

1997 Mazda MX-5 Miata

A/C-HEATER SYSTEM - MANUAL 1997 Manual A/C-Heater System

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A/C SYSTEM SPECIFICATIONS

WARNING: To avoid injury from accidental air bag deployment, read and follow all **SERVICE PRECAUTIONS** and **DISABLING & ACTIVATING AIR BAG SYSTEM** procedures in **AIR BAG RESTRAINT SYSTEM** article in the **ACCESSORIES/SAFETY EQUIPMENT** section.

CAUTION: When battery is disconnected, radio will go into anti-theft protection mode. Obtain radio anti-theft protection code from owner prior to servicing vehicle.

A/C SYSTEM SPECIFICATIONS

Application	Specifications
Compressor Type	Nippondenso TV12 Rotary Vane
Compressor Belt Deflection ⁽¹⁾	
New	5/16-23/64" (8-9 mm)
Used	23/64-25/64" (9-10 mm)
Compressor Oil Capacity ⁽²⁾	4.4-5.7 ozs.
Refrigerant Capacity	21.2 ozs.
System Operating Pressures	
High Side	200-227 psi (14.0-16.0 kg/cm ²)
Low Side	22-35 psi (1.5-2.5 kg/cm ²)

(1) Measure with 22-lb. (10 kg) pressure applied halfway between crankshaft pulley and Power Steering (P/S) pulley or idler pulley (without P/S).

(2) Use ND-Oil 9 refrigerant oil.

DESCRIPTION

Blower assembly, mounted under right side of instrument panel, contains blower motor, blower resistor and fresh/recirculated air door. Evaporator unit, located left of blower case, contains evaporator, evaporator thermoswitch and expansion valve. Heater unit, located left of evaporator case, contains heater core, airflow mode door and air-mix (temperature blend) door.

ELECTRICAL COMPONENT LOCATIONS

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ELECTRICAL COMPONENT LOCATIONS

Component	Location
A/C Relay	Right Front Corner Of Engine Compartment
Condenser Fan	Right Front Corner Of Engine Compartment
Blower Resistor	Bottom Of Blower Case
Evaporator Thermostwitch	On Evaporator Upper Case
Pressure Switch	In High-Pressure Line, Between Receiver-Drier & Evaporator

OPERATION

All air control doors are controlled manually by cable from control panel. Blower resistor determines blower speed. With blower switch in high position, blower motor is grounded directly through blower switch. With blower switch in all other positions, blower motor is grounded through blower resistor and blower switch.

A/C compressor clutch circuit is completed when A/C relay is energized and pressure switch is closed. A/C relay is energized when Powertrain Control Module (PCM) grounds the solenoid circuit of the relay. The PCM energizes A/C relay if evaporator thermostwitch is closed and A/C and blower switches are on. The PCM also controls A/C relay operation according to engine load.

ADJUSTMENTS

NOTE: For door control cable adjustments, see **ADJUSTMENTS** in **HEATER SYSTEM** article.

TESTING

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NOTE: For test procedures not covered in this article, see **TESTING** in **HEATER SYSTEM** article.

A/C SYSTEM PERFORMANCE

1. Connect manifold gauge set. Operate engine at 1500 RPM. Operate A/C at maximum cooling, recirculate, fan on high, vent mode. Close all doors and windows. Place thermometer at center vent outlet.
2. Allow A/C to stabilize. Ensure high pressure is 200-227 psi (14.0-16.0 kg/cm²). Read temperature at center vent outlet. Ensure temperature is within 39-43°F (3-6°C)

