F - BASIC TESTING

1998 Mitsubishi Galant

1998 ENGINE PERFORMANCE
Mitsubishi - Basic Diagnostic Procedures

Diamante, Eclipse, Galant, Mirage, Montero, Montero Sport, 3000GT

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 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.

Check engine compression with engine at normal operating temperature, all spark plugs removed and throttle wide open. See COMPRESSION SPECIFICATIONS table.

COMPRESSION SPECIFICATIONS TABLE

Application (1)	Specification
Compression Ratio	
1.5L (VIN A)	9.0:1
1.8L (VIN C)	9.5:1

2.0L	
(VIN F)	8.5:1
(VIN Y)	9.6:1
2.4L (VIN G)	9.5:1
3.0L	
(VIN H)	8.9:1
(VIN J)	10.0:1
(VIN K)	8.0:1
(VIN P)	9.0:1
3.5L (VIN M & P)	9.0:1
Compression Pressure	
1.5L (VIN A)	192 psi (13.4 kg/cm²)
1.8L (VIN C)	199 psi (13.9 kg/cm²)
2.0L (VIN F)	178 psi (12.5 kg/cm²)
2.0L (VIN Y)	170-225 psi (11.7-15.5 kg/cm²)
2.4L (VIN G)	192 psi (13.4 kg/cm²)
3.0L	
(VIN H & P)	171 psi (12.0 kg/cm²)
(VIN J)	185 psi (13.0 kg/cm²)
(VIN K)	156 psi (10.9 kg/cm²)
3.5L (VIN M & P)	171 psi (12.0 kg/cm²)
Maximum Variation	
Between Cylinders (2)	14 psi (1.0 kg/cm²)

(1) - See A - ENGINE/VIN ID article for VIN information.
(2) - On Eclipse 2.0L non-turbo engine, maximum variation between cylinders is 25%.

Exhaust System Backpressure

The exhaust system can be tested with a vacuum or pressure gauge. If using a pressure gauge, remove HO2S 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 2 psi, exhaust system or catalytic converter is plugged.

If using a vacuum gauge, connect vacuum gauge hose to intake manifold vacuum port. Start engine. Observe vacuum gauge. Open throttle part way and hold steady. If vacuum gauge indication slowly drops after stabilizing, inspect exhaust system for restriction.

FUEL SYSTEM

* PLEASE READ THIS FIRST *

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

RELIEVING FUEL PRESSURE

1) On Diamante, disconnect fuel pump harness connector at fuel tank from underneath vehicle. On Montero and Montero Sport, remove cargo compartment carpet, remove access plate and disconnect fuel pump harness connector. On all other models, remove rear seat cushion, remove access plate (if required) and disconnect fuel pump harness connector.

2) On all models, start engine. Let engine run until it stops. Turn ignition off. Disconnect negative battery cable. Connect fuel pump harness connector. Install rear seat and/or carpet as 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.

FUEL PRESSURE

1) Relieve fuel pressure. See RELIEVING FUEL PRESSURE. On models with fuel rail service valve, connect fuel pressure gauge to fuel rail. On models without fuel rail service valve, disconnect high pressure fuel inlet line at fuel rail. Remove throttle body bracket (if necessary). Connect fuel pressure gauge with adapter between fuel rail and high pressure fuel inlet line. See Fig. 1.

