A/C-HEATER SYSTEM

1998 Mitsubishi Montero

1998 AIR CONDITIONING & HEAT
Mitsubishi - A/C-Heater System

Montero

* PLEASE READ THIS FIRST *

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in AIR BAG RESTRAINT SYSTEM article.

A/C SYSTEM SPECIFICATIONS

A/C SYSTEM SPECIFICATIONS TABLE

Application	Specification
Compressor Type	Nippondenso 10PA15 10-Cyl.
Compressor Belt Deflection (1)	
New	13/64-15/64" (5.1-6.0 mm)
Used	17/64-19/64" (6.6-7.5 mm)
Compressor Oil Capacity	(2) 2.7 ozs.
Refrigerant (R-134a) Capacity	21-23 ozs.
System Operating Pressures (4)	
High Side	149-213 psi (10.5-15.0 kg/cm²)
Low Side	14-33 psi (1.0-2.3 kg/cm²)

(1) - With 22 lbs. (100 N.m) force applied midway on longest span of belt.
(2) - Use ND 8-OIL refrigerant oil.
(3) - Use SUN PAG 56 refrigerant oil.
(4) - With ambient temperature at about 80°F (27°C).

DESCRIPTION

Slight variations exist among manual A/C-heater systems used. On Montero, a Nippondenso 10-cylinder compressor is used. Cycling of compressor clutch is controlled by an automatic A/C Control Unit (ACCU).

Compressors will only operate within normal temperatures and pressures set for each model. An electric condenser fan operates whenever A/C system is operating. System components may vary depending upon model. Systems may include an ACCU, fan switch, evaporator, temperature sensor, dual-pressure switch, engine coolant temperature switch, compressor, condenser, receiver-drier and various pipes and hoses.

OPERATION

A/C CONTROL UNIT (ACCU)

ACCU controls cycling of compressor clutch based on information received from air thermosensor and air inlet sensor, dual-pressure switch, A/C switch and A/C engine coolant temperature switch. ACCU is attached to top of evaporator housing.

A/C SWITCH

When turned on, the A/C system will operate if blower motor control lever is in a position other than OFF. When activated, A/C switch allows A/C compressor clutch to engage and operate the compressor.

A/C ENGINE COOLANT TEMPERATURE SWITCH

The A/C engine coolant temperature switch, located on thermostat housing, is wired in series with compressor clutch. When coolant temperature is greater than switch control temperature, power to compressor is cut and compressor is turned off until temperature returns to operating range. Switch will turn on at 226°F (108°C) and off at 235-243°F (112-118°C).

AIR SELECTOR LEVER

The lever moves horizontally to select source of air used inside passenger compartment. Lever moves from position on left (outside air mode) to position on right (recirculated air mode). Lever should be set in recirculated air mode for maximum A/C cooling.

BLOWER MOTOR CONTROL SWITCH

Blower motor control switch rotates to select blower motor speeds. As switch is rotated from left or OFF position, increasing speeds of blower operation are selected. In order for A/C system to operate, blower motor control switch must be in a position other than OFF.

MODE SELECTOR KNOB

Mode selector knob has six modes available to achieve desired distribution of air from various outlets. When knob is rotated fully to left (counterclockwise), airflow is directed to upper passenger area. In second position (clockwise), airflow is directed to upper passenger area and slightly to leg area. Position 3, directs air mostly to leg area and slightly to upper passenger area. Position 4, directs air exclusively to leg area. Position 5, directs air to leg area and to windshield and door windows. Position 6, directs air exclusively to windshield and door windows.

TEMPERATURE CONTROL KNOB

Temperature control knob operates blend-air door in heater/air conditioning unit, mixing cooled and heated air so that selected air temperature can be obtained. The system will provide cooled air when A/C switch is in ON position and blower motor is in any position other than OFF. Temperature control knob should be on far left (maximum cooling) side of temperature selection scale when maximum A/C cooling is desired.

DUAL-PRESSURE SWITCH

The dual-pressure switch, mounted on receiver-drier, is wired in series with compressor clutch. Whenever system pressures drop below or increase above control points of switch, power supplied to compressor will be cut and compressor function will cease until pressures are back to normal operating ranges.

ADJUSTMENTS

NOTE: For adjustment procedures, see HEATER SYSTEM article.

TROUBLE SHOOTING

NO COOLING

1) Ensure compressor clutch is operating. If compressor clutch is operating, go to next step. If compressor clutch is not operating, check fuses and A/C switch. Check dual-pressure switch. Check air inlet sensor and air thermosensor. Check A/C compressor relay. Check A/C compressor clutch coil. Check A/C control unit.
2) Ensure system is properly charged with correct amount of refrigerant. Evacuate and charge system as necessary. Ensure receiver-drier is not clogged. Check compressor belt for proper tension. Check for clogged expansion valve. Check compressor operation. Repair or replace components as necessary.

INSUFFICIENT AIRFLOW

Check for air leakage at air duct joint. Check for frost on evaporator. Ensure blower motor is operating properly. Check for obstructed air intake.

INSUFFICIENT COOLING

Ensure system is properly charged with correct amount of refrigerant and free of air and moisture. Evacuate and charge system as necessary. Ensure receiver-drier is not clogged. Ensure sufficient airflow through condenser exists. Check compressor belt for proper tension. Check compressor operation. Repair or replace compressor as necessary. Check for clogged expansion valve. Replace expansion valve as necessary. Check A/C compressor clutch coil.

INTERMITTENT COOL AIR

Check for air or moisture in system. Evacuate and charge system as necessary. Check for expansion valve malfunction. Replace expansion valve if necessary. Check compressor belt for proper tension.

TESTING

* PLEASE READ THIS FIRST *

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NOTE: For testing procedures not covered in this article, see HEATER SYSTEM article.

A/C SYSTEM PERFORMANCE

1) Park vehicle out of direct sunlight. Install A/C gauge set. Start engine and allow it to idle at 1000 RPM. Turn A/C on. Set A/C controls to recirculated air, panel (vent) mode and full cold

settings.

2) Set blower/fan on high speed. Close doors and windows. Insert thermometer in center vent. Operate system for 20 minutes to allow system to stabilize. Measure temperature.

3) Discharge air temperature must be 37-44°F (3-7°C) at center vent, with high side and low side pressures within specification. See A/C SYSTEM SPECIFICATIONS table at beginning of article.

A/C CONTROL UNIT (ACCU)

1) Locate A/C Control Unit (ACCU) on top of evaporator case and disconnect 10-pin connector. Inspect connector and wiring for damage. Turn ignition and A/C on. Set temperature control to maximum cooling and blower switch to high. Using a DVOM set to appropriate test function, inspect harness side of connector. See Fig. 3. Go to next step. If all test readings are as specified, replace ACCU.

2) Terminal No. 1 (Green/Yellow wire) is ACCU output. With A/C and blower motor on, battery voltage should be present when ACCU has received signals from pressure and temperature sensors confirming A/C operation is okay.

3) Terminal No. 3 (Green/Blue wire) is ACCU power supply when A/C switch is in A/C mode. With ignition and blower on, and A/C switch at second level setting, battery voltage should be present.

4) Terminal No. 5 (Green/Red wire) is ACCU power supply when A/C switch is in ECONO mode. With ignition and blower on, and A/C switch at first level setting, battery voltage should be present. Terminals No. 2 and 7 (Black wire) are ACCU grounds. There should be zero volts at all times.

