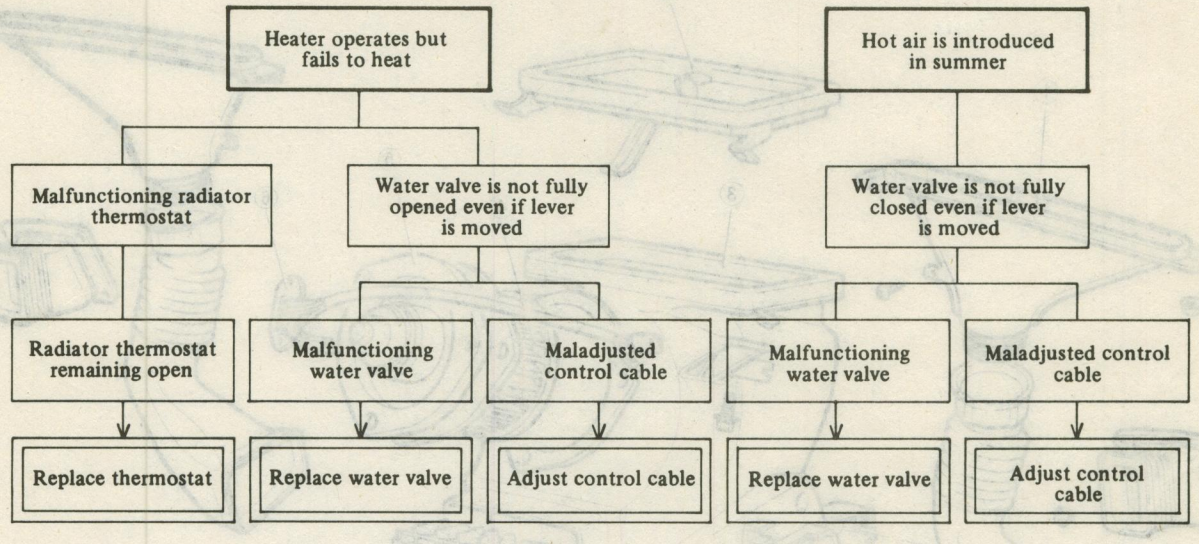
HEATERS AND AIR-CONDITIONING

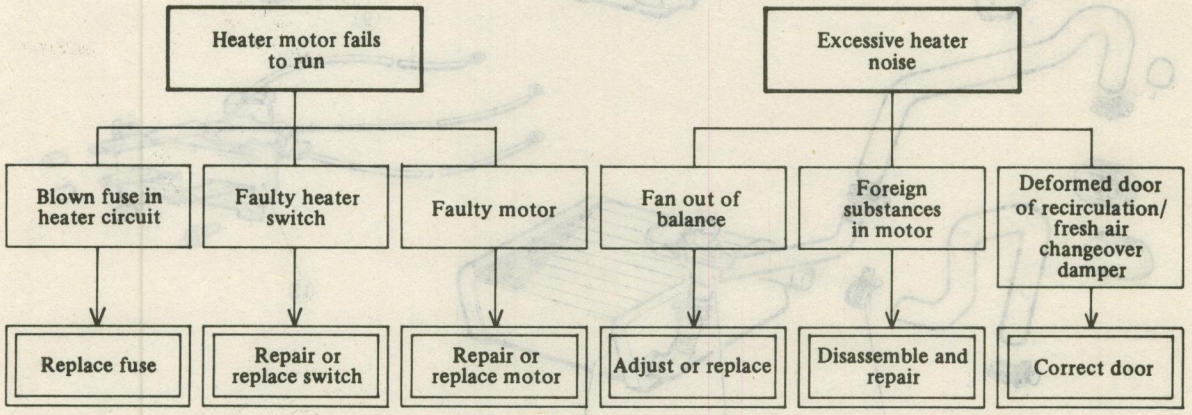
CONTENTS

ON SITE CONCRETE
5081 Pasadena Ave.
Sacramento, CA 95841

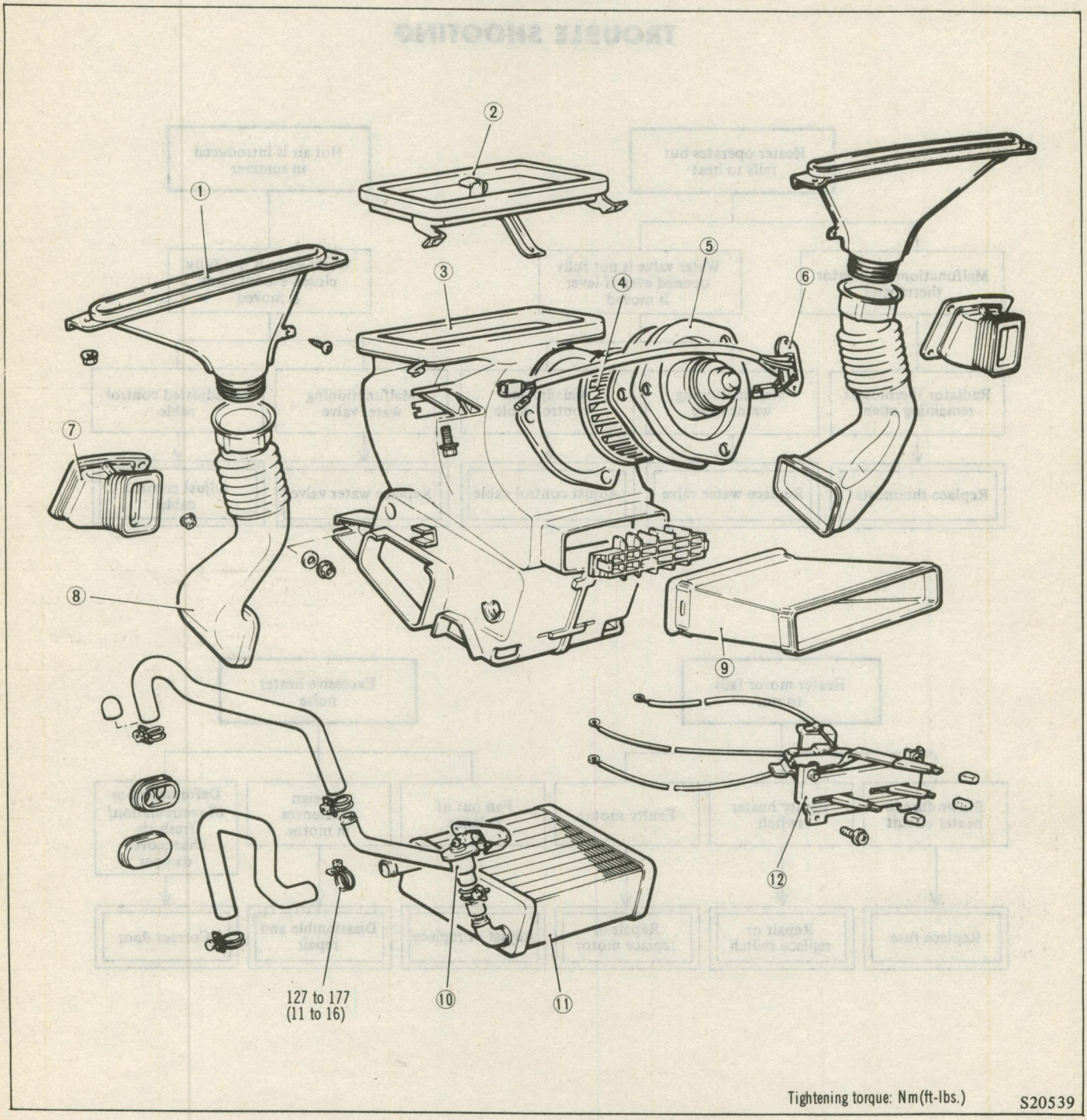
HEATERS

TROUBLE SHOOTING



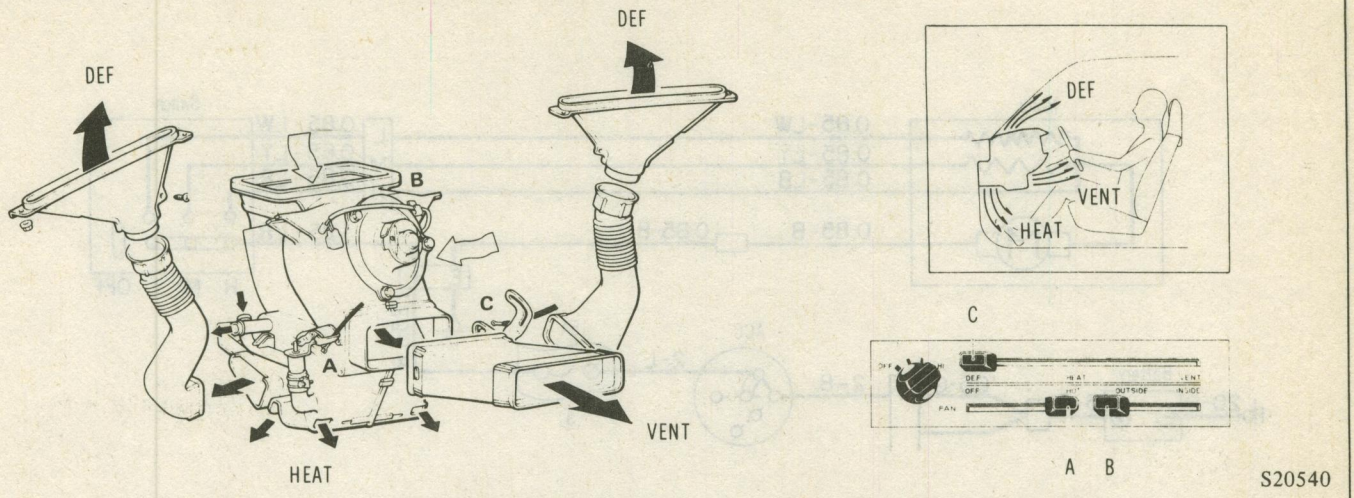


HEATER AND VENTILATOR



(1) Defroster nozzle
(2) Ventilator assembly
(3) Heater assembly
(4) Turbo fan
(5) Motor
(6) Heater resistor
(7) Side ventirator duct
(8) Defroster duct
(9) Center ventirator duct
(10) Water valve
(11) Heater core
(12) Heater control panel assembly

Fig. 1 Exploded View of Heater and Ventilator



Heater Control Lever Position and Valve and Damper Operation (⇨ Cool air, → Hot air)

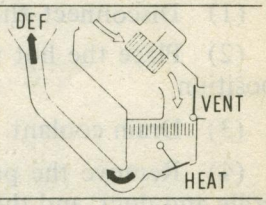
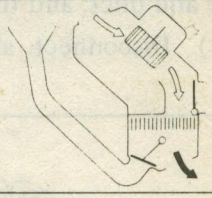
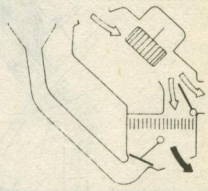
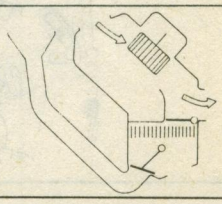
Symbol	Heater control lever position		Operation of valve and damper			Remarks
A	Hot water flow control lever	OFF	Hot water valve = closed			
		Intermediate position	Hot water valve = half opened			
		HOT	Hot water valve = fully opened			
B	INSIDE-OUTSIDE control lever	INSIDE	INSIDE opened (OUTSIDE closed)			
		OUTSIDE	OUTSIDE opened (INSIDE closed)			
C	DEF-HEAT-VENT control lever		VENT damper	DEF-HEAT damper		Illustration
				DEF side	HEAT side	
		DEF	Closed	Opened	Closed	
		HEAT	Closed	Closed	Opened	
		VENT-HEAT Center position (Bi-level operation)	Half opened	Closed	Opened	
		VENT	Fully opened	Closed	Opened	

Fig. 2 Control Lever Position and Air Flow

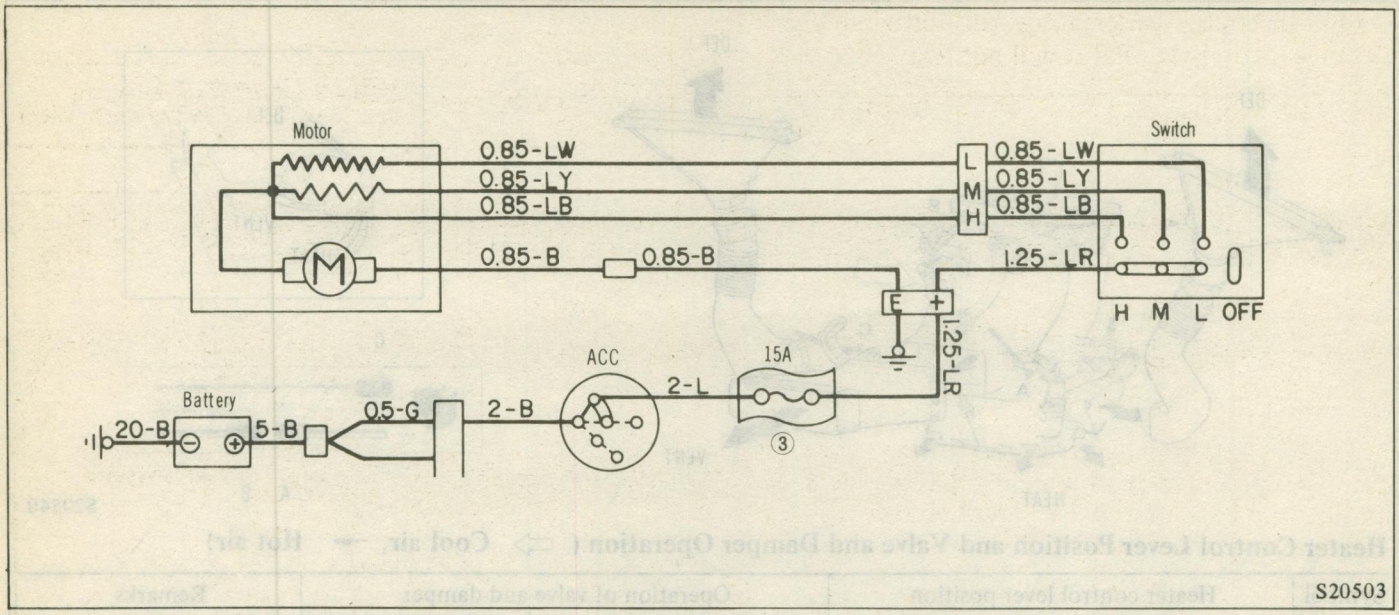


Fig. 3 Fan Motor Wiring Diagram

HEATER ASSEMBLY

Removal

(1) Disconnect the battery ground (–) terminal.

(2) Place the hot water flow control lever in OFF position.

(3) Drain coolant.

(4) Remove the parcel tray, the center ventilator grille and duct, and the defroster duct.

(5) Disconnect all control cables at the heater side.

(6) Disconnect water hose.

(7) Disconnect harness from the heater fan motor.

(8) Remove the top mounting bolts and center mounting nuts and remove the heater assembly. (Fig. 4)

CAUTION:
Coolant is remaining in the heater core and water valve. Use care not to spill it in the cab.

Installation

When installing the heater assembly, observe the following items.

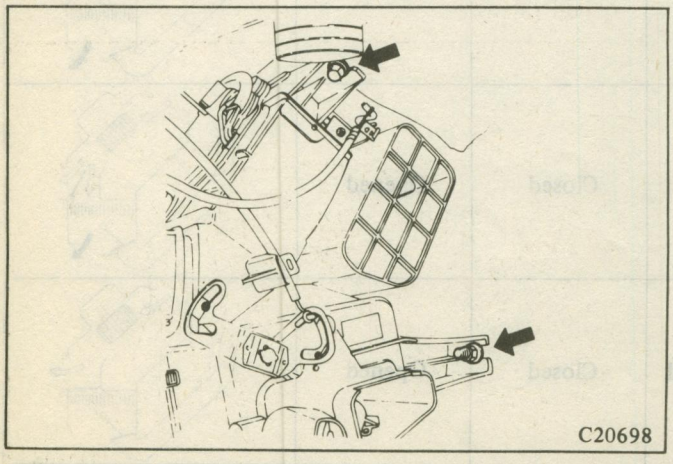


Fig. 4 Removing the Heater Assembly

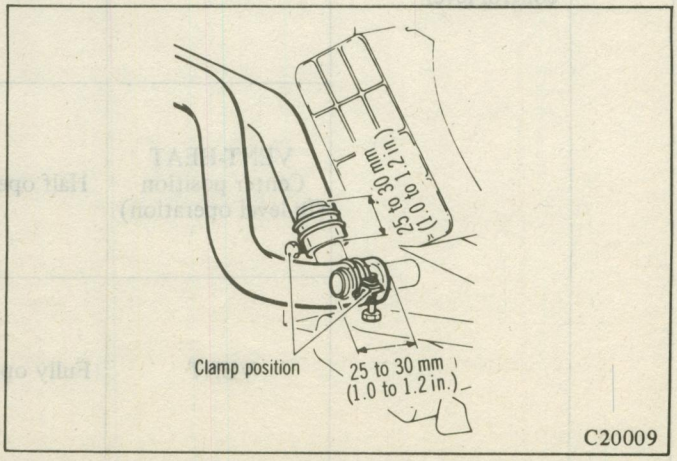


Fig. 5 Installing the Water Hose Clamp

(1) Insert the water hoses fully into the pipe and clamp it securely so that it will not leak. (Fig. 5)

Description	Standard value mm (in.)
Water hose inserting dimension	25 to 30 (1.0 to 1.2)

Description	Torque Ncm (in.-lbs.)
Water hose clamp	127 to 177 (11 to 16)

(2) When filling the radiator with coolant, first open the water valve fully and run the engine to circulate the coolant and discharge air from inside the heater and engine cooling system. Then stop the engine and add coolant.

