AIR CONDITIONING

CONTENTS

GENERAL INFORMATION

A/C COMPONENTS

COMPRESSOR—The SD-709 Compressor is used on all models. The compressor compresses the low-pressure refrigerant vapor from the evaporator into a high pressure, high temperature vapor. The compressor is serviced as an assembly only.

CLUTCH PULLEY AND COIL—They are mounted on the compressor and providing a way to drive the compressor. The compressor clutch and coil are the only serviced parts on the SD-709 compressor. When the compressor is not in operation, the pulley free wheels on the clutch hub bearing. When the coil is energized the clutch plate is magnetically engaged with the pulley and turns the compressor shaft.

CONDENSER—The condenser is located in front of the engine radiator. Its function is to cool the hot high pressure refrigerant gas. This causes it to condense into high pressure liquid refrigerant.

FILTER-DRIER—The drier is used to remove contaminates and traces of moisture from the refrigerant system.

SIGHT-GLASS—The sight glass is located on top of the filter drier. It is used as a diagnostic tool to observe refrigerant flow.

LOW-PRESSURE HIGH-PRESSURE CUT-OFF SWITCH—The switch is located on the filter drier and is wired in series with compressor clutch. When the pressure drops down to 193 kPa (28 psi) the switch interrupts the power to the compressor clutch. When the pressure increases above 3100 to 3375 kPa (450 to 490 psi) the switch interrupts the power to the compressor clutch.

HIGH PRESSURE RELIEF VALVE—The valve is located on the filter drier. The valve is used to prevent excessive pressure up build of 3445 to 4135 kPag (500 to 600 psi) and above. This will prevent damage to the compressor and other system components.

EXPANSION VALVE—The expansion valve is located in the engine compartment on XJ vehicles. On YJ vehicles it is located behind the A/C housing. Its function is to meter refrigerant into the evaporator in accordance with cooling requirements.

EVAPORATOR COIL—The coil is located in the A/C housing. Its function is to remove heat and dehumidify the air before it enters the vehicle.

FIN SENSING CYCLING CLUTCH SWITCH—The switch is attached to the evaporator coil. This switch prevents condensate water on the evaporator coil from freezing. It does this by cycling the compressor clutch on and off. This switch is used on **XJ** only

THERMOSTAT—The thermostat is located in the evaporator housing. Its function is to cycle the compressor clutch to control temperature. The thermostat is used on the **YJ** only.

REFRIGERANT LINES—The lines are used to carry the refrigerant between the various system components.

SERVICE PORTS—The high pressure service port is located on the discharge line near the compressor. The low pressure service port is located on the suction line near the compressor. The compressor no longer uses service valves.

After servicing the refrigerant system, always install service port caps.

REFRIGERANT

The vehicles use a new type of refrigerant called R-134a. It is a non-toxic, non-flammable, clear colorless liquified gas.

R-134a refrigerant is not compatible with R-12 refrigerant in an air conditioning system. A small amount of R-12 in a R-134a system will cause compressor failure, refrigerant oil sludge or poor A/C performance.

New service ports are used to ensure that the system is not accidentally filled with the wrong refrigerant.

Due to the different characteristics of R-134a it requires all new service procedures. Refer to Refrigerant Service Procedures in this section before making any repairs to the air conditioning system.

Chrysler Corporation recommends that a R-134a refrigerant Recovery/Recycling Station that meets SAE standard J2210 be used. Refer to the operating instructions provided with the equipment for proper operation.

REFRIGERANT OIL

R-134a refrigerant requires a special type of compressor oil. The system uses polyalklene glycol synthetic wax-free refrigerant oil SP-20 PAG. No other oil should be used.

R-12 compressor oil can not be mixed with the R-134a compressor oil. They ARE NOT compatible.

WARNINGS AND CAUTIONS FOR R134A SYSTEM

WARNING: AVOID BREATHING A/C REFRIGERANT AND LUBRICANT VAPOR OR MIST. EXPOSURE MAY IRRITATE EYES, NOSE AND/OR THROAT. WEAR EYE PROTECTION WHEN SERVICING THE AIR CONDITIONING REFRIGERANT SYSTEM. SERIOUS EYE INJURY CAN RESULT FROM EYE CONTACT WITH REFRIGERANT. IF EYE CONTACT IS MADE, SEEK MEDICAL ATTENTION IMMEDIATELY.