5) Turn ignition off. Reconnect 10-pin connector. Turn ignition on. Turn A/C on. Set temperature control to maximum cooling and blower switch to high. Backprobe 10-pin connector. Go to next step. If all test readings are as specified, replace ACCU.

6) Terminal No. 10 (Blue/White wire) is air thermosensor power supply. With ignition, blower and A/C on, approximately 5.5 volts should be present.

7) Terminal No. 8 (Blue/Yellow wire) is air thermosensor signal. When temperature of evaporator outlet portion is 77°F (25°C), there should be approximately 3.6 volts present.

8) Terminal No. 4 (White/Blue wire) is air inlet sensor power supply. With ignition, blower and A/C on, approximately 5.5 volts should be present.

9) Terminal No. 9 (Yellow/Green wire) is air inlet sensor signal. When temperature of evaporator outlet portion is 77°F (25°C), there should be approximately 1.5 volts present.

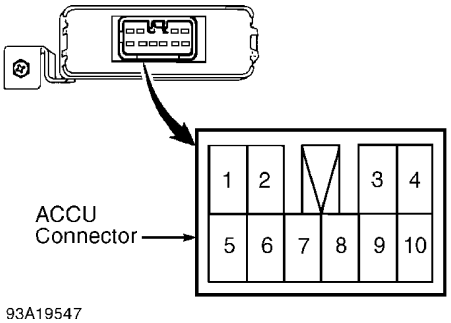

Fig. 1: Testing ACCU
Courtesy of Mitsubishi Motor Sales of America.

A/C SWITCH

With A/C switch in indicated position, ensure continuity exists between listed terminals. See appropriate A/C SWITCH CONTINUITY TEST table. See Fig. 2.

A/C SWITCH CONTINUITY TEST TABLE

Switch Position	Terminal No.	Continuity
OFF	(1)	No
ECONO	1 & 3	Yes
A/C	1, 3 & 4	Yes

(1) - Continuity should not exist between any terminals.

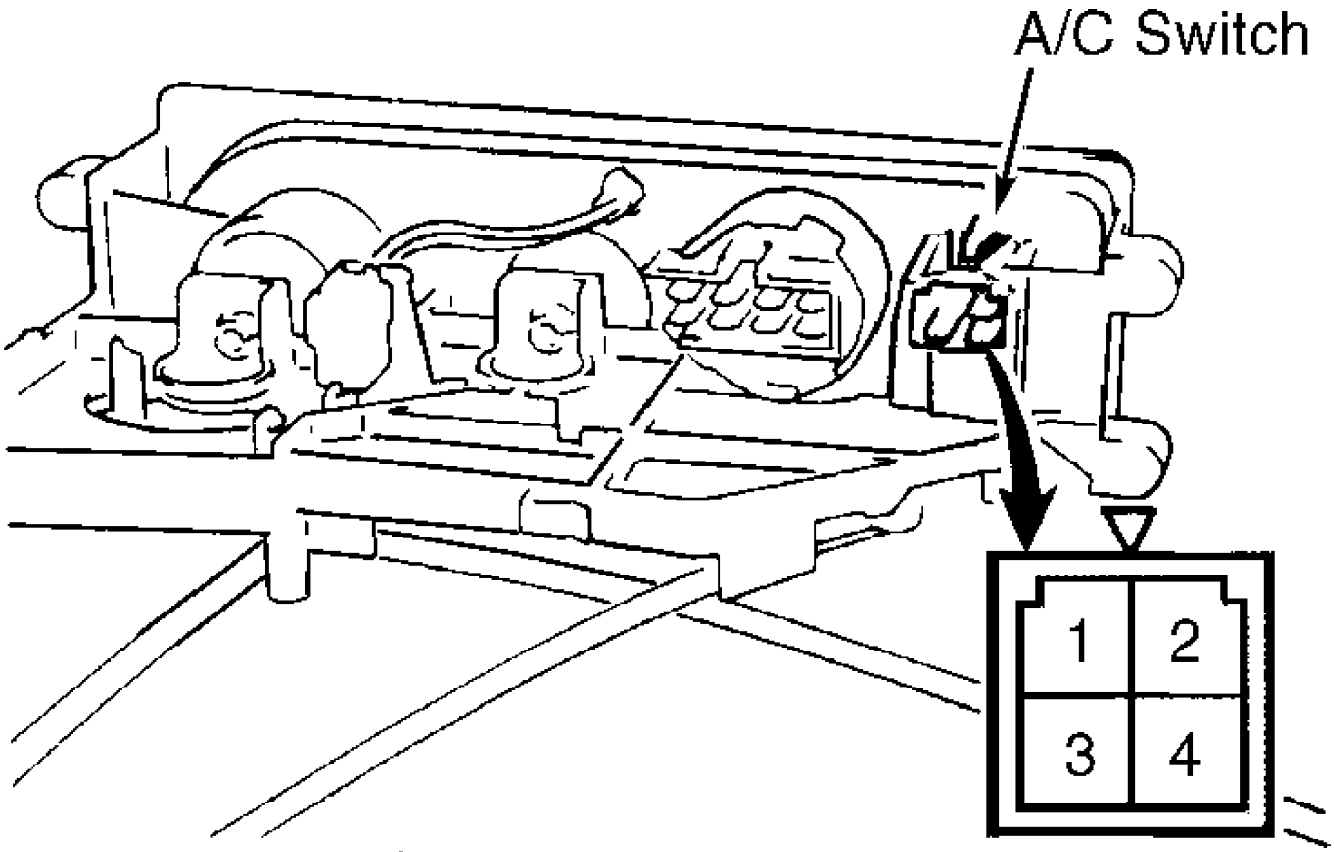

Fig. 2: Identifying A/C Switch Terminals
Courtesy of Mitsubishi Motor Sales of America.

A/C ENGINE COOLANT TEMPERATURE SWITCH

1) Disconnect A/C engine coolant temperature switch connector. Remove A/C engine coolant temperature switch. Carefully heat a pan of oil and hold coolant temperature switch up to threads in oil. Coolant switch is normally closed (continuity exists).

2) When oil reaches 235-243°F (112-118°C), coolant switch should open (no continuity). Replace A/C engine coolant temperature switch if it does not test as specified. See Fig. 3.

