

## 1991 Mazda MX-5 Miata

A/C-HEATER SYSTEM - MANUAL 1990-92 Manual A/C-Heater Systems

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## A/C SYSTEM SPECIFICATIONS

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Application	Specification
Compressor Type	Nippondenso Rotary Vane
Compressor Belt Deflection <sup>(1) (2)</sup>	
New	5/16-23/64" (8-9 mm)
Used	23/64-25/64" (9-10 mm)
Compressor Oil Capacity	2.7-3.3 oz.
Refrigerant (R-12) Capacity	28 oz.
System Operating Pressures	
High Side	171-235 psi (12.0-16.5 kg/cm <sup>2</sup> )
Low Side	21-43 psi (1.5-3.0 kg/cm <sup>2</sup> )
(1) With 22 lbs. (10 kg) pressure applied to center of belt.	
(2) On vehicles with P/S, measure midway between crankshaft pulley and P/S pump pulley. On vehicles without P/S, measure midway between crankshaft pulley and A/C idler pulley.	

## DESCRIPTION

Blower case, mounted under right end of instrument panel, contains blower motor and fresh/recirculated air door. Evaporator case, to left of blower case, contains evaporator, evaporator thermostwitch and expansion valve. Heater case, to left of evaporator case, contains airflow mode door and air-mix (temperature blend) door.

### ELECTRICAL COMPONENT LOCATIONS

Component	Location
A/C Relay	In Right Front Corner Of Engine Compartment
Blower Motor Relay	In Left Rear Corner Of Engine Compartment
Blower Resistor	On Bottom Of Blower Case
Evaporator Thermostwitch	. On Left Side Of Evaporator 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. Top lever controls the air-mix door, center lever controls the fresh/recirculated air door and bottom lever controls the airflow mode door.

Blower motor relay supplies power to blower motor. Blower resistor determines blower speed. With blower switch in highest position, blower motor is grounded through blower switch. With blower switch in all other positions, blower motor is grounded through blower resistor and blower switch.

Circuit through compressor clutch is completed when A/C relay is energized and pressure switch is closed. A/C relay is energized when Engine Control Unit (ECU) unit grounds the solenoid circuit of the relay. The ECU energizes A/C relay if evaporator thermostatic switch is closed and A/C and blower switches are on. The ECU also controls A/C relay operation according to engine load.

## **ADJUSTMENTS**

### **AIRFLOW MODE DOOR**

Set airflow mode control lever to vent position. Disconnect control cable at airflow mode door lever. Extend airflow mode door lever until it stops, and hold it there. See **Fig. 1** . Attach control cable to door lever and clip. Ensure control lever moves freely between defrost and vent positions.

### **AIR-MIX (TEMPERATURE BLEND) DOOR**

Set temperature control lever to maximum hot position. Disconnect control cable at air-mix door lever. See **Fig. 1** . Extend air-mix door lever until it stops, and hold it there. Attach control cable to door lever and clip. Ensure control lever moves freely between hot and cold positions.

### **RECIRCULATED/FRESH AIR DOOR**

Set recirculated/fresh air control lever to fresh position. Disconnect control cable at recirculated/fresh air door lever. Retract recirculated/fresh air door lever until it stops, and hold it there. Attach control cable to door lever and clip. Ensure control lever moves freely between recirculated air and fresh air positions.

## **TESTING**

### **AIR BAG WARNING**

**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 article in the ACCESSORIES/SAFETY EQUIPMENT Section.**

### **BLOWER MOTOR CIRCUIT**

1. Check 30-amp HEATER circuit breaker in passenger compartment fuse panel. If Red button has not popped out, go to next step. If Red button has popped out, repair short circuit and press Red button to reset circuit breaker.
2. Turn ignition on. Turn blower switch to 4th position (high). Check voltage at Blue wire terminal of 2-wire blower motor connector on bottom of blower case. If no voltage is present, repair wiring between circuit breaker and blower motor.

