

G - TESTS W/CODES

1993 Mitsubishi Montero

1993 ENGINE PERFORMANCE
Chrysler Corp./Mitsubishi Self-Diagnostics

Dodge; Ram-50
Mitsubishi; Montero, Pickup

INTRODUCTION

If no faults were found while performing F - BASIC TESTING, proceed with self-diagnostics. If no fault codes or only pass codes are present after entering self-diagnostics, proceed to H - TESTS W/O CODES article in this section for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.).

SELF-DIAGNOSTIC SYSTEM

SYSTEM DIAGNOSIS

System diagnosis can be accomplished using a voltmeter or appropriate scan tester. See RETRIEVING CODES. Engine Control Module (ECM) monitors several different engine control system circuits. If an abnormal input signal occurs, a fault code is stored in ECM memory and assigned a fault code number. Each circuit has its own fault number and message. A specific fault code indicates a particular system failure, but it does not indicate that cause of failure is necessarily within system.

A fault code does not condemn any specific component; it simply points out a probable malfunctioning area. If a fault code is set, ECM will turn on Malfunction Indicator Light (MIL). Fault codes can be confirmed by using a voltmeter. System malfunctions encountered are identified as either hard failures or intermittent failures as determined by ECM.

Hard Failures

Hard failures cause Malfunction Indicator Light (MIL) to glow and remain on until malfunction is repaired. If MIL comes on and remains on (MIL may flash) during vehicle operation, cause of malfunction may be determined by using fault codes. See FAULT CODES. If a sensor fails, ECM will use a substitute value in its calculations to continue engine operation. In this condition, vehicle is functional, but loss of good driveability may result.

Intermittent Failures

Intermittent failures may cause Malfunction Indicator Light (MIL) to flicker or glow and go out after intermittent fault goes away. However, corresponding trouble code will be retained in ECM memory. If related fault does not reoccur within a certain time frame, related trouble code will be erased from ECM memory. Intermittent failures may be caused by a sensor, connector or wiring problems. See INTERMITTENTS in H - TESTS W/O CODES article in this section.

SERVICE PRECAUTIONS

Before proceeding with diagnosis, following precautions must be observed:

- * Ensure vehicle has a fully charged battery and functional charging system.

- * Visually inspect connectors and circuit wiring being worked on.
- * DO NOT disconnect battery or ECM. This will erase any fault codes stored in ECM.
- * DO NOT cause short circuits when performing electrical tests. This will set additional fault codes, making diagnosis of original problem more difficult.
- * DO NOT use a test light in place of a voltmeter.
- * When checking for spark, ensure coil wire is NOT more than 1/4" from chassis ground. If coil wire is more than 1/4" from chassis ground, damage to vehicle electronics and/or ECM may result.
- * DO NOT prolong testing of fuel injectors. Engine may hydrostatically (liquid) lock.
- * When a vehicle has multiple fault codes, always repair lowest number fault code first.

RETRIEVING CODES

Using Scan Tester

1) Refer to manufacturer's operation manual for instructions in use of scan tester. Before entering on-board diagnostics, see SERVICE PRECAUTIONS. Turn ignition switch to OFF position. Locate Data Link Connector (DLC), next to fuse block. Connect power source terminal of scan tester to cigarette lighter socket.

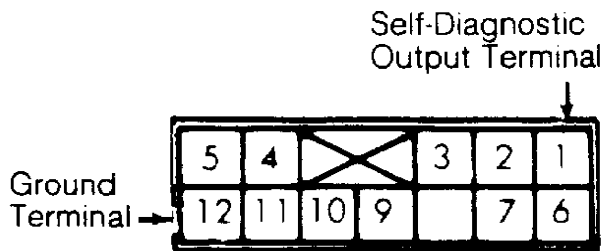
2) Connect scan tester to DLC. See Fig. 1. Turn ignition switch to ON position. Read and record scan tester self-diagnosis output. Perform necessary repair(s). See FAULT CODES.

Using Voltmeter

1) Before entering on-board diagnostics, see SERVICE PRECAUTIONS. Turn ignition switch to OFF position. Locate Data Link Connector (DLC), next to fuse block. Connect volt-meter positive lead to DLC terminal No. 1 and negative lead to terminal No. 12 (ground). See Fig. 1.

2) Turn ignition switch to ON position. Disclosure of ECM memory will begin. If 2 or more systems are non-functional, they are indicated by order of increasing code number. Indication is made by 12-volt pulses of voltmeter pointer. A constant repetition of short 12-volt pulses indicates system is normal. If system is abnormal, voltmeter will pulse between zero and 12 volts.

3) Signals will appear on voltmeter as long and short 12-volt pulses. Long pulses represent tens; short pulses represent ones. For example, 4 long pulses and 3 short pulses indicate Code 43. After recording fault code(s), perform necessary repair(s) to indicated circuit(s). See FAULT CODES.



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Fig. 1: Data Link Connector (DLC) Terminal ID
Courtesy of Mitsubishi Motor Sales of America.

FAULT CODES

NOTE: Codes listed in FAULT CODES are not used on all vehicles.

MIL Stays On
ECM fault. Possible cause: faulty ECM.

Code 11
Oxygen (O2) sensor fault. Possible causes: faulty O2 sensor, connector or harness, low or high fuel pressure, defective injector(s), intake air leaks.

Code 12
Airflow sensor fault. Possible causes: faulty airflow sensor, connector or harness.

Code 13
Intake air temperature sensor fault. Possible causes: faulty intake air temperature sensor, connector or harness.

Code 14
Throttle Position Sensor (TPS) fault. Possible causes: faulty TPS, connector or harness, closed throttle position switch.

Code 15
Idle Speed Control (ISC) motor position sensor fault.
Possible causes: faulty ISC motor position sensor, faulty throttle position sensor, connector or harness.

Code 21
Coolant temperature sensor fault. Possible causes: faulty coolant temperature sensor, connector or harness.

Code 22
Crankshaft Position (CKP) sensor fault. Possible causes: faulty distributor assembly (if equipped), faulty CKP sensor, connector or harness.

Code 23
Camshaft Position (CMP) sensor fault. Possible causes: faulty distributor assembly (if equipped), faulty CMP sensor, connector or harness.

Code 24
Vehicle Speed Sensor (VSS) fault. Possible causes: faulty VSS, connector or harness.

Code 25
Barometric (BARO) pressure sensor fault. Possible causes: faulty BARO pressure sensor, connector or harness.

Code 31
Knock sensor fault. Possible causes: faulty knock sensor, connector or harness.

Code 32
MAP sensor faulty. Possible causes: faulty MAP sensor, connector or harness.

Code 36
Ignition timing adjustment signal fault. Possible causes: connector or harness.

Code 39
Oxygen (O2) sensor fault. Possible causes: faulty O2 sensor,

faulty O2 sensor heater, connector or harness, low or high fuel pressure, defective injector(s), intake air leaks.

Code 41

Injector(s) fault. Possible causes: low or high injector coil resistance, connector or harness.

Code 42

Fuel pump fault. Possible causes: faulty ECM, faulty MPI relay, connector or harness.

Code 43

EGR fault. Possible causes: faulty EGR valve, faulty EGR temperature sensor, faulty EGR solenoid, faulty EGR vacuum control, connector or harness.

Code 44

Ignition coil (cylinders No. 1 and 4) fault. Possible causes: faulty ignition coil, faulty ignition power transistor unit, connector or harness.

Code 52

Ignition coil (cylinders No. 2 and 5) fault. Possible causes: faulty ignition coil, faulty ignition power transistor unit, connector or harness.

Code 53

Ignition coil (cylinders No. 3 and 6) fault. Possible causes: faulty ignition coil, faulty ignition power transistor unit, connector or harness.

Code 55

Idle Air Control (IAC) valve position sensor fault. Possible causes: faulty IAC valve position sensor, faulty IAC motor assembly, faulty ECM, connector or harness.

Code 59

Rear Oxygen (O2) sensor fault. Possible causes: faulty O2 sensor, faulty O2 sensor heater, faulty ECM, connector or harness.

Code 61

Transaxle control module torque reduction signal fault. Possible causes: faulty transaxle control module, connector or harness.

Code 62

Variable Induction Control (VIC) Valve position sensor fault. Possible causes: faulty VIC valve position sensor, connector or harness.

Code 71

Traction Control (TC) vacuum valve solenoid fault. Possible causes: faulty TC vacuum valve solenoid, connector or harness.

Code 72

Traction Control (TC) vent valve solenoid fault. Possible causes: faulty TC vent valve solenoid, connector or harness.

CLEARING CODES

NOTE: To clear codes using a scan tester, refer to owners manual supplied with scan tester.

Fault codes may be cleared by disconnecting negative battery cable for at least 10 seconds, allowing ECM to clear fault codes. Reconnect negative battery cable and check for codes to confirm repair.

ECM LOCATION

ECM LOCATION TABLE

Application	Location
All Models	Behind Right Side of Instrument Panel

TERMINAL IDENTIFICATION

NOTE: The following terminals are shown as viewed from component side.

TERMINAL ID DIRECTORY TABLE

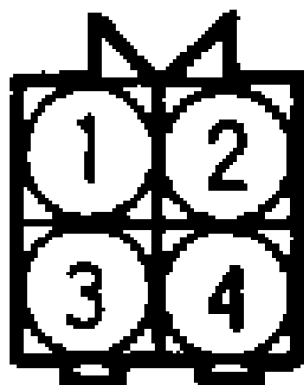
Connector	See Fig.
Airflow Sensor	Fig. 2
CKP/CMP Sensor	Fig. 3
Coolant Temperature Sensor	Fig. 4, 5
ECM	Fig. 6, 7
EGR Temperature Sensor	Fig. 8
Fuel Injector	Fig. 9
Fuel Pump	Fig. 10
Idle Air Control Valve Position Sensor	Fig. 11
Idle Speed Control Motor & Position Sensor	Fig. 12
Ignition Coil	Fig. 13
Induction Control Valve Position Sensor	Fig. 14
Knock Sensor	Fig. 15
MAP Sensor	Fig. 16
MPI Relay	Fig. 17
Oxygen (O2) Sensor	Fig. 18, 19
Throttle Position Sensor	Fig. 20
Traction Control Vacuum Solenoid	Fig. 21
Traction Control Vent Solenoid	Fig. 22
Transaxle Control Module	Fig. 23



ALL OTHER MODELS

93D45107

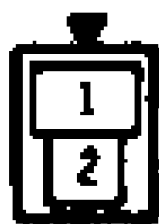
Fig. 2: Airflow Sensor Terminal ID
 Courtesy of Mitsubishi Motor Sales of America.



PICKUP & RAM-50 (2.4L - 4WD)

93D45123

Fig. 3: CKP/CMP Sensor Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



PICKUP & RAM-50 (2.4L - 4WD)

93F45125

Fig. 4: Coolant Temperature Sensor Terminal ID (2.4L)
Courtesy of Mitsubishi Motor Sales of America.

61	72
60	71
59	70
58	69
57	68
56	67
55	66
54	65
53	64
52	63
51	62
108	116
107	115
106	114
105	113
104	112
103	111
102	110
101	109
13	26
12	25
11	24
10	23
9	22
8	21
7	20
6	19
5	18
4	17
3	16
2	15
1	14

ALL OTHER MODELS

93F45109

Fig. 7: ECM Terminal ID (2.4L)
 Courtesy of Mitsubishi Motor Sales of America.



93J80258

Fig. 8: EGR Temperature Sensor Terminal ID
 Courtesy of Mitsubishi Motor Sales of America.



ALL OTHER MODELS

93B45113

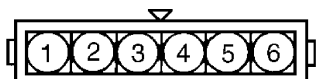
Fig. 9: Fuel Injector Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



PICKUP & RAM-50

93J45129

Fig. 10: Fuel Pump Terminal ID (Pickup & Ram-50)
Courtesy of Mitsubishi Motor Sales of America.