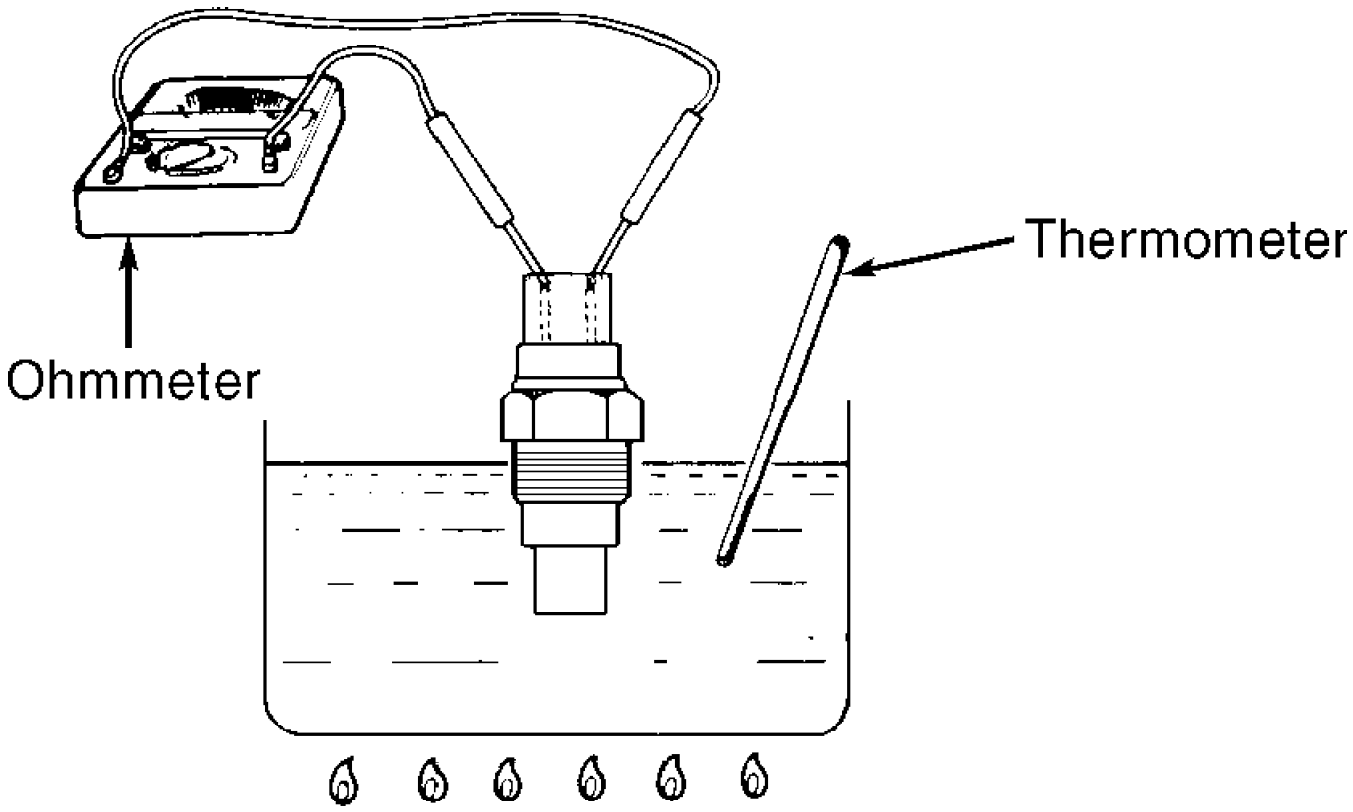

Fig. 3: Testing A/C Engine Coolant Temperature Switch
Courtesy of Mitsubishi Motor Sales of America.

AIR THERMOSENSOR & AIR INLET SENSOR

1) Disconnect sensor connector at evaporator case. See Fig. 12. Using ohmmeter, measure resistance between sensor terminals. See AIR THERMOSENSOR & AIR INLET SENSOR SPECIFICATIONS table.

2) If resistance is not within specifications, faulty sensor must be replaced. If resistance is within specifications and all other components are okay, replace A/C Compressor Control Unit (ACCU).

AIR THERMOSENSOR & AIR INLET SENSOR SPECIFICATIONS TABLE

Sensor Temperature °F (°C)	Ohms
-20 (-4)	12,000
32 (0)	4800
50 (10)	2800
68 (20)	1800
86 (30)	1000
104 (40)	800

BLOWER RESISTOR

Disconnect blower resistor connector. Using an ohmmeter, measure resistance between indicated terminals. See BLOWER RESISTOR RESISTANCE table. See Fig. 4

BLOWER RESISTOR RESISTANCE TABLE

Application & Terminal No.	Ohms
2 & 3	0.31-0.35
2 & 1	0.88-1.02
2 & 4	1.82-2.10

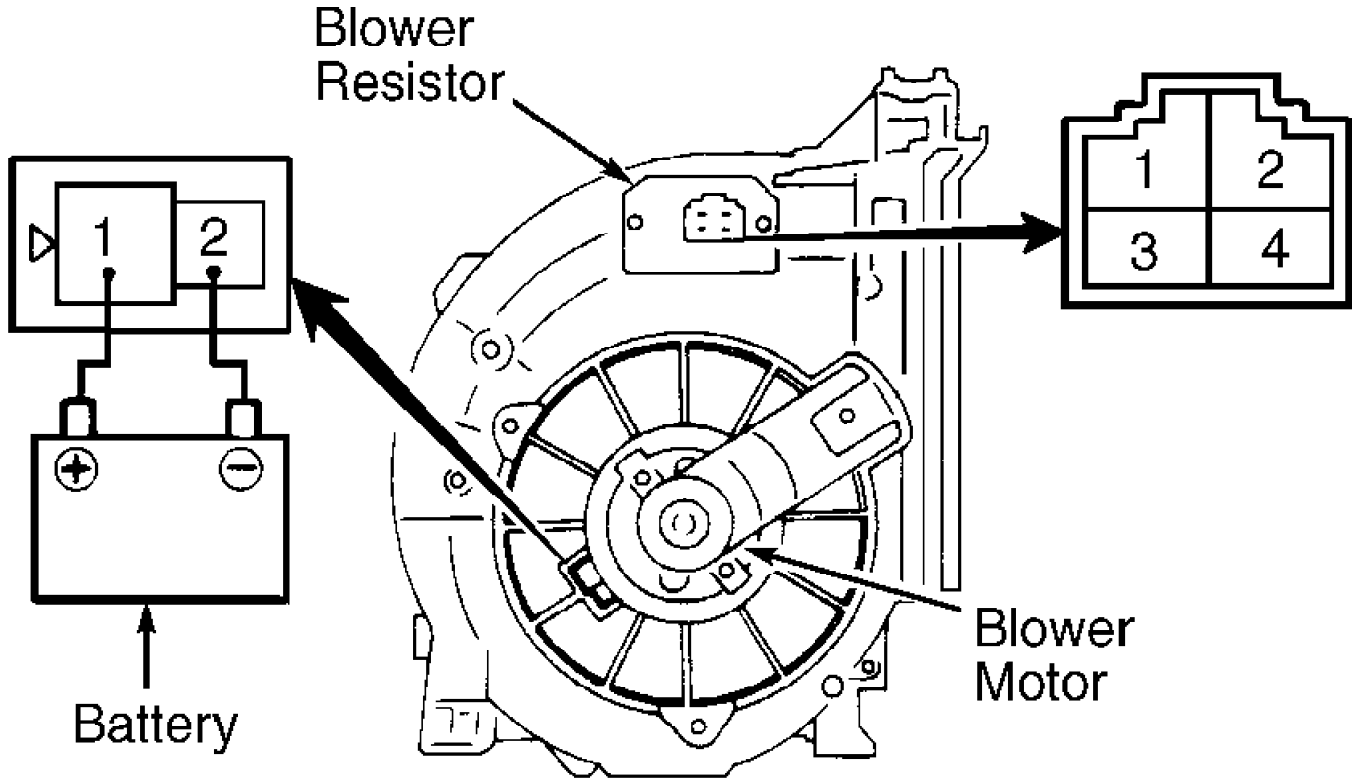

Fig. 4: Testing Blower Resistor
Courtesy of Mitsubishi Motor Sales of America.

BLOWER SWITCH

With blower switch in position indicated in BLOWER SWITCH CONTINUITY TEST table, ensure continuity exists between terminals listed. See Fig. 5.

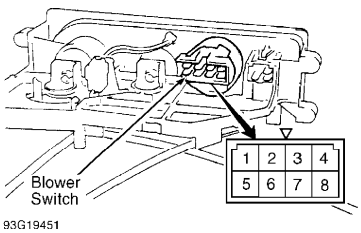

Fig. 5: Identifying Blower Switch Terminals
Courtesy of Mitsubishi Motor Sales of America.

