

HEATING & AIR CONDITIONING

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HEATING & AIR CONDITIONING

DESCRIPTION

DESCRIPTION - HEATER AND AIR CONDITIONER

All vehicles are equipped with a common HVAC housing assembly (Fig. 1). The system combines air conditioning, heating, and ventilating capabilities in a single unit housing mounted under the instrument panel.

DESCRIPTION - COOLING SYSTEM REQUIREMENTS

To maintain the performance level of the HVAC system, the engine cooling system must be properly maintained. The use of a bug screen is not recommended. Any obstructions in front of the radiator or condenser will reduce the performance of the air conditioning and engine cooling systems.

The engine cooling system includes the heater core and the heater hoses. Refer to Engine Cooling for more information before the opening of, or attempting any service to the engine cooling system.

DESCRIPTION - REFRIGERANT SYSTEM SERVICE PORT

The two refrigerant system service ports are used to charge, recover/recycle, evacuate, and test the air conditioning refrigerant system. Unique service port coupler sizes are used on the R-134a system, to

ensure that the refrigerant system is not accidentally contaminated by the use of the wrong refrigerant (R-12), or refrigerant system service equipment.

OPERATION

OPERATION - HEATER AND AIR CONDITIONER

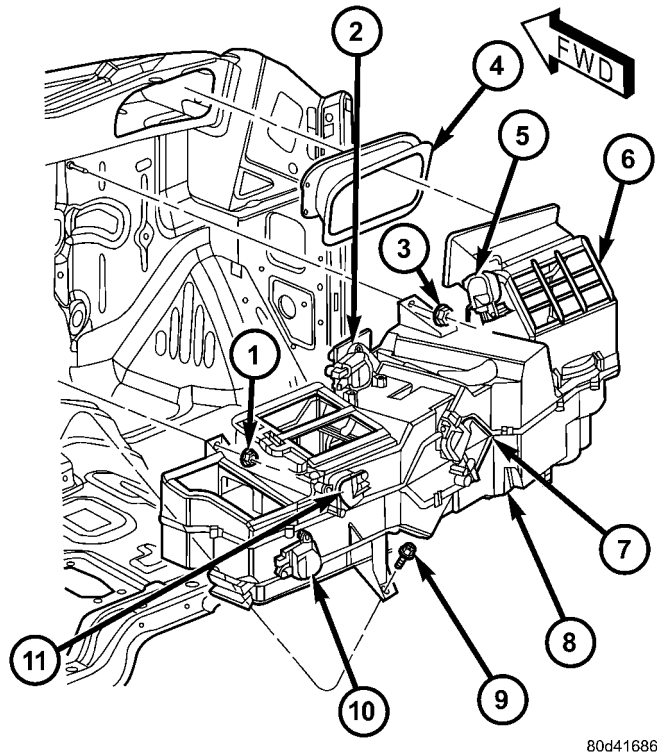
The heater air conditioner are blend-air type systems. In a blend-air system, a blend door controls the amount of unconditioned air (or cooled air from the evaporator on models with air conditioning) that is allowed to flow through, or around, the heater core. A temperature control knob on the A/C Heater control panel determines the discharge air temperature by controlling an electric actuator, which moves the blend door. This allows an almost immediate control of the output air temperature of the system.

The mode control knob on the A/C Heater control panel is used to direct the conditioned air to the selected system outlets. Both mode control switches use electric actuators to control the mode doors.

On all vehicles, the outside air intake can be shut off by selecting the Recirculation Mode with the mode control knob. This will operate a electric actuated recirculation door that closes off the outside fresh air intake and recirculates the air that is already inside the vehicle.

The air conditioner for all models is designed for the use of non-CFC, R-134a refrigerant. The air conditioning system has an evaporator to cool and dehumidify the incoming air prior to blending it with the heated air. This air conditioning system uses a fixed orifice tube in the liquid line near the condenser outlet tube to meter refrigerant flow to the evaporator

HEATING & AIR CONDITIONING (Continued)



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Fig. 1 HVAC Housing - Dual Zone Shown (Typical - Single Zone)

- 1 - Mounting Nut
- 2 - Passenger Blend Door Actuator (dual zone)
- 3 - Mounting Nut
- 4 - Air Intake Spacer
- 5 - Recirculation Door Actuator
- 6 - Recirculation Door Assembly
- 7 - Driver Side Blend Door Actuator
- 8 - HVAC Housing
- 9 - Mounting Screw
- 10 - Defroster Door Actuator
- 11 - Panel Actuator

coil. To maintain minimum evaporator temperature and prevent evaporator freezing, the A/C Fin Probe which is located in the evaporator cycles the compressor clutch by sending an A/C request to the JTEC which in turn processes this piece of information and if all conditions are met cycles the compressor clutch.

OPERATION - REFRIGERANT SYSTEM SERVICE PORT

The low pressure service port is located on the suction refrigerant line, near the accumulator. The high pressure service port is located on the liquid line at the passenger side of the engine compartment, near the condenser.

Each of the service ports has a threaded plastic protective cap installed over it from the factory. After servicing the refrigerant system, always reinstall both of the service port caps.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - A/C PERFORMANCE

The air conditioning system is designed to provide the passenger compartment with low temperature and low humidity air. The evaporator, located in the HVAC housing on the dash panel below the instrument panel, is cooled to temperatures near the freezing point. As warm damp air passes through the cooled evaporator, the air transfers its heat to the refrigerant in the evaporator and the moisture in the air condenses on the evaporator fins. During periods of high heat and humidity, an air conditioning system will be more effective in the Recirculation Mode. With the system in the Recirculation Mode, only air from the passenger compartment passes through the evaporator. As the passenger compartment air dehumidifies, the air conditioning system performance levels improve.

Humidity has an important bearing on the temperature of the air delivered to the interior of the vehicle. It is important to understand the effect that humidity has on the performance of the air conditioning system. When humidity is high, the evaporator has to perform a double duty. It must lower the air temperature, and it must lower the temperature of the moisture in the air that condenses on the evaporator fins. Condensing the moisture in the air transfers heat energy into the evaporator fins and tubing. This reduces the amount of heat the evaporator can absorb from the air. High humidity greatly reduces the ability of the evaporator to lower the temperature of the air.

However, evaporator capacity used to reduce the amount of moisture in the air is not wasted. Removing some of the moisture out of the air entering the vehicle adds to the comfort of the passengers. Although, an owner may expect too much from the air conditioning system on humid days. A performance test is the best way to determine whether the system is performing up to standard. This test also provides valuable clues as to the possible cause of trouble with the air conditioning system.

Before proceeding, (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION). The air temperature in the test room and in the vehicle must be a minimum of 21° C (70° F) for this test.

(1) Connect a tachometer and a manifold gauge set or A/C recycling/charging station.

(2) Set the A/C Heater mode control switch knob in the Recirculation Mode position, the temperature control knob in the full cool position, and the blower motor switch knob in the highest speed position.

HEATING & AIR CONDITIONING (Continued)

(3) Start the engine and hold the idle at 1,000 rpm with the compressor clutch engaged.

(4) The engine should be at operating temperature. The doors and windows must be closed.

(5) Insert a thermometer in the driver side center A/C (panel) outlet. Operate the engine for five minutes.

(6) The compressor clutch may cycle, depending upon the ambient temperature and humidity.

(7) With the compressor clutch engaged, record the discharge air temperature and the compressor discharge pressure.

(8) Compare the discharge air temperature to the Performance Temperature and Pressure chart. If the discharge air temperature is high, (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - DIAGNOSIS AND TESTING - REFRIGERANT SYSTEM LEAKS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - SPECIFICATIONS - CHARGE CAPACITY).

Performance Temperature and Pressure					
Ambient Air Temperature	21° C (70° F)	27° C (80° F)	32° C (90° F)	38° C (100° F)	43° C (110° F)
Air Temperature at Center Panel Outlet	7° C (45° F)	7° C (45° F)	13° C (55° F)	13° C (55° F)	18° C (64° F)
Compressor Inlet Pressure at Service Port (low Side)	138 to 207 kPa (20 to 30 psi)	172 to 241 kPa (25 to 35 psi)	207 to 276 kPa (30 to 40 psi)	241 to 310 kPa (35 to 45 psi)	276 to 345 kPa (40 to 50 psi)
Condensor Out Pressure at Service Port (High Side)	1034 to 1724 kPa (150 to 250 psi)	1379 to 2068 kPa (200 to 300 psi)	1724 to 2413 kPa (250 to 350 psi)	1999 to 2689 kPa (290 to 390 psi)	2413 to 2965 kPa (350 to 430 psi)

(9) Compare the compressor discharge pressure to the Performance Temperature and Pressure chart. If

the compressor discharge pressure is high, see the Pressure Diagnosis chart.

Pressure Diagnosis		
Condition	Possible Causes	Correction
Constant compressor engagement and warm air from passenger vents.	1. Low refrigerant system charge.	1. See Plumbing/Diagnosis and Testing - Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
Equal pressures, but the compressor clutch does not engage.	1. No refrigerant in the refrigerant system. 2. Faulty fuse. 3. Faulty a/c compressor clutch coil.	1. See Plumbing/Diagnosis and Testing - Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required. 2. Check the fuses in the Power Distribution Center and the junction block. Repair the shorted circuit or component and replace the fuses, if required. 3. See A/C Compressor/Diagnosis and Testing - Compressor Clutch Coil in this group. Test the compressor clutch coil and replace, if required.

HEATING & AIR CONDITIONING (Continued)

Pressure Diagnosis		
Condition	Possible Causes	Correction
	4. Faulty a/c compressor clutch relay. 5. Improperly installed or faulty Fin Sensor. 6. Faulty a/c high pressure transducer. 7. Faulty Powertrain Control Module (PCM).	4. See A/C Compressor Clutch Relay/Diagnosis and Testing - Compressor Clutch Relay in this group. Test the compressor clutch relay and relay circuits. Repair the circuits or replace the relay, if required. 5. See Fin Sensor/Diagnosis and Testing in this group. Reinstall or replace the Fin Sensor as required. 6. See A/C High Pressure Transducer/Diagnosis and Testing in this group. Test the a/c high pressure transducer and replace, if required. 7. (Refer to Appropriate Diagnostic Information). Test the PCM and replace, if required.
Normal pressures, but A/C Performance Test air temperatures at center panel outlet are too high.	1. Excessive refrigerant oil in system. 2. Blend door inoperative or sealing improperly. 3. Blend door actuator faulty or inoperative.	1. See Refrigerant Oil/Standard Procedure - Refrigerant Oil Level in this group. Recover the refrigerant from the refrigerant system and inspect the refrigerant oil content. Restore the refrigerant oil to the proper level, if required. 2. See Blend Door in this group. Inspect the blend door for proper operation and sealing and correct, if required. 3. Perform blend door actuator diagnosis, replace if faulty.
The low side pressure is normal or slightly low, and the high side pressure is too low.	1. Low refrigerant system charge. 2. Refrigerant flow through the accumulator is restricted. 3. Refrigerant flow through the evaporator coil is restricted. 4. Faulty compressor.	1. See Plumbing/Diagnosis and Testing - Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required. 2. See Accumulator in this group. Replace the restricted accumulator, if required. 3. See A/C Evaporator in this group. Replace the restricted evaporator coil, if required. 4. See A/C Compressor in this group. Replace the compressor, if required.
The low side pressure is normal or slightly high, and the high side pressure is too high.	1. Condenser air flow restricted. 2. Inoperative cooling fan. 3. Refrigerant system overcharged.	1. Check the condenser for damaged fins, foreign objects obstructing air flow through the condenser fins, and missing or improperly installed air seals. Refer to Cooling for more information on air seals. Clean, repair, or replace components as required. 2. Refer to Cooling for more information. Test the cooling fan and replace, if required. 3. See Plumbing/Standard Procedure - Refrigerant System Charge in this group. Recover the refrigerant from the refrigerant system. Charge the refrigerant system to the proper level, if required.

HEATING & AIR CONDITIONING (Continued)

Pressure Diagnosis		
Condition	Possible Causes	Correction
	4. Air in the refrigerant system. 5. Engine overheating.	4. See Plumbing/Diagnosis and Testing - Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required. 5. Refer to Cooling for more information. Test the cooling system and repair, if required.
The low side pressure is too high, and the high side pressure is too low.	1. Accessory drive belt slipping. 2. Fixed orifice tube not installed. 3. Faulty compressor.	1. Refer to Cooling for more information. Inspect the accessory drive belt condition and tension. Tighten or replace the accessory drive belt, if required. 2. See A/C Orifice Tube in this group. Replace the liquid line, if required. 3. See A/C Compressor in this group. Replace the compressor, if required.
The low side pressure is too low, and the high side pressure is too high.	1. Restricted refrigerant flow through the refrigerant lines. 2. Restricted refrigerant flow through the fixed orifice tube. 3. Restricted refrigerant flow through the condenser.	1. See Liquid, Suction, and Discharge Line in this group. Inspect the refrigerant lines for kinks, tight bends or improper routing. Correct the routing or replace the refrigerant line, if required. 2. See A/C Orifice Tube in this group. Replace the liquid line, if required. 3. See A/C Condenser in this group. Replace the restricted condenser, if required.

DIAGNOSIS AND TESTING - HEATER PERFORMANCE

Before performing the following tests, refer to Cooling for the procedures to check the engine coolant level and flow, engine coolant reserve/recovery system operation, accessory drive belt condition and tension, radiator air flow and the fan drive operation. Also be certain that the accessory vacuum supply line is connected at the engine vacuum source.

MAXIMUM HEATER OUTPUT

Engine coolant is delivered to the heater core through two heater hoses. With the engine idling at normal operating temperature, set the temperature control knob in the full hot position, the mode control switch knob in the floor position, and the blower motor switch knob in the highest speed position. Using a test thermometer, check the temperature of the air being discharged at the HVAC housing floor outlets. Compare the test thermometer reading to the Temperature Reference chart.

Temperature Reference				
Ambient Air Temperature	15.5° C (60° F)	21.1° C (70° F)	26.6° C (80° F)	32.2° C (90° F)
Minimum Air Temperature at Floor Outlet	62.2° C (144° F)	63.8° C (147° F)	65.5° C (150° F)	67.2° C (153° F)

HEATING & AIR CONDITIONING (Continued)

If the floor outlet air temperature is too low, refer to Cooling to check the engine coolant temperature specifications. Both of the heater hoses should be hot to the touch. The coolant return heater hose should be slightly cooler than the coolant supply heater hose. If the return hose is much cooler than the supply hose, locate and repair the engine coolant flow obstruction in the cooling system. Refer to Cooling for the procedures.

An alternate method of checking heater performance is to use a DRBIII® scan tool to monitor the engine coolant temperature. The floor outlet air temperature reading should be no more than 4.5° C (40° F) lower than the engine coolant temperature reading.

OBSTRUCTED COOLANT FLOW Possible locations or causes of obstructed coolant flow:

- Faulty water pump.
- Faulty thermostat.
- Pinched or kinked heater hoses.
- Improper heater hose routing.
- Plugged heater hoses or supply and return ports at the cooling system connections.
- A plugged heater core.

If proper coolant flow through the cooling system is verified, and heater outlet air temperature is still low, a mechanical problem may exist.

MECHANICAL PROBLEMS Possible locations or causes of insufficient heat:

- An obstructed cowl air intake.
- Obstructed heater system outlets.
- A faulty, obstructed or improperly installed blend door.
- A faulty blower system.
- A faulty a/c heater control.

TEMPERATURE CONTROL

If the heater outlet air temperature cannot be adjusted with the temperature control knob on the a/c heater control panel, the following could require service:

- A faulty a/c heater control.
- A faulty blend door actuator.
- A faulty, obstructed or improperly installed blend door.
- An obstructed cowl air intake.
- The engine cooling system.

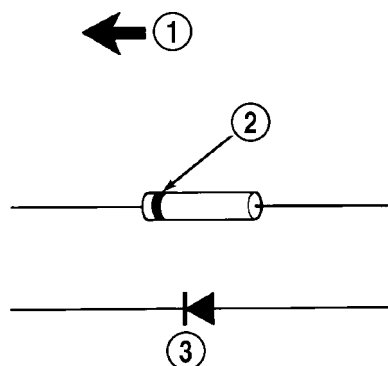
Heater Diagnosis		
CONDITION	POSSIBLE CAUSE	CORRECTION
INSUFFICIENT HEATER OUTPUT.	1. Incorrect engine coolant level. 2. Air trapped in engine cooling system. 3. Incorrect engine coolant temperature. 4. Blend door actuator inoperative or defective. 5. Blend door not operating properly. 6. Insufficient air flow through heater housing. 7. Improper blower motor operation.	1. Check the engine coolant level. Refer to Cooling for the procedures. 2. Check the operation of the coolant reserve/recovery system. Refer to Cooling for the procedures. 3. Check the performance and operation of the engine cooling system including: thermostat, water pump, fan drive, accessory drive belt, coolant flow (plugged radiator or heater core, plugged or kinked coolant hoses), air flow (missing or improperly installed radiator air seals or fan shroud). Refer to Cooling for the procedures. 4. (Refer to Controls/Blend Door Actuator) in this group. 5. Check for a damaged, obstructed or improperly installed blend door or seals. (Refer to Controls/Blend Door Actuator) in this group. 6. Remove foreign material or obstructions from cowl air intake. 7. (Refer to Distribution/Blower Motor/ Diagnosis and Testing) in this group.

HEATING & AIR CONDITIONING (Continued)**STANDARD PROCEDURE - DIODE REPLACEMENT**

(1) Disconnect the battery negative cable and isolate it. If vehicle has a dual battery remove both negative cables.

(2) Locate the diode in the harness, and remove the protective covering.

(3) Remove the diode from the harness, pay attention to the current flow direction (Fig. 2).



948W-197

Fig. 2 DIODE IDENTIFICATION

1 - CURRENT FLOW

2 - BAND AROUND DIODE INDICATES CURRENT FLOW

3 - DIODE AS SHOWN IN THE DIAGRAMS

(4) Remove the insulation from the wires in the harness. Only remove enough insulation to solder in the new diode.

(5) Install the new diode in the harness, making sure current flow is correct. If necessary refer to the appropriate wiring diagram for current flow.

(6) Solder the connections together using rosin core type solder only. **Do not use acid core solder.**

(7) Tape the diode to the harness using electrical tape making, sure the diode is completely sealed from the elements.

(8) Re-connect the battery negative cable(s), and test affected systems.

SPECIFICATIONS**A/C APPLICATION TABLE**

Item	Description	Notes
Vehicle	DR- Ram Truck	
System	R134a w/ fixed orifice tube	
Compressor	Saden SD-7	SP-15 PAG oil
Freeze-up Control	A/C Fin Sensor	Evaporator mounted
High psi Control	475 psi A/C cut out	discharge line
Control Head	electronic	Software - J2190
Mode Door	electric	
Blend Door	electric	
Recirculation Door	electric	
Blower Motor	hardwired to control head	resistor block
Cooling Fan	Viscous for cooling with a single speed electric for A/C for 3.7, 4.7 and 5.7L gas engines. Viscous for both cooling and A/C with 5.9L diesel engine and 8.0L gas engine.	
Clutch	Electro-mechanical	
Control	relay	PCM
Draw	2 - 3.7 amps @ 12V	± 0.5V @ 70° F
Gap	0.016" - 0.031"	
DRB III®		
Reads	TPS, RPM, A/C switch test	
Actuators	clutch and fan relay	

HEATING & AIR CONDITIONING (Continued)**SPECIFICATIONS****TORQUE SPECIFICATIONS**

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
A/C COMPRESSOR CLUTCH PLATE NUT	14.4	10.5	127.4
A/C COMPRESOR LINE MANIFOLD FASTENER	28 (±6)	21 (±4)	250 (±50)
A/C COMPRESSOR TO MOUNTING BRACKET BOLTS	27	20	239
ACCUMULATOR RETAINING BOLT	5	3.7	44
BLEND DOOR ACTUATOR SCREWS	2.4 (±.34)	1.8 (±.25)	21 (±3)
HVAC HOUSING SCREWS	2.4 (±.34)	1.8 (±.25)	21 (±3)
HVAC HOUSING TO DASH PANEL NUTS	6.2	4.6	55
SUCTION LINE TO ACCUMULATOR FITTING	9	6.6	80

CONTROLS

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A/C HEATER CONTROL		REMOVAL - FLOOR - DEFROST DOOR	
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A/C COMPRESSOR CLUTCH

DESCRIPTION

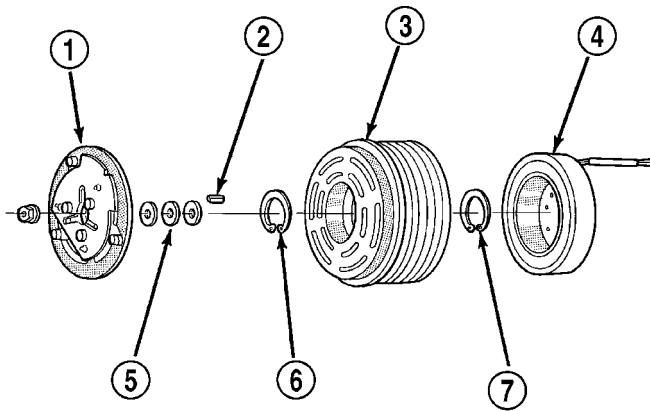
The compressor clutch assembly consists of a stationary electromagnetic coil, a rotor bearing and rotor assembly, and a clutch plate (Fig. 1). The electromagnetic coil unit and the rotor bearing and rotor assembly are each retained on the nose of the compressor front housing with snap rings. The clutch plate is keyed to the compressor shaft and secured with a nut. These components provide the means to engage and disengage the compressor from the engine serpentine accessory drive belt.