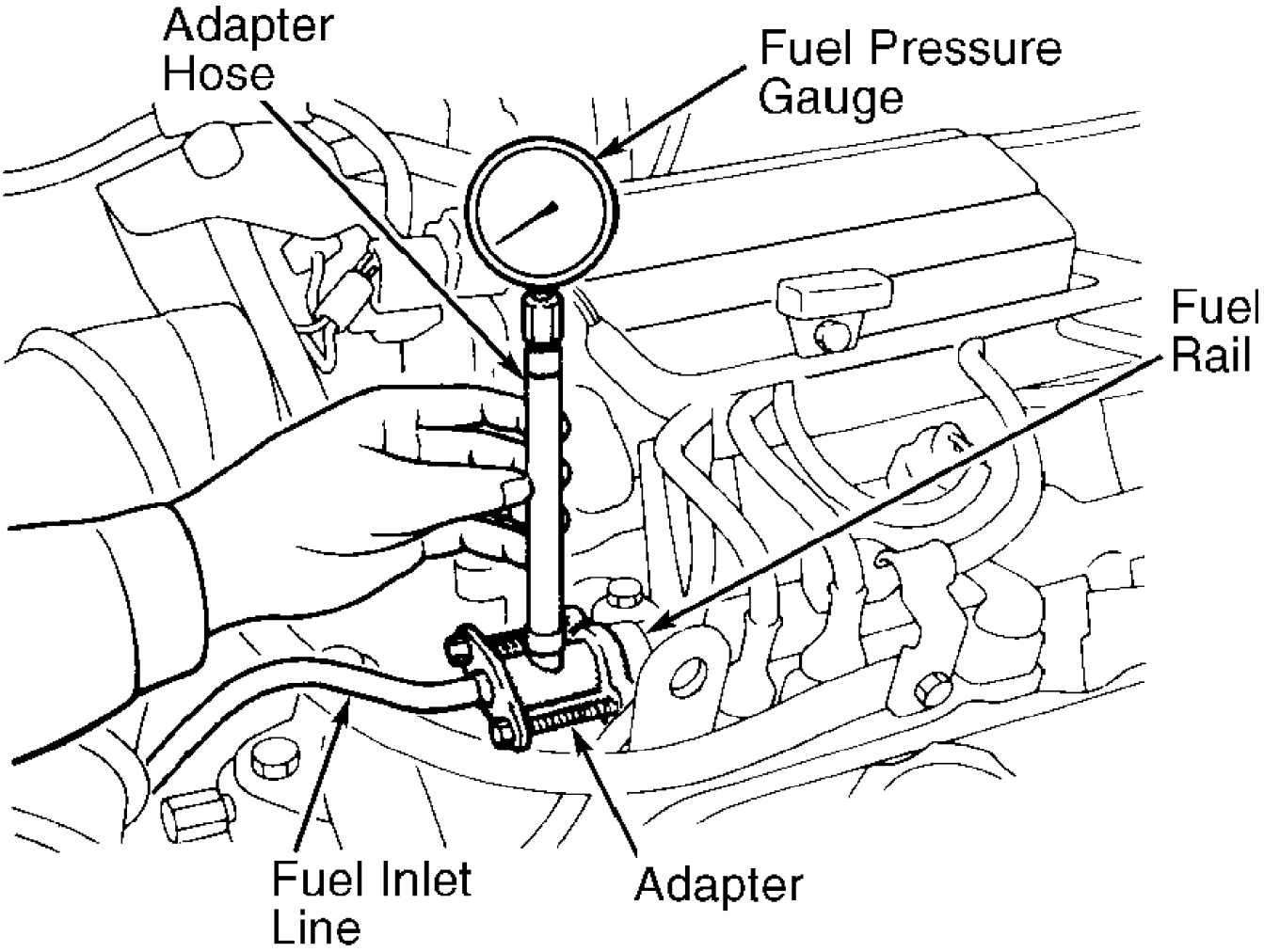

Fig. 1: Installing Fuel Pressure Tester (Typical)
Courtesy of Mitsubishi Motor Sales of America

2) On Eclipse 2.0L non-turbo and Montero Sport, use scan tool to operate fuel pump. On all other models, 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 from fuel pump test terminal.

FUEL PUMP TEST TERMINAL LOCATION TABLE

Application	Wire Color	Location
Diamante	Black/Blue	(1)
Eclipse (Turbo & 2.4L)	Black/Blue	(2)
Galant	Black/Blue	(3)
Mirage	Black/Blue	(1)
Montero	White	(4)
3000GT	Black/Blue	(6)

(1) - On firewall, above brake master cylinder.
(2) - On firewall behind battery.
(3) - On main wiring harness, near center of firewall.
(4) - On main wiring harness, near right center of firewall.
(5) - Near left rear corner of engine compartment, below cruise control actuator (if equipped).
(6) - On main wiring harness, near wiper motor on firewall, behind battery.

3) Start engine and allow it to 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. 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 greater 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 fuel inlet line. Check for fuel leaks.

FUEL PUMP PERFORMANCE TABLE

Application	At Idle w/Vacuum psi (kg/cm²)	At Idle w/o Vacuum psi (kg/cm²)
Eclipse 2.0L		
Non-Turbo	(1)	47-50 (3.3-3.5)
Turbo	33 (2.3)	42-45 (3.0-3.5)
3000GT Turbo	34 (2.4)	43-45 (3.0-3.1)
All Other Models	38 (2.7)	47-50 (3.3-3.5)

(1) - Information is not available from manufacturer at time

of publication.

MFI CONTROL RELAY

MFI control relay switches power to vehicle sensors and actuators including Volume Airflow (VAF) sensor, crankshaft position sensor, idle speed control, injectors and fuel pump. When ignition switch is turned to RUN position, PCM energizes coils controlling injectors, VAF sensor and idle air control. When ignition switch is turned to START position, PCM energizes coils (through park/neutral position switch on A/T models) to supply power to fuel pump. Relay failure will cause a no-start condition. For testing procedure, see I - SYSTEM/COMPONENT TESTS article.

IGNITION CHECKS

* PLEASE READ THIS FIRST *

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

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. Wire resistance should not exceed 22,000 ohms for all models except Eclipse 2.0L non-turbo and Montero. On Eclipse 2.0L non-turbo, resistance should not exceed 8000 ohms. On Montero, resistance should not exceed 26,000 ohms.

CAMSHAFT POSITION (CMP) SENSOR

For CMP sensor testing procedure, see G - TESTS W/CODES article.

CRANKSHAFT POSITION (CKP) SENSOR

For CKP sensor testing procedure, see G - TESTS W/CODES article.

DISTRIBUTORLESS IGNITION SYSTEM (DIS - 4-CYLINDER)

Ignition Coil Resistance (Eclipse)

1) On Mirage 1.8L, see POWER TRANSISTOR (MIRAGE). On Eclipse 2.0L non-turbo, go to step 3). On Eclipse 2.0L turbo and 2.4L, disconnect ignition coil connector. Go to next step.

2) On Eclipse 2.0L turbo, use DVOM to measure primary coil resistance between ignition coil connector terminals No. 2 and 3 (coil for cylinders No. 1 and 4) and terminals No. 1 and 3 (coil for cylinders No. 2 and 3). See Fig. 3. On Eclipse 2.4L, use DVOM to measure primary coil resistance Between ignition coil terminals. Go to step 4).