BLOWER SWITCH CONTINUITY TEST TABLE

Switch Position	Continuity Between Terminal No.
OFF	(1)
Low	1 & 8; 3 & 5
Medium-Low	1 & 8; 5 & 6
Medium-High	1, 4 & 8; 2 & 5
High	1, 4 & 8; 5 & 7

(1) - Continuity should not exist between any terminals.

DUAL-PRESSURE SWITCH

Disconnect dual-pressure connector, and connect a jumper wire across harness connector terminals. Connect manifold gauge set to system, and check operating pressures. Dual-pressure switch will allow compressor operation when system pressure is within specification. When high or low pressure side of dual-pressure switch is at operation pressure (ON), condition is normal if there is continuity between the respective terminals. If continuity is not present when switch is ON, replace dual-pressure switch. See PRESSURE SWITCH SPECIFICATIONS table.

PRESSURE SWITCH SPECIFICATIONS TABLE (1)

Application	ON Pressure psi (kg/cm²)	OFF Pressure psi (kg/cm²)
High Pressure	455 (32)	541 (38)
Low Pressure	32 (2.2)	28 (2.0)

(1) - With ambient temperature at 80°F (27°C).

COMPRESSOR CLUTCH

Disconnect wiring to compressor clutch. Connect battery voltage directly to A/C compressor clutch wiring harness terminals. If click is heard, clutch engagement is okay. If click is not heard, pulley and armature are not making contact. Repair or replace as necessary.

RELAYS

4-Terminal Relay

1) Remove relay from relay box located in engine compartment. Using an ohmmeter, check continuity between relay terminals. Continuity should exist between terminals No. 2 and 4, but not between terminals No. 1 and 3. See Fig. 6.

2) Connect battery voltage to terminal No. 2, and ground terminal No. 4. Ensure continuity now exists between terminals No. 1 and 3. If continuity is not as specified, replace relay.

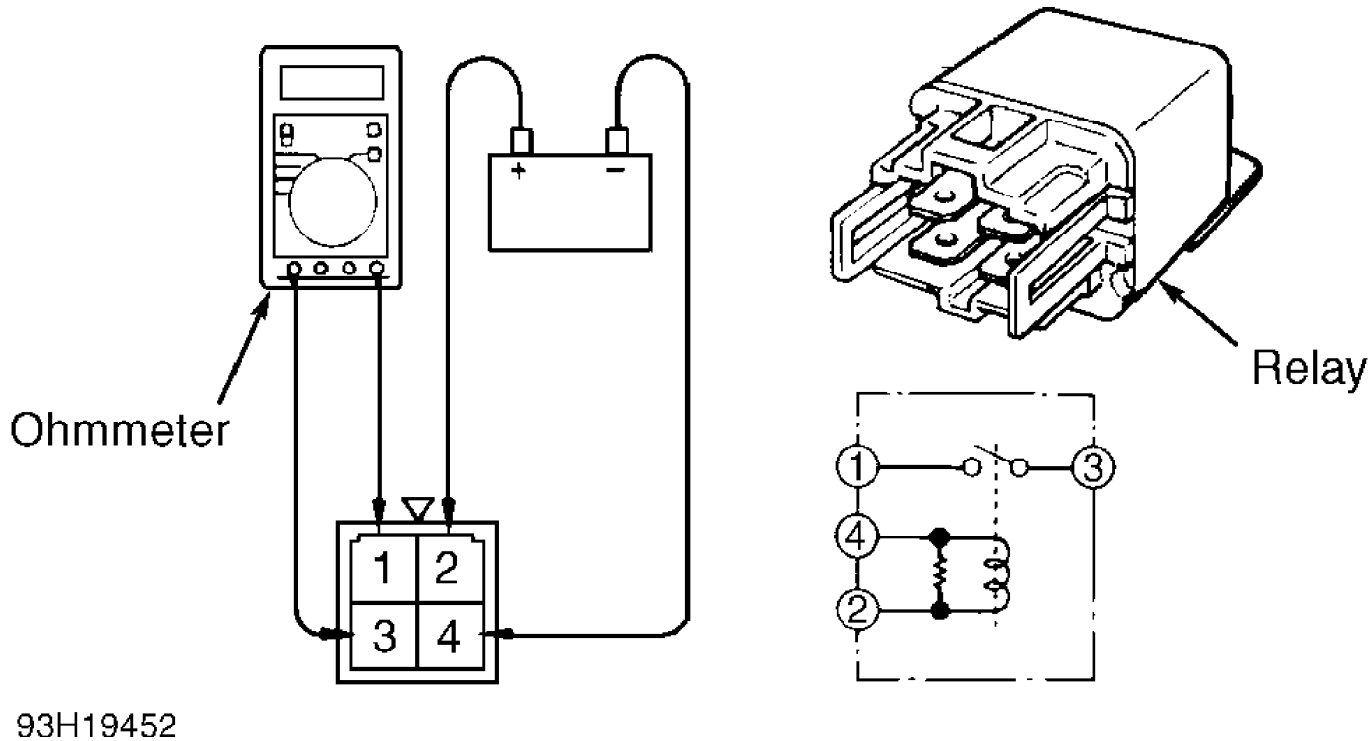

Fig. 6: Testing 4-Terminal Relay
Courtesy of Mitsubishi Motor Sales of America.

REMOVAL & INSTALLATION

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NOTE: For removal and installation procedures not covered in this article, see HEATER SYSTEM article.

A/C CONTROL UNIT (ACCU)

Removal & Installation

Lower glove box. Remove 2 clips on top of evaporator, and remove ACCU. Disconnect wiring harness from ACCU. To install, reverse removal procedure. See Fig. 7.

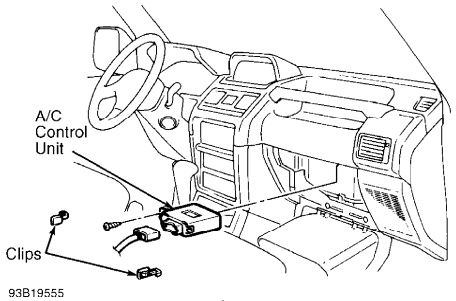


Fig. 7: Locating A/C Control Unit (ACCU)
Courtesy of Mitsubishi Motor Sales of America.

A/C SWITCH

Removal & Installation

Lower glove box. Remove instrument cover. Remove lap cooler and foot shower ducts. Remove center panel and A/C-heater control panel. Remove bezel and knob. Disconnect A/C switch connector, and remove A/C switch. To install, reverse removal procedure.

A/C ENGINE COOLANT TEMPERATURE SWITCH

Removal & Installation

Drain coolant below level of thermostat housing. See Fig. 8. Remove A/C engine coolant temperature switch wiring harness connector, and unscrew A/C engine coolant temperature switch from thermostat housing. To install, reverse removal procedure. Tighten A/C engine coolant temperature switch to specification. See TORQUE SPECIFICATIONS . Add coolant and check for leaks.

