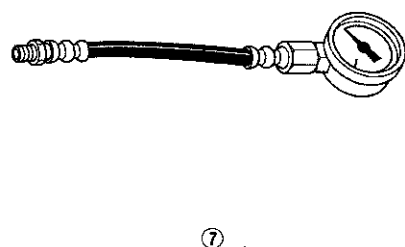
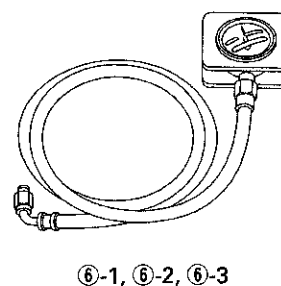
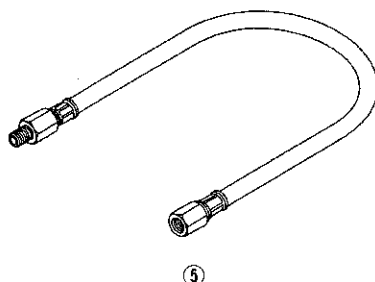
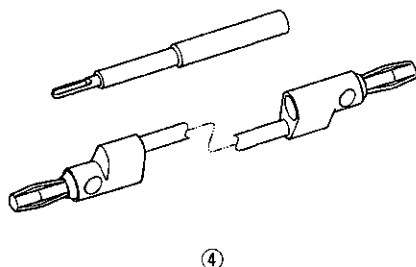
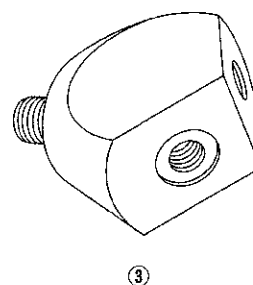
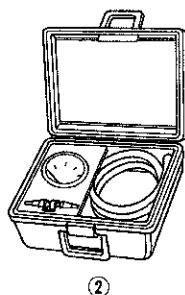
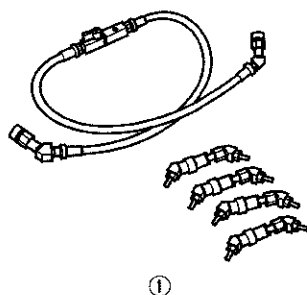


Fuel and Emissions Systems

Special Tools

Ref. No.	Tool Number	Description	Qty
①	07AAJ-S6MA150	Fuel Pressure Gauge Attachment Set	1
②	07JAZ-001000B	Vacuum/Pressure Gauge, 0—4 in.Hg	1
③	07NAJ-P07010A	Pressure Gauge Adapter	1
④	07SAZ-001000A	Backprobe Set	2
⑤	07ZAJ-S5AA200	Oil Pressure Hose	1
⑥-1	07406-0070301	A/T Low Pressure Gauge W/Panel	1
⑥-2	07MAJ-PY4011A	A/T Pressure Hose, 2,210 mm	1
⑥-3	07MAJ-PY40120	A/T Pressure Hose, Adapter	1
⑦	07406-004000B	Fuel Pressure Gauge	1





General Troubleshooting Information

Intermittent Failures

The term intermittent failure means a system may have had a failure, but it checks OK now. If the malfunction indicator lamp (MIL) on the dash does not come on, check for poor connections or loose terminals at all connectors related to the circuit that you are troubleshooting. If the MIL was on but then went out, the original problem may have been intermittent.

Service Information

Periodically, new PCM software or new service procedures may become available. Always check online for the latest software or service information related to the DTCs or symptoms you are troubleshooting.

Opens and Shorts

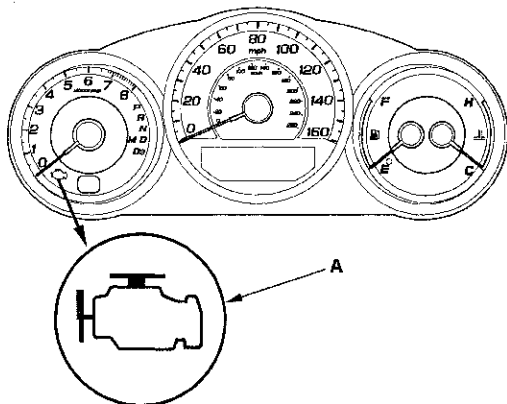
Open and short are common electrical terms. An open is a break in a wire or at a connection. A short is an accidental connection of a wire to ground or to another wire. In simple terms, this usually means something won't work at all. With complex electronics (such as PCMs) this can sometimes mean something works, but not the way it's supposed to.

How to Use the HDS (Honda Diagnostic System)

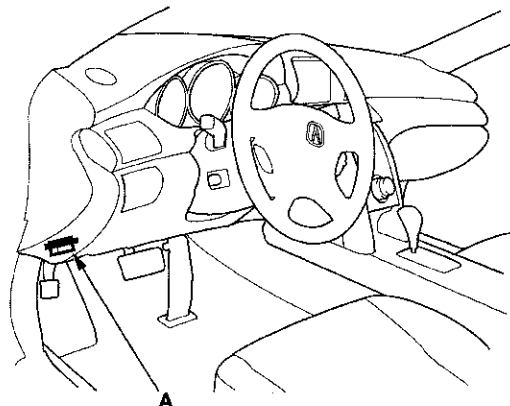
If the MIL (malfunction indicator lamp) has come on

1. Start the engine, and check the MIL (A).

NOTE: If the ignition switch is turned to ON (II), and the engine is not started, the MIL stays on for 15–20 seconds (see page 11-65).



2. If the MIL stays on, connect the HDS to the data link connector (DLC) (A) located under the driver's side of the dashboard.



3. Turn the ignition switch to ON (II).
4. Make sure the HDS communicates with the PCM and other vehicle systems. If it doesn't, go to DLC circuit troubleshooting (see page 11-211).
5. Check the diagnostic trouble code (DTC) and note it. Also check the freeze data and/or on-board snapshot data, and download any data found. Then refer to the indicated DTC's troubleshooting, and begin the appropriate troubleshooting procedure.

NOTE:

- Freeze data indicates the engine conditions when the first malfunction, misfire, or fuel trim malfunction that activated the MIL was detected.
- The HDS can read the DTCs, the freeze data, the on-board snapshot, the current data, and other powertrain control module (PCM) data.
- For specific operations, refer to the user's manual that came with the HDS.

6. If no DTCs are found, go to the MIL circuit troubleshooting (see page 11-210).

(cont'd)

Fuel and Emissions Systems

General Troubleshooting Information (cont'd)

If the MIL did not stay on

If the MIL did not stay on but there is a driveability problem, do the symptom troubleshooting.

If you can't duplicate the DTC

Some of the troubleshooting requires you to reset the PCM and try to duplicate the DTC. If the problem is intermittent and you can't duplicate the DTC, do not continue through the procedure. To do so will only result in confusion and possibly, a needlessly replaced PCM.

HDS Clear Command

The PCM stores various specific data to backup the system even if there is no electrical power, such as when the battery negative terminal or the No. 8 FI ECU (PCM) (15 A) fuse are disconnected. Stored data based on failed parts should be cleared by using the CLEAR COMMAND of the HDS, if parts are replaced.

The HDS has three kinds of clear commands to meet this purpose. They are DTC clear, PCM reset, and CKP pattern clear. The DTC clear command erases all stored DTC codes, freeze data, on-board snapshot, and readiness codes. This must be done with the HDS after reproducing the DTC during troubleshooting.

The PCM reset command erases all stored DTCs, freeze data, on-board snapshot, readiness codes, and all specific data to correct the system except CKP pattern. If the CKP pattern data in the PCM was cleared, you must do the CKP pattern learn procedure. The CKP pattern clear command erases only CKP pattern data. This command is for repair of a misfire or the CKP sensor.

Scan Tool Clear Command

If you are using a generic scan tool to clear commands, be aware that there is only one setting for clearing the PCM, and it clears all commands at the same time (CKP pattern learn, idle learn, readiness codes, freeze data, on-board snapshot, and DTCs). After you clear all commands, you then need to do these procedures, in this order: PCM idle learn (see page 11-313); CKP pattern learn; test-drive to set readiness codes to complete (see page 11-65).

DTC Clear

1. Clear the DTC with the HDS while the engine is stopped.
2. Turn the ignition switch to LOCK (0).
3. Turn the ignition switch to ON (II), and wait 30 seconds.
4. Turn the ignition switch to LOCK (0), and disconnect the HDS from the DLC.

PCM Reset

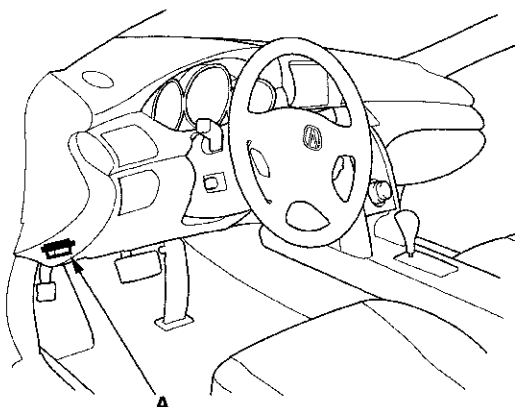
1. Reset the PCM with the HDS while the engine is stopped.
2. Turn the ignition switch to LOCK (0).
3. Turn the ignition switch to ON (II), and wait 30 seconds.
4. Turn the ignition switch to LOCK (0), and disconnect the HDS from the DLC.
5. Do the PCM idle learn procedure (see page 11-313).



CKP Pattern Clear/CKP Pattern Learn

Clear/Learn Procedure (with the HDS)

1. Connect the HDS to the data link connector (DLC) (A) located under the driver's side of the dashboard.



2. Turn the ignition switch to ON (II).
3. Make sure the HDS communicates with the PCM and other vehicle systems. If it doesn't, go to the DLC circuit troubleshooting (see page 11-211).
4. Select CRANK PATTERN in the ADJUSTMENT MENU with the HDS.
5. Select CRANK (CKP) PATTERN CLEAR, and clear the CKP pattern.
6. Select CRANK PATTERN LEARNING with the HDS, and follow the screen prompts.

Learn Procedure (without the HDS)

1. Start the engine. Hold the engine speed at 3,000 rpm without load (in P or N) until the radiator fan comes on.
2. Test-drive the vehicle on a level road: Decelerate (with the throttle fully closed) from an engine speed of 2,500 rpm down to 1,000 rpm with the transmission in 2.
3. Test-drive the vehicle on a level road: Decelerate (with the throttle fully closed) from an engine speed of 5,000 rpm down to 3,000 rpm with the transmission in 2.
4. Repeat step 2 and 3 several times.
5. Turn the ignition switch to LOCK (0).
6. Turn the ignition switch to ON (II), and wait 30 seconds.

How to End a Troubleshooting Session (required after any troubleshooting)

1. Reset the PCM with the HDS.
2. Do the PCM idle learn procedure (see page 11-313).
3. Turn the ignition switch to LOCK (0).
4. Disconnect the HDS from the DLC.

NOTE: The PCM is part of the immobilizer system. If you replace the PCM, it will have a different immobilizer code. For the engine to start, you must rewrite the immobilizer code with the HDS.

(cont'd)

Fuel and Emissions Systems

General Troubleshooting Information (cont'd)

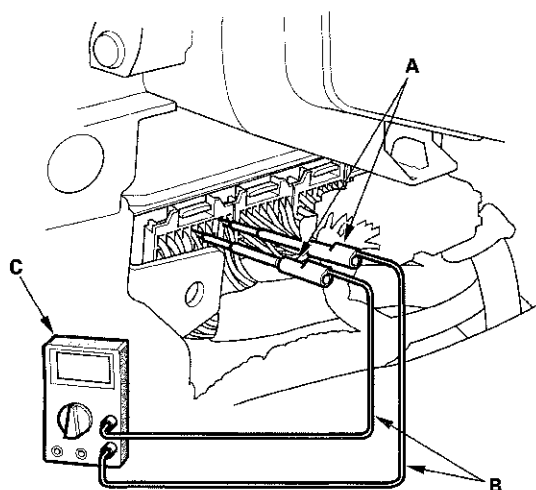
How to Troubleshoot Circuits at the PCM Connectors

Special Tools Required

- Digital multimeter KS-AHM-32-003 (1) or a commercially available digital multimeter
- Backprobe set 07SAZ-001000A (2)

NOTE: The PCM overwrites data and monitors the EVAP system for up to 40 minutes after the ignition switch is turned to LOCK (0). Jumping the SCS line after turning the ignition switch to LOCK (0) cancels this function. Disconnecting the PCM during this function, without jumping the SCS line first, can damage the PCM.

1. Connect the backprobe adapters (A) to the stacking patch cords (B), and connect the cords to a digital multimeter (C).

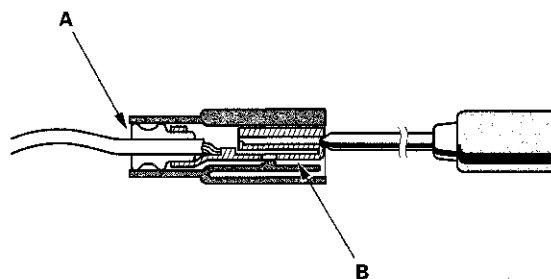


2. Using the wire insulation as a guide for the contoured tip of the backprobe adapter, gently slide the tip into the connector from the wire side until it touches the end of the wire terminal.

3. If you cannot get to the wire side of the connector or the wire side is sealed (A), disconnect the connector and probe the terminals (B) from the terminal side. Do not force the probe into the connector.

NOTICE

- Do not puncture the insulation on a wire. Punctures can cause poor or intermittent electrical connections.
- To prevent damage to the connector terminals, do not insert test equipment probes, paper clips, or other substitutes as they can damage the terminals. Damaged terminals cause a poor connection and an incorrect measurement.





Substituting the PCM

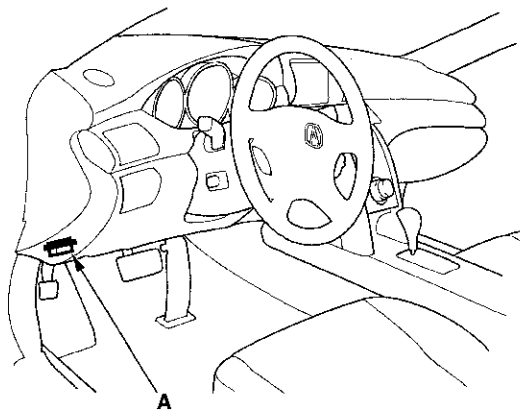
Special Tools Required

- Honda diagnostic system (HDS) tablet tester
- Honda interface module (HIM) and an iN workstation with the latest HDS software version
- HDS pocket tester
- GNA600 and an iN workstation with the latest HDS software version

Any one of the above updating tools can be used.

NOTE: Use this procedure when you have to substitute a known-good PCM during the troubleshooting procedures.

1. Connect the HDS to the data link connector (DLC) (A) located under the driver's side of the dashboard.

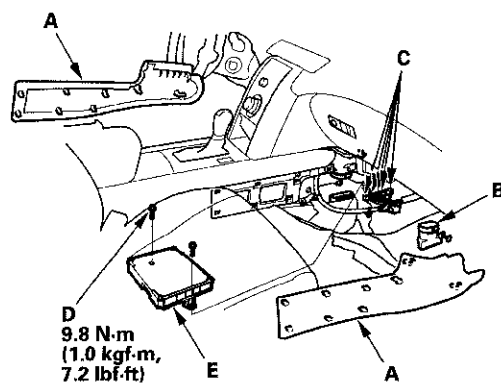


2. Turn the ignition switch to ON (II).
3. Make sure the HDS communicates with the PCM and other vehicle systems. If it doesn't, go to the DLC circuit troubleshooting (see page 11-211). If you are returning from DLC circuit troubleshooting, skip steps 4 and 5, then clean the throttle body (see page 11-366), after substituting the PCM.
4. Select the INSPECTION MENU with the HDS.
5. Select the ETCS TEST, then select the TP POSITION CHECK, and follow the screen prompts.

NOTE: If the TP POSITION CHECK indicates FAILED, continue this procedure.

6. Turn the ignition switch to LOCK (0).
7. Jump the SCS line with the HDS.

8. Remove the console covers (A) (see page 20-92), and pull back the carpet.



9. Remove the duct (B).
10. Disconnect the PCM connectors (C).
11. Remove the bolts (D), then remove the PCM (E).

(cont'd)

Fuel and Emissions Systems

General Troubleshooting Information (cont'd)

12. Install a known-good PCM in the reverse order of removal.
13. Turn the ignition switch to ON (II).

NOTE: DTC P0630 "VIN Not Programmed or Mismatch" may be stored because the VIN has not been programmed into the PCM; ignore it, and continue this procedure.
14. Manually input the VIN to the PCM with the HDS.
15. Select the IMMOBI SYSTEM with the HDS.
16. Enter the immobilizer PCM code that you got from the iN, and use the PCM replacement procedure in the HDS; it allows you to start the engine.
17. Reset the PCM with the HDS.
18. If the TP POSITION CHECK failed in step 5, clean the throttle body (see page 11-366).
19. Update the PCM if it does not have the latest software (see page 11-230).
20. Do the PCM idle learn procedure (see page 11-313).
21. Do the CKP pattern clear/CKP pattern learn procedure.

OBD Status

The OBD status shows the current system status of each DTC and all of the parameters. This function is used to see if the repair was successfully completed. The results of diagnostic tests for the DTC are displayed as:

- **PASSED:** The on board diagnosis is successfully finished.
- **FAILED:** The on board diagnosis has finished but failed.
- **EXECUTING:** The vehicle is in enable criteria conditions for the DTC, and the on board diagnosis is running.
- **NOT COMPLETED:** The on board diagnosis was running but is out of the enable conditions of the DTC.
- **OUT OF CONDITION:** The vehicle has stayed out of the enable conditions for the DTC.



DTC Troubleshooting Index

DTC (MIL indication*)	Two Drive Cycle Detection	Detection Item	MIL	Note
P0101 (50)	○	Mass Air Flow (MAF) Sensor Circuit Range/Performance Problem	ON	(see page 11-70)
P0102 (50)	—	Mass Air Flow (MAF) Sensor Circuit Low Voltage	ON	(see page 11-71)
P0103 (50)	—	Mass Air Flow (MAF) Sensor Circuit High Voltage	ON	(see page 11-74)
P0107 (3)	—	Manifold Absolute Pressure (MAP) Sensor Circuit Low Voltage	ON	(see page 11-76)
P0108 (3)	—	Manifold Absolute Pressure (MAP) Sensor Circuit High Voltage	ON	(see page 11-78)
P0111 (10)	○	Intake Air Temperature (IAT) Sensor Circuit Range/Performance Problem	ON	(see page 11-80)
P0112 (10)	—	Intake Air Temperature (IAT) Sensor Circuit Low Voltage	ON	(see page 11-81)
P0113 (10)	—	Intake Air Temperature (IAT) Sensor Circuit High Voltage	ON	(see page 11-82)
P0116 (86)	○	Engine Coolant Temperature (ECT) Sensor 1 Circuit Range/Performance Problem	ON	(see page 11-84)
P0117 (6)	—	Engine Coolant Temperature (ECT) Sensor 1 Circuit Low Voltage	ON	(see page 11-85)
P0118 (6)	—	Engine Coolant Temperature (ECT) Sensor 1 Circuit High Voltage	ON	(see page 11-87)
P0122 (7)	—	Throttle Position (TP) Sensor A Circuit Low Voltage	ON	(see page 11-236)
P0123 (7)	—	Throttle Position (TP) Sensor A Circuit High Voltage	ON	(see page 11-239)
P0125 (86)	○	Engine Coolant Temperature (ECT) Sensor 1 Malfunction Slow Response	ON	(see page 11-89)
P0128 (87)	○	Cooling System Malfunction	ON	(see page 11-90)
P0133 (157)	○	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) Malfunction/Slow Response	ON	(see page 11-91)
P0134 (151)	○	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) Heater System Malfunction	ON	(see page 11-92)
P0135 (151)	—	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) Heater Circuit Malfunction	ON	(see page 11-95)
P0137 (161)	○	Rear Secondary Heated Oxygen Sensor (Secondary HO2S (Bank 1, Sensor 2)) Circuit Low Voltage	ON	(see page 11-99)
P0138 (161)	○	Rear Secondary Heated Oxygen Sensor (Secondary HO2S (Bank 1, Sensor 2)) Circuit High Voltage	ON	(see page 11-101)
P0139 (161)	○	Rear Secondary Heated Oxygen Sensor (Secondary HO2S (Bank 1, Sensor 2)) Slow Response	ON	(see page 11-104)
P0141 (163)	—	Rear Secondary Heated Oxygen Sensor (Secondary HO2S (Bank 1, Sensor 2)) Heater Circuit Malfunction	ON	(see page 11-105)
P0153 (158)	○	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) Malfunction/Slow Response	ON	(see page 11-91)
P0154 (152)	○	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) Heater System Malfunction	ON	(see page 11-92)
P0155 (152)	—	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) Heater Circuit Malfunction	ON	(see page 11-95)
P0157 (162)	○	Front Secondary Heated Oxygen Sensor (Secondary HO2S (Bank 2, Sensor 2)) Circuit Low Voltage	ON	(see page 11-99)
P0158 (162)	○	Front Secondary Heated Oxygen Sensor (Secondary HO2S (Bank 2, Sensor 2)) Circuit High Voltage	ON	(see page 11-101)
P0159 (162)	○	Front Secondary Heated Oxygen Sensor (Secondary HO2S (Bank 2, Sensor 2)) Slow Response	ON	(see page 11-104)
P0161 (164)	—	Front Secondary Heated Oxygen Sensor (Secondary HO2S (Bank 2, Sensor 2)) Heater Circuit Malfunction	ON	(see page 11-105)
P0171 (153)	○	Rear Bank (Bank 1) Fuel System Too Lean	ON	(see page 11-109)
P0172 (153)	○	Rear Bank (Bank 1) Fuel System Too Rich	ON	(see page 11-109)
P0174 (154)	○	Front Bank (Bank 2) Fuel System Too Lean	ON	(see page 11-109)
P0175 (154)	○	Front Bank (Bank 2) Fuel System Too Rich	ON	(see page 11-109)
P0222 (7)	—	Throttle Position (TP) Sensor B Circuit Low Voltage	ON	(see page 11-242)
P0223 (7)	—	Throttle Position (TP) Sensor B Circuit High Voltage	ON	(see page 11-245)
P0300 (77) and any combination of the following: P0301 (71) P0302 (72) P0303 (73) P0304 (74) P0305 (75) P0306 (76)	○	Random Misfire Detected	ON	(see page 11-110)

NOTE: The above DTCs are indicated when the PGM-FI system is selected with the HDS.

Some automatic transmission DTCs cause the MIL to come on. If the MIL is on and no DTCs are indicated in the PGM-FI system, select the A/T system, and check for automatic transmission DTCs.

* : These DTCs are indicated by a blinking MIL when the SCS line is jumped with the HDS. Some DTCs do not cause the MIL to blink when the SCS line is jumped. The last four characters of these DTCs are shown in the gauge display.

(cont'd)

Fuel and Emissions Systems

DTC Troubleshooting Index (cont'd)

DTC (MIL indication)	Two Drive Cycle Detection	Detection Item	MIL	Note
P0301 (71)	○	No. 1 Cylinder Misfire Detected	ON	(see page 11-114)
P0302 (72)	○	No. 2 Cylinder Misfire Detected	ON	(see page 11-114)
P0303 (73)	○	No. 3 Cylinder Misfire Detected	ON	(see page 11-114)
P0304 (74)	○	No. 4 Cylinder Misfire Detected	ON	(see page 11-114)
P0305 (75)	○	No. 5 Cylinder Misfire Detected	ON	(see page 11-114)
P0306 (76)	○	No. 6 Cylinder Misfire Detected	ON	(see page 11-114)
P0325 (23)	—	Knock Sensor Circuit Malfunction	ON	(see page 11-123)
P0335 (4)	—	Crankshaft Position (CKP) Sensor A No Signal	ON	(see page 11-125)
P0339 (4)	—	Crankshaft Position (CKP) Sensor A Circuit Intermittent Interruption	ON	(see page 11-127)
P0340 (9)	—	Camshaft Position (CMP) Sensor No Signal	ON	(see page 11-128)
P0344 (9)	—	Camshaft Position (CMP) Sensor Intermittent Interruption	ON	(see page 11-130)
P0385 (54)	—	Crankshaft Position (CKP) Sensor B No Signal	ON	(see page 11-125)
P0389 (54)	—	Crankshaft Position (CKP) Sensor B Circuit Intermittent Interruption	ON	(see page 11-127)
P0400 (80)	○	Exhaust Gas Recirculation (EGR) System Leak Detected	ON	(see page 11-376)
P0401 (80)	○	Exhaust Gas Recirculation (EGR) Insufficient Flow	ON	(see page 11-377)
P0404 (12)	○	Exhaust Gas Recirculation (EGR) Valve Circuit Range/Performance Problem	ON	(see page 11-378)
P0406 (12)	—	Exhaust Gas Recirculation (EGR) Valve Position Sensor Circuit High Voltage	ON	(see page 11-381)
P0420 (165)	○	Rear Bank Catalyst System Efficiency Below Threshold (Bank 1)	ON	(see page 11-371)
P0430 (166)	○	Front Bank Catalyst System Efficiency Below Threshold (Bank 2)	ON	(see page 11-371)
P0443 (92)	—	Evaporative Emission (EVAP) Canister Purge Valve Circuit Malfunction	ON	(see page 11-395)
P0451 (91)	○	Fuel Tank Pressure (FTP) Sensor Circuit Range/Performance Problem	ON	(see page 11-398)
P0452 (91)	—	Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage	ON	(see page 11-399)
P0453 (91)	—	Fuel Tank Pressure (FTP) Sensor Circuit High Voltage	ON	(see page 11-402)
P0455 (90)	○	Evaporative Emission (EVAP) System Large Leak Detected	ON	(see page 11-405)
P0456 (90)	○	Evaporative Emission (EVAP) System Very Small Leak Detected	ON	(see page 11-405)
P0461	—	Fuel Level Sensor (Fuel Gauge Sending Unit) Circuit Range/Performance Problem	OFF	(see page 11-316)
P0462	—	Fuel Level Sensor (Fuel Gauge Sending Unit) Circuit Low Voltage	OFF	(see page 11-316)
P0463	—	Fuel Level Sensor (Fuel Gauge Sending Unit) Circuit High Voltage	OFF	(see page 11-319)
P0480	—	Radiator Fan Control (RFC) System Malfunction	OFF	(see page 11-296)
P0496 (92)	○	Evaporative Emission (EVAP) System High Purge Flow Detected	ON	(see page 11-409)
P0497 (90)	○	Evaporative Emission (EVAP) System Low Purge Flow Detected	ON	(see page 11-410)
P0498 (117)	—	Evaporative Emission (EVAP) Canister Vent Shut Valve Control Circuit Low Voltage	ON	(see page 11-414)
P0499 (117)	—	Evaporative Emission (EVAP) Canister Vent Shut Valve Control Circuit High Voltage	ON	(see page 11-417)
P050A (167)	○	Cold Start Idle Air Control System Performance Problem	ON	(see page 11-131)
P050B (167)	○	Cold Start Ignition Timing Control System Performance Problem	ON	(see page 11-133)
P0506 (14)	○	Idle Control System RPM Lower Than Expected	ON	(see page 11-304)
P0507 (14)	○	Idle Control System RPM Higher Than Expected	ON	(see page 11-306)
P0562	—	Charging System Low Voltage	OFF	(see page 11-136)
P0563	—	Powertrain Control Module (PCM) Power Source Circuit Unexpected Voltage	OFF	(see page 11-137)
P0602 (196)	—	Powertrain Control Module (PCM) Programming Error	ON	(see page 11-140)
P0615	—	Starter Cut Relay STRLD Circuit Malfunction	OFF	(see page 11-141)
P062F (131)	—	Powertrain Control Module (PCM) Internal Control Module Keep Alive Memory (KAM) Error	ON	(see page 11-143)
P0627 (169)	—	Fuel Pump Control Module System Malfunction	ON	(see page 11-323)
P0630 (139)	—	VIN Not Programmed or Mismatch	ON	(see page 11-143)
P0685 (135)	○	Powertrain Control Module (PCM) Internal Circuit Malfunction (Power Control Circuit)	ON	(see page 11-144)
P1077 (106)	○	Intake Manifold Tuning (IMT) Valve Stuck in High RPM Position	ON	(see page 11-357)
P1078 (106)	○	Intake Manifold Tuning (IMT) Valve Stuck in Low RPM Position	ON	(see page 11-360)
P1109 (13)	—	Barometric Pressure (BARO) Sensor Circuit Out of Range High	ON	(see page 11-145)
P1116 (86)	○	Engine Coolant Temperature (ECT) Sensor 1 Circuit Range/Performance Problem	ON	(see page 11-146)

NOTE: The above DTCs are indicated when the PGM-FI system is selected with the HDS.

