

# G - TESTS W/CODES

## 1996 Subaru SVX

1996 ENGINE PERFORMANCE  
Subaru Self-Diagnostics - Introduction

SVX

### INTRODUCTION

If no faults were found while performing BASIC DIAGNOSTIC PROCEDURES, proceed with self-diagnostics. If no fault codes are present after entering self-diagnostics, proceed to appropriate H - TESTS W/O CODES article for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.).

### SELF-DIAGNOSTIC SYSTEM

#### Hard Failures

Hard failures cause Malfunction Indicator Light (MIL) to illuminate and remain on until problem is repaired. If MIL comes on and remains on (light may flash) during vehicle operation, cause of malfunction must be determined using Diagnostic Trouble Code (DTC) charts. If a sensor fails, control unit will use a substitute value in its calculations to continue engine operation. In this condition, commonly known as limp-in mode, vehicle runs but driveability will not be optimum.

#### Intermittent Failures

Intermittent failures may cause MIL to flicker or illuminate then go out after intermittent fault goes away. However, a corresponding DTC will be retained in ECM memory. If related fault does not reoccur within a certain time frame, related DTC will be erased from ECM memory. Intermittent failures may be caused by sensor, connector or wiring related problems. See INTERMITTENTS in appropriate

### INTRODUCTION

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### RETRIEVING DTC(S)

NOTE: Subaru Select Monitor (SSM) or an OBD-II scan tool must be used to perform self-diagnostic tests. Follow scan tool manufacturer's instructions for proper operation. SSM can be plugged into either the OBD-II DLC or the dedicated SSM test connectors behind the dash.

1) Enter specific test mode by connecting or disconnecting read memory and/or test mode connectors as shown in RELATIONSHIP BETWEEN MODES & CONNECTORS table. Connectors are located behind left side of instrument panel. See Fig. 1.

2) Observe Malfunction Indicator Light (MIL) or oxygen sensor monitor light. Note any DTC(s). Long illumination periods of 1.2 seconds designate tens digit in numbered codes. Short illumination periods of .2 second designate ones digit in numbered codes.

3) Tens and ones digits are separated by a .3-second interval of non-illumination. For example: 3 long flashes (1.2 seconds each) followed by 5 short flashes (.2 second each) designate code 35.

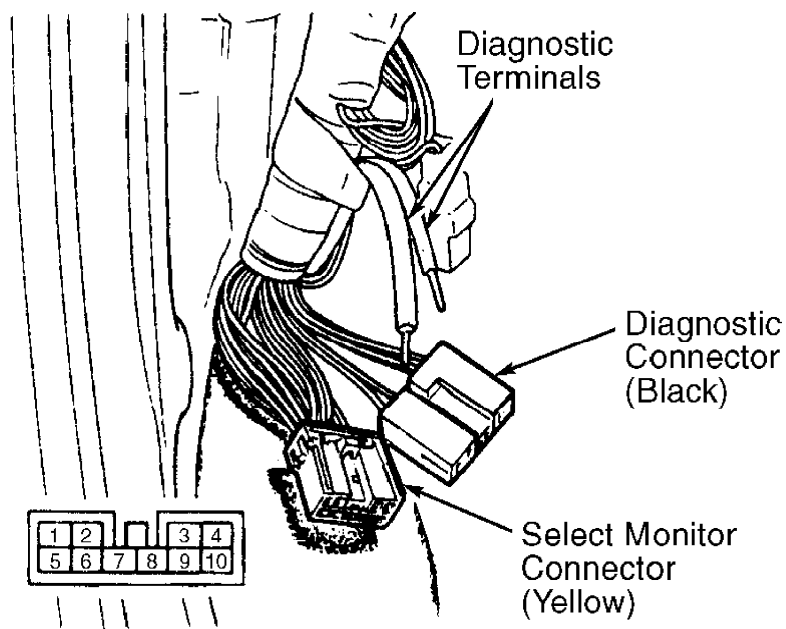
4) After a 2-second break, the next stored code will be displayed. Once all existing DTCs have been displayed, sequence will repeat.

#### RELATIONSHIP BETWEEN MODES & CONNECTORS TABLE

Mode	Read Memory Connector	Test Mode Connector
U-CHECK (1) .....	Disconnected .....	Disconnected
READ MEMORY (1) .....	Connected .....	Disconnected
D-CHECK (1) .....	Disconnected .....	Connected
CLEAR MEMORY (2) .....	Connected .....	Connected

(1) - Key on, engine off.

(2) - Key on, engine running.