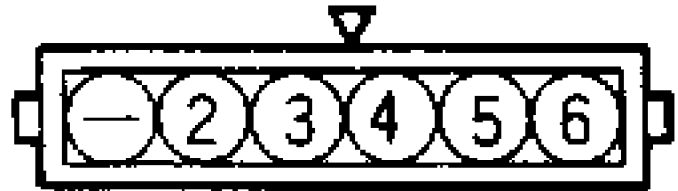


93E80261

Fig. 11: Idle Air Control Valve Position Sensor Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



ISC MOTOR



ISC POSITION SENSOR

93F80262

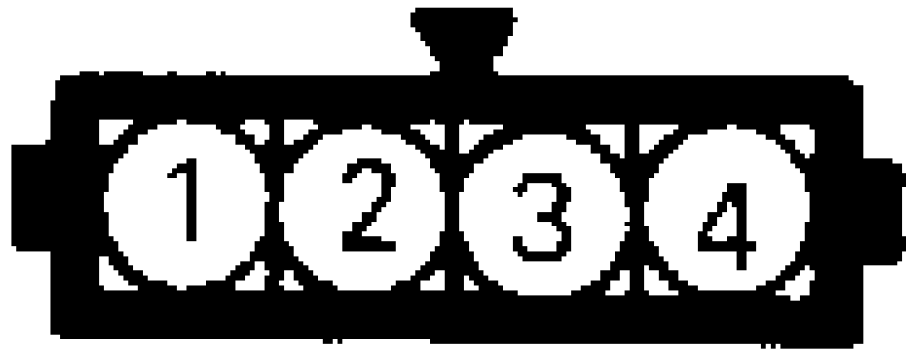
Fig. 12: Idle Speed Control Motor & Position Sensor Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



ALL OTHER MODELS

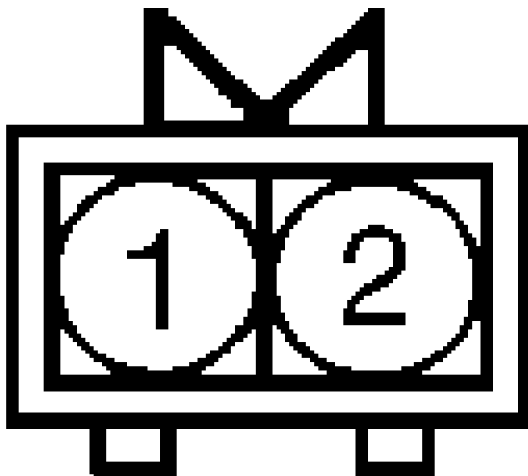
93D45115

Fig. 13: Ignition Coil Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



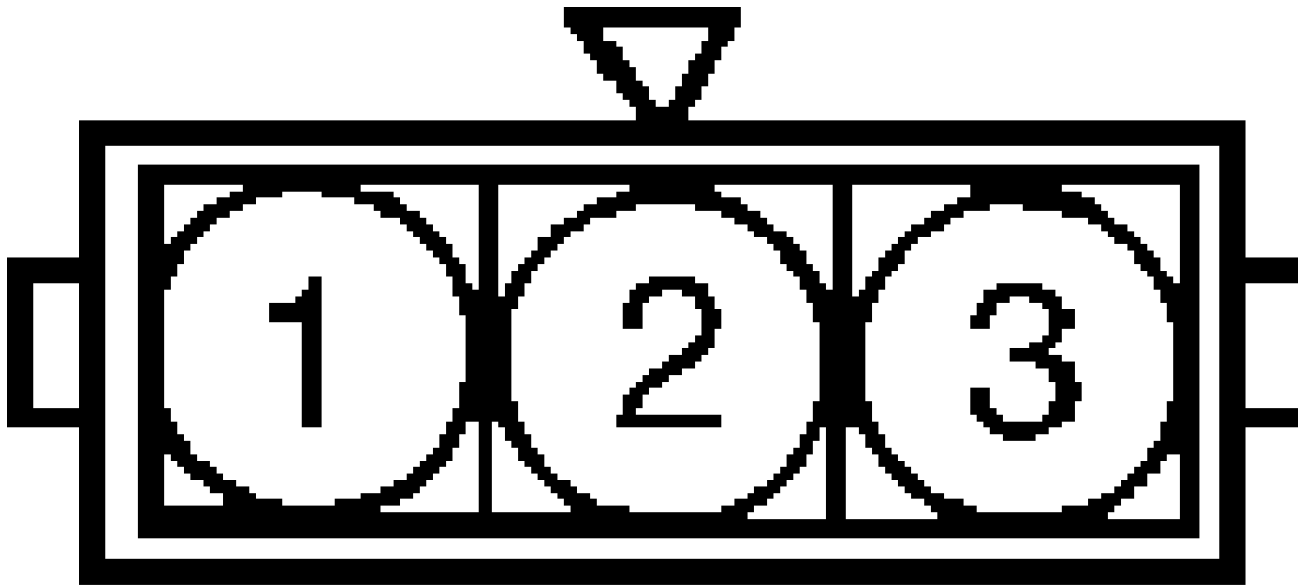
93H80264

Fig. 14: Induction Control Valve Position Sensor Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



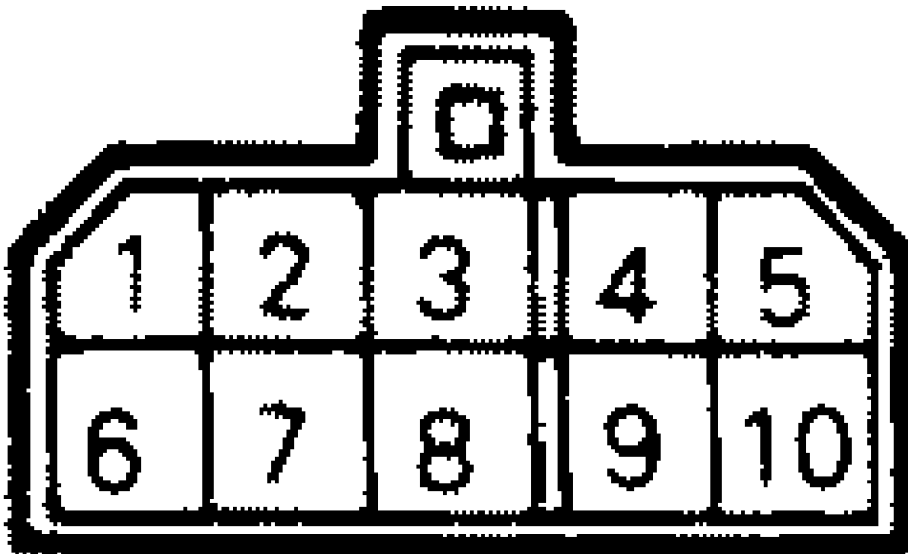
93I80265

Fig. 15: Knock Sensor Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



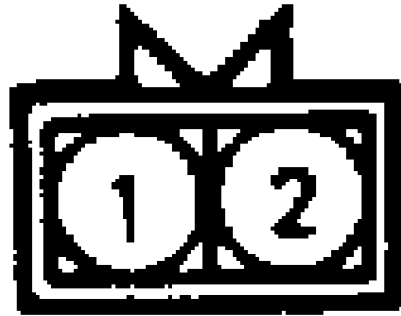
93J80266

Fig. 16: Map Sensor Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



93A80267

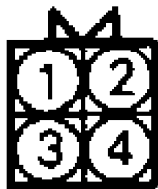
Fig. 17: MPI Relay Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



ALL OTHER MODELS (2-WIRE)

93F45117

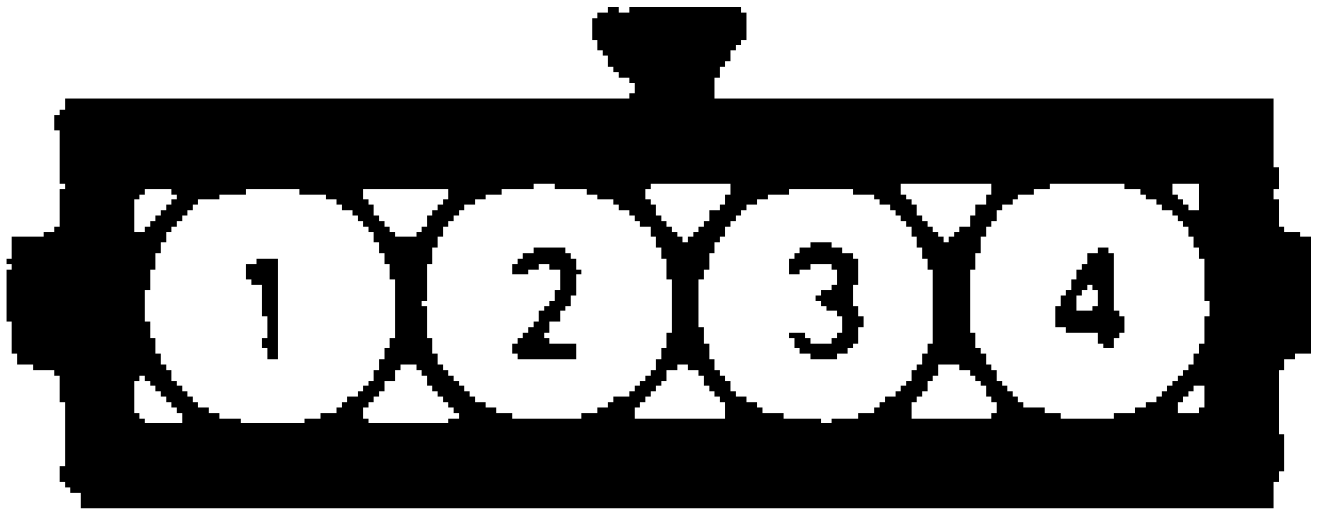
Fig. 18: Oxygen (O₂) Sensor Terminal ID (All Models, 2-Wire)
Courtesy of Mitsubishi Motor Sales of America.



ALL OTHER MODELS

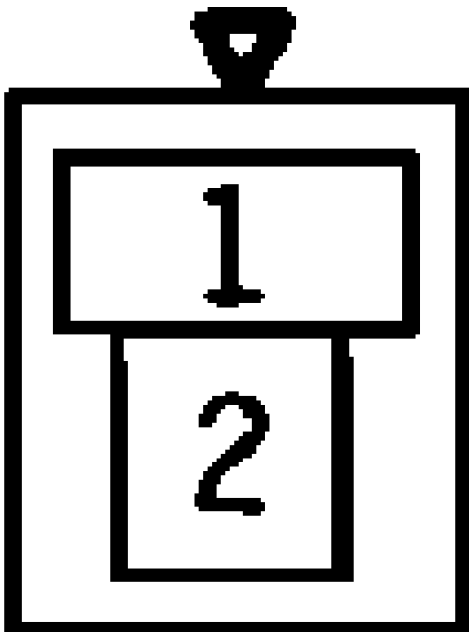
93A45120

Fig. 19: Oxygen (O₂) Sensor Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



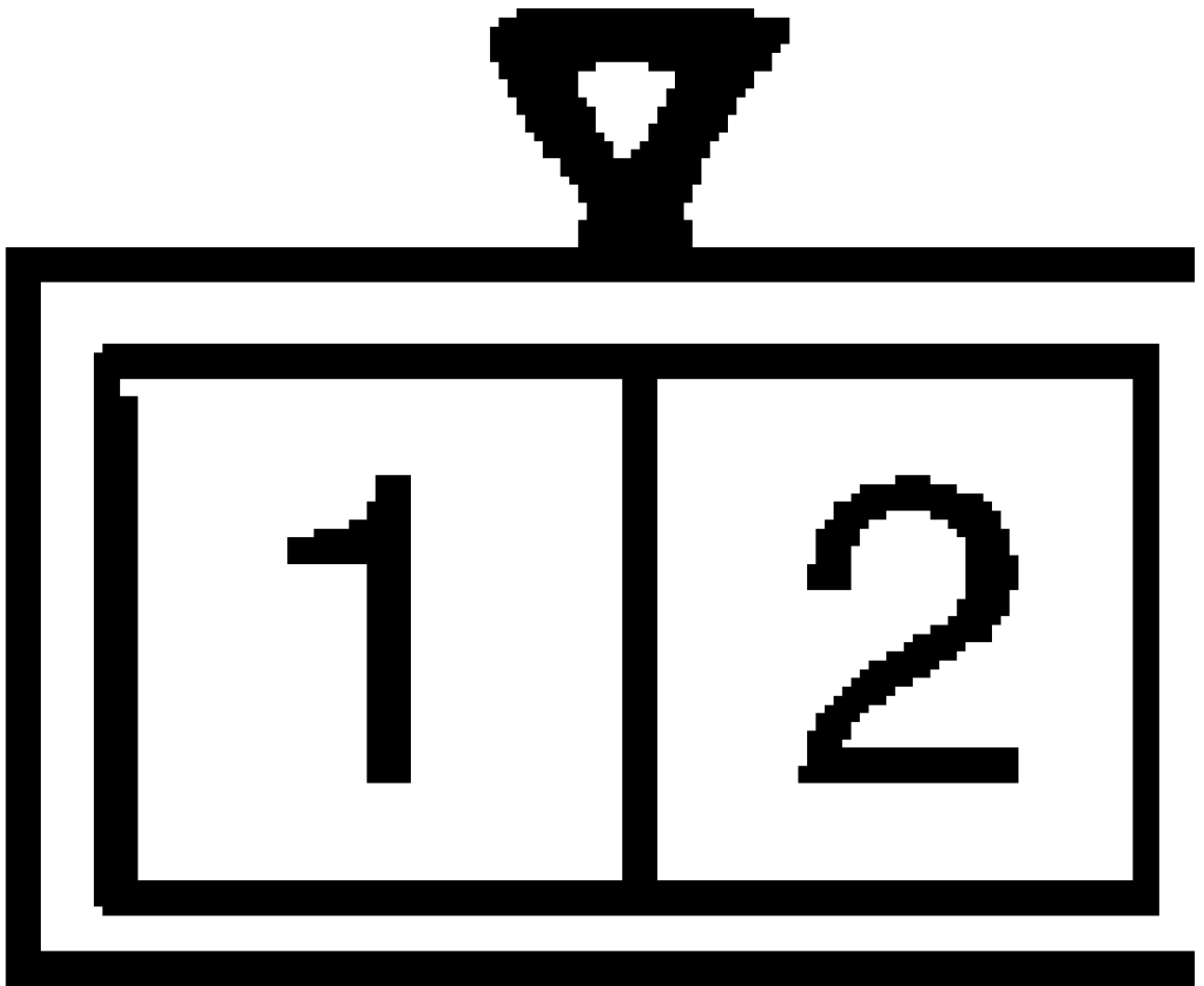
93C80269

Fig. 20: Throttle Position Sensor Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



