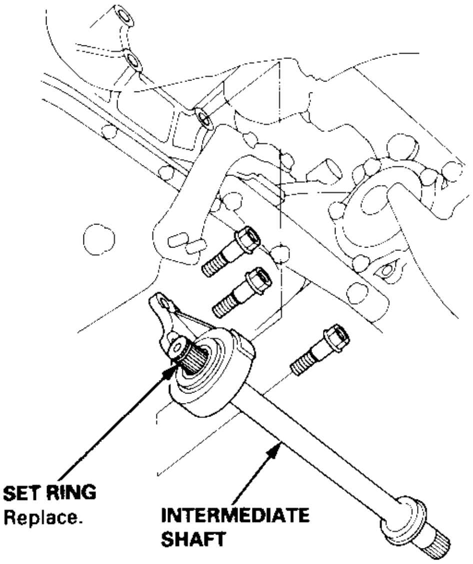
20. Make reference marks across the transfer assembly and propeller shaft flanges. (4WD)

21. Separate the propeller shaft from the transfer assembly. (4WD)



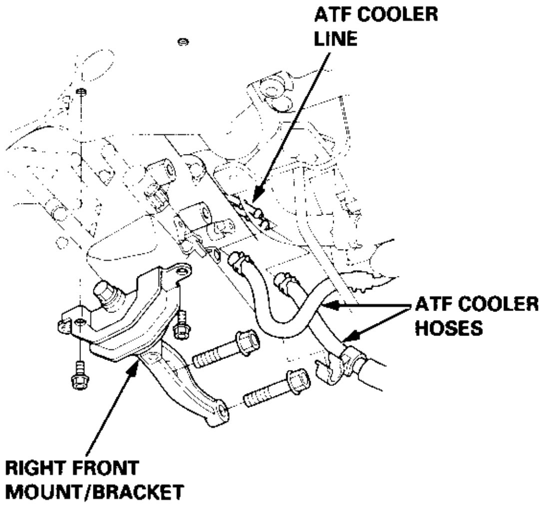
22. Remove the intermediate shaft.

23. Tie plastic bags over the both ends of the intermediate shaft. Coat all precision finished surfaces with clean engine oil.



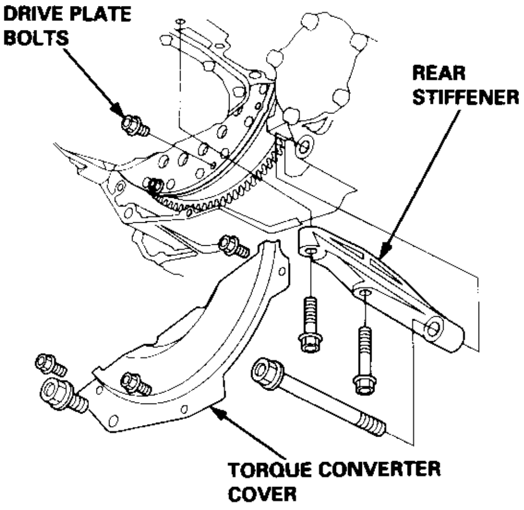
24. Remove the right front mount/bracket.

25. Remove the ATF cooler hoses at the ATF cooler lines. Turn the ends of the cooler hoses up to prevent ATF from flowing out, then plug the lines and hoses. Check for any sign of leakage at the hose joints.

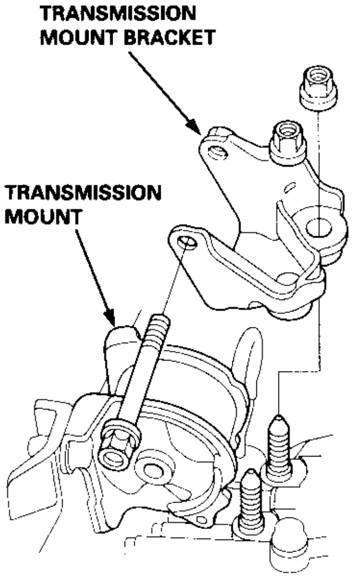


26. Remove the rear stiffener and torque converter cover.

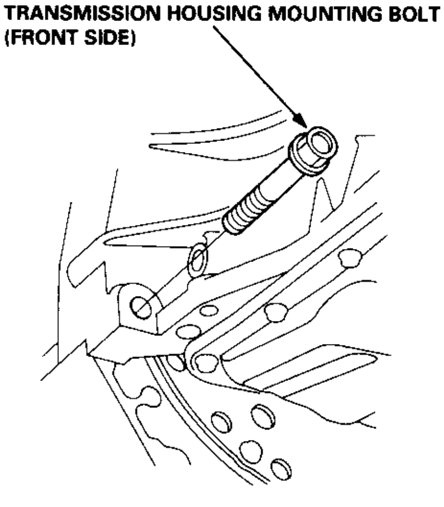
27. Remove the eight drive plate bolts, one at a time, while rotating the crankshaft pulley.



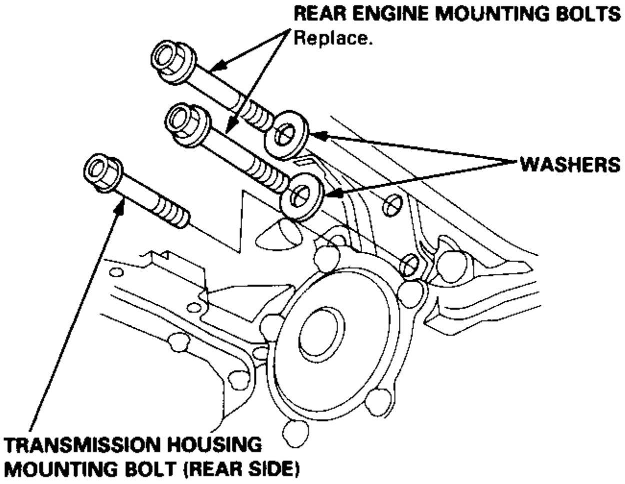
28. Place a jack under the transmission, raise it just enough to take it off of the mounts, then remove the transmission mount bracket.



