

• SUBJECT: 19EA OIL LOSS

F.E.R. 77-5

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ZONE TECHNICAL STAFF "C" DATE: DECEMBER 19TH, 1977

PURPOSE:

To advise the field of recommended troubleshooting techniques and repair procedures concerning 19EA Oil Displacement (Loss) problems.

MACHINES

AFFECTED: ALL 19EA MACHINES EXPERIENCING OIL DISPLACEMENT (LOSS) SYMPTOMS.

PROCEDURE:

This bulletin is to be read in its entirety before undertaking any oil loss problem on a 19EA machine. The problems outlined here will hopefully minimize investigative and corrective action time.

It contains all known past and present information concerning oil loss problems on the 19EA. However, if anyone has found other areas relating to this problem, please advise so others can benefit from your experience.

NOTE: THE ZONE OFFICE MUST BE NOTIFIED ABOUT ALL OIL LOSS PROBLEMS ON IN-WARRANTY MACHINES.

REGARDS,

DON CARLSON
DC/iam

ENCLOSURES

FILE INSTRUCTIONS:

TAB: COMPRESSOR
CENTRIFUGAL F.E.R. MANUAL

19EA OIL LOSS

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1.0 START-UP OR INITIAL START-UP OIL LOSS

- 1.1 Occasionally, a unit is encountered which requires an extra 1 to 5 gallons of oil to make the oil return system work. Adding this amount may solve the problem. All 19EA machines now shipped have the additional oil already added to the refrigerant charge.
- 1.2 At Start-Up, refrigerant flashes out of the oil in the reservoir, holding the reservoir pressure higher than the cooler, motor shell, and transmission cavity. This condition may cause oil to stack up in the transmission area. Oil will drop out of the sightglass and may or may not return during operation. However, if machine is shutdown shortly after start-up, oil should return to reservoir.
 - 1.2.1 Raise oil temperature to 155^o F. If problem persists, proceed to STEP 1.2.2.
 - 1.2.2 Add an additional vent line between the transmission inspection cover and either the oil reservoir cover or thru the side of the shell into the oil reservoir. Use 3/4" to 1" pipe. SEE FIGURE 1.

2.0 SEAL POT - CHECK VALVE ASSEMBLY

- 2.1 Early machines have a seal pot and float system (FIGURE 2). If the seal pot system is working, it is recommended that it be retained. The original design copper float ball has collapsed on occasion. This will be indicated by a full sightglass of oil. If a collapsed ball is found, and the assembly is to remain in use, replace it with a stainless steel ball, P/N EC28QZ-030.
- 2.2 If a problem is suspected in the seal pot-float system, the check valve/orifice assembly should be installed in its place.
 - 2.2.1 Remove the float valve and check valve.
 - 2.2.2 Remove the two lines between the float chamber and the discharge and bearing housing. SEE FIGURE 3. Plug the gas vent hole at the top of the discharge bearing housing.
 - 2.2.3 Install the new check valve/orifice assembly, P/N19EA41-262, in the oil drain at the bottom of the discharge and bearing housing. The check valve/orifice assembly has a 3/8" male NPT connection which fits into a 3/8" hole in the discharge bearing housing.

- 2.3 Later machines have a 3/16" orifice blowing refrigerant gas and seal leakage oil from behind the second stage wheel into the transmission cavity. Experience has shown that the centrifugal demistor can not handle the volume of gas from this size orifice (especially if any other leakage is present). These orifices should be modified to a 1/16" orifice. New machines have this modification.
- 2.3.1 Remove check valve. It is extremely difficult to do this modification thru the transmission inspection cover. The compressor cap may have to be lifted. SEE FIGURE 4.
- 2.3.2 Solder 3/16" orifice closed on threaded end.
- 2.3.3 Drill thru solder with 1/16" twist drill.
- 2.3.4 Replace check valve in compressor.
- 2.4 The following chart outlines the seal system that may be on a machine by compressor serial number.

<u>SEAL SYSTEM</u>	<u>COMPRESSOR S/N</u>
SEAL POT-FLOAT SYSTEM	100440 AND BELOW (4/71)
WITH 3/16" ORIFICE	100441-100717 PLUS 100719, 21, 23, 24, 26, 30, 33, 34, 35, 36, 38.
WITH 1/16" ORIFICE	100718 AND ABOVE (NOTE ABOVE EXCEPTIONS)

3.0 EXCESSIVE TRANSMISSION CAVITY PRESSURE

- 3.1 In operation, the centrifugal demistor system should hold the transmission cavity pressure at about 1 PSI below motor shell pressure. This permits refrigerant gas to flow across the motor shaft labyrinth to the transmission area rather than oil mist from the transmission to the motor.

If gas leakage into the transmission area is excessive the demistor system is overloaded and the result is continual oil loss of 1 to 5 gallons per week across the motor shaft labyrinth.

To test for this reversal of pressures, a pressure gage should be installed to measure the pressures in the transmission cavity and in the motor shell. SEE FIGURE 5 for a suggested hook-up. If the transmission cavity pressure is the greater of the two, a gas leak exists.

