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BULLETIN No. 747-G

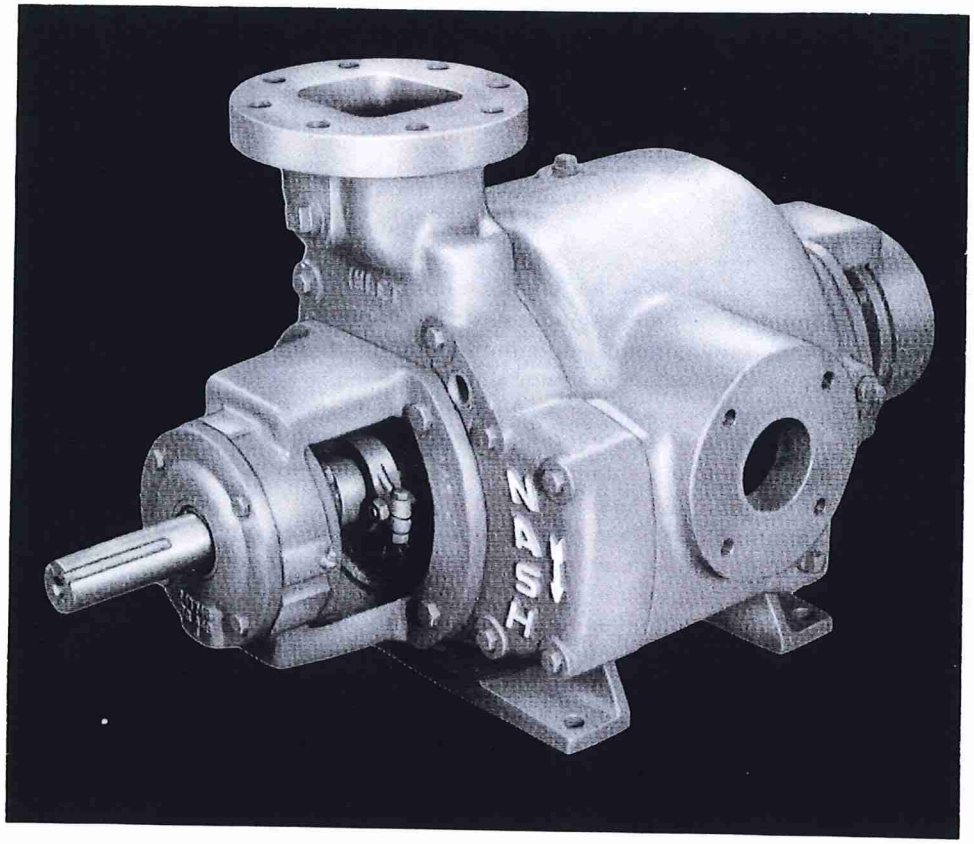
OPERATION

AND

MAINTENANCE

Belt & Dryer pump

NASH VACUUM PUMP/COMPRESSOR
SIZES SC-2, SC-3, SC-4, SC-5



NASH® U.S.

A Division of
THE NASH ENGINEERING COMPANY
TRUMBULL, CT 06611-1330

The Performance Meets The Promise®

WARNING

Do not operate until pump is initially primed and connected to constant supply of clean compressant liquid. **IF RUN DRY, PUMP WILL BE DAMAGED.** Always use strainer to prevent sand and scale from entering the pump with liquid.

Certain operating conditions in combination with water hardness may result in excessive lime deposits within the pump, causing it to bind. Should this condition be evident, flush pump with a solvent at regular intervals.

This pump has been drained and flushed with a water-soluble preservative oil prior to shipment. After pump has been in service, do not store without draining as specified within this Bulletin. Pump can be damaged by freezing.

USE CAUTION when removing inlet screens. Any foreign material on screen may fall into pump and cause extensive damage at start-up.

Base must be mounted to a leveled foundation and final coupling alignment done during installation. (Refer to Bulletin No. 642, Installation Instructions, Nash Vacuum Pumps and Compressors.)

NOTICE

SERVICE AND PARTS

SERVICE AND PARTS FOR NASH PUMPS ARE ASSURED THROUGH A WORLDWIDE NETWORK OF SALES AND SERVICE OFFICES LISTED ON THE BACK COVER OF THIS BULLETIN. ANY REQUEST FOR INFORMATION, SERVICE AND PARTS SHOULD BE DIRECTED TO THE NEAREST NASH FIELD OFFICE.

WHEN ORDERING REPLACEMENT AND SPARE PARTS, TEST NUMBERS AND PUMP SIZES MUST BE PROVIDED. Test number and pump size are located on nameplate fastened to body of pump. If nameplate has been destroyed, test number will be found stamped on the body. Parts must be identified by index number and name. Refer to pump exploded view and legend, found within this Bulletin.

If the location of the nearest office is unknown, information may be secured directly from Nash U.S., Trumbull, Connecticut 06611-1330, U.S.A. Telephone number is 203-459-3900, Fax No. 203-459-3988.

WARRANTY

Nash warrants that (i) the goods will be of the kind described on its acceptance of Buyer's order as modified by any subsequent mutual agreement of the parties, (ii) it will convey to Buyer good title to such goods, (iii) such goods will be delivered free of any lawful security interest or lien or encumbrances unknown to Buyer, and (iv) such goods will be of merchantable quality and free from defects in material or workmanship under normal use and prescribed maintenance for a period of two (2) years from the date of shipment. The warranties specified shall also extend to goods manufactured by others and supplied by Nash, unless such goods have been separately stated and quoted by Nash, in which case only the warranties in clauses (i), (ii), and (iii) shall apply. NASH MAKES NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE MERCHANTABILITY OF GOODS MANUFACTURED BY ITS SUPPLIERS AND SEPARATELY STATED AND QUOTED HEREIN. Nash's warranty in clause (iv) above shall not apply to goods of standard construction when handling corrosive gases or using corrosive liquid compressants nor will clause (iv) apply to goods which have been damaged, altered or negligently maintained after delivery. Buyer's exclusive remedy for Nash's breach of the warranties set forth in clauses (i), (ii) and (iii) above shall be the replacement by Nash of non-conforming goods with conforming goods, without extra costs to Buyer, F.O.B. point of manufacture, with transportation prepaid to U.S. destination or domestic port, and Buyer's exclusive remedy for Nash's breach of the warranty contained in clause (iv) above shall be the repair by Nash without charge, or the furnishing by Nash, F.O.B. point of manufacture, with transportation prepaid to U.S. destination or domestic port of a part or item of equipment to replace any part or item of equipment which is proved to have been defective; provided that (i) Buyer shall have notified Nash of any such breach not later than 10 days after the expiration of two (2) years from the date of shipment of the goods, and that (ii) Nash shall have the option of requiring the return of any defective material transportation prepaid to establish a claim. Nash shall in no event be liable for Buyer's manufacturing costs, lost profits, goodwill, expenses, or any other consequential or incidental damages resulting from a breach by Nash of any warranty. THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, WHICH EXTEND BEYOND THE WARRANTIES SET FORTH HEREIN.

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Section 1
DESCRIPTION

1-1 About This Bulletin

This bulletin contains information for owners and operators of Nash Vacuum Pumps and Compressors, sizes SC-2, SC-3, SC-4, and SC-5. This information includes a description of how to operate and maintain these units.

Note

For installation information, refer to Bulletin No. 642, Installation Instructions, Nash Vacuum Pumps and Compressors.

The term "pump" in this Bulletin applies to both vacuum pumps and compressors unless otherwise noted.

1-2 How The Unit Works

The main functional assemblies of the Nash SC pump are shown in Figure 1-1. A rotor and shaft assembly in the pump is turned by an external motor. The rotor lies within a chamber that is formed by the casing of a body.

Liquid compressant (usually water), referred to as seal liquid, is applied to the chamber in the body from an inlet through the head and cone. The mixture of liquid compressant and compressed gas is discharged through the pump discharge. Figure 1-2 shows the sequence of actions through the pump. The actions illustrated are made possible by the fact that the axis of the body casing is offset from the axis of the rotor.

The motion of the liquid being rotated in the pump operates as a compressant for the gas in the pump. In addition, the liquid compressant acts as a seal, preventing gas leakage to the atmosphere.

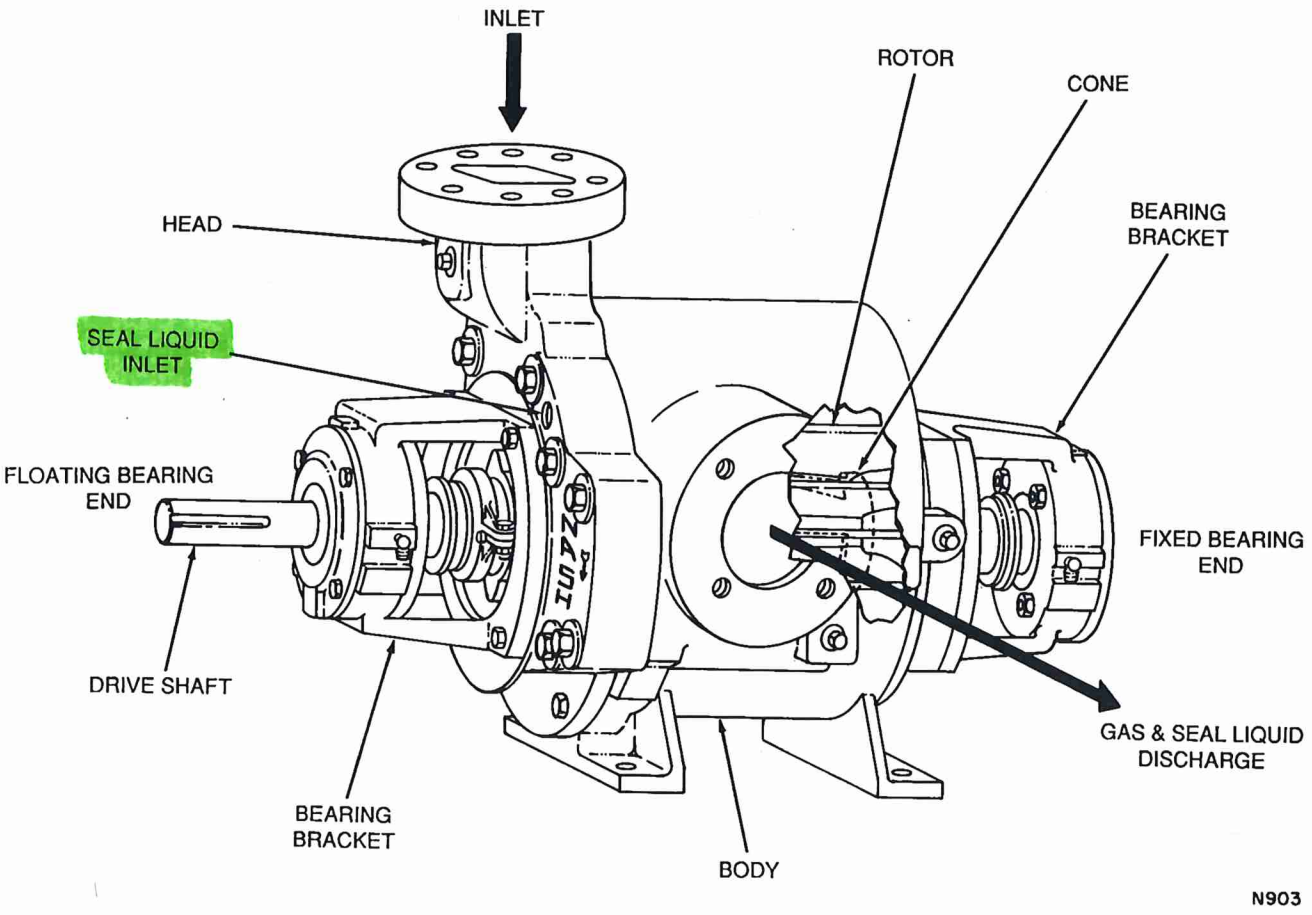


Figure 1-1. Functional Elements of Pump.

