Section C
Component Systems

Notice: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque values must be used when installing fasteners that require them. If the above procedures are not followed parts or system damage could result.

Section "C" provides information on the following:

- General description of components and subsystems.
- On-vehicle service.
- Diagnostic Tables. These include a functional check of the system as well as diagnosis of any malfunction found in the functional check.

For component locations, wiring diagrams, and ECM connector terminal end views, refer to *Section 6E3-A.*

Refer to the following sections for the appropriate subsystem information:

Diagnostic Tables

Section C1

Engine Control Module (ECM) And Sensors

Contents

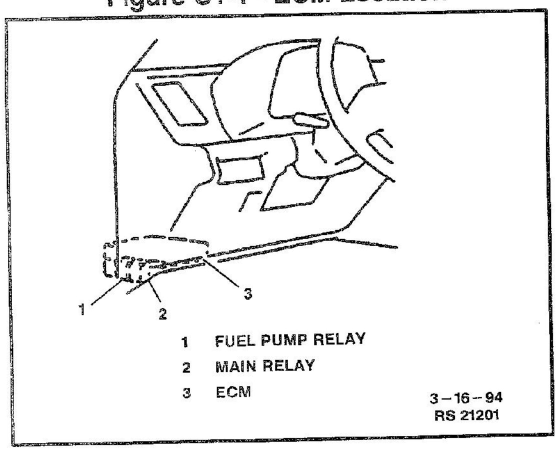
General Description

Engine Control Module (ECM)

Figure C1-1

The Engine Control Module (ECM) is a precision unit consisting of a one chip microcomputer, A/D (Analog/Digital) converter, and an I/O (Input/Output) unit. It is an essential part of the electronic control system, for its functions include not only such major functions as to control the fuel injector, Idle Air Control (IAC) valve, fuel pump relay, etc., but also a self-diagnosis function and a fail-safe function as described in the following section. The ECM is installed below the instrument panel left of the steering column (*Figure C1-1*).

Figure C1-1 - ECM Location



Self-Diagnosis Function

The Engine Control Module (ECM) diagnoses troubles which may occur in the system when the ignition switch is in the "ON" position with the engine running. The ECM indicates a malfunction by lighting the Malfunction Indicator Lamp (MIL) when a fault occurs in any of the following systems.

- Heated Oxygen Sensor 1 (HO2S 1).
- Heated Oxygen Sensor 2 (HO2S 2).
- Engine Coolant Temperature (ECT) sensor.
- Throttle Position (TP) sensor (including idle switch).
- Vehicle Speed Sensor (VSS).
- Intake Air Temperature (IAT) sensor.
- Mass Air Flow (MAF) sensor.
- Ignition fail-safe signal.
- Camshaft Position (CMP) sensor.
- Exhaust Gas Recirculation (EGR) system including EGR temperature sensor.
- Central Processing Unit (CPU) of ECM.
- The ECM and the MIL operate as follows:

The MIL lights when the ignition switch is turned to the "ON" position (engine not running), regardless of the condition of Sequential Multiport Fuel Injection (SFI) system. This is only to check the MIL circuit.

Once the engine is started and no faults are detected by the ECM, the MIL goes out. When the ECM detects a malfunction in one of the above areas, it lights the MIL to warn the driver of the occurrence of a fault. At the same time it stores a DTC in the ECM memory. If the cause of the malfunction is no longer detected by the ECM, the MIL will go out, but the corresponding DTC will be stored in the ECM memory.

The DTCs that are stored in the ECM's memory can be accessed through the use of a scan tool.

Any DTCs that occur with the engine running are stored in the ECM memory even if the fault was only temporary and disappeared immediately. The ECM memory is not erased unless the power to ECM is shut "OFF" for 20 seconds or longer.

Fail-Safe Function

When a malfunction occurs within the Sequential Multiport Fuel Injection (SFI) system, the Engine Control Module (ECM) maintains control over the fuel injector, Idle Air Control (IAC) valve etc., on the basis of the calculated signals and/or backup program prestored within the ECM.

This function is called the "Fail-Safe Function." Thus, with this function, a certain level of engine performance is available even when a failure occurs, thus avoiding complete disability in engine performance.

The systems covered are as follows:

- Engine Coolant Temperature (ECT) sensor.
- Throttle Position (TP) sensor.
- Mass Air Flow (MAF) sensor.
- Central Processing Unit (CPU) in ECM.
- Fuel Level sensor.
- Vehicle Speed sensor.
- Closed throttle Position Switch.
- Barometric Pressure sensor.

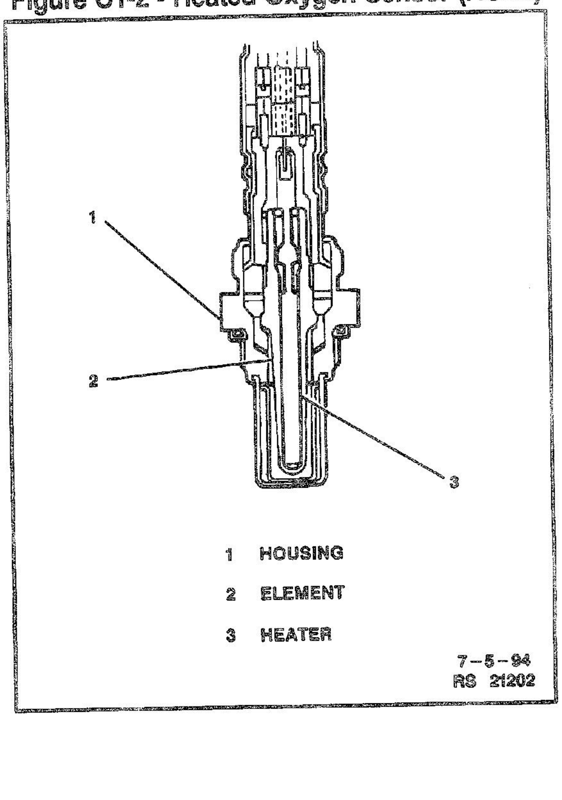
Information Sensors

Heated Oxygen Sensor 1 (HO2S 1)

