

HEATING AND AIR CONDITIONING

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GENERAL INFORMATION

HEATER AND AIR CONDITIONER

A manual temperature control type heating-air conditioning system is standard factory-installed equipment on this model. An electronically controlled Automatic Temperature Control (ATC) type heating-air conditioning system is an available factory-installed option.

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

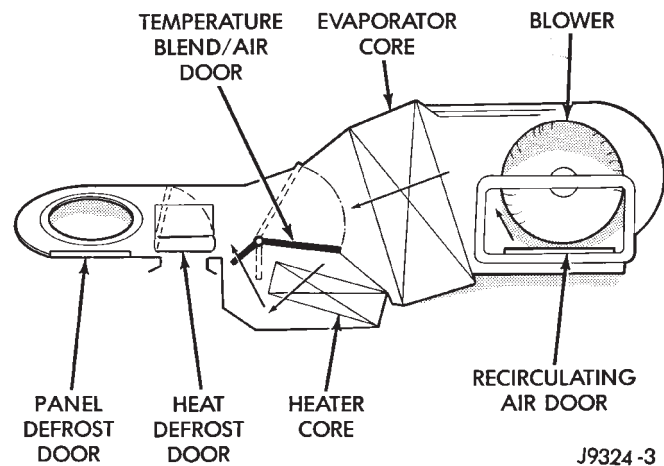


Fig. 1 Common Blend-Air Heater-Air Conditioner System

Outside fresh air enters the vehicle through the cowl top opening at the base of the windshield, and passes through a plenum chamber to the heater-A/C system blower housing. Air flow velocity can then be adjusted with the blower motor speed selector switch on the heater-A/C control panel. The air intake openings must be kept free of snow, ice, leaves, and other

obstructions for the heater-A/C system to receive a sufficient volume of outside air.

Both the manual and ATC heater and air conditioner are blend-air type systems. In a blend-air system, a blend-air door controls the amount of cooled or unconditioned air is allowed to flow through, or around, the heater core. A temperature control knob on the heater-A/C control panel determines the discharge air temperature by energizing the blend-air door motor, which operates the blend-air door. This allows an almost immediate control of the output air temperature of the system.

The mode control knob on the heater-A/C control panel is used to direct the conditioned air to the selected system outlets. On manual temperature control systems, the mode control knob switches engine vacuum to control the mode doors, which are operated by vacuum actuator motors. On ATC systems, the mode control knob switches electrical current to control the mode doors, which are operated by electronic actuator motors.

The outside air intake can be shut off by selecting the recirculation mode with the mode control knob. This will open the recirculating air door and recirculate 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 fresh or recirculated air prior to blending it with the heated air. This air conditioning system uses a fixed orifice tube in the condenser outlet line to meter refrigerant flow to the evaporator coil. To maintain minimum evaporator temperature and prevent evaporator freezing, a fixed pressure setting switch on the accumulator cycles the compressor clutch.

GENERAL INFORMATION (Continued)

NOTE: This group covers both Left-Hand Drive (LHD) and Right-Hand Drive (RHD) versions of this model. Whenever required and feasible, the RHD versions of affected vehicle components have been constructed as mirror-image of the LHD versions. While most of the illustrations used in this group represent only the LHD version, the diagnostic and service procedures outlined can generally be applied to either version. Exceptions to this rule have been clearly identified as LHD or RHD, if a special illustration or procedure is required.

HEATER AND AIR CONDITIONER CONTROLS

The manual temperature control heater-A/C system uses a combination of electrical, and vacuum controls. The ATC heater-A/C system uses only 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 for more information on the suggested operation and use of these controls.

Both heater-A/C control panels are located inboard of the instrument cluster on the instrument panel (Fig. 2). Both control panels have a temperature control knob, a mode control knob, a blower motor switch knob, and an air conditioning compressor pushbutton switch. The ATC control panel includes a Recirc pushbutton switch and a vacuum fluorescent display area.

wired sensor inputs and messages received on the CCD data bus network to control the many functions and features of the ATC system.

Both the manual heater-A/C control panel and the ATC control panel and controller units cannot be repaired. If faulty or damaged, the entire unit must be replaced.

SERVICE WARNINGS AND PRECAUTIONS

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.