(3) Adjust all control cables (Refer to Heater Control Assembly).

(4) When installing the water hose grommets, apply sealer. (Fig. 6)

Part to be bonded	Adhesive
Water hose grommet	MOPAR Lock N'Seal Adhesive Part Number 4057989 or equivalent

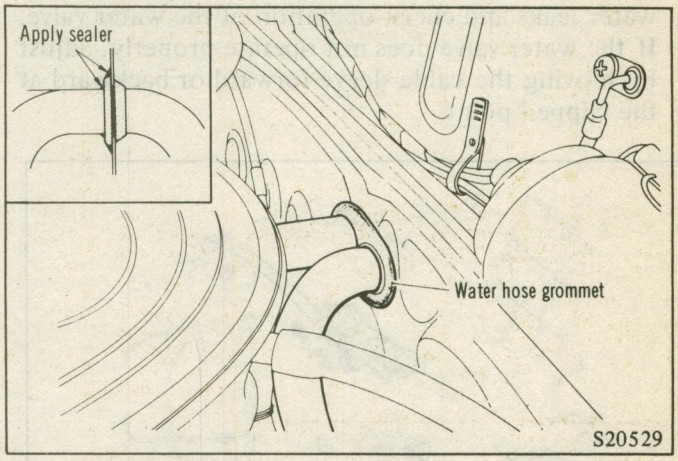


Fig. 6 Installing the Water Hose Grommet

HEATER CONTROL ASSEMBLY

HEATER CONTROL ASSEMBLY

Removal

(1) Remove the cluster panel (Refer to Group 23).
(2) Remove all control cables at the heater side.
(3) Remove the heater control assembly.

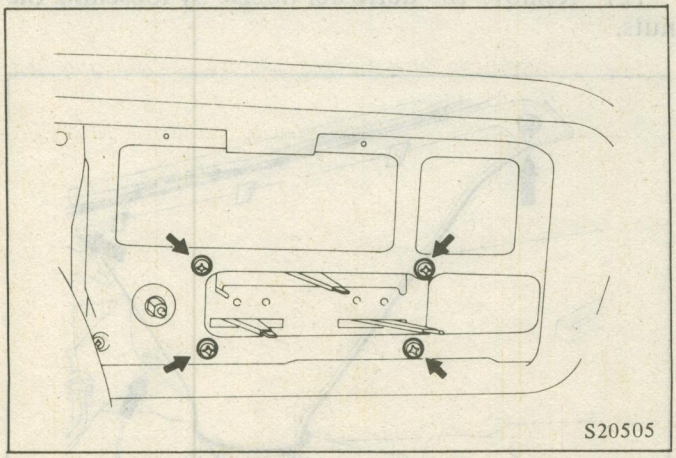


Fig. 7 Removing the Heater Control Assembly

Installation

After installing the heater control assembly, make sure each lever operates smoothly.

Adjustment

Adjust the each heater control cable by the following procedure.

1. INSIDE–OUTSIDE Control Cable

Place the control lever in the INSIDE position and connect the cable to the damper lever with the outside air intake to the heater closed (the damper lever pulled down). Secure the cable sleeve with clips and check operation of the damper. If the damper does not operate properly, adjust by moving the sleeve forward or backward at the clipped point.

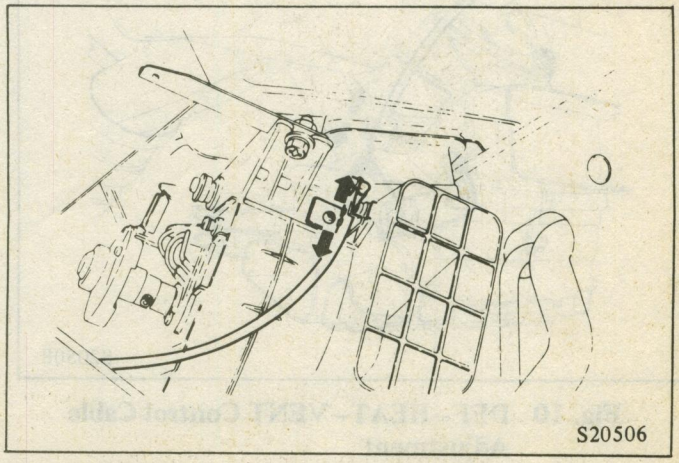


Fig. 8 INSIDE–OUTSIDE Control Cable Adjustment

2. Hot Water Flow Control Cable

Place the control lever at OFF position and connect the cable to the water control valve with the water valve fully closed. Secure the cable sleeve with clips. With the engine running, check for water leaks and check operation of the water valve. If the water valve does not operate properly, adjust by moving the cable sleeve forward or backward at the clipped point.

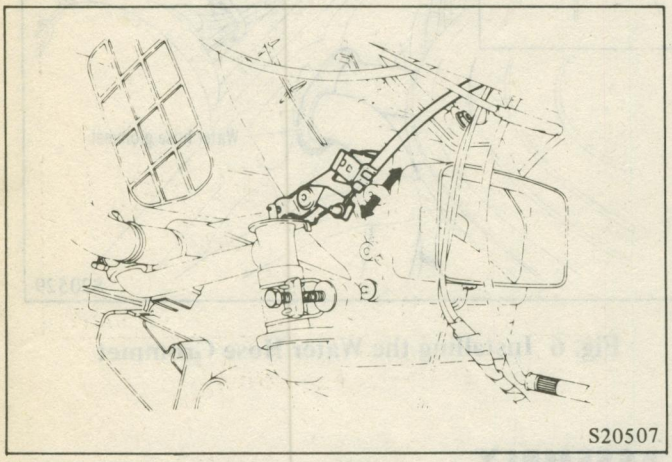


Fig. 9 Hot Water Flow Control Cable Adjustment

3. DEF–HEAT–VENT Control Cable

Place the control lever at DEF position and connect the cable with the damper lever lifted up. Secure the cable sleeve with clips. Next, move the lever to the HEAT position and check to ensure that there are no air leaks from the ventilator damper section.

If there are air leaks, adjust by moving the sleeve forward or backward at the clipped point.

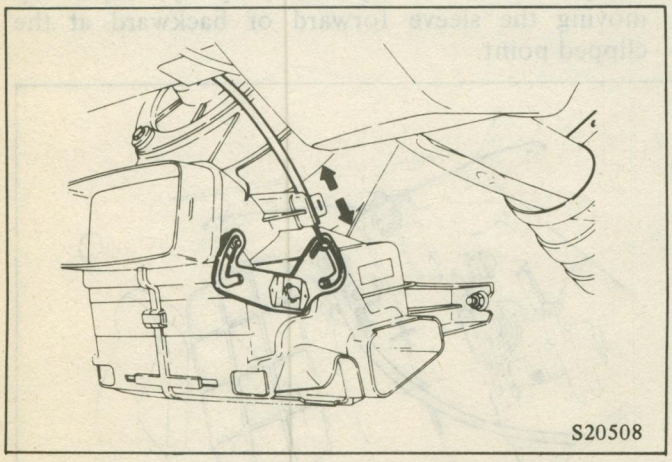


Fig. 10 DEF–HEAT–VENT Control Cable Adjustment

HEATER MOTOR

Removal

(1) Remove the cluster panel.

(2) Disconnect the cable between the motor and heater unit at the connector.

(3) After removing the motor and fan from heater unit, draw out each one separately.

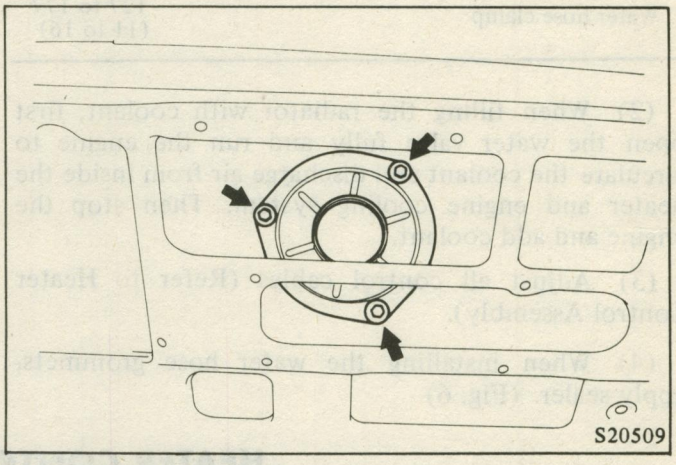


Fig. 11 Removing the Motor and Fan

DEFROSTER NOZZLE

Removal

(1) Remove the glove box and the combination meter assembly.

(2) Remove the defroster nozzle by loosening the nuts.

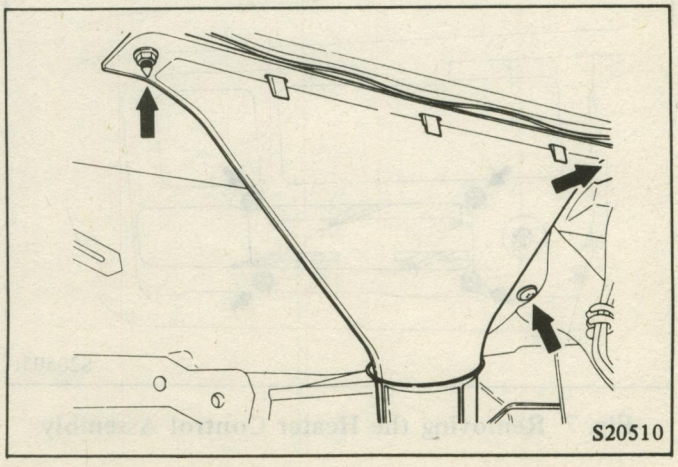


Fig. 12 Removing the Defroster Nozzle

SIDE VENTILATOR DUCT

Removal

(1) Remove the glove box (R.H.) and the combination meter assembly (L.H.).

(2) Loosen the side ventilator duct mounting nuts and remove the duct.

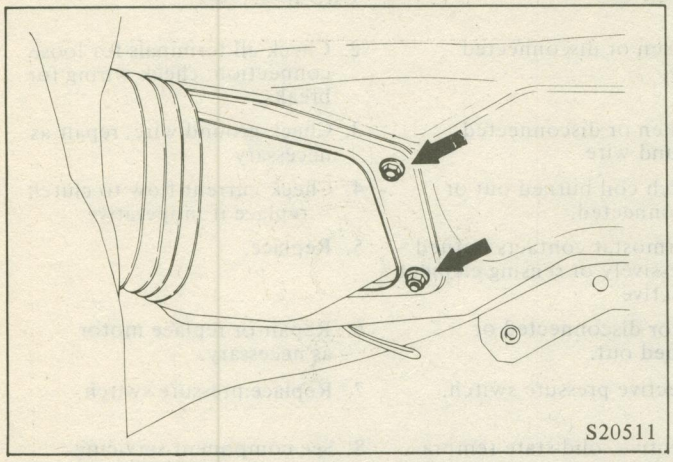


Fig. 13 Removing the Side Ventilator Duct

HEATER FAN SWITCH

Inspection

Operate the switch to check for continuity between each terminals.

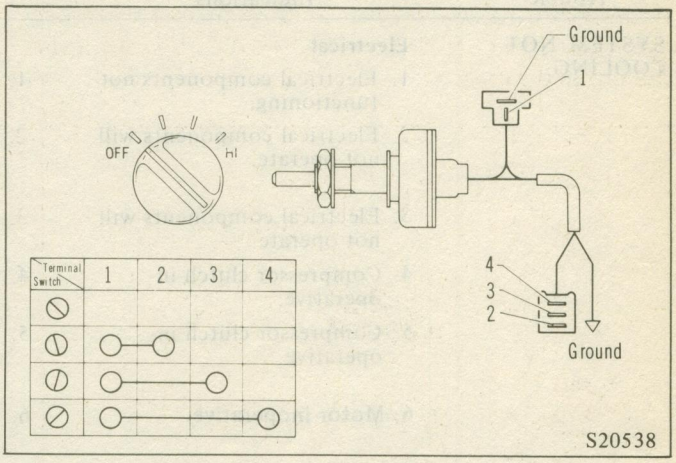


Fig. 14 Heater Fan Switch

Installation

Secure the wiring for heater fan switch with a clip so that it does not droop.

AIR-CONDITIONING

TROUBLE SHOOTING

Trouble	Indications	Cause	Remedy
SYSTEM NOT COOLING.	**Electrical**		
	1. Electrical components not functioning.	1. Blown fuse.	1. Replace fuse.
	2. Electrical components will not operate.	2. Broken or disconnected wire.	2. Check all terminals for loose connection; check wiring for breaks.
	3. Electrical components will not operate.	3. Broken or disconnected ground wire.	3. Check ground wire; repair as necessary.
	4. Compressor clutch inoperative.	4. Clutch coil burned out or disconnected.	4. Check current flow to clutch – replace if inoperative.
	5. Compressor clutch inoperative.	5. Thermostat contacts burned excessively or sensing element defective.	5. Replace.
	6. Motor inoperative.	6. Motor disconnected or burned out.	6. Repair or replace motor as necessary.
	7. Compressor clutch inoperative.	7. Defective pressure switch.	7. Replace pressure switch.
	8. Compressor clutch inoperative.	8. Defective solid-state temprature control.	8. See component servicing section for diagnosis and repair.
	Mechanical		
	1. System not functioning properly – or not at all.	1. Loose or broken drive belt.	1. Replace drive belts and/or tighten to specifications.
	2. Compressor pulley slips on belt or will not turn when clutch is engaged.	2. Compressor partially or completely frozen.	2. Remove compressor and repair or replace.
	3. Only slight variation of both gauge readings at any engine speed.	3. Compressor reed valves inoperative.	3. Service or replace reed valves.
	4. Head pressure normal, suction pressure high, evaporator flooding.	4. Expansion valve stuck in open position.	4. Replace expansion valve.
	Refrigeration		
	1. Complete lost of refrigerant.	1. Broken refrigerant line.	1. Check all refrigerant lines and repair any breaks – correct cause of break also.
	2. No pressure on high and low gauges.	2. Leak in system resulting in complete loss of refrigerant.	2. Evacuate system. Leak test system and repair as necessary.
	3. Clutch and front of compressor oily.	3. Compressor shaft seal leaking.	3. Replace compressor shaft seal.
	4. High pressure gauge normal or reads high; low gauge shows vacuum or very low pressure; frosting usually occurs at point of blockage.	4. Clogged screen(s) in receiver-drier or expansion valve; plugged hose or coil.	4. Repair as necessary.
	NOTE: After completing any of the above refrigeration repairs, the system must have the receiver-drier replaced, then evacuate and recharge the system.		

Trouble	Indications	Cause	Remedy
SYSTEM COOLS INTERMITTENTLY	**Electrical**		
	1. Unit operates intermittently.	1. Defective fuse, switch, or motor.	1. Locate defective part; repair or replace as necessary.
	2. Clutch disengages prematurely during operation.	2. Improper ground, loose connection, or partial open in compressor clutch coil.	2. Check connections and repair, or replace clutch coil.
	3. System does not operate properly with pressure switch in circuit, but does operate when pressure switch is bypassed.	3. Defective pressure switch.	3. Replace pressure switch.
	Mechanical		
	1. System operates until head pressure builds up (as viewed on high pressure gauge) at which time clutch starts slipping; may or may not be noisy.	1. Compressor clutch slipping.	1. Check for proper spacing; replace clutch, if necessary.
	Refrigeration		
	1. Unit ices up intermittently. Low side pressure may be low or excessively high. If both head and suction pressures are low, moisture in the system is usually indicated.	1. Excessive moisture in system, defective expansion valve, or defective thermostat.	1. Check expansion valve and thermostat; replace if defective. If moisture in system; replace receiver-drier, purge, evacuate and recharge the system.
	2. Compressor cycles rapidly. Gauge set will indicate 375 (±10)psig when pressure switch opens.	2. Excessive system pressure causing the pressure switch to open.	2. Check condenser for proper mounting and clear air passage.
SYSTEM WILL NOT PRODUCE SUFFICIENT COOLING.	**Electrical**		
	1. Small displacement of air from discharge ducts; motor may be noisy.	1. Motor sluggish in operation.	1. Remove motor and repair or replace as necessary
	2. Discharging air remains warm.	2. Defective thermostat.	2. Replace thermostat.
	3. Excessive clutch cycling.	3. Defective solid-state temperature control.	3. See component service section for diagnosis and repair.
	Mechanical		
	1. Discharging air remains warm.	1. Compressor clutch slipping.	1. Check for proper spacing; replace clutch, if necessary.
	2. Air displacement very small even with blower motor at high speed.	2. Obstructed air discharge passage.	2. Examine passage for kinks, wadding or failure to open passage during installation. Correct as necessary.
	3. Insufficient cooling at high-way speeds.	3. Outside air vents open.	3. Close vents. Instruct owner on the importance of keeping vents closed during operation of air-conditioner.
	4. Excessive high pressure gauge reading; engine temperature usually excessive.	4. Condenser fins clogged with dirt or bugs, interfering with proper air flow over condenser coil.	4. Clean engine radiator and reserve tank.