A/C COMPRESSOR CLUTCH CIRCUIT

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1. Check WIPER fuse (20-amp) in passenger compartment fuse block. Check AD FAN (additional fan) fuse (20-amp) in engine compartment fuse block. If fuses are okay, go to next step. If either fuse is blown, check for shorted wiring harness before replacing fuse.
2. Operate engine at idle. Turn A/C and blower on. Using voltmeter, backprobe Black/Red wire terminal of compressor clutch connector. If battery voltage exists, replace compressor clutch. If battery voltage is not present, go to next step.
3. Ensure engine is running. Ensure A/C and blower are on. Using a voltmeter, backprobe Blue/Yellow wire terminal of the A/C relay connector. If battery voltage exists, go to next step. If battery voltage does not exist, repair open Blue/Yellow wire between AD FAN fuse and A/C relay.
4. Backprobe Blue wire terminal of A/C relay connector. If battery voltage exists, go to next step. If battery voltage is not present, repair open Blue wire between WIPER fuse and A/C relay.
5. Backprobe Black/Red wire terminal of A/C relay connector. If battery voltage exists, repair open Black/Red wire between A/C relay and compressor clutch. If battery voltage is not present, go to next step.
6. Backprobe Blue/Black wire terminal of A/C relay connector. If voltage is Zero volts, replace A/C relay. If voltage is not Zero volts, repair open Blue/Black wire between A/C relay and PCM. If wire is okay, check PCM operation.

CONDENSER (ADDITIONAL) FAN CIRCUIT

1. Check ENGINE fuse (30-amp) in passenger compartment fuse block. Check AD FAN fuse (20-amp) in engine compartment fuse block. If fuses are okay, go to next step. If either fuse is blown, check for shorted wiring harness before replacing fuse.
2. Start engine. Turn A/C and blower switches on. Using voltmeter, backprobe Black/Yellow wire terminal of condenser fan motor. If battery voltage exists, go to next step. If battery voltage is not present, go to step 4).
3. Turn ignition switch off. Disconnect condenser fan connector. Using ohmmeter, check continuity between Black wire of condenser fan connector and ground. If continuity exists, replace condenser fan. If continuity is not present, repair open Black wire between condenser fan and ground.
4. Turn ignition on. Ensure A/C and blower switches are on. Using voltmeter, backprobe Black/White wire terminal of condenser fan relay connector. If battery voltage exists, go to next step. If battery voltage is not present, repair open Black/White wire between ENGINE fuse and condenser fan relay.
5. Backprobe Blue/Yellow wire terminal of condenser fan relay connector. If battery voltage exists, go to next step. If battery voltage is not present, repair open Blue/Yellow wire between AD FAN fuse and condenser fan relay.
6. Backprobe Black/Yellow wire terminal of condenser fan relay connector. If battery voltage exists, repair open Black/Yellow wire between condenser fan relay and condenser fan. If battery voltage is not present, go to next step.
7. Backprobe Blue/White wire terminal of condenser fan relay connector. If battery voltage exists, repair Blue/White wire between condenser fan relay and PCM. If wire is okay, check PCM operation. If battery voltage is not present, replace condenser fan relay.

A/C SWITCH

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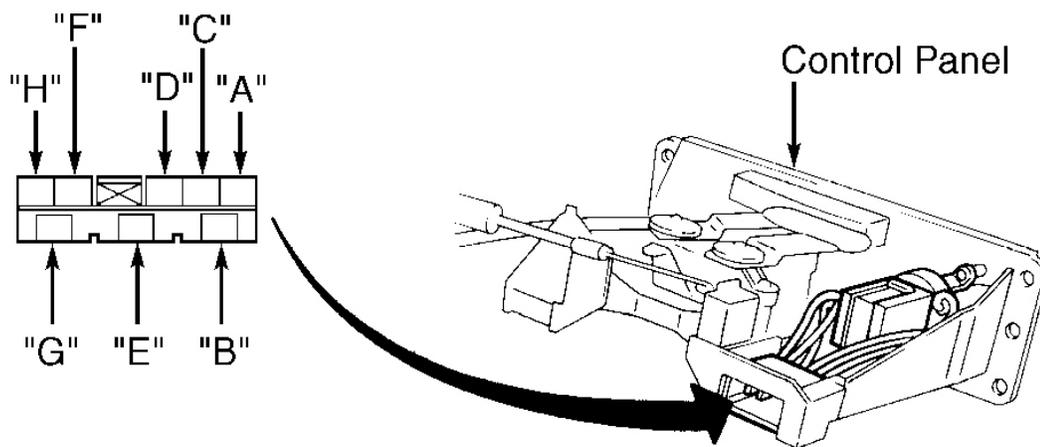
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Disconnect A/C switch connector. Turn A/C switch on. Check continuity between indicated terminals. See **A/C SWITCH TEST** table. See **Fig. 1** . Replace A/C switch if continuity is not as specified.

