A/C-HEATER SYSTEM - MANUAL

1988 Toyota Celica

1988 Manual A/C-Heater Systems

Celica

* PLEASE READ THIS FIRST *

CAUTION: When discharging air conditioning system, use only approved refrigerant recovery/recycling equipment. Make every attempt to avoid discharging refrigerant into the atmosphere.

A/C SYSTEM SPECIFICATIONS

A/C SYSTEM SPECIFICATIONS TABLE

Application	Specification
System Type	Magnetic Clutch
Compressor Type	Nippondenso 10-Cyl.
R-12 Capacity	21-27 oz.
Compressor Oil Capacities	2.0-3.4 oz.
Normal Operating Pressures	
Low Side	21-28 psi (1.5-2.0 kg/cm²)
High Side	206-213 psi (14.5-15 kg/cm²)
A/C Belt Tension (1)	60-100 lbs. (27.2-45.4 kg)

(1) - Measured at longest run of belt with thumb pressure applied.

DESCRIPTION

System combines air conditioning and heating unit. The A/C system consists of evaporator assembly, compressor, condenser, receiver-drier and electrical components in addition to the standard heating unit. Air door operation is controlled through cable connections, while compressor operation and associated A/C modes are electrically controlled. A thermistor is used to sense evaporator temperature, and an idle stabilizer amplifier controls compressor on and off function. Celica models are equipped with either lever switch type controls or push button type controls.

SYSTEM CONTROLS OPERATION

Celica uses 3 and 4 sliding lever type controls or push button type controls and an A/C on-off switch to operate A/C system. Controls operate air supply selection (fresh or recirculating air), mode and temperature selection, blower speeds and left-right heater output. The A/C switch completes the electrical circuit to the compressor when switch is on.

SYSTEM COMPONENTS

A/C ON-OFF SWITCH

When switch is depressed to "ON" position, A/C switch contacts are closed. This completes the electrical circuit from

ignition switch, through relay and idle stabilizing amplifier to compressor clutch.

PRESSURE SWITCH

A low pressure protection switch is used to stop compressor clutch operation in the event of loss of R-12 pressure charge. Switch is installed in the high side line inside evaporator housing. Switch diaphragm holds contact points in switch closed above 30 psi, completing the circuit to compressor. At pressures below 30 psi, contacts open and circuit to compressor is interrupted.

THERMISTOR

The thermistor is a thermocouple mounted in front of the evaporator (air outlet side) to sense airflow temperature. The value of thermistor is sent to amplifier. The amplifier then sends appropriate electrical signal to compressor clutch for proper on-off cycling.

VACUUM SWITCHING VALVE (VSV)

An electro-vacuum (solenoid) valve is used to assist in smooth engine operation during compressor on cycle. See Figs. 1 and 2. The VSV holds the throttle at slightly above idle (spring-loaded to this position) when A/C system is operating. When system is off, vacuum is directed to VSV diaphragm to allow throttle to return to normal idle position.

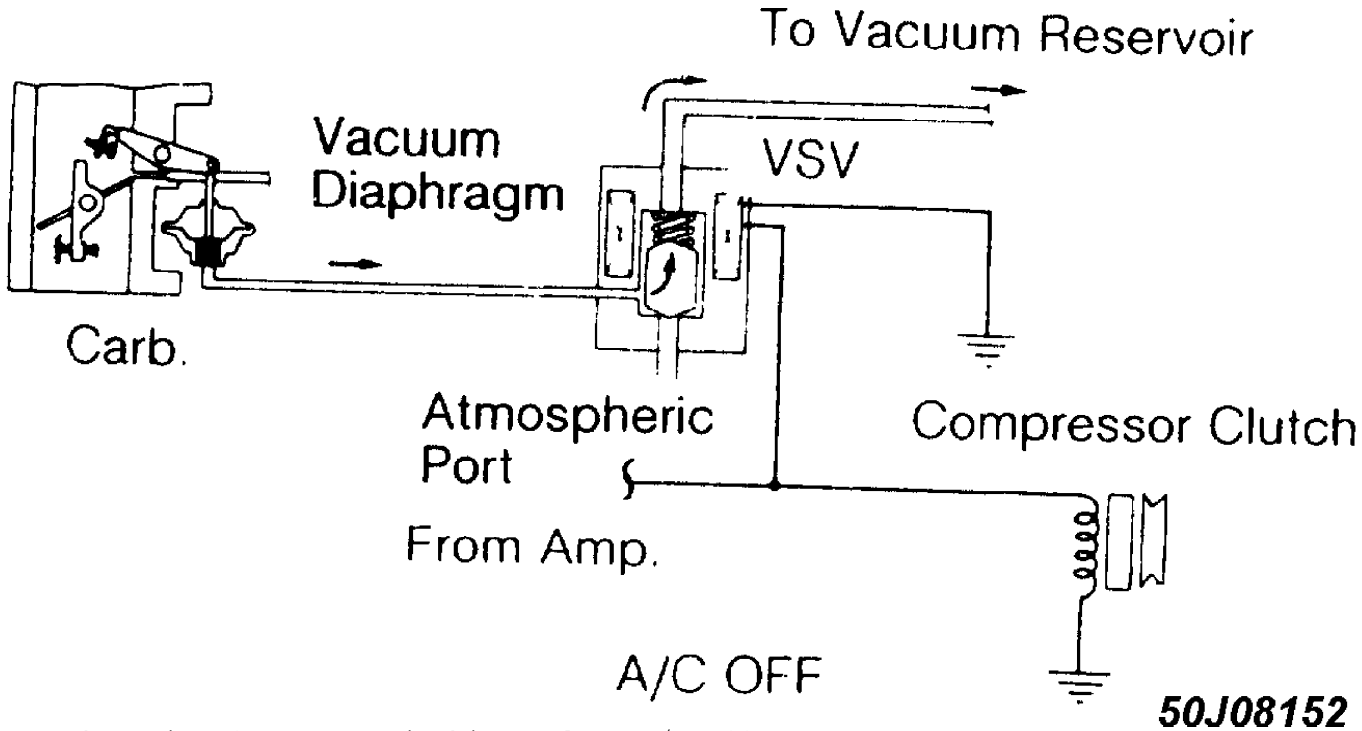

Fig. 1: Schematic of Vacuum Switching Valve (A/C Off)