Fig. 2: Ignition Coil Connector Terminals (Eclipse 2.0L Non-Turbo)
Courtesy of Mitsubishi Motor Sales of America

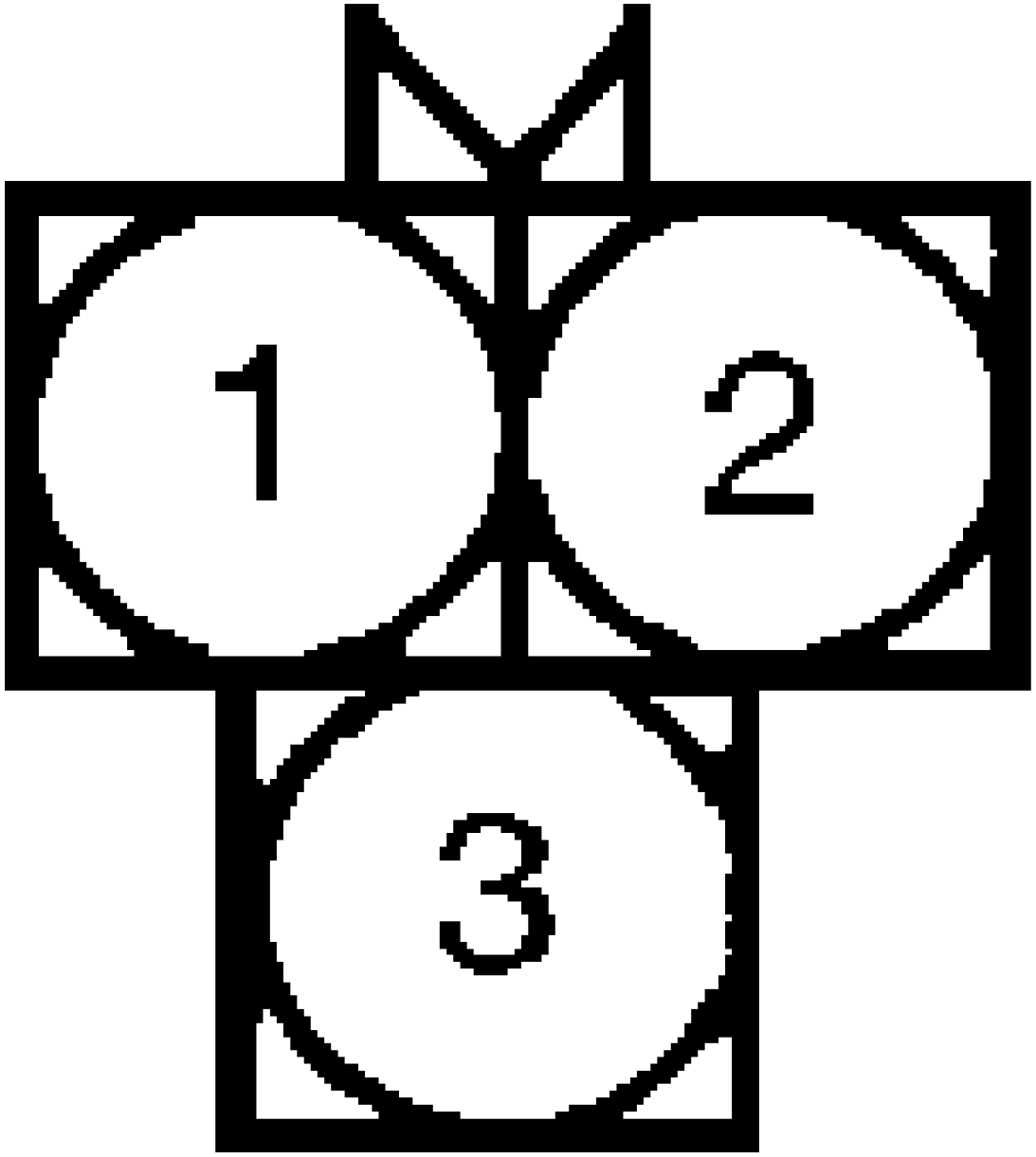

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Fig. 3: Ignition Coil Connector Terminals (Eclipse 2.0L Turbo)
Courtesy of Mitsubishi Motor Sales of America

3) Disconnect ignition coil connector. Using DVOM, measure primary coil resistance at coil (component side) 3-pin connector.

Measure between center and right terminals of connector for cylinders No. 1 and 4, and between center and left terminals of connector for cylinders No. 2 and 3.

4) On all models, remove ignition wires from coil. Measure secondary coil resistance between coil towers for cylinders No. 1 and 4 and between coil towers for cylinders No. 2 and 3. Primary and secondary coil resistance should be within specification. See IGNITION COIL RESISTANCE (ECLIPSE) table. Connect coil harness connector. Connect ignition wires to coil.

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

Application	Primary	Secondary
2.0L		
Non-Turbo	.51-.61	11,500-13,500
Turbo	.70-.86	11,300-15,300
2.4L	.74-.90	20,100-27,300

Power Transistor (Eclipse 2.0L Turbo & 2.4L)

1) To test the section of the power transistor that controls cylinders No. 1 and 4, disconnect power transistor connector. Using a 1.5-volt dry cell battery, connect negative end of battery to terminal No. 3 of power transistor and positive end to terminal No. 7. See Fig. 4.