NOTE: EXTREME CARE MUST BE USED WHEN DRILLING INTO THE MOTOR SHELL. ANY METAL FILINGS WHICH ENTER THE MOTOR SHELL COULD CAUSE SERIOUS DAMAGE TO THE STATOR.

3.2 Sources of gas leakage into the transmission cavity.

3.2.1 Wrong size orifice - SEE SECTION 2.0 for repair.

3.2.2 Gasket leak along splitline of compressor.

3.2.2.1 The flat gasket should be cut carefully to fit against the discharge wall and O-Ring and glued in place with Permatex #2 so it does not move away from the O-Ring when the compressor cap is lowered.

3.2.2.2 A strand of approximately .020" diameter polished twine should be added (SEE SKETCH 6) to the split line gasket on the inboard side of the compressor. Hold the twine in place with a thin coat of Permatex #2.

3.2.2.3 In replacing the O-Ring, Item 6 (FIGURE 6), flats one inch above and below the splitline may be filled with epoxy, and contoured with a narrow flat file. Apply grease to the O-Ring to avoid pinching it as the compressor cap is lowered.

3.2.3 Missing or plugged demister nozzle - this causes a reduction of the demister system's capacity. If a nozzle is missing, inspect for motor damage. Clean threads with Locquic and install new nozzle with Loctite.

3.2.4 Excessive clearance at the motor shaft labyrinth. Clearance should be .006-.010" on the diameter.

4.0 REAR SEAL GAS LEAKAGE

4.1 Leakage at the motor end carbon is not likely in a running condition since there is little pressure drop across the seal. At start-up, however, oil can be lost if the rear carbon is worn. Inspect and replace the seal if necessary. Check for binding of O-Ring (ITEM 19, FIGURE 7) against the seal ring by depressing seal ring against spring. Lubrication of O.D. of carbon ring will usually eliminate binding.

4.2 Motor cooling refrigerant may be mixing with the oil due to a bad O-Ring joint (ITEM 14, FIGURE 7). This will cause continuous oil foaming and low oil temperatures.

5.0 FRONT CARBON SEAL

5.1 Oil loss due to excessive leakage of gas at the front carbon seal is usually noticeable only after the carbon breaks or is so badly damaged that the oil is not being returned.

5.2 Test for a broken seal.

5.2.1 With the unit shutdown and the refrigerant charge in the utility vessel, remove the plug at 5 o'clock on the discharge volute.

5.2.2 Drain any oil that may be in the volute.

5.2.3 Run the oil pump. If oil appears in the volute, the seal is damaged.

5.3 Carbon Seal Replacement

5.3.1 Remove suction elbow, inlet vanes, impellers, intake wall, inner stage diaphragm.

5.3.2 Replace existing seal ring (P/N 19EA41-1143 or 19EA51-1902) with the new seal ring (P/N 19EA-41-601 or 19EA51-601). A new contact ring should also be installed with the new carbon seal ring.

