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SERVICE MANUAL

MOYNO[®]

2000 Pumps

**G2/G3 Enhanced Feed Models
Version 5 Models**



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Note: This service manual outlines installation, operation and maintenance procedures for the flanged "G4" models of Moyno 2000 pump. For information on the flanged G1, open throat (G2) and/or the bridge breaker (G3) models of the Moyno 2000 pump, refer to their respective Service Manual, or contact your nearest Moyno pump representative.



Always the Right Solution™

SERVICE MANUAL

Moyno® 2000 Pumps G2/G3 Enhanced Feed Open Throat Models

1-1. INTRODUCTION

1-2. GENERAL

The Moyno® 2000 Pump is the culmination of over 70 years of experience in manufacturing and marketing fluids handling equipment. This rugged pump has been engineered to be the most reliable product ever sold under the Moyno name. The pump has been painstakingly tested to assure consistent performance in the most difficult of applications. It represents the next generation of the world's most versatile pump.

The Moyno 2000 Pump is a progressing cavity pump. A single helical rotor rolling eccentrically in the double helix of the stator creates the pumping action. The rotor in conjunction with the stator forms a series of sealed cavities 180 degrees apart. As the rotor turns, the cavities progress from the suction to the discharge. As one cavity diminishes, the opposing cavity increases at exactly the same rate. Thus the sum of the two discharges is a constant volume. The result is a pulsation-free positive displacement flow utilizing no valves.

The G2 product line is the latest Moyno design which incorporates a wide open throat feed hopper with auger connecting rod for better fill efficiency. The G3 version incorporates the features of the G2 open throat plus has a separate bridge breaker mechanism to effectively pump even higher solids and viscosity products. This manual supports the G2/G3 version 5 product lines purchased after Oct 2003 (See fig 1-1 for indicator in trim code).

G2 Version 5 features include integral extension tube, larger auger feed connecting rods, and two piece drive shaft for easy maintenance. The G3 Version 5 includes the features of the G2 plus separate drive on the Bridge Breaker to allow the flexibility to vary the paddle speed, separate from the pump, when needed. The paddle shaft is designed for maintenance ease by allowing the paddles to be removed from the inside of the suction hopper. This feature allows servicing of the bottom pump portion without disturbing the bridge breaker drive mechanism, significantly reducing downtime.

1-3. NAMEPLATE DATA

The pump nameplate, located on the bearing housing, contains important information relating to the operation and servicing of the pump. This information includes the direction of rotation arrow and the pump model and serial numbers (see Figure 1-1.). The pump model number must be used for reference when ordering spare parts.

1-4. Pump Rotation. A rotation arrow on the nameplate indicates the direction of rotation. Normal rotation of Moyno 2000 pumps is clockwise, when viewed from the driven end of the pump.

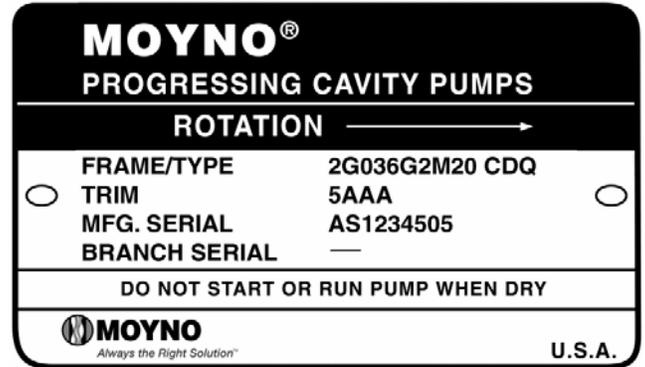


Figure 1-1. Typical nameplate showing rotation arrow, model, and manufacturing serial numbers.

1-5. Model Number. The pump model number consists of three component parts: Frame Designation, Type Designation and a Trim Code. A typical model number, for example, might be 2G036G2M20 CDQ 5AAA, as shown on the nameplate in Figure 1-1. Version #5 is indicated before the trim code (IE: 5AAA).

1-6. Frame Designation. The Moyno 2000 is modular in concept allowing for optimal matching of drive ends and pump elements (rotor and stator) to meet the requirements of the application. The ten or more characters in the frame designation describe the particular combination of drive end, hopper length, and pump elements, as well as other construction details of your pump. The first character in the frame designation, always a number, indicates the number of stages of the pump elements.

The second character is always a letter (E-K) and indicates the drive end size. The third, fourth and fifth numerical characters are indicating the theoretical capability of the pumping elements per 100 revolutions on water. The sixth character represents the type of universal joint utilized, "G" = gear type joint. The seventh character, a number, indicates the type of suction housing. Open throat pumps are designated by a "2", open throat pumps with a bridge breaker option by the numeral "3". On the G2 and G3 versions, the eighth character is a letter that represents the type of hopper and auger style used. The length of the hopper is designated by the ninth and tenth numerical characters. A length designation of 20 indicates a hopper length made to mate to 2 meter belt filter press (2.2 meters wide).

1-7. Type Designation. Following the Frame Designation is the Type Designation, a series of three letters describing the materials from which the pump is constructed.

The first letter identifies the material of the suction housing.

- C — Cast Iron
- E — Carpenter 20 Stainless Steel*
- G — 416 Stainless Steel
- H — Hastelloy "C"***
- J — 17-4 pH Stainless Steel
- M — Monel***
- S — 316 Stainless Steel
- W — Cast Steel
- X — Special to Application

The second letter indicates the material used in the drive shaft, connecting rod, rotor, and other wettable parts.

- D — Alloy Steel
- E — Carpenter 20 Stainless Steel*
- G — 416 Stainless Steel
- H — Hastelloy "C"***
- J — 17-4 pH Stainless Steel
- M — Monel***
- S — 316 Stainless Steel
- X — Special to Application

The third letter indicates the material of the stator. It identifies only the stator material and not that of the tube. The stator tube construction is typically carbon steel since it is isolated from the pumpage. Standard stator materials used in the Moyno 2000 pump are as follows:

- B — EPDM 300, 70 Durometer
- C — Nitrile 103, 50 Durometer
- D — Tool Steel
- E — Nitrile 110, 70 Durometer
- F — Fluoroelastomer 500, 75 Durometer
- G — 416 Stainless Steel
- H — Hastelloy "C"***
- I — Teflon 15% Glass†
- J — 17-4 pH Stainless Steel
- K — Hypalon 800, 70 Durometer‡
- M — Nitrile 100M 70 Durometer
- P — Thiokol 70 Durometer‡
- Q — Nitrile 100, 70 Durometer
- R — Natural Rubber 200, 55 Durometer
- T — Teflon 15% glass
- U — Urethane 70 Durometer
- X — Special to Application
- Z — White Nitrile 150, 70 Durometer

A typical type designation, such as CDQ, would identify the following materials of construction:

- C — Cast iron suction housing
- D — Alloy steel rotor, drive shaft, connecting rod and other minor metallic parts in contact with the fluid being pumped.
- Q — Nitrile (70 Durometer) stator

*Carpenter 20 is a trademark of Carpenter Technology Corp.

**Hastelloy is a trademark of Cabot Corp.

***Monel is a trademark of INCO Alloy Corp.

†Hypalon and Teflon are trademarks of E. I. DuPont de Nemours and Company

‡Thiokol is a trademark of Morton Thiokol, Inc.

1-8. Version Designation. Following the Frame Designation is the a number which indicates the version Designation. A metric version sold into the world markets is designated as a **1**. The current ANSI version, covered in this service manual, is designated by **5**.

1-9. Trim Code. Also included in the Model Number is the three character Trim Code which is used to identify pump construction. The letters "AAA" signify standard construction, with letters other than "A" signifying variations. The first letter identifies sealing variations; the second, internal variations; and the third, rotor variations.

1-10. Variations of Standard Parts. Refer to Sections 4-47 through 4-49 for variations available for modifying pumps to meet specialized pumping conditions. If the trim code of your pump is other than "AAA", contact your nearest Moyno representative for clarification. Do not modify your pump with any variation unless you have determined that it is compatible with your application.

2-1. INSTALLATION

2-2. GENERAL

Moyno pumps are lubricated and tested at the factory prior to shipment and require minimum pre-start up maintenance. Packing, however, is not lubricated at the factory.

Accessibility to the pump and adequate clearance should be a prime consideration in any installation. Enough space should surround the unit so that maintenance can be carried out with ease.

2-3. PIPING

2-4. Suction Hopper used with open throat and bridge breaker pumps should have nearly vertical sides, or be otherwise designed to enhance the flow of the material into the pump.

2-5. Discharge Piping diameter should generally be as large as the pump ports unless fluid conditions indicate otherwise.

An easily removable section of piping one-to-two times longer than the connecting rod (approximately the length of the suction housing and bearing housing together) should be mated to the discharge port. This will allow the rotor and stator to be removed without having to remove the complete pump from the base.

2-6. FOUNDATION

Each unit should be mounted on a strong, fabricated steel base plate. The base plate should be mounted on a concrete foundation. The foundation should be approximately 4" to 8" longer and wider than the base for which it is built (See Figure 2-1.). Anchor bolts for the base plate should be located in the foundation.

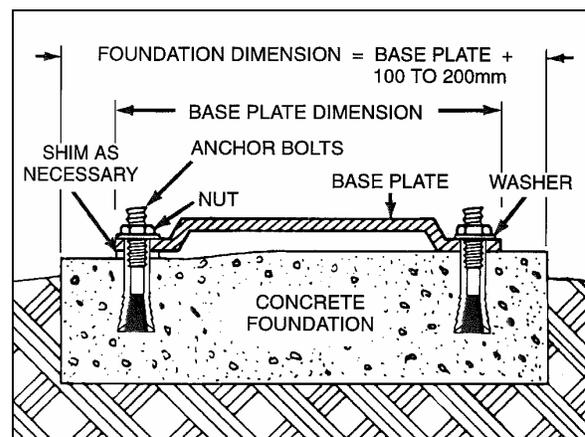


Figure 2-1. Typical Foundation Example

Check the base plate surface with a carpenter's level and place shims under the base plate at the places necessary to make it level. Then check the pump driver shaft and the pump ports to ensure that they are level. Complete base mounted units supplied by Moyno including pump and driver are leveled with respect to the base at the factory. Shifting may occur during shipment. The pump and driver should be realigned. Care should be exercised to ensure that all components are level and mounted in a direct line.

For maximum rigidity and lower noise levels, the base plate should be grouted to the foundation after the anchor bolts have been evenly tightened. A good grade of non-shrink grout is recommended. The spaces between the base plate and the foundation around the shims should also be filled with grout. Allow the grout to dry according to manufacturers' instructions, then fully tighten the anchor bolts.

2-7. SHAFT ALIGNMENT

Although the base-mounted units supplied by Moyno are leveled with respect to the base before shipment, most of the larger pump and driver units are shipped with the flexible coupling disconnected.

After the base has been bolted down to the foundation, check the following conditions:

2-8. On Coupling Connected Units, be sure that the pump and driver shafts are realigned before the coupling is connected. Care should be exercised to ensure that all components are level and mounted in a direct line.

Check gap between coupling halves (refer to coupling manufacturer's recommendations). Adjustment can usually be accomplished by loosening the mounting bolts on either the pump or driver and moving the loosened component into alignment with the fixed component. On couplings with equal diameter hubs, it may be possible to lay a straight edge axially across the coupling halves to check alignment.

Check gear reducer and motors for proper lubrication per manufacturer's recommendations.

2-9 On Belt Drive Units, check to ensure that sheaves or sprockets are in alignment. Check belts for proper tension. Tension requirements will vary with type of belt, center distances, and belt speeds. Consult belt manufacturer for specific recommendation.