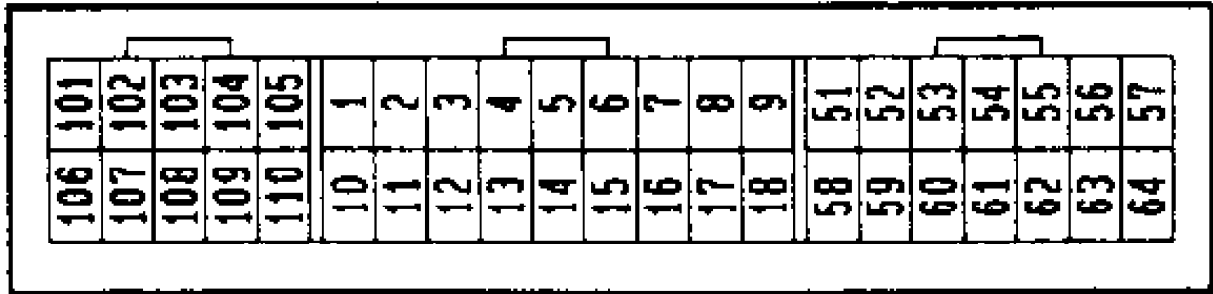
93F80270

Fig. 21: Traction Control Vacuum Solenoid Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



93G80271

Fig. 22: Traction Control Vent Solenoid Terminal ID
Courtesy of Mitsubishi Motor Sales of America.



93H80272

Fig. 23: Transaxle Control Module Terminal ID
 Courtesy of Mitsubishi Motor Sales of America.

DIAGNOSTIC TESTS

CAUTION: Ensure ignition switch is in OFF position when performing resistance tests.

NOTE: Perform all resistance and voltage tests using a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohms impedance, unless stated otherwise in test procedures.

Clear fault codes after each repair. See CLEARING CODES under SELF-DIAGNOSTIC SYSTEM. Recheck for codes to confirm repair. See RETRIEVING CODES under SELF-DIAGNOSTIC SYSTEM.

CODE 11: OXYGEN (O2) SENSOR, ONE-WIRE O2 SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) If using scan tester, go to step 2. Start and warm engine to operating temperature. Disconnect O2 sensor connector. Connect DVOM between chassis ground and O2 sensor terminal. While repeatedly racing engine, measure O2 sensor output voltage. If voltage is not .6-1.0 volt, replace O2 sensor. If voltage is within specification, go to step 4.

2) Using scan tester, read O2 sensor voltage. While monitoring scan tester, accelerate to 4000 RPM. Suddenly decelerate. Scan tester should read .3 volt or less. Suddenly accelerate. Scan tester should read .5-1.0 volt. If voltage is not as specified, replace O2 sensor. If voltage is as specified, go to next step.

3) While monitoring scan tester, accelerate to 2000 RPM and decelerate to 700 RPM (idle). Scan tester should switch between .6-1.0 volt and .4 volt or less. If voltage is not as specified, replace O2 sensor. If voltage is as specified, go to next step.

4) Disconnect O2 sensor connector and ECM connector. Using DVOM, check for continuity between O2 sensor terminal and ECM connector terminal No. 4. If continuity does not exist, repair wiring harness as necessary. If continuity exists, condition required to set fault is not present at this time. Test is complete. Intermittent

problem may exist. See H - TESTS W/O CODES article in this section.

CODE 11: OXYGEN (O2) SENSOR, 2-WIRE O2 SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) If using scan tester, go to step 2. Start and warm engine to operating temperature. Disconnect O2 sensor connector. Connect DVOM between chassis ground and O2 sensor terminal No. 1. While repeatedly racing engine, measure O2 sensor output voltage. If voltage is not .6-1.0 volt, replace O2 sensor. If voltage is within specification, go to step 4.

2) Using scan tester, read O2 sensor voltage. While monitoring scan tester, accelerate to 4000 RPM. Suddenly decelerate. Scan tester should read .3 volt or less. Suddenly accelerate. Scan tester should read .5-1.0 volt. If voltage is not as specified, replace O2 sensor. If voltage is as specified, go to next step.

3) While monitoring scan tester, accelerate to 2000 RPM and decelerate to 700 RPM (idle). Scan tester should switch between .6-1.0 volt and .4 volt or less. If voltage is not as specified, replace O2 sensor. If voltage is as specified, go to next step.

4) Disconnect O2 sensor connector and ECM connector. Using DVOM, check for continuity between O2 sensor terminal No. 1 and ECM connector terminal No. 4. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

5) Using DVOM, check continuity between chassis ground and O2 sensor connector terminal No. 2. If continuity does not exist, replace O2 sensor. If continuity exists, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CODE 11: OXYGEN (O2) SENSOR, 4-WIRE O2 SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) If using scan tester, go to step 3. Disconnect O2 sensor connector. On all models Pickup and Ram-50, install Test Harness (MB998464) between O2 sensor and O2 sensor connector. On all models, use DVOM to check resistance between specified O2 sensor connector heater terminals. See O2 SENSOR 4-WIRE CONNECTOR TERMINAL ID table. O2 sensor resistance should be 20 ohms at 68°F (20°C). If resistance is not as specified, replace O2 sensor. If resistance is as specified, go to next step.

2) Using jumper wires, apply 12 volts to specified O2 sensor connector heater terminals. See O2 SENSOR 4-WIRE CONNECTOR TERMINAL ID table. Using DVOM, check voltage between specified O2 sensor connector output terminals, while repeatedly racing engine. If voltage is not .6-1.0 volt, replace O2 sensor. If voltage is .6-1.0 volt, go to step 5.

O2 SENSOR 4-WIRE CONNECTOR TERMINAL ID TABLE

Application	(1) Heater Terminals	Output Terminals
Montero	1 & 3	2 & 4
Pickup, Ram-50	2 & 4	1 & 3

(1) - First terminal listed is positive. Second terminal

listed is negative.

3) Start and warm engine to operating temperature. Using scan tester, read O2 sensor voltage. While monitoring scan tester, accelerate to 4000 RPM. Suddenly decelerate. Scan tester should read .3 volt or less. Suddenly accelerate. Scan tester should read .5-1.0 volt. If voltage is not as specified, replace O2 sensor. If voltage is as specified, go to next step.

4) While monitoring scan tester, accelerate to 2000 RPM and decelerate to 700 RPM (idle). Scan tester should switch between .6-1.0 volt and .4 volt or less. If voltage is not as specified, replace O2 sensor. If voltage is as specified, go to next step.

5) Disconnect O2 sensor connector. On Pickup 3.0L, Ram-50 3.0L, go to next step. On all other models, disconnect MPI relay connector. Using DVOM, check for continuity between specified O2 sensor connector terminals and MPI connector terminals. See O2 SENSOR TO MPI WIRING HARNESS TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to step 7.

O2 SENSOR TO MPI WIRING HARNESS TERMINAL ID TABLE

Application	O2 Sensor Terminals	MPI Terminals
Montero	1	5
Pickup, Ram-50	2	2

6) Turn ignition switch to ON position. Using DVOM, check voltage between specified O2 sensor connector terminal and chassis ground. See O2 SENSOR CONNECTOR VOLTAGE CIRCUIT ID table. If system voltage does not exist, repair wiring harness as necessary. If system voltage exists, go to next step.

O2 SENSOR CONNECTOR VOLTAGE CIRCUIT ID TABLE

Application	Terminal No.
Pickup 3.0L & Ram-50 3.0L	2

7) Using DVOM, check for continuity between specified O2 sensor connector terminals and ECM connector terminals. See O2 SENSOR TO ECM WIRING HARNESS TERMINAL ID table. If continuity does not exist on either circuit, repair appropriate circuit for open or short to ground as necessary. If continuity exists, go to next step.

O2 SENSOR TO ECM WIRING HARNESS TERMINAL ID TABLE

Application	O2 Sensor Terminals	ECM Terminals
Pickup, Ram-50	3	56
	4	35
Montero	4	4

8) Disconnect O2 sensor connector. Using DVOM, check for continuity between specified O2 sensor connector terminal and chassis ground. See O2 SENSOR CONNECTOR GROUND CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If no system or

component malfunctions occur in preceding tests, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

O2 SENSOR CONNECTOR GROUND CIRCUIT ID TABLE

Application	Terminal No.
Pickup, Ram-50	1
Montero	2

CODE 12: AIRFLOW SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

NOTE: Procedures are provided by manufacturer for component testing using an engine analyzer with oscilloscope capability. Refer to manufacturer's operation manual for instructions in use of oscilloscope. If using a scan tester, go to step 3.

1) If using scan tester, go to step 3. Disconnect Airflow Sensor (AFS) connector. Install Test Harness (MB991348) between AFS and AFS connector. Using engine analyzer with oscilloscope capability, connect special patterns probe to AFS connector terminal No. 3.

2) Start engine. Verify that wave form high frequency and low frequency patterns are of approximately the same length (time). See Fig. 24. Verify that wave length decreases and frequency increases as engine RPM increases. If conditions are not as specified, replace AFS. If conditions are as specified, go to step 4.



93180273

Fig. 24: Known-Good Airflow Sensor Wave Pattern ID
Courtesy of Mitsubishi Motor Sales of America

3) Warm vehicle to normal operating temperature. Ensure headlights and accessories are off. Ensure steering wheel is in straight-ahead position. Using scan tester, read Airflow Sensor (AFS) volume (frequency) value. See AIRFLOW SENSOR VALUES table. Frequency should increase when engine is raced. If values are not as specified, replace AFS. If values are as specified, go to next step.

AIRFLOW SENSOR VALUES TABLE

Application	Hz @	
	700 RPM	2000 RPM
2.4L	40-60	85-105
3.0L		
Montero	22-48	60-100
Pickup & Ram-50	25-45	70-90

4) On Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD), go to step 8. On all other models, disconnect AFS connector and MPI relay connector. Using DVOM, check for continuity between specified AFS connector terminal and MPI relay connector terminal. See AFS TO MPI TERMINAL WIRING HARNESS ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

AFS TO MPI TERMINAL WIRING HARNESS ID TABLE

Application	AFS		MPI
	Terminal No.		
Montero	4	4	
Pickup, Ram-50	4	3	

5) Using DVOM, check for continuity between chassis ground and AFS connector terminal No. 5. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

6) Disconnect AFS connector and ECM connector. Using DVOM, check for continuity between specified AFS connector terminal and ECM connector terminal. See AFS TO ECM WIRING HARNESS TERMINAL ID table. If continuity does not exist on specified circuit(s), repair appropriate circuit for open or short to ground as necessary. If continuity exists, go to next step.

AFS TO ECM WIRING HARNESS TERMINAL ID TABLE

Application	AFS		ECM
	Terminal No.		
Montero	3	10	
	7	57	
Pickup, Ram-50	3	70	
	7	19	

7) Turn ignition switch to ON position. Using DVOM, check voltage between chassis ground and AFS harness connector terminal No. 3 on all models. If voltage is not 4.8-5.2 volts, replace ECM. If voltage is as specified, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

8) Disconnect AFS connector. Turn ignition switch to ON position. Using DVOM, check voltage between specified terminal and chassis ground. See AFS CONNECTOR POWER SUPPLY CIRCUIT ID table. If system voltage does not exist, repair wiring harness as necessary. If system voltage exists, go to next step.

AFS CONNECTOR POWER SUPPLY CIRCUIT ID TABLE

Application	Terminal No.
2.4L (4WD), 3.0L	5

9) With ignition switch in ON position, use DVOM to check voltage between specified terminal and chassis ground. See AFS CONNECTOR VOLTAGE CIRCUIT ID table. If voltage is not 4.8-5.2 volts, repair wiring harness as necessary. If voltage is as specified, go to next step.