OPERATION

When the clutch coil is energized, it magnetically draws the clutch into contact with the rotor and drives the compressor shaft. When the coil is not energized, the rotor freewheels on the clutch rotor bearing, which is part of the rotor. The compressor clutch and coil are the only serviced parts on the compressor.

The compressor clutch engagement is controlled by several components: the A/C Heater mode control switch, the A/C high pressure transducer, the compressor clutch relay, and the (JTEC). The JTEC may delay compressor clutch engagement for up to thirty

A/C COMPRESSOR CLUTCH (Continued)



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Fig. 1 COMPRESSOR CLUTCH - TYPICAL

- 1 - CLUTCH PLATE
- 2 - SHAFT KEY (not used on KJ)
- 3 - ROTOR
- 4 - COIL
- 5 - CLUTCH SHIMS
- 6 - SNAP RING
- 7 - SNAP RING

seconds. Refer to Electronic Control Modules for more information on the JTEC controls.

DIAGNOSIS AND TESTING - A/C COMPRESSOR CLUTCH COIL

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information). The battery must be fully-charged before performing the following tests. Refer to Battery for more information.

(1) Connect an ammeter (0 to 10 ampere scale) in series with the clutch coil terminal. Use a voltmeter (0 to 20 volt scale) with clip-type leads for measuring the voltage across the battery and the compressor clutch coil.

(2) With the A/C Heater mode control switch in any A/C mode, and the blower motor switch in the lowest speed position, start the engine and run it at normal idle.

(3) The compressor clutch coil voltage should read within 0.2 volts of the battery voltage. If there is voltage at the clutch coil, but the reading is not within 0.2 volts of the battery voltage, test the clutch coil feed circuit for excessive voltage drop and repair as required. If there is no voltage reading at the clutch coil, use a DRB III[®] scan tool and (Refer to Appropriate Diagnostic Information) for testing of the compressor clutch circuit and PCM control. The following components must be checked and repaired as required before you can complete testing of the clutch coil:

- Fuses in the junction block and the Power Distribution Center (PDC)
- A/C heater mode control switch
- Compressor clutch relay
- A/C high pressure transducer switch

- JTEC

(4) The compressor clutch coil is acceptable if the current draw measured at the clutch coil is 2.0 to 3.9 amperes with the electrical system voltage at 11.5 to 12.5 volts. This should only be checked with the work area temperature at 21° C (70° F). If system voltage is more than 12.5 volts, add electrical loads by turning on electrical accessories until the system voltage drops below 12.5 volts.

(a) If the clutch coil current reading is four amperes or more, the coil is shorted and should be replaced.

(b) If the clutch coil current reading is zero, the coil is open and should be replaced.

STANDARD PROCEDURE - A/C COMPRESSOR CLUTCH BREAK-IN

After a new compressor clutch has been installed, cycle the compressor clutch approximately twenty times (five seconds on, then five seconds off). During this procedure, set the A/C Heater control to the Recirculation Mode, the blower motor switch in the highest speed position, and the engine speed at 1500 to 2000 rpm. This procedure (burnishing) will seat the opposing friction surfaces and provide a higher compressor clutch torque capability.

REMOVAL

The refrigerant system can remain fully-charged during compressor clutch, rotor, or coil replacement. The compressor clutch can be serviced in the vehicle.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the serpentine drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(3) Unplug the compressor clutch coil wire harness connector.

(4) Remove the bolts that secure the compressor to the mounting bracket.

(5) Remove the compressor from the mounting bracket. Support the compressor in the engine compartment while servicing the clutch.

(6) Insert the two pins of the spanner wrench (Special Tool C-4489 or equivalent) into the holes of the clutch plate. Hold the clutch plate stationary and remove the hex nut (Fig. 2).

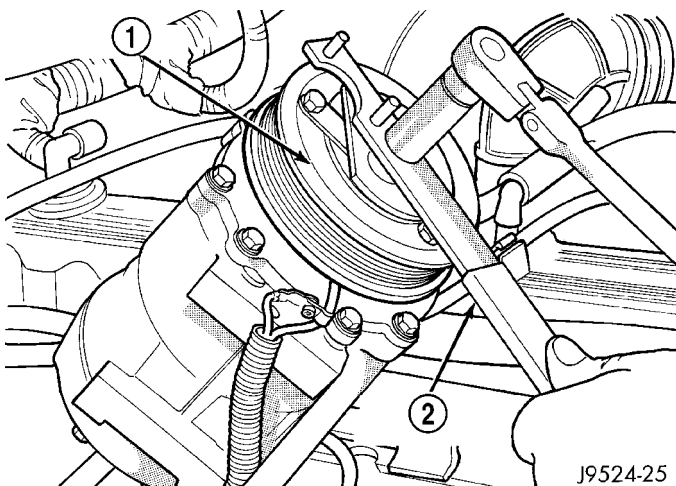
(7) Remove the clutch plate.

(8) Remove the compressor clutch shims.

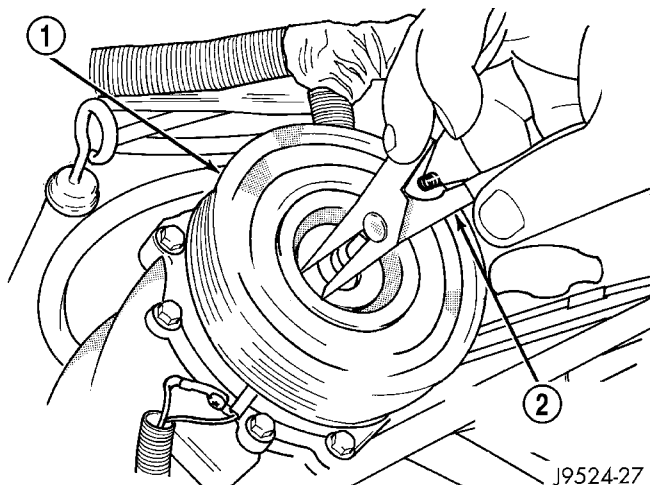
(9) Remove the external front housing snap ring with snap ring pliers (Fig. 3).

(10) Install the lip of the rotor puller (Special Tool C-6141-1 or equivalent) into the snap ring groove exposed in the previous step, and install the shaft protector (Special Tool C-6141-2 or equivalent) (Fig. 4).

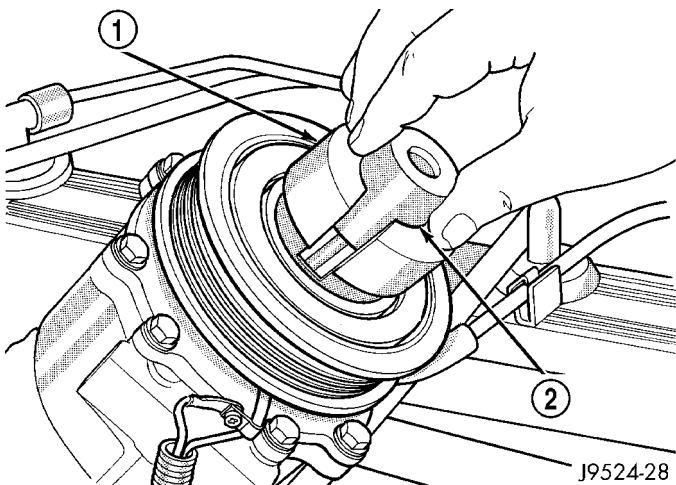
A/C COMPRESSOR CLUTCH (Continued)

**Fig. 2 CLUTCH NUT REMOVE - Typical**

- 1 - CLUTCH PLATE
2 - SPANNER

**Fig. 3 EXTERNAL SNAP RING REMOVE - Typical**

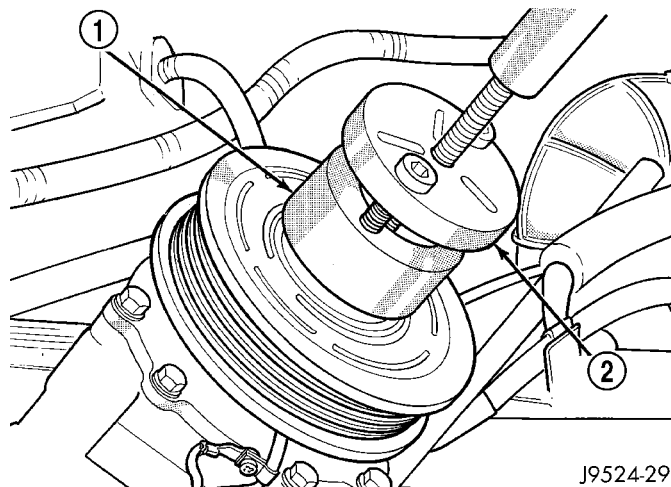
- 1 - PULLEY
2 - SNAP RING PLIERS

**Fig. 4 SHAFT PROTECTOR AND PULLER - Typical**

- 1 - PULLER JAW
2 - SHAFT PROTECTOR

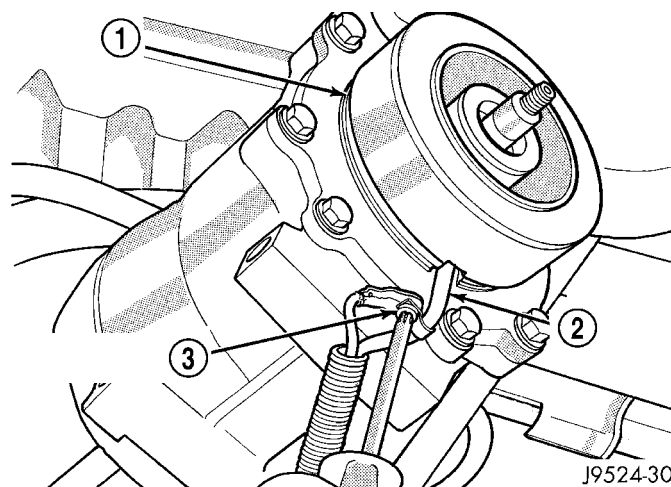
(11) Install the puller through-bolts (Special Tool C-6461 or equivalent) through the puller flange and into the jaws of the rotor puller and tighten (Fig. 5). Turn the puller center bolt clockwise until the rotor is free.

CAUTION: DO NOT APPLY FORCE TO THE END OF THE COMPRESSOR SHAFT.

**Fig. 5 INSTALL PULLER PLATE - Typical**

- 1 - PULLER JAW
2 - PULLER

(12) Remove the screw and retainer from the clutch coil lead wire harness on the compressor front housing (Fig. 6).

**Fig. 6 CLUTCH COIL LEAD WIRE HARNESS - Typical**

- 1 - COIL
2 - COIL WIRE
3 - RETAINER SCREW

(13) Remove the snap ring from the compressor hub and remove the clutch field coil (Fig. 7). Slide the clutch field coil off of the compressor hub.

A/C COMPRESSOR CLUTCH (Continued)

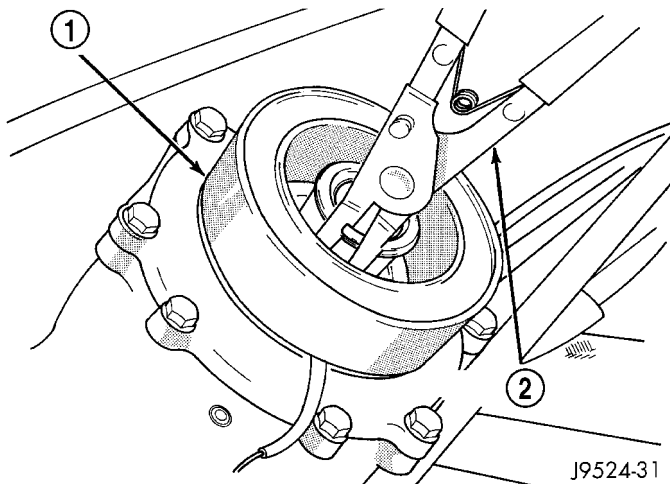


Fig. 7 CLUTCH FIELD COIL SNAP RING REMOVE - Typical

- 1 - COIL
2 - SNAP RING PLIERS

INSPECTION

Examine the friction surfaces of the clutch rotor and the clutch plate for wear. The rotor and clutch plate should be replaced if there is excessive wear or scoring.

If the friction surfaces are oily, inspect the shaft and nose area of the compressor for oil. Remove the felt from the front cover. If the felt is saturated with oil, the shaft seal is leaking and the compressor must be replaced.

Check the rotor bearing for roughness or excessive leakage of grease. Replace the rotor and clutch plate, if required.

INSTALLATION

- (1) Install the clutch field coil and snap ring.
- (2) Install the screw and retainer on the clutch coil lead wire harness on the compressor front housing. Tighten screw to 2.2 N·m (20 in. lbs.).
- (3) Align the rotor assembly squarely on the front compressor housing hub.
- (4) Install the rotor bearing assembly with the installer (Special Tool C-6871 or equivalent) (Fig. 8). Thread the installer on the shaft, then turn the nut until the rotor assembly is seated.
- (5) Install the external front housing snap ring with snap ring pliers. The bevel side of the snap ring must be facing outward. Press the snap ring to make sure it is properly seated in the groove.

CAUTION: If the snap ring is not fully seated in the groove it will vibrate out, resulting in a clutch failure and severe damage to the front housing of the compressor.

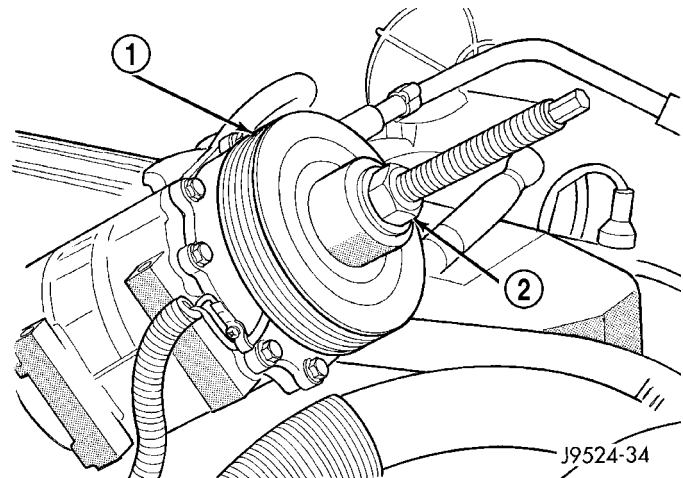


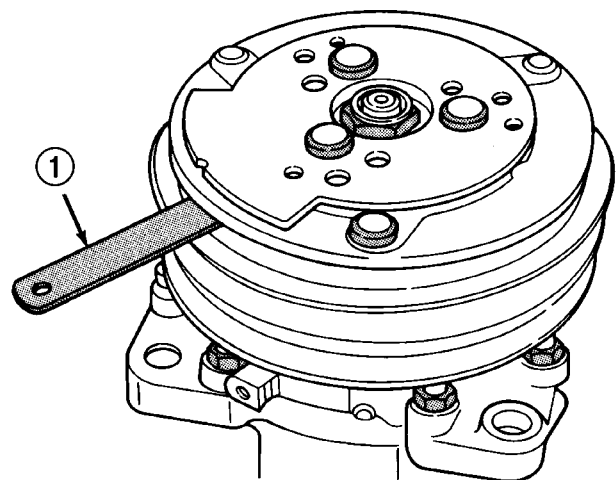
Fig. 8 CLUTCH PULLEY INSTALL - Typical

- 1 - ROTOR BEARING ASSEMBLY
2 - INSTALLER

(6) Install the original clutch shims on the compressor shaft.

(7) Install the clutch plate. Install the shaft hex nut and tighten to 15–20 N·m (11–15 ft. lbs.).

(8) Check the clutch air gap with a feeler gauge (Fig. 9). If the air gap does not meet the specification, add or subtract shims as required. The air gap specification is 0.41 to 0.79 millimeter (0.016 to 0.031 inch).



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Fig. 9 CHECK CLUTCH AIR GAP - Typical

- 1 - FEELER GAUGE

A/C COMPRESSOR CLUTCH (Continued)

NOTE: The air gap is determined by the spacer shims. When installing an original, or a new clutch assembly, try the original shims first. When installing a new clutch onto a compressor that previously did not have a clutch, use a 1.0, 0.50, and 0.13 millimeter (0.040, 0.020, and 0.005 inch) shims from the new clutch hardware package that is provided with the new clutch.

(9) To complete the procedure, (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - INSTALLATION).

A/C COMPRESSOR CLUTCH RELAY

DESCRIPTION

The compressor clutch relay is a International Standards Organization (ISO) micro-relay. The terminal designations and functions are the same as a conventional ISO relay. However, the micro-relay terminal orientation (footprint) is different, the current capacity is lower, and the relay case dimensions are smaller than those of the conventional ISO relay.

The compressor clutch relay is located in the Power Distribution Center (PDC) in the engine compartment. Refer to the PDC label for relay identification and location.

OPERATION

The compressor clutch relay is a electromechanical device that switches battery current to the compressor clutch coil when the Powertrain Control Module (PCM) grounds the coil side of the relay. The PCM responds to inputs from the A/C Heater mode control switch, the A/C low pressure switch, and the A/C high pressure switch. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C COMPRESSOR CLUTCH RELAY - DIAGNOSIS AND TESTING)

The compressor clutch relay cannot be repaired and, if faulty or damaged, it must be replaced.

DIAGNOSIS AND TESTING - COMPRESSOR CLUTCH RELAY

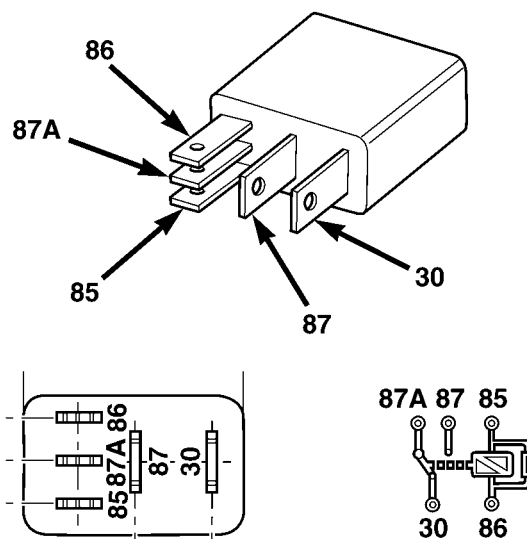
RELAY TEST

The compressor clutch relay (Fig. 10) is located in the Power Distribution Center (PDC). Refer to the PDC label for relay identification and location. Remove the relay from the PDC to perform the following tests:

(1) A relay in the de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to Step 2. If not OK, replace the faulty relay.

(2) Resistance between terminals 85 and 86 (electromagnet) should be 67.5 to 82.5 ohms. If OK, go to Step 3. If not OK, replace the faulty relay.

(3) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, see Relay Circuit Test. If not OK, replace the faulty relay.



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Fig. 10 COMPRESSOR CLUTCH RELAY

30 - COMMON FEED
85 - COIL GROUND
86 - COIL BATTERY
87 - NORMALLY OPEN
87A - NORMALLY CLOSED

RELAY CIRCUIT TEST

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information).

(1) The relay common feed terminal cavity (30) is connected to fused battery feed. There should be battery voltage at the cavity for relay terminal 30 at all times. If OK, go to Step 2. If not OK, repair the open circuit to the fuse in the PDC as required.

(2) The relay normally closed terminal (87A) is not used in this application. Go to Step 3.

(3) The relay normally open terminal cavity (87) is connected to the compressor clutch coil. There should be continuity between this cavity and the A/C compressor clutch relay output circuit cavity of the compressor clutch coil wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit as required.

(4) The relay coil battery terminal (86) is connected to the fused ignition switch output (run/start) circuit. There should be battery voltage at the cavity

A/C COMPRESSOR CLUTCH RELAY (Continued)

for relay terminal 86 with the ignition switch in the On position. If OK, go to Step 5. If not OK, repair the open circuit to the fuse in the junction block as required.

(5) The coil ground terminal cavity (85) is switched to ground through the Powertrain Control Module (PCM). There should be continuity between this cavity and the A/C compressor clutch relay control circuit cavity of the PCM wire harness connector C (gray) at all times. If not OK, repair the open circuit as required.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cover from the Power Distribution Center (PDC).

(3) Refer to the label on the PDC for compressor clutch relay identification and location.

(4) Unplug the compressor clutch relay from the PDC.

INSTALLATION

(1) Install the compressor clutch relay by aligning the relay terminals with the cavities in the PDC and pushing the relay firmly into place.

(2) Install the PDC cover.

(3) Connect the battery negative cable.

(4) Test the relay operation.

A/C HEATER CONTROL

DESCRIPTION

The A/C heater system uses a series of electrical controls. These controls provide the vehicle operator with a number of setting options to help control the climate and comfort within the vehicle. Refer to the owner's manual in the vehicle glove box for more information on the features, use, and suggested operation of these controls.

