

A/C-HEATER SYSTEM - MANUAL

1994 Toyota Celica

1994 Manual A/C-Heater System

Celica

A/C SYSTEM SPECIFICATIONS

MANUAL A/C SYSTEM SPECIFICATIONS TABLE

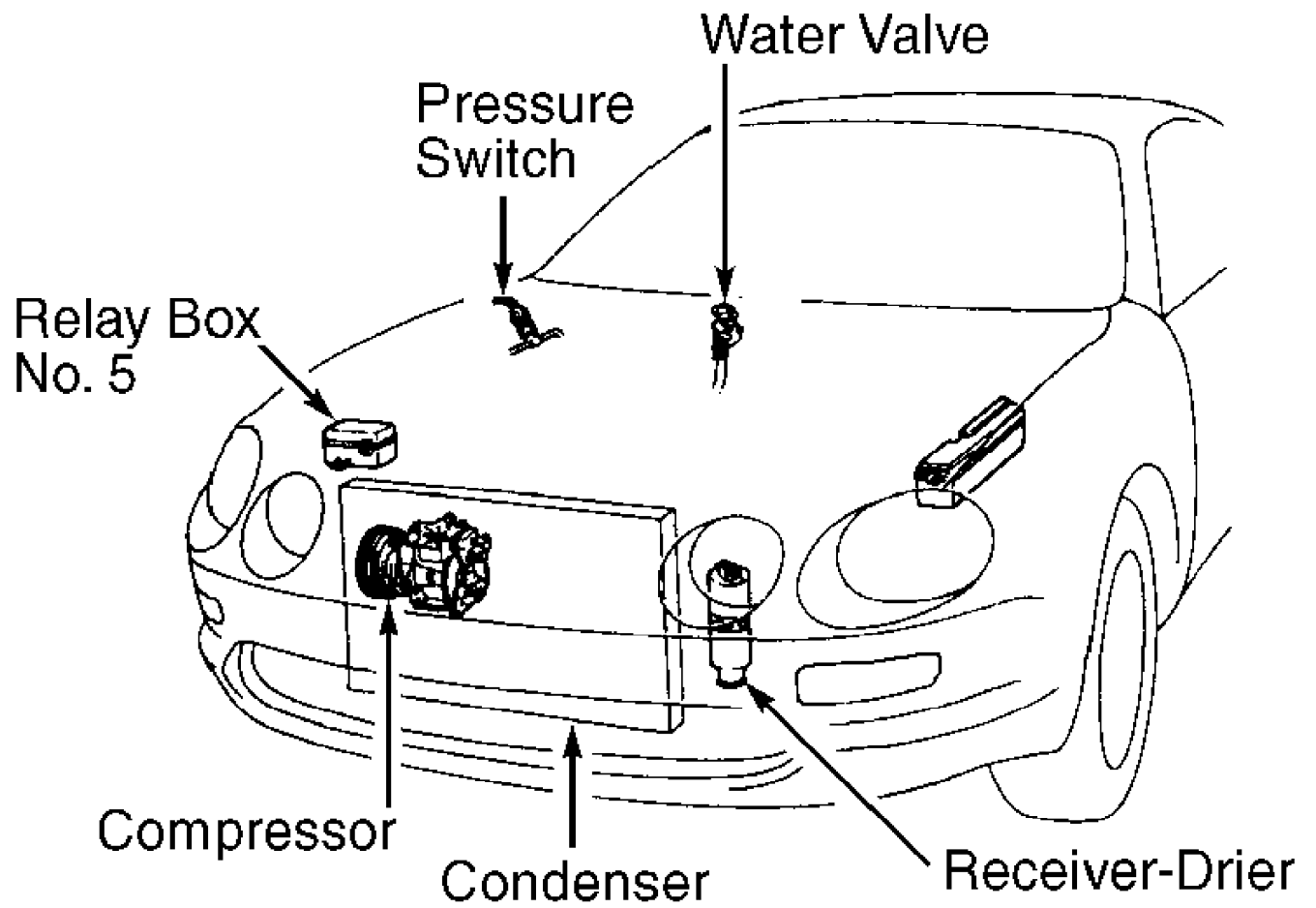
Application	Specification
Compressor Type	(1) Nippondenso 10PA15C 10-Cyl.
Compressor Belt Tension (2)	
1.8L Engine	
New	120-140 lbs. (54-64 kg)
Used	60-80 lbs. (27-36 kg)
2.2L Engine	
New	155-175 lbs. (70-79 kg)
Used	100-120 lbs. (45-54 kg)
Compressor Oil Capacity (3)	4.1 ozs.
Refrigerant (R-134a) Capacity	21.1-24.7 ozs.
System Operating Pressures (4)	
High Side	199-228 psi (14-16 kg/cm ²)
Low Side	21-36 psi (1.5-2.5 kg/cm ²)

- (1) - A Nippondenso 10PA17C/VC 10-cylinder compressor may also be used.
- (2) - Measure with belt tension gauge at midpoint of longest belt run.
- (3) - Use ND-OIL 8 (Part No. 38899-PR7-003).
- (4) - Specification is with ambient temperature at 86-95°F (30-35°C) and 1500 RPM engine speed.

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.

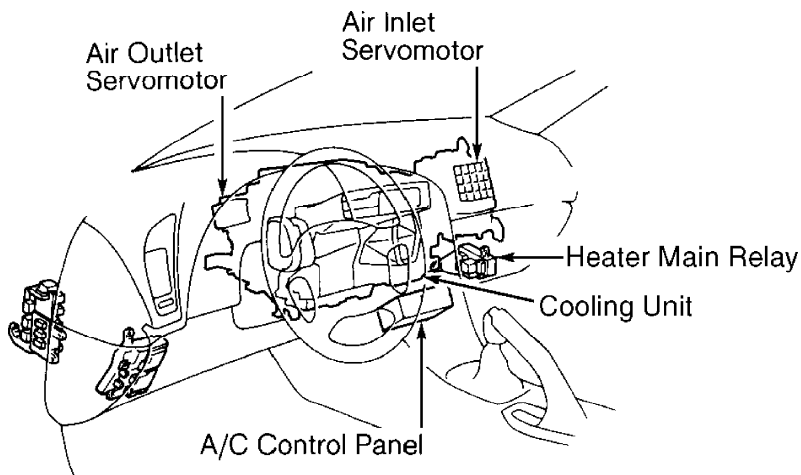
DESCRIPTION

System components include A/C control panel, A/C amplifier, evaporator, evaporator temperature sensor, pressure switch, engine coolant temperature switch, A/C compressor, condenser, receiver-drier, and pipes and hoses. See Figs. 1-2. Air doors operate by cables or servomotors. A/C compressor operation and A/C operation modes are electrically controlled. Cooling fans operate in response to engine temperature and A/C operating conditions.



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Fig. 1: Identifying Manual A/C-Heater System Components (1 Of 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 2: Identifying Manual A/C-Heater System Components (2 Of 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

OPERATION

SYSTEM CONTROLS

Knobs and push buttons control A/C control modes and temperature setting. See Fig. 3. The temperature control knob operates the blend-air door in the A/C-heater unit to mix cooled and heated air to obtain the selected temperature. The system provides cooled air when A/C switch is on and blower motor is in any position other than OFF.

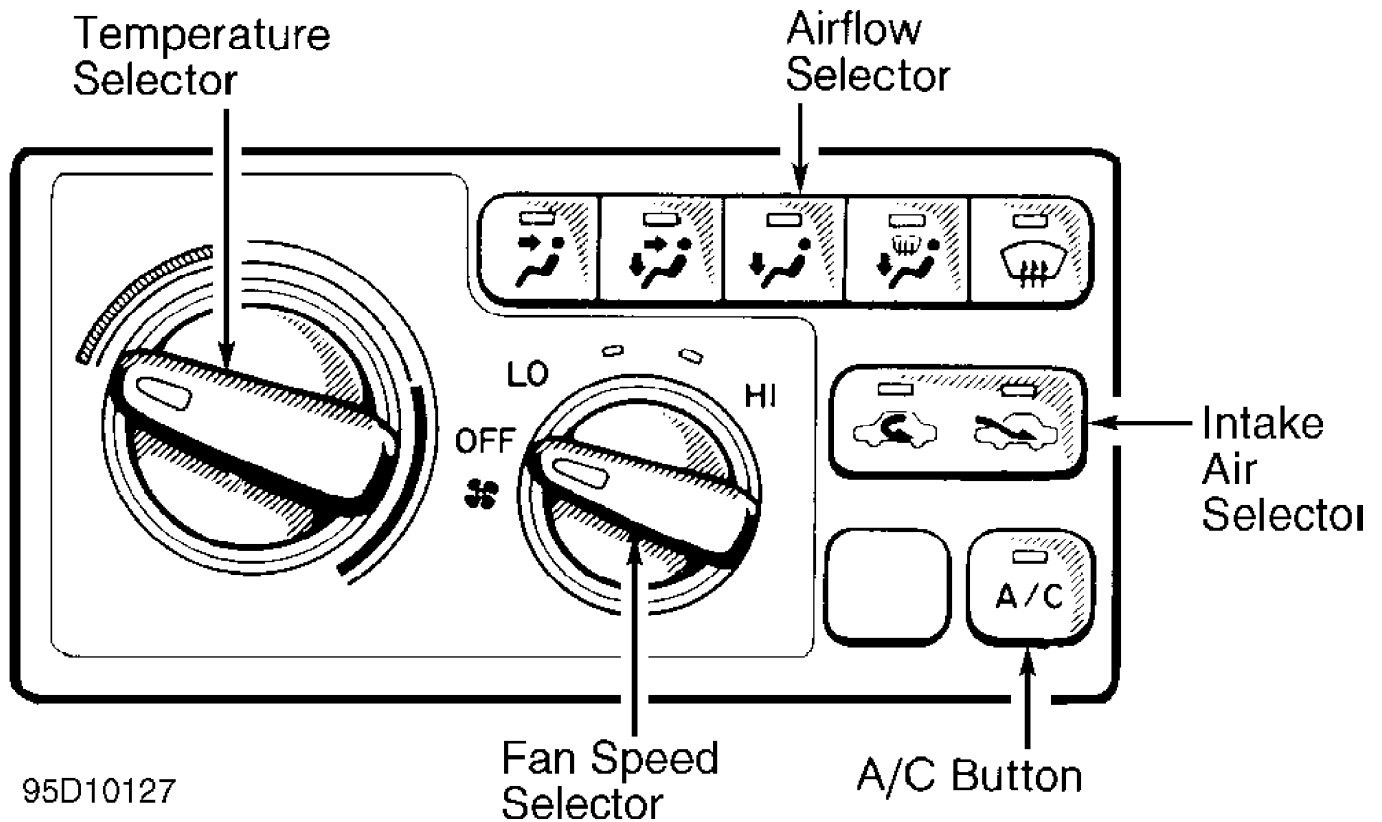


Fig. 3: Identifying A/C-Heater Control Panel Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

SYSTEM COMPONENTS

A/C Switch

When A/C switch is pressed, the system will operate if the blower motor control is in any position other than off. When activated, the A/C switch allows the compressor clutch to engage and operate the compressor.

Pressure Switch

The pressure switch is threaded into the liquid line. It sends a signal to the A/C amplifier to inhibit compressor operation whenever high side pressure is too high or too low.

Evaporator Temperature Sensor

This sensor is mounted at the air outlet side of the evaporator to sense airflow temperature. The A/C amplifier uses the signal from this sensor to send appropriate electrical signals to the compressor clutch for on-off cycling.