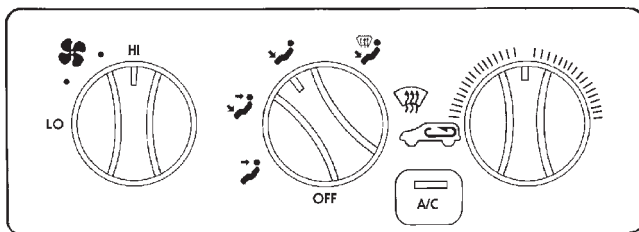
- DO NOT EXPOSE THE REFRIGERANT TO OPEN FLAME. POISONOUS GAS IS CREATED WHEN REFRIGERANT IS BURNED. AN ELECTRONIC LEAK DETECTOR IS RECOMMENDED.

- 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.

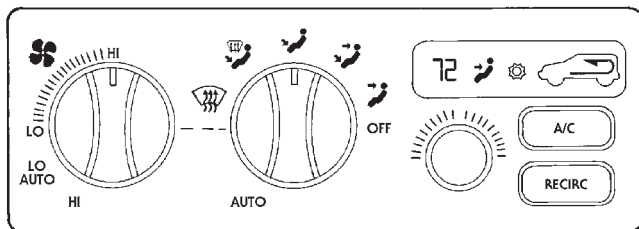
- THE EVAPORATION RATE OF R-134a REFRIGERANT AT AVERAGE TEMPERATURE AND ALTITUDE IS EXTREMELY HIGH. AS A RESULT, ANYTHING THAT COMES IN CONTACT WITH THE REFRIGERANT WILL FREEZE. ALWAYS PROTECT THE SKIN OR DELICATE OBJECTS FROM DIRECT CONTACT WITH THE REFRIGERANT.

- 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.

MANUAL AIR CONDITIONING SYSTEM



AUTOMATIC TEMPERATURE CONTROL SYSTEM



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Fig. 2 Heater-Air Conditioner Control Panels

The ATC control panel also includes the ATC controller. The ATC controller contains a microprocessor and uses internal programming along with hard-

GENERAL INFORMATION (Continued)

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 prevent 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.

COOLING SYSTEM REQUIREMENTS

To maintain the performance level of the heating-air conditioning 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 Group 7 - Cooling System for more information before the opening of, or attempting any service to the engine cooling system.

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

GENERAL INFORMATION (Continued)

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.

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.

DESCRIPTION AND OPERATION

COMPRESSOR

The air conditioning system uses a Nippon Denso 10PA17 ten cylinder, double-acting swash plate-type compressor on all models. This compressor has a fixed displacement of 170 cubic centimeters (10.374 cubic inches), 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.

The compressor is driven by the engine through an electric clutch, drive pulley 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.

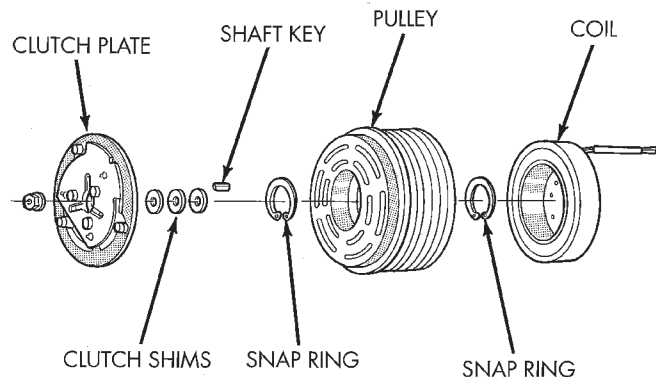
The compressor cannot be repaired. If faulty or damaged, the entire compressor assembly must be replaced. The compressor clutch, pulley and clutch coil are available for service.

COMPRESSOR CLUTCH

The compressor clutch is controlled by several components: the A/C compressor switch on the heater-A/C control panel, the ATC controller, the low pressure cycling clutch switch, the high pressure cut-off switch, the compressor clutch relay, and the Powertrain Control Module (PCM). The PCM may delay compressor clutch engagement for up to thirty seconds. Refer to Group 14 - Fuel System for more information on the PCM controls.

GASOLINE ENGINE

The compressor clutch assembly consists of a stationary electromagnetic coil, a hub bearing and pulley assembly, and a clutch plate (Fig. 3). The electromagnetic coil and pulley are retained on the compressor with snap rings. The clutch plate is mounted on the compressor shaft and secured with a bolt.