#### DIAGNOSTIC CONNECTOR TERMINALS:

1. Test Mode (MFI)
2. Read Memory Mode (MFI)
3. Clear Memory (SRS)
4. Not Used
5. Test Mode (Power Steering)
6. Read Memory (Power Steering)
7. Diagnostic Terminal (Power Steering)
8. Diagnostic Terminal (Passive Restraint System)
9. Diagnostic Terminal (SRS)
10. Ground

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Fig. 1: Locating Diagnostic Test Connectors  
Courtesy of Subaru of America, Inc.

#### CLEARING DTC(S)

After malfunction has been corrected, DTC will clear from memory when CLEAR MEMORY mode is accessed. Unless all items check okay in D-CHECK mode, memory will not be cleared. See RELATIONSHIP BETWEEN MODES & CONNECTORS table.

## ECM LOCATION

ECM LOCATION TABLE

Application	Location
SVX .....	Behind Left Side Of Dash

## DIAGNOSTIC TROUBLE CODES

### DIAGNOSTIC TROUBLE CODE (DTC) DEFINITION

DTC IDENTIFICATION CHART

Code No.	Circuit Affected	Probable Cause
11	Crank Angle Sensor No. 1	No Reference Signal
12	Starter Switch	Open/Short Circuit
13	Cam Angle Sensor	No Signal
14	Fuel Injector No. 1	Inoperative Fuel Injector
15	Fuel Injector No. 2	Inoperative Fuel Injector
16	Fuel Injector No. 3	Inoperative Fuel Injector
17	Fuel Injector No. 4	Inoperative Fuel Injector
18	Fuel Injector No. 5	Inoperative Fuel Injector
19	Fuel Injector No. 6	Inoperative Fuel Injector
21	Coolant Temperature Sensor	Open/Short Circuit
22	Knock Sensor No. 1 (Right)	Open/Short Circuit
23	Airflow Sensor Circuit	Open/Short Circuit
24	By-Pass Air Control Valve	Open/Short Circuit
28	Knock Sensor No. 2 (Left)	Abnormal Sensor Signal
29	Crank Angle Sensor No. 2	No Signal
31	Throttle Position Sensor	Open/Short Circuit
32	O2S No. 1 (Right)	Sensor Inoperative
33	Vehicle Speed Sensor No. 2	No Reference Signal
34	EGR Solenoid	EGR Solenoid Valve Inoperative

35	Purge Control Solenoid Valve	Open/Short Circuit
37	O2S No. 2 (Left)	Sensor Inoperative
38	Engine Torque Control	Shorted Circuit
41	Air/Fuel Learning Control	Faulty Learning Control Function
45	Atmospheric Pressure Sensor	Faulty Sensor
51	Neutral Switch	Abnormal Signal
52	Parking Brake Switch	Abnormal Signal
55 (1)	EGR Temperature Sensor	Abnormal Signal
56 (1)	EGR System	Stuck Open/Closed EGR
(1) - California models only.		

#### DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION TABLE

Code	Circuit Affected
11	Crank Angle Sensor No. 1
12	Starter Switch
13	Cam Angle Sensor
14	Fuel Injector No. 1
15	Fuel Injector No. 2
16	Fuel Injector No. 3
17	Fuel Injector No. 4
18	Fuel Injector No. 5
19	Fuel Injector No. 6
21	Coolant Temperature Sensor
22	Knock Sensor No. 1
23	Airflow Sensor
24	By-Pass Air Control Solenoid Valve
28	Knock Sensor No. 2
29	Crank Angle Sensor No. 2
31	Throttle Position Sensor
32	Oxygen Sensor No. 1
33	Vehicle Speed Sensor No. 2
34	EGR Solenoid Valve
35	Purge Control Solenoid Valve
37	Oxygen Sensor No. 2
38	Engine Torque Control
41	Air/Fuel Learning Control
45	Atmospheric Pressure Sensor
51	Neutral Position Signal
52	Parking Position Signal
55	EGR Temperature Sensor
56	EGR System

#### Connector Terminal Identification

Terminals are designated by an alphanumeric identifier. For example, terminal A9 is connector "A", terminal No. 9. ECM connector

can be identified by number of terminals in each connector. See ECM CONNECTOR IDENTIFICATION table.