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

WARNING: 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.

WARNING: 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 SKIN OR DELICATE OBJECTS FROM DIRECT CONTACT WITH REFRIGERANT.

WARNING: R-134A SERVICE EQUIPMENT OR VEHICLE A/C 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.

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

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

CAUTION: R-12 compressor oil can not be mixed with the R-134a compressor oil. They ARE NOT compatible.

CAUTION: DO NOT use R-12 equipment or parts on the R-134a system. Damage to the system will result.

SERVICE PRECAUTIONS

Never open or loosen a connection before discharging the system refrigerant.

The A/C system must always be evacuated before charging.

DO NOT open a refrigerant system or uncap a replacement component unless it is as close as possible to room temperature. This will prevent condensation from forming inside of a component which is cooler than the surrounding air.

Before disconnecting a component from the system, clean the outside of the fittings thoroughly.

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

Before connecting an open fitting always insall a new seal/gasket. Coat the fitting and seal with clean refrigerant oil before connecting.

DO NOT remove the sealing caps from a replacement component until ready to install.

When installing a refrigerant line avoid sharp bends. Position the line away from the exhaust or any sharp edges which may chafe the line.

Tighten fittings only to the specified torque. The aluminum fittings used in the A/C system will not tolerate over tightening.

When disconnecting a 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 an oil container until ready to use and install the cap immediately after using. Store the oil only in a clean moisture-free container.

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

AIR CONDITIONING EQUIPMENT

WARNING: EYE PROTECTION MUST BE USED WHEN SERVICING AN AIR CONDITIONING REFRIGERANT SYSTEM. TURN OFF (ROTATE CLOCKWISE) ALL VALVES ON THE EQUIPMENT BEING USED BEFORE PROCEEDING WITH THIS OPERATION. PERSONNEL INJURY CAN RESULT.

When servicing an air conditioning system, a R-134a Charging Station and a Recovery/Recycling Station is required. These devices must meet SAE standard J2210. Refer to the operating instructions provided with the equipment for proper operation.

A manifold gauge set (Fig. 1) must also be used with the Charging and or Recovery/Recycling Station. The service hoses on the gauge set uses a Quick-Disconnect coupler. The coupler has a knob on top which is used to engage and disengage the sharder valve in the service port.

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.

CENTER GAUGE HOSE

The center hose is YELLOW or WHITE with BLACK STRIP. It is used to recover, evacuate and charge the refrigerant system. When the low or high pressure gauge valves on the manifold gauge set are opened, the refrigerant in the system will escape through this hose.

This hose attaches to the Recovery/Recycling station. Refer to the Recovery/Recycling station Operators Manual for proper procedures.

LOW PRESSURE GAUGE HOSE

The low pressure hose is BLUE with BLACK STRIP. The low pressure port is located on the suction line.

HIGH PRESSURE GAUGE HOSE

The high pressure hose is RED with BLACK STRIP. The high pressure port is located on the discharge line.