29. Remove the front side transmission housing mounting bolt.



30. Remove the rear side transmission housing mounting bolt and the rear engine mounting bolts.

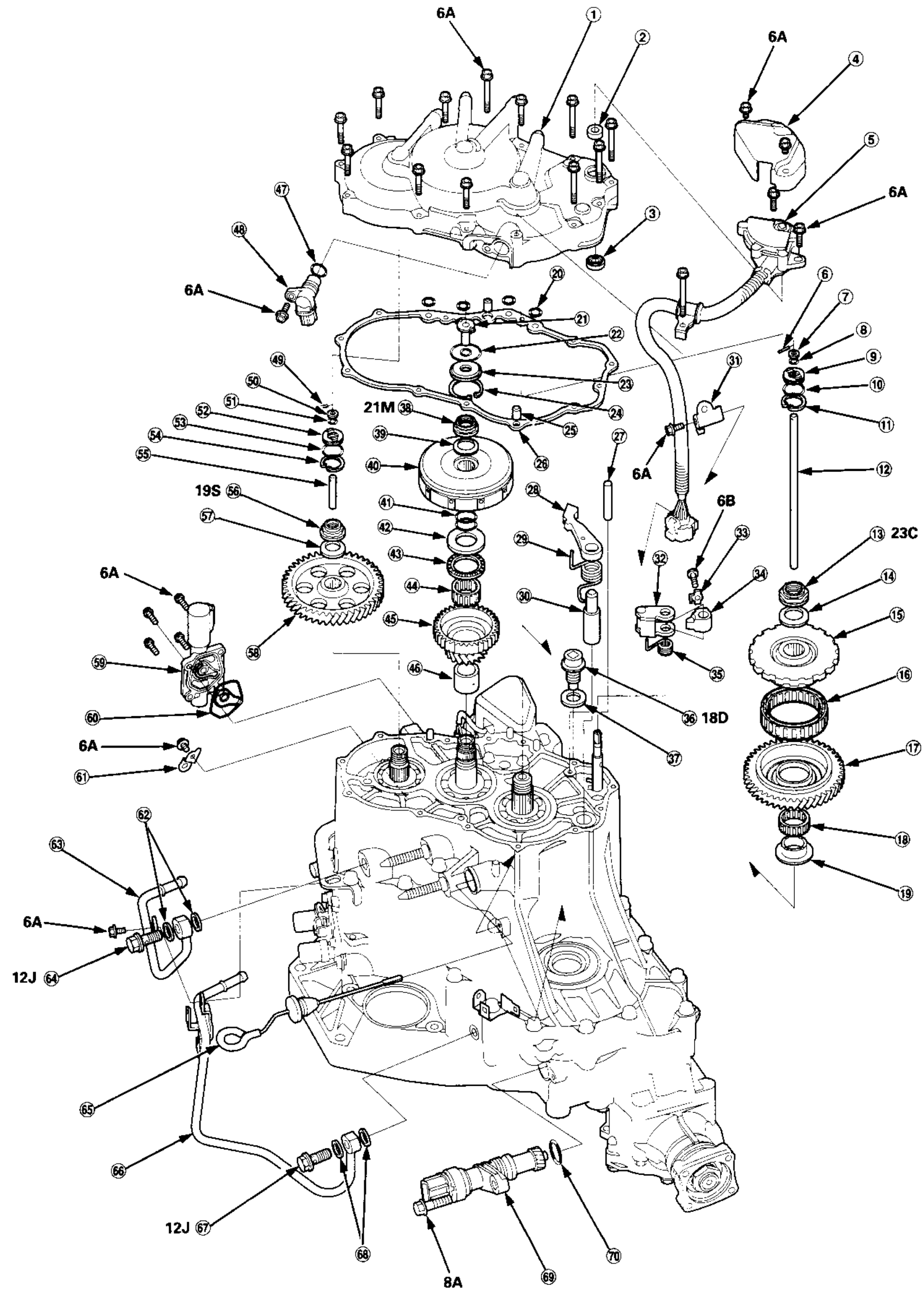


31. Pull the transmission away from the engine until it clears the dowel pins, then lower it on the transmission jack.

32. Remove the torque converter assembly from the transmission.

33. Remove the starter from the transmission housing.

End Cover/Transmission



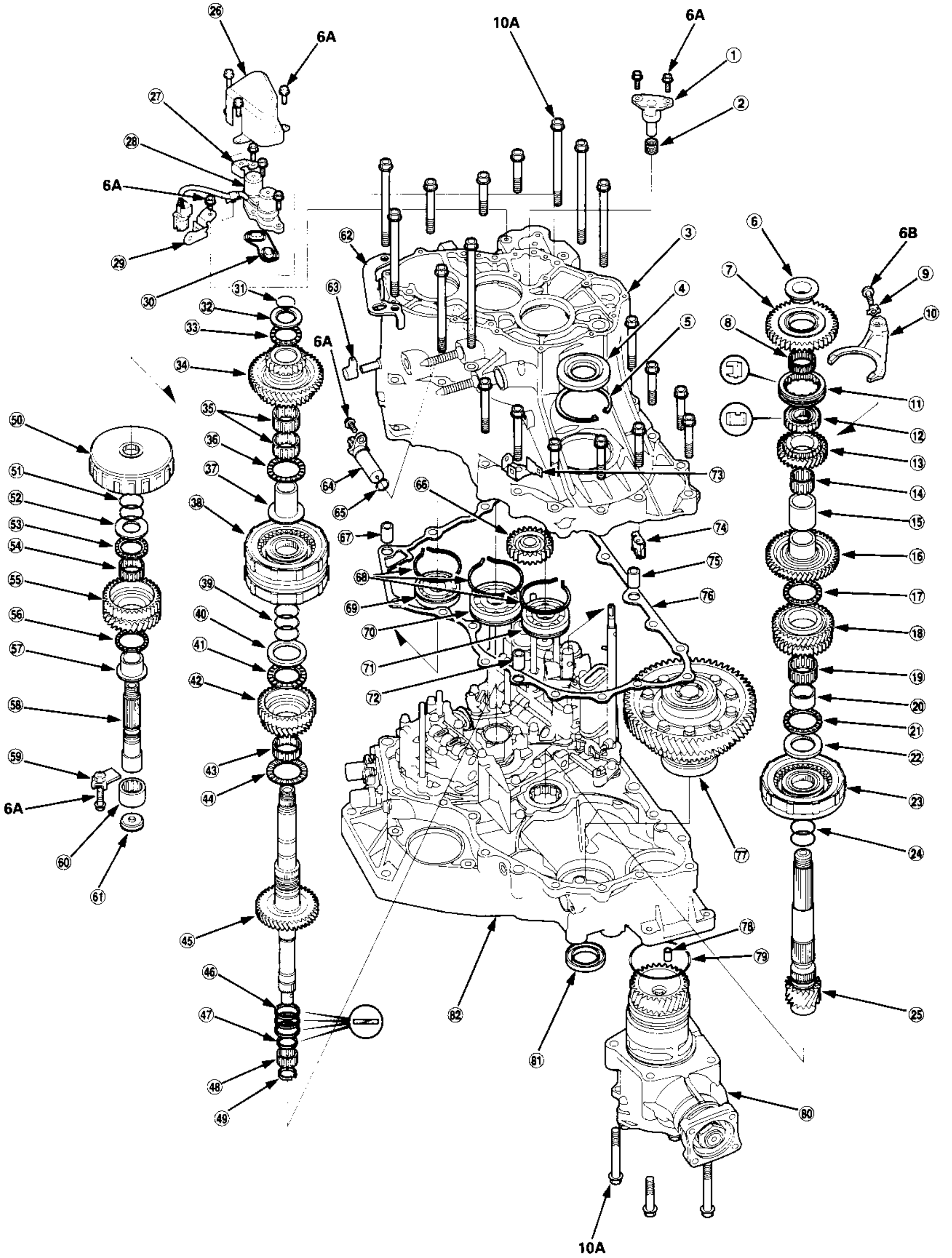
① **END COVER**
② **OIL SEAL** Replace.
③ **BALL BEARING**
④ **A/T GEAR POSITION SWITCH COVER**
⑤ **A/T GEAR POSITION SWITCH**
⑥ **ROLLER**
⑦ **COLLAR**
⑧ **O-RING** Replace.
⑨ **FEED PIPE FLANGE**
⑩ **O-RING** Replace.
⑪ **SNAP RING**
⑫ **3RD CLUTCH FEED PIPE**
⑬ **COUNTERSHAFT LOCKNUT 23 x 1.25 mm** Replace.
⑭ **CONICAL SPRING WASHER** Replace.
⑮ **PARK GEAR**
⑯ **ONE-WAY CLUTCH**
⑰ **COUNTERSHAFT 1ST GEAR**
⑱ **NEEDLE BEARING**
⑲ **COUNTERSHAFT 1ST GEAR COLLAR**
⑳ **O-RING** Replace.
㉑ **1ST CLUTCH FEED PIPE**
㉒ **O-RING** Replace.
㉓ **FEED PIPE FLANGE**
㉔ **SNAP RING**
㉕ **DOWEL PIN**
㉖ **END COVER GASKET** Replace.
㉗ **PARK PAWL STOP**
㉘ **PARK PAWL**
㉙ **PARK PAWL SPRING**
㉚ **PARK PAWL SHAFT**
㉛ **A/T GEAR POSITION SWITCH HARNESS CLAMP**
㉜ **PARK LEVER**
㉝ **LOCK WASHER** Replace.
㉞ **PARK STOP** Selective part
㉟ **PARK LEVER SPRING**
㊱ **DRAIN PLUG**
㊲ **SEALING WASHER** Replace.
㊳ **MAINSHAFT LOCKNUT 21 x 1.25 mm** Replace.
㊴ **CONICAL SPRING WASHER** Replace.
㊵ **1ST CLUTCH ASSEMBLY**
㊶ **O-RING** Replace.
㊷ **THRUST WASHER**
㊸ **THRUST NEEDLE BEARING**
㊹ **NEEDLE BEARING**
㊺ **MAINSHAFT 1ST GEAR**
㊻ **MAINSHAFT 1ST GEAR COLLAR**
㊼ **O-RING** Replace.
㊽ **COUNTERSHAFT SPEED SENSOR**
㊾ **ROLLER**
㊿ **COLLAR**
(51) **O-RING** Replace.
(52) **FEED PIPE FLANGE**
(53) **O-RING** Replace.
(54) **SNAP RING**
(55) **1ST-HOLD CLUTCH FEED PIPE**
(56) **SUB-SHAFT LOCKNUT 19 x 1.25 mm** Replace.
(57) **CONICAL SPRING WASHER** Replace.
(58) **SUB-SHAFT 1ST GEAR**
(59) **LINEAR SOLENOID ASSEMBLY**
(60) **LINEAR SOLENOID ASSEMBLY GASKET** Replace.
(61) **HARNESS BRACKET**
(62) **SEALING WASHERS** Replace.
(63) **ATF COOLER LINE**
(64) **LINE BOLT**
(65) **ATF DIPSTICK**
(66) **ATF COOLER LINE**
(67) **LINE BOLT**
(68) **SEALING WASHERS** Replace.
(69) **VEHICLE SPEED SENSOR (VSS)**
(70) **O-RING** Replace.