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Fig. 3 Compressor Clutch - Gasoline Engine

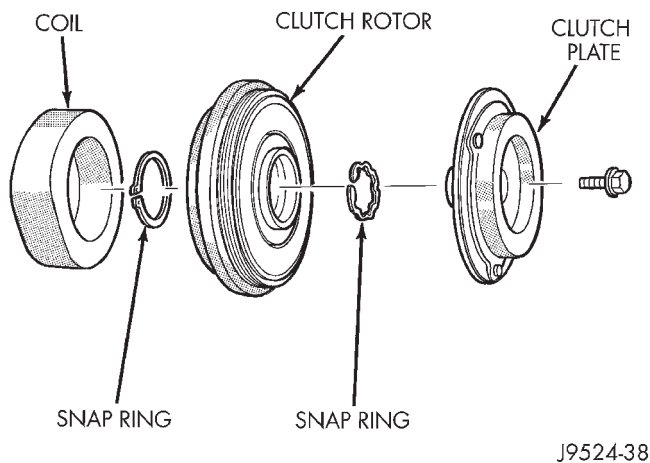
These components provide the means to engage and disengage the compressor from the engine serpentine accessory drive belt. When the clutch coil is energized, it magnetically draws the clutch into contact with the pulley and drives the compressor shaft. When the coil is not energized, the pulley freewheels on the clutch hub bearing, which is part of the pulley. The compressor clutch and coil are the only serviced parts on the compressor.

DIESEL ENGINE

The compressor clutch assembly consists of a stationary electromagnetic coil, a hub bearing and rotor assembly, and a clutch plate (Fig. 4). The electromagnetic coil and rotor are retained on the compressor with snap rings. The clutch plate is mounted on the compressor shaft and secured with a bolt.

The compressor is mounted on the left side of the engine block behind the power steering pump. The compressor is driven by a splined shaft off the rear of the power steering pump. The splined shaft has a

DESCRIPTION AND OPERATION (Continued)



J9524-38

Fig. 4 Compressor Clutch - Diesel Engine

drive flange mounted to it which attaches to a drive spool. The spool links the compressor clutch plate to the steering pump drive flange. When the clutch coil is energized, it magnetically draws the clutch plate into contact with the rotor and drives the compressor shaft. When the coil is not energized, the rotor free-wheels on the clutch hub bearing, which is part of the rotor. The compressor clutch and coil are the only serviced parts on the compressor.

DIAGNOSIS AND TESTING**COMPRESSOR**

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 Group 7 - Cooling System 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 pulley are properly aligned and have the correct air gap. See Compressor and Compressor Clutch in the Removal and Installation section of this group for the procedures.

(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. See Suction and Discharge Line in the Removal and Installation section of this group for more information.

(5) If the noise is from opening and closing of the high pressure relief valve, evacuate and recharge the refrigerant system. See Refrigerant System Evacuate and Refrigerant System Charge in the Service Procedures section of this group. 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, replace the accumulator. See Accumulator in the Removal and Installation section of this group for the procedures. Check the refrigerant oil level and the refrigerant system charge. See Refrigerant Oil Level and Refrigerant System Charge in the Service Procedures section of this group. If the liquid slugging condition continues following accumulator replacement, replace the compressor.

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

COMPRESSOR CLUTCH COIL

For circuit descriptions and diagrams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams. The battery must be fully-charged before performing the following tests. Refer to Group 8A - 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 heater-A/C mode control switch in any A/C mode, the heater-A/C control A/C switch in the On position, and the blower motor switch in the low-

DIAGNOSIS AND TESTING (Continued)

est speed position, start the engine and run it at normal idle.

(3) The compressor clutch coil voltage should read within two volts of the battery voltage. If there is voltage at the clutch coil, but the reading is not within two 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 scan tool and the proper Diagnostic Procedures manual for testing of the compressor clutch circuit. 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)
- Heater-A/C mode control switch
- Compressor clutch relay
- High pressure cut-off switch
- Low pressure cycling clutch switch
- Powertrain Control Module (PCM).

(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.

REMOVAL AND INSTALLATION

REFRIGERANT LINE COUPLER

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE GENERAL INFORMATION SECTION NEAR THE FRONT OF THIS GROUP BEFORE PERFORMING THE FOLLOWING OPERATION.