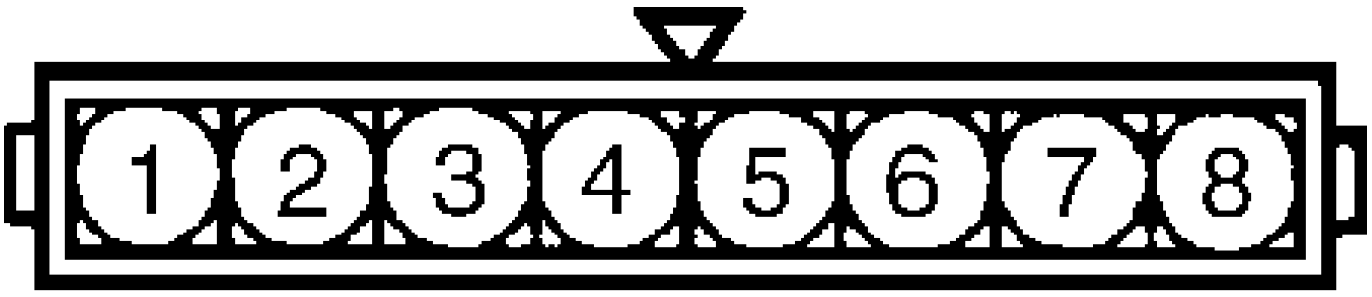

Fig. 4: Identifying Power Transistor Connector Terminals (Eclipse 2.0L Turbo & 2.4L)
Courtesy of Mitsubishi Motor Sales of America

2) Using an analog ohmmeter, check for continuity between terminals No. 3 and 8 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.

3) To test the section of the power transistor that controls cylinders No. 2 and 3, connect negative end of 1.5-volt dry cell battery to terminal No. 3 of power transistor and positive end to terminal No. 2.

4) Using an analog ohmmeter, check for continuity between terminals No. 1 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.

Power Transistor (Mirage)

1) Disconnect power transistor (distributor) connector. Using a 1.5-volt dry cell battery, connect negative end of battery to terminal No. 4 of power transistor and positive end to terminal No. 3. See Fig. 5.

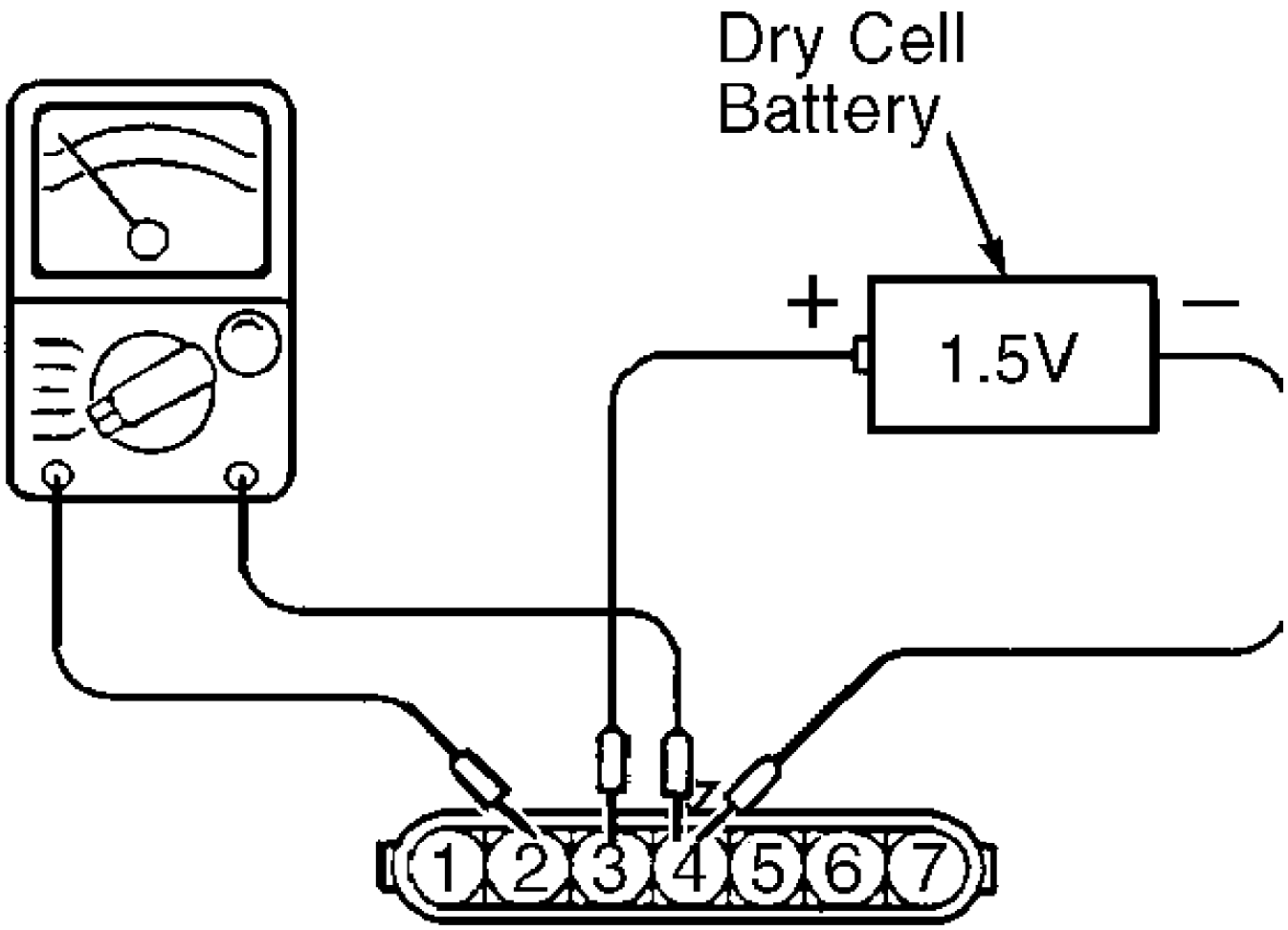

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Fig. 5: Power Transistor Connector Terminals (Mirage 1.8L)
Courtesy of Mitsubishi Motor Sales of America

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.