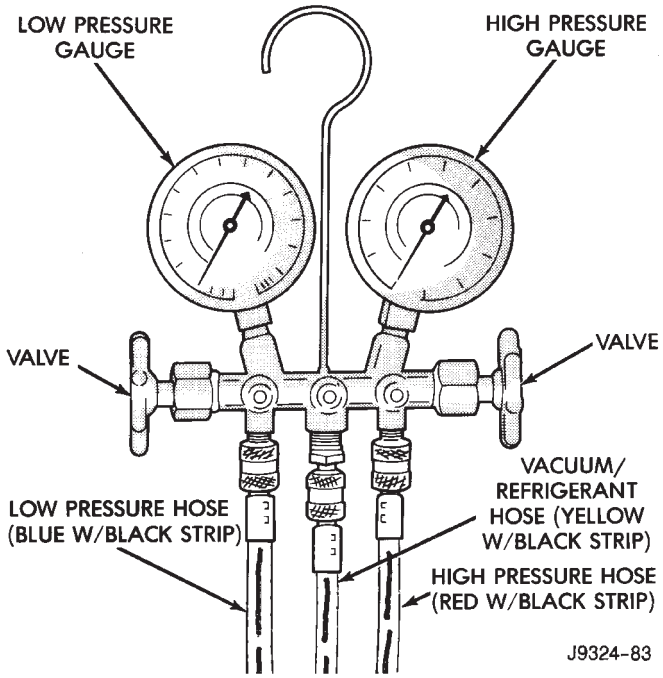

Fig. 1 Manifold Gauge Set

CONNECTION

(1) Remove the service port cap.

(2) Check all valves on the equipment being used to verify they are closed.

(3) Attach the Quick-Disconnect coupler to the service port and turn knob clockwise to depress sharder valve.

DISCONNECT

(1) Turn coupler knob counter clockwise to release sharder valve.

(2) Remove the coupler.

(3) Install the service port cap.

AIR CONDITIONING PERFORMANCE TESTS

Humidity has an improtant bearing on the temprature of the air delivered to the vehicle's interior. It is important to understand the effect humidity has on the performance of the system. When humidity is high, the evaporator has to perform a double duty. It must lower the air temperature and the temperature of the moisture carried in the air. 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 evaporator's ability to lower the temperature of the air.

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

PERFORMANCE TEST

Air temperature in test room must be 21°C (70°F) minimum for this test.

(1) Connect a Tachometer and manifold gauge set.

(2) Set A/C controls to Max A/C, temperature lever on full cool and blower on high.

(3) Start engine and adjust idle to 1,000 RPM with A/C clutch engaged.

(4) Engine should be warmed up with doors, windows and hood closed.

(5) Insert a thermometer in the left center A/C outlet. Operate the engine for 5 minutes. The A/C clutch may cycle depending on ambient temperatures.

(6) After 5 minutes note the discharge air temperature. If the clutch cycles, take the reading before the clutch disengages.

(7) Open the hood and disconnect vacuum line going to the heater water control valve. Observe the valve arm for movement as the line is disconnected. If it does not move repair vacuum circuit. Plug the vacuum line to prevent leakage.

(8) Operate the A/C for 2 more minutes and take the discharge air temperature reading again. On XJ vehicles if the temperature increased by more than 2°C (5°F) check the blend air door cable for correct operation.

(9) Compare the discharge air temperature to the A/C Performance (Temperature and Pressure) Chart. If discharge air temperature is high, refer to Refrigerant Leak Testing and Refrigerant System Diagnosis Chart.

(10) Compare the compressor discharge and suction pressures to the A/C Performance (Temperature and Pressure) Chart. If the discharge or suction pressure is not normal, check the operation of the refrigerant system, referring to Refrigerant System Diagnosis Chart.

The following charts have been developed for quick reference.

YJ PERFORMANCE TEMPERATURE AND PRESSURE CHART

Ambient 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	3- 8°C (38-46°F)	4- 10°C (39-50°F)	7- 13°C (44-55°F)	10- 17°C (50-62°F)	13- 21°C (56-70°F)
Evaporator Inlet Pressure At Charge Port	124 207 kPag	138 241 kPag	152 269 kPag	172 296 kPag	179 324 kPag
	18 30 psi	20 35 psi	22 39 psi	25 43 psi	26 47 psi
Compressor Discharge Pressure	1034 1516 kPag	1103 1620 kPag	1516 2136 kPag	1723 2205 kPag	1379 2344 kPag
	150 220 psi	160 235 psi	220 310 psi	250 320 psi	280 340 psi

