A/C-HEATER SYSTEM - MANUAL

1993 Mitsubishi Montero

1993 MANUAL A/C-HEATER SYSTEMS Chrysler Motors/Mitsubishi

Mitsubishi; Montero

SPECIFICATIONS

SPECIFICATIONS TABLE

Application	Specification
Compressor Type	Nippondenso 10PA15 10-Cyl.
New	,
Compressor Oil Capacity	2.0-3.4 ozs.
System Operating Pressures (2)	
High Side	49-185 psi (10.5-13 kg/cm ²) 17-33 psi (1.2-2.3 kg/cm ²)
(1) - With 22 lbs. (100 N.m) force a span of belt.(2) - With ambient temperature at ab	

DESCRIPTION

Slight variations exist among manual A/C-heater systems used. Either Sanden Scroll or Nippondenso 10-cylinder compressor is used. On some models, cycling of compressor clutch is controlled by an automatic A/C Control Unit (ACCU). On other models, cycling of compressor clutch is controlled by switches, which monitor temperatures and pressures.

Compressors will only operate within normal operating temperatures and pressures set for each model. An electric condenser fan operates whenever A/C system is operating. System components used vary depending upon model. Most systems include an ACCU, fan switch, evaporator, temperature sensor, high and low pressure switches, 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, A/C switch and refrigerant temperature sensor. ACCU is attached to evaporator housing top (if equipped).

A/C SWITCH

On Montero, A/C switch is located at top left of control panel. See Fig. 1. When switch is turned on, air conditioning 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.

AIR SELECTOR LEVER

On Montero, the air selector lever is located in lower left corner of control panel. The lever moves horizontally to select source of air used inside passenger compartment. Lever moves from OFF position on left to outside air mode. Third position allows a mixture of outside and inside air. Fourth position (full right) allows recirculation of inside air. Lever should normally be set in recirculation mode for maximum A/C cooling. See Fig. 1.

BLOWER MOTOR CONTROL SWITCH/LEVER

Blower motor control switch is located on upper left corner of control panel and 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. See Fig. 1.

MODE SELECTOR KNOB/LEVER

Mode selector knob is located in upper right corner of control panel. Six modes are 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. See Fig. 1.

TEMPERATURE CONTROL KNOB/LEVER

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. See Fig. 1.

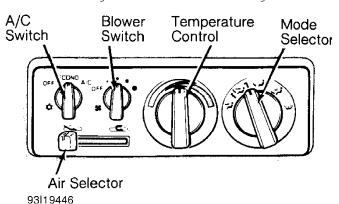


Fig. 1: Identifying A/C-Heater Control Panel (Montero) Courtesy of Mitsubishi Motor Sales of America.

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.

ENGINE COOLANT TEMPERATURE SWITCH

The 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 234-244 °F (112-118 °C).

EVAPORATOR THERMISTOR

The evaporator thermistor, attached to evaporator fins, is wired in series with compressor clutch and prevents evaporator freezing. Power to compressor clutch is cut if control temperature is exceeded, allowing evaporator to thaw. When temperature returns to operating range, thermistor again allows power to compressor clutch.

FUSIBLE PLUG

A fusible plug, located on receiver-drier, melts and allows refrigerant to escape when ambient temperature in engine compartment reaches 221°F (105°C). Once fusible plug has blown, it cannot be reused and must be replaced.

ADJUSTMENTS

NOTE: For adiu

For adjustment procedures, see HEATER SYSTEM article in the AIR CONDITIONING & HEAT section.

TROUBLE SHOOTING

AIR NOT COOL

- 1) Ensure compressor clutch is operating. If compressor clutch is not operating, check fuses and relay. Check A/C switch. Check high and low pressure switches or triple-pressure switch. Check thermistor, thermosensor relay or Electronic Cycling Clutch Switch (ECCS). Check blower switch and relay. Check A/C compressor clutch coil.
- 2) Ensure system is properly charged with correct amount of refrigerant. Add refrigerant or evacuate and recharge 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. Add refrigerant or evacuate and recharge 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.

INTERMITTENT COOL AIR

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

TESTING

NOTE: For testing procedures not covered in this article, see HEATER SYSTEM article in the AIR CONDITIONING & HEAT section.

