

1994 Mazda MX-5 Miata

A/C-HEATER SYSTEM - MANUAL 1994 Manual A/C-Heater Systems

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A/C SYSTEM SPECIFICATIONS

MANUAL A/C SYSTEM SPECIFICATIONS

Application	Specification
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⁾	3.9-5.1 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.	

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

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 thermostat 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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Component	Location
Relay	
A/C	Right Front Corner Of Engine Compartment
Condenser Fan	Right Front Corner Of Engine Compartment
Blower Resistor	Bottom Of Blower Case
Evaporator Thermostat	On Evaporator Upper Case
Pressure Switch	In High-Pressure Line, Between
Receiver-Drier And 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 Engine Control Unit (ECU) grounds the solenoid circuit of the relay. The ECU energizes A/C relay if evaporator thermostat is closed and A/C and blower switches are on. The ECU also controls A/C relay operation according to engine load.

ADJUSTMENTS

NOTE: For door control cable adjustments, see **ADJUSTMENTS** in **HEATER SYSTEM** article in the **AIR CONDITIONING & HEAT** section.

TESTING

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

A/C SYSTEM PERFORMANCE

1. Connect manifold gauge set. Operate engine at 1500 RPM. Operate A/C at maximum cooling. Open all doors and windows. Place thermometers at center vent outlet and blower inlet.
2. Allow A/C to stabilize. Ensure blower inlet temperature is 86-95°F (30-35°C), and high pressure is 200-227 psi (14.0-16.0 kg/cm²). Calculate difference between blower inlet temperature and center vent outlet

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temperature. Read temperatures at center vent outlet and blower inlet. Compare temperature difference to relative humidity. Ensure values are within specified range. See appropriate **A/C SYSTEM PERFORMANCE** table.

A/C SYSTEM PERFORMANCE

Temperature °F (°C) ⁽¹⁾	Relative Humidity (%)
70-81 (21-27)	40
63-73 (17-23)	50
57-68 (14-20)	60
52-63 (11-17)	70

(1) Difference between blower inlet temperature and center vent outlet temperature.

A/C COMPRESSOR CLUTCH CIRCUIT

1. Check 20-amp WIPER fuse in passenger compartment fuse block. Check 20-amp AD FAN (additional fan) fuse 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 voltmeter, backprobe Blue/Yellow wire terminal of A/C relay connector. If battery voltage exists, go to next step. If battery voltage is not present, repair wiring harness between AD FAN fuse and A/C relay.
4. Backprobe Blue wire terminal of A/C relay connector. If battery voltage exists, test A/C relay. See A/C RELAY. If relay is okay, repair wiring harness between A/C relay and compressor clutch. If battery voltage is not present, repair open Blue wire between WIPER fuse and A/C relay.

CONDENSER (ADDITIONAL) FAN CIRCUIT

1. Check AD FAN (additional fan) fuse in engine compartment fuse block and power window fuse (3-amp) in passenger 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. Turn ignition on. Using voltmeter, backprobe Black/Yellow wire terminal of condenser fan motor connector. If battery voltage exists, go to next step. If battery voltage is not present, test condenser fan relay. See **CONDENSER FAN RELAY**. If relay is okay, go to step 4).
3. Disconnect condenser fan connector. Check continuity between Black wire terminal of condenser fan motor connector and ground. If continuity exists, replace condenser fan motor. If continuity does not exist, repair wiring harness between condenser fan motor and ground.
4. Turn ignition off. Check continuity of Black/Yellow wire between condenser fan motor connector and condenser fan relay connector. If continuity exists, repair wiring harness between AD FAN fuse and 30-amp power window fuse. If continuity is not present, repair open Black/Yellow wire between condenser fan motor and condenser fan relay.

