

HEATER

3D

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CJ AND SCRAMBLER HEATER

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GENERAL

The blend-air type heater and defroster system is used on all CJ and Scrambler vehicles. The blend-air method of heating uses a constant flow system with engine coolant continuously flowing through the heater core. The temperature of the heated air entering the passenger compartment is controlled by regulating the quantity of air which flows through the heater core air passages, then blending it with a controlled amount of cool, fresh air which bypasses the heater core. System controls and operation are described in this section.

When servicing a malfunctioning heater system, refer to the Service Diagnosis for a list of the possible causes and recommended service procedures.

SYSTEM CONTROLS

The heater and defroster controls consist of a fan control switch and three push-pull knobs and cable assemblies which are located on the instrument panel (fig 3D-1).

The air control is a dual function control. When the control is pulled to the first position (Heat), it opens a door in the fresh air inlet to allow air to enter the heater. When the control is pulled completely out (Vent), it opens two additional doors (one in the left end of the fresh air inlet and one on the right side of the heater) to allow fresh air to enter the passenger compartment. A new fresh air duct has been added to direct fresh air to the driver's side.

The defrost control knob operates a door in the heater housing which regulates heater and defroster operation by directing the flow of air through the defroster hose or floor outlet.

The temperature control knob adjusts the amount of airflow around the heater core and through the heater core air passages. This regulates the degree of heat entering the passenger compartment.

The fan control is a four-position control switch (Off, Low, Med and High), which regulates the blower motor and airflow for heat and defrost.

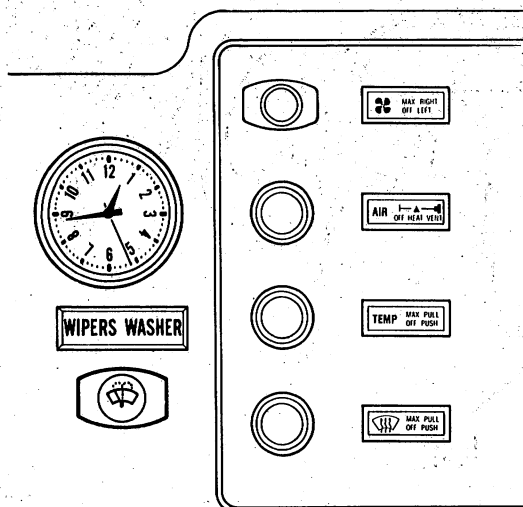


Fig. 3D-1 Heater and Defroster Controls

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HEATER AND DEFROSTER OPERATION

The heater is part of the engine cooling system and depends on normal engine operating temperature and airflow through the cowl fresh air intake to heat the interior of the vehicle. During heater operation, close the fresh air vent.

The air control knob operates a door in the fresh air intake duct which allows air to enter the heater housing. When the knob is pushed in, no air will enter the heater. As the knob is pulled out to the first position (Heat), the door opens, allowing airflow to the heater. The air control knob must be pulled to the Heat position to operate the heater.

The temperature control knob operates the blend air door in the heater housing (fig. 3D-2). At the full out position, all air is directed through the heater core, providing maximum heat flow. At the full in position, all air is directed around the heater core, providing unheated fresh air. Any in-between position of the control allows a blend of cool, fresh outside air and heated air. The defrost control knob must be pushed in for the

blended air to enter through the floor heat duct. When the defrost control knob is pulled out completely, all airflow will be directed through the defroster hose and onto the windshield. Any in-between position of the defrost control divides the airflow between the defroster hose and the floor heat duct.

If additional airflow is required, the blower motor should be operated at one of the three available speeds.

FRESH AIR VENTILATION

The fresh air ventilating system directs outside air through the air inlet to a door in the left end of the air inlet to provide air to the driver's side and also through a door on the right side of the heater to provide air to the passenger side. These doors are cable and linkage controlled. When the air control knob is pulled all the way out to the vent position, the driver's vent door is opened by linkage on the air inlet and the passenger vent door is opened by a cable that is attached to the linkage on the air inlet. When the air control is pushed in, no air will enter the vehicle.