ECM CONNECTOR IDENTIFICATION TABLE

Connector	Number Of Pins
A (B59)	22
B (B60)	12
C (B61)	16
D (B62)	26

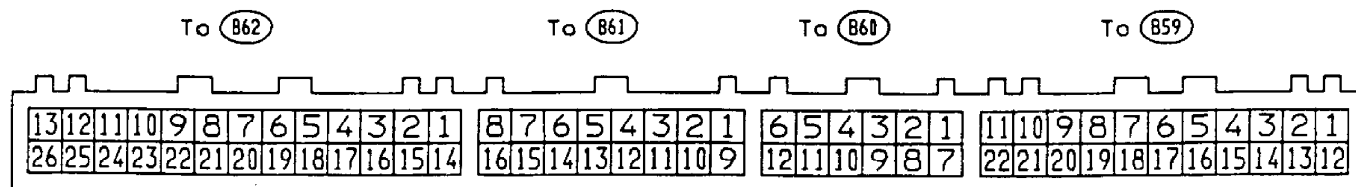


Fig. 2: Identifying ECM Connectors B59, B60, B61 & B62 (Component Side)  
 Courtesy of Subaru of America, Inc.

### CODE 11 - CRANK ANGLE SENSOR NO. 1

NOTE: For ECM harness connector terminal identification, see Fig. 2.

- 1) Turn ignition off. Disconnect ECM harness connectors. Turn ignition on. Using a DVOM set to low-volt AC scale, check for voltage variation between ECM harness connector terminals C1 and C2 while cranking engine. Voltage variation should be 0.1 volt or greater and should be synchronous with RPM. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector is okay, replace ECM.
- 2) Turn ignition off. Remove alternator. Disconnect crank angle sensor No. 1 harness connector. Using an ohmmeter, check resistance between ECM harness connector terminal C1 and crank angle sensor harness connector terminal No. 2 (White wire), and between ECM harness connector terminal C2 and crank angle sensor harness connector terminal No. 1 (Black wire). Resistance should be zero ohms for both circuits.
- 3) Check resistance between ground and ECM harness connector terminals C1, C2 and C3. Resistance should be at least one megohm at each terminal. If resistances are as specified, go to next step. If resistances are not as specified, repair appropriate circuit as necessary.
- 4) Remove crank angle sensor. Connect oscilloscope positive lead to sensor terminal No. 1 (Black wire), and negative lead to sensor terminal No. 2 (White wire). While moving magnet over crank angle sensor pick-up coil, check oscilloscope wave pattern. If wave pattern exists, malfunction is mechanical. If wave pattern does not exist, replace crank angle sensor No. 1.

### CODE 12 - STARTER SWITCH

NOTE: For ECM harness connector terminal identification, see Fig. 2.

- 1) Turn ignition switch to START position. Ensure starter

motor is operating. If starter motor is operating correctly, go to step 4). If starter motor is not operating correctly, check inhibitor switch operation. Turn ignition off. Disconnect inhibitor switch harness connector located near transaxle dipstick.

2) Using an ohmmeter, check resistance between harness connector terminals No. 11 (Black/White wire) and No. 12 (Black/Yellow wire). Resistance should be zero ohms with transaxle in Park or Neutral. Resistance should be at least 1000 ohms when transaxle is shifted into any other position. If resistance is as specified, go to next step. If resistance is not as specified, repair inhibitor switch as necessary.

3) Inspect starter assembly and repair as necessary. If starter assembly is okay, inspect and repair starter power supply circuit. Ensure vehicle security system is operating properly. Repair as necessary.

4) Turn ignition off. Disconnect ECM harness connectors. Using a DVOM, check voltage between ECM harness connector terminal C10 and ground while cranking engine.

5) Voltage should be 9-12 volts. If voltage is not as specified, repair circuit between ECM harness connector and starter assembly. If voltage is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

### CODE 13 - CAM ANGLE SENSOR

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition off. Disconnect ECM harness connectors. Check ECM input signal for cam angle sensor. Using a DVOM set to low-volt AC scale, check for voltage variation between ECM harness connector terminals A7 and A9 while cranking engine. Voltage variation should be at least 0.1 volt or greater and should be synchronous with RPM. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

2) Turn ignition off. Disconnect cam angle sensor harness connector. Using an ohmmeter, check resistance between ECM harness connector terminal A7 and cam angle sensor harness connector terminal No. 1 (Black wire), and between ECM harness connector terminal A9, and cam angle sensor harness connector terminal No. 2 (White wire). Resistance should be zero ohms for each circuit. If resistance is as specified, go to next step. If resistance is not as specified, repair appropriate circuit as necessary.

3) Check resistance between ground and ECM harness connector terminals A7 and A9. Resistance should be one megohm or greater at each terminal. If resistance is as specified, go to next step. If resistance is not as specified, repair circuit as necessary.