TORQUE SPECIFICATIONS

Bolt/Nut No.	Torque Value	Size	Remarks
6A	12 N·m (1.2 kgf·m, 8.7 lbf·ft)	6 x 1.0 mm	
6B	14 N·m (1.4 kgf·m, 10 lbf·ft)	6 x 1.0 mm	
8A	22 N·m (2.2 kgf·m, 16 lbf·ft)	8 x 1.25 mm	
12J	28 N·m (2.9 kgf·m, 21 lbf·ft)	12 x 1.25 mm	Line bolt
18D	49 N·m (5.0 kgf·m, 36 lbf·ft)	18 x 1.5 mm	Drain plug
19S	93 N·m (9.5 kgf·m, 69 lbf·ft)	19 x 1.25 mm	Sub-shaft locknut
21M	78 N·m (8.0 kgf·m, 58 lbf·ft)	21 x 1.25 mm	Mainshaft locknut: Left-hand threads
23C	103 → 0 → 103 N·m (10.5 → 0 → 10.5 kgf·m, 75.9 → 0 → 75.9 lbf·ft)	23 x 1.25 mm	Countershaft locknut: Left-hand threads

Illustrated Index (4WD)

Transmission Housing



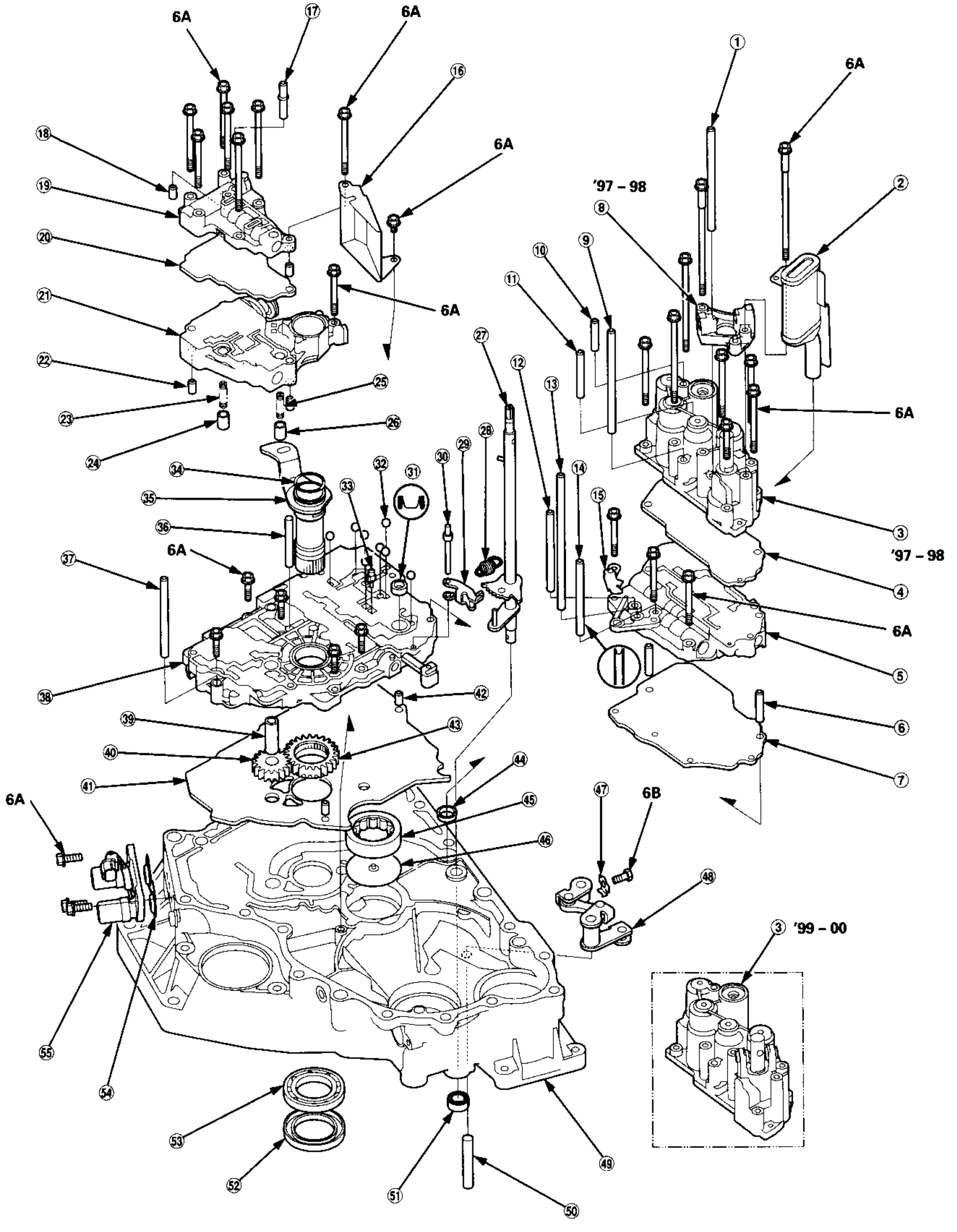
① **REVERSE IDLER GEAR SHAFT/HOLDER**
② **NEEDLE BEARING**
③ **TRANSMISSION HOUSING**
④ **TRANSMISSION HOUSING OIL SEAL** Replace.
⑤ **SET RING, 80 mm** Selective part
⑥ **REVERSE GEAR COLLAR**
⑦ **COUNTERSHAFT REVERSE GEAR**
⑧ **NEEDLE BEARING**
⑨ **LOCK WASHER** Replace.
⑩ **REVERSE SHIFT FORK**
⑪ **REVERSE SELECTOR**
⑫ **REVERSE SELECTOR HUB**
⑬ **COUNTERSHAFT 4TH GEAR**
⑭ **NEEDLE BEARING**
⑮ **DISTANCE COLLAR, 28 mm** Selective part
⑯ **COUNTERSHAFT 2ND GEAR**
⑰ **THRUST NEEDLE BEARING**
⑱ **COUNTERSHAFT 3RD GEAR**
⑲ **NEEDLE BEARING**
⑳ **COUNTERSHAFT 3RD GEAR COLLAR**
㉑ **THRUST NEEDLE BEARING**
㉒ **SPLINED WASHER**
㉓ **3RD CLUTCH ASSEMBLY**
㉔ **O-RING** Replace.
㉕ **COUNTERSHAFT**
㉖ **SHIFT CONTROL SOLENOID COVER**
㉗ **HARNESS CLAMP BRACKET**
㉘ **SHIFT CONTROL SOLENOID VALVE A/B ASSEMBLY**
㉙ **HARNESS CLAMP BRACKET**
㉚ **SHIFT CONTROL SOLENOID VALVE FILTER/GASKET** Replace.
㉛ **SNAP RING**
㉜ **THRUST WASHER**
㉝ **THRUST NEEDLE BEARING**
㉞ **MAINSHAFT 4TH GEAR**
㉟ **NEEDLE BEARINGS**
㊱ **THRUST NEEDLE BEARING**
㊲ **MAINSHAFT 4TH GEAR COLLAR**
㊳ **2ND/4TH CLUTCH ASSEMBLY**
㊴ **O-RING** Replace.
㊵ **THRUST WASHER, 36.5 x 55 mm** Selective part
㊶ **THRUST NEEDLE BEARING**
㊷ **MAINSHAFT 2ND GEAR**
㊸ **NEEDLE BEARING**
㊹ **THRUST NEEDLE BEARING**
㊺ **MAINSHAFT**
㊻ **SEALING RING, 35 mm**
㊼ **SEALING RING, 29 mm**
㊽ **NEEDLE BEARING**
㊾ **SET RING**
㊿ **1ST-HOLD CLUTCH ASSEMBLY**
(51) **O-RING** Replace.
(52) **THRUST WASHER**
(53) **THRUST NEEDLE BEARING**
(54) **NEEDLE BEARING**
(55) **SUB-SHAFT 4TH GEAR**
(56) **THRUST NEEDLE BEARING**
(57) **SUB-SHAFT 4TH GEAR COLLAR**
(58) **SUB-SHAFT**
(59) **NEEDLE BEARING STOP**
(60) **NEEDLE BEARING**
(61) **ATF GUIDE CAP** Replace.
(62) **TRANSMISSION HANGER**
(63) **BREATHER CAP**
(64) **MAINSHAFT SPEED SENSOR**
(65) **O-RING** Replace.
(66) **REVERSE IDLER GEAR**
(67) **DOWEL PIN, 14 x 25 mm**
(68) **SNAP RINGS**
(69) **SUB-SHAFT TRANSMISSION HOUSING BEARING**
(70) **MAINSHAFT TRANSMISSION HOUSING BEARING**
(71) **COUNTERSHAFT TRANSMISSION HOUSING BEARING**
(72) **DOWEL PIN, 14 x 25 mm**
(73) **CONNECTOR BRACKET**
(74) **ATF MAGNET**
(75) **DOWEL PIN, 14 x 20 mm**
(76) **TRANSMISSION HOUSING GASKET** Replace.
(77) **DIFFERENTIAL ASSEMBLY**
(78) **DOWEL PIN, 10 x 12 mm**
(79) **O-RING** Replace.
(80) **TRANSFER ASSEMBLY**
(81) **TORQUE CONVERTER HOUSING OIL SEAL** Replace.
(82) **TORQUE CONVERTER HOUSING**