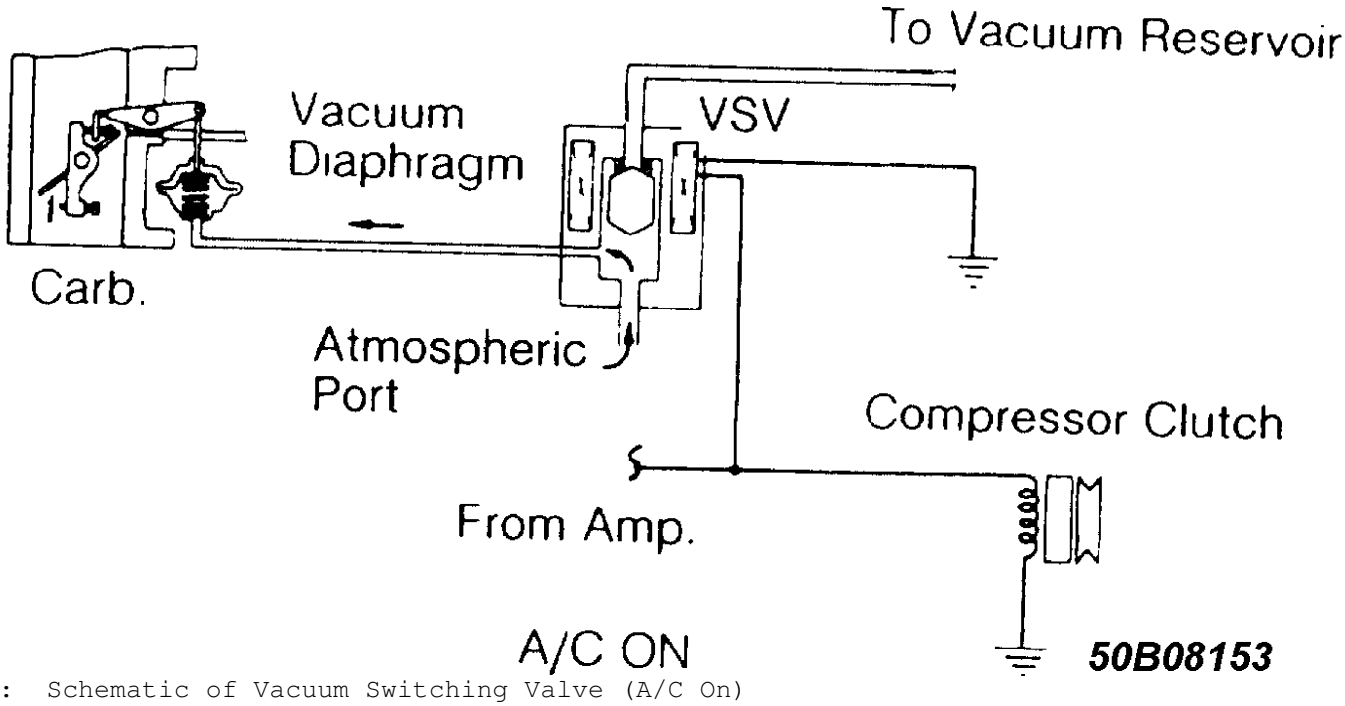

Fig. 2: Schematic of Vacuum Switching Valve (A/C On)

ADJUSTMENTS

NOTE: For adjustment of control cables, see HEATER SYSTEMS.

A/C SWITCH TEST

Disconnect battery and A/C switch connector. Test for continuity at terminals. See Figs. 3 and 4. Most A/C switches contain one-way diodes, measure continuity both ways before replacing any components.

A/C SWITCH CONTINUITY TABLE

Switch Position	Terminal Continuity
Lever Type	
"OFF"	1-4
"A/C"	5-6, 6-2, 1-4
Push Button Type	
"OFF"	(1)
"A/C"	B5-B6, B6-B2

(1) - No continuity in "OFF" position.

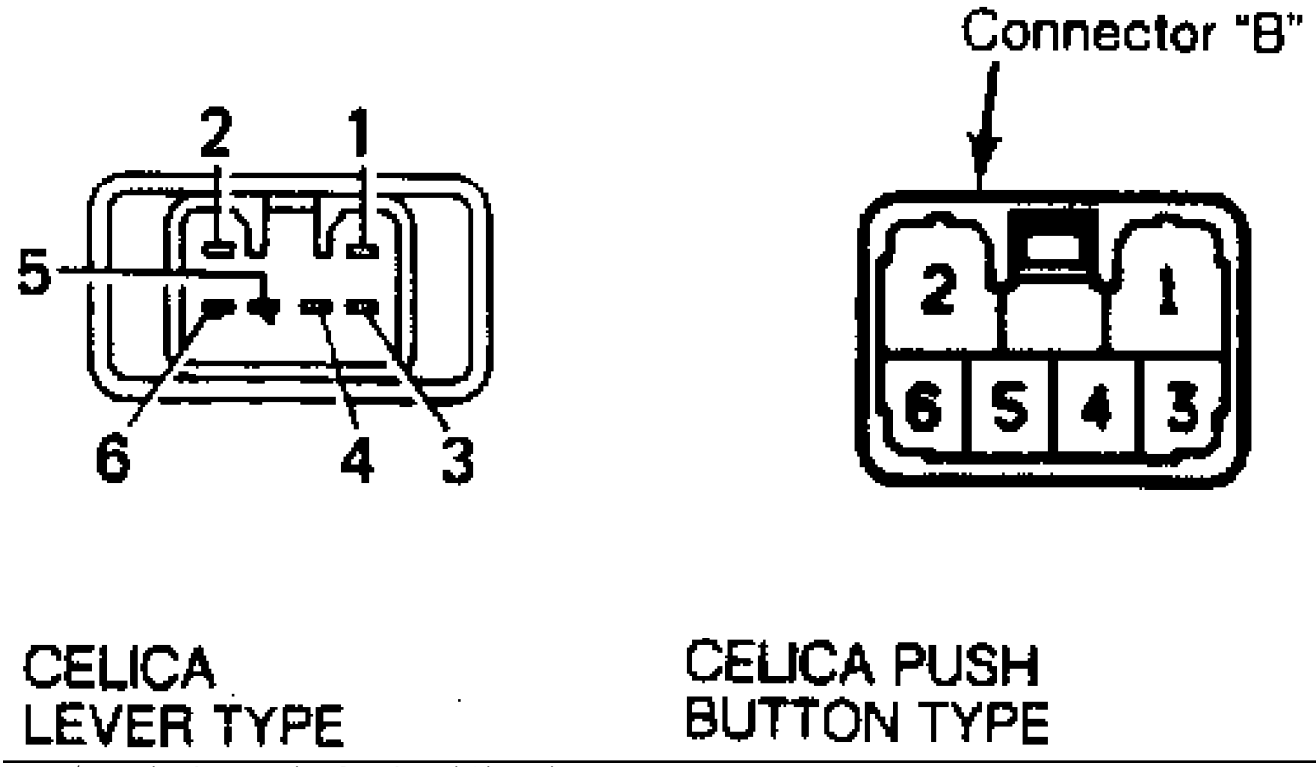

Fig. 3: A/C Switch Terminal Identification (Lever Type)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

