

F - BASIC TESTING

1993 Mitsubishi Montero

1993 ENGINE PERFORMANCE
Chrysler Corp./Mitsubishi Basic Diagnostic Procedures

Dodge; Ram-50
Mitsubishi; Montero, Pickup

INTRODUCTION

The following diagnostic steps will help prevent overlooking a simple problem. This is also where to begin diagnosis for a no-start condition.

The first step in diagnosing any driveability problem is verifying the customer's complaint with a test drive under the conditions the problem reportedly occurred.

Before entering self-diagnostics, perform a careful and complete visual inspection. Most engine control problems result from mechanical breakdowns, poor electrical connections or damaged/misrouted vacuum hoses. Before condemning the computerized system, perform each test listed in this article.

NOTE: Perform all voltage tests with a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohm input impedance, unless stated otherwise in test procedure.

PRELIMINARY INSPECTION & ADJUSTMENTS

VISUAL INSPECTION

Visually inspect all electrical wiring, looking for chafed, stretched, cut or pinched wiring. Ensure electrical connectors fit tightly and are not corroded. Ensure vacuum hoses are properly routed and are not pinched or cut. See M - VACUUM DIAGRAMS article in this section to verify routing and connections (if necessary). Inspect air induction system for possible vacuum leaks.

MECHANICAL INSPECTION

Compression

Check engine mechanical condition with a compression gauge, vacuum gauge, or an engine analyzer. See engine analyzer manual for specific instructions.

WARNING: DO NOT use ignition switch during compression tests on fuel injected vehicles. Use a remote starter to crank engine. Fuel injectors on many models are triggered by ignition switch during cranking mode, which can create a fire hazard or contaminate the engine's oiling system.

COMPRESSION SPECIFICATIONS TABLE

Application (1)	psi (kg/cm ²)
Compression Pressure	
2.4L (VIN G)	171 psi (12.0 kg/cm ²)
3.0L (VIN H)	171 psi (12.0 kg/cm ²)
Maximum Variation Between	
Cylinders	14 psi (1.0 kg/cm ²)

(1) - See A - ENGINE/VIN ID article in this section for VIN information.

Exhaust System Backpressure

Exhaust system can be checked with a vacuum or pressure gauge. Remove O2 sensor or air injection check valve (if equipped). Connect a 0-5 psi pressure gauge and run engine at 2500 RPM. If exhaust system backpressure is greater than 1 3/4 - 2 psi, exhaust system or catalytic converter is plugged.

If using a vacuum gauge, connect vacuum gauge hose to intake manifold vacuum port and start engine. Observe vacuum gauge. Open throttle part way and hold steady. If vacuum gauge reading slowly drops after stabilizing, exhaust system should be checked for a restriction.

FUEL SYSTEM

WARNING: ALWAYS relieve fuel pressure before disconnecting any fuel injection-related component. DO NOT allow fuel to contact engine or electrical components.

FUEL PRESSURE

Relieving Fuel Pressure

1) On Ram-50, and Pickup, disconnect fuel pump harness connector at fuel tank from underneath vehicle. On Montero, remove rear seat cushion and remove access plate if required to disconnect fuel pump harness connector.

2) On all models, start engine. Let engine run until it stops. Turn ignition off. Disconnect negative battery terminal. Connect fuel pump harness connector. Reinstall rear seat (if necessary.)

WARNING: Before disconnecting high pressure fuel hose at fuel delivery pipe, cover fuel hose connection with a rag. Some residual fuel pressure may still be in system.

Pressure Testing

1) Disconnect high pressure fuel hose at fuel delivery pipe. Remove throttle body bracket (if necessary). Connect fuel pressure gauge with adapter between fuel delivery pipe and high pressure hose. See Fig. 1.

2) Connect negative battery terminal. Operate fuel pump by connecting battery voltage to fuel pump test terminal. See FUEL PUMP TEST TERMINAL LOCATION table. Ensure no fuel leaks are present. Disconnect battery voltage to fuel pump test terminal.

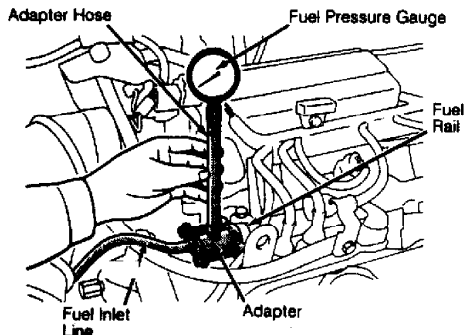


Fig. 1: Installing Fuel Pressure Tester (Typical)
Courtesy of Mitsubishi Motor Sales of America.

3) Start engine and let idle. Measure fuel pressure with vacuum hose connected to fuel pressure regulator. Record fuel pressure reading. See FUEL PUMP PERFORMANCE table. Disconnect and plug vacuum hose from fuel pressure regulator. Record fuel pressure reading.

4) Check for fuel pressure in fuel return hose by gently pinching hose while increasing engine speed. If fuel volume is low, fuel pressure in return hose will not be felt. Increase engine speed to 2500-3000 RPM, 2-3 times. Return engine to idle. Fuel pressure should not drop when engine is returned to idle.

5) Turn ignition off. Ensure fuel pressure reading does not decrease within 2 minutes. On all models, if a decrease is noted, monitor speed of decrease.

6) If fuel pressure is lower than specification, fuel pressure drops at idle after increasing engine speed to 2500-3000 RPM, or no fuel pressure in fuel return hose can be felt, check for clogged fuel filter, or faulty fuel pressure regulator or fuel pump.

7) If fuel pressure is higher than specification, check for a faulty fuel pressure regulator or plugged fuel return line. If fuel pressure does not change when vacuum hose to regulator is connected or disconnected, check for a leaking or clogged vacuum hose to fuel pressure regulator or faulty fuel pressure regulator.