Trouble	Indications	Cause	Remedy
SYSTEM WILL NOT PRODUCE SUFFICIENT COOLING. (Continued)	5. None of the above conditions exist, but unit not cooling properly.	5. Evaporator fins clogged with lint or dust and/or coated with cigarette tars.	5. Remove unit from under-dash; remove unit housing and clean evaporator with compressed air. Use cleaning solvent to remove cigarette tars. (NOTE: Refer to Servicing Evaporator Components for instructions on removing the unit.)
	Refrigeration		
	1. Bubbles in sight glass; high side gauge reading excessively low.	1. Insufficient refrigerant in system. Leak in system resulting in loss of refrigerant.	1. Leak test system; repair as necessary. Recharge system until bubbles disappear and gauge readings stabilize to specifications.
	2. Gauge pressures may be normal or may show slightly increased head pressure and low suction pressure. Discharge output temperature higher than specified.	2. Clogged screen in expansion valve.	2. Purge system, remove screen and clean or replace.
	3. Excessively high or low gauge readings; may cool in excess or not enough.	3. Expansion valve thermobulb has lost charge.	3. Purge system; replace expansion valve.
	4. High pressure gauge usually higher than normal; low pressure gauge lower than normal; receiver-drier cold to touch and may frost.	4. Clogged screen in receiver-drier.	4. Purge system; replace receiver-drier.
	5. Excessive high and low gauge readings.	5. Excessive oil in system.	5. Inspect system for refrigerant overcharge. Correct as necessary. If gauges still read high, remove condenser and inspect for oil clogging.
	6. Excessive high and low gauge readings. Sight glass shows bubbles or is cloudy.	6. Air and/or moisture in system.	6. Purge system, replace receiver-drier, evacuate, and charge system with new refrigerant.
	7. Low gauge reading high; clutch cycles at too high a reading.	7. Thermostat defective.	7. Replace thermostat.
	NOTE: After completing any of the above refrigeration repairs, the system must have the receiver-drier replaced, then evacuate and recharge the system.		
EXCESSIVELY NOISY SYSTEM.	**Electrical**		
	1. Clutch vibrates.	1. Defective winding or improper connection in compressor clutch coil.	1. Repair or replace as necessary.
	Mechanical		
	1. Belts slip and are noisy.	1. Loose or excessively worn drive belts.	1. Tighten or replace as required.
	2. Noisy clutch.	2. Clutch may or may not slip; noisy when engaged.	2. Remove and repair or replace clutch as necessary.
	3. Compressor noisy.	3. Loose mountings; worn parts inside compressor.	3. Check mountings and repair; remove and repair or replace conpressor as necessary.
	4. Excessive rattles during operation.	4. Loose panels in vehicle; vibration of refrigerant hoses or lines.	4. Tighten panels; check security of hose clamps and/or rubbing or vibrations or refrigerant lines.

Trouble	Indications	Cause	Remedy
EXCESSIVELY NOISY SYSTEM (Continued).	5. Compressor noisy; lower part hot to touch.	5. Compressor oil level low.	5. Determine cause of oil loss and repair. Replace oil to specifications as necessary.
	6. Motor noisy.	6. Excessive wear in motor.	6. Check for binding; remove and repair or replace motor as necessary.
	7. Whining or growling noise during operation; pulley has rough feel when rotated by hand.	7. Idler pulley and bearing defective.	7. Replace bearing; inspect idler and pulley for excessive wear; replace as necessary.
	Refrigeration		
	1. Rumbling noise or vibration in high pressure line; thumping noise in compressor; excessive head pressure and suction pressure.	1. Excessive charge in system.	1. Discharge excess refrigerant until high pressure gauge drops within specifications.
	2. Hissing in evaporator – at expansion valve; bubbles or cloudiness in sight glass.	2. Low charge in system.	2. Check system for leaks; charge system.
	3. Suction pressure low; expansion valve noisy.	3. Excessive moisture in system.	3. Replace receiver-drier, purge, evacuate, and charge the system.
	4. Compressor has excessive knocking noise; pressure gauges read above normal. (Liquid refrigerant "slugging" compressor.)	4. Defective expansion valve. (Stuck open.)	4. Refer to Interpreting Gauge Readings: Testing for Defective Expansion Valve (1).

DESCRIPTION AND INSTALLATION

GENERAL DESCRIPTION

The Air Conditioning System has been designed of compact, lightweight components to provide ease of installation and servicing without affecting the high performance expected. An illustration of a typical air conditioning refrigeration system is shown in Fig. 15. The function of the individual components is described below.

The compressor pumps refrigerant from the evaporator. It compresses the refrigerant and sends it, under high pressure, to the condenser as a vapor. Since the high-pressure vapor delivered to the condenser is much hotter than the surrounding air, it gives up its heat to the outside air flowing through the condenser.

As the refrigerant vapor gives up its heat, it changes to a liquid. The condensed liquid refrigerant is filtered, dried and temporarily stored, under pressure, in the receiver-drier until it is needed by the evaporator.

Liquid refrigerant is metered from the receiver-drier into the evaporator by the thermostatic expansion valve which controls the flow of refrigerant in this part of the system. The refrigerant enters the low pressure area of the evaporator and begins to boil, or change to a vapor. In so doing it must pick up heat from the warm air passing through the evaporator. This heat will be transmitted, via the compressor, to the condenser for dissipation, thus the cycle continues.

SYSTEM COMPONENTS

A description of the individual components that are used in the manufacture of the Air Conditioning System is provided below.

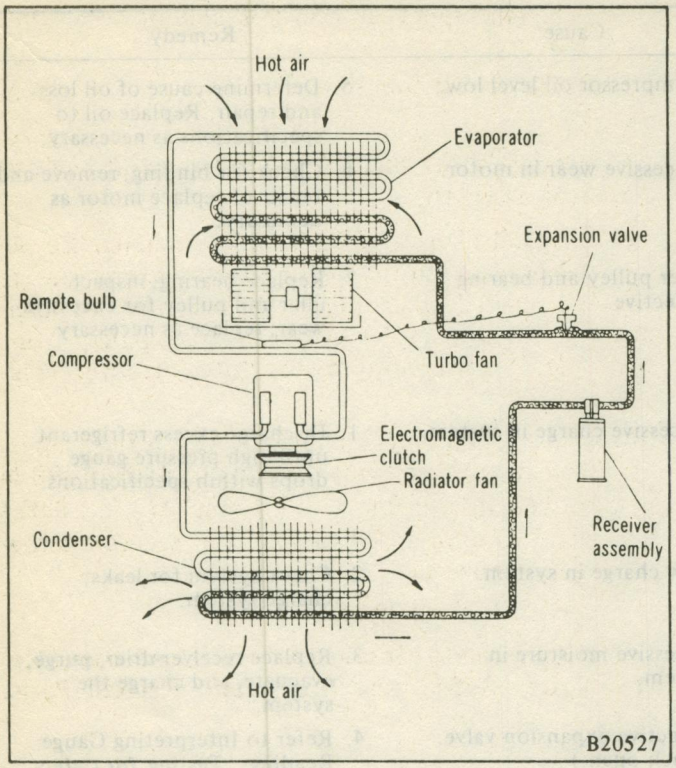


Fig. 15 Refrigeration System Components (Typical)

Compressor

A two cylinder 0.11 liter (6.11 cubic inch) displacement, reciprocating type that features positive lubrication and a non-corrosive case design. The compressor is engine driven and engine mounted.

Clutch

The electromagnetic clutch controls the on/off cycling of the compressor. The clutch is electrically controlled by the system's thermostat. Four bosses on the seal end of the compressor crankcase allow mounting the clutch independent of shaft seal cover plate.

Condenser

The condenser is mounted in front of the engine radiator so that the engine fan draws a continuous air flow through the condenser during operation. With vehicle motion, ram air increases the amount of air passing through the condenser fins, thereby increasing the condenser efficiency.

Receiver-Drier

The receiver-drier is a reservoir for the refrigerant. As the refrigerant leaves the condenser, it circulates to the receiver-drier where any dirt and/or moisture is removed before it continues to the expansion valve. A sight glass atop the receiver-drier permits observing the refrigerant flow through the system. The sight glass will appear clear during normal refrigerant cycling, but will have evidence of bubbles or foam if the system has a low refrigerant charge or if gas is present in the liquid.

High Pressure Switch

This switch, installed on the high (discharge) side of the compressor, is the system's safety feature. If the system pressure reaches 2,590 ± 70 kPa (375 ± 10 psi), the switch will open and disengage the compressor clutch. The switch will not close again until the system pressure has dropped to 1,720 ± 100 kPa (250 ± 15 psi).

Evaporator

The evaporator assembly, consisting of the evaporator coil and the thermostatic expansion valve, is housed within an injection molded ABS plastic case. This assembly is combined with the heater assembly. Two adjustable center louvers and side vents in each end of the dash provide maximum air flow into the passenger compartment.

Descriptions of the individual evaporator components are provided below:

NOTE: This system utilizes the motor assembly provided with the vehicle's heater. Refer to "HEATER" section of this group for details.

(1) A combination fan switch/temperature control is located in the instrument panel. Temperature control is provided through solid-state circuitry. The rotary-type potentiometer is operated using the outer ring behind the fan switch. Movement of "ring" clockwise lowers the air outlet temperature. The compressor clutch is cycled by this control to maintain interior temperature at the desired level.

CAUTION:
This control MUST be in the "OFF" position when the A/C system is not in use.

(2) The evaporator coil is constructed of copper tubing and aluminum fins. The coil is insulated from the evaporator case to prevent water from condensing on the case exterior and falling to the vehicle floor. Condensate collected inside the coil is directed outside the vehicle through drain tubes.

(3) The thermostat expansion valve is connected to the evaporator coil inlet. As heat loads vary, the refrigerant gas temperature leaving the coil will change. This change is sensed by the valve thermobulb attached to the coil outlet (suction) line and causes the valve to permit more or less liquid refrigerant to enter the coil.

Electrical System

The electrical system of the air conditioning unit is illustrated in Fig. 24. A description of the separate components, i.e., fan swtich, pressure swtich, etc., has been presented in the description of System Components, above.

INSTALLATION INSTRUCTIONS

These instructions provide information (with illustrations) for installing a complete Air Conditioning System. Installation is to be done in four sections
(1) the compressor and related components.
(2) the condenser, receiver-drier and unit hoses.
(3) the evaporator assembly installation with electrical circuit connections.
(4) the throttle opener installation and adjustment.

Compressor and Related Components (ENGINE COMPARTMENT)

(1) Disconnect battery cables.

(2) Remove and retain splashpan.

(3) Remove and discard alternator adjusting arm. Retain hardware. (Belt removal is not necessary).

(4) Hold upper and lower compressor mounts in mounting positions and determine bolts to be removed. Remove these bolts. (Fig. 16)

(5) Install lower compressor mount on engine. (Fig. 16)

(6) Secure clutch to compressor according to clutch manufacturer's instructions.

(7) Loosely install upper compressor mount to compressor. (Fig. 16)

(8) Loosely install compressor and upper mount assembly on lower mount assembly. (Fig. 16)

(9) Install upper compressor mount to engine. (Fig. 16)

(10) Tighten all compressor and compressor mount bolts.

(11) Loosely install alternator adjustment angle to alternator. (Fig. 16)

(12) Install idler mount assembly to engine. Loosely install idler eccentric to idler mount. Using spacers provided, install idler pulley to eccentric to align within ± 1.6 mm (1/16 in.) with drive pulley front groove and front compressor clutch groove. (Fig. 16)

(13) Install compressor drive belt. Adjust alternator and compressor belt tensions to 440 to 490 N (100 to 110 lbs.) gauge or 12.7 mm (1/2 in.) deflection per 300 mm (1 ft.) of span and secure alternator and eccentric.

(14) Reinstall splashpan.

(15) Proceed to Installation of Condenser, Receiver-Drier, Refrigerant Hoses, and Related Parts.

Packing Lists

Description	Quantity
CH-183-1 Compressor mount	1
CH-183-2 Hose guard	1
Std. Idler pulley	1
Short shoulder bolt	1
1 in. Aluminum eccentric	1
3/8 in. Mount spacer (welded)	2
1-1/16 in. Mount spacers (welded)	2
3838064 Clutch	1
15/32 in. x 36-1/2 in. Dayco Belt	1
3/8 in. x 7/8 in. NC Bolts	2
3/8 in. x 1-1/4 in. NC Bolts	2
1/2 in. x 1 in. NF Bolt	1
10 mm x 1.25 mm x 30 mm Bolts	2
10 mm x 1.25 mm x 45 mm Bolts	2
3/8 in. Lockwashers	6
10 mm lockwashers	4
3/8 in. Flatwashers	4
3/8 in. x 1 in. NC Bolts	2

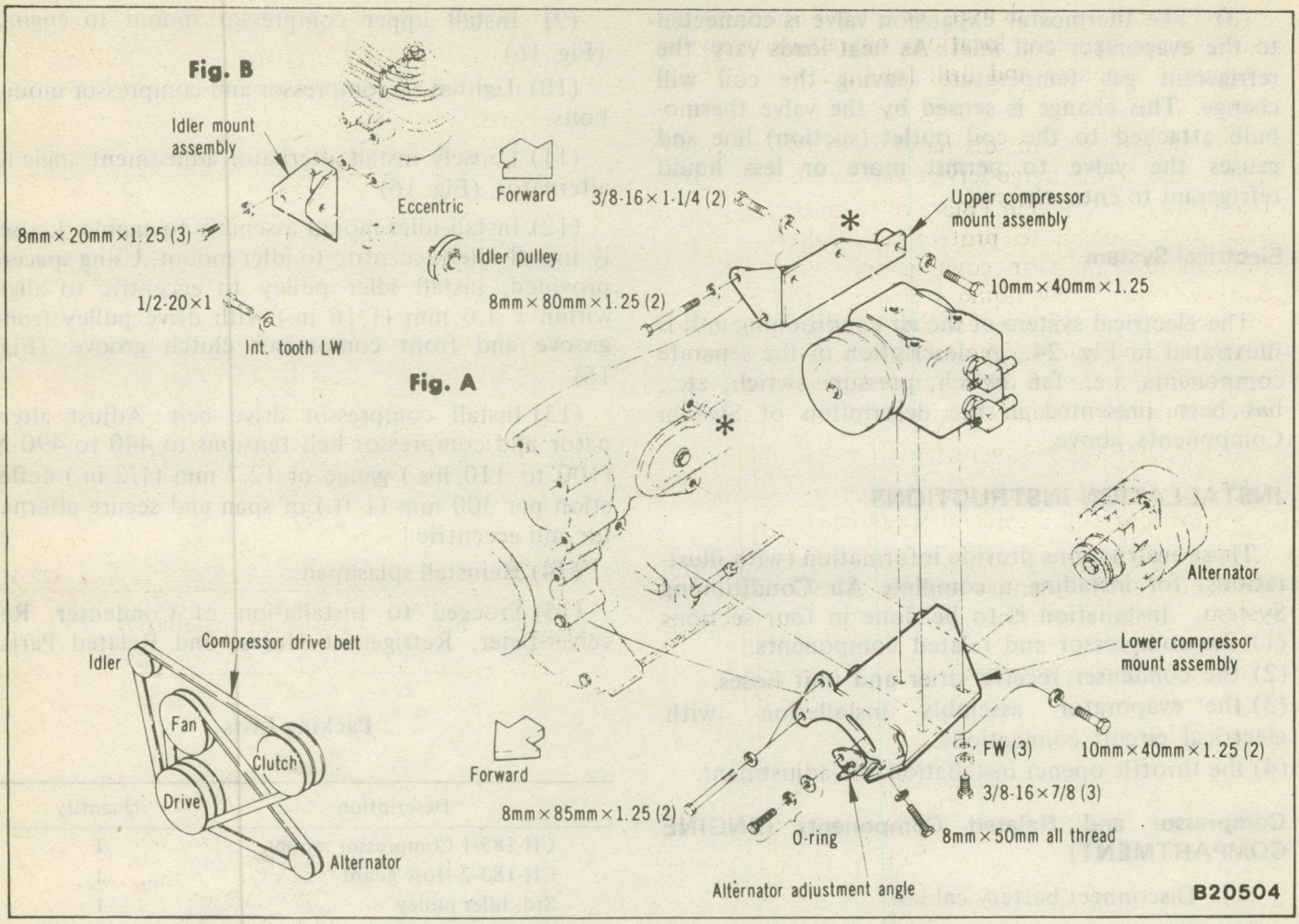


Fig. 16 Compressor Mounting

Installation of Condenser, Receiver-Drier, Refrigerant Hoses and Related Parts (ENGINE COMPARTMENT)

(1) Disconnect battery.