6.0 LOW LOAD OIL LOSS

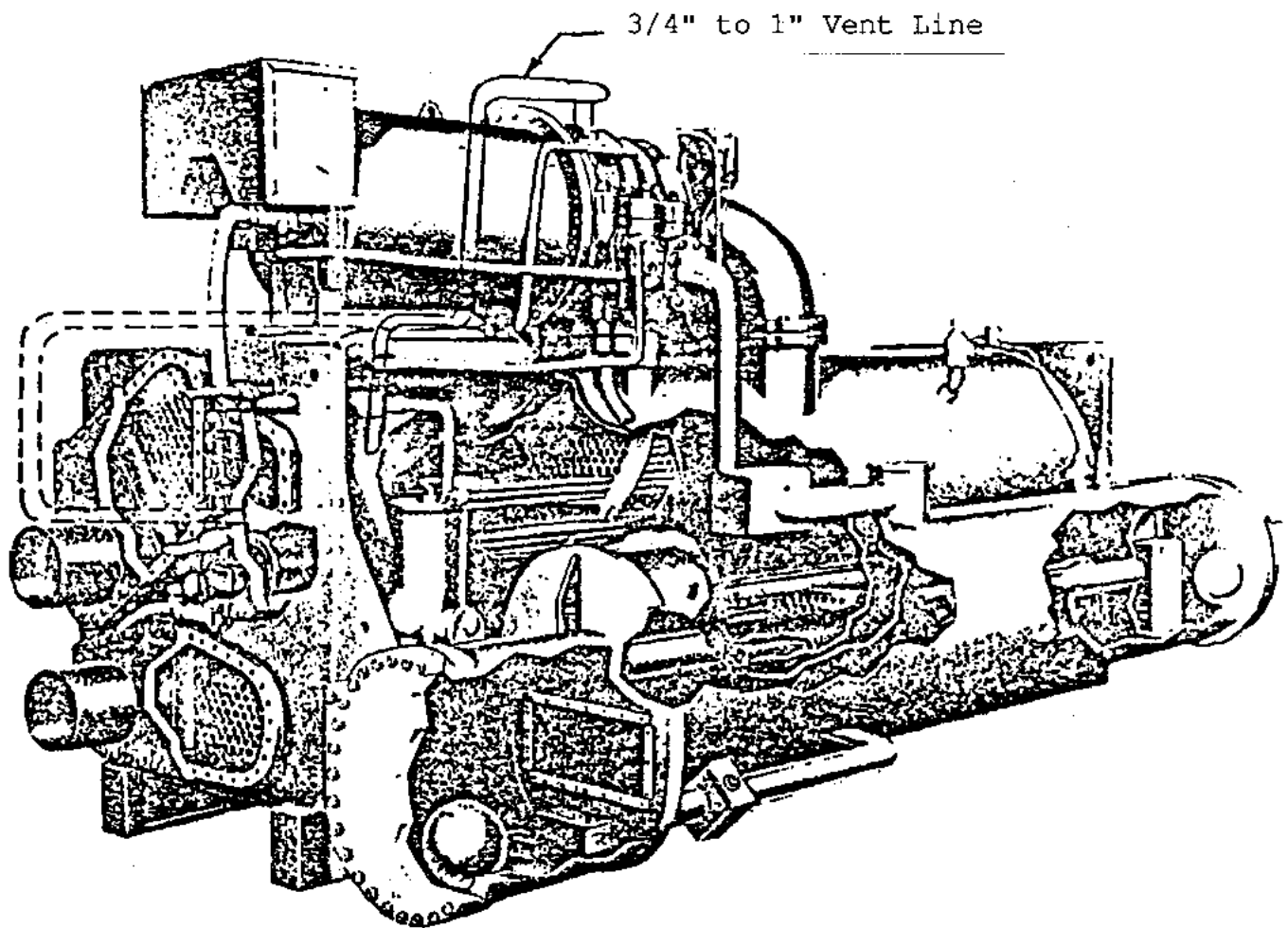
6.1 With the inlet guide vanes closed, the oil return system can become less effective on some machines. The oil that is usually carried with the refrigerant gas into the compressor suction remains in the cooler.

6.2 Oil return modification for low load oil loss.

6.2.1 Drill and tap a 3/8" hole approximately three rows down from the top row of tubes in the cooler. This location is approximately four (4) inches down from the filter-drier return connection. Consult BULLETIN 19SB-76-8E for dimensions.

6.2.2 Drill and tap a 3/8" hole in the downstream side of the inlet guide vanes. This connection is located at the suction of the first stage impeller. CONTACT ZONE SERVICE ENGINEERING for the exact location for this connection since the dimensions between vanes and the impeller differ for different impeller combinations.

6.2.3 Connect these two holes with 3/8" copper tubing. Install a 3/8" angle valve and sightglass in the line so the flow can be controlled. SEE FIGURE 8.