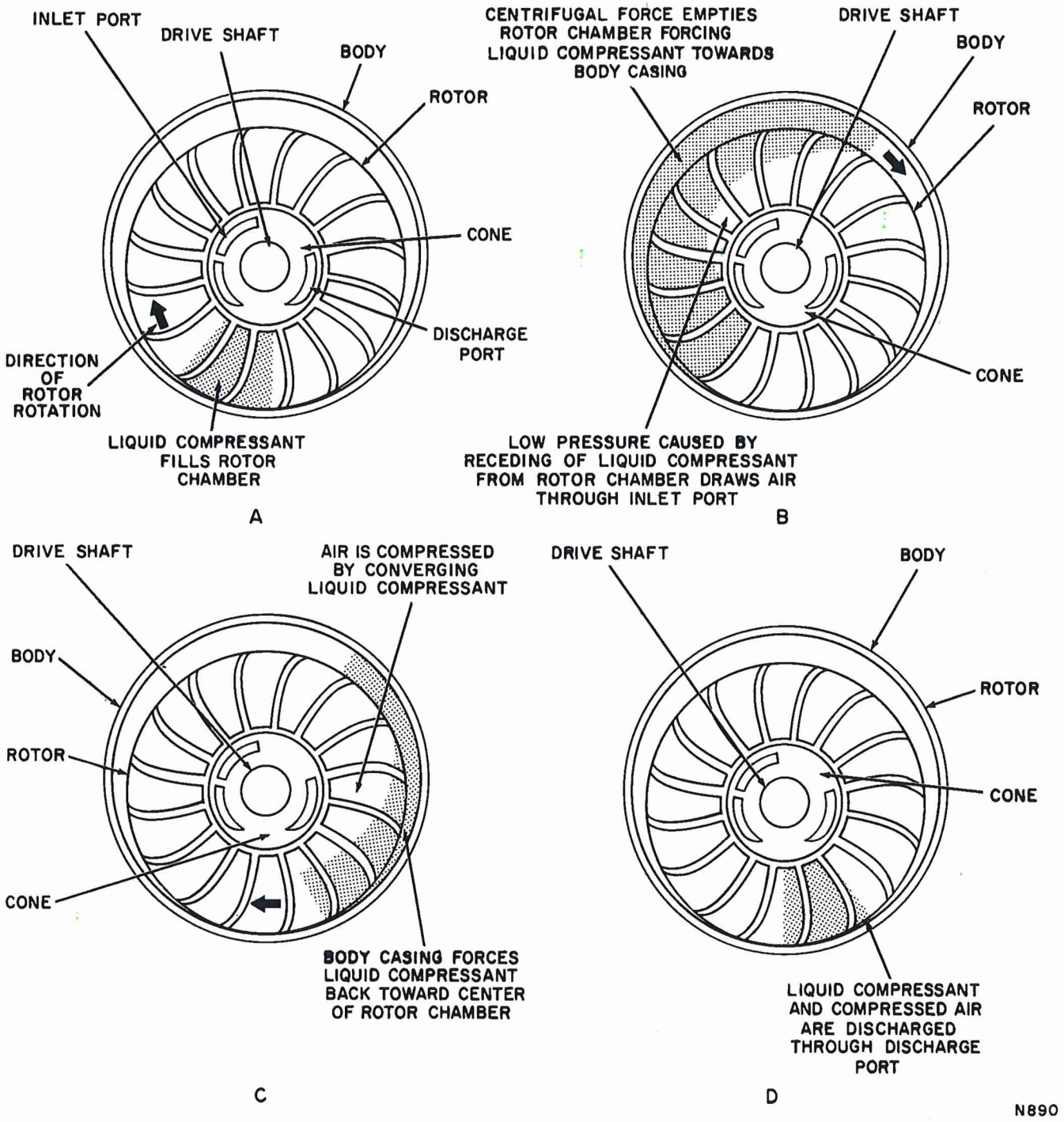


Figure 1-2. Liquid Compressant and Air Flow.

Section 2
OPERATION

2-1 Preparation For Initial Start-Up

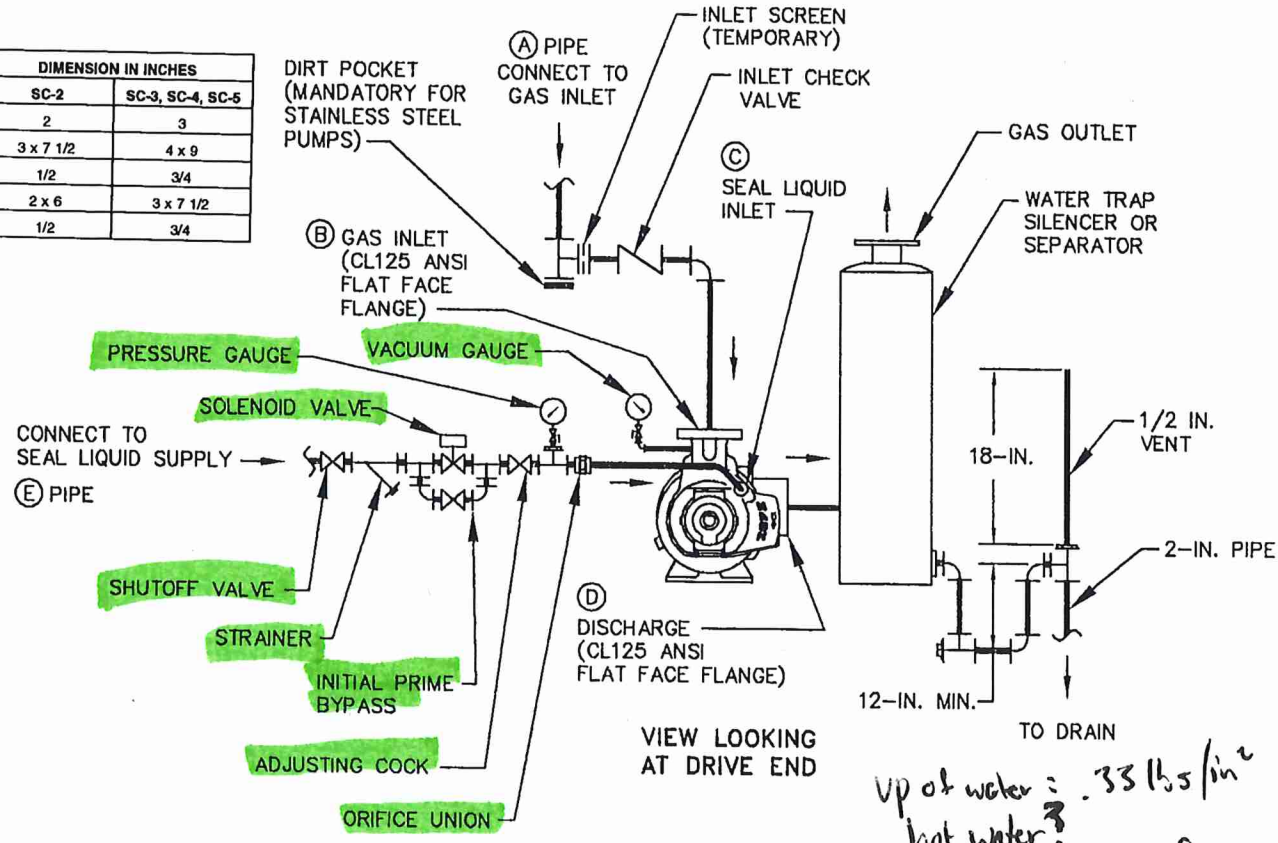
Note

Contact your Nash Representative for start-up assistance.

2-2 Liquid Compressant (Seal Water)

Piping connections must be made to all liquid compressant supply (See Figures 2-1, and 2-2). The usual liquid compressant is fresh water at 60°F (15°C). The flow rate to the pump shall be as specified below. Variations in the flow rate of ± 20% will not damage the pump, but wide variations in flow may alter pump capacity.

DIMENSION/ SIZE	DIMENSION IN INCHES	
	SC-2	SC-3, SC-4, SC-5
A	2	3
B	3 x 7 1/2	4 x 9
C	1/2	3/4
D	2 x 6	3 x 7 1/2
E	1/2	3/4



Up of water : .33 lbs/in²
hot water?
1.? > in seal pot than faces
2. non pressurized

Note

For Iron Vacuum Pumps:

Pump Size	Pump Speed-RPM	Flow Rate 0 to 25 in. Hg Vac.	U.S.GPM 25 to 28 in. Hg Vac.
SC-2	1450,1750	1 1/2	3
SC-3	2100	3	3
SC-3	980,1170,1450	4	8
SC-3	1600	8	8
SC-4	All	5	10
SC-5	All	5	10

Note

For Stainless Steel and Stainless Steel Fitted Vacuum Pumps:

Pump Size	Pump Speed-RPM	Flow Rate 0 to 25 in. Hg Vac.	U.S.GPM 25 to 28 in. Hg Vac.
SC-2	All	3	6
SC-3	980,1170,1450	4	8
SC-3	1600	8	8
SC-4	All	5	10
SC-5	All	5	10

For Compressors:

Seal liquid flow rate should be approximately **1/4 GPM per HP.**
When using the orifice, cock and gauge configuration, set the seal flow by adjusting the cock until the pressure gauge reads 10psig. This will establish the required flow rate.

For Compressors:

Seal liquid flow rate should be approximately **1/4 GPM per HP.** Seal water flow rates apply for stainless steel as well as iron pumps.
When using the orifice cock, and gauge configuration, set the seal flow by adjusting the cock until the pressure gauge upstream from the orifice reads 10 psig greater than the gauge downstream of the orifice. This will establish the required flow rate.

CAUTION

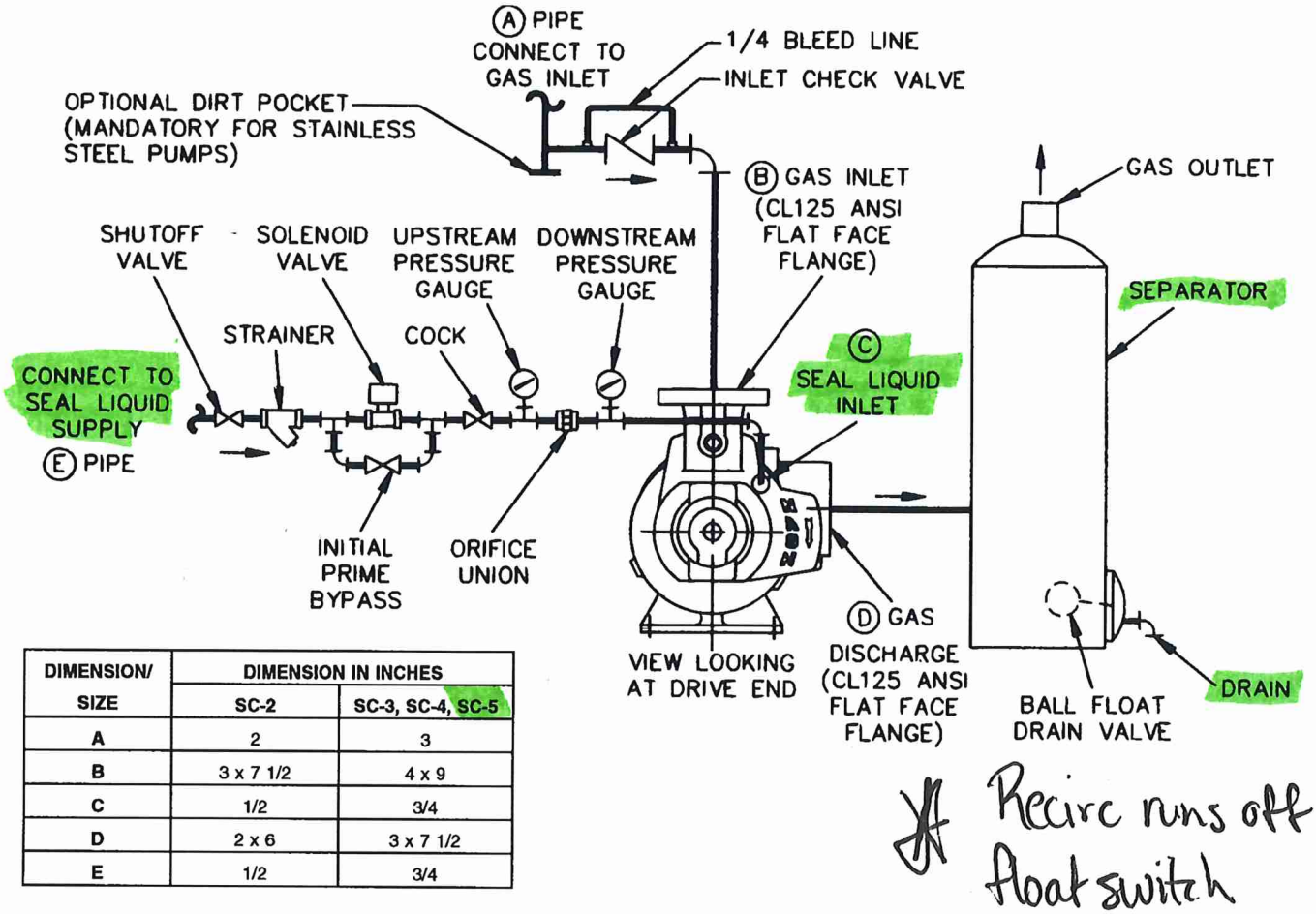
THE LIQUID COMPRESSANT FLOW MUST BE STARTED BEFORE STARTING THE PUMP DRIVE MOTOR, EVEN IF THE PUMP IS ONLY BEING OPERATED TO CHECK THE DIRECTION OF ROTATION.

2-3 Draining and Flushing

Before starting the pump upon completion of alignment (as specified in Bulletin No. 642, Installation Instructions, Nash Vacuum Pumps and Compressors), remove the seal water drain plugs (22-1, Figure 5-12) from the head and body of the vacuum pump. Turn on the shut-off valve for the seal water supply. The pump is flushed with water-soluble preservative oil prior to shipment which will be visible as a cream colored liquid. Allow the seal water to flow from all drains. Close the shut-off valve for the seal water supply. Replace the seal water drain plugs using a pipe thread compound.

