1982 Exhaust Emission Systems

GENERAL MOTORS 1.9L ENGINE CONTROL SYSTEM

California S-10 & S-15 Pickups Equipped with 1.9L Engine

DESCRIPTION

All California S-10 and S-15 trucks equipped with the 1.9L engine utilize the Closed Loop Emission Control system. It is an electronically controlled system which monitors various engine/vehicle functions to control engine operation and lower exhaust emissions while maintaining good fuel economy and driveability.

The Electronic Control Module (ECM) is the "brain" of this system. The ECM controls engine-related systems, constantly adjusting engine operation to maintain good vehicle performance under normal driving conditions.

NOTE: S-10 and S-15 trucks with 2.8L engine use the Computer Command Control system. See General Motors Computer Command Control article for information.

OPERATION

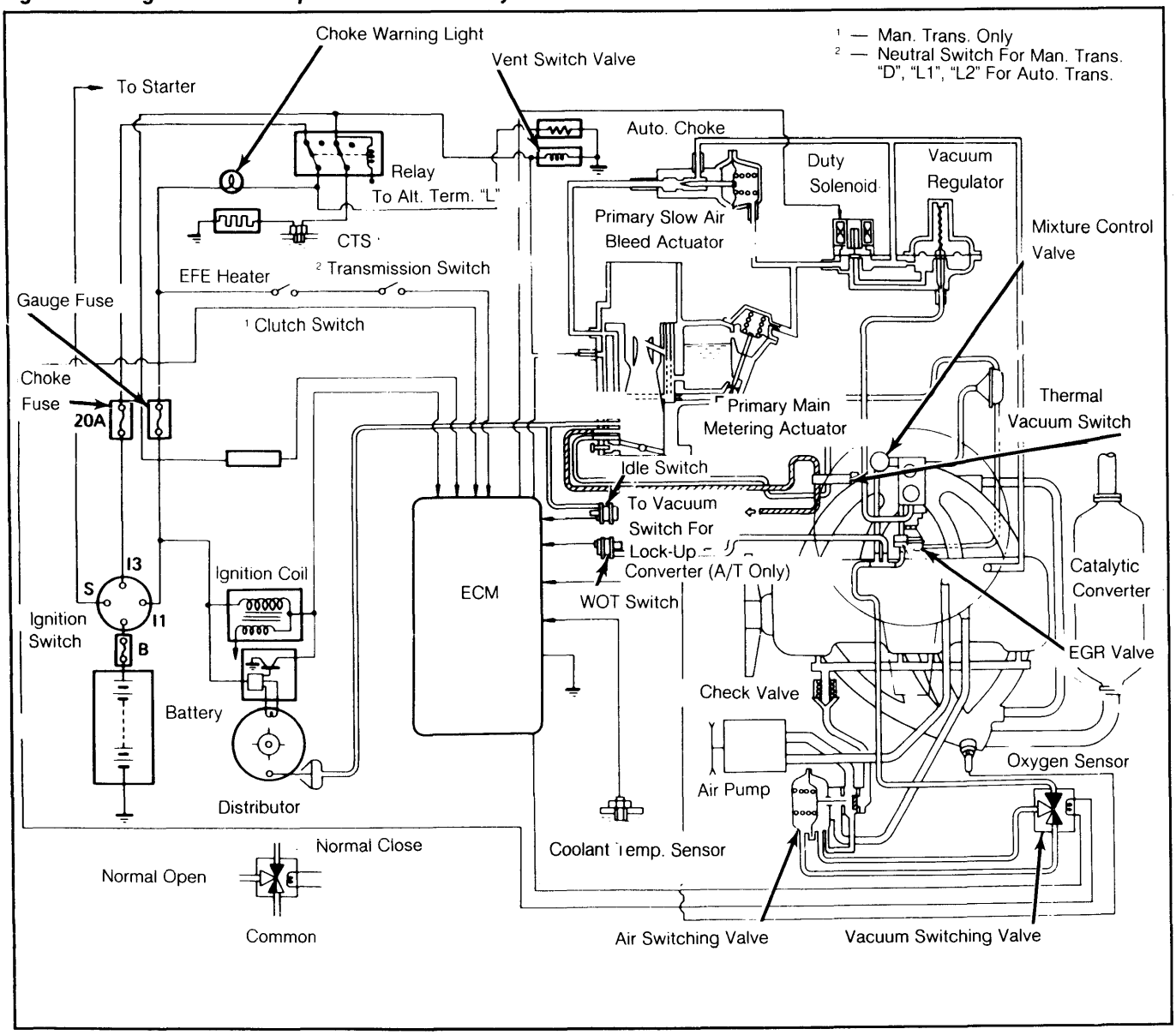
The primary function of the Closed Loop Emission Control system is to maintain an ideal air/fuel ratio of 14.7:1 under all operating conditions. When an ideal ratio is maintained, the catalytic converter can effectively control nitrogen oxides (NOx), hydrocarbons (HC) and carbon monoxide (CO).

The Closed Loop Emission Control system consists of the following sub-systems: Fuel Control, Data Sensors, Electronic Control Module (ECM), Diagnostic System and Catalytic Converter.

FUEL CONTROL

The engine is equipped with a "feedback" carburetor which contains vacuum-operated fuel control actuators. The ECM, responding to inputs from the data

Fig. 1: 1.9L Engine Closed Loop Emission Control System Schematic



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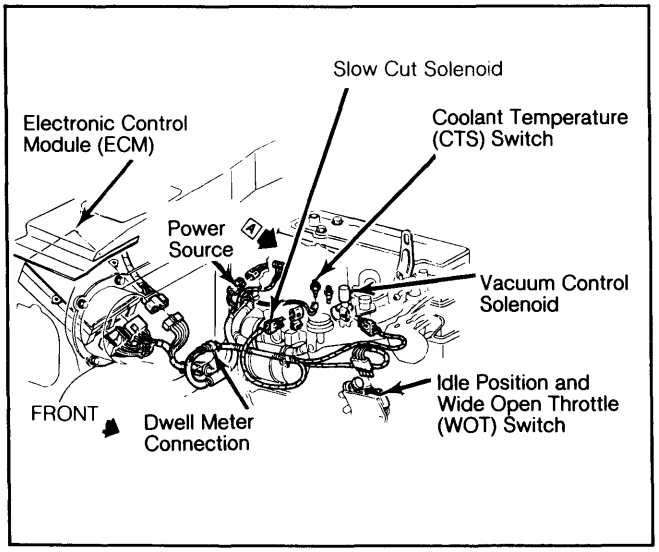
sensors, contantly adjusts the air/fuel ratio to maintain engine performance. The ECM sends electrical signals to a vacuum control valve. The vacuum control valve converts the ECM signals to vacuum signals to operate the actuators.

The vacuum control valve consists of a vacuum regulator and a vacuum control solenoid. The regulator changes the inconsistent vacuum levels from the intake manifold into constant vacuum levels. The solenoid, controlled by the ECM, uses the vacuum from the regulator to operate the fuel control actuators.

When the ECM adjusts fuel mixture based upon signals received from the oxygen sensor, the system is in closed loop operation. Under certain operating conditions, the ECM may ignore inputs from various data sensors and use a pre-programmed calibration control to operate the engine. During cold engine starts, the vacuum control solenoid is turned off by the ECM to provide a rich mixture. Operating conditions which cause the ECM to ignore oxygen sensor signals cause the system to operate in the open loop mode.

Although not a major component of the fuel control system, a vacuum-operated mixture control (M/C) valve is mounted on the right side of the engine. The M/C valve prevents backfiring during deceleration by admitting air from air pump into manifold when the throttle valve is suddenly closed. The M/C valve is closed under normal operating conditions. When vacuum in the intake manifold increases rapidly, the valve opens, allowing air from the air pump into the intake manifold.

Fig. 2: Data Sensor Locations on 1.9L California Engine



DATA SENSORS

Each sensor furnishes information to the ECM. The ECM computes the fuel mixture ratio necessary to maintain proper engine operation based on sensor information. The function of each sensor is closely related to that of the other sensors. The operation of each sensor is as follows:

Oxygen Sensor

This sensor is mounted in the exhaust manifold. It supplies a low voltage when fuel mixture is lean (too much oxygen) and a higher voltage when fuel mixture is rich (not enough oxygen). Oxygen sensor must be over 600°F (315°C) to function properly. The oxygen sensor measures quantity of oxygen only.