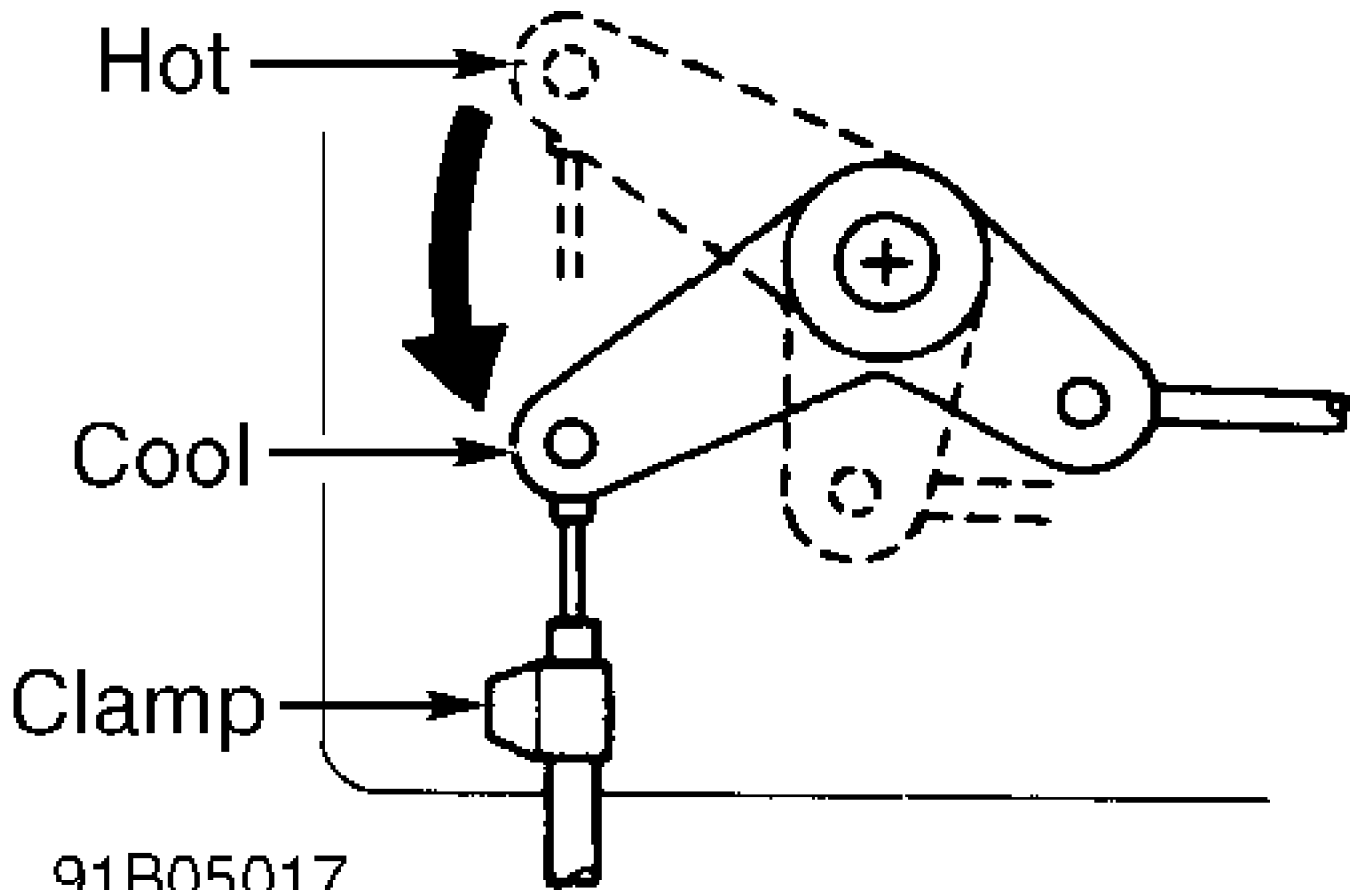
Vacuum Switching Valve (VSV)

This valve assists in smooth engine operation when the compressor is engaged. 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, allowing throttle to return to normal idle position.

ADJUSTMENTS

AIR MIX DAMPER

Disconnect air mix damper control cable. Set air mix damper and temperature control knob to cool position. See Fig. 4. Install control cable and clamp while lightly pushing cable in direction of arrow.

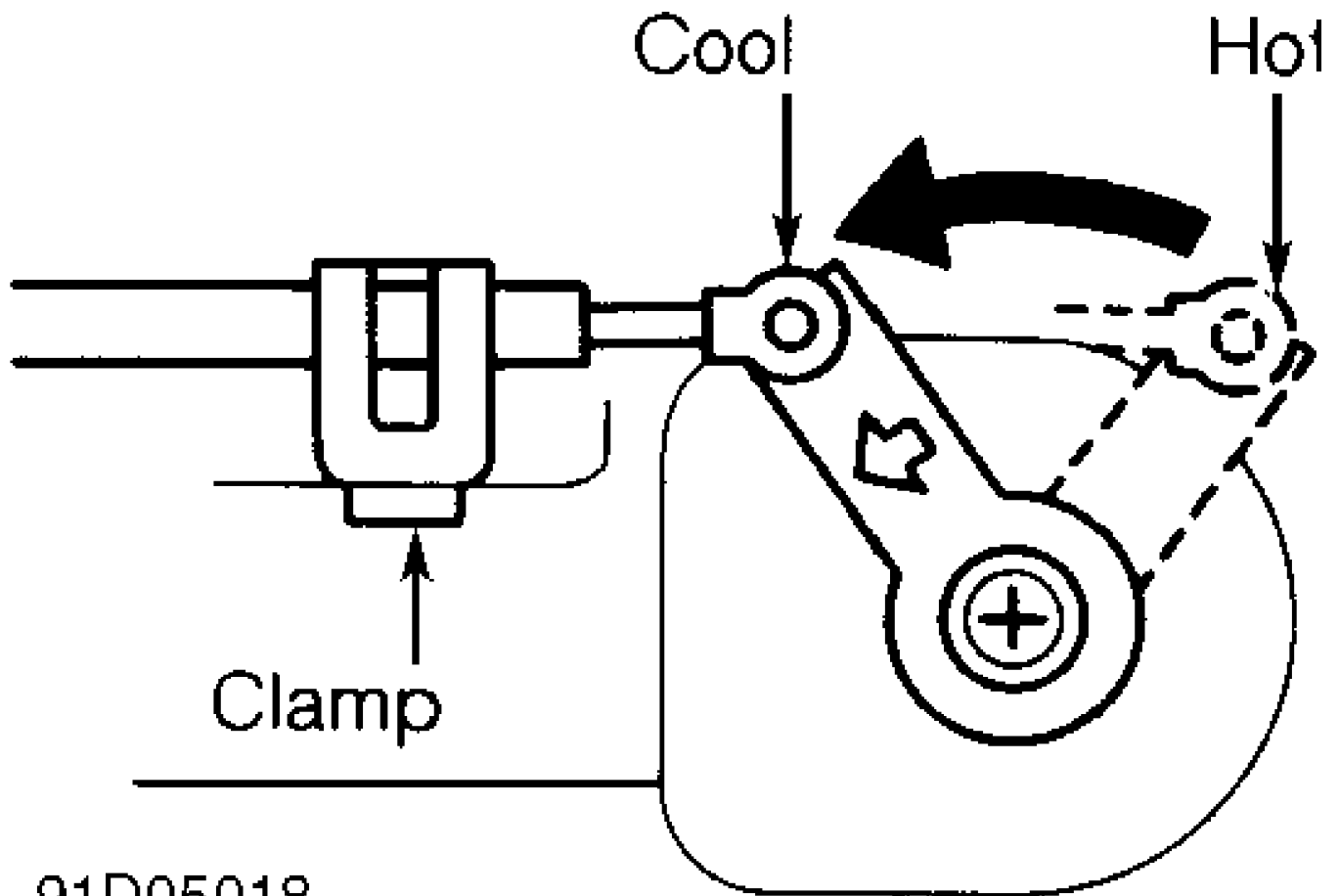


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Fig. 4: Adjusting Air Mix Damper
Courtesy of Toyota Motor Sales, U.S.A., Inc.

HEATER VALVE

Disconnect control cable from water valve. See Figs. 1-2. Set temperature control knob to cool position. Set heater valve lever to cool position. See Fig. 5. Install control cable and clamp while lightly pushing cable in direction of arrow.



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Fig. 5: Adjusting Heater Valve Control Cable
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

TROUBLE SHOOTING

NO BLOWER OPERATION

Problem may be blown fuses or faulty A/C control panel, blower motor, or resistor. Also inspect for defective wiring or bad ground.

NO COOL AIR

Problem may be blown fuses, incorrect refrigerant charge, incorrect A/C compressor belt tension, faulty compressor clutch relay, faulty pressure switch, or faulty A/C compressor. Inspect for plugged receiver-drier, condenser, expansion valve, or evaporator. Also inspect for faulty A/C-heater control panel, evaporator temperature sensor, A/C amplifier, or wiring.

COOL AIR ONLY AT HIGH SPEED

Problem may be incorrect refrigerant charge, incorrect A/C compressor belt tension, or faulty A/C compressor. Inspect for plugged condenser.

INSUFFICIENT COOLING

Problem may be incorrect refrigerant charge, incorrect A/C compressor belt tension, or plugged receiver-drier or condenser. Inspect for faulty A/C compressor, or faulty A/C fan or relay. Also inspect for faulty expansion valve, faulty A/C-heater control panel, or faulty wiring.

INSUFFICIENT COOL AIR VELOCITY

Problem may be by faulty blower motor, blocked air inlet, clogged/frosted evaporator, or air leakage from evaporator case or air duct.

TESTING

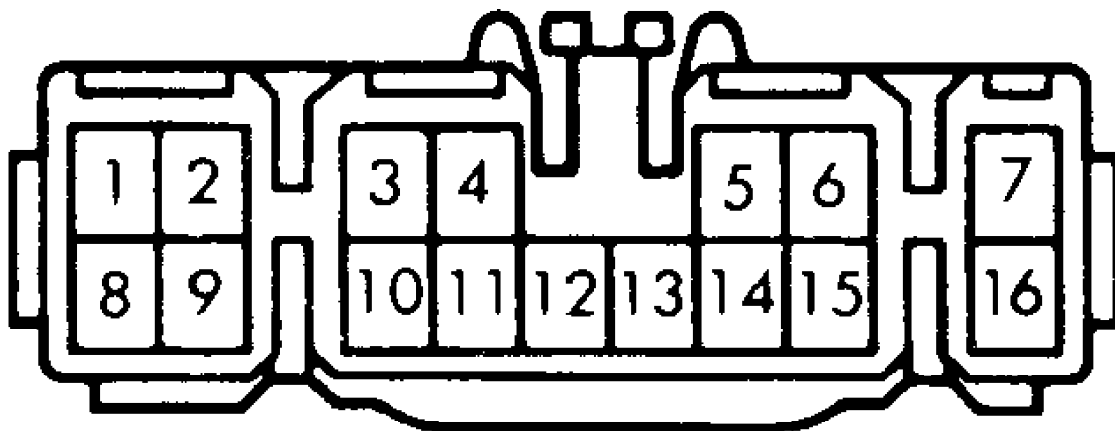
WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in appropriate AIR BAG RESTRAINT SYSTEM article in ACCESSORIES/SAFETY EQUIPMENT section.

A/C SYSTEM PERFORMANCE

Connect manifold gauge set. Operate engine at 1500 RPM. Set blower switch to high speed position. Set temperature control knob for maximum cooling. Set A/C-heater control panel for recirculated air mode. Ambient temperature should be between 86-95°F (30-35°C). Compare system operating pressures to SPECIFICATIONS table at beginning of article.

A/C AMPLIFIER

Unplug A/C amplifier connector, located within cooling unit. See Figs. 1-2. Make appropriate measurements at harness connector terminals. See Fig. 6. See A/C AMPLIFIER CIRCUIT TEST table. If all measurements are as specified, temporarily substitute known good A/C amplifier, then retest system. If any measurement is not as specified, repair circuit or component as necessary.