2-4 Preliminary Inspection

Perform the following preliminary inspections before starting the pump:



DIMENSION/ SIZE	DIMENSION IN INCHES	
	SC-2	SC-3, SC-4, SC-5
A	2	3
B	3 x 7 1/2	4 x 9
C	1/2	3/4
D	2 x 6	3 x 7 1/2
E	1/2	3/4

Figure 2-2. Typical Compressor Piping Connections.

WARNING

PERFORM ALL OF THE FOLLOWING STEPS IN ORDER TO ENSURE PERSONNEL SAFETY AND EQUIPMENT PROTECTION.

a. Isolate all power sources to the driver unit in order to make certain that no accidental starting occurs.

b. Inspect the pump to make certain that all drain plugs have been properly installed.

c. Manually prime the pump with liquid compressant until there is a flow from the overflow drain.

d. Inspect the separator, the receiver, and the heat exchanger (if used) to make certain that all shipping plug protectors have been removed and that all open connections have been plugged or piped.

e. Inspect all piping to make certain that proper connections have been made to the pump and its basic system in accordance with the Nash installation drawings(s) that have been supplied with the pump. Make certain that all piping is the correct size, securely connected, and properly supported.

f. Check pump and drive hold-down bolts and base or soleplate foundation bolts for tightness.

g. Inspect all other major operational component connections, associated with the pump, to make certain that they are in accordance with the recommendations of their respective equipment manufacturers.

h. Inspect all pump control components (control valves, gauges, etc.) to make certain that they have been positioned in accordance with the Nash installation drawings. Make certain that these components are correctly oriented in the piping scheme in order to achieve the proper direction of flow and functional operation.

i. Inspect the pump inlet to make certain that the inlet screen and clean-out connections have beenproperly made and are free of tools, equipment and debris.

j. Make certain that the liquid discharge connection is free of obstructions.

k. Remove the coupling or V-belt guard and rotate the pump shaft by hand in the specified direction of rotation. The specified direction of rotation is indicated by an arrow cast on the pump body and is illustrated on the installation drawing. THE PUMP SHAFT

MUST ROTATE FREELY. If the pump shaft is bound and cannot be freed by rotating it manually, **contact your Nash Representative** for assistance.

CAUTION

DO NOT ATTEMPT TO FREE A PUMP SHAFT FROM A BINDING OR BOUND CONDITION BY APPLYING POWER TO THE DRIVE MOTOR. SEVERE DAMAGE MAY RESULT.

l. Check coupling or V-belt alignment as specified in Bulletin No. 642, Installation Instructions, Nash Vacuum Pumps and Compressors.

CAUTION

NEVER OPERATE THE PUMP WITHOUT ADEQUATE PRIME AND LIQUID SEAL FLOW. HIGH LIQUID SEAL SUPPLY PRESSURES DO NOT NECESSARILY INDICATE THAT THE FLOW IS ADEQUATE. CHECK FOR FLOW FROM VACUUM PUMP DISCHARGE (OR WATER TRAP SILENCER).

m. With main supply valves open and the pump primed, as in step c, bump the drive motor for the pump in order to check for the proper direction of shaft rotation.

WARNING

MAKE CERTAIN THAT THE COUPLING OR V-BELT DRIVE IS ENCLOSED WITH A GUARD BEFORE STARTING THE DRIVE MOTOR.

2-5 Start-Up And Operating Checks

When the preliminary inspection and preoperational check procedures have been completed, start the pump and check pump operation as follows:

WARNING

IF THE PUMP IS TO BE CHECKED IN A SYSTEM, NOTIFY THE APPROPRIATE PLANT PERSONNEL BEFORE PLACING A PUMP ON LINE, PARTICULARLY WHEN PLACING THE PUMP ON LINE FOR THE FIRST TIME. STARTING UP A SYSTEM UNEXPECTEDLY MAY CAUSE PERSONNEL INJURY.

Note

Refer to Troubleshooting, Section 3, if any operating difficulties arise when performing the following steps.

a. Check the pump and the system for adequate prime and then turn on all main water supply sources to the pump or heat exchanger.

b. With the water supply sources turned on and all personnel and equipment clear of the pump system, apply power to the drive motor.

Note

If pump operation becomes unstable, pump vibration levels will increase and the pumping volume will decrease. IF THE PUMP DOES NOT STABILIZE, SHUT DOWN THE SYSTEM IMMEDIATELY, AND DETERMINE THE CAUSE.

c. While the pump is being stabilized at the required inlet vacuum, check the flow of liquid seal (water) to the pump. Make certain that the liquid seal is flowing out of the water trap silencer or separator drain.

d. Maintain a constant check on the temperature of the pump casing during the startup procedure. If the temperature rises rapidly or is 40°F or more above the liquid supply temperature, shut down the unit immediately and determine the cause.

e. After starting the pump, monitor the temperature of the bearing housing until the bearing housing temperature stabilizes or begins to drop. This may take several hours and should level out at about 30°F (17°C) greater than the casing or ambient temperature.

CAUTION

DURING START-UP, IF THE BEARING HOUSING TEMPERATURE EXCEEDS 180°F (82°C), OR IF ABNORMAL BEARING NOISE, VIBRATION, ODOR OR SMOKING OCCURS, SHUT DOWN THE PUMP IMMEDIATELY AND DETERMINE THE CAUSE.

f. Excessive bearing temperatures may be caused by several factors including excessive v-belt drive pull, coupling misalignment, excessive piping loads or improper greasing of bearings. The primary cause is over greasing. Pull the outer bearing housing cap back and check the quantity of grease in the cap and housing. If more than 1/3 full, remove excess grease and reassemble cap. If there is minimal or no grease in cap or housing, add grease through the grease fitting until grease extrudes from the face of the bearing, add grease to the cap until 1/3 full and reassemble cap.

g. Check the pump for vibration and noise. Excessive vibration and noise is an abnormal condition on a Nash pump. Shut down the pump immediately and determine the cause.

h. Check the speed (RPM) of pump shaft rotation by prying the nameplate cap from the fixed bearing outer cap and inserting a tachometer with a shaft extension, if necessary. Compare the measured speed with the rated speed for the pump. The rated operating speed and capacity can be determined from the purchase specifications or by **consulting with your Nash Representative.**

i. After the pump has been running for ten minutes, tighten the gland nuts evenly one-quarter turn. Repeat at ten minute intervals until there is a leakage of approximately 45 to 60 drops per minute from the gland with no overheating. Subsequent tightening of the gland nuts one-quarter turn should be done with the pump operating at normal working temperature and pressure.

Section 3
TROUBLESHOOTING

3-1 Locating Troubles

Nash vacuum pumps and compressors require little attention other than checking the ability of the unit to obtain full volume or maintain constant vacuum. If a V-belt drive is used, V-belt tension should be checked periodically and the V-belt should be inspected for excessive wear. V-belts are normally rated for service lives of 24,000 hours. If operating difficulties arise, make the following checks:

a. Check for proper seal water flow rate as specified in Paragraph 2-2.

b. Check for the correct direction of the pump shaft rotation as cast on the body of the pump.

c. Check that the unit operates at the correct rpm-not necessarily the test rpm stamped on the pump name plates. (Refer to Paragraph 2-5, step g.)

d. Check for a restriction in the gas inlet line.

e. If the pump is shut down because of a change in temperature, noise and or vibration from normal operating conditions, check bearing lubrication, bearing condition, and coupling or V-belt drive alignment. Refer to Bulletin No. 642, Installation Instructions, Nash Vacuum Pumps and Compressors, for alignment procedures and V-belt tensioning.

Note

If the trouble is not located through these checks, **call your Nash Representative** before dismantling or dissembling the pump. He will assist in locating and correcting the trouble.

Section 4
PREVENTIVE MAINTENANCE

4-1 Periodic Maintenance

Note

The following schedules should be modified as necessary for your specific operating conditions.

4-2 Six-Month Intervals

a. If the drive coupling is lubricated, it should be filled with oil or grease in accordance with the coupling manufacturer's guide.

b. Check the pump bearings and lubricate as specified in Paragraph 4-4.

c. Relubricate the drive motor bearings according to the motor manufacturer's instructions.

4-3 Twelve-Month Intervals

a. Inspect the pump bearings and lubricate as specified in Paragraph 4-4.

b. Replace the stuffing box packing as specified in Paragraph 4-5.

4-4 Bearing Lubrication

The pumps covered in this Bulletin have grease lubricated bearings installed in bearing brackets. Bearings are lubricated before shipment and require no lubrication for approximately six months. To check condition and quantity of grease in the bearing bracket proceed as follows:

a. Pull back or remove inner and outer bearing caps.

b. Check condition of grease in bearing cap for contamination or presence of water.

c. If grease is contaminated, remove fixed or floating bearing bracket (109 or 108), fixed or floating bearing (120 or 119) and associated parts as specified in Paragraph 5-2, steps a thru h for fixed bearing (120), or Paragraph 5-3, steps a thru g for floating bearing (119). Discard bearing.

d. Flush bearing bracket and bearing cap to remove all grease.

e. For Sizes SC-2, SC-3 and fixed bearing only for Sizes SC-4, SC-5, hand pack both sides of new bearing as specified in Table 5-1 with grease as specified in Table 4-1.

f. Install bearing bracket, bearing and associated parts as specified in Paragraph 5-17 and as follows:

1. For floating bearing (119), perform steps a, c, d and e, Paragraph 5-17; and steps b and c, Paragraph 5-19 (Sizes SC-2, SC-3) or Paragraph 5-19A (Sizes SC-4, SC-5).

Note

Lubricate the bearings every year, unless the pump is being operated in a corrosive atmosphere or with a liquid compressant other than water, in which case, the interval should be shortened.

Note

Make certain that new lip seal (5-1) is seated in floating bearing outer cap (115) with sealing lip away from bearing.

2. Install new lip seal (5-1) and secure floating bearing outer cap (115) and new gasket (115-3) to floating bearing bracket (108) as specified in Paragraph 5-20, steps m thru p.

3. Rotate shaft (111) by hand and make sure there is no rubbing or metal-to-metal contact.

4. For fixed bearing (120), perform steps a, c, d and e, Paragraph 5-17; and steps b thru g, Paragraph 5-18.

CAUTION

THICKNESS OF SHIMS (4) EQUAL TO THICKNESS OF SHIMS REMOVED FROM PUMP MUST BE REINSTALLED TO MAINTAIN REQUIRED END TRAVEL.

5. Install shims (4) and fixed bearing outer cap (117) on fixed bearing bracket (109) as specified in Paragraph 5-20, steps j and k.

6. Rotate shaft by hand and make sure there is no rubbing or metal-to-metal contact.

4-5 Stuffing Box Packing

A preventive maintenance schedule should be established for the tightening and replacement of the packing in the stuffing boxes of the pump. The packing in the stuffing boxes in pumps used in continuous process systems should be replaced at annual shutdown. More frequent replacement may be required on severe process applications in which liquid compressant in the pump is contaminated by foreign material. (The packing material consists of five rings with the dimensions listed in Table 5-1.)

When replacing the packing in a stuffing box, remove the old packing as follows:

Note

If lantern glands (10, Figure 5-12) are used, record position and number of packing rings on each side of lantern gland. This information is used to make certain that lantern gland is correctly aligned.

a. Slide slinger (3) against bearing inner cap (116 or 118).

b. Loosen and remove gland nuts (101-1 or 102-1, Figure 4-3 from studs.

c. Slide packing gland assembly (112) as far from stuffing box as it will go, remove two nuts, lockwashers and screws holding halves of packing gland assembly together and remove two halves.

Table 4-1. General Grease Specifications

GENERAL REQUIREMENTS:

A. *Premium quality* industrial bearing grease.

B. *Consistency grade:* NLGI #2

C. *Oil viscosity (minimum):*
@100° (38°C) - 500 SSU (108 cSt)
@210° (99°C) - 58 SSU (10c St)

D. *Thickener (Base):* Lithium or Lithium Complex for optimum WATER RESISTANCE.

E. *Performance characteristics* at operating temperature:
1. Operating temperature range; at least 0° to 250°
(18° to 121°C)
2. "Long-Life" performance
3. Good mechanical and chemical stability.

F. *Additives - Mandatory:*
1. Oxidation inhibitors
2. Rust inhibitors

G. *Additives - Optional:*
1. Anti-wear agents
2. Corrosion inhibitors
3. Metal deactivators
4. Extreme Pressure (EP) agents

H. *Additives - Objectionable:*
1. Molybdenum disulfide
2. Tackiness agents

NASH STANDARD GREASE RECOMMENDATIONS:
The following is a list, by manufacturer, of some greases that exhibit the desired characteristics required by Nash.