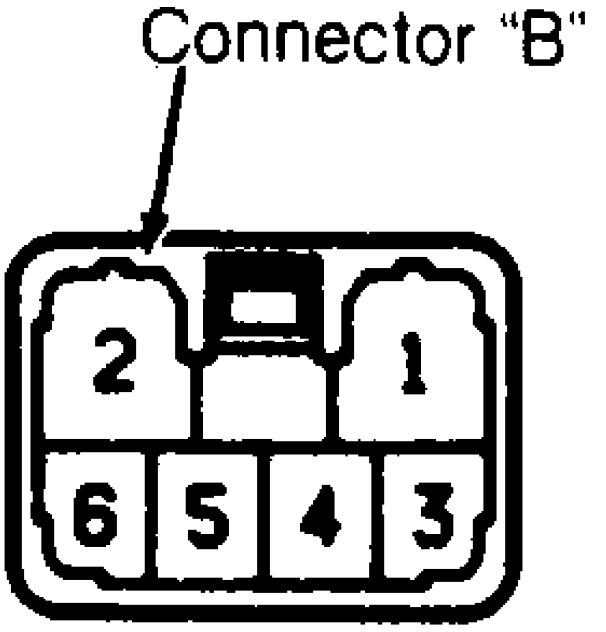

Fig. 4: A/C Switch Terminal Identification (Push Button Type
Courtesy of Toyota Motor Sales, U.S.A., Inc.

RADIATOR FAN RELAY TEST

Using ohmmeter, check for continuity between terminals No. 3 and 4. See Fig. 5. If there is no continuity, replace relay. Apply battery voltage between terminals No. 1 and 2. Check for continuity between terminals No. 3 and 4. If there is no continuity, relay is okay. If there is continuity, replace relay.

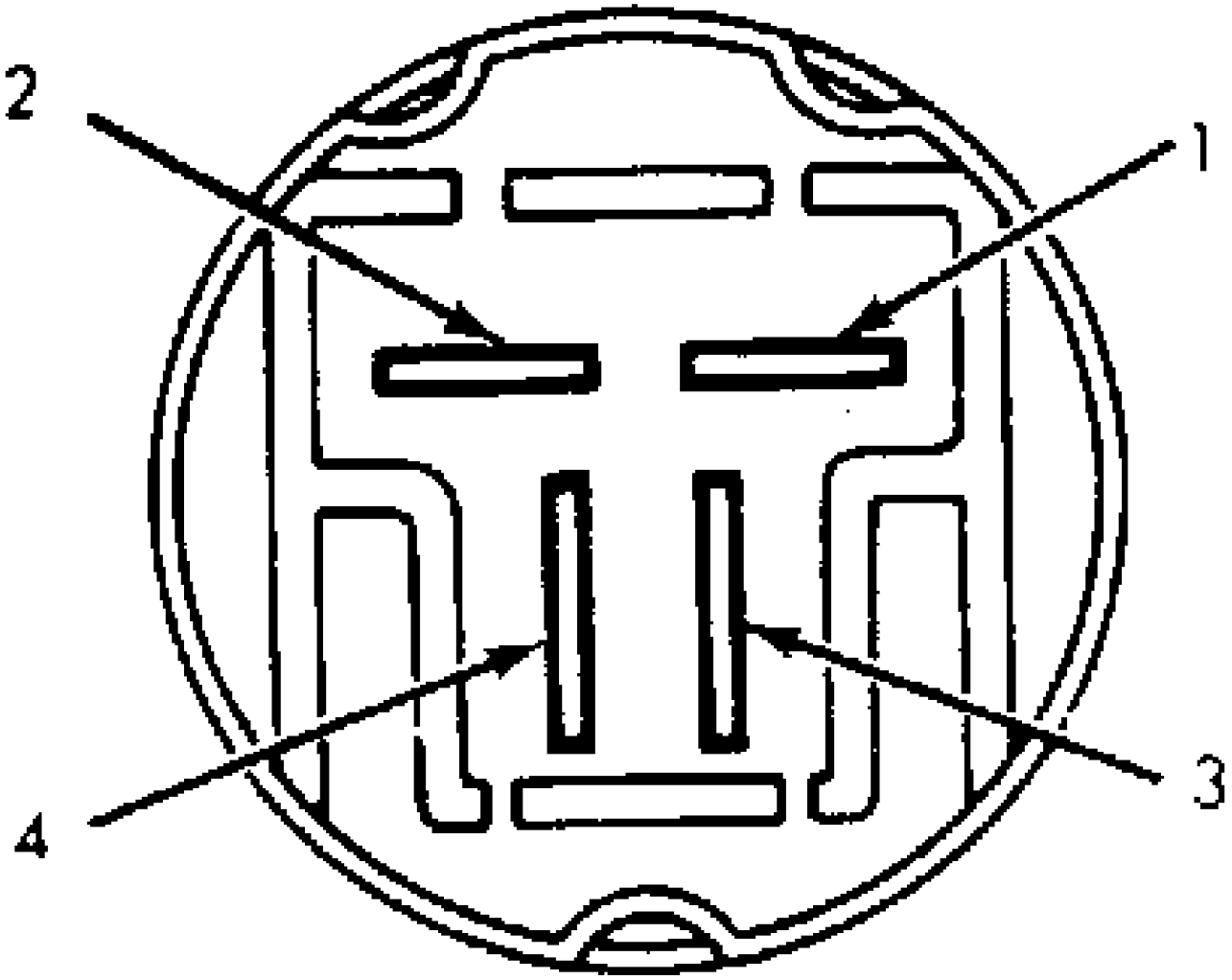

Fig. 5: Checking Radiator Fan Relay
Courtesy of Toyota Motor Sales, U.S.A., Inc.

FAN RELAY NO. 2 TEST

Using ohmmeter, check for continuity between terminals No. 1 and 4. See Fig. 6. If there is continuity, replace relay. If there is no continuity, relay is okay. Apply battery voltage between terminals No. 6 and 2. Check for continuity between terminals No. 1 and 4. If there is continuity, relay is okay. If there is no continuity, replace

relay.

