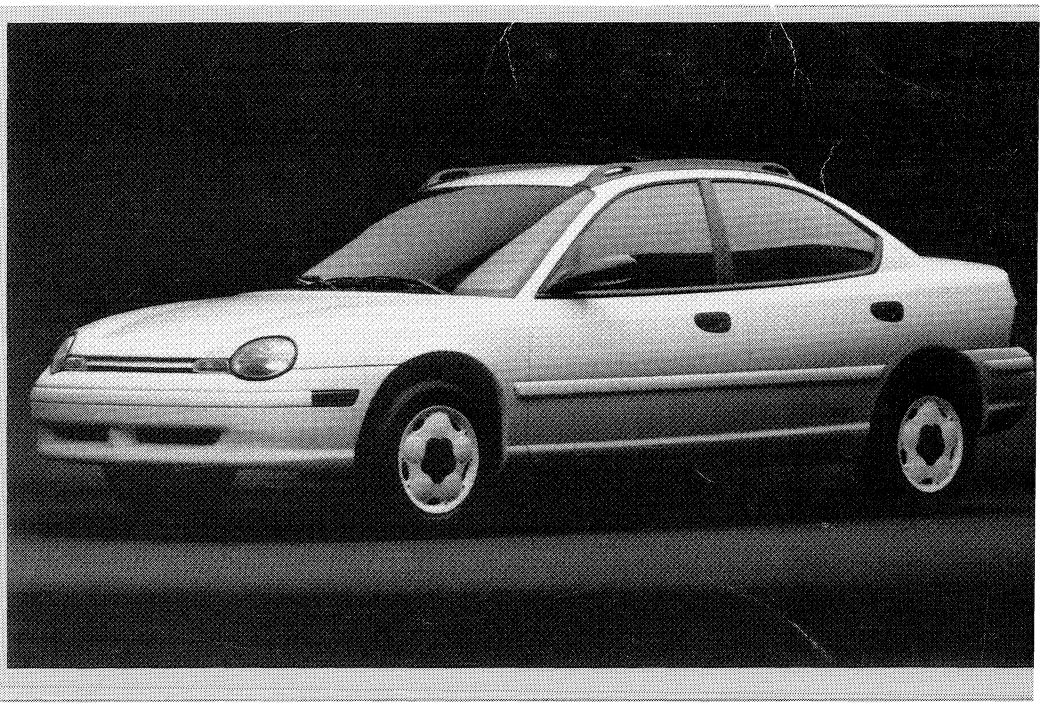
2.0L Fuel, Ignition, and Emissions

1995

Neon

Student Reference Book



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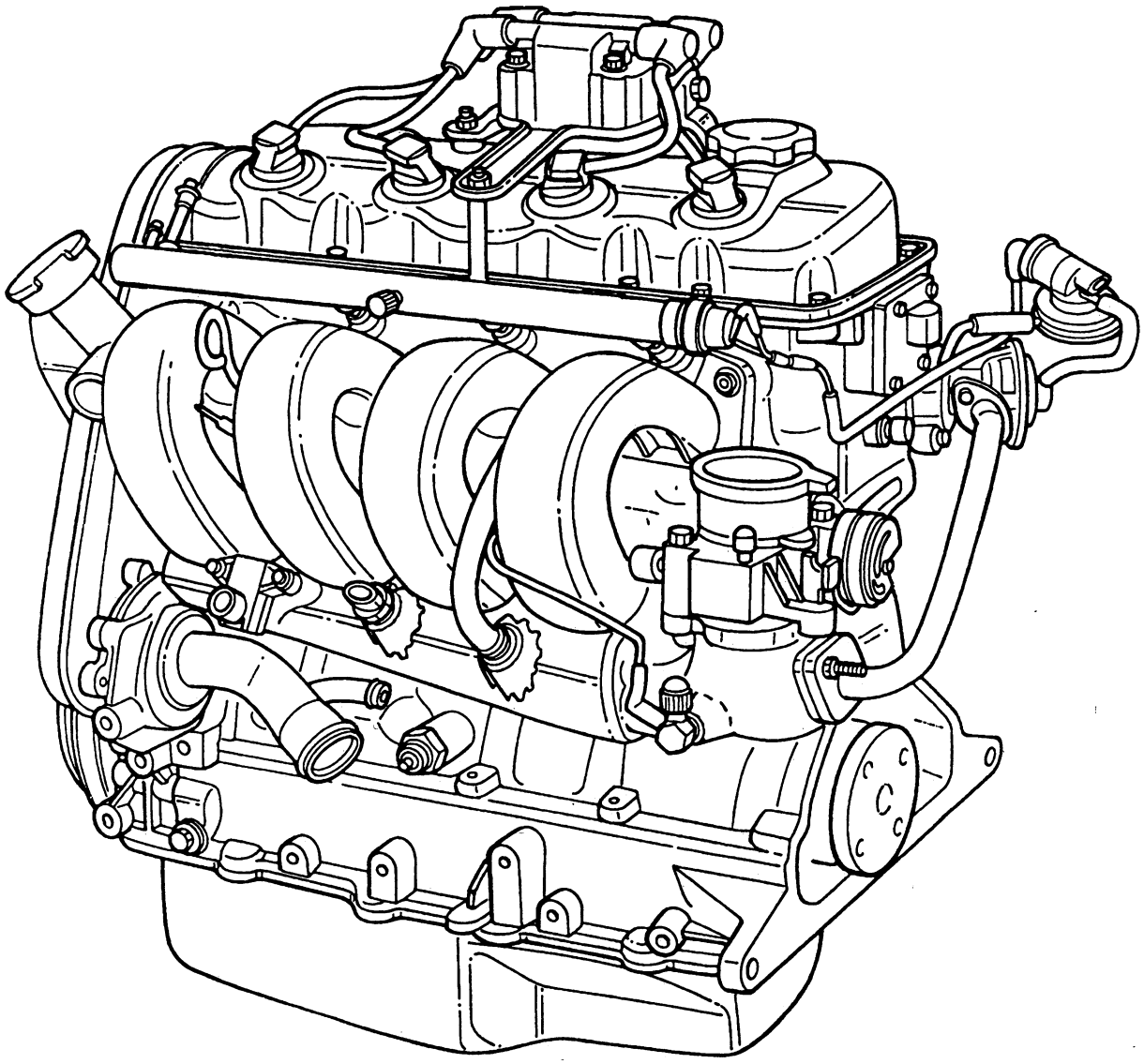

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INTRODUCTION

Student Learning Objectives

After completing this course, the technician will be able to:

- Identify and locate the following Fuel and Emission components:

  — A/C Relay
  — ASD Relay
  — Camshaft Position Sensor
  — Catalytic Converter
  — Coolant Temperature Sensor
  — Crankshaft Position Sensor
  — EGR Valve and Solenoid
  — Fuel Injectors
  — Fuel Pressure Regulator and Filter
  — Fuel Pump
  — Fuel Pump Relay
  — Fuel Rail
  — Idle Speed Stepper Motor
  — Ignition Coil
  — Intake Air Temperature Sensor
  — Manifold Pressure Sensor
  — Powertrain Control Module
  — Purge Solenoid
  — Starter Relay
  — Throttle Body
  — Throttle Position Sensor
  — Upstream and Downstream Oxygen Sensors
  — Vapor Canister
  — Vehicle Speed Sensor

- Identify which components from the above list are PCM inputs or outputs.

- Identify whether a component is part of the emission system, fuel system, ignition system, or a combination of systems.

- Recognize the signals generated by the crankshaft and camshaft position sensors.

2.0L Fuel, Ignition, and Emissions

General Description

The fuel system for the Neon's 2.0 liter SOHC engine utilizes sequential multi-port fuel injection to deliver precise amounts of fuel to the intake manifold. A new plastic intake manifold is used for these vehicles. Fuel pressure is delivered by an in-tank pump module that includes an integral fuel level sending unit. Like the fuel systems on Dodge trucks, this is a returnless system with a pressure regulating valve mounted to the fuel pump module.

This vehicle uses a direct ignition system, eliminating the need for a distributor. Ignition and fuel injector operation are controlled by a new powertrain control module (PCM) which reviews inputs from a number of sensors. The PCM provides outputs to fuel and ignition system components to promote the most efficient operation possible. The vehicle includes a catalytic converter and sophisticated emissions system diagnostic process (OBD II) to ensure that emissions meet federal clean air regulations.

FUEL SYSTEM COMPONENTS

Fuel Tank

The Neon's fuel tank is located at the rear of the vehicle, between the frame rails. The tank is of stamped steel, with a capacity of approximately 11 gallons (42 liters) and can be removed without interference from suspension components.

> ***Warning:*** *Release fuel system pressure before servicing fuel system components. The procedure is described in the service manual. Service vehicles in well ventilated areas and avoid ignition sources. Never smoke while servicing the vehicle's fuel system.*

The tank contains two rollover valves, one at the top of the tank and the other in the fuel filler tube (fig. 1) to prevent fuel flow through the vent valve hose serving the evaporative canister should the vehicle roll over.

The evaporative control system consists of a fuel cap that relieves pressure extremes and an evaporative canister. The fuel cap must be in place for proper system operation. The evaporative canister is mounted on a plastic bracket, behind the passenger side of the front fascia. It temporarily stores fuel vapors until intake manifold vacuum draws them into the combustion chamber.

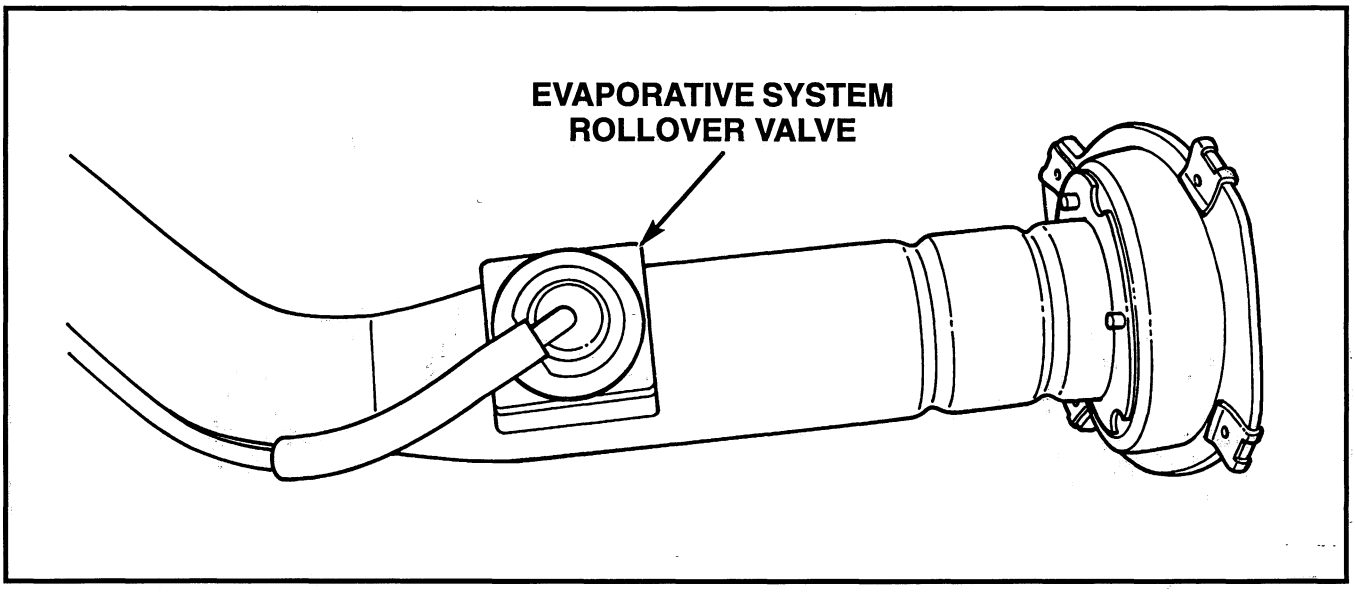


Figure 1 Evaporative System Rollover Valve

Fuel Pump Module

The Neon uses an in-tank fuel pump module (fig. 2) with an integral fuel level sending unit and pressure regulator to provide fuel to the system . A drain valve is included on the unit for removing fuel from the tank. Siphon fuel only into an approved container. Serviceable components on the module include the inlet strainer, fuel sending unit, and pressure regulator.

> ***Warning:*** *Use care when removing the fuel pump module from the fuel tank as gasoline remaining in the module reservoir will spill.*

Fuel is maintained at a constant 49 psi by a regulator in the fuel pump module. This fuel system does not contain the traditional fuel return lines. Instead, fuel is pumped to an externally mounted fuel filter which contains a short return line back to the tank and the pressure regulating valve. The valve contains a calibrated spring which forces a diaphragm against the fuel filter return port. When pressure exceeds 49 psi, the diaphragm retracts, allowing excess pressure and fuel to vent into the tank.

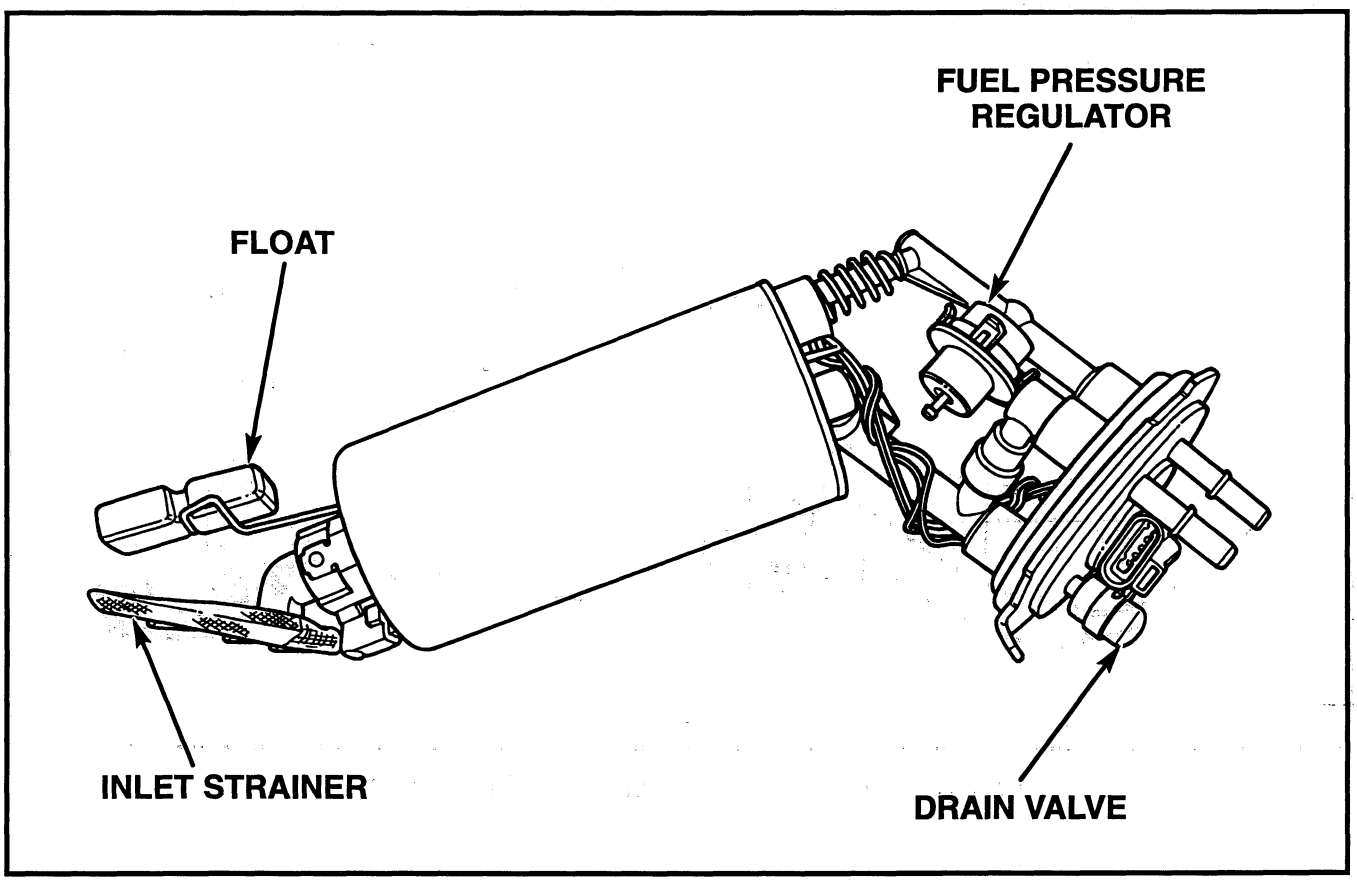


Figure 2 Fuel Pump Module

Fuel Filter
A unique fuel filter (fig. 3) is used with this system. Mounted near the fuel tank, the unit directs filtered fuel to the engine and also to the fuel pump module pressure regulator. The filter features three permanently attached nylon fuel lines which attach to the fuel tank and fuel line with quick connect fittings. If there is a leak at these connections, you must replace the filter assembly.

External mounting of the fuel filter improves serviceability when compared to the fuel pump mounted filters used with other returnless systems.

Fuel Line
A single fuel line runs from the fuel filter to the fuel rail. If the O-rings at the quick connect fittings become damaged, the line must be replaced.

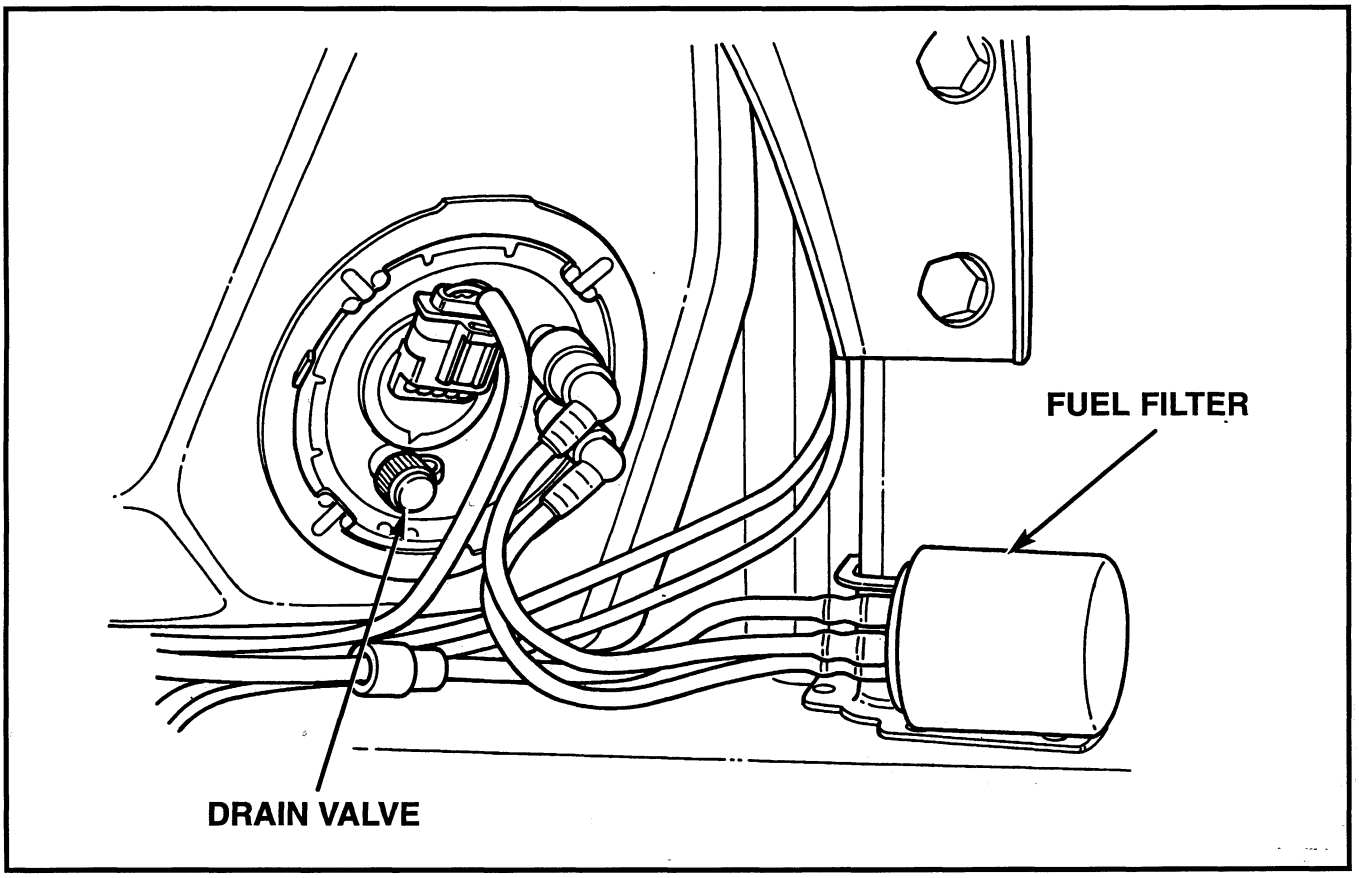


Figure 3 Externally Mounted Fuel Filter

Fuel Rail

The fuel rail (fig. 4) is mounted on the plastic intake manifold at the front of the engine compartment. It is attached to the fuel line with a quick connect fitting. A test port is located at the center of the rail to provide a location for pressure testing (with tool # C-4799-1) and venting fuel pressure prior to fuel system service (tool # C-4799-A).