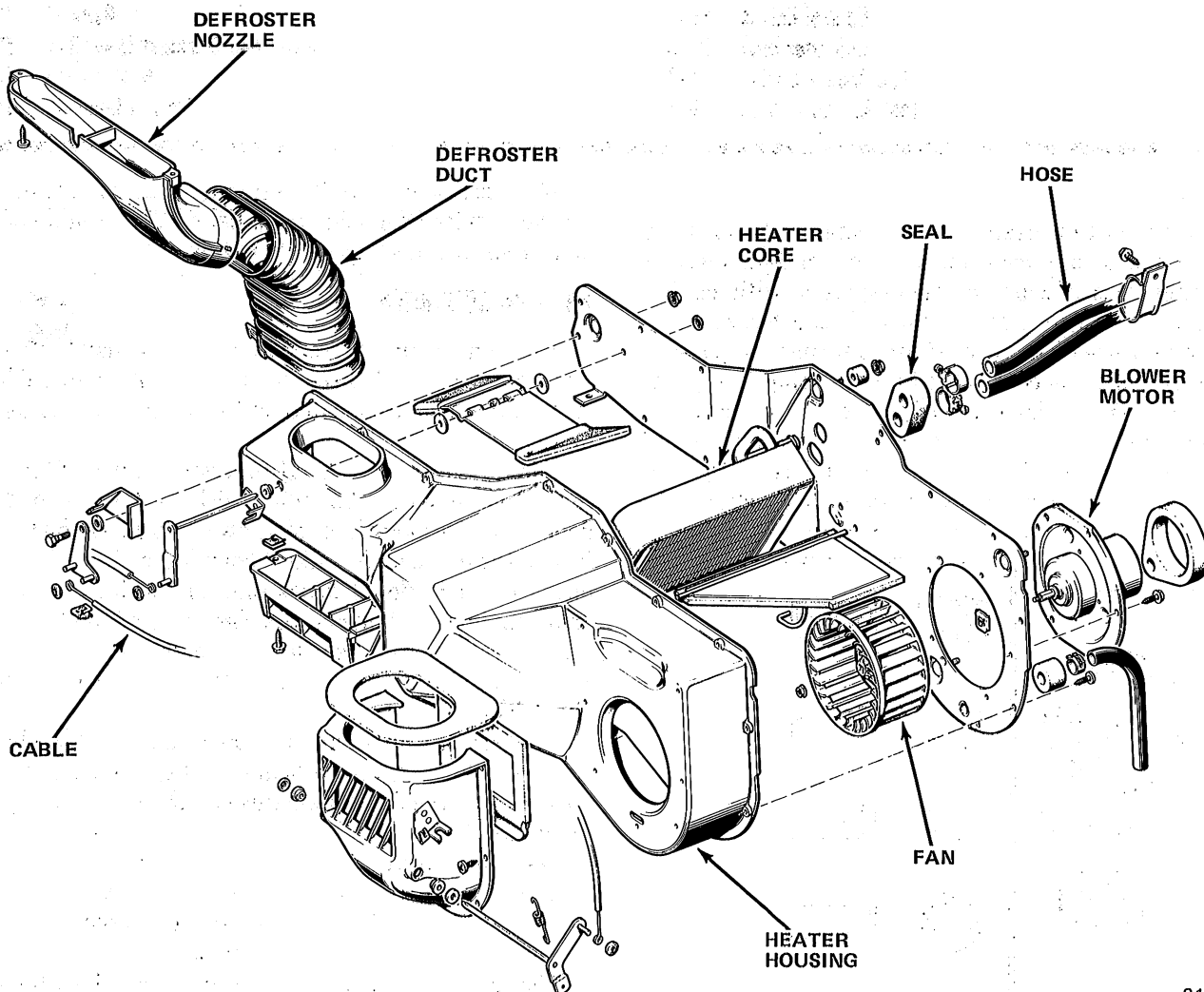
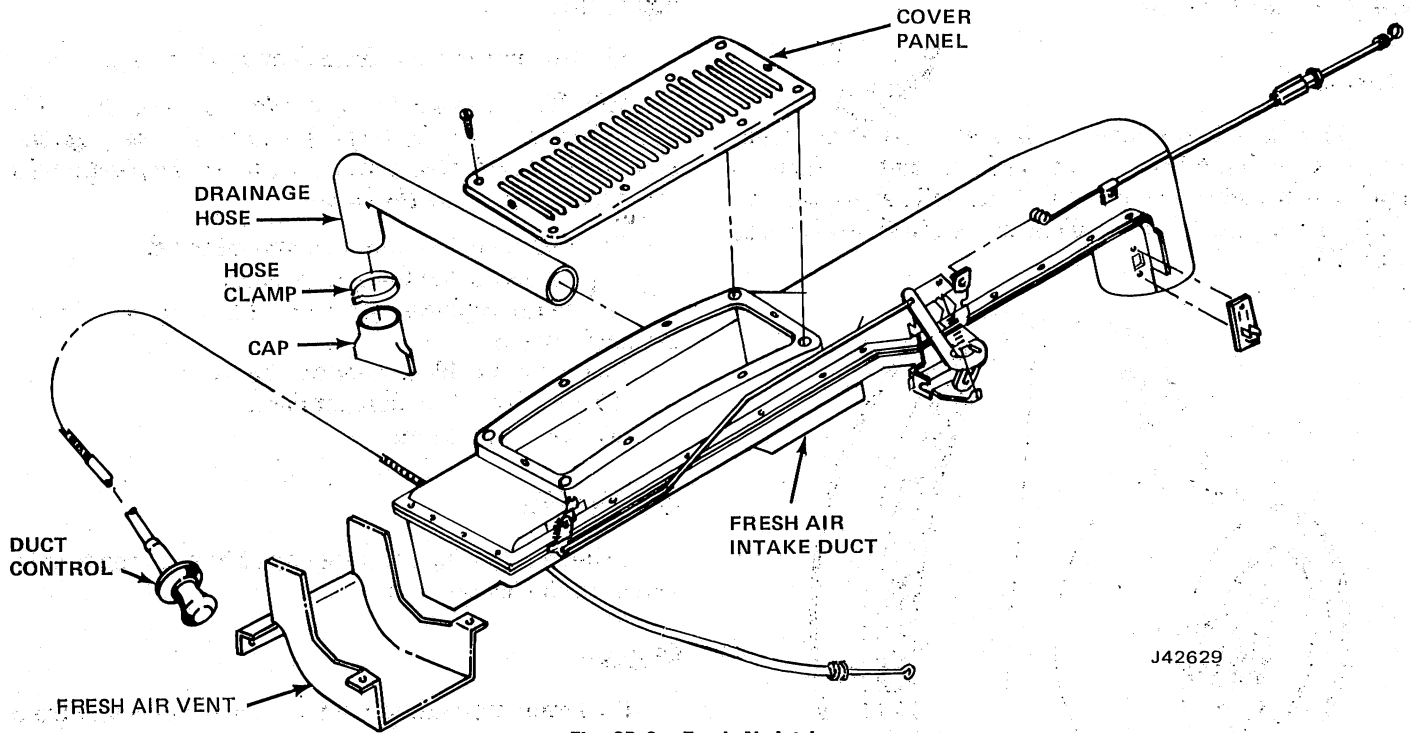