Some automatic transmission DTCs cause the MIL to come on. If the MIL is on and no DTCs are indicated in the PGM-FI system, select the A/T system, and check for automatic transmission DTCs.

*: These DTCs are indicated by a blinking MIL when the SCS line is jumped with the HDS. Some DTCs do not cause the MIL to blink when the SCS line is jumped. The last four characters of these DTCs are shown in the gauge display.



DTC (MIL indication ')	Two Drive Cycle Detection	Detection Item	MIL	Note
P1128 (5)	○	Manifold Absolute Pressure (MAP) Sensor Signal Lower Than Expected	ON	(see page 11-147)
P1129 (5)	○	Manifold Absolute Pressure (MAP) Sensor Signal Higher Than Expected	ON	(see page 11-148)
P1172 (157)	—	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) Circuit Out of Range High	ON	(see page 11-150)
P1174 (158)	—	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) Circuit Out of Range High	ON	(see page 11-150)
P1297	—	Electrical Load Detector (ELD) Circuit Low Voltage	OFF	(see page 11-151)
P1298	—	Electrical Load Detector (ELD) Circuit High Voltage	OFF	(see page 11-152)
P1454 (91)	○	Fuel Tank Pressure (FTP) Sensor Circuit Range/Performance Problem	ON	(see page 11-418)
P145C (90)	—	Evaporative Emission (EVAP) System Purge Flow Malfunction	ON	(see page 11-420)
P1549	—	Charging System High Voltage	OFF	(see page 11-154)
P1683 (40)	—	Throttle Valve Default Position Spring Performance Problem	ON	(see page 11-248)
P1684 (40)	—	Throttle Valve Return Spring Performance Problem	ON	(see page 11-249)
P168B	—	Alternator B Terminal Circuit Low Voltage	OFF	(see page 11-155)
P168C	—	Alternator FR Terminal Circuit/IGP Circuit Low Voltage	OFF	(see page 11-156)
P168D	—	Starter Relay 2 Malfunction	OFF	(see page 11-159)
P168E	—	Starter Relay 1 Malfunction	OFF	(see page 11-159)
P168F	—	Starter Relay STRLY Circuit Malfunction	OFF	(see page 11-160)
P2101 (40)	—	Throttle Actuator System Malfunction	ON	(see page 11-250)
P2108 (40)	—	Throttle Actuator Control Module Problem	ON	(see page 11-252)
P2118 (40)	—	Throttle Actuator Current Range/Performance Problem	ON	(see page 11-253)
P2122 (37)	—	Accelerator Pedal Position (APP) Sensor A (Throttle Position Sensor D) Circuit Low Voltage	ON	(see page 11-255)
P2123 (37)	—	Accelerator Pedal Position (APP) Sensor A (Throttle Position Sensor D) Circuit High Voltage	ON	(see page 11-257)
P2127 (37)	—	Accelerator Pedal Position (APP) Sensor B (Throttle Position Sensor E) Circuit Low Voltage	ON	(see page 11-259)
P2128 (37)	—	Accelerator Pedal Position (APP) Sensor B (Throttle Position Sensor E) Circuit High Voltage	ON	(see page 11-261)
P2135 (7)	—	Throttle Position (TP) Sensor A/B Incorrect Voltage Correlation	ON	(see page 11-263)
P2138 (37)	—	Accelerator Pedal Position (APP) Sensor A/B (Throttle Position Sensor D/E) Incorrect Voltage Correlation	ON	(see page 11-265)
P2176 (40)	—	Throttle Actuator Control System Idle Position Not Learned	ON	(see page 11-267)
P2183 (192)	○	Engine Coolant Temperature (ECT) Sensor 2 Circuit Range/Performance Problem	ON	(see page 11-162)
P2184 (192)	—	Engine Coolant Temperature (ECT) Sensor 2 Circuit Low Voltage	ON	(see page 11-164)
P2185 (192)	—	Engine Coolant Temperature (ECT) Sensor 2 Circuit High Voltage	ON	(see page 11-165)
P2195 (155)	—	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) Signal Stuck Lean	ON	(see page 11-168)
P2197 (156)	—	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) Signal Stuck Lean	ON	(see page 11-168)
P2227 (13)	○	Barometric Pressure (BARO) Sensor Circuit Range/Performance Problem	ON	(see page 11-170)
P2228 (13)	—	Barometric Pressure (BARO) Sensor Circuit Low Voltage	ON	(see page 11-171)
P2229 (13)	—	Barometric Pressure (BARO) Sensor Circuit High Voltage	ON	(see page 11-172)
P2237 (155)	—	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) IP Circuit High Voltage	ON	(see page 11-172)
P2238 (155)	—	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) IP Circuit Low Voltage	ON	(see page 11-174)
P2240 (156)	—	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) IP Circuit High Voltage	ON	(see page 11-172)
P2241 (156)	—	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) IP Circuit Low Voltage	ON	(see page 11-174)
P2243 (155)	—	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) VCEN Circuit High Voltage	ON	(see page 11-176)
P2245 (155)	—	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) VCEN Circuit Low Voltage	ON	(see page 11-178)
P2247 (156)	—	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) VCEN Circuit High Voltage	ON	(see page 11-176)
P2249 (156)	—	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) VCEN Circuit Low Voltage	ON	(see page 11-178)

NOTE: The above DTCs are indicated when the PGM-FI system is selected with the HDS.

Some automatic transmission DTCs cause the MIL to come on. If the MIL is on and no DTCs are indicated in the PGM-FI system, select the A/T system, and check for automatic transmission DTCs.

* : These DTCs are indicated by a blinking MIL when the SCS line is jumped with the HDS. Some DTCs do not cause the MIL to blink when the SCS line is jumped. The last four characters of these DTCs are shown in the gauge display.

(cont'd)

Fuel and Emissions Systems

DTC Troubleshooting Index (cont'd)

DTC (MIL Indication *)	Two Drive Cycle Detection	Detection Item	MIL	Note
P2251 (155)	————	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) VS Circuit High Voltage	ON	(see page 11-180)
P2252 (155)	————	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) VS Circuit Low Voltage	ON	(see page 11-182)
P2254 (156)	————	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) VS Circuit High Voltage	ON	(see page 11-180)
P2255 (156)	————	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) VS Circuit Low Voltage	ON	(see page 11-182)
P2279 (109)	○	Intake Air System Leak	ON	(see page 11-391)
P2413 (12)	○	Exhaust Gas Recirculation (EGR) System Malfunction	ON	(see page 11-383)
P2422 (117)	○	Evaporative Emission (EVAP) Canister Vent Shut Valve Stuck Close Malfunction	ON	(see page 11-418)
P2552 (40)	————	Throttle Actuator Control Module Relay Malfunction	ON	(see page 11-269)
P2610 (132)	————	Powertrain Control Module (PCM) Internal Power Off Timer Malfunction	ON	(see page 11-184)
P2646 (22)	————	Rocker Arm Oil Pressure Switch Circuit Low Voltage	ON	(see page 11-285)
P2647 (22)	————	Rocker Arm Oil Pressure Switch Circuit High Voltage	ON	(see page 11-287)
P2648 (21)	————	Rocker Arm Oil Control Solenoid Circuit Low Voltage	ON	(see page 11-290)
P2649 (21)	————	Rocker Arm Oil Control Solenoid Circuit High Voltage	ON	(see page 11-292)
P2A00 (157)	○	Rear Air Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) Circuit Range/Performance Problem	ON	(see page 11-185)
P2A03 (158)	○	Front Air Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) Circuit Range/Performance Problem	ON	(see page 11-185)
U0073 (126)	————	F-CAN Malfunction (BUS-OFF)	ON	(see page 11-186)
U0107 (30)	————	Lost Communication With Throttle Actuator Control Module	ON	(see page 11-271)
U0114	————	F-CAN Malfunction (PCM-SH-AWD Control Unit)	OFF	(see page 11-186)
U0122	————	F-CAN Malfunction (PCM-VSA Modulator-Control Unit)	OFF	(see page 11-188)
U0155 (126)	————	F-CAN Malfunction (PCM-Gauge Control Module)	ON	(see page 11-190)

NOTE: The above DTCs are indicated when the PGM-FI system is selected with the HDS.

Some automatic transmission DTCs cause the MIL to come on. If the MIL is on and no DTCs are indicated in the PGM-FI system, select the A/T system, and check for automatic transmission DTCs.

* : These DTCs are indicated by a blinking MIL when the SCS line is jumped with the HDS. Some DTCs do not cause the MIL to blink when the SCS line is jumped. The last four characters of these DTCs are shown in the gauge display.



Symptom Troubleshooting Index

When the vehicle has one of these symptoms, check for a diagnostic trouble code (DTC) with the HDS. If there is no DTC, do the diagnostic procedure for the symptom, in the sequence listed, until you find the cause.

Symptom	Diagnostic procedure	Also check for
Engine will not start (MIL works OK, no DTCs set)	1. Test the battery (see page 22-90). 2. Test the starter (see page 4-9). 3. Check the fuel pressure (see page 11-335).	• Low compression • No ignition spark • Intake air leaks • Locked up engine • Broken timing belt • Fuel contamination
Engine will not start (MIL comes on and stays on, no DTCs set)	Troubleshoot the DLC circuit (see page 11-211).	• No power to PCM • No ground to PCM
MIL comes on and stays on, or never comes on at all, no DTCs set	Troubleshoot the MIL circuit (see page 11-210).	
Engine will not start (MIL works OK, no DTCs set, immobilizer indicator stays on or flashes)	Check the immobilizer system (see page 22-505).	
Engine starts but stalls immediately (MIL works OK, no DTCs set, immobilizer indicator stays on or flashes)	Check the immobilizer system (see page 22-505).	
Engine is hard to start (MIL works OK, no DTCs set)	1. Test the battery (see page 22-90). 2. Check the fuel pressure (see page 11-335). 3. Clean the throttle body (see page 11-366).	• Low compression • Intake air leaks • Fuel contamination • Weak spark
Cold fast idle too low (MIL works OK, no DTCs set)	1. Do the PCM idle learn procedure (see page 11-313). 2. Check the idle speed (see page 11-312). 3. Clean the throttle body (see page 11-366).	
Cold fast idle too high (MIL works OK, no DTCs set)	1. Do the PCM idle learn procedure (see page 11-313). 2. Check the idle speed (see page 11-312). 3. Do the throttle position learning check (see page 11-365).	Intake air leaks
Idle speed fluctuates (MIL works OK, no DTCs set)	1. Do the PCM idle learn procedure (see page 11-313). 2. Check the idle speed (see page 11-312). 3. Do the carbon accumulation check (see page 11-365). 4. Troubleshoot the A/C signal circuit (see page 11-307).	• Incorrect valve timing or clearance adjustment • Intake air leaks

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Fuel and Emissions Systems

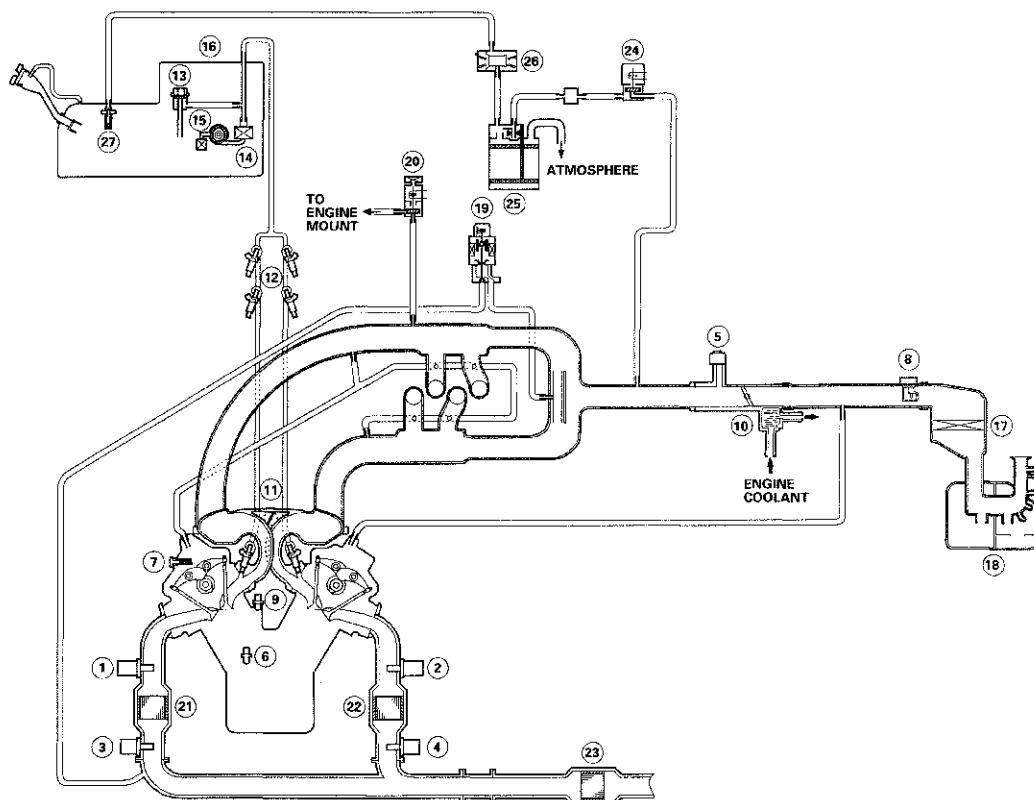
Symptom Troubleshooting Index (cont'd)

Symptom	Diagnostic procedure	Also check for
After warming up, idle speed is below specification without load (MIL works OK, no DTCs set)	1. Troubleshoot the alternator FR signal circuit (see page 11-308). 2. Do the carbon accumulation check (see page 11-365).	Incorrect valve timing
After warming up, idle speed is above specification without load (MIL works OK, no DTCs set)	1. Troubleshoot the alternator FR signal circuit (see page 11-308). 2. Inspect the APP sensor (see page 11-281).	Intake air leaks
After warming up, idle speed drops when steering wheel is turned (MIL works OK, no DTCs set)	1. Do the PCM idle learn procedure (see page 11-313). 2. Troubleshoot the PSP switch signal circuit (see page 11-308). 3. Do the carbon accumulation check (see page 11-365).	Power steering system problem
Low power (MIL works OK, no DTCs set)	Check the fuel pressure (see page 11-335).	• Low compression • Incorrect camshaft timing • Incorrect engine oil level • Exhaust restriction
Engine stalls (MIL works OK, no DTCs set)	1. Do the PCM idle learn procedure (see page 11-313). 2. Check the fuel pressure (see page 11-335). 3. Check the idle speed (see page 11-312). 4. Troubleshoot the brake pedal position switch signal circuit (see page 11-311).	• Intake air leaks • Faulty harness and sensor connections
Difficult to refuel (MIL works OK, no DTCs set)	1. Check the fuel vent tube between the EVAP canister and the fuel tank. 2. Check the fuel tank vapor recirculation tube between the fuel pipe and the fuel tank. 3. Replace the fuel tank (see page 11-351).	Malfunctioning gas station filling nozzle.
Fuel overflows during refueling (No DTCs set)	Replace the fuel tank (see page 11-351).	Malfunctioning gas station filling nozzle.
Fuel cap warning message stays on (MIL works OK, no DTCs set)	Troubleshoot the fuel cap warning message system (see page 11-421).	
HDS does not communicate with the PCM or the vehicle	Troubleshoot the DLC circuit (see page 11-211).	Correct HDS software



System Description

Fuel and Emissions System Diagram



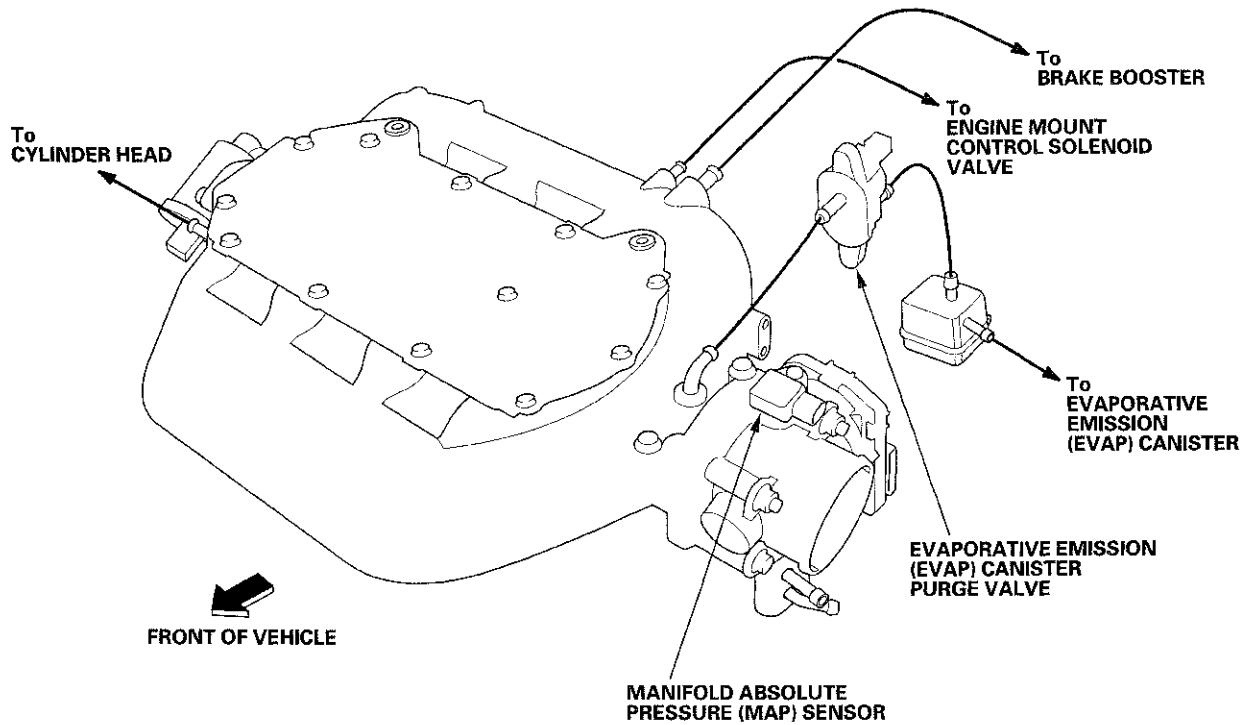
- | | |
|---|---|
| ① FRONT AIR FUEL RATIO (A/F) SENSOR (BANK 2, SENSOR 1) | ⑮ FUEL PUMP |
| ② REAR AIR FUEL RATIO (A/F) SENSOR (BANK 1, SENSOR 1) | ⑯ FUEL TANK |
| ③ FRONT SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO ₂ S) (BANK 2, SENSOR 2) | ⑰ AIR CLEANER |
| ④ REAR SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO ₂ S) (BANK 1, SENSOR 2) | ⑱ INTAKE AIR RESONATOR |
| ⑤ MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR | ⑲ EXHAUST GAS RECIRCULATION (EGR) VALVE and POSITION SENSOR |
| ⑥ ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1 | ⑳ ENGINE MOUNT CONTROL SOLENOID VALVE |
| ⑦ POSITIVE CRANKCASE VENTILATION (PCV) VALVE | ㉑ FRONT WARM UP THREE WAY CATALYTIC CONVERTER (WU-TWC) (BANK 2) |
| ⑧ MASS AIR FLOW (MAF) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR | ㉒ REAR WARM UP THREE WAY CATALYTIC CONVERTER (WU-TWC) (BANK 1) |
| ⑨ KNOCK SENSOR | ㉓ UNDER-FLOOR THREE WAY CATALYTIC CONVERTER (TWC) |
| ⑩ THROTTLE BODY | ㉔ EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VALVE |
| ⑪ INTAKE MANIFOLD TUNING (IMT) ACTUATOR | ㉕ EVAPORATIVE EMISSION (EVAP) CANISTER |
| ⑫ INJECTOR | ㉖ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE |
| ⑬ FUEL PRESSURE REGULATOR | ㉗ FUEL TANK VAPOR/LIQUID SEPARATION VALVE |
| ⑭ FUEL FILTER | |

(cont'd)

Fuel and Emissions Systems

System Description (cont'd)

Vacuum Hose Routing





Electronic Control Systems

The functions of the fuel and emission control systems are managed by the powertrain control module (PCM).

Self-diagnosis

The PCM detects a failure of a signal from a sensor or from another control unit and stores a Pending or Confirmed DTC. Depending on the failure, a Confirmed DTC is stored in either the first or the second drive cycle. When a DTC is stored, the PCM turns on the malfunction indicator lamp (MIL) by supplying ground to the MIL circuit.

- **One Drive Cycle Detection Method**

When an abnormality occurs in the signal from a sensor or from another control unit, the PCM stores a Confirmed DTC for the failure and turns on the MIL immediately.

- **Two Drive Cycle Detection Method**

When an abnormality occurs in the signal from a sensor or from another control unit in first drive cycle, the PCM stores a Pending DTC for the failure. The MIL does not come on at this time. If the failure continues in the second drive cycle, the Pending PCM stores a Confirmed DTC and turns on the MIL.

Fail-safe Function

When an abnormality occurs in the signal from a sensor or from another control unit, the PCM ignores that signal and substitutes a pre-programmed value that allows the engine to continue running. This causes a Confirmed DTC to be stored and the MIL to come on.

MIL Bulb Check and Readiness Code Condition

When the ignition switch is turned to ON (II), the PCM turns on the MIL via the F-CAN circuit for about 15 to 20 seconds to check the bulb condition. If any readiness codes are not set to complete, the MIL flashes five times. If all readiness codes are set to complete, the MIL goes off.

Self Shut Down (SSD) Mode

After the ignition switch is turned to LOCK (0), the PCM stays on about 30 minutes. If the PCM connector is disconnected during this time, the PCM may be damaged. To cancel this mode, disconnect the negative cable from the battery or jump the SCS line with the HDS after the ignition switch is turned to LOCK (0).