A/C SYSTEM PERFORMANCE

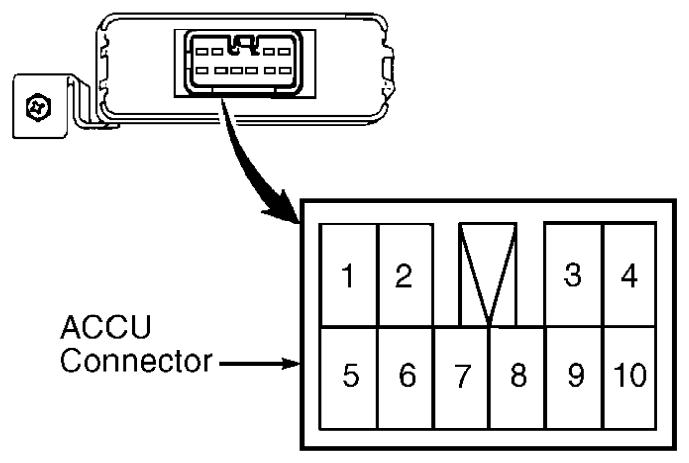
- 1) Park vehicle out of direct sunlight. Install A/C gauge set. Start engine and allow it to idle at 1000 RPM. Set A/C controls to recirculate air, panel (vent) mode, full cold, and A/C button on.
- 2) Set blower/fan on high speed and close doors and windows. Insert thermometer in center vent. Operate system for 20 minutes to allow system to stabilize. Measure temperature. Temperature must be $37-42\,^{\circ}\mathrm{F}$ (3-6°C) at center vent, with high side and low side pressures within specification. See SPECIFICATIONS table at beginning of article.

A/C CONTROL UNIT (ACCU)

Disconnect ACCU, found on top of evaporator case, and conduct tests on wire harness side of connector. See Fig. 2. Testing is done with ignition on, A/C switch on, temperature control lever at MAX COOL and blower switch on HI. If voltage is not as specified, replace control unit. See A/C CONTROL UNIT (ACCU) VOLTAGE TESTS (MONTERO) table.

A/C CONTROL UNIT (ACCU) VOLTAGE TESTS TABLE

1 (A/C Output) Battery	voltage
3 (A/C Switch) Battery 4 (Air Inlet Sensor +) S 5 (A/C Switch: ECONO Or A/C) Battery 6 (Lever Position Switch) Ze 7 (ACCU Ground) Ze 8 (Air Thermosensor -) S 9 (Air Inlet Sensor -) S 10 (Air Thermosensor +) S	7 Voltage r Voltage ero Volts ero Volts 3.6 Volts 5 Volts



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Fig. 2: Testing ACCU (Montero)
Courtesy of Mitsubishi Motor Sales of America.

A/C SWITCH

- 1) Disconnect A/C switch harness connector. Using wiring diagram as a guide, jumper appropriate terminals of A/C switch wiring harness connector. See WIRING DIAGRAMS.
- 2) Turn blower on and momentarily turn ignition on without starting engine. Listen for compressor clutch engagement. If compressor clutch does not engage, check fuse and other components wired in series with compressor clutch.
- 3) Using an ohmmeter, check continuity of switch. See Fig. 3. If continuity is not as specified, replace switch. See A/C SWITCH CONTINUITY TEST (MONTERO) table.

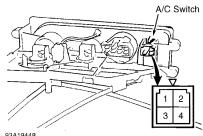


Fig. 3: Identifying A/C Switch Connector Courtesy of Mitsubishi Motor Sales of America.

Switch Position	Terminal No.	Continuity
OFF	1 & 3	Yes
(1) - Continuity should not e	xist between any	terminals.

AIR THERMOSENSOR & AIR INLET SENSOR

- 1) Disconnect sensor connector at evaporator case. Using an ohmmeter, measure resistance between sensor terminals. See AIR THERMOSENSOR & AIR INLET SENSOR SPECIFICATIONS (MONTERO) 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. See Fig. 14.