4) Remove cam angle sensor. Connect oscilloscope positive lead to sensor terminal No. 1 (Black wire), and negative lead to sensor terminal No. 2 (White wire). While moving magnet over cam angle sensor pick-up coil, check oscilloscope wave pattern. If wave pattern exists, malfunction is mechanical. If wave pattern does not exist, replace cam angle sensor.

### CODES 14, 15, 16, 17, 18 & 19 - FUEL INJECTORS

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) While cranking engine, ensure operating sound is heard at

each injector. If operating sound is heard, check system fuel pressure. See F - BASIC TESTING article. If operating sound is not heard, check power supply to each injector. Turn ignition off. Disconnect harness connector from each injector. Turn ignition on.

2) Using a DVOM, check voltage between each injector harness connector terminal No. 2 (White/Red wire) and ground. Reading should be at least 10 volts at each terminal. If voltage is as specified, go to next step. If voltage is not as specified, repair appropriate circuit as necessary.

3) Turn ignition off. Using an ohmmeter, check resistance for each injector. Resistance should be 11-12 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace appropriate injector.

4) Turn ignition off. Connect each fuel injector harness connector. Turn ignition on. Using a DVOM, check voltage between ground and ECM harness connector terminals D11, D12, D13 and D26. Check voltage between ground and ECM harness connector terminals A1 and A12. Reading should be at least 10 volts for each injector. If voltage is as specified, go to next step. If voltage is not as specified, repair appropriate circuit as necessary.

5) Turn ignition off. Disconnect ECM harness connector. Using an ohmmeter, check resistance between ground and ECM harness connector terminals D24 and D25. Resistance should be zero ohms. If resistance is not as specified, repair appropriate circuit as necessary. If resistance is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If ECM harness connector terminals are okay, replace ECM.

## CODE 21 - COOLANT TEMPERATURE SENSOR

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Remove collector cover and air intake boot. Disconnect coolant temperature sensor harness connector. Using an ohmmeter, check sensor resistance. Resistance should be 30,000 ohms at 68°F (20°C) and 400 ohms at 176°F (80°C). If resistance is as specified, go to next step. If resistance is not as specified, replace coolant temperature sensor.

2) Turn ignition off. Disconnect ECM harness connectors. Check resistance between ECM harness connector terminal A3 and sensor harness connector terminal No. 1 (Gray/Yellow wire), and between ECM harness connector terminal A21 and sensor harness connector terminal No. 2 (Blue/Black wire)

3) Resistance should be zero ohms for all circuits. If resistance is not as specified, repair appropriate circuit as necessary. If resistance is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

## CODE 22 - KNOCK SENSOR NO. 1 - R/H

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal C5 (backprobe) and ground. Voltage should be 2-3 volts. If voltage is as specified, go to next step. If voltage is not as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

2) Turn ignition off. Remove collector and disconnect knock sensor harness connector located on side of block. Using an ohmmeter,

check resistance between knock sensor terminal and ground. Resistance should be about 560,000 ohms. If resistance is as specified, repair circuit between ECM and knock sensor. If resistance is not as specified, replace knock sensor.

## CODE 23 - AIRFLOW SENSOR

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Check ECM input signal for airflow sensor. Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal B5 (backprobe) and ground. Voltage should be 0-0.3 volt. Check voltage between ECM harness connector terminal B6 (backprobe) and ground. Voltage should not exist. Check voltage between ECM harness connector terminal A11 (backprobe) and ground. Voltage should be 10-13 volts.

2) With engine idling, check voltage between ECM harness connector terminal B5 and ground. Voltage should be 0.8-1.2 volts. Check voltage between ECM harness connector terminal B6 and ground. Voltage should not exist. Check voltage between ECM harness connector terminal A11 and ground. Voltage should be 13-14 volts.

3) If voltage is as specified in previous steps, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM. If voltage is not as specified in previous steps, turn ignition off. Disconnect ECM and airflow sensor harness connectors.

4) Using an ohmmeter, check resistance between ECM harness connector terminal A11 and sensor harness connector terminal No. 3 (Black/Red wire), between ECM harness connector terminal B4 and sensor harness connector terminal No. 1 (Red wire), between ECM harness connector terminal B5 and sensor harness connector terminal No. 4 (White wire), and between ECM harness connector terminal B6 and sensor harness connector terminal No. 2 (Black wire).

5) Resistance should be zero ohms for all circuits. If resistance is not as specified, repair appropriate circuit as necessary. If resistance is as specified, replace airflow sensor.