(cont'd)

Fuel and Emissions Systems

System Description (cont'd)

PCM Inputs and Outputs at PCM Connector A (31P)

1 PG2	2 PG1	3 LG1	4 IGP	5 IAT	6 AFSHTC B2	7 AFSHTC B1						8 SO2S HTCB2	9 SO2S HTCB1
10 VBSOL	11 ALT L	12 ALT F	13 RFC RLY	14 ECT1	15 IGPLS6	16 IGPLS5	17 IGPLS4	18 IGPLS3	19 IGPLS2	20 IGPLS1	21 INJ1		
22 VTS	23 VTPSW	24 ALTC		25 SEFD	26 SEDF		27 INJ6	28 INJ5	29 INJ4	30 INJ3	31 INJ2		

Wire side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
1	BLK	PG2 (POWER GROUND)	Ground circuit for PCM	Less than 0.2 V at all times
2	BLK	PG1 (POWER GROUND)	Ground circuit for PCM	Less than 0.2 V at all times
3	BRN/YEL	LG1 (LOGIC GROUND)	Ground circuit for PCM	Less than 0.2 V at all times
4	YEL/BLK	IGP (POWER SOURCE)	Power source for PCM	With ignition switch ON (II): battery voltage
5	RED/YEL	IAT (INTAKE AIR TEMPERATURE (IAT) SENSOR)	Detects IAT sensor signal	With ignition switch ON (II): about 0.1—4.8 V (depending on intake air temperature)
6	GRN/WHT	AFSHTCB2 (AIR FUEL RATIO (A/F) SENSOR HEATER CONTROL BANK 2)	Drives front A/F sensor heater (Bank 2, sensor 1)	With ignition switch ON (II): battery voltage With warmed up engine running: about 0 V or pulses
7	BLK/WHT	AFSHTCB1 (AIR FUEL RATIO (A/F) SENSOR HEATER CONTROL BANK 1)	Drives rear A/F sensor heater (Bank 1, sensor 1)	With ignition switch ON (II): battery voltage With warmed up engine running: about 0 V or pulses
8	GRN/RED	SO2SHTCB2 (SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S) HEATER CONTROL BANK 2)	Drives front secondary HO2S heater (Bank 2, sensor 2)	With ignition switch ON (II): battery voltage With warmed up engine running: duty controlled
9	BLK/WHT	SO2SHTCB1 (SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S) HEATER CONTROL BANK 1)	Drives rear secondary HO2S heater (Bank 1, sensor 2)	With ignition switch ON (II): battery voltage With warmed up engine running: duty controlled
10	BLK/YEL	VBSOL (POWER SOURCE FOR SOLENOID VALVES)	Power source for solenoid valves	With ignition switch ON (II): battery voltage With ignition switch OFF: about 0 V
11	WHT/BLU	ALT L (ALTERNATOR L SIGNAL)	Detects alternator L signal	With ignition switch ON (II): about 0 V With engine running: battery voltage
12	WHT/RED	ALT F (ALTERNATOR FR SIGNAL)	Detects alternator FR signal	With engine running: about 0—5.0 V (depending on electrical load)
13	LT BLU	RFCRLY (RADIATOR FAN RELAY)	Drives radiator fan control (RFC) unit relay	With radiator fan motor ON: about 0 V With radiator fan motor OFF: battery voltage
14	RED/WHT	ECT1 (ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1)	Detects ECT sensor 1 signal	With ignition switch ON (II): about 0.1—4.8 V (depending on engine coolant temperature)



PCM Inputs and Outputs at PCM Connector A (31P)

1 PG2	2 PG1	3 LG1			4 IGP	5 IAT	6 AFSHTC B2	7 AFSHTC B1			8 SO2S HTCB2	9 SO2S HTCB1	
10 VBSOL	11 ALT L	12 ALT F	13 RFC RLY	14 ECT1	15 IGPLS6	16 IGPLS5	17 IGPLS4	18 IGPLS3	19 IGPLS2	20 IGPLS1	21 INJ1		
22 VTS	23 VTPSW	24 ALTC			25 SEFD	26 SEDF			27 INJ6	28 INJ5	29 INJ4	30 INJ3	31 INJ2

Wire side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
15	BRN/WHT	IGPLS6 (No. 6 IGNITION COIL PULSE)	Drives No. 6 ignition coil	With ignition switch ON (II): about 0 V With engine running: pulses
16	BLK/RED	IGPLS5 (No. 5 IGNITION COIL PULSE)	Drives No. 5 ignition coil	
17	BRN	IGPLS4 (No. 4 IGNITION COIL PULSE)	Drives No. 4 ignition coil	
18	WHT/BLU	IGPLS3 (No. 3 IGNITION COIL PULSE)	Drives No. 3 ignition coil	
19	BLU/RED	IGPLS2 (No. 2 IGNITION COIL PULSE)	Drives No. 2 ignition coil	
20	YEL/GRN	IGPLS1 (No. 1 IGNITION COIL PULSE)	Drives No. 1 ignition coil	
21	BRN	INJ1 (No. 1 INJECTOR)	Drives No. 1 injector	At idle: duty controlled With ignition switch ON (II): battery voltage
22	GRN/YEL	VTS (ROCKER ARM OIL CONTROL SOLENOID (VTEC SOLENOID VALVE))	Drives rocker arm oil control solenoid (VTEC solenoid valve)	At idle: about 0 V
23	BLU/BLK	VTPSW (ROCKER ARM OIL PRESSURE SWITCH (VTEC OIL PRESSURE SWITCH))	Detects rocker arm oil pressure switch (VTEC oil pressure switch) signal	With engine at low speed: about 0 V With engine at high speed: battery voltage
24	WHT/GRN	ALTC (ALTERNATOR CONTROL)	Sends alternator control signal	With warmed up engine running: battery voltage (depending on electrical load)
25	GRN	SEFD (THROTTLE ACTUATOR CONTROL SERIAL SIGNAL)	Sends throttle actuator control serial signal	
26	BLU	SEDF (THROTTLE ACTUATOR CONTROL SERIAL SIGNAL)	Detects throttle actuator control serial signal	
27	WHT/BLU	INJ6 (No. 6 INJECTOR)	Drives No. 6 injector	At idle: duty controlled With ignition switch ON (III): battery voltage
28	BLK/RED	INJ5 (No. 5 INJECTOR)	Drives No. 5 injector	
29	YEL	INJ4 (No. 4 INJECTOR)	Drives No. 4 injector	
30	BLU	INJ3 (No. 3 INJECTOR)	Drives No. 3 injector	
31	RED	INJ2 (No. 2 INJECTOR)	Drives No. 2 injector	

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Fuel and Emissions Systems

System Description (cont'd)

PCM Inputs and Outputs at PCM Connector B (24P)

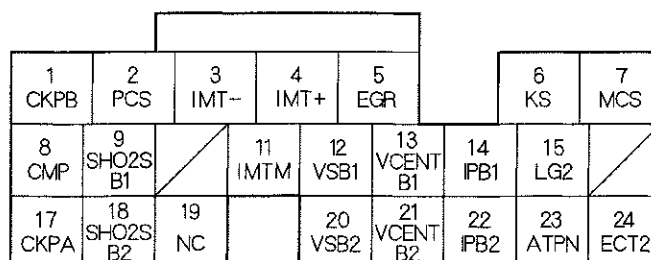
1 CKPB	2 PCS	3 IMT-	4 IMT+	5 EGR	6 KS	7 MCS
8 CMP	9 SHO2S B1	10 /	11 IMTM	12 VSB1	13 VCENT B1	14 IPB1
15 LG2	16 /	17 CKPA	18 SHO2S B2	19 NC	20 VSB2	21 VCENT B2
22 IPB2	23 ATPN	24 ECT2				

Wire side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
1	BLU/RED	CKPB (CRANKSHAFT POSITION (CKP) SENSOR B)	Drives CKP sensor B signal	With engine running: pulses
2	RED/YEL	PCS (EVAPORATIVE EMISSION (EVAP) CANISTER PURGE VALVE)	Drives EVAP canister purge valve	With engine running, engine coolant below 140 °F (60 °C): battery voltage With engine running, engine coolant above 140 °F (60 °C): duty controlled
3	WHT/RED	IMT- (INTAKE MANIFOLD TUNING (IMT) ACTUATOR -SIDE)	Ground for IMT actuator	With ignition switch ON (II): battery voltage
4	WHT/BLU	IMT+ (INTAKE MANIFOLD TUNING (IMT) ACTUATOR +SIDE)	Drives IMT actuator	With ignition switch ON (II): battery voltage
5	BLU/RED	EGR (EXHAUST GAS RECIRCULATION (EGR) VALVE)	Drives EGR valve	With EGR operating: duty controlled With EGR not operating: about 0 V
6	RED/BLU	KS (KNOCK SENSOR)	Detects knock sensor signal	With engine knocking: pulses
7	BLU/YEL	MCS (ENGINE MOUNT CONTROL SOLENOID VALVE)	Drives engine mount control solenoid valve	At idle: about 0 V Above idle: battery voltage
8	YEL	CMP (CAMSHAFT POSITION (CMP) SENSOR)	Detects CMP sensor signal	With engine running: pulses
9	GRN	SHO2SB1 (SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S) BANK 1, SENSOR 2)	Detects rear secondary HO2S (Bank 1, sensor 2) signal	With throttle fully opened from idle and warmed up engine: above 0.6 V With throttle quickly closed: below 0.4 V
11	WHT/BLK	IMTM (INTAKE MANIFOLD TUNING (IMT) ACTUATOR MONITOR)	Detects IMT actuator position	With engine running: about 5.0 V With engine speed above 3,800 rpm: about 0 V



PCM Inputs and Outputs at PCM Connector B (24P)



Wire side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
12	BLU	VSB1 (VS CELL +BANK 1)	Detects rear A/F sensor (Bank 1, sensor 1) VS CELL signal	With engine running: about 3.4—4.8 V
13	RED	VCENTB1 (VIRTUAL GROUND BANK 1)	Reference voltage for rear A/F sensor (Bank 1, sensor 1)	With warmed up engine at idle: about 3.4—3.8 V
14	GRN	IPB1 (IP CELL +BANK 1)	Detects rear A/F sensor (Bank 1, sensor 1) pump cell	With engine running: about 2.0—5.6 V
15	BRN/YEL	LG2 (LOGIC GROUND)	Ground circuit for PCM	Less than 0.2 V at all times
17	BLU	CKPA (CRANKSHAFT POSITION (CKP) SENSOR A)	Detects CKP sensor A signal	With engine running: pulses
18	WHT	SHO2SB2 (SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S) BANK 2, SENSOR 2)	Detects front secondary HO2S (Bank 2, sensor 2) signal	With throttle fully opened from idle and warmed up engine: above 0.6 V With throttle quickly closed: below 0.4 V
19	BLU	NC (OUTPUT SHAFT (COUNTERSHAFT) SPEED SENSOR)	Detects output shaft (countershaft) speed sensor signals	With ignition switch ON (II): about 0 V or about 5.0 V With driving: pluses
20	RED/BLU	VSB2 (VS CELL +BANK 2)	Detects front A/F sensor (Bank 2, sensor 1) VS CELL signal	With warmed up engine running: about 3.4—4.8 V
21	RED/WHT	VCENTB2 (VIRTUAL GROUND BANK 2)	Reference voltage for front A/F sensor (Bank 2, sensor 1)	With warmed up engine at idle: about 3.4—4.8 V
22	GRN/RED	IPB2 (IP CELL +BANK 2)	Detects front A/F sensor (Bank 2, sensor 1) pump cell	With engine running: about 2.0—5.6 V
23	RED/BLK	ATPN (TRANSMISSION RANGE SWITCH N POSITION)	Detects transmission range switch N position signal	In N: about 0 V In any position other than N: battery voltage
24	GRN/RED	ECT2 (ENGINE COOLANT TEMPERATURE (ECT) SENSOR 2)	Detects ECT sensor 2 signal	With ignition switch ON (II): about 0.1—4.8 V (depending on engine coolant temperature)

(cont'd)

Fuel and Emissions Systems

System Description (cont'd)

PCM Inputs and Outputs at PCM Connector C (22P)

1 SHA	2 SHD		3 TATF	4 SG1	5 MAP	6 VCC1	7 LSA
8 SHB	9 OP3 SW	10 ATPD	11 OP2 SW	12 SG2	13 EGRP	14 VCC2	15 LSB
16 SHC	17 OPSW	18 ATPS	19 ATP FWD	20 OP4 SW		21 ATP RVS	22 LSC

Wire side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
1	BLU/YEL	SHA (SHIFT SOLENOID VALVE A)	Drives shift solenoid valve A	With engine running in D (in 2nd and 3rd gears), S (in 2nd and 3rd gears), and R: battery voltage With engine running in P, N, D (in 1st, 4th, and 5th gears), and S (in 1st, 4th, and 5th gears): about 0 V
2	GRN/RED	SHD (SHIFT SOLENOID VALVE D)	Drives shift solenoid valve D	With engine running in N and D: about 0 V With engine running in P, N, and D: battery voltage In any other position: depending on conditions
3	BLU/YEL	TATF (ATF TEMPERATURE SENSOR)	Detects ATF temperature sensor signal	With ignition switch ON (II): about 0.2—4.0 V (depending on ATF temperature)
4	GRN/WHT	SG1 (SENSOR GROUND)	Sensor ground	Less than 0.2 V at all times
5	GRN/RED	MAP (MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR)	Detects MAP sensor signal	With ignition switch ON (II): about 3.0 V At idle: about 0.2 V (depending on engine speed)
6	YEL/RED	VCC1 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5.0 V With ignition switch OFF: about 0 V
7	RED	LSA (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A)	Drives A/T clutch pressure control solenoid valve A	With ignition switch ON (II): pulses
8	GRN/WHT	SHB (SHIFT SOLENOID VALVE B)	Drives shift solenoid valve B	With engine running in P, R, N, D (in 1st, 2nd, and 5th gears), and S (in 1st, 2nd, and 5th gears): battery voltage With engine running in D (in 3rd and 4th gears) and S (in 3rd and 4th gears): about 0 V
9	BLU/WHT	OP3SW (3RD CLUTCH TRANSMISSION FLUID PRESSURE SWITCH)	Detects 3rd clutch transmission fluid pressure switch input signal	With ignition switch ON (II): • Without 3rd clutch pressure: about 5.0 V • With 3rd clutch pressure: about 0 V
10	YEL/GRN	ATPD (TRANSMISSION RANGE SWITCH D POSITION)	Detects transmission range switch D position input signal	In D: about 0 V In any position other than D: battery voltage
11	BLU/BLK	OP2SW (2ND CLUTCH TRANSMISSION FLUID PRESSURE SWITCH)	Detects 2nd clutch transmission fluid pressure switch input signal	With ignition switch ON (II): • Without 2nd clutch pressure: about 5.0 V • With 2nd clutch pressure: about 0 V
12	GRN/YEL	SG2 (SENSOR GROUND)	Sensor ground	Less than 0.2 V at all times
13	WHT/BLK	EGRP (EXHAUST GAS RECIRCULATION (EGR) VALVE POSITION SENSOR)	Detects EGR valve position sensor signal	With engine running: about 1.2—3.0 V (depending on EGR valve lift)



PCM Inputs and Outputs at PCM Connector C (22P)

1 SHA	2 SHD		3 TATF	4 SG1	5 MAP	6 VCC1	7 LSA
8 SHB	9 OP3 SW	10 ATPD	11 OP2 SW	12 SG2	13 EGRP	14 VCC2	15 LSB
16 SHC	17 OPSW	18 ATPS	19 ATP FWD	20 OP4 SW		21 ATP RVS	22 LSC

Wire side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
14	YEL/BLU	VCC2 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5.0 V With ignition switch OFF: about 0 V
15	BRN/WHT	LSB (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B)	Drives A/T clutch pressure control solenoid valve B	With ignition switch ON (II): pulses
16	GRN	SHC (SHIFT SOLENOID VALVE C)	Drives shift solenoid valve C	With engine running in D (in 1st, 3rd, and 5th gears) and S (in 1st, 3rd, and 5th gears): battery voltage With engine running in P, R, N, D (in 2nd and 4th gears), and S (in 2nd and 4th gears): about 0 V
17	YEL/RED	OPSW (OIL PRESSURE SWITCH)	Detects engine oil pressure signal	With ignition switch ON (II): about 5.0 V With engine running: about 0 V
18	RED	ATPS (TRANSMISSION RANGE SWITCH S)	Detects transmission range switch S signal	In S: about 0 V In any position other than S: battery voltage
19	BLU/YEL	ATPFWD (TRANSMISSION RANGE SWITCH FWD POSITION)	Detects transmission range switch signal D and S position input signal	In D and S: about 0 V In any other position D and S: battery voltage
20	BLU/YEL	OP4SW (4TH CLUTCH TRANSMISSION FLUID PRESSURE SWITCH)	Detects 4th clutch transmission fluid pressure switch input	With ignition switch ON (II): • Without 4th clutch pressure: about 5.0 V • With 4th clutch pressure: about 0 V
21	RED/WHT	ATPRVS (TRANSMISSION RANGE SWITCH RVS POSITION)	Detects transmission range switch P, R, and N position input signal	In P, R, and N: about 0 V In any other position P, R, and N: battery voltage
22	GRN/RED	LSC (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE C)	Drives A/T clutch pressure control solenoid valve C	With ignition switch ON (II): pulses

(cont'd)

Fuel and Emissions Systems

System Description (cont'd)

PCM Inputs and Outputs at PCM Connector D (17P)

	2	3	4	5	6
	VCC3	APSA	STS	STRLD	IG1
7	8	9	10	11	12
SG3	NM	APSB	VG+	VG-	VB SOL2
13			15	16	17
ATPP			SDNP	ATPR	SUPP

Wire side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
2	RED	VCC3 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5.0 V With ignition switch OFF: about 0 V
3	PUR	APSA (ACCELERATOR PEDAL POSITION (APP) SENSOR A)	Detects APP sensor A signal	With ignition switch ON (II) and accelerator pedal pressed: about 4.5 V With ignition switch ON (II) and accelerator pedal released: about 1.0 V
4	LT BLU	STS (STARTER SWITCH SIGNAL)	Detects starter switch signal	With starter switch ON (III): battery voltage With starter switch OFF: about 0 V
5	PNK	STRLD (STARTER LOAD)	Detects starter cut relay 2 (ST CUT) voltage	With starter ON: battery voltage
6	YEL	IG1 (IGNITION SIGNAL)	Detects ignition signal	With ignition switch ON (II): battery voltage
7	WHT	SG3 (SENSOR GROUND)	Sensor ground	Less than 0.2 V at all times
8	RED	NM (INPUT SHAFT (MAINSHAFT) SPEED SENSOR)	Detects input shaft (mainshaft) speed sensor signals	With ignition switch ON (II): about 0 V or about 5.0 V With engine running in N: about 2.5 V
9	LT GRN	APSB (ACCELERATOR PEDAL POSITION (APP) SENSOR B)	Detects APP sensor B signal	With ignition switch ON (II) and accelerator pedal pressed: about 2.3 V With ignition switch ON (II) and accelerator pedal released: about 0.5 V
10	LT GRN	VG+ (MASS AIR FLOW (MAF) SENSOR +SIDE)	Detects MAF sensor signal	At idle: about 1.1–1.6 V (between VG+ terminal and VG- terminal)
11	PNK	VG- (MASS AIR FLOW (MAF) SENSOR -SIDE)	Ground for MAF sensor signal	
12	ORN	VBSOL2 (POWER SOURCE FOR SOLENOID VALVES)	Power source for solenoid valves	With ignition switch ON (II): battery voltage
13	GRN	ATPP (TRANSMISSION RANGE SWITCH P POSITION)	Detects transmission range switch P position input signal	In P: about 0 V In any position other than P: battery voltage
15	PUR	SDNP (PADDLE SHIFTER- (DOWNSHIFT SWITCH))	Detects paddle shifter- (downshift switch) signal	With ignition switch ON (II): • Paddle shifter- (downshift switch) pressed: about 0 V • Paddle shifter- (downshift switch) released: battery voltage
16	PUR	ATPR (TRANSMISSION RANGE SWITCH R POSITION)	Detects transmission range switch R position input signal	In R: about 0 V In any position other than R: battery voltage
17	BLU	SUPP (PADDLE SHIFTER+ (UPSHIFT SWITCH))	Detects paddle shifter+ (upshift switch) signal	With ignition switch ON (II): • Paddle shifter+ (upshift switch) pressed: about 0 V • Paddle shifter+ (upshift switch) released: battery voltage



PCM Inputs and Outputs at PCM Connector E (31P)

1 SG4	2 IMO FPR	3 ETCS RLY	4 AFS HTCR	5 MRLY	6 RFC	7 FPC	8 BKSW	9 BKSW NC
10 VSV	11 VSS OUT	12 VCC4	15 CANH	16 SCS	17 PSPSW	18 ELD	20 FPCD	21 STRLY
22 SLS	23 NEP	24 WEN	25 IMO CD	26 CANL	27 ACC	29 FTP	31 MET INH	

Wire side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
1	GRN	SG4 (SENSOR GROUND)	Sensor ground	Less than 0.2 V at all times
2	BRN	IMOFPR (IMMOBILIZER FUEL PUMP RELAY)	Drives PGM-FI main relay 2 (FUEL PUMP)	0 V for 2 seconds after turning ignition switch ON (II), then battery voltage
3	BLU	ETCSRLY (THROTTLE ACTUATOR CONTROL MODULE (DBW) RELAY)	Drives throttle actuator control module (DBW) relay	With ignition switch ON (II): about 0 V
4	PNK	AFSHTCR (AIR FUEL RATIO (A/F) SENSOR RELAY)	Drives A/F sensor relay	With ignition switch ON (II): about 0 V
5	GRN	MRLY (PGM-FI MAIN RELAY)	Drives PGM-FI main relay 1 (FI MAIN) Power source for DTC memory	With ignition switch ON (II): about 0 V With ignition switch OFF: battery voltage
6	LT BLU	RFC (RADIATOR FAN CONTROL UNIT)	Drives radiator fan control unit	With ignition switch ON (II): about 0 V
7	PNK	FPC (FUEL PUMP CONTROL)	Detects fuel pump control signal	With ignition switch ON (II): pulses With ignition switch OFF: about 0 V
8	LT GRN	BKSW (BRAKE PEDAL POSITION SWITCH)	Detects brake pedal position switch signal	With brake pedal released: about 0 V With brake pedal pressed: battery voltage
9	BRN	BKSWNC (BRAKE PEDAL POSITION SWITCH)	Detects brake pedal position switch signal	With ignition switch ON (II) and brake pedal released: battery voltage With ignition switch ON (II) and brake pedal pressed: about 0 V
10	LT GRN	VSV (EVAPORATIVE EMISSION (EVAP) CANISTER VENT SHUT VALVE)	Drives EVAP canister vent shut valve	With ignition switch ON (II): battery voltage
11	BRN	VSSOUT (VEHICLE SPEED SENSOR OUTPUT SIGNAL)	Sends vehicle speed sensor signal	Depending on vehicle speed: pulses
12	GRY	VCC4 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5.0 V With ignition switch OFF: about 0 V
15	WHT	CANH (CAN COMMUNICATION SIGNAL HIGH)	Sends communication signal	With ignition switch ON (II): pulses

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Fuel and Emissions Systems

System Description (cont'd)

PCM Inputs and Outputs at PCM Connector E (31P)

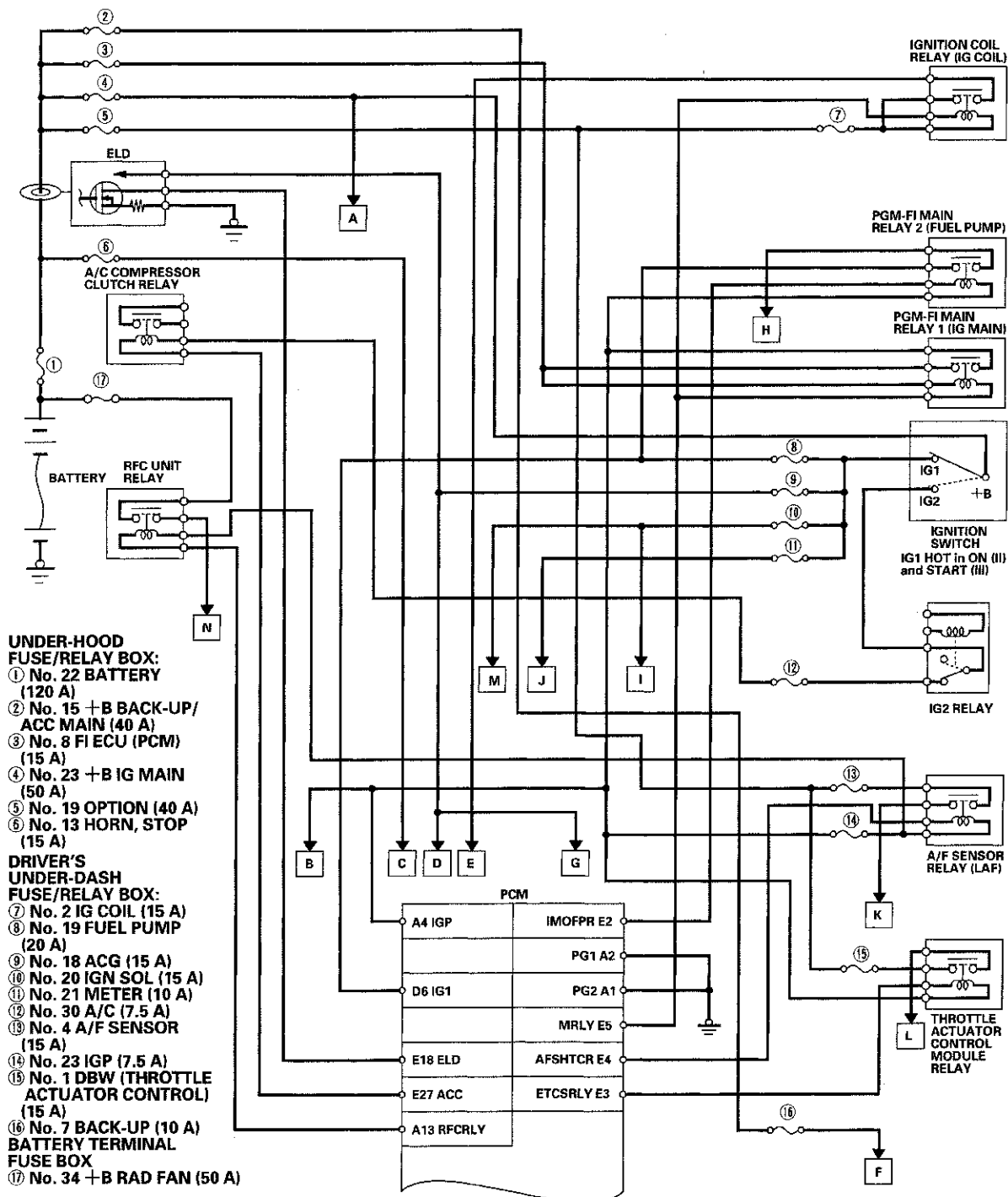
1 SG4	2 IMO FPR	3 ETCS RLY	4 AFS HTCR	5 MRLY	6 RFC	7 FPC						8 BKSW	9 BKSW NC
10 VSV	11 VSS OUT	12 VCC4			15 CANH	16 SCS	17 PSPSW	18 ELD		20 FPCD	21 STRLY		
22 SLS	23 NEP	24 WEN		25 IMO CD	26 CANL		27 ACC		29 FTP		31 MET INH		

Wire side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
16	BRN	SCS (SERVICE CHECK SIGNAL)	Detects service check signal	With service check signal shorted using the HDS: about 0 V With service check signal opened: about 5.0 V
17	PNK	PSPSW (POWER STEERING PRESSURE SWITCH SIGNAL)	Detects PSP switch signal	At idle with steering wheel in straight ahead position: about 0 V At idle with steering wheel at full lock: battery voltage
18	ORN	ELD (ELECTRICAL LOAD DETECTOR (ELD))	Detects ELD signal	With ignition switch ON (II): about 0.1—4.8 V (depending on electrical load)
20	LT BLU	FPCD (FUEL PUMP CONTROL MODULE DIAGNOSIS)	Detect fuel pump control diagnosis	With ignition switch ON (II): about 0 V At idle: about 10.0 V
21	LT GRN	STRLY (STARTER CUT RELAY)	Drives starter cut relay 2 (ST CUT)	With ignition switch ON (II): about 0 V
22	PNK	SLS (SHIFT LOCK SOLENOID)	Drives shift lock solenoid	With ignition switch ON (II), in P, brake pedal pressed, and accelerator released: about 0 V
23	PNK	NEP (ENGINE SPEED PULSE)	Outputs engine speed pulse	With engine running: pulses
24	RED	WEN (WRITE ENABLE SIGNAL)	Detects write enable signal	With ignition switch ON (II): about 0 V
25	ORN	IMOC (IMMOBILIZER CODE)	Detects immobilizer signal	
26	RED	CANL (CAN COMMUNICATION SIGNAL LOW)	Sends communication signal	With ignition switch ON (II): pulses
27	RED	ACC (A/C COMPRESSOR CLUTCH RELAY)	Drives A/C compressor clutch relay	With compressor ON: about 0 V With compressor OFF: battery voltage
29	LT GRN	FTP (FUEL TANK PRESSURE (FTP) SENSOR)	Detects FTP sensor signal	With ignition switch ON (II) and fuel fill cap removed: about 2.5 V
31	GRN	METINH (METER DISPLAY INHIBIT SIGNAL)	Sends A/T shift position inhibit signal	With ignition switch ON (II): about 10.0 V