TORQUE SPECIFICATIONS

Bolt/Nut No.	Torque Value	Size	Remarks
6A	12 N·m (1.2 kgf·m, 8.7 lbf·ft)	6 x 1.0 mm	
6B	14 N·m (1.4 kgf·m, 10 lbf·ft)	6 x 1.0 mm	
10A	44 N·m (4.5 kgf·m, 33 lbf·ft)	10 x 1.25 mm	

Illustrated Index (4WD)

Torque Converter Housing/Valve Body



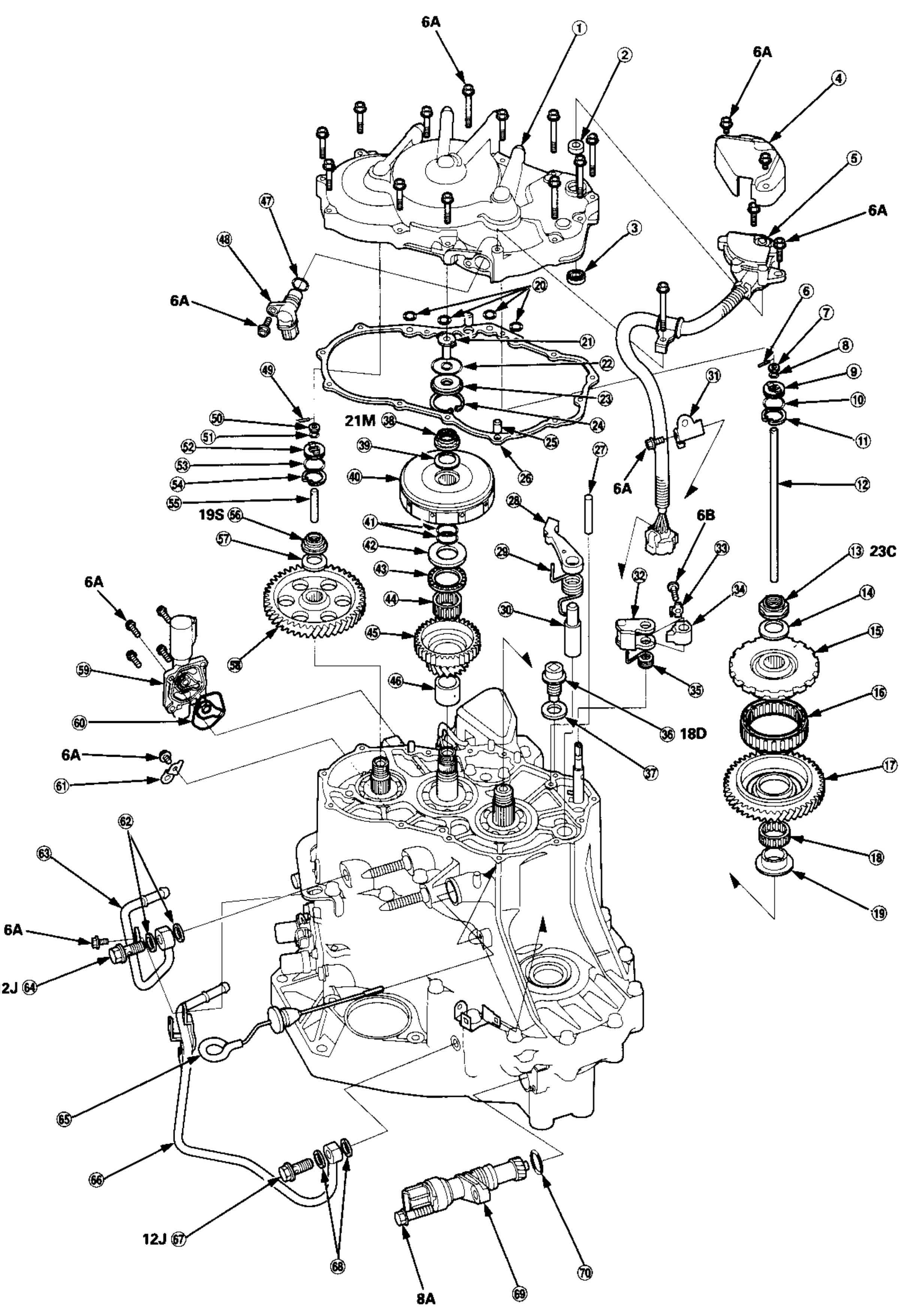
① ATF FEED PIPE, 8 x 145 mm
② ATF STRAINER
③ SERVO BODY
④ SERVO SEPARATOR PLATE
⑤ SECONDARY VALVE BODY
⑥ DOWEL PIN
⑦ SECONDARY SEPARATOR PLATE
⑧ SERVO DETENT BASE ('97 – 98 models only)
⑨ ATF FEED PIPE, 8 x 145 mm
⑩ ATF FEED PIPE, 8 x 40 mm
⑪ ATF FEED PIPE, 8 x 62 mm
⑫ ATF FEED PIPE, 8 x 112 mm
⑬ ATF FEED PIPE, 8 x 192.5 mm
⑭ ATF FEED PIPE, 8 x 105.8 mm
⑮ STOP SHAFT BRACKET
⑯ ATF LUBRICATION PLATE
⑰ ATF FEED PIPE
⑱ DOWEL PIN
⑲ LOCK-UP VALVE BODY
⑳ LOCK-UP SEPARATOR PLATE
㉑ REGULATOR VALVE BODY
㉒ DOWEL PIN
㉓ COOLER RELIEF VALVE SPRING
㉔ COOLER RELIEF VALVE
㉕ TORQUE CONVERTER CHECK VALVE SPRING
㉖ TORQUE CONVERTER CHECK VALVE
㉗ CONTROL SHAFT
㉘ DETENT ARM SPRING
㉙ DETENT ARM
㉚ DETENT ARM SHAFT
㉛ FILTER Replace.
㉜ CHECK BALLS
㉝ 1ST ACCUMULATOR CHOKE
㉞ O-RING Replace.
㉟ STATOR SHAFT
㊱ STOP SHAFT
㊲ ATF FEED PIPE, 8 x 112 mm
㊳ MAIN VALVE BODY
㊴ ATF PUMP DRIVEN GEAR SHAFT
㊵ ATF PUMP DRIVEN GEAR
㊶ MAIN SEPARATOR PLATE
㊷ DOWEL PIN
㊸ ATF PUMP DRIVE GEAR
㊹ SUCTION PIPE COLLAR
㊺ COUNTERSHAFT TORQUE CONVERTER HOUSING BEARING
㊻ ATF GUIDE PLATE
㊼ LOCK WASHER Replace.
㊽ CONTROL LEVER ASSEMBLY
㊾ TORQUE CONVERTER HOUSING
㊿ CHANGE SHAFT
(51) OIL SEAL Replace.
(52) MAINSHAFT OIL SEAL Replace.
(53) MAINSHAFT TORQUE CONVERTER HOUSING BEARING
(54) LOCK-UP CONTROL SOLENOID VALVE A/B FILTER/GASKET Replace.
(55) LOCK-UP CONTROL SOLENOID VALVE A/B ASSEMBLY

TORQUE SPECIFICATIONS

Bolt/Nut No.	Torque Value	Size	Remarks
6A	12 N·m (1.2 kgf·m, 8.7 lbf·ft)	6 x 1.0 mm	
6B	14 N·m (1.4 kgf·m, 10 lbf·ft)	6 x 1.0 mm	

Illustrated Index (2WD)

