

A/C SYSTEM GENERAL SERVICING

1988 Jeep Cherokee

1988 AIR CONDITIONING & HEAT
A/C General Servicing
Diagnostic Procedures

Eagle & Jeep

* PLEASE READ THIS FIRST *

CAUTION: When discharging air conditioning system, use only approved refrigerant recovery/recycling equipment. Make every attempt to avoid discharging refrigerant into the atmosphere.

INTRODUCTION

This article is to be used for general service and diagnosis. For specific repair or replacement procedures, use the appropriate repair article in this section.

R-12 REFRIGERANT - SAFETY PRECAUTIONS

1) Always work in a well-ventilated, clean area. Refrigerant (R-12) is heavier than oxygen, and will displace oxygen in a confined area. Always wear eye protection when working around air conditioning systems and R-12. The system's high pressure can cause severe injury to eyes and skin if a hose were to burst. R-12 evaporates quickly when exposed to atmosphere, freezing anything it contacts.

2) Use care when handling refrigerant containers. Do not drop or strike containers. Do not expose refrigerant containers to excessive heat. Containers must never be heated more than 125°F. Never expose R-12 directly to open flame.

CAUTION: When R-12 is exposed to an open flame, drawn into a running engine, or detected with a Halide (propane) leak tester, poisonous phosgene gas is formed. Keep work areas ventilated and keep vehicles with running engines away.

USING INDIVIDUAL R-12 CANS

Disposable refrigerant cans (referred to as one pound cans) have a flat type seal or a screw type seal, and the proper can tap must be used for each type. Be sure sealing gasket on can tap is in good condition. A proper safety can tap will prevent refrigerant from flowing back into open can, as the tap has a one-way flow control.

NOTE: Recent findings by the EPA indicate that R-11, R-12 and R-113 are harmful to the Earth's protective Ozone layer. Make every attempt possible, to avoid discharging R-11, R-12 or R-113 into the atmosphere.

USING MULTI-CAN DISPENSING VALVES

A multi-can dispensing valve allows the attachment of several cans of refrigerant, and is a good substitute when a bulk container is not available. Cans are installed onto each leg of the multi-can dispensing valve in the same manner as the individual cans, and each leg has its own can tap.

CAN TAP INSTALLATION

FLAT TYPE SEAL CANS

On cam-lock or one-piece can taps, first turn the handle out to the fully open position. Securely engage the locking lugs over the flange of the can, and lock them in place by turning the cam lock or locking nut. Screw the tap assembly into the adapter so the sealing gasket is fully seated against the can top. Turn the tap inward to pierce the can and close the tap. DO NOT open the tap until ready to purge the service hose or dispense refrigerant into the system.

On 2-piece can taps, be certain the tap handle is turned fully in, so it is closed. Check that the locking base is turned to its outer limit. Securely engage the locking lugs over the can flange. Turn the entire tap assembly (without disturbing the closed setting) down into the locking base to pierce the can. Do not open the tap until ready to dispense into system.

SCREW TYPE SEAL CANS

Ensure can tap is fully closed. Screw refrigerant can into can tap fitting until tight. This will pierce the can. Connect tap to center hose on manifold gauge set. DO NOT open tap until ready to dispense R-12 into system.

WARNING: DO NOT open high side hand valve while air conditioning system is in operation. This high pressure could rupture can or possibly burst fitting at safety can valve, resulting in damage and physical injury.

COMPRESSOR OIL CHECK

GENERAL PROCEDURES

Some models have compressor-mounted service valves that allow oil checking by isolating the compressor. On all others, system must be discharged, using approved refrigerant recovery/recycling equipment, and compressor may need to be removed to check oil. After oil level is checked and adjusted, A/C system must be evacuated and recharged.

ISOLATING COMPRESSOR

- 1) Connect manifold gauge set to service valves on the compressor. Close both gauge valves. Open both service valves to themid-position.
- 2) Start engine and operate air conditioning. Turn suction service valve slowly clockwise toward front-seated position. When suction pressure is reduced to zero or less, stop engine and quickly close suction service valve (front-seated).
- 3) Front-seat the discharge valve. Loosen oil check plug slowly to release any internal pressure. Service valves can now be removed from compressor and compressor removed from vehicle (if necessary). Purge compressor after servicing.

PURGING COMPRESSOR

- 1) Remove gauge set and place caps on service valve ports. Back-seat the suction service valve to allow refrigerant to enter compressor.

2) Loosen discharge port valve slightly. Loosen valve port cap to allow refrigerant to force out air from compressor. Back-seat the discharge valve and tighten the port cap. Compressor is ready for service.