DISTRIBUTORLESS IGNITION SYSTEM (DIS - V6)

Ignition Coil Resistance

1) On 3000GT DOHC, go to next step. On Montero and Montero Sport, use DVOM to measure primary coil resistance between each individual coil. To check secondary coil resistance, measure resistance between towers of each individual coil. Replace coil if primary and secondary coil resistances are not within specification. See IGNITION COIL RESISTANCE (V6) table.

2) Using DVOM, measure primary coil resistance between terminal No. 3 (power terminal) and each individual coil terminal. See Fig. 6. Terminal No. 1 controls coil "B", terminal No. 2 controls coil "A", and terminal No. 4 controls coil "C". See Fig. 7. To check secondary coil resistance, measure resistance between towers of each individual coil. Replace coil if primary and secondary coil

resistances are not within specification. See IGNITION COIL RESISTANCE (V6) table.

IGNITION COIL RESISTANCE (V6) – Ohms @ 68°F (20°C) TABLE

Application	Primary	Secondary
3.0L		
VIN J & K	.67-.81	11,300-15,300
VIN P	.74-.90	20,100-27,300
3.5L (VIN M)	.74-.90	20,100-27,300

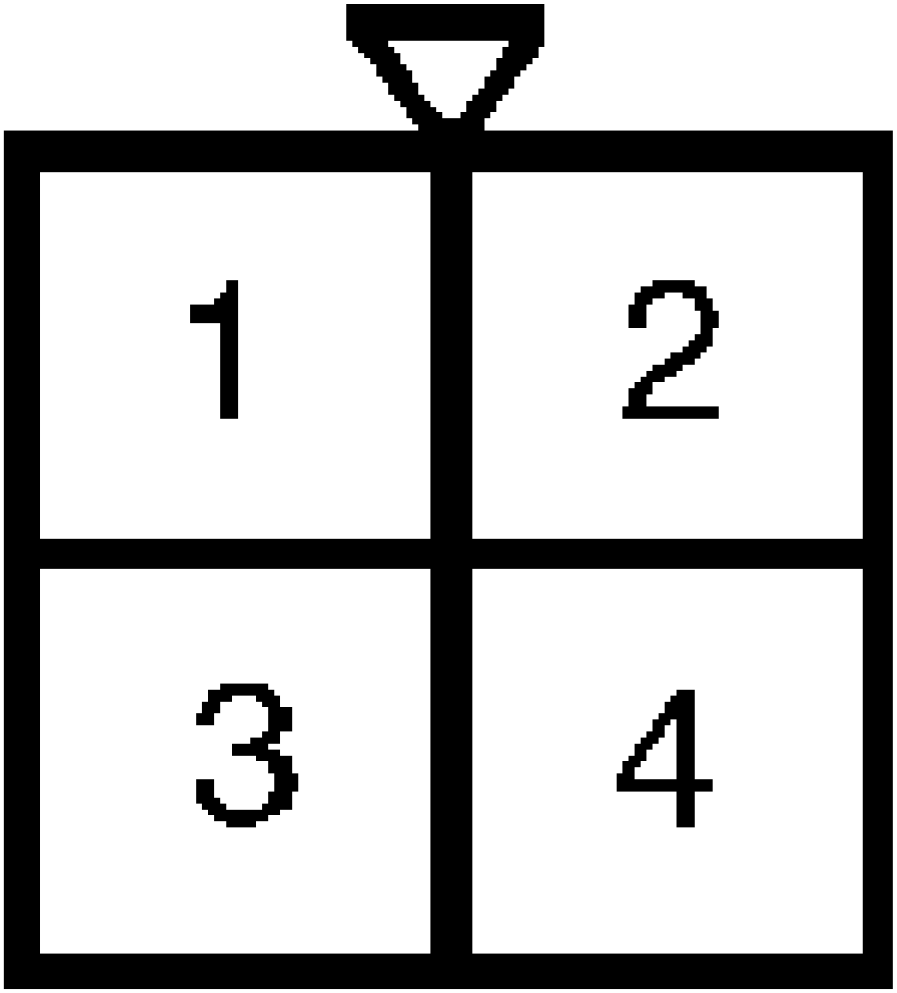

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Fig. 6: Identifying Ignition Coil Terminals (3000GT DOHC)
Courtesy of Mitsubishi Motor Sales of America