Warning: *Release fuel system pressure before servicing fuel system components. The procedure is described in the service manual. Service vehicles in well ventilated areas and avoid ignition sources. Never smoke while servicing the vehicle's fuel system.*

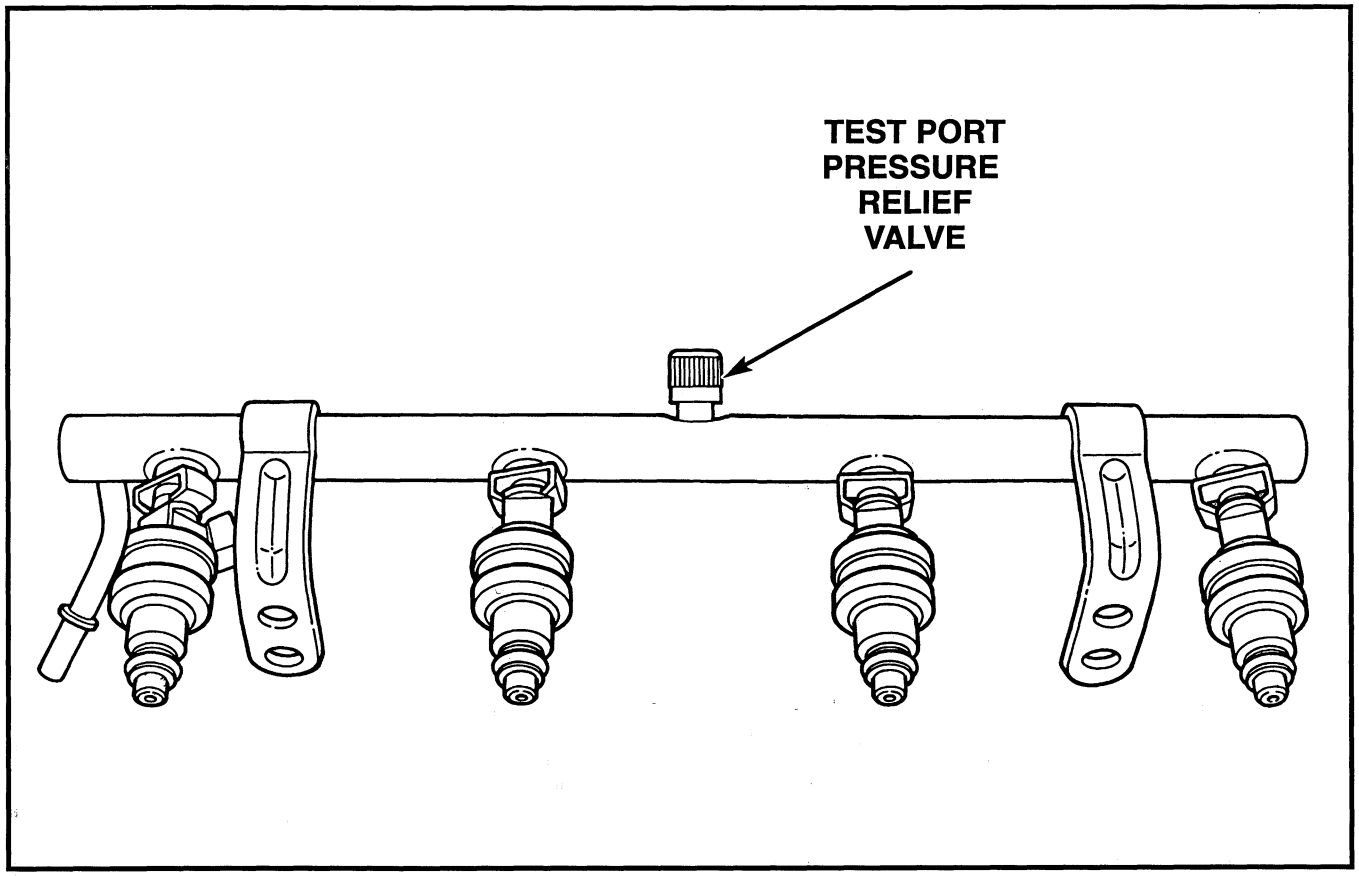


Figure 4 Fuel Rail

Fuel Injectors

The Neon uses two types of top feed fuel injectors: A standard injector for engines mated to automatic transmissions and a new injector used with manual transmissions (fig. 5). The injectors used with the manual transmissions are somewhat thinner than those used with automatics. Both types of injectors mount to the fuel rail with push-on retaining clips and use an O-ring to prevent leakage between the injector and fuel rail. Both injectors have an impedance of 12 ohms and a flow rate of approximately 180 grams per minute (static flow). Eventually, the new injectors will be used for all Neon applications.

At this point in time, the MTX injectors have not been certified for use on vehicles with automatic transmissions. These components are not interchangeable.

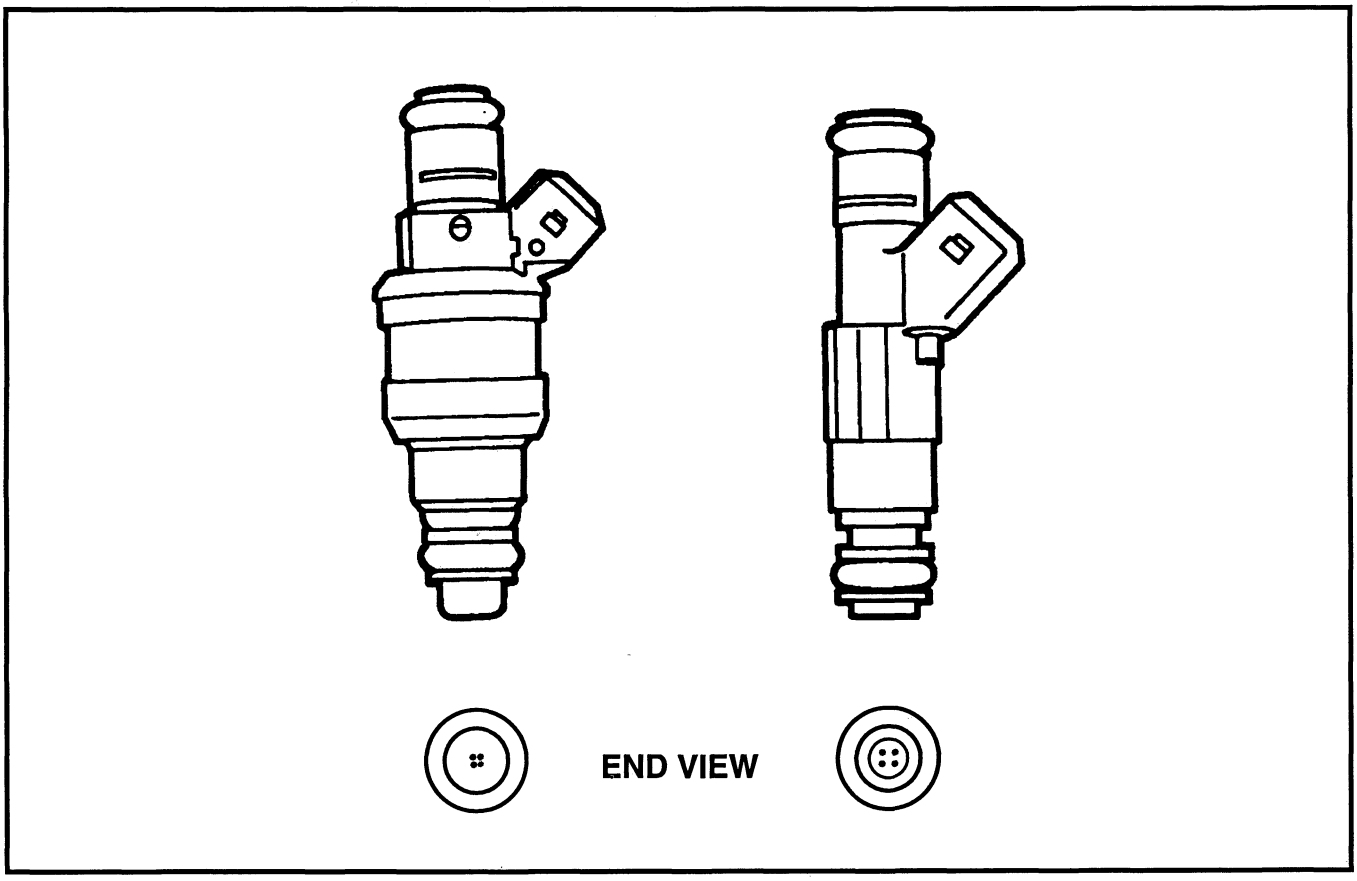


Figure 5 Fuel Injectors

Intake Manifold

A new molded plastic intake manifold that reduces engine weight is used on the SOHC Neon engine. The MAP sensor, intake air temperature sensor, and PCV vacuum line are mounted directly to the manifold body (fig. 6). Be sure to review torque specifications when working on this new manifold.

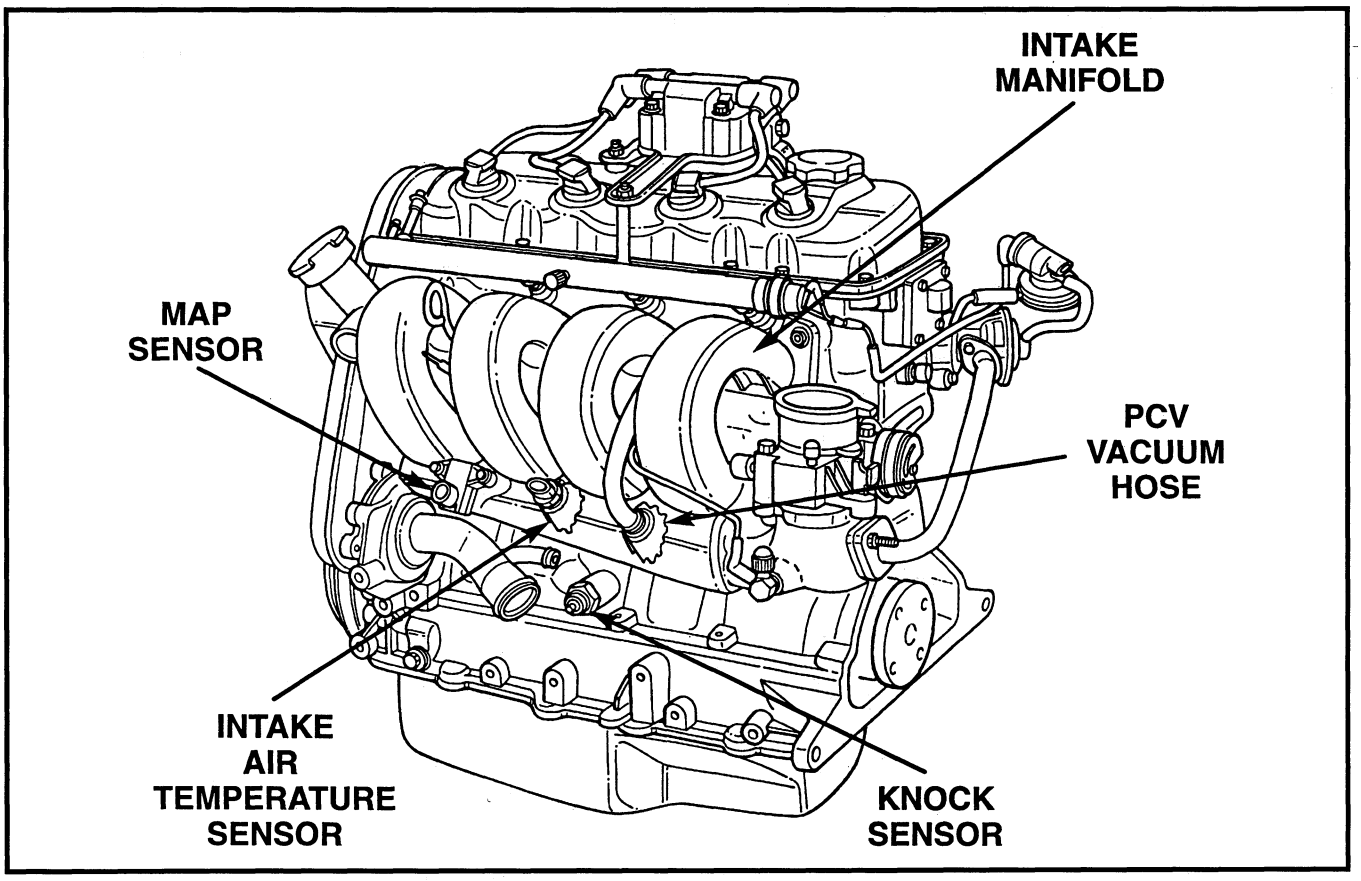


Figure 6 Plastic Intake Manifold

Throttle Body

The throttle body mounts to the intake manifold. The Neon uses two different throttle bodies, depending on transmission application (fig. 7). Those using an automatic transmission use a straight bore. Vehicles with a manual transmission receive a contoured throttle body. The contoured throttle body changes air velocity slightly with moderate pedal movement. This helps reduce buck and bobble at light throttle positions.

The manual transmission throttle body uses an off center (progressive) cam to provide graduated operation of the throttle blade with moderate pedal movement at tip-in. A straight throttle cam is used with automatic transmissions.

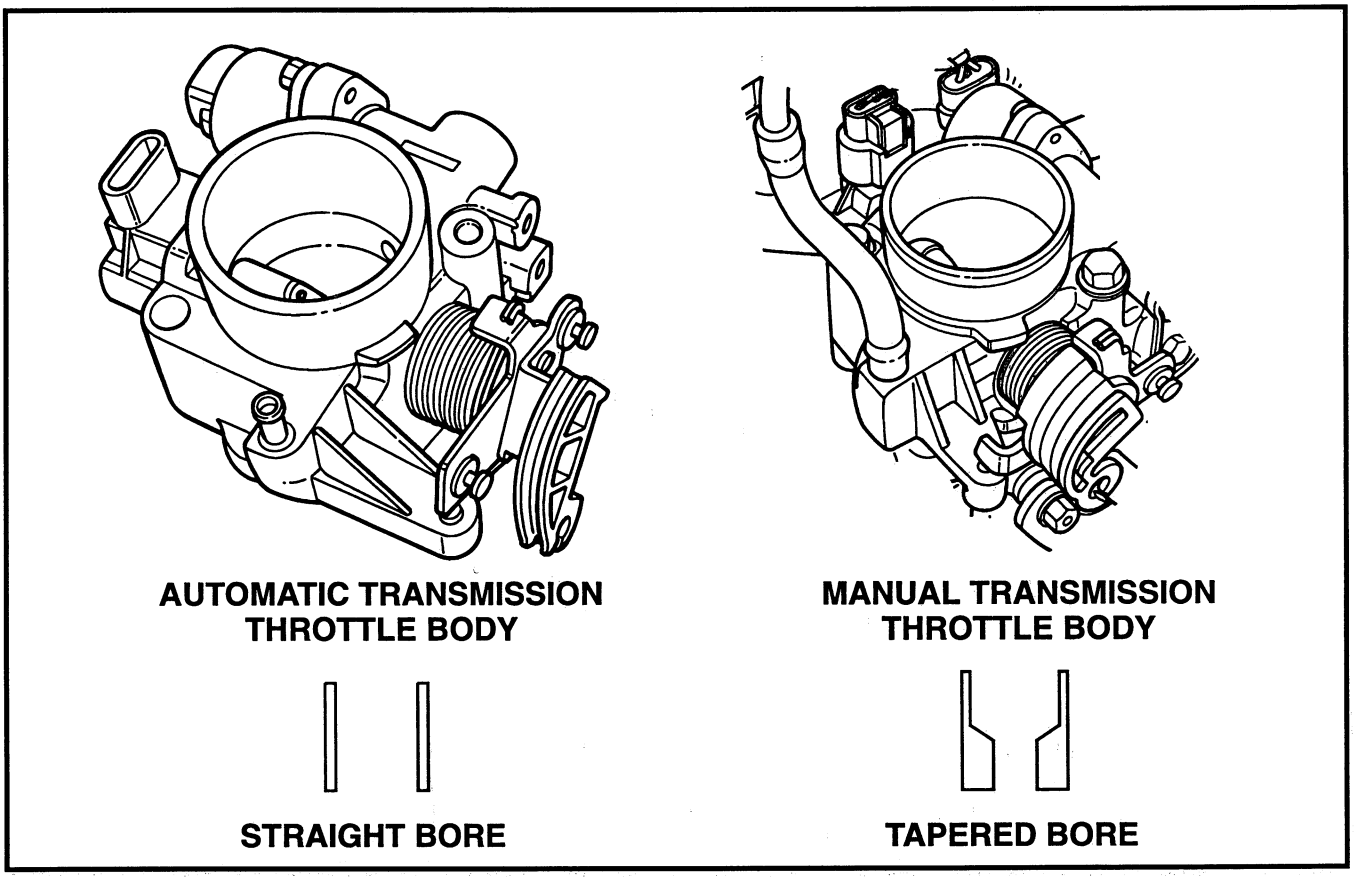


Figure 7 Neon Throttle Bodies

Air Cleaner
The Neon uses a rectangular air cleaner assembly (fig. 8) with a replaceable dry filter element. The two-piece housing is held together by spring-band clamps and is mounted to the engine's throttle body. An air duct supplies outside air for the system.

Evaporative Canister
A sealed, maintenance-free evaporative canister is used on all vehicles. The canister is mounted on a plastic bracket, just behind the front fascia on the passenger side of the vehicle. The fuel tank vent hose is placed high on the filler neck to prevent accidental flooding of the canister caused by overfilling.

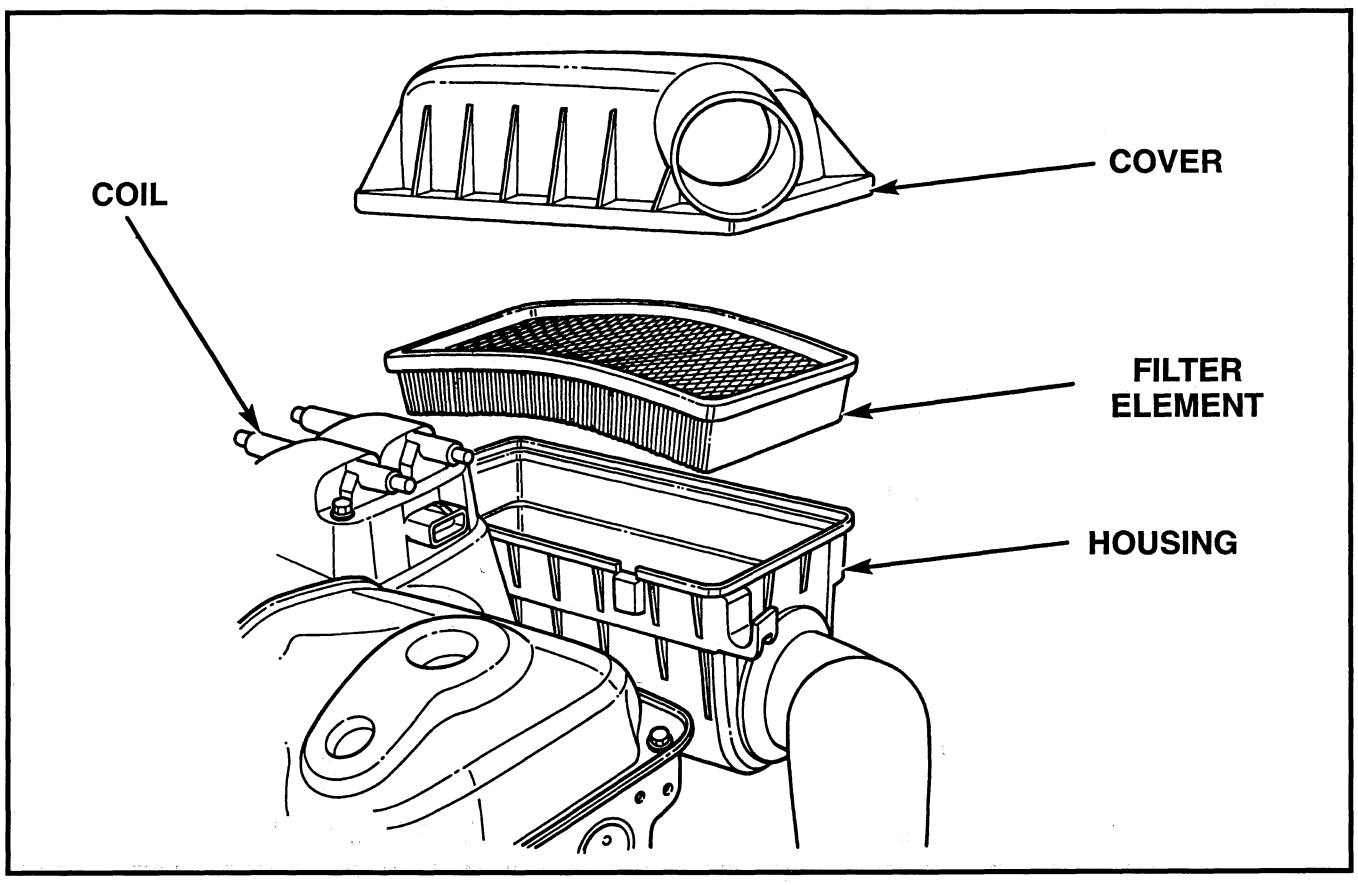


Figure 8 Air Cleaner Assembly

Powertrain Control Module (PCM)
The Neon requires a unique PCM (fig. 9) in order to accommodate the enhanced on-board diagnostics found on this vehicle. This new controller is smaller than previous PCM's and requires no airflow for cooling. It is located on the driver's side inner fender in the engine compartment.

The PCM controls operation of the fuel, ignition, emissions, charging, and speed control systems. It receives information from input sensors that monitor engine operating conditions. After processing this information, the PCM operates outputs that regulate engine performance. This cycle of input/processing/output ensures that the engine meets emission, performance, fuel economy, and driveability requirements.

The PCM controls operation of the ignition system by providing output voltage to the ignition coil through operation of the ASD relay. It also provides the coil's switched ground path. The PCM adjusts ignition timing to meet changing operating conditions as determined by data received from several PCM inputs.

The PCM controls injector operation by providing battery voltage through the automatic shut down (ASD) relay and ground for individual injectors. The PCM adjusts injector pulse width by varying the duration of the ground path provided to each injector. The PCM processes the data received from several inputs to determine the optimum injector pulse width for each operating condition.