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Fig. 6: Identifying A/C Amplifier Connector Terminals
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

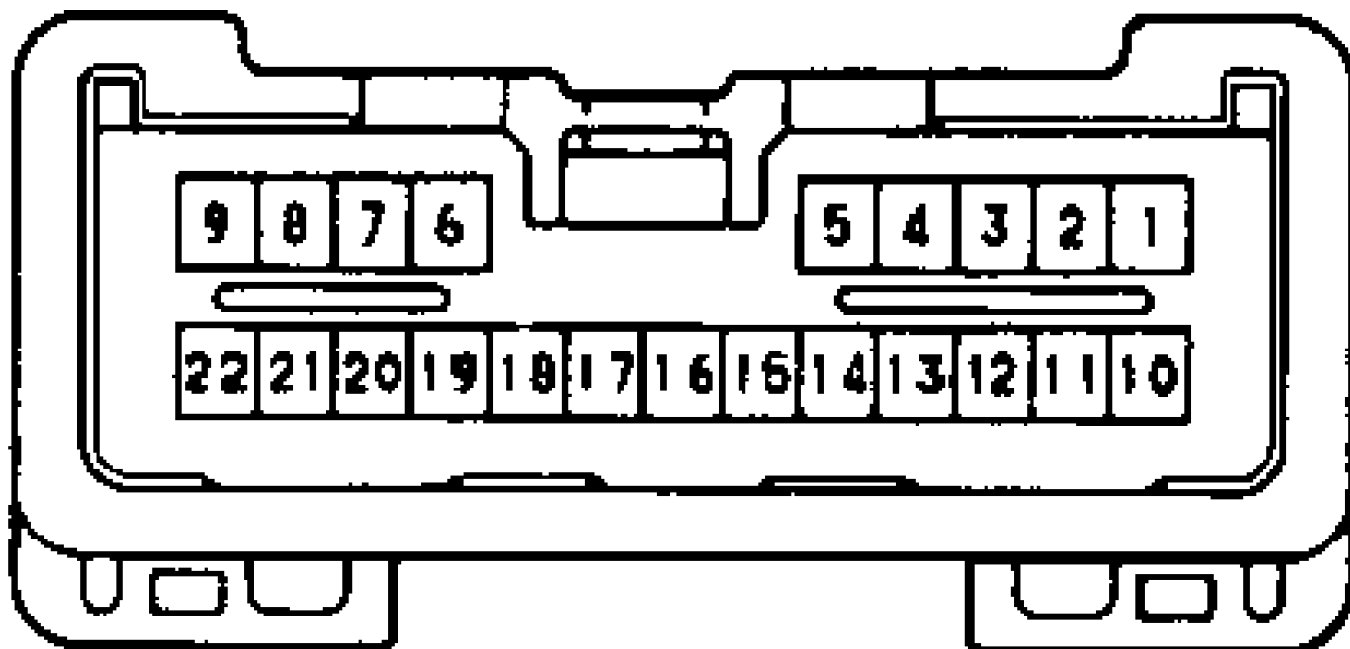
Terminal	Specification
6 & Ground	Continuity
11 To 15	(2) 1500 Ohms
15 To 16 (2.2L)	(2) 1500 Ohms
5 To Ground	10-14 Volts
7 To Ground	(2) 1200 Ohms
10 To Ground (3)	Battery Voltage
10 To Ground (4)	No Voltage
12 To Ground (3)	Battery Voltage
12 To Ground (4)	No Voltage
14 To Ground	Battery Voltage

- (1) - Basic test condition: ignition on, temperature control set to maximum cool position, and blower switch set to HI position.
- (2) - At 68°F (20°C).
- (3) - A/C switch on.
- (4) - A/C switch off.

A/C CONTROL PANEL

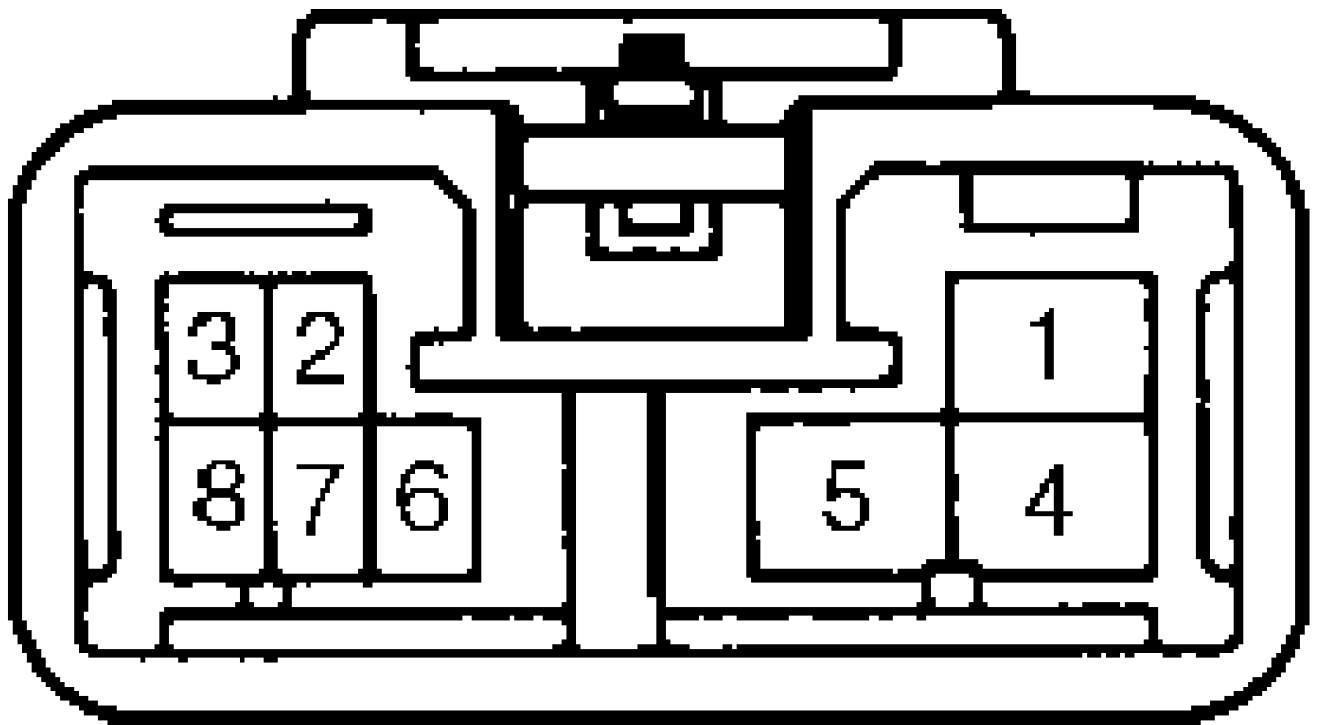
1) Disconnect negative battery cable. Remove A/C control panel. See A/C CONTROL PANEL under REMOVAL & INSTALLATION.

2) Test for continuity between terminals A15 and A20. See Figs. 7-10. Press A/C button to off position. Continuity should not exist. Press A/C button to on position. Continuity should exist. Replace A/C control panel if continuity is not as specified.



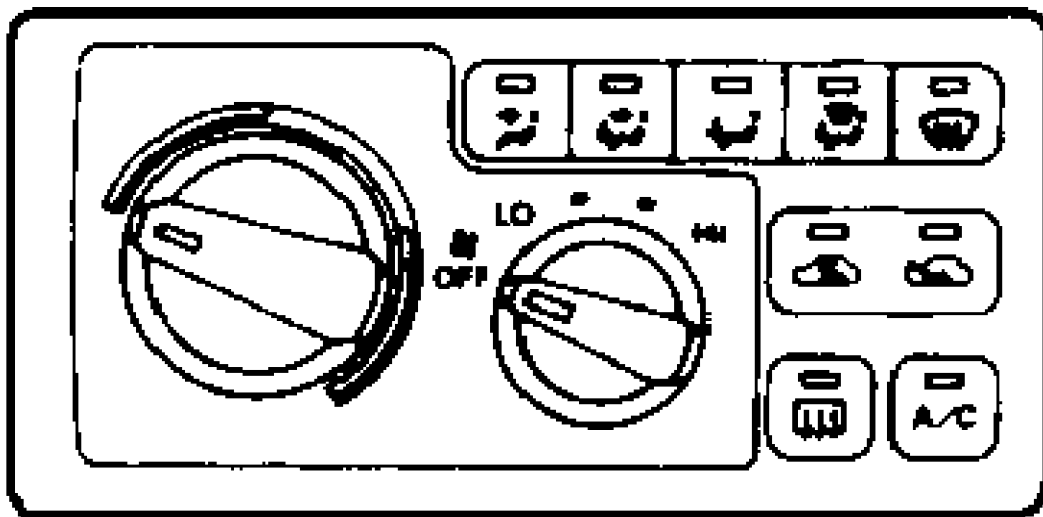
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Fig. 7: Identifying A/C Control Panel Terminals (1 Of 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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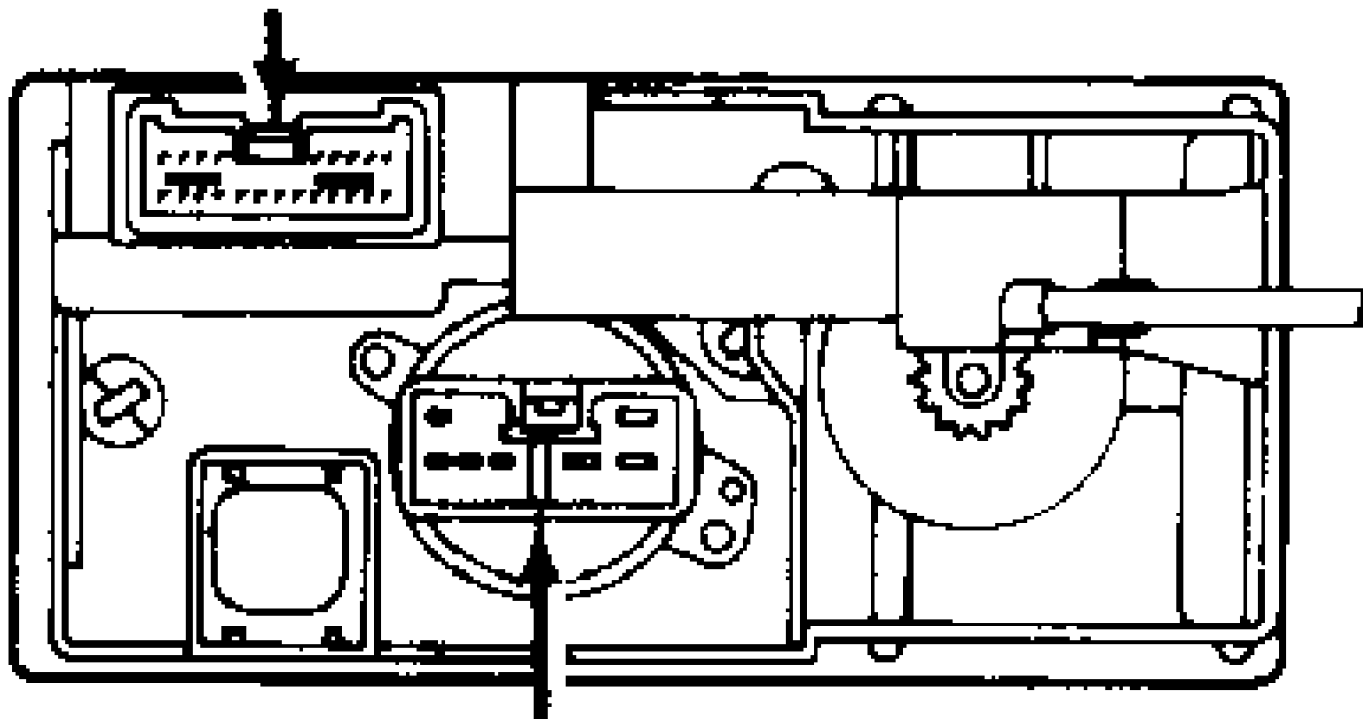
Fig. 8: Identifying A/C Control Panel Terminals (2 Of 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 9: Identifying A/C Control Panel Terminal Connector "A"
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

See Connector "A"



See Connector "B"

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Fig. 10: Identifying A/C Control Panel Terminal Connector "B"
Courtesy of Toyota Motor Sales, U.S.A., Inc.