REFRIGERATION OIL

Only new, pure, moisture-free refrigeration oil should be used in the air conditioning system. This oil is highly refined and dehydrated (moisture content less than 10 parts per million).

Refrigeration oil container must be kept tightly closed at all times when not in use, or moisture will be absorbed from the air and introduced into the refrigeration system.

NIPPONDENSO 10-CYLINDER

SHAFT SEAL

NOTE: Check compressor refrigerant oil level when replacing seals. See COMPRESSOR REFRIGERANT OIL CHECKING article in this section.

Removal

1) Hold clutch hub stationary and remove center nut. Screw remover into center of hub. Turn center bolt to remove pressure plate.

2) Remove shims from shaft. Remove snap ring from inside of pulley. Tap pulley off of shaft with plastic mallet. Be careful not to distort pulley while removing.

3) Disconnect clutch coil wires from compressor housing. Remove snap ring inside coil and lift coil off compressor. Pry dust seal out from around compressor shaft (if equipped).

4) Place shaft key remover on shaft and turn to remove key. Remove drain plug (if equipped). Remove bolts holding service valves to body of compressor and remove valves. Discard "O" rings. Drain oil out of compressor.

5) Remove 6 through bolts from front head of compressor and discard washers. Tap head loose from compressor, being careful not to scratch sealing surfaces. Remove snap ring (if equipped) from front housing. Press seal plate out. Remove seal from shaft. See Fig. 1.

Installation

1) Lubricate shaft seal with clean refrigerant oil. Place on compressor shaft. Lubricate seal plate (and "O" ring, if equipped) and install in front housing. Install snap ring (if equipped).

2) Place front housing on compressor body. Using new washers, install through bolts. Tighten bolts evenly and alternately to 18 ft. lbs. (24 N.m). Install shaft key with installer and plastic mallet. Insert dust seal into front of compressor.

3) Install drain plug using new gasket. Add correct amount of refrigerant oil to compressor. If service valves were removed, coat new "O" rings with refrigerant oil and install service valves.

4) Place clutch coil on compressor and install snap ring. Install shims on shaft to adjust clearance between pressure plate and rotor to .016-.028" (.41-.71 mm). Tighten shaft nut to 12 ft. lbs. (16 N.m). See REFRIGERANT OIL & R-12 SPECIFICATIONS table for system capacities.

SANKYO/SANDEN 5-CYLINDER COMPRESSOR SERVICING

NOTE: During the past year, Sankyo International (USA), Inc. has changed its name to Sanden International (USA), Inc.

Information pertaining to Sanden compressors in this article, will be found in earlier articles under Sankyo compressors.

AMERICAN MOTORS & JEEP WITH 5-CYLINDER COMPRESSOR

Compressor Overhaul

1) After the compressor and system have been run, stop the engine. Slowly discharge system using approved refrigerant recovery/recycling equipment. Clean and cool dipstick with R-12.

2) Loosen the compressor mounting bolts, remove the drive belt, and move the compressor to a bench for easiest and most accurate measurement. Position the compressor so that the oil fill plug is at top dead center.

3) Thoroughly clean the oil fill plug and the area around it. Loosen the fill plug slowly to allow trapped refrigerant pressure to escape through the loosened threads.

4) The front plate hub has a lobe, which is indexed (notched) 180° from TDC of the cam rotor. Rotate the hub plate lobe until the index notch is 110° from bottom center. See Fig. 1. Check this position by looking through the oil fill hole and noting that the ball end of the top piston rod lines up with the fill hole.

5) Looking at the front end of the compressor, insert the dipstick diagonally from upper left to lower left until the dipstick stop contacts the filler hole surface. Remove dipstick and note oil level. Oil level should be between the 4th and 6th increment on the dipstick (3-4 ounces). Add oil as necessary.

Compressor Replacement

If system was opened by a leak or so quickly that oil was lost, install new compressor with all the oil it contains. If system was opened slowly and oil was not lost, drain oil from new compressor and measure. Reinstall 6 ounces of oil back into new compressor prior to installation.

Component Replacement

If a hose, receiver-drier, condenser, expansion valve or evaporator core requires replacement, add 1 ounce of new oil for each new component installed.