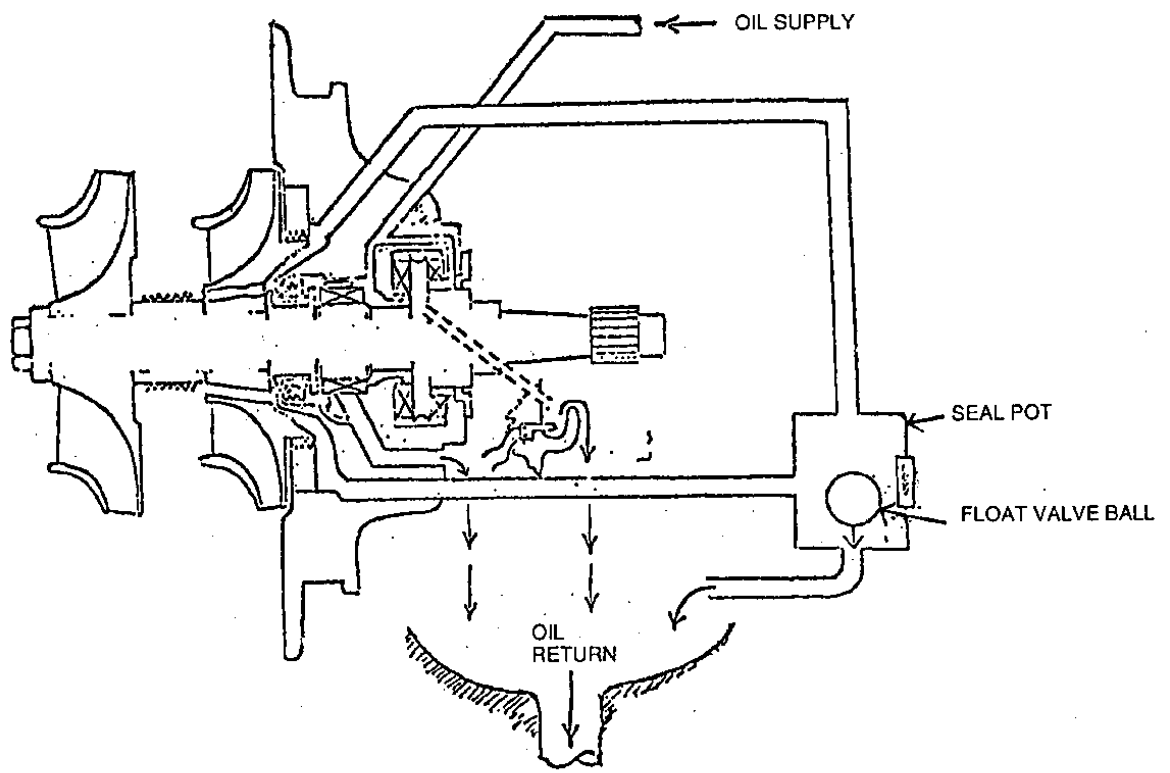


Typical 19EA4 Machine

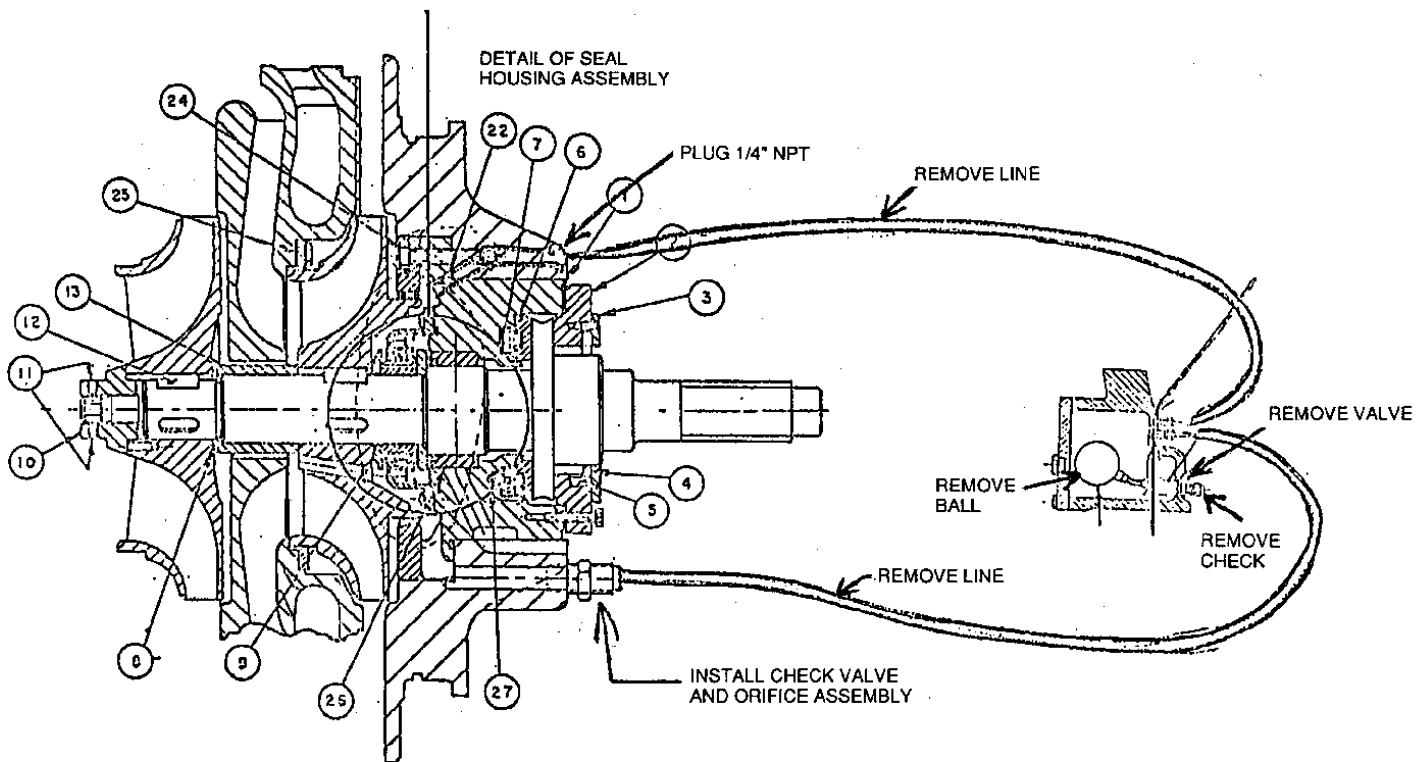
ADDITIONAL VENT LINE

From Transmission Inspection Cover to Either Oil Reservoir Cover
or Through the Side of the Shell