Fig. 3D-2 Heater and Defroster Components



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Fig. 3D-3 Fresh Air Intake

Service Diagnosis

| Condition | Possible Cause | Correction |
|-------------------------------------|---|---|
| FAN MOTOR WILL NOT RUN AT ANY SPEED | (1) Blown fuse (2) Loose connection (3) Poor ground (4) Faulty switch (5) Faulty motor (6) Faulty resistor | (1) Replace fuse (2) Inspect and tighten (3) Clean and tighten (4) Replace switch (5) Replace motor (6) Replace resistor |
| FAN MOTOR RUNS AT ONE SPEED ONLY | (1) Faulty switch (2) Faulty resistor | (1) Replace switch (2) Replace resistor |
| FAN RUNS BUT DOES NOT CIRCULATE AIR | (1) Intake blocked (2) Fan not secured to motor shaft | (1) Clean intake (2) Tighten securely |
| HEATER WILL NOT HEAT | (1) Coolant does not reach proper temperature (2) Heater core blocked internally (3) Heater core air-bound (4) Blend-air door not in proper position | (1) Check and replace thermostat if necessary (2) Flush or replace core if necessary (3) Purge air from core (4) Adjust cable |
| WILL NOT DEFROST | (1) Control cable adjustment incorrect (2) Defroster hose damaged | (1) Adjust control cable (2) Replace defroster hose |

FAN CONTROL SWITCH

Removal

(1) Rotate knob until slot in neck of knob is visible. Insert a small bladed screwdriver in the slot and depress spring metal clip toward knob. This will relieve tension on the spring metal clip and allow knob to slide off shaft (fig. 3D-4).