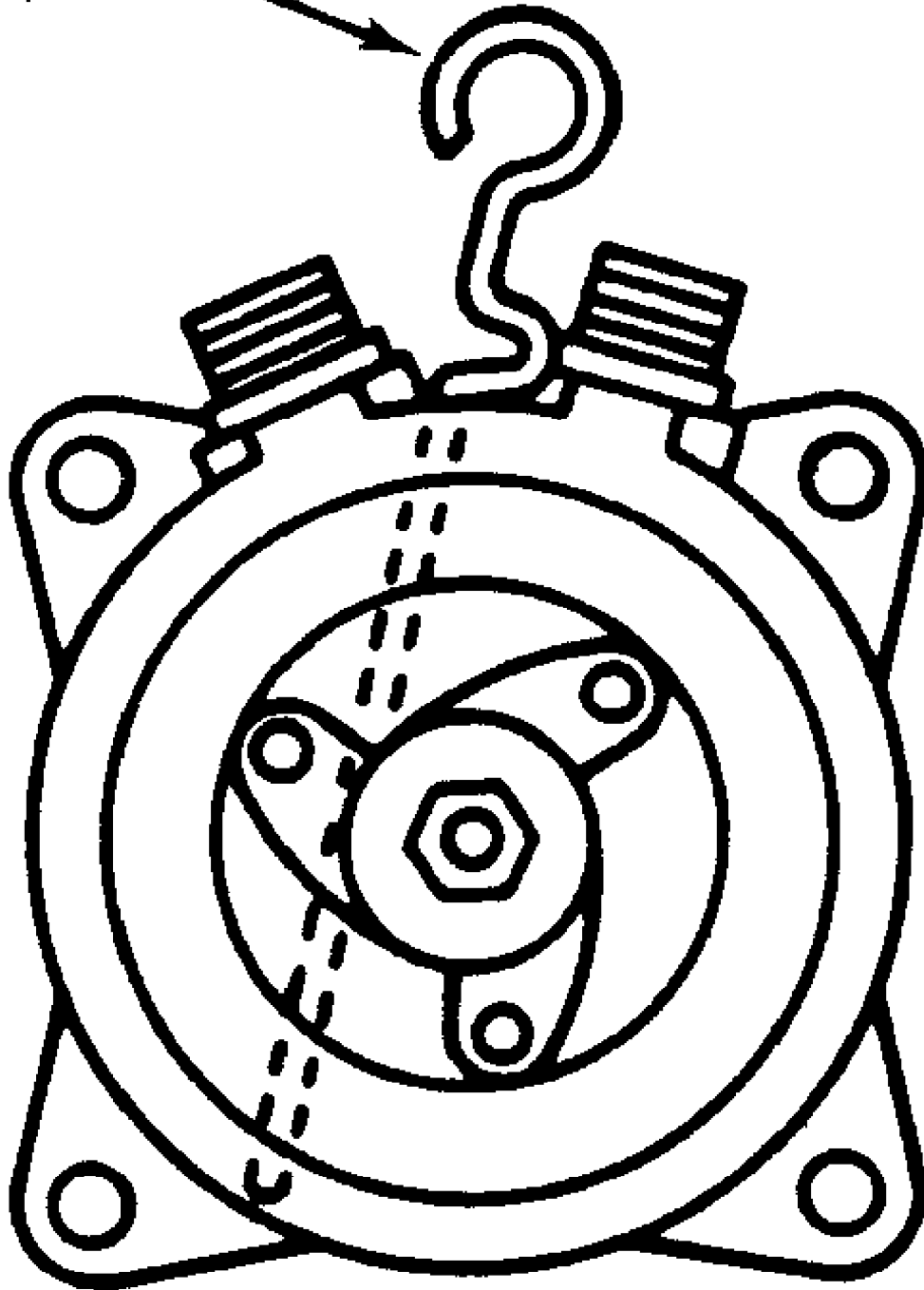
Compressor Oil Check

1) Discharge system, using approved refrigerant recovery/recycling equipment, or isolate compressor. Remove oil filler plug. Look through oil filler plug hole and rotate clutch front plate to position piston connecting rod in center of oil filler plug hole.

2) Insert dipstick (J-29642-12) through oil filler plug hole to the right of piston connecting rod until dipstick stop contacts the compressor housing.

3) Remove dipstick and count number of increments covered with oil. If compressor is properly filled, oil will cover 4-6 increments on the dipstick. Adjust oil level as necessary.

Dipstick



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Fig. 1: 5-Cylinder Compressor Oil Check (Use dipstick J-29642-12)

YORK 2-CYLINDER COMPRESSOR SERVICING

JEEP WITH 2-CYLINDER COMPRESSOR

Isolating Compressor

1) Connect manifold gauge set to service valves on compressor. Close both gauge valves. Open both service valves to the mid-position.

2) Start engine and operate air conditioning. Turn suction service valve slowly clockwise toward front-seated position. When suction pressure is reduced to zero or less, stop engine and quickly close suction service valve (front-seated).