PCM Electrical Connections

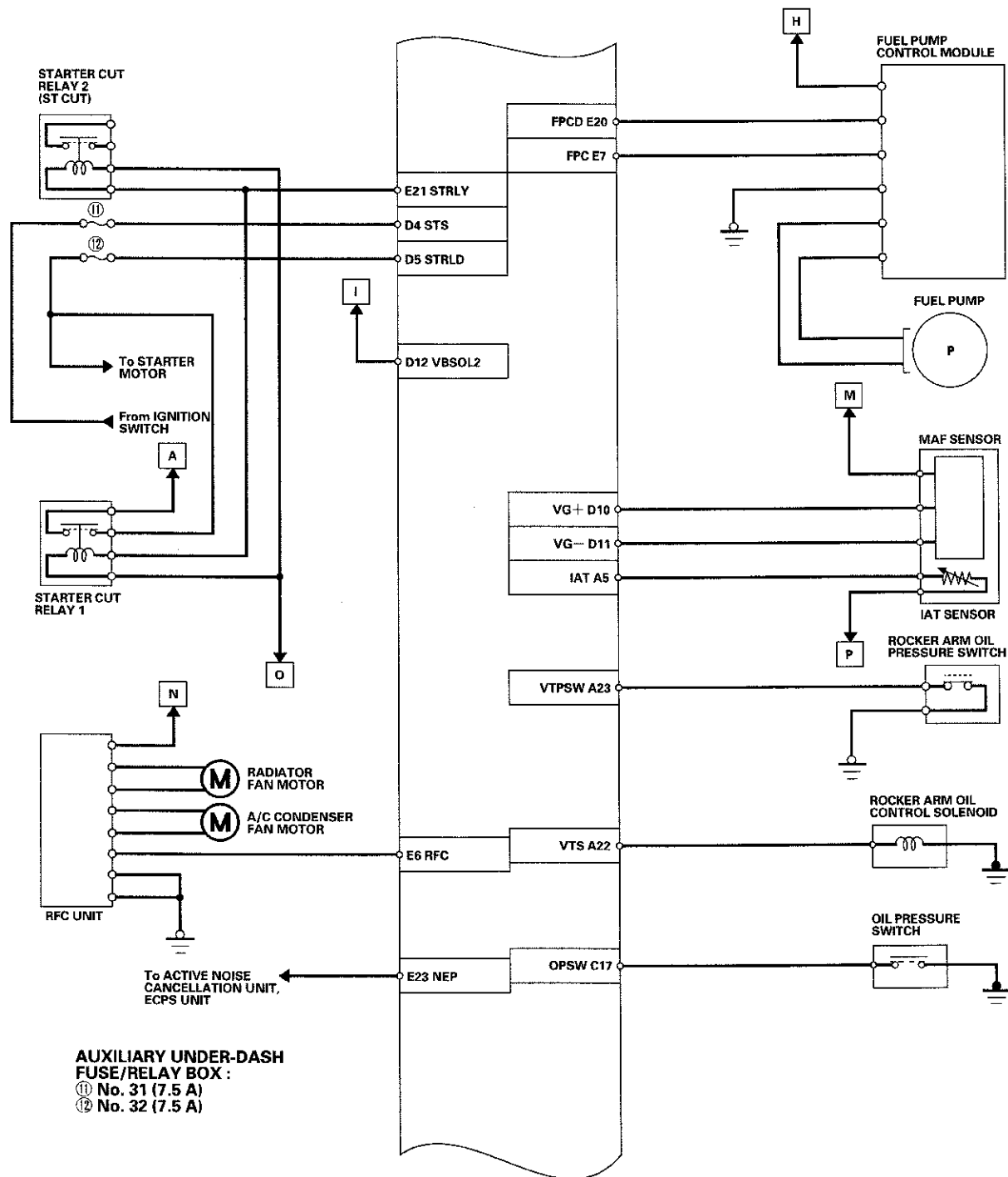


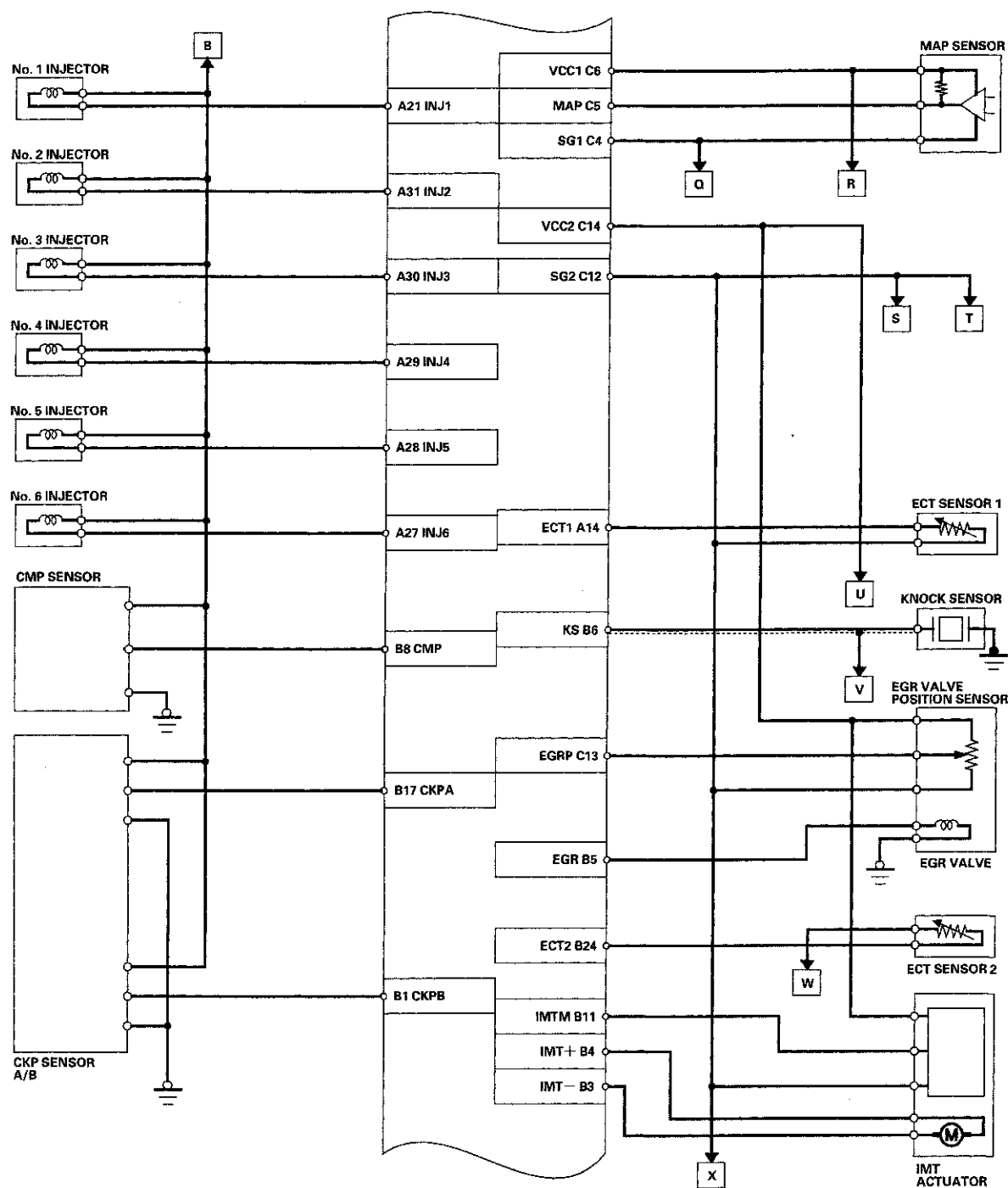
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Fuel and Emissions Systems

System Description (cont'd)

PCM Electrical Connections (cont'd)



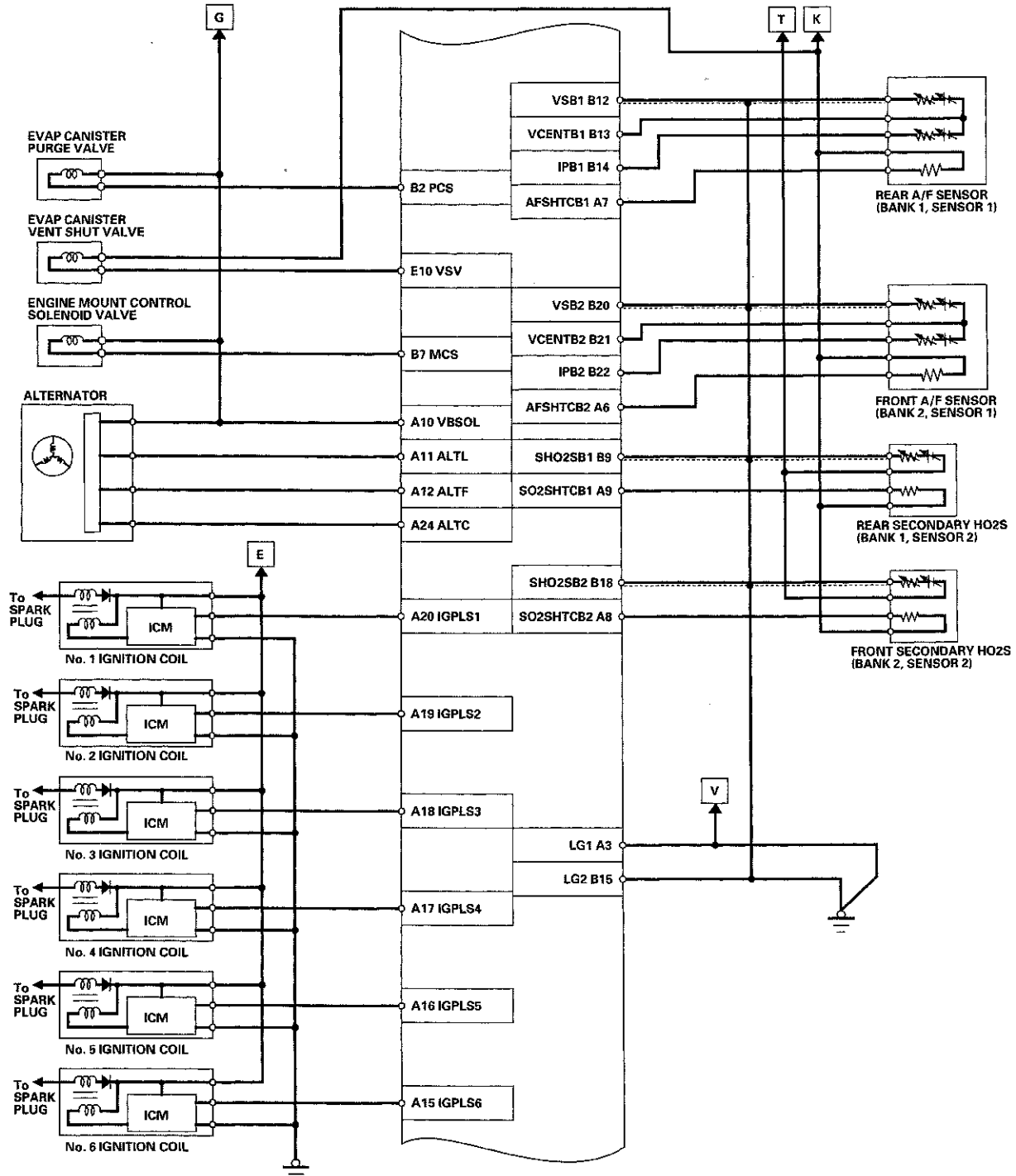


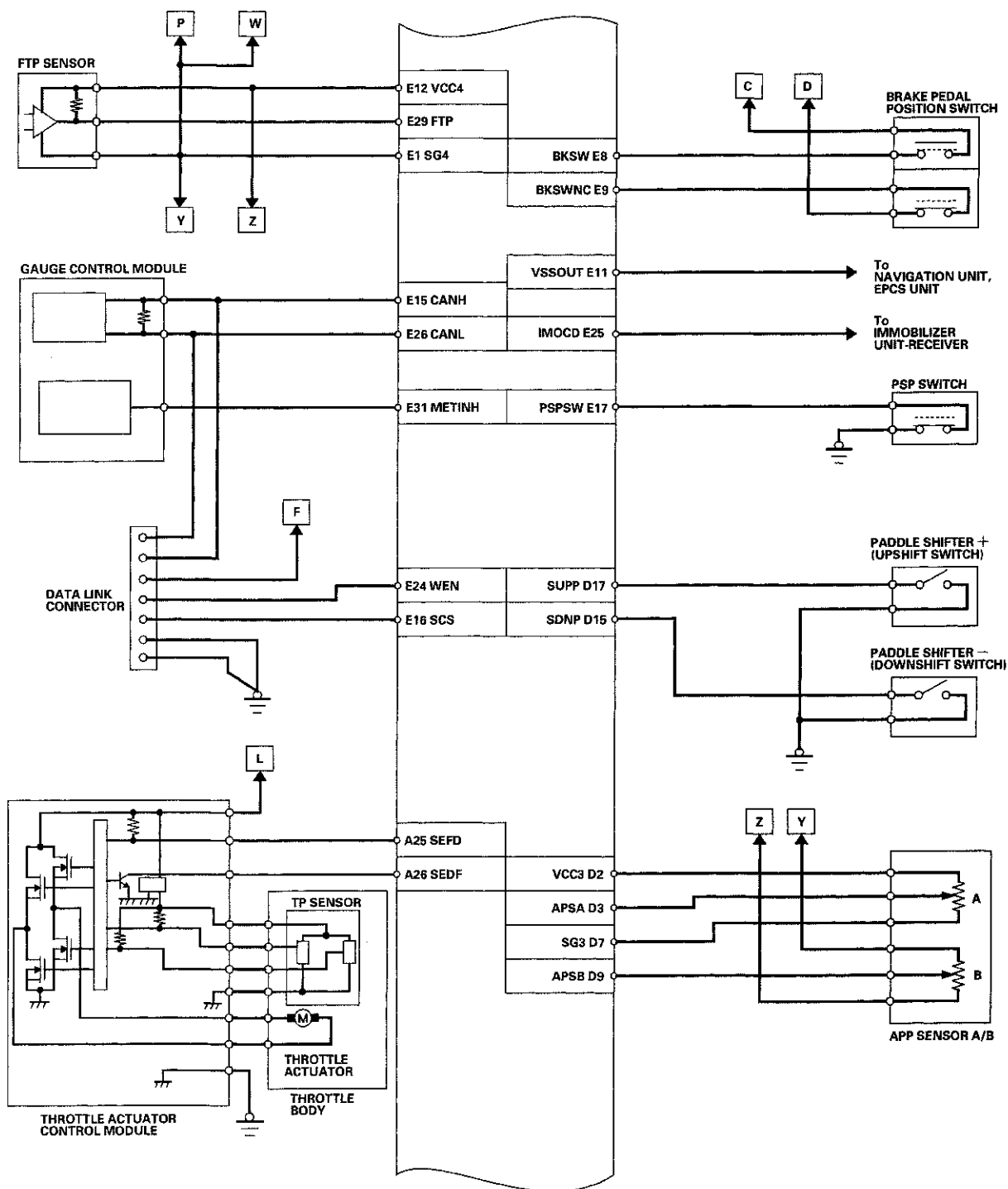
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Fuel and Emissions Systems

System Description (cont'd)

PCM Electrical Connections (cont'd)



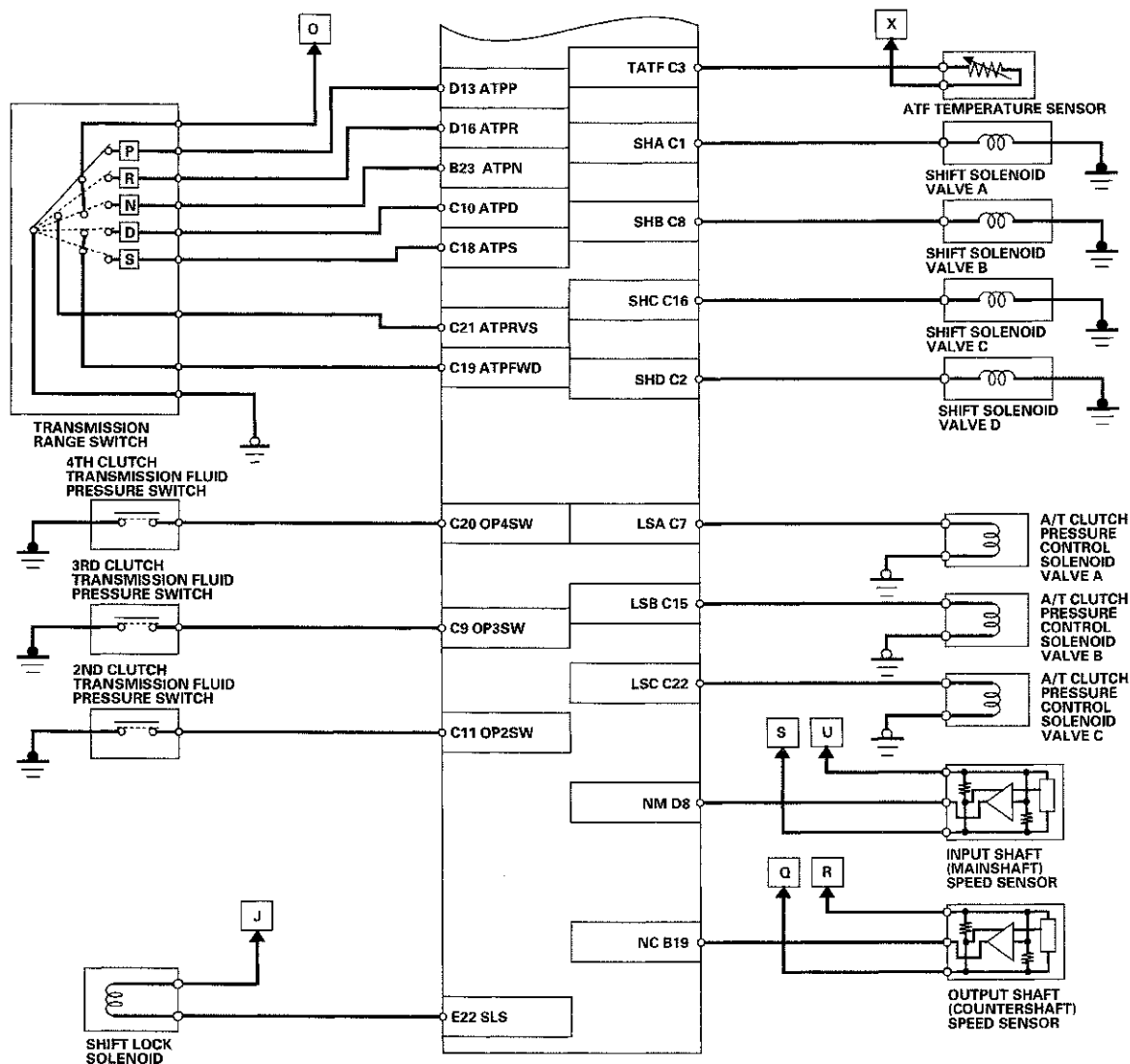


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Fuel and Emissions Systems

System Description (cont'd)

PCM Electrical Connections (cont'd)



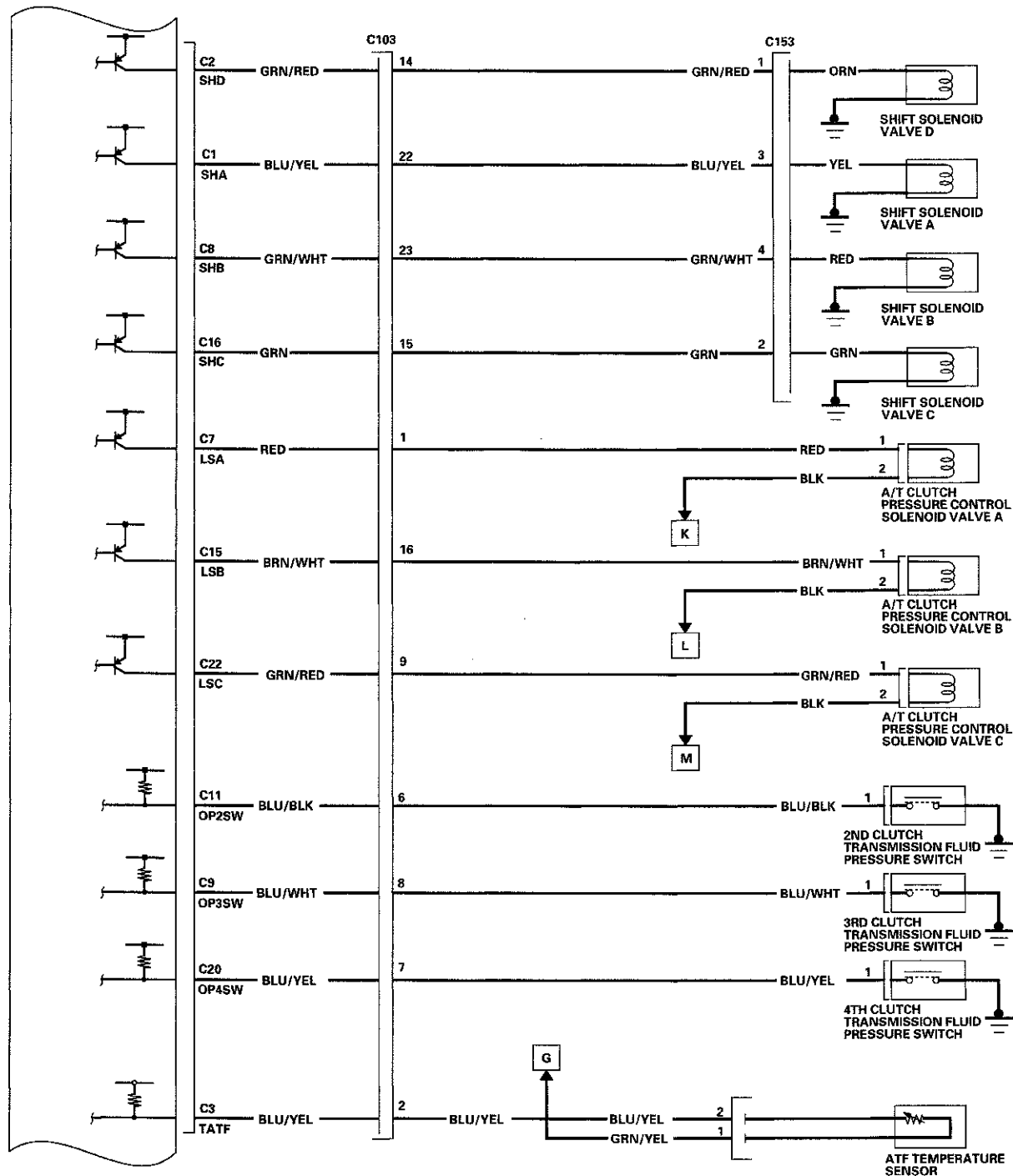
PCM A (31P)									PCM B (24P)							PCM C (22P)							PCM D (17P)						PCM E (31P)																									
1	2	3	4	5	6	7	8 9		1	2	3	4	5	6 7		1	2	3 4		5	6	7	1	2	3	4	5	6	7 8		1	2	3	4	5	6	7	8 9																
10	11	12	13	14	15	16	17	18	19	20	21	8	9	10	11	12	13	14	15	/		8	9	10	11	12	13	14	15	16	17	18	19	20	21	10	11	12	13	14	15	16	17	18	19	20	21							
22	23	24	25 26		27	28	29	30	31	17	18	19	20	21	22	23	24	16	17	18	19	20	21	22	7	8	9	10	11	12	22	23	24	25 26		27	28	29	30	31	18	19	20	21	22	23	24	25	26	27	28	29	30	31