Figures C1-2 and C1-3

The fuel control Heated Oxygen Sensor 1 (HO2S 1) is mounted in the exhaust pipe below the exhaust manifold, where it can monitor the oxygen content of the exhaust gas stream. The oxygen present in the exhaust gas reacts with the sensor to produce a voltage output. This voltage should constantly fluctuate from approximately 100mV (high oxygen content - lean mixture) to 900mV (low oxygen content - rich mixture). The oxygen sensor voltage can be monitored with a scan tool. By monitoring the voltage output of the oxygen sensor, the ECM calculates what fuel mixture command to give to the injectors (lean mixture-low HO2S voltage=rich command, rich mixture-high HO2S voltage=lean command).

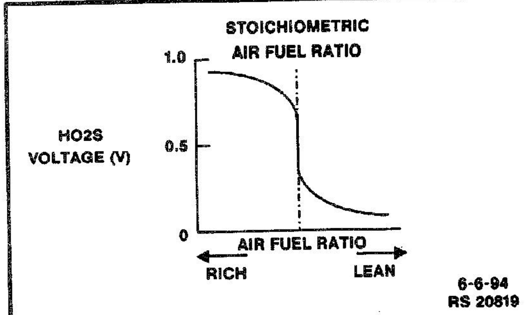
Figure C1-2 - Heated Oxygen Sensor (HO2S)



Heated Oxygen Sensor 2 (HO2S 2)

To control emissions of Hydrocarbons (HC), Carbon Monoxide (CO), and Oxides of Nitrogen (NOx), a warm-up three-way catalytic converter is used. The catalyst within the converter promotes a chemical reaction which oxidizes the HC and CO present in the exhaust gas, converting them into harmless water vapor and carbon dioxide. The catalyst also reduces NOx, converting it to nitrogen. The ECM uses the HO2S 2 to monitor the oxygen storage capability of the catalytic converter. Similar to the HO2S 1, the HO2S 2 reacts with the oxygen content in the exhaust stream to produce a voltage signal only after the catalytic converter. This voltage ranges from approximately .1 volt (high oxygen - lean mixture) to .9 volt (low oxygen - rich mixture). Unlike the HO2S 1, the HO2S 2 is normal when it's activity appears lazy or inactive. The ECM compares readings from both the front HO2S 1 and the HO2S 2 to determine the catalyst efficiency.

Figure C1-3 - Heated Oxygen Sensor 1 (HO2S 1) Output Characteristics

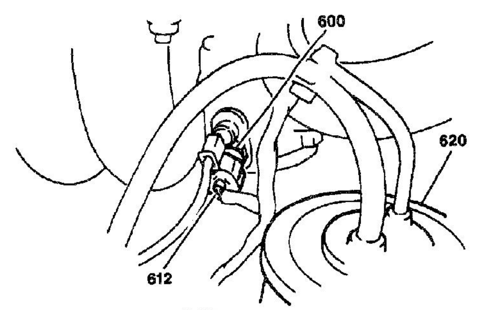


Engine Coolant Temperature (ECT) Sensor

Figure C1-4

The Engine Coolant Temperature (ECT) sensor is a thermistor (a variable resistor that changes along with temperature changes) in series with a fixed resistor in the Engine Control Module (ECM) that measures the temperature of the engine coolant. The ECM applies 5 volts to the ECT sensor. The ECM monitors the voltage across the ECT sensor and converts it into a temperature reading. When the engine is cold the ECT sensor resistance is high, and when the engine temperature is warm the ECT sensor resistance is low. Therefore, when the engine is cold the ECM will receive a high voltage input, and when the engine is warm the ECM will receive a low voltage input. The ECT sensor is located on the RH side of the intake manifold (*Figure C1-4*).

Figure C1-4 - Engine Coolant Temperature (ECT) Sensor



600 ECT SENSOR
612 ECT SENSOR ELECTRICAL CONNECTOR
620 EVAPORATIVE EMISSION CANISTER
3-28-94
RS 21204

Throttle Position (TP) Sensor

Figure C1-5

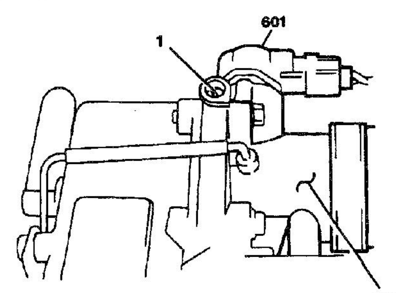
The Throttle Position (TP) sensor, consisting of a contact point (idle switch) and a potentiometer, is connected to the throttle valve shaft on the throttle body, and detects the throttle valve opening.

The throttle opening in the idle state is detected by means of the contact point which turns "ON" in that state. But beyond that, the full opening is detected by the potentiometer as follows.

A 5 volt reference voltage is applied to the sensor from the Engine Control Module (ECM), and as its brush moves over the resistance according to the throttle valve opening, the output voltage varies accordingly.

By monitoring the "ON/OFF" signal and sensor output voltage, the ECM detects the throttle valve opening.