## CODE 24 - BY-PASS AIR CONTROL SOLENOID VALVE

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal D14 (backprobe) and ground. Voltage should be 10 volts or greater. If voltage is as specified, go to step 4). If voltage is not as specified, go to next step.

2) Turn ignition off. Disconnect ECM and main relay harness connectors. Using an ohmmeter, check resistance between ECM harness connector terminal D14 and main relay harness connector terminal No. 1 (Black/White wire). Resistance should be zero ohms. If resistance is as specified, go to next step. If resistance is not as specified, repair circuit as necessary.

3) Turn ignition on. Using a DVOM, check voltage between ground and main relay harness connector terminals No. 1 (Black/White wire) and No. 2 (Brown/Black wire). Voltage should be 10 volts or greater at each terminal. If voltage is not as specified, repair appropriate circuit as necessary. If voltage is as specified, replace main relay.

4) Turn ignition on. Using a DVOM, check voltage between ground and ECM harness connector terminals D1 and D2. Voltage should be 6 volts or greater at terminal D1, and 7 volts or greater at terminal D2. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for



good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

5) Turn ignition off. Remove throttle body from collector. Disconnect by-pass air control solenoid valve harness connector. Using an ohmmeter, check resistance between ECM harness connector terminal D1 and solenoid valve harness connector terminal No. 3 (White wire), and between ECM harness connector terminal D2 and solenoid valve harness connector terminal No. 1 (Black wire). Resistance should be zero ohms for both circuits. If resistance is not as specified, repair appropriate circuit as necessary. If resistance is as specified, replace solenoid valve.

## CODE 28 - KNOCK SENSOR NO. 2 - L/H

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal C6 and ground. Voltage should be 3-4 volts. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

2) Remove collector and disconnect knock sensor harness connector located on side of block. Using an ohmmeter, check resistance between knock sensor terminal and ground. Resistance should be about 560,000 ohms. If resistance is as specified, repair circuit between ECM and knock sensor. If resistance is not as specified, replace knock sensor.

## CODE 29 - CRANK ANGLE SENSOR NO. 2

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition off. Disconnect ECM harness connectors. Check ECM input signal for crank angle sensor No. 2. Turn ignition on. Using a DVOM set to low-volt AC scale, check for voltage variation between ECM harness connector terminals A8 and A9 while cranking engine. Voltage variation should be 0.1 volt or greater and be synchronous with RPM. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

2) Turn ignition off. Remove alternator. Disconnect crank angle sensor No. 2 harness connector. Using an ohmmeter, check resistance between ECM harness connector terminal A8 and crank angle sensor harness connector terminal No. 2 (Black wire), and between ECM harness connector terminal A9 and crank angle sensor harness connector terminal No. 1 (Yellow wire).

3) Resistance should be zero ohms for both circuits. Check resistance between ground and ECM harness connector terminals A8, A9 and A10. Resistance should be one megohm or greater at each terminal. If resistance is as specified, go to next step. If resistance is not as specified, repair appropriate circuit as necessary.

4) Remove crank angle sensor. Connect oscilloscope positive lead to sensor terminal No. 1 (Yellow wire), and negative lead to sensor terminal No. 2 (Black wire). While moving magnet over crank angle sensor pick-up coil, check oscilloscope wave pattern. If wave pattern exists, malfunction is mechanical. If wave pattern does not exist, replace crank angle sensor No. 2.

## CODE 31 - THROTTLE POSITION (TP) SENSOR

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition off. Disconnect TP sensor harness connector. Using an ohmmeter, check resistance between TP sensor terminals No. 1 (Red wire) and No. 3 (Black wire). Resistance should be 5000 ohms. Check resistance between TP sensor terminals No. 2 (White wire) and No. 3 (Black wire), while slowly opening throttle valve from closed position.

2) Resistance should be 10,000-12,000 ohms at fully closed throttle and 3000-5000 ohms at fully open throttle. Resistance should increase in response to throttle valve opening. If resistance is as specified, go to next step. If resistance is not as specified, replace throttle position sensor.

3) Disconnect ECM harness connectors. Using an ohmmeter, check resistance between ECM harness connector terminal B1 and TP sensor harness connector terminal No. 3 (Black wire), between ECM harness connector terminal B2 and sensor harness connector terminal No. 1 (Red wire), and between ECM harness connector terminal B3 and TP sensor harness connector terminal No. 2 (White wire). Resistance should be zero ohms.