Fig. 1



Compressor Lubrication System
Fig. 2



Rotor and Bearing Assembly

ASSEMBLE CHECK VALVE
FILL BORE WITH SOLDER

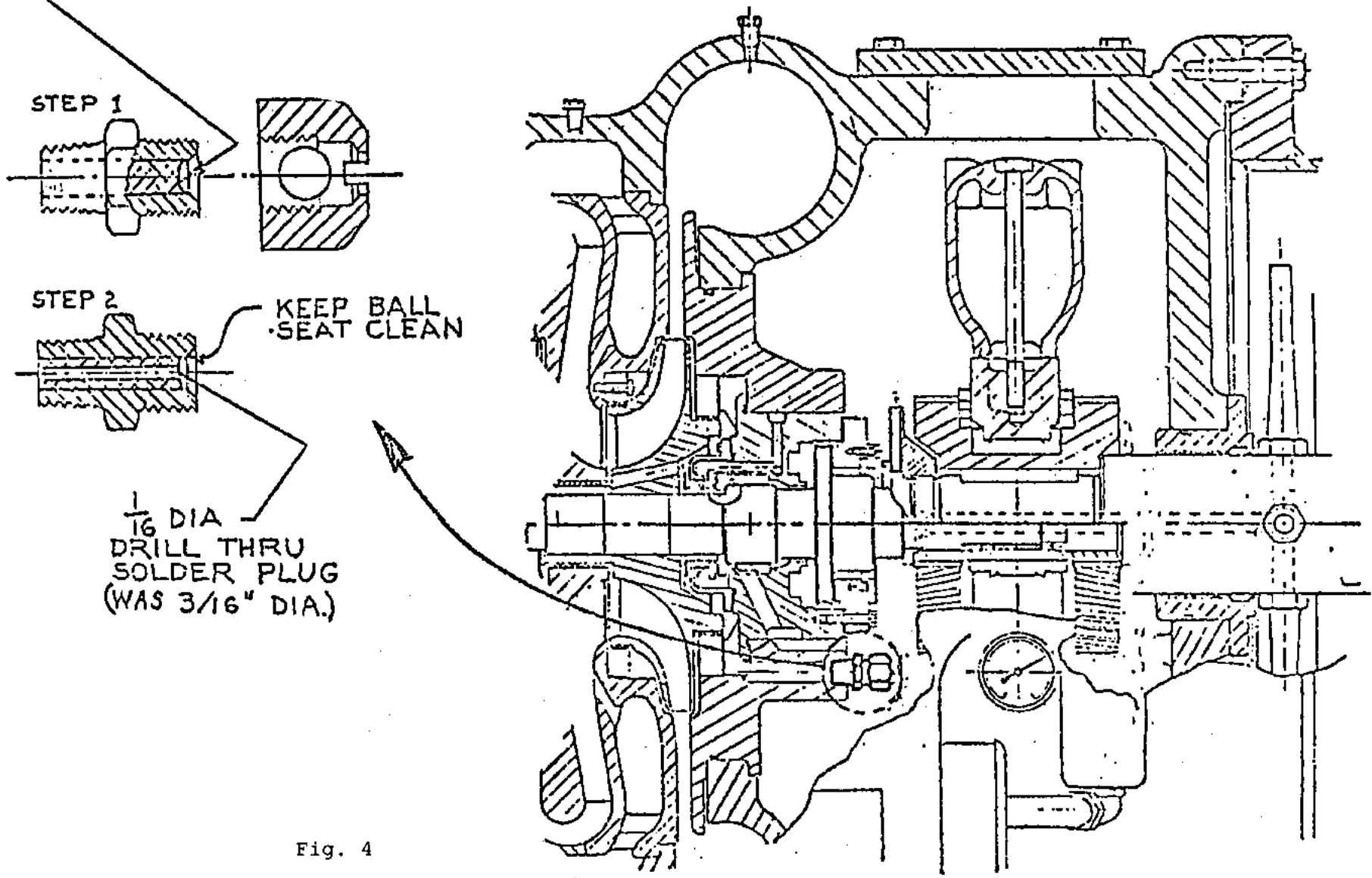
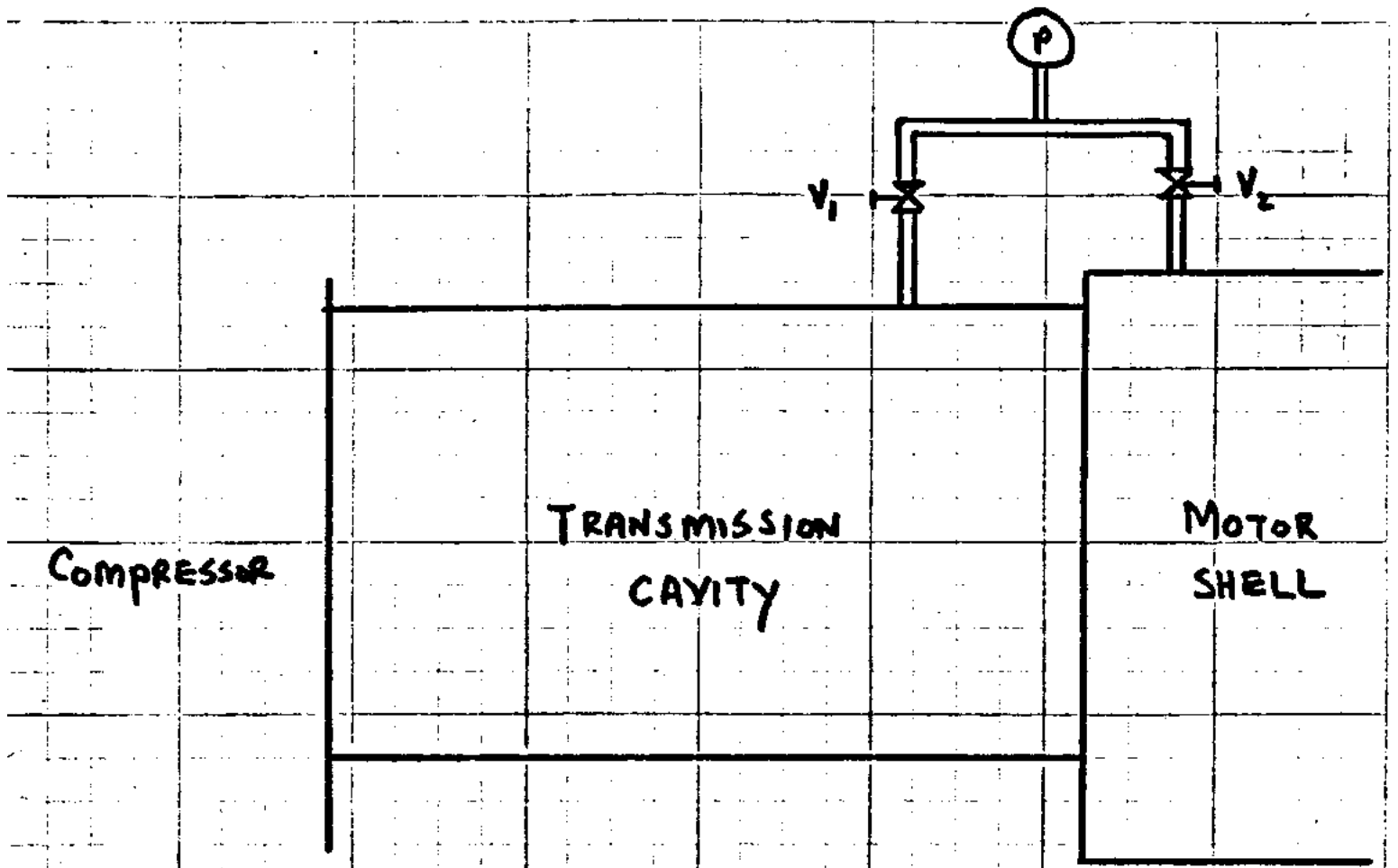