3) Front-seat the discharge valve. Loosen oil check plug slowly to release any internal pressure. Service valves can now be removed from compressor and compressor removed from vehicle (if necessary). Purge compressor after servicing.

Purging Compressor

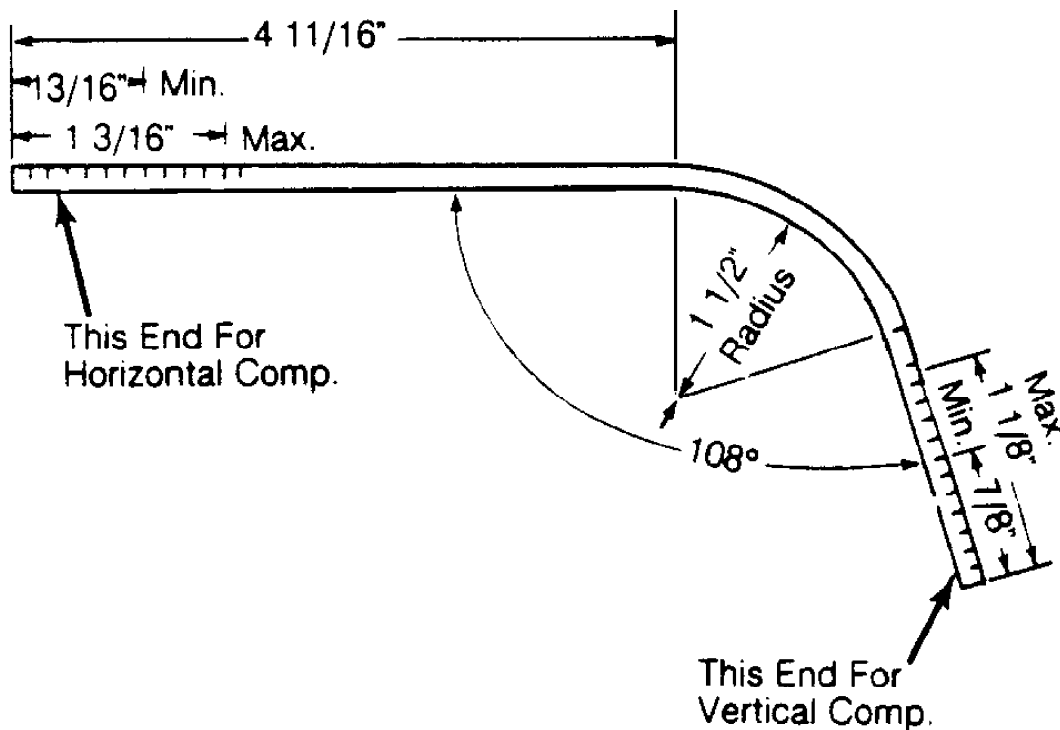
1) Remove gauge set and place caps on service valve ports. Back-seat the suction service valve to allow refrigerant to enter compressor.

2) Loosen discharge port valve slightly. Loosen valve port cap to allow refrigerant to force out air from compressor. Back-seat the discharge valve and tighten the port cap. Compressor is ready for service.

Compressor Oil Check

1) Operate system for 10 minutes, then stop and isolate compressor. Loosen filler plug slowly to release any pressure in crankcase.

2) Use dipstick to check oil level. See Fig. 2. Add oil as necessary. Install plug with new "O" ring. Purge compressor of air.



17494

Fig. 2: York Compressor Oil Level Dipstick
Check oil with shaft keyway facing head.

SYSTEM SERVICING CAUTIONS

BEFORE OPENING THE SYSTEM

Before disconnecting any lines or fittings, the system must be completely discharged using approved refrigerant recovery/recycling equipment.

DISCONNECTING LINES & FITTINGS

1) After system is discharged, carefully clean entire area around coupling nut to prevent dirt entering system. Always use two wrenches to avoid twisting or distorting lines and fittings (hold fitting with one wrench while loosening coupling nut with second wrench).

2) Ford spring-coupling fittings require a special coupling tool (Motorcraft YT-1056) to open or close. See procedure under CONNECTING LINES & FITTINGS.

3) Cap or plug all LINES and FITTINGS immediately to prevent entry of air and moisture into the system. Do not remove these caps until connections are being made.

COMPONENT REPLACEMENT

When components are replaced, system oil level must be adjusted. Add refrigeration oil to replacement component. See Compressor Oil Check article, as well as, Component Oil Replacement Quantities" chart under A/C SYSTEM SERVICE SPECIFICATIONS in this article.

CONNECTING LINES & FITTINGS

All Except Ford Spring-Coupling Fitting

1) A new "O" ring should be used in all instances when connecting lines and fittings (dip "O" ring in clean refrigeration oil and make certain it is not twisted during installation). Always use two wrenches to avoid twisting or distorting lines and fittings. Tighten coupling nuts securely.