AIR THERMOSENSOR & AIR INLET SENSOR SPECIFICATIONS TABLE

Sensor Temperature	°F (°C)	Ohms
32 (0)		4800 2800 1800 1000

BLOWER RESISTOR

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

BLOWER RESISTOR RESISTANCE TABLE

Termina	l No.	Approximate	Ohms
2 & 3			0.33

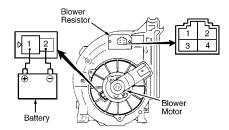
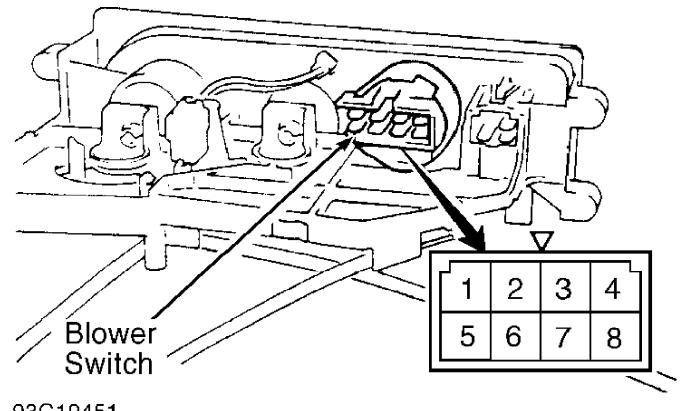


Fig. 4: Testing Blower Resistor Courtesy of Mitsubishi Motor Sales of America.

BLOWER SWITCH

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



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

BLOWER SWITCH CONTINUITY TEST TABLE

Switch Position Terminal No.
OFF (1) Low 1 & 8; 3 & 5 Medium 1 1 & 8; 5 & 6 Medium 2 1, 4 & 8; 2 & 5 High 1, 4 & 8; 5 & 7
(1) - Continuity should not exist between any terminals.

DUAL-PRESSURE SWITCH

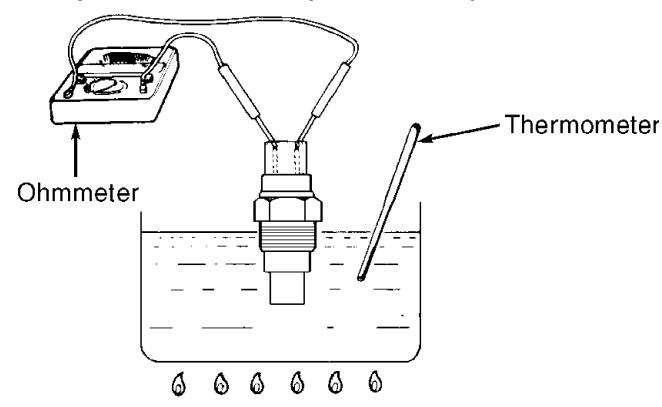
- 1) With engine off, disconnect harness connector at dual-pressure switch (located on receiver-drier). Connect a jumper wire across harness connector. Turn A/C switch and blower switch on. Momentarily turn ignition on while listening for compressor clutch to engage.
- 2) If compressor clutch does not engage, connect manifold gauge set to system, and check operating pressures. Dual-pressure switch should allow compressor operation if system pressures are 30-384 psi (2-27 kg/cm²). If dual-pressure switch does not operate within specified pressure range, discharge A/C system using approved

refrigerant recovery/recycling equipment and replace switch.

- 3) After replacing switch, recharge system and monitor pressures for proper compressor function. If dual-pressure switch cuts power to compressor clutch while driving, even though temperatures inside vehicle have not yet decreased, it is possible that high pressure side of dual-pressure switch has been activated. Go to next step.
- 4) Discharge A/C system using approved refrigerant recovery/recycling equipment. Replace dual-pressure switch, and recharge system. Ensure compressor clutch is operating within pressure range given in step 2), and check for sufficient system cooling.

A/C COOLANT TEMPERATURE SWITCH

- With engine off, disconnect connector at engine coolant temperature switch. Jumper wires on harness side of connector. If vehicle uses a single connector, ground connector.
 Turn A/C switch and blower switch to ON position.
- 2) Turn A/C switch and blower switch to ON position. Momentarily turn ignition on and listen for compressor clutch engagement. Clutch should engage. If clutch does not engage, check fuse and other components wired in series with compressor clutch. If okay, go to next step.
- 3) Remove coolant temperature switch and immerse in oil. See Fig. 6. With an ohmmeter, check continuity as oil temperature changes under heat. Switch will turn on at $226\,^{\circ}F$ ($108\,^{\circ}C$) and off at $234-244\,^{\circ}F$ ($112-118\,^{\circ}C$). Replace switch if it fails to operate in normal ranges.