The A/C heater control - (Single Zone) or (Dual Zone) panel is located to the right of the instrument cluster on the instrument panel.

The control panel contains a rotary-type temperature control, a rotary-type mode control switch knob, and a rotary-type blower motor speed switch knob. The control also has a push button to activate the Optional side view mirrors defroster elements and to turn the A/C on.

The Dual Zone HVAC control panel contains a pair of slider-type temperature controls, a rotary-type mode control switch knob and a rotary-type blower motor speed switch knob. The control also has buttons to turn the A/C ON, Set it on Max A/C and for the Optional Heated Sideview Mirrors.

The A/C heater control panel cannot be repaired. If faulty or damaged, the entire unit must be replaced. The illumination lamps are available for service replacement.

REMOVAL

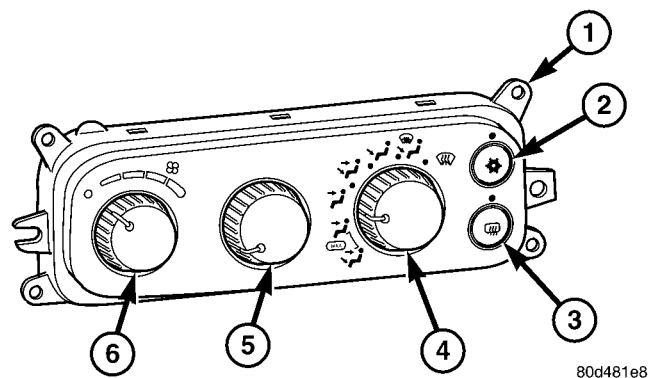
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the center bezel from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).

(3) Remove the screws that secure the A/C Heater control to the instrument panel (Fig. 11) or (Fig. 12).

(4) Pull the A/C Heater control assembly away from the instrument panel far enough to access the connections on the back of the control.



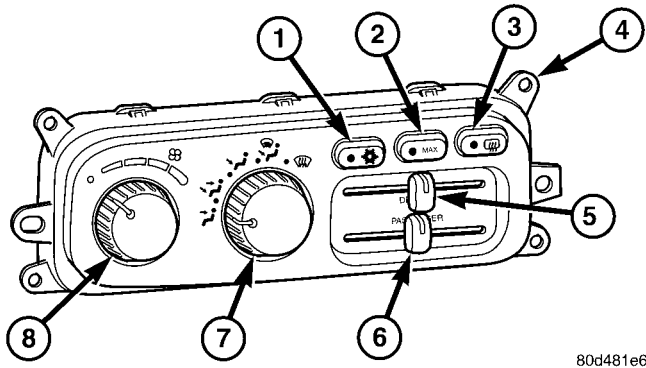
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Fig. 11 Single Zone HVAC Control

- 1 - Mounting Tab (4)
- 2 - A/C Button
- 3 - Sideview Mirror Defroster Button (if equipped)
- 4 - Mode Control
- 5 - Blend Air Control
- 6 - Blower Motor Speed Control

(5) Unplug the wire harness connectors from the back of the A/C Heater control (Fig. 13).

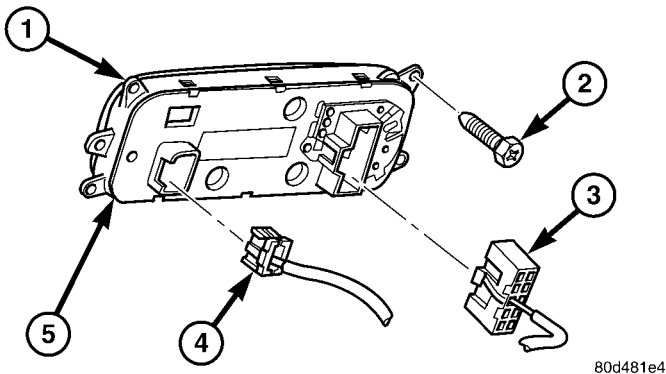
A/C HEATER CONTROL (Continued)



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Fig. 12 Dual Zone A/C Control

- 1 - A/C Button
- 2 - Max. A/C Button
- 3 - Sideview Mirror Defrost Button (if equipped)
- 4 - Mounting Tabs (4)
- 5 - Driverside Temperature Control
- 6 - Passengerside Temperature Control
- 7 - Mode Control
- 8 - Blower Motor Speed Control



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Fig. 13 HVAC Control - (Rear View- typical)

- 1 - Mounting Tabs (4)
- 2 - Mounting Screws (4)
- 3 - HVAC Control Connector
- 4 - Heated Sideview Mirror Connector
- 5 - HVAC Control Assembly

INSTALLATION

(1) Plug the two wire harness connectors into the back of the A/C Heater control.

(2) Position the A/C Heater control in the instrument panel bezel and secure it with four screws. Tighten the screws to 2.2 N·m (20 in. lbs.).

(3) Reinstall the center bezel onto the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

(4) Connect the battery negative cable.

A/C PRESSURE TRANSDUCER**DESCRIPTION - A/C PRESSURE TRANSDUCER**

The A/C pressure transducer is a switch that is installed on a fitting located on the refrigerant discharge line between the compressor and the condenser in the front corner of the engine compartment. An internally threaded hex fitting on the transducer connects it to the externally threaded Schrader-type fitting on the liquid line. A rubber O-ring seals the connection between the transducer and the discharge line fitting. Three terminals within a molded plastic connector receptacle on the top of the transducer connect it to the vehicle electrical system through a take out and connector of the headlamp and dash wire harness.

The A/C pressure transducer cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

The A/C pressure transducer monitors the pressures in the high side of the refrigerant system through its connection to a fitting on the discharge line. The transducer will change its internal resistance in response to the pressures it monitors. The Powertrain Control Module (PCM) provides a five volt reference signal and a sensor ground to the transducer, then monitors the output voltage of the transducer on a sensor return circuit to determine refrigerant pressure. The PCM is programmed to respond to this and other sensor inputs by controlling the operation of the air conditioning compressor clutch and the radiator cooling fan to help optimize air conditioning system performance and to protect the system components from damage. The A/C pressure transducer input to the PCM will also prevent the air conditioning compressor clutch from engaging when ambient temperatures are below about 10° C due to the pressure/temperature relationship of the refrigerant. The Schrader-type valve in the discharge line fitting permits the A/C pressure transducer to be removed or installed without disturbing the refrigerant in the system. The A/C pressure transducer is diagnosed using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING - A/C PRESSURE TRANSDUCER

The A/C pressure transducer is tested using a DRBIII® scan tool. Refer to the appropriate diagnostic information. Before testing the A/C pressure transducer, be certain that the transducer wire harness connection is clean of corrosion and properly connected. For the air conditioning system to operate,

A/C PRESSURE TRANSDUCER (Continued)

an A/C pressure transducer voltage reading between 0.451 and 4.519 volts is required. Voltages outside this range indicate a low or high refrigerant system pressure condition to the Powertrain Control Module (PCM). The PCM is programmed to respond to a low or high refrigerant system pressure by suppressing operation of the compressor. Refer to the A/C Pressure Transducer Voltage table for the possible condition indicated by the transducer voltage readings.

A/C PRESSURE TRANSDUCER VOLTAGE	
VOLTAGE	POSSIBLE INDICATION
0.0	1. NO SENSOR SUPPLY VOLTAGE FROM PCM. 2. SHORTED SENSOR CIRCUIT. 3. FAULTY TRANSDUCER.
0.150 TO 0.450	1. AMBIENT TEMPERATURE BELOW 10° C (50° F). 2. LOW REFRIGERANT SYSTEM PRESSURE.
0.451 TO 4.519	1. NORMAL REFRIGERANT SYSTEM PRESSURE.
4.520 TO 4.850	1. HIGH REFRIGERANT SYSTEM PRESSURE.
5.0	1. OPEN SENSOR CIRCUIT. 2. FAULTY TRANSDUCER.

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Disconnect the wire harness connector for the A/C pressure transducer from the transducer connector receptacle.
- (3) Using an open end wrench, unscrew the A/C pressure transducer from the fitting on the discharge line between the compressor and the condenser.
- (4) Remove the seal from the A/C pressure transducer fitting and discard.

INSTALLATION

- (1) Lubricate a new rubber O-ring seal with clean refrigerant oil and install it on the A/C pressure transducer fitting.
- (2) Using an open end wrench, install and tighten the A/C pressure transducer onto the fitting on the discharge line between the compressor and the condenser.
- (3) Reconnect the wire harness connector for the A/C pressure transducer to the transducer connector receptacle.
- (4) Reconnect the battery negative cable.

BLEND DOOR ACTUATOR**DESCRIPTION**

The blend door actuators are reversible, 12-volt Direct Current (DC), servo motors. Models with the single zone heater and air conditioner system have a single blend air door, which is controlled by a single blend door actuator. Models with the optional dual zone front heater and air conditioner system have dual blend air doors, which are controlled by two blend door actuators. The single zone blend door actuator is located on the driver side end of the heater-A/C housing unit, close to the dash panel. In the dual zone system, the same blend door actuator used for the single zone system becomes the driver side blend door actuator, and is mechanically connected to only the driver side blend air door. In the dual zone system, a second separate blend door actuator is also located on the top of the heater-A/C housing unit and is mechanically connected to only the passenger side blend air door.

The blend door actuators are interchangeable with each other, as well as with the actuators for the mode door and the recirculation air door. Each actuator is contained within an identical black molded plastic housing with an integral wire connector receptacle. Two integral mounting tabs allow the actuator to be secured with two screws to the heater-A/C unit housing. Each actuator also has an identical output shaft with splines that connects it to the linkage that drives the proper blend air door. The blend door actuators do not require mechanical indexing to the blend door linkage, as they are electronically calibrated by the heater-A/C control module. The blend door actuators cannot be adjusted or repaired and, if damaged or faulty, they must be replaced.

OPERATION

Each blend door actuator is connected to the heater-A/C control module through the vehicle electrical system by a dedicated two-wire take out and connector of the HVAC wire harness. The blend door actuator can move the blend air door in two directions. When the heater-A/C control module pulls the voltage on one side of the motor connection high and the other connection low, the blend air door will move in one direction. When the module reverses the polarity of the voltage to the motor, the blend air door moves in the opposite direction. When the module makes the voltage to both connections high or both connections low, the blend air door stops and will not move. These same motor connections also provide a feedback signal to the heater-A/C control module. This feedback signal allows the module to monitor the operation and relative positions of the blend door actuator and the blend air door. The heater-A/C con-

BLEND DOOR ACTUATOR (Continued)

trol module learns the blend air door stop positions during the calibration procedure and will store a Diagnostic Trouble Code (DTC) for any problems it detects in the blend door actuator circuits. The blend door actuator can be diagnosed using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

REMOVAL

The single zone heating and air conditioning system is equipped with a single blend door actuator. The dual zone system has two blend door actuators, one for the driver side blend air door and one for the passenger side blend air door. The same service procedures can be used for each of these actuators.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument panel assembly (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).

(3) Disconnect the HVAC wire harness connector for the blend door actuator from the actuator connector receptacle. (Fig. 14)

(4) Remove the screws that secure the blend door actuator to the distribution housing.

(5) Remove the blend door actuator from the distribution housing.

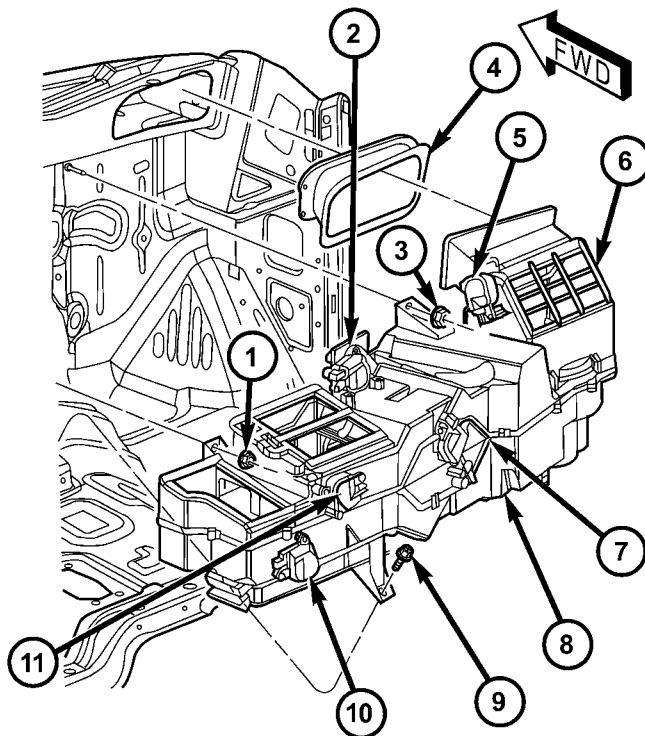
INSTALLATION

(1) Position the blend door actuator into the heater/air conditioner housing. If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those in the blend air door linkage.

(2) Install and tighten the three screws that secure the blend door actuator to the distribution housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Reconnect the HVAC wire harness connector for the blend door actuator to the actuator connector receptacle.

(4) Install the instrument panel assembly (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).



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Fig. 14 HVAC Housing - Dual Zone Shown (Typical - Single Zone)

- 1 - Mounting Nut
- 2 - Passenger Blend Door Actuator (dual zone)
- 3 - Mounting Nut
- 4 - Air Intake Spacer
- 5 - Recirculation Door Actuator
- 6 - Recirculation Door Assembly
- 7 - Driver Side Blend Door Actuator
- 8 - HVAC Housing
- 9 - Mounting Screw
- 10 - Defroster Door Actuator
- 11 - Panel Actuator

(5) Reconnect the battery negative cable.

(6) Perform the heater-A/C control calibration procedure. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C-HEATER CONTROL - STANDARD PROCEDURE - HEATER-A/C CONTROL CALIBRATION).

BLOWER MOTOR RESISTOR BLOCK

DESCRIPTION

The blower motor resistor is mounted to the rear side of the HVAC housing on the passenger side of the vehicle.

OPERATION

The resistor is a ceramic resistor that utilizes resistor circuit tracers to reduce current flow to the

BLOWER MOTOR RESISTOR BLOCK (Continued)

blower. The blower motor switch directs the ground path through the correct resistor circuit to obtain the selected speed.

The blower motor resistor cannot be repaired and, if faulty or damaged, it must be replaced.

DIAGNOSIS AND TESTING - BLOWER MOTOR RESISTOR

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information).

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(1) Disconnect and isolate the battery negative cable.

(2) Reach under the passenger side bottom of the HVAC unit and unplug the wire harness connector from the blower motor resistor.

(3) Check for continuity between each of the blower motor switch input terminals of the resistor and the resistor output terminal. In each case there should be continuity. If OK, repair the wire harness circuits between the blower motor switch and the blower motor resistor or blower motor relay as required. If not OK, replace the faulty blower motor resistor.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) The blower motor resistor is accessible from the passenger side of the HVAC unit and is located on the bottom of the HVAC unit.

(3) Pull out the lock on the blower motor resistor wire harness connector to unlock the connector latch.

(4) Depress the latch on the blower motor resistor wire harness connector and unplug the connector from the resistor.

(5) Remove the two screws that secure the resistor to the HVAC housing.

(6) Remove the resistor from the HVAC housing.

INSTALLATION

(1) Install the new resistor in the HVAC housing.

(2) Install the two screws that secure the resistor to the HVAC housing and tighten to 2.2 N·m (20 in. lbs.).

(3) Plug in the blower motor harness connector.

(4) Push in the lock on the blower motor resistor harness connector.

(5) Close the glove box door.

(6) Connect the battery negative cable.

BLOWER MOTOR SWITCH

DESCRIPTION

The A/C Heater blower motor is controlled by a four position rotary-type blower motor switch, mounted in the A/C Heater control panel. The switch allows the selection of one of four blower motor speeds, but can only be turned off by selecting the Off position on the blower motor switch.

OPERATION

The blower motor switch directs the blower motor ground path through the mode control switch to the blower motor resistor, or directly to ground, as required to achieve the selected blower motor speed.

The blower motor switch cannot be repaired and, if faulty or damaged, the entire A/C Heater control unit must be replaced.

DIAGNOSIS AND TESTING - BLOWER MOTOR SWITCH

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information).

BLOWER MOTOR SWITCH (Continued)

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Check for battery voltage at the fuse in the Power Distribution Center (PDC). If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Remove the A/C Heater control from the instrument panel. Check for continuity between the ground circuit cavity of the A/C Heater control wire harness connector and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open circuit to ground as required.

(3) With the A/C Heater control wire harness connector unplugged, place the A/C Heater mode control switch knob in any position except the Off position. Check for continuity between the ground circuit terminal and each of the blower motor driver circuit terminals of the A/C Heater control as you move the blower motor switch knob to each of the four speed positions. There should be continuity at each driver circuit terminal in only one blower motor switch speed position. If OK, test and repair the blower driver circuits between the A/C Heater control connector and the blower motor resistor as required. If not OK, replace the faulty A/C Heater control unit.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The blower motor switch cannot be repaired and, if faulty or damaged, the entire A/C Heater control unit must be replaced. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C HEATER CONTROL - REMOVAL)

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) The blower motor switch cannot be repaired and, if faulty or damaged the entire A/C heater control unit must be replaced (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C HEATER CONTROL - INSTALLATION).

DEFROST DOOR ACTUATOR**REMOVAL - FLOOR - DEFROST DOOR ACTUATOR**

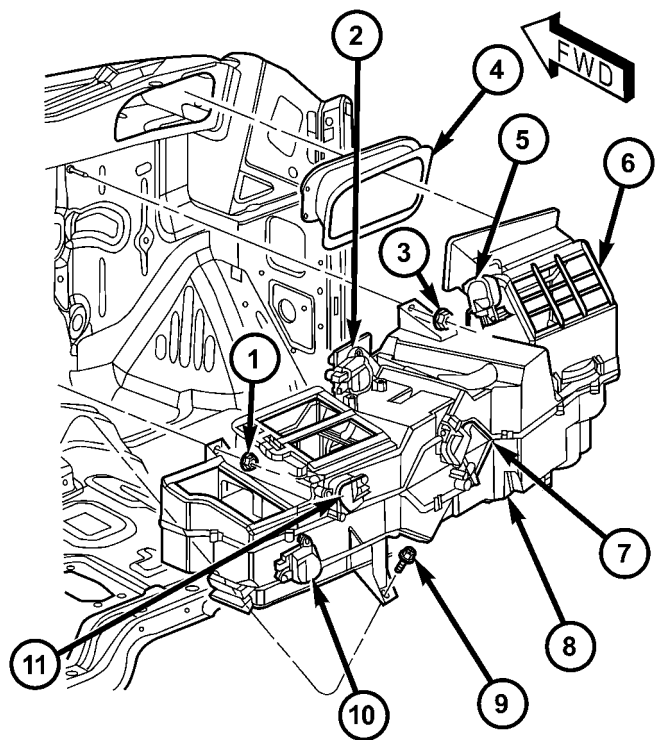
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(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument panel assembly from the vehicle (Refer to 23 - BODY/INSTRUMENT PANEL - REMOVAL).

(3) Remove the electrical connector from the actuator (Fig. 15).

DEFROST DOOR ACTUATOR (Continued)



80d41686

Fig. 15 HVAC Housing - Dual Zone Shown (Typical - Single Zone)

- 1 - Mounting Nut
- 2 - Passenger Blend Door Actuator (dual zone)
- 3 - Mounting Nut
- 4 - Air Intake Spacer
- 5 - Recirculation Door Actuator
- 6 - Recirculation Door Assembly
- 7 - Driver Side Blend Door Actuator
- 8 - HVAC Housing
- 9 - Mounting Screw
- 10 - Defroster Door Actuator
- 11 - Panel Actuator

(4) Remove the mounting screws from the actuator.

(5) Remove the actuator from the HVAC housing.

INSTALLATION - FLOOR - DEFROST DOOR ACTUATOR

(1) Install the floor-defrost door actuator to the HVAC assembly.

(2) Install the mounting screws and tighten to 2.2 N·m (20 in. lbs.).

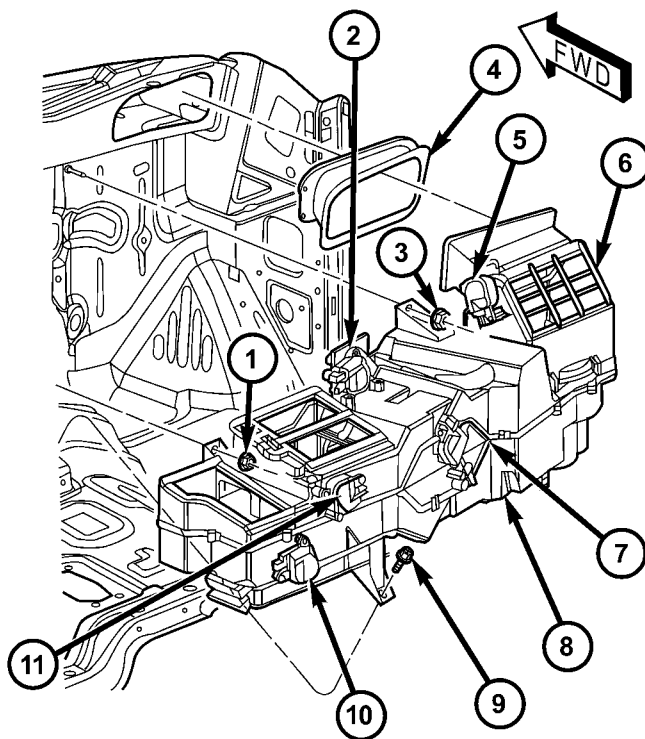
(3) Install the actuator electrical connector.