3) Test for continuity between terminals as specified in MODE SWITCH CONTINUITY table. Replace A/C control panel if continuity is not as specified.

MODE SWITCH CONTINUITY TABLE

Position	Terminals
FACE	A7-A22
B/L	A8-A22
FOOT	A5-A22
FOOT/DEF	A4-A22
DEF	A3-A22

4) Test for continuity between terminals A17 and A22. Continuity should exist with recirculated air button pressed. Continuity should not exist with recirculated air button released. Replace A/C control panel if continuity is not as specified.

5) Test for continuity between terminals A16 and A22. Continuity should exist with fresh air button pressed. Continuity

should not exist with fresh air button released. Replace A/C control panel if continuity is not as specified.

6) Test for continuity between terminals as specified in BLOWER SPEED SWITCH CONTINUITY table. Replace A/C control panel if continuity is not as specified.

BLOWER SPEED SWITCH CONTINUITY TABLE

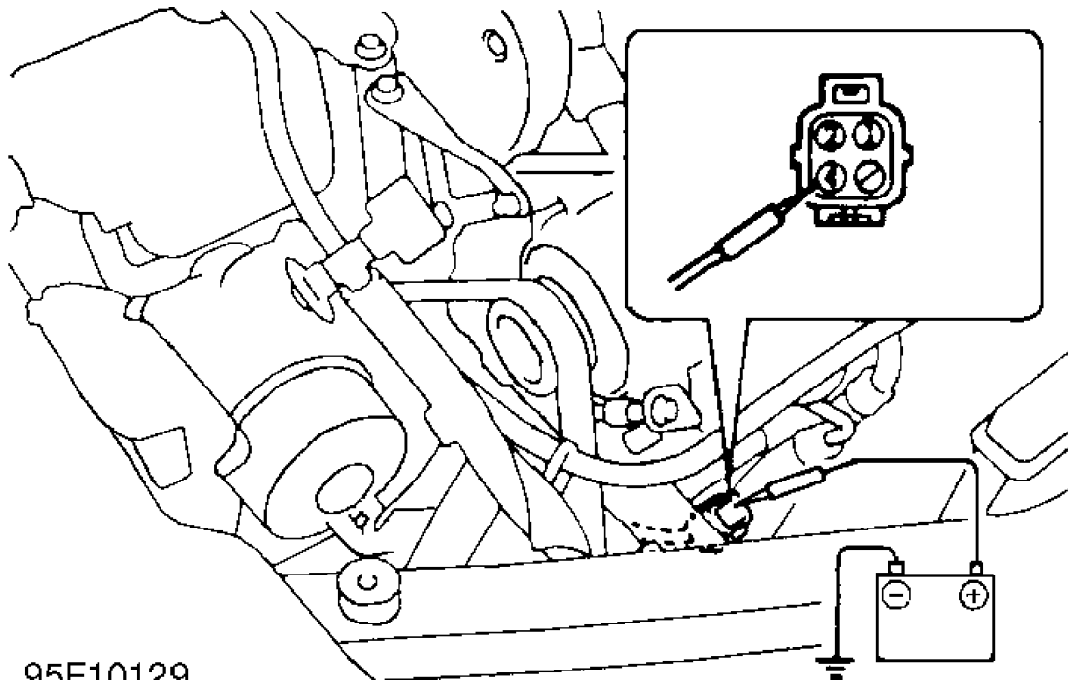
Position	Terminals
OFF	None
LO	B1-B3
MED LO	B1-B3-B4
MED HI	B1-B3-B8
HI	B1-B3-B5

BLOWER MOTOR

Unplug wiring harness connector. Blower motor is located under right side of instrument panel. Apply battery voltage to motor connector terminals. Replace motor if it does not operate smoothly.

COMPRESSOR CLUTCH

Inspect pressure plate and rotor for oil contamination. Inspect clutch bearing for noisy operation or grease leakage. Apply battery voltage to terminal No. 4 of compressor clutch connector on 2.2L. See Fig. 11. On 1.8L, apply battery voltage to single terminal of compressor clutch connector. On all vehicles, repair or replace clutch if it does not engage.



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Fig. 11: Identifying A/C Compressor Terminals (2.2L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

CONDENSER FAN MOTOR

Unplug fan motor connector. Apply battery voltage to fan motor connector terminals. Fan motor should run smoothly, and current draw should be 6.0-7.4 amps. If operation is not as specified, replace condenser fan motor.

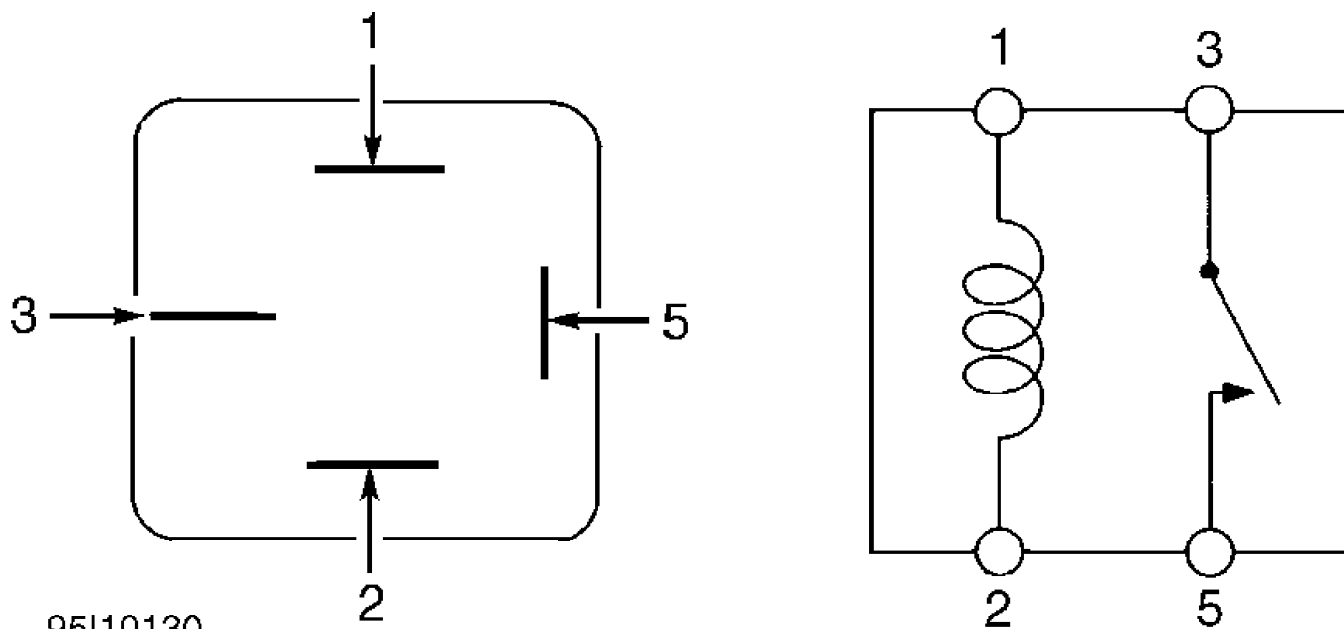
COOLANT TEMPERATURE SWITCH

Remove temperature switch. On 1.8L engines, switch is located beneath distributor. On 2.2L engines, switch is threaded into lower radiator tank. Connect continuity tester across coolant temperature switch terminals. Heat switch in water bath. Switch should open at 199°F (93°C). Allow switch to cool. Switch should close at 181°F (83°C). Replace switch if it does not function as specified.

RELAYS

Compressor Clutch Relay

Remove relay, located in relay box No. 5, on right side of engine compartment. See Figs. 1-2. Test for continuity between terminals No. 3 and 5. See Fig. 12. Continuity should not exist. Apply battery voltage to terminals No. 1 and 2. Continuity should exist between terminals No. 3 and 5. If continuity is not as specified, replace relay.

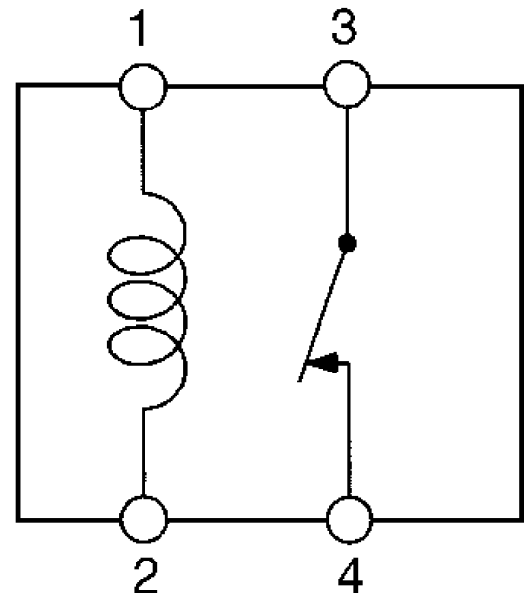
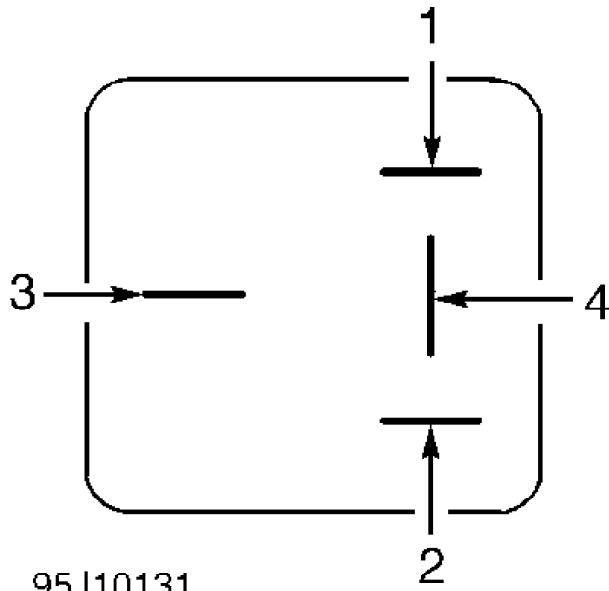


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Fig. 12: Identifying Compressor Clutch Relay Terminals

Fan Relay No. 1

Remove relay, located in relay box No. 2, on left side of engine compartment. Test for continuity between terminals No. 3 and 4. See Fig. 13. Continuity should exist. Apply battery voltage to terminals No. 1 and 2. Continuity should not exist between terminals No. 3 and 4. If continuity is not as specified, replace relay.

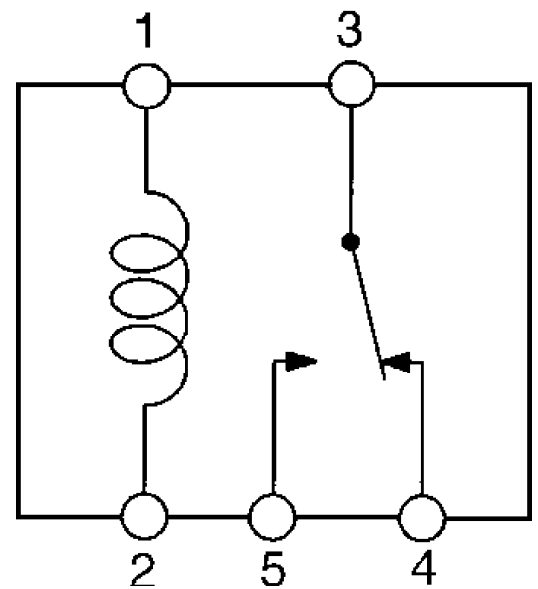
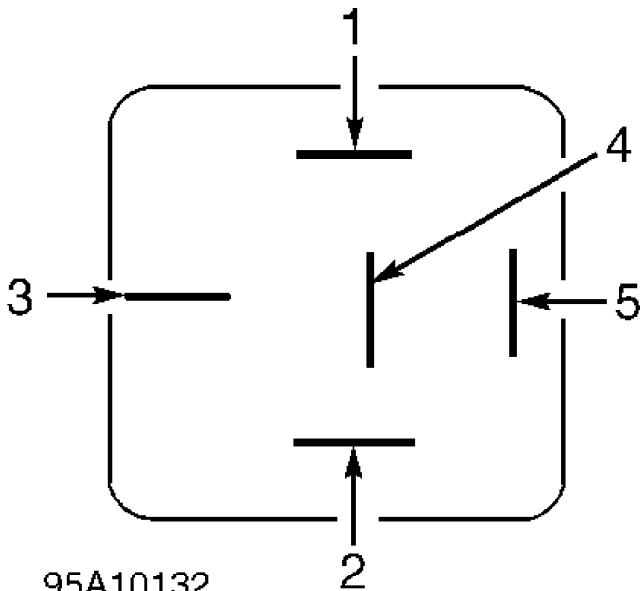


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Fig. 13: Identifying Fan Relay No. 1 Terminals

Fan Relay No. 2

Remove relay, located in relay box No. 5, on right side of engine compartment. See Figs. 1-2. Test for continuity between terminals No. 3 and 5. See Figs. 14. Continuity should not exist. Apply battery voltage to terminals No. 1 and 2. Continuity should exist between terminals No. 3 and 5. If continuity is not as specified, replace relay.