End Cover/Transmission



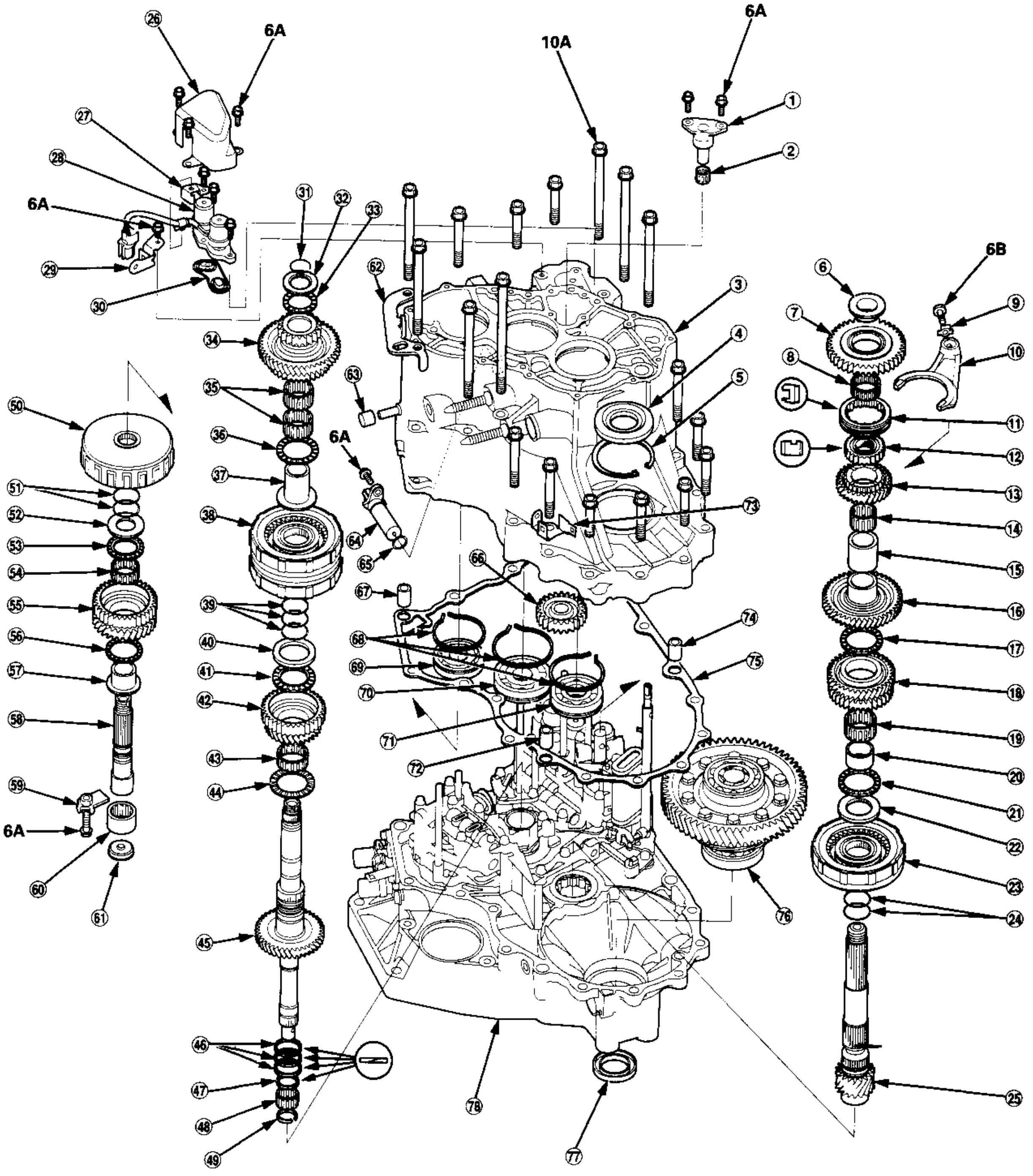
① **END COVER**
② **OIL SEAL** Replace.
③ **BALL BEARING**
④ **A/T GEAR POSITION SWITCH COVER**
⑤ **A/T GEAR POSITION SWITCH**
⑥ **ROLLER**
⑦ **COLLAR**
⑧ **O-RING** Replace.
⑨ **FEED PIPE FLANGE**
⑩ **O-RING** Replace.
⑪ **SNAP RING**
⑫ **3RD CLUTCH FEED PIPE**
⑬ **COUNTERSHAFT LOCKNUT 23 x 1.25 mm** Replace.
⑭ **CONICAL SPRING WASHER** Replace.
⑮ **PARK GEAR**
⑯ **ONE-WAY CLUTCH**
⑰ **COUNTERSHAFT 1ST GEAR**
⑱ **NEEDLE BEARING**
⑲ **COUNTERSHAFT 1ST GEAR COLLAR**
⑳ **O-RINGS** Replace.
㉑ **1ST CLUTCH FEED PIPE**
㉒ **O-RING** Replace.
㉓ **FEED PIPE FLANGE**
㉔ **SNAP RING**
㉕ **DOWEL PIN**
㉖ **END COVER GASKET** Replace.
㉗ **PARK PAWL STOP**
㉘ **PARK PAWL**
㉙ **PARK PAWL SPRING**
㉚ **PARK PAWL SHAFT**
㉛ **A/T GEAR POSITION SWITCH HARNESS CLAMP**
㉜ **PARK LEVER**
㉝ **LOCK WASHER** Replace.
㉞ **PARK STOP** Selective part
㉟ **PARK LEVER SPRING**
㊱ **DRAIN PLUG**
㊲ **SEALING WASHER** Replace.
㊳ **MAINSHAFT LOCKNUT 21 x 1.25 mm** Replace.
㊴ **CONICAL SPRING WASHER** Replace.
㊵ **1ST CLUTCH ASSEMBLY**
㊶ **O-RING** Replace.
㊷ **THRUST WASHER**
㊸ **THRUST NEEDLE BEARING**
㊹ **NEEDLE BEARING**
㊺ **MAINSHAFT 1ST GEAR**
㊻ **MAINSHAFT 1ST GEAR COLLAR**
㊼ **O-RING** Replace.
㊽ **COUNTERSHAFT SPEED SENSOR**
㊾ **ROLLER**
㊿ **COLLAR**
(51) **O-RING** Replace.
(52) **FEED PIPE FLANGE**
(53) **O-RING** Replace.
(54) **SNAP RING**
(55) **1ST-HOLD CLUTCH FEED PIPE**
(56) **SUB-SHAFT LOCKNUT 19 x 1.25 mm** Replace.
(57) **CONICAL SPRING WASHER** Replace.
(58) **SUB-SHAFT 1ST GEAR**
(59) **LINEAR SOLENOID ASSEMBLY**
(60) **LINEAR SOLENOID ASSEMBLY GASKET** Replace.
(61) **HARNESS BRACKET**
(62) **SEALING WASHERS** Replace.
(63) **ATF COOLER LINE**
(64) **LINE BOLT**
(65) **ATF DIPSTICK**
(66) **ATF COOLER LINE**
(67) **LINE BOLT**
(68) **SEALING WASHERS** Replace.
(69) **VEHICLE SPEED SENSOR (VSS)**
(70) **O-RING** Replace.

TORQUE SPECIFICATIONS

Bolt/Nut No.	Torque Value	Size	Remarks
6A	12 N·m (1.2 kgf·m, 8.7 lbf·ft)	6 x 1.0 mm	
6B	14 N·m (1.4 kgf·m, 10 lbf·ft)	6 x 1.0 mm	
8A	22 N·m (2.2 kgf·m, 16 lbf·ft)	8 x 1.25 mm	
12J	28 N·m (2.9 kgf·m, 21 lbf·ft)	12 x 1.25 mm	Line bolt
18D	49 N·m (5.0 kgf·m, 36 lbf·ft)	18 x 1.5 mm	Drain plug
19S	93 N·m (9.5 kgf·m, 69 lbf·ft)	19 x 1.25 mm	Sub-shaft locknut
21M	78 N·m (8.0 kgf·m, 58 lbf·ft)	21 x 1.25 mm	Mainshaft locknut: Left-hand threads
23C	103 → 0 → 103 N·m (10.5 → 0 → 10.5 kgf·m, 75.9 → 0 → 75.9 lbf·ft)	23 x 1.25 mm	Countershaft locknut: Left-hand threads

Illustrated Index (2WD)

