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Commercial Division
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SERVICE BULLETIN

SUPERSEDE BULLETIN:
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SUBJECT: 17DA COMPRESSOR

PURPOSE

To transmit information concerning the operation, disassembly and assembly of the shutdown seal, thrust and journal bearings.

MACHINES AFFECTED

17DA compressors equipped with the shutdown seal. (Serial No. 12509 and later)

BACKGROUND

Previously, our 17DA compressors had a sealing device incorporated in the carbon iso-seal which contained shutdown pistons. The main oil pump had to be kept running continuously in order to prevent gas leakage into the bearing chamber and out to the atmosphere.

The compressor seal has been redesigned to incorporate a static teflon shutdown device which seals off the bearing chamber on shutdown. This permits the oil pump to be shut off after machine shutdown. Included with this new seal is a safety switch which prevents the compressor from being started until the shaft shoulder and static teflon seal are disengaged.

Operation of the Shutdown Seal (Figure 1 and Figure 5)

During shutdown the shaft shoulder (shown on Figure 1) is pressing against the teflon seal ring (52). This provides a static seal which prevents refrigerant gas from passing by the carbon (37) into the bearing chamber which is under atmospheric pressure. The shutdown seal is operated in the following fashion:

Starting Machine (Figure 1 and Figure 5)

A hand operated bleed valve is located on the side of the outer bearing case. This bleed valve connects the area behind the counterthrust bearing (12) to the main oil reservoir. Before starting the main oil pump, the bleed valve should be open. (There is an elbow with a 1/16" orifice (Figure 4) at the inlet of the counterthrust bearing housing to prevent oil pressure from building up until the bleed valve is closed.) The oil pump should then be started allowing any air in the line to escape. After a few moments the bleed valve should be closed. Once this is accomplished oil pressure builds up, passing through the check valve (61) into the cavity behind the counterthrust bearing (12). The counterthrust bearing (12) acts as a hydraulic piston pushing against the thrust disc (18) which is keyed to the compressor shaft. This moves the shaft towards the seal end of the compressor 1/16" until the counterthrust bearing (12) seats at POINT A. This movement disengages

the teflon shutdown seal (52). Simultaneously the switch activating tab (56) activates the plunger (63) and closes the shutdown seal switch (27) which allows the compressor to be started.

Stopping the Machine (Figure 1 and Figure 5)

At shutdown high pressure oil drops to atmospheric pressure and closes the check valve (61). High pressure is still maintained behind the counterthrust bearing (12) during the time it takes for the shaft to stop rotating. Once the shaft has stopped rotating the bleed valve must be opened. This drains the existing oil behind the counterthrust bearing (12) into the oil reservoir. Pressure on the refrigerant side of the wheel will push the shaft towards the drive end and engage the shutdown static seal. This in turn allows the plunger (63) to return to its rest position and open the shutdown seal switch (27). With this switch open the compressor cannot be started again until the shaft is moved off the teflon seal seat and the switch is again closed.

It is important that the bleed valve remains closed during machine operation because at compressor shutdown the shaft will tend to return to its normal shutdown position. With the cavity behind the counterthrust filled with oil and closed off, the shaft cannot move if the compressor trips or is shut off and coasts down. A constant supply of oil is maintained to the counterthrust bearing (babbitt side) at all times. The main oil pump should be kept running until the compressor has stopped rotating.

Figure 4 depicts the entering and leaving oil connections for the counterthrust movement piston (counterthrust bearing).

Refer to Figure 5.

First let us explain how the shutdown seal opening is determined at the factory to give some background to the person who is reading this bulletin and has never been into a 17DA compressor.

The operation of the bleed valve and movable counterthrust bearing must be fully understood before reading any further. This was explained earlier in this bulletin.

The seal opening has 1/16" minimum and 5/64" maximum (.0625" to .078") tolerance. As you can see the length of the thrust disc spacer (21) determines how far the shaft shoulder will move off of the teflon seal face when pressure is applied to the back of the counterthrust bearing (hydraulic piston) and it seats at "POINT A" on the thrust bearing housing. This spacer is ground at the factory such that the seal opening is within the above limits when the counterthrust bearing is seated at "POINT A".

There are two methods to determine whether or not the shaft shoulder moves the prescribed amount off of the teflon seal ring when pressure is applied to the back of the counterthrust bearing.

The first method is to set a dial indicator on a convenient place such as the shaft end or coupling hub in order to take an axial movement reading. Use the following steps.

1) Open the bleed valve. (If there is refrigerant pressure in the machine the oil pressure will push the shaft towards the drive end and engage the teflon seal. If there is no gas pressure the shaft must be manually jacked all the way towards the drive end.)

2. Set dial indicator to 0.

3. Apply pressure to the back of the counterthrust bearing by starting the oil pump (if wired up) or using a bottle of R-12 to the orificed elbow inlet to the counterthrust bearing.

4. Close the bleed valve.

Note the movement of the shaft. It should be 1/16 + - 1/64 o. From this point we should have .008 to .012 in. additional movement which is thrust clearance. Use the coupling locknut or hub as a pry point to be sure there is adequate thrust clearance.

It can be seen that if there is .0" thrust clearance we do not know whether or not the counterthrust bearing has seated at POINT A or not. There is a possibility that the thrust disc has moved against the thrust shoes before the counterthrust has seated at POINT A. This may only be true when there is .0" thrust clearance. Should this be the case we must inspect the machine for damage or misassembly.

If there was adequate thrust clearance we can be sure that the counterthrust bearing has seated at POINT A. The axial movement previously taken is then the "seal opening." Again it must be between 1/16" and 5/64". If it is not within these tolerances it must be corrected. This will be covered later in this bulletin.

The second method of determining the proper "seal opening" must be used whenever the carbon seal is inspected. The reason for this is that we use the contact ring seal shoulder on the shaft as a reference point in relation to the seal housing face. This method is covered later in this bulletin giving the exact steps and measurements needed to determine proper shutdown seal opening.

Disassembly of the Shutdown Seal

On the 17DA compressor the seal and bearings can be completely disassembled from the drive end. Journal bearings, thrust and counterthrust bearings, the carbon seal and its mating parts may all be removed without the necessity of pumping the machine down. Should the shutdown seal need to be replaced, however, the machine will have to be pumped down.

All parts should be kept clean and arranged in an orderly fashion on a clean, lint free cloth to avoid misplacing or omitting any parts during reassembly. All open piping connections should be covered to prevent loss of any small pieces.

A compressor cross section is shown on Figure 2 showing all the various clearances needed to assemble the compressor.