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XJ PERFORMANCE TEMPERATURE AND PRESSURE CHART

Ambient 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	2- 7°C (36-44°F)	3- 8°C (38-46°F)	6- 12°C (42-53°F)	9- 16°C (48-60°F)	12- 20°C (54-68°F)
Evaporator Inlet Pressure At Charge Port	124 207 kPag	138 241 kPag	152 269 kPag	172 296 kPag	179 324 kPag
	18 30 psi	20 35 psi	22 39 psi	25 43 psi	26 47 psi
Compressor Discharge Pressure	1034 1516 kPag	1103 1620 kPag	1516 2136 kPag	1723 2205 kPag	1379 2344 kPag
	150 220 psi	160 235 psi	220 310 psi	250 320 psi	280 340 psi

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PRESSURE DIAGNOSIS

Condition	Possible Cause	Correction
Low side and high side pressure low.	(1) System refrigerant low. (2) Expansion valve is restricted. (3) Evaporator plugged.ga	(1) Evacuate, leak test and charge system. (2) Replace the expansion valve. (3) Replace evaporator.
Low side pressure high and high side pressure low.	(1) Internal leak in the compressor. (2) Cylinder head gasket is leaking. (3) Drive belt slipping.	(1) Replace the compressor. (2) Replace the compressor. (3) Adjust the belt tension.
Low side and high side pressure high.	(1) Condenser fins obstructed. (2) Air in the system. (3) Expansion valve is defective. (4) Loose or worn fan belt. (5) Refrigerant system overcharged.	(1) Clean condenser fins. (2) Evacuate, leak test and charge system. (3) Replace the expansion valve. (4) Adjust or replace belt. (5) Recover refrigerant and recharge.
Low side pressure low and high side pressure high.	(1) Expansion valve is defective. (2) Restriction in refrigerant hose. (3) Restriction in receiver/drier. (4) Restriction in condenser.	(1) Replace the expansion valve. (2) Check hoses for kinks and replace if necessary. (3) Replace receiver/drier. (4) Replace condenser.
Low side and high side pressures normal (inadequate cooling).	(1) Excessive oil in system.	(1) Discharge and drain oil. Restore proper oil level. Evacuate, leak test and charge system.

PERFORMANCE DIAGNOSIS

Condition	Possible Cause	Correction
Compressor noise	(1) Broken valve or piston ring. (2) Refrigerant system overcharged. (3) Incorrect oil level. (4) Loose or worn fan belt.	(1) Replace compressor. (2) Evacuate, leak test and charge system. (3) Discharge and drain oil. Restore proper oil level. Evacuate, leak test and charge system. (4) Adjust or replace belt.
Excessive vibration	(1) Incorrect belt tension. (2) Clutch loose. (3) Refrigerant system overcharged. (4) Pulley is misaligned.	(1) Adjust belt tension. (2) Tighten clutch. (3) Recover refrigerant and recharge. (4) Align pulley.
Condensation leaking inside vehicle.	(1) Evaporator drain plugged or kinked.	(2) Clean drain hose and check for proper installation.
Frozen Evaporator coil	(1) Faulty thermostat on YJ vehicle. (2) Faulty fin sensing cycling clutch switch XJ vehicle.	(1) Check for proper installation and adjustment. Replace if necessary. (2) Check for proper installation. Replace if necessary.

REFRIGERANT LEAK TESTING, DISCHARGING, EVACUATING AND CHARGING

LEAK TESTING REFRIGERANT

WARNING: REVIEW WARNINGS AND CAUTIONS IN GENERAL INFORMATION SECTION OF THIS GROUP BEFORE LEAK TESTING.

If A/C system is not cooling properly, determine if system is fully charged. Refer to Refrigerant System Diagnosis Chart. If the system is empty evacuate the A/C system and charge system with 0.283 kPa (0.6 lbs. or 10 oz.) R-134a refrigerant. Refer to Charging Refrigerant System for instructions. To detect a leak in the system, perform the following procedures.

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

(2) Bring A/C system up to operating temperature and pressure. This is done by allowing the engine to run with the A/C on for 5 to 7 minutes.

(3) Open hood 5 minutes prior to leak test. This will dissipate any accumulated refrigerant in the engine compartment.

(4) With the engine not running, use an R-134a Electronic Leak Detector and search for leaks. Move probe slowly along the bottom side of lines and fittings, because R-134a is heavier than air. Fittings, lines, or components that appear to be oily usually indicates a refrigerant leak.