**NOTE: Blower resistor uses a 1-wire connector and a 4-wire connector. The wire in the 1-wire connector is Blue/Red, and one of the wires in the 4-wire connector is Blue/Red. Check voltage at appropriate wire.**

3. If battery voltage is present, turn off blower switch and A/C switch (if equipped). Check voltage at Blue/Red wire terminal of blower resistor 1-wire connector. If no voltage is present, replace blower motor. If battery voltage is present, check voltage at Blue/White wire terminal of blower resistor connector.
4. If no voltage is present, replace blower resistor. If battery voltage is present, check voltage at Blue/Red wire terminal of blower resistor 4-wire connector. If no voltage is present, replace blower resistor.
5. If battery voltage is present, check voltage at Blue/Green wire terminal of blower resistor connector. If no voltage is present, replace blower resistor. If battery voltage is present, check voltage at Blue/Yellow wire terminal of blower resistor connector.
6. If no voltage is present, replace blower resistor. If battery voltage is present, turn ignition on and blower switch to 4th position (high). Check voltage at Black wire terminal of blower switch connector. If battery voltage is present, repair wiring between blower switch and ground.
7. If no voltage is present, turn ignition switch, blower switch and A/C switch off. Check voltage at Blue/White wire terminal of blower switch connector. If no voltage is present, repair wiring between blower resistor and blower switch.
8. If battery voltage is present, check voltage at Blue/Red wire terminal of blower switch connector. If no voltage is present, repair wiring between blower resistor and blower switch. If battery voltage is present, check voltage at Blue/Green wire terminal of blower switch connector.
9. If no voltage is present, repair wiring between blower resistor and blower switch. If battery voltage is present, check voltage at Blue/Yellow wire terminal of blower switch connector. If battery voltage is present, replace blower switch. If no voltage is present, repair wiring between blower resistor and blower switch.

## COMPRESSOR CLUTCH CIRCUIT

1. Turn ignition on. 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 blown, repair short circuit.
2. If fuses are okay, run engine at idle. Turn A/C and blower switches on. Check voltage at compressor clutch connector (Black/Red wire terminal). If no voltage is present, go to step 5).
3. If battery voltage is present, turn ignition off. Disconnect evaporator thermostatic switch connector. Check continuity between switch terminals. If there is no continuity, replace evaporator thermostatic switch.
4. If there is continuity, disconnect compressor clutch connector. Set ohmmeter to X1000 scale. Check continuity between compressor clutch connector and ground. If there is no continuity, replace compressor clutch. If there is continuity, adjust compressor clutch air gap or check compressor for internal damage.
5. Run engine at idle. Turn A/C and blower switches on. Check voltage at Black/Blue wire terminal of A/C relay connector. If battery voltage is present, go to step 9).
6. If no voltage is present, check voltage at Blue/Yellow wire terminal of A/C relay connector. If no voltage is present, repair circuit between 20-amp AD FAN fuse and A/C relay.
7. If battery voltage is present, check voltage at Blue wire terminal of A/C relay connector. If no voltage is present, repair circuit between 20-amp WIPER fuse and A/C relay.

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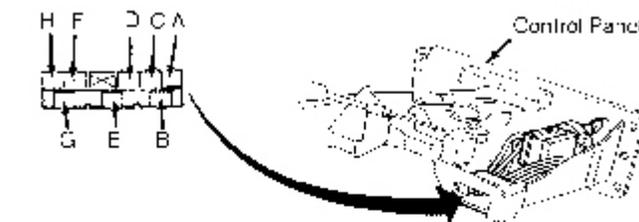
8. If battery voltage is present, check voltage at Blue/Black wire terminal of A/C relay connector. If no voltage is present, replace A/C relay. If battery voltage is present, check Engine Control Unit (ECU) terminal voltage.
9. Turn ignition off. Disconnect pressure switch connector. Check continuity between switch terminals. If there is continuity, repair circuit between A/C relay and compressor clutch.
10. If there is no continuity, connect manifold pressure gauges to system. If low pressure is 21-43 psi (1.5-3.0 kg/cm<sup>2</sup>) and high pressure is 171-235 psi (12.0-16.5 kg/cm<sup>2</sup>), replace pressure switch. If pressures are not as specified, check refrigerant system for proper charge.