AFS CONNECTOR VOLTAGE CIRCUIT ID TABLE

Application	Terminal No.
All Models	3

10) Using DVOM, check for continuity between specified AFS connector terminal and chassis ground. See AFS CONNECTOR GROUND CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. Intermittent problem may exist. See H - TESTS W/O CODES article in this section. On all other models, go to next step.

AFS CONNECTOR GROUND CIRCUIT ID

Application	Terminal No.
All Models	5

11) Disconnect AFS connector and ECM connector. Using DVOM, check for continuity between specified AFS connector terminal and ECM connector terminal. See ECM TO AFS WIRING HARNESS TERMINAL ID table. If continuity does not exist on specified circuit(s), repair appropriate circuit for open or short to ground as necessary. If continuity exists, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

ECM TO AFS WIRING HARNESS TERMINAL TABLE

Application	ECM Terminal No.	AFS Terminal No.
All Models	57	7

CODE 13: INTAKE AIR TEMPERATURE SENSOR

NOTE: On all models, intake air temperature sensor is built into airflow sensor. For code 13 test purposes, the airflow sensor will be referred to as the intake air temperature sensor. For component terminal identification, see AIRFLOW SENSOR under TERMINAL ID. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) If using scan tester, go to step 3. Disconnect Intake Air Temperature (IAT) sensor connector. Using a thermometer, check engine compartment ambient temperature. Using DVOM, check resistance between specified IAT sensor terminals. See IAT SENSOR TERMINAL ID table. Resistance should be 6000 ohms at 32°F (0°C), 2700 ohms at 68°F (20°C) or 400 ohms at 176°F (80°C). If resistance is not as specified,

replace IAT sensor. If resistance is as specified, go to next step.

IAT SENSOR TERMINAL ID TABLE

Application	Terminals No.
All Models	5 & 6

2) Using a hair dryer, warm IAT sensor while monitoring DVOM. Resistance should decrease evenly as temperature rises. If resistance remains unchanged, replace IAT sensor. If resistance changes, go to step 4.

3) Turn ignition switch to ON or RUN position. Using a thermometer, check engine compartment ambient temperature. Using scan tester, read Intake Air Temperature (IAT) sensor temperature. See IAT SENSOR TEMPERATURE table. If temperatures are not as specified, replace IAT sensor. If temperatures are as specified, go to next step.

IAT SENSOR TEMPERATURE TABLE

Ambient Temperature	Standard Value
-4°F (-20°C)	-20 °C
32°F (0°C)	0 °C
68°F (20°C)	20 °C
104°F (40°C)	40 °C
176°F (80°C)	80 °C

4) Disconnect IAT sensor connector. Using DVOM, check for continuity between chassis ground and specified IAT sensor connector terminal. See IAT SENSOR GROUND CIRCUIT TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

IAT SENSOR GROUND CIRCUIT TERMINAL ID TABLE

Application	Terminal No.
All Models	5

5) On Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD), go to next step. On all other models, with IAT sensor connector and ECM connector disconnected, check for continuity between specified IAT sensor connector terminal and ECM connector terminal. See IAT TO ECM WIRING HARNESS TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

IAT TO ECM WIRING HARNESS TERMINAL ID TABLE

Application	IAT Connector Terminal No.	ECM Connector Terminal No.
Montero	6	8
Pickup, Ram-50	6	52

6) Turn ignition switch to ON position. Check voltage between chassis ground and specified IAT sensor connector. See IAT SENSOR CONNECTOR VOLTAGE SUPPLY CIRCUIT TERMINAL ID table. If voltage is not 4.5-4.9 volts, replace ECM. If voltage is as specified, replace IAT

sensor.

IAT SENSOR CONNECTOR VOLTAGE SUPPLY CIRCUIT TERMINAL ID TABLE

Application	Terminal No.
All Models	6

CODE 14: THROTTLE POSITION SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

- 1) If using scan tester, go to step 3. Disconnect Throttle Position Sensor (TPS) connector. Using DVOM, check resistance between TPS terminals No. 1 and 4. If resistance is not 3500-6500 ohms, replace TPS. If resistance is as specified, go to next step
- 2) Check resistance between specified TPS terminals. See TPS TERMINAL ID table. While monitoring DVOM, slowly open throttle from idle to fully open position. If resistance does not change smoothly, replace TPS. If resistance changes smoothly, go to step 4.

TPS TERMINAL ID TABLE

Application	Terminals No.
3.0L	1 & 3
2.4L	2 & 4

3) Turn ignition switch to ON position. Using scan tester, read Throttle Position Sensor (TPS) voltage. With throttle at idle, voltage should read .3-1.0 volt. Voltage should increase while slowly opening throttle. At wide open throttle, voltage should read 4.5-5.5 volts. If voltage is not as specified, replace TPS. If voltage is as specified, go to next step.

4) On Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD), go to step 7. On all other models, disconnect TPS connector. Using DVOM, check continuity between chassis ground and specified TPS connector terminal. See TPS CONNECTOR GROUND CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

TPS CONNECTOR GROUND CIRCUIT ID TABLE

Application	Terminal No.
Montero	1
Pickup, Ram-50	4

5) Disconnect TPS connector and ECM connector. Check for continuity between specified TPS connector terminal and ECM connector terminal. See TPS TO ECM WIRING HARNESS TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

TPS TO ECM WIRING HARNESS TERMINAL ID TABLE

Application	TPS Terminal No.	ECM Terminal No.
-------------	------------------	------------------

Pickup 2.4L (RWD) & Ram-50 2.4L (RWD)	1	64
	2	61
Montero	3	19
	4	23

6) Check voltage between chassis ground and specified TPS connector terminal. See TPS VOLTAGE CIRCUIT ID table. If voltage is not 4.8-5.2 volts, replace ECM. If voltage is as specified, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. H - TESTS W/O CODES article in this section.

TPS VOLTAGE CIRCUIT ID TABLE

Application	TPS Terminal No.
Pickup 2.4L (RWD), Ram-50 2.4L (RWD)	1
Montero	4

7) Disconnect TPS connector. Turn ignition switch to ON position. Using DVOM, check voltage between chassis ground and specified TPS connector terminal. See TPS VOLTAGE SUPPLY ID table. If voltage is not 4.8-5.2 volts, repair wiring harness as necessary. If voltage is as specified, go to next step.

TPS VOLTAGE SUPPLY ID TABLE

Application	TPS Terminal No.
Pickup & Ram-50 2.4L (4WD)	4
3.0L	1

8) Check continuity between chassis ground and specified TPS connector terminal. See TPS CONNECTOR GROUND CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

TPS CONNECTOR GROUND CIRCUIT ID TABLE

Application	Terminal No.
Pickup 3.0L	1
Montero, Ram-50	4

9) With TPS connector and ECM connector disconnected, check for continuity between specified TPS connector terminal and ECM connector terminal. See ECM TO TPS HARNESS ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

ECM TO TPS HARNESS ID TABLE

Application	ECM Terminal No.	TPS Terminal No.
-------------	------------------	------------------

Pickup 3.0L	19	3
Montero, Ram-50	9	2

CODE 15: IDLE SPEED CONTROL POSITION SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) If using scan tester, go to step 3. Disconnect Idle Speed Control (ISC) motor position sensor connector. Using DVOM, check resistance between ISC motor position sensor terminals No. 2 and 3. If resistance is not 4000-6000 ohms, replace ISC motor position sensor. If resistance is as specified, go to next step.

CAUTION: Apply only 6 volts DC or less to ISC motor connector. Higher voltage could cause servo gears to lock up.

2) Disconnect ISC motor connector. Connect a 6-volt DC power supply between ISC motor connector terminals No. 1 and 2 to operate ISC motor. Check resistance between ISC motor position sensor terminals No. 3 and 5. Ensure ISC motor position sensor resistance changes smoothly as motor extends and retracts. If resistance does not change smoothly, replace ISC motor assembly. If resistance changes smoothly, go to step 4.

3) Ensure engine coolant temperature is 185-205°F (85-95°C). Place transmission in Park or Neutral. Turn off all accessories except A/C. Ensure A/C clutch is operating when A/C system is on. With engine at idle, use scan tester to read Idle Speed Control (ISC) motor position sensor voltage. See ISC VOLTAGE SPECIFICATIONS table. If voltage is not as specified, replace IAC motor position sensor. If voltage is as specified, go to next step.

ISC VOLTAGE SPECIFICATIONS TABLE

Application	A/C Switch Position	Standard Voltage
All Models	Off .....	.5-1.3
	On .....	.9-2.3
	(1) .....	.9-2.3

(1) - On A/T models only, apply brakes, place transmission selector in "D" position and A/C switch in ON position.

4) Disconnect ISC motor position sensor connector. Turn ignition switch to ON position. Using DVOM, check voltage between chassis ground and sensor connector terminal No. 2. Check voltage between chassis ground and sensor connector terminal No. 6. Voltage should be 4.8-5.2 volts on both circuits. If voltage is not as specified, repair appropriate wiring harness circuit(s) as necessary. If voltage is as specified, go to next step.

5) Check for continuity between chassis ground and sensor connector terminal No. 3. If continuity does not exist, repair wiring harness as necessary. If continuity exists, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CODE 21: COOLANT TEMPERATURE SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) If using scan tester, go to step 2. Remove Coolant Temperature Sensor (CTS) from intake manifold. Submerge temperature sensing portion of CTS in hot water. Using DVOM, check resistance across CTS terminals. See CTS RESISTANCE SPECIFICATIONS table. If resistance is not as specified, replace CTS. If resistance is as specified, go to step 3.

CTS RESISTANCE SPECIFICATIONS TABLE

Water Temperature	Approximate Ohms
32°F (0°C)	5800
68°F (20°C)	2400
104°F (40°C)	1100
176°F (80°C)	300

2) Turn ignition switch to ON or RUN position. Using a thermometer, check engine compartment ambient temperature. Using scan tester, read Coolant Temperature Sensor (CTS) voltage. See CTS VOLTAGE SPECIFICATIONS table. If voltage is not within specifications, replace CTS. If voltage is within specification, go to next step.

CTS VOLTAGE SPECIFICATIONS TABLE

Ambient Temperature	Standard Value °F (°C)
-4°F (-20°C)	-20 °C
32°F (0°C)	0 °C
68°F (20°C)	20 °C
104°F (40°C)	40 °C
176°F (80°C)	80 °C

3) Disconnect CTS connector. Using DVOM, check continuity between chassis ground and specified connector terminal. See CTS GROUND CIRCUIT TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

CTS GROUND CIRCUIT TERMINAL ID TABLE

Application	Terminal No.
Pickup 2.4L (4WD) & Ram-50 2.4L (4WD)	1
All Other Models	2

4) On Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD) go to next step. On all other models, Disconnect CTS connector and ECM connector. Check continuity between specified CTS connector terminals and ECM connector terminals. See CTS TO ECM WIRING HARNESS TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

CTS TO ECM WIRING HARNESS TERMINAL ID TABLE

CTS	ECM
-----	-----

Application	Terminal No.	Terminal No.
Montero	1	20
Pickup, Ram-50	1	63

5) Turn ignition switch to ON position. Check voltage between chassis ground and specified CTS connector terminal. See CTS VOLTAGE CIRCUIT ID table. If voltage is not 4.5-4.9 volts, replace ECM. If voltage is as specified, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CTS VOLTAGE CIRCUIT ID TABLE

Application	Terminal No.
Pickup & Ram-50 (2.4L - 4WD)	1
3.0L	2

CODE 22: CRANKSHAFT POSITION SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

NOTE: Procedures are provided by manufacturer for component testing using an engine analyzer with oscilloscope capability. Refer to manufacturer's operation manual for instructions in use of oscilloscope. If using a scan tester, go to step 3.

1) On all models except Pickup, Ram-50, disconnect Crankshaft/Camshaft Position (CKP/CMP) sensor connector. Install Test Harness (MB991348) between sensor and connector. On all models, using engine analyzer with oscilloscope capability, connect special patterns probe to specified connector terminal. See CKP PATTERN PICKUP TERMINAL ID table.

CKP PATTERN PICKUP TERMINAL ID TABLE

Application	Terminal No.
3.0L	2
2.4L	1

2) Start engine. Compare oscilloscope wave pattern with known-good wave pattern. See Fig. 25. Verify that wave length (time) decreases as engine RPM increases. If a wave pattern is output and it fluctuates to left or right, check for loose timing belt or an abnormality in sensor pickup disc. If a rectangular wave pattern is output even when engine is not started, substitute known-good CKP sensor. Repeat test. If wave pattern is still abnormal, go to step 5.