Fig. 4

1/16" Check Valve Orifices. (In Lieu of Seal Pot and System)



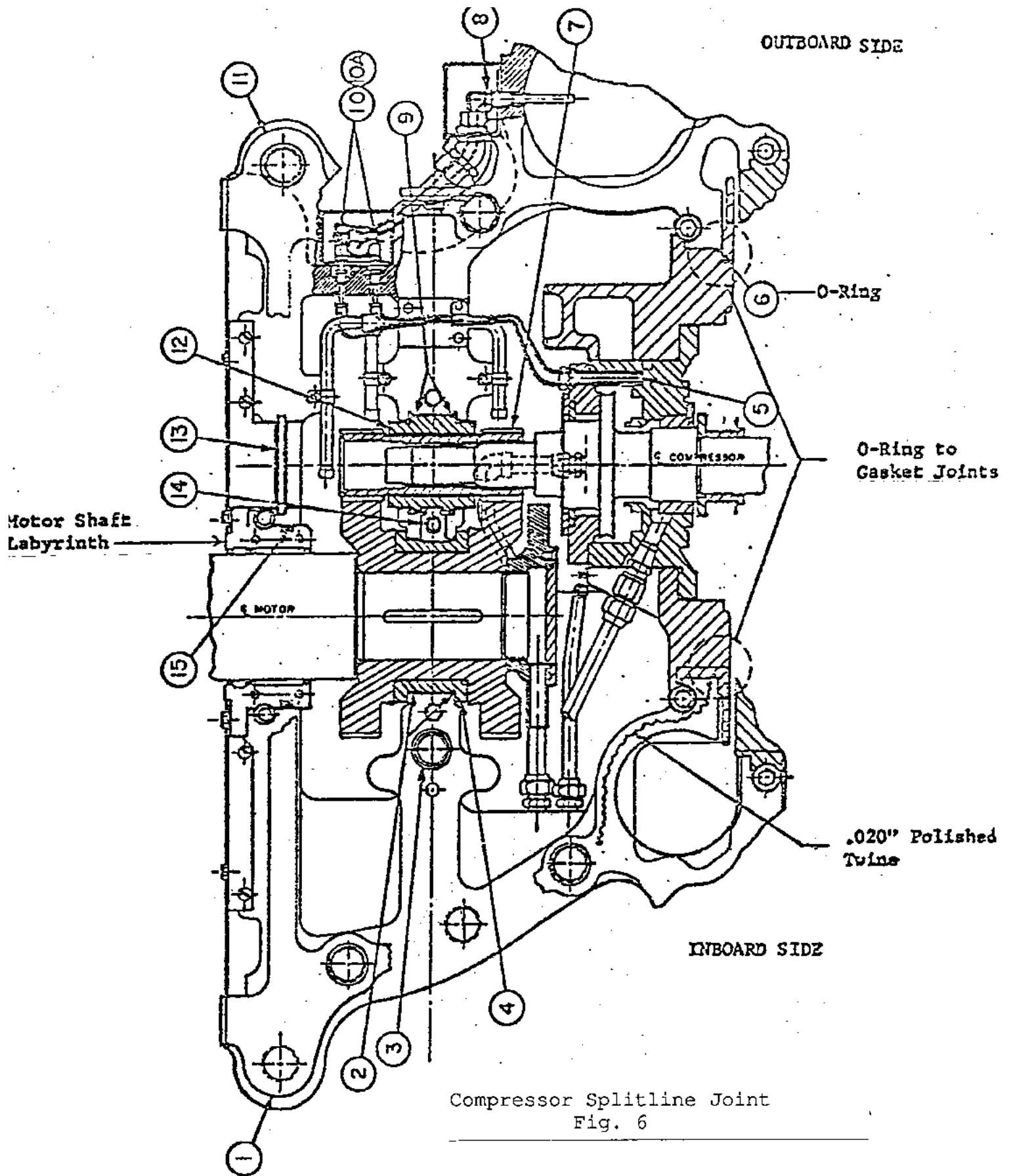
To MEASURE TRANSMISSION CAVITY PRESSURE :