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Fig. 6: Testing Engine Coolant Temperature Switch
Courtesy of Mitsubishi Motor Sales of America.

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.

REFRIGERANT TEMPERATURE SENSOR

Refrigerant temperature sensor should open and de-energize magnetic clutch if temperature of refrigerant exceeds 347 $^{\circ}$ F (175 $^{\circ}$ C). If sensor is suspect, measure resistance between terminals No. 1 and 2. See Fig. 7. Normal resistance is 80,470 ohms at 77 $^{\circ}$ F (25 $^{\circ}$ C). If resistance deviates greatly from norm, replace sensor.

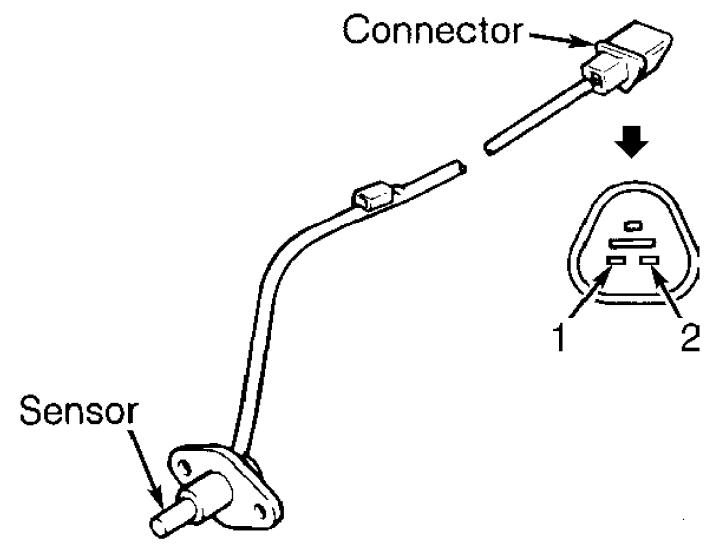
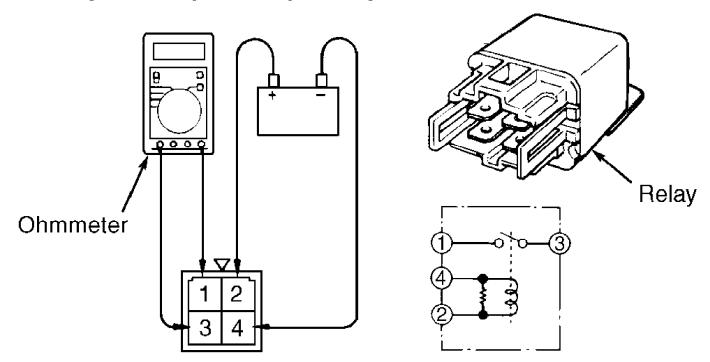


Fig. 7: Testing Refrigerant Temperature Sensor Courtesy of Mitsubishi Motor Sales of America.

RELAYS

1) Remove relay from relay box located in engine compartment. Using an ohmmeter, ensure continuity exists between terminals No. 2 and 4 and does not exist between terminals No. 1 and 3. See Fig. 8.

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



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Fig. 8: Testing Relay Courtesy of Mitsubishi Motor Sales of America.

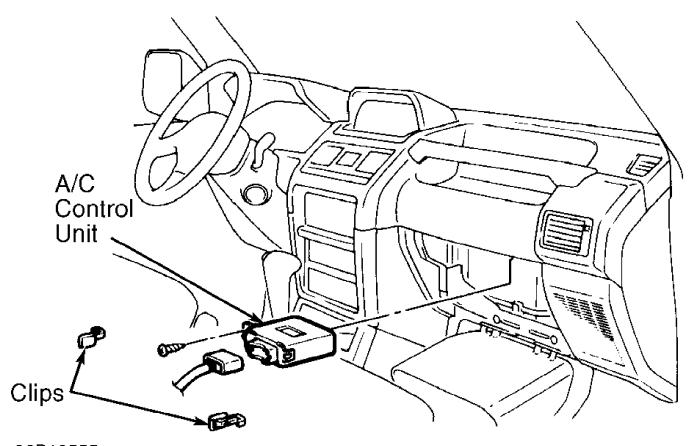
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REMOVAL & INSTALLATION

NOTE: For removal and installation procedures not covered in this article, see HEATER SYSTEM article in the AIR CONDITIONING & HEAT section.