### CONDENSER (ADDITIONAL) FAN CIRCUIT

1. Turn ignition on. Turn A/C and blower switches on. Check voltage at Black/Blue wire terminal of condenser fan connector. If no voltage is present, repair circuit between A/C relay and condenser fan.
2. If battery voltage is present, check voltage at Black wire terminal of condenser fan connector. If no voltage is present, replace condenser fan motor. If battery voltage is present, repair circuit between condenser fan and ground.

### A/C & BLOWER SWITCH

With switches in positions indicated, check continuity between specified terminals of A/C and blower switch connector. See **Fig. 1**. If continuity is not as specified, replace A/C and blower switch.



Position	Terminal							
	a	b	c	d	e	f	g	h
Blower switch	OFF							
	First	—	—	—	—	—	—	—
	Second							
	Fourth							
A/C switch	OFF							
	ON	—	—	—	—	—	—	—

— Indicates continuity  
 —|— Indicates diode

**Fig. 1: Testing A/C & Blower Switch**  
 Courtesy of MAZDA MOTORS CORP.

**A/C RELAY**

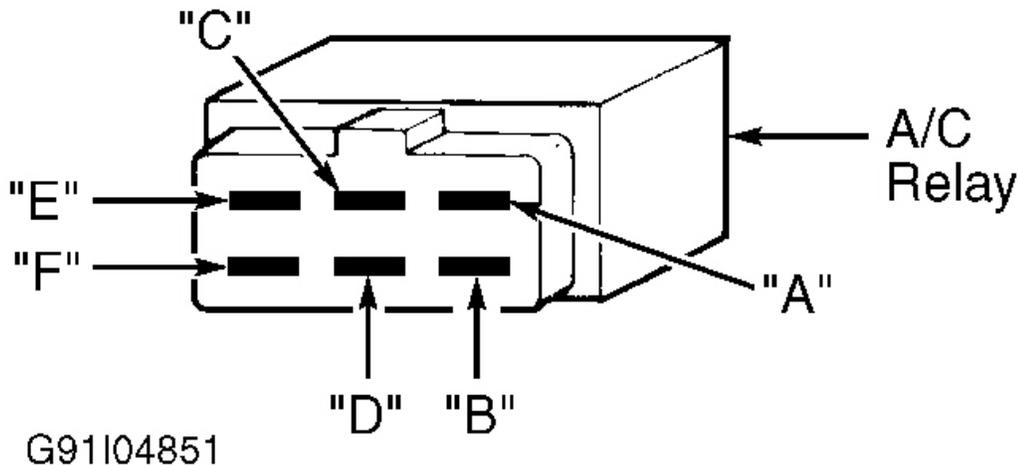
1. Remove relay. Check continuity between specified terminals of relay connector. See **A/C RELAY TEST** table. See **Fig. 2** . Ensure test lead polarity is correct. If continuity is not as specified, replace relay.
2. If continuity is as specified, apply battery positive lead to terminal "D" and negative lead to terminal "A". Check continuity between terminals "E" and "C". If there is continuity, relay is okay. If there is no continuity, replace relay.

**A/C RELAY TEST**

Terminal (+) <sup>(1)</sup>	Terminal (-) <sup>(2)</sup>	Continuity
A	B	Yes
A	D	Yes
B	A	No
C	E	No
D	A	No
E	C	Yes

(1) Connect ohmmeter positive lead to this terminal.

(2) Connect ohmmeter negative lead to this terminal.



**Fig. 2: A/C Relay Connector Terminal ID**  
 Courtesy of MAZDA MOTORS CORP.

## **BLOWER MOTOR**

Disconnect 2-wire connector from bottom of blower motor case. Apply battery voltage across blower motor terminals. Replace blower motor if it does not operate.