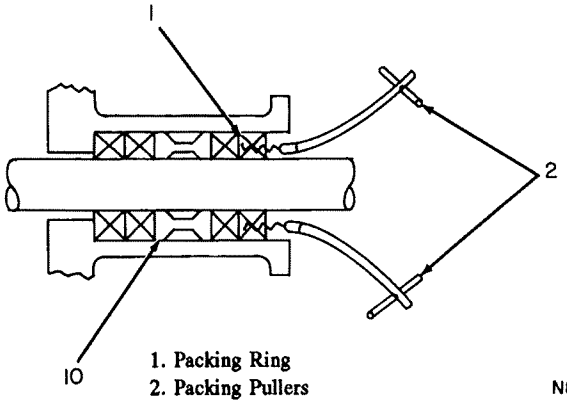
Grease Manufacturer	*Product*
AMOCO	Super Permalube or Amolith 2EP
BP Oil	Energrease LS-EP2
Castrol Oil	Spheerol SW 2 EP
Chevron Oil	Ulti-Plex Synthetic EP2
Exxon	Unirex N2 or Unirex EP2
Mobil Oil	Mobilith SHC 100 or Mobilith AW2
Shell Oil	Alvania 2 or Alvania EP2
Texaco Oil	Starplex 2 or Marfak MP2
Thames	Lithium EP2

Note: This list is not an endorsement of these products and is to be used only for reference. Have your local lubricant supplier cross reference these greases for an equivalent, as long as it meets the General Requirements.

Grease Compatibility Note: The above greases are the Nash Standard Grease. To maximize grease performance it is recommended that intermixing of different greases be kept to a minimum.

d. Screw tips of packing pullers (2, Figure 4-1) into packing (1).

e. Pull packing out of stuffing box.



1. Packing Ring
2. Packing Pullers
10. Lantern Gland

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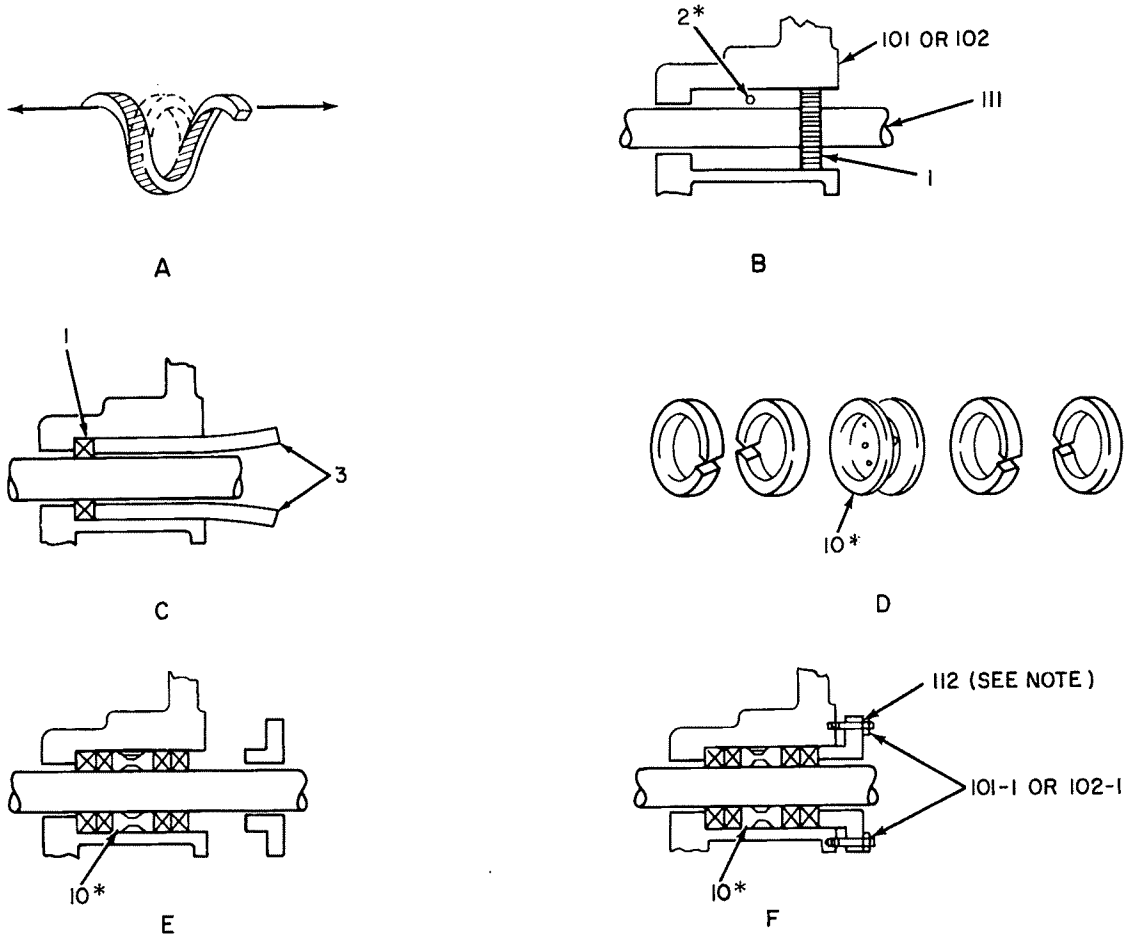
Figure 4-1. Removing Stuffing Box Packing

Figure 4-2. Stuffing Box Lantern Gland Puller



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NOTE: View F rotated 90° to show gland studs and nuts.

1. Packing Ring
2. Lantern Gland Supply Connection*
3. Packing Ring Pusher
10. Lantern Gland*
101. Body
101-1. Gland Nut
102. Floating Bearing End Head
102-1. Gland Nut
111. Shaft
112. Packing Gland Assembly

*When used

Figure 4-3. Packing Stuffing Boxes

f. If lantern gland (10, Figure 4-3) is supplied, form two lantern gland pullers from 1/8" diameter steel wire as shown in Figure 4-2.

g. Work bent tip of each lantern gland puller around outer diameter of lantern gland in stuffing box until pullers are felt catching in slots in lantern gland on opposite sides.

h. Pull lantern gland out of stuffing box.

i. Screw tips of packing pullers (2, Figure 4-1) into remaining packing in stuffing box and pull packing out.

j. Thoroughly clean stuffing box and check shaft for severe scoring and wear as specified in Paragraph 5-11 before installing new packing.

Install the new packing in the stuffing boxes as follows:

a. Fabricate two hard rubber strips to fit between OD of shaft (111) and ID of stuffing box, as shown in Figure 4-3, Part C, to use as packing ring pushers.

b. Lubricate inside diameter of packing rings with Molykote G-n paste or equivalent.

c. Open packing ring into spiral by pulling ends axially apart as shown in Figure 4-3, Part A.

d. Work each packing ring onto shaft and into stuffing box area as shown in Figure 4-3, Part B.

e. Using pushers fabricated in step a, push first packing ring into stuffing box as firmly as possible. Make certain that packing ring is seated against end of stuffing box as shown in Figure 4-3, Part C. As each additional packing ring is installed, stagger location of butted ends of ring so that successive rings are offset by 180 degrees. (See Figure 4-3, Part D.) Make certain that each packing ring is firmly seated.

f. Install lantern gland (10) if supplied. (See Figure 4-3, Part E.)

g. Install remaining packing rings as specified in step e.

h. Install two halves of packing gland assembly on shaft and assemble with two screws, lockwashers and nuts. Slide packing gland assembly on gland studs so that it is flush against last packing ring installed. Install and tighten gland nuts (101-1 or 102-1), evenly, finger tight. (See Figure 4-3, Part F).

i. Start pump as specified in Paragraph 2-6. Check temperature of pump stuffing box area as pump operates. Make certain that there is leakage from stuffing box. If there is no leakage or if stuffing box overheats, shut down pump and determine cause. Replace packing if necessary.

j. After the pump has been running for ten minutes, tighten gland nuts evenly one flat at a time. Repeat at ten minute intervals until there is a leakage of approximately 45 to 60 drops per minute from the gland with no overheating. Subsequent tightening of gland nuts should be done with pump operating at normal working temperatures and vacuum.

4-6 Shutdown Periods (Cast Iron pumps only)

If the pump is shut down for 2 to 3 weeks, rotate the vacuum pump and recirculating pump (if used) by hand at least once every week to prevent rust buildup between cast iron parts which may result in seizing. If the pump must be taken out of service for more than 3 weeks up to one year, proceed as follows to prevent seizing during the storage due to rust formation:

Note

These preservation procedures apply to all iron and nodular iron pumps only, maintained in covered storage.

a. Remove pipe plugs (22-1, Figure 5-12) from pump body (101) and head (102) and drain all liquid from pump. Replace pipe plugs.

b. Disconnect discharge piping and blank off pump discharge flange.

c. Fill pump one-quarter full of water soluble preserving oil, J.L. Quimby NRP100 or equivalent, through the inlet flange.

d. Start the pump and rotate it for 5 to 15 seconds, then shut down.

e. Drain all preserving oil from pump for reuse by removing pipe plugs as specified in step a. Replace pipe plugs using pipe thread compound.

f. Remove all packing as specified in Paragraph 4-5 and flush stuffing boxes with rust inhibitor.

g. Touch up any areas where paint has chipped and apply Houghton's Rust Veto #344 coating compound, or equivalent, to external surfaces as necessary.

h. Blank off pump inlet:

Note

For long term preservation procedures for storage periods of more than one year, **contact your Nash Representative.**

i. When pump is to be put back in service, proceed as follows:

   1. Remove blanks from the pump inlet and discharge the flanges. Reconnect piping.

   2. Repack stuffing boxes with new packing as specified in Paragraph 4-5.

   3. Flush pump as specified in Paragraph 2-4.

   4. Start pump as specified in Paragraphs 2-5 & 2-6.

j. After the preserving oil has been flushed from the pump, rotate the vacuum and recirculating pumps at weekly intervals until the pump is back in continuous service.

Section 5
DISASSEMBLY, INSPECTION and REASSEMBLY

5-1 Dismantling Pump

Before disassembling the pump, isolate the electrical input and disconnect the seal liquid connections, coupling to drive motor or V-belt drive, and inlet and outlet connections. Disassemble and reassemble the pump on a level surface. Mark all parts as they become accessible during disassembly to ensure correct positioning for reassembly. Before starting disassembly, collect the parts, materials and standard tools, and fabricate the special tools listed in the following paragraphs, which are required for disassembly and reassembly of the pump.

Parts and Materials

a. Minimum recommended spares specified in Legend for Figure 5-12 (which should be kept on hand at all times).

Note

It is not advisable to disassemble a pump unless the following replacement items are available for reassembly: two sets of stuffing box packing (1); one set of adjusting shims (4); one set of gaskets; and floating and fixed bearings (119 and 120). Refer to Table 5-1.

b. Molykote G-n Paste or equivalent.

c. Locquic Primer T and Loctite 242 (required only if gland studs (101-2 or 102-2) require replacement).

d. Any standard grease.

e. Grease as specified in Table 4-1.

f. Solvent such as kerosene.

g. Two 5/8-11 eyebolts with nuts to remove and install head (102).

h. Two 5/16-18 (Size SC-2) or 3/8-16 (Sizes SC-3, SC-4, SC-5) jackscrews as shown in Figure 5-10 to set end travel.

Standard Tools

a. Socket wrench set with shaft extension. In most cases, open-end or box wrenched can be substituted for socket wrenches.

b. Hexagonal (Allen) wrenches.

c. Spanner wrench (for fixed bearing locknut).

d. Bearing puller.

e. Press: approximately 40 ton capacity. Press must indicate amount of force applied and is only required if rotor or shaft requires replacement.

f. Spirit level.

g. Leaf (feeler) gauge.

h. Metal straightedge.

i. Rawhide mallet.

j Machinist's dial indicator with suitable clamps and mounts.

k. Needle-nosed pliers.

l. Propane torch and 250°F (121°C) temp stick (required only if gland studs require replacement.)

m. Asbestos gloves.

n. Hoist and slings.

WARNING

MAKE PROVISIONS FOR HANDLING HEAVY PARTS DURING DISASSEMBLY TO AVOID INJURY TO PERSONNEL OR DAMAGE TO PARTS. REFER TO TABLE 5-2 FOR APPROXIMATE WEIGHTS OF PARTS.

Table 5-1. Pump Data
Note: All dimensions are in inches.