Fig. 25: Known-Good CKP Sensor Wave Pattern ID
 Courtesy of Mitsubishi Motor Sales of America

3) Connect an engine tachometer. Crank engine. Ensure ignition coil primary current toggles on and off. Using tachometer and scan tester, compare cranking speed and scan tester read out. If engine fails to start and tachometer reads zero RPM when engine is cranked, check for broken timing belt or faulty CKP sensor. If CKP sensor is suspected, substitute known-good CKP sensor. Repeat test procedure. If engine fails to start, tachometer reads zero RPM, and ignition coil primary current fails to toggle on and off, check for faulty ignition coil, ignition circuit or power transistor. If engine starts and readouts agree, go to next step.

4) Ensure A/C switch is in ON position to activate closed throttle position switch. Allow engine to idle. Check coolant temperature. Using scan tester, read idle speed. See IDLE RPM SPECIFICATIONS table. If RPM is not to specification, check for faulty coolant temperature sensor, basic idle speed adjustment, or idle air control motor. If RPM is within specifications, go to next step.

IDLE RPM SPECIFICATIONS TABLE

Coolant Temperature	Engine RPM
-4°F (-20°C)	
Pickup, Ram-50	1460-1660
2.4L	1300-1500
3.0L	1500-1700
Montero	1500-1700
32°F (0°C)	
Pickup, Ram-50	
2.4L	1300-1500
3.0L	1250-1450
Montero	1250-1450
68°F (20°C)	
Pickup, Ram-50	
2.4L	1150-1350
Montero, Pickup 3.0L, Ram-50 3.0L	1050-1250
104°F (40°C)	
Pickup, Ram-50	
2.4L	950-1150
3.0L	850-1050
Montero	850-1050
176°F (80°C)	
Pickup, Ram-50	
2.4L	650-850
3.0L	600-800
Montero	600-800

5) Disconnect CKP/CMP sensor connector and Ignition (IG) switch connector. Using DVOM, check for continuity between CKP/CMP sensor connector terminal No. 2 and IG switch connector terminal No. 3. See Fig. 26. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to step 8.

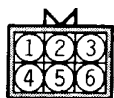


Fig. 26: Ignition Switch Terminal ID
Courtesy of Mitsubishi Motor Sales of America

6) On all other models except Montero, go to next step. Disconnect CKP/CMP connector and MPI relay connector. Using DVOM,

check for continuity between CKP/CMP connector terminal No. 3 and MPI relay connector terminal No. 5. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to step 8.

7) On all other models, disconnect CKP/CMP sensor connector. Turn ignition switch to ON position. Using DVOM, check voltage between chassis ground and specified CKP/CMP sensor connector terminal. See CKP SENSOR VOLTAGE TERMINAL ID table. If battery voltage does not exist, repair ignition circuit between CKP/CMP sensor connector and Ignition switch. If battery voltage exists, go to next step.

CKP SENSOR VOLTAGE TERMINAL ID TABLE

Application	Terminal No.
All Models	3

8) With CKP/CMP sensor connector disconnected, check for continuity between chassis ground and specified CKP/CMP sensor connector terminal. See CKP SENSOR GROUND CIRCUIT TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

CKP SENSOR GROUND CIRCUIT TERMINAL ID TABLE

Application	Terminal No.
3.0L	4
2.4L	2

9) On Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD), go to next step. On all other models, with CKP/CMP sensor connector and ECM connector disconnected, check for continuity between specified CKP/CMP sensor connector terminal and ECM connector terminal. See CKP TO ECM CONNECTOR TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

CKP TO ECM CONNECTOR TERMINAL ID TABLE

Application	CKP Terminal No.	ECM Terminal No.
Montero	1	22
	2	21
Pickup 2.4L (RWD) & Ram-50 2.4L (RWD)	1	69
All Other Models	3	69

10) With ignition switch in ON position, check for voltage between chassis ground and specified CKP/CMP sensor connector terminal. See CKP SENSOR SUPPLY CIRCUIT ID table. If 4.8-5.2 volts do not exist, replace ECM. If voltage is to specification and CKP sensor is suspected, replace CKP sensor.

CKP SENSOR SUPPLY CIRCUIT ID TABLE

Application	Terminal No.
3.0L	2
2.4L	1

CODE 23: CAMSHAFT POSITION SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

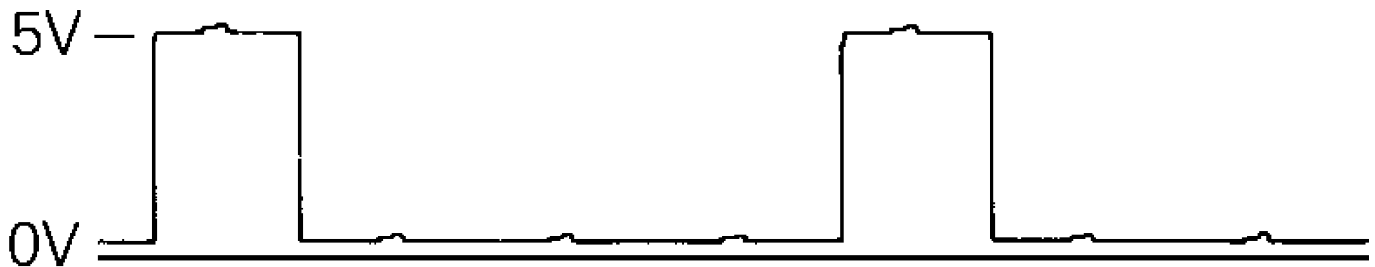
NOTE: Procedures are provided by manufacturer for component testing using an engine analyzer with oscilloscope capability. Refer to manufacturer's operation manual for instructions in use of oscilloscope. Manufacturer does not provide procedures for testing component using a scan tester.

1) On all models except Pickup, Ram-50, disconnect Crankshaft/Camshaft Position (CKP/CMP) sensor connector. Install Test Harness (MB991348) between sensor and connector. On all models, using engine analyzer with oscilloscope capability, connect special patterns probe to specified connector terminal. See CMP PATTERN PICKUP TERMINAL ID table.

CMP PATTERN PICKUP TERMINAL ID TABLE

Application	Terminal No.
3.0L	1
2.4L	4

2) Start engine. Compare oscilloscope wave pattern with known-good wave pattern. See Fig. 27. Verify that wave length (time) decreases as engine RPM increases. If a wave pattern is output and it fluctuates to left or right, check for loose timing belt or an abnormality in sensor pickup disc. If a rectangular wave pattern is output even when engine is not started, substitute known-good CMP sensor. Repeat test. If wave pattern is still abnormal, go to next step.



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Fig. 27: Known-Good CMP Sensor Wave Pattern ID
Courtesy of Mitsubishi Motor Sales of America

3) Disconnect CKP/CMP sensor connector and Ignition (IG) switch connector. Using DVOM, check for continuity between CKP/CMP sensor connector terminal No. 2 and IG switch connector terminal No. 3. See Fig. 26. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to step 6.

4) On all other models except Montero, go to next step. Disconnect CKP/CMP connector and MPI relay connector. Using DVOM, check for continuity between CKP/CMP connector terminal No. 3 and MPI relay connector terminal No. 5. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to step 6.

5) On all other models, disconnect CKP/CMP sensor connector.

Turn ignition switch to ON position. Using DVOM, check voltage between chassis ground and specified CKP/CMP sensor connector terminal. See CMP SENSOR VOLTAGE TERMINAL ID table. If battery voltage does not exist, repair ignition circuit between CKP/CMP sensor connector and Ignition switch. If battery voltage exists, go to next step.

CMP SENSOR VOLTAGE TERMINAL ID TABLE

Application	Terminal No.
All Models	3

6) With CKP/CMP sensor connector disconnected, check for continuity between chassis ground and specified CKP/CMP sensor connector terminal. See CMP SENSOR GROUND CIRCUIT TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

CMP SENSOR GROUND CIRCUIT TERMINAL ID TABLE

Application	Terminal No.
3.0L	4
2.4L	2

7) On Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD), go to next step. On all other models, with CKP/CMP sensor connector and ECM connector disconnected, check for continuity between specified CKP/CMP sensor connector terminal and ECM connector terminal. See CMP TO ECM CONNECTOR TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

CMP TO ECM CONNECTOR TERMINAL ID TABLE

Application	CMP Terminal No.	ECM Terminal No.
Montero	1	22
	2	21
All Other Models	4	68

8) With ignition switch in ON position, check for voltage between chassis ground and specified CKP/CMP sensor connector terminal. See CMP SENSOR SUPPLY CIRCUIT ID table. If 4.8-5.2 volts do not exist, replace ECM. If voltage is as specified, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CMP SENSOR SUPPLY CIRCUIT ID TABLE

Application	Terminal No.
3.0L	1
2.4L	4

CODE 24: VEHICLE SPEED SENSOR

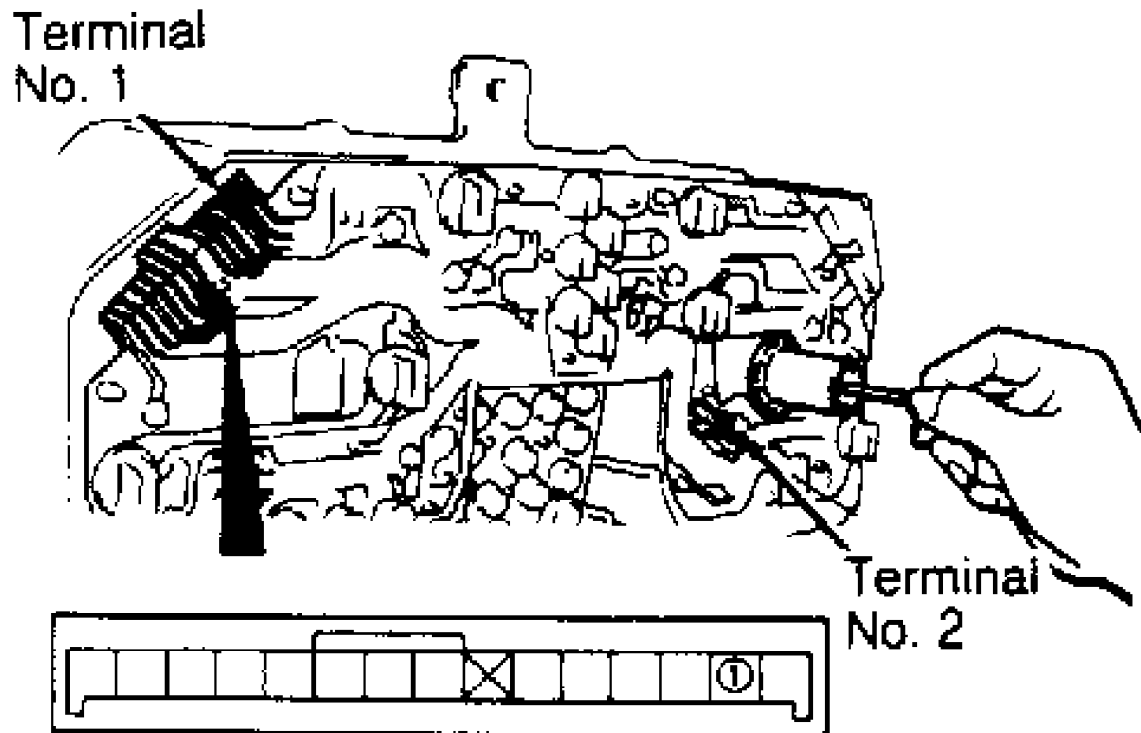
NOTE: For component terminal identification, see TERMINAL

IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) Manufacturer does not provide Vehicle Speed Sensor (VSS) testing procedures using scan tester. VSS is located in speedometer. VSS component testing procedures using DVOM require removal of instrument panel. Removal and installation of instrument panel is basically an unbolt and bolt-on procedure.

2) On all other models, use DVOM to check continuity between indicated VSS terminals. See Fig. 28 or 29. Ensure continuity pulses on and off 4 times per speedometer shaft revolution. If continuity is not as specified, replace VSS. If continuity is as specified, go to step 4.