A/C CONTROL UNIT (ACCU)

Removal & Installation Remove 2 clips on top of evaporator and remove ACCU. Disconnect wiring harness from ACCU. To install, reverse removal procedure. See Fig. 9.



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Fig. 9: Locating A/C Control Unit
Courtesy of Mitsubishi Motor Sales of America.

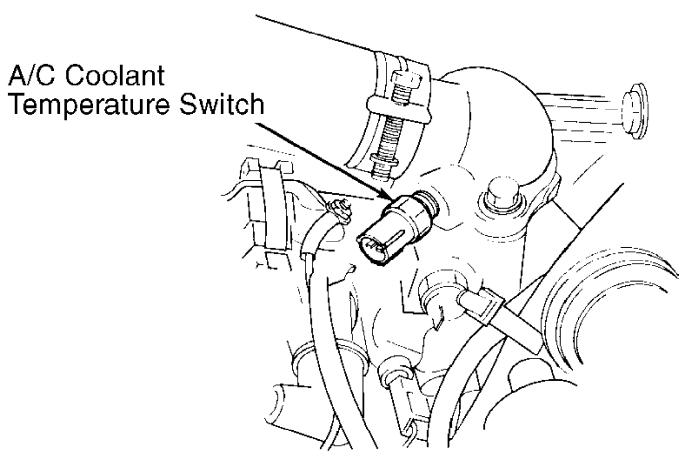
A/C SWITCH

Removal & Installation From back side of control panel, push right control panel clip aside while pushing control panel out of dash panel. Allow control panel to hang. Remove side bracket. Push temperature switch control assembly to left, and then remove A/C switch. To install, reverse removal procedure.

A/C COOLANT TEMPERATURE SWITCH

Removal & Installation

Drain coolant below level of thermostat housing. Remove coolant temperature switch wire connector and unscrew coolant temperature switch from thermostat housing. To install, reverse removal procedure. Tighten coolant switch to specification. See TORQUE SPECIFICATIONS table. See Fig. 10.



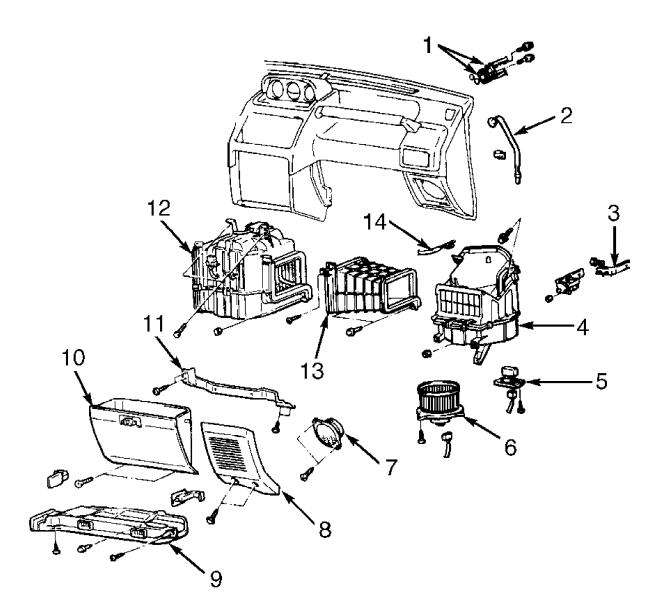
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Fig. 10: Locating A/C Coolant Temperature Switch Courtesy of Mitsubishi Motor Sales of America.

BLOWER MOTOR & RESISTOR

Removal & Installation

- 1) Remove glove box. Resistor is visible with glove box removed. Remove 2 screws, and remove resistor. See Fig. 11.
- 2) Remove right speaker cover, cowl trim, knee protector and glove box frame. Disconnect ventilator outlet at right side of blower housing. Disconnect electrical connector at blower motor. Remove engine control unit. Remove 3 screws, and remove blower motor assembly. To install, reverse removal procedure.