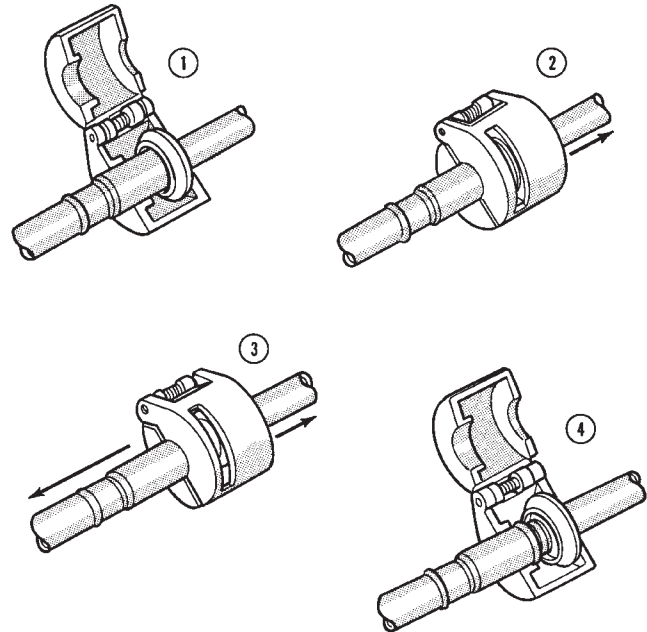
REMOVAL

(1) Recover the refrigerant from the refrigerant system. See Refrigerant Recovery in the Service Procedures section of this group.

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

(3) Fit the proper size A/C line disconnect tool (Special Tool Kit 7193) over the spring-lock coupler cage (Fig. 5).

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



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Fig. 5 Refrigerant Line Spring-Lock Coupler Disconnect

(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.

INSTALLATION

(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.

REMOVAL AND INSTALLATION (Continued)

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.

(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.

COMPRESSOR*GASOLINE ENGINE*

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

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE PERFORMING THE FOLLOWING OPERATION.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Loosen and remove the serpentine drive belt. Refer to Group 7 - Cooling System for the procedures.

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

(4) Recover the refrigerant from the refrigerant system as described in this group.

(5) Remove the refrigerant lines from the compressor. Install plugs in, or tape over all of the open refrigerant fittings.

(6) Remove the bolts that secure the compressor to the mounting bracket, and lift the compressor from the mounting bracket.

INSTALLATION

NOTE: If a replacement compressor is being installed, be certain to check the oil level. See Refrigerant Oil Level in this group.

(1) If the compressor mounting bracket was removed, install the bracket to the engine. Tighten the mounting bolts to 27 N·m (20 ft. lbs.).

(2) Install the compressor on the mounting bracket. Tighten the bolts to 27 N·m (20 ft. lbs.).

(3) Remove the tape or plugs from all of the refrigerant fittings, and install the refrigerant lines on the compressor.

(4) Install the serpentine drive belt. Refer to Group 7 - Cooling System for the procedures.

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

(6) Connect the battery negative cable.

(7) Evacuate and charge the refrigerant system as described in this group.

DIESEL ENGINE

The compressor and clutch may only be removed as a unit on models equipped with a diesel engine.

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE PERFORMING THE FOLLOWING OPERATION.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Recover the refrigerant from the refrigerant system as described in this group.

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

(4) Remove the refrigerant line bracket from the engine valve cover.

(5) Remove the refrigerant lines from the compressor. Install plugs in, or tape over all of the open refrigerant fittings.

(6) Raise and support the vehicle.

(7) Remove the bolts that secure the compressor clutch drive spool to the power steering pump drive flange.

(8) Remove the four compressor mounting bolts and spacers, and remove the compressor and clutch unit from the engine block.

(9) Remove the compressor clutch and drive spool from the compressor as described in this group.

REMOVAL AND INSTALLATION (Continued)

INSTALLATION

NOTE: If a replacement compressor is being installed, be certain to check the oil level. See Refrigerant Oil Level in this group.

- (1) Install the compressor clutch and drive spool on the compressor as described in this group.
- (2) Install the compressor on the engine block using the four mounting bolts and spacers. Tighten the bolts to 24 N·m (18 ft. lbs.).
- (3) Install the bolts that secure the compressor clutch drive spool to the power steering pump drive flange. Tighten the bolts to 16 N·m (12 ft. lbs.).
- (4) Lower the vehicle.
- (5) Remove the tape or plugs from all of the refrigerant fittings, and install the refrigerant lines on the compressor.
- (6) Install the refrigerant line bracket on the engine valve cover. Tighten the bolt to 5.6 N·m (50 in. lbs.).
- (7) Plug in the compressor clutch coil wire harness connector.
- (8) Connect the battery negative cable.
- (9) Evacuate and charge the refrigerant system as described in this group.

COMPRESSOR CLUTCH

GASOLINE ENGINE

The refrigerant system can remain fully-charged during compressor clutch, pulley, or coil replacement on gasoline engine models. The compressor clutch can be serviced in the vehicle.