2-10. WATER FLUSH OF PACKING

The packing may be either grease lubricated through a grease fitting in the stuffing box or have plumbing connected to the housing to allow for water flushing.

Packing is not grease lubricated at the factory prior to shipping.

When the material being pumped is abrasive, water flushing the packing is recommended to extend shaft life.

Clean water can be injected through a 1/8" NPT hole that normally houses the grease fitting for lubricating the packing. The water should be permitted to leak axially along the shaft and be removed from the second tapped hole in the stuffing box. The discharge from the stuffing box should be throttled slightly to maintain 10 – 15 PSI higher pressure in the stuffing box than is present in the suction housing (See Figure 2-2.). Flow rate should be approximately 1/2 - 2 GPM.

If a mechanical seal is used, consult the seal manufacturer's instructions for seal flush requirements.

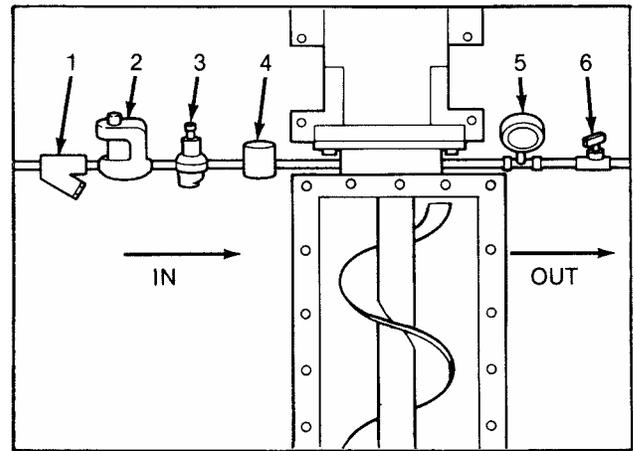


Figure 2-2. Typical water flush arrangement for units with packing includes strainer valve (1), pressure regulating valve (2), sight flow meter (3), solenoid valve (4), pressure gauge (5), and needle valve (6).

3-1. OPERATION

3-2. INITIAL CHECK

Before putting the pump into operation, the following items should be checked to ensure that each piece of equipment is installed correctly:

- Pump, driver, coupling, or sheave alignment.
- Electrical connections.
- Gauges and other instruments.
- Water flush connection to the stuffing box.
- Pump rotation. Normal rotation is indicated on the nameplate on the bearing housing.
- G3 Bridge Breaker rotation. Normal rotation is for paddles to rotate inward
- All valves should be open on both suction and discharge sides of the pump.
- Check for foreign objects in suction hopper.

CAUTION: This is a positive displacement pump. Do not operate it against a closed valve.

3-3. START-UP

CAUTION: DRY OPERATION IS HARMFUL TO THE PUMP! Never allow the pump to operate without liquid, as dry operation will cause premature wear of the stator and possible damage. The stator is lubricated by the liquid, which is pumped.

1. Before operating the pump for the first time, fill it with liquid (the drain plug hole on the suction housing may be used for filling). If the liquid to be pumped is highly viscous, dilute it before filling the pump. The liquid fill-up will lubricate the stator for the initial start-up.
2. Once the pump has been filled with liquid, check for direction of pump rotation by momentarily starting and stopping the drive. Check rotation arrow on pump nameplate for correct rotation.
3. If applicable, turn on the water to the packing.
4. Start pump.
5. Adjust packing as needed.
6. For G3 models, try to maintain level of the product within a few inches above the top of the bridge breaker paddles.

3-4. PACKING LEAKAGE

A packed stuffing box is designed to control leakage, not stop it completely. Leakage is generally necessary to reduce friction and dissipate heat. The amount of leakage necessary will depend on the fluid pump, the installation, and pump speed and type. Refer to Section 4-3. for packing adjustment. G3 pumps are equipped with packing on the pump as well as both sides of each bridge breaker paddle (IE: 4sets).

Moyno 2000 pumps have been designed for minimum stuffing box leakage when properly maintained. If leakage cannot be tolerated, then a mechanical seal should be used.

4-1. MAINTENANCE

NOTE: In this section, a number or a letter in parentheses will follow the first reference to each pump part (#). These numbers and letters are those used to identify the pump parts and hardware items in the Exploded View (Section 4-52 and 4-54).

4-2. GENERAL

The Moyno 2000 pump has been designed for a minimum of maintenance, the extent of which is routine adjustment and lubrication of packing. The pump is one of the easiest to work on, in that the main elements are very accessible and require few tools to disassemble.

4-3. PACKING ADJUSTMENT

Packing gland nuts should be evenly adjusted so they are little more than finger tight (See Figure 4-1). Over-tightening of the packing gland may result in premature packing failure and possible damage to the shaft and gland.

When packing is new, frequent minor adjustments during the first few hours of operation are recommended in order to compress and seat each ring of packing evenly.

1. Upon initial start-up of the pump, adjust the gland nuts for a leakage rate of 1 – 2 drops per second until the packing has seated and adjusted to the operating temperature (approximately 10 – 15 minutes).

2. If leakage is excessive after 15 minutes of operation, tighten the gland nuts until a desired leakage rate is obtained.

CAUTION: Do not tighten until zero leakage is obtained. Over-tightening of the packing gland may result in accelerated wear on the packing and damage to the shaft. In those situations where no packing leakage can be tolerated, consult your Moyno Authorized Service Representative.

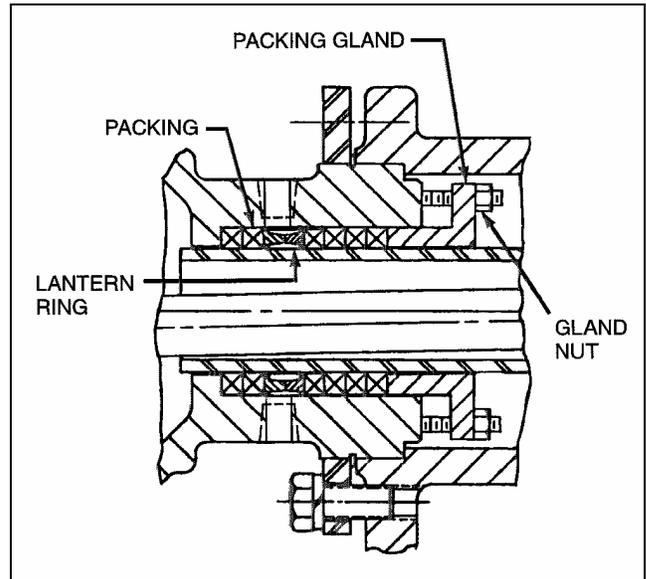


Figure 4-1. Cross Section of Stuffing Box

4-4. PACKING REPLACEMENT

When tightening the gland nuts can no longer regulate leakage, remove and replace the packing. Replace as follows:

1. Remove packing gland nuts (47), and slide gland (28) and clamp collar (33) back along drive shaft (38).
2. Remove packing gland studs(6)
3. Use a pair of packing extractors (Figure 4-2.) to remove four packing rings (62), lantern ring halves (7), and two additional packing rings (62).



Figure 4-2. Packing Removal Tool

4. Inspect surface of drive shaft for wear or grooves. If shaft is worn through the chrome plating into the base metal, or is badly scored or grooved, it should be replaced.
5. If drive shaft is not worn, install two rings of packing, the lantern ring halves, and four more rings of packing; lubricating them before installation with a good grade of packing grease. Be sure to stagger the packing ring joints at 90-degree increments (See Section 4-30.).

CAUTION: Always use a proper packing tamper tool to install packing. Do not use a pointed or sharp tool, as damage to the packing material or drive shaft could result. To assure proper shaft lubrication, never use a one-piece spiral wrap packing.

6. Replace packing gland (28) and secure with packing gland nuts. (See Figure 4-1.)
7. Adjust packing per Section 4-3.

4-5 LUBRICATION

4-6. Bearings. The bearings are lubricated at the factory and will only need to be re-lubricated when the shaft/bearing assembly is removed from the pump.

4-7. Gear Joints. Both gear joints are packed with lubricant during assembly, and will only need to be re-lubricated when gear joints are disassembled.

4-8. PUMP DISASSEMBLY

NOTE: The following instructions cover ONE procedure for disassembling all pump components. Major pump components can be disassembled in various ways since specific installation location limitations will determine method of component removal. Reference section 4-51: Table 4-1 G2 Parts List and section 4-52: G2 Exploded View.

4-9. Disconnect Pump

1. Flush the pump (preferably with clean water) to remove the pumpage from the unit.
2. Shut off pump.
3. Close suction (if any) and discharge valves.
4. Turn off flush water to packing or mechanical seal, if used.
5. Disconnect power source.
6. Drain any fluid in pump by removing the drain plug (34) from the suction housing (35) or inspection plate (if installed).

4-10. Packing Removal

1. Shut off pump.
2. Complete Section 4-9, Steps 3 – 6.
3. Remove gland adjustment nuts (47), gland studs (6), and gland halves (28) from stuffing box.
4. Remove packing rings (62). Using flexible packing extractors (See Figure 4-2.) best does this. Use two extractors simultaneously on opposite sides of each ring. Pull evenly.
5. Remove lantern rings (7) in similar fashion. Twist split rings to remove from shaft (38).
6. Remove additional packing rings.

4-11. Stator Removal

1. Complete Section 4-9.
2. Remove section of discharge pipe attached to discharge flange (8).
- 3.
4. Remove top half of stator support (13).
5. Unbolt stator clamp ring (9) from suction housing (35). Pull stator off rotor (see methods below). Remove stator gasket (4). Use a screwdriver tip to carefully remove stator retaining ring (39) (See Figure 4-3.). Remove stator clamp ring (9) from stator (11).

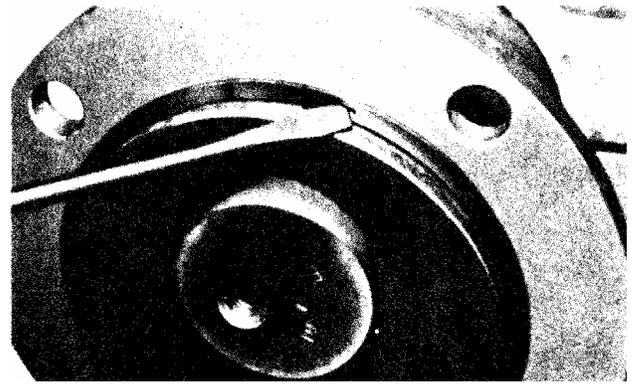


Figure 4.3. Typical Retaining Ring Removal

NOTE: On multiple stage pumps, or when cleaning, checking or changing stator (11), rotor (14), and/or gear joint assembly, one of the following procedures is suggested for removing the stator.

Method 1: Utilize Moyno's Hydraulic Stator Removal Device (SRD). See separate SRD service manual or [contact the local Moyno distributor for further information on this new product.](#)

Method 2: Use winch-type device anchored directly opposite stator end. Attach cable to discharge flange (8) to pull stator (11) off rotor (14).

Method 3: Remove stator (11), rotor (14), connecting rod (36), and intermediate shaft (38) as a single unit (See Section 4-12). Stator can then be taken off the rotor in a more convenient location. Place the stator (11) in an upright position on the discharge flange (8). Remove rotor (14), connecting rod (36), and intermediate shaft (38) from the stator (11). It may be necessary to use a chain or sling with a lifting device. Anchor discharge flange (8) securely to the floor before lifting.

If sufficient space is not available to remove the entire drive assembly (Rotor/Stator, conrod and intermediate shaft), pull the drive train through the suction housing (35) far enough to expose the front gear joint. Disassemble the gearjoint at this time, per section 4-13, and remove the rotor and stator together. If additional clearance is needed to access the head ring screws (50), slide adapter flange over the gear joint, or pull stator back a few inches.