No attempt should be made to measure oxygen sensor voltage output. Current drain of conventional voltmeters could permanently damage sensor, shift sensor calibration range and/or render sensor unusable. Do not connect jumper wire, test leads or other electrical connectors to sensor. Use these devices only on ECM side of harness after disconnecting from sensor.

Coolant Temperature Sensor (CTS)

The CTS is located in the engine coolant stream to supply coolant temperature information to ECM. This information is used by the ECM to determine when the system is ready to go into closed loop and to determine operation of the secondary air injection system.

Idle Position Switch

The Idle Position Switch is vacuum-controlled. It is mounted on a bracket on right side of engine compartment (next to coil). This switch senses intake manifold vacuum and sends an electrical signal to the ECM in relation to the amount of manifold vacuum. The ECM uses this information to distinguish between closed throttle (idle) and open throttle positions.

Wide Open Throttle (WOT) Switch

This switch is mounted on the same bracket as the Idle Position Switch. Like the Idle Position Switch, this switch senses intake manifold vacuum and sends an electrical signal to the ECM when the engine is at WOT. This information is used by the ECM to distinguish between closed throttle (idle) and wide open throttle positions.

Transmission Gear Position Switch

This switch is mounted on the transmission to inform the ECM when the transmission is in neutral position on manual transmission models or in "D", "L1" or "L2" on automatic transmission models. This information is used by the ECM for fuel control.

Clutch Pedal Position Switch

This switch is mounted on pedal assembly of manual transmission models to inform the ECM when the clutch pedal is engaged/disengaged. This information is used in conjunction with the Transmission Gear Position Switch for fuel control.

ELECTRONIC CONTROL MODULE (ECM)

The ECM is located in the passenger compartment (behind glove compartment) and controls all functions of the Closed Loop Emission Control system. The ECM sends an electrical signal to the vacuum control solenoid, which controls the air/fuel mixture by vacuum signals. This control signal is constantly cycling the solenoid between "on" and "off" time (duty cycle) as a function of the input voltages from the data sensors. The control signal generated by the ECM is selected from 4 operational modes. These modes include: Inhibit Mode, Enrichment Mode, Open Loop Mode and Closed Loop Mode. A brief description of each mode follows:

- **Inhibit Mode**
  No electrical signals are sent to the vacuum control solenoid by the ECM in this mode.
- **Enrichment Mode**
  In this mode a fixed, pre-programmed duty cycle electrical signal is sent to the vacuum control solenoid by the ECM. This signal is sent to the solenoid when fuel enrichment is necessary for cold engine starts or sudden acceleration.

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- **Open Loop Mode**
  In this mode the ECM sends electrical signals to the vacuum control solenoid based upon stored information within the ECM. This information has been calculated and is used by the ECM to operate the engine at optimum efficiency for that particular operating condition of the engine, without any input from the data sensors. Open loop mode is used when the engine has not reached operating temperature.
- **Closed Loop Mode**
  In this mode the ECM sends an electrical signal to the vacuum control solenoid based upon input from the oxygen sensor and other data sensors. In closed loop, the air/fuel mixture is controlled directly by the ECM in response to oxygen sensor signals.

During any operating mode, the ECM maintains the current duty cycle being used within its memory; for either idle or off-idle operation. When the ECM receives a change in idle position, as signaled by the Idle Position Switch or WOT Switch, the ECM retrieves data from its memory to operate the engine at the duty cycle last recorded for optimum operation. After the initial change in idle position, the ECM then controls the system in one of the 4 operational modes.

The ECM also controls operation of the slow cut solenoid valve incorporated within the carburetor. When the ECM senses a coasting condition (based upon signals received from the Transmission Gear Position Switch, Clutch Pedal Position Switch and Idle Position Switch), it opens the circuit to the slow cut solenoid valve (engine speed above a predetermined value). The circuit to the slow cut solenoid valve is cut off only when the following 4 conditions exist at the same time:

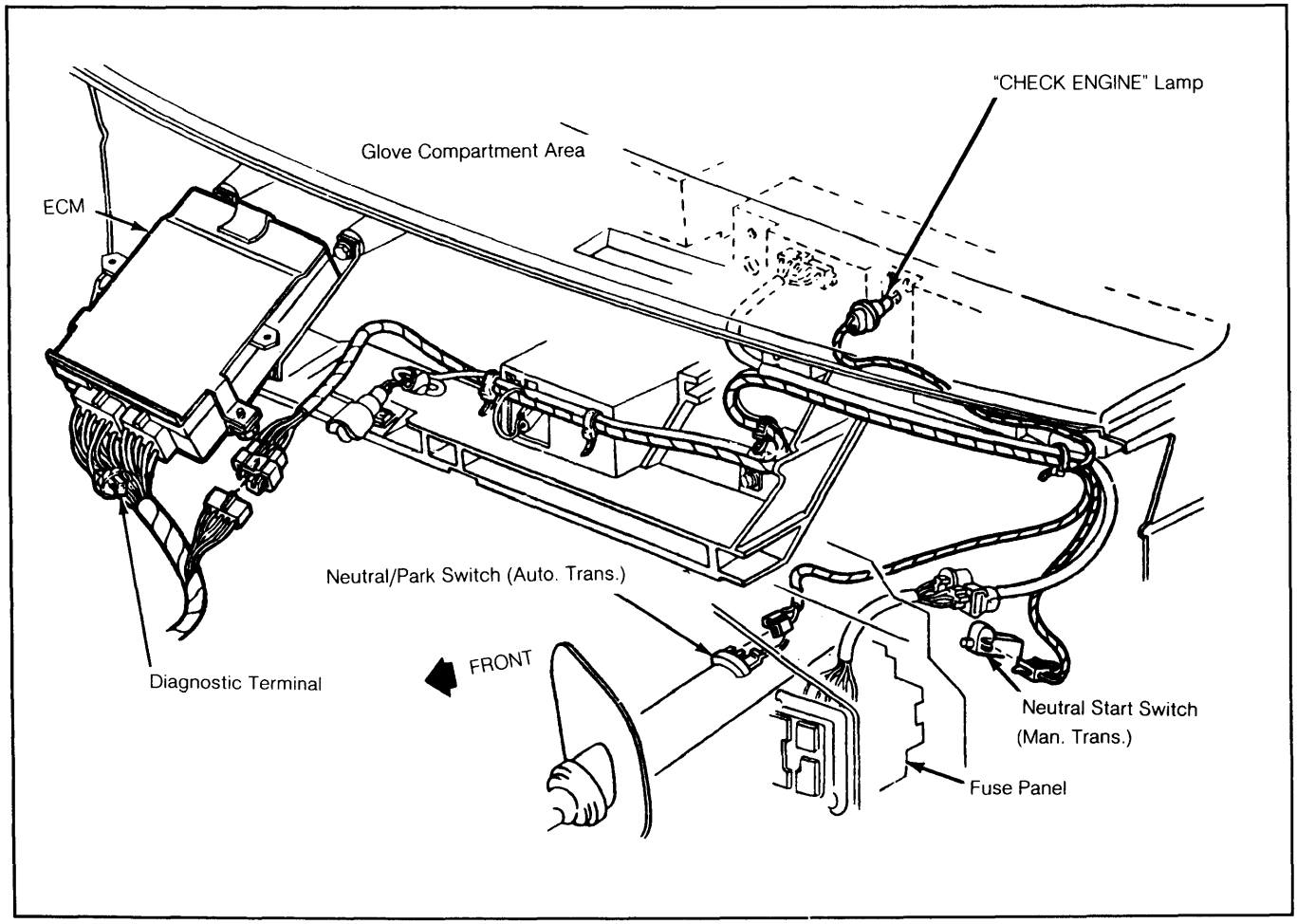
- Transmission is not in Neutral (man. trans.) or in "N" or "P" (auto. trans.).
- Clutch is engaged on manual transmission models.
- Throttle is at idle position.
- Engine speed exceeds predetermined speed.