(4) Install the instrument panel assembly into the vehicle (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

(5) Connect the battery negative cable.

MODE DOOR ACTUATOR

DESCRIPTION



80d41686

Fig. 16 HVAC Housing - Dual Zone Shown (Typical - Single Zone)

- 1 - Mounting Nut
- 2 - Passenger Blend Door Actuator (dual zone)
- 3 - Mounting Nut
- 4 - Air Intake Spacer
- 5 - Recirculation Door Actuator
- 6 - Recirculation Door Assembly
- 7 - Driver Side Blend Door Actuator
- 8 - HVAC Housing
- 9 - Mounting Screw
- 10 - Defroster Door Actuator
- 11 - Panel Actuator

The mode door actuator is a reversible, 12-volt Direct Current (DC), servo motor (Fig. 16). The single mode door actuator is located on the driver side end of the heater-A/C housing unit, close to the top of the distribution housing. The mode door actuator is mechanically connected to the mode door. The mode door actuator is interchangeable with the actuators for the blend air door(s) and the recirculation air door. Each actuator is contained within an identical black molded plastic housing with an integral wire connector receptacle. Two integral mounting tabs allow the actuator to be secured with two screws to the heater-A/C unit housing. Each actuator also has an identical output shaft with splines that connects it to the linkage that drives the mode door. The mode door actuator does not require mechanical indexing

MODE DOOR ACTUATOR (Continued)

to the mode door linkage, as it is electronically calibrated by the heater-A/C control module. The mode door actuator cannot be adjusted or repaired and, if damaged or faulty, it must be replaced.

OPERATION

The mode door actuator is connected to the heater-A/C control module through the vehicle electrical system by a dedicated two-wire take out and connector of the HVAC wire harness. The mode door actuator can move the mode door in two directions. When the heater-A/C control module pulls the voltage on one side of the motor connection high and the other connection low, the mode door will move in one direction. When the module reverses the polarity of the voltage to the motor, the mode door moves in the opposite direction. When the module makes the voltage to both connections high or both connections low, the mode door stops and will not move. These same motor connections also provide a feedback signal to the heater-A/C control module. This feedback signal allows the module to monitor the operation and relative position of the mode door actuator and the mode door. The heater-A/C control module learns the mode door stop positions during the calibration procedure and will store a Diagnostic Trouble Code (DTC) for any problems it detects in the mode door actuator circuits. The mode door actuator can be diagnosed using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

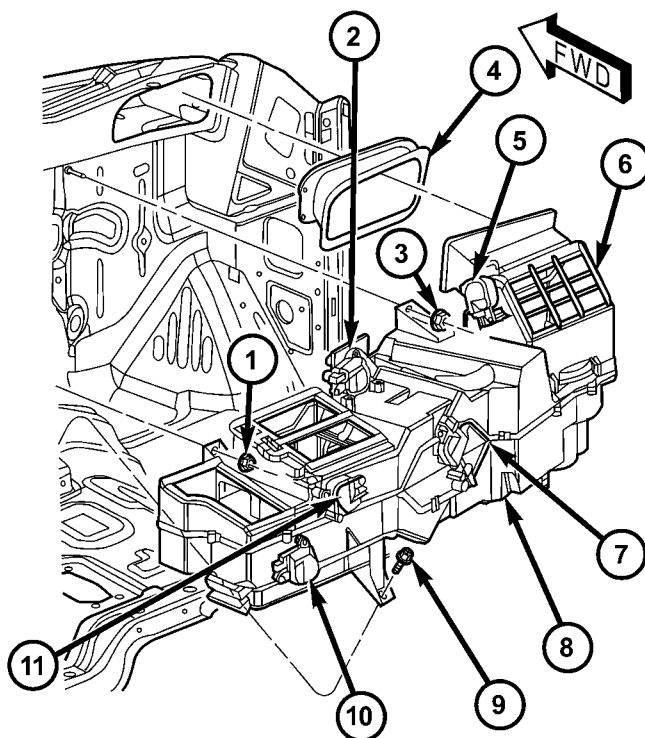
(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument panel assembly (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).

(3) Disconnect the electrical connector from the actuator (single or dual zone as required).

(4) Remove the two screws that secure the mode door actuators to the distribution housing. For single

zone systems only lower actuator in present. For dual zone systems remove second actuator which is mounted on top of HVAC housing (Fig. 17).



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Fig. 17 HVAC Housing - Dual Zone Shown (Typical - Single Zone)

- 1 - Mounting Nut
- 2 - Passenger Blend Door Actuator (dual zone)
- 3 - Mounting Nut
- 4 - Air Intake Spacer
- 5 - Recirculation Door Actuator
- 6 - Recirculation Door Assembly
- 7 - Driver Side Blend Door Actuator
- 8 - HVAC Housing
- 9 - Mounting Screw
- 10 - Defroster Door Actuator
- 11 - Panel Actuator

(5) Remove the mode door actuators from the distribution housing.

MODE DOOR ACTUATOR (Continued)

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the mode door actuators onto the heater/A/C housing. If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those in the mode door linkage.

(2) Install and tighten the two screws that secure the mode door actuators to the distribution housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Reconnect the HVAC wire harness connector for the mode door actuators to the actuator connector receptacle.

(4) Install the instrument panel assembly (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

(5) Reconnect the battery negative cable.

(6) Perform the heater-A/C control calibration procedure. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C-HEATER CONTROL - STANDARD PROCEDURE - HEATER-A/C CONTROL CALIBRATION).

RECIRCULATION DOOR ACTUATOR**DESCRIPTION**

The recirculation door actuator is a reversible, 12-volt Direct Current (DC), servo motor. The single recirculation door actuator is located on the passenger side end of the heater-A/C housing unit. The recirculation door actuator is mechanically connected to the recirculation air door. The recirculation door actuator is interchangeable with the actuators for the blend air door(s) and the mode doors. Each actuator is contained within an identical black molded plastic housing with an integral wire connector receptacle. Two integral mounting tabs allow the actuator to be secured with two screws to the intake air housing. Each actuator also has an identical output shaft with splines that connects it to the linkage that drives the

recirculation air door. The recirculation door actuator does not require mechanical indexing to the recirculation air door, as it is electronically calibrated by the heater-A/C control module. The recirculation door actuator cannot be adjusted or repaired and, if damaged or faulty, it must be replaced.

OPERATION

The recirculation door actuator is connected to the heater-A/C control module through the vehicle electrical system by a dedicated two-wire take out and connector of the HVAC wire harness. The recirculation door actuator can move the recirculation door in two directions. When the heater-A/C control module pulls the voltage on one side of the motor connection high and the other connection low, the recirculation air door will move in one direction. When the module reverses the polarity of the voltage to the motor, the recirculation air door moves in the opposite direction. When the module makes the voltage to both connections high or both connections low, the recirculation air door stops and will not move. These same motor connections also provide a feedback signal to the heater-A/C control module. This feedback signal allows the module to monitor the operation and relative position of the recirculation door actuator and the recirculation air door. The heater-A/C control module learns the recirculation air door stop positions during the calibration procedure and will store a Diagnostic Trouble Code (DTC) for any problems it detects in the recirculation door actuator circuits. The recirculation door actuator can be diagnosed using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Pull the carpet on the passenger side front floor away from the dash panel far enough to access the recirculation door actuator.

RECIRCULATION DOOR ACTUATOR (Continued)

(3) Disconnect the HVAC wire harness connector for the recirculation door actuator from the actuator connector receptacle (Fig. 18).

(5) Remove the recirculation door actuator from the intake air housing.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the recirculation door actuator onto the intake air housing. If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those in the recirculation air door.

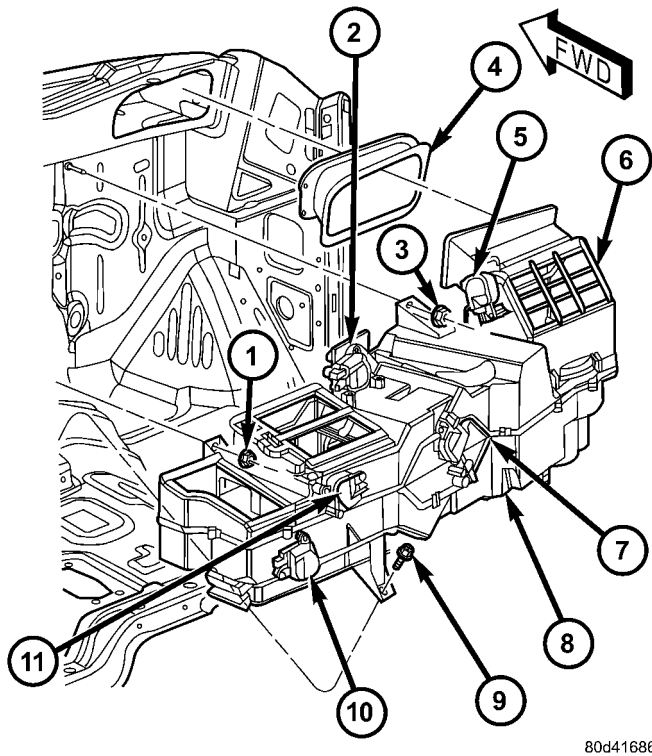
(2) Install and tighten the two screws that secure the recirculation door actuator to the lower intake air housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Reconnect the HVAC wire harness connector for the recirculation door actuator to the actuator connector receptacle.

(4) Install the Instrument Panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

(5) Reconnect the battery negative cable.

(6) Perform the heater-A/C control calibration procedure. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C-HEATER CONTROL - STANDARD PROCEDURE - HEATER-A/C CONTROL CALIBRATION).



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Fig. 18 HVAC Housing - Dual Zone Shown (Typical - Single Zone)

- 1 - Mounting Nut
- 2 - Passenger Blend Door Actuator (dual zone)
- 3 - Mounting Nut
- 4 - Air Intake Spacer
- 5 - Recirculation Door Actuator
- 6 - Recirculation Door Assembly
- 7 - Driver Side Blend Door Actuator
- 8 - HVAC Housing
- 9 - Mounting Screw
- 10 - Defroster Door Actuator
- 11 - Panel Actuator

(4) Remove the two screws that secure the recirculation door actuator to the intake air housing.

DISTRIBUTION

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AIR OUTLETS

REMOVAL - PANEL OUTLETS

(1) Use a trim stick or another suitable wide flat-bladed tool to gently pry the panel outlet grill out of the panel outlet housing (Fig. 1). The panel outlet grill is retained by a light snap fit.

INSTALLATION - PANEL OUTLETS

To install, position the grill housing in the panel outlet housing and press firmly until it snaps into place.

BLEND DOOR

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRE-

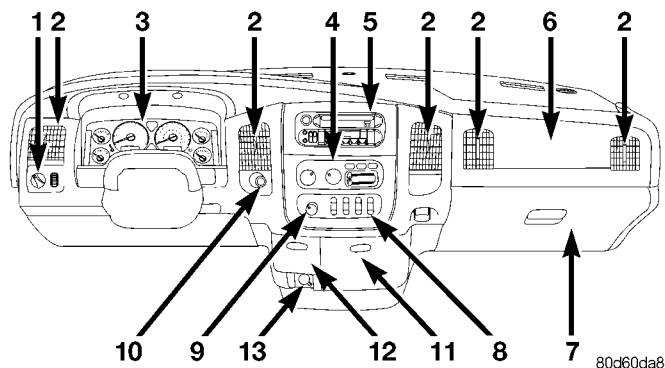


Fig. 1 Dash Panel

- 1 - Headlight Switch
- 2 - Air Outlets
- 3 - Instrument Cluster
- 4 - Climate Control
- 5 - Radio
- 6 - Airbag
- 7 - Glove Box
- 8 - Heated Seat Switch (if equipped)
- 9 - Transfer Case Control Switch (if equipped)
- 10 - Cigar Lighter
- 11 - Cup Holders
- 12 - Ash Tray (if equipped)
- 13 - Power Outlet

CAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

BLEND DOOR (Continued)

(1) Recover refrigerant(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE).

(2) Remove and disassemble the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - DISASSEMBLY)

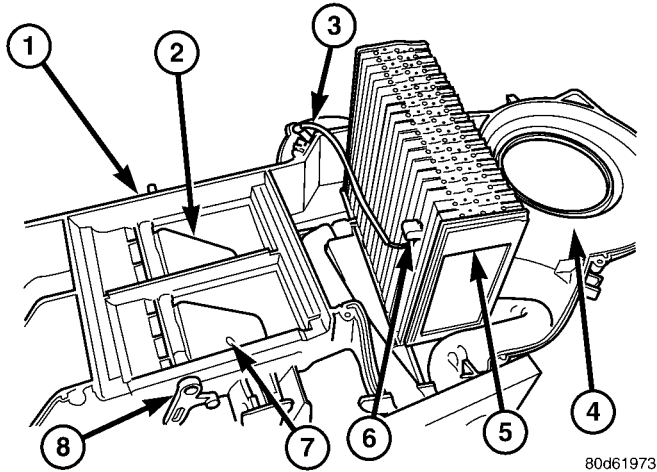


Fig. 2 Dual Zone HVAC Housing- (typical single zone)

- 1 - Passenger Side Blend Door Lever (if equipped)
- 2 - Passenger Side Blend Door (if equipped)
- 3 - Fin Sensor Wire
- 4 - Lower Blower Motor Mounting Housing
- 5 - HVAC Evaporator
- 6 - Fin Sensor
- 7 - Driver Side Blend Door
- 8 - Driver Side Blend Door Lever

(3) Remove the levers from the driver and passenger side blend air doors (Fig. 2).

(4) Gently slide the drivers or passenger side blend air door toward the out side of the case and tilt and lift the doors out of the case.

(5) Inspect doors, seals and case for damage or binding and repair or replace as required.

INSTALLATION

NOTE: Vehicles equipped with single zone HVAC systems will only have one blend air door, dual zone systems have two blend air doors.

(1) Place the blend door pivot shafts in to the pivot holes in the bottom of the lower half of the HVAC housing.

(2) Blend doors are installed by carefully tipping the doors in and then sliding each door into position.

(3) Install blend door levers to each door, position levers so that the doors are able to move smoothly without any binding. Adjust as required to insure proper operation.

(4) Check all sealing surfaces and reposition or replace any seals as required.

(5) Assemble the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - ASSEMBLY)

(6) Install the HVAC housing in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION)

(7) Run calibration test.

BLOWER MOTOR**DESCRIPTION**

The blower motor and blower wheel are located in the passenger side end of the HVAC housing, below the glove box. The blower motor controls the velocity of air flowing through the HVAC housing by spinning a squirrel cage-type blower wheel within the housing at the selected speed. The blower motor and wheel can be removed from the housing inside the vehicle without removing the dash or HVAC housing assembly.

OPERATION

The blower motor will only operate when the ignition switch is in the On position, and the A/C Heater mode control switch knob is in any position, except Off. The blower motor receives a fused battery feed through the blower motor relay whenever the ignition switch is in the On position. The blower motor battery feed circuit is protected by a fuse in the Power Distribution Center (PDC). Blower motor speed is controlled by regulating the ground path through the A/C Heater control blower motor switch and the blower motor resistor.

The blower motor and blower motor wheel cannot be repaired and, if faulty or damaged, they must be replaced. The blower motor and blower wheel are serviced only as a unit.

BLOWER MOTOR (Continued)

DIAGNOSIS AND TESTING - BLOWER MOTOR

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information). Possible causes of an inoperative blower motor include:

- Faulty fuse
- Faulty blower motor circuit wiring or wire harness connectors
- Faulty blower motor resistor
- Faulty blower motor relay
- Faulty blower motor switch
- Faulty A/C Heater mode control switch
- Faulty blower motor.

Possible causes of the blower motor not operating in all speeds include:

- Faulty blower motor switch
- Faulty blower motor resistor
- Faulty blower motor circuit wiring or wire harness connectors.

VIBRATION

Possible causes of blower motor vibration include:

- Improper blower motor mounting
- Improper blower wheel mounting
- Blower wheel out of balance or bent
- Blower motor faulty.

NOISE

To verify that the blower is the source of the noise, unplug the blower motor wire harness connector and operate the HVAC system. If the noise goes away, possible causes include:

- Foreign material in the HVAC housing
- Improper blower motor mounting
- Improper blower wheel mounting
- Blower motor faulty.

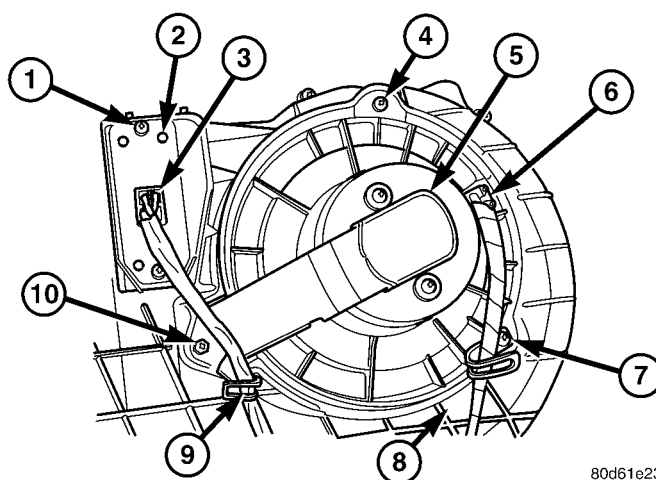
REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING

COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The blower motor is located on the passenger side of the vehicle under the dash

- (1) Disconnect and isolate the battery negative cable.



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Fig. 3 Blower Motor Assembly- (Case Removed from vehicle for graphic)

- 1 - Blower Motor Resistor Mounting Screws (2)
- 2 - Blower Motor Resistor
- 3 - Blower Motor Resistor Connector
- 4 - Blower Motor Mounting Screw
- 5 - Blower Motor Assembly
- 6 - Blower Motor Wire
- 7 - Blower Motor Mounting Screw
- 8 - HVAC Housing
- 9 - Blower Motor Wire Hold Down
- 10 - Blower Motor Mounting Screw

- (2) Unplug the blower motor wire harness connector (Fig. 3).

- (3) Remove the three screws that secure the blower motor and wheel assembly to the HVAC housing.

- (4) Rotate and tilt the blower motor unit as needed for clearance to remove the blower motor and wheel from the HVAC housing.

INSTALLATION

- (1) Align and install the blower motor and wheel assembly into the HVAC housing.

- (2) Install the three mounting screws and tighten to 2.2 N·m (20 in. lbs.).

BLOWER MOTOR (Continued)

- (3) Plug in the blower motor wire harness connector.
- (4) Connect the battery negative cable.

DEFROST DOOR

REMOVAL - DEFROST DOOR

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION).

- (1) Recover refrigerant(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE).
- (2) Remove and disassemble the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - DISASSEMBLY)
- (3) Remove the defrost door actuator.
- (4) Remove the defrost door from the HVAC housing, by first removing the actuator if not already removed. Then carefully move the door so that one pivot point cleans then tilt and lift the door out of the HVAC housing.

INSTALLATION - DEFROST DOOR

- (1) Install the defrost door in the HVAC housing.
- (2) Install the defrost door actuator.
- (3) Assemble the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - ASSEMBLY)
- (4) Install the HVAC housing in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION)
- (5) Run calibration test.

FLOOR DISTRIBUTION DUCTS

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Remove the screws that secure the floor duct to the HVAC housing.
- (2) Remove the floor duct from the HVAC housing.

INSTALLATION

- (1) Install the floor duct on the HVAC housing.
- (2) Install the screws that secure the floor duct to the HVAC housing. Tighten the mounting screws to 2.2 N·m (20 in. lbs.).
- (3) Install the battery negative cable.

HVAC HOUSING

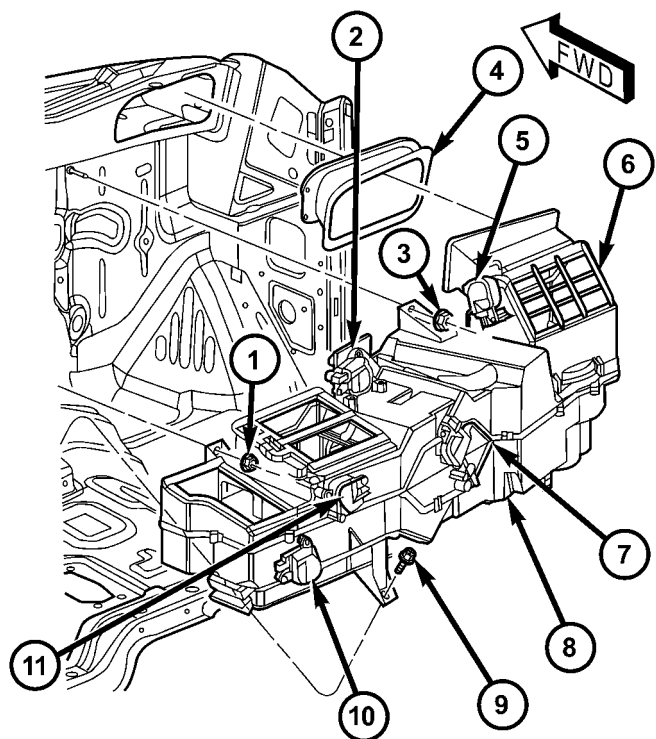
REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the instrument panel from the vehicle(Refer to 23 - BODY/INSTRUMENT PANEL - REMOVAL).