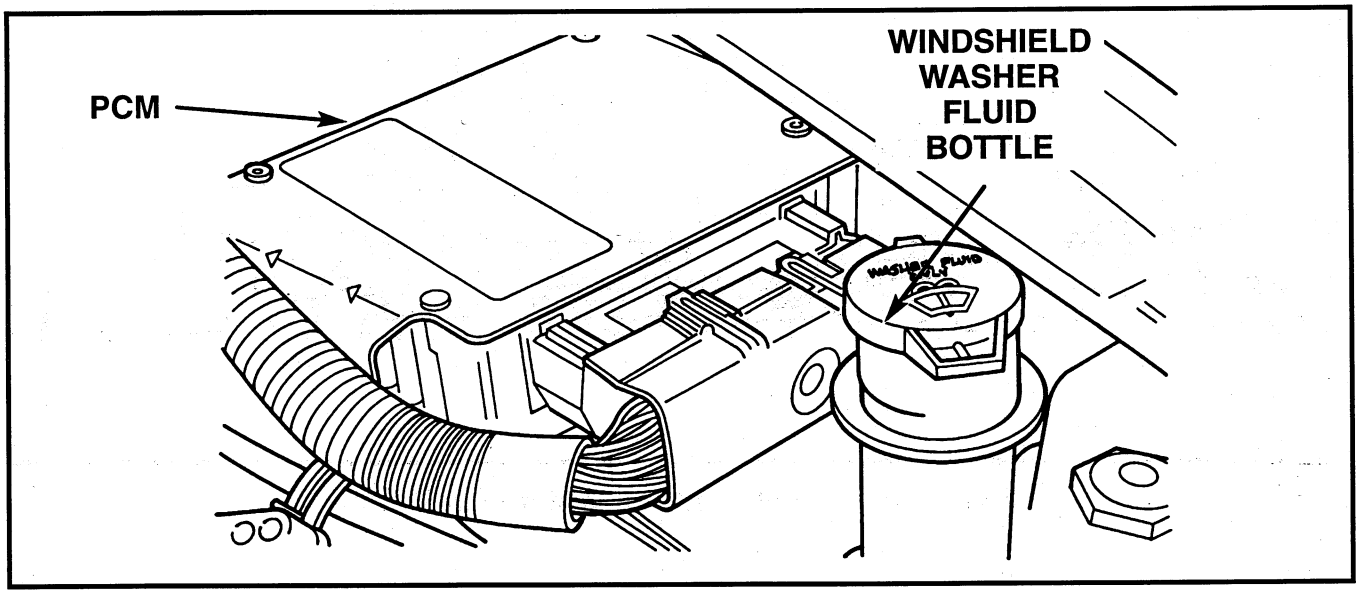


Figure 9 Powertrain Control Module (PCM)

Ignition Coil

The Neon uses a direct ignition system (DIS) with a single coil pack (fig. 10) mounted to the top of the engine. The pack contains two independent coils – one for each pair of cylinders – and is capable of generating up to 40,000 volts. Coil one serves cylinders 1 and 4, and coil two serves cylinders 2 and 3. Each coil tower is labelled with the number of the cylinder it serves. The positioning of the coil allows the use of relatively short spark plug wires leading to each cylinder.

Each coil fires two spark plugs simultaneously in a series circuit. One cylinder is on the compression stroke, the other is on the exhaust stroke. Resistance on the primary side of each coil should be between 0.51 and 0.61 ohm. Secondary side resistance is between 11,500 and 13,500 ohms.

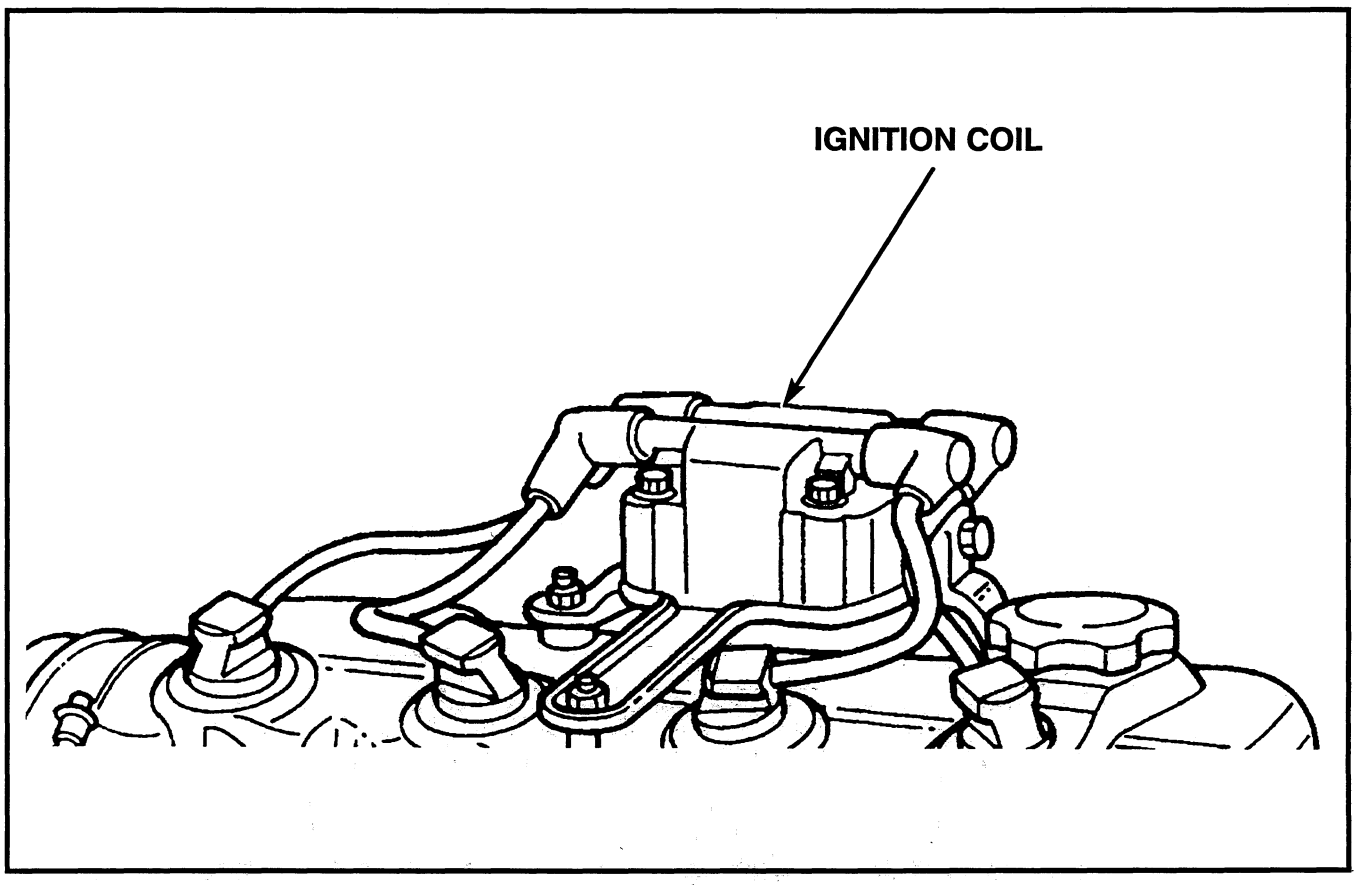


Figure 10 Direct Ignition System (DIS) Coil

PCM INPUTS

Crankshaft Position Sensor (CKP)
The Neon uses a Hall-effect crankshaft position sensor as a PCM input. Previous four-cylinder models used the distributor mounted pick-up for this task. The crankshaft position sensor mounts on the engine block, just above the oil filter (fig. 11). There it interfaces with the second crankshaft counterweight which is machined with two sets of four timing notches.

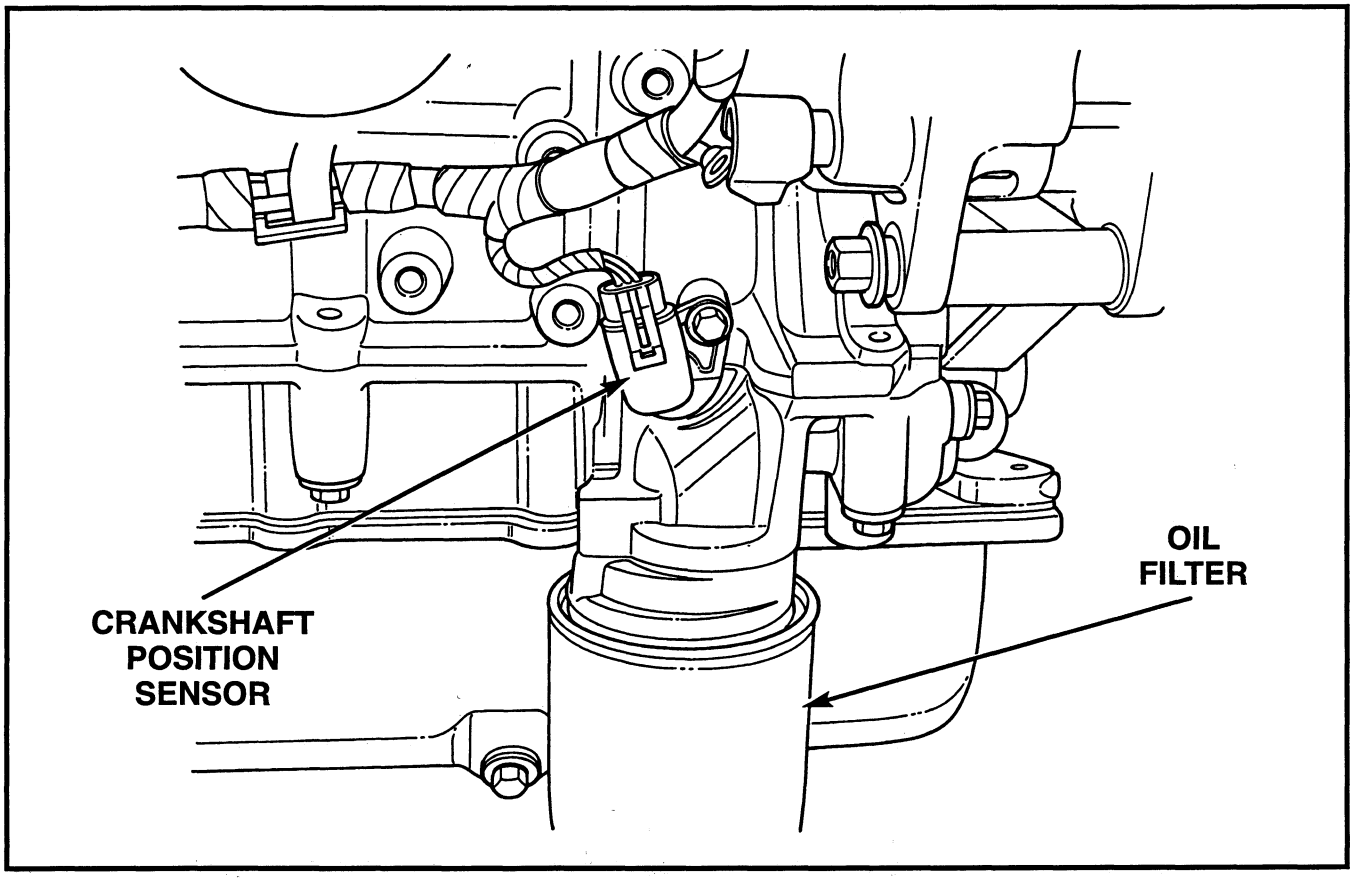


Figure 11 Crankshaft Position Sensor

One of the sets of machined counterweight notches (fig. 12) contains a wider (60°) notch used to indicate crank position. As these notches pass the pole of the sensor, output voltage alternates between a high of 5 volts and low of 0.3 volt (fig. 13). Low output occurs when the high side of the counterweight passes the sensor. High output occurs when the machined notches pass under the sensor.

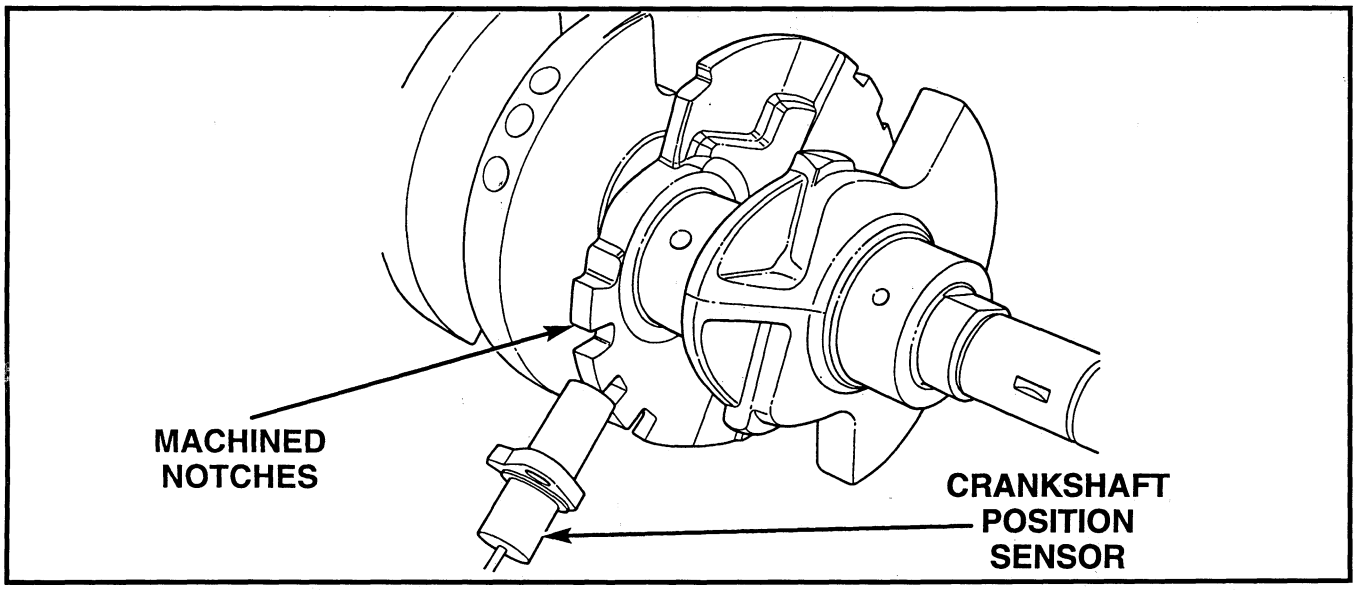


Figure 12 Crankshaft Counterweight

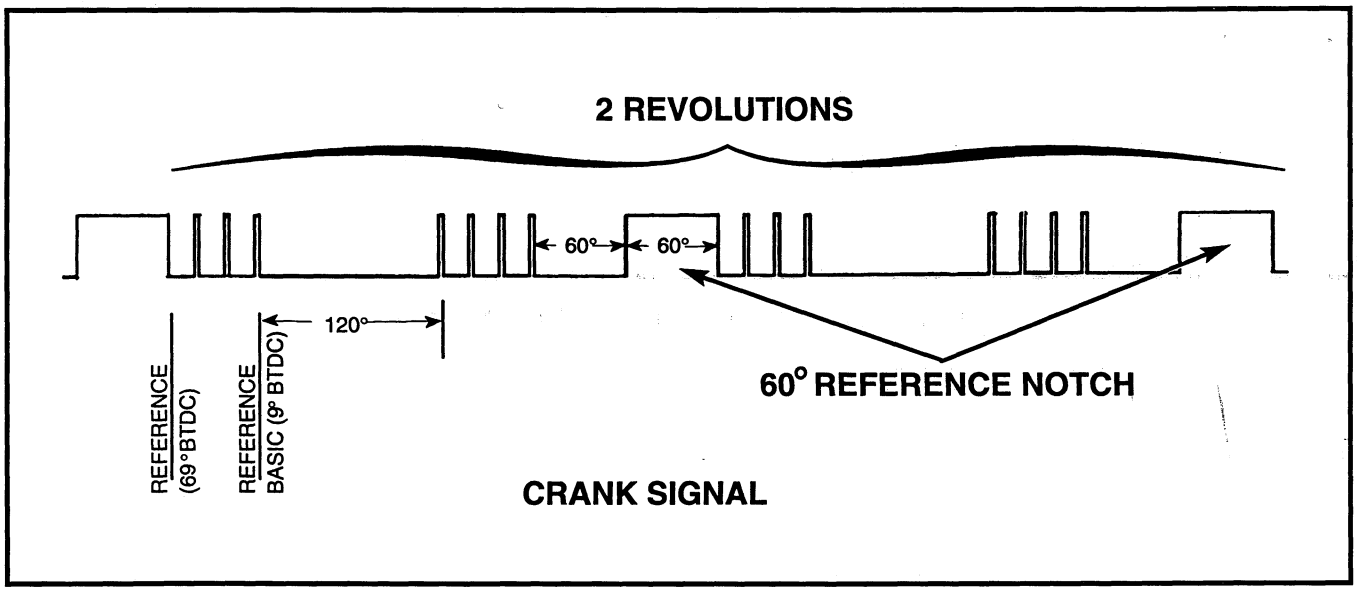


Figure 13 Sensor Pattern

Sensor output voltage pulse width is dependent on crank rotational speed. The faster the crank turns, the shorter the time between the individual high/low pulses produced by the sensor (fig. 14). It is these changes of direction, or edges, that the PCM uses to make its calculations. In this way the sensor is able to relay crankshaft speed and position (by noting the location of the 60° notch) to the PCM. Without input from the sensor, the PCM will not allow the engine to operate.

The sensor contains a highly charged magnet that is susceptible to damage. Do not drop the sensor on a metal table or store sensors face to face.

The Crankshaft Position Sensor is not adjustable. You should reset the sync signal with the DRB III diagnostic scan tool after replacing the sensor.

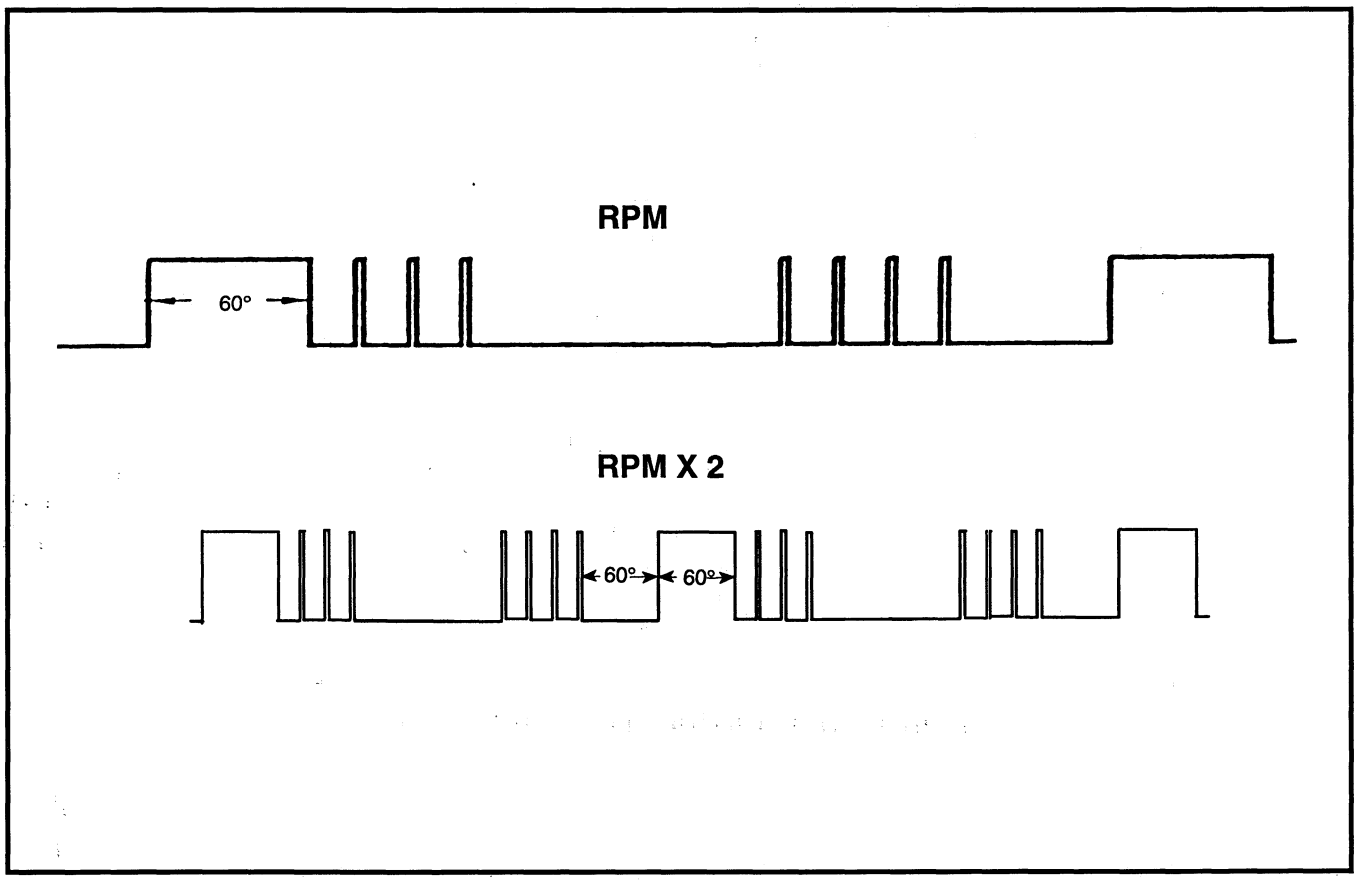


Figure 14 Sensor Data at Different RPM

Camshaft Position Sensor (CPS)

The camshaft position sensor is mounted to the rear of the cylinder head (fig. 15) where the sensor serves the dual purpose of controlling camshaft endplay and sending cam position information to the PCM. Camshaft position information on earlier models used to be determined by a Hall-effect sensor located in the vehicle's distributor. The new positioning of the sensor against the camshaft allows the PCM to receive a more direct reading.