## **BLOWER RESISTOR**

Note 4-wire connector and 1-wire connector attached to seam where upper and lower blower cases meet. Wires in these connectors lead to blower resistor on bottom of blower case. Disconnect both connectors. If continuity does not exist between 1-wire connector terminal and each terminal of 4-wire connector, replace blower resistor.

## **CONDENSER (ADDITIONAL) FAN MOTOR**

Disconnect condenser fan connector. Apply battery voltage across condenser fan terminals. Replace condenser fan motor if it does not operate.

## **EVAPORATOR THERMOSWITCH**

1. Remove glove box. Run engine at idle. Turn off A/C switch. Turn blower switch to 4th position (high) for a few minutes to ensure evaporator temperature is greater than 32°F (0°C). Turn off blower switch and engine.
2. Disconnect evaporator thermoswitch connector. Check continuity between switch terminals. If there is continuity, thermoswitch is okay. If there is no continuity, replace thermoswitch.

## **PRESSURE SWITCH**

1. Turn ignition off. Connect manifold pressure gauges to system. If high-side pressure is less than 31.2 psi (2.2 kg/cm<sup>2</sup>), check system for proper refrigerant charge.
2. If high-side pressure is greater than 31.2 psi (2.2 kg/cm<sup>2</sup>), disconnect pressure switch connector. Check continuity between switch terminals. If there is continuity, switch is okay. If there is no continuity, replace switch.

## **REMOVAL & INSTALLATION**

### **AIR BAG WARNING**

**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 article in the ACCESSORIES/SAFETY EQUIPMENT Section.

### **BLOWER CASE**

#### **Removal & Installation**

Disconnect electrical connectors from blower case. Remove glove box. Loosen seal plate between blower motor case and evaporator case. Remove blower motor case nuts. Remove case and seal plate. To install, reverse removal procedure.

## **COMPRESSOR**

### **Removal & Installation**

1. Disconnect negative battery cable. Discharge A/C system using approved refrigerant recovery/recycling equipment. Disconnect compressor clutch connector. Disconnect refrigerant lines from compressor. Remove drive belt.
2. Raise and support vehicle. Remove compressor mounting bolts and remove compressor. To install, reverse removal procedure. Adjust drive belt to specified tension. Evacuate and charge system.

## **CONDENSER & RECEIVER-DRIER**

### **Removal & Installation**

Discharge A/C system using approved refrigerant recovery/recycling equipment. Raise and support vehicle. Remove splash shield and air guide. Remove condenser and receiver-drier as an assembly. To install, reverse removal procedure. Evacuate and charge system.