Figure C1-5 - Throttle Position (TP) Sensor



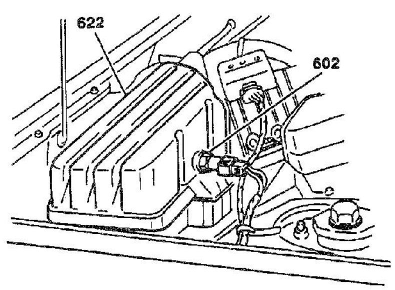
601 THROTTLE POSITION (TP) SENSOR
604 THROTTLE BODY
1 IDLE SPEED/IDLE AIR CONTROL (IAC) DUTY ADJUSTING SCREW
7-5-94
RS 21238

Intake Air Temperature (IAT) Sensor

Figure C1-6

The Intake Air Temperature (IAT) sensor is a thermistor (a variable resistor that changes along with temperature changes) in series with a fixed resistor within the Engine Control Module (ECM), that measures the temperature of the air entering the intake manifold. The ECM applies 5 volts to the sensor. The ECM monitors the voltage across the IAT sensor and converts it into a temperature reading. When the outside air temperature is cold, the IAT sensor resistance is high, and when the outside air temperature is warm, the IAT sensor resistance is low. Therefore, when the air temperature is cold the ECM will receive a high voltage input, and when the air temperature is warm the ECM will receive a low voltage input. The IAT sensor is located on the Air Cleaner (ACL) (*Figure C1-6*).

Figure C1-6 - Intake Air Temperature (IAT) Sensor



602 INTAKE AIR TEMPERATURE (IAT) SENSOR
622 AIR CLEANER (ACL)

3-19-94
RS 21206

Vehicle Speed Sensor (VSS)

The Vehicle Speed Sensor (VSS) consists of a reed switch and a magnet are built into the speedometer head. As the magnet turns with the speedometer cable, its magnetic force causes the reed switch to turn "ON" and "OFF". The "ON," "OFF" frequency increases or decreases in proportion with the vehicle speed and is sent to the ECM as a pulse signal.

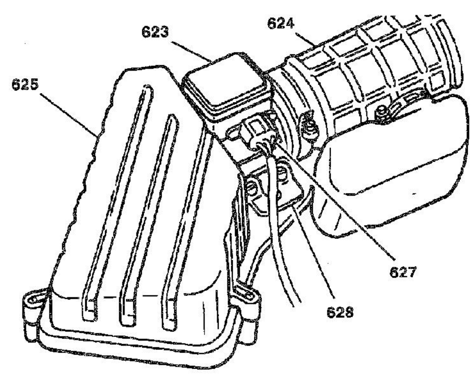
Mass Air Flow (MAF) Sensor

Figure C1-7

The Mass Air Flow (MAF) sensor measures the amount of air which passes through it in a given amount of time. The Engine Control Module (ECM) uses this information to determine the operating condition of the engine, to control fuel delivery. A large quantity of air movement indicates acceleration, while a small quantity indicates deceleration or idle.

The MAF sensor consists of a heat resistor, metering duct, straightening net, body and control circuit. This MAF sensor is of the thermal control type. The heat resistor is cooled off by the air entering the MAF sensor. The control circuit controls the heat resistors temperature within a predetermined range of the ambient temperature. As the amount of air entering the sensor increases, then so does the sensors signal current to the ECM. As air flow decreases, then so does the signal current to the ECM. The MAF sensor is located in the air intake tube between the throttle body and the Air Cleaner (*Figure C1-7*).

Figure C1-7 - Mass Air Flow (MAF) Sensor



623 MASS AIR FLOW (MAF) SENSOR
624 AIR CLEANER (ACL) OUTLET TUBE
625 AIR CLEANER (ACL)
627 MAF SENSOR ELECTRICAL CONNECTOR
628 MAF SENSOR BRACKET

3-24-94
RS 21207

Crankshaft Position (CKP) Sensor

The Crankshaft Position (CKP) sensor consists of a magnet and coil. It is mounted on the oil pan, behind the crank pulley with a specified air gap between the sensor core end and the crankshaft timing belt pulley tooth. As the crankshaft turns, a AC voltage (pulse) is generated in the sensor. The ECM detects the crankshaft revolution speed from the signal and uses it as one of the signals for misfire monitoring.

Fuel Level Sensor

This signal is sent from the fuel level sensor installed in the fuel tank and operates the same as other vehicles. The ECM uses this signal as one of the monitoring conditions for detecting DTC's. For vehicles with Enhanced EVAP systems, if the fuel level is higher than a specified level, the ECM makes the EVAP Tank Pressure Control Solenoid Vacuum Valve operate so as to prevent liquid fuel from flowing from the fuel tank to the EVAP canister, thus the tank pressure control valve shuts the vapor line.

Fuel Tank Pressure Sensor

The sensor is installed on top of the fuel tank. The fuel tank pressure sensor senses the fuel vapor pressure in the fuel tank and compares it with the barometric pressure, then the ECM converts it into a voltage signal. The ECM uses this signal as one of the signals to detect Enhanced EVAP malfunctions. Refer *Section 6E3-C3* for additional information.

Inputs/Signals

Crank Signal

This signal is sent from the engine starter circuit. Receiving it, the Engine Control Module (ECM) detects that the engine is cranking and uses it as one of the signals to control the fuel injection timing and Idle Air Control (IAC) valve operation.

Transaxle Range Switch Signal (A/T only)

This signal is sent to the Engine Control Module (ECM) from the Park/Neutral Position (PNP) switch whenever the manual selector lever is in the "P" or "N" position (automatic transmission models only). The ECM uses this signal as one of the signals to control fuel injection timing and Idle Air Control (IAC) valve operation.