4) Check resistance between ground and harness connector terminals B1, B2 and B3. Resistance should be one megohm or greater at each terminal. If resistance is not as specified, repair appropriate circuit as necessary. If resistance is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

## CODE 32 - OXYGEN SENSOR (O2S) NO. 1 - R/H

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Using a DVOM, check voltage between ground and ECM harness connector terminal A6 with engine idling. Voltage should vary between 0.1 volt and 1.0 volt. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair terminals as necessary. If harness connector terminals are okay, replace ECM.

2) With engine at idle, disconnect oxygen sensor harness connector located on right side of engine. Using a DVOM, check voltage between sensor harness connector terminal No. 4 (White wire) and ground. Voltage should vary between 0.1 volt and 1.0 volt. If voltage is as specified, go to next step. If voltage is not as specified, replace oxygen sensor.

3) Turn ignition off. Disconnect ECM harness connectors. Using an ohmmeter, check resistance between ECM harness connector terminal A6 and sensor harness connector terminal No. 4 (White wire). Resistance should be zero ohms. Check resistance between sensor harness connector terminal No. 4 (White wire) and ground. Resistance should be one megohm or greater. If resistances are as specified, go to next step. If resistances are not as specified, repair appropriate circuit as necessary.

4) Disconnect main relay harness connector. Using an ohmmeter, check resistance between main relay harness connector terminal No. 1 (Black/White wire) and sensor harness connector terminal No. 1 (Black/White wire), and between main relay harness connector terminal No. 3 (White/Red wire) and sensor harness connector terminal No. 2 (White/Red wire). Resistance should be zero ohms for both circuits. If resistance is as specified, go to next step. If resistance is not as specified, repair appropriate circuit as necessary.

5) Turn ignition on. Using a DVOM, check voltage between ground and main relay harness connector terminals No. 2 (Brown/Black wire) and No. 1 (Black/White wire). Voltage should be 10 volts or greater at each terminal. If voltage is as specified, replace main relay. If voltage is not as specified, repair appropriate circuit as necessary.

## CODE 33 - VEHICLE SPEED SENSOR NO. 2

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Raise and support vehicle. Start engine and rotate wheels to check speedometer operation. If speedometer does not operate, go to next step. If speedometer operates, use a DVOM to check voltage between ECM harness connector terminal A3 (backprobe) and ground. Voltage should toggle between zero and 5 volts. If voltage toggles as specified, go to next step. If voltage does not toggle as specified, go to step 5).

2) Turn ignition off. Disconnect ECM harness connectors. Turn ignition on. Using a DVOM, check voltage between ground and ECM harness connector terminals A2 and A13.

3) Voltage should be 10 volts or greater at each terminal. If voltage is not as specified, repair appropriate circuit as necessary. If voltage is as specified, go to next step.

4) Turn ignition off. Using an ohmmeter, check resistance between ground and ECM harness connector terminals A11 and A22. Resistance should be zero ohms at each terminal. If resistance is not as specified, repair appropriate circuit as necessary. If resistance is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

5) Turn ignition off. Disconnect speed sensor harness connector. Using an ohmmeter, check resistance between ECM harness connector terminal B11 and speed sensor harness connector terminal No. 1 (Yellow/Red wire). Resistance should be zero ohms. If resistance is as specified, go to next step. If resistance is not as specified, repair circuit as necessary.

6) Turn ignition on. Using a DVOM, check voltage between speed sensor harness connector terminal No. 1 (Yellow/Red wire) and ground. Voltage should be 10 volts or greater. If voltage is as specified, go to next step. If voltage is not as specified, go to step 8).

7) Using a DVOM, check voltage between main relay harness connector terminal No. 3 (White/Red wire) and ground. Voltage should be 10 volts or greater. If voltage is as specified, replace main relay. If voltage is not as specified, repair circuit as necessary.

8) Remove speed sensor. Connect sensor harness connector to speed sensor. Connect DVOM between speed sensor harness connector terminals No. 1 (Yellow/Red wire) and No. 3 (Green/Yellow wire). While rotating speed sensor shaft, ensure voltage switches from zero to 5 volts, 4 times per revolution. If voltage changes as described, speed sensor is okay. Malfunction is mechanical. If voltage does not change as described, replace speed sensor.

## CODE 34 - EGR SOLENOID VALVE

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal D14 (backprobe) and ground. Voltage should be 10 volts or greater. If voltage is not as specified, go to next

step. If voltage is as specified, go to step 4).

2) Turn ignition off. Disconnect ECM and main relay harness connectors. Using an ohmmeter, check resistance between ECM harness connector terminal D14 and main relay harness connector terminal No. 1 (Black/White wire). Resistance should be zero ohms. If resistance is as specified, go to next step. If resistance is not as specified, repair circuit as necessary.