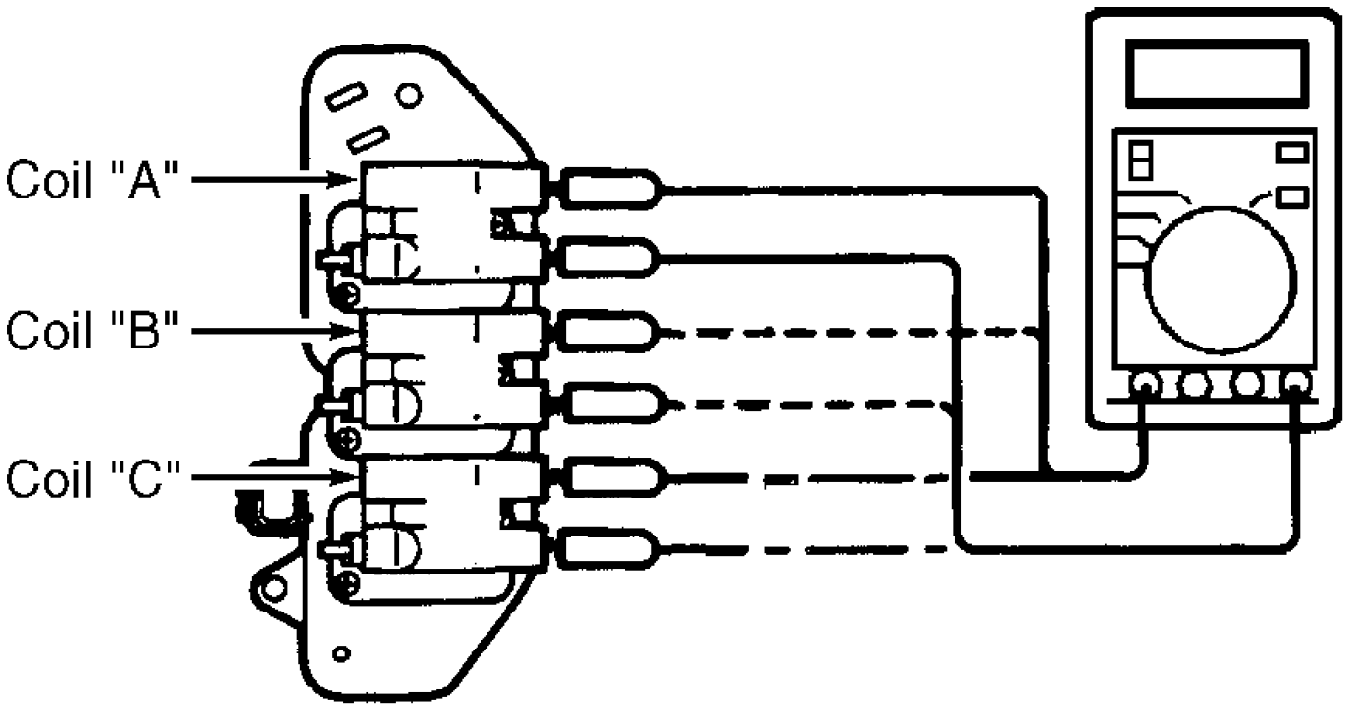

Fig. 7: Identifying Ignition Coils (3000GT DOHC)
Courtesy of Mitsubishi Motor Sales of America

Power Transistor

1) To test section of power transistor that controls cylinders No. 1 and 4 of ignition coil, disconnect power transistor connector. Using a 1.5-volt dry cell battery, connect negative end of 1.5-volt battery to terminal No. 4 of power transistor and positive end to terminal No. 3. See Fig. 8.

2) Using an analog ohmmeter, check for continuity between terminals No. 4 and 13 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.

3) To test section of power transistor that controls cylinders No. 2 and 5 of ignition coil, connect negative end of 1.5-volt battery to terminal No. 4 of power transistor and positive end to terminal No. 2.

4) Using an analog ohmmeter, check for continuity between terminals No. 4 and 12 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.

5) To test section of power transistor that controls cylinders No. 3 and 6 of ignition coil, connect negative end of 1.5-volt battery to terminal No. 4 of power transistor and positive end to terminal No. 1.

6) Using an analog ohmmeter, check for continuity between terminals No. 4 and 11 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.

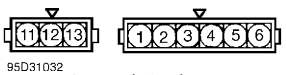

Fig. 8: Identifying Power Transistor Terminals
Courtesy of Mitsubishi Motor Sales of America

HALL EFFECT IGNITION

Ignition Coil Resistance

Using a DVOM, measure primary coil resistance between specified coil terminals. See Figs. 9-12. On Galant, measure between terminals No. 11 and 12. On Mirage measure between terminals No. 1 and 2. On all other vehicles, measure between positive and negative terminals. 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
1.5L (VIN A)	.50-.70	15,000-22,000
2.4L (VIN G)		
Galant	.90-1.20	20,000-29,000
Montero Sport	.67-.81	11,300-15,300
3.0L (VIN H)	.72-.88	12,290-13,920
3.5L (VIN P)	.50-.70	9000-13,000