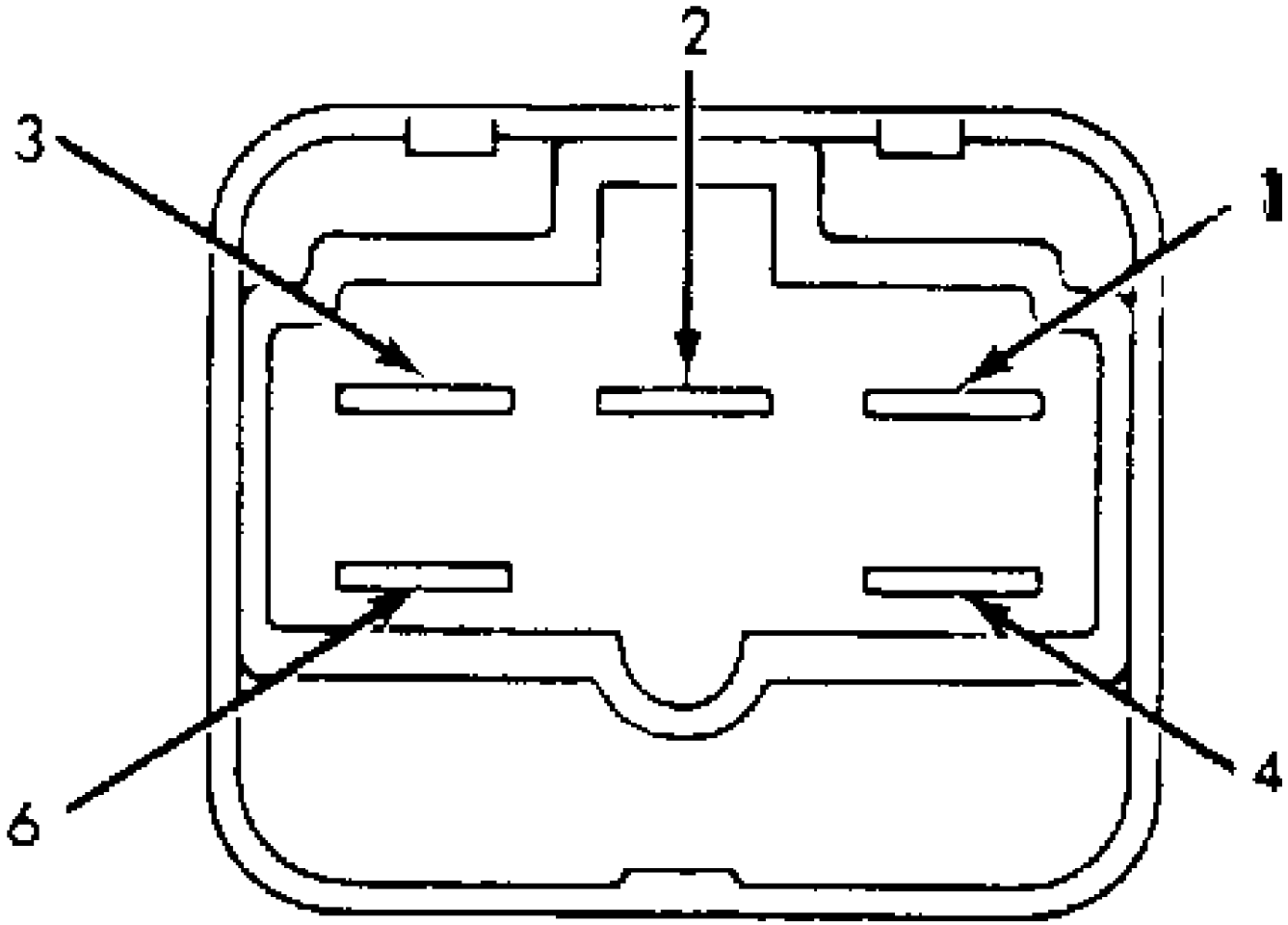

Fig. 6: Checking Condenser Fan Relay No. 2
Courtesy of Toyota Motor Sales, U.S.A., Inc.

IDLE-UP & FAN RELAY NO. 3 TEST

Using ohmmeter, check for continuity between terminals No. 2 and 4. See Fig. 7. If there is no continuity, relay is okay. If there is continuity, replace relay. Apply battery voltage between terminals No. 1 and 3. Check for continuity between terminals No. 2 and 4. If there is continuity, relay is okay. If there is no continuity, replace relay.

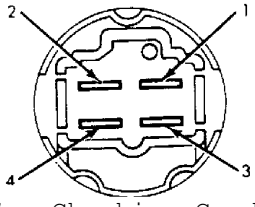

Fig. 7: Checking Condenser Fan Relay No. 3
Courtesy of Toyota Motor Sales, U.S.A., Inc.

A/C CUT RELAY TEST

Check for continuity between terminals No. 3 and 4. See Fig. 8. If there is no continuity, replace relay. Apply battery voltage between terminals No. 1 and 2. Check for continuity between terminals No. 3 and 4. If there is continuity, replace relay. If there is no continuity, relay is okay.