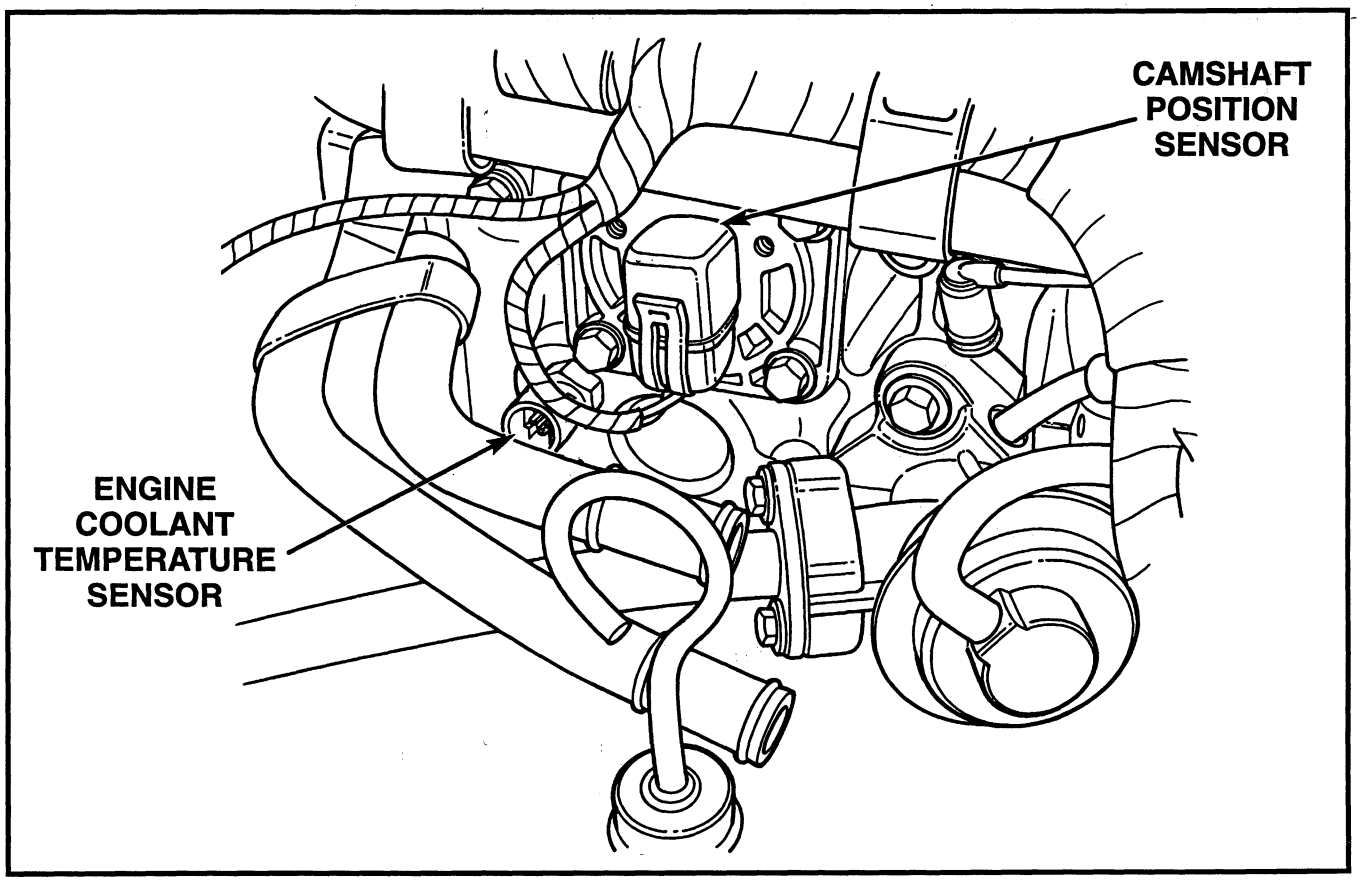


Figure 15 Camshaft Position Sensor

The sensor uses a target magnet attached to the end of the camshaft (fig. 16) to switch sensor output voltage between a high of 5 volts and low of 0.3 volt as the camshaft rotates (fig. 17). When the north pole of the target magnet passes under the sensor, the output switches to high. The output switches to low when the south pole of the magnet passes under the sensor. The uneven distribution of polarity on the target magnet allows the PCM to determine cam position based on these signals.

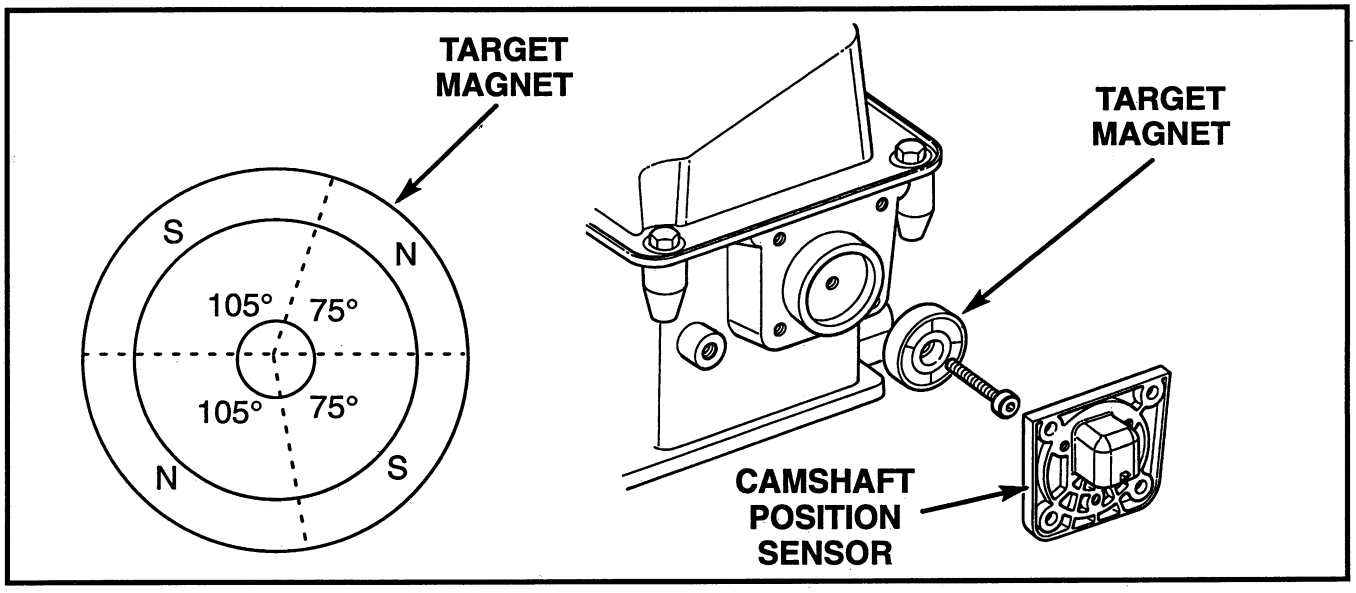


Figure 16 Camshaft Position Sensor with Target Magnet

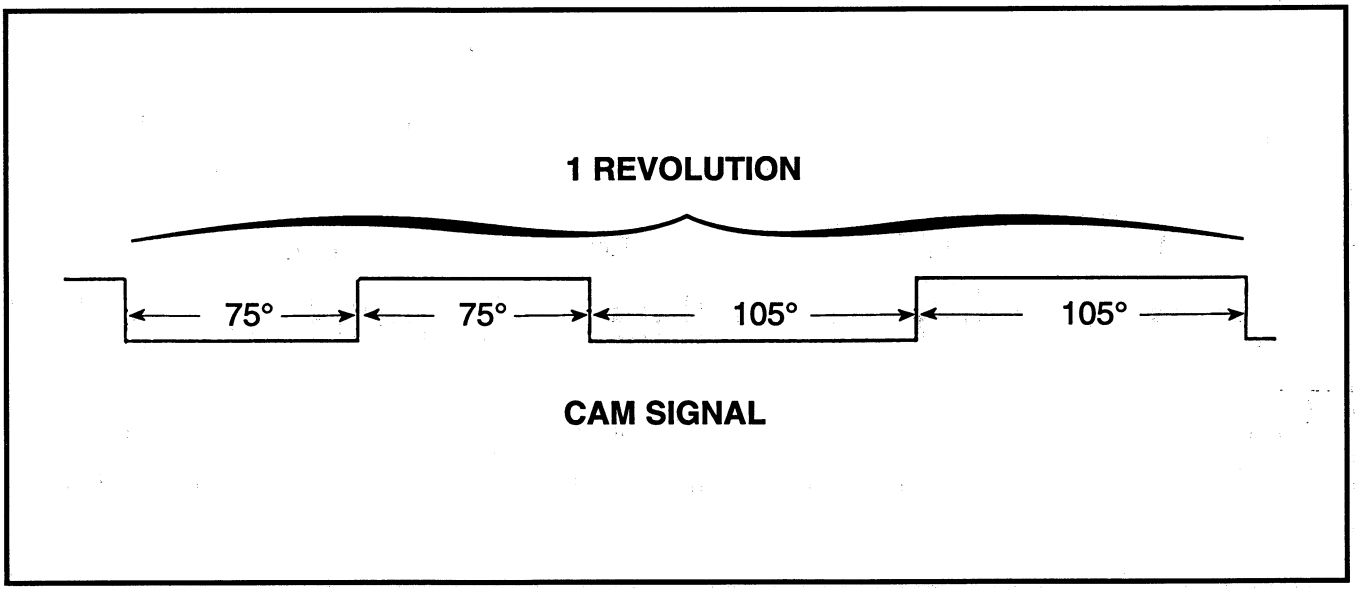


Figure 17 Camshaft Position Sensor Signal

By combining information from both this sensor and the camshaft position sensor, the PCM can accurately determine ignition timing (fig. 18) and monitor for timing belt slip. For example, if the camshaft position sensor switches from high to low when the 60° reference notch passes under the camshaft position sensor, the PCM knows that the next cylinder at TDC is cylinder one. Note the difference in cam and crankshaft rotational speeds as shown by the signals they produce. The crank completes two revolutions for each rotation of the cam.

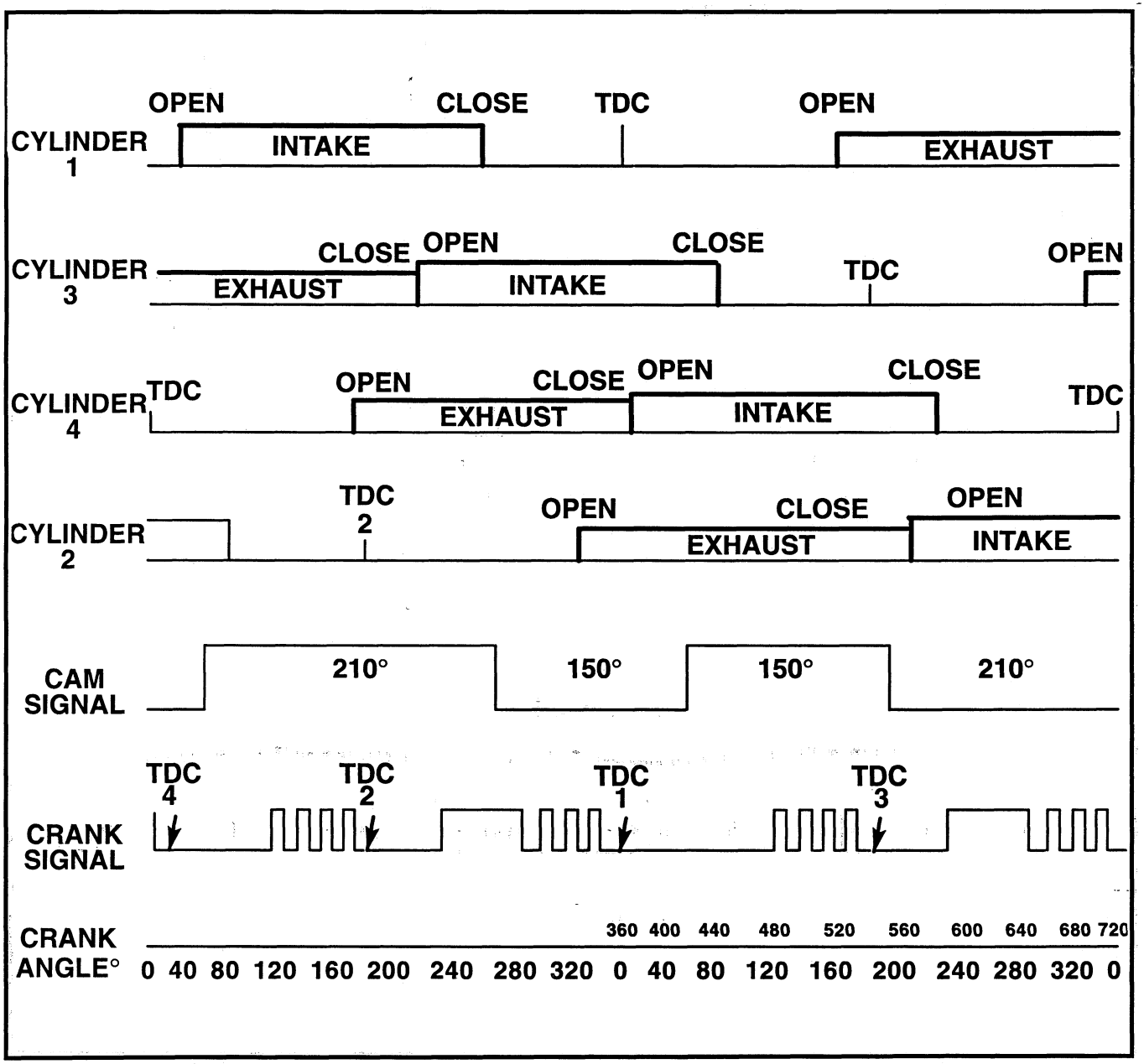


Figure 18 Ignition Timing Chart

Manifold Absolute Pressure (MAP) Sensor
The Neon's MAP sensor is located on the engine's plastic intake manifold, between the intake ports for cylinders 1 and 2 (fig. 19). Previously, four-cylinder engines located the MAP sensor on the bulkhead. Moving the sensor to the manifold eliminates the need for a hose connecting the MAP to the engine and reduces the possibility of moisture contamination.

The MAP serves as a PCM input, using a silicon based sensing unit to provide data on the manifold vacuum that draws the air/fuel mixture into the combustion chamber. The PCM requires this information to determine injector pulse width and spark advance.

The sensor is supplied a 5 volt reference voltage from the PCM and returns a voltage signal to the controller that reflects manifold pressure. During key ON (engine not running) and wide open throttle (WOT) conditions, the sensor reads barometric pressure. As manifold vacuum increases, the MAP sensor input voltage decreases proportionally.

The two fluorosilicone O-rings are susceptible to damage from shipping or careless installation. Care must be taken when removing or installing the MAP sensor.

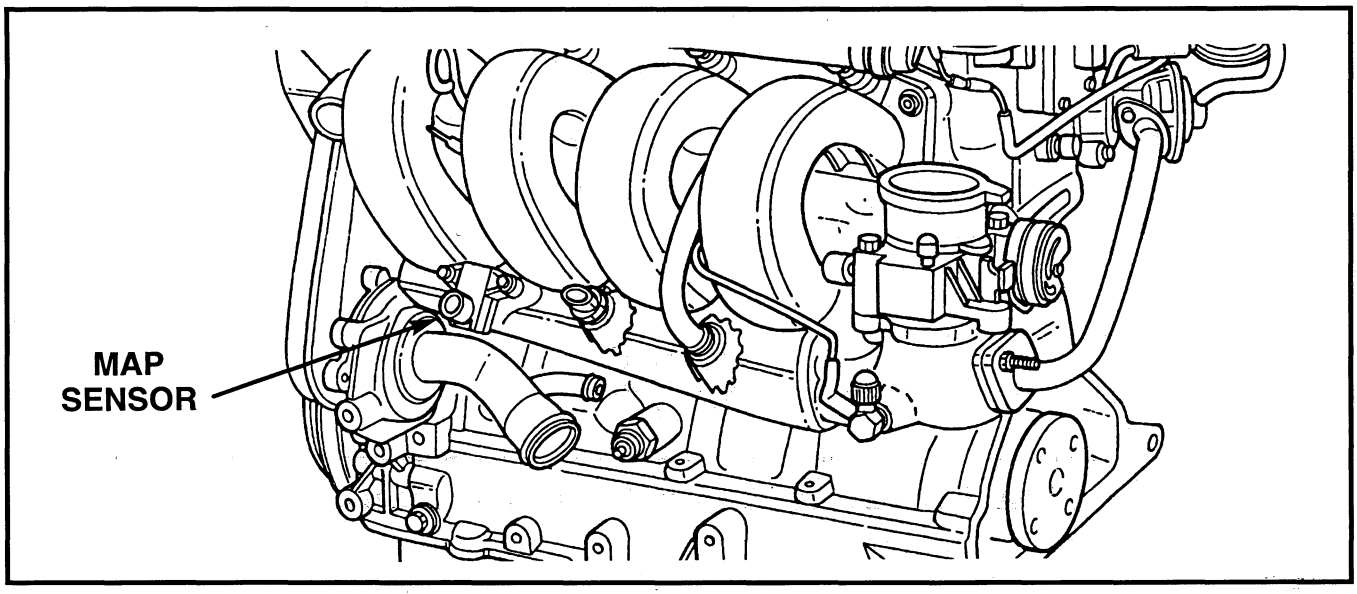


Figure 19 Manifold Absolute Pressure (MAP) Sensor

Engine Coolant Temperature Sensor (ECT)
The coolant temperature sensor is located at the rear of the cylinder head, just below the camshaft position sensor (fig. 20). It is used by the PCM for determining the air/fuel mixture and spark advance. The sensor has a lot of authority over fuel control when the engine is cold. As the engine warms up, its authority diminishes.

This sensor serves a dual purpose as it also provides engine temperature information to the gauge on the instrument cluster through a separate circuit.

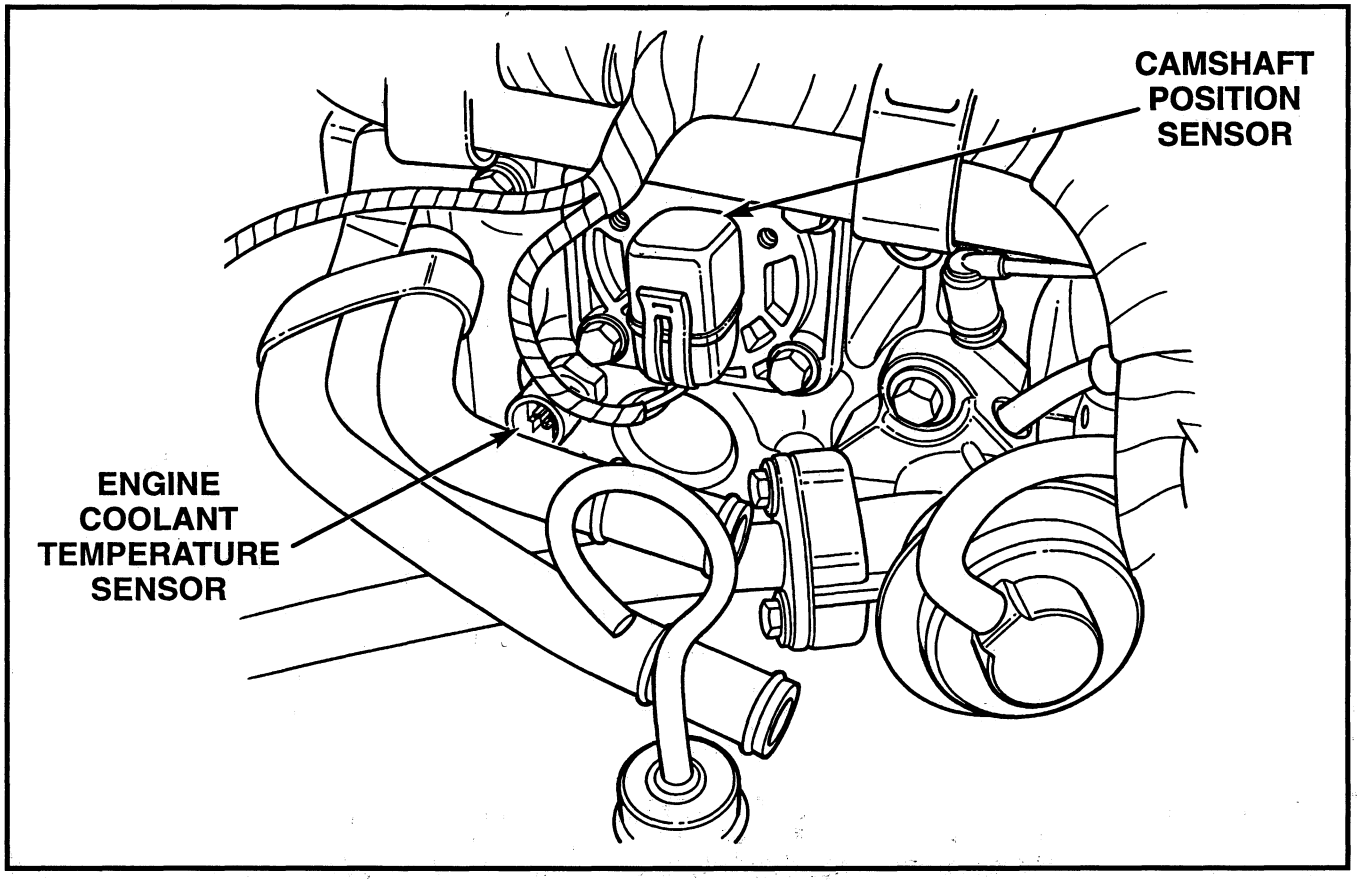


Figure 20 Engine Coolant Temperature Sensor

The sensor's output voltage (table 1) is used for more than just fuel and spark calculations. These applications are listed below:

- Auto Shut Down (ASD) Relay Time
- Determining Idle Air Control (IAC) Motor Key ON Steps
- Determining Pulse Width for the Priming Function
- Oxygen Sensor Closed Loop Timer
- Purge Solenoid On/Off Times
- Radiator Fan Relay On/Off
- EGR Solenoid On/Off times

Table 1. Coolant Temperature Sensor Cold and Hot Temperature vs. Voltage Curves

DEGREES F.	VOLTS		DEGREES F.	VOLTS
-20	4.70V		110	4.20V
-10	4.57V		120	4.00V
0	4.45V		130	4.00V
10	4.30V		140	3.60V
20	4.10V		150	3.40V
30	3.90V		160	3.20V
40	3.60V		170	3.02V
50	3.30V		180	2.80V
60	3.00V		190	2.60V
70	2.75V		200	2.40V
80	2.44V		210	2.20V
90	2.15V		220	2.00V
100	1.83V		230	1.80V
110	1.57V		240	1.62V
120	1.25V		250	1.45V

Intake Air Temperature Sensor (IAT)
This PCM input, mounted on the plastic intake manifold (fig. 21) sends a voltage signal to the PCM based on the temperature of the air about to enter the combustion chamber. This information is important because air density varies with temperature. The PCM uses the information provided to perform the following:

- Alter Injector Pulse Width
- Adjust Spark Timing (to prevent knock with high charge temperatures)

The intake air temperature sensor has the most authority at cold temperatures and during wide-open throttle. At a temperature of -20° F and wide open throttle, the PCM could increase fuel injector pulse width as much as 37% based on input from this sensor.