## **CONTROL PANEL**

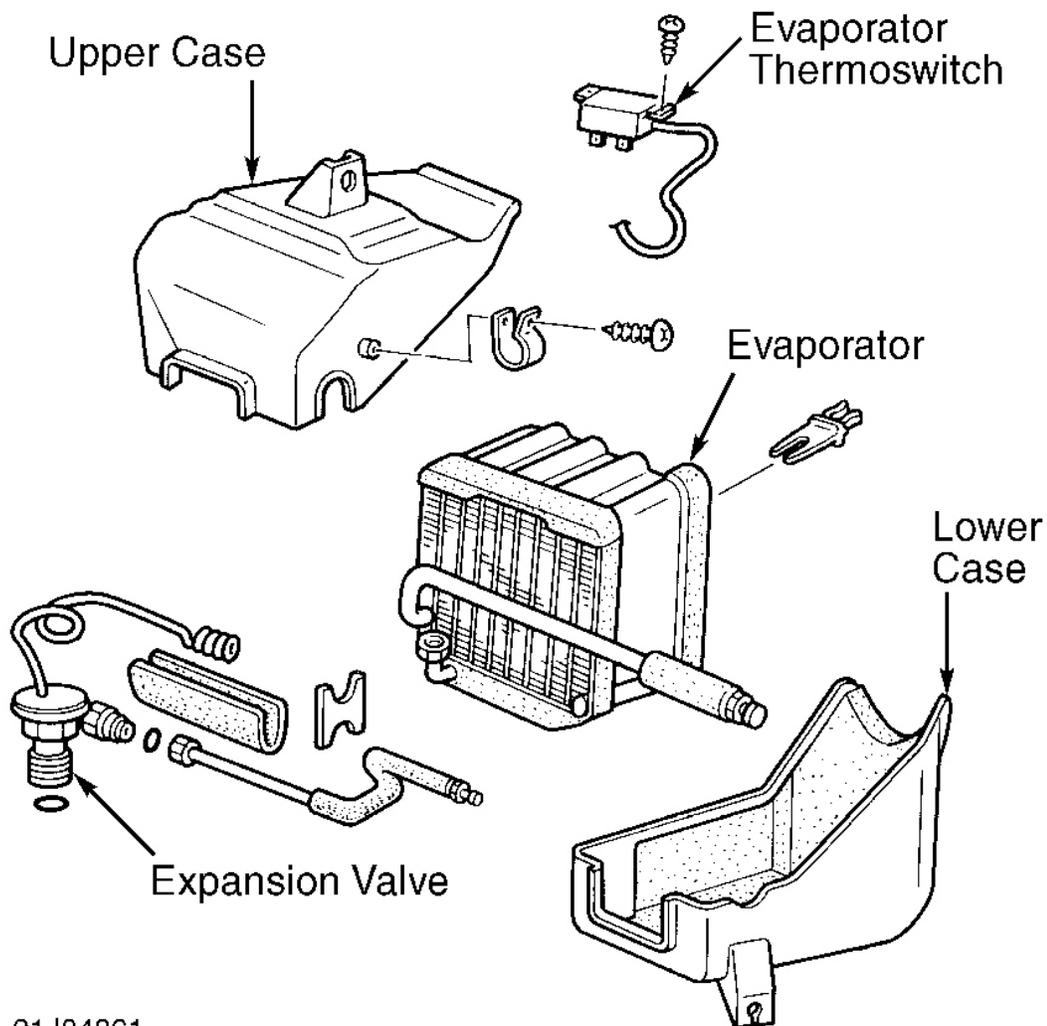
### **Removal & Installation**

Remove rear console assembly. See **Fig. 4** . Remove vent outlets from center panel assembly. Remove center panel assembly. Remove control panel screws. Pull control panel from hole. Disconnect door control cables from back of control panel and remove panel. To install, reverse removal procedure.

## **EVAPORATOR CORE & THERMOSWITCH**

### **Removal & Installation**

1. Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove condenser and receiver-drier as an assembly. Disconnect low-pressure and high-pressure pipes from evaporator tubes at engine compartment firewall.
2. Remove right undercover and glove box. Disconnect thermoswitch electrical connector. Loosen left seal plate (between heater case and evaporator case). Loosen right seal plate (between evaporator case and blower motor case).
3. Remove evaporator case. Disassemble evaporator case, and remove evaporator core and thermoswitch. See **Fig. 3** . To install, reverse removal procedure. Evacuate and charge system.



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**Fig. 3: Exploded View of Evaporator Case**  
 Courtesy of MAZDA MOTORS CORP.

## HEATER CORE

### Removal & Installation

Drain coolant. Disconnect heater hoses at engine compartment firewall. Remove grommets from holes (if equipped). Remove instrument panel. Remove heater case. Disassemble case and remove heater core. See **Fig. 1**. To install, reverse removal procedure. Fill cooling system.