Ignition Signal

This signal is sent from the ignition system circuit. The Engine Control Module (ECM) detects the status of the ignition coil through this signal and uses it as one of the factors for controlling various circuits and devices.

A/C Idle-Up Signal

This signal is sent from the A/C amplifier. When the A/C compressor is engaged, the A/C amplifier sends a signal to the Engine Control Module (ECM) to inform it that the A/C compressor is operating. This additional load on the engine requires a higher idle speed. The ECM will open the Idle Air Control (IAC) valve to create a lean condition. At the same time, it will also adjust the air/fuel mixture to compensate for the lean condition. This will increase the idle speed slightly to prevent stalling during A/C system operation.

Power Steering Pressure (PSP) Switch Signal

The Power Steering Pressure (PSP) switch signals the Engine Control Module (ECM) when the vehicle is in need of power steering assist. The turning of the steering wheel causes increased power steering fluid pressure which will close the PSP switch. The ECM uses this signal to control the Idle Air Control (IAC) valve to raise the idle speed before the load can cause a poor idling condition. The PSP switch is located in the power steering pump housing.

Diagnosis

Precautions In Diagnosing Faults In A Sequential Multiport Fuel Injection (SFI) System

Precautions In Identifying Diagnostic Trouble Codes (DTCs)

- Do not disconnect connectors from the Engine Control Module (ECM), battery cables, ECM ground wire harness, or the 15 amp "TAIL DOME" Fuse. Such disconnection will erase ECM DTCs in memory.
- Note DTC indicated first.
- Intermittent malfunctions - There are cases where the MIL indicates a DTC representing a fault which occurred only temporarily and has gone away. In such a case, it may occur that good parts are replaced unnecessarily. To prevent such an error, be sure to follow instructions given below when checking by using the "Diagnostic Tables."
- When a malfunction can be identified, that is, it is not an intermittent one, check the following areas:
  - sensor
  - wires
  - each connection.
- When a fault cannot be identified, but the MIL indicates a DTC:
  - Diagnose a fault by using that DTC number and if a sensor (actuator), wires and each connection are all in good condition, erase DTC in ECM memory. Then conduct a test run and check what the MIL indicates. Only when it indicates a DTC again, is the fault present.

Notes on System Circuit Inspection

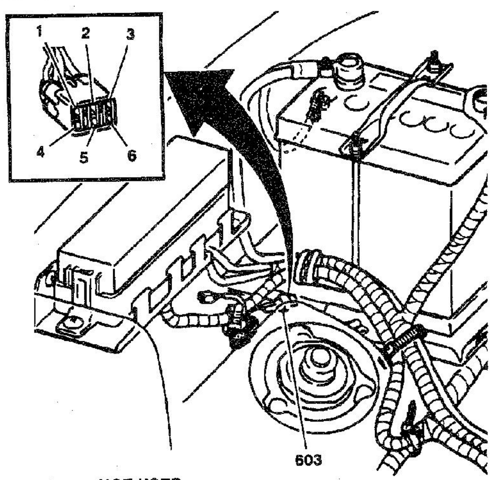
- Most intermittent malfunctions are caused by faulty electrical connections or wiring. Perform a careful check of suspect circuits for:
  - Poor mating of connector halves, or terminals not fully seated into the connector body (backed out).
  - Improperly formed or damaged terminals. All connector terminals in malfunctioning circuits should be carefully reformed to increase contact tension.
  - Poor terminal to wire connection.
- Never connect any tester (voltmeter, ohmmeter, etc.) to the Engine Control Module (ECM) when the connectors are disconnected. Attempting to do so may cause damage to the ECM.
- Be sure to use a digital multimeter whose minimum resistance is more than one megaohm per volt. Any other digital multimeter should not be used because accurate measurements are not obtained. (Use J 39200 or equivalent.)
- When checking voltage at each terminal of the connector which is connected to the ECM, be sure to connect the negative (-) probe to body ground and, using a jumper wire connect the positive (+) probe to connector terminal being tested. Applying the probes of digital multimeter improperly may cause a sensor or the ECM to be shorted and damaged.

Duty Check Data Link Connector

Figure C1-8

The Duty Check Data Link Connector is located in the RH rear engine compartment near the battery (*Figure C1-8*). When this terminal is grounded, the Engine Control Module (ECM) sets the ignition timing to base timing.

Figure C1-8- Duty Check Data Link Connector



1 NOT USED
2 DIAGNOSTIC REQUEST TERMINAL
3 DIAGNOSTIC OUTPUT TERMINAL
4 GROUND TERMINAL
5 TEST SWITCH TERMINAL
6 DUTY CHECK TERMINAL
603 DUTY CHECK DATA LINK CONNECTOR (DLC)

3-25-94
RS 21209

On-Vehicle Service

Engine Control Module (ECM)

Service of the Engine Control Module (ECM) consists of complete replacement of the ECM. There are no serviceable parts, such as Programmable Read Only Memory (PROM) or Erasable Programmable Read Only Memory (EPROM) to replace inside the ECM. If the ECM is determined to be faulty, it is to be replaced as a complete assembly.

Important: When replacing the production ECM with a service ECM, it is important to transfer the broadcast code and production ECM number to the service ECM label. This will allow positive identification of the ECM parts throughout the service life of the vehicle.

Remove or Disconnect

1. Negative (-) battery cable.
2. Disconnect ECM electrical connectors (and TCM if equipped).
3. Two bolts and ECM (TCM if equipped) from vehicle.

Install or Connect

- Transfer old plastic shield to new ECM; secure with two screws (convertible models).

1. Two ECM electrical connectors.
2. ECM (TCM if equipped) secure with to bolts.
3. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

Heated Oxygen Sensor 1 (HO2S 1)

Figure C1-9

Notice: Care should be used when removing the Heated Oxygen Sensor (HO2S 1), as damage could occur to the HO2S 1 and its wires.