V1 - OPEN
V2 - CLOSED

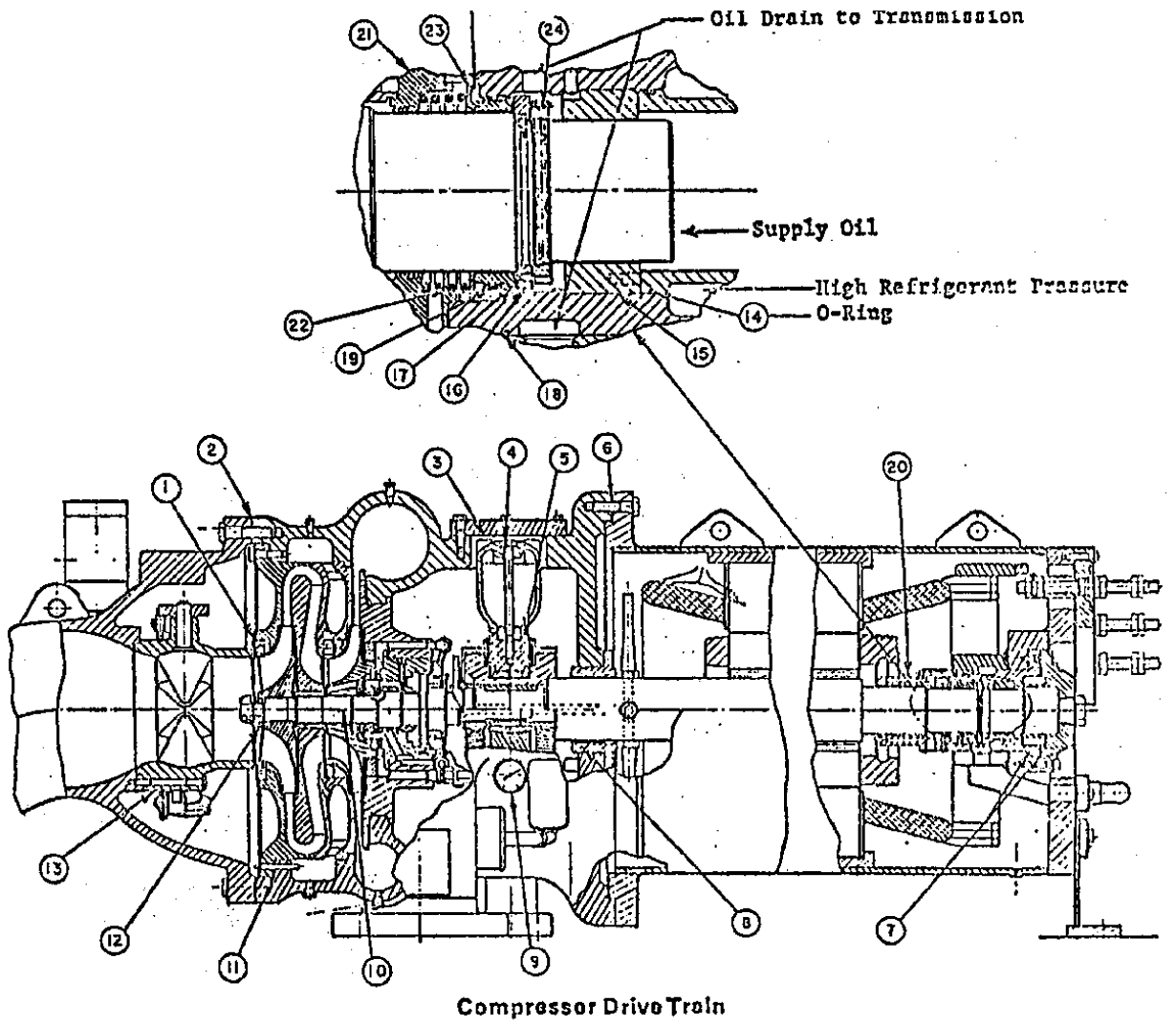
To MEASURE MOTOR SHELL PRESSURE :