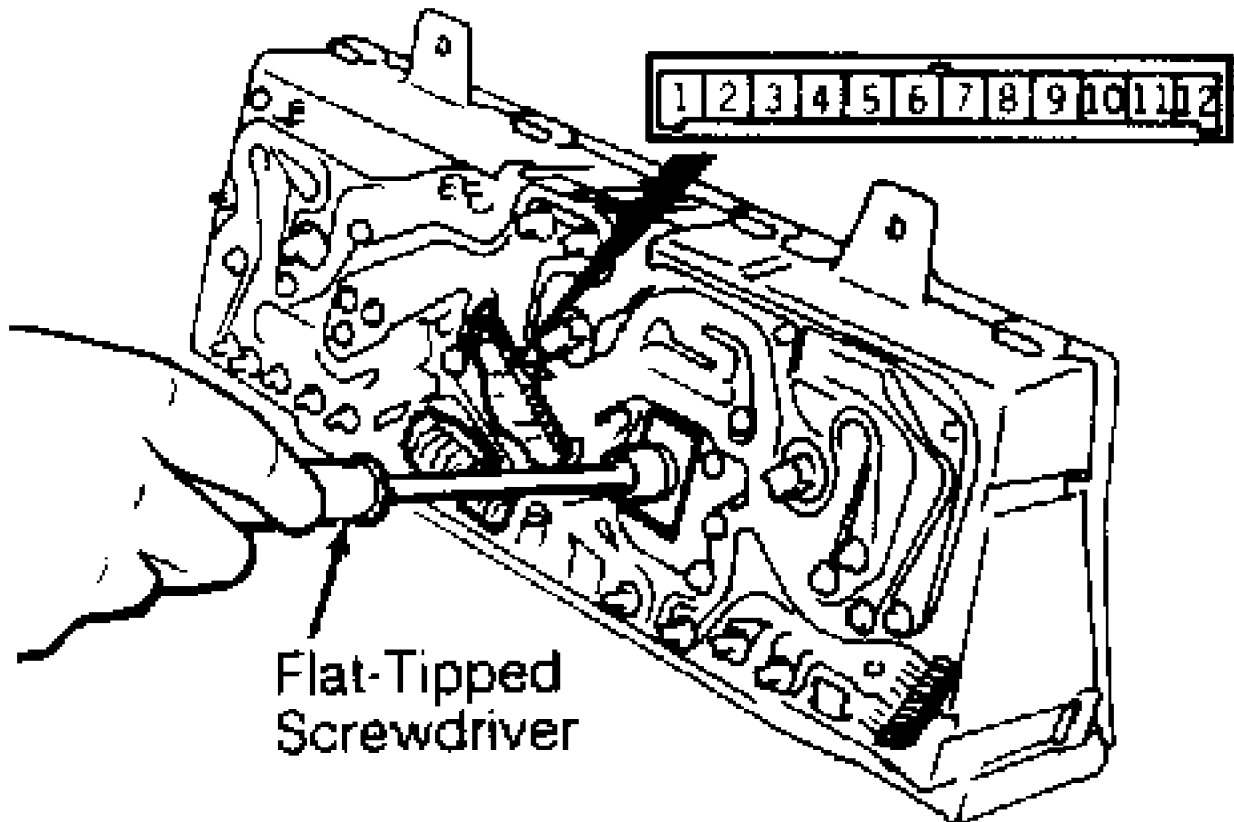
3) Remove VSS. Connect battery, resistor (3-10 ohms) and voltmeter to indicated terminals. See Fig. 28 or 29. Ensure voltage pulses 4 times per speedometer shaft revolution. If voltage is not as specified, replace VSS. If voltage is as specified, go to next step.



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MONTERO

Fig. 28: VSS Test Terminal ID (Montero)
Courtesy of Mitsubishi Motor Sales of America.



Flat-Tipped
Screwdriver

93F81096

PICKUP & RAM-50

Fig. 29: VSS Test Terminal ID (Pickup & Ram-50)
Courtesy of Mitsubishi Motor Sales of America.

4) Disconnect ECM connector. Using DVOM, check continuity between chassis ground and specified ECM connector terminal. See VSS OUTPUT CIRCUIT ID table. Move vehicle. Ensure continuity pulses on and off 4 times per tire revolution. If continuity is not as specified on Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD) and 3.0L, go to step 6. On all other models, go to next step.

VSS OUTPUT CIRCUIT ID TABLE

Application	Terminal No.
All Models	18

5) With ECM connector disconnected, disconnect VSS connector. Ground ECM connector VSS output terminal. See VSS OUTPUT CIRCUIT ID table. Using DVOM, check for continuity between chassis ground and specified VSS connector terminal. See ECM TO VSS CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

ECM TO VSS CIRCUIT ID TABLE

Application	Terminal No.
-------------	--------------

Montero, Pickup 2.4L (RWD) &	
Ram-50 2.4L (RWD)	1
All Other Models	9

6) With VSS connector disconnected, check for continuity between chassis ground and specified VSS connector terminal. See VSS GROUND CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

VSS GROUND CIRCUIT ID TABLE

Application	Terminal No.
Montero	13
Pickup & Ram-50	10

7) With VSS connector and ECM connector disconnected, turn ignition switch to ON position. Using DVOM, check for voltage between chassis ground and specified VSS connector terminal. See VSS VOLTAGE FEED CIRCUIT ID table. If voltage is not 4.5-4.9 volts, replace ECM. If voltage is as specified, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

VSS VOLTAGE FEED CIRCUIT ID TABLE

Application	Terminal No.
All Models	1

CODE 25: BAROMETRIC PRESSURE SENSOR

NOTE: Barometric (BARO) pressure sensor is built into airflow sensor. For code 25 test purposes, the airflow sensor will be referred to as the BARO pressure sensor. For component terminal identification, see AIRFLOW SENSOR under TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) Manufacturer does not provide component testing procedure without scan tester. Turn ignition switch to ON position. Using scan tester, read sensor pressure. See BARO PRESSURE SENSOR SPECIFICATIONS table. If pressure is not as specified, replace BARO pressure sensor. If pressure is as specified, go to next step.

BARO PRESSURE SENSOR SPECIFICATIONS TABLE

Altitude Ft. (M)	Pressure In. Hg
0 (0)	29.92
1969 (600)	27.95
3937 (1200)	25.98
5906 (1800)	24.02

2) Disconnect BARO pressure sensor connector. Using DVOM, check for continuity between chassis ground and specified BARO pressure sensor connector terminal. See BARO PRESSURE SENSOR GROUND

CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

BARO PRESSURE SENSOR GROUND CIRCUIT ID TABLE

Application	Terminal No.
All Models	5

3) On Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD), go to step 5. On all other models, with BARO pressure sensor disconnected, disconnect ECM connector. Check for continuity between specified ECM connector terminal and BARO pressure sensor connector terminal. See BARO PRESSURE SENSOR TO ECM CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

BARO PRESSURE SENSOR TO ECM CIRCUIT ID TABLE

Application	BARO Terminal No.	ECM Terminal No.
Montero	1	23
	2	16
All Other Models	2	65

4) With BARO pressure sensor connector and ECM connector disconnected, turn ignition switch to ON position. Check for voltage between chassis ground and BARO pressure sensor connector terminal No. 1. If voltage is not 4.8-5.2 volts, replace ECM. If voltage is as specified, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

5) With BARO pressure sensor connector disconnected, turn ignition switch to ON position. Check for voltage between chassis ground and specified BARO pressure sensor connector terminal. See BARO PRESSURE SENSOR POWER SUPPLY CIRCUIT ID table. If voltage is not 4.8-5.2 volts, repair wiring harness as necessary. If voltage is as specified, go to next step.

BARO PRESSURE SENSOR POWER SUPPLY CIRCUIT ID TABLE

Application	Terminal No.
All Models	1

6) With BARO pressure sensor connector and ECM connector disconnected, ground ECM connector terminal No. 16. Using DVOM, check for continuity between chassis ground and specified BARO pressure sensor connector terminal. See ECM TO BARO PRESSURE SENSOR GROUND CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

ECM TO BARO PRESSURE SENSOR GROUND CIRCUIT ID TABLE

Application	Terminal No.
Pickup, Ram-50	1

CODE 31: KNOCK SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) Manufacturer does not provide component testing procedure using scan tester. Go to next step.

2) Connect oscilloscope special patterns pickup between ECM and ECM connector at ECM terminal No. 9. Start engine. Accelerate engine to 5000 RPM. Compare oscilloscope wave pattern with known-good wave pattern. See Fig. 30. If wave pattern is abnormal, replace knock sensor. If wave pattern is normal, go to next step.



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Fig. 30: Known-Good Knock Sensor Wave Pattern ID
Courtesy of Mitsubishi Motor Sales of America.

3) Using DVOM, check voltage between chassis ground and knock sensor connector terminal No. 1. If voltage is not 8.0-11.0 volts, repair wiring harness as necessary. If voltage is as specified, go to step 5.

4) Disconnect knock sensor connector and ECM connector. Ground ECM connector terminal No. 58. Using DVOM, check continuity between chassis ground and knock sensor connector terminal No. 1. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

5) With knock sensor connector disconnected, check for continuity between chassis ground and knock sensor connector terminal No. 2. If continuity does not exist, repair wiring harness as necessary. If continuity exists, condition required to set code is not present at this time. Test is complete.

CODE 32: MAP SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) Manufacturer does not provide component testing procedure without scan tester. Ensure coolant temperature is 176-203°F (80-95°C). Ensure all accessories are off, transmission is in Neutral, and ignition switch is in ON position. Using scan tester, read intake manifold plenum pressure. See INTAKE MANIFOLD PLENUM PRESSURE SPECIFICATIONS table. If conditions are not as specified, replace Manifold Absolute Pressure (MAP) sensor. If conditions are as specified, go to next step.

INTAKE MANIFOLD PLENUM PRESSURE SPECIFICATIONS TABLE

Engine State	Altitude Ft. (M)	Pressure In. Hg
Off	0 (0)	29.92
	1969 (600)	27.95
	3937 (1200)	25.98
	5906 (1800)	24.02
Idle (750 RPM)		6.70-10.62
Suddenly Raced		(1)

(1) - Pressure should increase.

2) Disconnect MAP sensor connector. Using DVOM, check continuity between chassis ground and MAP sensor connector terminal No. 3. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

3) With MAP sensor connector disconnected, disconnect ECM connector. Ground ECM connector terminal No. 70. Using DVOM, check continuity between chassis ground and MAP sensor connector terminal No. 2. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

4) With MAP sensor connector and ECM connector disconnected, turn ignition switch to ON position. Check voltage between chassis ground and MAP sensor connector terminal No. 1. If 4.8-5.2 volts do not exist, replace ECM. If voltage is as specified, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CODE 36: IGNITION TIMING ADJUSTMENT SIGNAL

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

Turn ignition switch to ON position. Using DVOM, check voltage at ignition timing adjustment terminal (located at firewall) with terminal grounded and ungrounded. With terminal grounded, voltage should be 0-1.0 volt. With terminal ungrounded, voltage should be 4.0-5.5 volts. If voltage is not as specified, repair ignition timing adjustment terminal wiring harness or connector as necessary. If voltage is as specified, replace ECM.

CODE 39: OXYGEN (O2) SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) If using scan tester, go to step 3. Disconnect O2 sensor

connector. Install Test Harness (MB998464) between O2 sensor and O2 sensor connector. Using DVOM, check resistance between O2 sensor connector terminals No. 1 and 3. O2 sensor resistance should be 20 ohms at 68°F (20°C). If resistance is not as specified, replace O2 sensor. If resistance is as specified, go to next step.

2) Start and warm engine to operating temperature. Using jumper wires, ground O2 sensor connector terminal No. 3 and apply 12 volts to O2 sensor connector terminal No. 1. Using DVOM, check voltage between O2 sensor connector terminals No. 2 and 4 while repeatedly racing engine. If voltage is not .6-1.0 volt, replace O2 sensor. If voltage is as specified, go to step 5.

3) Start and warm engine to operating temperature. Using scan tester, read O2 sensor voltage. While monitoring scan tester, accelerate to 4000 RPM. Suddenly decelerate. Scan tester should read .2 volt or less. Suddenly accelerate. Scan tester should read .6-1.0 volt. If voltage is not as specified, replace O2 sensor. If voltage is as specified, go to next step.

4) While monitoring scan tester, accelerate to 2000 RPM and decelerate to 700 RPM (idle). Scan tester should switch between .6-1.0 volt and .4 volt or less. If voltage is not as specified, replace O2 sensor. If voltage is as specified, go to next step.

5) With O2 sensor connector disconnected, turn ignition switch to ON position. Using DVOM, check voltage between chassis ground and O2 sensor connector terminal No. 1. If system voltage does not exist, repair wiring harness as necessary. If system voltage exists, go to next step.

6) Using DVOM, check for continuity between O2 sensor connector terminal No. 4 and ECM connector terminal No. 56. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

7) With O2 sensor connector disconnected, check for continuity between chassis ground O2 sensor connector terminal No. 2. If continuity does not exist, repair wiring harness as necessary. If continuity exists, condition required to set fault is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CODE 41: FUEL INJECTOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) Using a stethoscope or long-bladed screwdriver, listen for clicking sound from each injector while engine is running or being cranked. If no sound is heard from injector(s), check injector connections. If connections are not okay, repair connections as necessary. If connections are okay, go to next step.

2) Disconnect injector connector. Using DVOM, check resistance across injector terminals. If resistance is not 13-16 ohms, replace injector. If resistance is as specified, go to next step.

3) Using scan tester, read injector drive time while cranking engine. See INJECTOR CRANKING DRIVE TIME SPECIFICATIONS table. Go to next step.