Part Name (See Figure 5-12)	Pump Size		
	SC-2	SC-3	SC-4, SC-5
Packing (1)* Dimensions	3/8 sq x 1 3/4 ID x 2 1/2 OD	3/8 sq x 2 1/8 ID x 2 7/8 OD	3/8 sq x 2 1/4 ID x 3 OD
No. of Rings per Stuffing Box**	5	5	5
Lip Seal (5), Floating and Fixed Bearing Inner Caps	Johns Manville (2 req.) Type SS No. 11822SS 1.750 Shaft Dia. 2.375 Bore Dia. 0.312 Wide	Johns Manville (2 req.) Type SS No. 6944SS 2.125 Shaft Dia. 2.500 Bore Dia. 0.312 Wide	Johns Manville (2 req.) Type LPD No.8494 2.250 Shaft Dia. 3.125 Bore Dia. 0.500 Wide
Body Gasket (101-3), 0.010 thick, Qty.	1	1	1
Cone Gasket (104-3), 0.010 thick, Qty.	1	1	1
Floating Bearing (119) Drive-End	Single Row Ball Bearing (Non-filling slot), SKF 6407 or equivalent	Spherical Roller Bearing, SKF 21309CC or equivalent	Cylindrical Roller Bearing, SKF NJ409 or equivalent
Fixed Bearing (120) Idle-End	Single Row Ball Bearing (Non-filling slot), SKF 6407 or equivalent	Double Row Ball Bearing, SKF 5309CO or equivalent	Single Row Ball Bearing (Non-filling slot), SKF 6409 or equivalent

* **Contact your Nash Representative** for required packing material specification.
** If lantern glands (10, Figure 5-12) are used, one less packing ring is required.

Fabricated Tools

a. Bushing or pipe section as specified in Paragraph 5-6, step c (required only of rotor or shaft requires replacement).

b. 1 1/2 inch (Size SC-2) or 2 inch (Sizes SC-3, SC-4, SC-5) steel pipe machined as specified in Paragraph 5-18, step d.

Note

Do not disassemble the pump beyond the point required to remedy the trouble that has been observed. Before disassembling the pump, remove the drain plugs (22-1, Figure 5-12) from the head (102) and the body (101) to drain all liquid from the pump.

5-2 Disassembling Fixed Bearing End

a. Remove three fixed bearing outer cap screws (117-4, Figure 5-12), four nuts (117-2), four screws (117-1) and fixed bearing outer cap (117) from fixed bearing bracket (109).

b. Remove shims (4). Discard any damaged metal shims and all paper shims, if present.

c. Remove four fixed bearing bracket screws (109-1) and fixed bearing bracket from body (101).

Table 5-2. Approximate Weights of Parts

Figure 5-22 Index No.	Part Name	Weight In Pounds			
		SC-2	SC-3	SC-4	SC-5
101	Body	99	172	189	200
102	Head	49	81	86	86
104	Cone	3 1/2	14	16	16
108 109	Bearing Brackets	15 each	22 each	25 each	25 each
110	Rotor	27	61	88	103
111	Shaft	18	35	41	43
119 120	Floating and Fixed Bearing	2 each	2 1/2 each	3 1/2 each	3 1/2 each
	Pump (dry)	243	451	469	535

d. Remove and discard two fixed bearing ring gaskets (120-3).

e. Using spanner wrench or brass drift and hammer, loosen and remove fixed bearing locknut (120-1) from shaft (111).

f. Using bearing puller as shown in Figure 5-1, remove fixed bearing (120) from shaft. Discard bearing.

g. Remove fixed bearing inner cap (118) from shaft.

h. Remove lip seal (5) from fixed bearing inner cap. Discard lip seal.

i. Remove tension spring (3-1) (Sizes SC-2, SC-3 only) and slinger (3) from shaft.

j. Remove two gland nuts (101-1) from studs (101-2) and remove gland assembly (112) from body (101).

k. Remove packing (1) and lantern gland (10), if present, from body. Discard packing.

l. If gland studs (101-2), require replacement, heat base of stud to 250°F (121°C) maximum, using propane torch and 250°F temp stick, to free Loctite 242 and remove stud.

5-3 Disassembling Floating Bearing End

a. Remove shaft key (111,-1, Figure 5-12) from shaft (111).

b. Remove four outer cap nuts (115-2), screws (115-1), outer cap (115) and gasket (115-3) from bearing bracket (108). Discard gasket.

c. Remove lip seal (5-1) from bearing outer cap. Discard lip seal.

d. Remove four bracket screws (108-1) and bearing bracket from bearing end head (102).

Note

On sizes SC-4, SC-5: if bearing (119) is ball bearing, perform step e; if bearing is cylindrical rollar bearing, perform step f.

e. For sizes SC-2, SC-3: use bearing puller as shown in Figure 5-2, to remove bearing from shaft. Discard bearing.

CAUTION

WHEN HEATING INNER RING, MAKE CERTAIN NOT TO HEAT THE SHAFT (111).

f. For sizes SC-4 and SC-5, remove and discard the outer ring of bearing (119). Install bearing puller with jaws engaging inner ring and treaded post against end of shaft. Using propane torch, heat inner ring until tightening the bearing puller can remove the inner ring form the shaft shoulder. Discard inner ring.

g. Remove inner cap gasket (116-3) and inner cap (116) from shaft. Discard gasket.

h. Remove lip seal (5) from inner cap. Discard lip seal.

i. Remove tension spring (3-1, sizes SC-2 and SC-3 only) and slinger (3) from shaft.

5-4 Removing Head and Cone Assembly

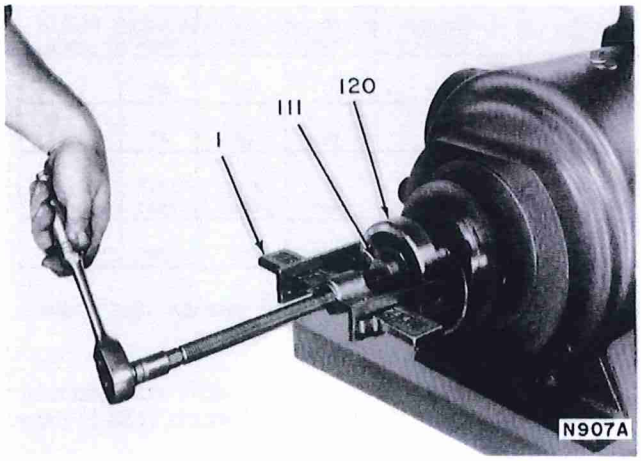
a. Install two 5/8-11 eyebolts in holes 180° apart in inlet flange of head (102, Figure 5-12) and secure with nuts. Connect chain hoist to eyebolts and support but do not lift head.

b. Remove six floating bearing end head screws (102-4) and two (Size SC-2) or four (Sizes SC-3, SC-4, SC-5) head screws (102-5).

c. Remove head and cone assembly from body (101).

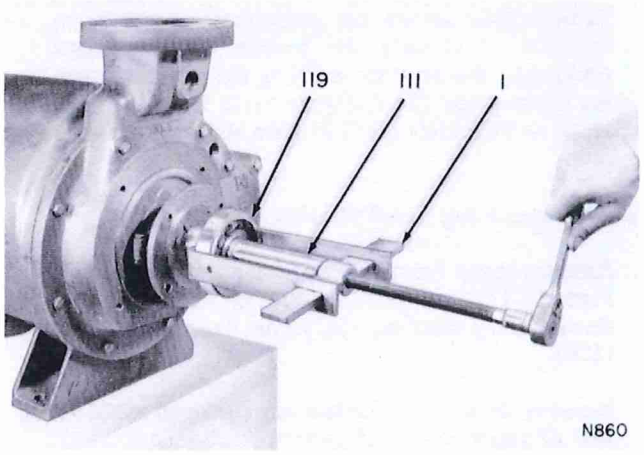
Note

If head and cone assembly will not separate from body, reinstall floating bracket (108) and secure with four screws (108-1). Using bearing puller, remove floating bearing bracket, head and cone as an assembly. Remove floating bearing bracket from head.



1. Bearing Puller 2. Shaft 3. Fixed Bearing

Figure 5-1. Pulling Fixed Bearing.



1. Bearing Puller 2. Shaft 119. Floating Bearing

Figure 5-2. Pulling Floating Bearing.

d. Remove body gasket (101-3) and discard.

e. Remove two gland nuts (102-1) from studs (102-2) and remove gland assembly (112) from head.

f. Remove packing (1) and lantern gland (10), if present from head. Discard packing

g. If gland studs (102-2) require replacement, heat base of stud to 250°F (121°C) maximum, using propane torch and 250°F (121°C) temp stick, to free Loctite 242 and remove stud.

h. Inspect cone (104) as specified in Paragraph 5-9.

5-5 Removing Rotor and Shaft Assembly

a. Grasp floating bearing end of shaft (111, Figure 5-12) and slide shaft and rotor (110) assembly out of body (101).

b. As soon as the rotor extends beyond the body, support the rotor with a sling and chain hoist as shown in Figure 5-6. Reposition the sling to the point of balance as rotor and shaft assembly is removed.

c. Inspect rotor tapered bores and shaft as specified in Paragraphs 5-10 and 5-11.

5-6 Removing Rotor From Shaft

If inspection of the rotor (Paragraph 5-10) or the shaft (Paragraph 5-11) indicates that either part requires replacement or repair which requires disassembly, proceed as follows:

a. Measure and record dimension A, Figure 5-5, from flat face of rotor to fixed bearing journal shoulder.

b. Lift rotor and shaft assembly with chain hoist and sling.

c. Slide bushing or pipe section sized to fit over fixed bearing end of shaft with face of bushing contacting rotor hub face only.

Note

Press large enough to handle rotor diameter with 40 ton capacity is required.

d. Position rotor and shaft assembly in press with floating bearing end of shaft against the press ram, and bushing (installed in step c) against the press backup plate.

e. Make provision to support fixed bearing end of shaft as it is pushed from rotor. Support rotor with blocks or sling passed through rotor blades and around each shroud.

f. Make certain that shaft is level and apply ram force to remove shaft from rotor.

5-7 Removing Cone From Head

If inspection of the cone (Paragraph 5-9) indicates that the cone must be replaced or reworked, proceed as follows:

a. Insert Allen wrench in socket of each cone screw (104-1, Figure 5-12). In turn, tap Allen wrench with mallet as shown in Figure 5-3 to loosen and remove six cone screws (Size SC-2) or eight cone screws (Sizes SC-3, SC-4, SC-5).

b. Tap side of cone (104) with soft-headed mallet to free cone from head (102).

c. Pull cone from head.

d. Remove gasket (104-3) and discard.

5-8 Inspection of Disassembled Parts

With the pump disassembled, inspect the parts for wear as described in the following paragraphs.

Note

If there is any question about the reusability or repair of worn major pump parts, **contact your local Nash Representative.**

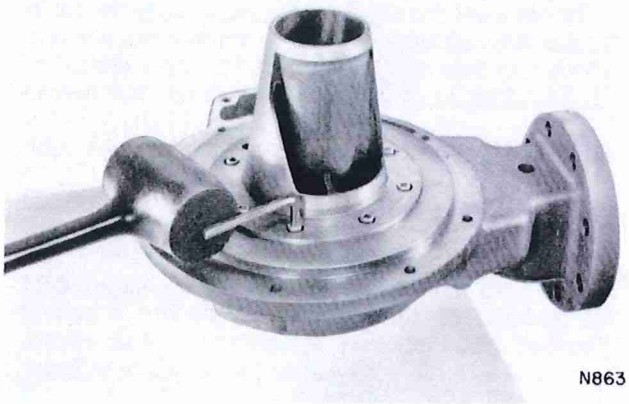


Figure 5-3. Loosening Cone Screws

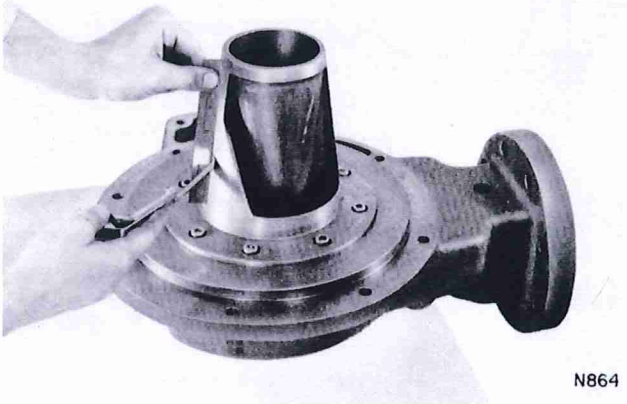


Figure 5-4. Checking Cone for Wear

5-8A Cone

Normally worn tapered surfaces of the cone will be smooth, requiring only cleaning and light filing around the ports and tips. If foreign material has entered the pump suction inlet during operation, circular score marks may be noticed around the outside of the cone tapers. Inspect the cone for damage and wear as follows:

Check for uneven wear and scoring between the ports and at the edges of the ports with a straightedge and feeler gauge as shown in Figure 5-4.

Localized wear or scoring not more than 0.030 inch deep is acceptable unless the pump is required to operate at or near maximum capacity. If score marks are not too deep, high spots can be removed by light filling. If localized wear or scoring exceeds 0.030 inch in depth, **contact your Nash Representative** for assistance in determining the reusability of the cone. Minor pitting is acceptable.

5-8B Rotor

Inspect the taper cone bores of the rotor on the same basis as the tapered surface of the cones as follows:

Check for uneven wear, undercutting or scalloping on the cone bore tapered surface with a straightedge and feeler gauge in a manner similar to that shown in Figure 5-4. If localized wear, undercutting or scalloping is more than 0.030 inch deep, **contact your Nash Representative** for assistance in determining the reusability of the rotor. Minor pitting is acceptable.