HVAC HOUSING (Continued)

(3) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)



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Fig. 4 HVAC Housing - Dual Zone Shown (Typical - Single Zone)

- 1 - Mounting Nut
- 2 - Passenger Blend Door Actuator (dual zone)
- 3 - Mounting Nut
- 4 - Air Intake Spacer
- 5 - Recirculation Door Actuator
- 6 - Recirculation Door Assembly
- 7 - Driver Side Blend Door Actuator
- 8 - HVAC Housing
- 9 - Mounting Screw
- 10 - Defroster Door Actuator
- 11 - Panel Actuator

(4) Disconnect the liquid line refrigerant line fitting from the evaporator inlet tube (Fig. 4). (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(5) Disconnect the accumulator inlet tube refrigerant line fitting from the evaporator outlet tube. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS) Install plugs in, or tape over all of the opened refrigerant line fittings.

(6) Drain the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(7) Disconnect the heater hoses from the heater core tubes. Install plugs in, or tape over the opened heater core tubes.

(8) Unplug all electrical connectors from the actuators and blower motor.

(9) Remove the nuts from the HVAC housing mounting studs.

(10) Remove the HVAC housing from inside the vehicle taking care not to allow any remaining coolant to drain on the vehicles interior.

DISASSEMBLY

(1) Remove the HVAC housing from the vehicle and place it on the workbench. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL)

(2) Unplug the electrical connectors from each actuator.

(3) Remove the HVAC assembly wiring harness from the HVAC case.

(4) Remove the blower motor and blower wheel unit from the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/BLOWER MOTOR - REMOVAL)

(5) Remove the heater core mounting screws and carefully remove the heater core assembly (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER CORE - REMOVAL).

(6) Carefully remove the foam seals from the heater core and evaporator coil tube mounting flange of the HVAC housing. If either seal is deformed or damaged it must be replaced.

(7) Use a screwdriver to pry off the four snap clips that help secure the upper and lower HVAC housing halves together.

(8) Remove the screws that secure the upper and lower HVAC housing halves together.

(9) Carefully separate the upper HVAC housing from the lower half.

ASSEMBLY

(1) Assemble the upper HVAC housing half to the lower half. During assembly, be certain of the following.

(a) That each of the mode door pivot shaft ends and the temperature blend door shafts are properly engaged in their pivot holes.

(b) That the blower motor is properly indexed and installed.

(c) If the unit is equipped with air conditioning, that the evaporator coil tube rubber seal is properly positioned in the grooves in both the upper and lower HVAC housing halves.

(d) That the evaporator drain opening is clean.

(e) That the evaporator drain shield is installed correctly.

HVAC HOUSING (Continued)

(2) Install the screws and snap clips that secure the upper and lower HVAC housing halves to each other. Tighten the screws to 2.2 N·m (20 in. lbs.).

(3) Install the blower motor and wheel unit in the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/BLOWER MOTOR - INSTALLATION)

(4) Install the foam seals on the flanges around the heater core and evaporator coil tube mounting flange of the HVAC housing. Repair or replace any seals as required.

(5) Install the electrical wiring harness for the actuators. Make sure the wires are routed through all wiring retainers, replace any retainers that are damaged or missing.

(6) Connect the wiring harness to each actuator, making sure each connector is securely attached.

INSTALLATION

WARNING: IF THE VEHICLE IS EQUIPPED WITH AIR CONDITIONING, REVIEW THE WARNINGS AND CAUTIONS IN PLUMBING BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

(1) Position the HVAC housing to the dash panel. Be certain that the evaporator condensate drain tube and the housing mounting studs are inserted into their correct mounting holes.

(2) Install and tighten the nuts onto the HVAC housing mounting studs. Tighten the nuts to 6.2 N·m (55 in.lbs.).

(3) Connect the HVAC system electrical connectors.

(4) Unplug or remove the tape from the heater core tubes. Connect the heater hoses to the heater core tubes and fill the engine cooling system(Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(5) Unplug or remove the tape from the liquid line and the evaporator inlet tube fittings. Connect the liquid line coupler to the evaporator inlet tube. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

(8) Install the instrument panel in the vehicle(Refer to 23 - BODY/INSTRUMENT PANEL - INSTALLATION).

(9) Connect the battery negative cable.

(10) Start the engine and check for proper operation of the heating and air conditioning systems.

(11) Run the calibration procedure.

INSTRUMENT PANEL DUCTS

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the HVAC assembly from the vehicle(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL).

(3) Disassemble the HVAC housing(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - DISASSEMBLY).

(4) Remove the panel door actuator from the housing if not already removed.

(5) With the actuator removed you can take the door and shift it so that one pivot point will clear the housing. You can then tilt the door and remove it from the housing.

INSTALLATION

(1) Take the door and tilt it so one pivot point is installed. The carefully install the second pivot point. Check to be sure no binding of the door is occurring, repair as required.

(2) Reassemble the HVAC housing(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - ASSEMBLY).

(3) Install the HVAC assembly into the vehicle(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/INSTRUMENT PANEL DUCTS - INSTALLATION).

(4) Connect the battery negative cable.

MODE DOOR

REMOVAL - FLOOR - DEFROST DOOR

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION).

- (1) Remove and disassemble the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - DISASSEMBLY)
- (2) Remove the floor door actuator from the lower HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/MODE DOOR ACTUATOR - REMOVAL - FLOOR DOOR ACTUATOR)
- (3) Take the defrost door and shift it so that one pivot point clears the door and remove from the HVAC housing.

INSTALLATION - FLOOR - DEFROST DOOR

- (1) Install the floor-defrost door in the HVAC housing by placing the door in the lower housing.
- (2) Assemble the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - ASSEMBLY)
- (3) Install the floor door actuator to the lower HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/MODE DOOR ACTUATOR - INSTALLATION - FLOOR DOOR ACTUATOR)
- (4) Install the HVAC housing in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION)

RECIRC DOOR

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: IF THE VEHICLE IS EQUIPPED WITH AIR CONDITIONING, REVIEW THE WARNINGS AND CAUTIONS IN PLUMBING BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

- (1) Remove the HVAC housing and disassemble. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - DISASSEMBLY)
- (2) Remove the four screws to remove the recirculation door assembly. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/RECIRCULATION DOOR ACTUATOR - REMOVAL)
- (3) With the actuator remove take the recirculation door and move it to one side so that one pivot point clears the housing. The tilt the recirculation door and remove from the assembly.

INSTALLATION

- (1) Guide the recirculation door lever through the air intake grille of the HVAC housing while installing the door in the housing.
- (2) Assemble the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - ASSEMBLY)
- (3) Install the HVAC housing in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION)
- (4) Install the recirculation door actuator on the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/RECIRCULATION DOOR ACTUATOR - INSTALLATION)

PLUMBING

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PLUMBING

DESCRIPTION - REFRIGERANT LINE

The refrigerant lines and hoses are used to carry the refrigerant between the various air conditioning system components. A barrier hose design with a nylon tube, which is sandwiched between rubber layers, is used for the R-134a air conditioning system on this vehicle. This nylon tube helps to further contain the R-134a refrigerant, which has a smaller molecular structure than R-12 refrigerant. The ends of the refrigerant hoses are made from lightweight aluminum or steel, and commonly use braze-less fittings.

Any kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire air conditioning system. Kinks and sharp bends reduce the flow of refrigerant in the system. A good rule for the flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. In addition, the flexible hose refrigerant lines should be routed so they are at least 80 millimeters (3 inches) from an exhaust manifold.

OPERATION- REFRIGERANT LINES

High pressures are produced in the refrigerant system when the air conditioning compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

The refrigerant lines and hoses are coupled with other components of the HVAC system with either 3 O-ring spring lock couplings or dual axes seals.

The refrigerant lines and hoses cannot be repaired and, if faulty or damaged, they must be replaced.

WARNING

SERVICE WARNINGS

WARNING: THE AIR CONDITIONING SYSTEM CONTAINS REFRIGERANT UNDER HIGH PRESSURE. SEVERE PERSONAL INJURY MAY RESULT FROM IMPROPER SERVICE PROCEDURES. REPAIRS SHOULD ONLY BE PERFORMED BY QUALIFIED SERVICE PERSONNEL.

AVOID BREATHING THE REFRIGERANT AND REFRIGERANT OIL VAPOR OR MIST. EXPOSURE MAY IRRITATE THE EYES, NOSE, AND/OR THROAT. WEAR EYE PROTECTION WHEN SERVICING THE AIR CONDITIONING REFRIGERANT SYSTEM. SERIOUS EYE INJURY CAN RESULT FROM DIRECT CONTACT WITH THE REFRIGERANT. IF EYE CONTACT OCCURS, SEEK MEDICAL ATTENTION IMMEDIATELY.

DO NOT EXPOSE THE REFRIGERANT TO OPEN FLAME. POISONOUS GAS IS CREATED WHEN REFRIGERANT IS BURNED. AN ELECTRONIC LEAK DETECTOR IS RECOMMENDED.

IF ACCIDENTAL SYSTEM DISCHARGE OCCURS, VENTILATE THE WORK AREA BEFORE RESUMING SERVICE. LARGE AMOUNTS OF REFRIGERANT RELEASED IN A CLOSED WORK AREA WILL DISPLACE THE OXYGEN AND CAUSE SUFFOCATION. THE EVAPORATION RATE OF R-134a REFRIGERANT AT AVERAGE TEMPERATURE AND ALTITUDE IS EXTREMELY HIGH. AS A RESULT, ANYTHING THAT COMES IN CONTACT WITH THE REFRIGERANT WILL FREEZE. ALWAYS PROTECT THE SKIN OR DELICATE OBJECTS FROM DIRECT CONTACT WITH THE REFRIGERANT.

THE R-134a SERVICE EQUIPMENT OR THE VEHICLE REFRIGERANT SYSTEM SHOULD NOT BE PRESSURE TESTED OR LEAK TESTED WITH COMPRESSED AIR. SOME MIXTURES OF AIR AND R-134a HAVE BEEN SHOWN TO BE COMBUSTIBLE AT ELEVATED PRESSURES. THESE MIXTURES ARE POTENTIALLY DANGEROUS, AND MAY RESULT IN FIRE OR EXPLOSION CAUSING INJURY OR PROPERTY DAMAGE.

PLUMBING (Continued)

CAUTION

SERVICE CAUTIONS

CAUTION: Liquid refrigerant is corrosive to metal surfaces. Follow the operating instructions supplied with the service equipment being used.

Never add R-12 to a refrigerant system designed to use R-134a. Damage to the system will result.

R-12 refrigerant oil must not be mixed with R-134a refrigerant oil. They are not compatible.

Do not use R-12 equipment or parts on the R-134a system. Damage to the system will result.

Do not overcharge the refrigerant system. This will cause excessive compressor head pressure and can cause noise and system failure.

Recover the refrigerant before opening any fitting or connection. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

Do not remove the secondary retention clip from any spring-lock coupler connection while the refrigerant system is under pressure. Recover the refrigerant before removing the secondary retention clip. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

The refrigerant system must always be evacuated before charging.

Do not open the refrigerant system or uncap a replacement component until you are ready to service the system. This will prevent contamination in the system.

Before disconnecting a component, clean the outside of the fittings thoroughly to prevent contamination from entering the refrigerant system.

Immediately after disconnecting a component from the refrigerant system, seal the open fittings with a cap or plug.

Before connecting an open refrigerant fitting, always install a new seal or gasket. Coat the fitting and seal with clean refrigerant oil before connecting.

Do not remove the sealing caps from a replacement component until it is to be installed.

When installing a refrigerant line, avoid sharp bends that may restrict refrigerant flow. Position the refrigerant lines away from exhaust system components or any sharp edges, which may damage the line.

Tighten refrigerant fittings only to the specified torque. The aluminum fittings used in the refrigerant system will not tolerate overtightening.

When disconnecting a refrigerant fitting, use a wrench on both halves of the fitting. This will pre-

vent twisting of the refrigerant lines or tubes.

Refrigerant oil will absorb moisture from the atmosphere if left uncapped. Do not open a container of refrigerant oil until you are ready to use it. Replace the cap on the oil container immediately after using. Store refrigerant oil only in a clean, airtight, and moisture-free container.

Keep service tools and the work area clean. Contamination of the refrigerant system through careless work habits must be avoided.

**CAUTION - REFRIGERANT HOSES/LINES/
TUBES PRECAUTIONS**

Kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all refrigerant system connections are pressure tight.

A good rule for the flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. Sharp bends will reduce the flow of refrigerant. The flexible hose lines should be routed so they are at least 80 millimeters (3 inches) from the exhaust manifold. It is a good practice to inspect all flexible refrigerant system hose lines at least once a year to make sure they are in good condition and properly routed.

There are two types of refrigerant fittings:

- All fittings with O-rings need to be coated with refrigerant oil before installation. Use only O-rings that are the correct size and approved for use with R-134a refrigerant. Failure to do so may result in a leak.

- Unified plumbing connections with gaskets cannot be serviced with O-rings. The gaskets are not reusable and new gaskets do not require lubrication before installing.

Using the proper tools when making a refrigerant plumbing connection is very important. Improper tools or improper use of the tools can damage the refrigerant fittings. Always use two wrenches when loosening or tightening tube fittings. Use one wrench to hold one side of the connection stationary, while loosening or tightening the other side of the connection with a second wrench.

The refrigerant must be recovered completely from the system before opening any fitting or connection. Open the fittings with caution, even after the refrigerant has been recovered. If any pressure is noticed as a fitting is loosened, tighten the fitting and recover the refrigerant from the system again.

Do not discharge refrigerant into the atmosphere. Use an R-134a refrigerant recovery/recycling device that meets SAE Standard J2210.

PLUMBING (Continued)

The refrigerant system will remain chemically stable as long as pure, moisture-free R-134a refrigerant and refrigerant oil is used. Dirt, moisture, or air can upset this chemical stability. Operational troubles or serious damage can occur if foreign material is present in the refrigerant system.

When it is necessary to open the refrigerant system, have everything needed to service the system ready. The refrigerant system should not be left open to the atmosphere any longer than necessary. Cap or plug all lines and fittings as soon as they are opened to prevent the entrance of dirt and moisture. All lines and components in parts stock should be capped or sealed until they are to be installed.

All tools, including the refrigerant recycling equipment, the manifold gauge set, and test hoses should be kept clean and dry. All tools and equipment must be designed for R-134a refrigerant.

STANDARD PROCEDURE

STANDARD PROCEDURE - REFRIGERANT SYSTEM SERVICE EQUIPMENT

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

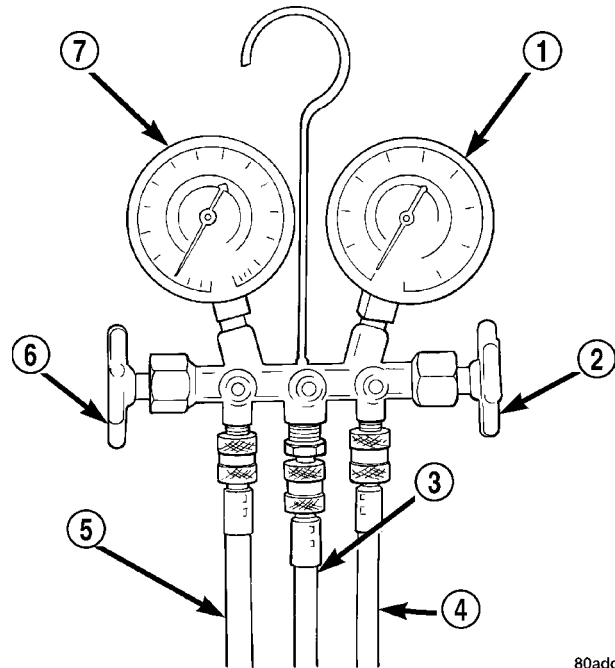
When servicing the air conditioning system, a R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used. Contact an automotive service equipment supplier for refrigerant recovery/recycling/charging equipment. Refer to the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

A manifold gauge set may be needed with some recovery/recycling/charging equipment (Fig. 1). The service hoses on the gauge set being used should have manual (turn wheel), or automatic back-flow valves at the service port connector ends. This will prevent refrigerant from being released into the atmosphere.

MANIFOLD GAUGE SET CONNECTIONS

CAUTION: Do not use an R-12 manifold gauge set on an R-134a system. The refrigerants are not compatible and system damage will result.

LOW PRESSURE GAUGE HOSE The low pressure hose (Blue with Black stripe) attaches to the suction



80add30c

Fig. 1 MANIFOLD GAUGE SET - TYPICAL

- 1 - HIGH PRESSURE GAUGE
- 2 - VALVE
- 3 - VACUUM/REFRIGERANT HOSE (YELLOW W/ BLACK STRIPE)
- 4 - HIGH PRESSURE HOSE (RED W/ BLACK STRIPE)
- 5 - LOW PRESSURE HOSE (BLUE W/ BLACK STRIPE)
- 6 - VALVE
- 7 - LOW PRESSURE GAUGE

service port. This port is located on the suction line between the accumulator outlet and the compressor.

HIGH PRESSURE GAUGE HOSE The high pressure hose (Red with Black stripe) attaches to the discharge service port. This port is located on the liquid line between the condenser outlet and the evaporator.

RECOVERY/RECYCLING/EVACUATION/CHARGING HOSE The center manifold hose (Yellow, or White, with Black stripe) is used to recover, evacuate, and charge the refrigerant system. When the low or high pressure valves on the manifold gauge set are opened, the refrigerant in the system will escape through this hose.

STANDARD PROCEDURE - REFRIGERANT RECOVERY

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

A R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to recover the refrigerant from an R-134a refri-

PLUMBING (Continued)

erant system. Refer to the operating instructions supplied by the equipment manufacturer for the proper care and use of this equipment.

STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

If the refrigerant system has been open to the atmosphere, it must be evacuated before the system can be charged. If moisture and air enters the system and becomes mixed with the refrigerant, the compressor head pressure will rise above acceptable operating levels. This will reduce the performance of the air conditioner and damage the compressor. Evacuating the refrigerant system will remove the air and boil the moisture out of the system at near room temperature. To evacuate the refrigerant system, use the following procedure:

(1) Connect a R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 and a manifold gauge set to the refrigerant system of the vehicle.

(2) Recover the refrigerant (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE).

(3) Open the low and high side valves and start the charging station vacuum pump. When the suction gauge reads 88 kPa (26 in. Hg.) vacuum or greater, close all of the valves and turn off the vacuum pump.

(a) If the refrigerant system fails to reach the specified vacuum, the system has a leak that must be corrected. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - DIAGNOSIS AND TESTING - REFRIGERANT SYSTEM LEAKS)

(b) If the refrigerant system maintains the specified vacuum for five minutes, restart the vacuum pump, open the suction and discharge valves and evacuate the system for an additional ten minutes.

(4) Close all of the valves, and turn off the charging station vacuum pump.

(5) The refrigerant system is now ready to be charged with R-134a refrigerant. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

After the refrigerant system has been tested for leaks and evacuated, a refrigerant charge can be injected into the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - SPECIFICATIONS - CHARGE CAPACITY)

A R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to charge the refrigerant system with R-134a refrigerant. Refer to the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

The R-134a refrigerant charge capacity for this vehicle is 0.7371 Kg (26 oz.).

NOTE: Always refer to the HVAC underhood sticker for current refrigerant charge level and refrigerant oil specifications.

SPECIFICATIONS - CHARGE CAPACITY

The R-134a refrigerant system charge capacity for this vehicle is: 0.7371 Kg. (26 oz.).

A/C COMPRESSOR

DESCRIPTION

DESCRIPTION

The air conditioning system uses a Sanden SD-7 reciprocating swash plate-type compressor on all models. This compressor has a fixed displacement of 165 cubic centimeter and has both the suction and discharge ports located on the cylinder head. A label identifying the use of R-134a refrigerant is located on the compressor.

DESCRIPTION - HIGH PRESSURE RELIEF VALVE

A high pressure relief valve is located on the compressor cylinder head, which is on the rear of the compressor. This mechanical valve is designed to vent refrigerant from the system to protect against damage to the compressor and other system compo-

A/C COMPRESSOR (Continued)

nents, caused by condenser air flow restriction or an overcharge of refrigerant.

OPERATION

OPERATION

The compressor is driven by the engine through an electric clutch, drive rotor and belt arrangement. The compressor is lubricated by refrigerant oil that is circulated throughout the refrigerant system with the refrigerant.

The compressor draws in low-pressure refrigerant vapor from the evaporator through its suction port. It then compresses the refrigerant into a high-pressure, high-temperature refrigerant vapor, which is then pumped to the condenser through the compressor discharge port.