A/C SWITCH TEST

Terminal	Continuity
"D" & "A"	(1) Yes
"F" & "A"	(1) Yes

(1) Continuity exists in only one direction.



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Fig. 1: Identifying A/C Switch Terminals
 Courtesy of MAZDA MOTORS CORP.

A/C RELAY

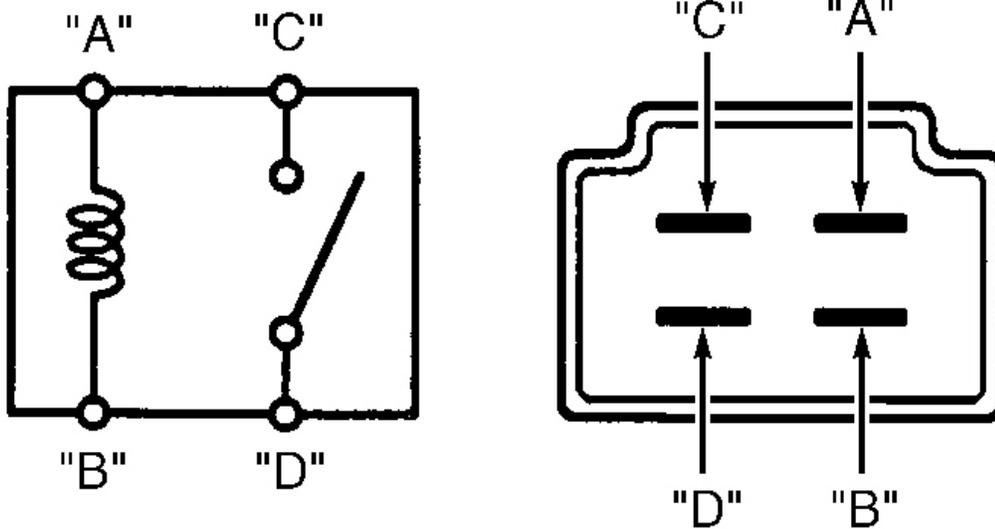
Remove relay. Check continuity between indicated relay terminals. See A/C RELAY TEST table. See **Fig. 2** . Replace relay if continuity is not as specified.

A/C RELAY TEST

Test Between Terminals	Continuity
"A" & "B"	(1) Yes
"C" & "D"	(1) No
"C" & "D"	(2) Yes

(1) With no voltage applied.

(2) With battery voltage applied to terminals "A" and "B".



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Fig. 2: Identifying A/C Relay Terminals
 Courtesy of MAZDA MOTORS CORP.

CONDENSER FAN RELAY

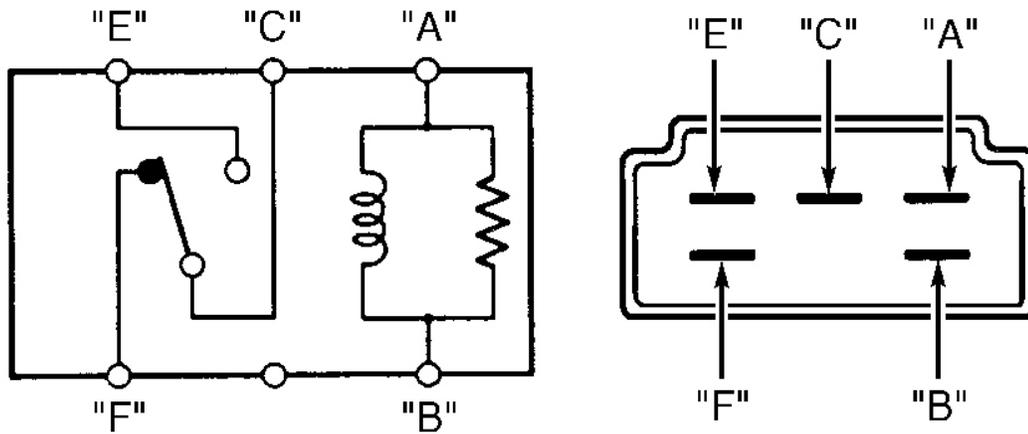
Remove condenser fan relay. Check continuity between indicated relay terminals. See **CONDENSER FAN RELAY TEST** table. See **Fig. 3** . If continuity is not as specified, replace relay.