(2) Remove vehicle grill and center brace.

(3) Secure refrigerant hoses to condenser (1/2 hose must be at the top). Use refrigerant oil on all hoses and fittings before attaching. See clamp torque specifications.

(a) Oil inside of the hose and outside of the "Push-On" fitting with a few drops of refrigerant oil. Use refrigerant oil only. Other types of oil will not mix with refrigerant oil in the system.

(b) Put the hose clamp on the hose and push hose over fitting with a rotating motion until it stops against the top of the saddle connection of the condenser header, the stop bead of the compressor service valve, or the stop bead of the receive-drier manifold. The headers on the condenser coil should be reinforced by backing the fittings with a workbench or other suitable means during hose application. The hose should be attached to the condenser before installation.

(c) With most "Push-On" fittings, the clamp should be placed so that the "Clamp Finder" is snug against the end of the hose. In some cases, it may be impossible to push the hose completely onto the fitting. The hose should be pushed past the last barb and the clamp finder set flush with the top of the saddle connection, or stop beads of the compressor, or receiver-drier. The most important thing is that the clamp must be centered above the last inside barb. Tighten the clamp until it is squeezed flush with the outside of the hose.

HOSE	CLAMP TORQUE
No. 6	15 to 18 Nm (11 to 13 ft-lbs.)
No. 8	20 to 27 Nm (15 to 20 ft-lbs.)
No.10	28 to 37 Nm (21 to 27 ft-lbs.)

(4) Holding condenser in mounting position, mark mounting hole locations on radiator cowling. Remove condenser and drill four 3.2 mm (1/8 in.) holes.

(5) Route 1/2 in. discharge hose to compressor and secure to discharge service valve with hose clamp. Use the 255 mm (10 in.) piece of foam tubing around hose and position to protect hose where it passes through the radiator cowling and along side the battery. Route the liquid hose from the condenser through the opening in cowling directly behind the notch in the condenser mounting bracket. Use the 76 mm (3 in.) piece of foam tube to protect the hose where it passes through the cowling.

(6) Install the receiver-drier.

(7) Determine necessary length of liquid line from condenser to receiver-drier and cut.

NOTE: Check hose routing to prevent contact with emission canister, cruise control, servo motor and linkage, exhaust manifold, etc.

(8) Reinstall center brace and grill.

NOTE: DO NOT RECONNECT BATTERY CABLES until electrical circuit connections have been completed.

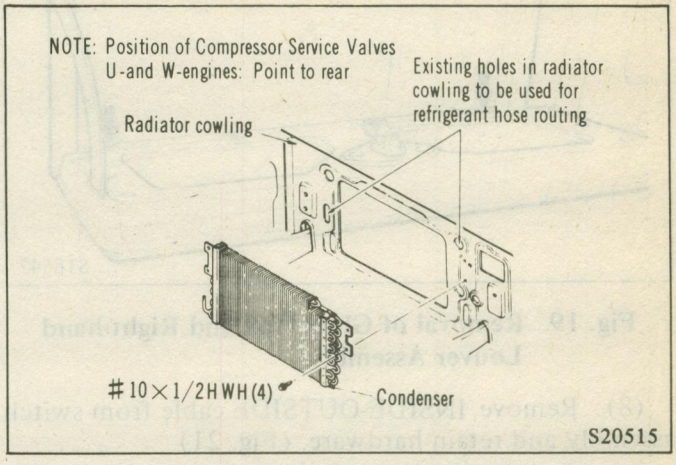


Fig. 17 Condenser Installation

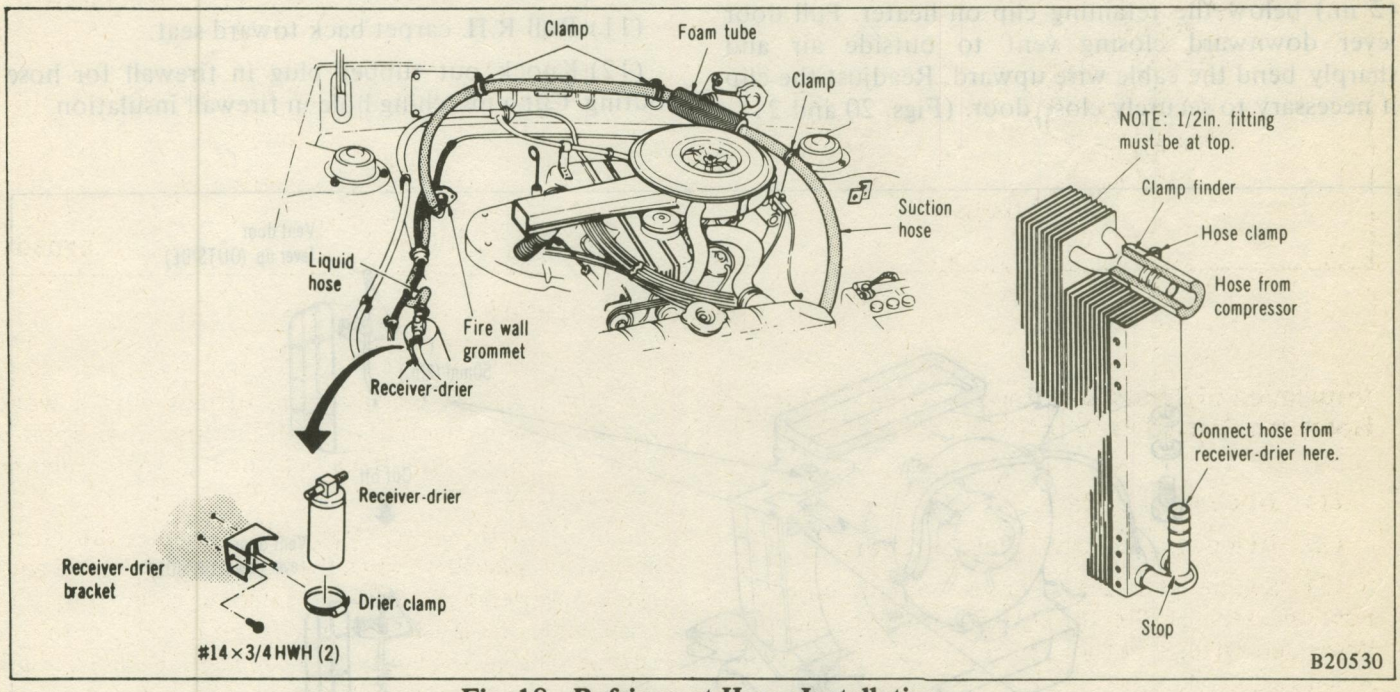


Fig. 18 Refrigerant Hoses Installation

Evaporator Assembly Installation and Electrical Circuit Connections.

- **Preparation for Installation of Evaporator Assembly**

(1) Remove glove box and right hand louver assembly. (Fig. 19)

(2) Remove package tray and brace attached to R.H. side of console and discard.

(3) Remove the plastic fresh air duct from R.H. side. Retain the metal retainer and discard the duct.

(4) Remove and lay aside the R.H. defrost duct from heater to defrost outlet.

(5) Remove center console assembly – lay aside.

(6) Remove ash tray and its mounting bracket.

(7) Remove center air plenum (discard).

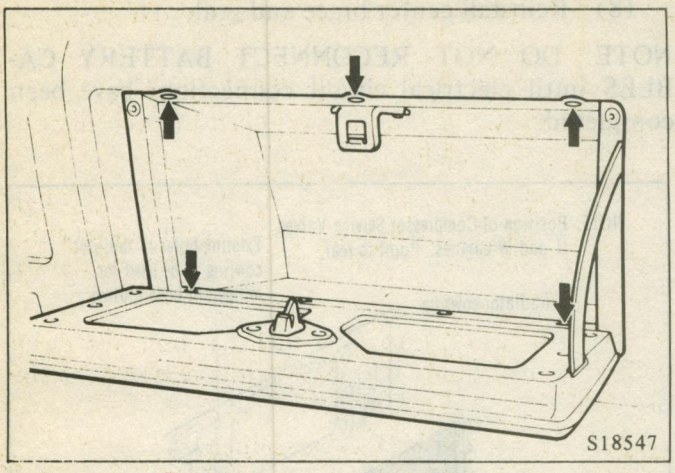


Fig. 19 Removal of Glove Box and Right-hand Louver Assembly

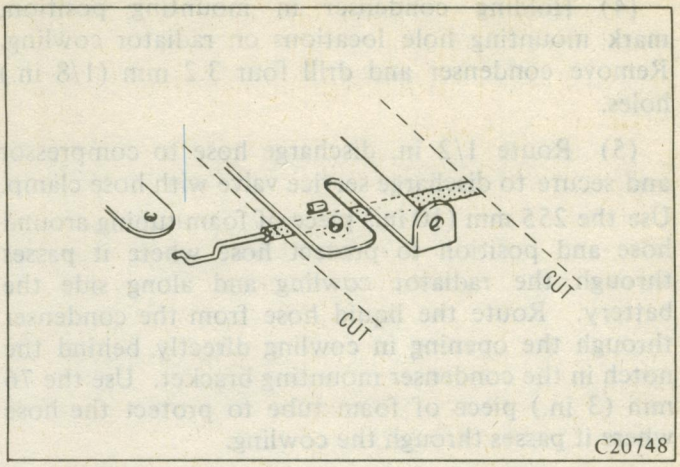


Fig. 20 Control Cable Cutting Positions

(8) Remove INSIDE-OUTSIDE cable from switch assembly and retain hardware. (Fig. 21)

Position the INSIDE-OUTSIDE vent door in the OUTSIDE position and cut cable approx. 50 mm (2 in.) below the retaining clip on heater. Pull door lever downward closing vent to outside air and sharply bend the cable wire upward. Readjust the clip if necessary to securely close door. (Figs. 20 and 21)

(9) Remove the lever knobs and fan switch knob from heater control panel.

(10) Snap control panel out of dash. Remove the fan switch and its wiring harness. (Discard switch and fan switch knob.) Save lever knobs.

(11) Roll R.H. carpet back toward seat.

(12) Knock out rubber plug in firewall for hose routing. Cut a matching hole in firewall insulation.

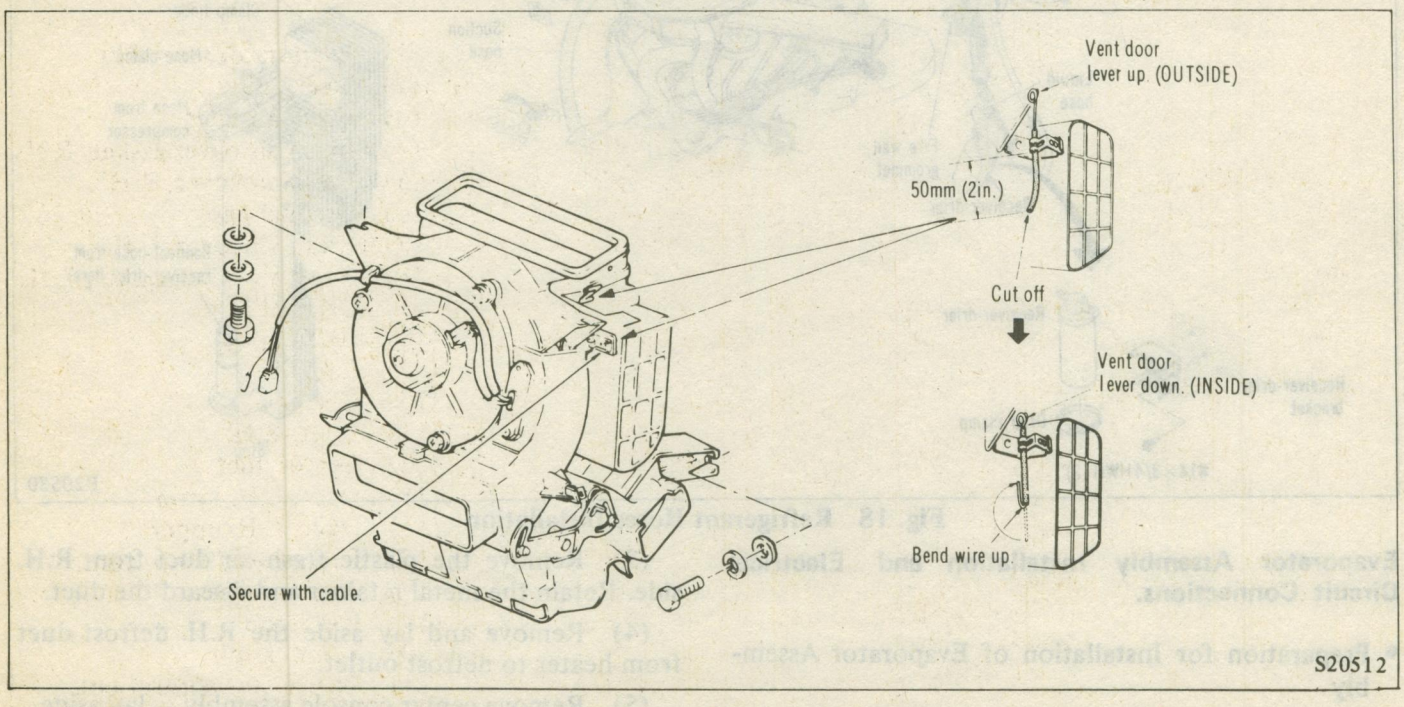


Fig. 21 Securing Heater Fresh Air Inlet Door in Closed Position

(13) Remove the lower L.H. louver and headlight switch panel from dash.

(14) Remove plastic fresh air duct from L.H. side. Retain metal retainer.

- Installation of Evaporator Assembly.

(1) Position firewall grommet over hole (engine side) and drill (2) 3.2 mm (1/8 in.) dia. mounting holes. (Do not secure grommet at this time.)

(2) Place rubber duct joint over heater recirculating air inlet and fold back duct joint flush to edge of grill.

(3) Place fresh air inlet and gasket in metal retainer and secure to R.H. side using original hardware. Place mastic sealer around the outside of the throat protruding inside of vehicle.

(4) Work evaporator into mounting position with black clutch wire over top.

(5) Place mastic around the fresh air inlet throat on evaporator.

(6) With evaporator in a mounting position, place the fresh air duct over the cowling inlet and the evaporator inlet. Loosely secure evaporator mounting flange to welded mounting bracket on firewall, using (2) 8 mm x 16 mm bolts, lockwashers and flatwashers. Be sure suction and liquid pipes are through the hole in the firewall as well as black clutch cable.

(7) Adjust evaporator assembly to match inlet to heater and secure upper mounting bolts.

(8) Drill (2) 3.2 mm (1/8 in.) dia. holes through firewall, using slots in lower rear as a guide and secure, using (2) #10 x 3/4 SMS. Fold duct joint over evaporator outlet.

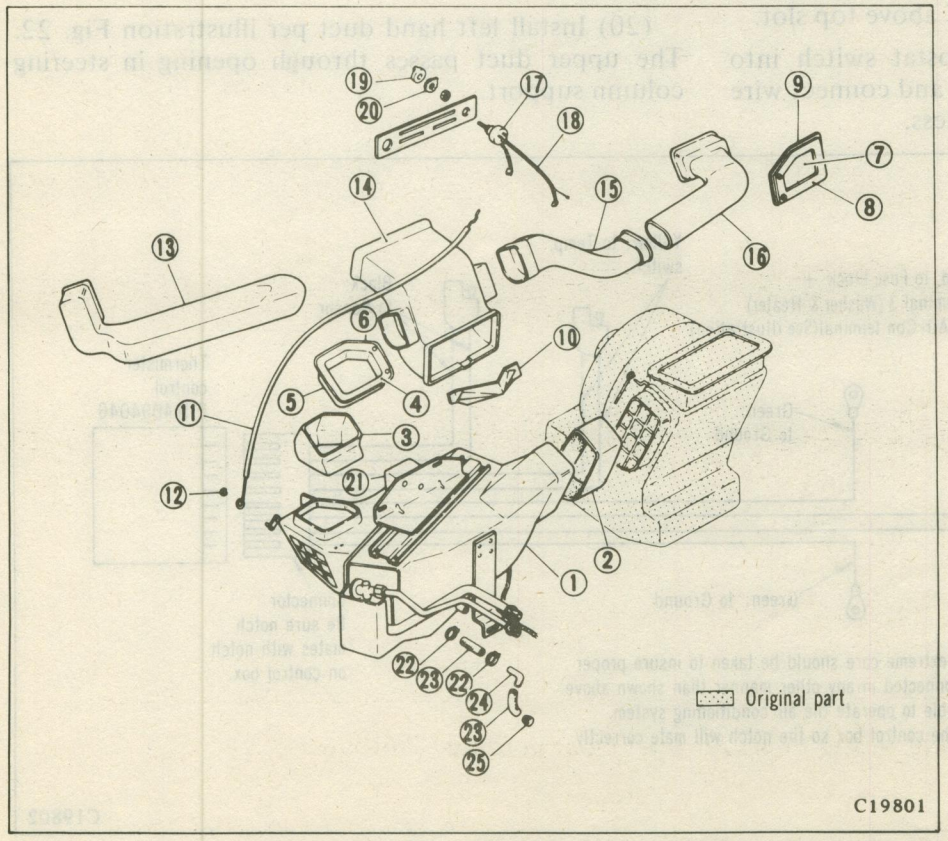
(9) Drill a 16 mm (5/8 in.) dia. hole for drain tube directly below this bracket and centered on the two slots through the firewall.