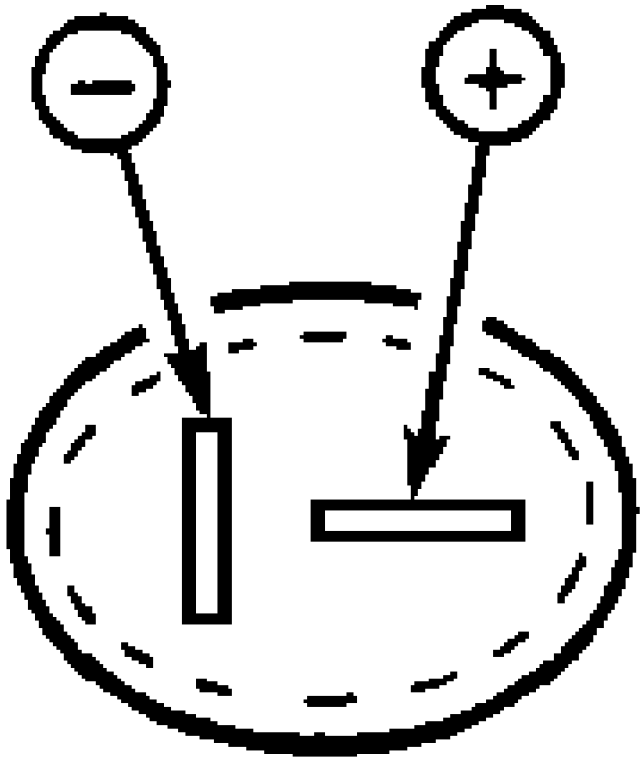

Fig. 9: Ignition Coil Connectors Terminals (Except DIS - Diamante)
Courtesy of Mitsubishi Motor Sales of America

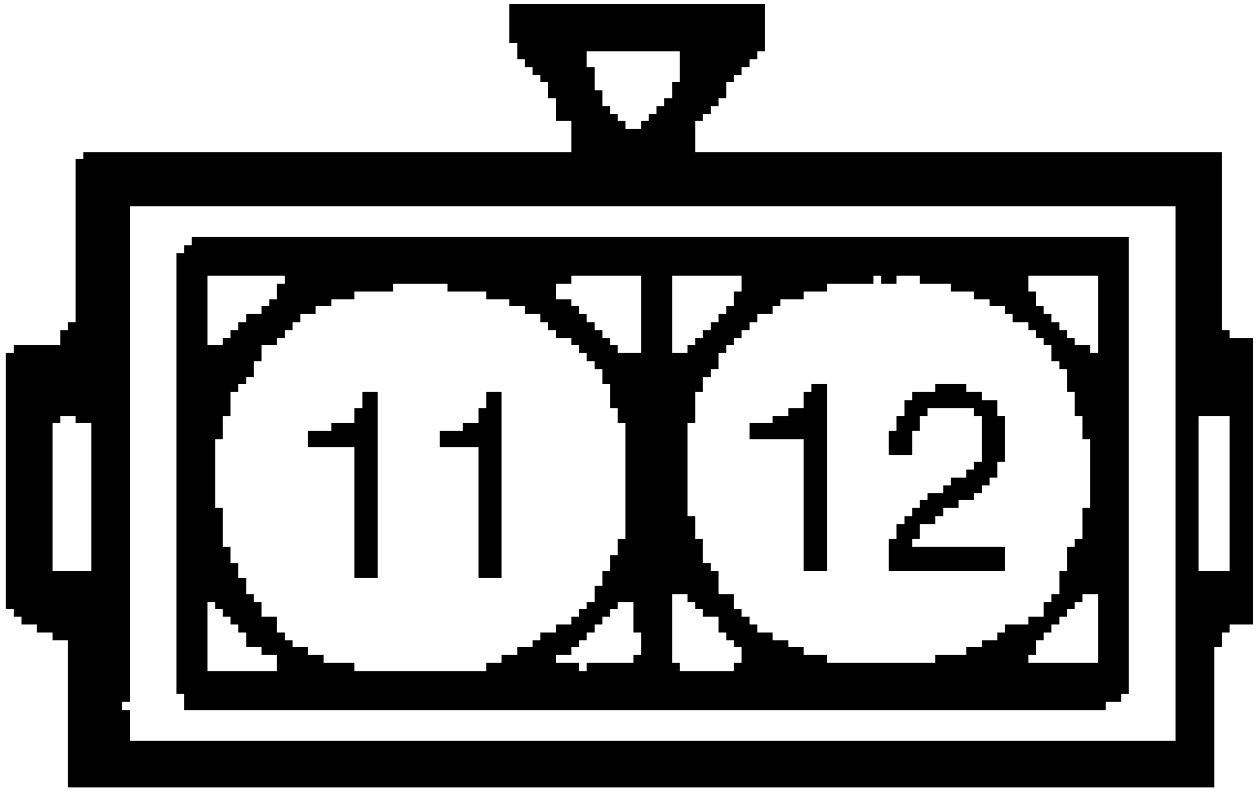

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Fig. 10: Ignition Coil Connectors Terminals (Except DIS - Galant)
Courtesy of Mitsubishi Motor Sales of America

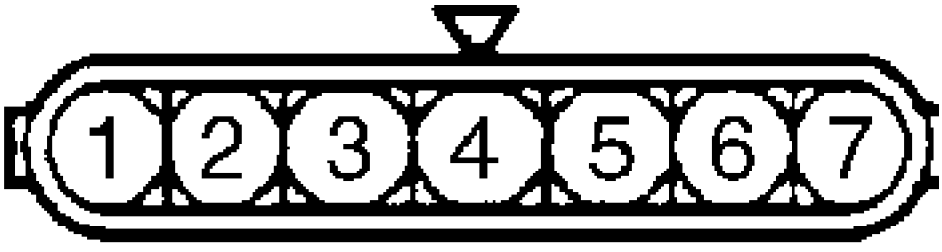

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Fig. 11: Ignition Coil Connectors Terminals (Except DIS - Mirage 1.5L)
Courtesy of Mitsubishi Motor Sales of America

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Fig. 12: Ignition Coil Connectors Terminals (Except DIS - Montero Sport 2.4L)
Courtesy of Mitsubishi Motor Sales of America

CAUTION: Power transistor test must be performed in less than 10 seconds to prevent coil from burning or power transistor from breaking.