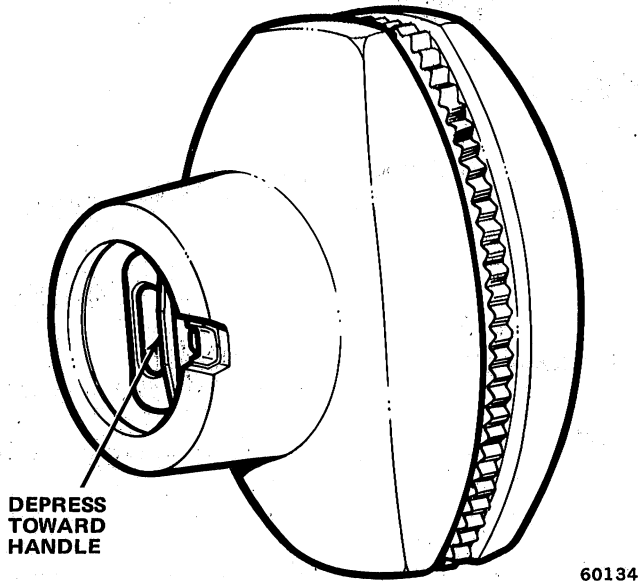


Fig. 3D-4 Fan Control Knob Locking Feature

- (2) Remove retaining nut and trim ring.
- (3) Remove switch from instrument panel and disconnect wires.

Installation

- (1) Connect wires and position switch in instrument panel.
- (2) Install trim ring and retaining nut.
- (3) Install control knob.

CONTROL CABLES

Adjustment

The only cable that is adjustable is the cable from the air inlet linkage to the passenger vent door at the right side of the heater. This cable has a turnbuckle adjustment located approximately six inches above the cable attachment to the right side of the heater. Adjust this cable until the passenger vent door is closed when the air control knob is pushed in.

NOTE: If the cable is adjusted beyond the closed door position it will cause a bind in the linkage and may prevent the driver's vent door from closing.

Replacement

- (1) Disconnect cable from door and housing.

NOTE: The control cables are retained on the backside of the instrument panel by plastic tabs. To disengage the cables from the instrument panel, press the plastic tabs together and pull out the cable.

- (2) Remove cable from instrument panel.
- (3) Remove cable-to-damper door.
- (4) Route replacement cable through hole in instrument panel
- (5) Connect cable to door and housing.
- (6) Install cable to damper door.
- (7) Check operation.

HEATER CORE

The heater housing assembly must be removed to gain access to the heater core.

Removal

- (1) Drain approximately two quarts of coolant from the radiator.
- (2) Disconnect heater hoses.
- (3) Disconnect damper door control cables.
- (4) Disconnect blower motor wire.
- (5) Disconnect water drain hose and defroster hose.
- (6) Remove nuts from heater housing studs in engine compartment.
- (7) Remove heater housing assembly by tilting down to disengage from air inlet duct and pulling to the rear of the vehicle.
- (8) Remove heater core from heater housing.

Installation

- (1) Install heater core in housing.
- (2) Position heater core housing and install attaching nuts.

NOTE: Make sure that the seals around the core pipes and blower motor are in position before installing the heater to the dash panel. Do not over-torque the heater to dash panel nuts as this can cause distortion of the heater assembly. Tighten until two threads are visible beyond the nut.

- (3) Connect water drain hose and defroster hose.
- (4) Connect blower motor wire.
- (5) Connect and adjust damper door control cables.
- (6) Connect heater hoses.
- (7) Replace coolant.
- (8) Check heater operation.

BLOWER MOTOR

The heater housing assembly must be removed to replace the blower motor.

Removal

- (1) Remove heater assembly as outlined above.
- (2) Remove blower motor assembly-to-heater housing attaching screws and remove blower motor assembly.

Installation

- (1) Position blower motor assembly to heater housing and install attaching screws.
- (2) Reinstall heater assembly as outlined above.
- (3) Check blower motor and heater control operation.