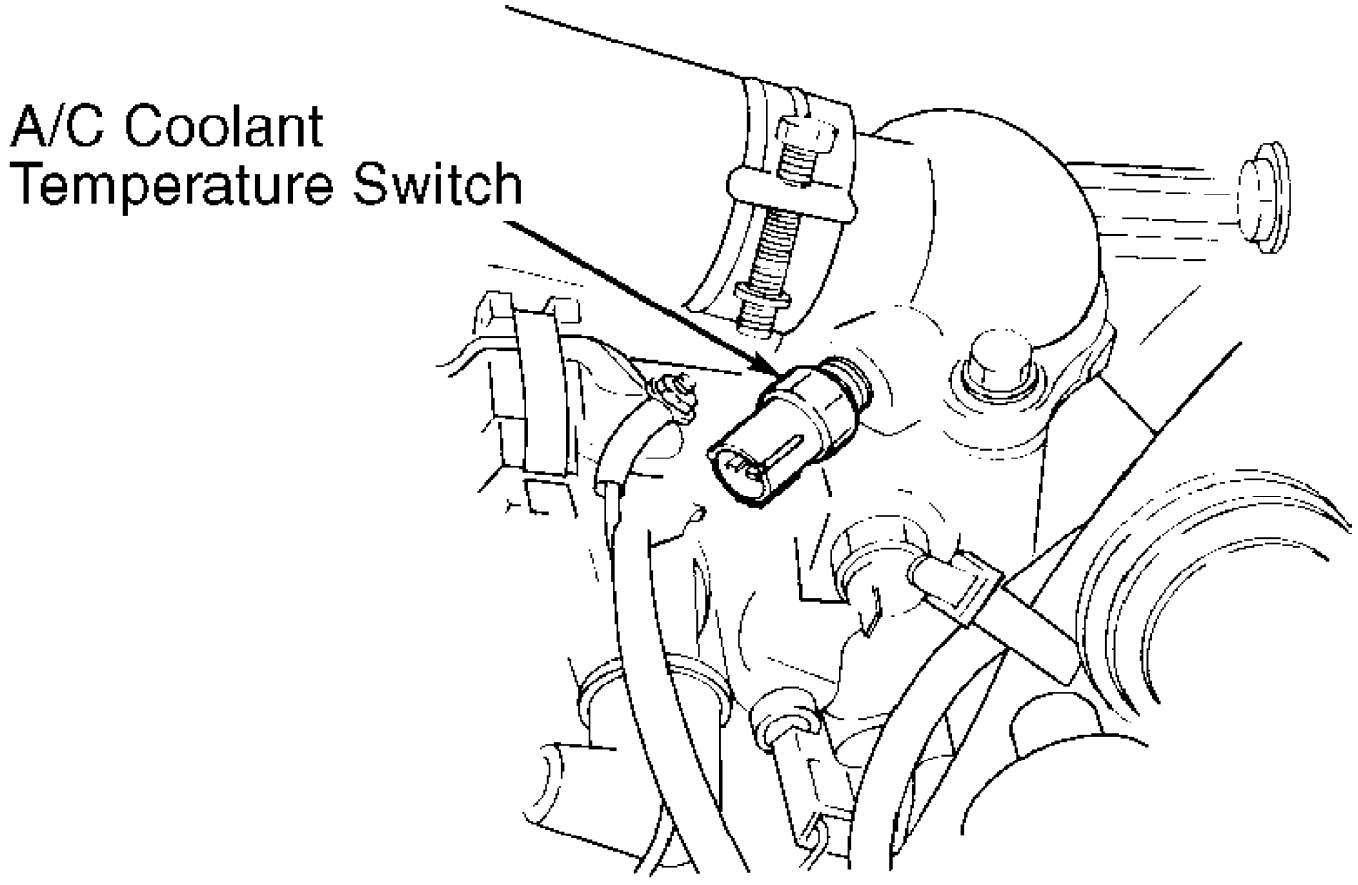
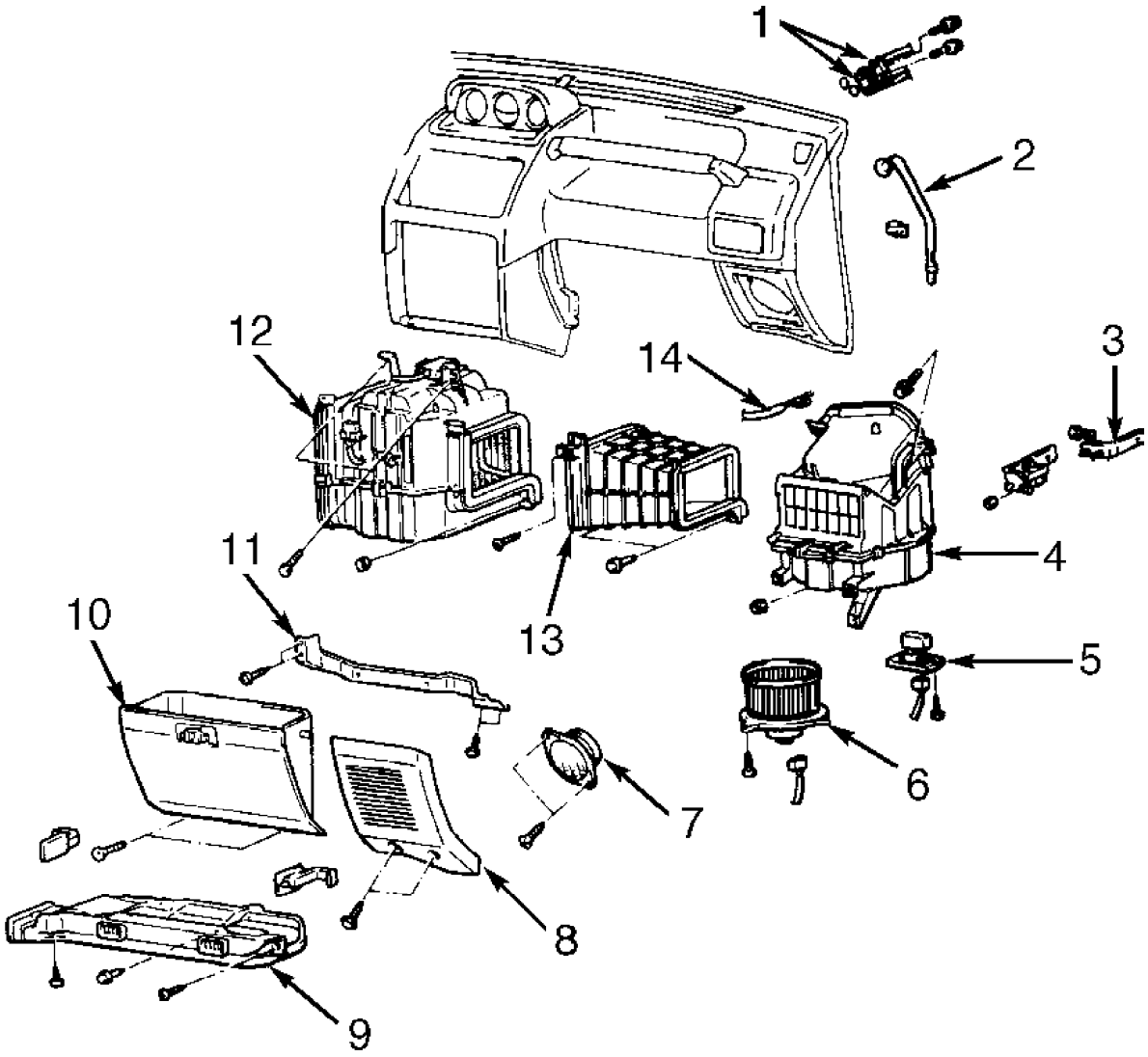


Fig. 8: Locating A/C Engine Coolant Temperature Switch
Courtesy of Mitsubishi Motor Sales of America.

BLOWER MOTOR & RESISTOR

Removal & Installation

Remove right side foot shower duct. Disconnect blower and/or resistor. Remove blower motor and/or resistor. See Fig. 9. To install, reverse removal procedure.