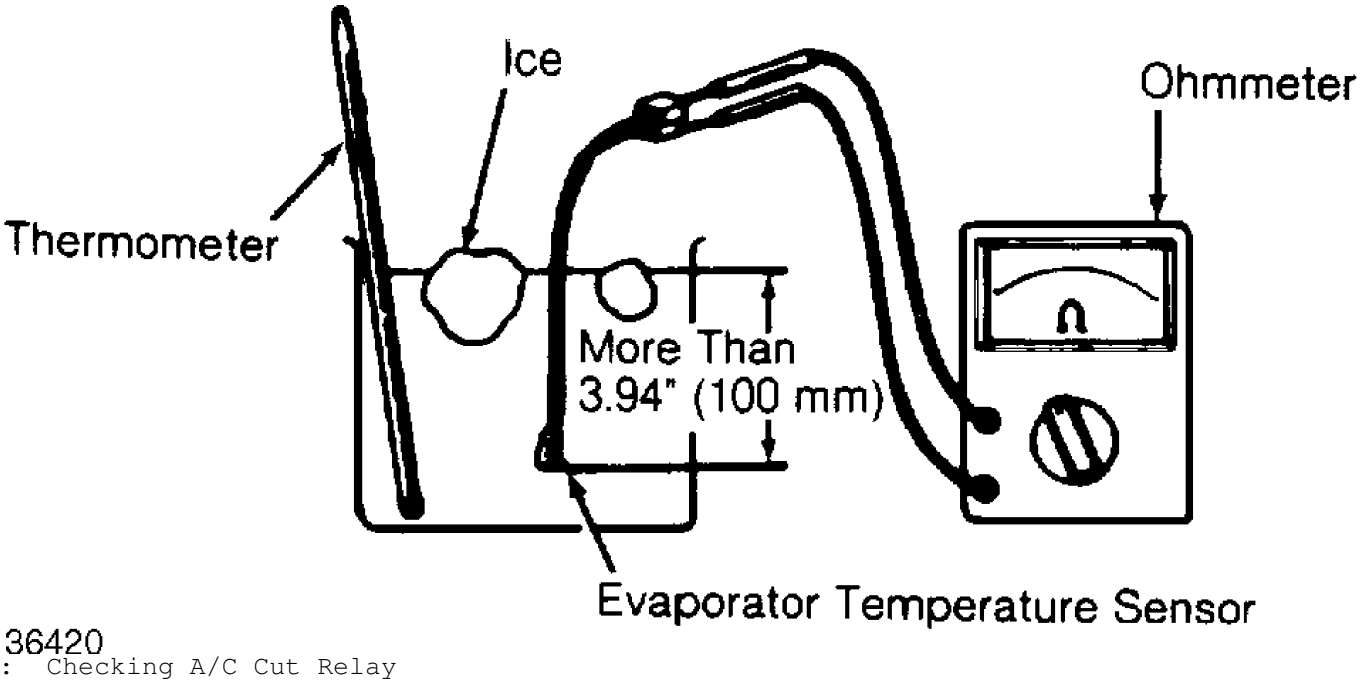

Fig. 8: Checking A/C Cut Relay
Courtesy of Toyota Motor Sales, U.S.A., Inc.

THERMISTOR TEST

1) Disconnect battery. Remove instrument panel lower trim and glove box.

2) Connect ohmmeter leads to thermistor connector. See Fig. 9. While measuring the ambient temperature, measure resistance of the thermistor as shown. Vary surrounding temperature and take another reading. See Fig. 9. If not within given range, replace thermistor. See Fig. 10.

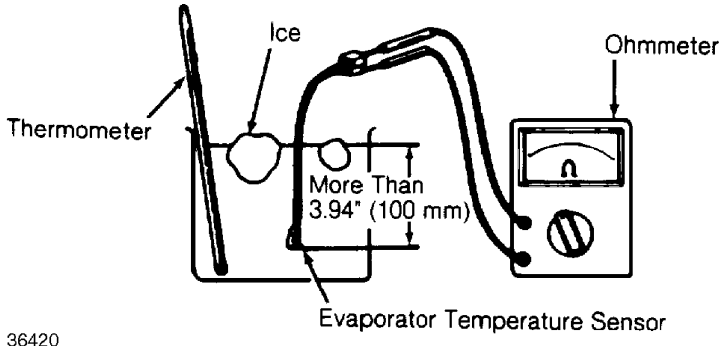

Fig. 9: Thermistor Resistance Testing
Courtesy of Toyota Motor Sales, U.S.A., Inc.

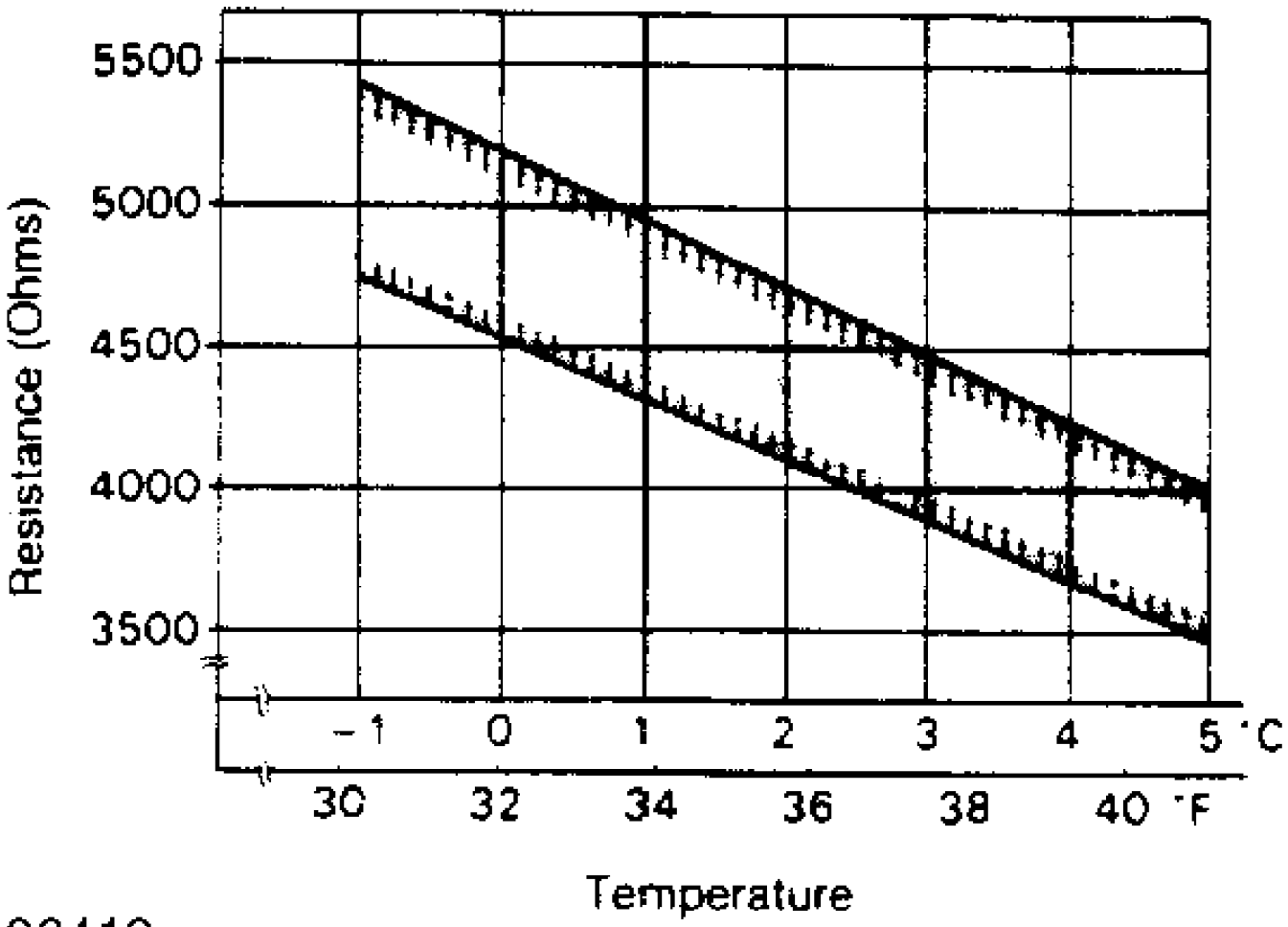

Fig. 10: Thermistor Resistance Graph
Courtesy of Toyota Motor Sales, U.S.A., Inc.