5-8C Shaft

Check the shaft diameters on which the packing sits for excessive wear. If the shaft is scored or worn through the metal surface, **contact your Nash Representative** for assistance in determining the reusability of the shaft.

Check shaft journals for signs of pick-up and check all surfaces for wear and or damage.

5-9 Reassembling Pump

CAUTION

THOROUGHLY CLEAN ALL PARTS BEFORE REASSEMBLY. BE SURE TO REMOVE ALL OLD GASKET MATERIAL FROM MOUNTING FLANGES. REMOVE BURRS FROM MATING SURFACES AND MOUNTING FACES.

PUMP SIZE	DIMENSION A - INCHES
SC-2	5 43/64 TO 5 45/64
SC-3	6 43/64 TO 6 45/64
SC-4	7 3/64 TO 7 5/64
SC-5	6 39/64 TO 6 41/64

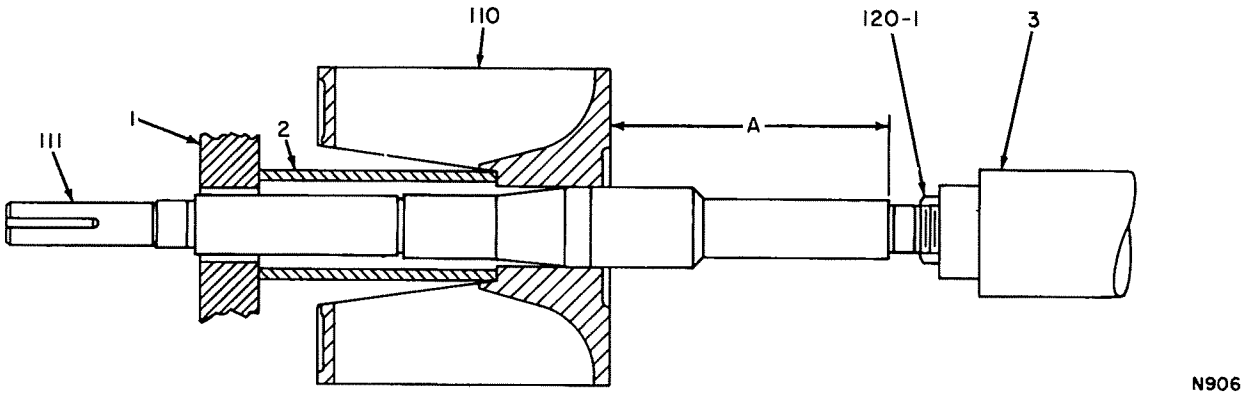


Figure 5-5. Pressing Rotor Onto Shaft

5-10 Reassembling Rotor and Shaft

To reassemble the rotor on the shaft, proceed as follows:

CAUTION

THIS PROCEDURE APPLIES TO ASSEMBLY OF IRON ROTOR ON STEEL SHAFT ONLY. ROTOR AND SHAFT MUST BE AT THE SAME TEMPERATURE DURING ASSEMBLY.

a. File taper bores of rotor (110, Figure 5-12) to remove burrs and high spots.

b. Check shaft for dents or rough spots on rotor seat and bearing journals.

c. Stone or polish shaft smooth.

d. Coat rotor hub bore and rotor seat of shaft with Molykote G-n paste, or equivalent, to prevent damage from friction or pick-up when shaft is pressed into rotor.

e. Thread fixed bearing locknut (120-1) on shaft to protect threads.

f. Slide drive end of shaft (111) into flat end of rotor. Gently tap threaded end of shaft with soft-headed mallet.

g. Slide same bushing or pipe section used in disassembly, on floating bearing end of shaft. (See Figure 5-5).

h. Sling rotor and shaft by a sling placed around the outside diameter at the point of balance and place the rotor and shaft in press with fixed bearing end of shaft in line with ram end of press and face of bushing or pipe section contacting rotor hub face only, with bushing or pipe section supported by press backup plate. Level rotor shaft assembly.

i. Press shaft into rotor until dimension A, Figure 5-5, from flat face of rotor to fixed bearing journal shoulder is within limits specified. *Record force applied.* Maximum allowable force is as specified:

Pump Size	Allowable Force-Tons	
	Maximum	Minimum
SC-2	11	3 1/2
SC-3	14	4 1/2
SC-4	16	5
SC-5	22	7

CAUTION

IF ASSEMBLY FORCE RECORDED IS NOT WITHIN LIMITS SPECIFIED ABOVE, DO NOT INSTALL ASSEMBLED ROTOR AND SHAFT IN PUMP. **CONTACT YOUR LOCAL NASH REPRESENTATIVE** TO DETERMINE WHETHER ROTOR/SHAFT MUST BE REPLACED.

WARNING

BEFORE REMOVING ROTOR AND SHAFT ASSEMBLY FROM PRESS, MOVE SLING TO NEW POINT OF BALANCE TO AVOID INJURY OR DAMAGE.

j. Remove fixed bearing locknut from shaft.

5-11 Installing Cone in Head.

If the head and cone assembly has been disassembled, reassemble as follows:

a. If a new cone is being installed, check it carefully against the old cone for correct part number and remove rust preventative from surfaces with solvent such as kerosene.

b. File taper surfaces on the cone smooth, paying special attention to edges of cone ports.

c. Apply light coat of grease to replacement cone gasket (104-3, Figure 5-12) and position gasket on head (102).

d. Lower cone into place on head making certain that eight holes in cone flange align with tapped holes in head. Thread in six 1/4-20(Size SC-2), eight 5/16-18(Size SC-3) or eight 3/8-16(Sizes SC-4, SC-5) socket head cone screws (104-1) and tighten screws.

e. After tightening screws, tap Allen wrench with mallet to finish tightening each screw.

5-12 Installing Rotor and Shaft Assembly into Body

a. If gland studs (101-2, Figure 5-12) have been removed from body (101), install new studs as follows:

   1. Apply Locquic Primer T to tapped holes in body and stud threads. Allow primer to dry.

   2. Apply Loctite 242 to stud threads and install studs in body.

b. Fasten mounting feet of body to level surface.

c. Lift rotor and shaft assembly with sling and chain hoist as shown in Figure 5-6 and install fixed bearing end of shaft into body (101).

d. Keep moving rotor and shaft assembly, adjusting position of sling as necessary, until shaft passes through stuffing box in body (101) and rotor shroud seats against body.

5-13 Installing Head and Cone Assembly on Body

a. If gland studs (102-2, Figure 5-12) have been removed from head (102), install new studs as follows:

   1. Apply Locquic Primer T to tapped holes in head and stud threads. Allow primer to dry.

   2. Apply Loctite 242 to stud threads and install studs in head.

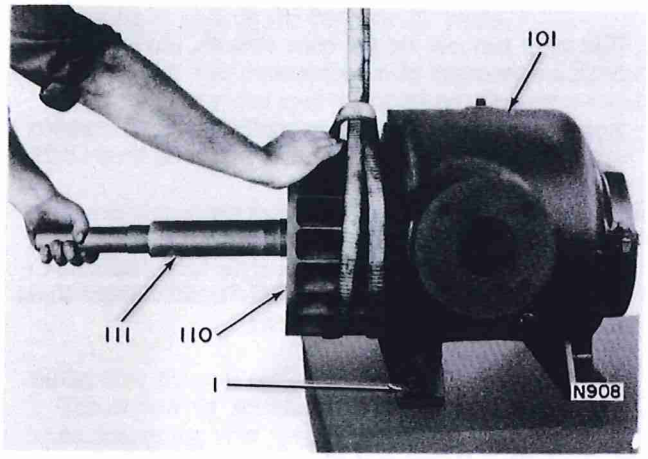
b. Apply light coat of grease to new body gasket (101-3) and position gasket on head.

c. Using eyebolts and chain hoist as specified in Paragraph 5-4, step a, position head and cone assembly on body. Make certain that the head rabbet seats in body bore and that 8 (Size SC-2) or 10(Sizes SC-3, SC-4, SC-5) mounting holes in head align with tapped holes in body.

d. Secure head to body with six screws (102-4) and two (Size SC-2) or four (Sizes SC-3, SC-4, SC-5) screws (102-5).

5-14 Assembling Bearing Ends

a. Install new lip seals (5, Figure 5-12) in bearing inner caps (116 and 118) as follows:



1. Mounting Bolt
101. Body
110. Rotor
111. Shaft

Figure 5-6. Installing Rotor and Shaft Assembly

1. Apply light coat of grease to OD and sealing lips of lip seals.

2. Install lip seals in caps with sealing lips facing away from bearing housing. Make certain that lip seals are properly seated.

b. Install slingers (3) and tension springs (3-1)(Sizes SC-2 and SC-3) on floating and fixed bearing ends of shaft (111).

c. Install floating and fixed bearing inner caps and floating bearing inner cap gasket (116-3) on shaft.

d. Slide slingers and inner caps beyond bearing journal shoulder toward head (102) and body (101).

e. Install bearing brackets (108 and 109) on head and body, and secure each with four screws (108-1 and 109-1).

Note

Make sure that pipe plugs (22) and grease fittings (23) are installed in brackets.

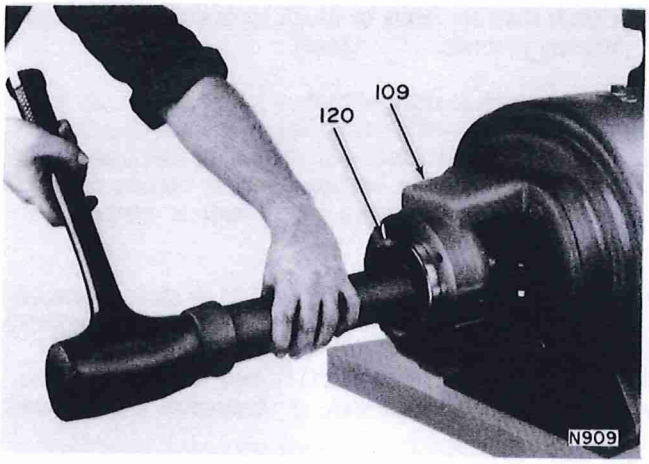
5-15 Installing Fixed Bearing

a. Pack new fixed bearing (120) with grease as specified in Table 4-1.

b. Slide new inner bearing ring gasket (120-3) over fixed bearing end of shaft.

c. Slide bearing onto shaft journal taking care not to damage shaft threads.

d. Machine one end of 1 1/2 inch (Size SC-2) or 2 inch (Sizes SC-3, SC-4, SC-5) steel pipe, 6 1/2 inches long, square, thread opposite end of pipe and install pipe cap.



109. Fixed Bearing Bracket
120. Fixed Bearing

Figure 5-7. Installing Fixed Bearing

CAUTION

MAKE CERTAIN THAT MACHINED END OF PIPE IS CLEAN AND CONTACTS INNER RACE OF BEARING ONLY WHEN PERFORMING STEP e.

e. Using pipe fabricated in step d, drive fixed bearing onto shaft as shown in Figure 5-7 until bearing is seated against shaft shoulder.

f. Thread fixed bearing locknut (120-1) onto shaft and tighten with spanner wrench or brass drift and hammer as shown in Figure 5-8.

g. Install new outer bearing ring gasket (120-3, Figure 5-12) over shaft and against bearing.

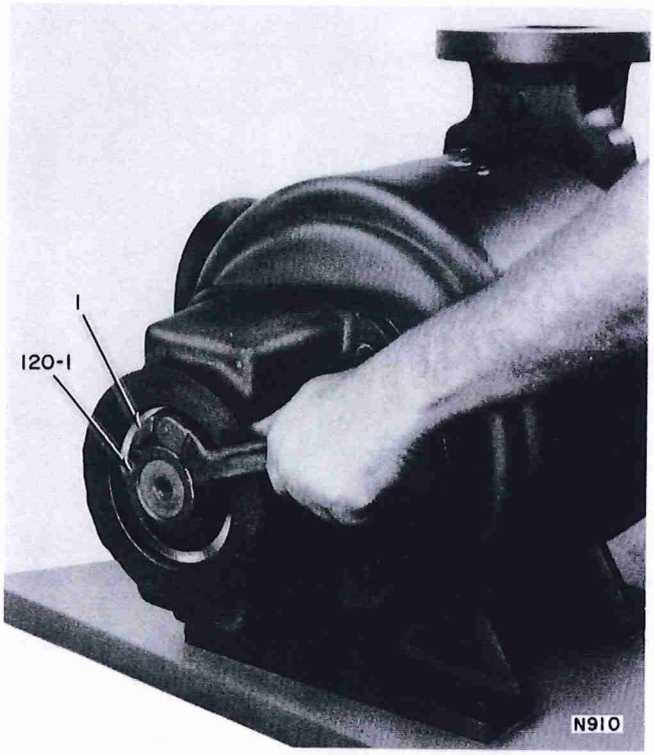
h. Install fixed bearing outer cap (117) on bearing bracket (109).

i. Align holes of inner and outer caps with holes in bearing bracket and secure with four screws (117-1) and nuts (117-2).