Thrust End Disassembly - (Refer to Legend Page and Cross-Section)

1. Remove the coupling spacer.
2. Remove the coupling hub from the compressor shaft.
3. Remove thermometers (55) and thrust bearing indicator shutdown device (Legend Page).
4. Remove shaft end baffle (1) by unscrewing the four flat head screws (2).
5. Remove shaft end labyrinth (3).
6. Remove end cover (4).
7. Remove upper bearing chamber housing.
8. Remove all necessary tubing assemblies.
9. Remove clamp ring (5).
10. Remove baffle plate (8) by unscrewing the four cap screws (9).
11. Remove seal ring (10).
12. Remove plate (6) by unscrewing the six cap screws (7).
13. Remove the counterthrust bearing housing (11). Within this housing the counterthrust bearing (12) is held in place by two O-rings (13 and 14).
14. Remove upper bearing housing (15) and upper liner (23) by removing four cap screws (58) and two taper pins (59). The shutdown switch (27) and push rod assembly (60) are mounted in the upper housing.
15. Remove set screw (17).
16. Remove locknut (16) which holds the thrust disc on by turning it in a counter-clockwise direction using a spanner wrench.
17. Remove thrust disc (18) and key (19).
18. Remove thrust bearing assembly (20). Shim assembly (24) and screws (25) are attached to the thrust assembly and will come out with it.
19. Remove thrust spacer (21).
20. Remove lower bearing liner (23). Use a sling or another method to lift the shaft slightly if necessary.
21. Remove lower bearing housing (22) by rolling out. It should slide out freely. Wiper plate (26) and screws (28) will come out with the housing.

The thrust end is now disassembled. All parts left out on the bench should be oiled thoroughly to prevent oxidation. Oxidation can occur overnight.

Seal End Disassembly

1. Remove wiper plate (53) by unscrewing the four cap screws (57).
2. Remove upper bearing housing (29) by unscrewing the four screws attached to the seal housing, unscrewing the two cap screws, loosening the two taper pins.

3. Remove bearing liner upper and lower (30). A sling or other lifting device may have to be rigged to lift the shaft slightly in order to remove the lower bearing liner.
4. Remove lower bearing housing by unscrewing the four screws which attach it to the seal housing.

   Note: The inner parts of the carbon seal are exposed and the shaft is now resting on the seal housing labyrinth (51).

5. Remove outer spring retainer (41) by removing the three cap screws (40). This relieves tension on the seal parts.
6. Remove set screw (31) which loosens the teflon locking pellet (32) and then locknut (33) by turning it in a counterclockwise direction.
7. Remove rotating contact ring (34) by first pulling it out approximately 1/2" and then pushing it back in. The two keys (35) will remain in their keyways and can then be removed. Do not attempt to remove the contact ring over the keys. The keyways in the contact ring are not cut through the entire thickness of the ring.
8. Remove O-ring (36) from the shaft.
9. Remove carbon ring (37) being careful not to touch the seal surfaces.
10. Remove contact sleeve (38) by screwing two capscrews into the inner spring retainer (42) and pulling on the screws. The inner spring retainer will pull the contact sleeve (38) with it. Do not be afraid to pull hard.

    The compressor can be dismantled up to this point without pumping the machine down. There might be intermittent sounds of refrigerant leaking by the teflon ring due to moving the shaft around as parts are removed.

    If the teflon seal is to be replaced or looked at, the machine must be pumped down.

    To remove the teflon seal continue with steps 11 thru 15.

11. Loosen seal housing assembly (44) by removing the 12 cap screws which fasten it to the compressor wall. Slide the housing out towards the drive end. Cap screws may have to be used as jacking bolts in order to free the housing. The housing should be pulled straight back when removing it.

    Note: Any binding felt is due to the weight of the shaft on the shaft labyrinth. The sling should again be used to lift the shaft slightly until the seal housing is freed. Once the housing has slid out, the shaft will sit on the impeller labyrinth. Do not turn the shaft while it is sitting on the impeller labyrinth.

12. With the seal housing on the bench, it is possible to remove the eight seal springs (43). Check them each for free length. They should all be approximately the same height. If not, replace them all with new ones.
13. Remove labyrinth (51) from seal housing by unscrewing eight cap screws (54).
14. Remove shutdown seal retainer (48) by unscrewing the cap screws (54).

15. Teflon seal ring (52) and shutdown seal housing (49) may now be removed from the seal housing (44).

    Note: All seal parts have now been removed. Examine all critical surfaces and fits. All the O-rings should be replaced each time the seal is apart. Examine the teflon seal ring carefully and replace it if necessary. Check all the wearing rotating parts. The lapped surfaces on (34), (37) and (38) should be free of knicks and scratches. Avoid touching the surfaces because moisture from the hands will harm them and the sealing action will be effected. Cover them liberally with oil and place in a soft lint free rag or "gift wrapping" tissue.

Seal Assembly

With the seal housing on the bench, assemble the following items:

1. Insert the teflon seal ring (52), seal ring retainer (48), into the seal ring housing (49).
2. Bolt the seal ring housing (49) to the seal housing (44), using the eight cap screws (47). Be sure to replace the O-ring (50).
3. Check the fit of labyrinth (51) before attaching it to the seal housing (44). See Figure 2 for labyrinth clearance.
4. Bolt the labyrinth (51) to the seal housing using the eight cap screws (54). Be sure the O-ring (46) is in place.
5. Insert a new O-ring (39) into the seal ring housing (49).
6. Insert the eight seal springs (43) into the seal housing.

    Note: The seal housing is now ready to be bolted in. Check again to be sure that all the O-rings are in place.

7. Mount the seal housing assembly. Be sure to replace the O-ring (45). Use the reverse procedure of "Seal Disassembly" under Step 11.
8. Insert the inboard spring retainer (42) over the seal springs (43), insuring that the anti-rotation pin is lined up and engaged with the anti-rotation slot in the spring retainer (see Figure 4).
9. Insert contact sleeve (38) pushing it as far in as possible. Insure that the contact sleeve engages the anti-rotation pin of the inner spring retainer within one of its notches. (The contact sleeve should not rotate.) KEEP YOUR FINGERS OFF THE SEAL FACE. USE OILED TISSUE PAPER.

    NOTE: THESE SEAL PARTS ARE LAPPED AND THE SURFACES SHOULD BE KEPT CLEAN AND FREE FROM LINT AND DUST. A FILM OF OIL SHOULD BE PUT ON ALL SEAL PARTS BEING ASSEMBLED.

Shaft Position Check

A check must be made at this point to insure that the shaft and impeller are in the proper axial position when the compressor is running. This position also determines the correct "shutdown seal opening." The thrust end will have to be assembled in order to make this check. Use the following procedure.