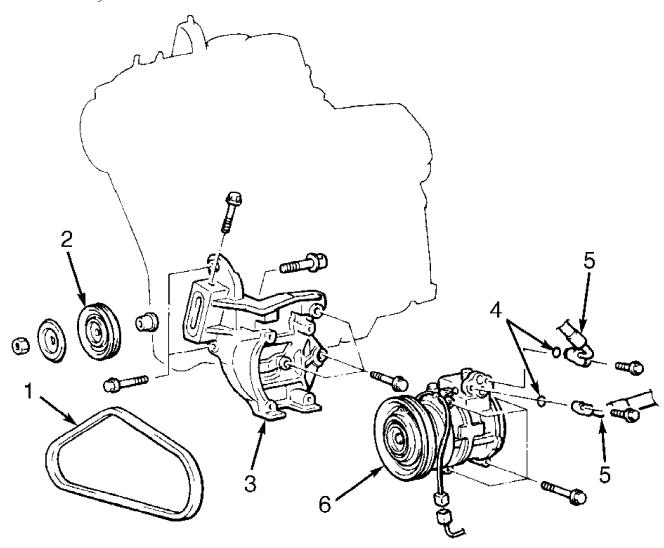


- 1. A/C Hose Connections
- Drain Hose
 Engine Control Relay
- 4. Blower Case
- 5. Blower Resistor
- 6. Blower Motor
- 7. Speaker

- 8. Speaker Cover9. Foot Shower Duct
- 10. Glove Box
- 11. Lower Frame
- 12. Evaporator 13. Joint Duct
- 14. Air Selector Connection

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Fig. 11: Exploded View Of Blower Assembly Courtesy of Mitsubishi Motor Sales of America.

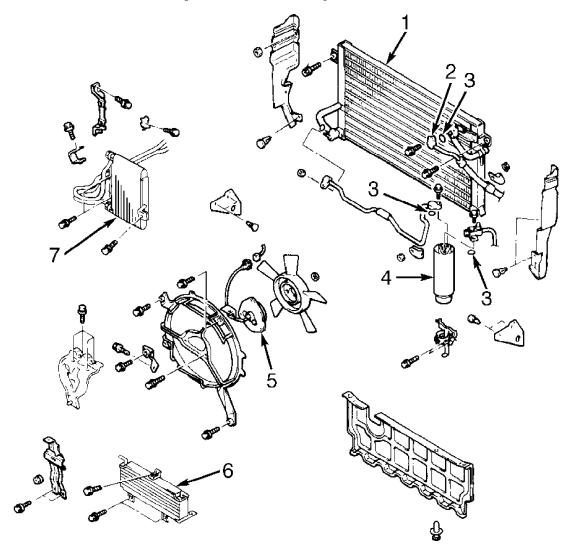
Removal & Installation
Discharge A/C system using approved refrigerant
recovery/recycling equipment. Loosen idler pulley, and remove belt.
Disconnect compressor electrical connector. Remove high and low
pressure lines and "O" rings from compressor. Remove compressor mounting bolts. Remove compressor. To install, reverse removal procedure. See Fig. 12.



- 1. Drive Belt
- Tension Pulley
 Compressor Bracket
- 4. "O" Ring5. Hose Connections
- 6. Compressor

Courtesy of Mitsubishi Motor Sales of America.

Removal & Installation
Discharge A/C system using approved refrigerant
recovery/recycling equipment. Remove front grille and grille brackets. Remove front end cover and condenser harness. Disconnect electrical fan connector. Slowly disconnect pressure lines from condenser. Remove 2 condenser mounting bolts. Lift up and remove condenser from vehicle. To install, reverse removal procedure. See Fig. 13.