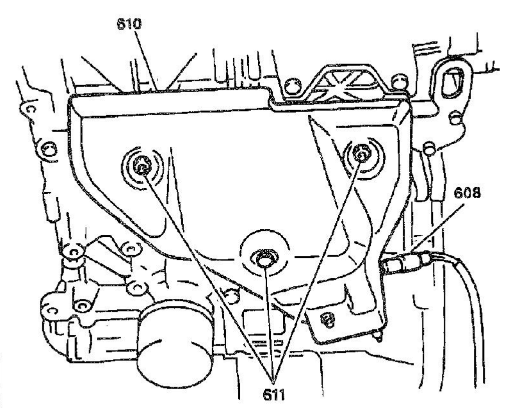
Important: HO2S 1 may be difficult to remove at temperatures below 48°C (120°F). Care should be used so as to not damage threads in exhaust manifold.

Remove or Disconnect

Caution: If exhaust manifold is hot, care should be exercised when removing HO2S as to not burn yourself on a hot radiator or exhaust manifold.

1. Negative (-) battery cable.
2. HO2S 1 electrical connector (*Figure C1-9*).
3. Three bolts, two nuts and heat shield from exhaust manifold (*Figure C1-9*).
4. HO2S 1 from exhaust manifold (*Figure C1-9*).

Figure C1-9 - Removing (HO2S 1)



608 HO2S
610 HEAT SHIELD
611 HEAT SHIELD RETAINING NUTS AND BOLTS

3-24-94
RS 21213

Install or Connect

Important: The HO2S 1 comes with anti-seize coating on the new sensor. Care should be used as to not remove any of this coating.

1. HO2S 1 to exhaust manifold.

Tighten

- HO2S 1 to 40-46 N•m (29-34 lb. ft.).

2. Heat shield to exhaust manifold; secure with three bolts and two nuts.

Tighten

- Heat shield nuts and bolts to 15 N•m (11 lb. ft.).

3. HO2S 1 electrical connector.
4. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

Heated Oxygen Sensor 2 (HO2S 2)

Notice: Care should be used when removing the Heated Oxygen Sensor 2 (HO2S 2), as damage could occur to the HO2S 2 and its wires.

Important: HO2S 2 may be difficult to remove at temperatures below 48°C (120°F). Care should be used so as to not damage threads on exhaust pipe.

Remove or Disconnect

Caution: If exhaust manifold is hot, care should be exercised when removing HO2S as to not burn yourself on a hot exhaust pipe.

1. Negative (-) battery cable.
2. Body plug from floor pan.
3. HO2S 2 electrical connector.
4. HO2S 2 from exhaust pipe.

Install or Connect

Important: The HO2S 2 comes with anti-seize coating on the new sensor. Care should be used as to not remove any of this coating.

1. HO2S 2 to exhaust pipe.

Tighten

- HO2S 2 to 40-46 N•m (29-34 lb. ft.).

2. HO2S 2 electrical connector.
3. Attach body plug to floor pan.
4. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

Engine Coolant Temperature (ECT) Sensor

Figure C1-4

Notice: Care must be used when handling the Engine Coolant Temperature (ECT) sensor. Damage to the ECT sensor will affect proper operation of the fuel injection system.

Remove or Disconnect

- Drain coolant system. Refer to *Section 6B.*

1. Negative (-) battery cable.
2. ECT sensor electrical connector (*Figure C1-4*).
3. ECT sensor from intake manifold (*Figure C1-4).*

Install or Connect

1. ECT sensor to intake manifold.

Tighten

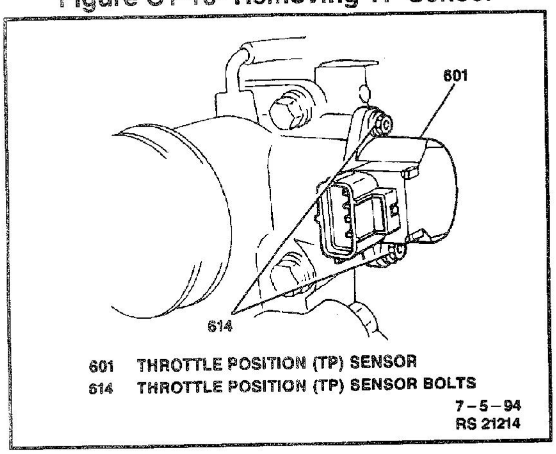
- ECT sensor to 12.5-17.5 N•m (9.5-12.5 lb. ft.).

2. ECT sensor electrical connector.
3. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).
- Replenish coolant system to proper level. Refer to *Section 6B.*

Figure C1-10- Removing TP Sensor



Throttle Position (TP) Sensor Replacement/Adjustment

Figures C1-10 through C1-13

Remove or Disconnect

1. Negative (-) battery cable.
2. Throttle position (TP) sensor electrical connector.
3. Two bolts and TP sensor from throttle body (*Figure C1-10).*