1. Insert lower seal end bearing liner and housing (24).
2. Insert lower bearing housing (22) and bearing liner (23) (thrust end). Use plenty of oil to coat the liner surface and shaft.
3. Check the thrust spacer (21) to see that it can be reused. It must be absolutely parallel and square with the shaft. Should a new spacer be needed, follow the procedure under "Shaft Adjustment."
4. If the original spacer can be used slide the thrust spacer (21) on the shaft until it is flush against the shaft shoulder. This spacer is individually ground at the factory and positions the thrust disc on the shaft. This important dimension must be kept to insure adequate impeller clearance.
5. Insert thrust bearing assembly (20) including shim assembly (24).
6. Insert thrust disc (18) and key (19).
7. Mount the locknut (16). Be sure it is mounted as shown. The inner surface of the seal ring (which is babbitted) must ride on the outer diameter of the locknut. Take up until it is tight with a spanner wrench and small drift punch. Lock it with set screw (17). Reversal of the locknut will result in low oil pressure.
8. Insert upper bearing housing and liner.
9. Insert counterthrust housing (11) onto the back of the upper and lower bearing housings using the six cap screws (6). Note: Tighten counterthrust housing bolts before tightening bearing housing split line bolts.
10. Insert clamp ring (5). Be sure the two dowels in the clamp ring are in place.

An important measurement must be made at this point. This measurement shows whether the shaft and impeller are in their correct axial position. Figure 6 depicts the two machined surfaces that are used as reference points. The distance between the seal housing face and the seal shoulder or the shaft must be between 1 59/64" (1.922) and 1 61/64" (1.953") when the counterthrust bearing is seated at POINT A (Figure 5). To seat the counterthrust we must apply pressure to the back of the counterthrust bearing. Use compressor air or a bottle of R-12. Use a steel rule and a straight edge to make the measurement.

CAUTION: To be sure the counterthrust bearing has seated at POINT A, there must be some thrust clearance after pressure is applied to the counterthrust housing. Without thrust clearance we do not know whether or not the counterthrust bearing has seated at POINT A or the thrust disc has come against the thrust shoes.

If the original thrust disc spacer and thrust bearing assembly are used, this measurement should be well within the tolerances given. If it is not, recheck the measurement.

Should the required distance still be outside the tolerances, several possibilities may occur:

First, the distance may be below the minimum dimension. If this is the case the spacer has possibly been ground incorrectly and a new one will have to be installed. Follow the procedure under "Shaft Adjustment."

Secondly, the distance may be above the maximum dimension. This means that some of the spacer will have to be ground. To decide how much, subtract the median of the two tolerances (1.937) from the indicated measurement and this is the amount that must be ground off the spacer. Do not remove any shims from behind the thrust bearing to correct the measurement.

Once the correct seal housing face and seal shoulder distance is obtained, disassemble the thrust end completely. Use the steps under "Thrust Disassembly" starting at Step 13.

10. (Seal Assembly Continued) Slide O-ring (36) over shaft and be sure that it is firmly in place.
11. Insert carbon ring (37).
12. Insert rotating contact ring (34) and insert two keys (35). Hold with fingers on the O.D. only.
13. Screw on locknut (31) and tighten using a small drift punch.
14. Lock the nut in position with set screw (33) and locking pellet (32).
15. Attach outer spring retainer (41) to inner spring retainer (42). Take up until screws are tight. This is a very delicate operation because of the tension of the springs.

    A check should be made here to insure that the pin on the inner spring retainer is engaged within one of the notches on the contact sleeve. To do this press on the outer retainer firmly at several points diametrically opposite. The retainer should move inwards approximately 1/8". Do this at 45° intervals around the circumference of the outer retainer to insure the spring retainer pin is engaged in one of the notches of the contact sleeve (see Figure 4).

16. Reassemble the remainder of the seal end. Use the reverse procedure of "Seal Disassembly" from steps 4 to 1. Be sure to check bearing liner contact with blueing.

Thrust Assembly

1. Insert lower bearing housing (22) and bearing liner (23). Use plenty of oil to coat the liner surface.
2. Slide thrust spacer (21) on the shaft until it is flush with the shaft shoulder.
3. Insert thrust bearing assembly (20).
4. Insert thrust disc (13) and key (19).

5. Mount the locknut (16). Be sure it is mounted as shown. The inner surface of the seal ring (10) (which is babbitted) must ride on the outer diameter of the locknut. Take up until the nut is tight with a small drift punch. Lock it with set screw (17). Reversal of the locknut will result in low thrust bearing oil pressure.
6. Remove counterthrust bearing (12) from its housing (11). Replace O-rings (13 and 14) and insert counterthrust bearing (12) back into its housing. Be sure switch activating tab (56) is in place and the screws holding it are tight.
7. Insert upper bearing housing and liner. Take journal bearing clearances with "Plastigage." See Figure 2 for clearances.
8. Mount counterthrust bearing housing (11) onto the back of the upper and lower bearing housings using the six cap screws (7). Tighten these six cap screws before tightening the bearing housings together.
9. Insert clamp ring (5).

The compressor is now ready to check the thrust clearance and double check the amount of seal opening. First be sure the shaft is fully back in the shutdown position. Pry the shaft all the way back towards the drive end using the coupling locknut as a pry point until it will not move any further. If the machine has pressure the impeller and shaft assembly will be pushed towards the drive end by that refrigerant pressure.

10. Mount a dial indicator on any convenient spot on the shaft that will give a reliable axial shaft movement reading.
11. We must now move the counterthrust bearing (12) until it seats at POINT A by applying pressure in back of the counterthrust through the orificed elbow (67).

Any pressure source can be used. Insert oil lines (tubing assemblies) or use a bottle of compressed air or R-12. Do not exceed a pressure of 125 pounds. If oil pressure is used put a rag over the temperature well in the bearing housing. This prevents oil from spurting out.

12. Open bleed valve if oil pressure is used. If not, insert a flare cap over the outlet to the counterthrust housing (Figure 4).
13. Close bleed valve (not shown). (If oil pressure is used.) If not, apply pressure to the orificed elbow (67) inlet to the counterthrust housing.
14. With the upper bearing chamber housing still off, note the movement of the shaft. It should be at least 1/16" +-1/64 0.

    The counterthrust bearing will be pushed forward by the oil pressure (gas pressure if used) and then seat at "POINT A" (shown on Figure 5). If this movement is less than 1/16", check assembly.

15. With the shaft in this position (step 14) and keeping pressure in back of the counterthrust bearing (12) pry the shaft all the way to the seal end. Then pry the shaft back as far as it will go towards the drive end. Note the movement of the dial indicator. Thrust clearance should be .008 to .012 inches.