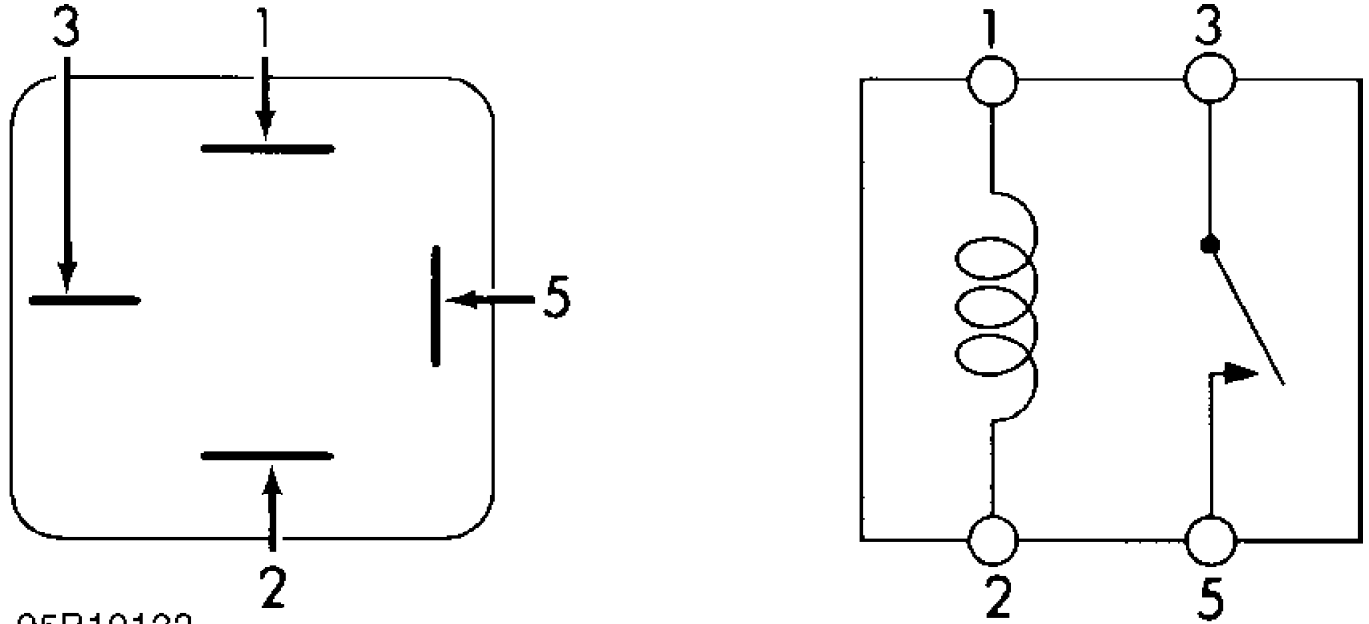
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Fig. 14: Identifying Fan Relay No. 2 Terminals

Fan Relay No. 3

Remove relay, located in relay box No. 5, on right side of engine compartment. See Figs. 1-2. Test for continuity between terminals No. 3 and 5. See Fig. 15. Continuity should not exist. Apply battery voltage to terminals No. 1 and 3. Continuity should exist between terminals No. 3 and 5. If continuity is not as specified,

replace relay.

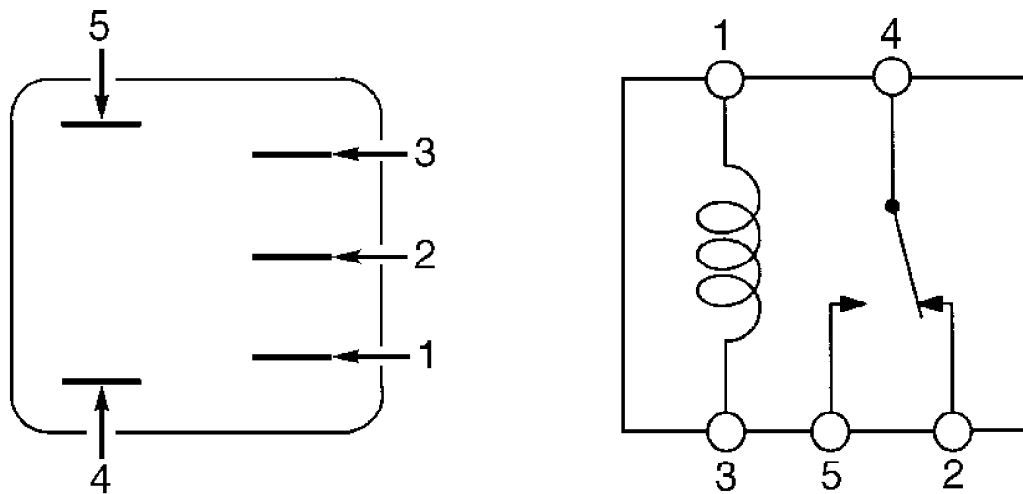


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Fig. 15: Identifying Fan Relay No. 3 Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Heater Main Relay

Remove relay, located in relay box No. 4, at right kick panel. See Figs. 1-2. Test for continuity between terminals No. 1 and 3, and between terminals No. 2 and 4. See Fig. 16. Continuity should exist. Apply battery voltage to terminals No. 1 and 3. Continuity should not exist between terminals No. 2 and 4. Continuity should exist between terminals No. 4 and 5. If continuity is not as specified, replace relay.



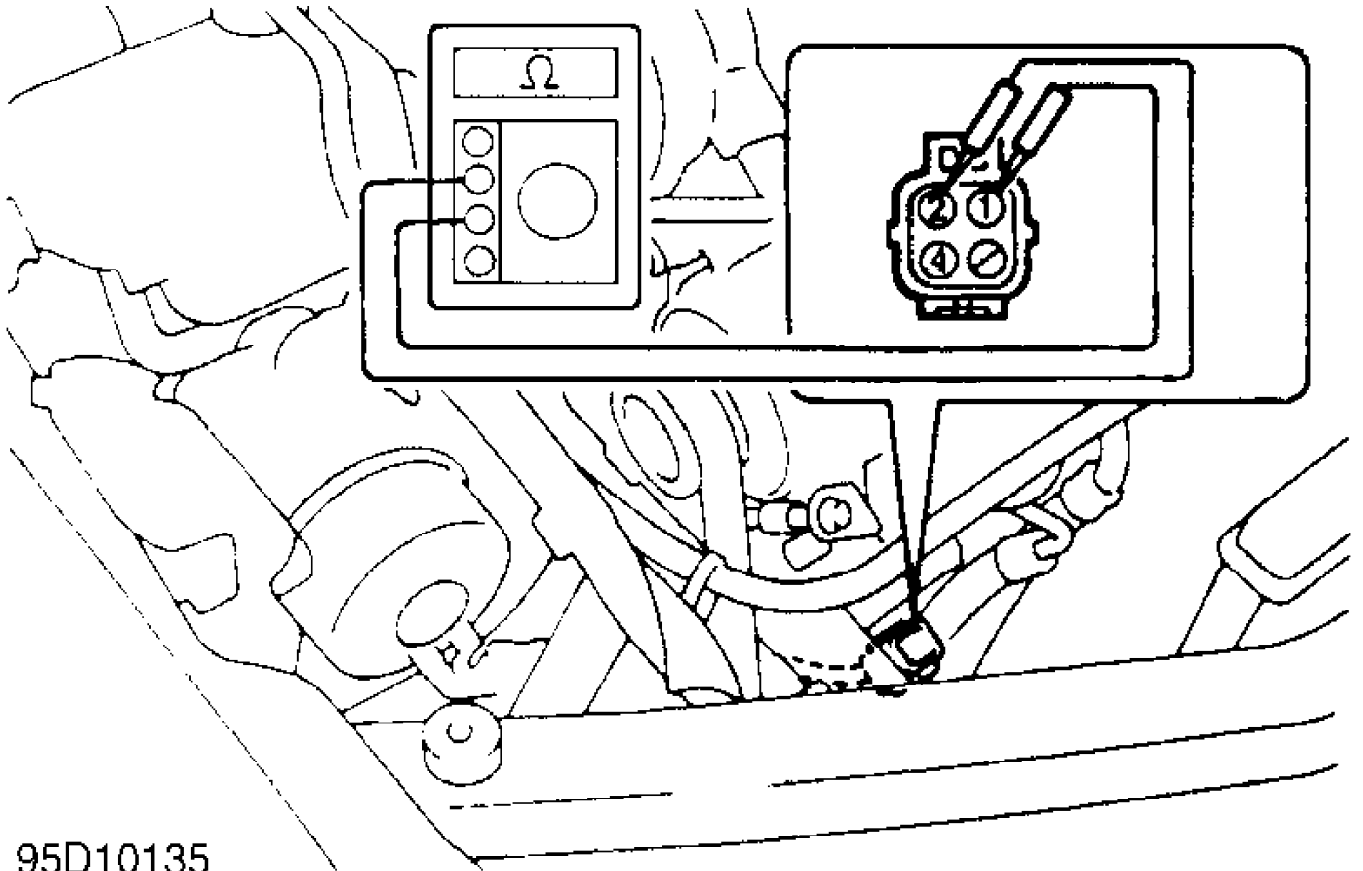
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Fig. 16: Identifying Heater Main Relay Terminals

RPM SENSOR

Unplug RPM sensor connector, located at A/C compressor.

Measure resistance between RPM sensor terminals No. 1 and 2. See Fig. 17. Resistance should be 165-205 ohms at 68°F (20°C). If resistance is not within specification, replace RPM sensor.