IDLE STABILIZING AMPLIFIER TEST

Operate system, measuring cut-off points of compressor and clutch according to engine speed and temperature of outlet air. If system is not operating as noted, adjust amplifier by turning recessed adjusting screw. If proper adjustments cannot be made, replace amplifier.

VACUUM SWITCHING VALVE (VSV) TEST

1) With valve on car, remove vacuum connections from both fittings on VSV. See Fig. 11. Connect VSV terminal connector to battery. Blow air through fitting "A". Air should pass from "A" and out through "B". It should not be felt at atmospheric port.

2) Disconnect battery from VSV terminal connector. Blow air through fitting "A". It should pass from "A" and come out of atmospheric port. It should not come out of fitting "B".

3) Use an ohmmeter to check for short between each terminal and VSV body. Also check resistance between the terminals. Reading should be 38-43 ohms at 68°F (20°C).

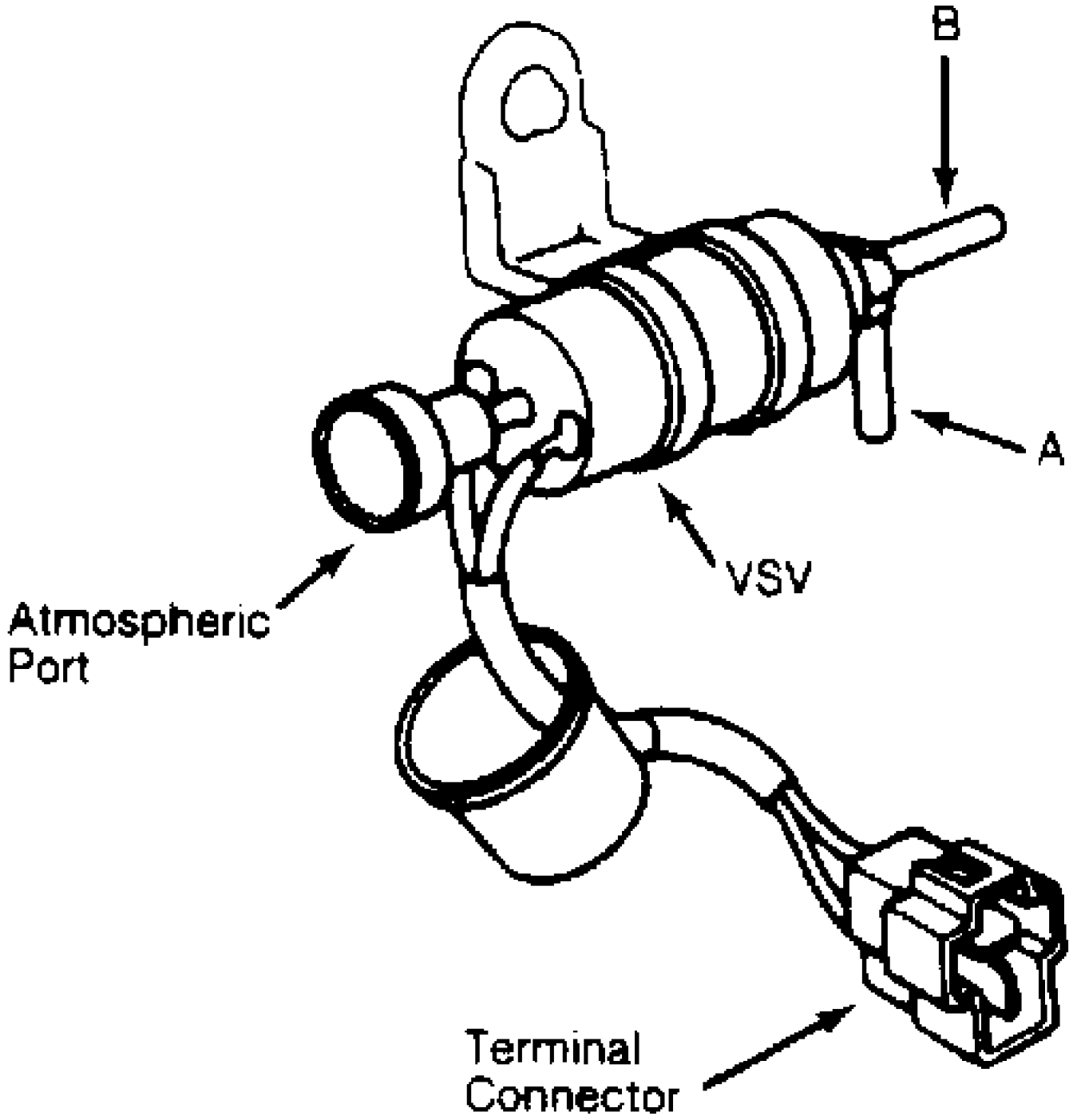

Fig. 11: Testing Vacuum Switching Valve
Courtesy of Toyota Motor Sales, U.S.A., Inc.

PRESSURE SWITCH TEST

1) Use manifold gauge set to check R-12 pressure. If high side is above 30 psi, pressure switch should keep electrical circuit to compressor completed. If not, test as described.

2) Remove glove box and lower trim. Disconnect leads from pressure switch. Using an ohmmeter, check continuity between terminals. Reading should be zero. If not, replace pressure switch.

NOTE: For removal and installation procedure of heater components, see HEATER SYSTEMS.

COMPRESSOR R & I

Removal

1) If possible, run system for more than 10 minutes before beginning removal. Disconnect battery. Detach magnetic clutch wire from A/C harness. Discharge A/C system using approved refrigerant recovery/recycling equipment.

2) Detach A/C hoses from service valves. Plug all openings. Loosen and remove compressor belt from pulley. Remove compressor mounting bolts and remove compressor.

Installation

To install, reverse removal procedure. Evacuate, recharge and leak test system.

EVAPORATOR ASSEMBLY R & I

Removal

1) Disconnect battery. Discharge A/C system using approved refrigerant recovery/recycling equipment. Detach inlet and outlet lines and grommets from evaporator. Plug openings.