A/C SWITCH

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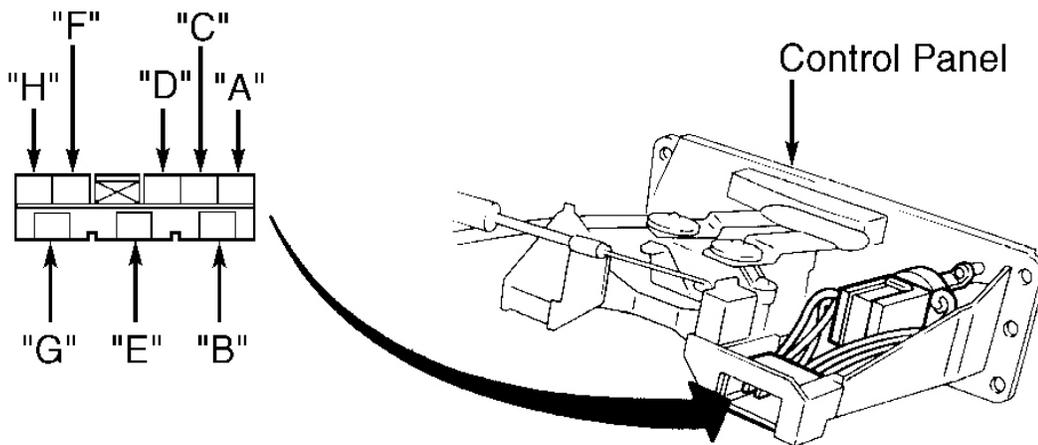
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Disconnect A/C switch connector. Turn A/C switch on. Check continuity between indicated terminals. See **A/C SWITCH TEST** table. See **Fig. 1** . Replace A/C switch if continuity is not as specified.

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

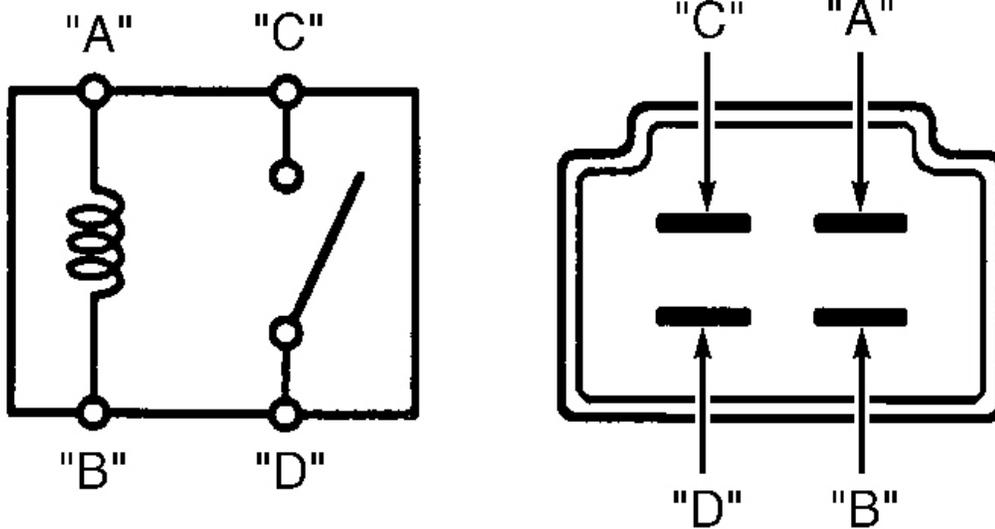
Remove relay. Check continuity between indicated relay terminals. See **A/C RELAY TEST** table. See **Fig. 2** . Replace relay if continuity is not as specified.