See Table 1 on the preceding page for voltage values produced by this sensor.

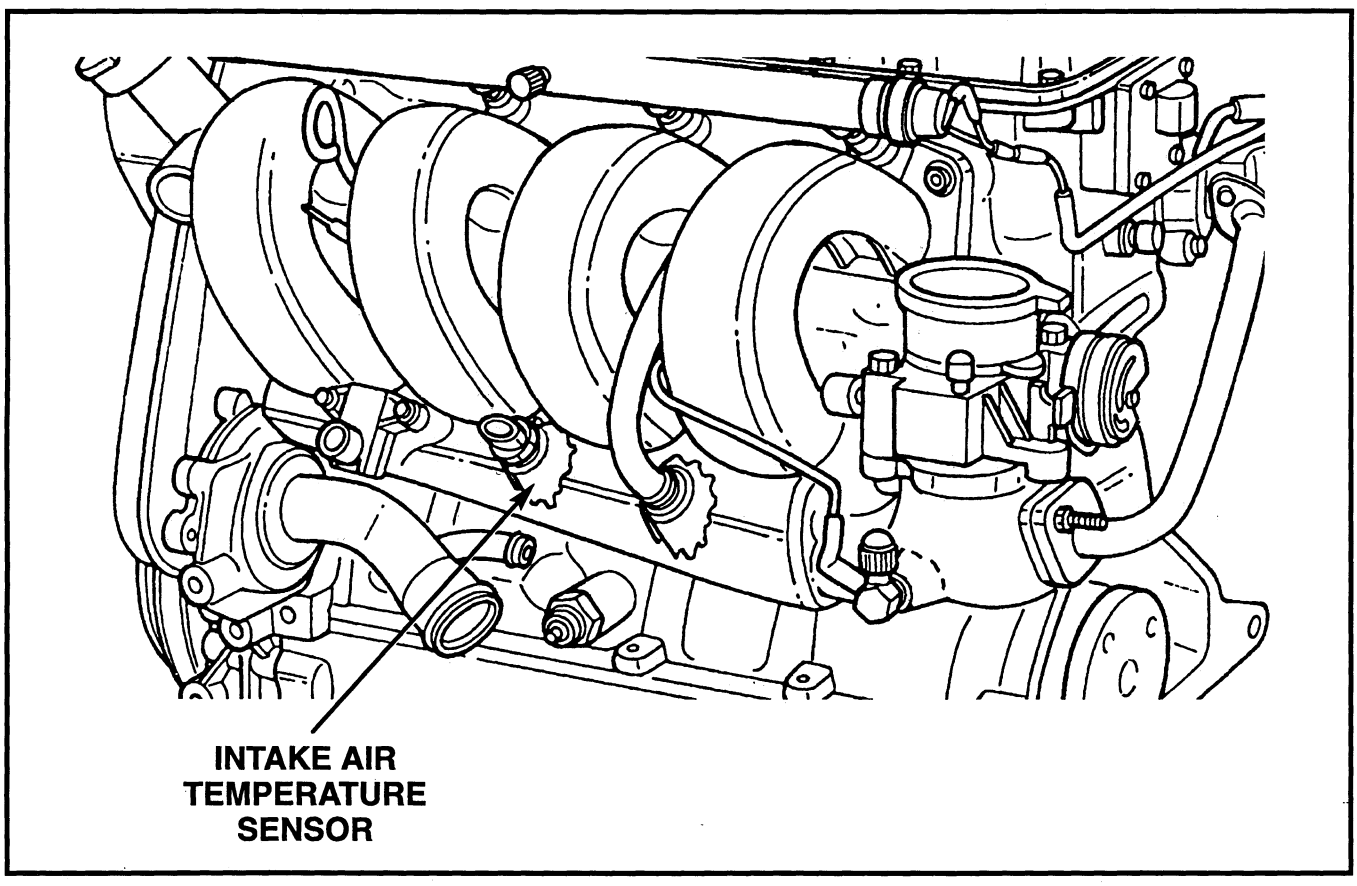


Figure 21 Intake Air Temperature Sensor

Throttle Position Sensor (TPS)
The throttle position sensor is mounted to the side of the throttle body (fig. 22). The sensor consists of a variable resistor that provides the PCM with a voltage signal based on position of the throttle blade. TPS output voltage varies between 0.5 to 1 volt at idle and will have an increase of approximately 3 volts at wide-open throttle (WOT). A TPS exhibiting 0.75 volt at idle would register 3.75 volts at WOT.

The PCM uses the information provided by the TPS to adjust ignition timing and fuel injector pulse width. It also uses throttle position information along with data from other sensors to recognize the following conditions:

- Idle (learned value)
- Off Idle (0.06 volt)
- Wide-Open Throttle (WOT) 2.608 volts above learned idle
- Deceleration
- Fuel Cut-off at WOT – 2.608 volts above learned idle
- A/C Cut-off at WOT

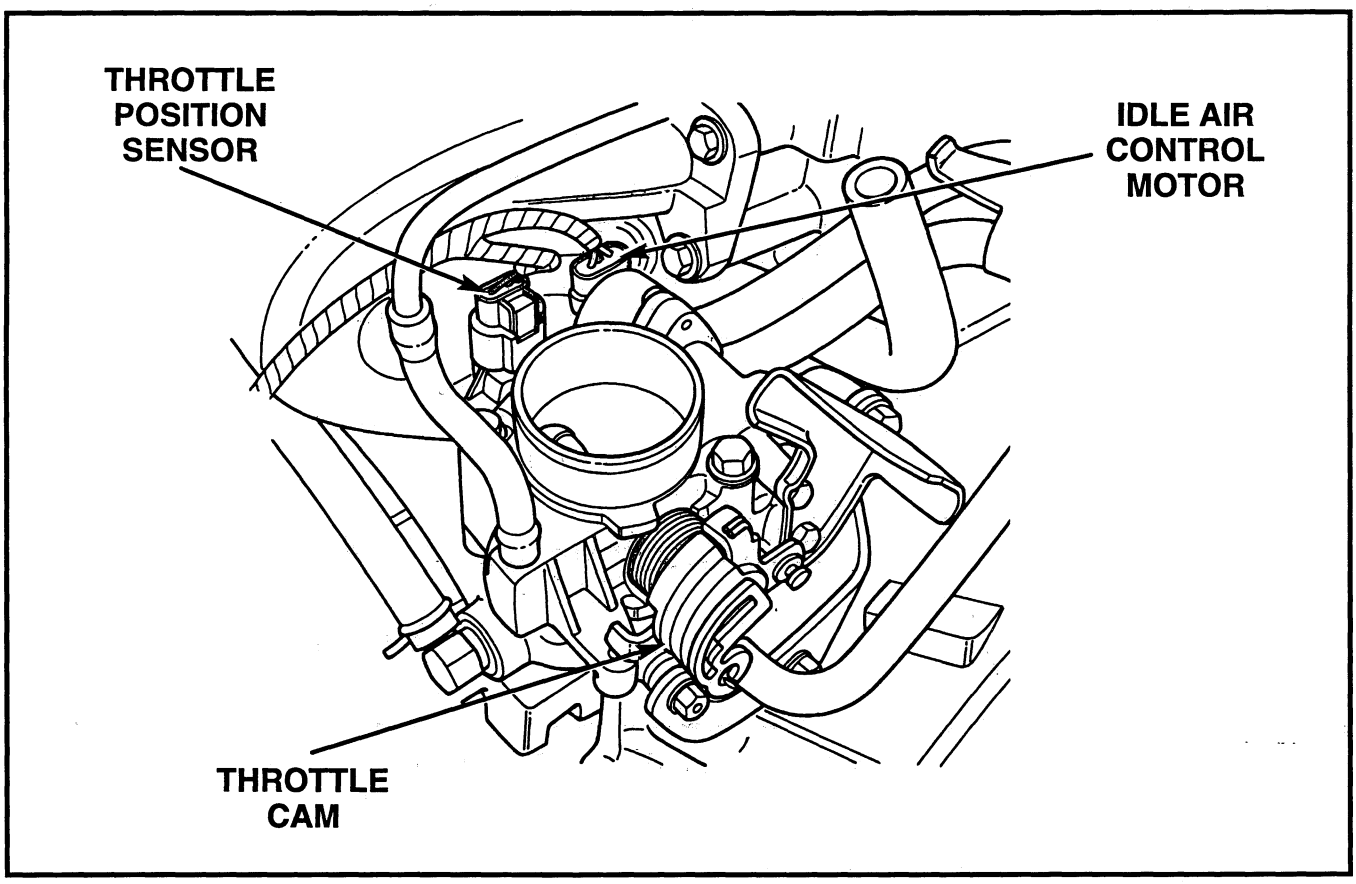


Figure 22 Throttle Position Sensor

Battery Voltage

The PCM monitors battery voltage levels during engine operation. If voltage levels fall, the PCM increases injector pulse width to compensate for low current at the injector. This can prevent the injector plunger from fully opening and restrict fuel flow.

Knock Sensor

The knock sensor is a PCM input located near the starter, on the side of the engine block (fig. 23). The sensor consists of a piezoelectric material that constantly vibrates, sending a voltage signal to the PCM when the engine is operating. The voltage signal produced increases with the frequency of vibration. When the signal reaches a preset threshold, the PCM retards engine timing to reduce engine knock.

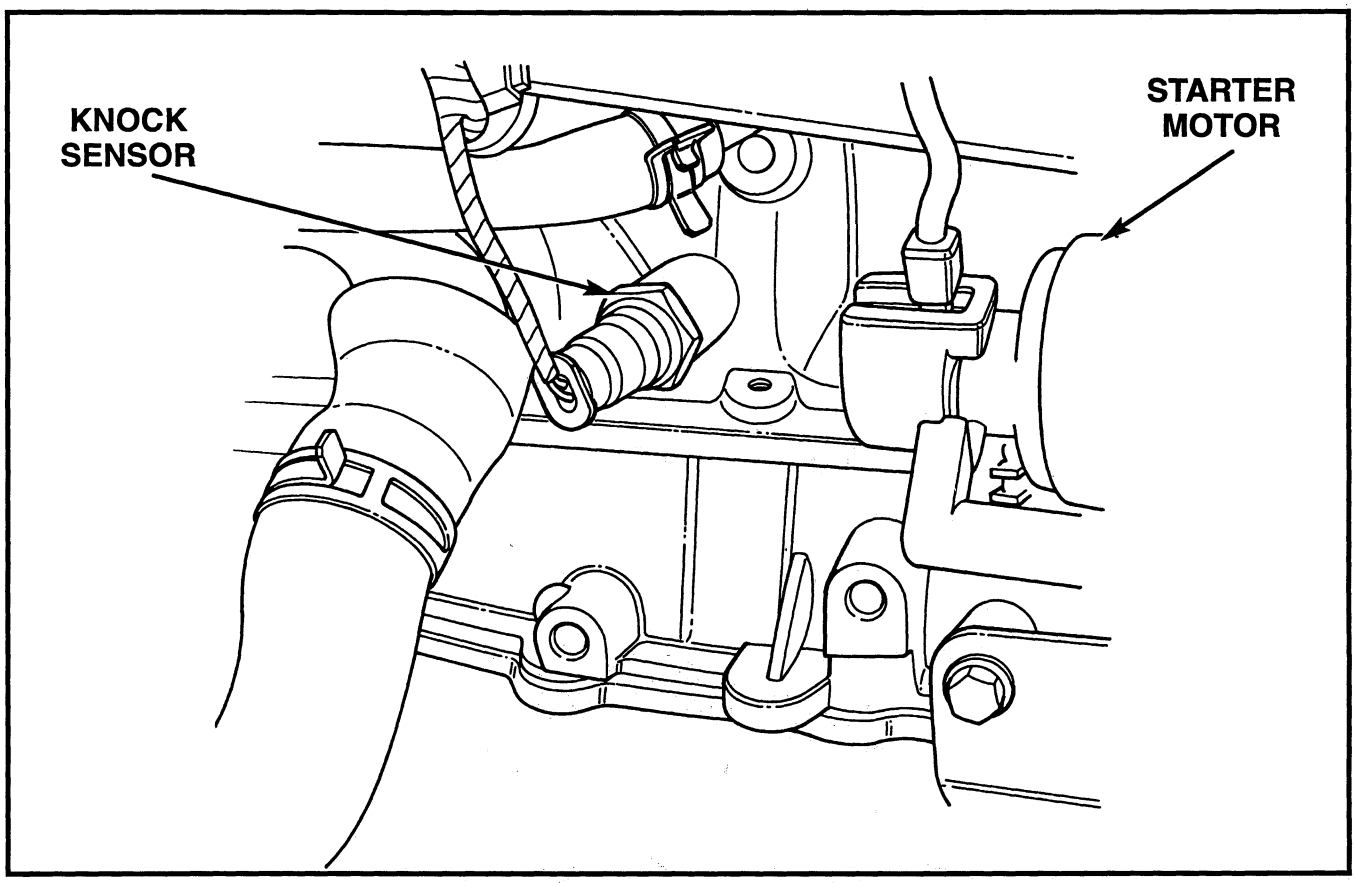


Figure 23 Knock Sensor Location

Oxygen (O_2) Sensors

The Neon uses two heated oxygen sensors (fig. 24) to monitor fuel system and catalyst operation. The "upstream" sensor is located on the exhaust manifold. It provides the PCM with a voltage signal (0-1 volt) inversely proportional to the amount of oxygen in the exhaust. The PCM uses this information to adjust injector pulse width to achieve the air/fuel ratio necessary for proper engine operation. The "downstream" sensor, located just below the catalytic converter, produces a similar signal input to the PCM.

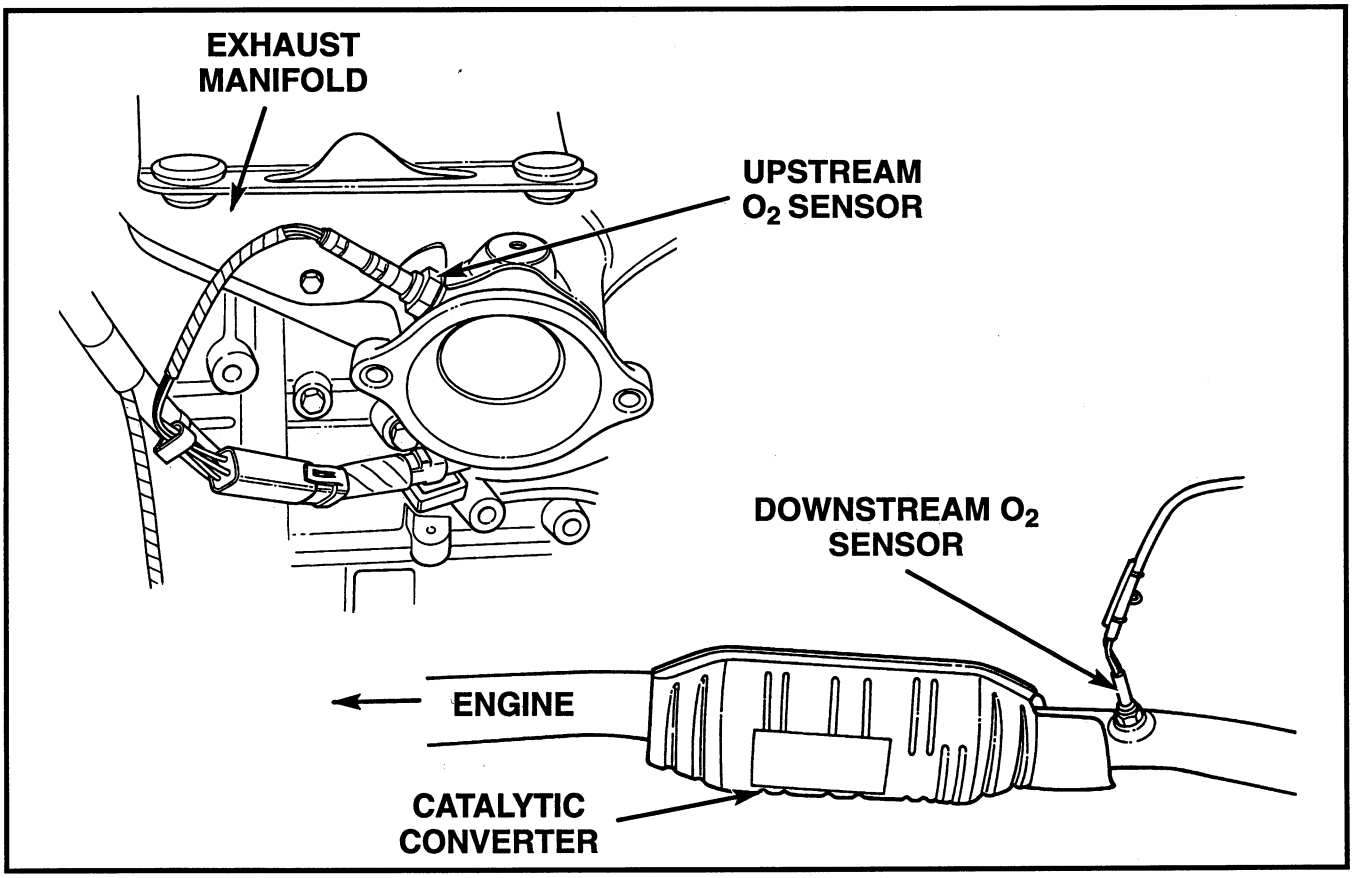


Figure 24 Oxygen Sensor Locations

The PCM can compare the signals produced by the upstream and downstream oxygen sensors to determine the operating efficiency of the catalyst (fig. 25). If the signal produced by the downstream sensor exceeds 90% of the signal value of the upstream sensor, the catalyst is faulty.

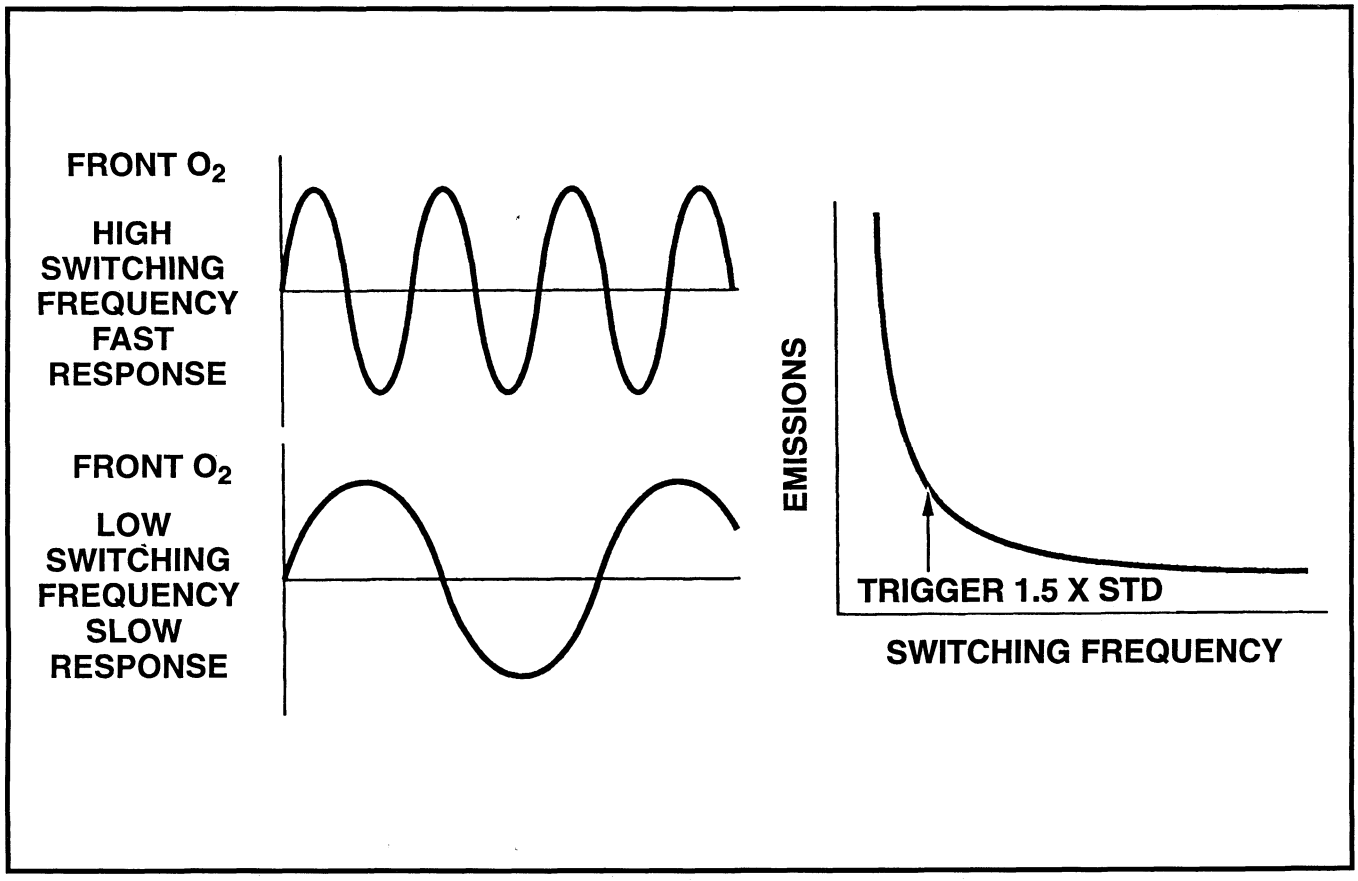


Figure 25 Oxygen Sensor Signal

Vehicle Speed Sensor

Vehicle speed is transmitted to the PCM via the vehicle speed sensor located in the transmission's extension housing (fig. 26). This Hall-effect sensor allows the PCM to determine if the vehicle is idling or in motion. Under deceleration, the PCM adjusts the air/fuel ratio to lean out the emissions. When the proper MAP value has been reached, fuel shut-off could occur. The speed and MAP sensors provide the information that determines when the fuel will be turned back on.