Method 4: Hold stator (11) with pipe or strap wrench and turn drive shaft (37) slowly in the clockwise direction to unscrew stator (11) from rotor (14).

6. Remove discharge flange (8) by unbolting from stator clamp ring (9) and remove stator gasket (4). Remove stator retaining ring (39) and stator clamp ring from stator (11).
7. Check rotor (14) and stator (11) for wear (See Sections 4-25 and 4-26 for instructions).

4-12. Drive Train Removal

1. Complete Section 4-9 and 4-10.
2. Remove shaft collar screw (49) from the shaft collar (33) located between the suction housing and bearing housing. Push drive pin (19) out from the intermediate shaft (38) with punch.
3. Pull the rotor, stator, connecting rod, and intermediate shaft assembly through the suction housing (35). Adapter flange (27) and O-Ring (3) will move with the assembly.
4. If sufficient space is not available to remove the entire drive assembly, pull the drive train through the suction housing far enough to expose the front gear joint. Disassemble the gearjoint

at this time per section 4-13.

4-13. Rotor, Connecting Rod, and Intermediate Shaft Removal

1. Complete Sections 4-9, 4-11, and 4-12.
2. Pull the rotor/connecting rod/ and intermediate shaft assembly from the pump. Remove the vent plug (45) and set screw (41) from the gear joint shell (31).
3. Remove six socket head screws (50) from head ring (25) and remove head ring and O-ring (1). Slide connecting rod/gear joint assembly off rotor head. Remove gear joint keys (5) and primary thrust plate (23) from rotor (14).
4. Slide gear joint shell (31) off gear ball/connecting rod assembly. Slide ring gear (10) off gear ball (12).
5. Clamp connecting rod (36) in vice and hold with pipe wrench and remove lock nut (48). Remove gear ball (12), secondary thrust plate (24), seal support (26), and gear joint seal (29) from connecting rod.
6. Remove intermediate drive shaft (38) from the connecting rod (36) by disassembling the back gearjoint in a similar fashion as removing the rotor (14) from the connecting rod.

NOTE: It is recommended that each time the rotor / intermediate shaft and gear joint is disassembled, the O-ring (1) and gear joint seal (29) should be replaced.

4-14. Drive Shaft and Bearings Removal

1. Complete Sections 4-9 through 4-13.
2. Disassemble bearing housing (34) from the suction housing (35). Pull back the clamp ring (15) by loosening Hex screw (54) from the bearing housing. Remove bearing housing from the pump base through the base bolts. Slide the bearing housing assembly backwards until stuffing box portion is disengaged from the suction housing.
3. Relocate bearing housing assembly in a place that is easy to work on. Remove six hex head screws (52) from bearing cover plate (30). Slide bearing cover plate with radial grease seal (18) and O-ring (2) off drive shaft (37).
4. Pull drive shaft/bearing assembly out of bearing housing (34), taking steps to support the weight of the assembly as the bearings clear the housing. Remove grease seal (17) from the bearing housing.

NOTE: Some pumps may have an optional sleeve installed on the drive shaft to receive any possible wear caused by the packing.

CAUTION: The bearings are pressed on the shaft during assembly. Care must be taken during disassembly to avoid damaging the bearings or shaft.

5. Remove lock nut set screw (42) from the bearing nut (21). Using suitable spanner wrench, or soft punch and hammer, thread lock nut off drive shaft (37). Do not use a pipe wrench to remove the lock nut.
6. Remove both halves of bearing spacer (22) from shaft (37), and using suitable bearing press and adapters, press bearings (20) off shaft.

4-15. G3 BRIDGE BREAKER DISASSEMBLY

NOTE: The following instructions cover ONE procedure for disassembling all Bridge Breaker components. Major components can be disassembled in various ways since specific installation location limitations will determine method of component removal. **Reference section 4-53: Table 4-2 G3 Parts List and section 4-54: G3 Exploded View in addition to the G2 parts.** The only part shown on both parts list is the suction housing, which is different on the G3 verses the G2. See item 13 on table 4-2 for the G3 suction housing and item 35 on table 4-1 for the G2 suction housing.

4-16. G3 Paddle Removal

1. Reference table 4-2. Remove socket screws (28) from the paddle end shaft (12), paddle intermediate shaft (9), and paddle drive shaft (10). You may need to rotate shafts to access the screws. Take off the coupling half to each shaft, and pull paddles straight up.
2. In two meter suction housing lengths, there is an additional hanger bracket which will also need to be removed before taking the paddles out. To remove the bracket for each paddle, loosen hex screws (75).

Note: The interior of the suction housing can now be accessed to help in servicing the pump drive train parts. No further disassembly of the bridge breaker is required in servicing the pump portion. See section 4-8 through 4-14 to disassemble the G3 pump portion. The next sections (4-17 and 4-18) are for further disassembly of the bridge breaker drive train.

4-17. G3 Bearing Side Removal

1. Remove shaft guard (18) by loosening hex nut (25).
2. Remove packing hex nut (26) and take off packing gland halves (8) for each shaft.
3. Unlock the bearings (4) from the paddle end shaft (12) by loosening the set screw on each bearing.
4. Remove bearing retainer hex screws (32) and slide bearing retainer (11) off the drive shafts. Dowel pins (27) are used to align the bearing retainer with the extension block. Remove the snap ring retainers (20) from the bearing retainer, and pull bearings (4) out of their bore.
5. Remove extension block (6) from the suction housing (13). Pull out spring dowels (27) that align the extension block to the suction housing and align the extension block to the bearing retainer (11).
6. Pull out the paddle end shafts (9) from the inside of the suction housing (13). From the stuffing box bores on the suction housing (13) pull out the packing rings (1). Unthread packing gland studs (22) from the suction housing and remove.

4-18. G3 Drive Side Removal

1. Remove shaft guard (19) by loosening hex nut (25).
2. Remove packing hex nut (26) and take off packing gland halves (8) for each shaft.
3. Support gearmotor (39) for removal. Loosen the hex bolts

(35) on the drive adapter (15) Slide the female hollow shaft gearmotor off the male Paddle Drive Shaft (10).

4. Loosen Hex screws (31) and remove the gear case cover (17) and gear case gasket (7) by sliding them off the paddle drive shaft (10). Remove grease seal (21) from the gear case cover. Loosen hex screws (33) and remove drive adapter (15) from the gear case cover.

Note: Certain models may use a belt and pulley arrangement with a shaft output gearmotor instead of a hollow shaft gearmotor. On these models, an adapter flange is substituted for the drive adapter (15). A pulley would be installed on the paddle drive shaft (10) instead of the hollow shaft gearmotor.

5. Remove gears (5) by sliding each gear off the paddle drive shaft (10) and off the paddle intermediate shaft (9). Remove key (23 and 24) from their respective paddle shafts.

6. Unlock the bearings (4) from the paddle end shaft (12) by loosening the set screw on each bearing.

7. Support gearcase (16) for removal. Remove hex screw (30) which attaches the bottom of the gearcase to the suction housing (13) support bracket. Unscrew socket screws (29) and pull gearcase back away from the extension block (6) and suction housing (13). Dowel pins (27) are used to align the gearcase with the extension block (6). Remove seal washer (38) from the gearcase.

8. Remove the snap ring retainers (20) from the gearcase (16), and pull the bearings out of the gearcase (16) bore. Remove grease seals (21) from the gearcase (16).

9. Remove extension block (6) from the suction housing (13). Pull out spring dowels (27) that align the extension block to the suction housing and align the extension block to the gearcase (16).

10. Pull out the paddle drive shafts (10) and the paddle intermediate shaft (9) from the inside of the suction housing (13). From the stuffing box bores on the suction housing (13) pull out the packing rings (1). Unthread packing gland studs (22) from the suction housing and remove.

4-19. CLEANING

Clean all parts in a suitable cleaning solvent being careful to observe all safety precautions regarding the use of solvent.

4-20. INSPECTION

4-21. Bearings. After cleaning, rotate bearings very slowly under hand pressure to feel for smoothness and even action. Never spin a dry bearing. Check for cracks, galling, pitting, burrs, etc. Replace bearing if there is any doubt concerning complete serviceability.

4-22. Drive Shaft. Inspect drive shaft (37) and intermediate drive shaft (38) for scoring, burrs, cracks, etc. Replace as necessary. For G3 models also inspect paddle drive shaft (10) and paddle intermediate drive shaft (9) for scoring, burrs, cracks, etc. Replace as necessary.

4-23. Seals. It is sound practice to always replace grease seals (17 and 18) whenever drive shaft and tapered roller bearings are removed. Apply Locktite 690 to outside diameter

of both grease seals. For G3 models, replace the grease seals (21) whenever disassembling the bridge breaker bearings.

4-24. Packing. It is sound practice to always replace packing (62) whenever the pump bearing housing is disassembled. For G3 models, replace the packing (1) whenever disassembling the bridge breaker bearings.

4-25. Rotor

1. To check for excessive wear of rotor (40), measure the rotor crest-to-crest diameter (See Figure 4-4) and compare with the following chart:

| Rotor Capacity | Standard *Crest to Crest Dia. (inches) |
|----------------|--|
| 008 | 2.772 + .000/— .004 |
| 012 | 2.676 + .000/— .004 |
| 022 | 3.425 + .000/— .004 |
| 036 | 4.015 + .000/— .004 |
| 050 | 4.015 + .000/— .004 |
| 065 | 4.906 + .000/— .004 |
| 090 | 4.906 + .000/— .004 |
| 115 | 5.709 + .000/— .004 |
| 175 | 6.584 + .000/— .004 |
| 335 | 5.800 + .000/— .005 |
| 345 | 7.260 + .000/— .004 |
| 620 | 7.128 + .000/— .005 |
| 800 | 7.658 + .000/— .004 |

* These dimensions are applicable for AAA trim codes only.

NOTE: The rotor is designated by the third, fourth and fifth numbers in the Model Number, i.e., 2G012G2.

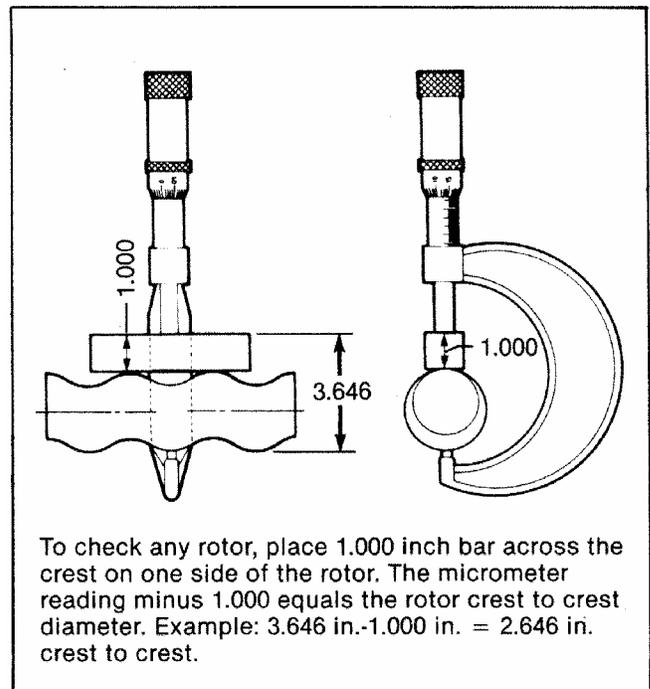


Figure 4-4. Measuring Rotor Dimension

2. If the measured crest-to-crest diameter is within 0.010 inch of the standard value and is free of deep nicks, gouges, or other surface defects, the rotor is re-usable.