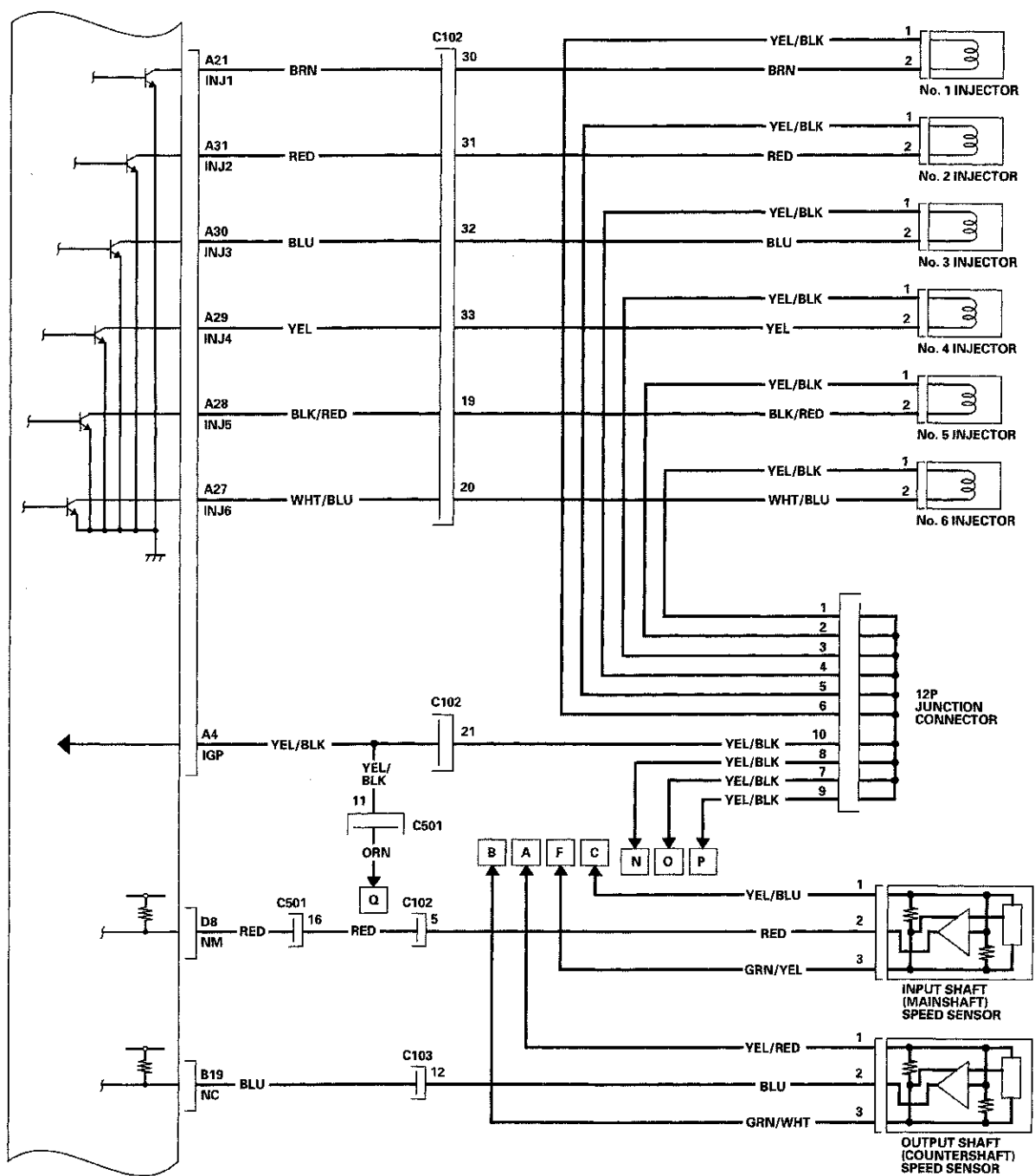
TERMINAL LOCATIONS

Fuel and Emissions Systems

System Description (cont'd)

PCM Circuit Diagram (cont'd)



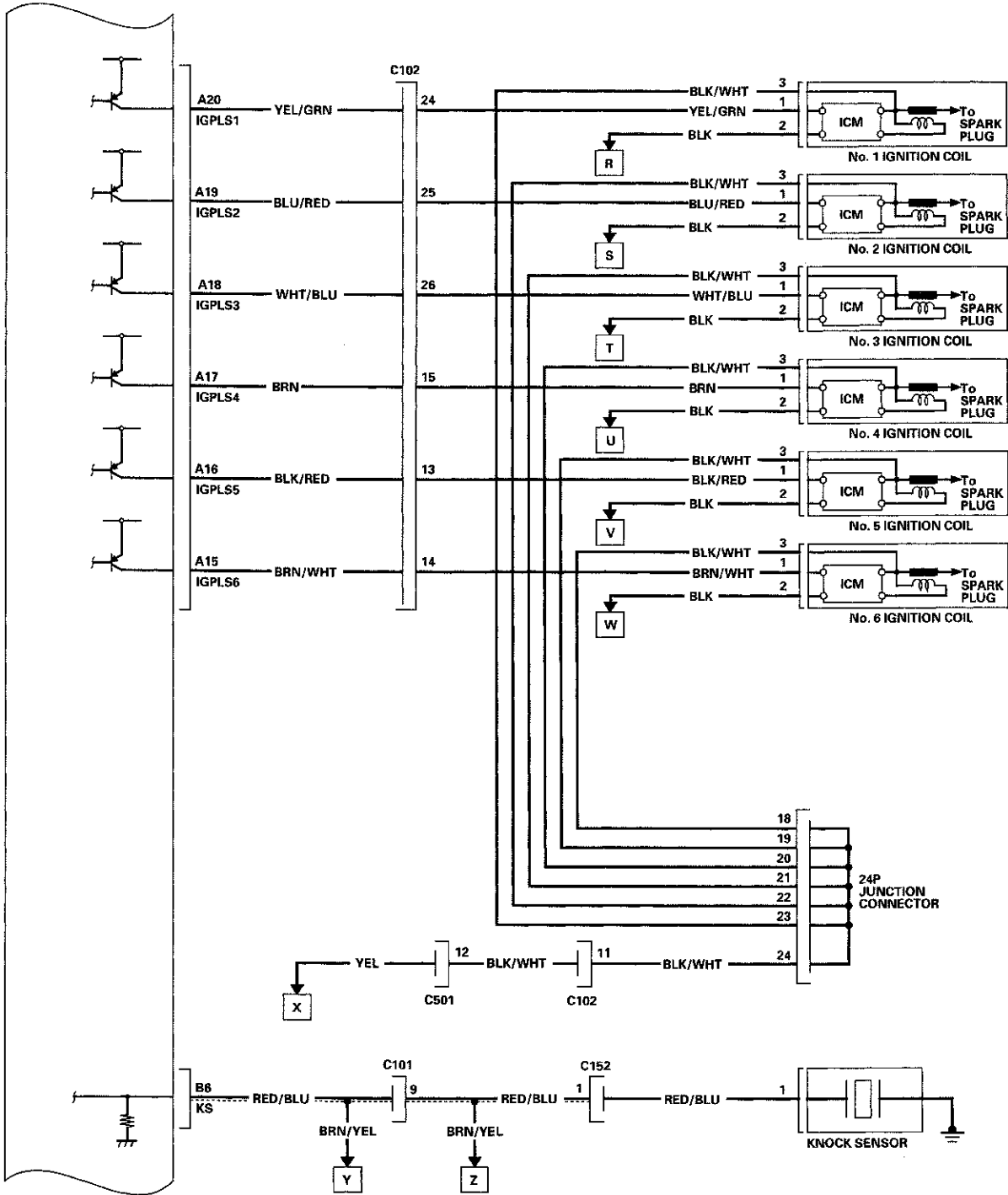


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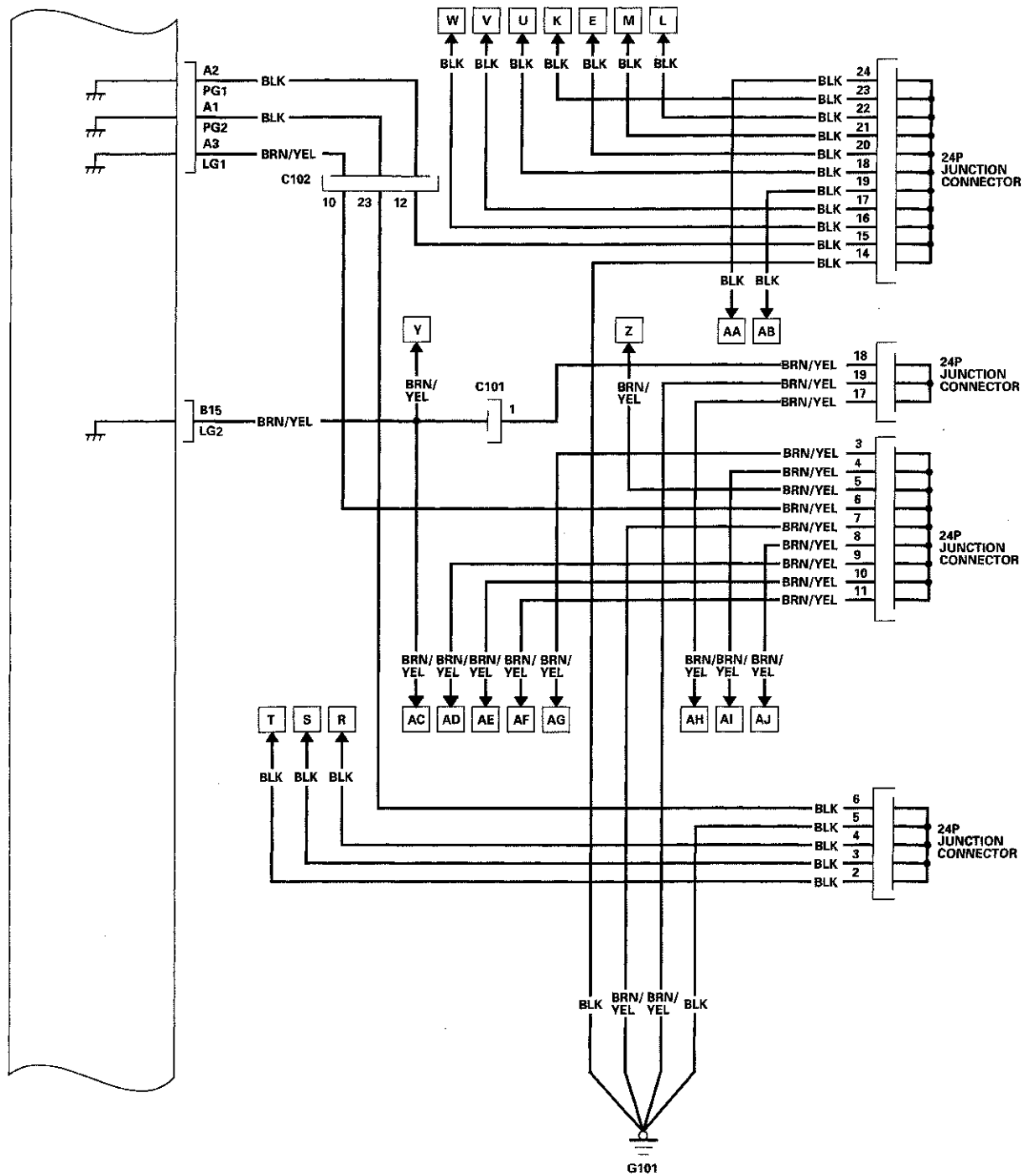
Fuel and Emissions Systems

System Description (cont'd)

PCM Circuit Diagram (cont'd)



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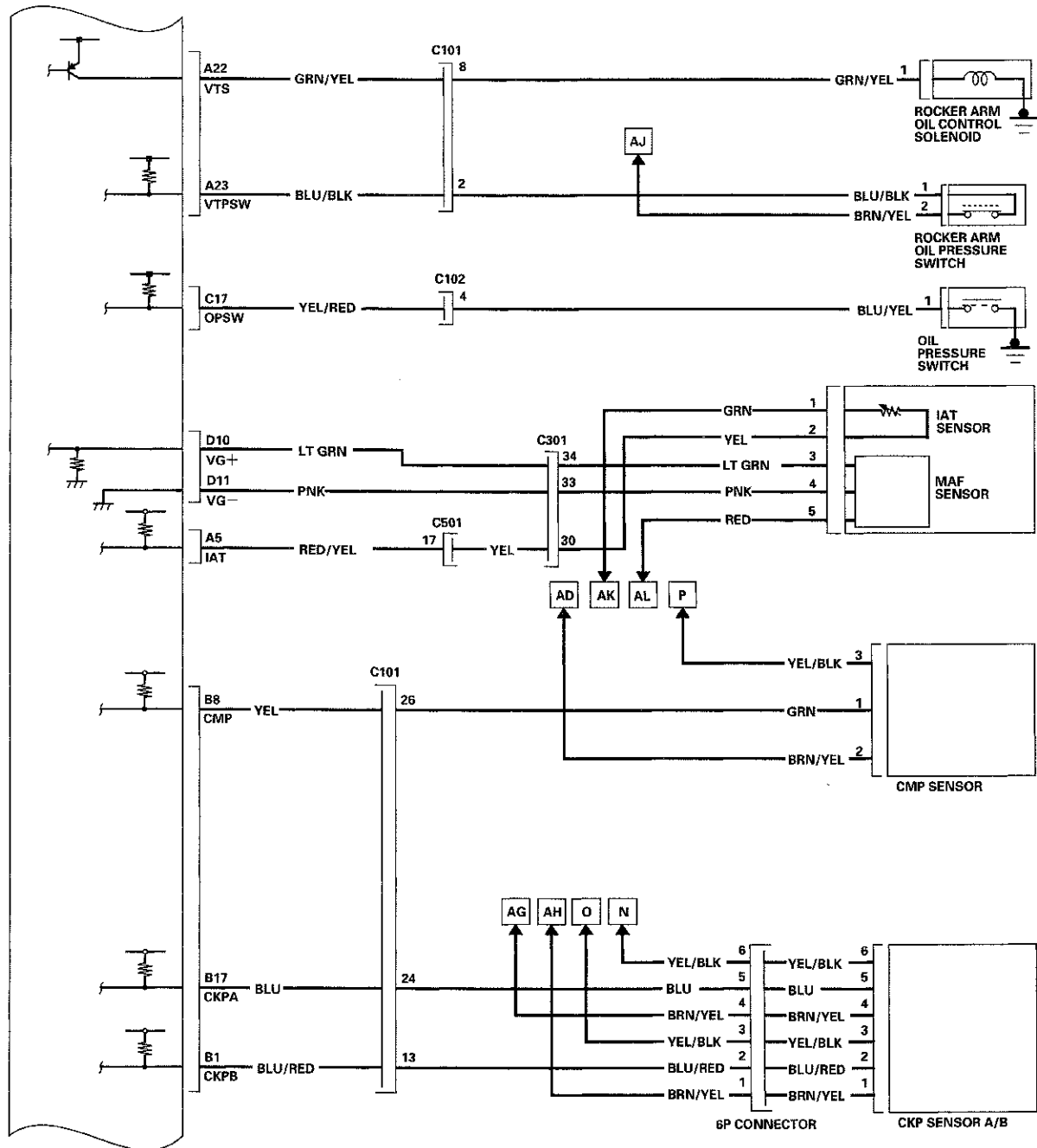


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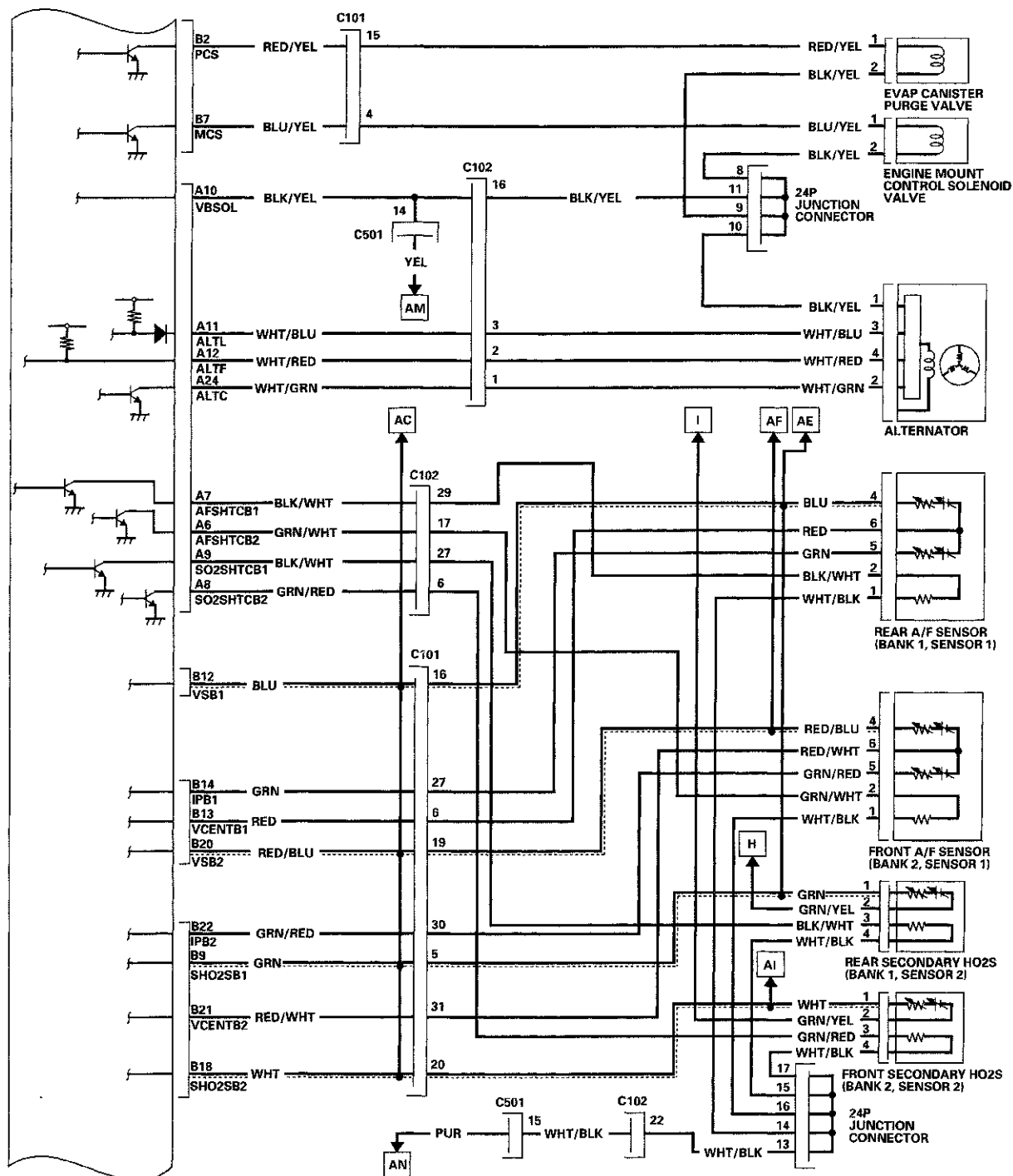
Fuel and Emissions Systems

System Description (cont'd)

PCM Circuit Diagram (cont'd)



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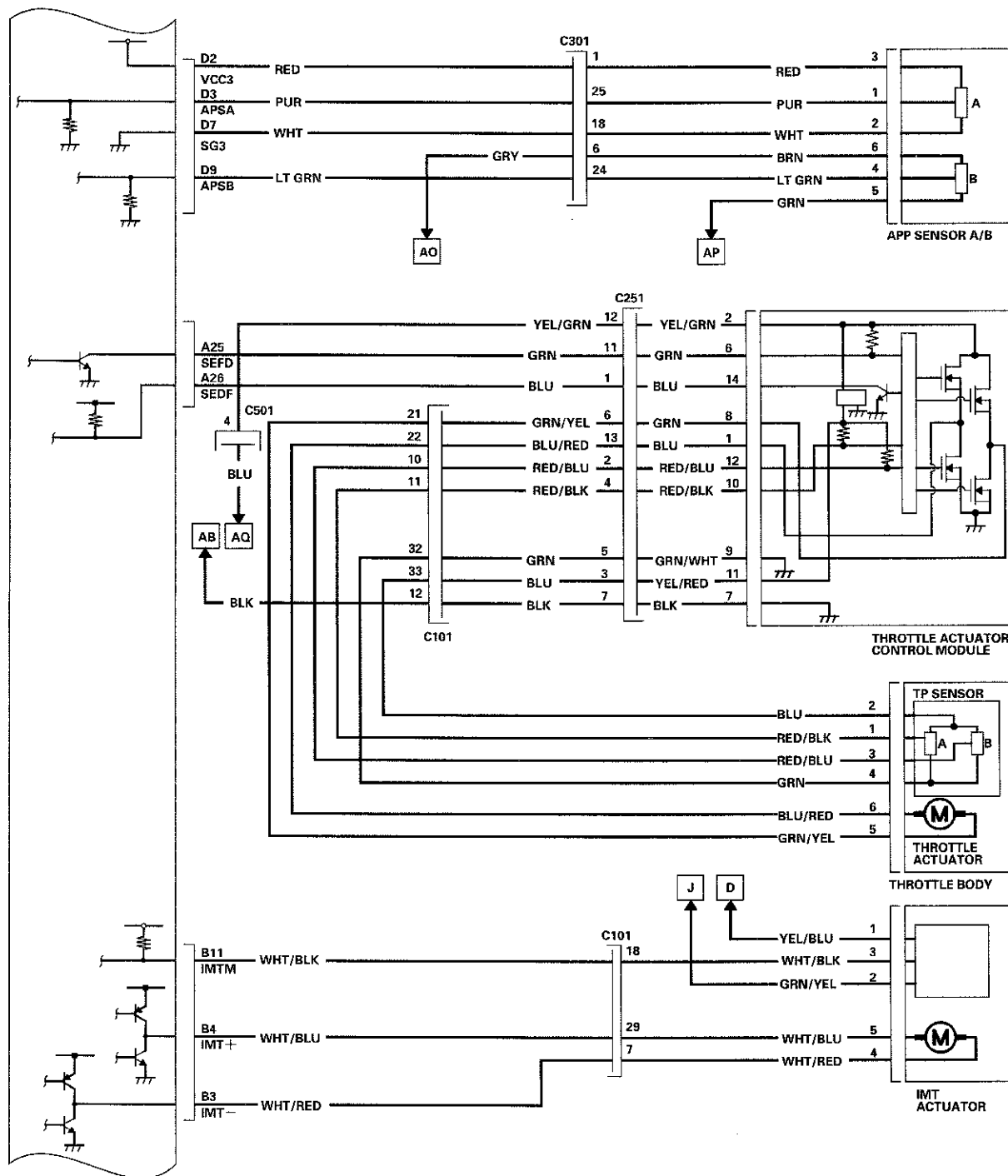


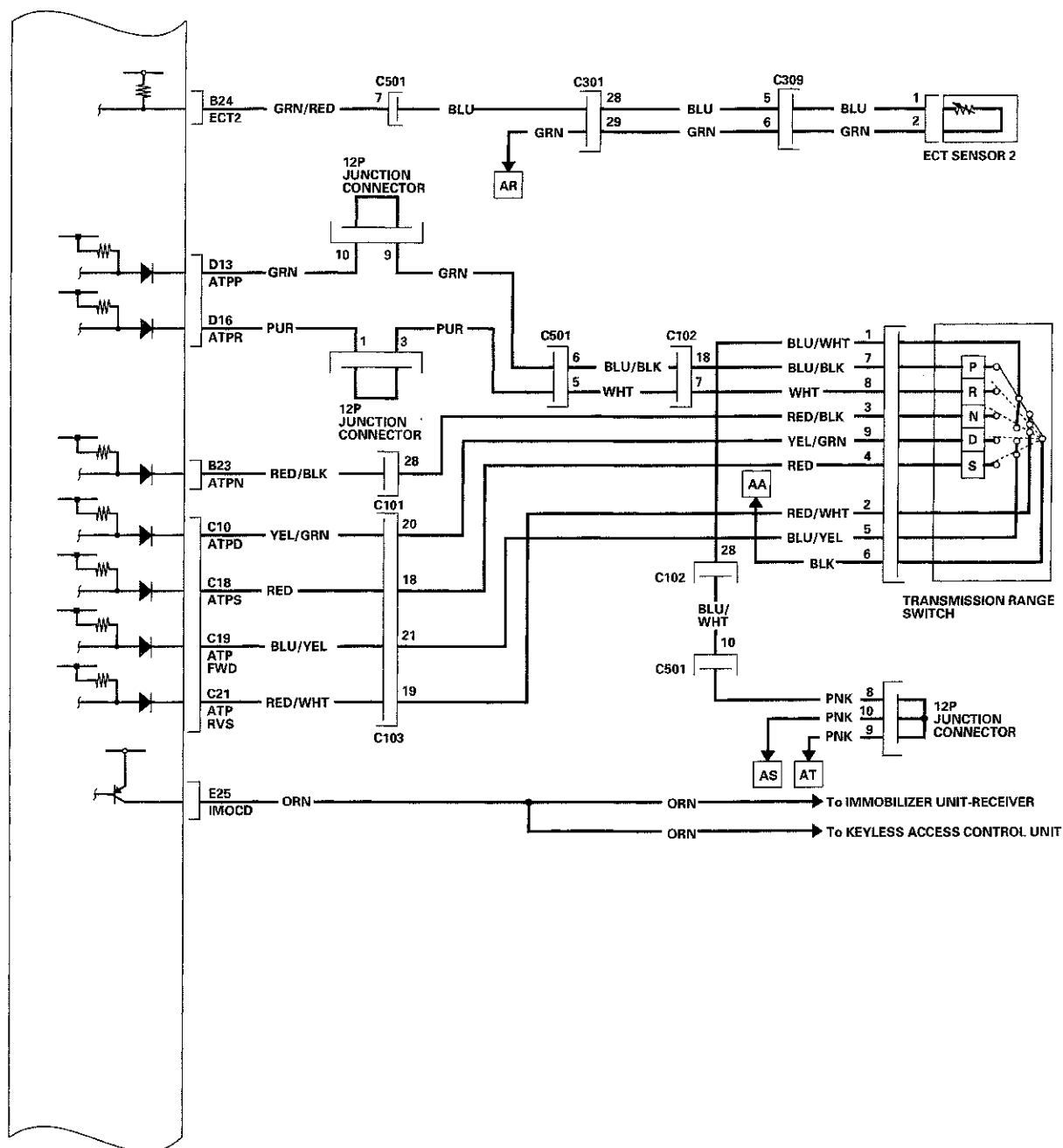
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Fuel and Emissions Systems

System Description (cont'd)

PCM Circuit Diagram (cont'd)