DEFROSTER DUCT**Removal**

- (1) Disconnect negative battery cable.
- (2) Drain two quarts of antifreeze from radiator.
- (3) Remove heater hoses.
- (4) Remove drain tube from heater housing.
- (5) Remove screws attaching evaporator housing to instrument panel and lower housing.
- (6) Disconnect wiring from A/C switch.
- (7) Remove screw attaching heater motor housing to bracket.
- (8) Remove nuts attaching heater housing-to-dash panel from engine compartment.
- (9) Disconnect speedometer cable.
- (10) Remove glove box.
- (11) Tilt heater housing assembly back and pull to rear and lower housing.
- (12) Disconnect heater control cables.
- (13) Remove fresh air cover panel from cowl.
- (14) Remove fresh air intake duct assembly.
- (15) Lower windshield.
- (16) Remove screws from defroster duct and remove defroster duct and tube.

Installation

- (1) Position defroster duct and install attaching screws and tube.
- (2) Raise windshield and secure.
- (3) Install fresh air intake duct assembly.
- (4) Install fresh air cover panel on cowl.
- (5) Install heater control cables.
- (6) Position heater housing assembly on dash panel.
- (7) Install nuts attaching heater housing to dash panel.
- (8) Install glove box.
- (9) Install speedometer cable.

- (10) Install screw attaching heater housing to bracket.
- (11) Connect wiring to A/C switch.
- (12) Install evaporator housing to instrument panel.
- (13) Connect drain tube to heater housing.
- (14) Connect heater hoses.
- (15) Refill radiator.
- (16) Connect negative battery cable.

FRESH AIR INTAKE DUCT**Removal**

- (1) Disconnect negative battery cable.
- (2) Drain two quarts of antifreeze from radiator.
- (3) Remove heater hoses.
- (4) Remove drain tube from heater housing.
- (5) Remove screws attaching evaporator housing to instrument panel and lower housing.
- (6) Disconnect wiring from A/C switch.
- (7) Remove screw attaching heater motor housing to bracket.
- (8) Remove nuts attaching heater housing to dash panel from engine compartment.
- (9) Disconnect speedometer cable.
- (10) Remove glove box.
- (11) Tilt heater housing assembly back and pull to the rear a lower housing.
- (12) Disconnect heater control cables.
- (13) Remove fresh air cover panel from cowl.
- (14) Remove fresh air intake duct assembly.

Installation

- (1) Position defroster duct and install attaching screws and tube.
- (2) Raise windshield and secure.
- (3) Install fresh air intake duct assembly.
- (4) Install fresh air cover panel on cowl.
- (5) Install heater control cables.
- (6) Position heater housing assembly on dash panel.
- (7) Install nuts attaching heater housing to dash panel.
- (8) Install glove box.
- (9) Install speedometer cable.
- (10) Install screw attaching heater housing to bracket.
- (11) Connect wiring to A/C switch.
- (12) Install evaporator housing to instrument panel.
- (13) Connect drain tube to heater housing.
- (14) Connect heater hoses.
- (15) Refill radiator.
- (16) Connect negative battery cable.

CHEROKEE - WAGONEER - TRUCK HEATER

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GENERAL

The blend-air type heater and defroster system is used on all Cherokee, Wagoneer and Truck models. The blend-air method of heating uses a constant flow system with engine coolant continuously flowing through the heater core. The temperature of the heated air entering the passenger compartment is controlled by regulating the quantity of air which flows through the heater core air passages, then blending it with a controlled amount of cool, fresh air which bypasses the heater core. System controls and operation are described in this section.

When servicing a malfunctioning heater system, refer to the Service Diagnosis for a list of the possible causes and recommended service procedures.

SYSTEM CONTROLS

The heater and defroster controls consists of a fan control switch, a vacuum control switch operated by three pushbuttons, and a slide temperature control lever (fig. 3D-5).