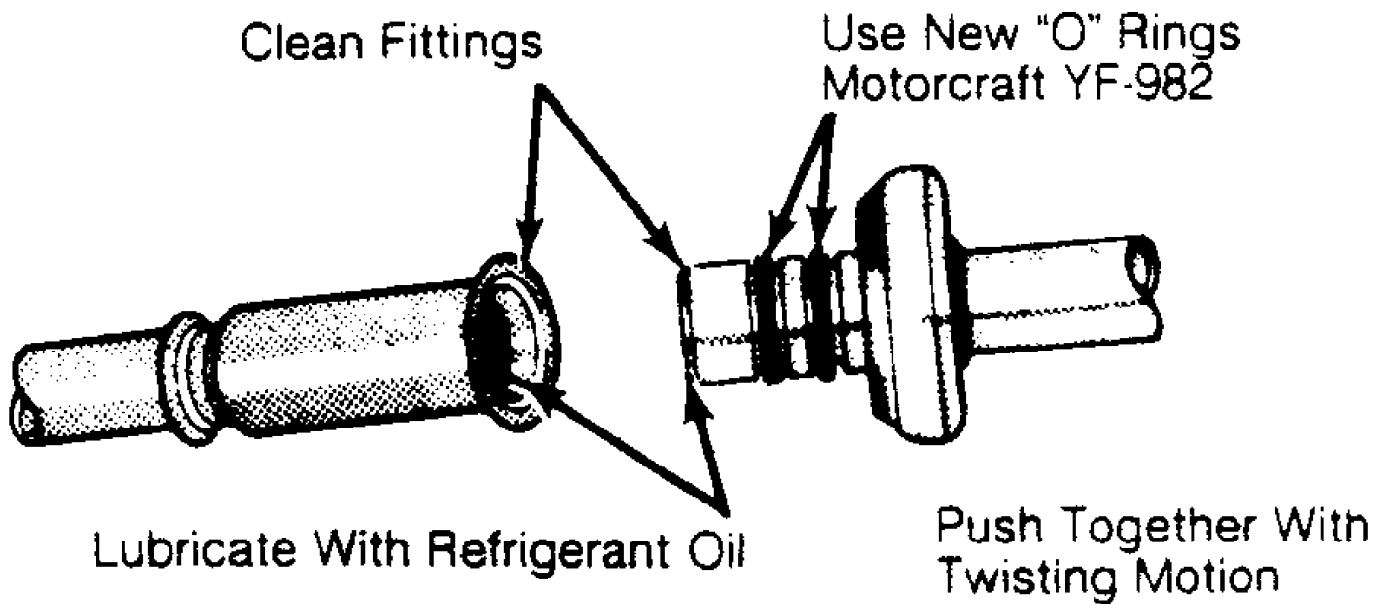
2) Ford spring-coupling fittings require a special coupling tool (Motorcraft YT-1056) to open or close. Use the following procedure to connect or disconnect the spring-coupling fitting.

Ford Spring-Coupling Fitting

1) Discharge system using approved refrigerant recovery/recycling equipment. Place proper end of tool over refrigerant line. Tool fits both 3/8" and 1/2" fittings. Push tool into fitting cage to release spring inside. Pull lines apart and remove tool.

2) Before connecting, check internal spring for damage. If Necessary, pry spring out and replace it. Clean fittings and install new "O" rings.

CAUTION: Use ONLY "O" rings designed for these Ford fittings (Motorcraft YF-982). Normal refrigerant "O" rings will NOT seal.



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Fig. 3: Assembling Ford Spring-Coupling Fitting

3) Lubricate both sides of fitting with clean refrigeration oil. Assemble the fitting by pushing together with a slight twisting motion. Check to make sure spring is over flared end of female fitting.

PLACING SYSTEM IN OPERATION

After component replacement and/or system servicing has been completed and all connections have been made, proceed as follows:

- 1) Evacuate the system using vacuum pump.
- 2) Charge the system with R-12. See REFRIGERANT CAPACITY in the A/C SYSTEM SERVICE SPECIFICATIONS in this article.
- 3) Leak test the system, with particular attention to all new connections and components.
- 4) Make a performance test of the system. Never assume that a recharging has automatically corrected a problem.

DIAGNOSTIC PROCEDURES

Diagnosis is an important first step in A/C system servicing. To save time and effort, systems should be carefully checked to identify the causes of poor performance. By using the following diagnostic charts, defective components or system damage can be quickly located. To identify problems that are specific to one system, refer to the repair sections of this article. The charts in this article apply to all systems.