(10) Replace the R.H. defrost duct.

(11) Ground the loose green wire to one of the nuts retaining the right hand fresh air cover.

(12) Install the new INSIDE-OUTSIDE cable in the hole in INSIDE-OUTSIDE lever. Start from below and 90° to the hole so the hook in cable will slip into hole in lever. Install cable clip.

(13) Securely clamp the plastic jacket of new control cable into retainer, leave approx. 1 in. of plastic jacket protruding from clamp toward the control lever.



(1) Evaporator assembly
(2) Sleeve duct
(3) Fresh air duct
(4) Fresh air cover gasket, R.H.
(5) Fresh air cover, R.H.
(6) Original part
(7) Fresh air cover, L.H.
(8) Fresh air cover gasket, L.H.
(9) Original part
(10) Baffle
(11) Cable
(12) Clip
(13) Duct, R.H.
(14) Center duct
(15) Duct, L.H. lower
(16) Duct, L.H. upper
(17) Fan switch/temp. control
(18) Wiring harness
(19) Fan knob
(20) Temp. knob
(21) Thermistor control box
(22) Drain clamp
(23) Drain hose, 1/2 x 8 in.
(24) Elbow, 90°
(25) Drain restrictor

Fig. 22 Evaporator Assembly Installation

(14) Route the other end of cable over top of the evaporator and fasten to operating arm on evaporator INSIDE-OUTSIDE door. Position top control lever to the extreme left and the evaporator door horizontal to the floor board. Snap plastic jacket into clip on evaporator. Work the INSIDE-OUTSIDE lever to be sure the evaporator fully closes and opens. Readjust cable if necessary.
NOTE: The above step is very important and must be correctly installed.

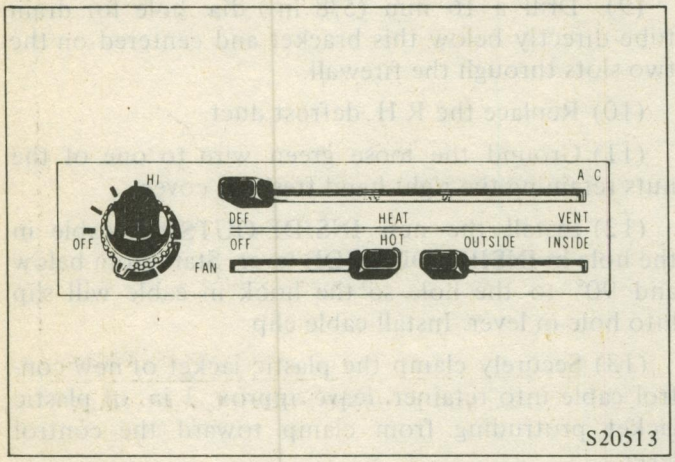


Fig. 23 Original Switch Plate

(15) Install the decals on the original switch plate. (Fig. 23) Center on switch hole, A/C above top slot.

(16) Install the new fan thermostat switch into switch panel. Reinstall switch panel and connect wire from switch to matching wiring harness.

Connect the 2 yellow wires with male and female plug to matching yellow wires from evaporator control. See wiring diagram. (Fig. 24)

(17) Connect the red power lead from evaporator to the blue wire from fuse block (heater) or air-con terminal. Connect using piggy back connector.

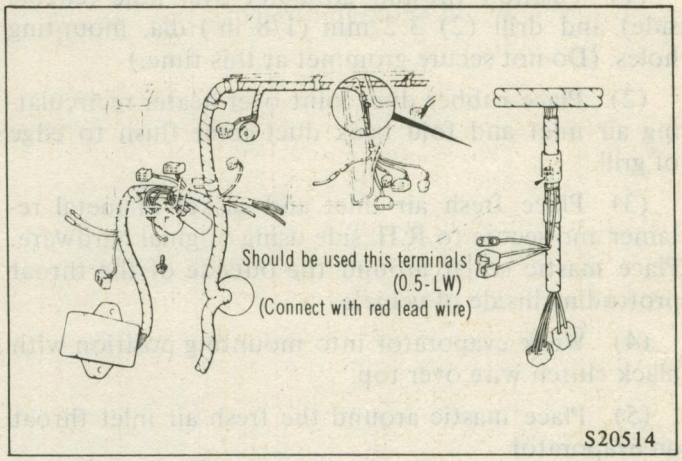


Fig. 25 Connecting the Air Conditioner Wiring

(18) Install the L.H. vent cover using the original metal retainer.

(19) Install right hand ducts per illustration Fig. 22.

(20) Install left hand duct per illustration Fig. 22. The upper duct passes through opening in steering column support.

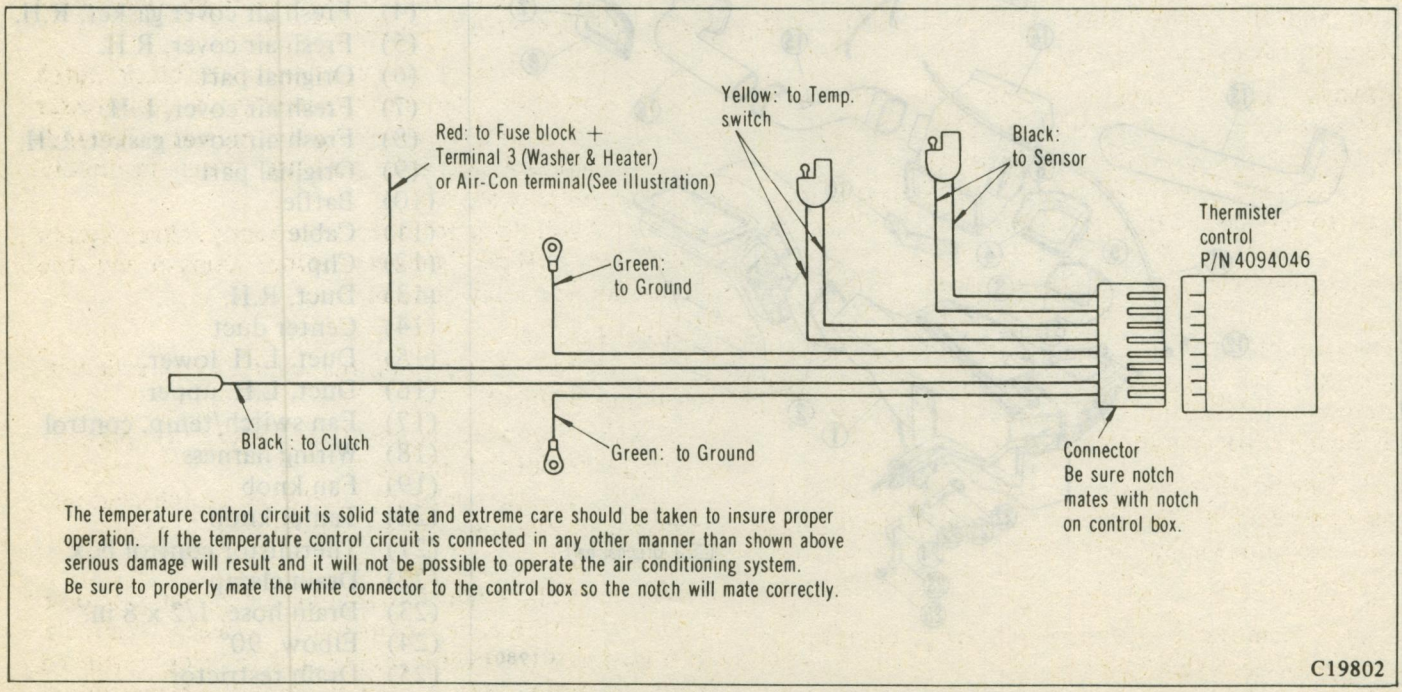


Fig. 24 Electrical Schematic Diagram Air Conditioning System

(21) Rotate the headlight switch 180 degrees if necessary so wire connector will clear the L.H. duct. It also will be necessary to properly orient the Light Knob.

(22) Reinstall L.H. louver and headlight switch panel. Be sure louver fits into duct.

(23) Reinstall glove box and louver panel. Be sure louver fits into duct.

(24) Connect refrigerant hoses to proper evaporator connections (engine side). Be sure to use refrigerant oil on all fittings and a backup wrench before tightening. Fig. 18 for proper hose routing.

(25) Install firewall grommet over refrigerant hoses and secure to firewall using 2 #8 x 1/2 SMS.

(26) Fold carpet back and cut an X in location over drain hole in firewall. Install drain hose using clamp on evaporator. Extend drain hose 50 mm (2 in.) inside engine compartment and install the 90° elbow pointing down. Use a 50 mm (2 in.) piece of drain hose on 90° elbow and insert the drain restrictor in the end.

(27) Evacuate the system and reconnect battery. Charge with 900 g (32 oz.) R-12. Install high pressure switch at compressor.

CAUTION:
Do not tighten pressure switch by plastic body. Switch can be permanently damaged. Connect pressure switch wiring. (Fig. 26)

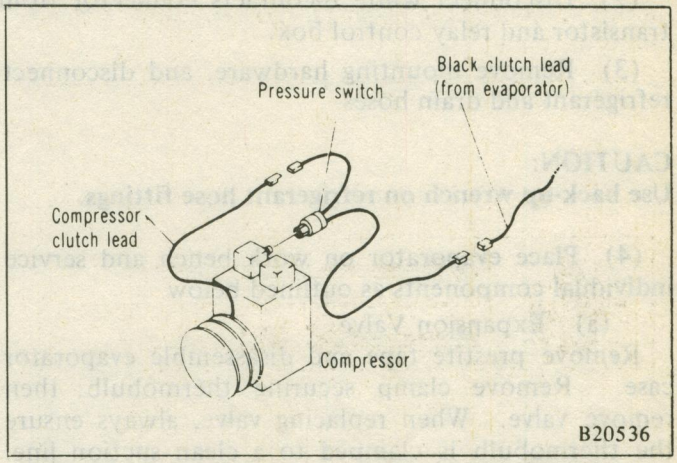


Fig. 26 Clutch and Pressure Switch Connections

COMPONENT SERVICING

ELECTRICAL SYSTEM SERVICING

A schematic diagram of the evaporator's electrical circuit and its connections to the vehicle electrical system is provided in Fig. 24.

Always verify the system's electrical components are operating properly before considering a possible defective component within the evaporator assembly. The glove box will have to be removed from the vehicle to service the individual parts.

Servicing System Electrical Components

The trouble shooting chart will provide a quick check for the most common types of electrical component difficulties. To check the components individually, proceed as follows:

(1) Check all electrical wiring for wear or abrasions – especially if it passes through firewall or is located near hot engine parts.

(2) Pressure Switch

(a) Remove pressure switch from compressor discharge service valve.

(b) Disconnect pressure switch cables.

(c) Check continuity between cable connectors on pressure switch. Since pressure switch is "normally closed", continuity should exist between connectors when it is removed from the circuit.

(d) As a double check, connect the black clutch wire from the evaporator directly to compressor clutch wire. If unit responds to thermostatic demands now – but did not with pressure switch in circuit, replace pressure switch.

If unit still does not operate properly, check clutch field (as outlined below) before considering the transistor and relay control box.

(3) Clutch

(Refer to trouble shooting chart for mechanical clutch problems.)

(a) Remove connection between pressure switch and clutch lead.

(b) Check continuity between clutch lead and ground. If continuity exists, clutch field is good.

(4) Temperature Control

Unplug yellow wires. With ohmmeters set to middle scale (R x 100), check continuity between terminals. If a swing of the needle, as the control "ring" is moved from 'Off' to 'Max.', is indicated, the temperature control is good.

Servicing Evaporator Components

Servicing any evaporator component requires removing the evaporator assembly from the vehicle. To remove the evaporator assembly, proceed as follows:

(1) Remove glove box.

(2) Disconnect white 8-contacts connector from transistor and relay control box.

(3) Remove mounting hardware, and disconnect refrigerant and drain hoses.

CAUTION:
Use back-up wrench on refrigerant hose fittings.

(4) Place evaporator on work bench and service individual components as outlined below.

(a) Expansion Valve

Remove prestite tape and disassemble evaporator case. Remove clamp securing thermobulb; then remove valve. When replacing valve, always ensure the thermobulb is clamped to a clean suction line. Reassemble evaporator case and replace prestite tape.

(b) Motor

(See Heater Section.)

(c) Fan Switch/temp. Control

(See Heater Section and see installation instructions on preceding pages.)

(d) Temperature Probe

Disconnect plug. With ohmmeter set to lowest scale (Rx1), check continuity between terminals. If continuity exists, probe is good.

(e) Transistor and Relay Control Box

If it has been determined that the temperature probe and slide switch are good, and the green ground wire is securely fastened, using white 8-contacts connector disconnected in Step (2), check connector as follows:

(i) With ohmmeter set to lowest scale (Rx1), check continuity between green ground wire and ground. If continuity exists, ground wire and connection are good.

(ii) Disconnect clutch wire at compressor clutch. With ohmmeter set at lowest scale (Rx1), check continuity at white 8-contacts connector between the black clutch wire and ground. If continuity exists, clutch wire at white 8-contacts connector and clutch wire terminal at compressor. If continuity is shown, clutch wire is good.

(iii) With ignition on, using a test light between the red power wire at white 8-contacts connector and ground, the test light should come on. If test light does not come on, check fuse or test light bulb.

(iv) Reconnect clutch lead at compressor. With ignition on, using small jumper wire, connect jumper wire to red power wire and black clutch wire at white 8-contacts connector. The clutch should engage. If it has been determined that the clutch, temperature probe, slide switch, and white 8-contacts connector are operating properly, and the clutch will not cycle, engage or disengage the transistor and relay box are defective and should be replaced.

REFRIGERATION SYSTEM SERVICING

In order for any refrigeration system to function properly without damage to the components, all components must be in good working order. The unit cooling cycle and the compressor's temperature-pressure relationship can help determine proper operation of the system as described below.

(1) Unit Cooling Cycle

The amount of time required for the cooling cycle is dependent on such factors as ambient temperature, humidity, thermostat setting, and air leakage into the cooled area. With a constant operating condition – about equal ambient temperatures (same type of weather), same thermostat settings, etc. – any sudden increase in the length of the cooling cycle should indicate abnormal unit operation.

(2) Temperature-Pressure Relationship

The low side and high side pressures of the compressor will vary with changing temperature, humidity, and altitude. The following conditions should be checked after operating the system for 2 to 3 minutes.

CAUTION:
Servicing any closed refrigeration system should be performed by trained, skilled servicemen only.

(a) All high pressure lines and components should be warm to touch.

(b) All low pressure lines and components should be cool to touch.

(c) Inlet and outlet line connections at receiver-drier should be about the same temperature. Any drastic change in temperature indicates a restriction in receiver-drier.

(d) Heavy frost on inlet side of expansion valve may indicate defective valve or moisture in the system.

Safety Precautions

The following safety precautions should be observed while servicing any refrigeration system.

(1) Wear safety glasses, goggles, or face shield while charging and/or servicing refrigerant system.

(2) Do not apply discharge pressures to refrigerant can. Discharge pressure can blow-up can and cause serious injuries.

(3) Do not use a torch, electricity, or engine heat to heat refrigerant containers. If necessary, heat container by placing it in 54°C (130°F) (maximum) water while container is open to the system; DO NOT EXCEED 54°C (130°F).

(4) Refrigerant storage area should never exceed 54°C (130°F).

(5) If LIQUID REFRIGERANT GETS IN EYES, BATHE EYES WITH COOL WATER. PLACE CLEAN WET BANDAGES OVER EYES AND SEE A DOCTOR AS SOON AS POSSIBLE.

(6) Do not weld around free refrigerant gas. Do not release refrigerant gas or liquid around any open flame. The open flame will break the refrigerant gas down to phosgene gas. Phosgene gas is colorless, has an unpleasant odor, and causes severe respiratory irritation.

Operation of Compressor Service Valves

The compressor service valves, located on top of the compressor, are identified on the casing. The suction valve has a 15.9 mm (5/8 in.) male barb fitting for attaching the suction hose; the discharge valve has a 12.7 mm (1/2 in.) male barb fitting. Both service valves also have 6.35 mm (1/4 in.) male fittings called gauge ports that are used to connect service hoses of the manifold gauge set. Both the suction and discharge service valves operate in the same manner.

The Schrader valves on the compressor require a valve depressor in the hose fitting before the manifold gauge set can be connected. As the service hose is screwed onto the valve, the depressor depresses a center pin in the valve which allows pressure readings on the service gauges. Removing the service hose (with the fitting) closes the valve, returning it to the back-seated position.

Leak Testing a System

To leak test a closed refrigeration system, proceed as follows:

(1) Disconnect pressure switch wires at the Packard connectors (refer to Fig. 26) and remove pressure switch from compressor discharge service valve. Reconnect wires.

(2) Connect manifold gauge set to compressor. Open valves and bleed any refrigerant in system. (See "Evacuating a System" below.) Connect charging hose to a good vacuum pump. Verify proper hose connections.