3. Rotors with crest-to-crest values 0.011 to 0.050 inch under the standard values should be replaced. These rotors can be

returned to Moyno for refurbishing. Rotors are stripped and re-plated with chrome to standard dimensions provided that:

- a. The key slots are not excessively worn.
- b. The rotor surface is not cracked, pitted or deeply grooved (1/32 inch or more).
- c. The base surface metal is not pitted or corroded.

4-26. Stator. A worn stator may appear pitted and gouged or may appear smooth similar to when new. Performance is the best measure of rotor to stator fit. If unable to measure performance adequately, suspected stator wear can be evaluated by a Moyno sales or factory representative.

4-27. All Other Parts. Check for cracks, excessive wear, damage to threaded holes, burrs, etc. Replace as necessary. Replace O-rings and all gaskets at each disassembly and reassembly.

4-28. PUMP ASSEMBLY
(Ref: Table 4-1, Section 4-51)

The Moyno 2000 pumps are reassembled in the reverse order of dismantling. The following suggestions are offered:

1. While pump is dismantled, check all gaskets, seals, packing, and O-rings. Replace all worn items. It is recommended that the gear joint seals (29) and gear joint O-ring (1) be replaced each time either of the gear joints is disassembled.

During the assembly process, cleanliness is important. To avoid premature failure, bearings, and gear joint components must be handled with care and kept clean.

4-29. Lubrication During Assembly

NOTE: The bearings are lubricated at the factory and will only need to be re-lubricated when the shaft/bearing assembly is completely removed from pump.

1. **Bearings.** Pack bearings after installation on shaft (Section 4-32). Lubricant should be packed around all of the rollers and should completely cover the faces of the races. The void inside the spacer between the bearings should be filled approximately half way with lubricant.
2. **Gear Joints.** Both gear joints should be packed with lubricant during assembly (Sections 4-34). DO NOT use zerk fittings to lubricate gear joints after assembly. The pipe plugs (C) in the drive shaft head, drive shaft, and gear joint shell are vent plugs and MUST BE REMOVED during assembly of the gear joints to allow excess lubricant to vent from the gear joints.

3. **Packing.** Lubricate packing rings during assembly. Additional grease can be added after assembly through the zerk fittings installed in the side of the stuffing box.

4. **Approved Lubricants.**

CAUTION: Do not mix different brands of lubricants for the same application.

| Area to Lubricate | Approved Lubricant or Equivalent |
|---------------------------------|----------------------------------|
| Bearings, Gear Joints & Packing | ACG-2 (Dubois Chemical, Inc.) |

4-28. Packing Installation

1. The standard packing set (62) consists of five braided

packing rings. Lantern ring halves (7) must be ordered separately.

2. Install packing and lantern ring halves into the stuffing box area of the suction housing (35) in the following sequence:
 - a. Wipe a film of lubricant on each packing ring and install two rings. Push each ring firmly in place.

NOTE: Install the packing rings with the splits staggered at 90 degrees to the adjacent ring of packing. On initial assembly, one ring of packing may not fit in stuffing box. This final ring of packing should be installed after pump is started and packing is seated.

CAUTION: Always use a proper packing tamper tool to install packing. Do not use pointed or sharp tool, as damage to the packing material or drive shaft could result. To assure proper shaft lubrication, never use a one-piece spiral wrap packing.

- b. Install the two lantern ring halves with the flat side against the packing.
- c. Install final three packing rings, firmly pushing each ring into place.

3. Install packing gland studs (6), packing gland halves (28), and gland adjusting nuts (47). Tighten nuts finger tight at this time.

4-31. Bearing Housing/Suction Housing Assembly. This procedure may be performed now or after the bearing drive shaft assembly is installed in the bearing housing.

1. Place clamp ring (15) on suction housing (35) and install retaining ring (40) in groove on suction housing.
2. Slide turned diameter of suction housing into bore on end of bearing housing (34). Align holes in clamp ring (15) with four threaded holes in bearing housing (34) and thread four hex head screws (54) with lock washers into threaded holes. Tighten finger tight.
3. Both suction housing and bearing housing supports should be hand tightened only to the base. With suction housing and bearing housing positioned correctly, tighten four hex head screws (54) to secure suction housing to the bearing housing. Tighten suction housing and bearing housing feet to the base.

NOTE: Refer to Torque Guidelines Chart (Page 12) for the proper torque requirement for all threaded fasteners.

4-32. Bearing/Drive Shaft Assembly

1. Bearings must be pressed on the shaft in the following sequence: (Larger units [G drive end and larger] require heating of the bearings to 250 degrees F before assembly).
 - a. Press bearing (20) cone on shaft (37) making sure rollers face in proper direction to receive cup (Step b). Cone should be pressed firmly against shoulder on shaft.
 - b. Place cup on rollers.
 - c. Place bearing spacer (22) halves on cup.
 - d. Place second cup on spacers.
 - e. Press second bearing (20) cone on shaft with rollers facing seat in cup. Cone should be pressed on until face of cone is flush or even with shoulder on shaft.

CAUTION: Do not press second cone past shoulder on shaft.

2. Thread bearing nut (21) on shaft (37) and tighten until it rests against the shoulder on the drive shaft. Install brass tip set screw (42) in bearing nut and tighten.

NOTE: The tapered bearings are designed such that when properly installed there may be a very slight end play in the bearings (bearing spacer halves may slip freely out of place) or they may have a slight pre-load (bearing spacer halves held tightly in place and bearings do not turn freely).

3. Remove bearing spacer halves (22). Thoroughly pack lubricant around rollers and on bearing races. Install one half of bearing spacer. Fill area between bearings half full of lubricant, and install other half of bearing spacer.

NOTE: Assuming the bearings are not too hot, an alternate method of lubricating bearings is as follows: Pack the rollers of the first cone immediately after it is pressed on shaft. Lubricate race of first cup before it is installed. Place bearing spacer halves in place and fill it full of lubricant. Lubricate race of second bearing cup and place on spacer. Pack rollers of second cone with lubricant, and press on shaft until flush with shoulder.

NOTE: If too much grease is packed into the bearings during assembly, it may seep from the grease seals during the first few hours of operation until the proper lubricant level is achieved. This lubricant should be wiped from the seal area, when the pump is not operating, to prevent contaminants from collecting in the seal area.

4. Install (light press) grease lip seals (17 and 18) into bearing cover plate (30) and bearing housing (34) with Loctite. The lip of the radial grease seal (18) should be facing outward with spring visible. The tip of the seal (17) should be facing the bearings. The lips of both seals should be wiped with grease.

5. Install drive shaft (37) with bearings installed in bearing housing, being careful to avoid damaging the grease seal (17).

6. Place O-ring (2) on bearing cover plate (30) and bolt bearing cover plate to bearing housing (34) using six hex head screws (52) and lock washers (56). The six screws should be tightened evenly, and care should be taken to ensure the O-ring becomes seated in the step in the bearing housing. When the bearing cover plate is fully secured to the bearing housing, a small gap of 0.010 to 0.020 inch will exist between the bearing cover plate and the bearing housing.

NOTE: Some pumps have a sleeve installed on the drive shaft to receive any possible wear caused by the packing. If the shaft sleeve is used, install at this time and tighten set screws to the drive shaft.

4-33. Rotor/Stator Assembly

1. Slide head ring (25) over rotor (14) contour to the rotor head. The side of the head ring with the smallest diameter holes should be facing the rotor head

NOTE: On some models the head ring is a two-piece component which eliminates this step.

2. Slide stator clamp rings (9 and 16) on both ends of the stator (11) and secure in position with retaining rings (39).

3. Place one stator gasket (4) in recess of adapter flange (27), and fit adapter flange with gasket to end of stator (11). Install O-Ring (3) onto adapter flange.

4. Coat the rotor (14) contour with waterless hand cleaner, glycol, or other lubricant compatible with the stator elastomer.

Insert rotor into stator so that rotor head is at the specified distance from the end of the stator (Dimension "A," Figure 5-1). Be sure the rotor is inserted in the end of the stator fitted with the adapter flange (27) and gasket (4).

NOTE: Rotor can also be inserted in the stator utilizing Moyno's Hydraulic Stator Removal Device (SRD). See separate SRD service manual or contact the local Moyno distributor for further information on this new product.

NOTE: Turning the rotor counterclockwise while inserting into stator will ease assembly.

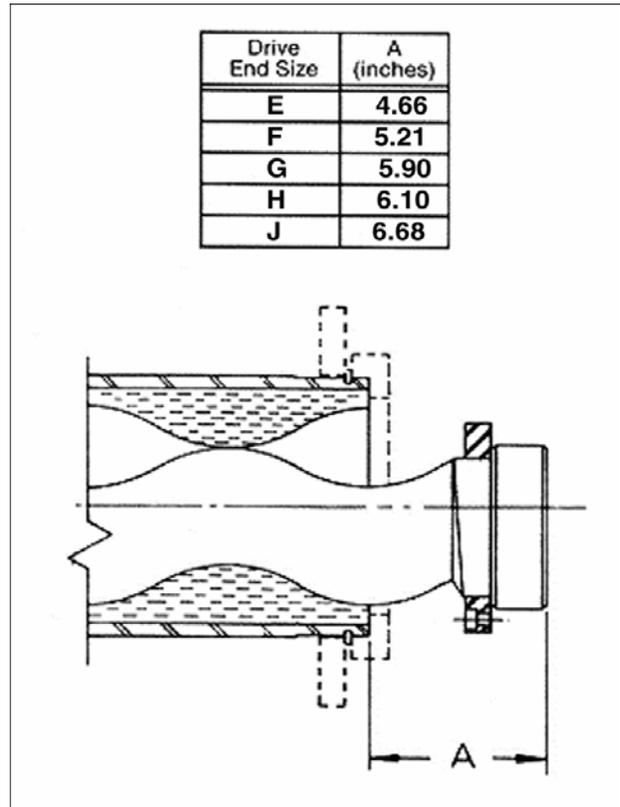


Figure 4-5. Rotor Installation

4-34. Rotor Gear Joint Assembly

1. Slip O-ring (1) over the rotor head and allow to hang loose. Insert primary thrust plate (23) into rotor head, flat side first. Thrust plate and rotor head surfaces must be flush to assure proper assembly and operation of the pump (see Figure 5-2.).

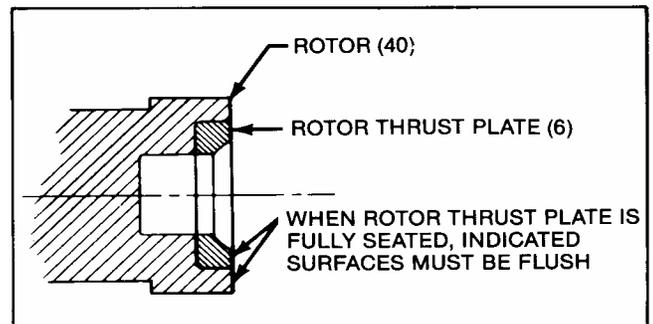


Figure 4-6. Rotor Thrust Plate Seating Detail

2. Assemble the rotor end gear joint by first fitting a gear joint seal (29) onto the connecting rod assembly (36). The seal must be positioned so that the flat face of the seal neck fits into the

seal retainer component of the connecting rod assembly. Apply a small coating of approved gear joint lubricant to the inside surfaces of the seal.

3. Apply a small amount of lubricant to the flat face of the seal support (26) and slide it onto the connecting rod so that the flat face and radius of the support is against the seal (29).

4. Grease the concave spherical surface of the rear thrust plate (24) and position thrust plate against the seal (29) with the lip on the outside diameter of the seal fitting the step on the back side of the thrust plate.