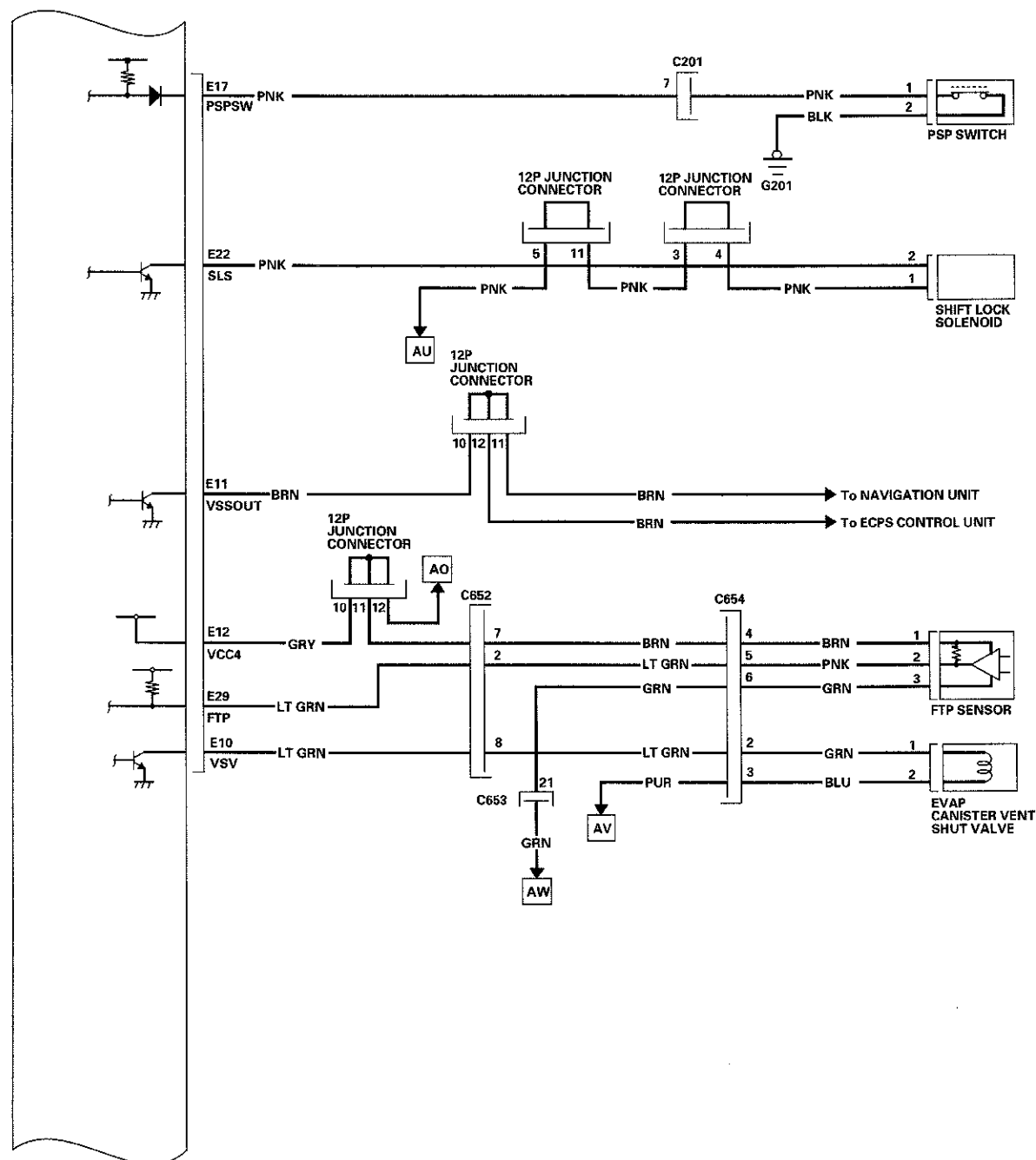


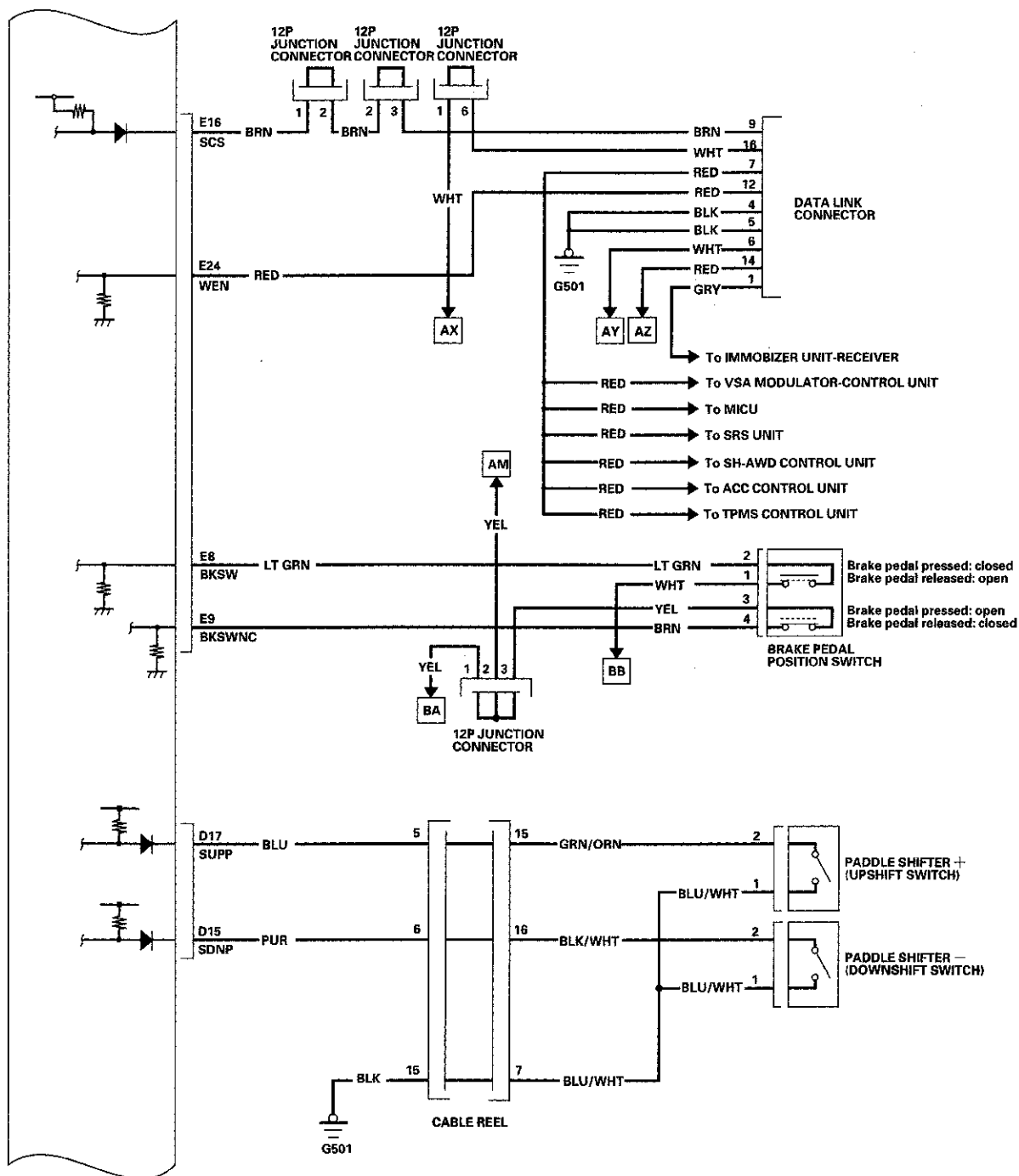
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Fuel and Emissions Systems

System Description (cont'd)

PCM Circuit Diagram (cont'd)



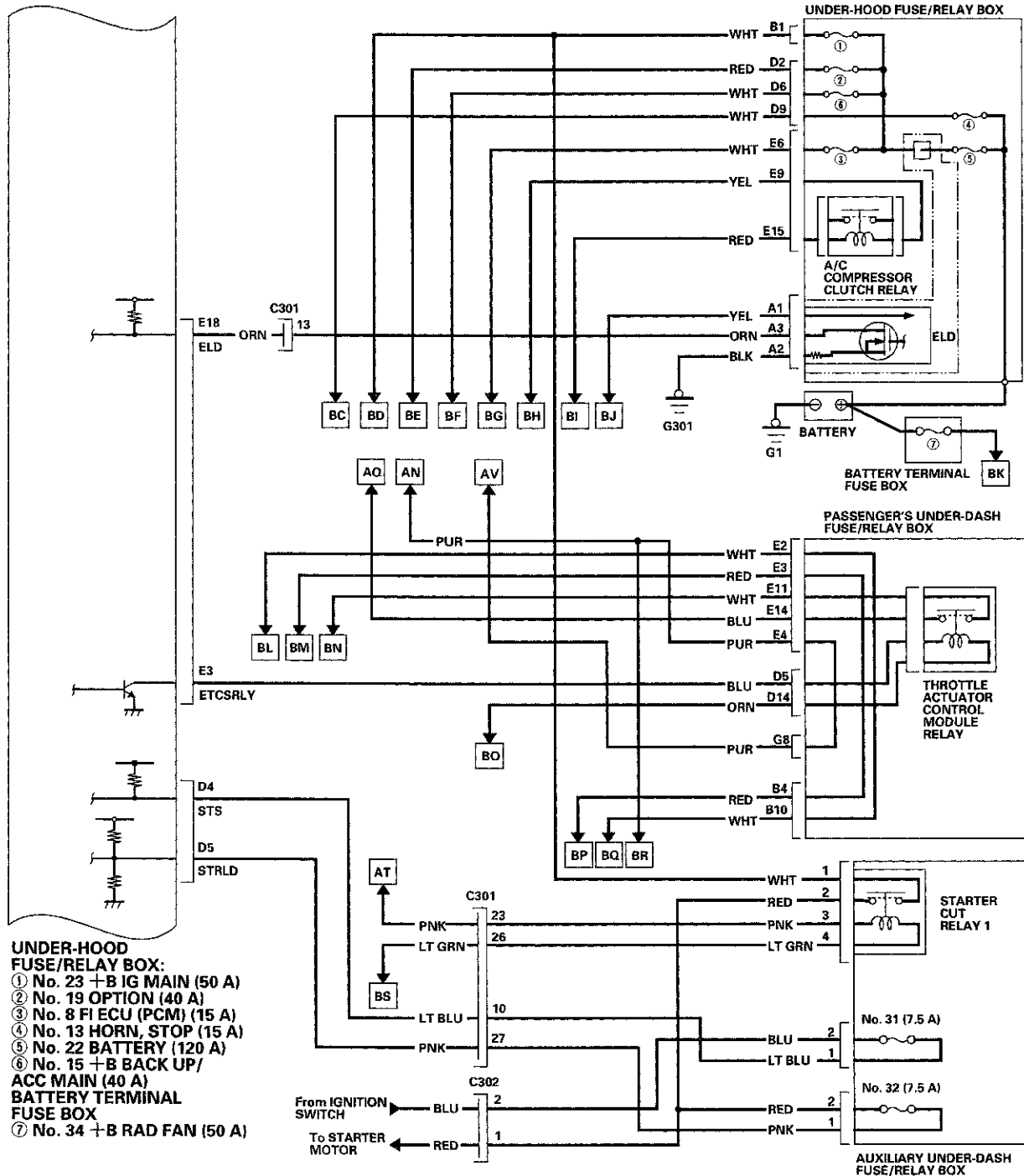


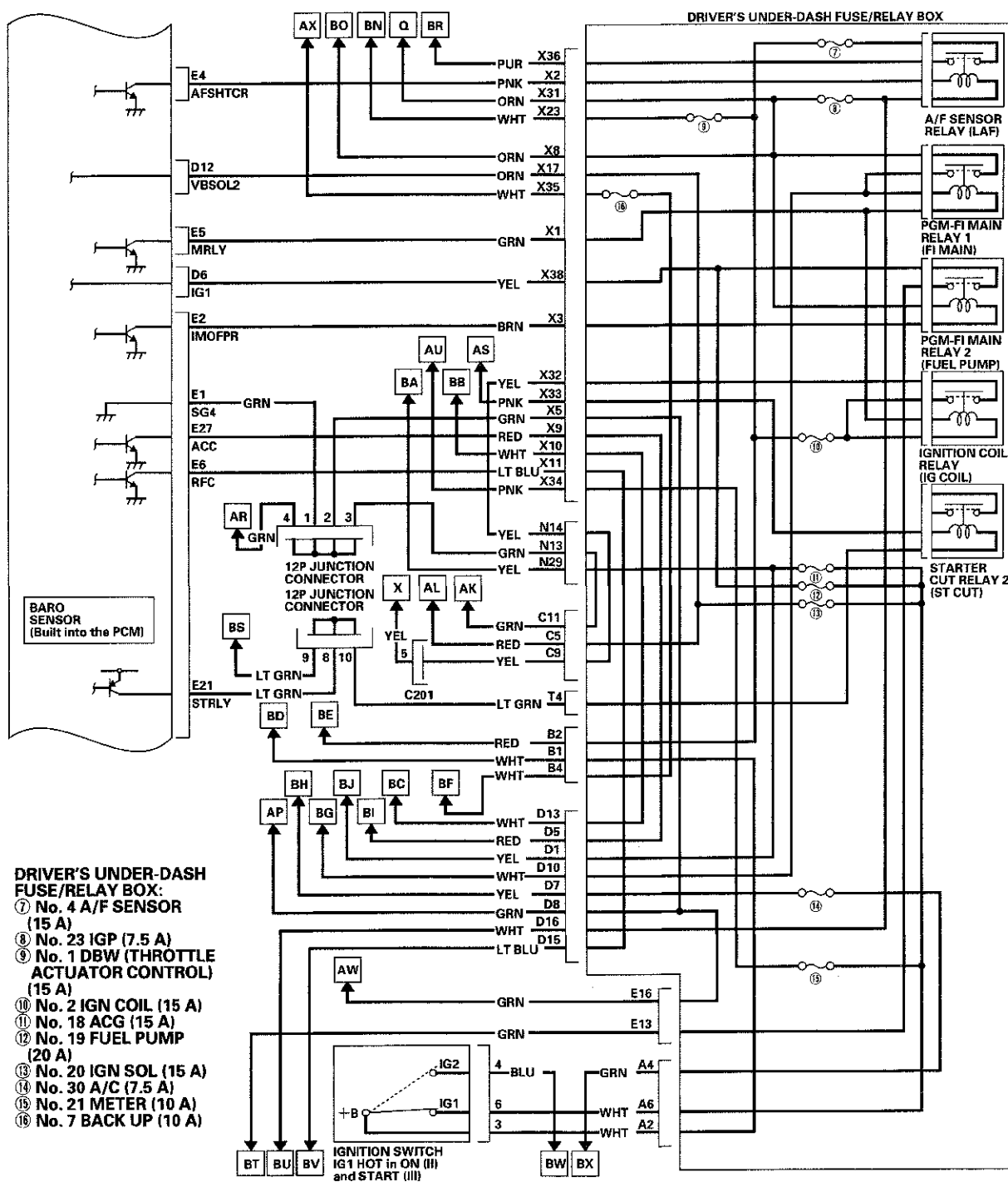
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Fuel and Emissions Systems

System Description (cont'd)

PCM Circuit Diagram (cont'd)



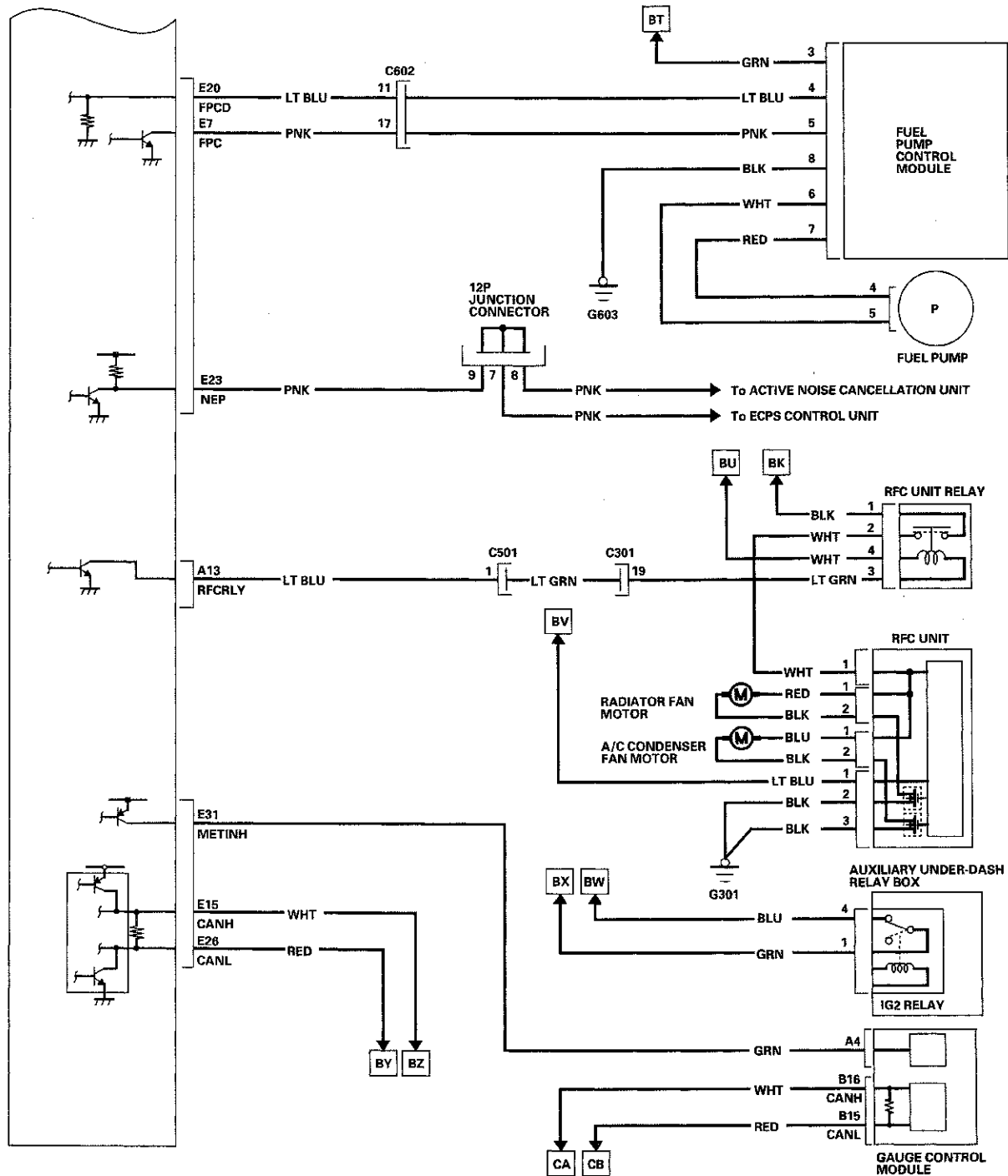


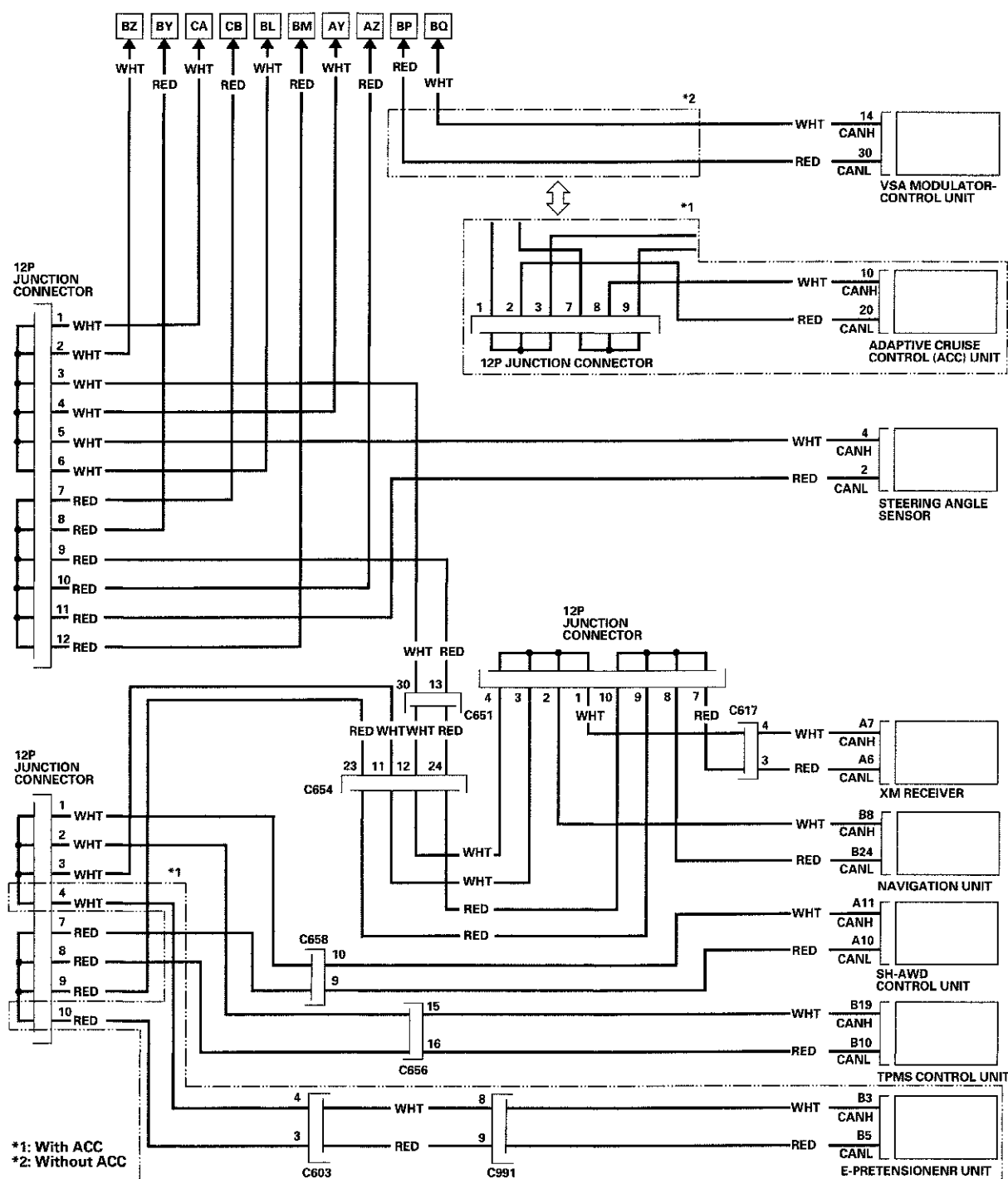
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Fuel and Emissions Systems

System Description (cont'd)

PCM Circuit Diagram (cont'd)





Fuel and Emissions Systems

System Description (cont'd)

PGM-FI System

The programmed fuel injection (PGM-FI) system is a sequential multiport fuel injection system.

Alternator Control

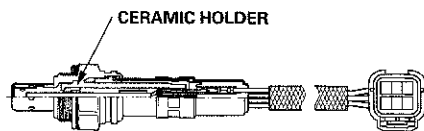
The alternator signals the PCM during charging.

Air Conditioning (A/C) Compressor Clutch Relay

When the PCM receives a demand for cooling from the A/C system, it delays the compressor from being energized, and enriches the mixture to assure a smooth transition to the A/C mode.

Air Fuel Ratio (A/F) Sensor

The A/F sensor operates over a wide air/fuel range. The A/F sensor is installed upstream of the WU-TWC, and it sends signals to the PCM which varies the duration of fuel injection accordingly.

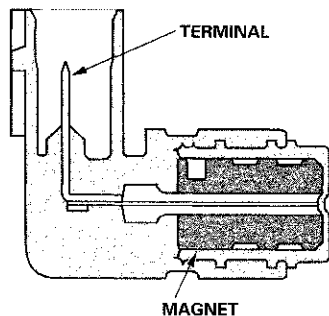


Barometric Pressure (BARO) Sensor

The BARO sensor is inside the PCM. It converts atmospheric pressure into a voltage signal that is used by the PCM to modify the basic duration of the fuel injection discharge.

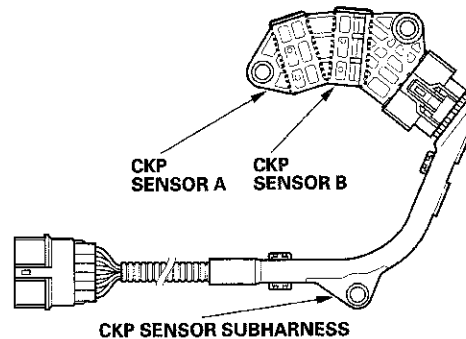
Camshaft Position (CMP) Sensor

The CMP sensor input is used by the PCM to determine ignition timing at start up (cranking) and when crank angle is abnormal.



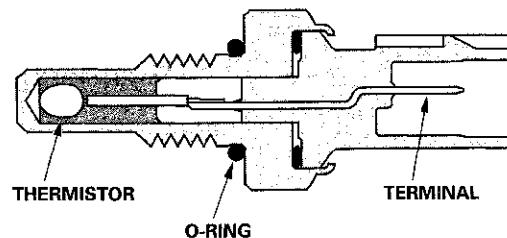
Crankshaft Position (CKP) Sensor

The CKP sensor detects crankshaft speed and is used by the PCM to determine ignition timing, timing for fuel injection of each cylinder, and engine misfire detection.



Engine Coolant Temperature (ECT) Sensors 1 and 2

ECT sensors 1 and 2 are temperature dependent resistors (thermistors). The resistance decreases as the engine coolant temperature increases.



Ignition Timing Control

The PCM contains the memory for basic ignition timing at various engine speeds and manifold absolute pressures. It also adjusts the timing according to engine coolant temperature.

Injector Timing and Duration

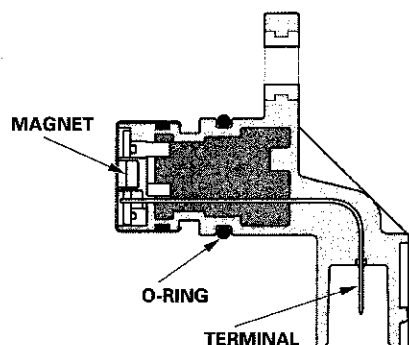
The PCM contains the memory for basic discharge duration at various engine speeds and manifold pressures. The basic discharge duration, after being read out from the memory, is further modified by signals sent from various sensors to obtain the final discharge duration.

By monitoring long term fuel trim, the PCM detects long term malfunctions in the fuel system and sets diagnostic trouble codes (DTCs) if needed.



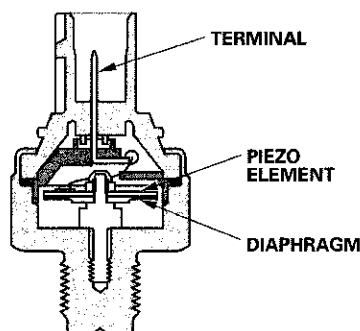
Input Shaft (Mainshaft) Speed Sensor

This sensor detects input shaft (mainshaft) speed.



Knock Sensor

The knock control system adjusts the ignition timing to minimize knock.