The compressor cannot be repaired. If faulty or damaged, the entire compressor assembly must be replaced. The compressor clutch, pulley and clutch coil are available for service.

OPERATION - HIGH PRESSURE RELIEF VALVE

The high pressure relief valve vents the system when a discharge pressure of 3445 to 4135 kPa (500 to 600 psi) or above is reached. The valve closes when a minimum discharge pressure of 2756 kPa (400 psi) is reached.

The high pressure relief valve vents only enough refrigerant to reduce the system pressure, and then re-seats itself. The majority of the refrigerant is conserved in the system. If the valve vents refrigerant, it does not mean that the valve is faulty.

The high pressure relief valve is a factory-calibrated unit. The valve cannot be adjusted or repaired, and must not be removed or otherwise disturbed. The valve is only serviced as a part of the compressor assembly.

DIAGNOSIS AND TESTING - A/C COMPRESSOR NOISE

When investigating an air conditioning related noise, you must first know the conditions under which the noise occurs. These conditions include: weather, vehicle speed, transmission in gear or neutral, engine speed, engine temperature, and any other special conditions. Noises that develop during air conditioning operation can often be misleading. For example: What sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose compressor clutch assembly.

Drive belts are speed sensitive. At different engine speeds and depending upon belt tension, belts can develop noises that are mistaken for a compressor

noise. Improper belt tension can cause a misleading noise when the compressor clutch is engaged, which may not occur when the compressor clutch is disengaged. Check the serpentine drive belt condition and tension as described in Cooling before beginning this procedure.

(1) Select a quiet area for testing. Duplicate the complaint conditions as much as possible. Switch the compressor on and off several times to clearly identify the compressor noise. Listen to the compressor while the clutch is engaged and disengaged. Probe the compressor with an engine stethoscope or a long screwdriver with the handle held to your ear to better localize the source of the noise.

(2) Loosen all of the compressor mounting hardware and retighten. Tighten the compressor clutch mounting nut. Be certain that the clutch coil is mounted securely to the compressor, and that the clutch plate and rotor are properly aligned and have the correct air gap. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C COMPRESSOR CLUTCH - INSTALLATION)

(3) To duplicate a high-ambient temperature condition (high head pressure), restrict the air flow through the condenser. Install a manifold gauge set to be certain that the discharge pressure does not exceed 2760 kPa (400 psi).

(4) Check the refrigerant system plumbing for incorrect routing, rubbing or interference, which can cause unusual noises. Also check the refrigerant lines for kinks or sharp bends that will restrict refrigerant flow, which can cause noises. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

(5) If the noise is from opening and closing of the high pressure relief valve, evacuate and recharge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE) If the high pressure relief valve still does not seat properly, replace the compressor.

(6) If the noise is from liquid slugging on the suction line. Check the refrigerant oil level and the refrigerant system charge. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - STANDARD PROCEDURE) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - SPECIFICATIONS - CHARGE CAPACITY) If either is out of specification range reclaim, evacuate and recharge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE), (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/RE-

A/C COMPRESSOR (Continued)

FRIGERANT - STANDARD PROCEDURE) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE). If the liquid slugging condition continues replace the accumulator (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/ACCUMULATOR - REMOVAL). If after replacing the accumulator the slugging condition still exists then replace the compressor. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - REMOVAL)

(7) If the noise continues, replace the compressor and repeat Step 1.

REMOVAL

REMOVAL

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

The compressor may be removed and repositioned without disconnecting the refrigerant lines or discharging the refrigerant system. Discharging is not necessary if servicing the compressor clutch or clutch coil, the engine, the cylinder head, or the generator.

(1) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(2) Disconnect and isolate the battery negative cable.

(3) Remove the serpentine drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(4) Unplug the compressor clutch coil wire harness connector.

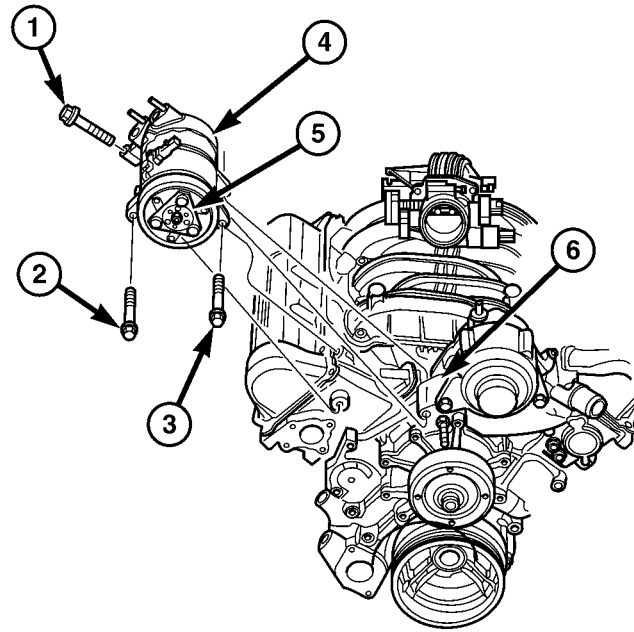
(5) Remove the suction and discharge refrigerant line manifold from the compressor. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/SUCTION LINE - REMOVAL) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C DISCHARGE LINE - REMOVAL) Install plugs in, or tape over all of the opened refrigerant fittings.

(6) Remove the bolts that secure the compressor to the mounting bracket (Fig. 2).

(7) Remove the compressor from the mounting bracket.

REMOVAL - 5.9L DIESEL ENGINE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE



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Fig. 2 A/C COMPRESSOR - 3.7L ENGINE- (typical 4.7, 5.7 & 8.0L)

- 1 - COMPRESSOR BOLT #1
- 2 - COMPRESSOR BOLT #2
- 3 - COMPRESSOR BOLT #3
- 4 - A/C COMPRESSOR
- 5 - A/C COMPRESSOR CLUTCH AND PULLEY
- 6 - COMPRESSOR MOUNT

PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

The compressor may be removed and repositioned without disconnecting the refrigerant lines or discharging the refrigerant system. Discharging is not necessary if servicing the compressor clutch or clutch coil, the engine, the cylinder head, or the generator.

(1) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(2) Disconnect and isolate the battery negative cable.

(3) Remove the serpentine drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(4) Unplug the compressor clutch coil wire harness connector.

(5) Remove the bolt that secures the refrigerant line manifold to the compressor. Install plugs in, or tape over all of the opened refrigerant line fittings.

(6) Remove the four bolts that secure the compressor to the mounting bracket (Fig. 3).

(7) Remove the a/c compressor from the mounting bracket.

A/C COMPRESSOR (Continued)

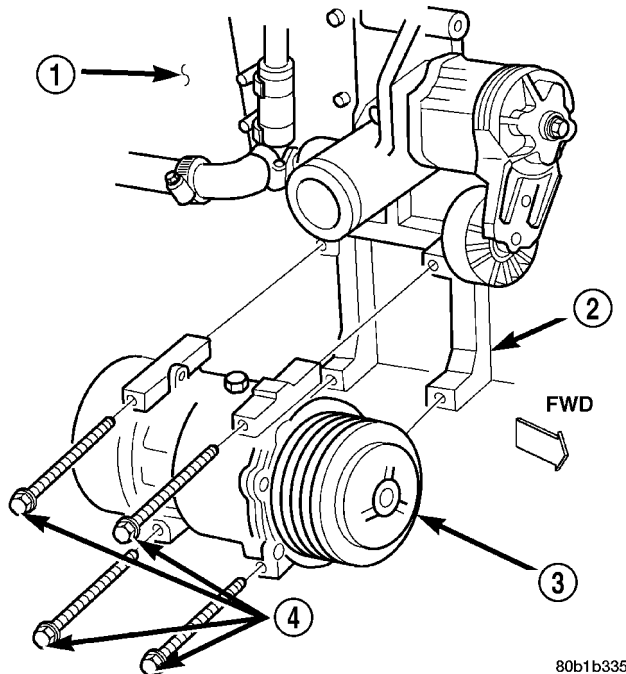


Fig. 3 COMPRESSOR REMOVE/INSTALL - DIESEL ENGINE

- 1 - ENGINE
- 2 - BRACKET
- 3 - A/C COMPRESSOR
- 4 - BOLTS

INSTALLATION

INSTALLATION

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

The compressor may be removed and repositioned without disconnecting the refrigerant lines or discharging the refrigerant system. Discharging is not necessary if servicing the compressor clutch or clutch coil, the engine, the cylinder head, or the generator.

NOTE: If a replacement compressor is being installed, be certain to check the refrigerant oil level. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - STANDARD PROCEDURE - REFRIGERANT OIL LEVEL) Use only refrigerant oil of the type recommended for the compressor in the vehicle. (Refer to 24 - HEATING &

AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - DESCRIPTION)

(1) Install the compressor to the mounting bracket.
(2) On the 3.7L, 4.7L, 5.7L and 8.0L gasoline engines install and tighten the bolts in the following sequence (Fig. 4):

- The number one bolt (rear) is hand tightened first then tightened to 55 N·m (41 ft. lbs.)
- The number three bolt is then hand tightened and torqued to 40 N·m (30 ft. lbs.)
- The number two bolt is also hand tightened and torqued to 55 N·m (41 ft. lbs.)

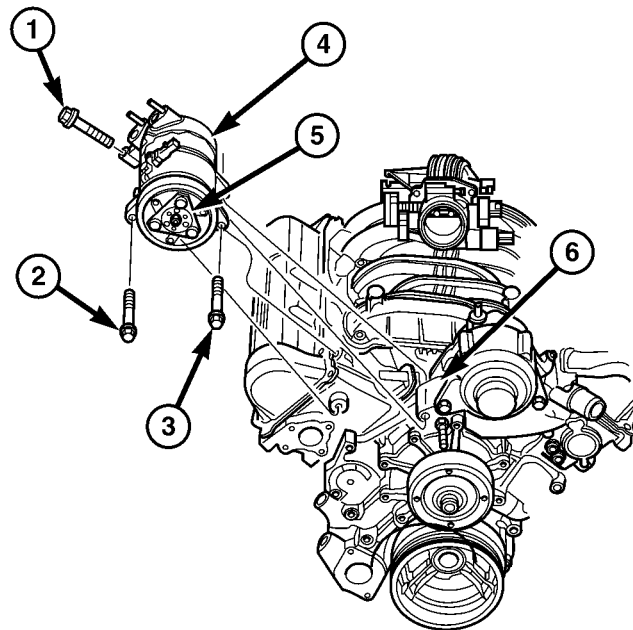


Fig. 4 A/C COMPRESSOR - 3.7L ENGINE- (typical 4.7, 5.7 & 8.0L)

- 1 - COMPRESSOR BOLT #1
- 2 - COMPRESSOR BOLT #2
- 3 - COMPRESSOR BOLT #3
- 4 - A/C COMPRESSOR
- 5 - A/C COMPRESSOR CLUTCH AND PULLEY
- 6 - COMPRESSOR MOUNT

(3) Remove the tape or plugs from all of the opened refrigerant line fittings. Install the suction and discharge line manifold to the compressor. Tighten the fastener to 28 N·m (250 in. lbs.). (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/SUCTION LINE - INSTALLATION) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C DISCHARGE LINE - INSTALLATION)

(4) Install the serpentine drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(5) Plug in the compressor clutch coil wire harness connector.

(6) Connect the battery negative cable.

A/C COMPRESSOR (Continued)

(7) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(8) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

INSTALLATION - 5.9L DIESEL ENGINE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

NOTE: If a replacement compressor is being installed, be certain to check the refrigerant oil level. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - STANDARD PROCEDURE) Use only refrigerant oil of the type recommended for the compressor in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - DESCRIPTION)

(1) Install the compressor to the mounting bracket. Tighten the four mounting bolts to 24 N·m (210 in. lbs.).

(2) Remove the tape or plugs from all of the opened refrigerant line fittings. Install the suction and discharge line manifold to the compressor. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C SUCTION AND DISCHARGE LINE - INSTALLATION)

(3) Install the serpentine drive belt(Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(4) Plug in the compressor clutch coil wire harness connector.

(5) Connect the battery negative cable.

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

A/C CONDENSER

DESCRIPTION

The condenser is located in the air flow next to the engine cooling radiator. The condenser is a heat exchanger that allows the high-pressure refrigerant gas being discharged by the compressor to give up its heat to the air passing over the condenser fins.

OPERATION

When the refrigerant gas gives up its heat, it condenses. When the refrigerant leaves the condenser, it has become a high-pressure liquid refrigerant. The volume of air flowing over the condenser fins is critical to the proper cooling performance of the air conditioning system. Therefore, it is important that there are no objects placed in front of the radiator grille openings in the front of the vehicle or foreign material on the condenser fins that might obstruct proper air flow. Also, any factory-installed air seals or shrouds must be properly reinstalled following radiator or condenser service.

The condenser cannot be repaired and, if faulty or damaged, it must be replaced.

REMOVAL

REMOVAL - 3.7, 4.7 and 5.7L ENGINES

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

(1) Disconnect and isolate the battery negative cable.

(2) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(3) Disconnect the discharge line refrigerant line fitting at the condenser inlet. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS) Install plugs in, or tape over all of the opened refrigerant line fittings.

(4) Disconnect the liquid line refrigerant line fitting at the condenser outlet. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS) Install plugs in, or tape over all of the opened refrigerant line fittings.

A/C CONDENSER (Continued)

(5) Disconnect the condenser cooling fan electric connector.

(6) Remove the two nuts that secure the condenser studs to the upper cross brace. (Fig. 5).

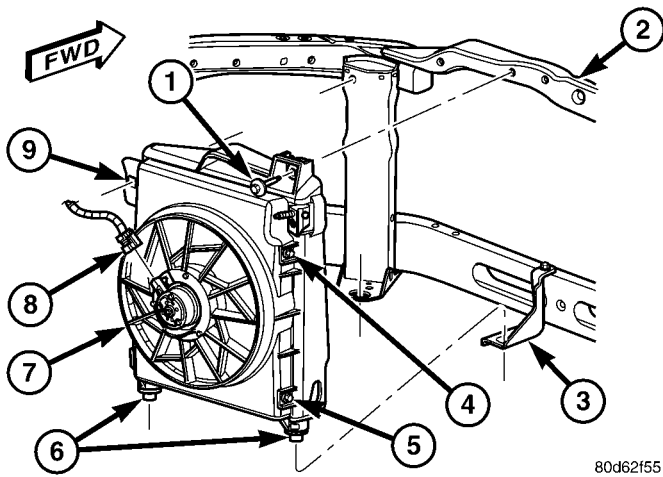


Fig. 5 Condenser Module

- 1 - Condenser Module Mounting Screw
- 2 - Front Cross Member
- 3 - Lower Module Mounting Flang
- 4 - Fan Assembly Mounting Screw
- 5 - Fan Assembly Mounting Screw
- 6 - Condensor Mounting Tabs
- 7 - Condensor Fan Assembly
- 8 - Fan Power Connector
- 9 - Condensor Module Mounting Screw

(7) Remove the condenser and fan assembly from the vehicle.

REMOVAL - 5.9L DIESEL ENGINE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

(1) Disconnect and isolate the battery negative cable.

(2) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(3) Remove the nut that secures the block fitting to the stud on the condenser inlet, and disconnect the discharge line from the condenser. Install plugs in, or tape over all of the opened refrigerant line fittings.

(4) Disconnect the refrigerant line fitting that secures the liquid line to the condenser outlet. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COU-

PLER) Install plugs in, or tape over all of the opened refrigerant line fittings.

(5) On diesel engine models:

(a) Remove the two screws that secure the brackets on the passenger side end of the condenser to the charge air cooler (Fig. 6).

(b) Remove the two nuts that secure the driver side end of the condenser to the studs on the charge air cooler.

(c) Remove the condenser from the vehicle.

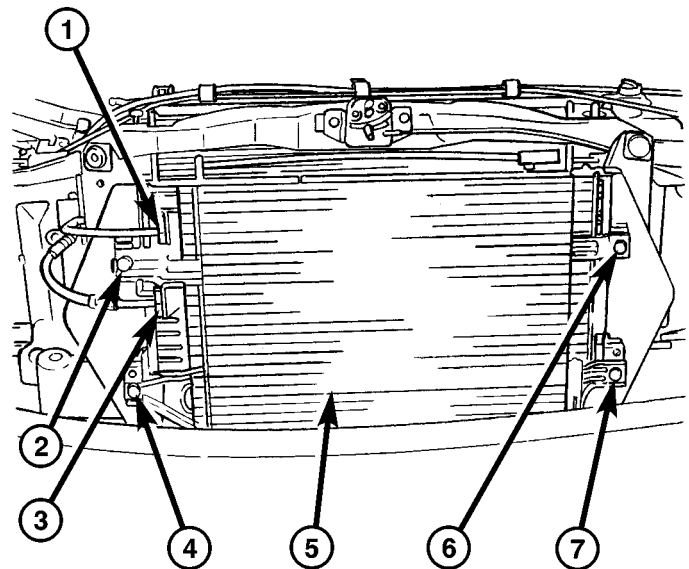


Fig. 6 CONDENSER - DIESEL ENGINE

- 1 - Discharge line to condenser
- 2 - Condensor mounting bolt
- 3 - Liquid Line
- 4 - Condenser mounting bolt
- 5 - A/C condenser
- 6 - Condenser mounting bolt
- 7 - Condenser mounting bolt

REMOVAL - 8.0L Engine

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) AND (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION).

(1) Remove battery negative cable.

(2) Recover refrigerant from a/c system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE).

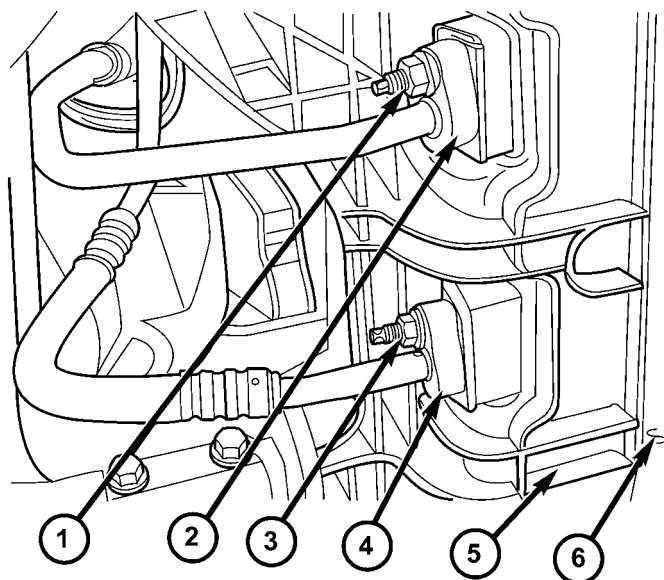
A/C CONDENSER (Continued)

NOTE: Removal of the front bumper on the V-10 is required, failure to do so could result in damage to the condenser assembly and the bumper.

(3) Remove the front bumper assembly from the vehicle (Refer to 13 - FRAME & BUMPERS/ BUMPERS/Front BUMPER - REMOVAL).

(4) Remove hood latch bolts and set hood latch assembly aside (Refer to 23 - BODY/HOOD/LATCH - REMOVAL).

(5) Remove a/c lines from condenser (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C DISCHARGE LINE - REMOVAL) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/ SUCTION LINE - REMOVAL). Install plugs or tape over all open connections (Fig. 7).



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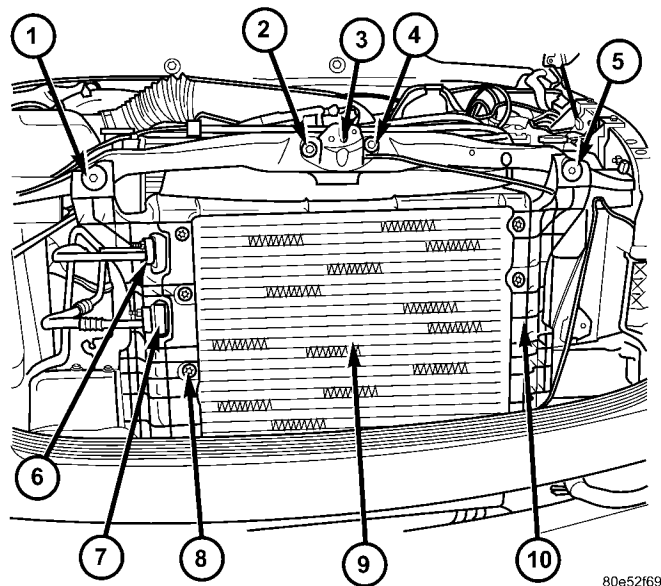
Fig. 7 CONDENSER LINES

- 1 - Discharge line to condenser
- 2 - Mounting nut
- 3 - Mounting nut
- 4 - Liquid line
- 5 - A/C condenser shroud
- 6 - A/C condenser

(6) Remove two bolts from top of condenser shroud assembly (Fig. 8).

(7) Lift condenser and shift assembly to passenger side of vehicle and remove from vehicle.

(8) With condenser and shroud on a clean flat work area remove condenser retainer screws and separate condenser from shroud.