5. Apply a film of grease to the splines on the inside of the gear ball (12). Install gear ball on connecting rod (36), with counter-bored end of the gear ball (end without splines) first on connecting rod. Gear ball should slide freely against shoulder on connecting rod. Place lock nut (48) on connecting rod and tighten against gear ball. Apply grease to spherical surfaces and teeth of gear ball.

6. Apply grease to the teeth of the ring gear (10), and slide ring gear into the gear ball (12). When ring gear is in place, keyways should be facing the lock nut end of connecting rod.

7. Apply a thin coating of grease to the spherical surface of the thrust plate (23) already installed in the rotor head. Fill the recessed area in the rotor head with grease.

8. Slide the gear joint shell (31) over the connecting rod (36) and assembled gear joint components, being careful to seat the outside diameter of the gear joint seal (29) in the end of the gear joint shell (31). The two tapped holes in the gear joint shell should be in line with one of the keyways in the ring gear.

9. Place keys (5) in the keyways in the ring gear (10). Check to ensure the tapped holes in the side of the gear joint shell (31) are aligned with one of the keyways.

10. Align the keys (5) in the ring gear (10) with the keyways in the rotor head (14). Slide assembled gear joint shell (31) onto the rotor head, checking to be sure the keys are properly engaged in the rotor head and ring gear. The shallow hole in the rotor head should be aligned with the first threaded hole in the outside of the gear joint shell. Thread the set screw (41) into the threaded hole in the shell until light contact is made with the hole in the rotor head.

11. Place O-ring (1) into step in gear joint shell. Align holes in head ring (25) with six threaded holes in end of gear joint shell (31) and install stainless socket head screws (50) and lock washer (58). Tighten the six socket head screws evenly, checking to ensure O-ring (1) remains in place. When tightened properly, a small gap of a few thousandths of an inch may exist between the shell (31) and head ring (25).

12. Excess grease in the assembly will be purged from the vent hole while the socket head screws (50) are tightened. Tighten the set screw (41) in the shell (31). Move the free end of the connecting rod (36) in a circular motion to assure that the joint is free and assembled properly. This will also help to purge excess grease from the assembly.

13. Install the stainless steel pipe plug (45) in the second hole in the shell and tighten.

14. Assemble the back gear joint between the conrod (36) and the intermediate drive shaft (38) in a similar fashion.

4-35. Rotor/Stator to Drive End Assembly

1. If not already in place, slip stator clamp rings (16 and 9) on both ends of stator (11), and install retaining rings (39) in grooves provided on both ends of stator.

2. Place stator gasket (4) in recess in end of adapter flange (27) and discharge flange (9). Install O-Ring (3) onto adapter flange.

3. Apply generous amount of anti-seize to male portion of the drive shaft (37) that the intermediate shaft (38) will cover.

4. Move the rotor/stator, connecting rod, and intermediate shaft assembly in position, and insert intermediate shaft (38) through the suction housing (35) and its stuffing box while sliding over the drive shaft (37). The assembly should be supported as it is threaded through the suction housing. Align stator (11) and adapter flange (27) with bore in suction housing, and slide adapter flange in place, checking to ensure that O-ring (3) remains properly positioned.

5. Rotate stator (11) until the hole on the intermediate shaft (38) lines up with the mating hole on the drive shaft (37). When holes are aligned, insert shaft pin (19) through both shafts. To secure, position the two halves of the shaft collar (33) over the shaft pin and tighten down with the shaft collar screws (49).

NOTE: To help align the pin holes once the intermediate shaft (38) is positioned over the drive shaft (37), tap the end of the rotor with a block of wood to help position the drive train.

6. Align holes in clamp ring (16) with threaded holes in suction housing, and thread four hex head screws (64) with lock washers (65) through holes in clamp ring into threaded holes in suction housing. Tighten hex head screws evenly.

7. Make sure packing (62), lantern rings (7), and packing glands (28) are positioned correctly. Tighten packing nut (47) a little more than finger tight.

4-36. Stator Support/Discharge Assembly

1. Place top of stator support(s) (13) over stator and fasten to bottom half of stator supports using hex head screws (55).

2. If not already done so, place stator gasket (4) in recess in discharge flange (8) and position discharge flange on end of stator. Align holes in stator clamp ring (9) with threaded holes in discharge flange, and install and tighten hex head screws (53) and washers (57).

4-37. G3 BRIDGE BREAKER ASSEMBLY

The bridge breaker is reassembled in the reverse order of dismantling.

Reference Table 4-2 Parts List and the G3 Exploded View in addition to the G2 parts.

4-38. G3 Drive Side Assembly

1. Insert the paddle drive shafts (10) and the paddle intermediate shaft (9) from the inside of the suction housing (13) and through their respective stuffing box bores. Insert the packing rings (1) into the stuffing box bores on the suction housing (13). Lantern rings are not normally used on the bridge breaker assembly. Thread in the packing gland studs (22) to the suction housing.

2. Insert spring dowels (27) into the extension block (6). Dowel pins align the extension block to the suction housing (13) and align the extension block to the gearcase (16). Insert extension block (6) into the suction housing (13) through the use of the spring dowels.

3. Insert grease seals (21) into gearcase (16) bore. Install bearings (4) also into the gearcase bore and secure in position with the snap ring retainers (20). Bearings on the G3 bridge breaker are the sealed bearing type and do not require grease themselves.

4. Insert seal washer (38) onto socket screws (29).

5. Support gearcase (16) for installation. Position gearcase over the paddle drive shaft (10) and intermediate drive shaft (9), and position so spring dowels (27) are engaged in the gearcase. Tap lightly with a rubber mallet to ensure proper engagement.

6. Screw socket screws (29) through the gearcase(16), both sets of dowel pins(27), extension block (6), and thread into the suction housing (13). Gearcase is also supported from the suction housing. Insert screw (30) through washer (67) and suction housing (13) support bracket, and tighten into the gearcase.

7. Position heads of the paddle drive shafts (10) and the paddle intermediate shaft (9) approximately 0.125" from the inside of the suction housing (13). Lock down the bearing (4) to the shafts by tightening the bearing set screw.

8. Position key (23) into the keyway on the paddle drive shaft (10). Lubricate gears (5) with bearing grease and slide gear over the drive shaft and position on the key inside of the gearcase (16). Turn the paddle drive shaft (10) and paddle intermediate shaft (9) so the exposed clamp collar portion in the suction housing (13) is facing up. Install key (23) and gear (5) on the intermediate paddle drive shaft (9) in a similar way. Position so teeth of the gears are intermeshing.

9. Insert grease seal (21) into the gear case cover (17). Install drive adapter (15) onto the gear case cover (17) by securing hex screw (33) and washer (65). Position the gear case gasket (7) on the gearcase cover.

10. Install the gearcase cover (17) over the paddle drive shaft (10) ensuring the grease seal (21) and gasket (7) is properly positioned. Secure with hex screws (31 and 66) and washers (65).

11. Align the key way of the gearmotor (39) with the key way of the paddle drive shaft (10). Gearmotor shaft can be rotated by spinning the motor fan. Support gearmotor (39) for installation and insert key (24) on to the paddle drive shaft (10). Slide the gearmotor over the paddle drive shaft until the gearmotor flange meets up with the drive adapter (15). Secure gearmotor with the hex bolts (35) and washers (66) to the drive adapter (15).

NOTE: Certain models may use a belt and pulley arrangement with a shaft output gearmotor instead of a hollow shaft gearmotor. On these models, an adapter flange is substituted for the drive adapter (15). A pulley would be installed on the paddle drive shaft (10) instead of the hollow shaft gearmotor.

4-39. G3 Bearing Side Assembly

1. Insert the paddle end shafts (12) from the inside of the suction housing (13) and through their respective stuffing box bores. Insert the packing rings (1) into the stuffing box bores on the suction housing (13). Lantern rings are not normally used on the bridge breaker assembly. Thread in the packing gland studs (22) to the suction housing.

2. Insert spring dowels (27) into the extension block (6). Dowel pins align the extension block to the suction housing (13) and align the extension block to the bearing retainer (11). Insert extension block (6) into the suction housing (13) through the use of the spring dowels.

Install bearings (4) into the bearing retainer bore and secure in position with the snap ring retainers (20). Bearings on the G3 bridge breaker are the sealed bearing type and do not require grease themselves.

3. Insert washer (63) onto hex screws (32).

4. Support bearing retainer (11) for installation. Position bearing retainer over the paddle end shaft (12) and position so spring dowels (27) are engaged in the bearing retainer. Tap lightly with a rubber mallet to ensure proper engagement.

5. Screw socket screws (32) through the bearing retainer (11), both sets of dowel pins(27), extension block (6), and thread into the suction housing (13).

4-40. G3 Paddle Assembly

1. Rotate paddle drive shaft (10), paddle intermediate shaft (9), and paddle end shafts (12) with open collar half up. Insert paddles into each shaft. It may be necessary to move paddle end shafts (12) along their axis to position the bridge breaker drive train.

2. Use **Loctite 242** medium strength thread locker compound on the socket screws (28). Place shaft collar on paddle shaft and secure with socket screws (28). Torque socket screws to 190 in. lbs of torque on the E, F, and G drive ends and 345 in. lbs of torque on the H, J, and K drive ends. Torque down screws using a cross over sequence so coupling half is evenly spaced on paddles and not slanted towards one side.

Note: Do not operate paddles without using a thread locker compound on the socket screws and torquing the screws to their proper level.

3. On the bearing side assembly, lock down the bearing (4) to the paddle end shafts (12) by tightening the bearing set screw.

4. In two meter suction housing lengths, there is an additional hanger bracket which will also need to be installed after paddles are positioned. To install the bracket for each paddle, position hanger bushing (79) around paddle end shaft (12). Position bushing bracket (74) around bushings (79) and secure with hex screw (80), washer (77) and hex nuts (78). Locate the bushing bracket (74), in comparison to the suction housing (13), through the use of bushing shims (73). Attach bushing bracket (74) to the suction housing with hex screw (75) and washer (76).

Standard packing on all Moyno 2000 pumps consists of braided PTFE fibers impregnated with ultra-fine graphite. Optional types of packing are available for food, high temperature, and other types of service. Consult your nearest Moyno representative.

4-4. FINAL ASSEMBLY

1. Install pipe plugs (43) and zerk fittings (63) in appropriate threaded holes in suction housing. Install pipe plugs in threaded holes of the bearing housing catch basin under the exposed drive shaft, or attach drain lines if preferred.
2. Position packing gland halves (8) around each shaft and tighten packing hex nut (26) to slightly more than finger tight.
3. Install shaft guard (18 and 19) by securing hex nut (25) and washers (36 and 37).
4. Connect power source. Turn on flush water to packing if used. Open suction and discharge valves, and start pump.

4-42. Packing Adjustment

After starting, adjust packing per Section 4-3.

4-43. OTHER CONSIDERATIONS

4-44. Short-Term Storage. Storage of 6 months or less will not damage the pump. However, to ensure the best possible protection, the following is advised:

1. Store pump inside whenever possible or cover with some type of protective covering. Do not allow moisture to collect around pump.
2. Remove drain plug and inspection plates to allow the pump body to drain and dry completely. Replace inspection plates.
3. Loosen the packing gland and inject a liberal amount of grease into the stuffing box. Tighten the gland nuts only hand tight. When water flush systems are to be used, do not use grease. A small amount of light oil is recommended.
4. See drive manufacturer's instructions for motor and/or drive storage.
5. See OPERATION Sections 3-1 through 3-4 before startup. Be sure all lubricants are in good condition.