PREPARATION FOR TESTING

- 1) Attach Low and High side gauges.
- 2) Start engine and allow it to warm up.
- 3) Set system to COOL and blower to HIGH.
- 4) Open car doors and hood.
- 5) Run at fast idle for 2-3 minutes.

ALTITUDE PRESSURE VARIATIONS

ALTITUDE PRESSURE VARIATIONS

Altitude (Ft. Above Sea Level)	Absolute Pressure of Atmosphere (psi)	Gauge Altitude Correction (1) (psi)
0	14.7	0
1000	14.2	-0.5
2000	13.7	-1.0
3000	13.2	-1.5
4000	12.7	-2.0
5000	12.2	-2.5
6000	11.7	-3.0
7000	11.3	-3.4
8000	10.9	-3.8
9000	10.5	-4.2
10,000	10.1	-4.6

(1) - Subtract correction shown from gauge readings.

ALTITUDE VACUUM VARIATIONS

Altitude (Ft. Above Sea Level)	Complete Vacuum (In. Hg)	Gauge Altitude Correction (In. Hg)
0	29.92	0
1000	28.92	+1.0
2000	27.82	+2.1
3000	26.82	+3.1
4000	25.82	+4.1
5000	24.92	+5.0
6000	23.92	+6.0
7000	23.02	+6.9
8000	22.22	+7.7
9000	21.32	+8.6
10,000	20.52	+9.4

(1) - Add correction shown to gauge readings.

OPERATIONAL TEST GAUGE READINGS

Normal System Operating Pressures (PSI) (1)

Application	Low Side Gauge (Suction)	High Side Gauge (Discharge)
Thermostatic Switch	5-24	208-250

(1) - Pressure readings given are for a system in good operating condition, at sea level and an ambient temperature of 80°F (27°C).