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the compressor shaft bolt (Fig. 6). A band-type oil filter wrench may be used to aid in securing the clutch during bolt removal.
- (3) Tap the clutch plate with a plastic mallet to release it from the splines on the compressor shaft. Remove clutch plate and shim(s) from the compressor shaft (Fig. 7).

CAUTION: Do not pry between the clutch plate assembly and the pulley to remove the front plate. This may damage the front plate assembly.

- (4) Remove the pulley retaining snap ring with snap ring pliers (Special Tool C-4574) and slide the pulley assembly off of the compressor (Fig. 8).
- (5) Unplug the clutch coil wire harness connector. Remove the screw and retainer from the clutch coil wire harness on the compressor front housing.

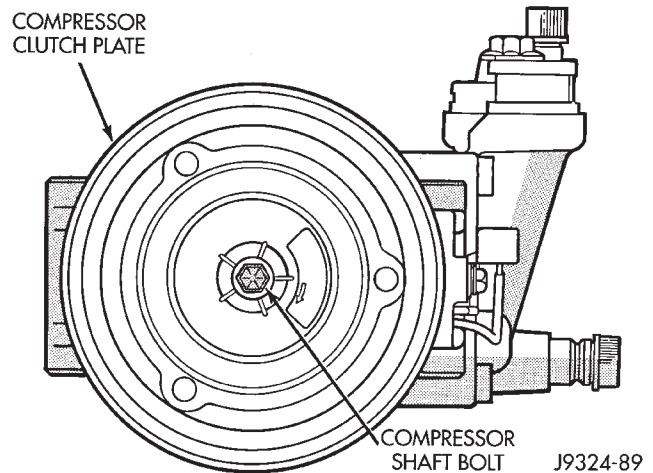


Fig. 6 Compressor Shaft Bolt

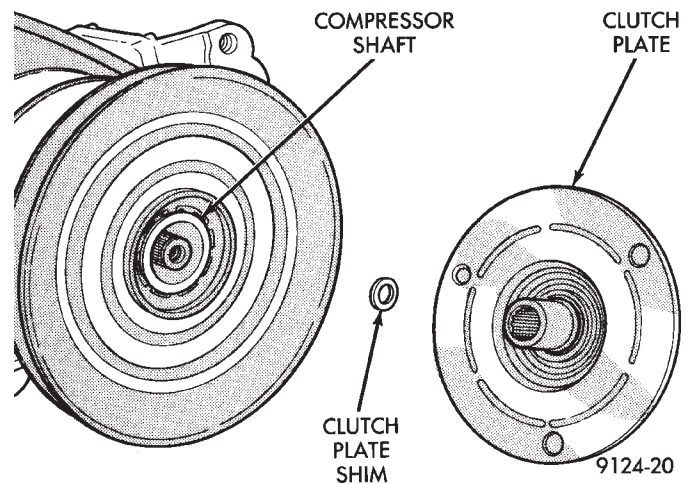


Fig. 7 Clutch Plate and Shim

- (6) Remove the snap ring from the compressor hub and remove the clutch field coil (Fig. 9). Slide the clutch field coil off of the compressor hub.

INSPECTION

Examine the friction surfaces of the clutch pulley and the front plate for wear. The pulley and front 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 clutch pulley bearing for roughness or excessive leakage of grease. Replace the bearing, if required.

REMOVAL AND INSTALLATION (Continued)