Power Transistor (Diamante)

1) Disconnect power transistor connector. Using a 1.5-volt dry cell battery, connect negative end of 1.5-volt battery to terminal No. 4 of power transistor and positive end to terminal No. 3. See Fig. 13.

2) Using an analog ohmmeter, check for continuity between terminals No. 1 and 4 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.

Power Transistor (Galant)

1) Disconnect power transistor connector. Using a 1.5-volt dry cell battery, connect negative end of 1.5-volt battery to terminal No. 5 of power transistor and positive end to terminal No. 6. See Fig. 14.

2) Using an analog ohmmeter, check for continuity between terminals No. 5 and 12 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.

Power Transistor (Mirage)

1) Disconnect power transistor (distributor) connector. Using a 1.5-volt dry cell battery, connect negative end of 1.5-volt battery to terminal No. 4 of power transistor and positive end to terminal No. 3. See Fig. 15.

2) Using an analog ohmmeter, check for continuity between terminals No. 2 and 4 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.

Power Transistor (3000GT SOHC)

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. 15.

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.

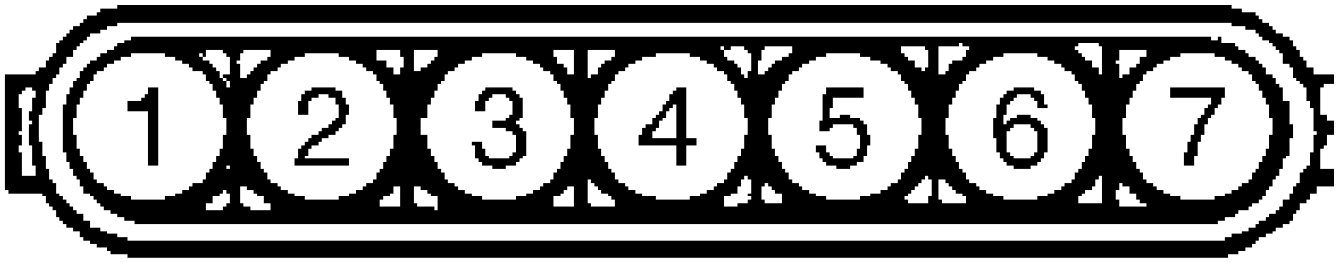

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Fig. 13: Power Transistor Connectors (Except DIS - Diamante)
Courtesy of Mitsubishi Motor Sales of America

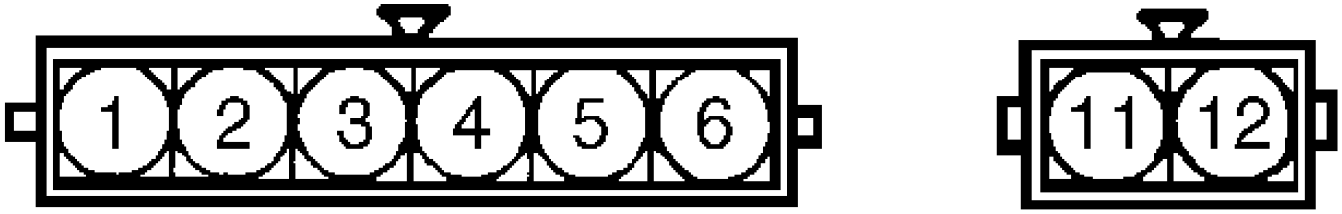

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Fig. 14: Power Transistor Connectors (Except DIS - Galant)
Courtesy of Mitsubishi Motor Sales of America

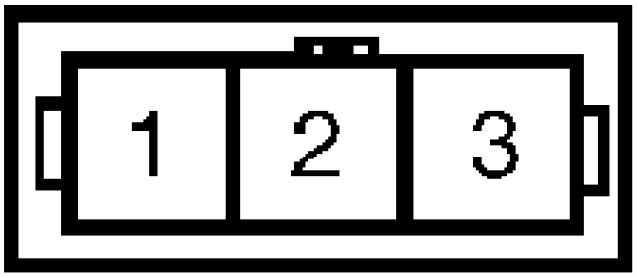

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Fig. 15: Power Transistor Connectors (Except DIS - Mirage & 3000GT SOHC)
Courtesy of Mitsubishi Motor Sales of America

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.

IGNITION TIMING SPECIFICATIONS (Degrees BTDC @ RPM) TABLE

Application	(1) Base	(2)	(3) (4) Actual
1.5L	2-78@ 650-750		10 @ 600-800
1.8L	2-8 @ 600-800		5 @ 600-800
2.0L			
Non-Turbo	(5)		(5)
Turbo	2-8 @ 650-850		8 @ 650-850
2.4L	2-8 @ 650-850		10 @ 650-850
3.0L	2-8 @ 600-800		15 @ 600-800
3.5L	2-8 @ 600-800		15 @ 600-800

(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.
(3) - If vehicle altitude is more than 2300 feet above sea level, actual timing may be advanced (5 degrees).
(4) - Actual ignition timing is approximate and may fluctuate plus or minus 7 degrees.
(5) - Ignition timing is NOT adjustable.

SUMMARY

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