CONDENSER FAN RELAY TEST

Test Between Terminals	Continuity
"A" & "B"	(1) Yes
"C" & "E"	(1) No
"C" & "F"	(1) Yes
"C" & "E"	(2) Yes

(1) With no voltage applied.

(2) With battery voltage applied to terminals "A" and "B".



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Fig. 3: Identifying Condenser Fan Relay Terminals
 Courtesy of MAZDA MOTORS CORP.

CONDENSER FAN MOTOR

Disconnect condenser fan motor connector. Connect positive battery lead to condenser fan motor Black/Yellow wire terminal, and ground Black wire terminal. Replace condenser fan motor if it does not operate.

EVAPORATOR THERMOSWITCH

1. Remove glove box. Operate engine at idle. Turn A/C off. Turn blower switch to 4th position (high) for a few minutes to ensure evaporator temperature is greater than 32°F (0°C). Turn blower switch and engine off.
2. Disconnect evaporator thermoswitch connector. Check continuity between thermoswitch terminals. If continuity exists, go to next step. If there is no continuity, replace thermoswitch.
3. Submerge thermoswitch sensing bulb in ice cold water of less than 32°F (0°C). Ensure continuity does not exist between thermoswitch terminals. Replace thermoswitch if continuity is not as specified.

PRESSURE SWITCH

1. Turn ignition off. Connect manifold pressure gauge set to system. If high-side pressure is 37-310 psi (2.6-22.0 kg/cm²), go to next step. If pressure is not as specified, check refrigerant level.
2. Disconnect pressure switch connector. Check continuity between switch terminals. If continuity exists, pressure switch is okay. If there is no continuity, replace pressure switch.

REMOVAL & INSTALLATION

WARNING: To avoid injury from accidental air bag deployment, read and follow all **SERVICE PRECAUTIONS** and **DISABLING & ACTIVATING AIR BAG SYSTEM** procedures in **AIR BAG RESTRAINT SYSTEM** article in the **ACCESSORIES/SAFETY EQUIPMENT** section.

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

COMPRESSOR

Removal & Installation

1. Before disconnecting negative battery cable, obtain radio anti-theft code from vehicle owner. Disconnect negative battery cable.
2. Raise and support front of vehicle with safety stands. Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove splash shield and air guide.
3. Disconnect compressor clutch connector. Disconnect refrigerant lines from compressor, and plug open fittings. Remove compressor drive belt. Remove compressor bolts and compressor. To install, reverse removal procedure. Adjust drive belt deflection. Apply clean compressor oil to "O" ring before connecting fittings. **DO NOT** apply compressor oil to fitting nuts. Evacuate and charge A/C system. Check for leaks.

CONDENSER & RECEIVER-DRIER

Removal

Raise and support front of vehicle with safety stands. Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove splash shield and air guide. Remove condenser. Remove receiver-drier. Plug open fittings.

Installation

To install, reverse removal procedure. Apply clean compressor oil to "O" rings before connecting fittings. **DO NOT** apply compressor oil to fitting nuts. If installing new condenser, add 1.0 ounce of compressor oil to A/C compressor. If installing new receiver-drier, add .3 ounce of compressor oil to A/C compressor. Evacuate and charge A/C system. Check for leaks.