1. A/C Hose Connections
2. Drain Hose
3. Engine Control Relay
4. Blower Case
5. Blower Resistor
6. Blower Motor
7. Speaker
8. Speaker Cover
9. Foot Shower Duct
10. Glove Box
11. Lower Frame
12. Evaporator
13. Joint Duct
14. Air Selector Connection

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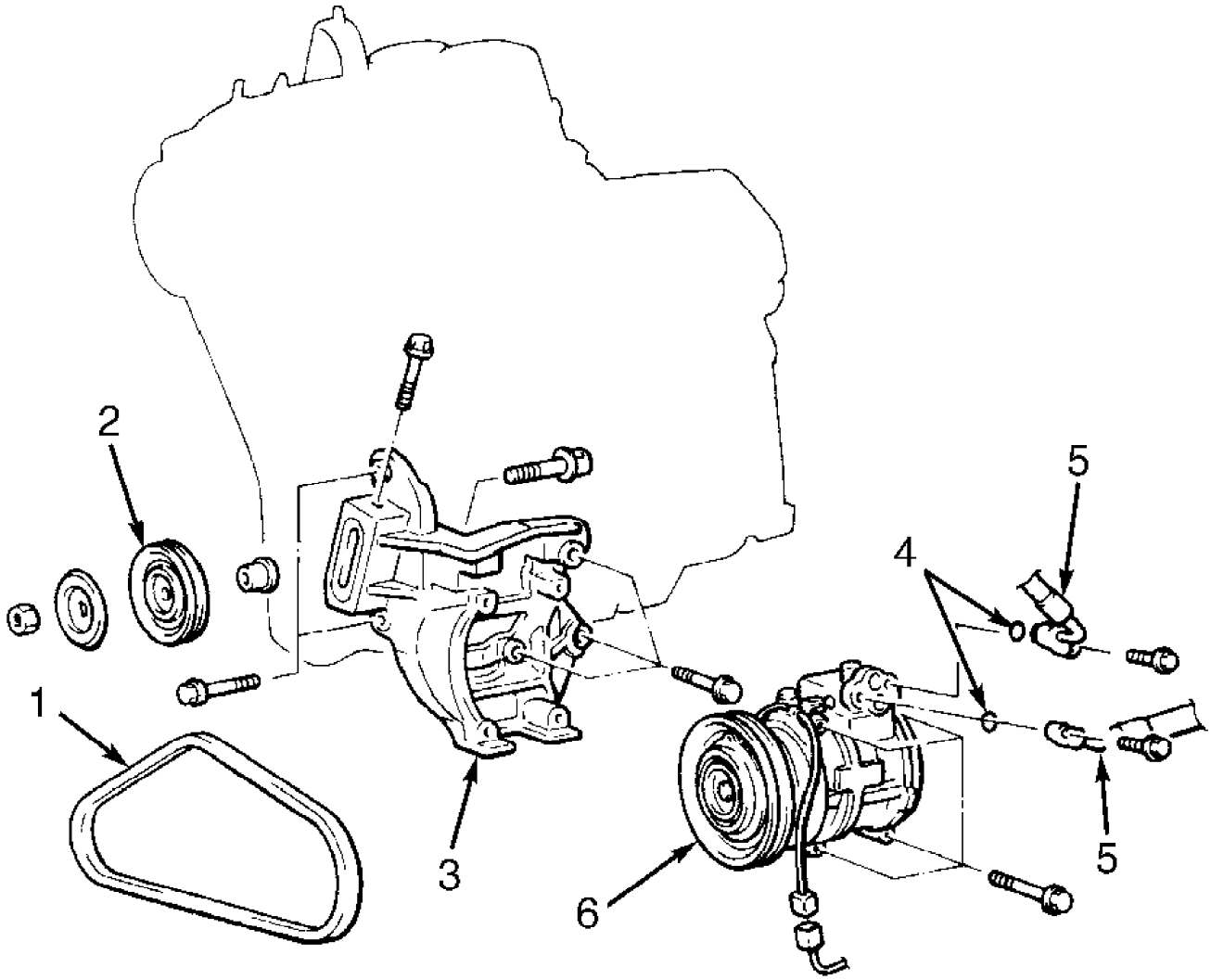
Fig. 9: Exploded View Of Blower Assembly
Courtesy of Mitsubishi Motor Sales of America.

COMPRESSOR

Removal & Installation

Discharge A/C system, using approved refrigerant recovery/recycling equipment. Loosen idler pulley, and remove belt. Disconnect compressor electrical connector. Remove high and low pressure lines and "O" rings from compressor. Remove compressor mounting bolts. Remove compressor. To install, reverse removal procedure. See Fig. 10.



1. Drive Belt
2. Tension Pulley
3. Compressor Bracket
4. "O" Ring
5. Hose Connections
6. Compressor

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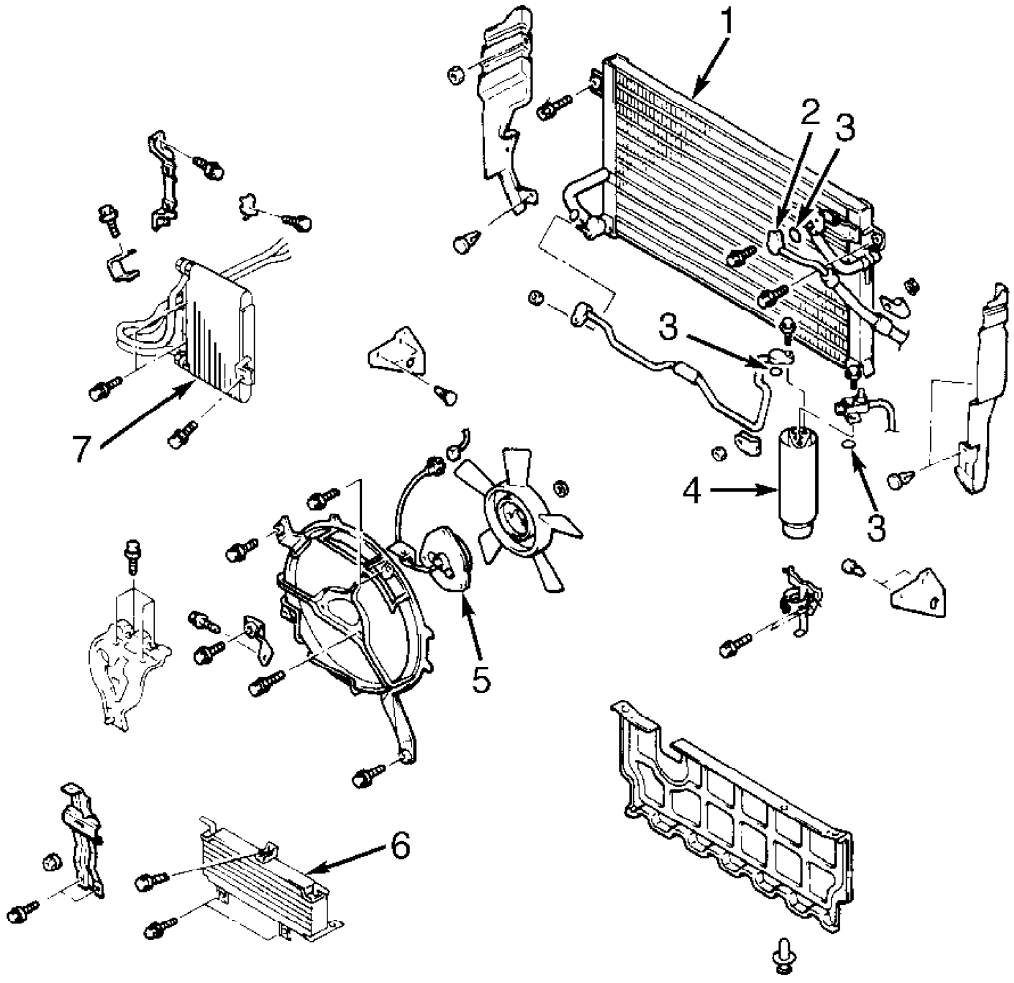
Fig. 10: Exploded View Of Compressor Mounting (Typical)
Courtesy of Mitsubishi Motor Sales of America.