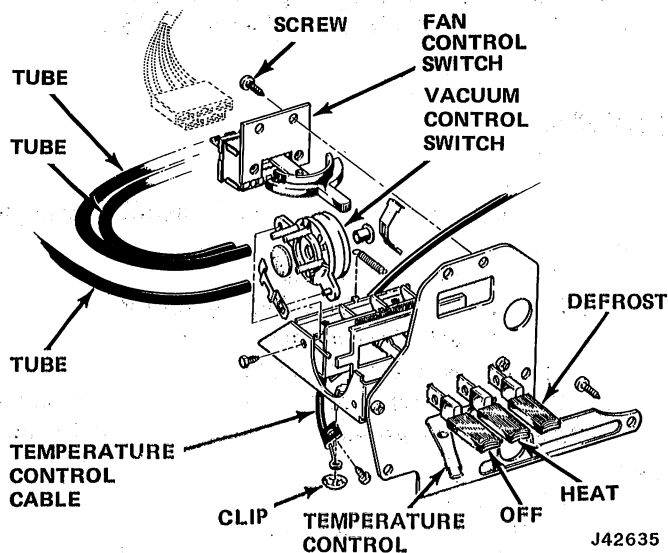


Fig. 3D-5 Heater and Defroster Controls

The three pushbuttons manually operate the vacuum control switch which directs vacuum to two vacuum motors, controlling airflow and point of air distribution.

The temperature control lever adjusts the amount of airflow around the heater core and through the heater core air passages. This regulates the degree of heat entering the passenger compartment.

The fan control is a four-position control switch (Off, Low, Medium, and High), which regulates the blower motor and airflow for heat, defrost, and fresh air ventilation.

There has been a vacuum storage tank added to prevent the heater doors from closing on acceleration and is located in the engine compartment in the center of dash panel.

HEATER AND DEFROSTER OPERATION

The heater is part of the engine cooling system and depends on normal engine operating temperature and airflow through the cowl fresh air intake to heat the interior of the vehicle. During heater operation, close the fresh air vents.

The Off, Heat and Def buttons (fig. 3D-5) on the heater control panel operate a vacuum control switch which controls two vacuum motors. When the off button is pressed, the vacuum switch shuts off vacuum to the air inlet door vacuum motor. A spring closes this door, preventing any outside air from entering the heater (fig. 3D-6).

When the Heat button is pressed, the air inlet door is opened by the air inlet vacuum motor and air will flow through the heat transition housing and out of the floor heat distributor.

When the Def button is pressed, the vacuum switch directs vacuum to the defrost vacuum motor, which closes the door to the floor heat distributor. Airflow is then directed through the defroster hoses onto the windshield. The air inlet door remains open to allow airflow through the heat transition housing.

The Temperature control lever operates the blend air door in the heater core housing. At the full right position, all air is directed through the heater core providing maximum heat flow. At the full left position, all air is directed around the heater core providing unheated fresh air. The temperature control lever may be placed in any in-between position to provide a blend of cool, fresh, outside air and heater air. However, either the Heat or Def button must be pressed before any air can enter the vehicle.