(5) To inspect the evaporator core for leaks. Set the blower at low speed and the selector in PANEL and RECIRC mode check for leaks at CENTER panel oulets.

DISCHARGING REFRIGERANT SYSTEM

WARNING: REVIEW WARNINGS AND CAUTIONS IN GENERAL INFORMATION SECTION OF THIS GROUP BEFORE DISCHARGING SYSTEM.

R-134a refrigrant is a hydrofluorocarbon (HFC) that does not contain chlorine. R-134a refrigerant Recovery/Recycling Station that meets SAE standard J2210 must be used to discharge the refrigerant system. Refer to the operating instructions provided with the equipment for proper operation.

EVACUATING REFRIGERANT SYSTEM

WARNING: REVIEW WARNINGS AND CAUTIONS IN GENERAL INFORMATION SECTION OF THIS GROUP BEFORE EVACUATING SYSTEM.

If the A/C system has been open to the atmosphere, it must be evacuated before the system can be charged. Moisture and air mixed with refrigerant will raise the compressor head pressure above acceptable operating levels. This will reduce the performance of the air conditioner and damage the compressor. Moisture will boil at near room temperature when exposed to vacuum. To evacuate the refrigerant system use following procedure:

(1) Connect a suitable charging station and manifold gauge set to the vehicle.

(2) Open the low and high side valves and start vacuum pump. When suction gauge reads 88 kPag (26 in. Hg) vacuum or greater, close all valves and turn off vacuum pump. If system fails to reach specified vacuum, the system has a leak that must be corrected. If system maintains the specified vacuum for 30 minutes, start the vacuum pump. Then open the suction and discharge valves and evacuate an additional 10 minutes.

(3) Close all valves. Turn off and disconnect the vacuum pump.

The system is now ready to be charged with refrigerant.

CHARGING REFRIGERANT SYSTEM

WARNING: REVIEW WARNINGS AND CAUTIONS IN GENERAL INFORMATION SECTION OF THIS GROUP BEFORE CHARGING SYSTEM.

After the system has been tested for leaks and evacuated, a refrigerant charge can be injected into the system. Refer to refrigerant capacities for proper amount of refrigerant charge.

The most accurate method of charging is to completely evacuate the system. Then charge the system using a Recovery/Recycling Station approved for R-134a refrigerant. Refer to the operating instructions provided with the equipment for proper operation.

CAUTION: Do not over charge refrigerant system. This will cause excessive compressor head pressure and can cause noise and system failure.

REFRIGERANT CHARGE CAPACITY

The R-134a system charge capacity is 0.9 kPag (32 oz.) for XJ and YJ vehicles.

REFRIGERANT OIL

It is important to have the correct amount of oil in the A/C system. This will ensure 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 system.

The oil used in the SD-709 compressor is a polyalkylene glycol synthetic oil SP-20 PAG. This is a wax-free refrigerant oil. Only refrigerant oil of the same type should be used to service the system. Do not use any other oil. The oil container should be kept tightly capped until it is ready for use and then capped after use to prevent contamination. Refrigerant oil will quickly absorb any moisture it comes in contact with.

It will not be necessary to check oil level in the compressor or to add oil unless there has been an oil loss. This may be due to a rupture or leak from a line, shaft seal, evaporator or condenser. Oil loss at a leak point will be evident by the presence of a wet, shiny surface around the leak.

Add an additional 28 grams (1 fluid oz.) of compressor oil to the system when a receiver-drier, condenser or evaporator core is replaced.

OIL LEVEL

When an A/C system is assembled at the factory, all components (except the compressor) are refrigerant oil free. After the system has been charged and operated, the oil in the compressor is dispersed through the system. The evaporator, condenser and compressor will retain a significant amount of oil (refer to the Refrigerant Oil Capacities Chart).

When a component is replaced, the specified amount of refrigerant oil must be added. When the compressor is replaced, the oil must be drained from the replaced compressor and measured. Drain all the oil from the new compressor. Add back into the new compressor the amount of oil that was drained out of the old compressor.