CAUTION: Remember if there is no thrust clearance we do not know whether the counterthrust bearing has seated at "POINT A" or the thrust disc has moved up against the thrust shoes.

If there is no thrust clearance, disassemble the thrust end and remove the entire shim assembly (24). Removing this assembly will allow the counterthrust to move far enough to seat at "POINT A".

IF THE THRUST CLEARANCE IS CORRECT CONTINUE TO STEP 16.

If the thrust clearance is not correct, continue with the following steps:

A. Stop oil pump (if used) or remove pressure source.
B. From the reading taken in step 15 decide whether to add or remove shims and how much.
C. Remove necessary tubing assemblies.
D. Remove clamp ring (5).
E. Remove counterthrust housing (11).
F. Remove upper bearing housing.
G. Remove anti-rotation pins which prevent the thrust bearing assembly from rotating.
H. The thrust shim assembly is attached in two halves. Remove or add shims as necessary. Be sure both halves measure the same thickness. Each shim is laminated and is .003" thick.
I. Reassemble using steps from 7 to 9 under "Thrust Assembly."
J. Recheck shaft movement (seal opening) and thrust clearance using steps 14 and 15 under "Thrust Assembly."

Thrust Assembly (continued)

16. Insert seal ring (10). Be sure the pin is in its anti-rotation slot.
17. Insert baffle plate (8) (hole side down). This hole is used to drain oil which normally passes by the seal ring (10).
18. Insert all tubing assemblies and baffle plate (6).

The seal movement switch (shutdown seal switch) (27) should be adjusted as follows:

A. Terminals should be connected to "normally open" contacts.
B. With the counterthrust bearing (12) seated at "POINT A" adjust screw (62) to position switch plunger (63) .020 to .025 past the switch actuation point.
C. Double locknuts (65) provide a stop for the push rod assembly when the housing is removed.

19. Insert upper bearing chamber cover.
20. Insert end cover (4).
21. Insert shaft end labyrinth (3).
22. Insert end baffle (1) and two thermometers (55).

NOTE: IF the machine is to be pressure tested above 150 psig, a special spacer will have to be machined to insert behind the counterthrust bearing. The thickness of this spacer should be 3/16". This spacer will prevent the high pressure from pushing the shaft shoulder into the teflon seal ring (52) thus causing damage to it.

Shaft Adjustment

1. Obtain a new thrust disc spacer (21). Check to see the ends are parallel and square.
2. Slide the new spacer on the shaft.
3. Insert thrust bearing assembly (20).
4. Insert thrust disc (18). The thrust disc key (10) need not be installed at this point because it will interfere with the new spacer.
5. Mount the locknut (16) as shown. Take up tight with a drift punch. The set screw (17) may be installed at final assembly.
6. Install upper bearing housing and counterthrust bearing housing.
7. Apply pressure to the back of the counterthrust bearing (12). Be sure the counterthrust seats at "POINT A". Remember to be sure that if this is the case there must be some thrust clearance once the counterthrust has seated.
8. Measure the distance from the seal shoulder on the shaft to the seal housing face (Figure 6).

   The prescribed tolerances are from 1 59/64" to 1 61/64" or 1.922" to 1.953". Generally a new spacer will not give the desired reading and will have to be ground in a field machine shop.

9. Take the measurement in step 8. If it is larger than the maximum tolerance, subtract the two. This difference is the amount that will have to be ground off the spacer.

   This should be done at a local machine shop to be sure the spacer ends are parallel within .0005 inches. Grind one end only.

   If the indicated reading is smaller than the minimum tolerance, check the thrust disc and locknut assembly. The new spacer is purposely made long so material can be ground off.

   Once the shaft adjustment has been made, disassemble the thrust end and continue with step 10 under "Seal Assembly."

Start the oil pump to test the lube system. Check all the possible leakage points: pilot holes, flare connections and for reversed position of the locknut. Check to see that the 1/4" plug (66) is in place in the counterthrust bearing housing (11). The pressure regulators should be checked for correct springs if design pressures cannot be obtained. The thrust bearing regulator should have the yellow spring (15-35#), the differential regulator should have the green spring (25-75#).

Refer to Figure 3 for a lube system schematic. Settings for the switches are given in the operation and maintenance instructions.

Shutdown Seal Test

1. Turn on oil pump.
2. Close bleed valve on side of bearing chamber.
3. Set seal oil pressure around 35 psid to make sure the shutdown seal is not seated.
4. Turn off pump.
5. Pressurize the volute to 30 psig with air (this is not necessary if the machine is already charged).
6. Open bleed valve. Check to make sure the shaft is moved outwards 1/16" thus seating the shutdown seal. Use the face of the bearing chamber as a reference point for this measurement.
7. Turn on oil pump and close bleed valve. Seal oil differential pressure should be 35 psid. The shaft should move inward 1/16" to 5/64".
8. Turn the oil pump on five times (rotating the shaft 90° each time while pump is running) to make sure that the shaft moves back and forth freely. Do not rotate the shaft without running pump or shutdown seal may be damaged.

NOTE: Bleed valve must be opened to permit shaft to move outward and closed when running oil pump to move shaft inward (towards the seal).

Coupling Alignment

When aligning a 17DA compressor equipped with a shutdown seal to a turbine or a motor-gear using a FAST coupling or equivalent, the following procedure must be followed:

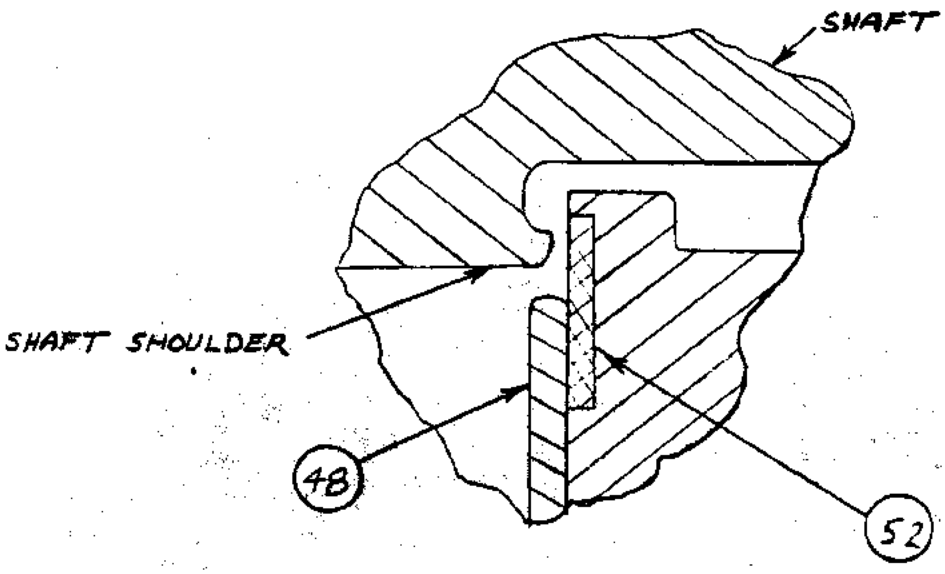
With the coupling sleeves in place, the critical measurement is the hub-to-hub distance. The 17DA compressor needs at least 1/16 + - 1/64 0 inches of axial movement in order to operate the shutdown seal properly.