Transmission Housing



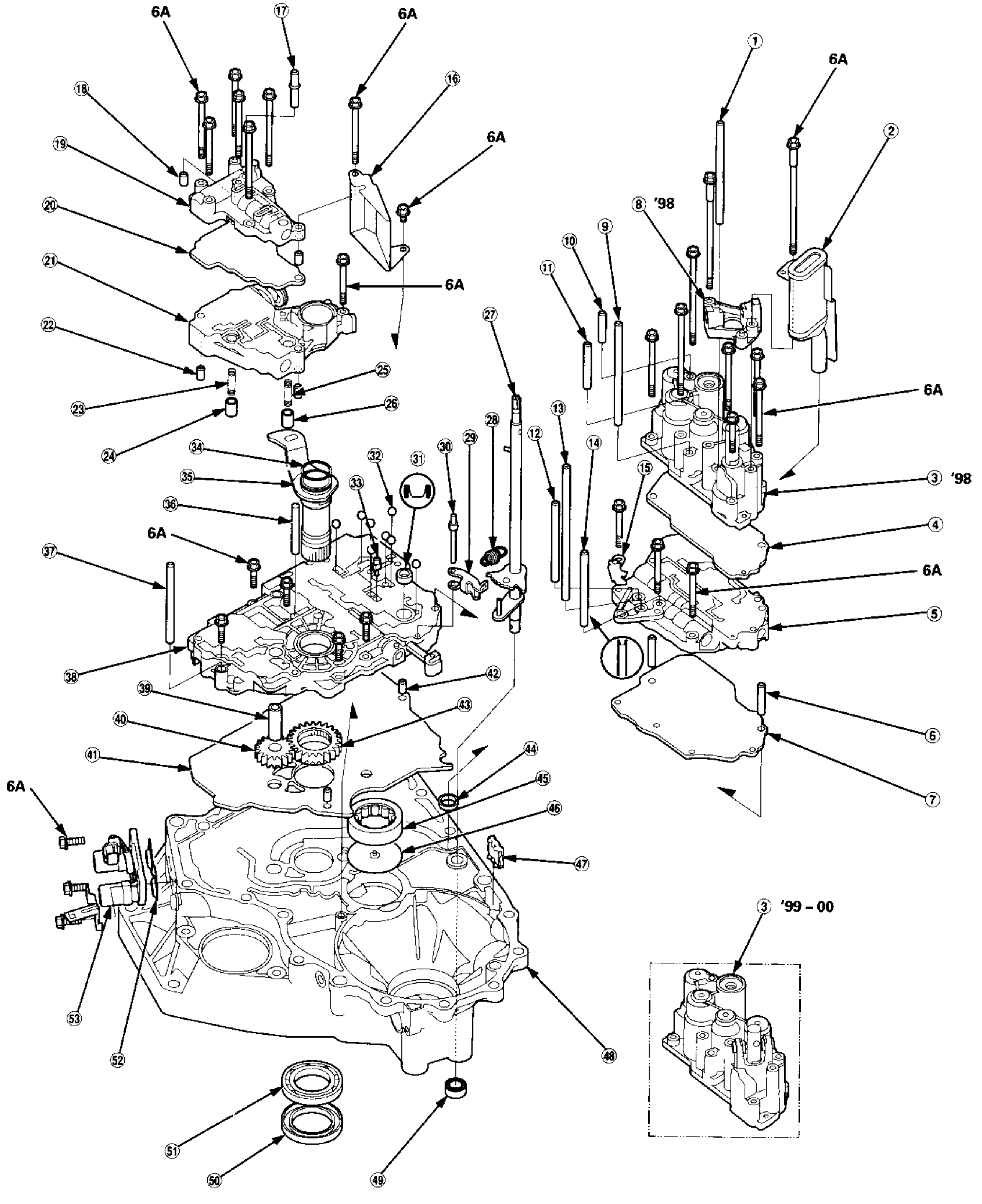
① **REVERSE IDLER GEAR SHAFT/HOLDER**
② **NEEDLE BEARING**
③ **TRANSMISSION HOUSING**
④ **TRANSMISSION HOUSING OIL SEAL** Replace.
⑤ **SET RING, 80 mm** Selective part
⑥ **REVERSE GEAR COLLAR**
⑦ **COUNTERSHAFT REVERSE GEAR**
⑧ **NEEDLE BEARING**
⑨ **LOCK WASHER** Replace.
⑩ **REVERSE SHIFT FORK**
⑪ **REVERSE SELECTOR**
⑫ **REVERSE SELECTOR HUB**
⑬ **COUNTERSHAFT 4TH GEAR**
⑭ **NEEDLE BEARING**
⑮ **DISTANCE COLLAR, 28 mm** Selective part
⑯ **COUNTERSHAFT 2ND GEAR**
⑰ **THRUST NEEDLE BEARING**
⑱ **COUNTERSHAFT 3RD GEAR**
⑲ **NEEDLE BEARING**
⑳ **COUNTERSHAFT 3RD GEAR COLLAR**
㉑ **THRUST NEEDLE BEARING**
㉒ **SPLINED WASHER**
㉓ **3RD CLUTCH ASSEMBLY**
㉔ **O-RINGS** Replace.
㉕ **COUNTERSHAFT**
㉖ **SHIFT CONTROL SOLENOID COVER**
㉗ **HARNESS CLAMP BRACKET**
㉘ **SHIFT CONTROL SOLENOID VALVE A/B ASSEMBLY**
㉙ **HARNESS CLAMP BRACKET**
㉚ **SHIFT CONTROL SOLENOID VALVE FILTER/GASKET** Replace.
㉛ **SNAP RING**
㉜ **THRUST WASHER**
㉝ **THRUST NEEDLE BEARING**
㉞ **MAINSHAFT 4TH GEAR**
㉟ **NEEDLE BEARINGS**
㊱ **THRUST NEEDLE BEARING**
㊲ **MAINSHAFT 4TH GEAR COLLAR**
㊳ **2ND/4TH CLUTCH ASSEMBLY**
㊴ **O-RINGS** Replace.
㊵ **THRUST WASHER, 36.5 x 55 mm** Selective part
㊶ **THRUST NEEDLE BEARING**
㊷ **MAINSHAFT 2ND GEAR**
㊸ **NEEDLE BEARING**
㊹ **THRUST NEEDLE BEARING**
㊺ **MAINSHAFT**
㊻ **SEALING RINGS, 35 mm**
㊼ **SEALING RING, 29 mm**
㊽ **NEEDLE BEARING**
㊾ **SET RING**
㊿ **1ST-HOLD CLUTCH ASSEMBLY**
(51) **O-RINGS** Replace.
(52) **THRUST WASHER**
(53) **THRUST NEEDLE BEARING**
(54) **NEEDLE BEARING**
(55) **SUB-SHAFT 4TH GEAR**
(56) **THRUST NEEDLE BEARING**
(57) **SUB-SHAFT 4TH GEAR COLLAR**
(58) **SUB-SHAFT**
(59) **NEEDLE BEARING STOP**
(60) **NEEDLE BEARING**
(61) **ATF GUIDE CAP** Replace.
(62) **TRANSMISSION HANGER**
(63) **BREATHER CAP**
(64) **MAINSHAFT SPEED SENSOR**
(65) **O-RING** Replace.
(66) **REVERSE IDLER GEAR**
(67) **DOWEL PIN, 14 x 25 mm**
(68) **SNAP RINGS**
(69) **SUB-SHAFT TRANSMISSION HOUSING BEARING**
(70) **MAINSHAFT TRANSMISSION HOUSING BEARING**
(71) **COUNTERSHAFT TRANSMISSION HOUSING BEARING**
(72) **DOWEL PIN, 14 x 25 mm**
(73) **CONNECTOR BRACKET**
(74) **DOWEL PIN, 14 x 20 mm**
(75) **TRANSMISSION HOUSING GASKET** Replace.
(76) **DIFFERENTIAL ASSEMBLY**
(77) **TORQUE CONVERTER HOUSING OIL SEAL** Replace.
(78) **TORQUE CONVERTER HOUSING**

TORQUE SPECIFICATIONS

Bolt/Nut No.	Torque Value	Size	Remarks
6A	12 N·m (1.2 kgf·m, 8.7 lbf·ft)	6 x 1.0 mm	
6B	14 N·m (1.4 kgf·m, 10 lbf·ft)	6 x 1.0 mm	
10A	44 N·m (4.5 kgf·m, 33 lbf·ft)	10 x 1.25 mm	

Illustrated Index (2WD)