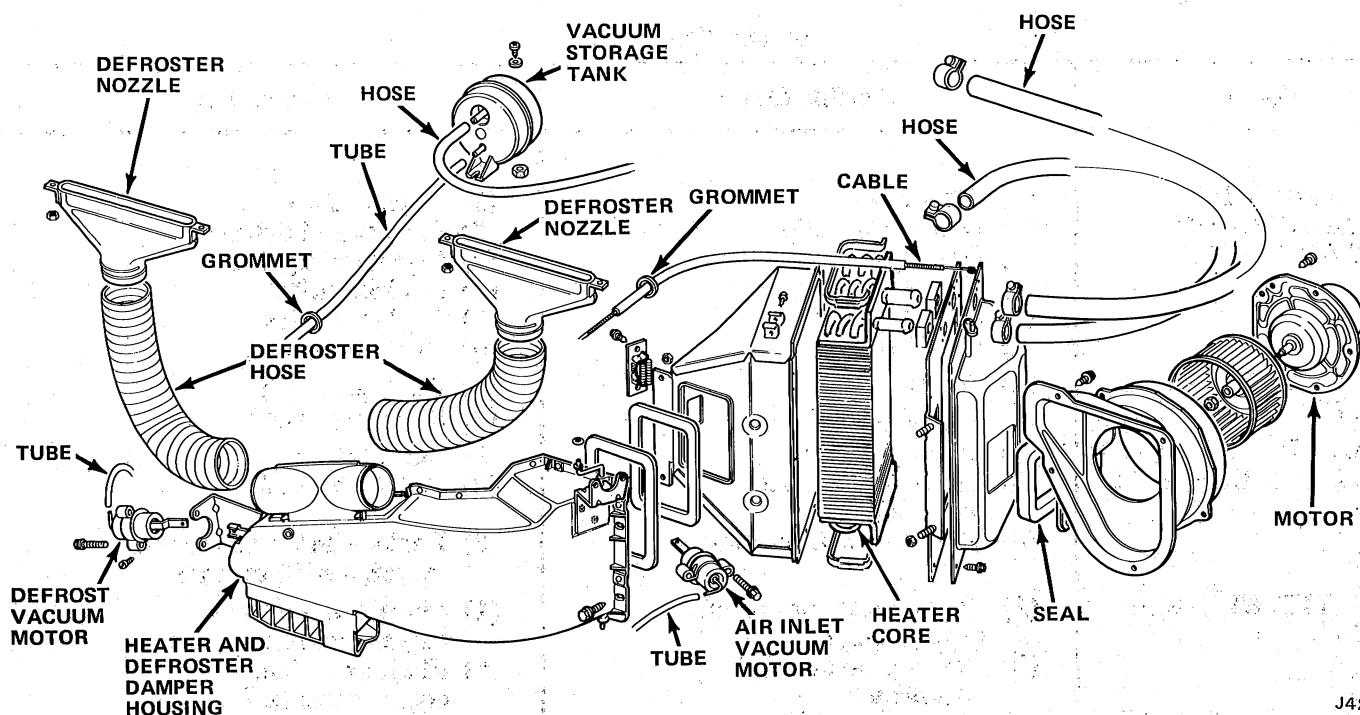


Fig. 3D-6 Heater and Defroster

If additional airflow is required, the blower motor should be operated at one of the three available speeds.

FRESH AIR VENTILATION

The ventilating system has two fresh air vents, one in the right cowl trim panel and one in the left cowl trim panel (fig. 3D-7). Both vents are cable controlled with the control knobs mounted on the instrument panel to the right and left of the steering column.

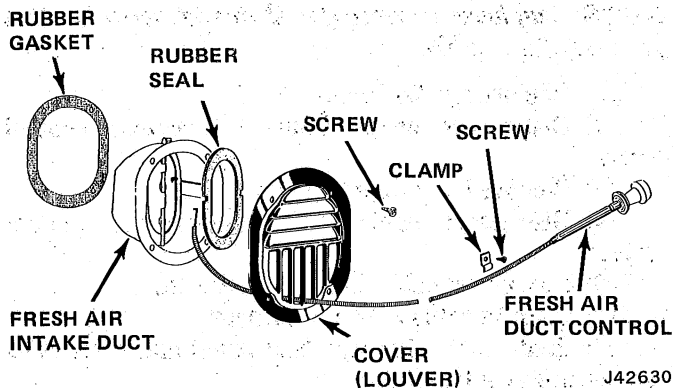


Fig. 3D-7 Fresh Air Intake Duct and Control

HEATER CONTROL PANEL

Removal

- (1) Disconnect battery negative cable.
- (2) Remove instrument cluster retaining screws.
- (3) Disconnect speedometer cable.

- (4) Disconnect electrical connectors from cluster.
- (5) Disconnect vacuum hoses from vacuum control switch.

NOTE: Tag hoses according to their numbered location for ease of assembly.

- (6) Remove cluster lamps.
- (7) Disconnect cable from temperature control lever.
- (8) Remove instrument cluster.
- (9) Remove heater and defroster control attaching screws and remove control from cluster.
- (10) Remove fan control switch attaching screws and remove switch.

Installation

- (1) Install fan control switch.
- (2) Install heater and defroster control to cluster.
- (3) Position instrument cluster in dash opening.
- (4) Install cluster lamps.
- (5) Connect cable to temperature control lever.
- (6) Connect vacuum hoses.
 - (a) Number 1 on vacuum control switch goes to defroster vacuum motor.
 - (b) Number 3 on vacuum control switch goes to vacuum storage tank.
 - (c) Number 4 on vacuum control switch goes to air inlet door vacuum motor.
- (7) Connect cluster electrical connectors.
- (8) Connect speedometer cable.
- (9) Install cluster retaining screws.
- (10) Connect battery negative cable.
- (11) Check heater, defroster and fan operation.