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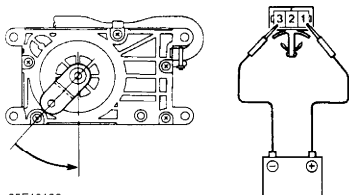
Fig. 17: Identifying RPM Sensor Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

SERVOMOTORS

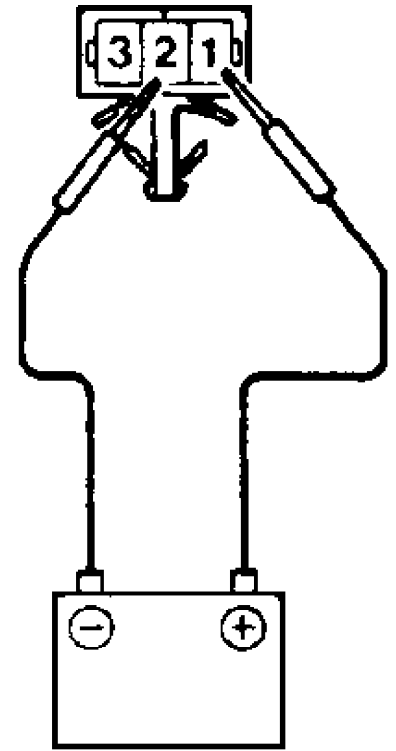
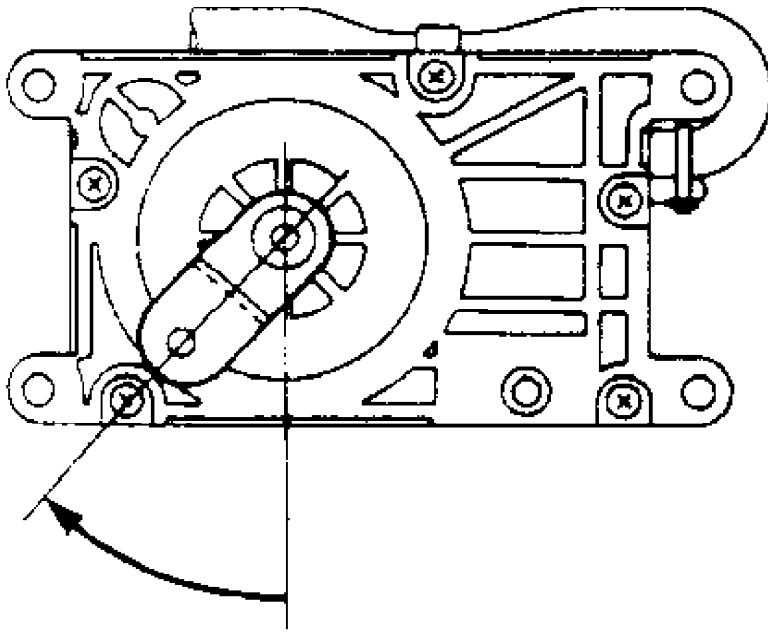
Air Inlet Servomotor

1) Remove servomotor. See AIR INLET SERVOMOTOR under REMOVAL & INSTALLATION. Apply battery voltage to terminal No. 1. Connect terminal No. 3 to ground. Servomotor lever should move smoothly to fresh air position.

2) Disconnect power leads. Connect battery voltage to terminal No. 1. Connect terminal No. 2 to ground. Servomotor lever should move smoothly to recirculated air position. If operation is not as specified, replace servomotor.



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Fig. 18: Testing Air Inlet Control Servomotor (1 Of 2)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 19: Testing Air Inlet Control Servomotor (2 Of 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

Air Outlet Servomotor

Remove servomotor. See AIR OUTLET SERVOMOTOR under REMOVAL & INSTALLATION. Apply battery voltage to terminal No. 5. Connect terminal No. 6 to ground. See Figs. 20-21. Connect specified terminals to ground. See TESTING AIR OUTLET SERVOMOTOR table. Servomotor arm should move smoothly to appropriate position. If operation is not as specified, replace servomotor.

TESTING AIR OUTLET SERVOMOTOR TABLE

Ground Terminal No.	Arm Position
1	Face
2	Bi-Level
3	Foot
4	Foot/Defrost
7	Defrost

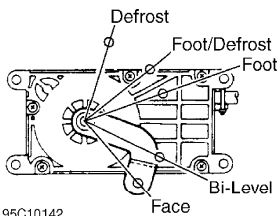
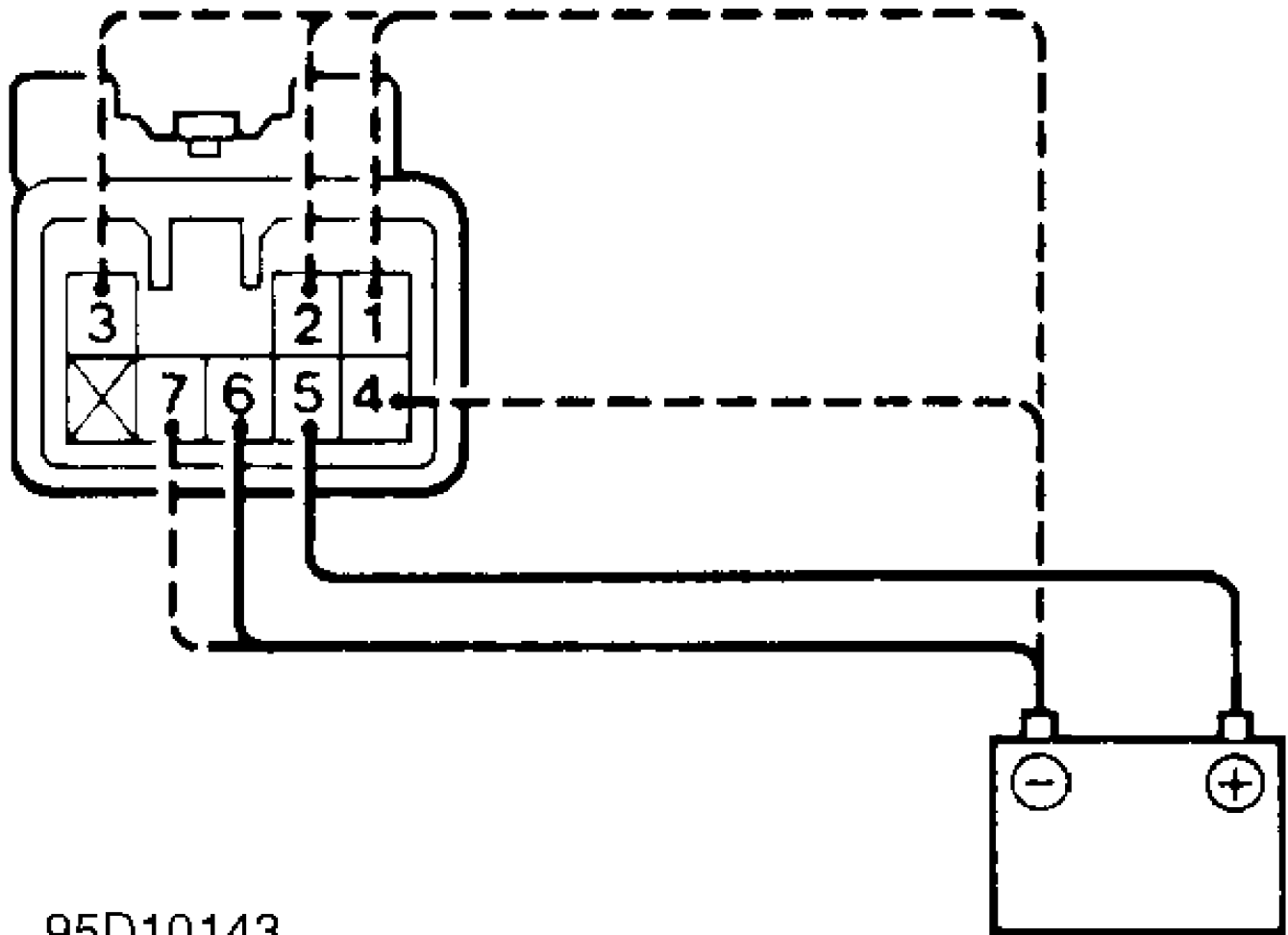


Fig. 20: Testing Air Outlet Servomotor (1 Of 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 21: Testing Air Outlet Servomotor (2 Of 2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

EVAPORATOR TEMPERATURE SENSOR

Remove evaporator and evaporator temperature sensor. See EVAPORATOR under REMOVAL & INSTALLATION. Immerse sensor at least 4" (100 mm) deep into water bath. Measure sensor resistance while cooling water to specified temperatures. See EVAPORATOR TEMPERATURE SENSOR RESISTANCE table. If resistance is not within specification, replace sensor.

EVAPORATOR TEMPERATURE SENSOR RESISTANCE TABLE

Temperature °F (°C)	Ohms
32 (0)	5000
59 (15)	2600

PRESSURE SWITCH

Compressor Clutch Control

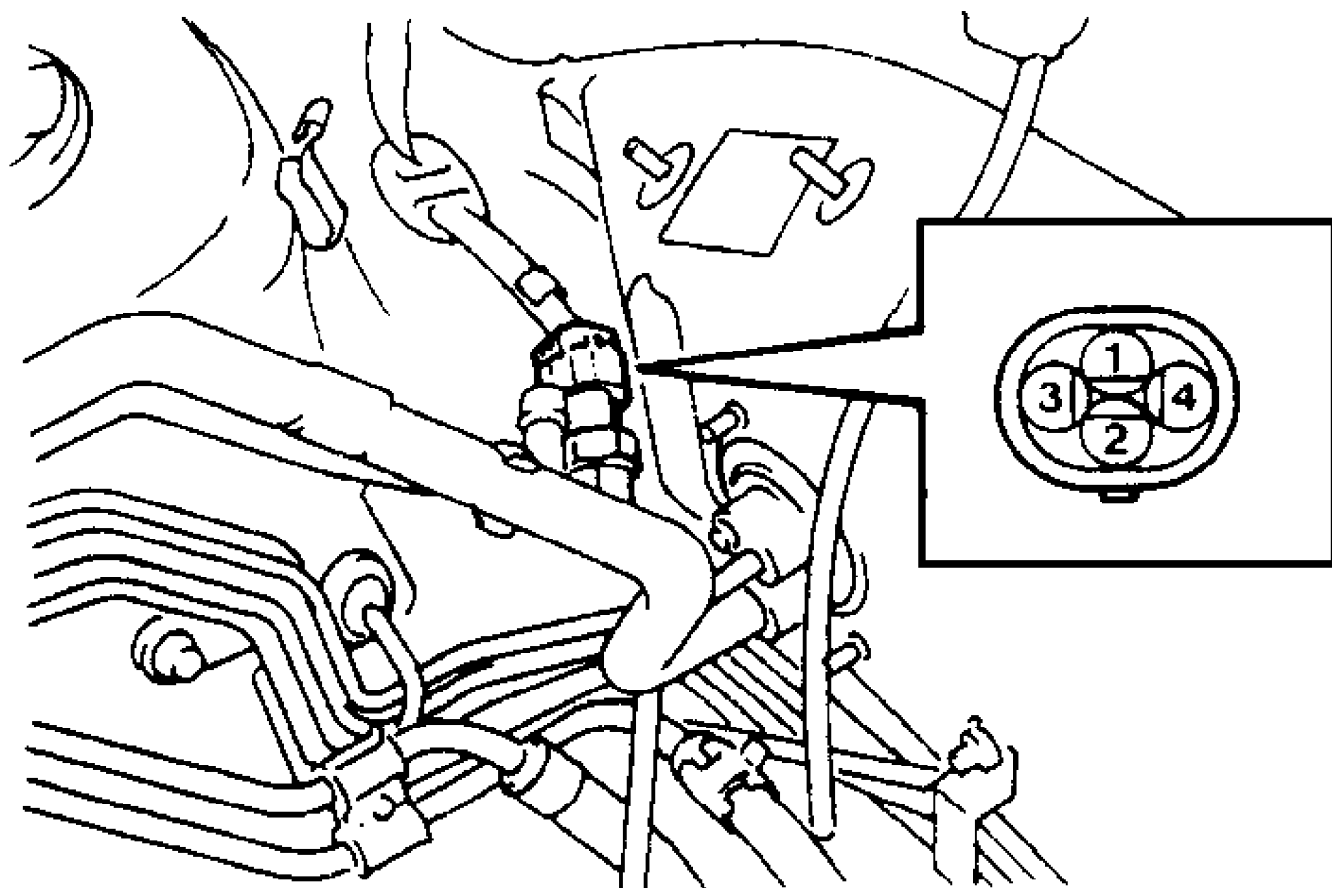
1) Pressure switch is located in engine compartment, on right side. See Figs. 1-2. Install manifold gauge set. Start and run engine at 2000 RPM. Turn A/C on. Observe system pressure. Unplug pressure

switch connector. Test for continuity between pressure switch terminals No. 1 and 4. See Fig. 22.

2) Continuity should not exist when high side pressure is lower than 28 psi (2.0 kg/cm²) or higher than 455 psi (32 kg/cm²). Continuity should exist when high side pressure is higher than 28 psi (2.0 kg/cm²) or lower than 455 psi (32 kg/cm²). If continuity is not as specified, replace pressure switch.