Torque Converter Housing/Valve Body



① ATF FEED PIPE, 8 x 145 mm
② ATF STRAINER
③ SERVO BODY
④ SERVO SEPARATOR PLATE
⑤ SECONDARY VALVE BODY
⑥ DOWEL PIN
⑦ SECONDARY SEPARATOR PLATE
⑧ SERVO DETENT BASE ('98 model only)
⑨ ATF FEED PIPE, 8 x 145 mm
⑩ ATF FEED PIPE, 8 x 40 mm
⑪ ATF FEED PIPE, 8 x 62 mm
⑫ ATF FEED PIPE, 8 x 112 mm
⑬ ATF FEED PIPE, 8 x 192.5 mm
⑭ ATF FEED PIPE, 8 x 105.8 mm
⑮ STOP SHAFT BRACKET
⑯ ATF LUBRICATION PLATE
⑰ ATF FEED PIPE
⑱ DOWEL PIN
⑲ LOCK-UP VALVE BODY
⑳ LOCK-UP SEPARATOR PLATE
㉑ REGULATOR VALVE BODY
㉒ DOWEL PIN
㉓ COOLER RELIEF VALVE SPRING
㉔ COOLER RELIEF VALVE
㉕ TORQUE CONVERTER CHECK VALVE SPRING
㉖ TORQUE CONVERTER CHECK VALVE
㉗ CONTROL SHAFT
㉘ DETENT ARM SPRING
㉙ DETENT ARM
㉚ DETENT ARM SHAFT
㉛ FILTER Replace.
㉜ CHECK BALLS
㉝ 1ST ACCUMULATOR CHOKE
㉞ O-RING Replace.
㉟ STATOR SHAFT
㊱ STOP SHAFT
㊲ ATF FEED PIPE, 8 x 112 mm
㊳ MAIN VALVE BODY
㊴ ATF PUMP DRIVEN GEAR SHAFT
㊵ ATF PUMP DRIVEN GEAR
㊶ MAIN SEPARATOR PLATE
㊷ DOWEL PIN
㊸ ATF PUMP DRIVE GEAR
㊹ SUCTION PIPE COLLAR
㊺ COUNTERSHAFT TORQUE CONVERTER HOUSING BEARING
㊻ ATF GUIDE PLATE
㊼ ATF MAGNET
㊽ TORQUE CONVERTER HOUSING
㊾ OIL SEAL Replace.
㊿ MAINSHAFT OIL SEAL Replace.
(51) MAINSHAFT TORQUE CONVERTER HOUSING BEARING
(52) LOCK-UP CONTROL SOLENOID VALVE A/B FILTER/GASKET Replace.
(53) LOCK-UP CONTROL SOLENOID VALVE A/B ASSEMBLY

TORQUE SPECIFICATIONS

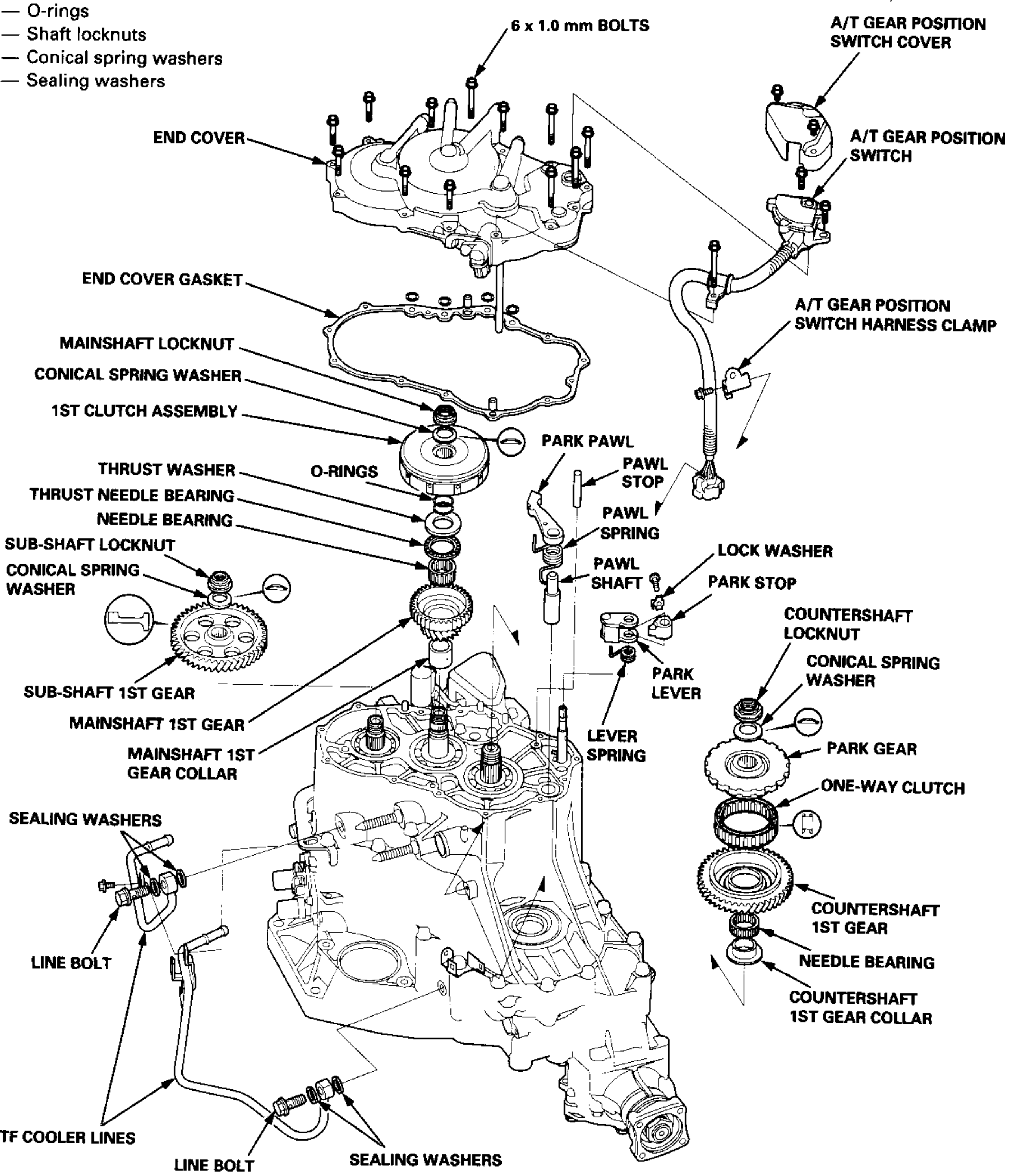
Bolt/Nut No.	Torque Value	Size	Remarks
6A	12 N·m (1.2 kgf·m, 8.7 lbf·ft)	6 x 1.0 mm	

End Cover

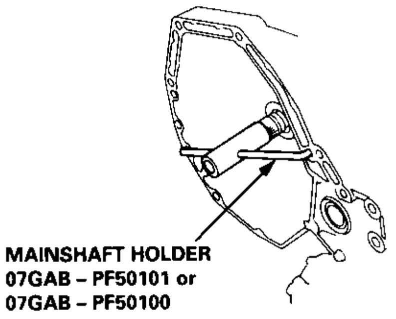
Removal

NOTE:

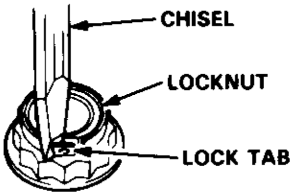
- The illustration shows the 4WD automatic transmission; the 2WD is similar.
- Clean all parts thoroughly in solvent or carburetor cleaner, and dry them with compressed air.
- Blow out all passages.
- When removing the transmission end cover, replace the following:
  - — End cover gasket
  - — Lock washer
  - — O-rings
  - — Shaft locknuts
  - — Conical spring washers
  - — Sealing washers



1. Remove the A/T gear position switch harness clamp.
2. Remove the A/T gear position switch cover.
3. Remove the bolt securing the A/T gear position switch harness clamp on the end cover, then remove the A/T gear position switch.
4. Remove the 12 bolts securing the end cover, then remove the cover.
5. Slip the special tool onto the mainshaft as shown.

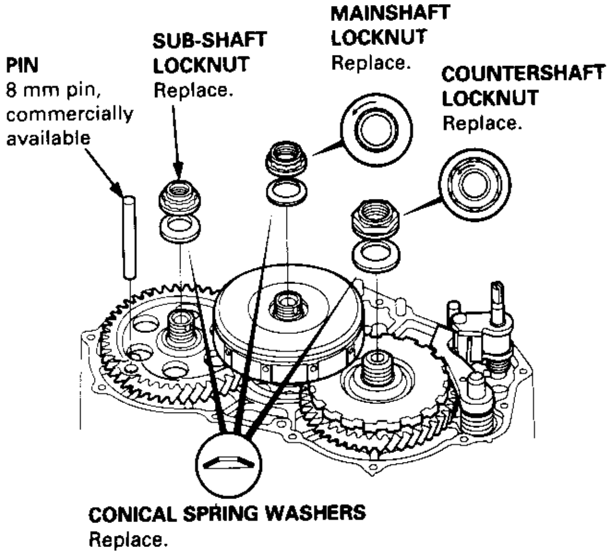


6. Engage the park pawl with the park gear.
7. Cut the lock tabs of each shaft locknut using a chisel as shown. Keep all chiseled particles out of the transmission.