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

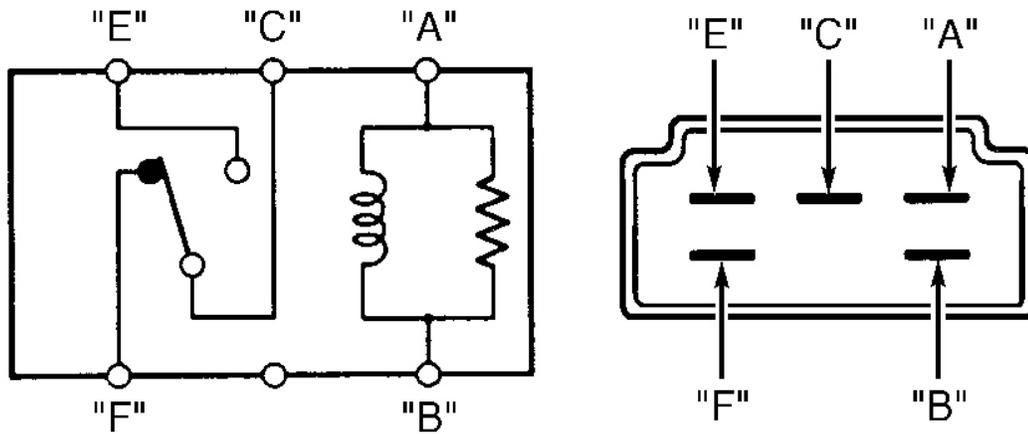
Remove condenser fan relay. Check continuity between indicated relay terminals. See **CONDENSER FAN RELAY TEST** table. See **Fig. 3** . If continuity is not as specified, replace relay.

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 30-370 psi (2.3-26.0 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 carefully follow all **SERVICE PRECAUTIONS** and **DISABLING & ACTIVATING AIR BAG SYSTEM** procedures in the appropriate **AIR BAG RESTRAINT SYSTEM** article in **ACCESSORIES/SAFETY EQUIPMENT** section.

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

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 oil to fitting nuts. Evacuate and charge A/C system.

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 compressor, add .9 ounce of new compressor oil. If installing new receiver-drier, add .3 ounce of new compressor oil. Evacuate and charge A/C system.