Condenser Fan Control

Connect continuity tester between terminals No. 2 and 3. See Fig. 22. When high side pressure increases to 220 psi (15.5 kg/cm²), switch should close. When pressure drops to approximately 178 psi (12.5 kg/cm²), switch should open. If switch does not function as specified, replace switch.



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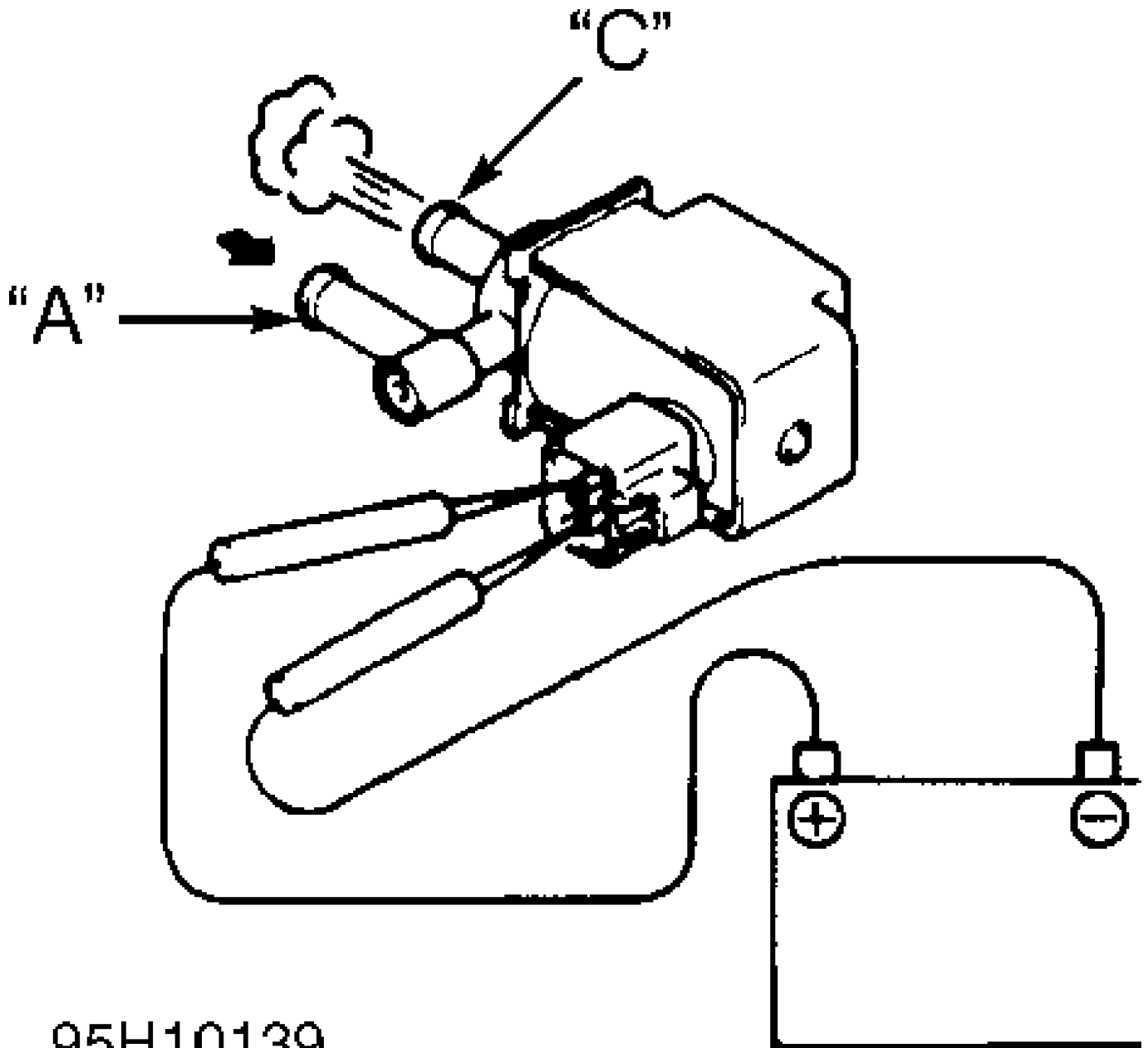
Fig. 22: Identifying Pressure Switch Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

VACUUM SWITCHING VALVE (VSV)

1.8L

1) VSV is in vacuum line between intake manifold and throttle valve. Disconnect vacuum hoses. See Fig. 23. Unplug electrical connector. Connect VSV terminals connector to battery. Blow air through port "A". Air should emerge through port "C".

2) Inspect for short between each terminal and VSV body. Measure resistance between terminals. Resistance should be 30-34 ohms at 68°F (20°C). Replace VSV if operation is not as specified.



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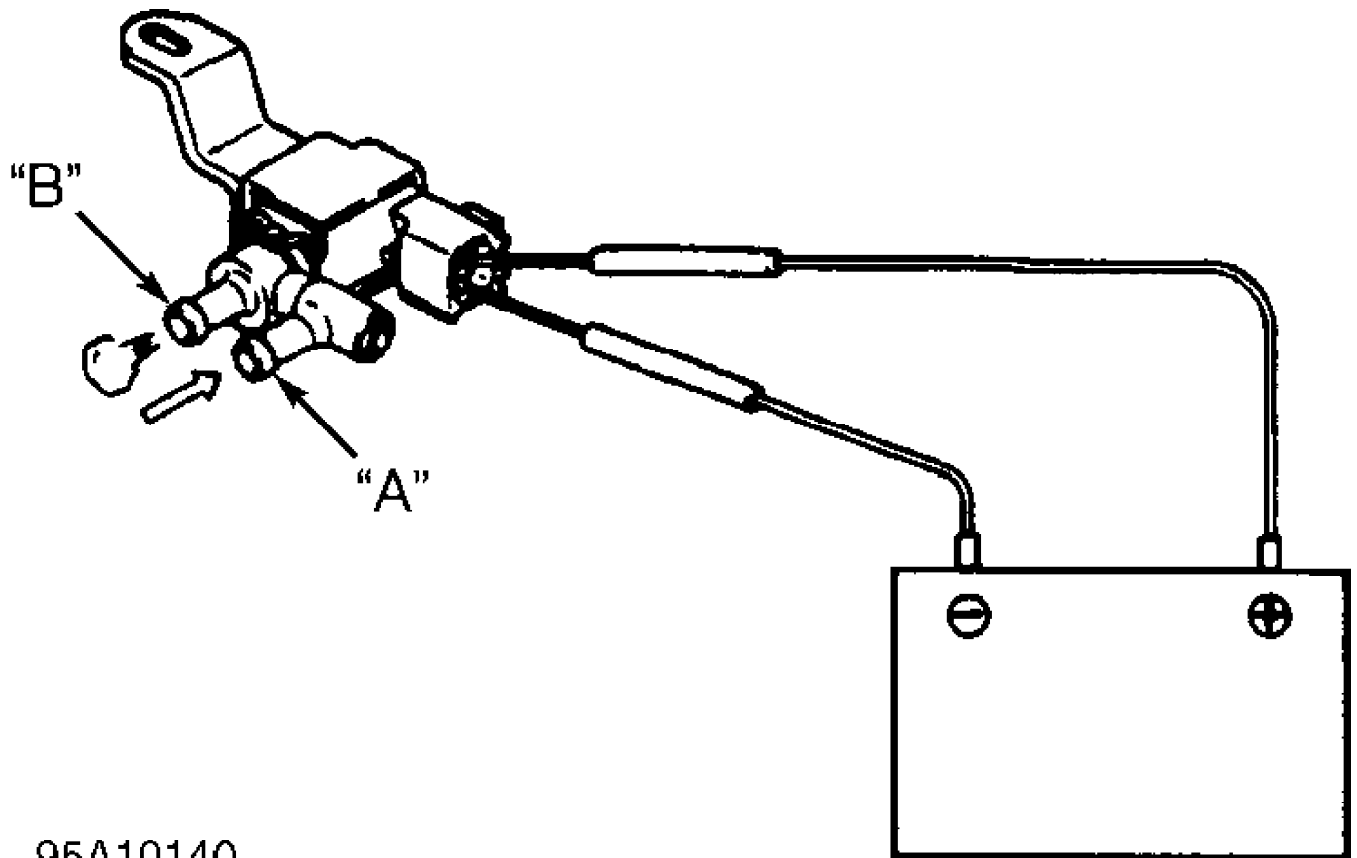
Fig. 23: Testing Vacuum Switching Valve (1.8L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

2.2L

1) VSV is located at intake manifold. Disconnect vacuum hoses. See Fig. 24. Unplug electrical connector. Connect VSV terminals connector to battery. Blow air through port "A". Air should emerge through port "B".

2) Disconnect battery leads. Blow air through fitting "A". Air should not emerge from port "B".

3) Inspect for short between each terminal and VSV body. Measure resistance between terminals. Resistance should be 30-34 ohms at 68°F (20°C). Replace VSV if operation is not as specified.



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Fig. 24: Testing Vacuum Switching Valve (2.2L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

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 appropriate AIR BAG RESTRAINT SYSTEM article in ACCESSORIES/SAFETY EQUIPMENT section.

A/C AMPLIFIER

Removal & Installation

Disconnect negative battery cable. Remove cooling unit. See EVAPORATOR. Remove A/C amplifier. To install, reverse removal procedure.

A/C CONTROL PANEL

Removal & Installation

Disconnect negative battery cable. Remove lower finish panel. Remove heater duct. Disengage control cables from A/C control panel. Remove upper console panel. Remove upper instrument cluster panel. Remove A/C control panel. To install, reverse removal procedure.

AIR INLET SERVOMOTOR

Removal & Installation

Disconnect negative battery cable. Remove instrument panel. See INSTRUMENT PANEL. Remove servomotor. See Figs. 1-2. To install, reverse removal procedure.

AIR OUTLET SERVOMOTOR

Removal & Installation

Disconnect negative battery cable. Remove lower finish panels from dash. Remove heater duct. Remove servomotor. See Figs. 1-2. To install, reverse removal procedure.

COMPRESSOR

Removal & Installation

1) If compressor runs, idle engine for 10 minutes with A/C on. Turn ignition off. Disconnect negative battery cable. Remove splash shield. Discharge A/C system using approved refrigerant recovery/recycling equipment. Unplug compressor connector.

2) Disconnect refrigerant hoses from compressor. Cap openings immediately. Loosen drive belt. Remove compressor. To install, reverse removal procedure. If replacing compressor, add 4.1 ounces of refrigerant oil to replacement compressor. Evacuate and recharge system. Test system for leaks.

CONDENSER

Removal

Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove cooling fan. Remove upper radiator mounts. Disconnect inlet and outlet lines. Plug openings immediately. Remove condenser.

Installation

To install, reverse removal procedure. If installing new condenser, add 1.4 ounces of refrigerant oil before installation. Evacuate and recharge system. Test system for leaks.