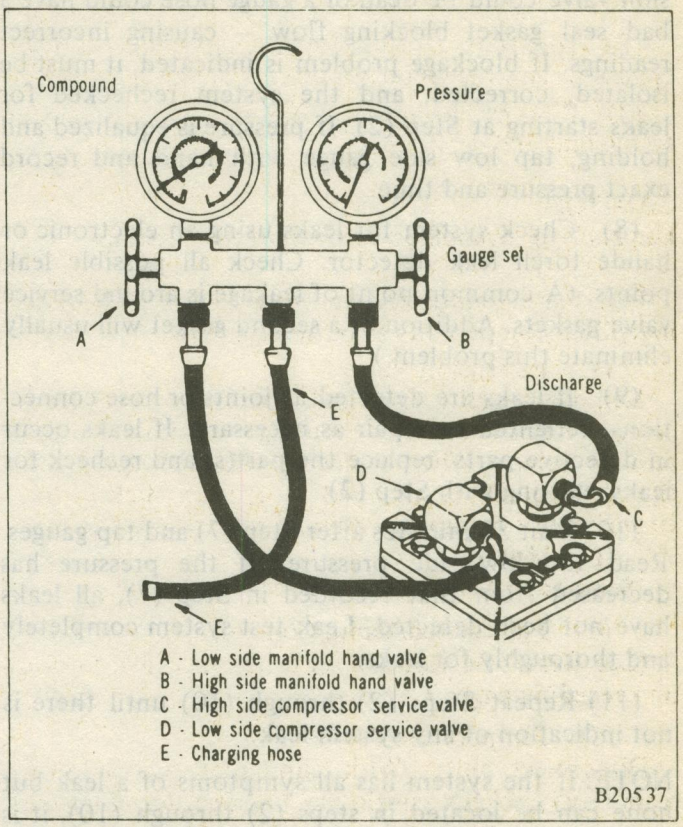


Fig. 27 Manifold Gauge Set Connections

(3) Open both manifold hand valves and pull a vacuum on the system to 749 mm (29.5 in.) of Mercury at sea level (or 1,000 microns if an absolute pressure gauge is available). When using a manifold gauge set at elevations above sea level, vacuum pressure will have to be interpolated.

(4) While vacuum pump is running, close both manifold hand valves (turn fully closkwise). Turn vacuum pump off.

(5) Monitor system vacuum for at least 10 minutes, tapping low side gauge before each reading. If vacuum does not hold, the system has leaks (probably in hose connections) that must be located and repaired.

(6) Connect charging hose to a container of refrigerant. Loosen charging hose connection at manifold and open refrigerant container valve to purge air from hose. Tighten connection when pure refrigerant flows from hose (approximately five seconds).

(7) Break vacuum by allowing small amount of refrigerant vapor (not liquid) to enter the discharge side by slowly opening high side valve. Continue adding gas until 280 kPa (40 psi) is indicated on both gauges. If low side gauge does not indicate 280 kPa (40 psi), the system is blocked. The expansion valve could be dead or a gauge hose could have a bad seal gasket blocking flow – causing incorrect readings. If blockage problem is indicated, it must be isolated, corrected, and the system rechecked for leaks starting at Step (2). If pressure is equalized and holding, tap low side gauge with hand and record exact pressure and time.

(8) Check system for leaks using an electronic or halide torch leak detector. Check all possible leak points. (A common point of leakage is around service valve gaskets. Addition of a second gasket will usually eliminate this problem.)

(9) If leaks are detected at joints or hose connections, retighten or repair as necessary. If leaks occur in defective parts, replace the part(s) and recheck for leaks, starting with Step (2).

(10) Wait 30 minutes after Step (7) and tap gauges. Read the low side pressure. If the pressure has decreased from that recorded in Step (7), all leaks have not been detected. Leak test system completely and thoroughly for leaks.

(11) Repeat Steps (2) through (10) until there is not indication of any system leak.

NOTE: If the system has all symptoms of a leak but none can be located in steps (2) through (10), it is possible the leak was occurring at the pressure switch connection on the discharge service valve. With the system properly charged, replace the pressure switch and check it for leaks.

Evacuating a System

(1) After all leaks have been located and repaired, bleed system to 0 kPa (0 psi) and connect charging hose to vacuum pump.

NOTE: Bleed system slowly from low side to prevent loss of system oil. Oil will be lost if system is bled too rapidly.

(2) Evacuate system for at least 30 minutes. Close valves, disconnect vacuum pump, connect refrigerant container, purge charging hose, and break vacuum to 100 kPa (15 psi).

(3) Wait 10 minutes, remove refrigerant container, bleed system to 0 kPa (0 psi), connect vacuum pump, and evacuate system for at least one hour.

NOTE: If an absolute pressure gauge is available, pull vacuum until 1,000 microns is reached or as low in the 1,000 to 2,000 micron range as possible. This deep vacuum should be pulled using a high vacuum pump with recently changed or new oil.

(4) Valve off vacuum pump. Turn pump off and disconnect charging hose. The system is now ready for charging.

Charging a System

(1) Connect charging hose to refrigerant container and purge air from hose at manifold. Let refrigerant into system as a vapor (not liquid) until system will take no more or until approximately 0.9 kg (2 lbs.) of refrigerant has entered the system. DO NOT OVERCHARGE.

(2) Close discharge (high pressure) gauge set hand valve fully clockwise until tight.

WARNING:
NEVER OPEN DISCHARGE HAND VALVE WITH REFRIGERANT CONTAINER ATTACHED AND COMPRESSOR RUNNING. Compressor discharge pressure can cause refrigerant containers to explode and cause serious injuries.

(3) Start vehicle engine, open vehicle doors, and turn system controls on full to keep compressor running. Make sure evaporator blower and vehicle fan are operating.

(4) Charge system with refrigerant until sight glass is clear. Close low side hand valve.

(5) The vehicle should be cooled to its lowest desired operating temperature, the sight glass checked, and additional refrigerant added if foam or bubbles are present. (Occasional bubbles, seen for a few seconds during compressor starting, are normal and should not require additional refrigerant in the system) DO NOT USE MORE THAN 0.9 kg (2 lbs.) OF REFRIGERANT. If bubbles are still present in sight glass with 0.9 kg (2 lbs.) of regrigerant in the system, the system has not been properly evacuated or receiver-drier has been installed backwards.

(6) Disconnect manifold gauge set and replace gauge port cap on suction service valve.

(7) Disconnect pressure switch wires at the Packard connectors, install pressure switch on discharge service valve, and reconnect wires.

TROUBLE SHOOTING PROCEDURES

VISUAL INSPECTION

Before any performance tests are conducted, the system should be visually inspected to see if:

(1) Drive belts are tightened to specifications and all pulleys are properly aligned. Belts should not be worn or frayed. The compressor belt is subjected to a heavy load during operation of the compressor. This is especially true when the head pressures build up in excess of 1,380 kPa (200 psi) during hot weather and city driving. The belt must be in excellent condition to withstand the strain of heavy load requirements. Too tight a belt tension will cause a strain on the bearings of the parts which are operated by the compressor belt. Too loose a belt tension will cause vibration, belt slippage, and poor unit performance. A belt tension gauge eliminates guesswork in tightening the compressor belt. If a belt tension gauge is not available, tighten the adjustment until a 9.5 to 12.7 mm (3/8 to 1/2 in.) deflection in the longest span can be made with hand pressure.

(2) Compressor brackets and braces are tight and not cracked or broken. Improperly tightened mounting bolts can work loose, and brackets and braces could then break under the strain and vibrations. Failure to inspect and repair any damage at these points can result in system failure and possible damage to other vehicle components.

(3) Drain hoses and refrigerant lines are not worn nor leaking. Grommets and rubber pads that were originally installed to protect these components from contact with metal parts can deteriorate and become mispositioned or fall off. This will expose the hose(s) or line(s) to constant rubbing and chafing. To prevent such damage, some type of protective material should be reinstalled.

(4) The compressor seal is not leaking. This will be indicated by an oily streak across the under side of the engine compartment hood and/or oil on the compressor.

(5) The condenser is clean and properly mounted. Bugs and dirt clogging the condenser impair air movement through the condenser fins and interfer with proper condensing action. Bug screens in front of the condenser will prevent clogging of the condenser but at the same time will prevent full air passage through the condenser. (Bug screens equal approximately two years accumulation of bugs.) Any interference with full air flow must be corrected to allow proper condensing action.

(6) All ducts, louvers, and air distributing mechanisms are operating smoothly without binding or sticking.

(7) The evaporator coil is free from accumulations of dust. The evaporator condenses moisture, which in turn, traps dust and lint on the side where the air enters the unit. The blower fan will function most effectively when the evaporator passages are clear. Dust and lint should be removed.

(8) Blower motor is operating correctly. Operate blower motor at all speed. If the motor operates at some control switch selections, but not others; check the evaporator control switch and resistor board for short circuit(s). "Shorting" can be caused by wires touching each other. Also check for loose or frayed wire connections.

(9) There are no refrigerant leaks. An oily spot usually indicates a refrigerant leak since oil will be carried out of the system with the escaping refrigerant.

SYSTEM DIAGNOSTIC PROCEDURES

Diagnosing system malfunctions in an automotive air conditioning system depends mainly on the mechanic's ability to interpret gauge readings. The following material will demonstrate the use of these instruments, show typical readings, and explain how they can be used to detect possible system malfunctions.

Connecting a Manifold Gauge Set

Connecting a manifold gauge set is illustrated in Fig. 28, however, Air Conditioning Systems have a high pressure switch installed on the compressor discharge service valve. Before connecting the gauge set, disconnect the pressure switch wires at the Packard connectors, remove the pressure switch, and then reconnect the wires.

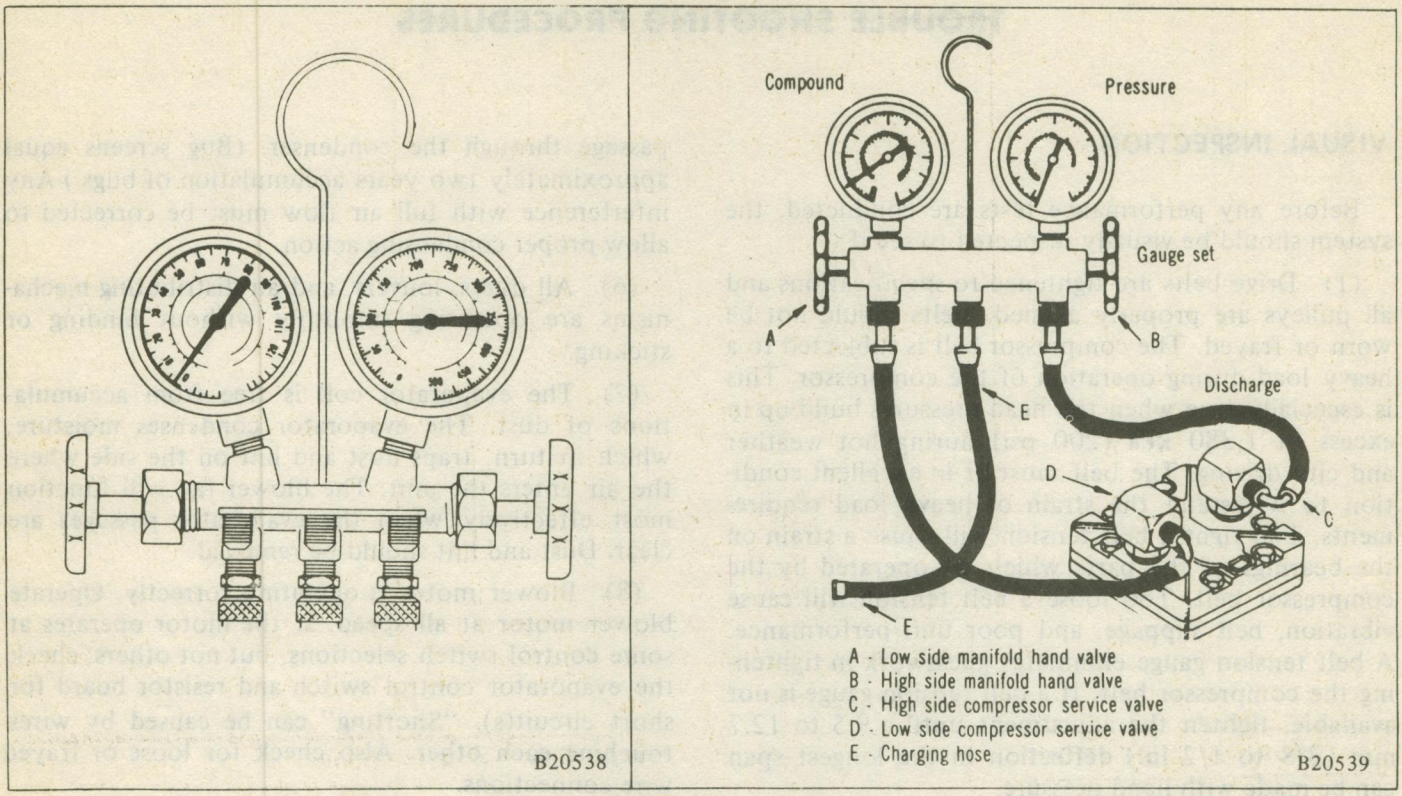


Fig. 28 Typical Manifold Gauge Set and Connections

NOTE: When the pressure switch is removed from the compressor it will be "normally closed"; thus, the system's thermostat-to-clutch circuit will be complete and the unit can be operated as usual. No circuit adjustments are required.

Verify that no refrigerant is leaking from the high side gauge port Schrader valve, then the connect the manifold gauge set as follows:

NOTE: Use safety glasses. Use fender covers to protect car finish.

(1) Slowly remove gauge port cap from low pressure service port, insuring that no refrigerant is leaking from a defective Schrader valve.

(2) Verify that the service hoses are equipped with a Schrader valve depressing pins.

(3) Close HAND SHUTOFF VALVES.

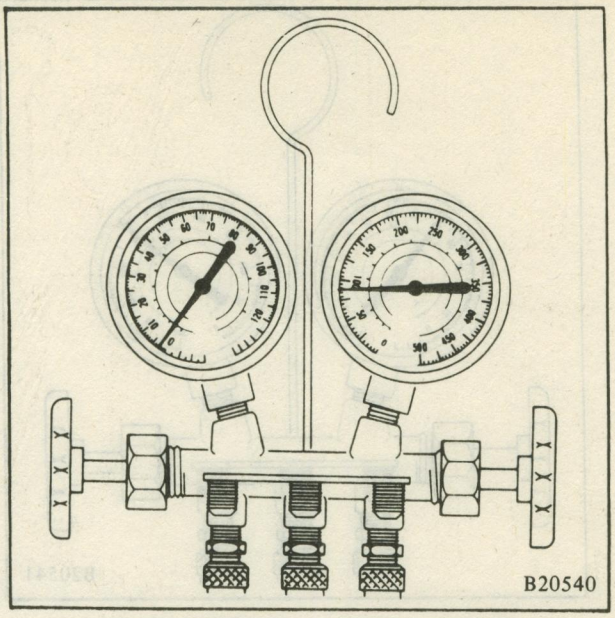
(4) Connect high pressure and low pressure hoses to correct service valves: LOW PRESSURE HOSE TO LOW SIDE VALVE and HIGH PRESSURE HOSE TO HIGH PRESSURE VALVE. Verify that high side manifold valve is tight.

(5) Purge hoses by cracking the low side valve on the manifold. Wait a few seconds, then close. Repeat this process with the manifold high side manifold valve. Air should now be purged from the service hoses.

Interpreting Gauge Readings

It is not practical to list low and high pressure readings since pressures will vary with ambient temperature, relative humidity, and atmospheric pressure.

The following gauge readings represent various malfunctioning air conditioning conditions. The satisfactory readings indicated in the charts are for an ambient temperature of 38°C (100°F) and normal humidity. Actual gauge readings for other weather conditions will have to be interpolated.



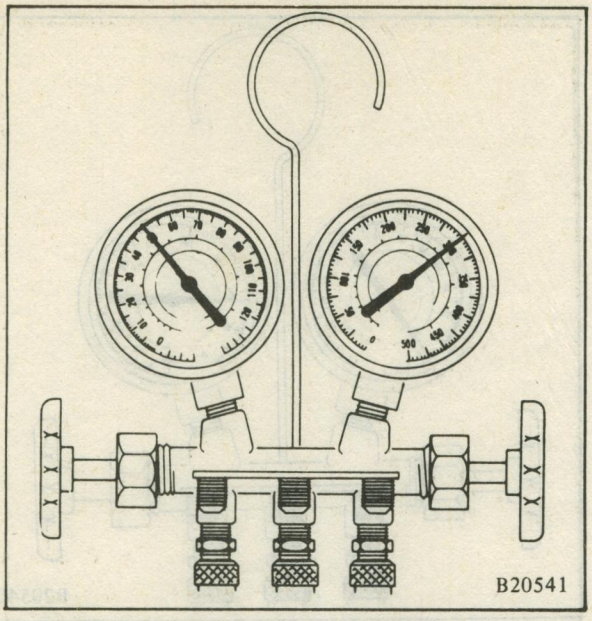
Deficient System Gauge Readings

ABNORMAL INDICATIONS	SATISFACTORY SYSTEM WILL SHOW		
1. Little or no cooling. 2. Suction side reading low. 3. Low head pressure. 4. Warm air coming from evaporator. 5. Bubbles or foam in sight glass. 6. Clear sight glass if all refrigerant has been lost.	Manifold Gauge Readings: Low side 100-210 kPa (15-30 psi)	High side 1,450-1,590 kPa (210-230 psi)	Other normal indications 1. Full liquid in sight glass. 2. Sharp cold feel of discharge air from evaporator.