INJECTOR CRANKING DRIVE TIME SPECIFICATIONS TABLE

Coolant Temperature	Drive Time
32°F (0°C)	
2.4L	17-20 ms
3.0L	14-16 ms
68°F (20°C)	

All Models	38-41 ms
176°F (80°C)	
All Models	9-10 ms

4) Ensure coolant temperature is at 176-205°F (80-95°C), all accessories are off and transaxle is in Neutral position. Using scan tester, read injector drive time under specified engine conditions. See INJECTOR OPERATING DRIVE TIME SPECIFICATIONS table. Go to next step.

INJECTOR OPERATING DRIVE TIME SPECIFICATIONS TABLE

Engine State	Drive Time
750 RPM	
Montero	2.4-3.6
Pickup 2.4L & Ram-50 2.4L	(1)
2000 RPM	
Montero	2.3-3.5
Pickup 3.0L & Ram-50 3.0L	2.6-3.1 ms
All Other Models	2.0-3.3 ms
Suddenly Accelerated	
All Models	(2)

(1) - On 2.4L, drive time is 3.0-4.0 ms. On 3.0L, drive time is 2.7-3.2 ms.

(2) - Drive time should increase.

5) Allow engine to idle after warm up. Using scan tester, shut off injectors in sequence. Idle should change when good injectors are shut off. If idle state does not change, check injector connection, spark plug and cable, and cylinder compression. If conditions are not as specified in preceding steps, go to next step.

6) On Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD), go to step 8. On all other models, disconnect MPI relay connector and injector connector at faulty injector. Using DVOM, check for continuity between specified MPI relay connector terminal and injector connector terminal. See MPI TO FUEL INJECTOR HARNESS TERMINAL ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

MPI TO FUEL INJECTOR HARNESS TERMINAL ID TABLE

Application	MPI Terminal No.	Fuel Injector Terminal No.
All Models	2	1

7) Using a DVOM, check for continuity between injector connector terminal No. 2, and specified ECM connector terminal. See INJECTOR TO ECM CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, condition required to set code is not present at this time. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

INJECTOR TO ECM CIRCUIT ID TABLE

Application	Injector No.	ECM Terminal No.
Montero	1	51

	2	.....	52
	3	.....	60
	4	.....	61
	5	.....	105
	6	.....	109
All Other Models	1	.....	1
	2	.....	14
	3	.....	2
	4	.....	15

8) Disconnect injector connector at faulty injector. Turn ignition switch to ON position. Using DVOM, check for voltage between chassis ground and injector connector terminal No. 1 (terminal No. 2 on Pickup 3.0L and Ram-50 3.0L). If battery voltage does not exist, repair wiring harness as necessary. If battery voltage exists, go to next step.

9) With injector connector disconnected, disconnect ECM connector. Check for continuity between injector connector terminal No. 2 and ECM connector terminal No. 51 for injector No. 1, No. 52 for injector No. 2, No. 60 for injector No. 3, or No. 61 for injector No. 4 (ECM connector terminal No. 105 for injector No. 5 or terminal No. 109 for injector No. 6 on Pickup 3.0L and Ram-50 3.0L). If continuity does not exist, repair wiring harness as necessary. If continuity exists, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

10) Turn ignition switch to ON position. With MPI relay connector connected, check for voltage between chassis ground and MPI relay connector terminals No. 4 and 5. If battery voltage does not exist, check MPI relay. If battery voltage exists: go to step 13.

11) Disconnect MPI relay resistor connector. Turn ignition switch to ON position. Check for voltage between chassis ground and relay resistor connector terminal No. 3. If battery voltage does not exist, repair wiring harness between MPI relay and relay resistor. If battery voltage exists, go to next step.

12) With relay resistor connector disconnected and injector connector connected, check resistance between relay resistor terminals No. 3 and 1 for injector No. 1, No. 3 and 4 for injector No. 2, No. 3 and 5 for injector No. 3, or No. 3 and 6 for injector No. 4. If resistance is not 5.5-6.5 ohms at 68°F (20°C), replace relay resistor. If resistance is as specified, go to next step.

13) Disconnect injector connector at faulty injector. Using DVOM, check voltage between chassis ground and injector connector terminal No. 1. If battery voltage does not exist, repair wiring harness as necessary. If battery voltage exists, go to next step.

14) With injector connector disconnected, disconnect ECM connector. Ground ECM connector terminal No. 51 for injector No.1, No. 52 for injector No. 2, No. 60 for injector No. 3, or No. 61 for injector No. 4. Check for continuity between chassis ground and injector connector terminal No. 1. If continuity does not exist, repair wiring harness as necessary. If continuity exists, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

15) Disconnect MPI relay resistor connector. Turn ignition switch to ON position. Using DVOM, check for voltage between chassis ground and resistor connector terminal No. 2. See Fig. 31. If battery voltage does not exist, repair wiring harness as necessary between MPI relay resistor connector and MPI relay. If battery voltage exists, reconnect MPI relay resistor connector. Go to next step.



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Fig. 31: MPI Relay Resistor Terminal ID
 Courtesy of Mitsubishi Motor Sales of America

16) If faulty injector is on rear injector bank, go to next step. Disconnect injector connector at faulty front injector. Turn ignition switch to ON position. Using DVOM, check voltage between chassis ground and injector connector terminal No. 1. If battery voltage does not exist, repair wiring harness as necessary between injector connector and MPI relay. If voltage exists, go to step 18.

17) Disconnect rear bank injector connector. Using DVOM, check voltage between chassis ground and injector connector terminal 1. If battery voltage does not exist, repair wiring harness as necessary between injector connector and MPI relay. If voltage exists, go to step 19.

18) With injector connector disconnected, disconnect ECM connector. Ground ECM connector terminal No. 1 for injector No. 1, No. 2 for injector No. 3, or No. 3 for injector No. 3. Using DVOM, check for continuity between chassis ground and injector connector terminal No. 2. If continuity does not exist, repair wiring harness as necessary between appropriate injector connector and ECM connector terminal. If continuity exists, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

19) With rear bank injector connector disconnected, disconnect ECM connector. Ground ECM connector terminal No. 14 for injector No. 2, No. 15 for injector No. 4, or No. 16 for injector No. 6. Using DVOM, check for continuity between chassis ground and rear bank injector connector terminal No. 2 for injector No. 2, No. 3 for injector No. 4, or No. 4 for injector No. 6. If continuity does not exist, repair wiring harness between rear bank injector connector and ECM connector. If continuity exists, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CODE 42: FUEL PUMP

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) Turn ignition switch to ON position. Using a scan tester, actuate fuel pump. Crank engine with fuel pump actuated. Operating noise should be heard. Pinch fuel pump return hose and feel for fuel flow pulsations. If operating noise is not heard or fuel flow is not felt, replace fuel pump. If conditions are as specified, go to next

step.

2) Apply 12 volts to fuel pump check terminal. See Fig. 32. If fuel pump operates, go to step 5. If fuel pump does not operate, go to next step.

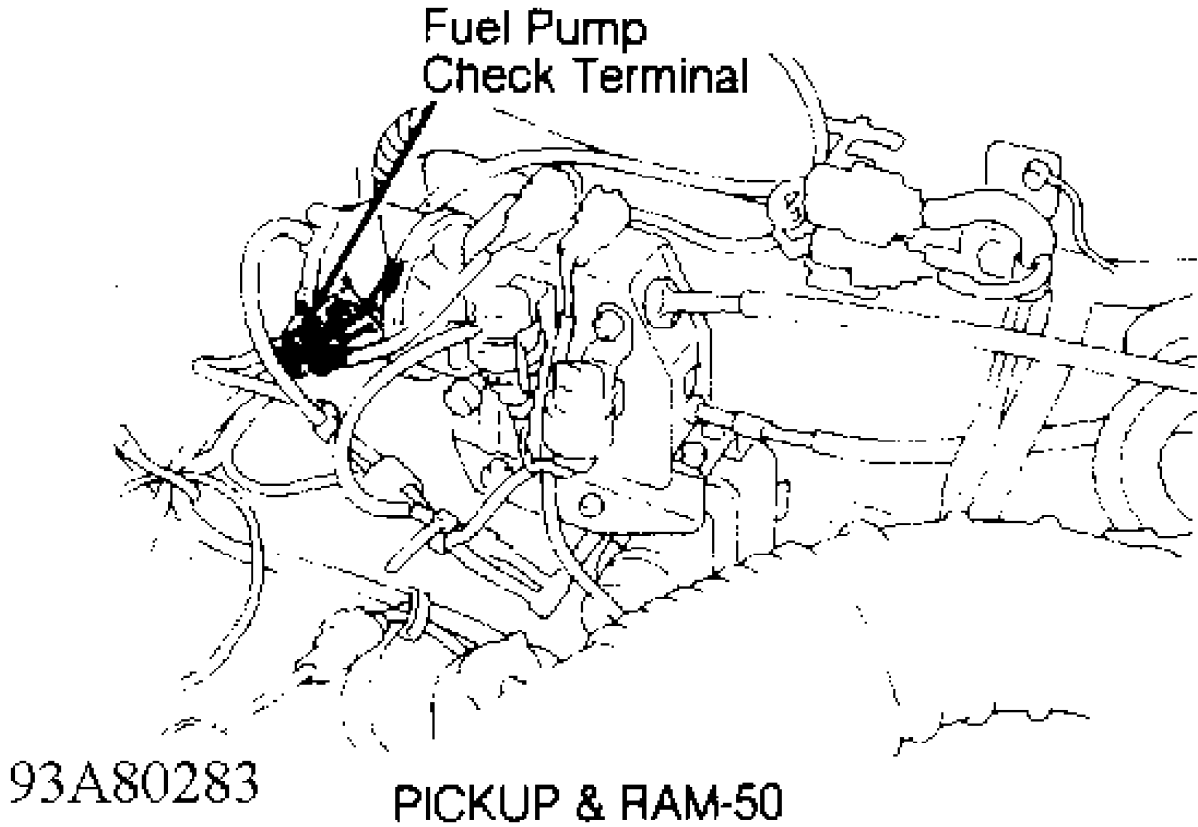


Fig. 32: Locating Fuel Pump Check Terminal (Pickup & Ram-50)
Courtesy of Mitsubishi Motor Sales of America

3) Disconnect fuel pump connector, located at front of fuel tank. Using DVOM, check for continuity between chassis ground and specified fuel pump connector terminal. See FUEL PUMP GROUND CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

FUEL PUMP GROUND CIRCUIT ID TABLE

Application	Terminal No.
All Models	1

4) Ground fuel pump check terminal. With fuel pump connector disconnected, disconnect MPI relay connector. Check for continuity between chassis ground and specified fuel pump connector terminal. See FUEL PUMP DRIVE CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

FUEL PUMP DRIVE CIRCUIT ID TABLE

Application	Terminal No.
All Models	2

5) Disconnect MPI relay connector. Check voltage between chassis ground and specified MPI relay connector terminal. See MPI RELAY VOLTAGE SUPPLY TERMINAL ID table. With ignition switch in OFF position, voltage should be zero. With engine cranking, voltage should be 8.0 volts or more. If voltage is not as specified, repair ignition switch or wiring harness as necessary. If voltage is as specified, go to next step.

MPI RELAY VOLTAGE SUPPLY TERMINAL ID TABLE

Application	Terminal No.
All Models	7

6) Turn ignition to OFF position. With MPI connector disconnected, disconnect ECM connector. Ground specified ECM connector terminal and check continuity between chassis ground and specified MPI relay connector terminal. See ECM TO MPI GROUND CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

ECM TO MPI GROUND CIRCUIT ID TABLE

Application	ECM Terminal No.	MPI Terminal No.
Pickup & Ram-50	56	5

7) On Pickup 4WD and Ram-50 4WD, go to next step. On all other models, with fuel pump connector and MPI relay connector disconnected, ground fuel pump check terminal. Check for continuity between chassis ground and MPI relay connector terminal No. 1. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to step 9.

8) With ECM connector disconnected and MPI relay connector disconnected, ground fuel pump check terminal. Check resistance between chassis ground and ECM connector terminal No. 109, and between chassis ground and MPI relay connector terminal No. 1. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

9) With fuel pump connector and MPI relay connector disconnected, ground MPI relay connector terminal No. 1. Check for continuity between chassis ground and fuel pump connector terminal No. 2. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

10) On Pickup RWD, Ram-50 RWD, go to next step. On all other models, with MPI relay connector disconnected, check for continuity between chassis ground and MPI relay connector terminal No. 6. If continuity does not exist, repair wiring harness as necessary. If continuity exists, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

11) Reconnect ECM connector and MPI relay connector. While cranking engine, check voltage between chassis ground and MPI

connector terminal No. 1. Voltage should be 8 volts or more. Race engine. Voltage should be 12 volts or more. If voltage is not as specified, replace MPI relay. Repeat step 11. If voltage is still not as specified, replace ECM. If voltage is as specified, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CODE 43: EGR TEMPERATURE SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) If using scan tester, go to step 2. Remove EGR temperature sensor from intake manifold. Submerge temperature sensing portion of EGR temperature sensor in hot water. Using DVOM, check resistance across sensor terminals. Resistance should be 60,000-83,000 ohms at 122°F (50°C), 11,000-14,000 at 212°F (100°C). If resistance is not as specified, replace EGR temperature sensor. If resistance is as specified, go to step 3.