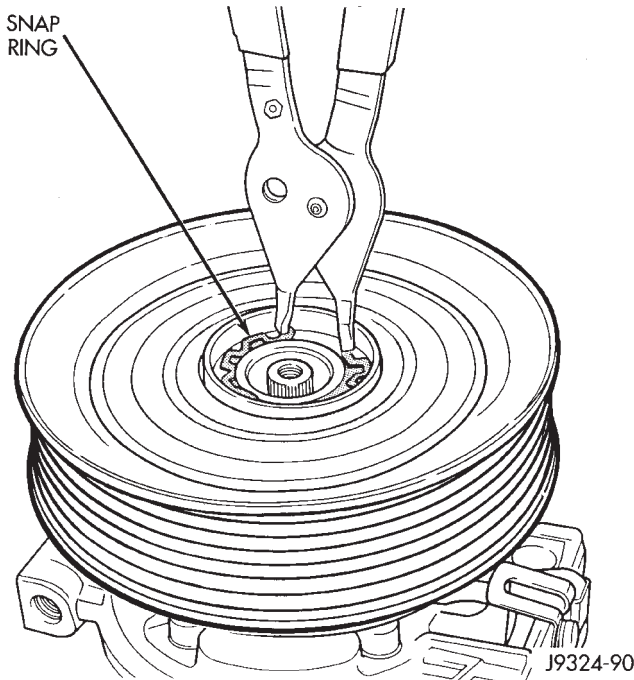


Fig. 8 Pulley Snap Ring Remove/Install

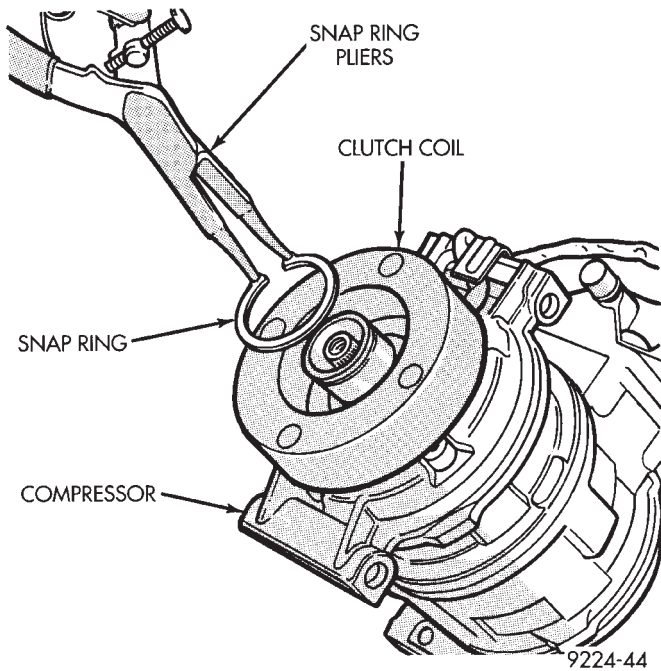


Fig. 9 Clutch Coil Snap Ring Remove/Install

INSTALLATION

(1) Align the dowel pin on the back of the clutch field coil with the hole in the compressor front housing and press the field coil into place.

(2) Install the clutch coil wire harness retaining clip on the compressor front housing and tighten the retaining screw. Plug in the clutch coil wire harness connector.

(3) Install the clutch field coil and snap ring with snap ring pliers (Special Tool C-4574). The bevel side of the snap ring must be facing outward. Also, both eyelets of the snap ring must be to the right or left of the pin on the compressor. 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.

(4) Install the pulley assembly onto the compressor. If necessary, place a block of wood on the friction surface and tap gently with a hammer (Fig. 10).

CAUTION: Do not mar the pulley friction surface.

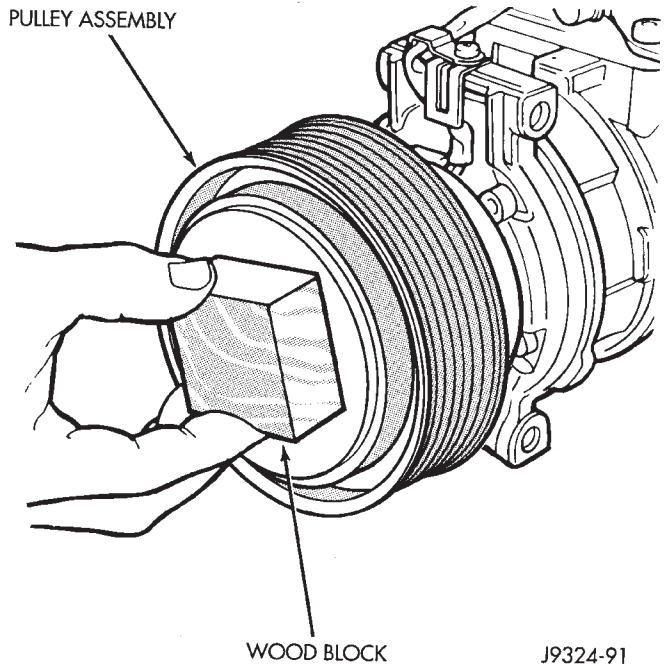


Fig. 10 Pulley Assembly Install

(5) Install the pulley assembly retaining snap ring (bevel side outward) with snap ring pliers (Special Tool C-4574). Press the snap ring to make sure it is properly seated in the groove.

(6) If the original front plate assembly and pulley assembly are to be reused, the old shim(s) can be used. If not, place a stack of shim(s) equal to the old shim(s) on the shaft against the shoulder.

(7) Install the front plate assembly onto the shaft.