A/C SYSTEM PERFORMANCE CHECK TABLE

AIR CONDITIONING SYSTEM PERFORMANCE CHECK

PERFORM TESTS:	SHOULD BE:	IF:
Temperature Check		Temperature Check Is

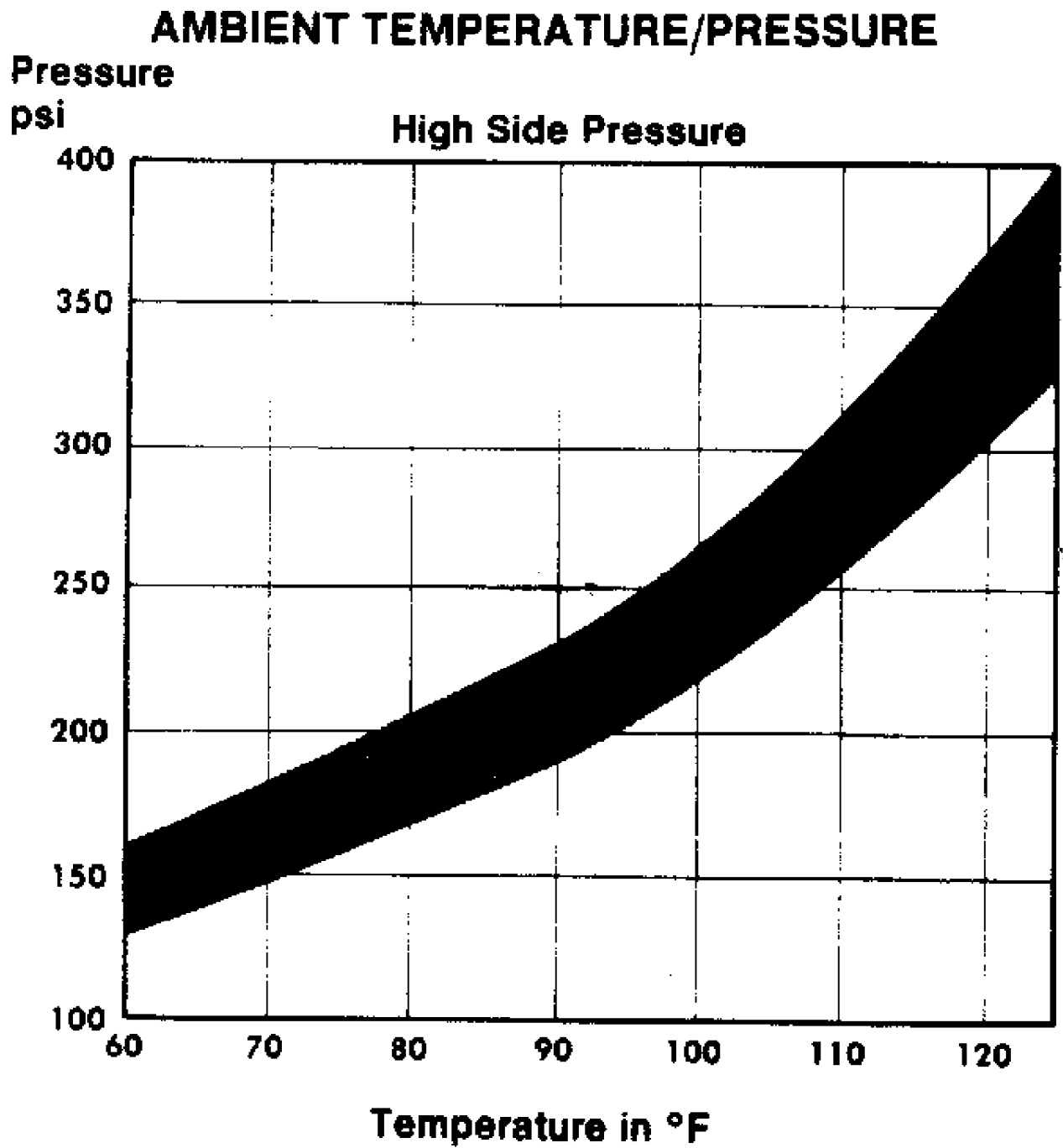


Fig. 4: Ambient Temperature/Pressure

EVAPORATOR TEMPERATURE/PRESSURE

Pressure

psi

Low Side Pressure

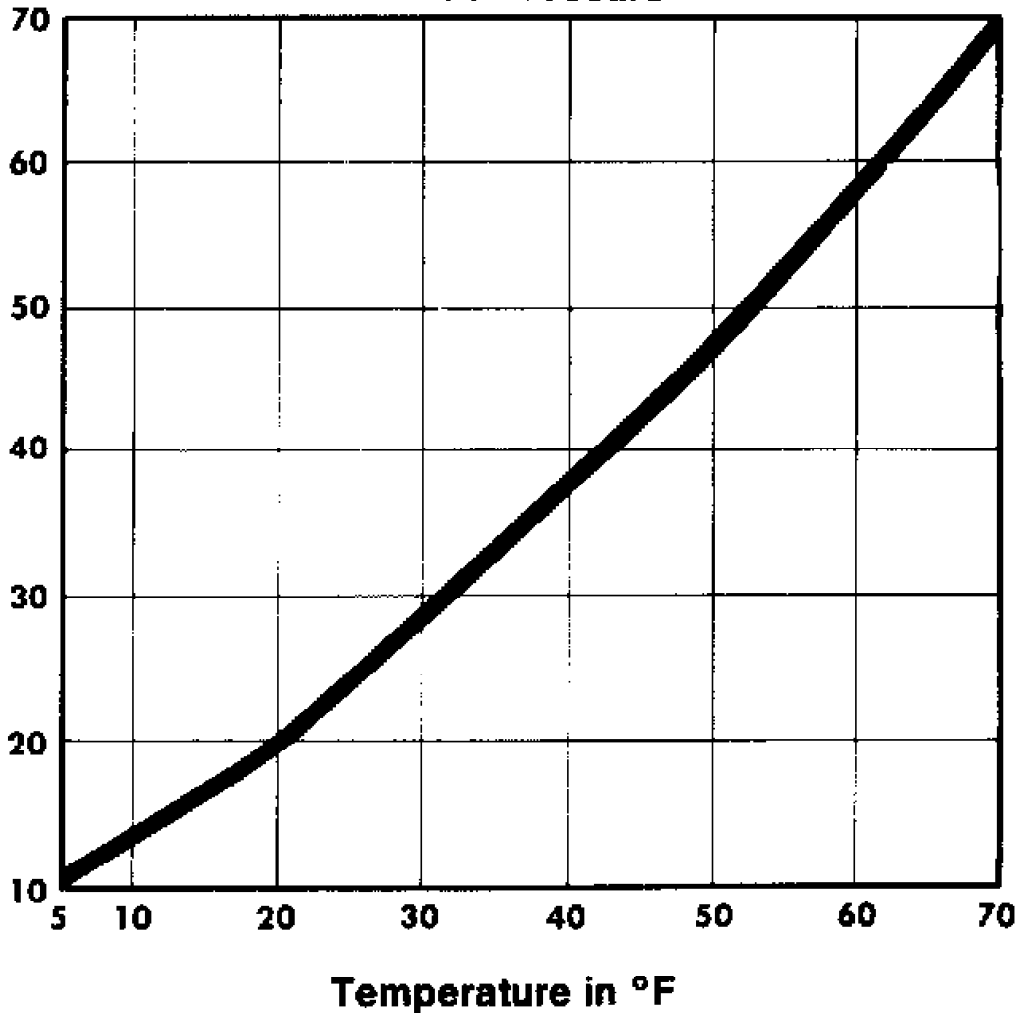


Fig. 5: Evaporator Temperature/Pressure

A/C SYSTEM DIAGNOSIS WITH GAUGES

DIAGNOSIS WITH GAUGES - SYSTEMS WITH INSUFFICIENT OR NO COOLING

LOW SIDE GAUGE	HIGH SIDE GAUGE	OTHER SYMPTOMS (1)	DIAGNOSIS
Normal	Normal	No or few bubbles in sight glass. High side gauge may go high. Low side gauge does not fluctuate with compressor on/off cycle.	Some Air and Moisture in System
Normal	Normal	Cools okay in morning but not during hot part of day.	Excessive Moisture in System

Tiny bubbles in sight glass. Discharge air warm when low side gauge drops into vacuum.

Normal	Normal	Thermostatic switch system only-compressor cycles off and on too rapidly.	Defective Thermo-static Switch
Normal to High	Normal	Cycling clutch systems only-Compressor doesn't turn on soon enough. Discharge air becomes warm as low side pressure rises.	Misadjusted Thermo static Switch or Defective Pressure Sensing Switch
Low	Low	Bubbles in sight glass. Outlet air slightly cool.	Low R-12 Charge
Low	Low	Sight glass clear or oil-streaked. Outlet air very warm.	Excessively Low R-12 Charge
Low	Low	Outlet air slightly cool. Sweating or frost at expansion valve.	Expansion Valve Stuck Closed. Screen Plugged or Sensing Bulb Malfunction
Low	Low	Outlet air slightly cool. High side line cool to touch. Sweating or frost on high side.	Restriction on High Side.
Low	High	Evaporator outlet pipe cold. Low side goes into vacuum when blower is disconnected.	STV Stuck Open