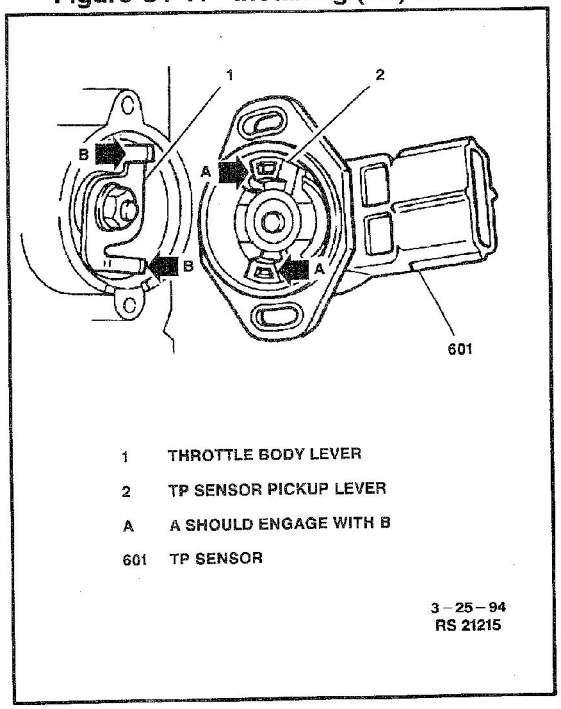
Install or Connect

1. Align TP sensor onto throttle body so that sensor pickup lever can engage with throttle body lever; secure with two bolts. Do not tighten fully (*Figure C1-11).*
2. TP sensor electrical connector.
3. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

Figure C1-11 - Installing (TP) Sensor



TP sensor Adjustment

1. Connect a DVM to TP sensor terminal "1" to "2" (TP sensor side). Measure resistance (*Figure C1-12).*

Notice: Throttle valve must be closed.

2. Insert 0.65 mm (0.026-inch) feeler gage between throttle stop screw and throttle lever and with retaining screws loosely installed, turn TP sensor fully counterclockwise, then slowly clockwise gradually to find position where ohmmeter reading changes from continuity to no continuity (*Figure C1-13).*

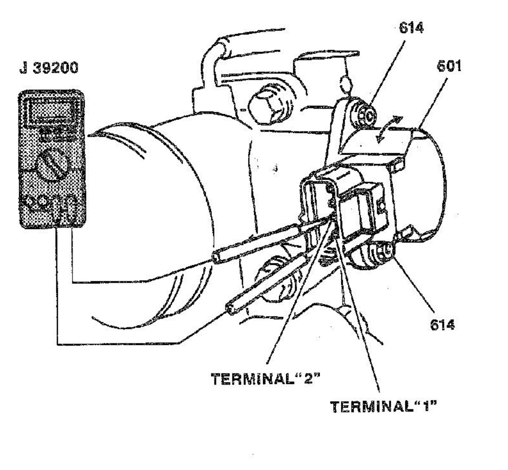
Tighten

- TP sensor bolts to 2.5-4.5 N•m (22.8-38.4 lb. in.).

3. Remove feeler gage. DVM should still indicate continuity.

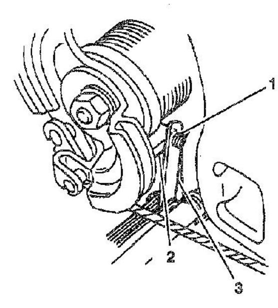
4. Insert 0.8 mm (0.037 inch) feeler gage between throttle stop screw and throttle lever. DVM should now indicate an open circuit (no continuity) (*Figure C1-13*).

Figure C1-12 - Measuring (TP) Sensor Resistance



5. Insert 0.5 mm (0.020 inch) feeler gage between throttle stop screw and throttle lever (*Figure C1-13*) the DVM should indicate continuity. If steps C, D or E are unsatisfactory, return to step A and repeat entire procedure.

Figure C1-13 - Inserting Feeler Gage



Throttle Position (TP) Sensor Check

Figure C1-14

Remove or Disconnect

1. Negative (-) battery cable.
2. Throttle Position (TP) sensor electrical connector.

Measure

Tool Required J 39200 Digital Multimeter

- TP sensor resistance according to *Figure C1-14*. If TP sensor resistance is not within the specified ranges, adjust/replace TP sensor. Refer to procedure in this section.

Figure C1-14 - Throttle Position (TP) Sensor Output Check

Resistance between "1" and "2" terminals (idle switch)	When throttle lever-to-stop screw clearance is 0.5 mm (0.020 in.)	0 - 500 Ω
	When throttle lever-to-stop screw clearance is 0.8 mm (0.031 in.)	∞ (infinite)
Resistance between "1" and "4" terminals	—	3.5 - 6.5k Ω
Resistance between "1" and "3" terminals	When throttle valve is at idle position	0.3 - 2k Ω
	When throttle valve is fully open	2 - 6.5k Ω

NOTICE:

- There should be more than 2k Ω resistance difference between when throttle valve is at idle position and when it is fully open.

5-11-94
RS 21218

Install or Connect

1. TP sensor electrical connector.
2. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

Intake Air Temperature (IAT) Sensor

Figure C1-6

Remove or Disconnect

1. Negative (-) battery cable.
2. Intake Air Temperature (IAT) sensor electrical connector (*Figure C1-6*).
3. IAT sensor from Air Cleaner (ACL) (*Figure C1-6*).

Install or Connect

1. IAT sensor and new gasket to Air Cleaner (ACL).

Tighten

- IAT sensor to 13-17 N•m (9.5-12.0 lb. ft.).

2. IAT sensor electrical connector.
3. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

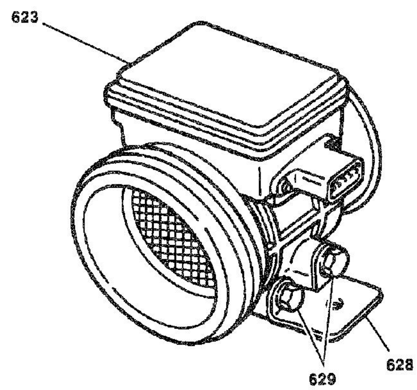
Mass Air Flow (MAF) Sensor

Figures C1-7 and C1-15

Remove or Disconnect

1. Negative (-) battery cable.
2. MAF sensor electrical connector (*Figure C1-7*).
3. One clamp and Air Cleaner (ACL) outlet tube from MAF sensor.
4. Two bolts and MAF sensor and bracket from ACL (*Figure C1-7*).
5. Two bolts and bracket from MAF sensor (*Figure C1-15*).