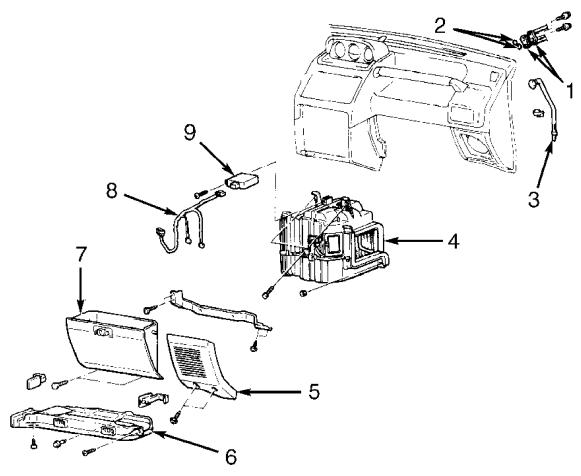
- 1. Condenser
- 2. High Pressure Hose3. "O" Ring4. Receiver-Drier

- 5. Condenser Fan Motor
- 6. A/T Oil Cooler
- 7. Engine Oil Cooler

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

- 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 attaching bolts in passenger compartment. Remove evaporator assembly. To install, reverse removal procedure. See Figs. 14 and 15.

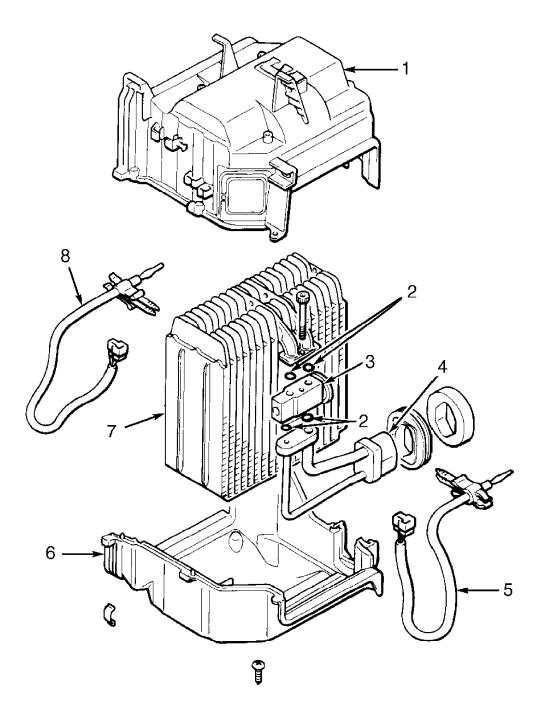


- 1. High & Low Pressure Hoses 2. "O" Ring
- 3. Drain Hose
- 4. Evaporator
- 5. Speaker Cover

- 6. Foot Shower Duct
- 7. Glove Box
- 8. A/C Wiring Harness9. A/C Control Unit

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Fig. 14: Removing Evaporator Assembly Courtesy of Mitsubishi Motor Sales of America.



- Upper Evaporator Case
 "O" Ring
 Expansion Valve
 High/Low Pressure Pipe
- 5. Air Inlet Sensor6. Lower Evaporator Case7. Evaporator8. Air Thermosensor

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Fig. 15: Exploded View Of Evaporator Assembly Courtesy of Mitsubishi Motor Sales of America.

Removal & Installation

Discharge A/C system using approved refrigerant recovery/recycling equipment. Disconnect refrigerant temperature sensor wiring connector. Remove 2 bolts securing temperature sensor to compressor. Remove temperature sensor from compressor. To install, reverse removal procedure using new "O" ring on temperature sensor.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
A/C Compressor Bolt/Nut A/C Compressor Bracket Bolt/Nut A/C Compressor Clutch Coil Nut A/C Coolant Temperature Switch	37 (50) 12 (16)
	INCH Lbs. (N.m)
Blower Motor Bolts/Nuts	106 (12) 89 (10) 44 (5)

WIRING DIAGRAMS

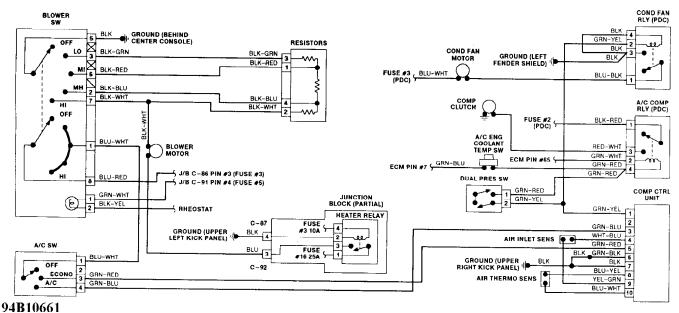


Fig. 16: Manual A/C-Heater Wiring Diagram