3) Turn ignition on. Using a DVOM, check voltage between ground and main relay harness connector terminals No. 1 (Black/White wire) and 2 (Brown/Black wire). Voltage should be 10 volts or greater at both terminals. If voltage is as specified, replace main relay. If voltage is not as specified, repair appropriate circuit as necessary.

4) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal D22 (backprobe) and ground. Voltage should be 7 volts or greater. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair terminals as necessary. If harness connector terminals are okay, replace ECM.

5) Turn ignition off. Remove collector and disconnect EGR solenoid valve harness connector. Using an ohmmeter, check resistance between ECM harness connector terminal D22 and EGR solenoid valve harness connector terminal No. 2 (White/Black wire). Resistance should be zero ohms. If resistance is as specified, replace EGR solenoid valve. If resistance is not as specified, repair circuit as necessary.

## CODE 35 - PURGE CONTROL SOLENOID VALVE

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal D14 (backprobe) and ground. Voltage should be 10 volts or greater. If voltage is not as specified, go to next step. If voltage is as specified, go to step 4).

2) Turn ignition off. Disconnect ECM and main relay harness connectors. Using an ohmmeter, check resistance between ECM harness connector terminal D14 and main relay harness connector terminal No. 1 (Black/White wire). Resistance should be zero ohms. If resistance is as specified, go to next step. If resistance is not as specified, repair circuit as necessary.

3) Turn ignition on. Using a DVOM, check voltage between ground and main relay harness connector terminals No. 1 (Black/White wire) and No. 2 (Brown/Black wire). Voltage should be 10 volts or greater at each terminal. If voltage is as specified, replace main relay. If voltage is not as specified, repair appropriate circuit as necessary.

4) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal D6 (backprobe) and ground. Voltage should be 7 volts or greater. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

5) Turn ignition off. Remove collector and disconnect purge control solenoid valve harness connector. Using an ohmmeter, check resistance between ECM harness connector terminal D6 and solenoid valve harness connector terminal No. 2 (White/Red wire). Resistance should be zero ohms. If resistance is as specified, replace purge control solenoid valve. If resistance is not as specified, repair circuit as necessary.

## CODE 37 - OXYGEN SENSOR (O2S) NO. 2 - L/H

NOTE: For ECM harness connector terminal identification,

see Fig. 2.

1) Warm engine to operating temperature and allow to idle. Using a DVOM, check voltage between ECM harness connector terminal A5 (backprobe) and ground. Voltage should vary between 0.1 volt and 1.0 volt. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

2) With engine at idle, disconnect oxygen sensor harness connector located on left side of engine. Using a DVOM, check voltage between sensor harness connector terminal No. 4 (Yellow/Blue wire) and ground. Voltage should vary between 0.1 volt and 1.0 volt. If voltage is as specified, go to next step. If voltage is not as specified, replace left oxygen sensor.

3) Turn ignition off. Disconnect ECM harness connectors. Using an ohmmeter, check resistance between ECM harness connector terminal A5 and sensor harness connector terminal No. 4 (Yellow/Blue wire). Resistance should be zero ohms. Check resistance between sensor harness connector terminal No. 4 (Yellow/Blue wire) and ground. Resistance should be one megohm or greater. If resistances are as specified, go to next step. If resistances are not as specified, repair circuit as necessary.

4) Disconnect main relay harness connector. Using an ohmmeter, check resistance between main relay harness connector terminal No. 1 (Black/White wire) and sensor harness connector terminal No. 1 (Black/White wire), and between main relay harness connector terminal No. 3 (White/Red wire) and sensor harness connector terminal No. 2 (White/Red wire). Resistance should be zero ohms for both circuits. If resistance is as specified, go to next step. If resistance is not as specified, repair appropriate circuit as necessary.

5) Turn ignition on. Using a DVOM, check voltage between ground and main relay harness connector terminals No. 2 (Brown/Black wire) and No. 1 (Black/White wire). Voltage should be 10 volts or greater. If voltage is as specified, replace main relay. If voltage is not as specified, repair appropriate circuit as necessary.

## CODE 38 - ENGINE TORQUE CONTROL

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal A20 (backprobe) and ground. Voltage should be 5 volts or greater. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

2) Turn ignition off. Disconnect ECM and Transaxle Control Module (TCM) harness connectors. Using an ohmmeter, check resistance between ECM harness connector terminal A20 and TCM harness connector terminal C16 (Black/Yellow wire). Resistance should be zero ohms. If resistance is not as specified, repair circuit as necessary. If resistance is as specified, check TCM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace TCM.