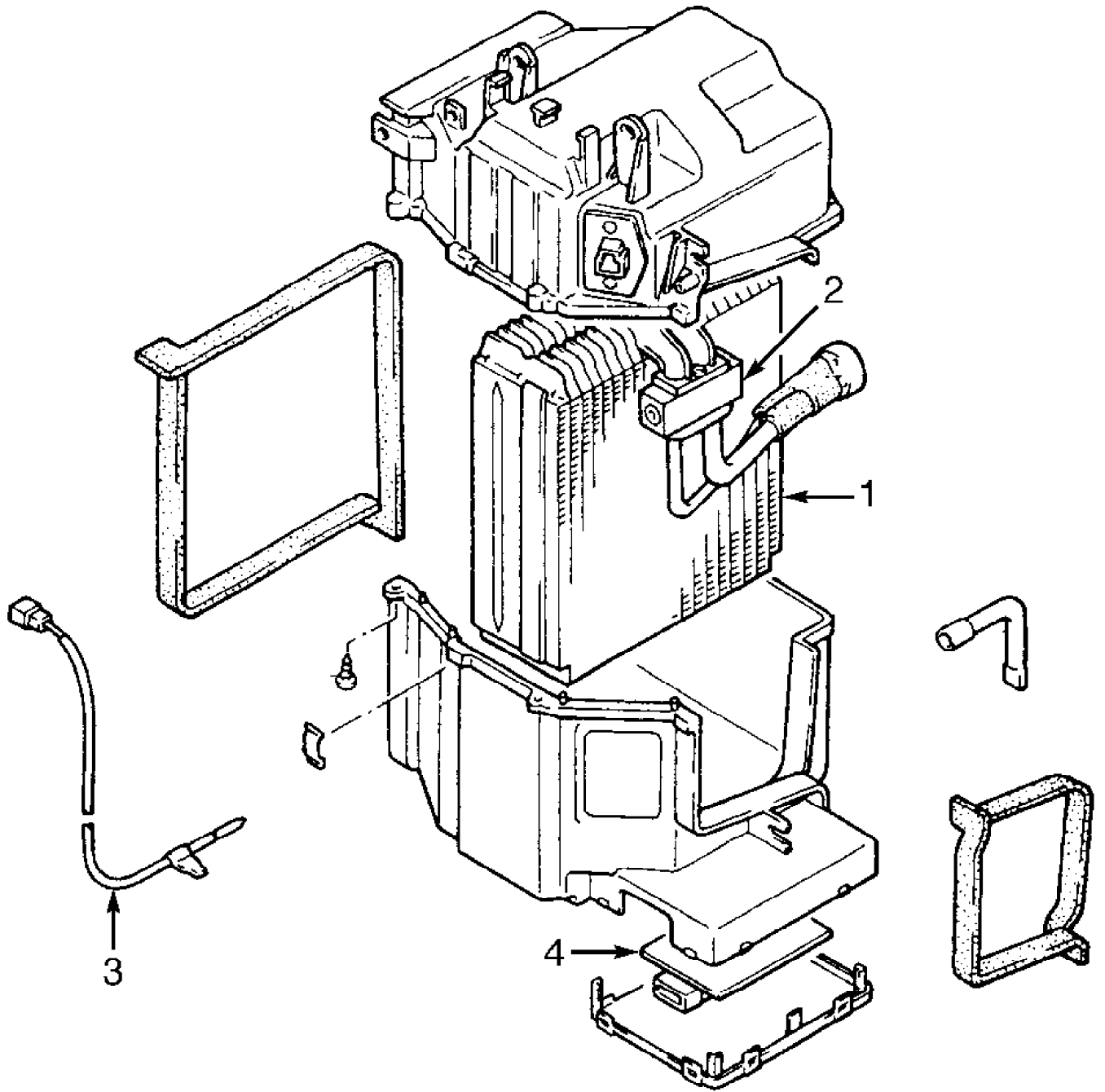
EVAPORATOR

Removal

Disconnect negative battery cable. Discharge A/C system using approved refrigerant recovery/recycling equipment. Disconnect inlet and outlet lines. Plug openings immediately. Remove grommets. Remove instrument panel and reinforcement. See INSTRUMENT PANEL. Unplug electrical connectors. Separate cooling unit cases. Remove evaporator. See Fig. 25.

Reassembly & Installation

To install evaporator assembly, reverse removal procedure. If installing new evaporator core, add 1.4 ounces of refrigerant oil before installation. Evacuate and recharge system. Test system for leaks.



- 1. Evaporator
- 2. Expansion Valve

- 3. Evaporator Temperature Sensor
- 4. A/C Amplifier

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Fig. 25: Exploded View Of Cooling Unit
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

EVAPORATOR TEMPERATURE SENSOR

Removal & Installation

Remove evaporator. See EVAPORATOR. Remove evaporator temperature sensor. To install, reverse removal procedure.

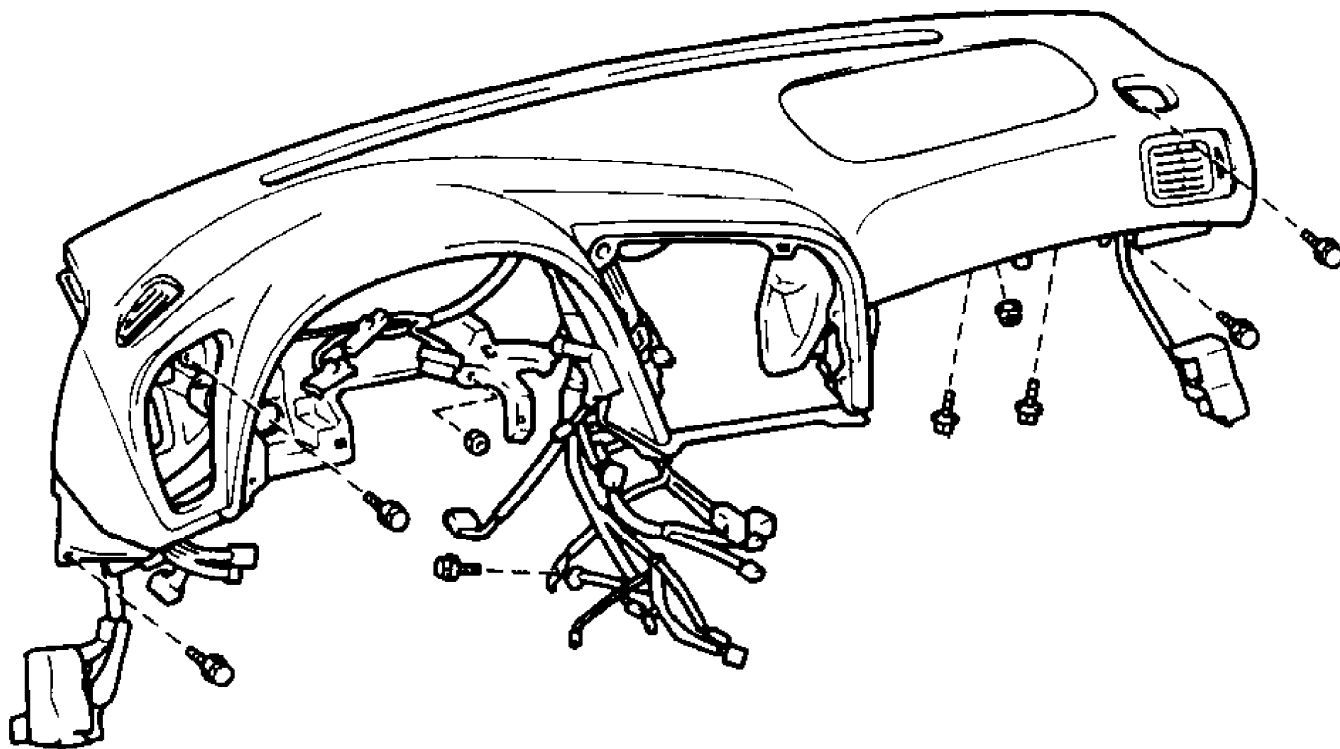
INSTRUMENT PANEL

Removal & Installation

1) Disconnect negative battery cable. Remove steering wheel. Remove front pillar upper and lower garnish moldings, front door scuff plates, and kick panel trim. Remove upper console panel and console box.

2) Remove lower finish panels and heater duct. Remove combination switch. Remove instrument cluster finish panels. Remove air register. Remove instrument cluster. Remove center finish panel. Remove radio.

3) Disengage cables from A/C control panel. Remove A/C control panel. Remove glove box door. Remove glove box. Remove lower pad inserts. Remove lower center panel. Remove side defroster outlet. Remove steering column. Remove instrument panel. See Fig. 26. To install, reverse removal procedure.



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Fig. 26: Removing Instrument Panel
Courtesy of Toyota Motor Sales, U.S.A., Inc.

RECEIVER-DRIER

Removal

Remove battery. Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove coolant reservoir. Remove lines from receiver-drier. Cap all openings immediately. Remove receiver-drier.

Installation

To install, reverse removal procedure. Add 2.9 ounces

refrigerant oil. Evacuate and recharge system. Test system for leaks.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
Compressor Bolt	18 (25)
	INCH Lbs. (N.m)
Refrigerant Lines	
Compressor	86 (9.8)
Evaporator	86 (9.8)
Receiver-Drier	48 (5.4)

WIRING DIAGRAMS

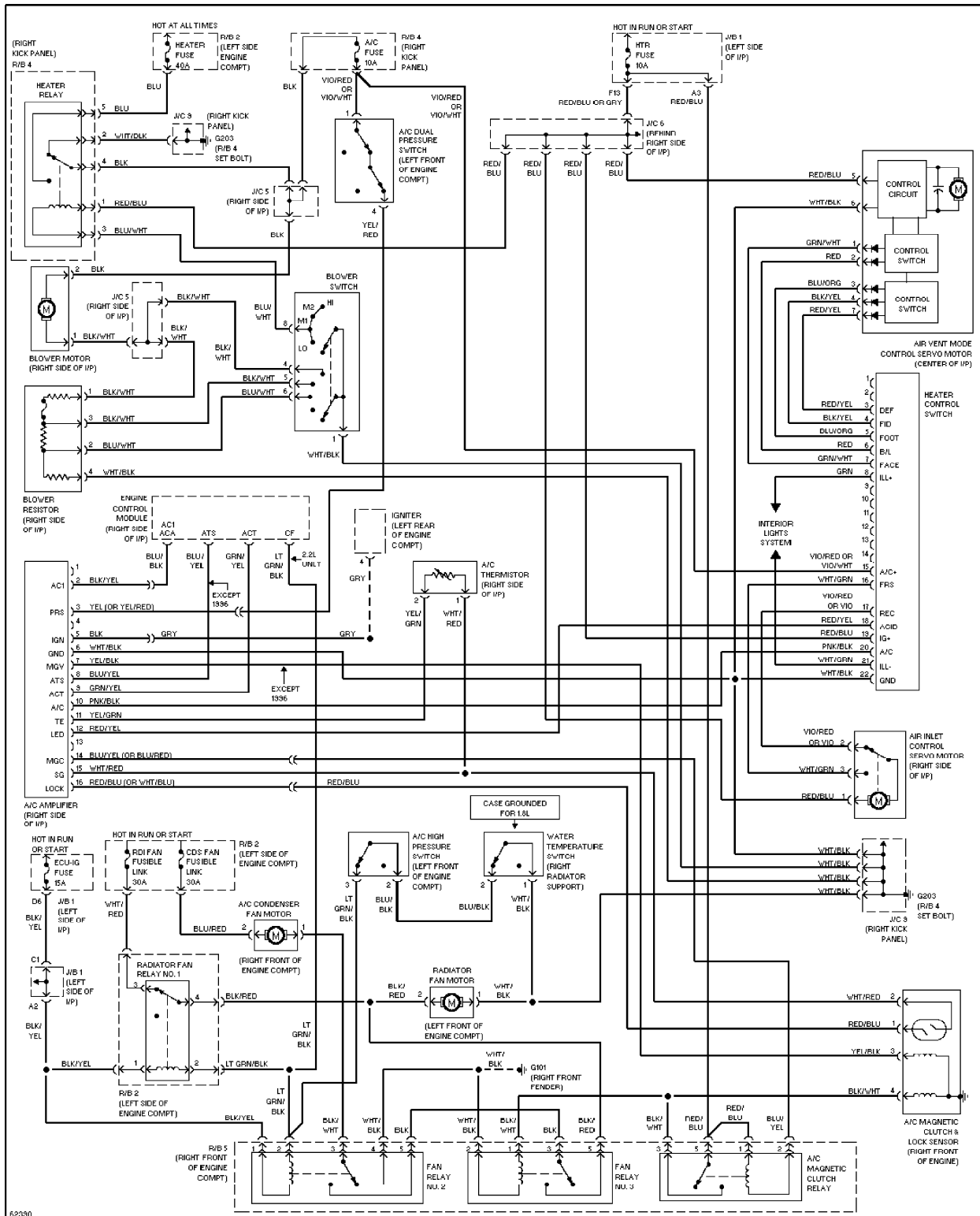


Fig. 27: Manual A/C-Heater System Wiring Diagram