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Service Diagnosis

| Condition | Possible Cause | Correction |
|---|--|--|
| FAN MOTOR WILL NOT RUN AT ANY SPEED | (1) Blown fuse (2) Loose connection (3) Poor ground (4) Faulty switch (5) Faulty motor (6) Faulty resistor | (1) Replace fuse (2) Inspect and tighten (3) Clean and tighten (4) Replace switch (5) Replace motor (6) Replace resistor |
| FAN MOTOR RUNS AT ONE SPEED ONLY | (1) Faulty switch (2) Faulty resistor | (1) Replace switch (2) Replace resistor |
| FAN RUNS BUT DOES NOT CIRCULATE AIR | (1) Intake blocked (2) Fan not secured to motor shaft (3) Inlet door not opening | (1) Clean intake (2) Tighten securely (3) Replace defective vacuum motor, switch or hose. |
| HEATER WILL NOT HEAT | (1) Coolant does not reach proper temperature (2) Heater core blocked internally (3) Heater core air-bound (4) Blend-air door not in proper position | (1) Check and replace thermostat if necessary (2) Flush or replace core if necessary (3) Purge air from core (4) Adjust cable |
| WILL NOT DEFROST | (1) Vacuum motor not operating (2) Vacuum control switch inoperative (3) Defroster hose damaged | (1) Check for engine vacuum at vacuum motor (2) Check for engine vacuum at switch (3) Replace defroster hose |

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CONTROL CABLE

Adjustment

The blend-air door control cable is equipped with a turnbuckle to simplify adjustment. The turnbuckle is located in the engine compartment close to the vacuum can.

(1) Rotate turnbuckle counterclockwise to obtain complete closing of the blend-air door when the temperature control lever is in the far left Cool position.

(2) Check blend-air door operation by moving temperature control lever toward the Warm position and back to the Cool position. Adjust cable if necessary.

Replacement

- (1) Disconnect battery negative cable.
- (2) Remove instrument cluster retaining screws.
- (3) Disconnect speedometer cable.
- (4) Disconnect electrical connectors from cluster.
- (5) Disconnect vacuum hoses from vacuum control switch.

NOTE: Tag hoses according to their numbered location for ease of assembly.

- (6) Remove cluster lamps.
- (7) Disconnect cable from temperature control lever.
- (8) Remove instrument cluster.
- (9) Disconnect cable from temperature control lever.
- (10) Disconnect cable from blend-air door.
- (11) Connect cable to blend-air door.
- (12) Route cable through dash panel and connect to temperature control lever.
- (13) Position instrument cluster in dash opening.
- (14) Install cluster lamps.
- (15) Connect cable to temperature control lever.
- (16) Connect vacuum hoses.
 - (a) Number 1 on vacuum control switch goes to defroster vacuum motor.
 - (b) Number 3 on vacuum control switch goes to vacuum storage tank.
 - (c) Number 4 on vacuum control switch goes to air inlet door vacuum motor.

- (17) Connect cluster electrical connectors.
- (18) Connect speedometer cable.
- (19) Install cluster retaining screws.
- (20) Connect battery negative cable.
- (21) Check heater, defroster and fan operation.
- (22) Adjust cable.
- (23) Check cable operation.

HEATER CORE

Removal

- (1) Drain approximately two quarts of coolant from radiator.
- (2) Disconnect temperature control cable from blend-air door.
- (3) Disconnect heater hoses at heater core.
- (4) Disconnect blower motor resistor wires.
- (5) Remove heater core housing to dash panel attaching nuts.
- (6) Remove heater core housing assembly.
- (7) Remove attaching screws holding housing halves together and separate housing.
- (8) Remove heater core to housing attaching screws and remove core.

Installation

- (1) Position heater core in housing and install attaching screws.

- (2) Seal and assemble two halves of heater core housing and install attaching screws.
- (3) Position heater core housing on dash panel and install attaching nuts.
- (4) Connect heater resistor wires.
- (5) Connect heater hoses.
- (6) Connect temperature control cable to blend air door.
- (7) Replace coolant.
- (8) Check heater operation.

BLOWER MOTOR

Removal

- (1) Disconnect blower motor electrical connector.
- (2) Remove blower motor-to-blower motor housing attaching screws and remove blower motor and fan assembly.

Installation

- (1) Position blower motor and fan assembly on blower motor housing and install attaching screws.
- (2) Connect blower motor electrical connector.
- (3) Check blower motor operation.