(8) With the front plate assembly tight against the shim(s), measure the air gap between the front plate and the pulley face with feeler gauges. The air gap should be 0.35 to 0.65 mm (0.014 to 0.026 in.). If the proper air gap is not obtained, add or subtract shims as needed until the desired air gap is obtained.

REMOVAL AND INSTALLATION (Continued)

(9) Install the compressor shaft bolt. Tighten the bolt to 13 N·m (115 in. lbs.).

NOTE: The shims may compress after tightening the shaft bolt. Check the air gap in four or more places to verify the air gap is still correct. Spin the pulley before performing a final check of the air gap.

(10) Connect the battery negative cable.

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 heater-A/C control to the A/C (Recirc) 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.

DIESEL ENGINE

The refrigerant must be recovered from the refrigerant system during compressor clutch, drive, or coil replacement on diesel engine models. The compressor clutch cannot be serviced in the vehicle.

REMOVAL

(1) Remove the compressor and clutch from the vehicle as described in this group.

(2) Mount the compressor in a vise and remove the bolts that secure the drive spool to the drive plate.

(3) Remove the compressor drive plate with a spanner wrench (Special Tool 3281). Turn the drive plate counterclockwise to remove (Fig. 11).

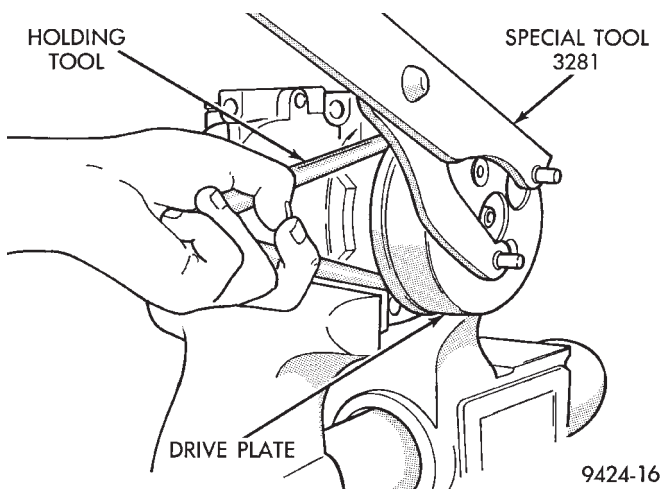


Fig. 11 Drive Plate Remove

(4) Insert the two pins of the spanner wrench into two holes of the clutch plate. Hold the clutch plate

stationary and remove the bolt that secures the clutch plate to the compressor shaft.

(5) Remove the clutch plate (Fig. 12).

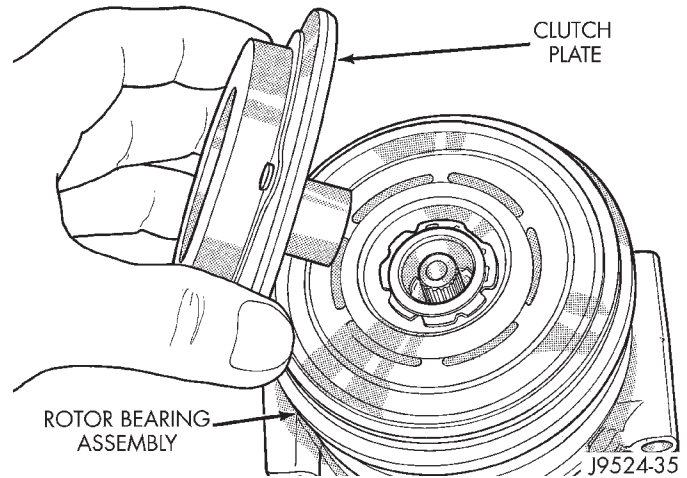


Fig. 12 Clutch Plate Remove/Install

(6) Remove the external snap ring from the front compressor housing hub with snap ring pliers and remove the clutch rotor and bearing assembly (Fig. 13).

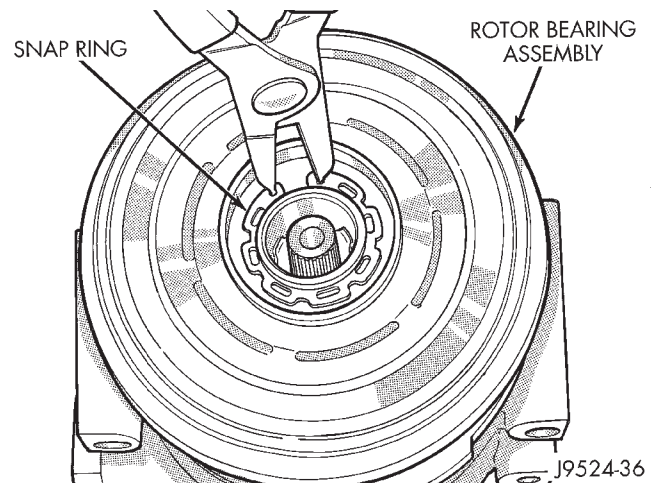


Fig. 13 External Snap Ring Remove/Install

(7) Remove the screw and retainer from the clutch coil wire harness on the compressor front housing.