DIAGNOSTIC SYSTEM

The ECM of the Closed Loop Emission Control system is equipped with a self-diagnostic system which detects system failures or abnormalities. When a malfunction occurs, the ECM will light the amber "CHECK ENGINE" lamp located on the instrument panel. At the same time, a corresponding trouble code is stored in ECM memory. Malfunctions are recorded as "hard failures" or "intermittent failures".

- "Hard failures" cause "CHECK ENGINE" lamp to glow and remain on until malfunction is repaired. If the "CHECK ENGINE" lamp comes on and remains on during vehicle operation, cause of malfunction MUST be determined.

Fig. 3: Location of Diagnostic Terminal on Electronic Control Module



View of ECM mounted position behind glove compartment.

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- "Intermittent failures" allow lamp to flicker or go out, 10 seconds after fault goes away. However, the associated trouble code will be retained in ECM memory. "Intermittent failures" may be sensor related. If a sensor fails, ECM will use a substitute value in its calculations to continue engine operation. In this condition, service is not mandatory, but loss of driveability may result.

As a bulb and system check, the "CHECK ENGINE" lamp will glow when ignition switch is turned on and engine is not running. When engine is started, the lamp should go out after 1-4 seconds. If not, a malfunction has been detected in the Closed Loop Emission Control system.

NOTE: Trouble codes will be recorded at various operating times. Some codes require operation of that sensor or switch for 5 seconds; others require operation for 5 minutes or longer.

Diagnose the Closed Loop Emission Control system in the following order:

1) Ensure all engine systems NOT related to the system are fully operational. Do not proceed with testing unless all other problems have been corrected. Ensure that all electrical and vacuum connections are correct and in good condition.

2) Enter diagnostic mode and record trouble codes flashed by "CHECK ENGINE" lamp. Exit diagnostic mode. Distinguish between "hard" and "intermittent" codes.

3) If trouble codes were displayed, go to Diagnostic Circuit Check chart. Follow instructions given there.

4) If no trouble codes were recorded, go to Driver Complaint chart and follow instructions given there.

5) After any repairs are made, perform System Performance Check. Clear any trouble codes.

DIAGNOSIS & TESTING

NOTE: The following paragraphs explain the procedures involved in performing the preceeding steps.

The ECM stores component failure information for the Closed Loop Emission Control system under a related trouble code which can be recalled for diagnosis and repair. When recalled, these codes will be displayed by flashes of the "CHECK ENGINE" lamp. For example: "FLASH", "FLASH", pause, "FLASH", "FLASH", "FLASH" followed by a longer pause identifies trouble code "23". First series of flashes indicates first digit of code; second series of flashes indicates second digit. Codes are displayed starting with lowest numbered code. Only codes in which a related malfunction has occurred will be displayed.

DIAGNOSTIC PROCEDURE

Entering Diagnostic Mode

1) Turn ignition on (engine off). "CHECK ENGINE" lamp should glow. Locate diagnostic terminal taped on wiring harness near ECM. Start engine. Connect terminals together and note "CHECK ENGINE" lamp.

2) If any trouble codes are stored in ECM memory, the "CHECK ENGINE" lamp will flash 2-digit codes. Trouble codes will be displayed from lowest to highest numbered code (3 times each) and be repeated as long as the diagnostic terminals are connected.

ECM TROUBLE CODE IDENTIFICATION

Trouble Code	Circuit Affected
12	Idle Position Switch — High Output
13	Idle Position Switch — Low Output
14	WOT Switch — High Output
15	WOT Switch — Low Output
21	Vacuum Control Solenoid — High Output
22	Vacuum Control Solenoid — Low Output
23	Incorrect Oxygen Sensor Reading
24	Incorrect CTS Reading
25	RAM Error

Clearing Trouble Codes

To clear memory of trouble codes, turn ignition on and connect diagnostic terminals together. Turn ignition off and remove positive battery cable from battery. Disconnect diagnostic terminals.

Exiting Diagnostic Mode

To exit diagnostic mode, turn engine off and disconnect diagnostic terminals.

NOTE: The terms "enter diagnostics" and "exit diagnostics" will be used periodically throughout this section. Follow the procedure for entering diagnostic mode when instructed to "enter diagnostics". Follow the procedure for exiting diagnostic mode when instructed to "exit diagnostics".

Diagnostic Circuit Check

If complaint is "CHECK ENGINE" lamp related, this check will lead to most likely problem area. Enter diagnostics and record stored trouble codes. Begin diagnosis with lowest numbered code. Refer to appropriate trouble code chart.

Driver Complaint Sheet

1) If complaint is not "CHECK ENGINE" lamp related, this check will lead to most likely problem area. However, first make checks that would normally be made on a vehicle without Closed Loop Emission Control system.

2) Follow instructions in diagnostic chart and repair malfunction. After repair, perform System Performance Check.

System Performance Check

1) This check verifies that Closed Loop Emission Control system is functioning correctly. This check should always be made after any repair on the system.

2) When performing this check, always engage parking brake and block drive wheels. Transmission should be in neutral (man. trans.) or "P" (auto. trans.).

TOOLS REQUIRED

Diagnostic Tools

1) The Closed Loop Emission Control system does not require special tools for diagnosis. A dwell meter, tachometer, test light, ohmmeter, digital voltmeter with 10 megohms impedance (minimum), vacuum pump, vacuum gauge and jumper wires are the only tools necessary for diagnosis.

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2) A test light, rather than a voltmeter, must be used when indicated by diagnostic chart.

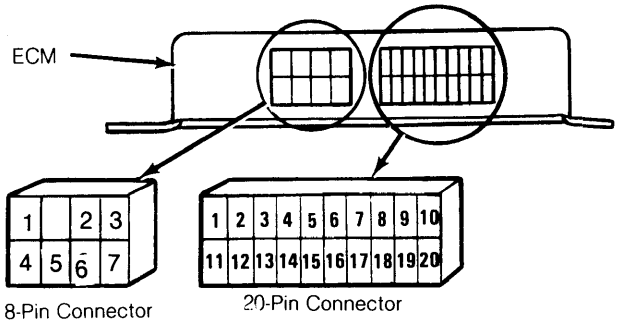
3) A dwell meter is used to measure the time that the vacuum control solenoid is on or off. This gives an indication of how the system is working and how rich or lean the mixture. Set dwell meter for 4-cylinder scale.

4) Dwell meter is connected to Green connector located near the carburetor. This connector will not be connected to any circuit EXCEPT when testing with the dwell meter. Do not allow terminal wire to come in contact with any ground source, including rubber hoses.

5) When engine is at operating temperature and idling, dwell meter needle will move up and down scale. This indicates the system is in closed loop operation. If the needle does not move, the system is in open loop operation.

NOTE: If engine operation seems to change when dwell meter is connected to Green wire, remove dwell meter and use another type. A few brands are not compatible with the electronic emission system.

Fig. 4: Electronic Control Module Terminal Identification



8-PIN CONNECTOR

PIN	FUNCTION
1	Power Ground
2	"CHECK ENGINE" Lamp
3	Ignition Coil Tach Input
4	Air Solenoid Output
5	Vacuum Control Solenoid
6	Fuel Cut Solenoid
7	+12V to Ignition

20-PIN CONNECTOR

PIN	FUNCTION
1	Control Ground
2	Oxygen Sensor Input
3	Not Used
4	Clutch and Transmission Input
5	Not Used
6	Idle position Switch Input
7	WOT Switch Input
8	CTS Input
9	Not Used
10	Cold Start Modifier Input
11	Idle Position Switch Ground
12	WOT Switch Ground
13	Not Used
14	Not Used
15	Not Used
16	Not Used
17	Not Used
18	Diagnostic Output Terminal
19	Diagnostic Ground Terminal
20	Not Used