CONDENSER

Removal & Installation

1) Discharge A/C system, using approved refrigerant recovery/recycling equipment. Remove front grille and grille brackets. Remove hood latch bracket mounting bolt. Remove hood latch brace. Remove A/T oil cooler and engine oil cooler mounting bolts and brackets.

2) Remove receiver bracket and receiver. Remove condenser fan motor. Disconnect pressure lines from condenser. Remove condenser mounting bolts. Lift condenser from vehicle. To install, reverse removal procedure. See Fig. 11. If replacing condenser, add 1.4 ounces of refrigerant oil to new condenser.



1. Condenser
2. High Pressure Hose
3. "O" Ring
4. Receiver-Drier
5. Condenser Fan Motor
6. A/T Oil Cooler
7. Engine Oil Cooler

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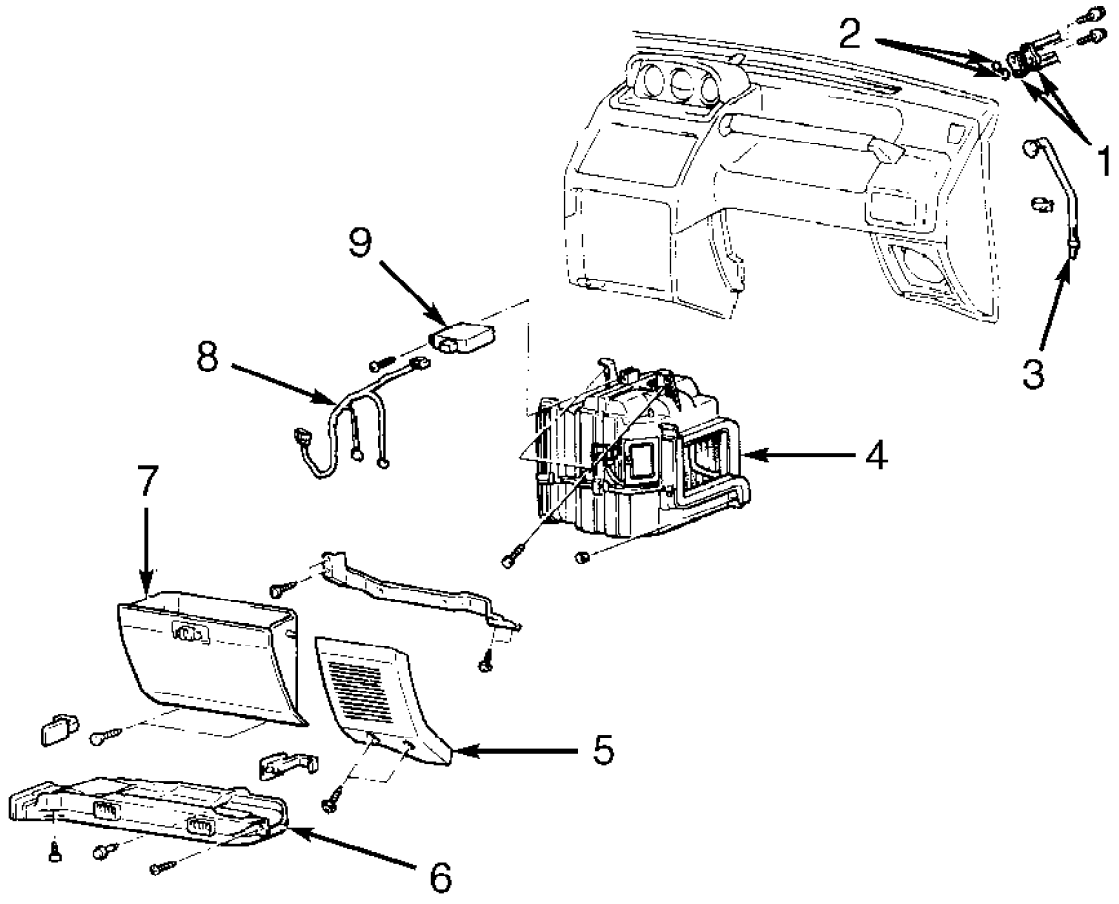
Fig. 11: Exploded View Of Condenser & Condenser Fan Motor
Courtesy of Mitsubishi Motor Sales of America.

EVAPORATOR ASSEMBLY

Removal & Installation

1) Discharge A/C system, using approved refrigerant recovery/recycling equipment. Remove glove box with lower frame attached. Loosen duct joint bolt to free duct joint. Disconnect A/C switch harness. Disconnect evaporator drain hose.

2) Disconnect refrigerant lines at firewall side of engine compartment. Remove evaporator top bolts in passenger compartment. Remove evaporator assembly. To install, reverse removal procedure. See Figs. 12 and 13. If replacing evaporator, add 1.4 ounces of refrigerant oil to new evaporator.



1. High & Low Pressure Hoses
2. "O" Ring
3. Drain Hose
4. Evaporator
5. Speaker Cover
6. Foot Shower Duct
7. Glove Box
8. A/C Wiring Harness
9. A/C Control Unit