2) Disconnect electrical leads from evaporator. Remove glove box and lower trim panel. Remove side air duct. Remove nuts, bolts and evaporator assembly.

Disassembly

1) Remove thermistor. Release spring clips holding covers together. Remove any screws at case joints. Separate upper and lower cases from evaporator core. Remove idle stabilizing amplifier from lower case.

2) Remove heat insulator from outlet tube. Remove high side (inlet) line from expansion valve and remove expansion valve. Remove pressure switch.

Reassembly & Installation

Reverse disassembly and removal procedure. If installing new evaporator core, add 1.4-1.7 oz. of refrigerant oil to core prior to installation. Evacuate, recharge and leak test system.

CONDENSER R & I

Removal

Discharge A/C system using approved refrigerant recovery/ recycling equipment. Remove grille and hood lock brace. Remove lower engine cover, if equipped. Detach A/C lines from condenser. Plug all openings. Remove mounting bolts and take out condenser.

Installation

To install, reverse removal procedure. If installing new condenser, add 1.4-1.7 oz. of refrigeration oil before installation. Evacuate, recharge and leak test system.

RECEIVER-DRIER R & I

Removal

Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove A/C lines from receiver-drier. Plug all openings. Remove mounting bolts and take out receiver-drier.

Installation

To install, reverse removal procedure. Add 0.7 oz. of refrigerant oil on all models. Evacuate, recharge and leak test system.

EXPANSION VALVE R & I

Evaporator must be removed to remove expansion valve. See EVAPORATOR ASSEMBLY removal and installation procedures in this article.

PRESSURE SWITCH R & I

Evaporator assembly must be removed to remove pressure switch. See EVAPORATOR ASSEMBLY removal and installation procedures in this article.