5-16A Installing Floating Bearing, Sizes SC-2, SC-3

a. Pack new floating bearing (119, Figure 5-12) with grease as specified in Table 4-1.

b. Slide bearing onto shaft journal.



1. Spanner Wrench 120-1. Fixed Bearing Locknut

Figure 5-8. Tightening Fixed Bearing Locknut

CAUTION

MAKE CERTAIN THAT MACHINED END OF PIPE IS CLEAN AND CONTACTS INNER RACE OF BEARING ONLY WHEN PERFORMING STEP c.

c. Using pipe fabricated in Paragraph 5-18, step d, drive bearing onto shaft until bearing is seated against shaft shoulder.

5-16B Installing Floating Bearing, Sizes SC-4, SC-5

a. Slide inner ring of new floating bearing (119, Figure 5-12) onto shaft journal.

CAUTION

MAKE CERTAIN THAT MACHINED END OF PIPE IS CLEAN AND CONTACTS FACE OF INNER RING ONLY WHEN PERFORMING STEP b.

b. Using pipe fabricated in Paragraph 5-18, step d, drive inner ring onto shaft until inner ring is seated against shaft shoulder.

c. Pack outer ring and rollers with grease as specified in Table 4-1.

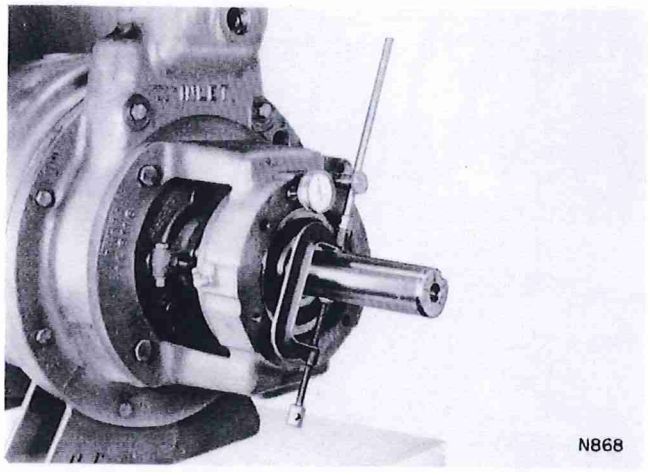


Figure 5-9. Measuring End Travel at Floating Bearing End

CAUTION

DO NOT USE FORCE WHEN INSTALLING OUTER RING TO AVOID DAMAGE TO FLOATING BEARING.

d. Mount outer ring on inner ring by slowly rotating and gradually working outer ring into position on inner ring.

5-17 Setting End Travel and Final Assembly

a. Mount dial indicator on floating bearing end of shaft (111, Figure 5-12) with spindle of dial indicator on face of floating bearing bracket (108) as shown in Figure 5-9.

b. Install three 5/16-18 (Size SC-2) or 3/8-16 (Sizes SC-3, SC-4, SC-5) screws (117-4, Figure 5-10) through fixed bearing outer cap (117) into tapped holes in fixed bearing bracket (109) to act as takeup screws.

c. Gradually tighten three takeup screws equally until shaft cannot be rotated with spanner wrench engaging keyway in drive end of shaft. **DO NOT TIGHTEN TAKEUP SCREWS BEYOND THIS POINT.** Rotor taper bore is now seated on floating bearing end cone. Zero dial indicator.

d. Loosen three takeup screws at least 1/4 inch.

e. Install two 5/16-18 (Size SC-2) or 3/8-16 (Sizes SC-3, SC-4, SC-5) screws (1, Figure 5-10) in tapped holes in fixed bearing outer cap to act as jackscrews.

n. Apply light coat of grease to new floating bearing outer cap gasket (115-3) and place gasket on outer cap.

o. Slide floating bearing outer cap and gasket over shaft and position on floating bearing bracket (108).

p. Align four holes in floating bearing inner cap, bearing bracket and outer cap and secure caps with four screws (115-1) and nuts (115-2).

q. Install new packing (1), lantern glands (10), if used, and gland assemblies (112) at floating and fixed bearing ends as specified in Paragraph 4-5.

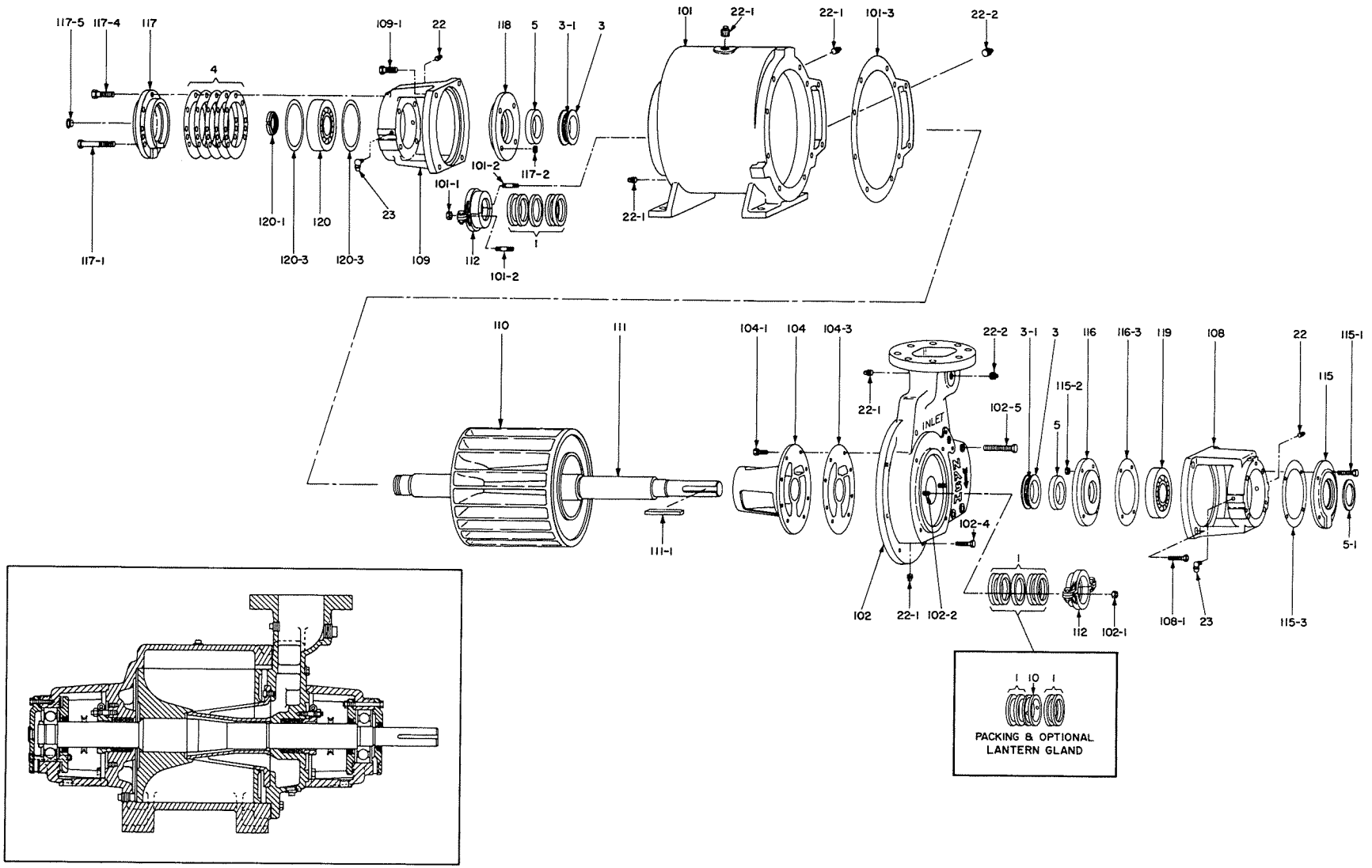
Note

For vacuum pumps and compressors equipped with mechanical shaft seals refer to Bulletin no. 789 "Removal and Replacement of Mechanical Shaft Seals - Nash Vacuum Pumps and Compressors - Sizes SC2, SC-3, SC-4, SC-5".

Note

Before placing pump back into service, align coupling or V-belt drive as specified in Bulletin No. 642, Installation Instructions, Nash Vacuum Pumps and Compressors.

Prime pump as specified in Paragraph 2-4, step c, and start pump as specified in Paragraph 2-5.



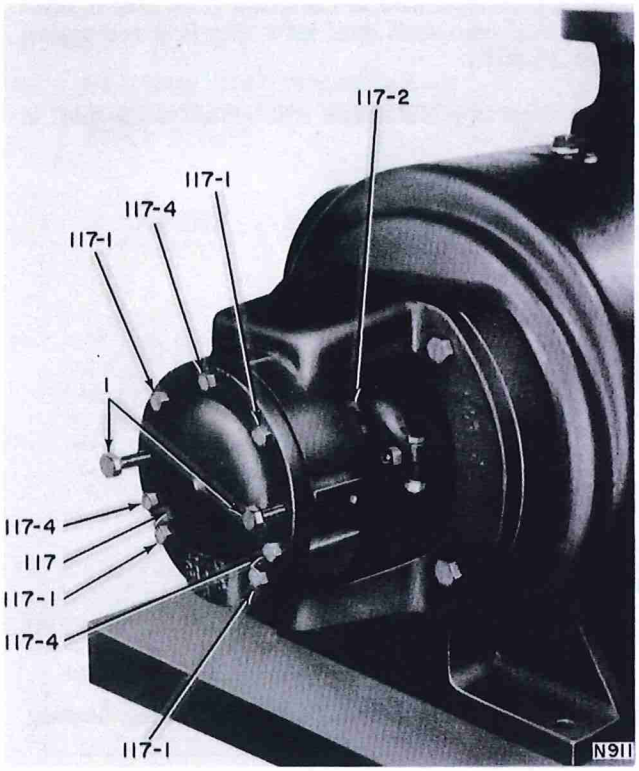
Drawing 14-8955A

Figure 5-12. Nash Size SC-2, SC-3, SC-4 and SC-5 Pumps/Compressors, Exploded View.

LEGEND FOR FIGURE 5-12

Index No.	Qty	Part Name	Index No.	Qty	Part Name
*1	10 rings	Packing	108-1	4	Floating Bearing Bracket Screw
*3	2	Slinger	109	1	Fixed Bearing Bracket
†*3-1	2	Spring, Tension	109-1	4	Fixed Bearing Bracket Screw
*4	AR	Shim	110	1	Rotor
*5	2	Lip Seal	111	1	Shaft
*5-1	1	Lip Seal	111-1	1	Shaft Key
**10	2	Lantern Gland	112	2	Gland Assembly
22	2	Pipe Plug	115	1	Floating Bearing Outer Cap
22-1	10	Pipe Plug	115-1	4	Outer Cap Screw
22-2	1	Pipe Plug	115-2	2	Outer Cap Nut
23	2	Grease Fitting	*115-3	1	Outer Cap Gasket
101	1	Body	116	1	Floating Bearing Inner Cap
101-1	2	Gland Nut	*116-3	1	Inner Cap Gasket
101-2	2	Gland Stud	117	1	Fixed Bearing Outer Cap
*101-3	1	Body Gasket	117-1	4	Outer Cap Screw
102	1	Head	117-2	4	Outer Cap Nut
102-1	2	Gland Nut	117-4	3	Outer Cap Screw
102-2	2	Gland Stud	117-5	1	Outer Cap Nameplate
102-4	6	Head Screw	118	1	Fixed Bearing Inner Cap
102-5	4	Head Screw	*119	1	Floating Bearing
104	1	Floating Bearing End Cone	*120	1	Fixed Bearing
104-1	8	Cone Screw	*120-1	1	Fixed Bearing Locknut
*104-3	1	Cone Gasket	*120-3	2	Fixed Bearing Gasket
108	1	Floating Bearing Bracket			

AR — As required.
*Minimum recommended spares.
**When used, optional; requires 8 packing rings, Index No. 1.
†Used on Sizes SC-2, SC-3 only.