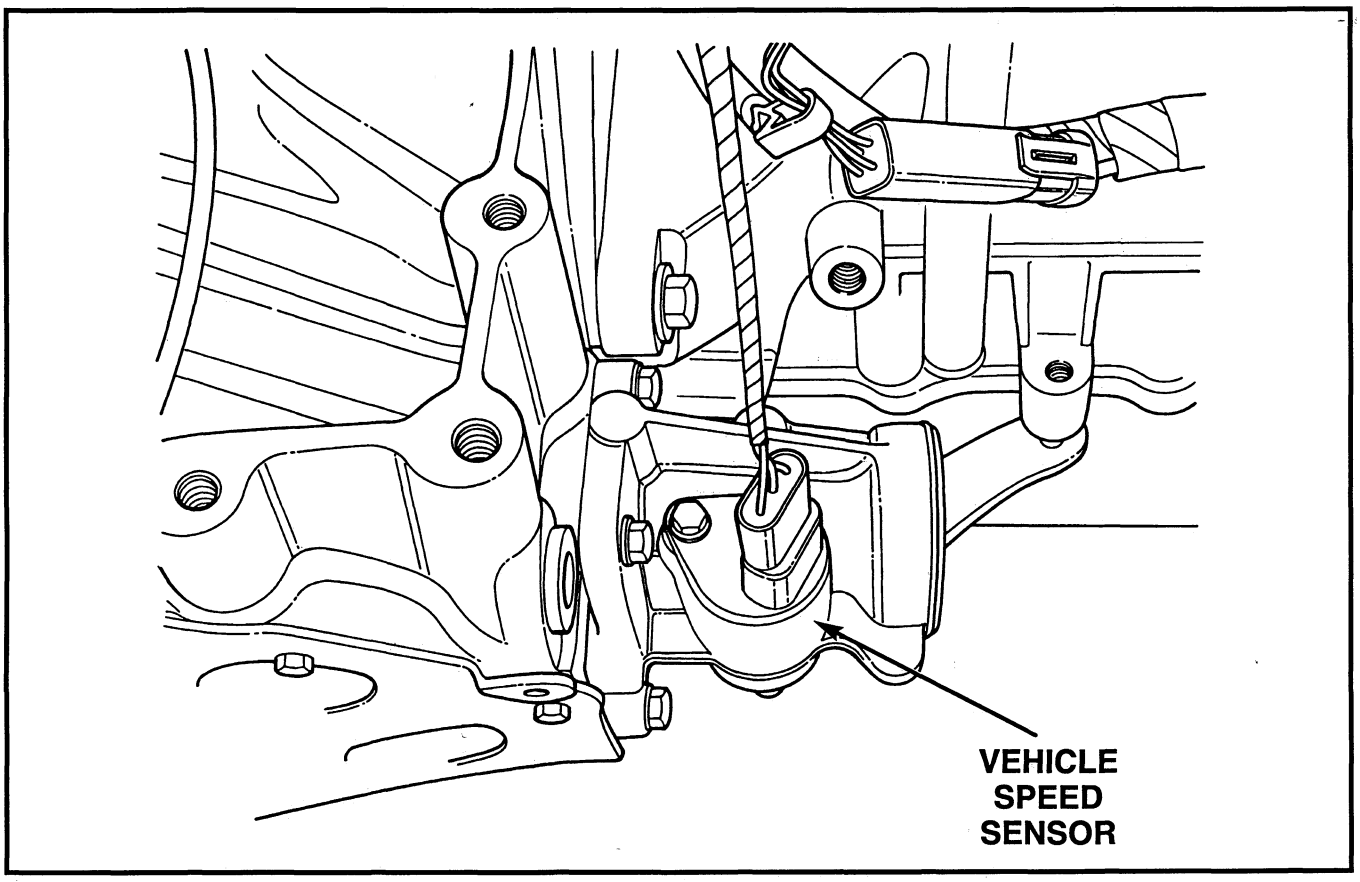


Figure 26 Vehicle Speed Sensor

Brake Switch

The brake switch provides an input to the PCM when the brakes are applied. The signal from the switch is used by the PCM to influence control over the speed control and engine idle speed. If the vehicle speed sensor malfunctions, the PCM may assume that the brake input indicate deceleration, and adjusts the air/fuel ratio accordingly.

Power Steering Pressure Switch

A pressure switch is located on the power steering unit's body to signal periods of high pump load and pressure, such as those which occur during parking maneuvers. This allows the PCM to maintain target idle speed. To compensate for the additional engine load, the PCM increases airflow by adjusting the idle air control motor.

Speed Control

The speed control switch (fig. 27) provides one of five voltage inputs to the PCM to indicate which position (On, Off, Set, Resume, Cancel) the switch is in.

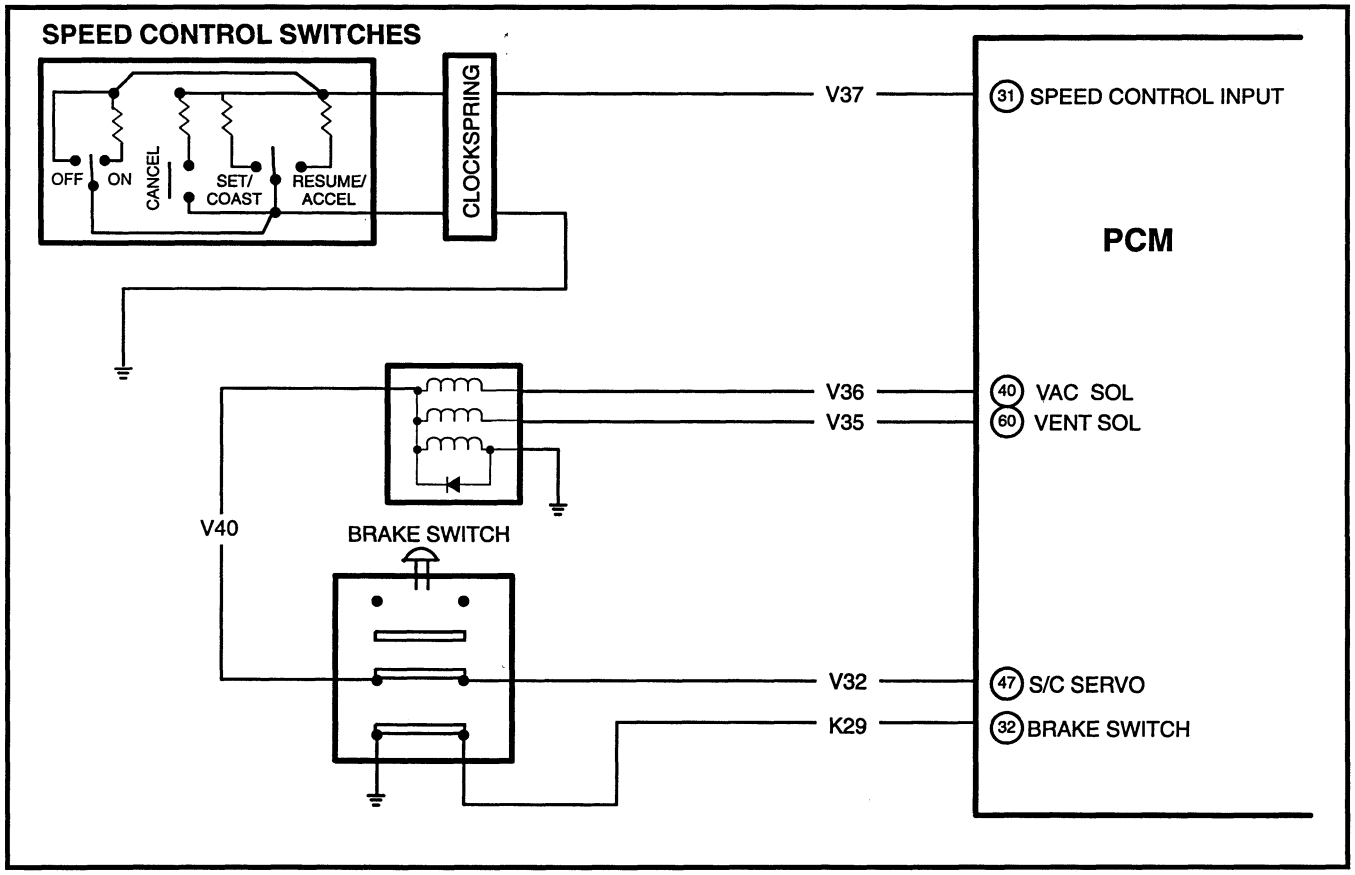


Figure 27 Speed Control Circuit

Air Conditioning Switch

When air conditioning or defrost is selected, the PCM receives an input signal that allows it to ground the A/C clutch relay. This provides power to the A/C clutch. In addition, the PCM adjusts the idle air controller motor to compensate for the increased engine load and maintain target idle.

Park/Neutral Switch (Auto Trans Only)
The Park/Neutral switch on vehicles with automatic transmissions is located on the transaxle housing. The switch indicates transmission gear selection to the PCM which can then vary rpm, fuel injector pulse width, and timing to provide optimum engine performance. The Park/Neutral switch uses the same contacts as the starter relay and provides a path to ground when the vehicle is shifted into PARK or NEUTRAL. When in PARK or NEUTRAL, the PCM will see a ground signal. DRIVE or REVERSE gears produce a voltage signal.

Battery Temperature Sensor
The PCM receives battery temperature input at pin 49 from a sensor mounted to the battery's case (fig. 28).

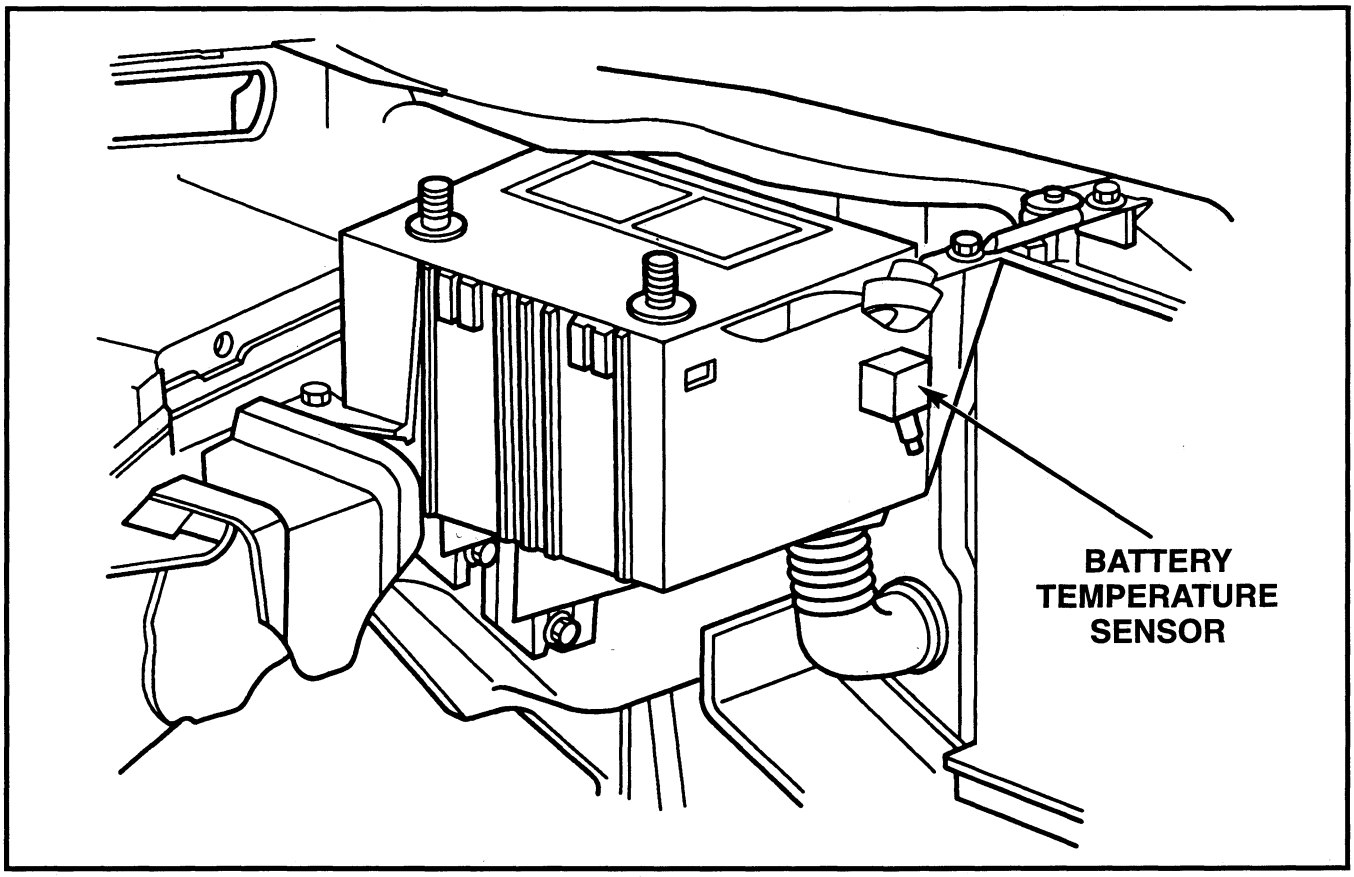


Figure 28 Battery Temperature Sensor

The Battery Temperature Sensor is used to monitor ambient temperature to control the following:

- Alternator Output (13.5 – 15.5V)
- Serves as an aid in OBD II diagnostics

Voltage values for the Battery Temperature Sensor are listed in Table 2.

Table 2. Battery Temperature Sensor Voltages Cold and Hot
Temperature vs. Voltage

DEGREES F.	VOLTS		DEGREES F.	VOLTS
-20	4.70V		110	4.20V
-10	4.57V		120	4.00V
0	4.45V		130	4.00V
10	4.30V		140	3.60V
20	4.10V		150	3.40V
30	3.90V		160	3.20V
40	3.60V		170	3.02V
50	3.30V		180	2.80V
60	3.00V		190	2.60V
70	2.75V		200	2.40V
80	2.44V		210	2.20V
90	2.15V		220	2.00V
100	1.83V		230	1.80V
110	1.57V		240	1.62V
120	1.25V		250	1.45V

ASD Sense Circuit

The PCM receives a battery voltage signal at pin 42 indicating that the automatic shut down (ASD) relay has energized (fig. 29). It uses this input for diagnostic purposes. The PCM provides the relay coil with a path to ground as an output function.

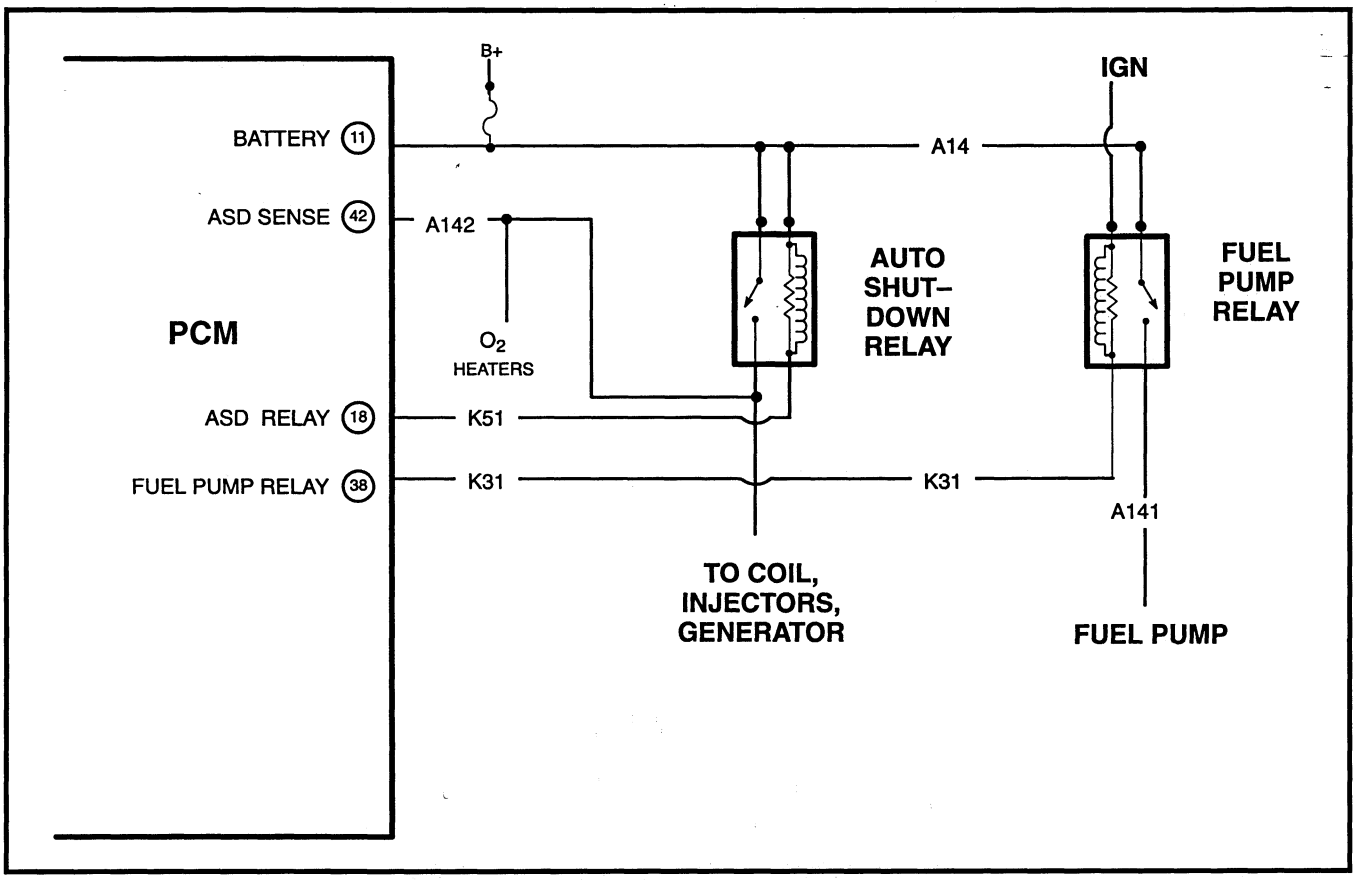


Figure 29 Automatic Shutdown (ASD) Circuit

Sensor Return (Ground)

The PCM contains uses a sensor return circuit to provide an internal ground circuit for system sensors.

PCM Outputs

Malfunction Indicator Lamp (MIL)
The MIL (CHECK ENGINE) lamp is located in the Neon's instrument cluster (fig. 30). Because this vehicle contains an upgraded on-board diagnostic system (OBD II), the MIL can illuminate under a greater number of conditions than on previous models. Operation of the lamp may indicate a significant problem with the vehicle's emissions equipment – it should be serviced immediately. See the On-Board Diagnostics II student reference book or the Diagnostic Procedures book for more information.

The MIL is operated by the PCM and illuminates for a three second bulb test each time the ignition is turned to ON. The MIL lamp remains continuously illuminated when an emission component fails or the vehicle enters the "limp-in" mode. In the limp-in mode, the PCM provides programmed outputs to try and keep the vehicle operational.

The MIL flashes if the on-board diagnostic system detects engine misfire severe enough to damage the catalytic converter. The vehicle should not be driven if this occurs. Finally, the MIL may also be used to access flash diagnostic trouble codes (DTC's).

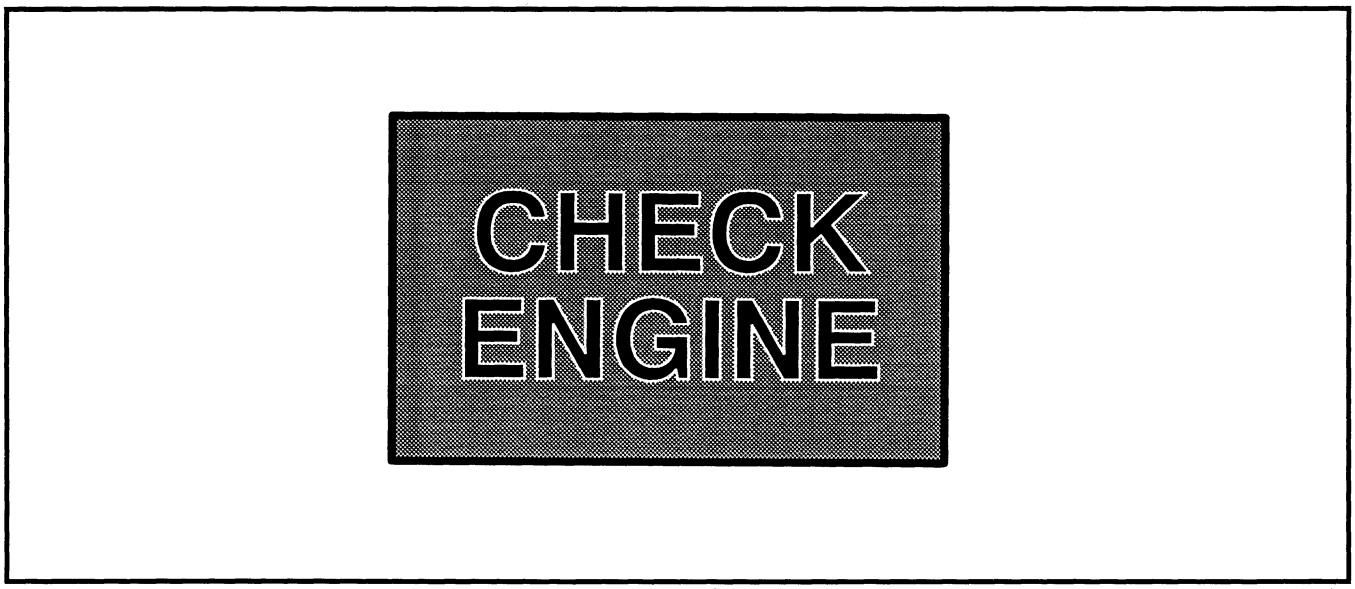


Figure 30 Instrument Panel Malfunction Indicator Lamp (MIL)

Ignition Coil
The PCM provides battery voltage to the coil through the ASD relay. Coil operation is controlled by a ground path provided to each coil by the PCM. See the description of coil operation included in the Fuel Systems Components section of this reference guide for further information.