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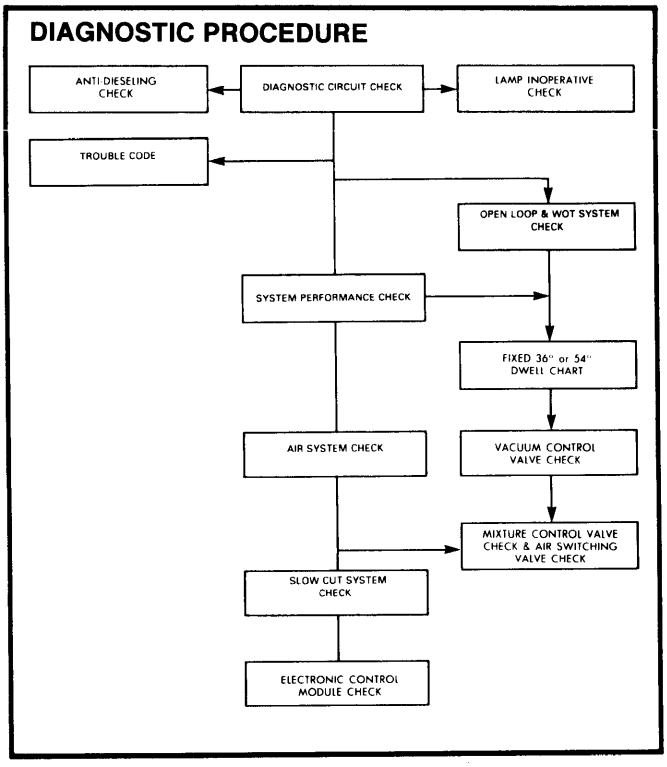

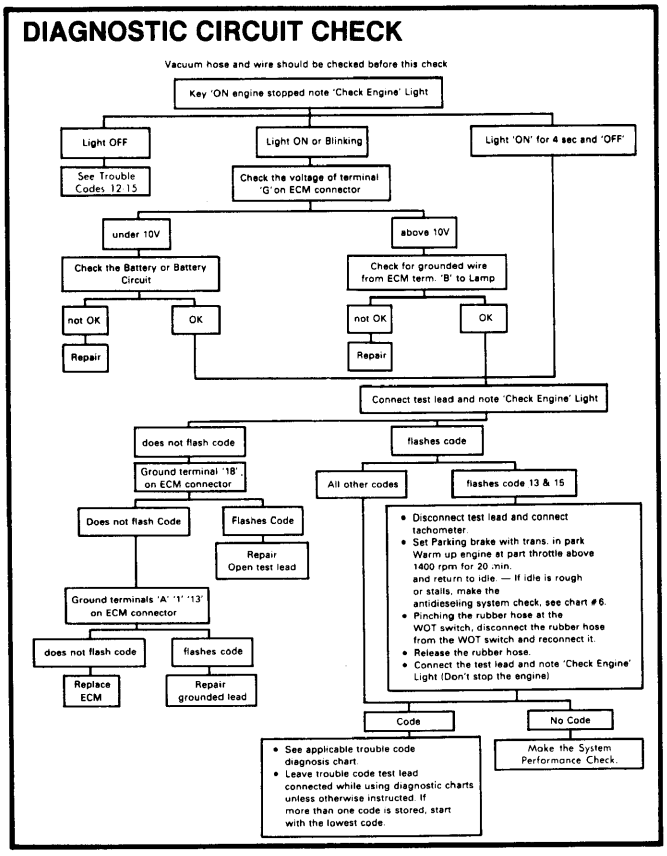

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SYSTEMS PERFORMANCE CHECK DRIVER COMPLAINT OR EMISSION FAILURE ENGINE PERFORMANCE PROBLEM (ODOR, SURGE, FUEL ECONOMY)

INSPECT FOR HARNESS AND HOSE DISCONNECTS AT COOLANT SENSOR, DUTY SOLENOID, ETC. REPAIR AS NECESSARY

- Cold operation complaint and full throttle performance complaint see Open Loop and WOT check. Also see Vacuum Control Valve Check.
- All other complaints follow chart below on warm engine (Upper radiator hose hot).

1. PLACE TRANSMISSION IN PARK (A.T.) OR NEUTRAL (M.T.) AND SET PARK BRAKE AND BLOCK DRIVE WHEELS.
2. START ENGINE.
3. DISCONNECT PURGE HOSE FROM CANISTER AND PLUG IT.
4. CONNECT TACHOMETER
5. DISCONNECT M/C SOLENOID AND GROUND M/C SOLENOID DWELL LEAD.
6. RUN ENGINE AT 3,000 RPM AND WHILE KEEPING THROTTLE CONSTANT, RECONNECT M/C SOLENOID AND NOTE RPM.

LESS THAN 100 RPM DROP → CHECK VCV AND CARBURETOR

MORE THAN 100 RPM DROP →

- REMOTE GROUND FROM M/C SOLENOID DWELL LEAD.
- CONNECT DWELL METER TO M/C SOLENOID DWELL LEAD (4 CYL. SCALE)
- SET CARB. ON MEDIUM STEP OF FAST IDLE CAM. AND RUN FOR 10 MINUTES OR UNTIL DWELL STARTS TO VARY. WHICHEVER HAPPENS FIRST.
- RETURN ENGINE TO IDLE AND AFTER 2 MIN NOTE DWELL.

Fixed 0° or 90° → Replace ECM

Fixed 36° or 54° → See Fixed 36° or 54° Dwell Chart

Varying → Run engine at 3,000 rpm and after 2 min. note dwell

Varying → Make the AIR system check

Fixed → Check carburetor

ELECTRONIC CONTROL MODULE (ECM) CHECK

- Before this check inspect all connections of vacuum hoses and wires.

1. Place transmission in Park (A.T.) or Neutral (M.T.) and set park brake and block drive wheels.
2. Disconnect purge hose at Canister and plug it.
3. Connect dwell meter to m/c sol. dwell lead (4 cyl. scale).
4. Set carb on high step of fast idle cam and run engine until dwell starts to vary.
5. Return engine to idle and note dwell.
6. Confirm dwell varying.
7. Disconnect oxygen sensor and measure time required for the dwell meter to read a fixed 36° or 54°.

between 20-40 sec. → No-trouble found in system → Check engine idle.

not between 20-40 sec. → Replace ECM

THE SYSTEM PERFORMANCE CHECK SHOULD BE PERFORMED AFTER ANY REPAIRS TO THIS SYSTEM HAVE BEEN MADE.

VACUUM CONTROL VALVE (VCV) CHECK

Before this check, inspect all vacuum hoses for splits, kinks, clogged and proper connection.

Connect vacuum gauge at the vacuum line between VCV and carburetor

- Connect dwell meter to the M/C solenoid dwell lead. (4 cyl. scale)
- Disconnect Oxygen Sensor.
- Start engine and note dwell.

Fixed 36° → Note vacuum gauge

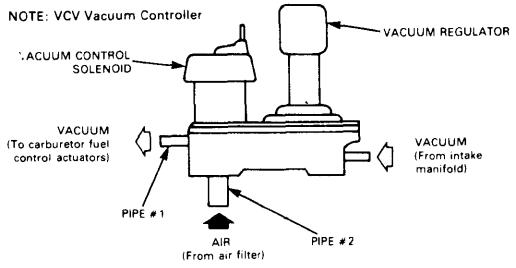
- between 1.4" and 1.8" Hg → See Fixed 36° or 54° Dwell Chart, Mixture Control Valve Chart or Air Switching Valve Chart
- not between 1.4" and 1.8" Hg →

Fixed 54° → Note vacuum gauge

- between 1.8" and 2.1" Hg → See Fixed 36° or 54° Dwell Chart, Mixture Control Valve Chart or Air Switching Valve Chart
- not between 1.8" and 2.1" Hg →

Remove VCV from engine. Clean orifice in the Pipe #2 Replace VCV, wire and hoses.

Repeat procedure. If not OK, replace VCV.



THE SYSTEM PERFORMANCE CHECK SHOULD BE PERFORMED AFTER ANY REPAIRS TO THIS SYSTEM HAVE BEEN MADE.