IF SYSTEM DOES NOT PASS TESTS

REASON	REMEDY
System excessively low on refrigerant – serious leak indicated.	1. Leak test system. Purge system. Repair leak or leaks as necessary. 2. Check oil level. 3. Evacuate system. Charge system with NEW refrigerant. NOTE: If system had no positive pressure, replace receiver-drier prior to evacuation and charging.

TESTING FOR LOW REFRIGERANT CHARGE



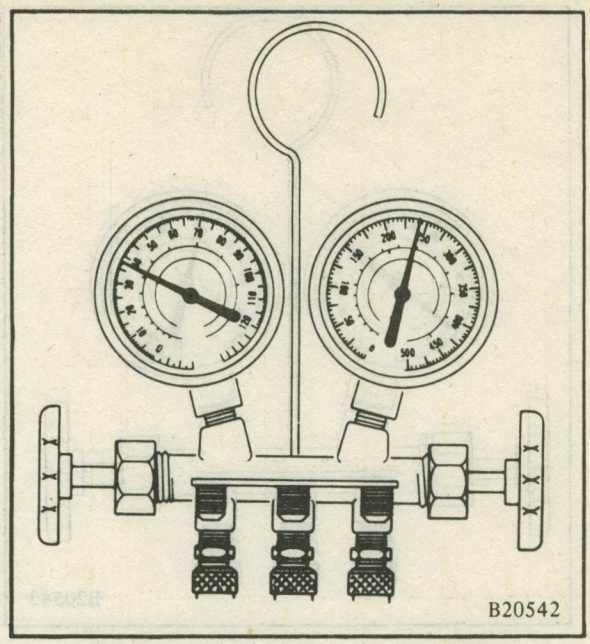
Deficient System Gauge Readings

ABNORMAL INDICATIONS	SATISFACTORY SYSTEM WILL SHOW		
1. Occasional bubbles in sight glass. 2. Slight cooling from evaporator.	Manifold Gauge Readings: Low side	High side	Other normal indications 1. Drop of low side pressure until thermostat control cycles clutch: modulation at suction control. 2. Slightly lower high side pressure, especially if large fan is used to substitute ram air. 3. No trace of bubbles in sight glass. 4. Suction line cool during system operation. 5. Sharp cold feed of discharge air from evaporator.
	–	–	

IF SYSTEM DOES NOT PASS TESTS

REASON	REMEDY
Air and moisture present instead of full refrigerant charge.	1. Leak test system. Purge system. 2. Replace receiver-drier. 3. Check oil level. 4. Evacuate system. Charge system with NEW refrigerant.

TESTING FOR AIR IN SYSTEM



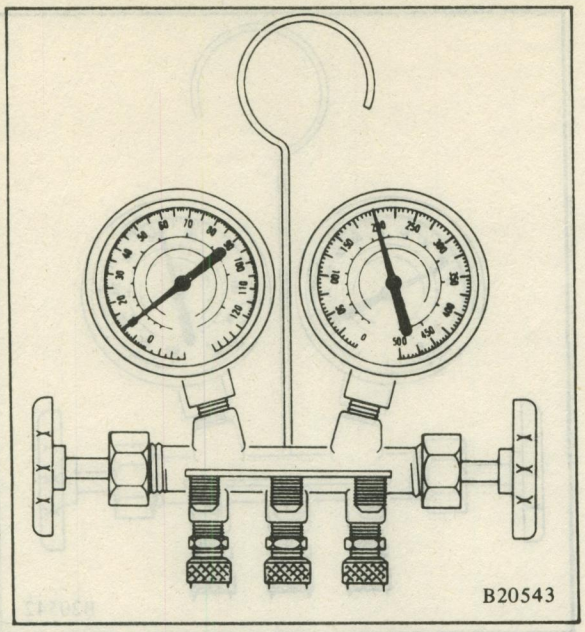
Deficient System Gauge Readings

ABNORMAL INDICATIONS	SATISFACTORY SYSTEM WILL SHOW		
1. Occasional bubbles in sight glass. 2. High head pressure. 3. High suction side pressure. 4. Cooling insufficient.	Manifold Gauge Readings: Low side 100-210 kPa (15-30 psi)	High side 1,450-1,590 kPa (210-230 psi)	Other normal indications 1. Full liquid in sight glass. 2. Sharp cold feel of discharge air from evaporator.

IF SYSTEM DOES NOT PASS TESTS

REASON	REMEDY
Air and/or moisture in system.	1. Purge system. 2. Replace receiver-drier. 3. Evacuate system. Charge system with NEW refrigerant.

TESTING FOR SYSTEM CONTAMINATED WITH AIR



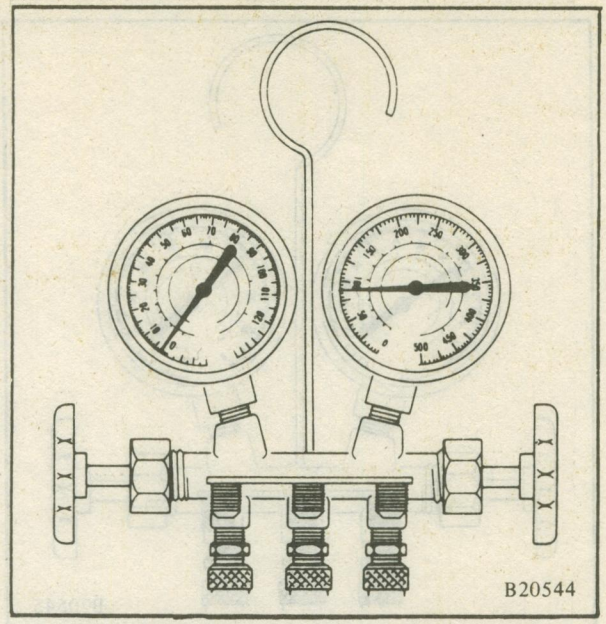
Deficient System Gauge Readings

ABNORMAL INDICATIONS	SATISFACTORY SYSTEM WILL SHOW		
1. Loss of cooling efficiency when outside temperature rises. 2. Suction readings may show a vacuum reading during testing. Head pressure reads low. 3. During vacuum condition, air at outlets will be warm. 4. Normal pressures are restored when a hot, wet rag is applied to the body of the expansion valve.	Manifold Gauge Readings:		
	Low side	High side	Other normal indication
	100-210 kPa (15-30 psi)	1,450-1,590 kPa (210-230 psi)	1. Full liquid in sight glass. 2. Sharp cold feel of discharge air from evaporator.

IF SYSTEM DOES NOT PASS TESTS

REASON	REMEDY
Drier saturated with moisture.	1. Purge system. 2. Replace receiver-drier. 3. Evacuate system. Charge system with NEW refrigerant.

TESTING FOR EXCESSIVE MOISTURE IN SYSTEM



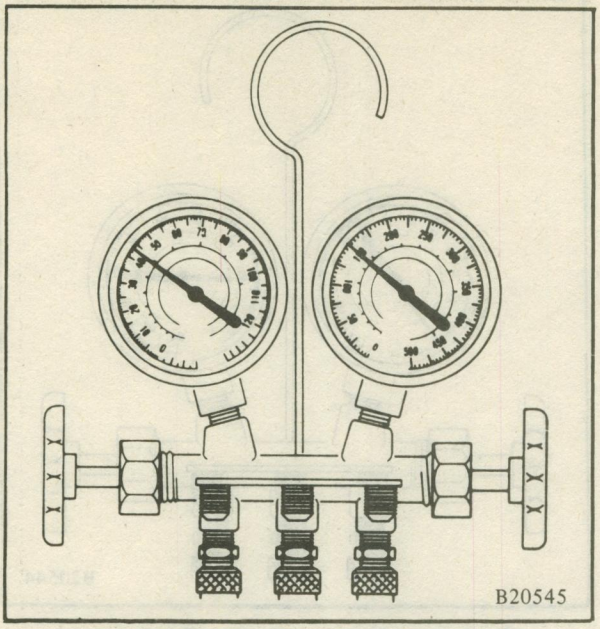
Deficient System Gauge Readings

ABNORMAL INDICATIONS	SATISFACTORY SYSTEM WILL SHOW		
	Manifold Gauge Readings:		
	Low side	High side	Other normal indications
1. Slight but insufficient cooling from evaporator. 2. Low suction side pressure. 3. Low head pressure. 4. Liquid lines are frosted.	100-210 kPa (15-30 psi)	1,450-1,590 kPa (210-230 psi)	1. Sharp cold feel of discharge air from evaporator. 2. Warm receiver and liquid line.

IF SYSTEM DOES NOT PASS TESTS

REASON	REMEDY
Restriction in receiver or liquid line-receiver clogged.	1. Purge system. 2. Replace defective part (liquid line or receiver-drier). 3. Evacuate system. Charge system with NEW refrigerant.

TESTING FOR HIGH SIDE RESTRICTION



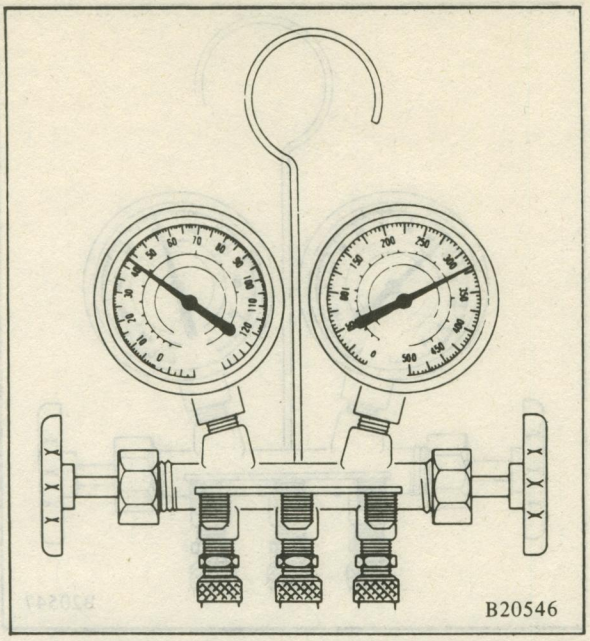
Deficient System Gauge Readings

ABNORMAL INDICATIONS	SATISFACTORY SYSTEM WILL SHOW		
1. High suction reading. 2. Low head pressure. 3. Cooling insufficient.	Manifold Gauge Readings:		
	Low side	High side	Other normal indications 1. Full liquid in sight glass. 2. Sharp cold feel of discharge air from evaporator.
	100-210 kPa (15-30 psi)	1,450-1,590 kPa (210-230 psi)	

IF SYSTEM DOES NOT PASS TESTS

REASON	REMEDY
Internal leak in compressor.	1. If high and low side service valves are present on system, isolate compressor. OR If no service valves are present on system, purge system. 2. Replace read plate and/or head gasket. 3. Check oil level. 4. Replace receiver-drier. 5. Pump down compressor or system. Charge system with NEW refrigerant.

TESTING FOR MALFUNCTION OF COMPRESSOR



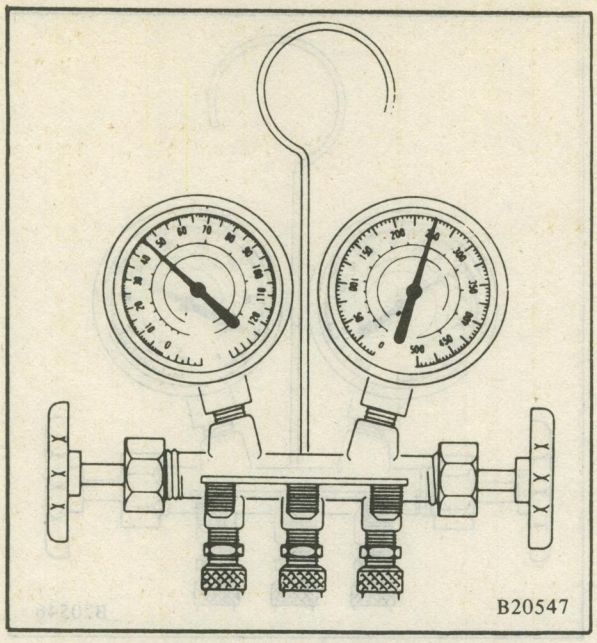
Deficient System Gauge Readings

ABNORMAL INDICATIONS	SATISFACTORY SYSTEM WILL SHOW		
1. No cooling. 2. Suction lines hot. 3. Suction side pressure readings high. 4. Head pressure readings too high. 5. Bubbles in sight glass. 6. Engine may overheat.	Manifold Gauge Readings: Low side 100-210 kPa (15-30 psi)	High side 1,450-1,590 kPa (210-230 psi)	Other normal indications 1. No trace of bubbles in sight glass. Liquid line warm but not hot. 2. Sharp cold feel of discharge air from evaporator.

IF SYSTEM DOES NOT PASS TESTS

REASON	REMEDY
Improper condenser operation-too high a high side pressure direct cause of lack of cooling. System will have either normal or overcharge of refrigerant.	1. Inspect for loose or worn drive belts. 2. Inspect condenser for clogged air passages, incorrect mounting and improper radiator clearance. 3. Inspect radiator pressure cap for operation. 4. (IF CORRECTION IS NOT OBTAINED) Inspect system for overcharge of refrigerant. 5. (IF GAUGE PRESSURES ARE STILL TOO HIGH) Remove and inspect condenser for oil clogging.

TESTING FOR DEFECTIVE CONDENSER



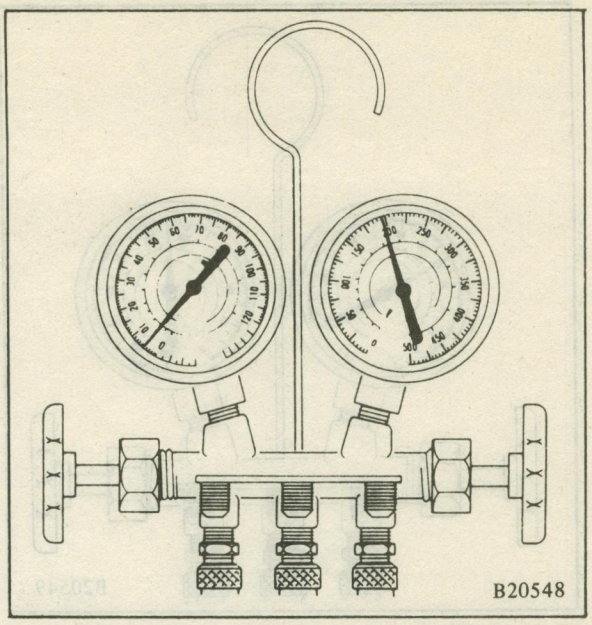
Deficient System Gauge Readings

ABNORMAL INDICATIONS	SATISFACTORY SYSTEM WILL SHOW		
	Manifold Gauge Readings:		
1. Condensation on suction hoses and evaporator.	Low side	High side	Other normal indications
2. Vehicle interior not cooled.			1. Sharp cold feel of discharge air from evaporator.
3. High suction side pressure.			
4. High head pressure.	100-210 kPa (15-30 psi)	1,450-1,590 kPa (210-230 psi)	2. Light sweat on metal of suction hose when humidity is 60% or more, very light or no sweat on suction hose connections when humidity is 60% or less.

IF SYSTEM DOES NOT PASS TESTS

REASON	REMEDY
Expansion valve flooding evaporator coil-expansion valve allowing excessive flow of refrigerant through evaporator.	1. Inspect expansion valve for operation. 2. (IF LITTLE OR NO REDUCTION IS OBTAINED IN HIGH LOW SIDE GAUGE PRESSURE) Replace expansion valve. 3. Pump down system. Charge system with NEW refrigerant.