High	Low	Evaporator outlet pipe warm. Outlet air warm.	STV Stuck Open
High	Low	Noise from compressor	Compressor Malfunction
High	High	Outlet air warm. Liquid line very hot. Bubbles in sight glass.	Condenser Malfunction or R-12 Overcharge
High	High	Outlet air slightly cool. Bubbles in sight glass.	Large Amount of Air and Moisture in System.
High	High	Outlet air warm. Evaporator outlet sweating and frost.	Expansion Valve Stuck Open.

(1) - If equipped with a low refrigerant charge protection system, compressor operation may have stopped.

A/C SYSTEM SERVICE SPECIFICATIONS

REFRIGERANT OIL & R-12 CAPACITY TABLE

Application	(1) Oil Ounces	R-12 Ounces
Eagle	5.7	36

(1) - Total system capacity, unless otherwise noted.

SYSTEM REFRIGERANT CAPACITIES

Application	Pounds	Ounces
Eagle		
Medallion & Premier	1 7/8	29
Summit (FX105V)	2 1/4	36
Jeep		
CJ Models	2 1/2	40
Comanche	2	32
All Other Jeep Models .	2 1/4	36

COMPONENT OIL REPLACEMENT QUANTITIES

Component	Ounces
Accumulator	(1)
Condenser	1
Evaporator	1
Receiver-Drier	1
Compressor	
Premier	(1)
Medallion	5.7
Grand Wagoneer	8
All Other Jeep Models	7

(1) - Add amount drained plus 1 ounce.

COMPRESSOR BELT TENSION (Lbs.) (1)

Application	New Belt	Used Belt
Eagle		
1.4L & 1.7L	120-160	90-115
Jeep		
Regular Belt	125-155	90-115
Serpentine Belt	180-200	140-160

(1) - Using standard strand tension gauge.

COOLING SYSTEM CAPACITIES (1)

Application	Quarts (Liters)
Eagle	
Medallion & Premier	
With A/C	4.8 (4.5)

Without A/C 4.4 (4.2)

Jeep

Cherokee & Wagoneer (2)

4-Cylinder 10.0 (9.5)

V6 12.0 (11.4)

CJ & Scrambler

4-Cylinder 9.0 (8.5)

6-Cylinder 10.5 (9.9)

Grand Wagoneer & Truck (3)

6-Cylinder 12.5 (11.8)

V8 15.5 (14.7)

(1) - May vary +/- 15% due to system variations.

(2) - Includes 2.3 qts. (2.2L) in recovery bottle.

(3) - Includes 1 qt. (.9L) for heater.