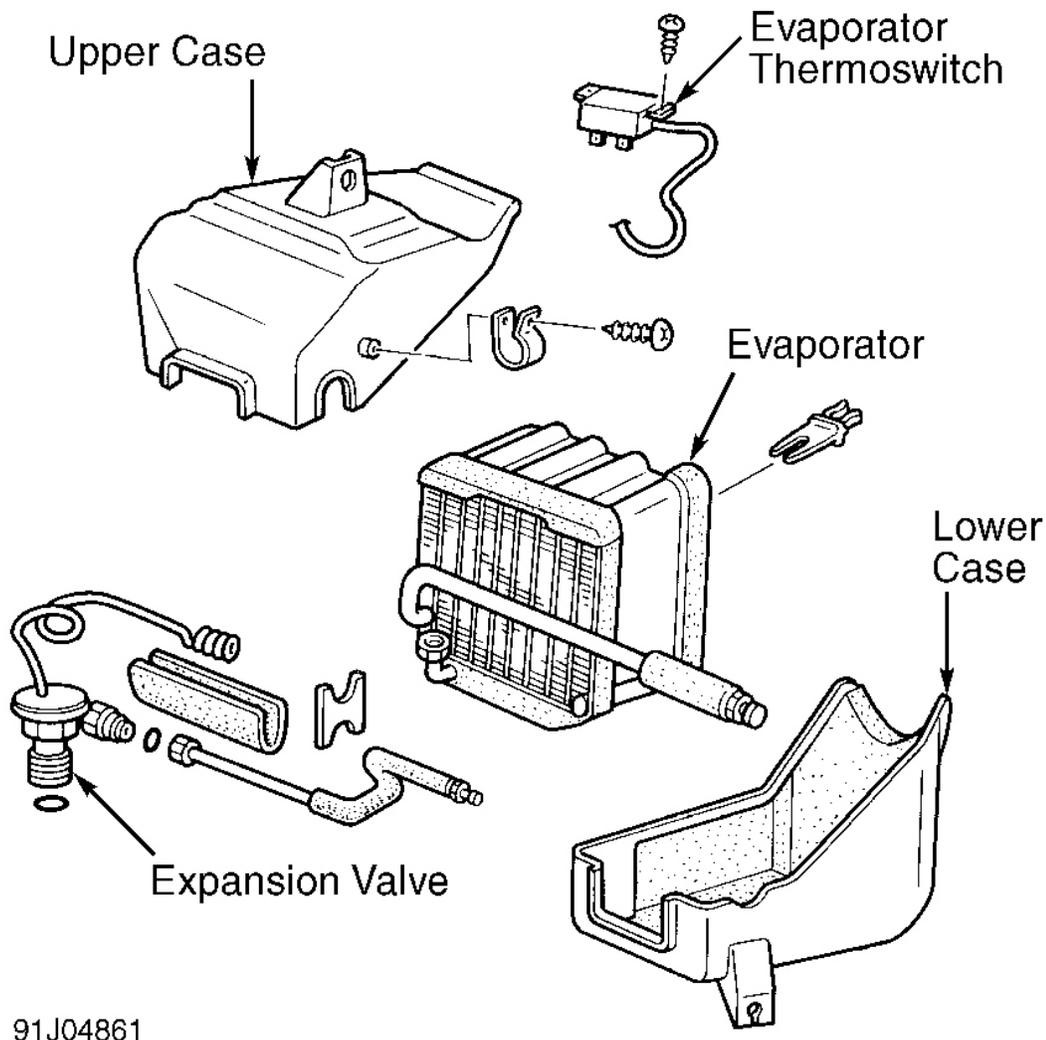
EVAPORATOR UNIT

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. Evacuate and charge A/C system.



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

INSTRUMENT PANEL

Removal & Installation

Before disconnecting negative battery cable, obtain radio anti-theft code from vehicle owner. Disconnect

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negative battery cable. Remove components in the order listed in illustration. See **Fig. 5** . To install, reverse removal procedure.

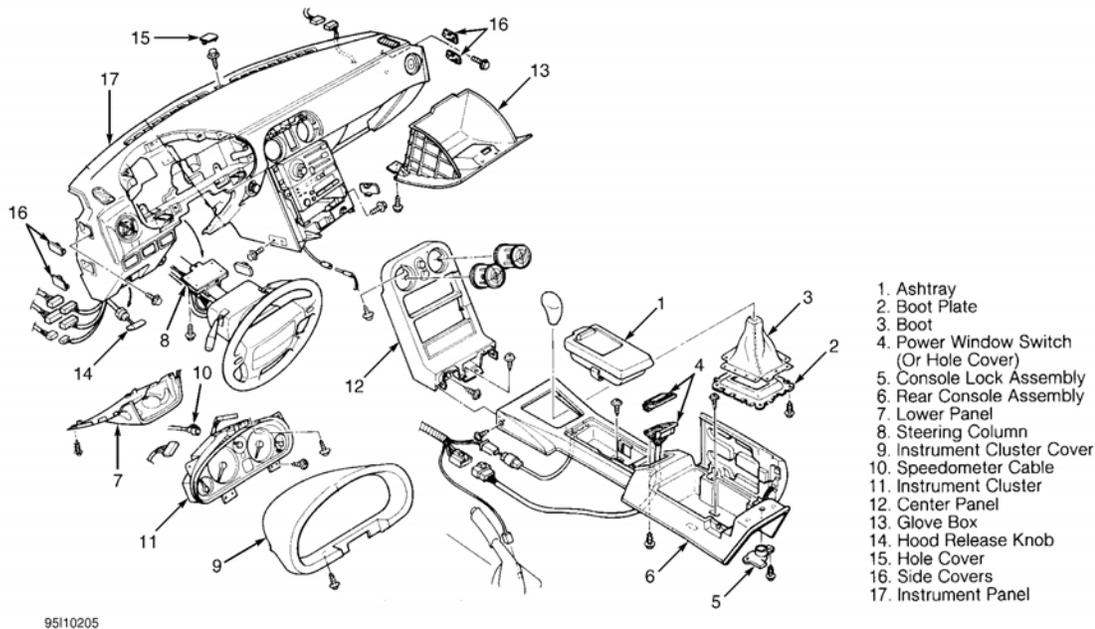


Fig. 5: Exploded View Of Instrument Panel
 Courtesy of MAZDA MOTORS CORP.