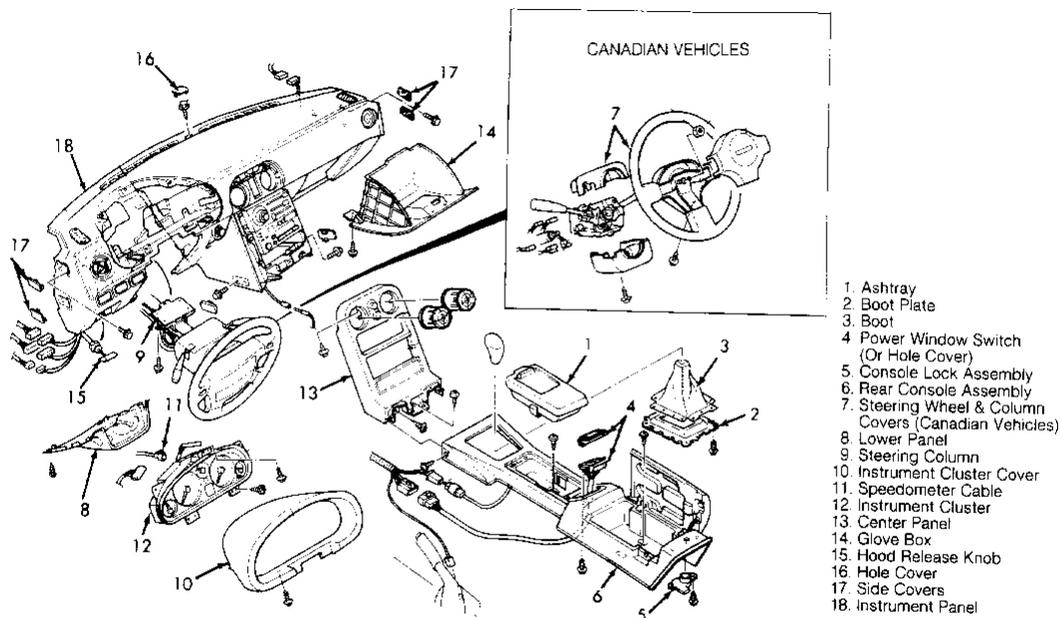
## INSTRUMENT PANEL

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#### Removal & Installation

Obtain code number and deactivate audio anti-theft system. Disconnect negative battery cable. Remove all components in order listed in illustration. See **Fig. 4** . To install, reverse removal procedure.



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**Fig. 4: Exploded View of Instrument Panel**  
Courtesy of MAZDA MOTORS CORP.

## WIRING DIAGRAMS

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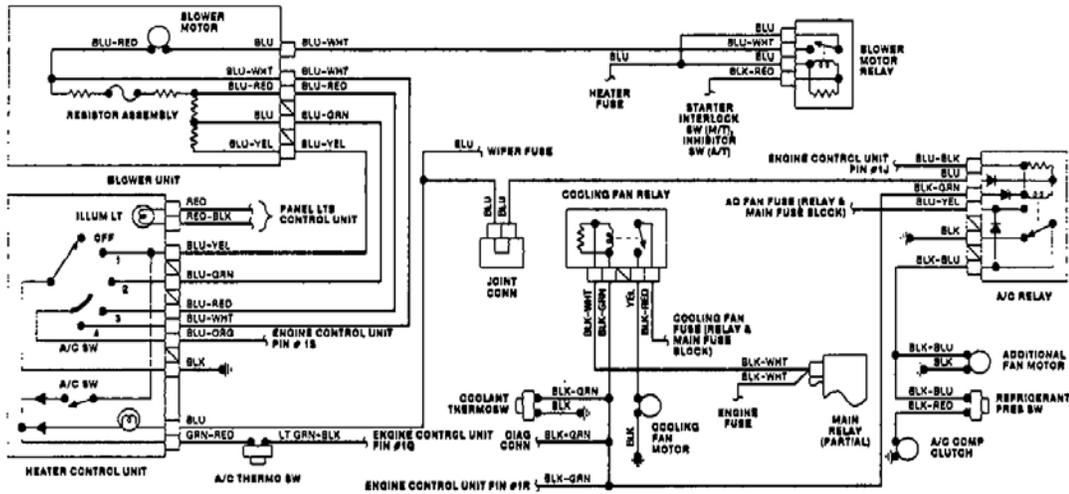


Fig. 5: Manual Heater-A/C System Wiring Diagram (1990)