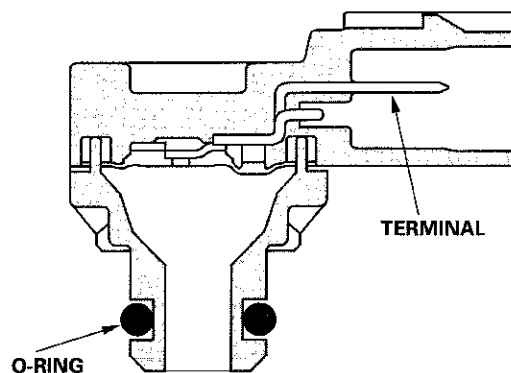
Malfunction Indicator Lamp (MIL) Indication (In relation to Readiness Codes)

The vehicle has certain readiness codes that are part of the on-board diagnostics for the emissions systems. If the vehicle's battery has been disconnected or gone dead, if DTCs have been cleared, or if the PCM has been reset, these codes are reset. In some states, part of the emissions testing is to make sure these codes are set to complete. If all of them are not set to complete, the vehicle may fail the test, or the test cannot be finished.

To check if the readiness codes are set to complete, turn the ignition switch to ON (II), but do not start the engine. The MIL will come on for 15–20 seconds. If it then goes off, the readiness codes are complete. If it flashes five times, one or more readiness codes are not set to complete. To set each code, drive the vehicle or run the engine as described in the procedures (see page 11-65).

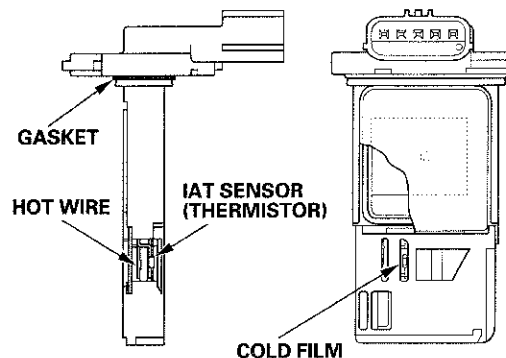
Manifold Absolute Pressure (MAP) Sensor

The MAP sensor converts manifold absolute pressure into electrical signals to the PCM.



Mass Air Flow (MAF) Sensor/Intake Air Temperature (IAT) Sensor

The mass air flow (MAF) sensor/intake air temperature (IAT) sensor contains a hot wire, a cold film, and a thermistor. It is located in the intake air passage. The resistance of the hot wire, the cold film, and the thermistor changes due to intake air temperature and air flow. The control circuit in the MAF sensor controls the current to keep the hot wire at a set temperature. The current is converted to voltage in the control circuit, then output to the PCM.



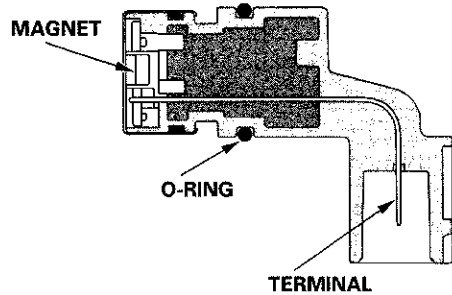
(cont'd)

Fuel and Emissions Systems

System Description (cont'd)

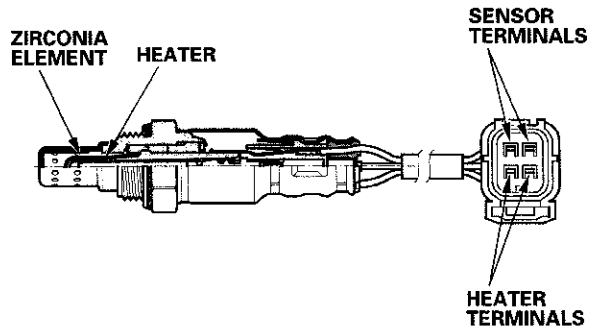
Output Shaft (Countershaft) Speed Sensor

This sensor detects countershaft speed.



Secondary Heated Oxygen Sensor (Secondary HO2S)

The secondary HO2S detects the oxygen content in the exhaust gas downstream of the warm up three way catalytic converter (WU-TWC), and sends signals to the PCM. To stabilize its output, the sensor has an internal heater. The PCM compares the HO2S output with the A/F sensor output to determine catalyst efficiency. The secondary HO2S is on the WU-TWC.

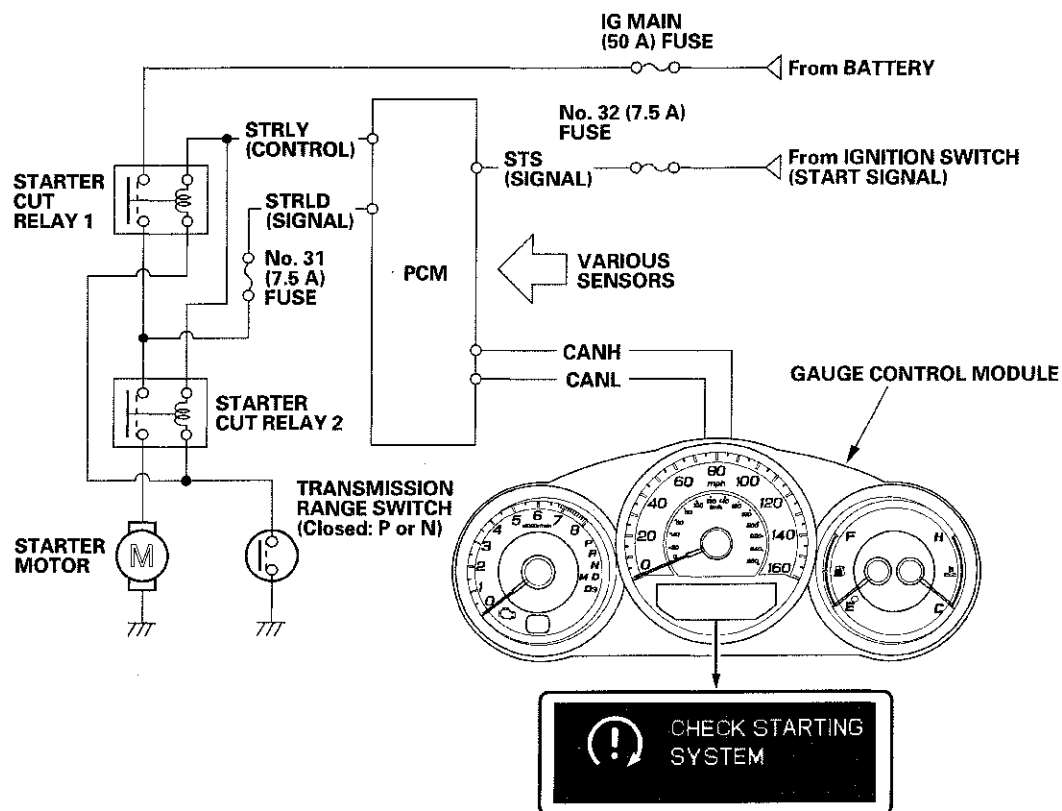




Starter Control System Diagram

The starter control system controls the starter motor.

- When the ignition switch is turned to START (III), the PCM applies current to starter cut relay 1 and starter cut relay 2, then battery voltage is applied to the starter solenoid, and the starter motor runs.
- Once the ignition switch is released, the PCM keeps the starter motor running until the engine starts. If the PCM detects that the engine starts, the PCM stops applying current to the relays, and the starter motor stops.
- If you turn the ignition switch to START (III), while the engine is running, the starter motor does not operate.
- In the following cases, the PCM stops the starter motor:
 - After the starter motor operates for 10 seconds (to prevent the starter motor from overheating).
 - If the engine rpm is too high during starter motor operation.
- If there is a problem with the starter control system, a message appears on the gauge display. When the message is on, the engine can only be started by turning and holding the ignition switch in the start position.



Fuel and Emissions Systems

System Description (cont'd)

Electronic Throttle Control System

The throttle is electronically controlled. Refer to the system diagram to see a functional layout of the system.

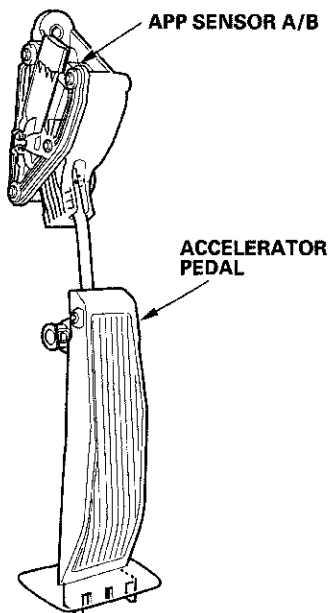
Idle control: When the engine is idling, the PCM controls the throttle actuator to maintain the proper idle speed according to engine loads.

Acceleration control: When the accelerator pedal is pressed, the PCM opens the throttle valve based on the accelerator pedal position (APP) sensor signal.

Cruise control: The PCM controls the throttle actuator to maintain the set speed when cruise control is operating. The throttle actuator takes the place of the cruise control actuator.

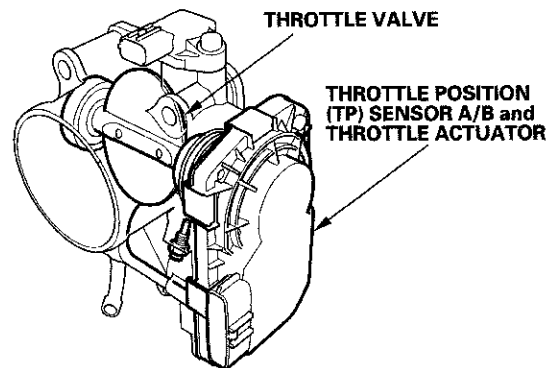
Accelerator Pedal Position (APP) Sensor

As the accelerator pedal position changes, the sensor varies the signal voltage to the PCM which then controls the throttle position.



Throttle Body

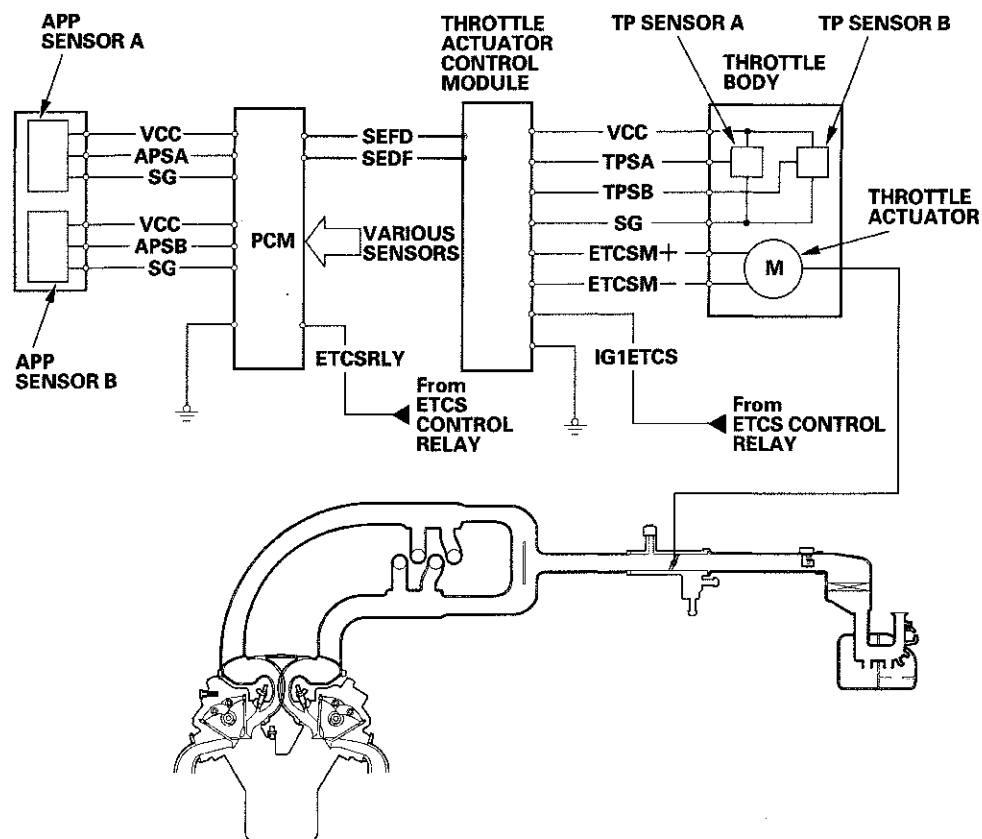
The throttle body is a single-barrel side draft type. The lower portion of the throttle valve is heated by engine coolant from the cylinder head to prevent icing of the throttle plate.





Electronic Throttle Control System Diagram

The electronic throttle control system consists of the throttle actuator, throttle position (TP) sensor A/B, accelerator pedal position (APP) sensor A/B, the electronic throttle control system (ETCS) control relay, and the PCM.

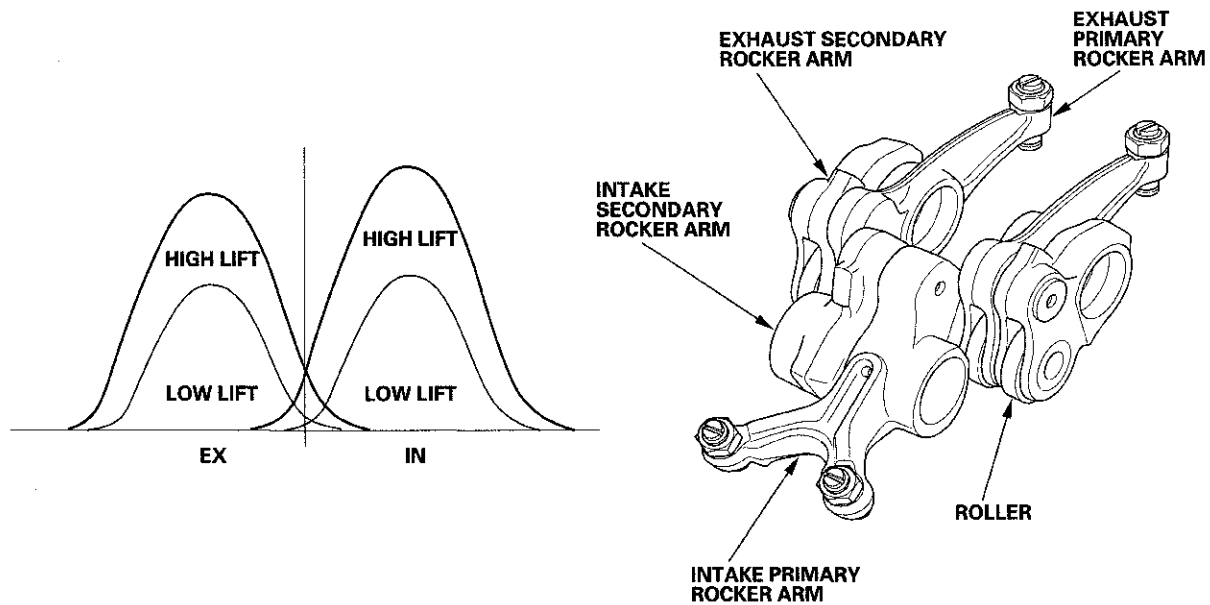


Fuel and Emissions Systems

System Description (cont'd)

VTEC

- The VTEC system changes the cam profile to correspond to engine speed. It maximizes torque at low engine speed and output at high engine speed. The low lift cam is used at low engine speeds, and the high lift cam is used at high engine speeds.
- Both the intake valve side and the exhaust valve side have primary and secondary rocker arms. These rocker arms are locked and separated to change the cam profile by switching the oil passages. Roller rockers are used to minimize mechanical friction.



- The VTEC system oil pressure switched by the rocker arm oil control valve changing the hydraulic circuit. The rocker arm oil control valve is controlled by the rocker arm oil control solenoid. The rocker arm oil pressure switch detects VTEC system oil pressure and sends this information to the PCM.

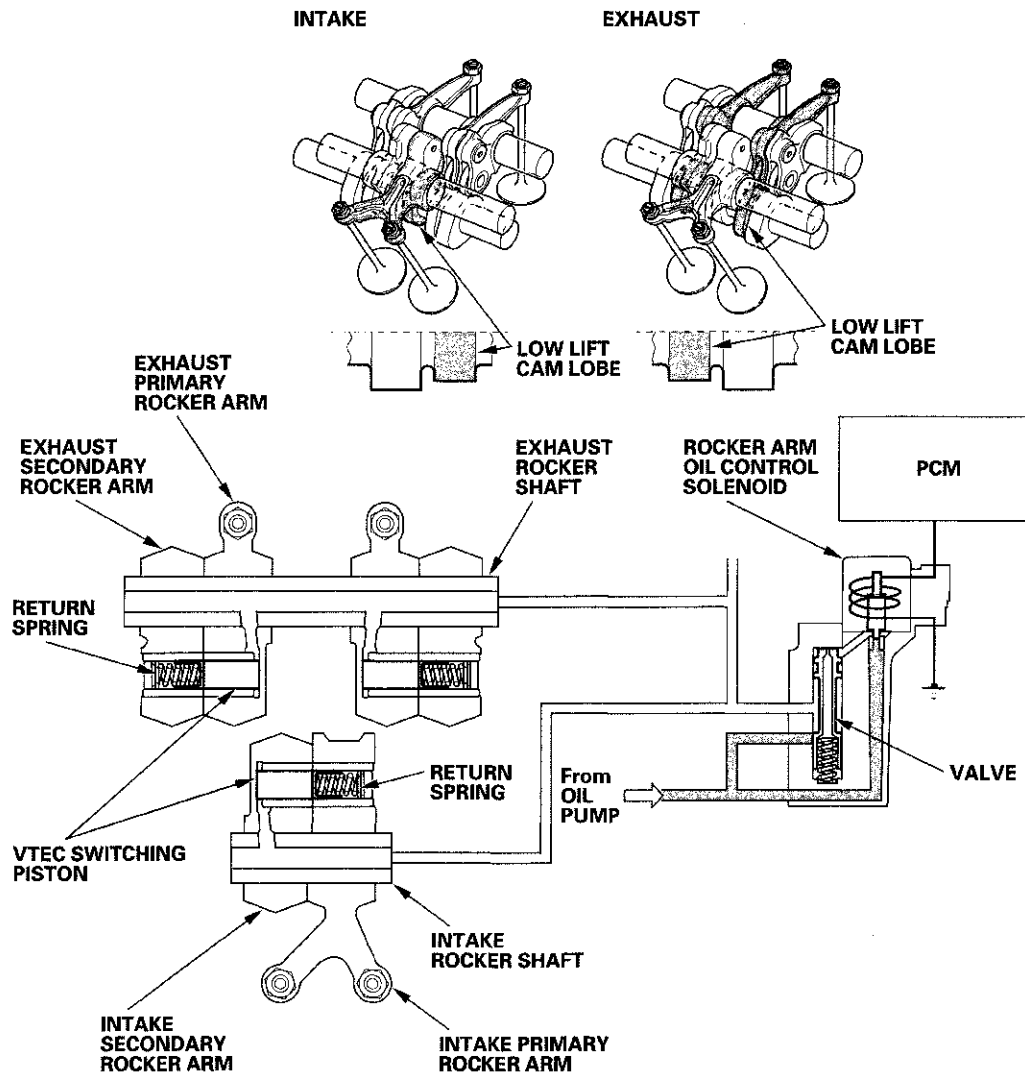
ENGINE SPEED	ROCKER ARM OIL CONTROL SOLENOID	INTAKE and EXHAUST VALVE LIFT
LOW	OFF	LOW
HIGH	ON	HIGH



VTEC System Operation

At low engine speed

The rocker arm oil control solenoid is turned off by the PCM. Oil pressure from the rocker arm oil control valve does not enter the rocker shaft. The primary and secondary rocker arms are separated by a return spring and lifted by the low lift cam lobe.



(cont'd)

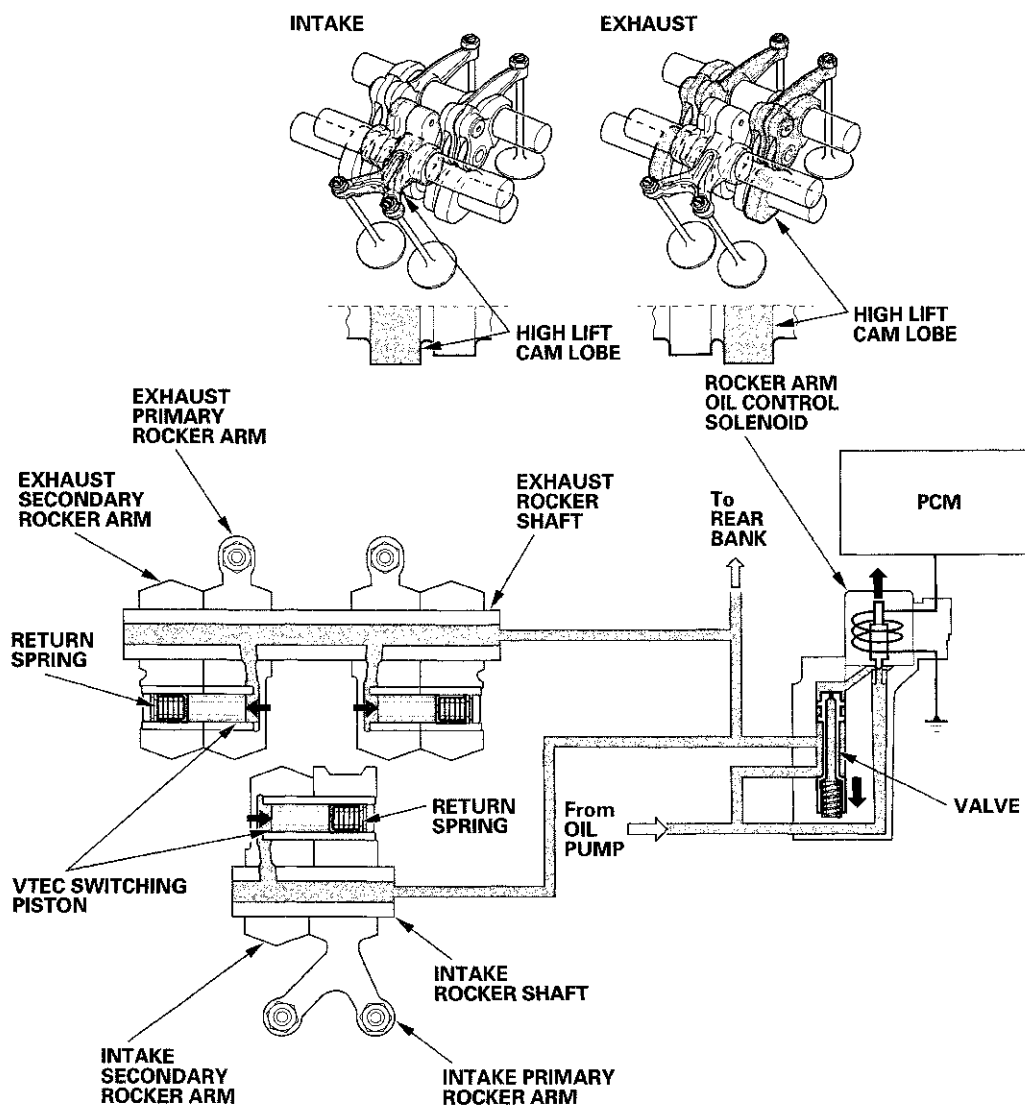
Fuel and Emissions Systems

System Description (cont'd)

VTEC System Operation

At high engine speed

The rocker arm oil control solenoid is turned on by the PCM. Oil pressure from the rocker arm control solenoid enters the intake secondary rocker arm and the exhaust primary rocker arm via the rocker shaft, and it moves the VTEC switching piston into the intake primary rocker arm and the exhaust secondary rocker arm. This causes the VTEC switching pistons to lock both rocker arms (primary and secondary) together. Both rocker arms are then lifted by the high lift cam lobe.





Idle Control System

When the engine is cold, if the A/C compressor is on, the transmission is in gear, the brake pedal is pressed, the power steering load is high, or the alternator is charging, the PCM controls current to the throttle actuator to maintain the correct idle speed.

Brake Pedal Position Switch

The brake pedal position switch signals the PCM when the brake pedal is pressed.

Power Steering Pressure (PSP) Switch

The PSP switch signals the PCM when the power steering load is high.

Fuel Supply System

Fuel Cutoff Control

During deceleration with the throttle valve closed, current to the injectors is cut off to improve fuel economy at engine speeds over 850 rpm. Fuel cutoff control also occurs when the engine speed exceeds 6,900 rpm, regardless of the position of the throttle valve, to protect the engine from over-revving. When the vehicle is stopped, the PCM cuts the fuel at engine speeds over 4,000 rpm. On a cold engine, fuel cut occurs at a lower engine speed.

Fuel Pump Control

When the ignition switch is turned to ON (II), the PCM grounds PGM-FI main relay 2 which feeds current to the fuel pump control module. The PCM sends a signal to the fuel pump control module to operate the fuel pump for 2 seconds to pressurize the fuel system. When the engine starts, the fuel pump speed is controlled in four levels by the fuel pump control module. The PCM selects the fuel pump speed based on calculating the injector activation time and the engine speed, and then sends an operation command signal to the fuel pump control module. This operation decreases fuel pump noise at low engine speed.

PGM-FI Main Relay 1 (FI MAIN) and 2 (FUEL PUMP)

PGM-FI main relay 1 (FI MAIN) is energized whenever the ignition switch is ON (II) to supply battery voltage to the PCM, power to the injectors, and power for PGM-FI main relay 2 (FUEL PUMP). PGM-FI main relay 2 (FUEL PUMP) is energized to supply power to the fuel pump for 2 seconds when the ignition switch is turned to ON (II), and when the engine is cranking or running.

Transfer Fuel Pump

The fuel in the right side of the fuel tank is drawn over to the left side by the transfer fuel pump.