TORQUE SPECIFICATIONS

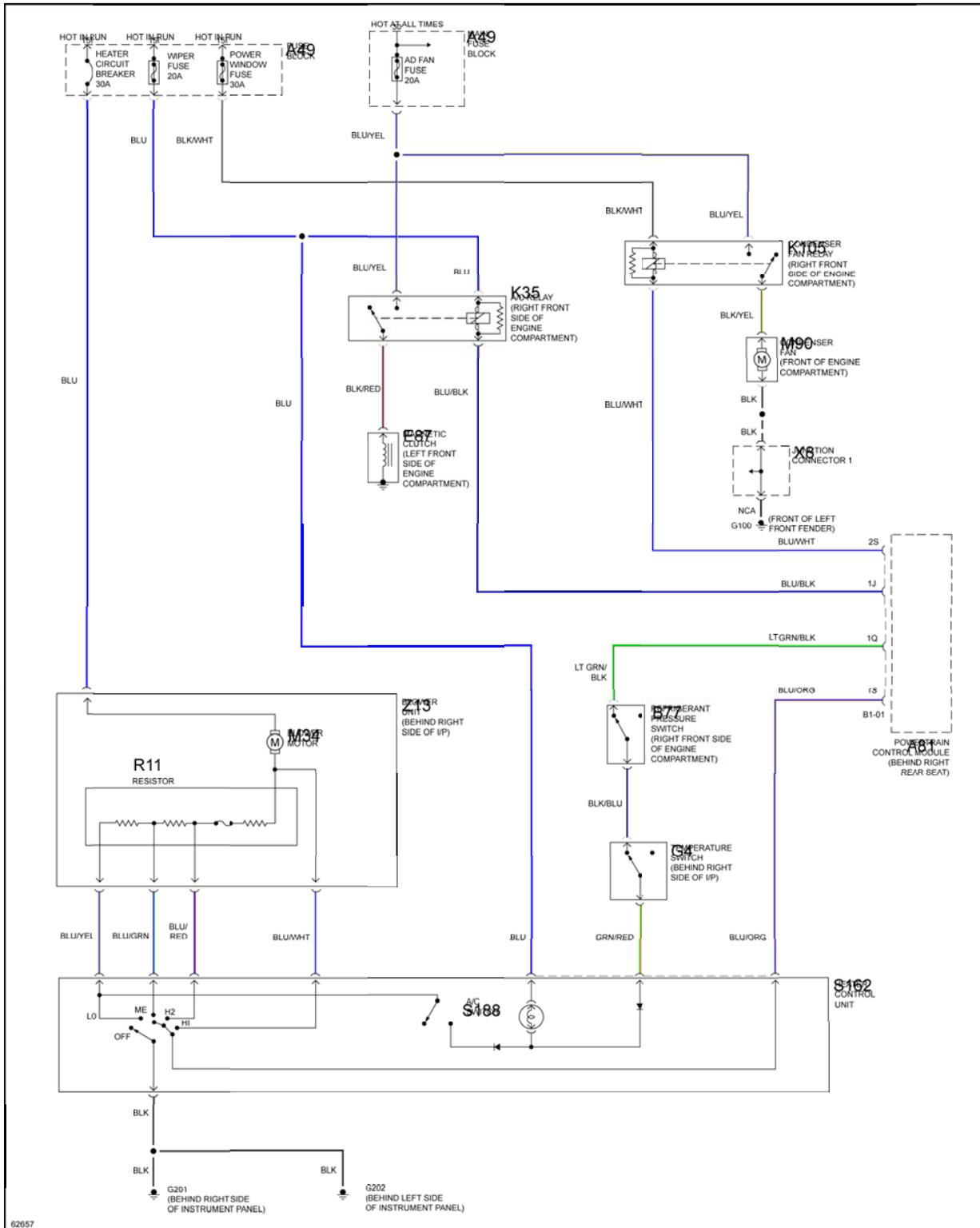
TORQUE SPECIFICATIONS

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. 6: Manual A/C-Heater System Wiring Diagram