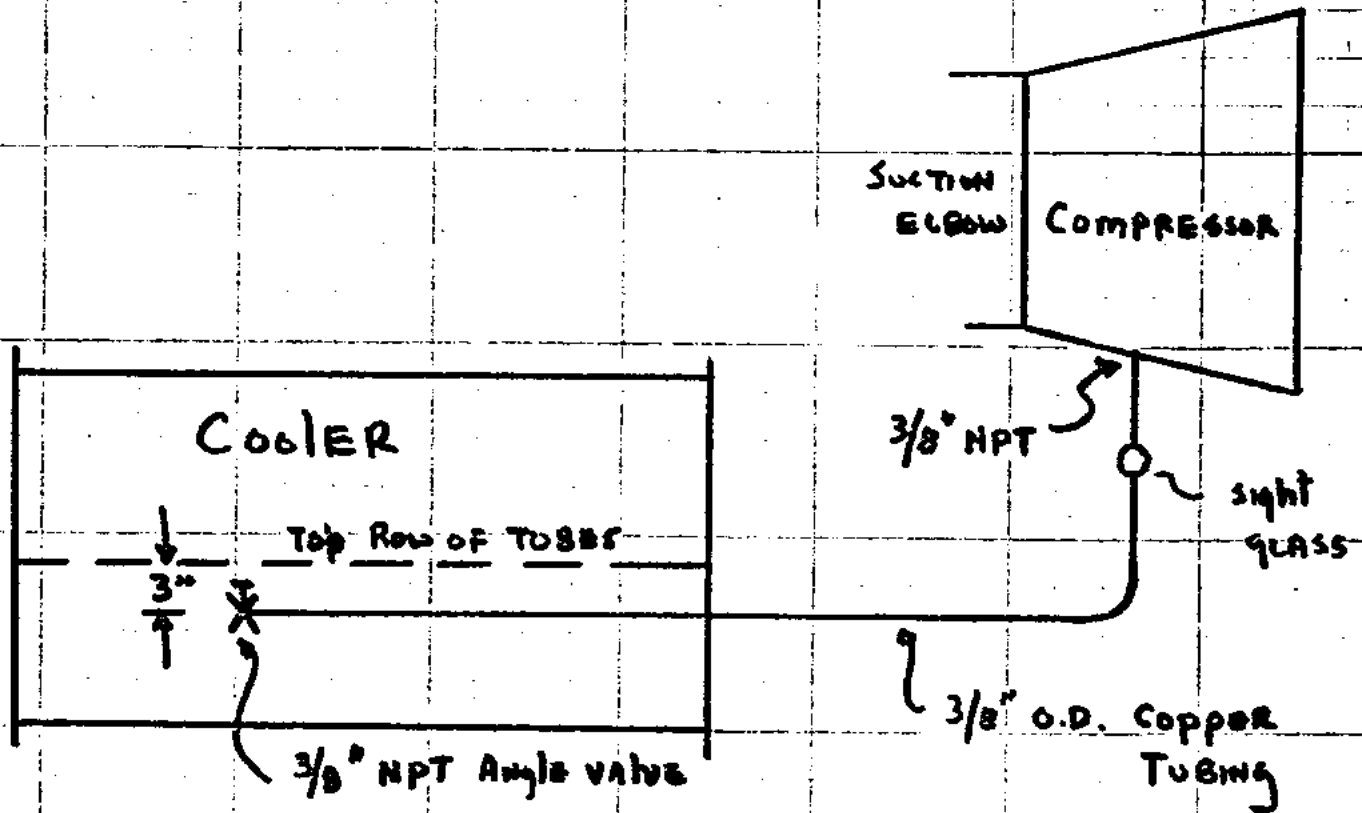
V1 - CLOSED
V2 - OPEN

Method to Check Pressure Differential
Fig. 5



Rear Carbon Seal
Fig. 7





Angle valve : CARRIER P/N EP23LA155
 3/8" NPT x 1/2" SAE FLARE

19EA LOW LOAD OIL FILTER

Fig. 8

19EA5