4-45. Long-Term Storage. If pump is to be in storage for more than 6 months, perform the above short-term storage procedures plus the following:

1. Occasionally rotate the pump manually a few revolutions to avoid a "set" condition of rotor in stator elastomer. This will prevent hard starting and excessive torque requirements when pump is again put into operation.
2. Apply rust inhibitor to all unpainted cast iron and machined carbon steel surfaces.
3. Remove drive belts if applicable.

4-46. PACKING SPECIFICATION

4-47. VARIATIONS OF STANDARD PARTS

The following are variations available for modifying pumps to meet specialized pumping conditions. If the trim code of your pump is other than "AAA", contact your nearest Moyno representative for clarification. Do not modify your pump with any variation unless you have determined that it is compatible with your application.

The three-character trim code is designed as follows. The first character identifies any seal variations, the second character identifies any internal variations, and the third character identifies any rotor variations.

| <u>Sealing Variation</u> | <u>Internal Variation</u> | <u>Rotor Variation</u> |
|------------------------------|-------------------------------|----------------------------|
| A | A | A |

The trim code "AAA" represents a pump with standard features. Deviations from standard are to be indicated by changing the appropriate character from the choices listed. When two or more letters are combined, dashes are used to separate the three areas of the trim code for clarity.

SEALING VARIATIONS

- A — BRAIDED TEFLON & GRAPHITE PACKING (Black). Standard to all lines except Quick Disassembly pumps. Optional on Quick Disassembly pumps.
- C — BRAIDED TEFLON PACKING (White). Optional packing on all lines.
- D — DOUBLE MECHANICAL SEAL. Optional on all lines; not offered on #2 "L" Frame.
- F — BRAIDED TEFLON FOOD GRADE PACKING (White). Standard on all Quick Disassembly pumps. Optional on all other lines.
- G — 100% GRAPHITE PACKING (Gray). Optional to all lines.
- H — FLUSH PACKING GLAND.
- S — SINGLE MECHANICAL SEAL. Optional on all lines.
- W — WATER FLUSH. Optional on all lines.
- X — Special to application

INTERNAL VARIATIONS

- A — Standard plated shaft.
- B — Non-plated shaft.
- C — Solid drive shaft configuration.
- E — Extension tube with auger (Standard on G2/G3 version 5)
- F — Extended drive shaft (for back stop or large pulley).
- G — RMP15 ceramic coated drive shaft.
- K — RMS20 carbide coated drive shaft
- M — RMD10 carbide coated drive shaft.
- R — Fiber deflector
- S — Shaft sleeve
- X — Special to application.

ROTOR VARIATIONS

- A — Standard size with chrome plating.
- B — Non-plated (no plating).

- C — Standard undersize.
- E — Standard oversize.
- G — RMP15 ceramic coating.
- K — RMS20 carbide coating.
- M — RMD10 carbide coating.
- X — Special to application.

TORQUE GUIDELINES CHART

| Stainless Steel Bolts | | Carbon Steel Bolts | |
|-----------------------|--------------|--------------------|--------------|
| Size | Max. Torque | Size | Max Torque |
| NO. 10-24 | 22.8 in. lb. | 5/16-18 | 10 ft. lb. |
| 1/4-20 | 75.2 in lb. | 3/8-16 | 21.7 ft. lb. |
| 5/16 - 18 | 132 in. lb. | 1/2 - 13 | 43.5 ft. lb. |
| 3/8 - 16 | 236 in. lb. | 5/8 - 11 | 86 ft. lb. |
| 1/2 - 13 | 517 in. lb. | 3/4 - 10 | 152 ft. lb. |

4-48. Rotors identified on parts listing are standard size with hard chrome plated surface. Other variations of rotor size and finish may be ordered by selecting the standard rotor part number and changing the last digit of the rotor number as follows:

- 2 = Standard size, non-plated.
- 3 = Undersize, chrome plated.
- 4 = Undersize, non-plated.
- 5 = Oversize, chrome plated.

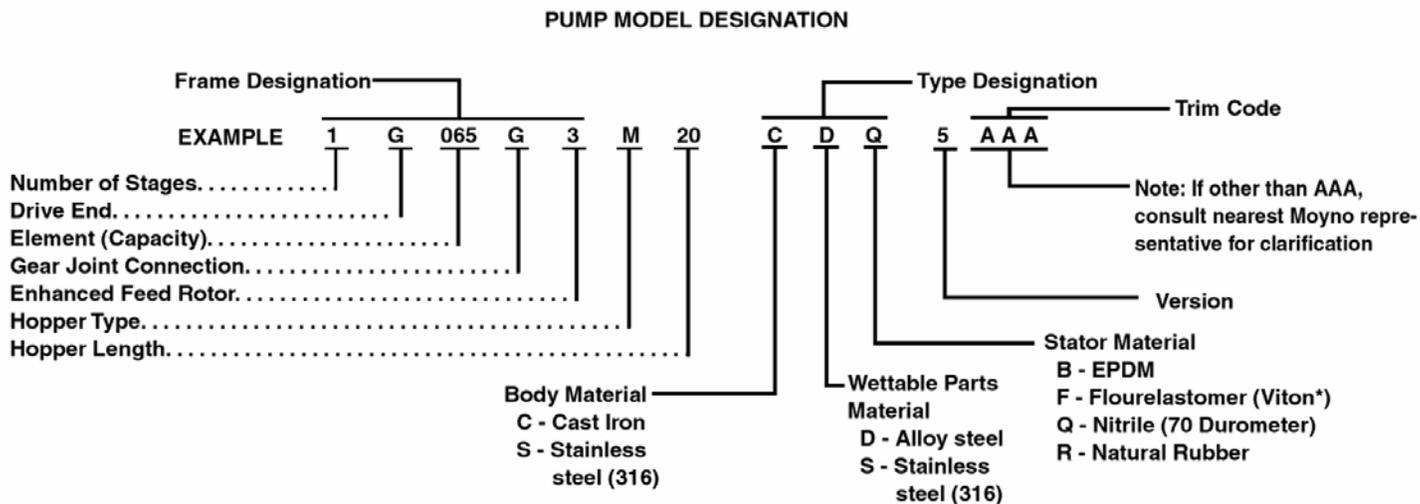
Do not change rotor sizes without consulting your local Moyno sales office. These variations are used for certain specialized pumping conditions only.

4-49. Drive shafts shown have hard chrome plating on the packing wear area. If non-plated drive shafts are required, consult factory.

| Connecting Rod Lock Nuts | | |
|--------------------------|------------|-------------|
| Drive End | Nut Size | Max. Torque |
| F | 3/4 - 16 | 35 ft. lb. |
| G, H | 7/8 - 14 | 50 ft. lb. |
| J | 1-1/4 - 12 | 85 ft. lb. |
| K | 1-1/2 - 12 | 110 ft. lb. |

NOTE: Torque values are from the Industrial Fasteners Institute and Craftsman Corp.

4-50. SELECTING THE CORRECT PART FOR YOUR MOYNO 2000 PROGRESSING CAVITY PUMP



NOTE: For "Hopper types" other than "M", Type / Trim codes designated by "X", specialty stator materials not shown, and specialty materials like stainless steel or hastelloy, consult factory for updated parts listing per the pumps "AS" serial number.

4-51. G2 Open Throat Parts List

| ITEM # | G2 PART DESCRIPTION | E PART NUMBER | F PART NUMBER | G PART NUMBER | H PART NUMBER | J PART NUMBER | K PART NUMBER |
|--------|-------------------------------|------------------|---------------|---------------|---------------|---------------|---------------|
| 1 | O-Ring : Rotor/intermed Sft | 3207902150 | 3207902153 | 3207902156 | 3207902158 | 3207902162 | 3207902264 |
| 2 | O-Ring - Bearing Cover | 3207902248 | 3207902256 | 3207902264 | 3207902267 | 3207902270 | 3207902450 |
| 3 | O-Ring : Adapter Flange | 3207902251 | 3207902258 | 3207902262 | 3207902269 | 3207902275 | 3207902278 |
| 4 | Stator Gasket | 4052001000 | 4062000900 | 4072001000 | 4082000900 | 4082000900 | 4102001300 |
| 5 | Key - Gear Joint | 4052001100 | 4062001000 | 4072001100 | 4082001000 | 4092000700 | 4102000800 |
| 6 | Gland Studs | 4052001400 | 4052001400 | 4072001400 | 4092000900 | 4092000900 | 4220022000 |
| 7 | Latern Ring Half | 4053000500 | 4230011000 | 4230042000 | 4230057000 | 4093000500 | 4230068000 |
| 8 | Discharge Flange | 4053000901 | 4063001001 | 4073000901 | 4083000901 | 4083000901 | 4103004301 |
| 9 | Clamp Ring - Disch Flange | 4053001000 | 4063001100 | 4073001000 | 4083001000 | 4083001000 | 4103004200 |
| 10 | Ring Gear | 4053001200 | 4064000900 | 4074000900 | 4084000900 | 4094000900 | 4104000900 |
| 11 | Stator | See Stator Chart | | | | | |
| 12 | Gear Joint Ball | 4054000700 | 4064000700 | 4074000700 | 4084000700 | 4094000700 | 4104000700 |
| 13 | Stator Support | 4054000901 | 4064001001 | 4074001000 | 4084001000 | 4094001300 | 4104001001 |
| 14 | Rotor | See Rotor Chart | | | | | |
| 15 | Clamp Ring | 4063001100 | 4073001000 | 4230052000 | 4083001000 | 4230017000 | 4230070000 |
| 16 | Clamp Ring - Suction Housing | 4063002200 | 4073001800 | 4230855000 | 4230856000 | 4103002200 | 4230879000 |
| 17 | Grease Seal - Bearing Housing | 4220045000 | 4102009800 | 4220014000 | 4220016001 | 3201693000 | 4220019000 |
| 18 | Grease Seal - Bearing Cover | 4102000600 | 4102009800 | 4220014000 | 4220016000 | 3201693000 | 4220050000 |
| 19 | Drive Pin | 4220769017 | 4220770017 | 4220771017 | 4220772017 | 4220773017 | 4220774017 |
| 20 | Roller Bearing | 4230029000 | 4230007000 | 4230046000 | 4230054000 | 4230013000 | 4230073000 |
| 21 | Bearing Lock Nut | 4230030000 | 4240015000 | 4240065000 | 4240075000 | 4240023000 | 4240082000 |
| 22 | Bearing Spacer | 4230031000 | 4230008000 | 4230047000 | 4230053000 | 4230014000 | 4230071000 |
| 23 | Thrust Plate | 4230037000 | 4230027000 | 4230044000 | 4230061000 | 4230028000 | 4230065000 |
| 24 | Thrust Plate Rear | 4230038000 | 4230003000 | 4230045000 | 4230062000 | 4240019000 | 4230066000 |
| 25 | Head Ring | 4230039001 | 4230010001 | 4240070001 | 4240074001 | 4240021001 | 4240085001 |
| 26 | Seal support -Gear Joint | 4230040000 | 4220001000 | 4230051000 | 4230059000 | 4230016000 | 4230072000 |
| 27 | Adapter Flange | 4230850001 | 4230851001 | 4230852001 | 4230853001 | 4230854001 | 4241496001 |
| 28 | Packing Gland Half | 4240008001 | 4240006001 | 4240009001 | 4240013001 | 4240012001 | 4240026001 |
| 29 | Gear Joint Seal | 4240055001 | 4230006001 | 4240071001 | 4230060001 | 4240020001 | 4240079001 |
| 30 | Bearing Cover Plate | 4240059000 | 4240005000 | 4240069000 | 4240086000 | 4240011000 | 4240025000 |
| 31 | Gear Joint Shell | 4240060004 | 4240007004 | 4240067004 | 4240073004 | 4240022004 | 4240084004 |
| 32 | Support | 4241575001 | 4241576001 | 4241577001 | 4241578001 | 4241578001 | 4241579001 |
| 33 | Shaft Collar | 4241609001 | 4241609002 | 4241609003 | 4241609004 | 4241609005 | 4241609006 |
| 34 | Bearing Housing | 4250010000 | 4250003000 | 4250014000 | 4250019000 | 4250005000 | 4250023000 |