## CODE 41 - AIR/FUEL LEARNING CONTROL

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Check fuel injector operation and repair as necessary. See Codes 14, 15, 16, 17, 18 and 19. If injectors are okay, check airflow sensor (Code 23) and repair as necessary. If airflow sensor is okay, check coolant temperature sensor (Code 21) and repair as necessary. If coolant temperature sensor is okay, check throttle position sensor (Code 31) and repair as necessary. If throttle position sensor is okay, check both oxygen sensors (Codes 32 and 37) and repair as necessary. If oxygen sensors are okay, go to next step.

2) Check system fuel pressure. See F - BASIC TESTING article. Ensure all fuel injectors are operating properly. If all components have been inspected and Code 41 is still present, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

## **CODE 45 - ATMOSPHERIC PRESSURE SENSOR**

A faulty atmospheric pressure sensor may cause erratic idle or engine will not start. Sensor is located inside ECM. If Code 45 is present, replace ECM.

## **CODE 51 - NEUTRAL POSITION SIGNAL**

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal B10 (backprobe) and ground. With shifter in Neutral, voltage should be zero.

2) Check voltage at terminal B10 with shifter in all other positions. Voltage should be 8 volts or greater. If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

3) Turn ignition off. Disconnect neutral switch harness connector located near transaxle dipstick. Using an ohmmeter, check resistance between neutral switch harness connector terminal No. 1 (Light Green/Yellow wire) and ground. With shifter in Neutral, resistance should be zero ohms.

4) Check resistance at terminal No. 1 with vehicle in all other shift positions. Resistance should be one megohm or greater. If resistances are not as specified, replace neutral switch. If resistances are as specified, repair circuit between ECM and neutral switch as necessary.

## **CODE 52 - PARKING POSITION SIGNAL**

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal B9 (backprobe) and ground. With shifter in Park, voltage should be zero.

2) Check voltage at terminal B9 with transaxle in all other shift positions. Voltage should be 8 volts or greater. If voltages are not as specified, go to next step. If voltages are as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

3) Turn ignition off. Disconnect inhibitor switch harness connector located near transaxle dipstick. Using an ohmmeter, check resistance between inhibitor switch harness connector terminal No. 2 (Light Green wire) and ground. With shifter in Park, resistance should be zero ohms.

4) Check resistance at terminal No. 2 with shifter in all

other positions. Resistance should be one megohm or greater. If resistances are not as specified, replace inhibitor switch. If resistances are as specified, repair circuit between ECM and inhibitor switch as necessary.

## CODE 55 - EGR TEMPERATURE SENSOR

NOTE: For ECM harness connector terminal identification, see Fig. 2.

1) Turn ignition on. Using a DVOM, check voltage between ECM harness connector terminal A4 (backprobe) and ground. Voltage should be 4-4.8 volts at 68°F (20°C) and 0.4-1.2 volts at 212°F (100°C). If voltage is not as specified, go to next step. If voltage is as specified, check ECM harness connector terminals for good contact. Repair as necessary. If harness connector terminals are okay, replace ECM.

2) Turn ignition off. Disconnect EGR temperature sensor harness connector. Using an ohmmeter, backprobe ECM and check resistance between ECM harness connector terminal A4 and temperature sensor harness connector terminal No. 2 (Green/Red wire), and between ECM harness connector terminal A11 and temperature sensor harness connector terminal No. 1 (Black/Red wire). Resistance should be zero ohms for both circuits.

3) Check resistance between sensor harness connector terminal No. 2 (Green/White wire) and ground. Resistance should be one megohm or greater. If resistances are as specified, replace EGR temperature sensor. If resistances are not as specified, repair affected circuit as necessary.

## CODE 56 - EGR SYSTEM

A faulty EGR system may cause poor driveability at low engine speed. Check for mechanical problem with EGR valve, faulty EGR vacuum controller and/or EGR line. Check for EGR valve stuck in open or closed position. For EGR system diagnosis, see appropriate I - SYSTEM/COMPONENT TESTS article.

## SUMMARY

If no hard fault codes are present, driveability symptoms

**exist or intermittent codes exist, proceed to INTRODUCTION**

If no faults were found while performing BASIC DIAGNOSTIC PROCEDURES, proceed with self-diagnostics. If no fault codes are present after entering self-diagnostics, proceed to appropriate H - TESTS W/O CODES article for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.) or intermittent diagnostic procedures.