(8) Remove the snap ring from the compressor hub and remove the clutch field coil (Fig. 14). Slide the clutch field coil off of the compressor hub.

INSPECTION

Examine the friction surfaces of the clutch drive plate and the clutch plate for wear. The drive plate 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

REMOVAL AND INSTALLATION (Continued)

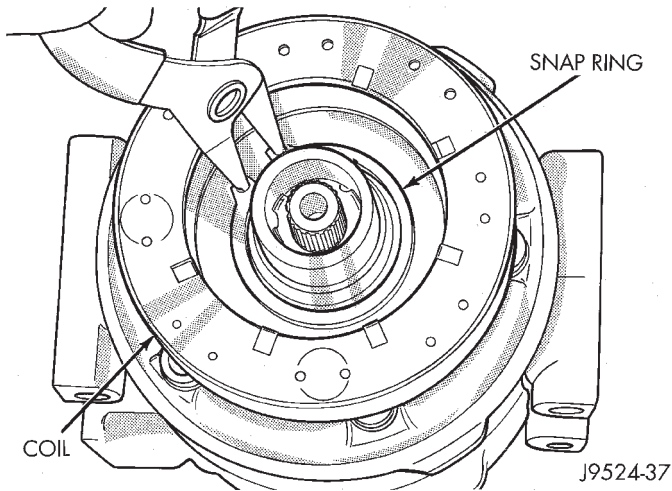


Fig. 14 Clutch Coil Snap Ring Remove/Install

oil, the shaft seal is leaking and the compressor must be replaced.

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

INSTALLATION

(1) Align the dowel pin on the back of the clutch field coil with the hole in the compressor front housing and press the field coil into place.

(2) Install the clutch coil wire lead retaining clip on the compressor front housing and tighten the retaining screw.

(3) Install the clutch field coil and 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.

(4) Check that the original clutch spacer shims are in place on the compressor shaft and install the clutch plate. Replace the shaft bolt and tighten to 14.4 N·m (10.5 ft. lbs.).

NOTE: The clutch air gap is determined by the spacer shims. When installing the original or a new clutch assembly, try the original shims first. When installing a new clutch onto a compressor that pre-

viously did not have a clutch, use 0.040, 0.020, and 0.005 in. shims from the clutch accessory sack.

(5) Check the air gap with a feeler gauge (Fig. 15). If the air gap does not meet the specification add or subtract shims as required. The specification is 0.41 to 0.79 mm (0.016 to 0.031 inch). If the air gap is not consistent around the circumference, lightly pry up at the points of minimum variation. Lightly tap down at the points of maximum variation.

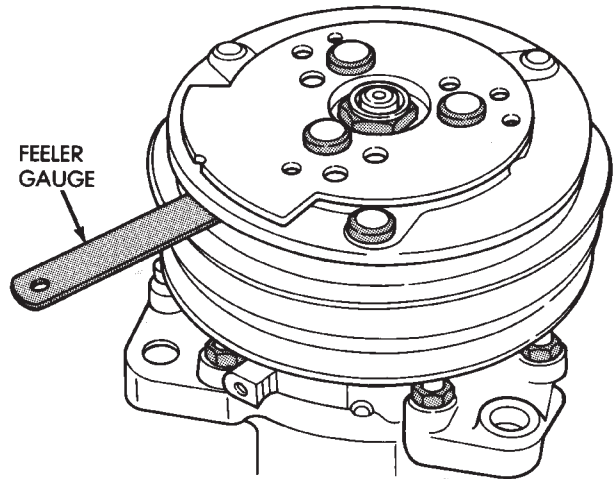


Fig. 15 Check Air Gap

(6) Install the drive plate onto the clutch and tighten to 98 N·m (72 ft. lbs.).

(7) Install the drive spool onto the drive plate. Tighten the drive spool bolts to 16 N·m (12 ft. lbs.).

(8) Reverse the remaining removal procedures to complete the installation.

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 heater-A/C control to the A/C (Recirc) 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.