This distance is obtained by setting each shaft in its normal thrust or operating position. The distance from hub-to-hub must be adjusted by moving the compressor and/or the turbine or gear to comply to the coupling manufacturer's specifications of free float of the coupling.

The two shafts should then be aligned using the normal aligning procedure as prescribed by the coupling manufacturer.

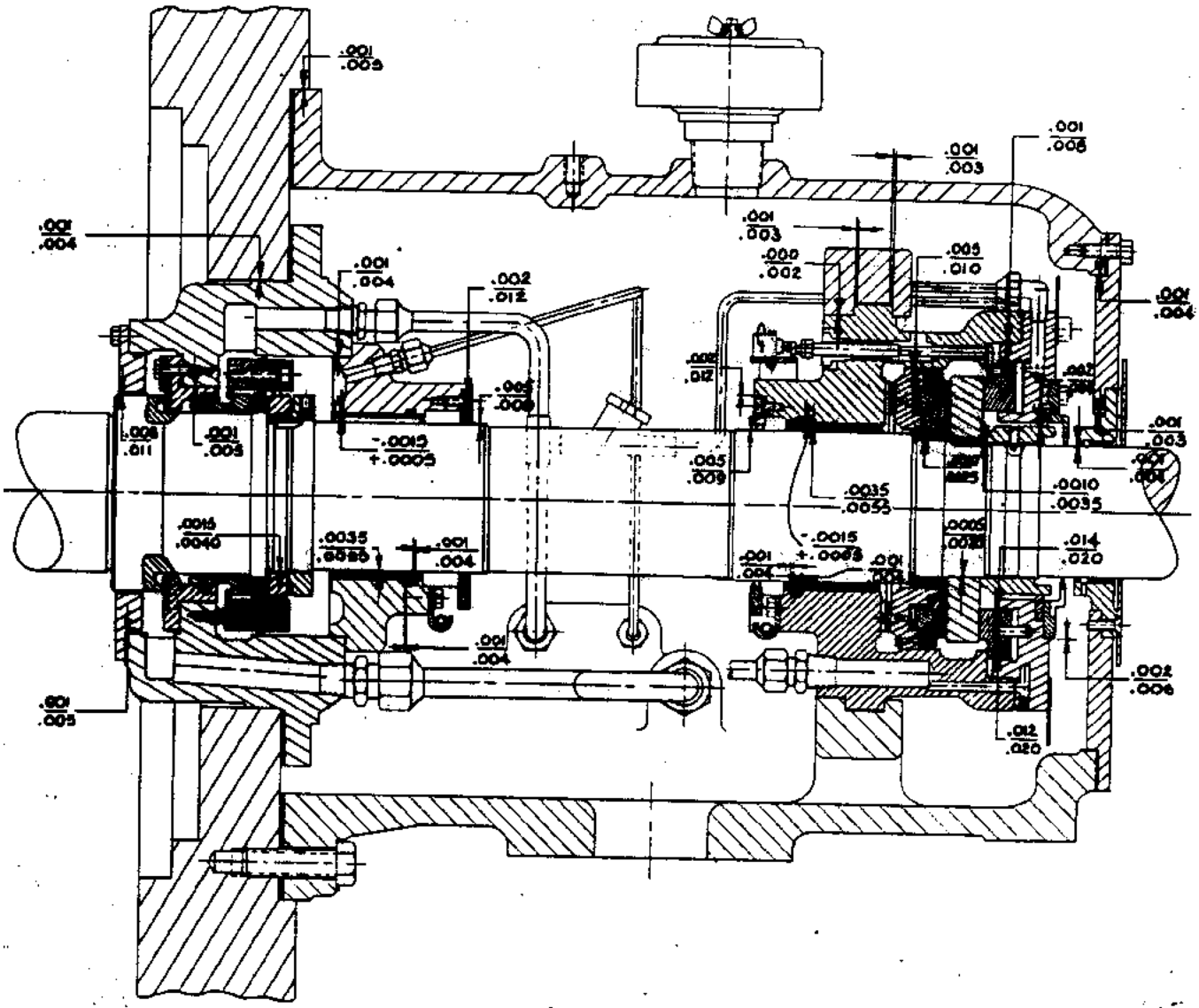
NOTE: If erratic coupling readings are obtained, the compressor shaft must be held down to make sure the shaft is resting in the lower bearing liner.

Once the coupling is aligned, a check must be made to assure the compressor shaft is able to move freely on and off the teflon shutdown seal the full 1/16" without binding inside the coupling sleeve. To do this mount a dial indicator on a convenient location and take axial readings at the compressor shutdown and compressor operating positions.