G2 Open Throat Parts List (continued)

| ITEM # | G2 PART DESCRIPTION | E PART NUMBER | F PART NUMBER | G PART NUMBER | H PART NUMBER | J PART NUMBER | K PART NUMBER |
|--------|-------------------------------------|---|---------------|---------------|---------------|---------------|---------------|
| 35 | G2 Suction Housing - Std CS | 4251554001 | 4251534001 | 4251491001 | NA | NA | NA |
| | G2 Suction Housing - 1meter CS | 4251555001 | 4251535001 | 4251492001 | 4251542001 | 4251503001 | 4251566001 |
| | G2 Suction Housing - 1.5 meter CS | 4251556001 | 4251536001 | 4251493001 | 4251543001 | 4251504001 | 4251567001 |
| | G2 Suction Housing - 2 meter CS | 4251557001 | 4251537001 | 4251494001 | 4251544001 | 4251505001 | 4251568001 |
| 36 | Auger connecting rod - Std CS | See Connecting Rod Chart | | | | | |
| 37 | Drive Shaft | 4251639001 | 4251640001 | 4251641001 | 4251642001 | 4251643001 | 4251644001 |
| 38 | Intermediate Drive Shaft | 4251645001 | 4251646001 | 4251647001 | 4251648001 | 4251649001 | 4251650001 |
| 39 | Retainer Ring - Stator | 4052000200 | 4062000200 | 4072000400 | 4082000600 | 4082000600 | 4102001200 |
| 40 | Retainer Ring - Bearing Housing | 4062000200 | 4072000400 | 4220015000 | 4082000600 | 4220006000 | 4220021000 |
| 41 | Set Screw - Gear Joint shell | 4220052001 | 4220052001 | 4220052001 | 4220052001 | 4220052002 | 4220052002 |
| 42 | Set Screw - Bearing Lock Nut | 4220053000 | 4220053000 | 4220053000 | 4220053000 | 4220053000 | 4220053000 |
| 43 | Pipe Plug - Suction Housing | 6100030160 | 6100030160 | 6100030160 | 6100030160 | 6100030160 | 6100030160 |
| 44 | Pipe Plug - Bearing Housing | 4220485000 | 4220485000 | 4220485000 | 4220485000 | 4220485000 | 4220485000 |
| 45 | Socket Pipe Plug - Gear Joint Shell | 4220044001 | 4220044001 | 4220044001 | 4220044001 | 4220044001 | 4220044001 |
| 46 | Key - Drive Shaft | 6110080600 | 6110080600 | 6110100640 | 6110120680 | 6110140680 | 6110160800 |
| 47 | Hex Nuts - Packing Gland | 6140010111 | 6140010111 | 6140050051 | 6140050071 | 6140050071 | 6140050081 |
| 48 | Lock Nut | 4052006401 | 4052006402 | 4052006403 | 4052006403 | 4052006404 | 4052006405 |
| 49 | Hex Screw - Shaft Collar | Part of Shaft Collar assembly - Item 33 | | | | | |
| 50 | Socket Screw - Head Ring | 6191432080 | 6191442120 | 6191442120 | 6191452140 | 6191462200 | 6191482200 |
| 51 | Hex Screw- Support | 6191530201 | 6191530201 | 6191530201 | 6191550241 | 6191550241 | 6191550241 |
| 52 | Hex Screw- Bearing Cover | 6191530281 | 6191550281 | 6191550321 | 6191570361 | 6191570361 | 6191580441 |
| 53 | Hex Screw - Disch Flange | 6191570241 | 6191570241 | 6191580281 | 6191580321 | 6191580321 | 6191580361 |
| 54 | Hex Scew - Bearing Housing | 6191570321 | 6191580321 | 6191580321 | 6191580361 | 6191580361 | 6191580401 |
| 55 | Hex Bolt - Stator support | 6191570521 | 6191570481 | 6191580561 | 6191580561 | 6191580721 | 6191570641 |
| 56 | Lock Washer - Bearing Cover | 6230010411 | 6230010431 | 6230010431 | 6230010451 | 6230010451 | 6230010471 |
| 57 | Lock Washer - Disch Flange | 6230010451 | 6230010451 | 6230010471 | 6230010471 | 6230010471 | 6230010471 |
| 58 | Lock Washer - Head ring | 6230012970 | 6230012990 | 6230012990 | 6230013000 | 6230013010 | 6230013030 |
| 59 | Lock washer - Bearing Housing | 6230010451 | 6230010471 | 6230010471 | 6230010471 | 6230010471 | 6230010471 |
| 60 | Hex Nut- Support | 6140010111 | 6140010111 | 6140010111 | 6140050051 | 6140050051 | 6140050051 |
| 61 | Lock Washer - Support | 6230010411 | 6230010411 | 6230010411 | 6230010431 | 6230010431 | 6230010431 |
| 62 | Packing set | 3403396016 | 3403396019 | 3403396021 | 3403396024 | 3403396026 | 3403396028 |
| 63 | Grease Fitting - Stuffing Box | 3207259001 | 3207259001 | 3207259001 | 3207259001 | 3207259001 | 3207259001 |
| 63 | Pipe Plug - Stuffing Box | 6100120011 | 6100120011 | 6100120011 | 6100120011 | 6100120011 | 6100120011 |
| 64 | Hex Screw - Suction Housing | 6191570321 | 6191580361 | 6191580401 | 6191580401 | 6191580441 | 6191580441 |
| 65 | Lock Washer - Suction Housing | 6230010451 | 6230010471 | 6230010471 | 6230010471 | 6230010471 | 6230010471 |

G2 Open Throat Parts List (continued)

Rotor (Ref. No. 14) for Type Designations Beginning with CD

| STAGES | | | | |
|--------|--------|--------|--------|--------|
| MODEL | 1 | 2 | 4 | 6 |
| F012 | C71FE1 | C72FE1 | C74FE1 | C76FE1 |
| F022 | C71FF1 | C72FF1 | C74FF1 | ----- |
| G022 | ----- | ----- | ----- | C76GF1 |
| G036 | C71GG1 | C72GG1 | C74GG1 | ----- |
| G050 | C71G51 | C72G51 | C74G51 | ----- |
| H036 | ----- | ----- | ----- | C76HG1 |
| H050 | ----- | ----- | ----- | C76H51 |
| H065 | C71HH1 | C72HH1 | C74HH1 | ----- |
| H090 | C71H91 | C72H91 | C74H91 | ----- |
| J065 | ----- | ----- | ----- | C76JH1 |
| J090 | ----- | ----- | ----- | C76J91 |
| J115 | C71JJ1 | C72JJ1 | C74JJ1 | ----- |
| K115 | ----- | ----- | ----- | C76KJ1 |

Stator (Ref. No. 11) Part Number

| MODEL | 1 | 2 | 4 | 6 |
|-------|----------|---------|---------|---------|
| F012 | CD310E† | CD320E† | CD340E† | CD360E† |
| F022 | CD310F† | CD320F† | CD340F† | ---- |
| G022 | ---- | ---- | ---- | CD360F† |
| G036 | CD310G† | CD320G† | CD340G† | ---- |
| G050 | CD3150† | CD3250† | CD3450† | ---- |
| H036 | ---- | ---- | ---- | CD360G† |
| H050 | ---- | ---- | ---- | CD3650† |
| H065 | CD310H† | CD320H† | CD340H† | ---- |
| H090 | ---- | CD3290† | CD3490† | ---- |
| J065 | ---- | ---- | ---- | CD360H† |
| J090 | ---- | ---- | ---- | CD3690† |
| J115 | CD310JH† | CD320J† | CD340J† | ---- |
| K115 | ---- | ---- | ---- | CD360J† |

† Add third letter of Type Designation to complete the part number; i.e., for Type CDQ, add Q to basic number of stator.

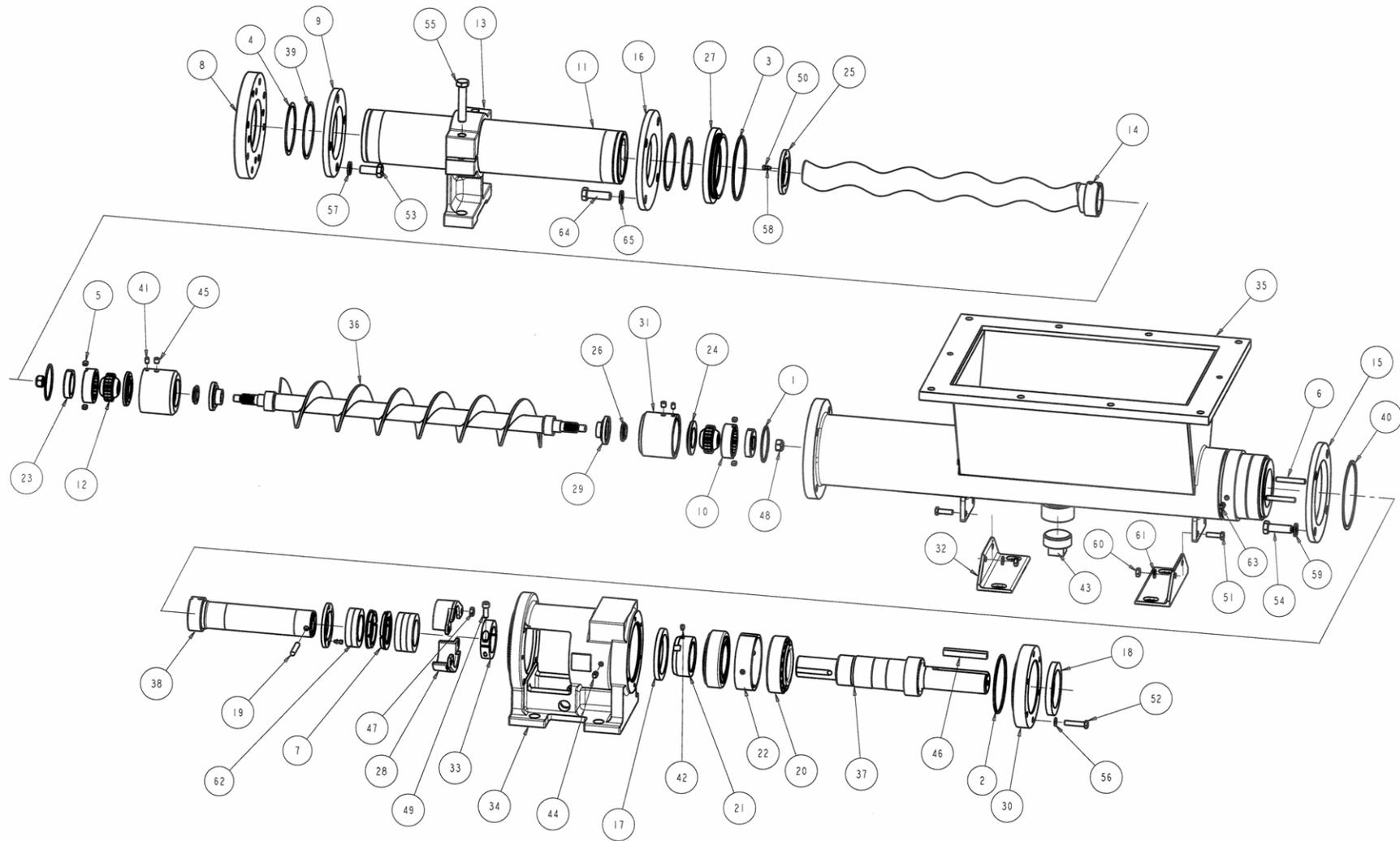
G2 Open Throat Parts List (continued)