1. Jackscrew 117-2. Fixed Bearing Outer Cap Nut
117. Fixed Bearing Outer Cap 117-4. Takeup Screw
117-1. Fixed Bearing Outer Cap Screw

Figure 5-10. End Travel Check Setup at Fixed Bearing End

f. Gradually tighten two jackscrews equally until dial indicator reading is within limits specified below:

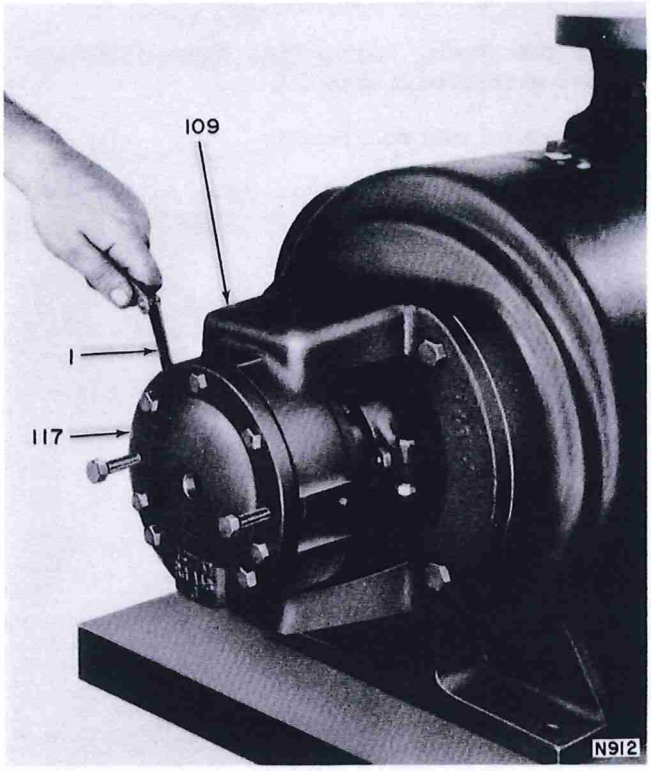
Dial Indicator Reading - Inches				
	Vacuum Pump		Compressor	
Pump	Iron	St.St.*	Iron	St.St.*
SC-2	.025-.030	.070-.080	.050-.060	.080-.085
SC-3	.025-.030	.055-.065	.050-.060	.085-.095
SC-4	.080-.085	.090-.100	.080-.085	.090-.100
SC-5	.028-.040	.070-.080	.060-.080	.095-.105

* includes stainless steel fitted pumps

Note

Make certain that shaft rotates freely without any rubbing or contact.

g. Using leaf (feeler) gauge, measure gap between fixed bearing outer cap (117) and fixed bearing bracket (109) at four places 90° apart. (See Figure 5-11). Add four measurements and divide sum by four to compute average gap.



1. Leaf (Feeler) Gauge 117. Fixed Bearing Bracket
109. Fixed Bearing Bracket Outer Cap

Figure 5-11. Measuring Shim Gap

h. Select combination of new shims (4, Figure 5-12) equal to average gap computed in step g.

i. Remove three screws (117-4), four nuts (117-2) and screws (117-1) and remove fixed bearing outer cap.

Note

If 0.010 inch thick paper shim gasket was one of the shims selected in step h, lightly grease both sides of paper shim gasket and install on face of fixed bearing bracket when performing step j.

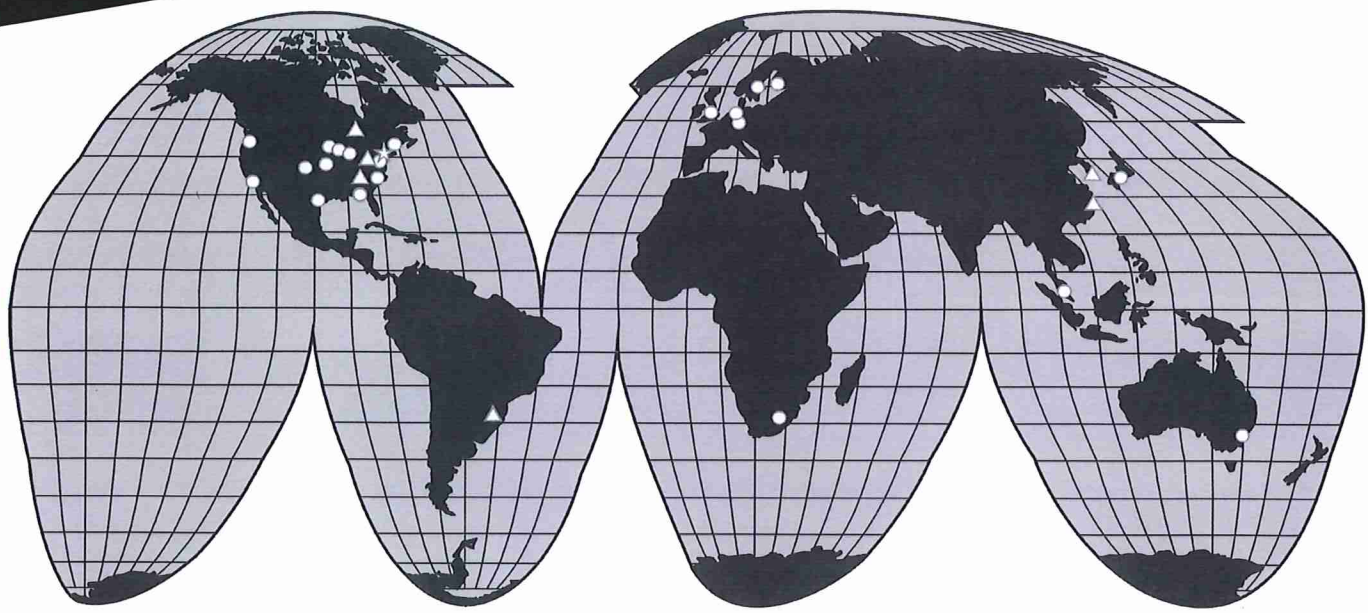
j. Position shims selected in step g and fixed bearing outer cap on fixed bearing bracket. Align four holes in fixed bearing inner cap (118), bearing bracket and outer cap. Secure outer and inner caps with four screws (117-1) and nuts (117-2).

k. Secure outer cap to bearing bracket with three screws (117-4).

l. Make certain that dial indicator reading is same as value recorded in step f within ±0.005 inch. Then remove dial indicator from shaft.

m. Install new lip seal (5-1) in floating bearing outer cap (115) in same manner as specified in Paragraph 5-17, steps a.1 and a.2.

NASH WORLDWIDE



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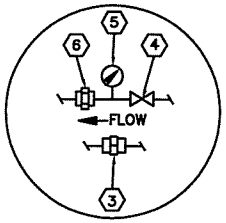
NASH®
THE PERFORMANCE MEETS THE PROMISE®

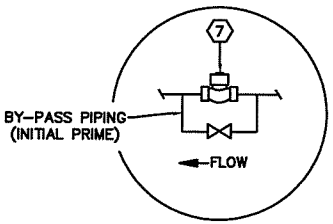
DWG. NO. 14-8839 SH REV C

ZONE	REV	DESCRIPTION	DATE	APPROVED
	B	REDRAWN AND REVISED (2031U86)	9/25/86	LJL
	C	UPDATED DWG TO LATEST ENGINEERING STANDARDS ECN1139U03 RMK	9-19-03	CGD

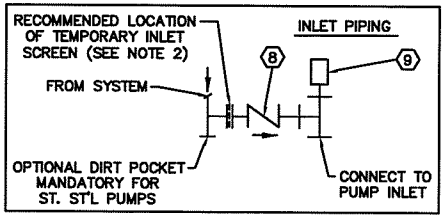
LIQUID SEAL SUPPLY CONNECTIONS



FLOW CONTROLS
USE (3) OR (4) (5) AND (6)
[A] DETAIL

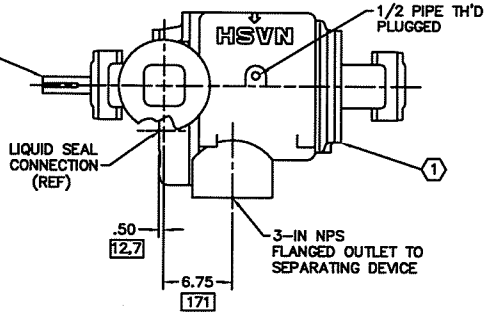


SHUT-OFF SOLENOID VALVE
[B] DETAIL



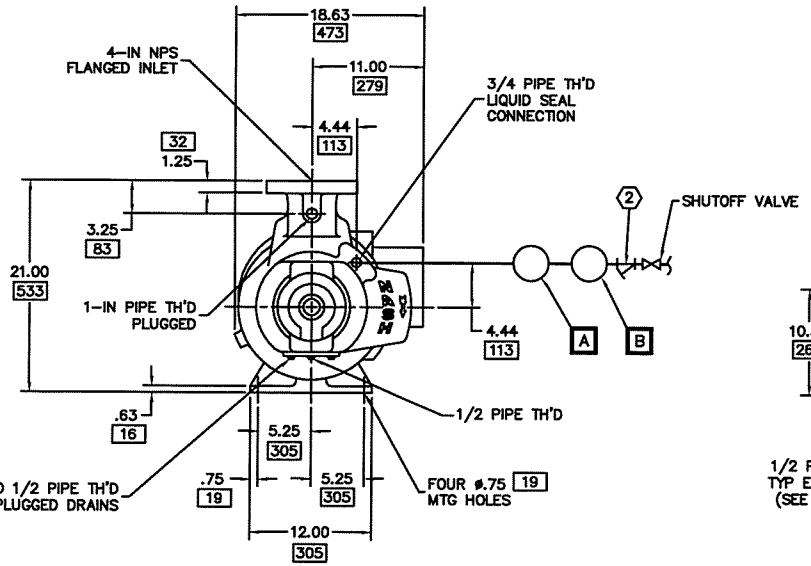
41,275 +0,000 −0,012 SHAFT DIA.
9,52 x 4,76 KEYWAY

1.6250 +.0000 −.0005 SHAFT DIA.
3/8 x 3/16 KEYWAY

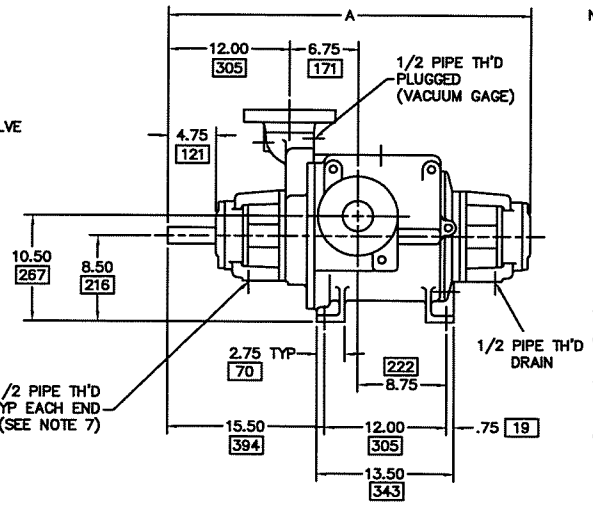


BILL OF MATERIAL

KEY NO.	ITEM
1	VACUUM PUMP
2	STRAINER
3	FLOW CONTROL VALVE
4	ADJUSTING COCK
5	PRESSURE GAUGE
6	ORIFICE UNION
7	SOLENOID VALVE
8	INLET CHECK VALVE
9	RELIEF VALVE



VIEWED AT THIS END
DIRECTION OF ROTATION
IS CLOCKWISE



PUMP SIZE	A
SC-4	35.75 908
SC-5	37.88 962

NOTES:

1. REFER TO ENGINEERING DATA SHEET FOR CERTIFICATION AND ITEMS SPECIFICALLY FURNISHED FOR THIS ORDER.
2. STAINLESS STEEL TEMPORARY SCREENS FOR PUMP INLET WILL BE SUPPLIED BY GARDNER DENVER NASH FOR PROTECTION FROM FOREIGN MATERIAL DURING START-UP PERIOD. TWO SCREENS (.25-IN & NO. 30 MESH) WILL BE SUPPLIED WITH STAINLESS STEEL PUMPS. THE NO. 30 MESH SCREEN SHOULD BE INSTALLED ON THE UPSTREAM SIDE OF THE .25-IN MESH SCREEN.
3. FOUNDATION BOLTS ARE NOT FURNISHED.
4. ALL PUMP FLANGES ARE FLAT FACE AND CONFORM TO ANSI CLASS 125 BOLT PATTERNS. BOLT HOLES STRADDLE CENTERLINES.
5. PUMP PIPE THD. CONNECTIONS ARE ANSI B1.20.1.
6. FOR INSTALLATION AND OPERATION SEE INSTRUCTION BULLETINS.
7. STUFFING BOX DRIP TRAY DRAIN CONNECTION. FOR PUMPS WITH PACKING, PIPE AWAY TO DRAIN.
8. SOLIDLY GROUND UNIT. DO NOT USE PIPING SYSTEM FOR GROUND.

-- UNLESS OTHERWISE NOTED --
DIMENSIONAL UNITS ARE: INCHES [MM]
-- TOLERANCES --

GENERAL	MOUNTING HOLE LOCATIONS	PIPE CONNECTION LOCATIONS ≤ 2" NPS	PIPE CONNECTION LOCATIONS > 2" NPS
± .06 [1,5]	± .03 [0,8]	± .13 [3,3]	± .06 [1,5]

DRN	ETM	9-23-86
CHKD	LJL	9-23-86
APVD DESIGN	RAL	9-24-86
APVD MFGR	RAL	9-25-86
APVD QA		

PROJECTION 1

Gardner Denver Nash LLC

INSTALLATION SC4 AND SC5 VACUUM PUMPS

SIZE D | FROM NO. 42280 | DWG NO. 14-8839 | REV C
SCALE 1/8 | SHEET

50psi Temp max: 200°F
0-78

How is liquid returned to seal pot?