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Fig. 8 A/C CONDENSER

- 1 - A/C shroud mounting bolt
- 2 - Hood latch bolt
- 3 - Hood latch assembly
- 4 - Hood latch bolt
- 5 - A/C shroud mounting bolt
- 6 - A/C discharge line
- 7 - A/C liquid line
- 8 - Condenser to shroud mounting bolts (5)
- 9 - A/C condenser
- 10 - Condenser to shroud mounting bolts (5)

INSTALLATION

INSTALLATION - 3.7, 4.7 and 5.7L ENGINES

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

(1) Install the condenser lower dowel pins to the bottom of the support rail.

(2) Position the condenser until both of the condenser studs are installed through the holes in the upper support rail. Tighten the mounting nuts to 5.3 N·m (47 in. lbs.).

(3) Remove the tape or plugs from the refrigerant line fittings on the condenser outlet and the liquid line. Install the liquid line or the liquid line jumper to the condenser outlet. (Refer to 24 - HEATING &

A/C CONDENSER (Continued)

AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(4) Remove the tape or plugs from the refrigerant line fittings on the condenser inlet and the discharge line. Connect the discharge line to the condenser inlet. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(5) Connect the battery negative cable.

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

NOTE: If the condenser is replaced, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system. Use only refrigerant oil of the type recommended for the compressor in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - DESCRIPTION)

INSTALLATION - 5.9L DIESEL ENGINE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

(1) On diesel engine models:

(a) Install the driver side condenser mounting brackets over the two studs on the charge air cooler.

(b) Install the two screws that secure the brackets on the passenger side end of the condenser to the charge air cooler. Tighten the mounting screws to 10.5 N·m (95 in. lbs.).

(c) Install the two nuts that secure the driver side end of the condenser to the studs on the charge air cooler. Tighten the mounting nuts to 10.5 N·m (95 in. lbs.).

(2) Remove the plugs or tape from the refrigerant line fittings on the liquid line and the condenser outlet. Connect the liquid line to the condenser outlet. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(3) Install a new gasket and the discharge line block fitting over the stud on the condenser inlet. Tighten the mounting nut to 20 N·m (180 in. lbs.).

(4) Check that all of the condenser and radiator air seals are in their proper locations.

(5) Connect the battery negative cable.

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

NOTE: If the condenser is replaced, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system. Use only refrigerant oil of the type recommended for the compressor in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - DESCRIPTION)

INSTALLATION - 8.0L Engine

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) AND (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION).

(1) If the condenser was removed from the shroud, install it and tighten the mounting screws.

(2) Install the condenser and shroud in the vehicle. Make sure the lower mounting flanges are positioned correctly before installing the two mounting screws to the radiator brace. Tighten the screws to spec.

(3) Remove and plugs or tape installed over the condenser connections and the a/c lines.

(4) Install the lines to the condenser (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C DISCHARGE LINE - INSTALLATION) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/SUCTION LINE - INSTALLATION).

(5) Install the hood latch assembly (Refer to 23 - BODY/HOOD/LATCH - INSTALLATION).

(6) Install the front bumper assembly (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT BUMPER - INSTALLATION).

(7) Evacuate the a/c system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE).

A/C CONDENSER (Continued)

NOTE: If the condenser is replaced, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system. Use only refrigerant oil of the type recommended for the compressor in the vehicle (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - DESCRIPTION).

(8) Charge the a/c system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE).

(9) Install the battery negative cable.

A/C CONDENSER FAN**REMOVAL - CONDENSER FAN (GAS ENGINE ONLY - 3.7, 4.7 & 5.7L)**

(1) Remove and isolate negative battery cable.

(2) Remove condenser assembly (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C CONDENSER - REMOVAL).

(3) Place condenser assembly on a flat work area and remove screws holding fan assembly to condenser.

(4) Separate fan assembly from condenser noting location of all seals for reinstallation.

INSTALLATION - CONDENSER FAN (GAS ENGINE ONLY - 3.7, 4.7 & 5.7L)

(1) Position fan assembly on to the condenser.

(2) Check all fan shroud seals and replace as required then install retainer screws to hold fan assembly to condenser.

(3) Install condenser and fan assembly to vehicle (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C CONDENSER - INSTALLATION).

(4) Install battery negative cable.

A/C DISCHARGE LINE**REMOVAL****REMOVAL**

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

(1) Disconnect and isolate the battery negative cable.

(2) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDIT-

TIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(3) Unplug the wire harness connector from the high pressure transducer.

(4) Disconnect the discharge line refrigerant line fitting from the condenser inlet tube (Fig. 9). (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS) Install plugs in, or tape over all of the opened refrigerant line fittings.

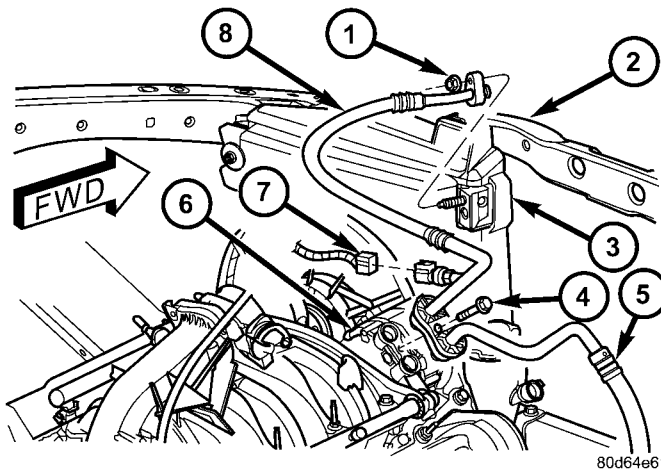


Fig. 9 A/C Discharge Line

- 1 - Discharge Line Retainer Nut
- 2 - Front Upper Cross Brace
- 3 - Condensor Module Port
- 4 - Suction and Discharge Line Retainer Screw
- 5 - Suction Line
- 6 - A/C Compressor
- 7 - High Pressure Transducer Connector
- 8 - Discharge Line

(5) Disconnect the connection that secures the suction line fitting to the accumulator outlet. Install plugs in, or tape over all of the opened refrigerant line fittings.

(6) Remove the screw that secures the suction and discharge line manifold to the compressor. Install plugs in, or tape over all of the opened refrigerant line fittings.

(7) Remove the suction and discharge line assembly from the vehicle.

REMOVAL - 5.9L DIESEL ENGINE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

(1) Disconnect and isolate the battery negative cable.

A/C DISCHARGE LINE (Continued)

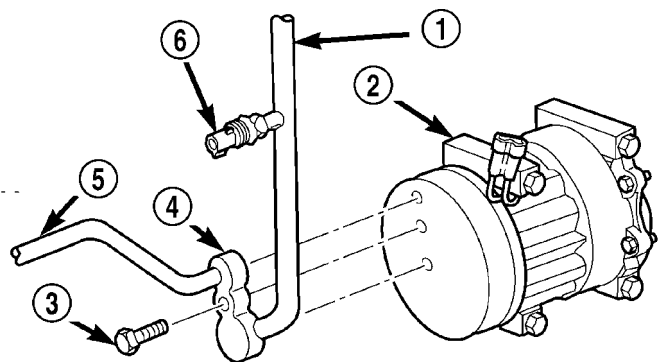
(2) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(3) Unplug the wire harness connector from the a/c high pressure switch.

(4) Disconnect the suction line refrigerant line coupler at the accumulator. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLER) Install plugs in, or tape over all of the opened refrigerant line fittings.

(5) Remove the nut that secures the block fitting to the stud on the condenser inlet and disconnect the discharge line from the condenser. Install plugs in, or tape over all of the opened refrigerant line fittings.

(6) Remove the bolt that secures the refrigerant line manifold to the compressor (Fig. 10). Install plugs in, or tape over all of the opened refrigerant line fittings.



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Fig. 10 SUCTION AND DISCHARGE LINE REMOVE/INSTALL - DIESEL ENGINE

- 1 - DISCHARGE LINE (TO CONDENSER)
- 2 - COMPRESSOR
- 3 - BOLT
- 4 - MANIFOLD
- 5 - SUCTION LINE (FROM ACCUMULATOR)
- 6 - A/C HIGH PRESSURE SWITCH

(7) Remove the suction and discharge line assembly from the vehicle.

INSTALLATION

INSTALLATION

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING -

CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

(1) Remove the tape or plugs from the suction and discharge line manifold and the compressor. Install the suction and discharge line manifold to the compressor. Tighten the fastener to 28 N·m (250 in. lbs.).

(2) Remove the tape or plugs from the suction line and the accumulator outlet fittings. Install the suction line to the accumulator outlet and install fastener.

(3) Remove the tape or plugs from the refrigerant line fittings on the discharge line and the condenser inlet tube. Connect the discharge line refrigerant line coupler to the condenser inlet tube. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(4) Plug in the wire harness connector to the high pressure transducer switch.

(5) Connect the battery negative cable.

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

INSTALLATION - 5.9L DIESEL ENGINE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

(1) Remove the tape or plugs from all of the refrigerant line fittings. Connect the suction line refrigerant line coupler to the accumulator. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(2) Install a new gasket and the discharge line block fitting over the stud on the condenser inlet. Tighten the mounting nut to 20 N·m (180 in. lbs.).

(3) Install the refrigerant line manifold to the compressor. Tighten the mounting bolt to 22 N·m (200 in. lbs.).

(4) Plug in the wire harness connector to the a/c high pressure switch.

(5) Connect the battery negative cable.

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING -

A/C DISCHARGE LINE (Continued)

STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

LIQUID LINE

REMOVAL

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

(1) Disconnect and isolate the battery negative cable.

NOTE: Removal of the second battery and battery tray is required on the diesel equipped vehicles.

(2) Remove rightside battery(Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - REMOVAL).

(3) Remove rightside battery tray(Refer to 8 - ELECTRICAL/BATTERY SYSTEM/TRAY - REMOVAL).

(4) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(5) Disconnect the liquid line refrigerant line couplers at the condenser outlet the mid point connection and the evaporator inlet. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS) Install plugs in, or tape over all of the opened refrigerant line fittings.

(6) Disengage any clips that secure the liquid line to the inner fender shield or cross brace. (Fig. 11).

(7) Remove the both sections of the liquid line from the vehicle.

INSTALLATION

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING -

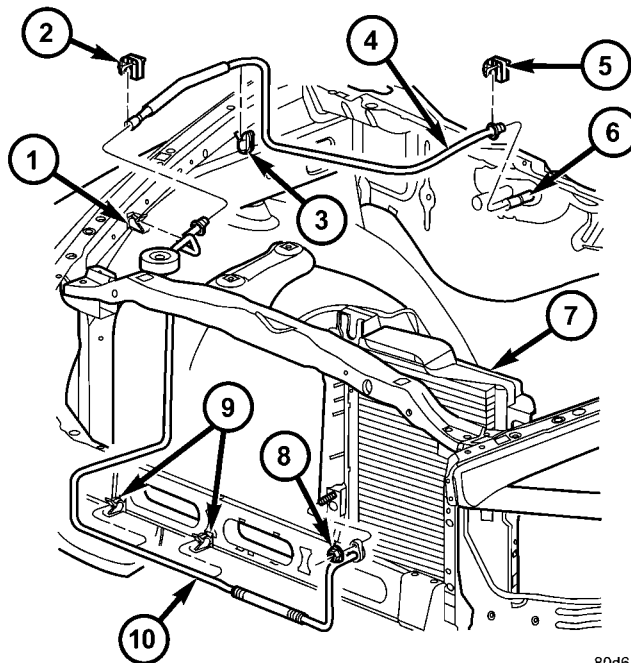


Fig. 11 A/C Liquid Line - Gas Engine shown

- 1 - A/C Line Retainer Clip
- 2 - A/C Line Retention Clip
- 3 - A/C Line Retainer Clip
- 4 - Liquid Line to Evaporator
- 5 - A/C Line Retention Clip
- 6 - Evaporator Ports
- 7 - A/C Condensor Modular
- 8 - A/C Jumper Line Retainer Nut
- 9 - A/C Line Retainer Clip
- 10 - A/C Liquid Jumper Line

CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

(1) Install both sections of the liquid line into any clips on the inner fender shield and the dash panel.

(2) Remove the tape or plugs from the refrigerant line fittings on the liquid line, the condenser outlet, and the evaporator inlet. Connect the liquid line pieces together and to the condenser and the evaporator. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

NOTE: Installation of the second battery and battery tray is required on the diesel equipped vehicles.

(3) Install the rightside battery tray(Refer to 8 - ELECTRICAL/BATTERY SYSTEM/TRAY - INSTALLATION).

(4) Install the rightside battery(Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - INSTALLATION).

(5) Connect the battery positive cables.

(6) Connect the battery negative cables.

(7) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING -

LIQUID LINE (Continued)

STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(8) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

SUCTION LINE

REMOVAL

REMOVAL

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

(1) Disconnect and isolate the battery negative cable.

(2) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(3) Unplug the wire harness connector from the a/c high pressure transducer.

(4) Disconnect the suction line refrigerant line coupler at the accumulator. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLER) Install plugs in, or tape over all of the opened refrigerant line fittings.

(5) Remove the nut that secures the condenser inlet and disconnect the discharge line from the condenser. Install plugs in, or tape over all of the opened refrigerant line fittings.

(6) Remove the suction and discharge line assembly from the vehicle.

REMOVAL - 5.9L DIESEL ENGINE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

(1) Disconnect and isolate the battery negative cable.

(2) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDIT-

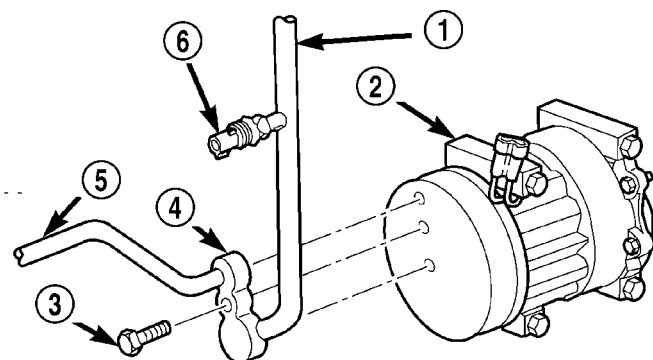
TIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(3) Unplug the wire harness connector from the a/c high pressure switch.

(4) Disconnect the suction line refrigerant line coupler at the accumulator. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLER) Install plugs in, or tape over all of the opened refrigerant line fittings.

(5) Remove the nut that secures the block fitting to the stud on the condenser inlet and disconnect the discharge line from the condenser. Install plugs in, or tape over all of the opened refrigerant line fittings.

(6) Remove the bolt that secures the refrigerant line manifold to the compressor (Fig. 12). Install plugs in, or tape over all of the opened refrigerant line fittings.



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Fig. 12 SUCTION AND DISCHARGE LINE REMOVE/INSTALL - DIESEL ENGINE

- 1 - DISCHARGE LINE (TO CONDENSER)
- 2 - COMPRESSOR
- 3 - BOLT
- 4 - MANIFOLD
- 5 - SUCTION LINE (FROM ACCUMULATOR)
- 6 - A/C HIGH PRESSURE SWITCH

(7) Remove the suction and discharge line assembly from the vehicle.

INSTALLATION

INSTALLATION

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

SUCTION LINE (Continued)

(1) Remove the tape or plugs from all of the refrigerant line fittings. Connect the suction refrigerant line coupler to the accumulator. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(2) Install a new gasket and the discharge line block fitting over the stud on the condenser inlet. Tighten the mounting nut to 20 N·m (180 in. lbs.).

(3) Install the refrigerant line manifold to the compressor. Tighten the mounting bolt to 22 N·m (200 in. lbs.).

(4) Plug in the wire harness connector to the A/C high pressure transducer.

(5) Connect the battery negative cable.

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

INSTALLATION

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

(1) Remove the tape or plugs from all of the refrigerant line fittings. Connect the suction line refrigerant line coupler to the accumulator. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(2) Install a new gasket and the discharge line block fitting over the stud on the condenser inlet. Tighten the mounting nut to 20 N·m (180 in. lbs.).

(3) Install the refrigerant line manifold to the compressor. Tighten the mounting bolt to 22 N·m (200 in. lbs.).

(4) Plug in the wire harness connector to the a/c high pressure switch.

(5) Connect the battery negative cable.

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

A/C EVAPORATOR

DESCRIPTION

The A/C evaporator is located in the HVAC housing, under the instrument panel. The evaporator coil is positioned in the HVAC housing so that all air that enters the housing must pass over the fins of the evaporator before it is distributed through the system ducts and outlets. However, air passing over the evaporator coil fins will only be conditioned when the compressor is engaged and circulating refrigerant through the evaporator coil tubes.

OPERATION

Refrigerant enters the evaporator from the fixed orifice tube as a low-temperature, low-pressure liquid. As air flows over the fins of the evaporator, the humidity in the air condenses on the fins, and the heat from the air is absorbed by the refrigerant. Heat absorption causes the refrigerant to boil and vaporize. The refrigerant becomes a low-pressure gas when it leaves the evaporator.

The evaporator coil cannot be repaired and, if faulty or damaged, it must be replaced.

REMOVAL

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

(1) Remove the HVAC housing from the vehicle, and disassemble the housing halves. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - DISASSEMBLY)

(2) Lift the A/C evaporator out of the HVAC housing (Fig. 13).

INSTALLATION

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

A/C EVAPORATOR (Continued)

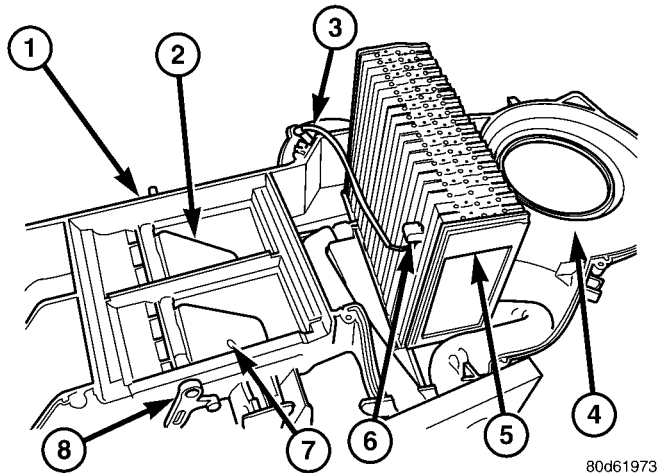


Fig. 13 Dual Zone HVAC Housing- (typical single zone)

- 1 - Passenger Side Blend Door Lever (if equipped)
- 2 - Passenger Side Blend Door (if equipped)
- 3 - Fin Sensor Wire
- 4 - Lower Blower Motor Mounting Housing
- 5 - HVAC Evaporator
- 6 - Fin Sensor
- 7 - Driver Side Blend Door
- 8 - Driver Side Blend Door Lever

(1) Insert the evaporator coil into the bottom of the HVAC housing. Make sure that the evaporator drain is clean and unrestricted and evaporator deflector shield is also installed.

(2) Reassemble and reinstall the HVAC housing in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - ASSEMBLY) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION)

NOTE: If the evaporator is replaced, add 60 milliliters (2 fluid ounces) of refrigerant oil to the refrigerant system.

A/C ORIFICE TUBE

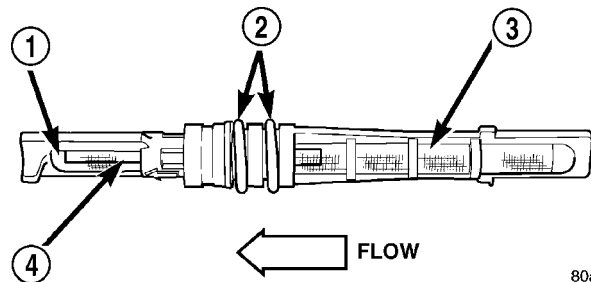
DESCRIPTION

The fixed orifice tube is installed in the liquid line between the outlet of the condenser and the inlet of the evaporator. The fixed orifice tube is only serviced as an integral part of the liquid line.

OPERATION

The inlet end of the fixed orifice tube has a nylon mesh filter screen, which filters the refrigerant and helps to reduce the potential for blockage of the metering orifice by refrigerant system contaminants (Fig. 14). The outlet end of the tube has a nylon

mesh diffuser screen. The O-rings on the plastic body of the fixed orifice tube seal the tube to the inside of the liquid line and prevents the refrigerant from bypassing the fixed metering orifice.



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Fig. 14 FIXED ORIFICE TUBE - TYPICAL

- 1 - DIFFUSER SCREEN
- 2 - "O" RINGS
- 3 - INLET FILTER SCREEN
- 4 - ORIFICE

The fixed orifice tube is used to meter the flow of liquid refrigerant into the evaporator coil. The high-pressure liquid refrigerant from the condenser expands into a low-pressure liquid as it passes through the metering orifice and diffuser screen of the fixed orifice tube.

The fixed orifice tube cannot be repaired and, if faulty or plugged, the liquid line assembly must be replaced.

DIAGNOSIS AND TESTING - FIXED ORIFICE TUBE

The fixed orifice tube can be checked for proper operation using the following procedure. However, the fixed orifice tube is only serviced as a part of the liquid line unit. If the results of this test indicate that the fixed orifice tube is obstructed or missing, the entire liquid line unit must be replaced.