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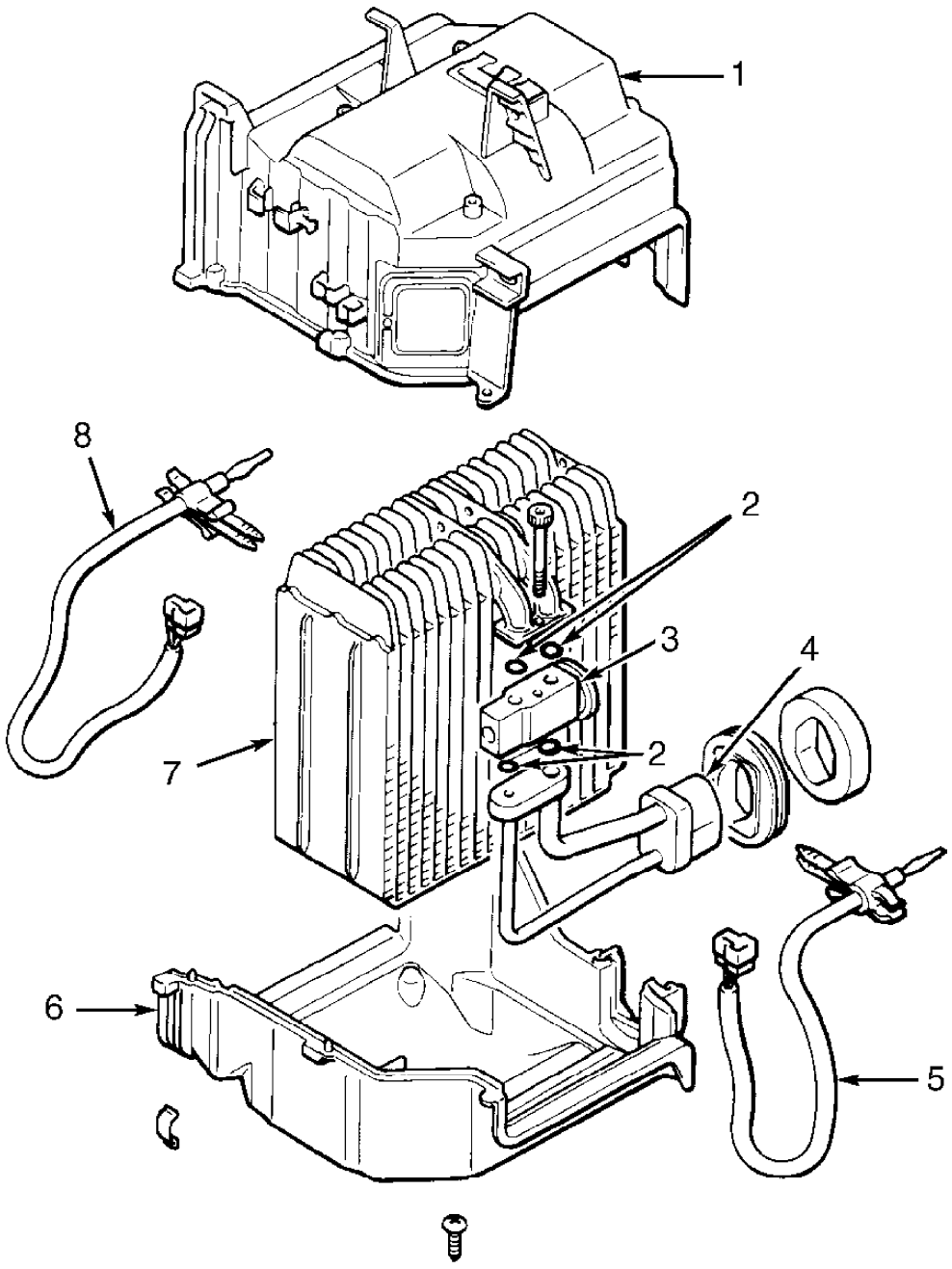
Fig. 12: Removing Evaporator Assembly
Courtesy of Mitsubishi Motor Sales of America.



1. Upper Evaporator Case
2. "O" Ring
3. Expansion Valve
4. High/Low Pressure Pipe
5. Air Inlet Sensor
6. Lower Evaporator Case
7. Evaporator
8. Air Thermosensor

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Fig. 13: Exploded View Of Evaporator Assembly
Courtesy of Mitsubishi Motor Sales of America.

REFRIGERANT TEMPERATURE SENSOR

Removal & Installation

Discharge A/C system, using approved refrigerant recovery/recycling equipment. Disconnect refrigerant temperature sensor wiring connector. Remove temperature sensor from compressor. To install, reverse removal procedure. Use new "O" ring on temperature sensor.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
A/C Compressor Bolt/Nut	17-20 (23-27)
A/C Compressor Bracket Bolt/Nut	37 (50)
A/C Compressor Clutch Coil Nut	12 (16)
A/C Engine Coolant Temperature Switch	26 (35)
	INCH Lbs. (N.m)
Blower Motor Bolts/Nuts	44 (5)
Condenser Bolts/Nuts	106 (12)
Dual-Pressure Switch	89 (10)
Evaporator Assembly Bolts/Nuts	44 (5)
Heater Assembly Bolts/Nuts	44 (5)

WIRING DIAGRAMS

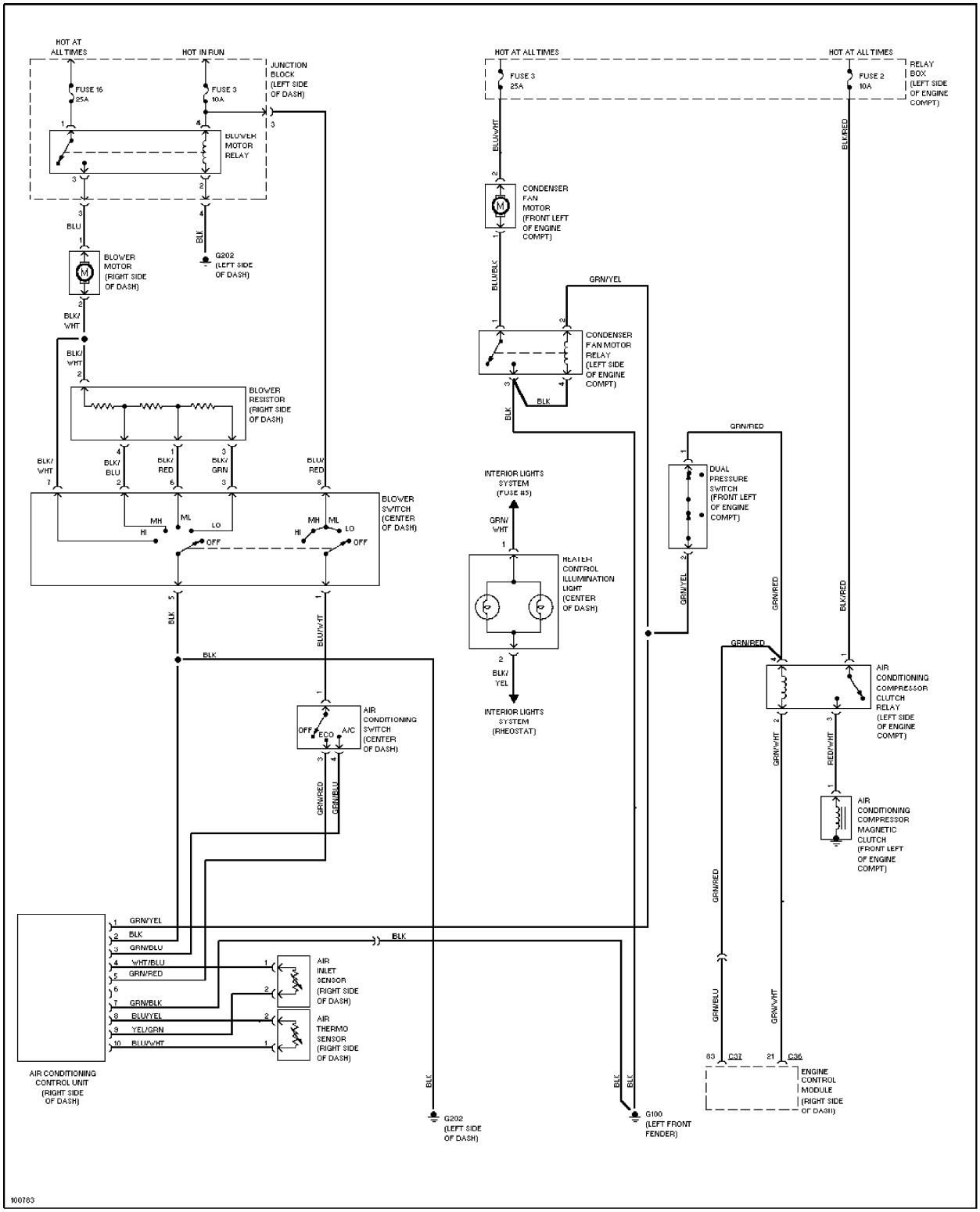

Fig. 14: Manual A/C-Heater System Wiring Diagram
Courtesy of Mitsubishi Motor Sales of America.