2) Warm engine to operating temperature. Allow engine to idle for 2 minutes. Squeeze green-striped hose between EGR valve and EGR solenoid. Using scan tester, read EGR temperature sensor temperature. At 700-750 RPM, scan tester should read 212°F (100°C) or less. AT 3500-4000 RPM, scan tester should read 158°F (70°C) or more. On all other models, scan tester should read 248°F (120°C) or more. If reading is not as specified, replace EGR temperature sensor. If reading is as specified, go to next step.

3) Disconnect EGR temperature sensor connector. Using DVOM, check continuity between chassis ground and EGR temperature sensor terminal No. 2, Pickup 3.0L and Ram-50 3.0L (terminal No. 1 on all other models). If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

4) On Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD), go to next step. On all other models, with EGR temperature sensor disconnected, disconnect ECM connector. Check for continuity between EGR temperature sensor connector terminal No. 2 and ECM connector terminal No. 53. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

5) On all models, with EGR temperature sensor connector and ECM connector disconnected, turn ignition switch to ON position. Check voltage between chassis ground and EGR connector terminal No. 2 on Pickup 3.0L and Ram-50 3.0L (terminal No. 1 on all other models). Voltage should be 3.3-4.7 volts. If voltage is not as specified on Pickup 2.4L (4WD) and 3.0L, Ram-50 2.4L (4WD), repair wiring harness as necessary. If voltage is not as specified on all other models, replace ECM. If voltage is as specified, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CODE 55: IDLE AIR CONTROL POSITION SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) Manufacturer does not provide component testing procedure without using scan tester. Ensure engine coolant temperature is 185-205°F (85-95°C). Place transmission in Park or Neutral. Turn off all accessories except A/C. Ensure A/C clutch is operating when A/C system is on. Allow engine to idle.

2) Using scan tester, read Idle Air Control (IAC) position

sensor step. See IAC POSITION SENSOR STEP SPECIFICATIONS table. If scan tester does not read as specified, replace IAC position sensor. If readings are as specified, go to next step.

IAC POSITION SENSOR STEP SPECIFICATIONS TABLE

A/C Switch Position	Standard Step Value
Off	2-20
On	Increase From 8-50
(1)	Increase From 3-40

(1) - For A/T models. Brakes applied, transmission selector in "D" and A/C on.

3) Disconnect ECM connector and IAC position sensor connector. Ground specified ECM connector terminal and using DVOM, check continuity between chassis ground and specified IAC connector terminal. See ECM TO IAC HARNESS CIRCUIT ID table. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

ECM TO IAC HARNESS CIRCUIT ID TABLE

Application	ECM Terminal No.	IAC Terminal No.
All Models	5	4
	18	2
	61	1

4) With IAC position sensor connector disconnected, check continuity between chassis ground and IAC position sensor connector terminal No. 3. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

5) With IAC position sensor connector disconnected and ECM connector connected, turn ignition switch to ON position. Check for voltage between chassis ground and IAC connector terminals No. 2 and 4. If voltage is not 4.8-5.2 volts on either circuit, replace ECM. If voltage is as specified, go to next step.

6) Check voltage between chassis ground and IAC position sensor connector terminal No. 1. If voltage is not 4.8-5.2 volts, replace ECM. If voltage is as specified, condition required to set code is not present at this time. Test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CODE 59: REAR OXYGEN (O2) SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) If using scan tester, go to next step. Disconnect O2 sensor connector. Using DVOM, check continuity between O2 sensor terminals. 3 and 4. If continuity does not exist, replace O2 sensor. If continuity exists, go to step 3.

2) With an assistant, road test vehicle. Drive vehicle with wide open throttle in 2nd gear (M/T) or "L" position (A/T). Using scan tester, read O2 sensor voltage. If O2 sensor voltage is not .6-1.0 volt at 3500 RPM, replace O2 sensor. If voltage is as specified, go to

next step.

3) Disconnect O2 sensor connector and MPI relay connector. Using DVOM, check for continuity between O2 sensor connector terminal No. 3 and MPI relay connector No. 2. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

4) With O2 sensor connector disconnected, disconnect ECM connector. Check for continuity between O2 sensor connector terminal No. 1 and ECM connector terminal No. 55. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

5) With O2 sensor connector disconnected, check for continuity between chassis ground and O2 sensor connector terminals No. 2 and 4. If continuity does not exist on either circuit, repair wiring harness as necessary. If continuity exists and preceding test procedure did not discover any faults, replace O2 sensor.

CODE 61: TRANSAXLE CONTROL MODULE SIGNAL

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) Disconnect Transaxle Control Module (TCM) and ECM connectors. Ground TCM connector terminal No. 7. Using DVOM, check continuity between chassis ground and ECM connector terminal No. 116. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

2) Ground TCM connector terminal No. 9. Check continuity between chassis ground and ECM connector terminal No. 59. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

3) Ground TCM connector terminal No. 108 to ground. Check continuity between chassis ground and ECM connector terminal No. 7. If continuity does not exist, repair wiring harness as necessary. If continuity exists, test is complete. Intermittent problem may exist. See H - TESTS W/O CODES article in this section.

CODE 62: INDUCTION CONTROL VALVE POSITION SENSOR

NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section. Induction control valve position sensor is built into induction control motor.

1) Disconnect induction control motor connector and ECM connector. Ground ECM connector terminal No. 61. Using DVOM, check continuity between chassis ground and induction control motor connector terminal No. 1.

2) Ground ECM connector terminal No. 111. Check continuity between chassis ground and induction control motor connector terminal No. 2.

3) Ground ECM connector terminal No. 103. Check continuity between chassis ground and induction control motor connector terminal No. 4.

4) If continuity exists in previous steps, go to next step. If continuity does not exist in previous steps, check for open or short to ground in appropriate circuit between ECM connector and induction control motor.

5) With induction control motor connector disconnected, check continuity between chassis ground and induction control motor connector terminal No. 3. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

6) Turn ignition switch to ON position. Ensure control motor connector is disconnected and ECM connector is connected. Using DVOM, check voltage at induction control motor connector terminals No. 2 and 4. If voltage is not 4.8-5.2 volts, repair wiring harness as necessary. If wiring harness is okay, replace ECM. If voltage is as specified, go to next step.

7) Ensure ignition switch is in ON position. Ensure control motor connector is disconnected and ECM connector is connected. Using DVOM, check voltage at induction control motor connector terminal No. 1. If voltage is not 4.8-5.2 volts, repair wiring harness as necessary. If wiring harness is okay, replace ECM. If voltage is as specified, test is complete. Intermittent problem may exist. See appropriate H - TESTS W/O CODES article in this section. If wiring harness, connectors and induction control motor are okay, replace air intake plenum assembly. See appropriate article in ENGINES section.

CODE 71: TRACTION CONTROL VACUUM SOLENOID

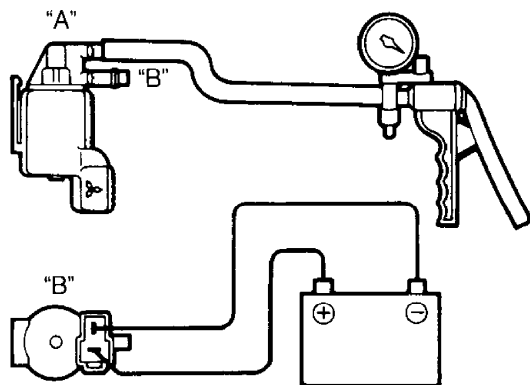
NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) Turn ignition switch to ON position. Using a scan tester, actuate vacuum solenoid. With solenoid actuated, operating noise should be heard. If operating noise is not heard, go to next step. If operating noise is heard, go to step 4.

2) Disconnect vacuum solenoid and fuel injection relay connectors. Using DVOM, check for continuity between vacuum solenoid connector terminal No. 1 and fuel injection relay connector terminal No. 5. If continuity does not exist, repair wiring harness between fuel injection relay and vacuum solenoid as necessary. If continuity exists, go to next step.

3) Disconnect ECM connector. Ground ECM connector terminal No. 102. Check continuity between chassis ground and vacuum solenoid connector terminal No. 2. If continuity does not exist, repair wiring harness as necessary. If continuity exists, check solenoid vacuum. Go to next step.

4) Remove vacuum hoses from solenoid. Ensure solenoid harness connector is disconnected. Connect a vacuum pump to solenoid nipple "A". Use jumper wires to connect battery voltage to solenoid terminals. See Fig. 33. With vacuum applied, nipple "B" unplugged, and negative jumper wire disconnected, solenoid should hold vacuum.



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Fig. 33: Testing Traction Control Vacuum Solenoid
Courtesy of Mitsubishi Motor Sales of America

5) With vacuum applied, nipple "B" unplugged, and negative jumper wire connected, solenoid should not hold vacuum. With vacuum

applied, nipple "B" plugged, and negative jumper wire connected, solenoid should hold vacuum.

6) If solenoid tests as described, check resistance between solenoid terminals. Resistance should be 36-44 ohms at 68°F (20°C). If resistance is not as specified, replace solenoid. If resistance is as specified, inspect throttle valve operation. Clean or repair as necessary.

7) Connect a vacuum pump to 90 degree vacuum nipple on vacuum tank. Apply 19.8" Hg of vacuum to tank and ensure vacuum holds. Connect vacuum pump to straight nipple on vacuum tank. Plug 90 degree nipple. Apply 19.8" Hg of vacuum. Unplug 90 degree nipple and ensure vacuum releases. Replace tank as necessary.

8) Remove Green stripe vacuum hose from vacuum actuator, located near throttle valve. Connect vacuum pump to actuator. With accelerator pedal depressed, apply 7.9" Hg of vacuum to actuator. Ensure actuator rod is pulled upward and vacuum is held. Repair actuator as necessary.

CODE 72: TRACTION CONTROL VENT SOLENOID

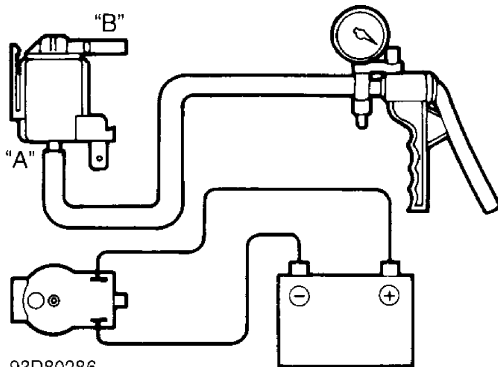
NOTE: For component terminal identification, see TERMINAL IDENTIFICATION. For wiring diagrams, see L - WIRING DIAGRAMS article in this section.

1) Turn ignition switch to ON position. Using a scan tester, actuate ventilation solenoid. With solenoid actuated, operating noise should be heard. If operating noise is not heard, go to next step. If operating noise is heard, go to step 4.

2) Disconnect ventilation solenoid and fuel injection relay connectors. Using DVOM, check for continuity between ventilation solenoid connector terminal No. 1 and fuel injection relay connector terminal No. 5. If continuity does not exist, repair wiring harness as necessary. If continuity exists, go to next step.

3) Disconnect ECM connector. Ground ECM connector terminal No. 105. Check continuity between chassis ground and ventilation solenoid connector terminal No. 2. If continuity does not exist, repair wiring harness as necessary. If continuity exists, check solenoid vacuum. Go to next step.

4) Remove vacuum hoses from solenoid. Ensure solenoid harness connector is disconnected. Connect a vacuum pump to solenoid nipple "A". Use jumper wires to connect battery voltage to solenoid terminals. See Fig. 34. With vacuum applied, nipple "B" unplugged, and negative jumper wire connected, solenoid should hold vacuum.



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Fig. 34: Testing Traction Control Vent Solenoid
Courtesy of Mitsubishi Motor Sales of America

5) With vacuum applied, nipple "B" unplugged, and negative jumper wire disconnected, solenoid should not hold vacuum. With vacuum

applied, nipple "B" plugged, and negative jumper wire disconnected, solenoid should hold vacuum.

6) If solenoid tests as described, check resistance between solenoid terminals. If resistance is not 36-44 ohms at 68°F (20°C), replace solenoid. If resistance is as specified, go to Code 71: TRACTION CONTROL VACUUM SOLENOID.

SUMMARY

If no hard fault codes (or only pass codes) are present, driveability symptoms exist, or intermittent codes exist, proceed to H - TESTS W/O CODES article in this section for diagnosis by symptom (i. e., ROUGH IDLE, NO START, etc.) or intermittent diagnostic procedures.