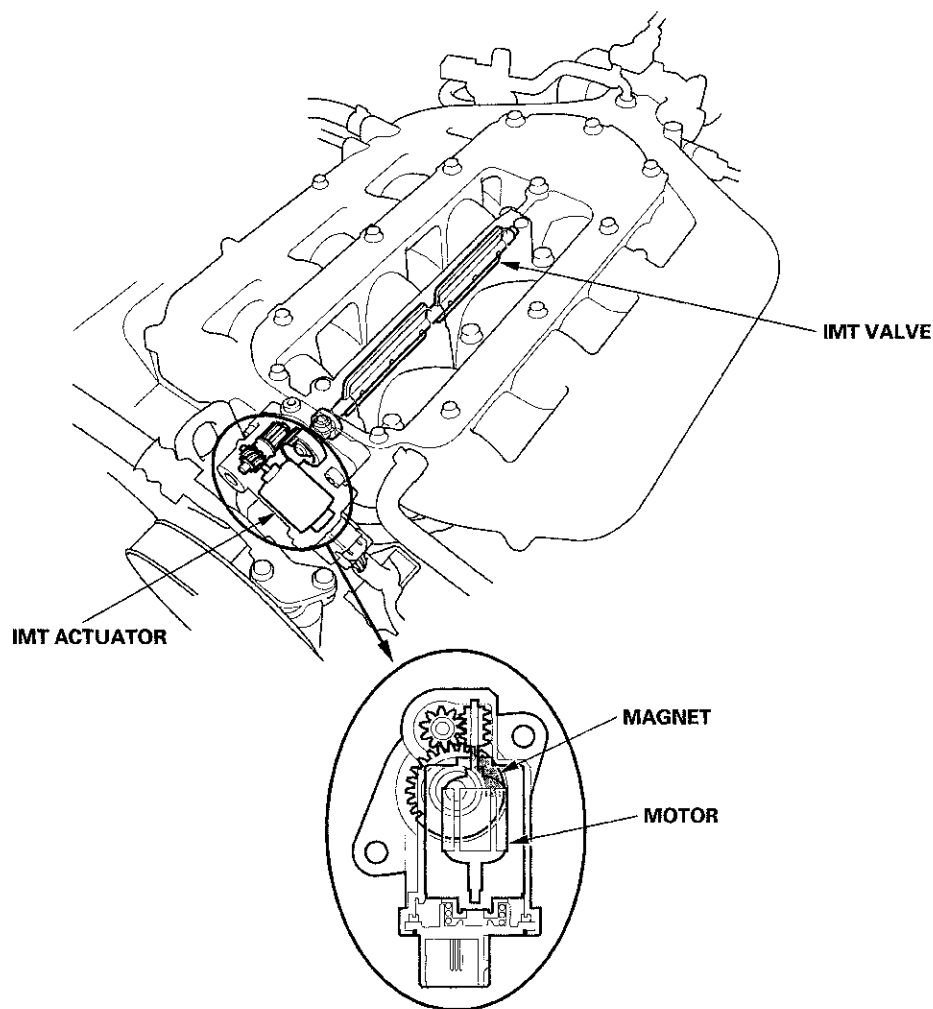
Fuel and Emissions Systems

System Description (cont'd)

Intake Air System

Intake Manifold Tuning (IMT) Valve

Engine power is adjusted by opening and closing the intake manifold tuning (IMT) valve. When the valve is closed, there is high torque at low engine speed. When the valve is open, there is high torque at high engine speed. The intake manifold tuning (IMT) actuator contains a sensor that detects the IMT valve position and sends it to the PCM.



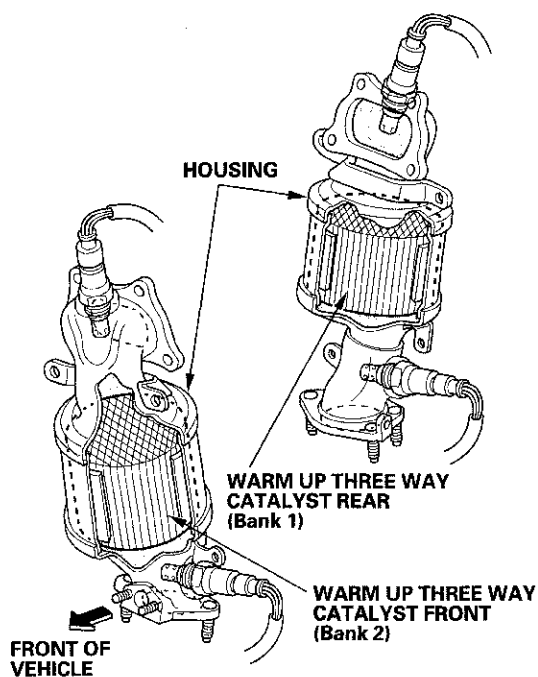


Catalytic Converter System

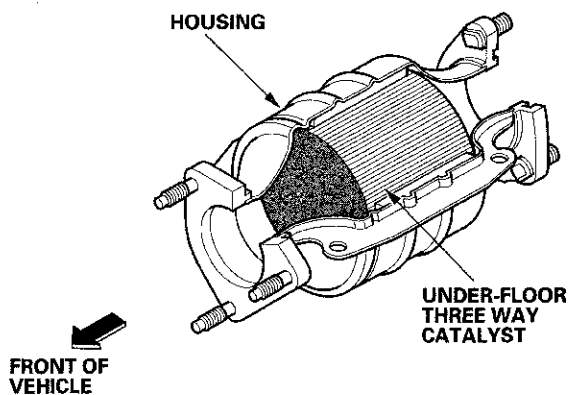
Warm Up Three Way Catalytic Converter (WU-TWC) and Under-floor Three Way Catalytic Converter (TWC)

The WU-TWC/Under-floor TWC converts hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to carbon dioxide (CO₂), nitrogen (N₂), and water vapor.

WU-TWC



UNDER-FLOOR TWC



Exhaust Gas Recirculation (EGR) System

Refer to the system diagram to see a functional layout of the system.

EGR Valve

The EGR valve lowers peak combustion temperatures and reduces oxides of nitrogen emissions (NOx) by recirculating exhaust gas through the intake manifold and into the combustion chambers.

(cont'd)

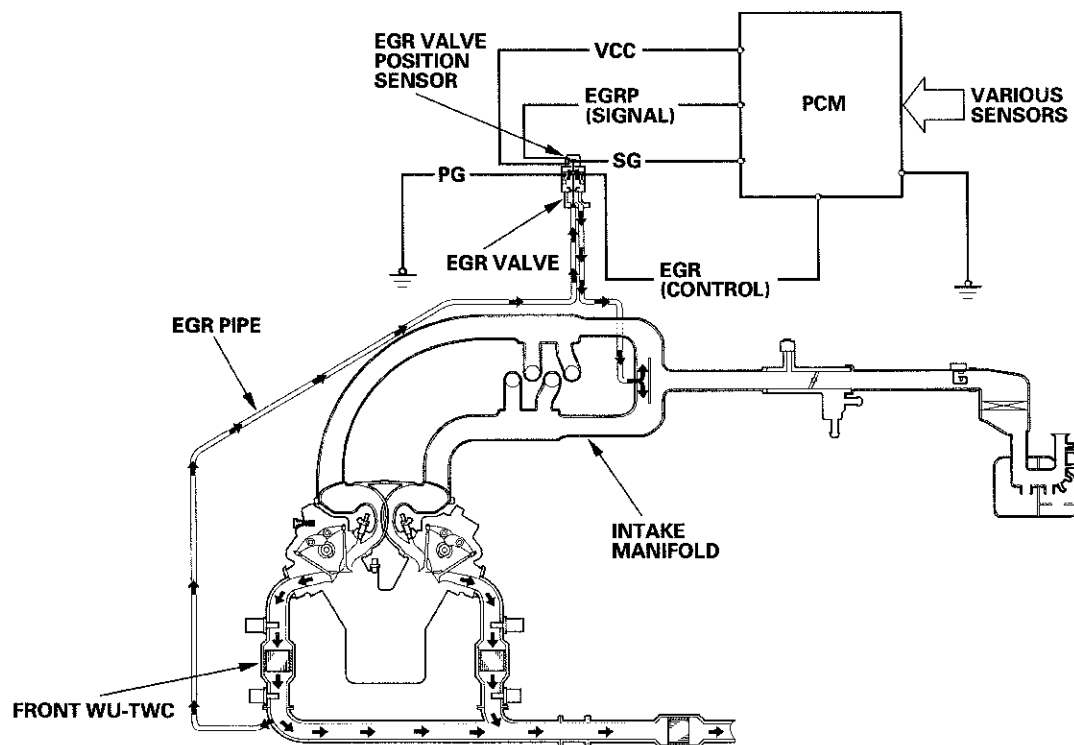
Fuel and Emissions Systems

System Description (cont'd)

Exhaust Gas Recirculation (EGR) System Diagram

The EGR system reduces oxides of nitrogen (NO_x) emissions by recirculating exhaust gas through the EGR pipe to the intake manifold, and into the combustion chambers. Routing the exhaust gas through the EGR pipe helps to prevent carbon deposits from forming in the intake manifold and the throttle body. The PCM memory includes the ideal EGR valve position for varying operating conditions.

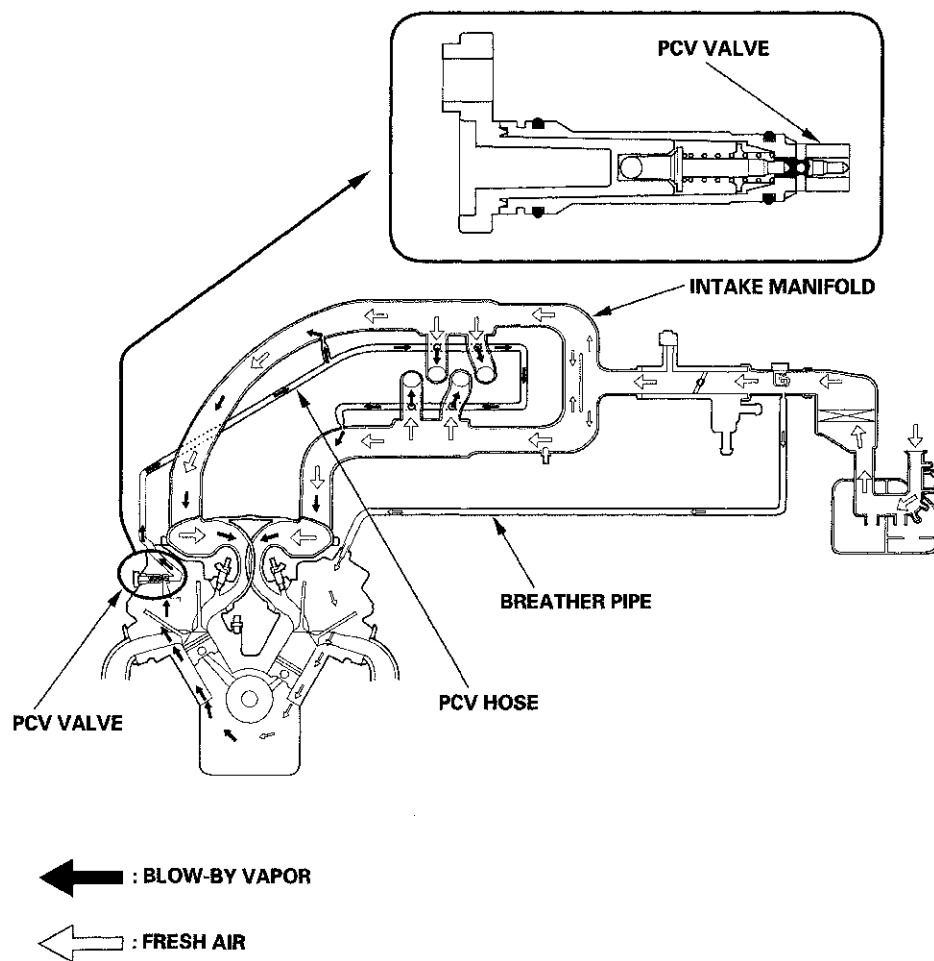
The EGR valve position sensor detects the amount of EGR valve lift and sends it to the PCM. The PCM then compares it with the ideal lift in its memory (based on signals sent from other sensors). If there is any difference between the two, the PCM cuts current to the EGR valve.





Positive Crankcase Ventilation (PCV) System

The PCV valve prevents blow-by gasses from escaping into the atmosphere by venting them into the intake manifold.



Fuel and Emissions Systems

System Description (cont'd)

Evaporative Emission (EVAP) Control System

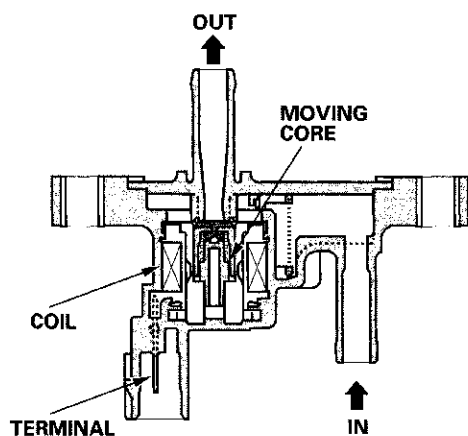
Refer to the system diagram to see a functional layout of the system.

EVAP Canister

The EVAP canister temporarily stores fuel vapor from the fuel tank until it can be purged from the EVAP canister into the engine and burned.

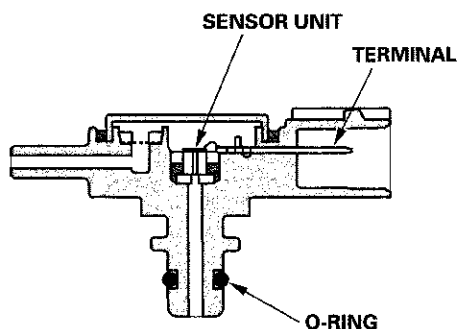
EVAP Canister Purge Valve

When the engine coolant temperature is below 140 °F (60 °C), the PCM turns off the EVAP canister purge valve which cuts vacuum to the EVAP canister.



Fuel Tank Pressure (FTP) Sensor

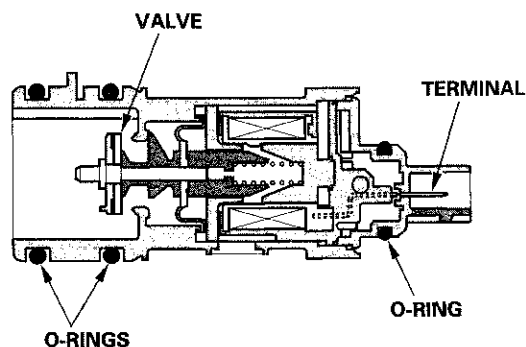
The FTP sensor converts fuel tank absolute pressure into an electrical input to the PCM.



EVAP Canister Vent Shut Valve

The EVAP canister vent shut valve is on the EVAP canister.

The EVAP canister vent shut valve controls the venting of the EVAP canister.

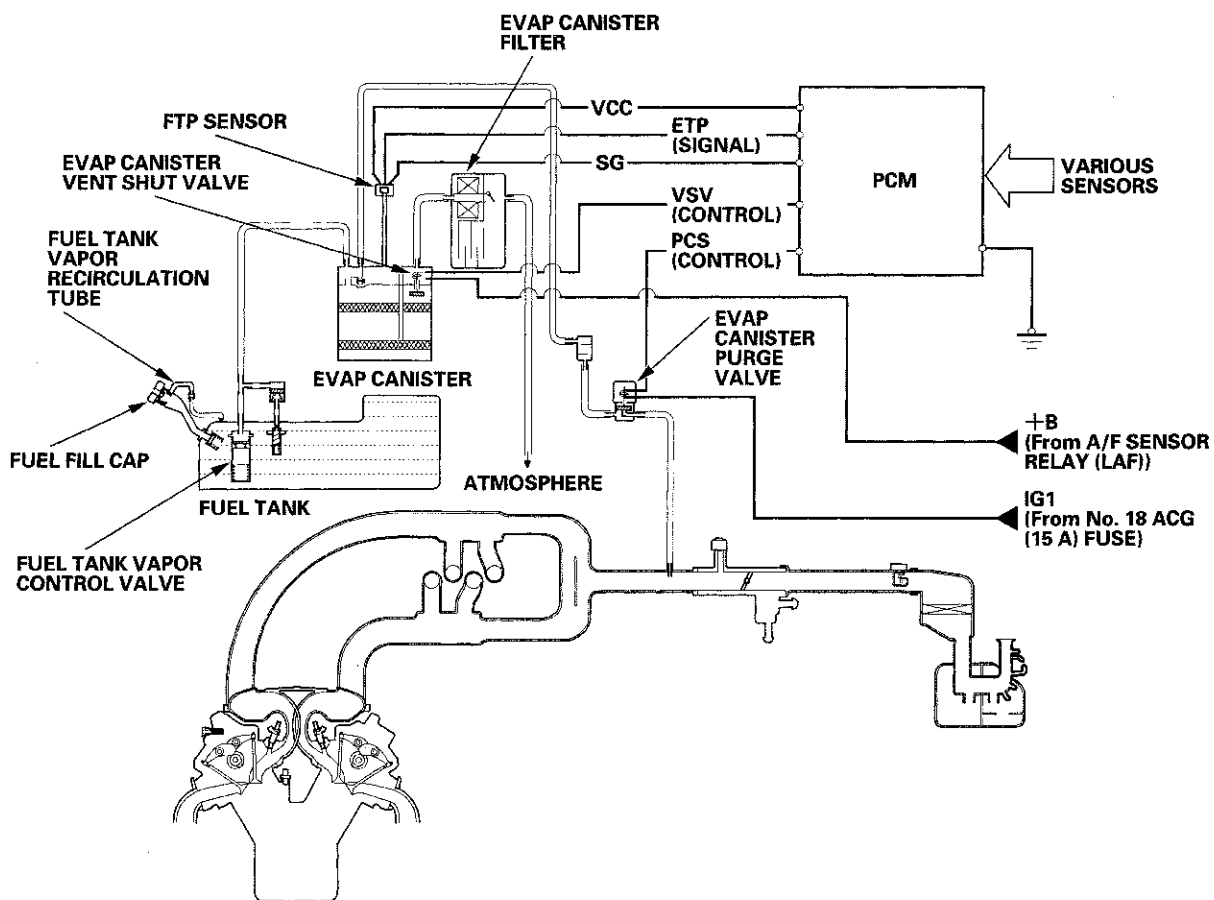




Evaporative Emission (EVAP) Control Diagram

The EVAP controls minimize the amount of fuel vapor escaping to the atmosphere. Vapor from the fuel tank is temporarily stored in the EVAP canister until it can be purged from the canister into the engine and burned.

- The EVAP canister is purged by drawing fresh air through it and into a port on the intake manifold. The purging vacuum is controlled by the EVAP canister purge valve, which operates whenever the engine coolant temperature is above 140 °F (60 °C).
- During refueling, the fuel tank vapor control valve opens from pressure in the fuel tank and feeds the fuel vapor to the EVAP canister.



(cont'd)

Fuel and Emissions Systems

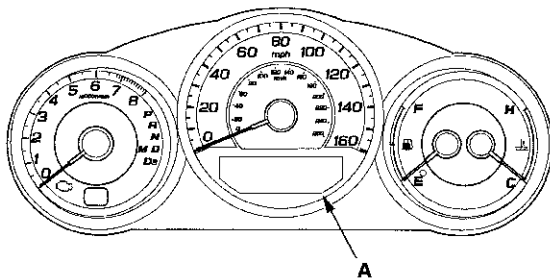
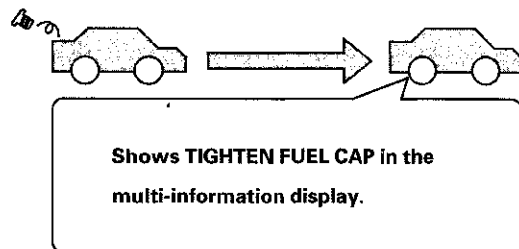
System Description (cont'd)

Fuel Cap Warning Message

The PCM detects a loose or missing fuel fill cap as an evaporative system leak and alerts the driver by showing a warning message in the multi-information display.

First drive cycle

The first time a leak is detected a TIGHTEN FUEL CAP message appears in the multi-information display (A). To scroll to another message, press the select/reset button. The TIGHTEN FUEL CAP message appears each time you restart the engine until the system turns the message off. Turn the engine off, then replace or tighten the fuel fill cap until it clicks at least once.



To make the message go off (with the HDS)

Procedure

1. Tighten the fuel fill cap until it clicks.
2. Clear the Pending DTC with the HDS.
3. Verify there is no leak by doing the EVAP FUNCTION TEST in the INSPECTION MENU with the HDS.

To make the message go off (without the HDS)

Procedure

1. Tighten the fuel fill cap until it clicks.
2. Start the engine, then turn the ignition switch to LOCK (0).
3. Repeat step 2 two more times.



How to Set Readiness Codes

Malfunction Indicator Lamp (MIL) Indication (In relation to Readiness Codes)

The vehicle has certain readiness codes that are part of the on-board diagnostics for the emissions systems. If the vehicle's battery has been disconnected or gone dead, if DTCs have been cleared, or if the PCM has been reset, these readiness codes are reset to incomplete. In some states, part of the emissions testing is to make sure these codes are set to complete. If all of them are not set to complete, the vehicle may fail the emission test, or the test cannot be finished.

To check if the readiness codes are set to complete, turn the ignition switch to ON (II), but do not start the engine. The MIL comes on for 15—20 seconds. If it then goes off, the readiness codes are set to complete. If it flashes five times, one or more readiness codes are not set to complete. To set readiness codes from incomplete to complete, do the procedure for the appropriate code.

To check the status of a specific DTC system, check the OBD status in the DTC MENU with the HDS (see page 11-8). This screen displays the DTC, the current data list of the enable criteria, and the status of the readiness testing.

Catalytic Converter Monitor and Readiness Code

NOTE:

- Do not turn the ignition switch to ACC (I) or to LOCK (0) during the procedure.
- All readiness codes are cleared when the battery is disconnected, if DTCs have been cleared, or if the PCM is reset with the HDS.
- Low ambient temperatures or excessive stop-and-go traffic may increase the drive time needed to switch the readiness code from incomplete to complete.
- The readiness code will not switch to complete until all the enable criteria are met.
- If a fault in the secondary HO2S system caused the MIL to come on, the readiness code cannot be set to complete until you correct the fault.

Enable Criteria

- ECT SENSOR 1 at 158 °F (70 °C) or more.
- IAT SENSOR at 14.7 °F (–9.6 °C) or more.
- Vehicle speed above 3 mph (5 km/h).

Procedure

1. Connect the HDS to the vehicle's data link connector (DLC), and bring up the READINESS CODEs screen for Catalyst in the DTCs MENU.
2. Start the engine.
3. Test-drive the vehicle under stop-and-go conditions with short periods of steady cruise. After about 5 miles (8 km), the readiness code should switch to completed.
4. If the readiness code is still not set to complete, check for a Pending DTC with the HDS. If there is no DTC, one or more of the enable criteria were probably not met; repeat the procedure.

(cont'd)

Fuel and Emissions Systems

How to Set Readiness Codes (cont'd)

Evaporative Emissions (EVAP) Control System Monitor and Readiness Code

NOTE: All readiness codes are cleared when the battery is disconnected, if DTCs have been cleared, or if the PCM is reset with the HDS.

Enable Criteria

- Battery voltage is higher than 10.5 V.
- Engine at idle.
- ECT SENSOR 1 and 2 between 176 °F (80 °C) and 212 °F (100 °C).
- MAP SENSOR less than 46.6 kPa (14 in.Hg, 350 mmHg).
- Vehicle speed 0 mph (0 km/h).
- IAT SENSOR between 32 °F (0 °C) and 212 °F (100 °C).

Procedure

1. Connect the HDS to the DLC.
2. Start the engine.
3. Select the EVAP TEST in the INSPECTION MENU with the HDS, then select the FUNCTION TEST in the EVAP TEST MENU.
 - If the result is normal, readiness is complete.
 - If the result is not normal, go to the next step.
4. Check for a Pending DTC. If there is no DTC, one or more of the enable criteria were probably not met; repeat the procedure.

Air Fuel Ratio (A/F) Sensor Monitor and Readiness Code

NOTE:

- Do not turn the ignition switch to ACC (I) or to LOCK (0) during the procedure.
- All readiness codes are cleared when the battery is disconnected, if DTCs have been cleared, or if the PCM is reset with the HDS.

Enable Criteria

ECT SENSOR 1 at 158 °F (70 °C) or more.

Procedure

1. Start the engine.
2. Test-drive the vehicle under stop-and-go conditions with short periods of steady cruise. During the drive, decelerate (with the throttle fully closed) for 5 seconds. After about 3.5 miles (5.6 km), the readiness code should switch from incomplete to complete.
3. Check the readiness codes screen for the AIR FUEL RATIO (A/F) SENSOR in the DTCs MENU with the HDS.
 - If the screen shows complete, readiness is complete.
 - If the screen shows not complete, go to the next step.
4. Check for a Pending DTC. If there is no DTC, the enable criteria was probably not met. Select the DATA LIST Menu. Check the ECT SENSOR in the ALL DATA LIST with the HDS. If the ECT is lower than 158 °F (70 °C), run the engine until it is more than 158 °F (70 °C), then repeat the procedure.



Air Fuel Ratio (A/F) Sensor Heater Monitor Readiness Code

NOTE: All readiness codes are cleared when the battery is disconnected, if DTCs have been cleared, or if the PCM is reset with the HDS.

Procedure

1. Start the engine, and let it idle for 1 minute. The readiness code should switch from incomplete to complete.
2. If the readiness code is still not set to complete, check for a Pending DTC. If there is no DTC, repeat the procedure.

Misfire Monitor and Readiness Code

- This readiness code is always set to available because misfiring is continuously monitored.
- Monitoring pauses, and the misfire counter resets, if the vehicle is driven over a rough road.
- Monitoring also pauses, and the misfire counter holds at its current value, if the throttle position changes more than a predetermined value, or if driving conditions fall outside the range of any related enable criteria.

Fuel System Monitor and Readiness Code

- This readiness code is always set to available because the fuel system is continuously monitored during closed loop operation.
- Monitoring pauses when the catalytic converter, the EVAP control system, and the A/F sensor monitors are active.
- Monitoring also pauses when any related enable criteria are not being met. Monitoring resumes when the enable criteria is again being met.

Comprehensive Component Monitor and Readiness Code

This readiness code is always set to available because the comprehensive component monitor is continuously running whenever the engine is cranking or running.

EGR Monitor and Readiness Code

NOTE:

- Do not turn the ignition switch to ACC (I) or to LOCK (0) during the procedure.
- All readiness codes are cleared when the battery is disconnected, if DTCs have been cleared, or if the PCM is reset with the HDS.

Enable Criteria

ECT SENSOR 1 at 176 °F (80 °C) or more.

Procedure

1. Connect the HDS to the DLC.
2. Start the engine.
3. Drive at a steady speed with the transmission in D, at 50—62 mph (80—100 km/h) or above for more than 10 seconds.
4. With the transmission in D, decelerate from 62 mph (100 km/h) or above by completely releasing the throttle for at least 5 seconds. If the engine is stopped during this procedure, go to step 3 and do the procedure again.
5. Check the OBD status screen for DTC P0401 in the DTC's MENU with the HDS.
 - If it is passed, readiness is complete.
 - If it is not passed, go to step 3 and retest.