ENLARGED VIEW OF TEFLON SEAL

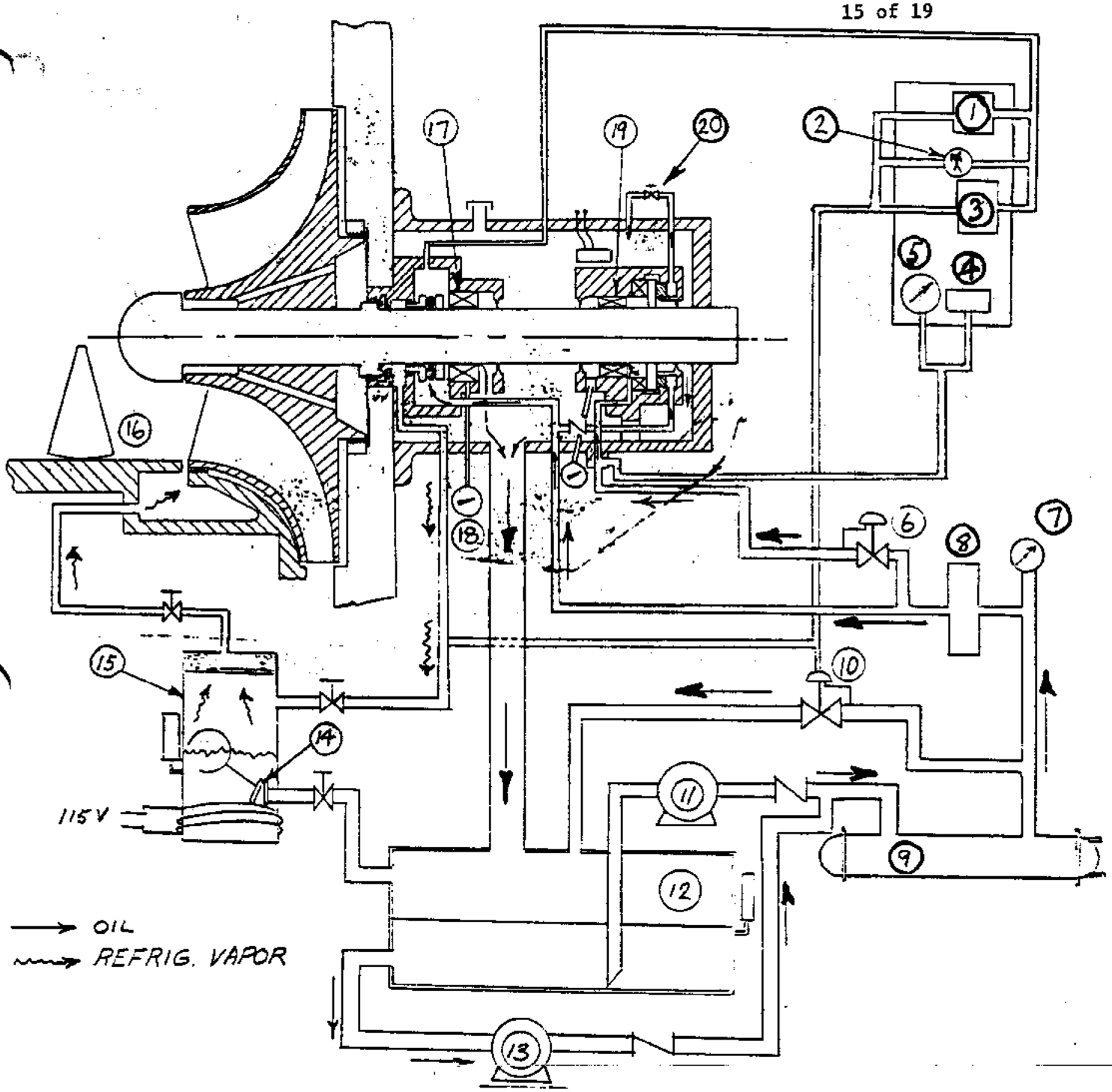
FIGURE 1



CLEARANCES
~ BEARINGS & SEAL ~

FIGURE 2

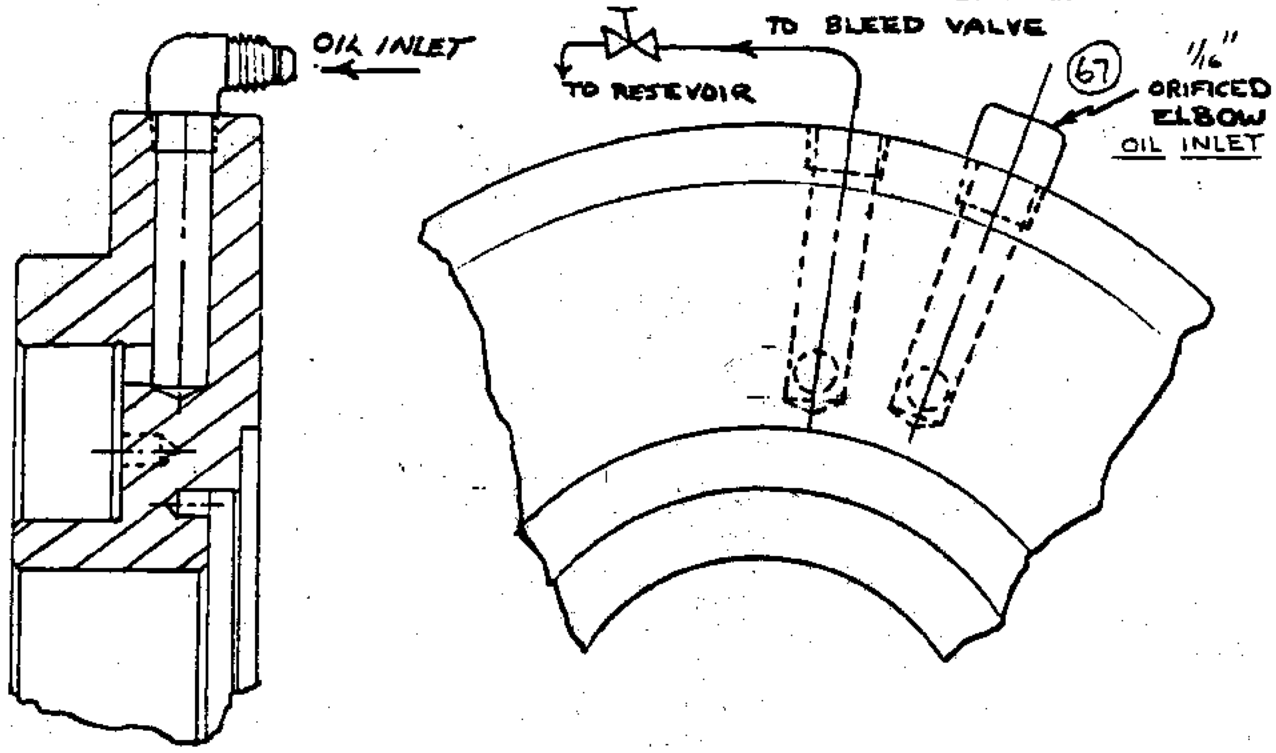
17DA OIL PIPING



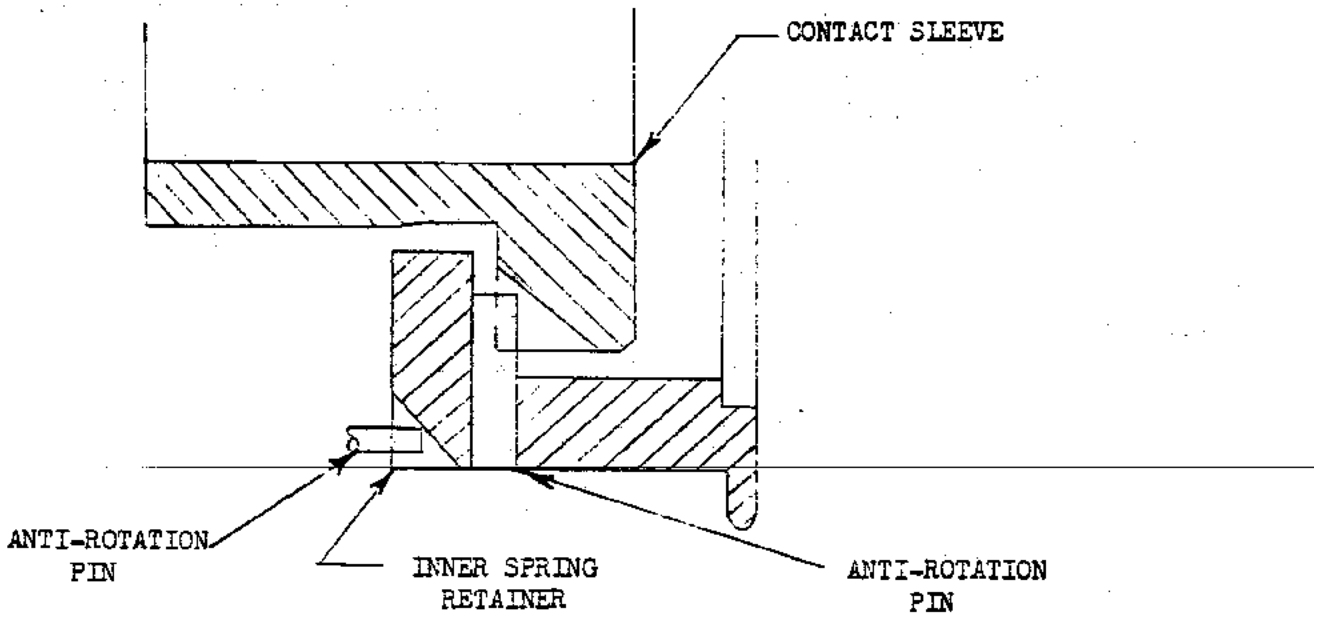
LEGEND

1. Auxiliary Pump Control
2. Duplex Pressure Gage; Seal Oil Supply and Back-of-Seal Pressure
3. Seal Oil Low-Pressure Cutout
4. Bearing Oil Low-Pressure Cutout
5. Bearing Oil Supply Pressure Gage
6. Pressure Regulating Valve
7. Temperature Gage
8. Oil Filter
9. Oil Cooler
10. Differential Back-Pressure Regulator