Figure C1-15 - Removing MAF Sensor



623 MAF SENSOR
628 MAF SENSOR BRACKET
629 MAF SENSOR RETAINING BOLTS

3-16-94
RS 21219

Install or Connect

1. MAF sensor to bracket; secure with two bolts.

Tighten

- MAF sensor bolt to 10 N•m (89 lb. in.).

2. MAF sensor and bracket to ACL; secure with two bolts.

Tighten

- MAF sensor brackets bolts to 10 N•m (89 lb. in.).

3. ACL outlet tube to MAF sensor; secure with one clamp.
4. MAF sensor electrical connector.
5. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

Crankshaft Position (CKP) Sensor

Remove or Disconnect

1. Negative (-) battery cable.
2. CKP sensor electrical connector.
3. One bolt and CKP sensor from the oil pan.

Install or Connect

1. CKP sensor oil pan; secure with one bolt.

Tighten

- CKP sensor bolt to 15 N•m (11 lb. ft.).

2. CKP sensor electrical connector.
3. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

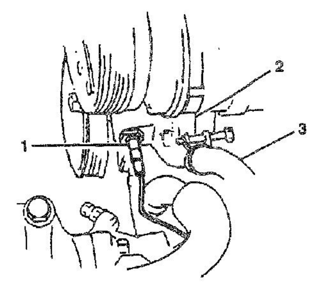
Power Steering Pressure (PSP) Switch

Figure C1-16

Remove or Disconnect

1. Negative (-) battery cable.
2. Power steering pressure switch electrical connector.
3. PSP switch from power steering pump (*Figure C1-16*).

Figure C1-16 - Removing Power Steering Pressure (PSP) Switch



1 POWER STEERING PRESSURE SWITCH LEAD WIRE
2 POWER STEERING PUMP
3 SUCTION HOSE

3-23-94
RS 21220

Install or Connect

1. PSP switch to power steering pump.

Tighten

- PSP switch to 27 N•m (20 lb. ft.).

2. PSP switch electrical connector.
3. Negative (-) battery cable.

Tighten

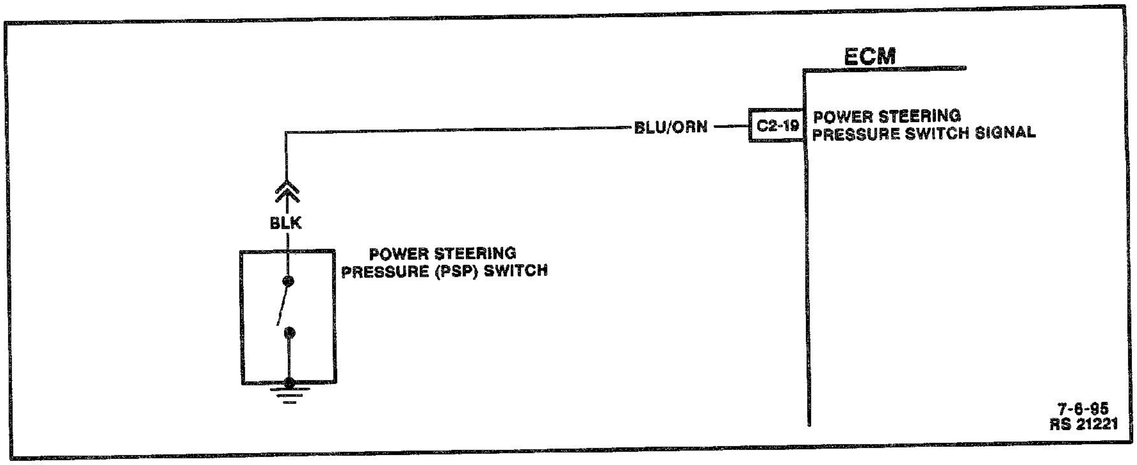
- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

Specifications

Engine Fastener Tightening Specifications

Application	N•m	Lb Ft	Lb In
ECM-to-I/P Support Brace Bolts	20	15	—
Negative (-) Battery Cable-to-Negative (-) Battery Terminal Retainer	15	11	—
HO2S 1	40-46	29-34	—
HO2S 2	40-60	29-34	—
Heat Shield Nuts and Bolts	15	11	—
ECT Sensor	12.5-17.5	9.5-12.5	—
TP Sensor Bolts	2.5-4.5	—	22.8-38.4
IAT Sensor	13-17	9.5-12	—
MAF Sensor Bolts	10	—	89
MAF Sensor Bracket Bolts	10	—	89
PSP Switch	27	20	—

Table C-1A - Power Steering Pressure (PSP) Switch Check



Circuit Description

The Power Steering Pressure (PSP) switch is normally open to ground, and the Engine Control Module (ECM) terminal will be near battery voltage.

Turning the steering wheel increases power steering oil pressure and its load on an idling engine. The PSP switch will close before the load can cause a poor idling condition.

Closing the switch causes the ECM voltage signal to read less than one volt. The ECM will increase the idle speed and prevent engine load stall.