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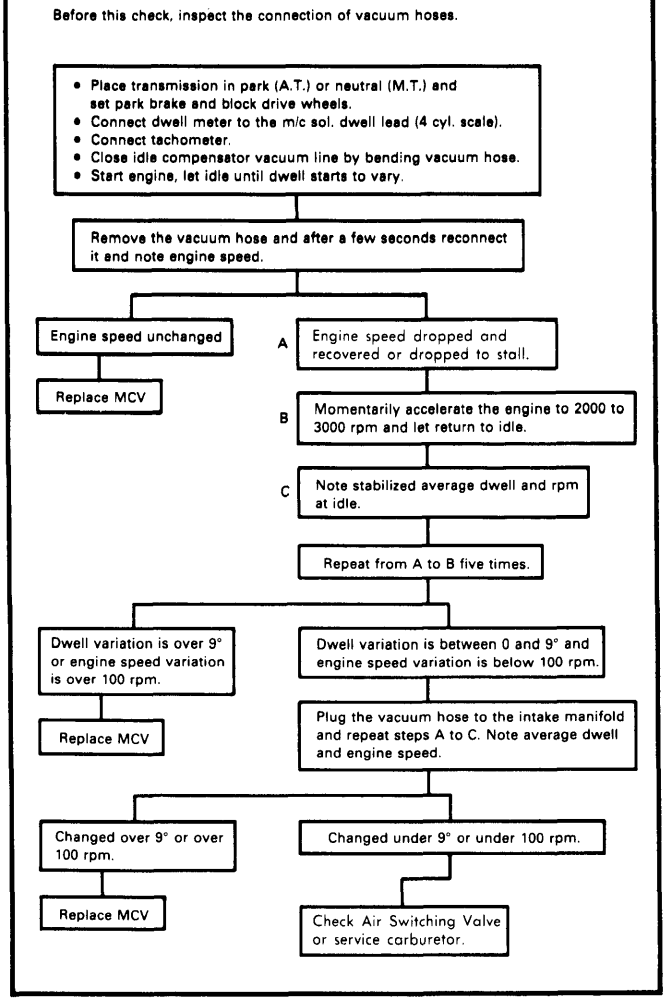
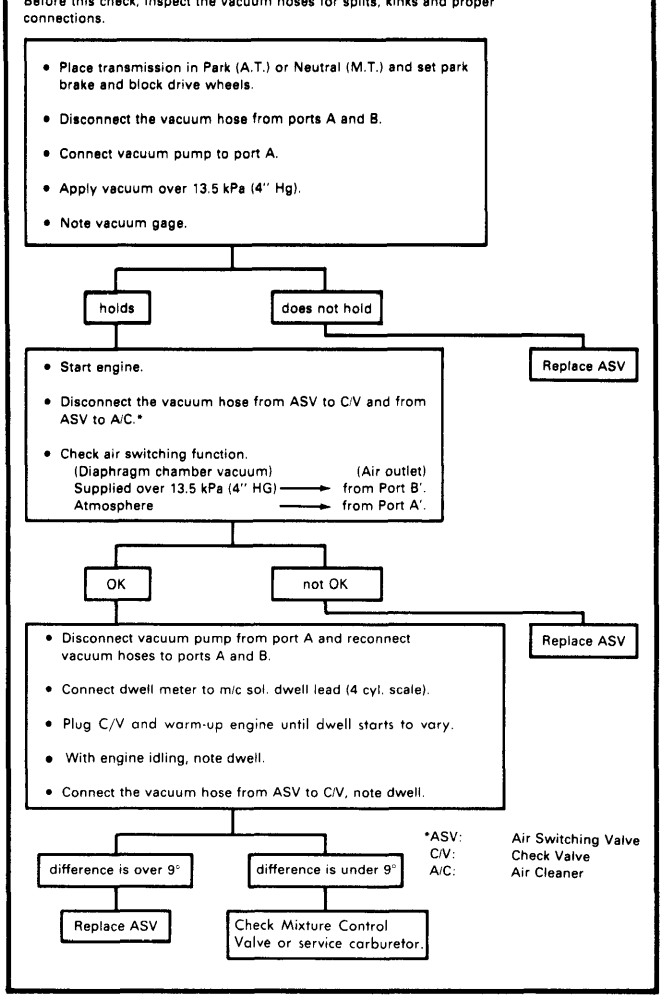
MIXTURE CONTROL (M/C) VALVE CHECK



AIR SWITCHING VALVE (ASV) CHECK



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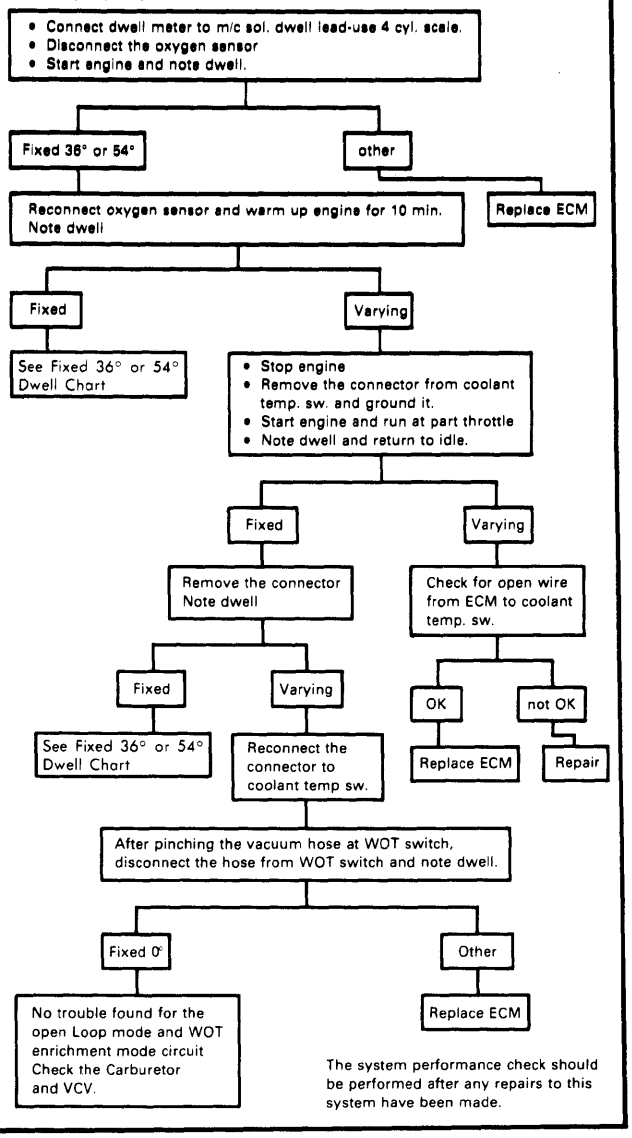
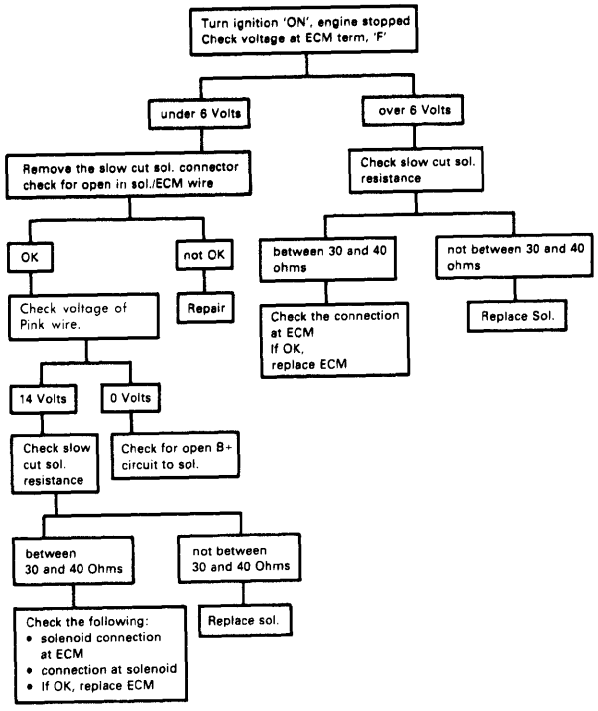
OPEN LOOP AND WIDE OPEN THROTTLE (WOT) CHECK

Open Loop Mode and WOT Enrichment Mode Circuit Check. Before this check, confirm the operation of coolant temp switch itself and the proper connection of rubber hose and wire.



The system performance check should be performed after any repairs to this system have been made.

ANTI-DIESELING SYSTEM CHECK



THE SYSTEM PERFORMANCE CHECK SHOULD BE PERFORMED AFTER ANY REPAIRS TO THIS SYSTEM HAVE BEEN MADE.