11. Main Oil Pump
12. Oil Reservoir
13. Auxiliary Oil Pump (optional)
14. Oil Return Float Valve
15. Separation Tank
16. Compressor Suction
17. Seal and Seal End Journal Bearing
18. Seal End Journal Bearing Thermometer
19. Thrust Bearing and Drive End Journal Bearing
20. Shut down Seal Bleed Valve

FIGURE 3



SECTION THROUGH
COUNTERTHRUST BEARING HSG.
VIEWED FROM DRIVE END



ENLARGED VIEW OF CONTACT SLEEVE
AND INNER SPRING RETAINER

FIGURE 4

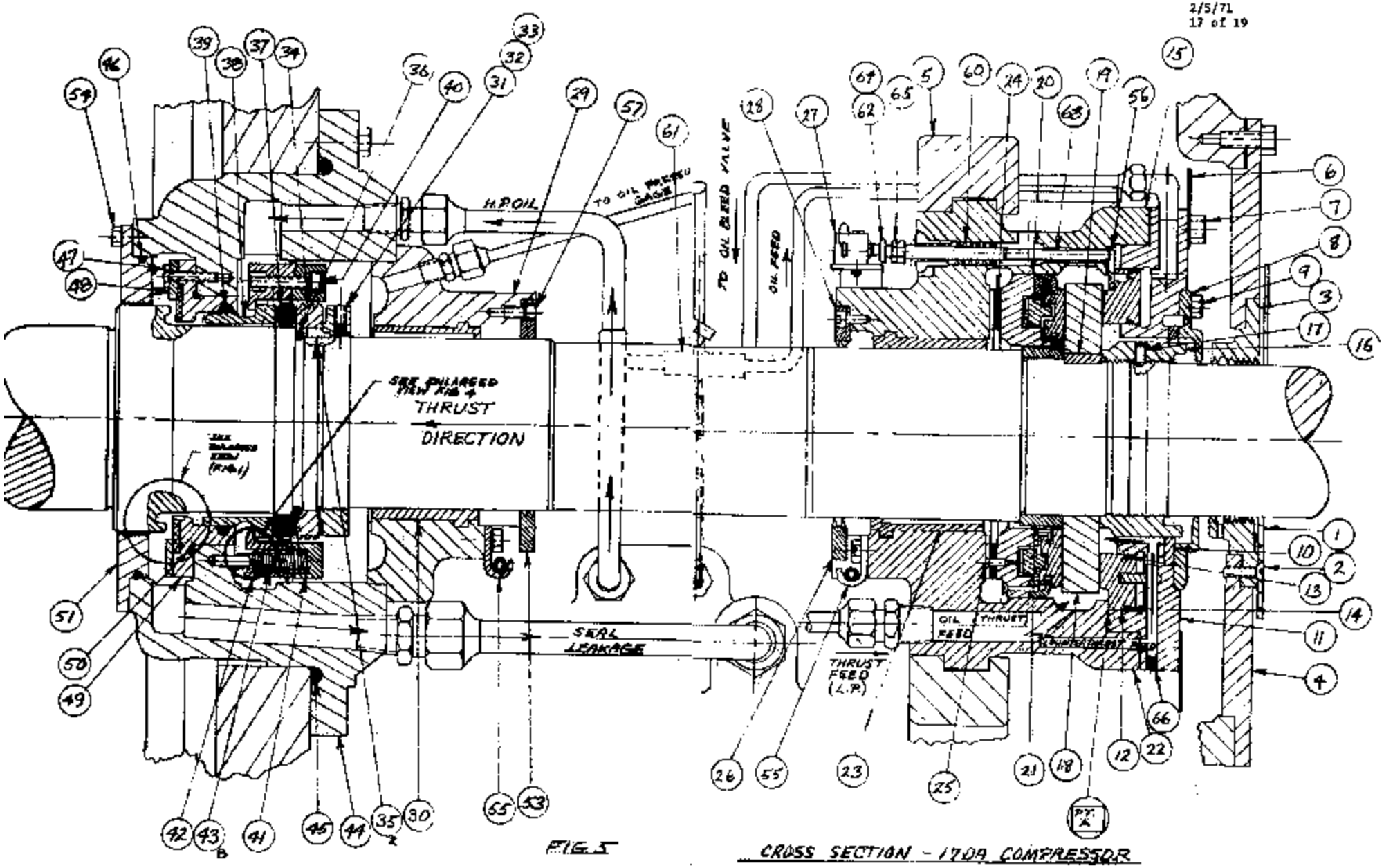
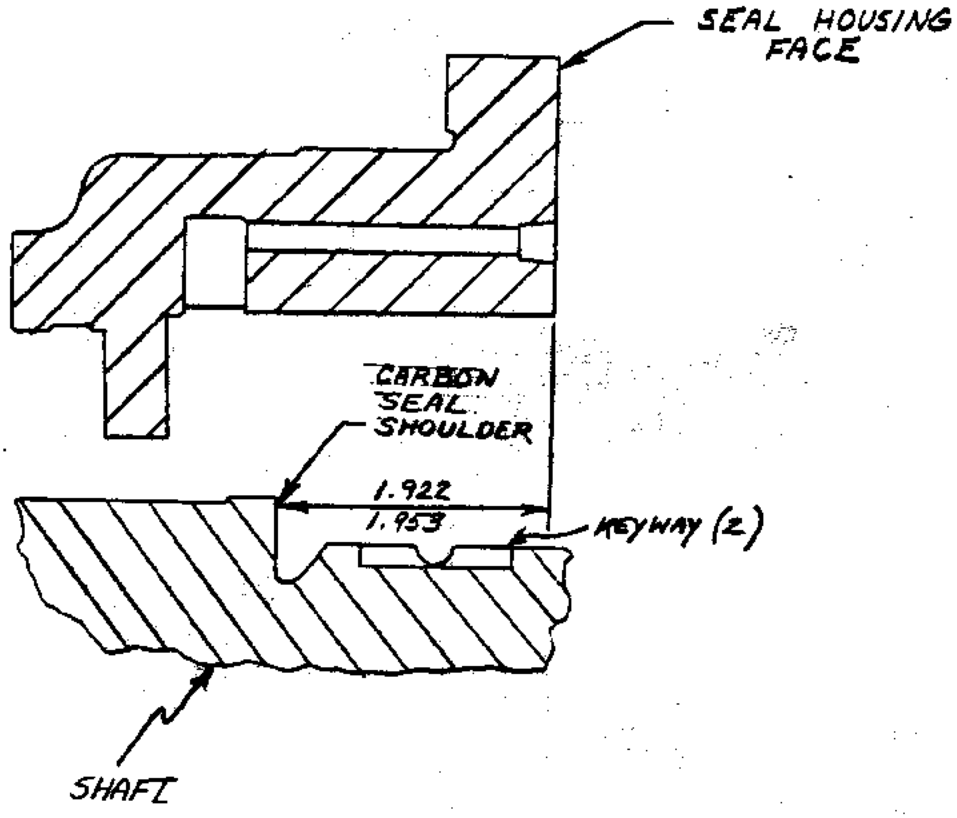