WIRING DIAGRAMS

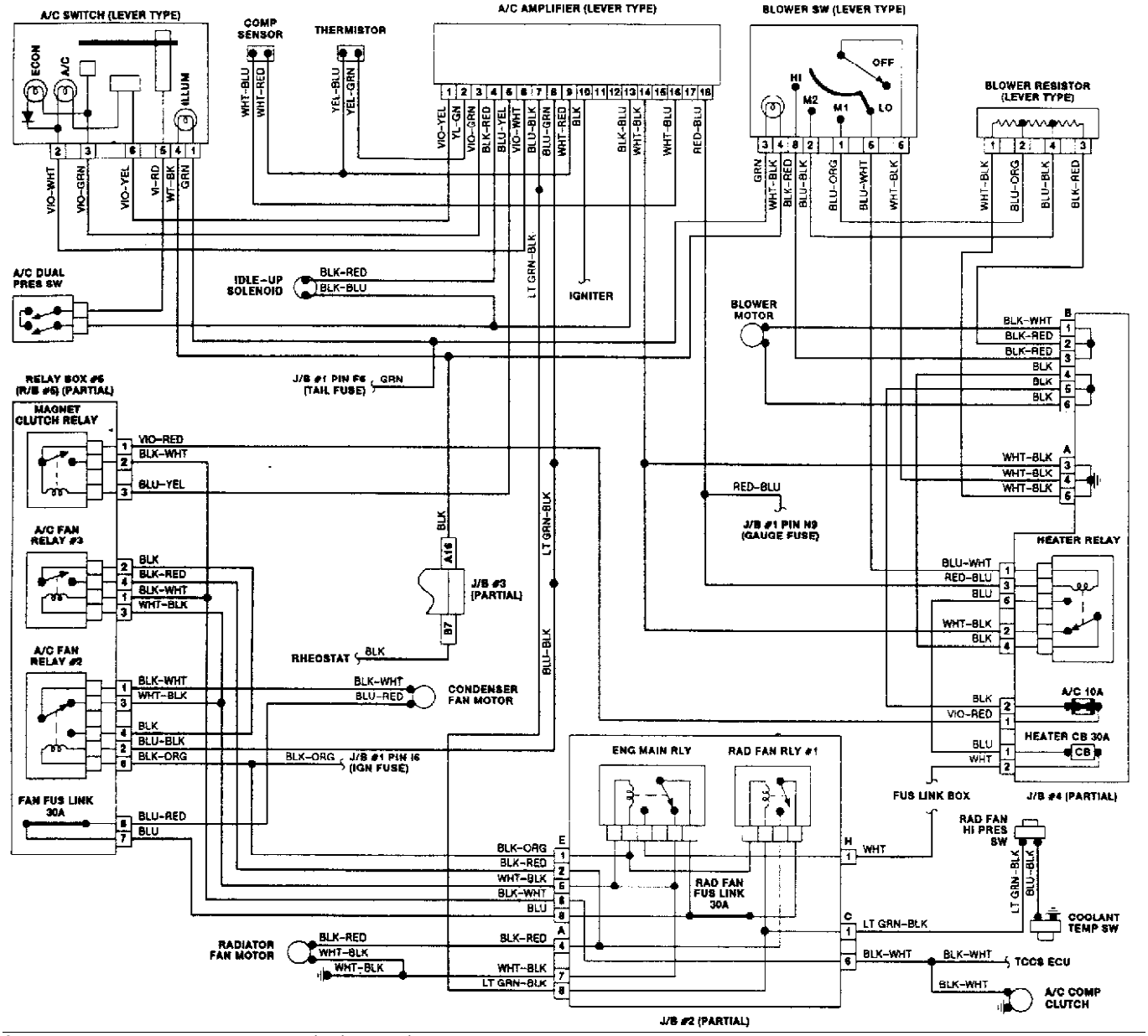

Fig. 12: Lever Type System Wiring Diagram

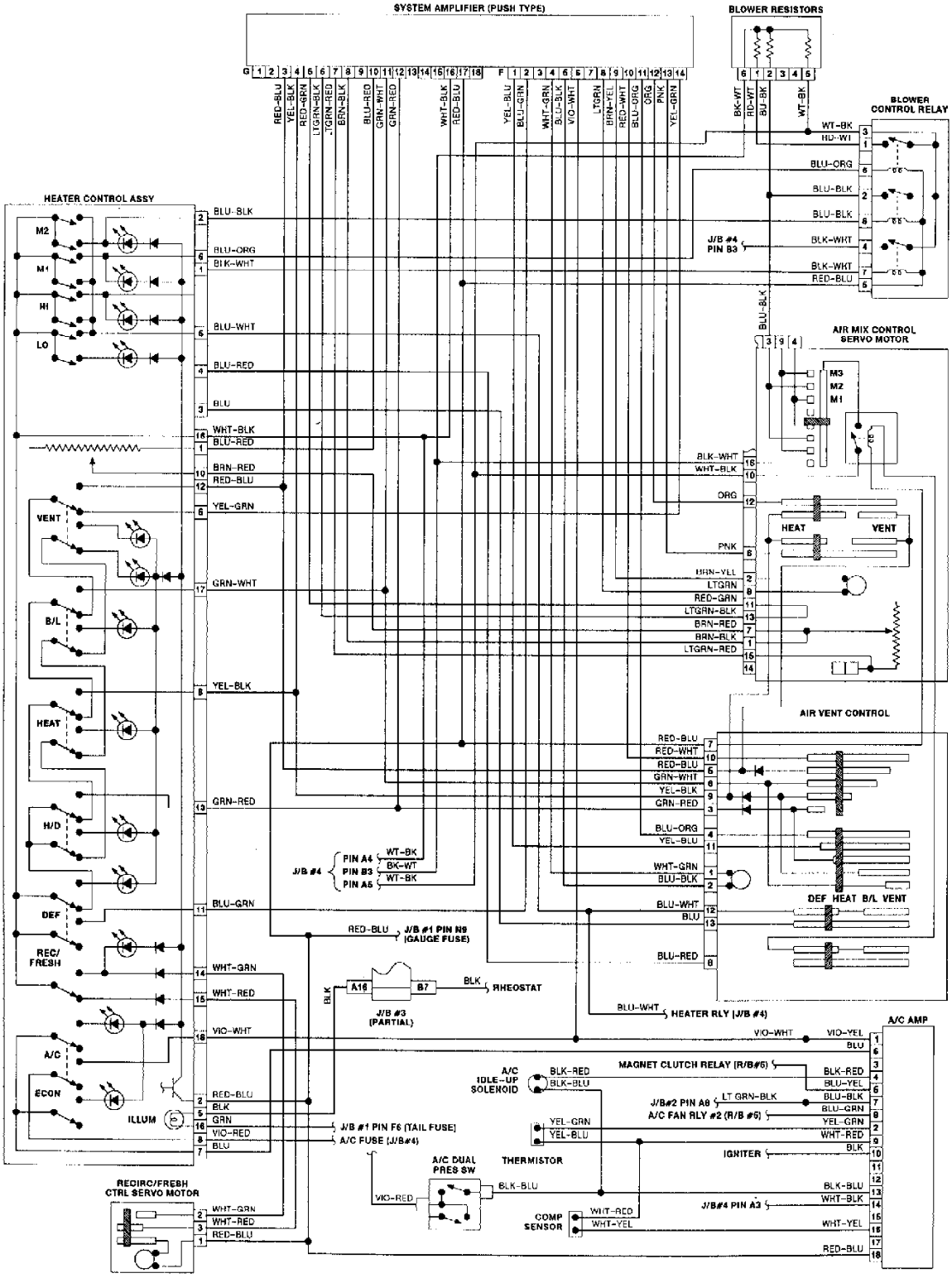

Fig. 13: Push Button System Wiring Diagram (1 of 2)

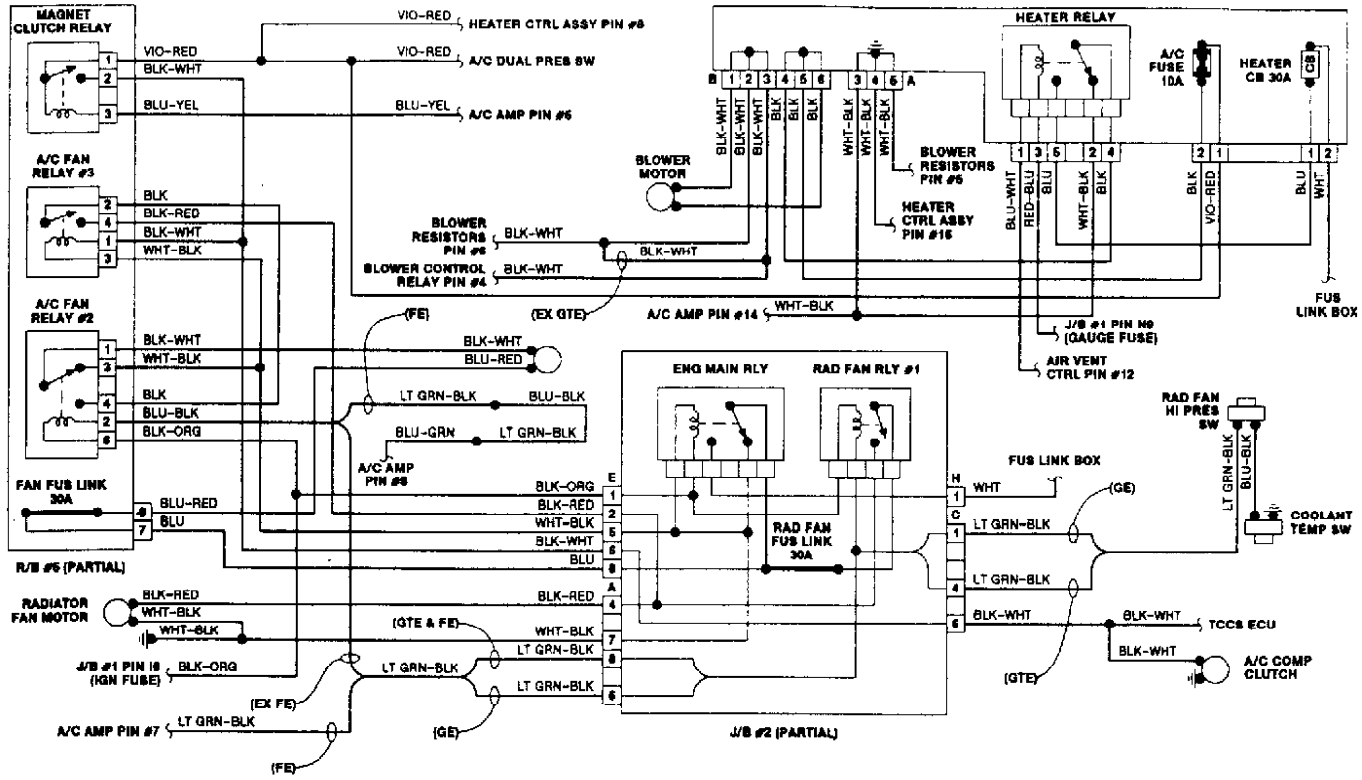

Fig. 14: Push Button System Wiring Diagram (2 of 2)