TESTING FOR DEFECTIVE EXPANSION VALVE (1)



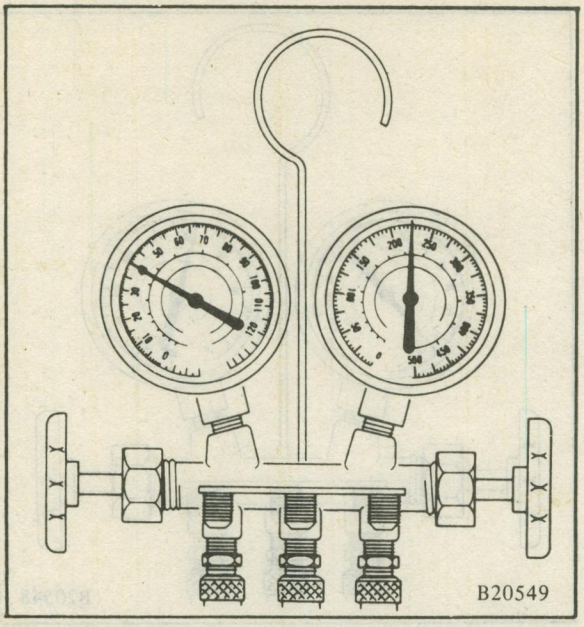
Deficient System Gauge Readings

ABNORMAL INDICATIONS	SATISFACTORY SYSTEM WILL SHOW		
1. Expansion valve inlet sweating or frosted. 2. Slight cooling from evaporator. 3. Low suction side pressure. 4. Low head pressure.	Manifold Gauge Readings:		Other normal indications 1. Sharp cold feel of discharge air from evaporator. 2. Warm expansion valve inlet and upper half of expansion valve (approximately same temperature as liquid line).
	Low side	High side	
	100-210 kPa (15-30 psi)	1,450-1,590 kPa (210-230 psi)	

IF SYSTEM DOES NOT PASS TESTS

REASON	REMEDY
Expansion valve restricting refrigerant flow. Valve stuck closed or thermal bulb has lost charge.	1. (IF VALVE INLET REVEALS SWEAT OR FROST) Purge refrigerant, remove screen, clean and REPLACE. Evacuate system and charge with NEW refrigerant. 2. (IF INLET END OF VALVE IS WARM) Force operation of valve. 3. (IF VALVE DOES NOT OPERATE) Replace valve. Evacuate system and charge with NEW refrigerant.

TESTING FOR DEFECTIVE EXPANSION VALVE (2)



Deficient System Gauge Readings

ABNORMAL INDICATIONS	SATISFACTORY SYSTEM WILL SHOW		
1. Compressor cycles in and out too rapidly. 2. High suction pressure. 3. Head pressure normal.	Manifold Gauge Readings: Low side 100-210 kPa (15-30 psi)	High side 1,450-1,590 kPa (210-230 psi)	Other normal indications 1. Sharp cold feel of discharge air from evaporator. 2. Warm expansion valve inlet and upper half of expansion valve (approximately same temperature as liquid line). 3. Low side pressure cycle should be: Cycle "Off" 83-100 kPa (12-15 psi) Cycle "On" 260-280 kPa (38-41 psi) Cycle Range 170-190 kPa (24-28 psi)

IF SYSTEM DOES NOT PASS TESTS

REASON	REMEDY
Thermostatic switch defective causing compressor to cut in and out rapidly.	1. Stop engine, turn off A/C. 2. Remove and replace thermostatic switch. Be sure capillary tube is installed in the same position and depth in the evaporator core as the old switch tube.

TESTING FOR DEFECTIVE THERMOSTATIC SWITCHES

Compressor Oil Level Check

The compressor oil level should be checked whenever refrigerating system components have been changed and/or refrigerant has been lost due to leaks.

The oil level should be checked with the keyway in the shaft positioned to face the compressor head. This is the most favorable position for the throws of the crankshaft that will allow passage of the dip stick. If the position of the keyway cannot be determined with the clutch mounted, the crank position can be determined by feel. Then, the dip stick can be inserted so the oil level is measured from the lowest point in the crankcase.

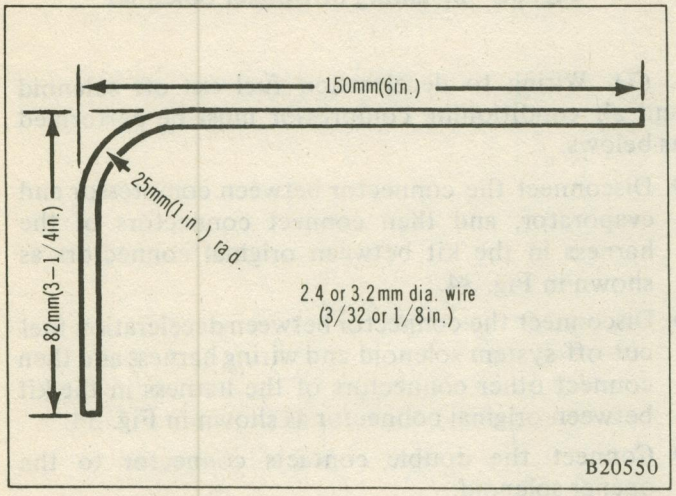


Fig. 29 Oil Dip Stick

(1) If system is pressurized, purge system of all refrigerant.

(2) Slowly unscrew oil plug five full turns and allow crankcase pressure to bleed off.

(3) After pressure is gone, remove oil plug and check oil level.

(4) Add clean oil as necessary – according to the chart below. If new compressor has been installed, some oil may have to be drawn as oil already in the system will pump back into the compressor after 15 minutes of operation.

NOTE: The compressor oil level should never be permitted to get below 113 g (4 oz) (minimum). If oil is added, the level should not exceed 227 g (8 oz) because excess oil is detrimental to proper operation of the system. If compressor replacement is required, the new compressor's oil level should not exceed 227 g (8 oz). Use Texaco Capilla E (Viscosity 500 Saybolt), Suniso 36, or known equivalent oil.

Compressor Oil Level

Oil quantity g ($\frac{fl}{oz}$)	Oil level mm (in.)
57 (2)	11 (7/16)
113 (4)	16 (5/8)
170 (6)	24 (15/16)
227 (8)	30 (1-3/16)

(5) To replace oil plug, carefully slip O ring over plug threads and seat it so it is not twisted. Both O ring and plug must be completely clean to avoid possible leaks at oil access port. Tighten plug securely.

(6) Check for leaks. If a leak develops, DO NOT over-tighten plug attempting to correct leak. Instead, replace O ring and plug, as needed.

(7) Evacuate and charge the system.

THROTTLE OPENER

Installation of idle up component kit as shown below and adjustment of engine

Idle up component kit

Description	Quantity
Throttle opener kit	x 1
Solenoid valve assembly	x 1
Joint harness	x 1
T joint	x 1
Terminal cover	x 1
Vacuum hose	x 2
Cable band	x 1
Snap clip	x 3

Installation of throttle opener

(1) Remove the accelerator cable from throttle lever.

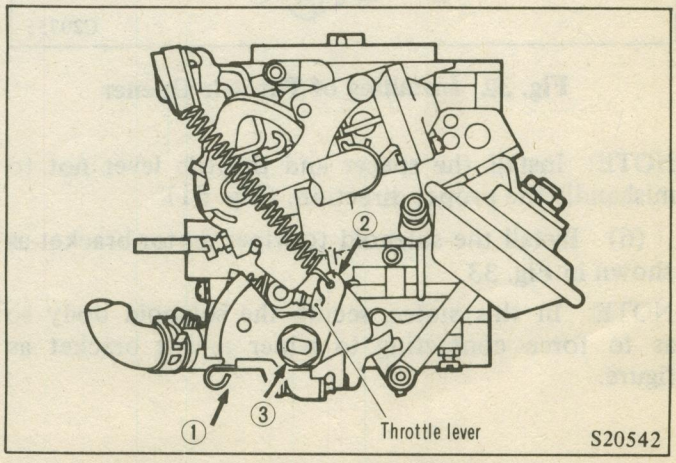


Fig. 30 Removing Throttle Lever

(2) Remove the throttle return spring. (Fig. 30)

(3) Remove the throttle lever installing nut. (Fig. 30)

(4) Remove the throttle lever and spacer.

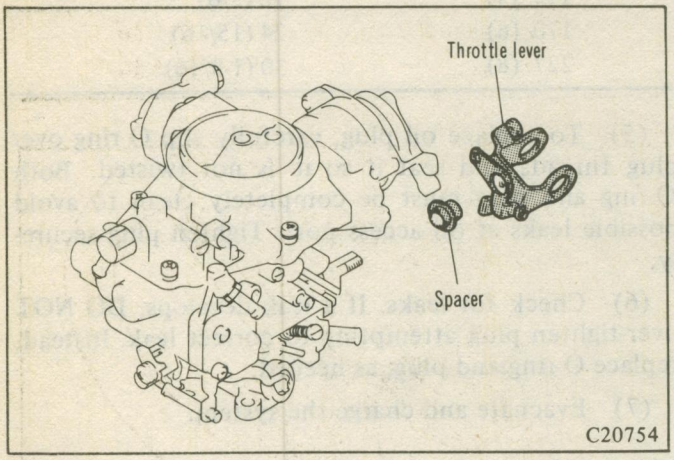


Fig. 31 Removing Throttle Lever and Spacer

(5) Install the throttle opener and fully loosen adjusting bolt to carburetor as shown in Fig. 32.

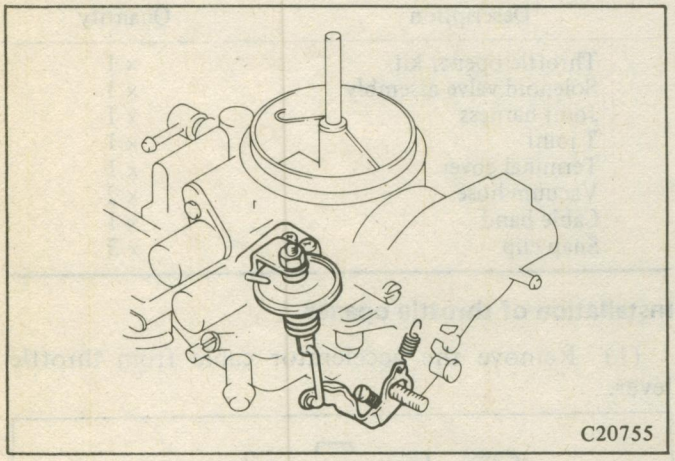


Fig. 32 Installing of Throttle Opener

NOTE: Install the spacer and throttle lever not to mishandle the proper direction. (Fig. 31)

(6) Install the solenoid to wiper motor bracket as shown in Fig. 33.

NOTE: In this states, secure the solenoid body so as to force contacting to wiper motor bracket as figure.

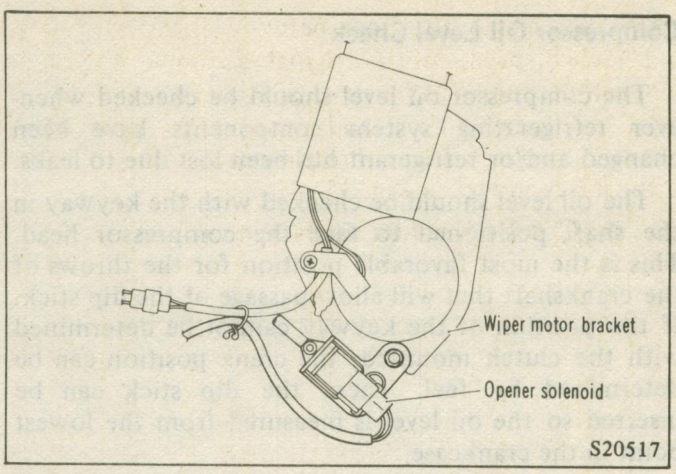


Fig. 33 Installing of Opener Solenoid

(7) Wiring to deceleration fuel cut off solenoid and air conditioning compressor must be performed as belows.

- Disconnect the connector between compressor and evaporator, and then connect connectors of the harness in the kit between original connectors as shown in Fig. 34.
- Disconnect the connector between deceleration fuel cut off system solenoid and wiring harness and then connect other connectors of the harness in the kit between original connector as shown in Fig. 34.
- Connect the double contacts connector to the opener solenoid.

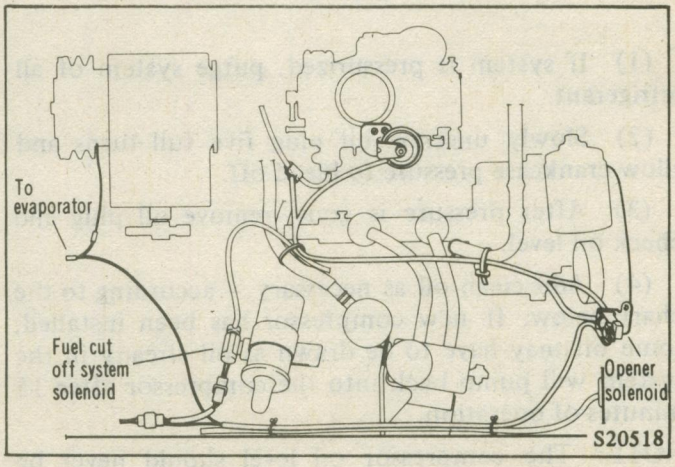


Fig. 34 Wiring for Throttle Opener

(8) To install the hose between throttle opener and new solenoid, cut the original vacuum hose routed between carburetor and air cleaner at 100 mm (4 in.) apart from carburetor, and connect the new hose between carburetor and throttle opener using T joint in the kit as shown in Fig. 35.

NOTE: Clip the vacuum hoses and wiring harness to parts as shown in Fig. 35.

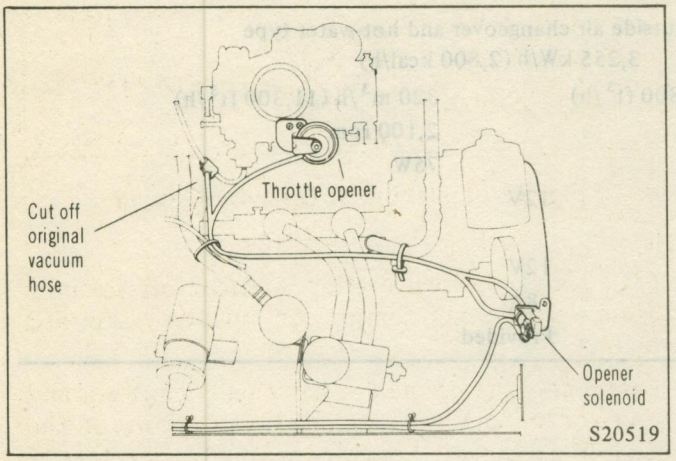


Fig. 35 Installing of Vacuum Hoses

(9) Turn air-conditioning switch off to leave throttle opener inactive and connect the tachometer. Adjust engine idling speed as shown table below using the idle speed adjusting screw (SAS) when engine warmed up.

Engine	Transmission	Curb idle speed (rpm)
U-engine	Manual	650 ± 50
U-engine	Automatic	700 ± 50
W-engine	Manual & Auto	750 ± 50

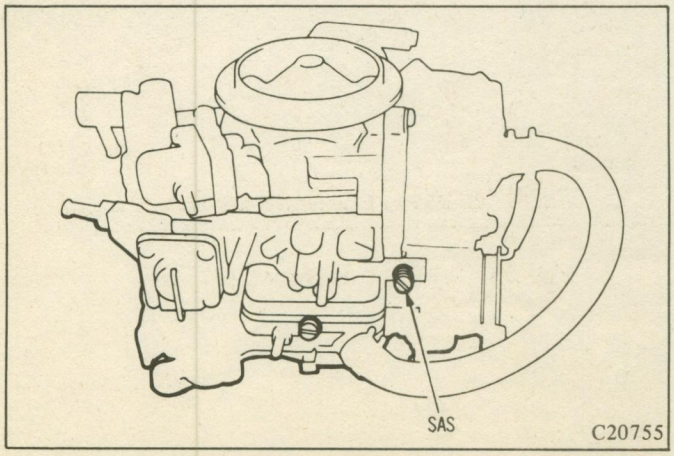


Fig. 36 Adjusting Screw

(10) Turn air-conditioning switch on to activate throttle opener. Set engine speed as shown in table below using new opener adjusting bolt.

Engine	Engine R.P.M.
U-engine	1150 ± 50
W-engine	1050 ± 50

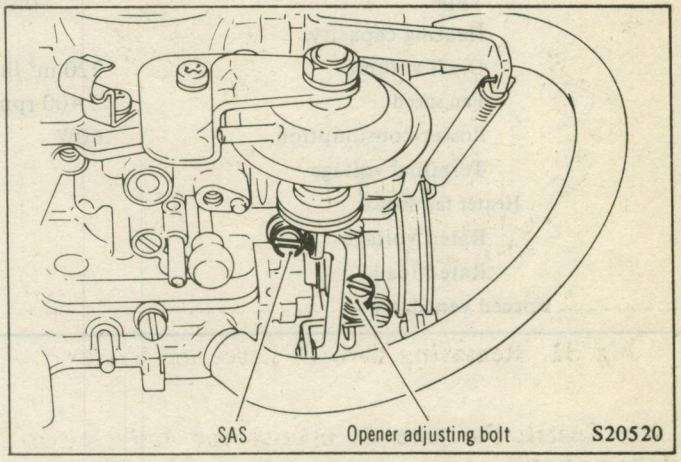


Fig. 37 Adjusting Engine R.P.M.

SPECIFICATIONS

Description	Specifications	
	Heater outside	Vent inside
Heater		
Heater unit		
Type	Inside-outside air changeover and hot-water type	
Heating capacity	3,255 kW/h (2,800 kcal/h)	
Draft volume	220 m^3/h (7,800 ft^3/h)	320 m^3/h (11,300 ft^3/h)
Fan speed	2,400 rpm	2,100 rpm
Power consumption	60W	75W
Terminal voltage	12V	
Heater fan switch		
Rated voltage	12V	
Rated load	8A	
Forced ventilator	Provided	