WARNING: THE LIQUID LINE BETWEEN THE CONDENSER OUTLET AND THE FIXED ORIFICE TUBE CAN BECOME HOT ENOUGH TO BURN THE SKIN. USE EXTREME CAUTION WHEN PERFORMING THE FOLLOWING TEST.

(1) Confirm that the refrigerant system is properly charged. (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - A/C PERFORMANCE)

(2) Start the engine. Turn on the air conditioning system and confirm that the compressor clutch is engaged.

(3) Allow the air conditioning system to operate for five minutes.

(4) Lightly and cautiously touch the liquid line near the condenser outlet at the front of the engine

A/C ORIFICE TUBE (Continued)

compartment. The liquid line should be hot to the touch.

(5) Touch the liquid line near the evaporator inlet at the rear of the engine compartment. The liquid line should be cold to the touch.

(6) If there is a distinct temperature differential between the two ends of the liquid line, the orifice tube is in good condition. If there is little or no detectable temperature differential between the two ends of the liquid line, the orifice tube is obstructed or missing and the liquid line must be replaced.

REMOVAL

The fixed orifice tube is located in the liquid line, between the condenser and the evaporator coil. The orifice has filter screens on the inlet and outlet ends of the tube body. If the fixed orifice tube is faulty or plugged, the liquid line assembly must be replaced (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/LIQUID LINE - REMOVAL).

INSTALLATION

The fixed orifice tube is located in the liquid line, between the condenser and the evaporator coil. The orifice has filter screens on the inlet and outlet ends of the tube body. If the fixed orifice tube is faulty or plugged, the liquid line assembly must be replaced (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/LIQUID LINE - INSTALLATION).

ACCUMULATOR

DESCRIPTION

The accumulator is mounted in the engine compartment between the A/C evaporator outlet tube and the compressor inlet.

OPERATION

Refrigerant enters the accumulator canister as a low pressure vapor through the inlet tube. Any liquid, oil-laden refrigerant falls to the bottom of the canister, which acts as a separator. A desiccant bag is mounted inside the accumulator canister to absorb any moisture which may have entered and become trapped within the refrigerant system.

REMOVAL

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)

(1) Disconnect and isolate the battery negative cable.

(2) Recover the refrigerant from the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

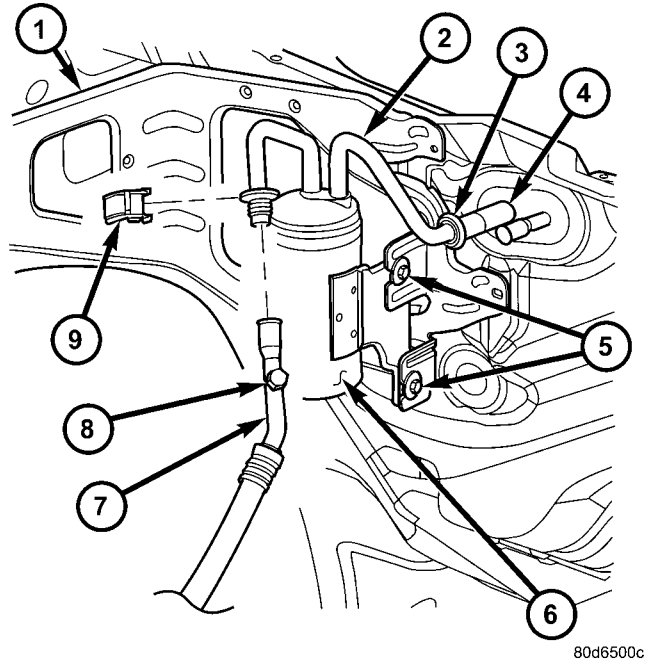


Fig. 15 A/C Accumulator

- 1 - Inner Fender
- 2 - Line from Accumulator to Evaporator
- 3 - A/C Line Retention Clip
- 4 - Evaporator Ports
- 5 - Accumulator Mounting Screws
- 6 - Accumulator
- 7 - Suction Line
- 8 - A/C Charging Port
- 9 - A/C Line Retention Clip

(3) Loosen the fasteners that secure the accumulator and support bracket to the dash panel (Fig. 15).

(4) Disconnect the suction line refrigerant line fitting from the accumulator outlet. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS) Install plugs in, or tape over all of the opened refrigerant line fittings.

(5) Disconnect the accumulator inlet refrigerant line fitting from the evaporator outlet. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE) Install plugs in, or tape over all of the opened refrigerant line fittings.

(6) Remove the accumulator assembly from the engine compartment.

ACCUMULATOR (Continued)

INSTALLATION

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION)(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

(1) Install the accumulator to the bulkhead but do not tighten yet.

(2) Remove the tape or plugs from the refrigerant line fittings on the accumulator inlet and the evaporator outlet. Connect the accumulator inlet refrigerant line coupler to the evaporator outlet. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(3) Remove the tape or plugs from the refrigerant line fittings on the suction line and the accumulator outlet. Connect the suction line refrigerant line coupler to the accumulator outlet. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(4) Tighten the accumulator fasteners to 4.5 N·m (40 in. lbs.).

(5) Connect the battery negative cable.

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

NOTE: If the accumulator is replaced, add 60 milliliters (2 fluid ounces) of refrigerant oil to the refrigerant system. Use only refrigerant oil of the type recommended for the compressor in the vehicle.

HEATER CORE

DESCRIPTION

The heater core is located in the HVAC housing, under the instrument panel. It is a heat exchanger made of rows of tubes and fins.

The heater core is not repairable and if damaged it must be replaced.

OPERATION

Engine coolant is circulated through heater hoses to the heater core at all times. As the coolant flows

through the heater core, heat removed from the engine is transferred to the heater core fins and tubes. Air directed through the heater core picks up the heat from the heater core fins. The blend door allows control of the heater output air temperature by controlling how much of the air flowing through the HVAC housing is directed through the heater core. The blower motor speed controls the volume of air flowing through the HVAC housing.

The heater core cannot be repaired and, if faulty or damaged, it must be replaced.

REMOVAL

NOTE: Disassembly of the HVAC housing is not required to remove heater core.

(1) Remove the HVAC housing from the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL)

(2) Remove the screws and retainers that secure the heater core to the HVAC housing.

(3) Lift the heater core out of the heater-A/C housing.

(4) Inspect all seals and repair or replace as required.

INSTALLATION

(1) Place the heater core into the HVAC housing.

(2) Snap the retainers for the heater core to the housing. Install and tighten the screws that secure the heater core to the HVAC housing (if equipped). Tighten the screws to 2.2 N·m (20 in. lbs.).

(3) Reinstall the HVAC housing in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION)

REFRIGERANT

DESCRIPTION

The refrigerant used in this air conditioning system is a HydroFluoroCarbon (HFC), type R-134a. Unlike R-12, which is a ChloroFluoroCarbon (CFC), R-134a refrigerant does not contain ozone-depleting chlorine. R-134a refrigerant is a non-toxic, non-flammable, clear, and colorless liquefied gas.

Even though R-134a does not contain chlorine, it must be reclaimed and recycled just like CFC-type refrigerants. This is because R-134a is a greenhouse gas and can contribute to global warming.

OPERATION

R-134a refrigerant is not compatible with R-12 refrigerant in an air conditioning system. Even a

REFRIGERANT (Continued)

small amount of R-12 added to an R-134a refrigerant system will cause compressor failure, refrigerant oil sludge or poor air conditioning system performance. In addition, the PolyAlkylene Glycol (PAG) synthetic refrigerant oils used in an R-134a refrigerant system are not compatible with the mineral-based refrigerant oils used in an R-12 refrigerant system.

R-134a refrigerant system service ports, service tool couplers and refrigerant dispensing bottles have all been designed with unique fittings to ensure that an R-134a system is not accidentally contaminated with the wrong refrigerant (R-12). There are also labels posted in the engine compartment of the vehicle and on the compressor identifying to service technicians that the air conditioning system is equipped with R-134a.

DIAGNOSIS AND TESTING- REFRIGERANT SYSTEM LEAKS

WARNING: (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION).

If the air conditioning system does not cool properly, the A/C system performance should be tested. See A/C Performance in the Diagnosis and Testing section of this group for the procedures. If the A/C system refrigerant fill is found to be low or if the system is empty; a leak at a refrigerant line, connector fitting, component, or component seal is likely.

An electronic leak detector designed for R-134a refrigerant, or a fluorescent R-134a leak detection dye and a black light are recommended for locating and confirming refrigerant system leaks. Refer to the operating instructions supplied by the equipment manufacturer for the proper care and use of this equipment.

An oily residue on or near refrigerant system lines, connector fittings, components, or component seals can indicate the general location of a possible refrigerant leak. However, the exact leak location should be confirmed with an electronic leak detector prior to component repair or replacement.

To detect a leak in the refrigerant system with an electronic leak detector, perform one of the following procedures:

SYSTEM EMPTY

(1) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE).

(2) Connect and dispense 0.283 kilograms (0.625 pounds or 10 ounces) of R-134a refrigerant into the evacuated refrigerant system (Refer to 24 - HEAT-

ING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE).

(3) Position the vehicle in a wind-free work area. This will aid in detecting small leaks.

(4) With the engine not running, use a electronic R-134a leak detector and search for leaks. Because R-134a refrigerant is heavier than air, the leak detector probe should be moved slowly along the bottom side of all refrigerant lines, connector fittings and components.

(5) To inspect the evaporator coil for leaks, insert the electronic leak detector probe into the center instrument panel outlet and the floor duct outlet. Set the blower motor switch to the lowest speed position, and the mode control switch in the recirculation mode (Max-A/C).

SYSTEM LOW

(1) Position the vehicle in a wind-free work area. This will aid in detecting small leaks.

(2) Bring the refrigerant system up to operating temperature and pressure. This is done by allowing the engine to run with the air conditioning system turned on for five minutes.

(3) With the engine not running, use a electronic R-134a leak detector and search for leaks. Because R-134a refrigerant is heavier than air, the leak detector probe should be moved slowly along the bottom side of all refrigerant lines, connector fittings and components.

(4) To inspect the evaporator coil for leaks, insert the electronic leak detector probe into the center instrument panel outlet and the floor duct outlet. Set the blower motor switch to the lowest speed position, and the mode control switch in the recirculation mode (Max-A/C).

STANDARD PROCEDURE

STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE

WARNING: (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) AND (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) BEFORE PERFORMING THE FOLLOWING OPERATION.

If the refrigerant system has been open to the atmosphere, it must be evacuated before the system can be charged. If moisture and air enters the system and becomes mixed with the refrigerant, the compressor head pressure will rise above acceptable operating levels. This will reduce the performance of the air conditioner and could damage the compressor. Evacuating the refrigerant system will remove the

REFRIGERANT (Continued)

air and boil the moisture out of the system at near room temperature. To evacuate the refrigerant system, use the following procedure:

(1) Connect a R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 and a manifold gauge set (if required) to the refrigerant system of the vehicle and recover refrigerant.

(2) Open the low and high side valves and start the charging station vacuum pump. When the suction gauge reads 88 kPa (26 in. Hg.) vacuum or greater, close all of the valves and turn off the vacuum pump.

(a) If the refrigerant system fails to reach the specified vacuum, the system has a leak that must be corrected. See Refrigerant System Leaks in the Diagnosis and Testing section of this group for the procedures.

(b) If the refrigerant system maintains the specified vacuum for five minutes, restart the vacuum pump, open the suction and discharge valves and evacuate the system for an additional ten minutes.

(3) Close all of the valves, and turn off the charging station vacuum pump.

(4) The refrigerant system is now ready to be charged with R-134a refrigerant (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE).

STANDARD PROCEDURE- REFRIGERANT RECOVERY

WARNING: (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) AND (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) BEFORE PERFORMING THE FOLLOWING OPERATION.

A R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to recover the refrigerant from an R-134a refrigerant system. Refer to the operating instructions supplied by the equipment manufacturer for the proper care and use of this equipment.

STANDARD PROCEDURE- REFRIGERANT SYSTEM CHARGE

WARNING: (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) AND (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) BEFORE PERFORMING THE FOLLOWING OPERATION.

After the refrigerant system has been tested for leaks and evacuated, a refrigerant charge can be

injected into the system. See Refrigerant Charge Capacity in the Service Procedures section of this group for the proper amount of the refrigerant charge, this fill level can also be found on a label attached under the hood of the vehicle..

A R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to charge the refrigerant system with R-134a refrigerant. Refer to the operating instructions supplied by the equipment manufacturer for the proper care and use of this equipment.

The R-134a refrigerant system charge capacity for this vehicle is:

- If equipped with a 3.7L or a 4.7L engine charge to 0.6804 Kg. (24 oz.).
- If equipped with a 5.9L engine charge to 0.7371 Kg. (26 oz.).

REFRIGERANT LINE COUPLER

DESCRIPTION

Spring-lock type refrigerant line couplers are used to connect many of the refrigerant lines and other components to the refrigerant system. These couplers require a special tool for disengaging the two coupler halves.

OPERATION

The spring-lock coupler is held together by a garter spring inside a circular cage on the male half of the fitting (Fig. 16). When the two coupler halves are connected, the flared end of the female fitting slips behind the garter spring inside the cage on the male fitting. The garter spring and cage prevent the flared end of the female fitting from pulling out of the cage.

Three O-rings on the male half of the fitting are used to seal the connection. These O-rings are compatible with R-134a refrigerant and must be replaced with O-rings made of the same material.

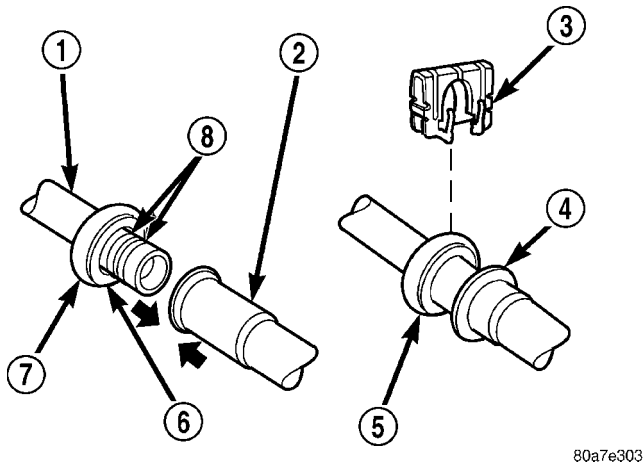
Secondary clips are installed over the two connected coupler halves at the factory for added blowoff protection.

REMOVAL

WARNING: (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) BEFORE PERFORMING THE FOLLOWING OPERATION.

(1) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE).

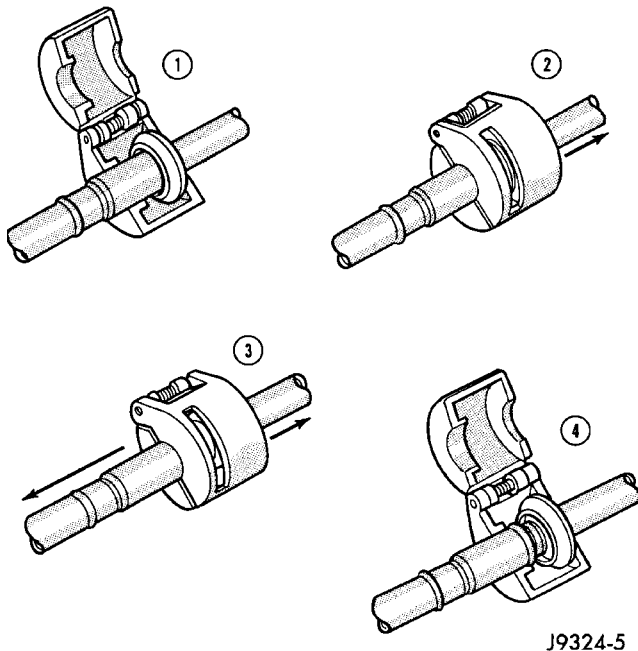
REFRIGERANT LINE COUPLER (Continued)

**Fig. 16 Spring-Lock Coupler - Typical**

- 1 - MALE HALF SPRING-LOCK COUPLER
- 2 - FEMALE HALF SPRING-LOCK COUPLER
- 3 - SECONDARY CLIP
- 4 - CONNECTION INDICATOR RING
- 5 - COUPLER CAGE
- 6 - GARTER SPRING
- 7 - COUPLER CAGE
- 8 - "O" RINGS

(2) Remove the secondary clip from the spring-lock coupler.

(3) Fit the proper size A/C line disconnect tool (Special Tool Kit 7193 or equivalent) over the spring-lock coupler cage (Fig. 17).

**Fig. 17 Refrigerant Line Spring-Lock Coupler Disconnect**

(4) Close the two halves of the A/C line disconnect tool around the spring-lock coupler.

(5) Push the A/C line disconnect tool into the open side of the coupler cage to expand the garter spring.

Once the garter spring is expanded and while still pushing the disconnect tool into the open side of the coupler cage, pull on the refrigerant line attached to the female half of the coupler fitting until the flange on the female fitting is separated from the garter spring and cage on the male fitting within the disconnect tool.

NOTE: The garter spring may not release if the A/C line disconnect tool is cocked while pushing it into the coupler cage opening.

(6) Open and remove the A/C line disconnect tool from the disconnected spring-lock coupler.

(7) Complete the separation of the two halves of the coupler fitting. Inspect the O-ring seals and mating areas for damage.

INSTALLATION

WARNING: (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) AND (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) BEFORE PERFORMING THE FOLLOWING OPERATION.

(1) Check to ensure that the garter spring is located within the cage of the male coupler fitting, and that the garter spring is not damaged.

(a) If the garter spring is missing, install a new spring by pushing it into the coupler cage opening.

(b) If the garter spring is damaged, remove it from the coupler cage with a small wire hook (DO NOT use a screwdriver) and install a new garter spring.

(2) Clean any dirt or foreign material from both halves of the coupler fitting.

(3) Install new O-rings on the male half of the coupler fitting.

CAUTION: Use only the specified O-rings as they are made of a special material for the R-134a system. The use of any other O-rings may allow the connection to leak intermittently during vehicle operation.

(4) Lubricate the male fitting and O-rings, and the inside of the female fitting with clean R-134a refrigerant oil. Use only refrigerant oil of the type recommended for the compressor in the vehicle.

(5) Fit the female half of the coupler fitting over the male half of the fitting.

(6) Push together firmly on the two halves of the coupler fitting until the garter spring in the cage on the male half of the fitting snaps over the flanged end on the female half of the fitting.

REFRIGERANT LINE COUPLER (Continued)

(7) Ensure that the spring-lock coupler is fully engaged by trying to separate the two coupler halves. This is done by pulling the refrigerant lines on either side of the coupler away from each other.

(8) Reinstall the secondary clip over the spring-lock coupler cage.

REFRIGERANT OIL

DESCRIPTION

The refrigerant oil used in R-134a refrigerant systems is a synthetic-based, PolyAlkylene Glycol (PAG), wax-free lubricant. Mineral-based R-12 refrigerant oils are not compatible with PAG oils, and should never be introduced to an R-134a refrigerant system.

There are different PAG oils available, and each contains a different additive package. The SD-7 compressor used in this vehicle is designed to use an SP-15 PAG refrigerant oil. Use only refrigerant oil of this same type to service the refrigerant system.

OPERATION

After performing any refrigerant recovery or recycling operation, always replenish the refrigerant system with the same amount of the recommended refrigerant oil as was removed. Too little refrigerant oil can cause compressor damage, and too much can reduce air conditioning system performance.

PAG refrigerant oil is much more hygroscopic than mineral oil, and will absorb any moisture it comes into contact with, even moisture in the air. The PAG oil container should always be kept tightly capped until it is ready to be used. After use, recap the oil container immediately to prevent moisture contamination.

STANDARD PROCEDURE - REFRIGERANT OIL LEVEL

When an air conditioning system is assembled at the factory, all components except the compressor are refrigerant oil free. After the refrigerant system has

been charged and operated, the refrigerant oil in the compressor is dispersed throughout the refrigerant system. The accumulator, evaporator, condenser, and compressor will each retain a significant amount of the needed refrigerant oil.

It is important to have the correct amount of oil in the refrigerant system. This ensures proper lubrication of the compressor. Too little oil will result in damage to the compressor. Too much oil will reduce the cooling capacity of the air conditioning system.

It will not be necessary to check the oil level in the compressor or to add oil, unless there has been an oil loss. An oil loss may occur due to a rupture or leak from a refrigerant line, a connector fitting, a component, or a component seal. If a leak occurs, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system after the repair has been made. Refrigerant oil loss will be evident at the leak point by the presence of a wet, shiny surface around the leak.

Refrigerant oil must be added when a accumulator, evaporator coil or condenser are replaced. See the Refrigerant Oil Capacities chart. When a compressor is replaced, the refrigerant oil must be drained from the old compressor and measured. Drain all of the refrigerant oil from the new compressor, then fill the new compressor with the same amount of refrigerant oil that was drained out of the old compressor.

Refrigerant Oil Capacities		
Component	ml	fl oz
Complete A/C System	180	6
Accumulator	60	2
Condenser	30	1
Evaporator	60	2
Compressor	drain and measure the oil from the old compressor - see text.	