Connecting Rod Chart (Ref # 36)

| ITEM # | G2 PART DESCRIPTION | Element Size | E PART NUMBER | | Element Size | F PART NUMBER | | Element Size | G PART NUMBER | |
|--------|--------------------------------|--------------|---------------|------------|--------------|---------------|------------|--------------|---------------|------------|
| | | | G2 | G3 | | G2 | G3 | | G2 | G3 |
| 36 | Conrod Assembly - STD CS | 008 | 4251737001 | 4251737301 | 012 | 4251739001 | 4251739301 | 022 | 4251741001 | 4251741301 |
| | | 012 | 4251609001 | 4251609301 | 022 | 4251610001 | 4251610301 | 036 | 4251611001 | 4251611301 |
| | | | | | | | | 050 | 4251743001 | 4251743301 |
| | Conrod Assembly - 1 meter CS | 008 | 4251737101 | 4251737401 | 012 | 4251739101 | 4251739401 | 022 | 4251741101 | 4251741401 |
| | | 012 | 4251609101 | 4251609401 | 022 | 4251610101 | 4251610401 | 036 | 4251611101 | 4251611401 |
| | | | | | | | | 050 | 4251743101 | 4251743401 |
| | Conrod Assembly - 1.5 meter CS | 008 | 4251737201 | 4251738101 | 012 | 4251739201 | 4251740101 | 022 | 4251741201 | 4251742101 |
| | | 012 | 4251609201 | 4251615101 | 022 | 4251610201 | 4251616101 | 036 | 4251611201 | 4251617101 |
| | | | | | | | | 050 | 4251743201 | 4251744101 |
| | Conrod Assembly - 2.0 meter CS | 008 | 4251738001 | 4251738201 | 012 | 4251740001 | 4251740201 | 022 | 4251742001 | 4251742201 |
| | | 012 | 4251615001 | 4251615201 | 022 | 4251616001 | 4251616201 | 036 | 4251617001 | 4251617201 |
| | | | | | | | | 050 | 4251744001 | 4251744201 |

| ITEM # | G2 PART DESCRIPTION | Element Size | H PART NUMBER | Element Size | J PART NUMBER | Element Size | K PART NUMBER |
|--------|--------------------------------|--------------|---------------|--------------|---------------|--------------|---------------|
| 36 | Conrod Assembly - STD CS | | | | | | |
| | | 036 | 4251541001 | 090 | 4251758001 | | |
| | | 065 | 4251612001 | 115 | 4251613001 | 175 | 4251614001 |
| | Conrod Assembly - 1 meter CS | 090 | 4251573001 | 175 | 4251760001 | | |
| | | 036 | 4251572001 | 090 | 4251759001 | | |
| | | 065 | 4251618001 | 115 | 4251619001 | 175 | 4251620001 |
| | Conrod Assembly - 1.5 meter CS | 090 | 4251574001 | 175 | 4251761001 | | |
| | | 036 | 4251572101 | 090 | 4251759101 | | |
| | | 065 | 4251618101 | 115 | 4251619101 | 175 | 4251620101 |
| | Conrod Assembly - 2.0 meter CS | 090 | 4251574101 | 175 | 4251761101 | | |

4-52. Table 4.1: G2 Exploded View



4-53. G3 Bridge Breaker Parts List

| ITEM # | G3 PART DESCRIPTION | E PART NUMBER | F PART NUMBER | G PART NUMBER | H PART NUMBER | J PART NUMBER | K PART NUMBER |
|--------|-----------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| 1 | Packing Set | 3403654002 | 3403654002 | 3403654002 | 3403654003 | 3403654003 | 3403654003 |
| 4 | Bearing | 4220764000 | 4220764000 | 4220764000 | 4220767000 | 4220767000 | 4220767000 |
| 5 | Gear | 4230872000 | 4230872000 | 4230873000 | 4230874000 | 4230875000 | 4230876000 |
| 6 | Extension Block | 4230920001 | 4230920001 | 4230920001 | 4230921001 | 4230921001 | 4230921001 |
| 7 | Gear Case Gasket | 4241533001 | 4241533001 | 4241533001 | 4241571001 | 4241571001 | 4241571001 |
| 8 | Packing Gland | 4241617007 | 4241617007 | 4241617007 | 4240927007 | 4240927007 | 4240927007 |
| 9 | Paddle Intermediate Shaft | 4241619018 | 4241619018 | 4241619018 | 4251607018 | 4251607018 | 4251607018 |
| 10 | Paddle Drive Shaft | 4241620018 | 4241620018 | 4241620018 | 4251695018 | 4251695018 | 4251695018 |
| 11 | Bearing Retainer | 4241631001 | 4241631001 | 4241621001 | 4251497001 | 4251498001 | 4251510001 |
| 12 | Paddle End Shaft | 4241694018 | 4241694018 | 4241694018 | 4251799018 | 4251799018 | 4251799018 |
| 13 | G3 Suction Housing - Std CS | 4251558001 | 4251530001 | 4251499001 | 4251545001 | 4251506001 | 4251569001 |
| | G3 Suction Housing - 1meter CS | 4251559001 | 4251531001 | 4251500001 | | | |
| | G3 Suction Housing - 1.5 meter CS | 4251560001 | 4251532001 | 4251501001 | 4251546001 | 4251507001 | 4251570001 |
| | G3 Suction Housing - 2 meter CS | 4251561001 | 4251533001 | 4251502001 | 4251547001 | 4251508001 | 4251571001 |
| 14 | Paddle Assembly | 4251630001 | 4251634001 | 4251626001 | 4251635001 | 4251538001 | 4251548001 |
| 15 | Drive Adapter | Consult Factory | | | | | |
| 16 | Gearcase | 4251703001 | 4251703001 | 4251706001 | 4251840001 | 4251841001 | 4251842001 |
| 17 | Gear Case Cover | 4251715001 | 4251715001 | 4251697001 | 4251701001 | 4251565001 | 4251564001 |
| 18 | Shaft Guard | 4251801001 | 4251801001 | 4251801001 | 4251805001 | 4251805001 | 4251805001 |
| 19 | Shaft Guard - Gear Side | 4251802001 | 4251802001 | 4251802001 | 4251806001 | 4251806001 | 4251806001 |
| 20 | Retainer - Bearing Retainer | 6010030244 | 6010030244 | 6010030244 | 6010030334 | 6010030334 | 6010030334 |
| 21 | Grease Seal - Gearcase | 6030021001 | 6030021001 | 6030021001 | 6030021002 | 6030021002 | 6030021002 |
| 22 | Stud - Packing Gland | 6042220501 | 6042220501 | 6042220501 | 6042220501 | 6042220501 | 6042220501 |
| 23 | Key - Gear | 6110040280 | 6110040280 | 6110040280 | 6110060300 | 6110060300 | 6110060300 |
| 24 | Key - Gearmotor | 6110040400 | 6110040400 | 6110040400 | 6110060440 | 6110060440 | 6110060440 |
| 25 | Hex Nut - Shaft Guard | 6140010091 | 6140010091 | 6140010091 | 6140010091 | 6140010091 | 6140010091 |
| 26 | Hex Nut - Packing Gland | 6140700081 | 6140700081 | 6140700081 | 6140700081 | 6140700081 | 6140700081 |
| 27 | Spring Dowel - Packing, Gearcase | 6160100711 | 6160100711 | 6160100711 | 6160100911 | 6160100911 | 6160100911 |
| 28 | Socket Screw - Paddle End shaft | 6191322160 | 6191322160 | 6191322160 | 6191332160 | 6191332160 | 6191332160 |
| 29 | Socket Screw - Gearcase | 6191460723 | 6191460723 | 6191460723 | 6191480723 | 6191480723 | 6191480723 |
| 30 | Hex Screw - Gearcase support | 6191510121 | 6191510121 | 6191510121 | 6191530161 | 6191530161 | 6191530201 |
| 31 | Hex Screw - Gearcase cover | 6191530241 | 6191530241 | 6191530241 | 6191550241 | 6191550241 | 6191550241 |
| 32 | Hex Screw - Bearing Retainer | 6191530721 | 6191530721 | 6191530721 | 6191550801 | 6191550801 | 6191550801 |
| 33 | Hex Screw - Drive Adapter | 6191520161 | 6191520161 | 6191520161 | 6191520161 | 6191520161 | 6191520161 |
| 35 | Hex Screw - Drive adapter | Consult Factory | | | | | |
| 36 | Lock Washer - Gearcase support | 6230010391 | 6230010391 | 6230010391 | 6230010391 | 6230010391 | 6230010391 |
| 37 | Plain Washer - Gearcase support | 6230020091 | 6230020091 | 6230020091 | 6230020091 | 6230020091 | 6230020091 |
| 38 | Sealing washer - Gearcase | 6230150111 | 6230150111 | 6230150111 | 6230150131 | 6230150131 | 6230150131 |
| 39 | Gearmotor | Consult Factory | | | | | |

G3 Bridge Breaker Parts List (continued)

| ITEM # | G3 PART DESCRIPTION 2 Meter Option Only | E PART NUMBER | F PART NUMBER | G PART NUMBER | H PART NUMBER | J PART NUMBER | K PART NUMBER |
|---------------|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 63 | Lock Washer - Bearing Retainer | 6230010411 | 6230010411 | 6230010411 | 6230010431 | 6230010431 | 6230010431 |
| 65 | Lock washer - Gearcase cover | 6230010411 | 6230010411 | 6230010411 | 6230010431 | 6230010431 | 6230010431 |
| 66 | Hex Screw - Gearcase cover | 6191530281 | 6191530281 | 6191530281 | 6191550321 | 6191550321 | 6191550321 |
| 67 | Lock Washer - Gearcase support | 6230010391 | 6230010391 | 6230010391 | 6230010411 | 6230010411 | 6230010411 |
| 68 | Lock Washer - Drive adapter | 6230010401 | 6230010401 | 6230010401 | 6230010402 | 6230010401 | 6230010401 |
| 69 | Lock Washer - Drive adapter | 6230010401 | 6230010401 | 6230010401 | 6230010401 | 6230010401 | 6230010401 |
| 73 | Hanger Shim | 4220776001 | 4220776001 | 4220776001 | 4220779001 | 4220779001 | 4220779001 |
| 74 | Bushing Bracket | 4241707001 | 4241707001 | 4241707001 | 4241708001 | 4241708001 | 4241708001 |
| 75 | Hex Screw - Bushing Bracket | 6191530201 | 6191530201 | 6191530201 | 6191530201 | 6191530201 | 6191530201 |
| 76 | Lock washer -hanger bkt | 6230010411 | 6230010411 | 6230010411 | 6230010411 | 6230010411 | 6230010411 |
| 77 | Hangar Bracket | 4241705001 | 4241705001 | 4241705101 | 4241706001 | 4241706101 | 4241706201 |
| 78 | Hex Nut - Bushing Bracket | 6140010111 | 6140010111 | 6140010111 | 6140010111 | 6140010111 | 6140010111 |
| 79 | Hanger Bushing | 4220777001 | 4220777001 | 4220777001 | 4220780001 | 4220780001 | 4220780001 |
| 80 | Hex Screw - hanger bkt | 6191530161 | 6191530161 | 6191530161 | 6191530161 | 6191530161 | 6191530161 |

4-54. Table 4:2 G3 Exploded View