Fuel Injectors
The PCM provides battery voltage to each injector through the ASD relay (fig. 31). Injector operation is controlled by a ground path provided for each injector by the PCM. Injector pulse width is variable and is determined by the duration of the ground path provided. See the description of fuel injectors in the Fuel System Components section of this reference guide for further information.

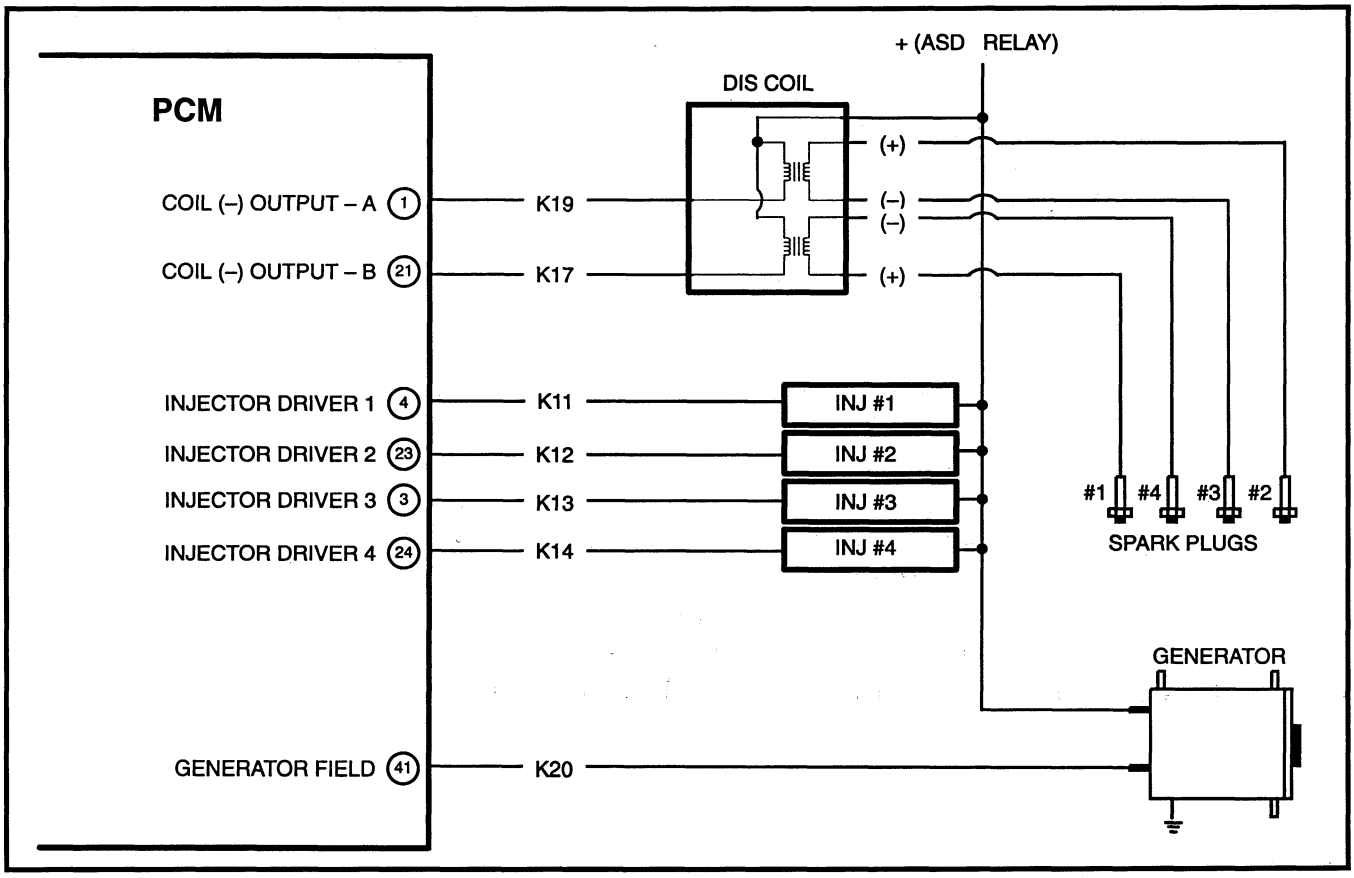


Figure 31 Ignition Coil/Fuel Injection Circuit

Automatic Shutdown (ASD) Relay
On previous Chrysler models, the ASD relay provided power to the ignition coil, injectors, fuel pump, and O_2 heater feed, and also served as a PCM input. In 1992 (1991 on XJ), a fuel pump relay was added to take over the responsibility of providing power to the fuel pump and O_2 heater. At that time, the ASD took on the responsibility of providing power for the generator field.

The Neon still uses both a fuel pump and ASD relay (fig. 32). The ASD relay, located in the power distribution center, reclaims responsibility for the O_2 heaters. It supplies power to both the upstream and downstream O_2 sensor heaters used on this vehicle. The PCM continues to use the ASD relay to supply battery voltage to the coil, injectors, generator field, and PCM ASD input sensor.

The PCM supplies the ground path for the relay when the ignition switch moved to the RUN or crank positions. If the PCM does not receive a signal from the crankshaft sensor when the engine is in the RUN position, the ASD relay's ground path will remain on for ½ – 1 second based upon engine coolant temperature. If the PCM recognizes an rpm signal, the relay will remain energized, providing power to the coil, injectors, generator, O_2 heaters, and PCM pin 42.

When the PCM recognizes the ignition signal return to OFF, it clocks down a timer based on ambient temperature from the Battery Temperature Sensor. Once timed out, the PCM re-energizes the ASD relay to provide power to the O_2 sensor heaters. At this time the PCM performs the test to determine if the heaters are functioning.

Fuel Pump Relay
The fuel pump relay is located in the power distribution center. The PCM controls operation of the relay by momentarily supplying a ground path for the relay's coil when the ignition is turned to the ON position. This allows the fuel pump to prime. During cranking, the PCM looks for a crank signal and energizes the relay. As with the ASD relay, the PCM will shut off the fuel pump relay if the crank signal is lost.

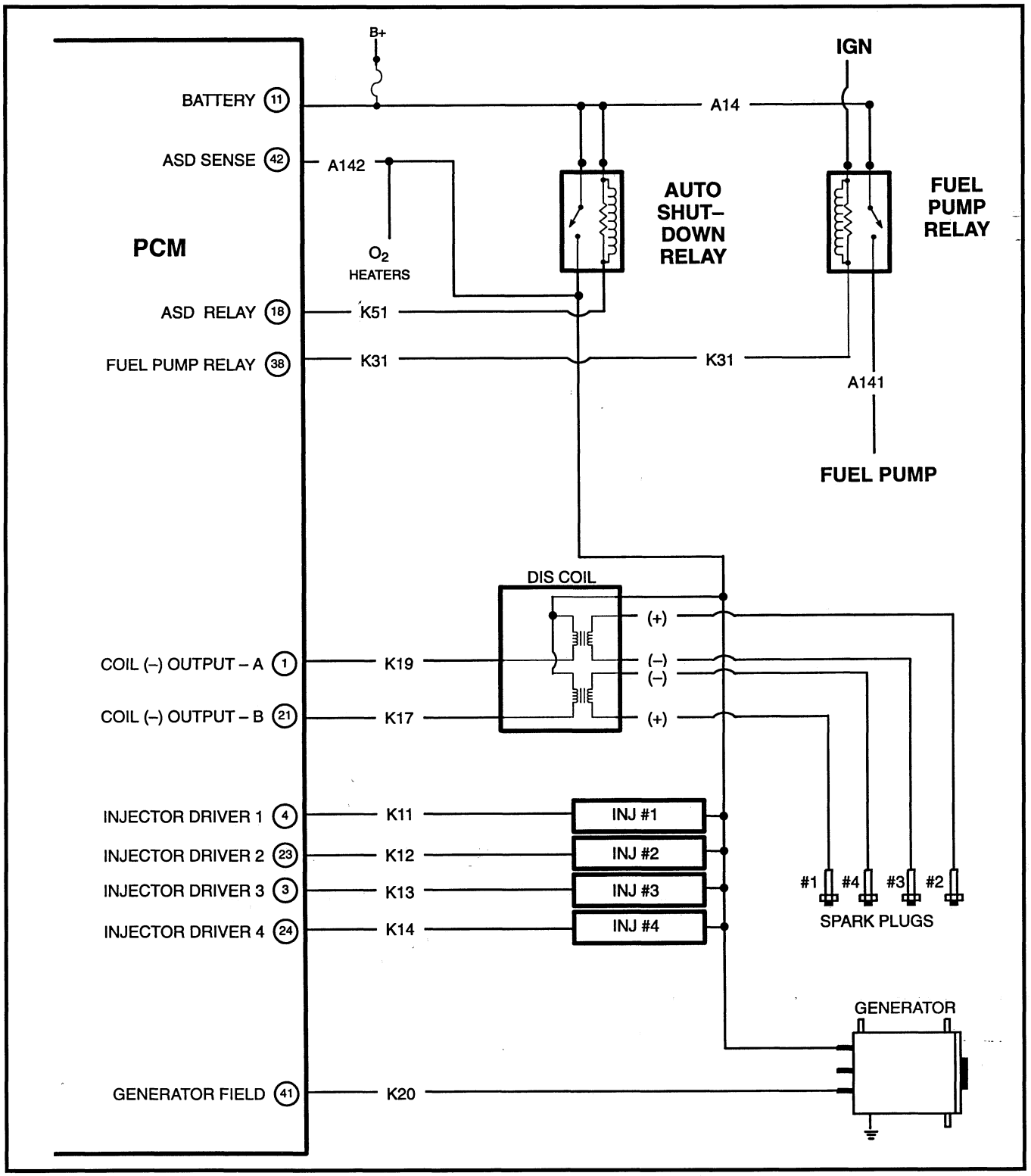


Figure 32 ASD and Fuel Pump Relays

Idle Air Control (IAC) Stepper Motor
The idle air control (IAC) stepper motor is mounted to the throttle body (fig. 33). It is controlled by the PCM and adjusts airflow into the intake manifold to compensate for engine load or ambient conditions.

This is accomplished by regulating the size of an air passage that bypasses the closed throttle plates. A pintle on a stepper motor protrudes into the passage, restricting airflow. Engine speed can be increased by retracting the pintle and allowing more air to pass through the port. Engine speed can be decreased at idle by restricting the passage with the pintle, and diminishing the amount of air bypassing the throttle plate.

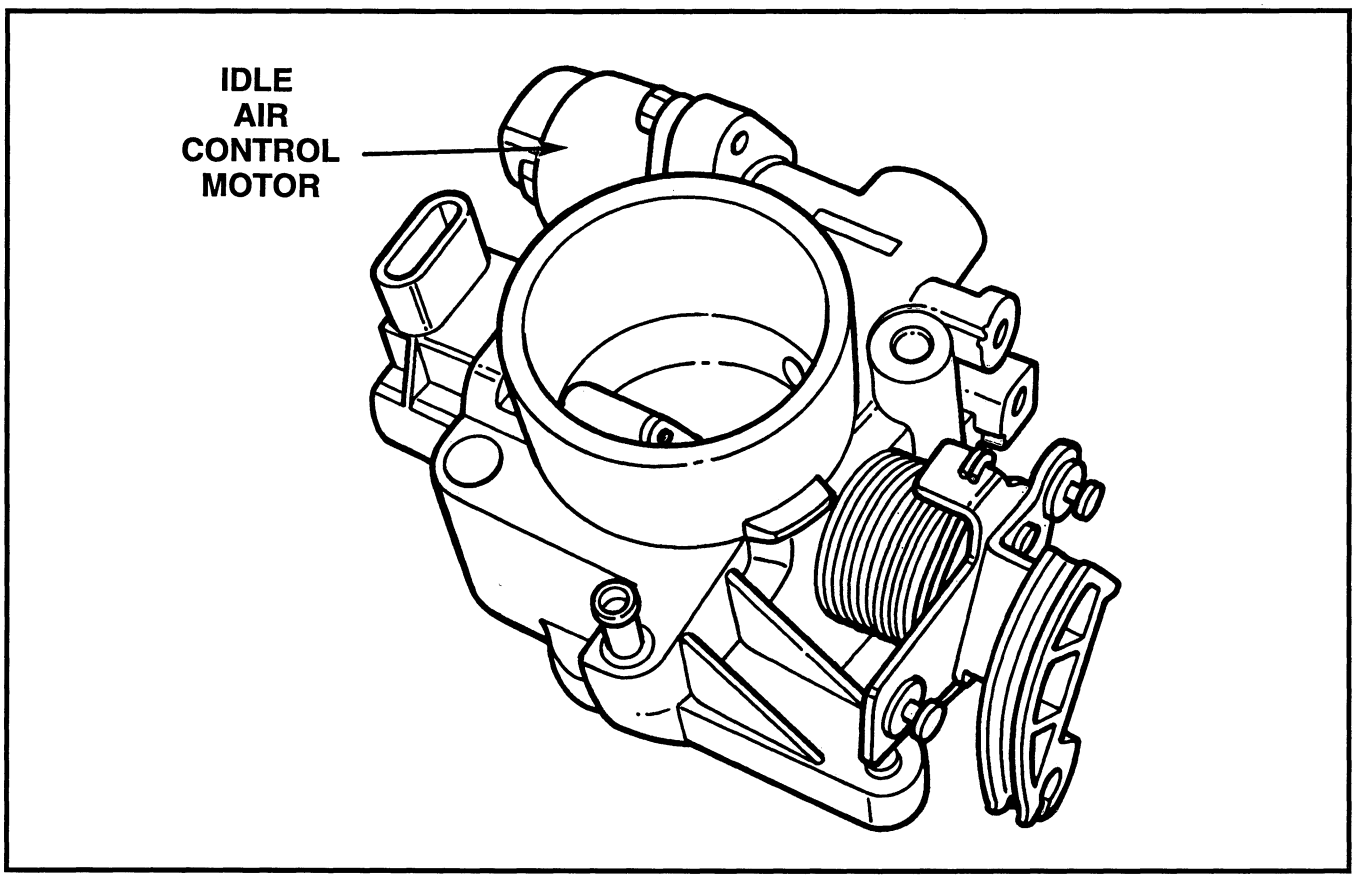


Figure 33 Idle Air Control (IAC) Stepper Motor

Exhaust Gas Recirculation (EGR) Transducer
The EGR valve and backpressure transducer are located at the rear of the cylinder head, near the camshaft position sensor (fig. 34). The PCM provides a ground path which operates the solenoid on the EGR transducer based on inputs from the fuel injection system. When the solenoid is energized, manifold vacuum is not allowed to reach the transducer. De-energizing the solenoid allows vacuum to flow through the transducer, and with appropriate backpressure, the transducer vent closes. This allows vacuum to reach, and open, the EGR valve.

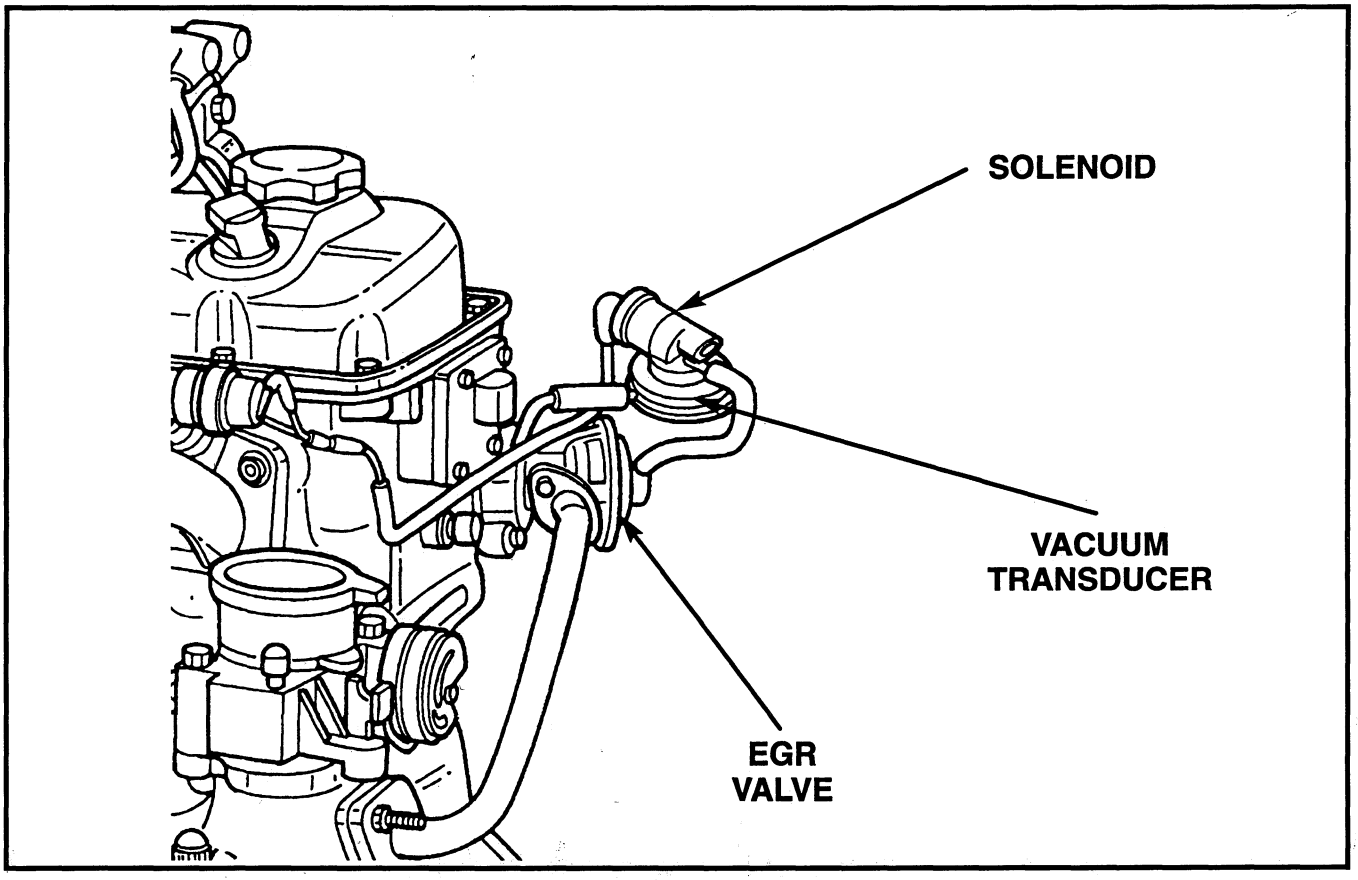


Figure 34 EGR Valve and Transducer

Radiator Fan Relay
The radiator fan relay is located in the power distribution center. The PCM operates the relay based on inputs from the engine coolant temperature sensor and A/C system. The PCM supplies the ground circuit for the relay coil.

The PCM energizes the relay when the coolant temperature reaches 212° F or when the A/C compressor clutch is engaged. The relay's ground path is removed when engine coolant temperature drops below 199° F or when the A/C clutch is disengaged.

Air Conditioning Clutch Relay
Like the radiator fan relay, the air conditioning clutch relay is located in the power distribution center. The PCM provides the ground path for the relay coil. Relay operation is based on inputs the PCM receives from the air conditioning switch. The PCM deactivates the relay at vehicle start-up and also if it senses a part throttle/ wide open throttle launch condition. This temporarily reduces the accessory load on the engine.

Evaporative Purge Solenoid
The purge solenoid, mounted on the passenger side of the engine compartment (fig. 35) regulates vapor flow to the combustion chamber. Operation of the solenoid is controlled by the PCM which provides a ground path that allows the solenoid to open and permit vapor flow.

The PCM will not energize the solenoid during the cold start warm-up period or during the hot start time delay. Once the vehicle enters closed loop operation and delay times have elapsed, the PCM energizes the solenoid approximately five to ten times per second, depending on throttle position, rpm, and engine load. The PCM varies the pulse width signal to the solenoid to control the amount of vapor flow.