8) If fuel pressure decreases suddenly after engine is stopped, check valve in fuel pump is not seated. Replace fuel pump. If fuel pressure drops slowly, fuel injector is leaking or fuel pressure regulator valve seat is leaking. Check for faulty fuel injector or fuel pressure regulator. Repair as necessary.

9) When fuel pressure test is complete, repeat fuel pressure release procedure before disconnecting fuel pressure gauge. Install new "O" ring at end of high pressure hose. Check for fuel leaks.

FUEL PUMP TEST TERMINAL LOCATION TABLE

Application	Wire Color	Location
Montero	White	(1)
Ram-50 & Pickup	Blue	(2)

- (1) - On main wiring harness, near wiper motor on firewall.
- (2) - Near left rear corner of engine compartment, below cruise control actuator (if equipped).

FUEL PUMP PERFORMANCE TABLE

Application	At Idle	
	W/Vacuum (1) psi (kg/cm ²)	W/O Vacuum (2) psi (kg/cm ²)
All Models	38 (2.6)	47-50 (3.3-3.5)

- (1) - With vacuum at pressure regulator.
- (2) - Without vacuum at pressure regulator.

MPI Control Relay

Multipurpose relay switches power to vehicle sensors and actuators including airflow sensor, crank angle sensor, idle speed control, injectors and fuel pump. When ignition switch is turned to ON position, ECM energizes coils controlling injectors, airflow sensor and idle speed control. When ignition switch is turned to START position, ECM energizes coils (through inhibitor switch on A/T models) to supply power to fuel pump. Relay failure will cause a no-start

condition. For testing procedure, refer to I SYS/COMP TESTS article in this section.

IGNITION CHECKS

SPARK

Check for spark at coil wire (if applicable) and at each spark plug wire using a high output spark tester. Check spark plug wire resistance on suspect wires. For wire resistance specification, see C - SPECIFICATIONS article in this section.

CRANKSHAFT POSITION SENSOR

For crank position sensor testing procedure, see I - SYS/COMP TESTS article in this section.

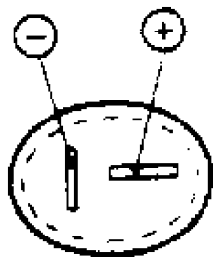
OPTICAL IGNITION

Ignition Coil Resistance

Using a DVOM, measure primary coil resistance between positive and negative terminals of coil. See Fig. 2, 3, or 4. Measure secondary coil resistance between coil positive terminal and ignition coil tower. Primary and secondary coil resistance should be within specification. See IGNITION COIL RESISTANCE table.

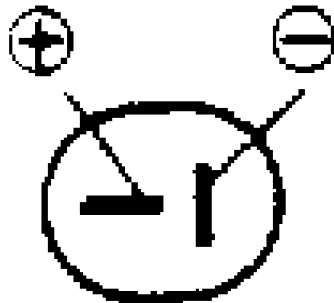
IGNITION COIL RESISTANCE TABLE - Ohms @ 68°F (20°C)

Application	Primary	Secondary
2.4L (VIN G) Pickup & Ram-5072-.88	10,300-13,900
3.0L (VIN H) Montero72-.88	10,300-13,900



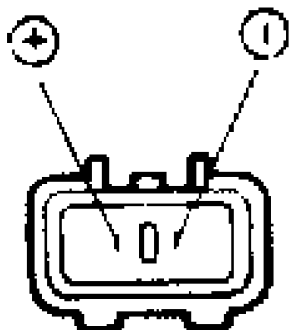
93H78177

Fig. 2: Ignition Coil Connectors ID (Montero)
Courtesy of Mitsubishi Motor Sales of America.



93C78180

Fig. 3: Ignition Coil Connectors ID (Pickup 3.0L)
Courtesy of Mitsubishi Motor Sales of America.



93D78181

Fig. 4: Ignition Coil Connectors ID (Ram-50, Pickup 2.4L)
Courtesy of Mitsubishi Motor Sales of America.

Power Transistor

1) Disconnect power transistor connector. Using a 1.5-volt

dry cell battery, connect negative end of 1.5-volt battery to terminal No. 2 of power transistor and positive end to terminal No. 1. See Fig. 5.

2) Using an analog ohmmeter, check for continuity between terminals No. 2 and 3 of power transistor. Continuity should exist. With positive end of 1.5-volt battery disconnected, there should be no continuity. Replace power transistor if it fails test.



93G78184

Fig. 5: Identifying Power Transistor Connectors (Typical)
 Courtesy of Mitsubishi Motor Sales of America.

IDLE SPEED & IGNITION TIMING

Ensure idle speed and ignition timing are set to specification. See IGNITION TIMING SPECIFICATIONS table. For adjustment procedures, see D - ADJUSTMENTS article in this section.

IGNITION TIMING TABLE (Degrees BTDC @ RPM)

Application	(1) Basic	(2) (3) Actual
2.4L		
Pickup & Ram-50	3-7 @ 600-800	8 @ 600-800
3.0L		
Montero	3-7 @ 600-800	15 @ 600-800
Pickup & Ram-50	3-7 @ 650-850	15 @ 650-850

- (1) - With ignition timing adjustment connector grounded or vacuum hose (farthest from distributor) disconnected.
- (2) - With ignition timing adjustment connector ungrounded or vacuum hose (farthest from distributor) connected. Ignition timing may fluctuate.
- (3) - If vehicle altitude is more than 2300 ft. above sea level, actual timing may be advanced.

SUMMARY

If no faults were found while performing F - BASIC TESTING, proceed to G - TESTS W/ CODES article in this section. If no hard codes are found in G - TESTS W/ CODES, 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.