Diagnostic Aids

An intermittent malfunction, may be caused by a poor connection, rubbed through wire insulation, or a wire broken inside the insulation. Check for the following items:

- Inspect harness connectors for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals and poor terminal-to-wire connections before component replacement.
- A PSP switch that will not close, or loss of ground at the PSP switch may cause the engine to stall when power steering loads are high.
- A PSP switch that will not open or a signal line shorted to ground may affect Idle quality.
- If no problem was found, refer to *Service Category Symptoms.*

Test Description

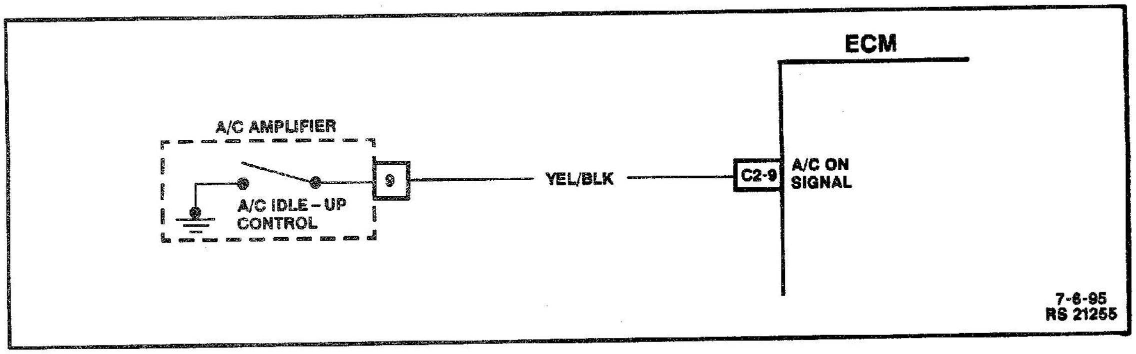
Number(s) below refer to the step number(s) on the Diagnostic Table.

3. Checks for ECM signal voltage and for an open or a short to ground in signal circuit or for a faulty ECM.
4. Checks for a poor ground connection at the power steering pump and for a faulty PSP switch.

Table C-1A - Power Steering Pressure (PSP) Switch Check

Step	Action	Value(s)	Yes	No
1	Was the "On-Board Diagnostic (OBD) System Check" performed?	—	Go to Step 2	Go to *OBD System Check*
2	1. Start and run engine until normal operating temperature is attained. 2. Turn "OFF" all accessories. 3. Observe the engine speed parameter on the scan tool. 4. Turn the steering wheel all the way to the right or left. Does engine speed increase slightly with the steering wheel turned all the way in either direction?	—	PSP switch is functioning normally	Go to Step 3
3	1. Ignition "ON," engine "OFF." 2. Disconnect the PSP switch connector. 3. Using a DVM, measure voltage from the PSP switch connector to ground (harness side). Is voltage near the specified value?	B+	Go to Step 4	Go to Step 5
4	1. Connect a test light to B+, probe the PSP switch connector (switch side). 2. Ignition "ON," engine "ON." Is the test light "ON" when the steering wheel is turned all the way to the right or left?	—	Refer To *Diagnostic Aids*	Go to Step 6
5	Check for an open or short to ground in the PSP signal circuit between the ECM and the PSP switch, repair as necessary. Was a repair necessary?	—	Go to Step 9	Go to Step 8
6	Check for a poor ground connection at the power steering pump, repair as necessary. Was a repair necessary?	—	Go to Step 9	Go to Step 7
7	Replace the PSP switch. Is action complete?	—	Go to Step 9	—
8	Replace the ECM. Is action complete?	—	Go to Step 9	—
9	Operate vehicle within the conditions under which the original symptom was noted. Does the system now operate properly?	—	System OK	Refer To *Diagnostic Aids*

Table C-1B - A/C Idle-Up Circuit Check



Circuit Description

This signal is sent from the A/C amplifier. The Engine Control Module (ECM) detects whether or not the A/C system is operating via the A/C amplifier. The extra load the A/C system demands from the engine requires a higher idle speed. When the ECM receives the A/C "ON" signal, it will activate the Idle Air Control (IAC) valve and the idle speed will increase.

Diagnostic Aids

An intermittent malfunction may be caused by a poor connection, rubbed through wire insulation or a wire broken inside the insulation. Inspect harness connectors for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals and poor terminal-to-wire connections before component replacement.

Test Description

Number(s) below refer to the step number(s) on the Diagnostic Table.

2. This checks for an open or short to ground in YEL/BLK wire, or a faulty ECM.
3. This checks for a faulty ECM or for a faulty A/C amplifier.

Table C-2A - A/C Idle-Up Circuit Check

Step	Action	Value(s)	Yes	No
1	Was the "On-Board Diagnostic (OBD) System Check" performed?	—	Go to Step 2	Go to *OBD System Check*
2	1. Ignition "OFF." 2. Disconnect A/C amplifier connector. 3. Ignition "ON." 4. Using a DVM, measure voltage from A/C amplifier connector cavity 9. Does DVM read within specified value?	B+	Go to Step 3	Go to Step 4
3	1. Ignition "OFF." 2. Reconnect A/C amplifier connector. 3. Start engine. 4. Press A/C switch to "ON" and move blower speed selector switch to any position expect "OFF." 5. Using a DVM, backprobe A/C amplifier connector cavity 9. 6. Measure voltage. Does DVM read within specified value?	0V	System OK	Go to Step 5
4	1. Check for an open or short in the A/C "ON" signal between A/C amplifier and ECM. 2. Repair as necessary. Was a repair necessary?	—	Go to Step 7	Go to Step 6
5	Replace A/C amplifier. Is action complete?	—	Go to Step 7	—
6	Replace ECM. Is action complete?	—	Go to Step 7	—
7	Operate vehicle within the conditions under which the original symptom was noted. Does the system now operate properly?	—	System OK	Refer To *Diagnostic Aids*

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