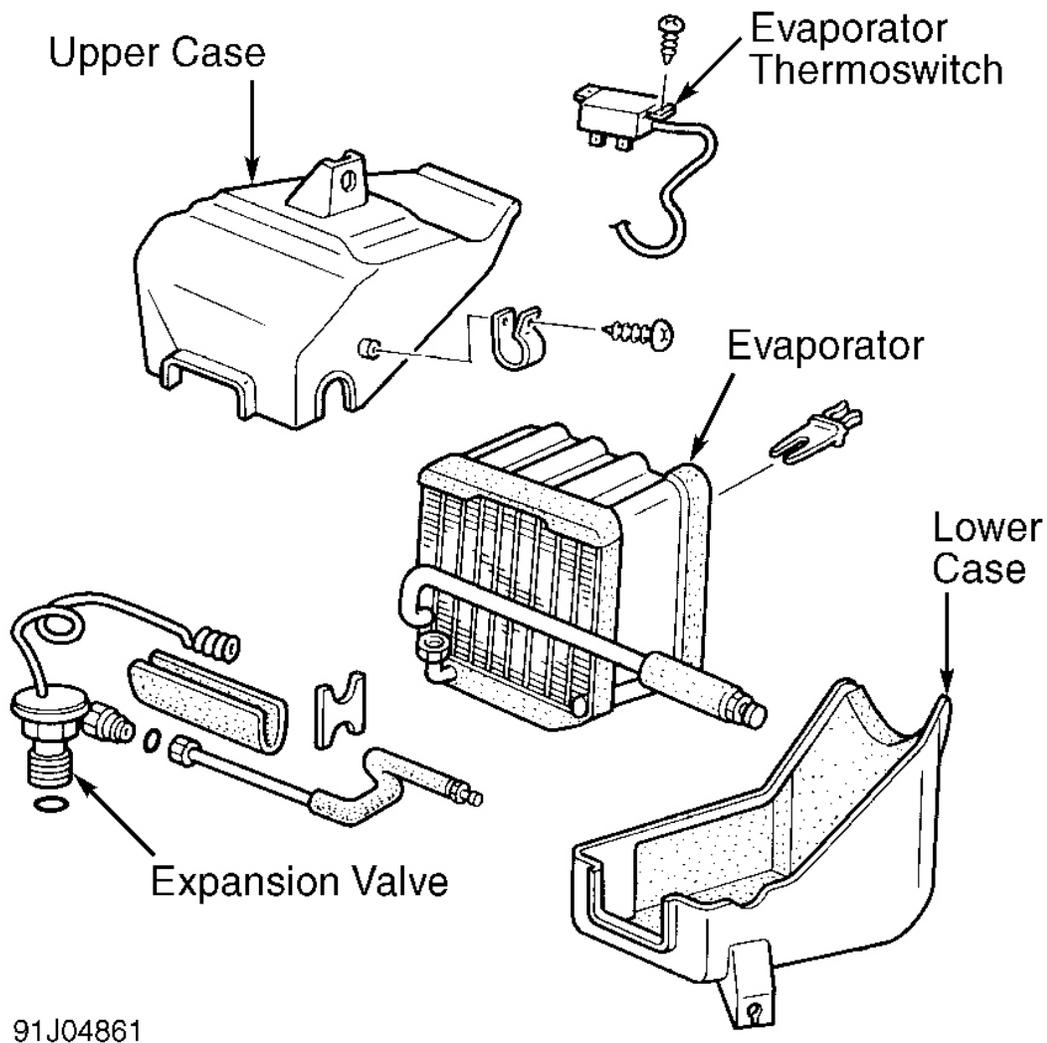
EVAPORATOR UNIT

Removal

1. Discharge A/C system using approved refrigerant recovery/recycling equipment. Disconnect refrigerant pipes from evaporator tubes at engine compartment firewall and plug open fittings. Remove passenger-side instrument panel undercover. Remove glove box.
2. Disconnect electrical connectors. Loosen seal plates between evaporator unit, heater unit and blower unit. Remove evaporator unit. Disassemble evaporator unit to remove evaporator core and thermo-switch. See

Fig. 4 .**Installation**

To install, reverse removal procedure. Apply clean compressor oil to "O" rings before connecting fittings. **DO NOT** apply compressor oil to fitting nuts. If installing new evaporator, add 1.7 ounces of compressor oil to A/C compressor. Evacuate and charge A/C system. Check for leaks.



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Fig. 4: Exploded View Of Evaporator Unit
Courtesy of MAZDA MOTORS CORP.

TORQUE SPECIFICATIONS

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TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Compressor Bracket-To-Engine Bolt	28-38 (38-51)
Compressor-To-Compressor Bracket Bolt	11-15 (15-21)
Refrigerant Pipe Fittings	
Condenser Inlet	11-18 (15-24)
Evaporator Outlet	15-21 (20-29)
	INCH Lbs. (N.m)
Evaporator Unit Nut	71-97 (8-11)
Refrigerant Pipe Fittings	
Compressor Inlet & Outlet	89-132 (10-15)
Evaporator Inlet	89-168 (10-19)
Receiver-Drier Inlet & Outlet	89-168 (10-19)
Steering Wheel Nut	79-121 (9-14)

WIRING DIAGRAM

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Fig. 5: Manual A/C-Heater System Wiring Diagram