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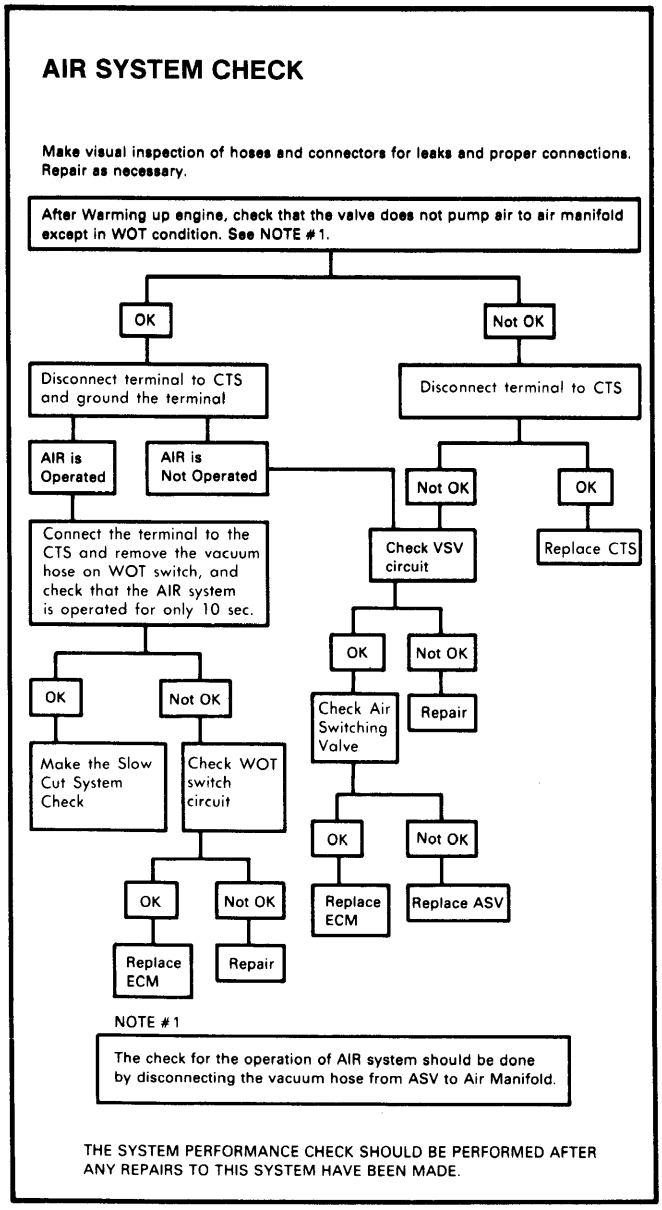

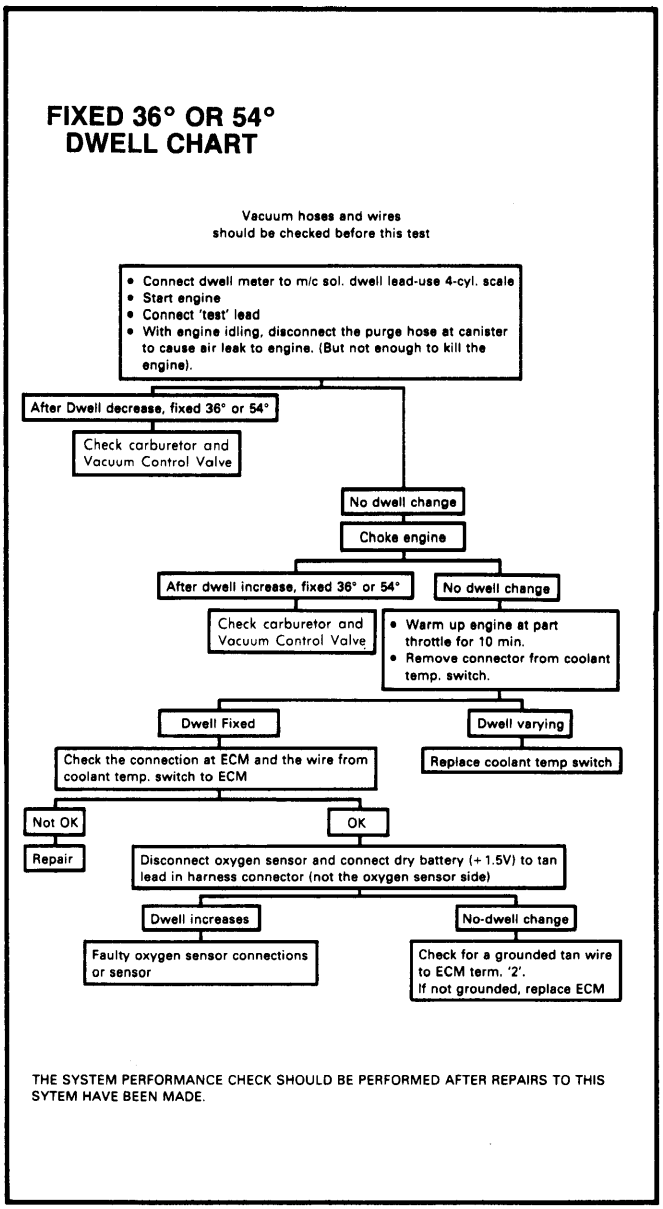

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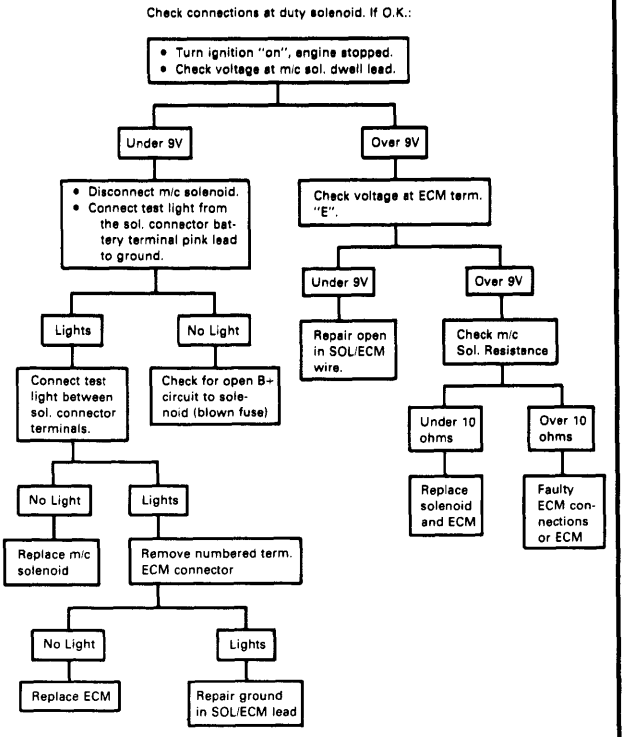
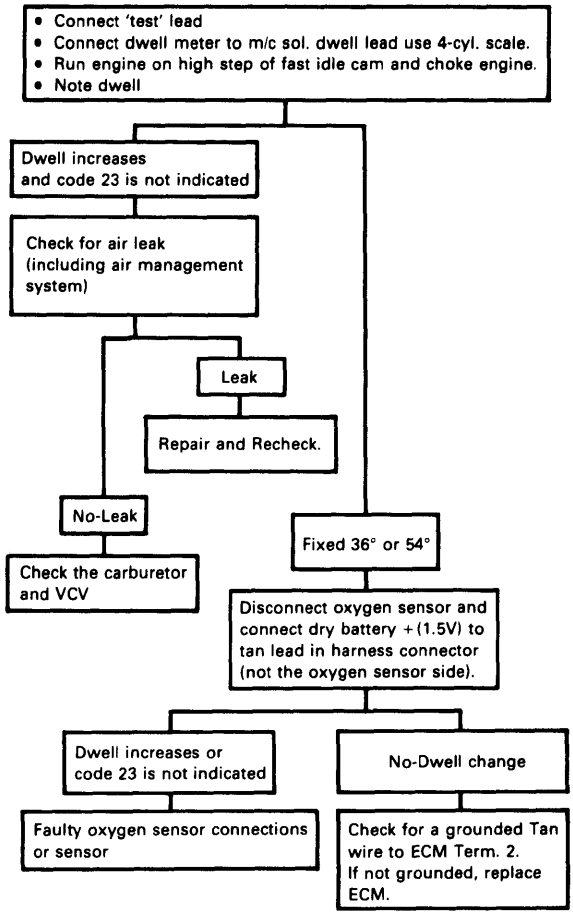
TROUBLE CODES 21 OR 22



THE SYSTEM PERFORMANCE CHECK SHOULD BE PERFORMED AFTER ANY REPAIRS TO THIS SYSTEM HAVE BEEN MADE.