FIG 5

CROSS SECTION - 170A COMPRESSOR

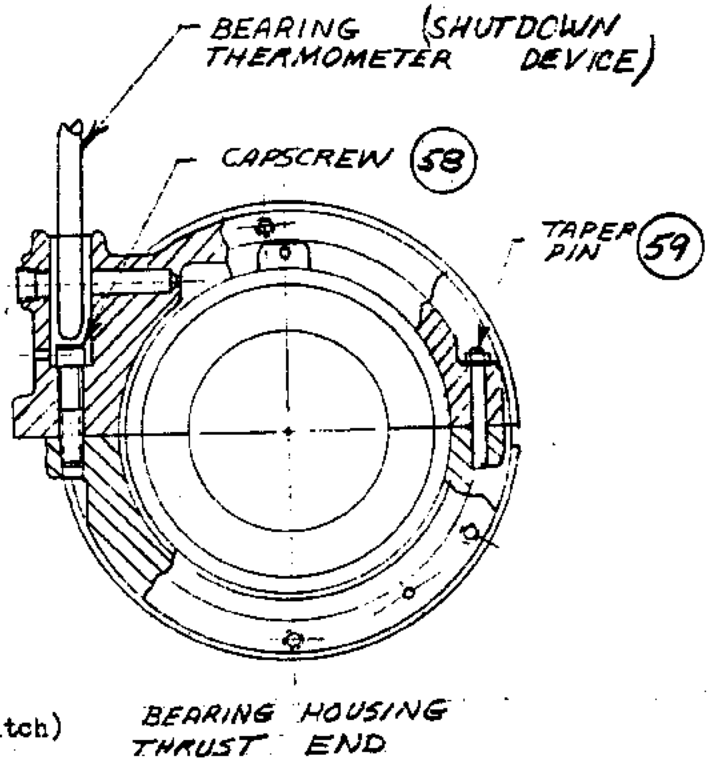


DISTANCE BETWEEN SEAL SHOULDER ON SHAFT AND SEAL HOUSING FACE MUST BE BETWEEN 1 59/64" AND 1 61/64" WHEN THE SHAFT IS IN THE STARTING POSITION.

FIGURE 6

LEGEND PAGE

1. Shaft and baffle
2. Flat head screw
3. Shaft end labyrinth
4. End cover
5. Clamp ring
6. Plate (Baffle)
7. Cap screw
8. Baffle plate
9. Cap screw
10. Seal ring
11. Counterthrust bearing housing
12. Counterthrust bearing
13. "O" ring
14. "O" Ring
15. Upper bearing housing (T.E.)
16. Locknut
17. Set screw
18. Thrust disc
19. Thrust disc key
20. Thrust bearing assembly
21. Thrust spacer
22. Lower bearing housing (T.E.)
23. Bearing liner
24. Shim assembly
25. Screw
26. Wiper plate
27. Shutdown seal switch (Seal Movement Switch)
28. Screw
29. Upper bearing housing (S.E.)
30. Bearing liner
31. Set screw
32. Teflon locking pellet
33. Locknut
34. Rotating contact ring
35. Contact ring key
36. "O" ring
37. Carbon ring
38. Contact sleeve
39. "O" ring
40. Cap screw
41. Outer spring retainer
42. Inner spring retainer
43. Spring
44. Seal housing assembly
45. "O" ring
46. "O" ring
47. Cap screw
48. Shutdown seal retainer
49. Shutdown seal housing
50. "O" ring



51. Labyrinth
52. Teflon seal ring
53. Wiper plate
54. Cap screw
55. Thermometer
56. Switch activating tab
57. Screw
58. Cap screw
59. Taper pin
60. Push rod assembly
61. Check valve
62. Screw
63. Plunger
64. Nut
65. Nut
66. Plug
67. 1/15" orificed elbow