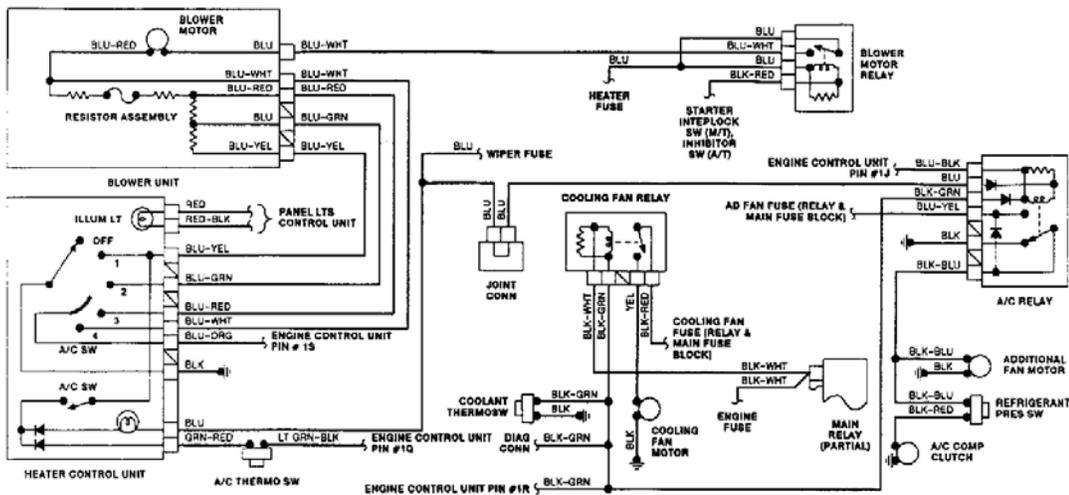
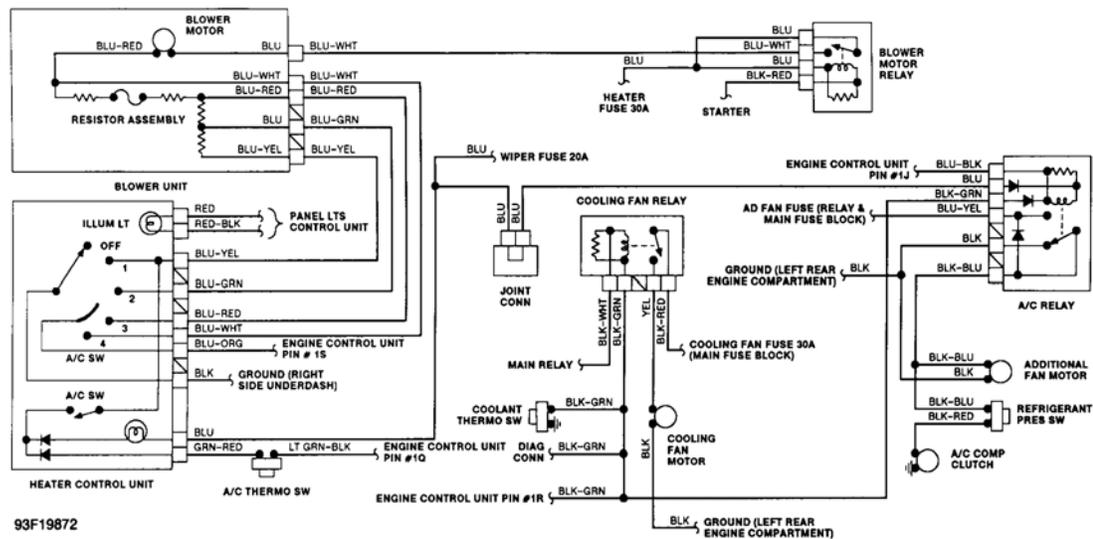


Fig. 6: Manual Heater-A/C System Wiring Diagram (1991)

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**Fig. 7: Manual Heater-A/C System Wiring Diagram (1992)**