TROUBLE CODE 23

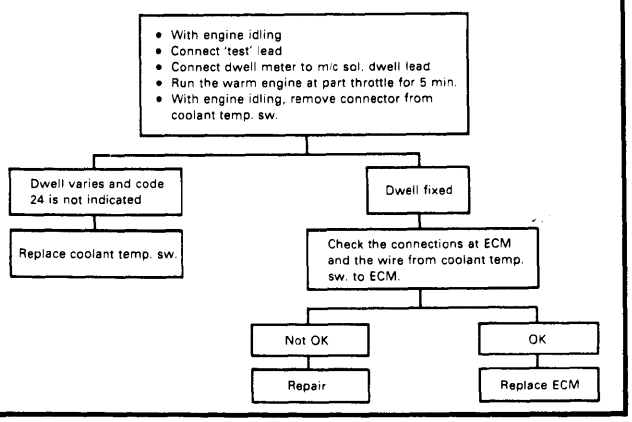
When this code is indicated, don't stop the engine before this check.
If the engine was stopped, before this check, warm up engine for 20 min.



THE SYSTEM PERFORMANCE CHECK SHOULD BE PERFORMED AFTER ANY REPAIRS TO THIS SYSTEM HAVE BEEN MADE.

TROUBLE CODE 24

When this code is indicated, don't stop the engine before this check.
If the engine was stopped, before this check, warm up engine above 1400 rpm for 20 min. and confirm that code 24 is indicated.



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TROUBLE CODE 25

Check that all pins are fully inserted in the socket and that 'A' '1' '13' are grounded completely. If o.k., replace ECM.

THE SYSTEM PERFORMANCE CHECK SHOULD BE PERFORMED AFTER ANY REPAIRS TO THIS SYSTEM HAVE BEEN MADE.

TROUBLE CODES 12 THRU 15

Before this check, check for proper connection of vacuum hoses and wires

- Stop engine
- Check the operation of Idle (Code 12.13) or WOT (code 14.15) switch by using ohmmeter and vacuum pump

OK → Check the following:
- Connection of the wire at ECM
- Connection of the wire at the switch.
- Vacuum hoses
- Wires

→ OK → Replace ECM
→ Not OK → Repair

Not OK → Replace switch

THE SYSTEM PERFORMANCE CHECK SHOULD BE PERFORMED AFTER ANY REPAIRS TO THIS SYSTEM HAVE BEEN MADE

"CHECK ENGINE" LAMP INOPERATIVE

Check fuses that supply voltage to ECM

Blown fuse → Replace fuse — check for cause

OK → Check "Check Engine" light connector for proper connection. Remove the connector from m/c sol. and WOT SW. With ign. "on" engine stopped, check voltage from same connector BRN/WHT wire term. to ground.

Under 9 volts → Check voltage from same connector pink/black wire term. to ground

Over 9 volts → Check bulb and leads to it

Under 9 volts → Repair open in lead from fuse to connector

Over 9 volts → Check voltage from ECM term. "B" to ground.

Over 9 volts → Check Voltage from ECM term. '1' to ground

Under 1 volt → Faulty ECM connections or ECM

Over 1 volt → Repair ECM ground

Under 9 volts → Repair open in lead from ECM term 'B' to "Check Engine" light connector

THE SYSTEM PERFORMANCE CHECK SHOULD BE PERFORMED AFTER ANY REPAIRS TO THE SYSTEM HAVE BEEN MADE.

SLOW CUT SYSTEM CHECK

- Connect tachometer and warm up engine for 10 min.
- With the drive wheels off the floor, place the trans. in 1st gear (M/T) or L range (A/T).
- Run the engine up to 2200 RPM and then decelerate to idle.
- While decelerating check voltage at ECM term. "F".

engine speed	the voltage of ECM term 'F'
above 2000 to 2200 rpm	above 6V
under 2000 to 2200 rpm	under 6V

OK → Make the ECM Check

Not OK → Check the clutch switch or the Neutral switch and wire or the wire from ECM term 'C' to Ign Coil.

OK → Replace ECM

Not OK → Repair

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CANISTER CHECK

Before this check, check all vacuum hoses for splits, kinks, and proper connections.

- Disconnect the purge signal line at the canister
- Connect vacuum pump to purge signal pipe and apply vacuum 5 to 8 inch Hg

holds → Disconnect vacuum pump and reconnect the vacuum hose.

does not hold → Replace canister

- Place transmission in "P" (A/T) or Neutral (M/T), set parking brake and block drive wheels.
- Connect dwell meter to M/C solenoid dwell lead (4 cyl.-scale).
- Connect vacuum gauge to the vacuum hose from canister to TVV (near the canister).
- Connect tachometer.

Idle compensation vacuum line closed by bending vacuum hose.
Warm up the engine until dwell starts to vary.
Return to idle and confirm vacuum gauge is under 1 inch Hg.

A Race the engine and check if the gauge moves over 5 inch Hg.
B Return to idle and after 1 min, note dwell and engine speed.

Repeat from A to B five times

dwell varies

Dwell variation is over 9° or engine speed variation is over 100rpm → Replace canister

Dwell variation is under 9° or engine speed variation is under 100rpm → Pinching the vacuum hose from canister to Inlet Manifold, note dwell and compare with average dwell before pinching

difference over 9° → Replace canister

difference under 9° → Canister is OK

dwell Fixed

Engine speed variation is over 100rpm → Replace canister

Engine speed variation is under 100rpm → Pinching the vacuum hose from canister to Inlet Manifold, slightly race the engine to 2000 to 3000rpm and release the throttle to idle. After 1 min, note engine speed and compare before pinching.

Difference over 100 rpm → Replace canister

difference under 100 rpm → Canister is OK

SLOW CUT SOLENOID CHECK

Place transmission in Park (A.T.) or Neutral (M.T.) and set part brake and block drive wheels.

- Before proceeding to the steps shown below, check to see if harness connector connecting ECM to carburetor is connected securely. If found loose, re-connect securely.
- Warm up the engine and proceed to the steps shown in the chart below.

Stop engine

Disconnect the harness connector at the ECM and carburetor. Using an ohmmeter, check to see if the lead wire connecting carburetor slow-cut solenoid to ECM F-terminal is open.

not open → Connect harness connector at ECM side as it was originally.

Open → Replace or repair the harness

A
- Connect a set of jumper wires to the white or pink wire and black/white or brown connector on the fuel cut solenoid.
- Connect the white or pink jumper to 12 volts.
- Alternately ground and open the other jumper, listening for the sound of the solenoid operating.

No operating sound heard → Replace slow-cut solenoid

Operating sound heard → Start the engine, continuing the operation at idle speed.

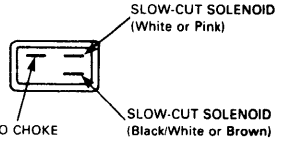
Engine idle stall → Replace slow-cut solenoid

OK

B Disconnect the ground lead wire connected to the terminal for the carburetor slow-cut sol.