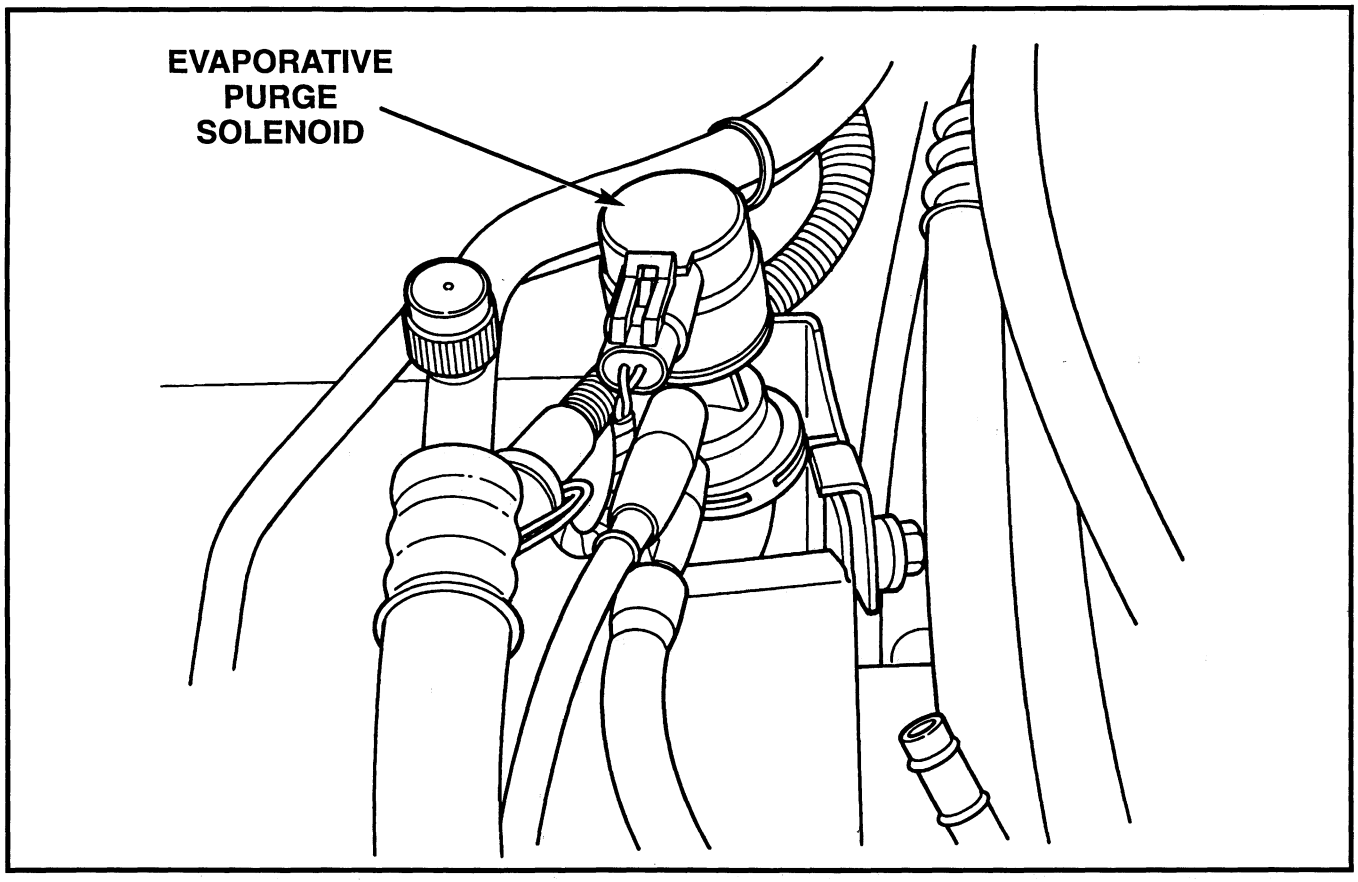


Figure 35 Evaporative Purge Solenoid

Speed Control Solenoids
The speed control vacuum and vent solenoids are operated by the PCM based on vehicle speed inputs into the system. The PCM provides a ground path for the vent and vacuum solenoids during speed control operation. Anytime the brakes are applied, power and ground for the solenoids are removed. When the brake is released, ground for the vent and vacuum circuits is restored only when the RESUME switch has been set.

The PCM powers the speed control when it recognizes an ON signal from the speed control set switch. Power is removed when the OFF button is pressed.

Tachometer
The PCM operates the tachometer on the instrument panel, calculating engine speed based on input from the crankshaft position sensor. The PCM provides duty cycled output voltage to the tachometer, based on engine rpm.

Torque Convertor Clutch Solenoid (Auto Trans Only)
Vehicles equipped with the three speed automatic transmission contain a PCM input to verify operation of the torque convertor clutch solenoid. The PCM controls engagement of the clutch through the solenoid. The automatic transmission will not allow the torque converter clutch to engage if the transmission is not in direct drive.

Charging System Indicator Lamp
The PCM controls operation of the charging system indicator lamp located in the vehicle's instrument cluster. The PCM provides a ground to complete the lamp circuit if the charging output falls below a specified threshold.

Data Link Connector

The PCM maintains communication with scan tools through the vehicle's data link connector (fig. 36). The Neon contains a new 16-way connector for use with the new DRB III diagnostic scan tool. The connector is located at the bottom edge of the vehicle's instrument panel, just below the steering column.

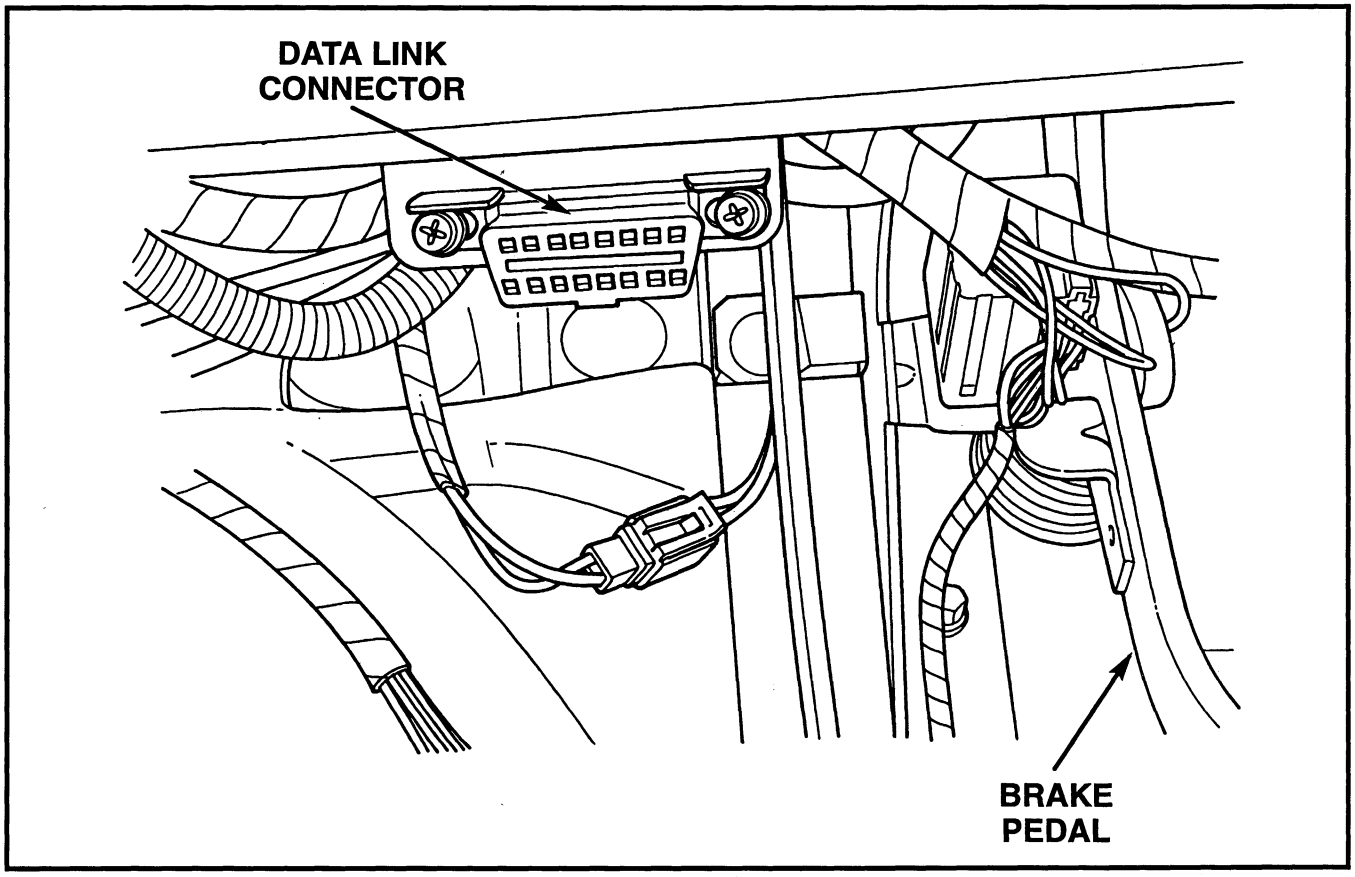
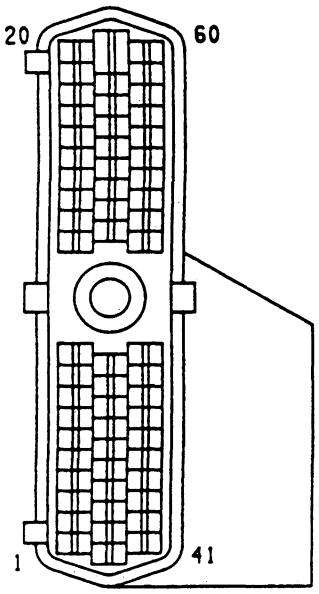


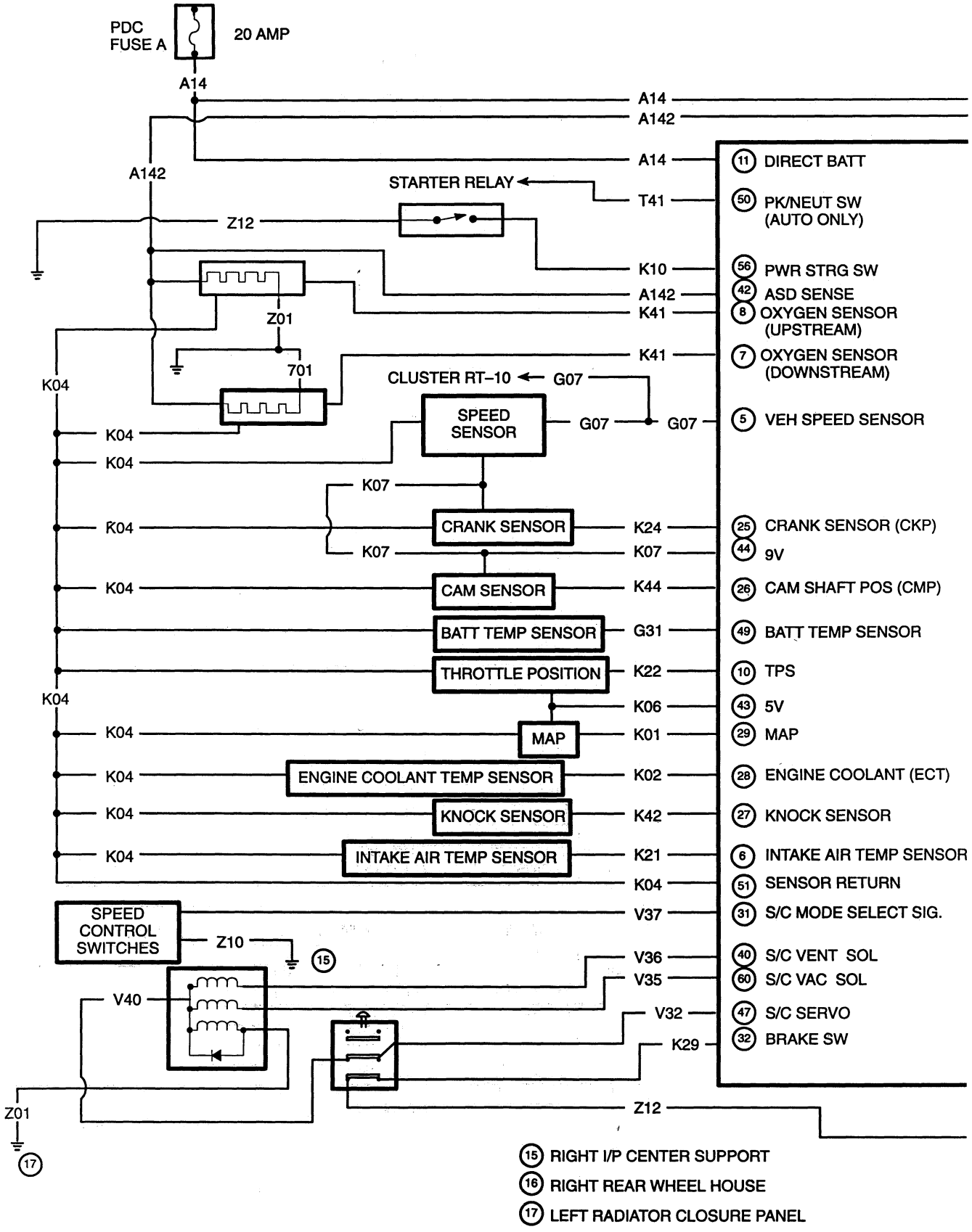
Figure 36 16-Way Data Link Connector



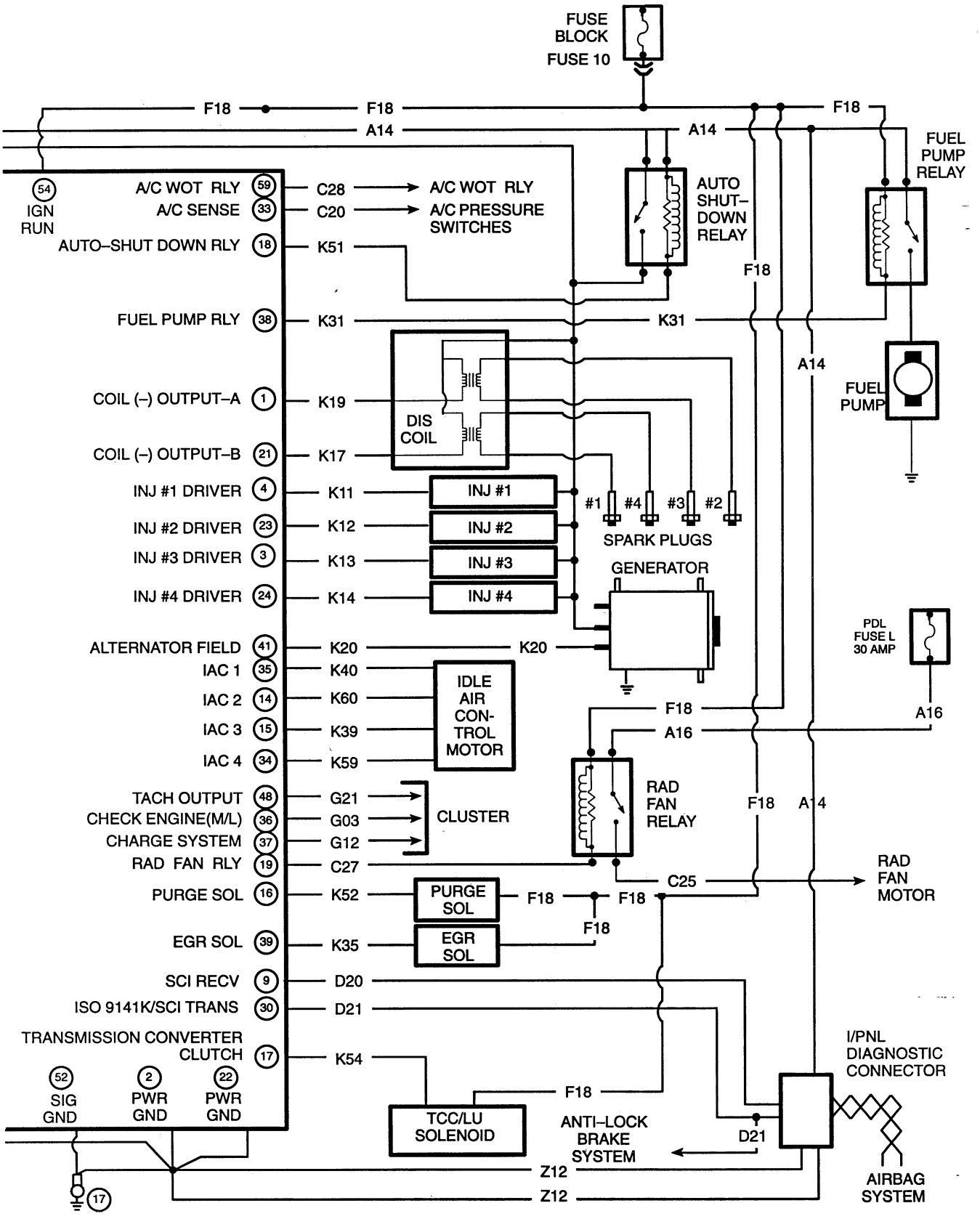
VIEWED FROM
TERMINAL END

CAV	CIRCUIT	FUNCTION
1	K19 20BK/GY*	IGNITION COIL DRIVER
2	Z12 20BK/TN*	POWER GROUND
3	K13 20YL/WT*	FUEL INJECTOR #3
4	K11 20WT/DB*	FUEL INJECTOR #1
5	G7 20WT/OR*	VEHICLE SPEED SENSOR
6	K21 20BK/RD*	INTAKE AIR TEMPERATURE SENSOR
7	K141 20DG/BK*	HEATED OXYGEN SENSOR 2 (DOWNSTREAM)
8	K141 20BK/DG	HEATED OXYGEN SENSOR 1 (UPSTREAM)
9	D20 20LG	DATA LINK
10	K22 20OR/DB*	THROTTLE POSITION (SENSOR)
11	A14 18RD/WT	BATTERY FEED
12	–	–
13	G4	FUEL LEVEL SENDING UNIT
14	K60 20YL/BK*	IDLE AIR CONTROL #2
15	K39 20GY/RD*	IDLE AIR CONTROL #3
16	K52 20PK/BK*	EVAP/PURGE SOLENOID
17	K54 20OR/BK*	TRANSMISSION TCC LU SOLENOID
18	K51 20DB/YL*	AUTOMATIC SHUTDOWN RELAY
19	C27 20DB/PK*	FAN CONTROL RELAY
20	–	–
21	K17 20DB/YL*	IGNITION COIL DRIVER
22	Z12 20BK/TN*	POWER GROUND
23	K12 20TN	FUEL INJECTOR #2
24	K14 20LB/BR*	FUEL INJECTOR #4
25	K24 20GY/BK*	CRANKSHAFT POSITION SENSOR
26	K44 20TN/YL*	CAMSHAFT POSITION SENSOR
27	K42 20BK/LG*	KNOCK SENSOR
28	K2 20TN/BK*	ENGINE COOLANT TEMPERATURE SENSOR
29	K1 20DG/RD*	MAP SENSOR
30	D21 20PK	DATA LINK
31	V37 20RD/LG*	VEHICLE SPEED CONTROL MODE SELECT SIGNAL
32	K29 20WT/PK*	BRAKE SWITCH SENSOR
33	C20 20BR/OR*	A/C SENSE
34	K59 20VT/BK*	IDLE AIR CONTROL #4
35	K40 20BR/WT*	IDLE AIR CONTROL #1
36	G3 20BK/PK*	CHECK ENGINE LAMP (MIL)
37	G12 20TN/BK*	CHARGE SYSTEM LAMP (CLUSTER)
38	K31 20BR	FUEL PUMP RELAY
39	K35 20GY/YL*	EXHAUST GAS RECIRCULATION SOLENOID
40	V36 20TN/RD	VEHICLE SPEED CONTROL VENT SOLENOID
41	K20 18DG	GENERATOR FIELD
42	A142 18DG/OR*	ASD SENSE
43	K6 20VT/WT*	5 VOLTS
44	K7 20OR	9 VOLTS
45	–	–
46	–	–
47	V32 20YL/RD*	VEHICLE SPEED CONTROL SWITCHED IGNITION FEED
48	G21 20GY/LB*	TACHOMETER SIGNAL
49	–	BATTERY TEMP SENSOR
50	T41 20BR/YL*	PARK/NEUTRAL POSITION SWITCH
51	K4 20BK/LB*	SENSOR GROUND
52	Z11 22BK/WT*	SIGNAL GROUND
53	–	–
54	F18 20LG/BK*	IGNITION FEED
55	L1 20VT/OR*	REVERSE INPUT SENSE
56	K10 20WT	POWER STEERING SWITCH
57	–	–
58	–	–
59	C28 20DB/OR*	A/C COMPRESSOR CLUTCH
60	V35 20LG/RD	POSITION FEEDBACK VEHICLE SPEED CONTROL VACUUM SOLENOID

2.0L Fuel, Ignition, and Emissions



2.0L Fuel, Ignition, and Emissions



2.0L Fuel, Ignition, and Emissions

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Technical Service Training is offered year-round, tuition-free, at these Chrysler Corporation Training Centers. The Centers are designed to advance the technical knowledge of Chrysler Corporation authorized Dealers and their personnel. Employees from Fleet Accounts, Municipal and Government Agencies are invited also.

All technical courses are conducted by professional Automotive Service Training instructors using the latest training methods. Courses cover disassembly, assembly, diagnosis, and problem-solving techniques on each subject.

All Chrysler Corporation Dealers are furnished schedules, available through the DIAL system, showing courses offered at the Training Centers. For more information regarding the schedule of courses available, phone or write to the Training Center nearest you, as listed below.

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Tappan, New York 10983

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Training Center Manager
550 Forbes Blvd.
Mansfield, Massachusetts
02048-2038

PHILADELPHIA (Zone Trng Ctr)
Training Center Manager
42 Lee Blvd
Malvern, Pennsylvania 19355

PITTSBURGH (Zone Trng Ctr)
Training Center Manager
P.O. Box 2072
Warrendale, Pennsylvania 15086

RICHMOND (Zone Trng Ctr)
Training Center Manager
5723 Charles City Circle
Richmond, Virginia 23231

ROCHESTER (Zone Trng Ctr)
Training Center Manager
245 Summit Point Dr. Suite 1
Henrietta, NY 14467

ATLANTA (Zone Trng Ctr)
Training Center Manager
3772 Pleasantdale Road
Atlanta, Georgia 30340

ORLANDO (Zone Trng Ctr)
Training Center Manager
8000 S. Orange Blossom Trail
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CHICAGO (Zone Trng Ctr)
Training Center Manager
925 W. Thorndale
Itasca, Illinois 60143

CINCINNATI (Zone Trng Ctr)
Training Center Manager
Enterprise Business Park
2714 E. Kemper Road
Cincinnati, Ohio 45241

MINNEAPOLIS (Zone Trng Ctr)
Training Center Manager
Plymouth Oaks Park
12800 Highway 55
Minneapolis, MN 55441

ST. LOUIS (Zone Trng Ctr)
Training Center Manager
5790 Campus Drive
Hazelwood, Missouri 63042

KANSAS CITY (Zone Trng Ctr)
Training Center Manager
Lenexa Industrial Park
13253 West 98th Street
Lenexa, Kansas 66215

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5141 Santa Ana St.
Ontario, California 91761

DENVER (Zone Trng Ctr)
Training Center Manager
7022 S. Revere Parkway
Englewood, Colorado 80112

SAN FRANCISCO (Zone Trng Ctr)
Training Center Manager
151 Unit "F" Lindbergh
Livermore, California 94550

PHOENIX (Zone Trng Ctr)
Training Center Manager
Arizona Automotive Institute
6829 N. 46th Avenue
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