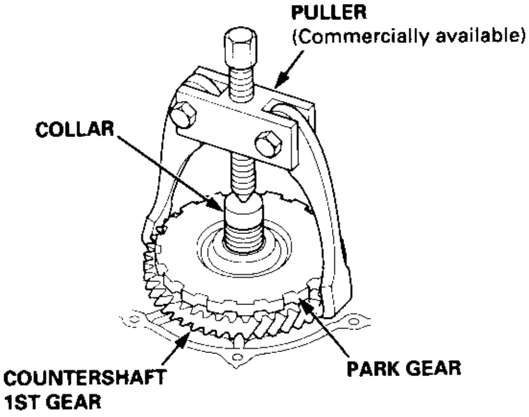


8. Align the hole of the sub-shaft 1st gear with the hole of the transmission housing, then insert a pin to lock the sub-shaft while removing the sub-shaft locknut. Remove the locknuts and conical spring washers from each shaft.

NOTE:
- Mainshaft and countershaft locknuts have left-hand threads.
- Clean the old countershaft locknut. It is used to install the press fit park gear on the countershaft.



9. Remove the lock pin that was installed to hold the sub-shaft.
10. Remove the special tool from the mainshaft.
11. Remove the 1st clutch, mainshaft 1st gear assembly, and mainshaft 1st gear collar.
12. Remove the sub-shaft 1st gear.
13. Remove the park pawl, pawl spring, pawl shaft, and pawl stop.
14. Remove the park lever from the control shaft.
15. Using a universal two jaw puller, remove the park gear, one-way clutch, and countershaft 1st gear assembly.



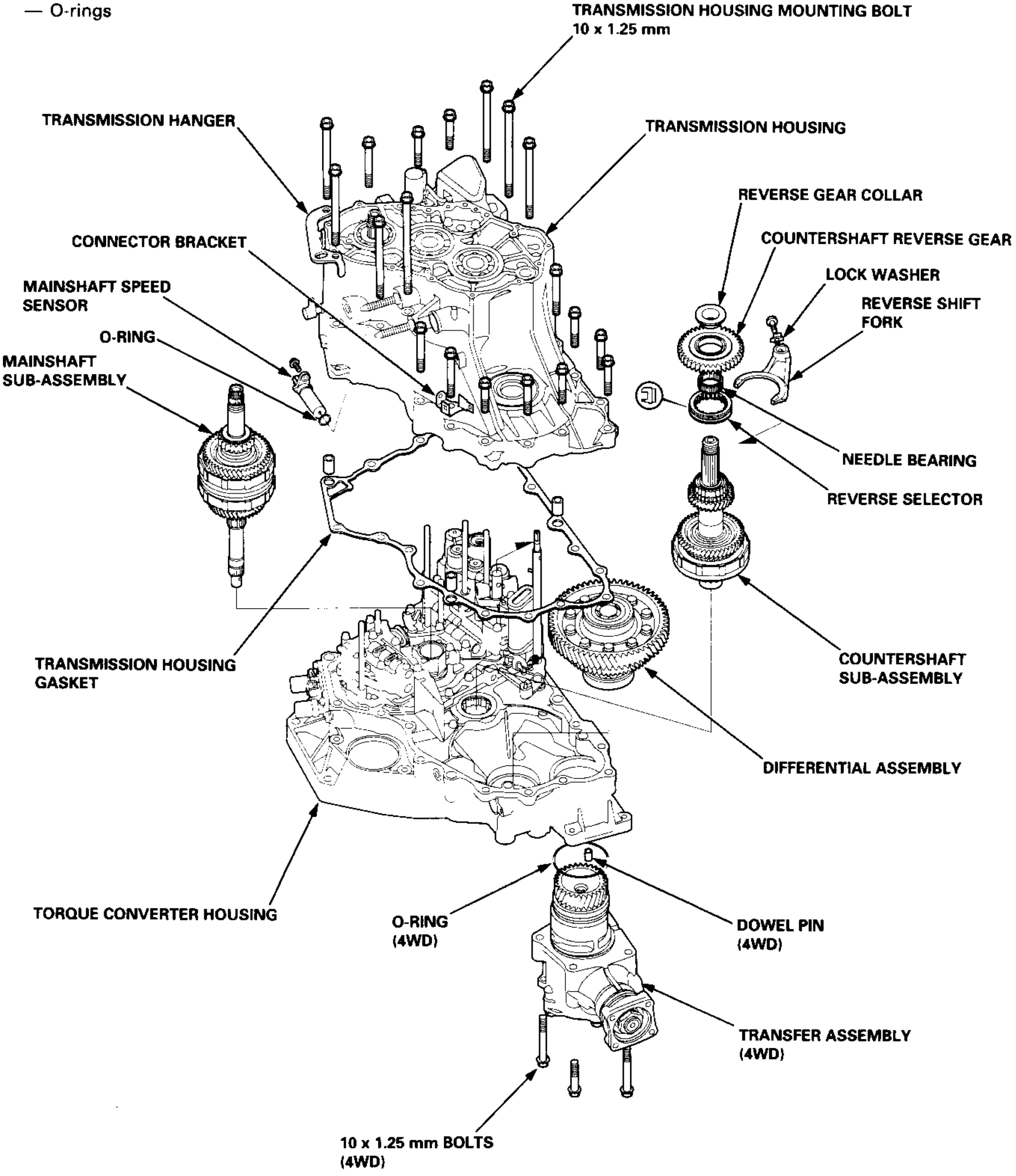
16. Remove the needle bearing and countershaft 1st gear collar.
17. Remove the ATF cooler lines.

Transmission Housing

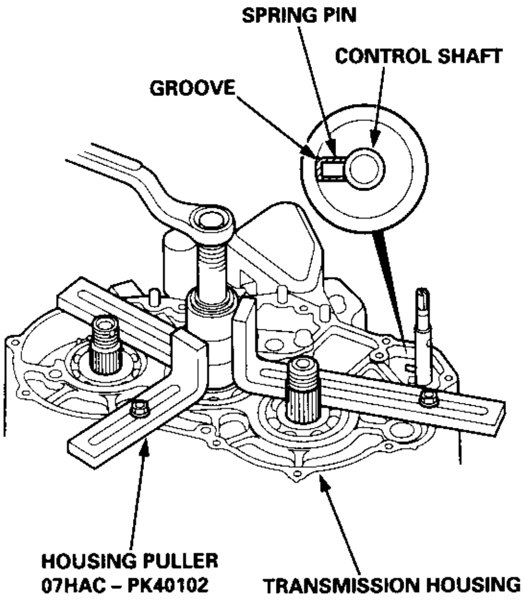
Removal

NOTE:

- The illustration shows the 4WD automatic transmission; the 2WD is similar.
- Clean all parts thoroughly in solvent or carburetor cleaner, and dry them with compressed air.
- Blow out all passages.
- When removing the transmission housing, replace the following:
  - — Transmission housing gasket
  - — Lock washer
  - — O-rings

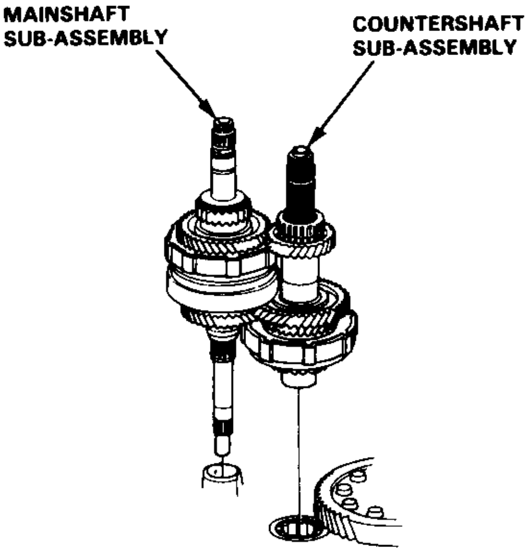


1. Remove the transfer assembly from the torque converter housing. (4WD)
2. Remove the mainshaft speed sensor from the transmission housing.
3. Remove the transmission housing mounting bolts, transmission hanger, and connector bracket.
4. Align the spring pin on the control shaft with the transmission housing groove by turning the control shaft.



5. Install the special tool over the mainshaft, then remove the transmission housing as shown.

6. Remove the countershaft reverse gear collar, needle bearing, and countershaft reverse gear from the countershaft.
7. Remove the lock bolt securing the reverse shift fork, then remove the reverse shift fork and reverse selector together.
8. Remove the countershaft sub-assembly and mainshaft sub-assembly together.



9. Remove the differential assembly.

Torque Converter Housing/Valve Body

Removal

NOTE:

- The illustration shows the 4WD automatic transmission; the 2WD is similar.
- Clean all parts thoroughly in solvent or carburetor cleaner, and dry them with compressed air.
- Blow out all passages.
- When removing the valve bodies, replace the following:
  - — Lock washer
  - — O-ring