Engine Stop → Repeat check from A to B 3 times → No trouble found

Idling continued → Replace slow-cut solenoid



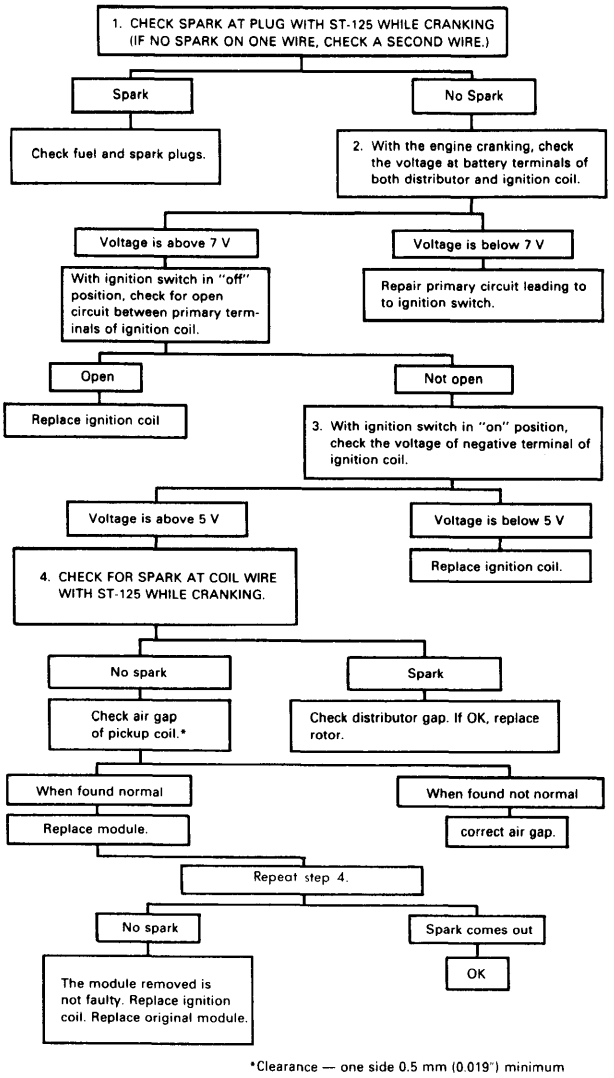
THE SYSTEM PERFORMANCE CHECK SHOULD BE PERFORMED AFTER ANY REPAIRS TO THIS SYSTEM HAVE BEEN MADE.

1982 Exhaust Emission Systems

GENERAL MOTORS 1.9L ENGINE CONTROL SYSTEM (Cont.)

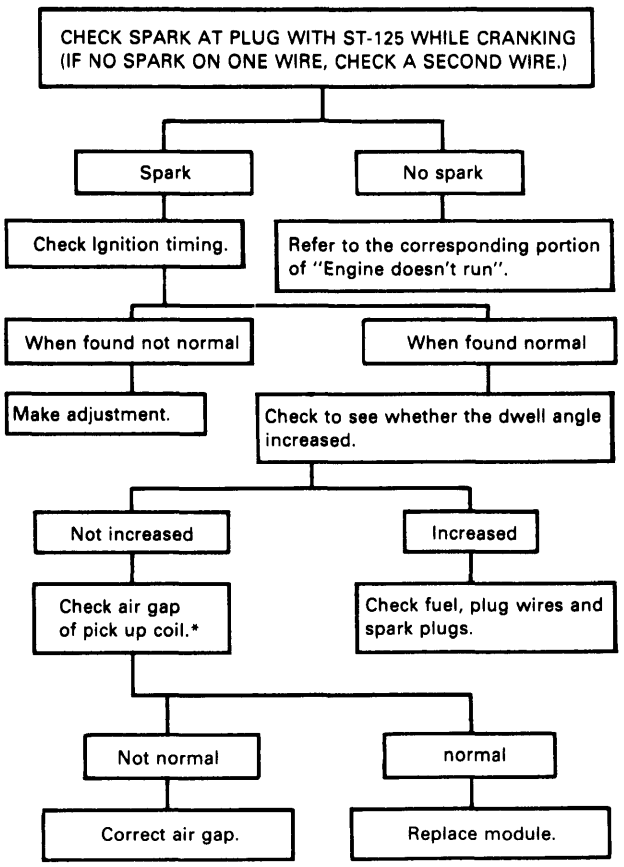
1982 TEST CHARTS

ENGINE CRANKS, BUT WILL NOT RUN



*Clearance — one side 0.5 mm (0.019") minimum
Total both sides 1 mm (0.039") maximum

ENGINE DOES NOT RUN SMOOTHLY



*Clearance — one side 0.5 mm (0.019") minimum
Total both sides 1 mm (.039") maximum

TESTING

Air Switching Valve

If air switching valve (ASV) is serviceable, secondary air continues to blow out from valve for a few seconds when the accelerator pedal is fully depressed and quickly released. If secondary air continues to blow out for more than 5 seconds, replace ASV.

Mixture Control (M/C) Valve

Disconnect and plug vacuum hose from intake manifold to mixture control valve. If M/C valve is serviceable, secondary air continues to blow out from valve for a few seconds when the accelerator pedal is fully depressed and quickly released. If secondary air continues to blow out for more than 5 seconds, replace M/C valve.

REMOVAL & INSTALLATION

ELECTRONIC CONTROL MODULE (ECM)

Removal & Installation

Disconnect negative battery cable. Remove glove compartment door and liner. Disconnect electrical connectors and ground strap from ECM. Remove ECM mounting hardware and ECM. To install ECM, reverse removal procedure and ensure ground strap is attached securely. *See Fig. 3.*

MIXTURE CONTROL (M/C) VALVE

Removal & Installation

Disconnect vacuum hoses. Remove M/C valve from clamp bracket. To install, reverse removal procedure.

GENERAL MOTORS 1.9L ENGINE CONTROL SYSTEM (Cont.)

AIR SWITCHING VALVE (ASV)

Removal & Installation

ASV is located on air pump. To remove ASV, remove hoses at valve. Remove mounting hardware and valve. To install, reverse removal procedure.

VACUUM SWITCHING VALVE (VSV)

Removal & Installation

Disconnect negative battery cable. Remove hoses from valve. Remove valve. To install, reverse removal procedure.

COOLANT TEMPERATURE SENSOR

Removal & Installation

Disconnect negative battery cable. Remove electrical connector at CTS. Remove CTS. To install, reverse removal procedure.

VACUUM CONTROL VALVE (VCV)

Removal & Installation

Disconnect negative battery cable. Disconnect vacuum hoses. Remove VCV. To install, reverse removal procedure.

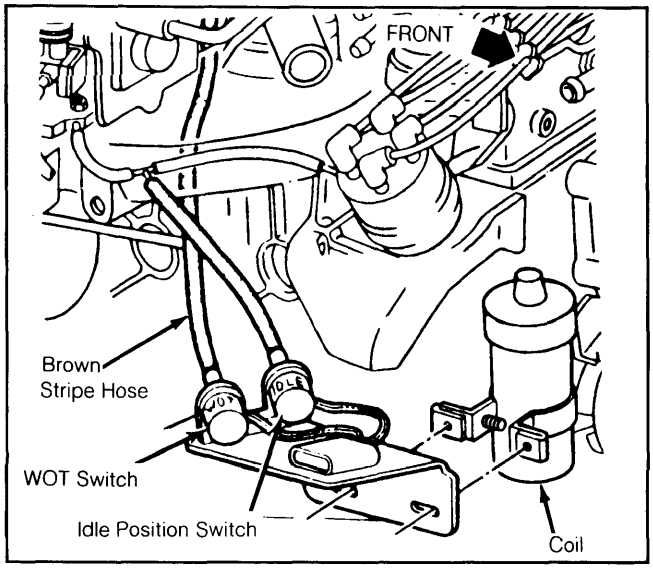
WOT SWITCH & IDLE POSITION SWITCH

Removal & Installation

Disconnect negative battery cable. Disconnect electrical connectors and vacuum hoses. Remove vacuum switch(es). To install, reverse removal procedure. *See Fig. 5.*

NOTE: Vacuum hose to WOT switch has a brown stripe. Ensure hoses are installed correctly.

Fig. 5: Idle Position Switch and WOT Switch Locations



When installing switches, be sure that vacuum lines are properly connected.

OXYGEN SENSOR

CAUTION: Oxygen sensor uses a permanently attached pigtail and connector. Do not remove pigtail from sensor. Damage to, or removal of pigtail or connector could affect sensor operation.

Removal

Disconnect negative battery cable. Raise vehicle as needed to disconnect electrical connector and any attaching hardware. Spray threads of oxygen sensor with penetrating oil and allow to soak for 5 minutes. Carefully remove oxygen sensor.

NOTE: Oxygen sensor may be difficult to remove when engine temperature is below 120°F (50°C). DO NOT use excessive force to remove sensor as damage to threads in exhaust manifold may result.

Installation

Install new oxygen sensor and torque to 30 ft. lbs. (41 N.m). When installing sensor, do not remove anti-seize compound from threads or install with any type of sealant. Reconnect electrical connector and any attaching hardware.

Fig. 6: Oxygen Sensor Location