

# OPERATION and MAINTENANCE INSTRUCTIONS for SHARPE MIXERS CLOSED TANK F-SERIES MIXERS with VAPOR SEAL or PACKED GLAND

	<b>PAGE</b>
SECTION 1: INITIAL INSPECTION, RECEIVING, AND STORAGE.....	1
SECTION 2: MOUNTING.....	2
SECTION 3: INSTALLING THE MIXER SHAFT & IMPELLER.....	2
SECTION 4: POSITIONING.....	2
SECTION 5: INSTALLING THE STEADY BEARING (optional equipment).....	3
SECTION 6: MOTOR CONNECTIONS.....	4
SECTION 7: LUBRICATION.....	4
SECTION 8: SEAL START-UP AND OPERATION.....	5
SECTION 9: OPERATION & START-UP CHECKLIST.....	6
SECTION 10: SIDE ENTRY RETRACTION.....	8
SECTION 11: STUFFING BOX REPACKING.....	8
SECTION 12: DIRECT DRIVE DISASSEMBLY.....	9
SECTION 13: GEAR DRIVE DISASSEMBLY.....	12
SECTION 14: MIXER OFFSET GUIDE.....	13
SECTION 15: TROUBLE SHOOTING GUIDE.....	14
SECTION 16: ACCESSORIES.....	16

### CAUTION

Because neither manufacturer nor seller can control the application or installation of this product, their only obligation shall be to replace this part if defective and shall not be liable for any injury, loss, or damage, direct or consequential, arising from the installation of this product. User assumes all risk in using this product and is therefore cautioned in selecting the product suitable to the intended use. Refer to inside cover of this manual for Terms and Conditions.

## SECTION 1 INITIAL INSPECTION, RECEIVING AND STORAGE

1.1 Immediately upon receipt of the equipment check the crating and contents for any damage that may have occurred in transit. Report any damage immediately to the carrier and to Sharpe Mixers. Check against the packing slip to be sure that all parts were received. Report missing items to Sharpe Mixers.

1.2 Mixer and impellers are normally packed together. The mixer shaft is packed in a separate container. Impellers are usually banded to mixer drive or lag-bolted to drive skid. Side entry mixers are normally shipped on one skid with the shaft installed and the impeller lag-bolted to the skid. If space allows, keep shipping containers for possible future use.

1.3 Storage: storage is when a) mixer has been delivered to job site and is awaiting installation, b)

mixer has been installed, but regular operation is delayed, c) there are long idle periods between operating cycles, and d) plant/department operation is shut down. Store mixer in a clean dry location, with circulating air free from wide variations in temperature. Electric motors are easily damaged by moisture. Store the entire unit off the floor, covered with plastic, and use desiccants to reduce moisture build-up. Do not seal the plastic cover as this traps moisture. If the motor shows signs of moisture absorption before start-up, dry the motor out by applying 10% voltage on two leads (if in doubt, measure resistance in windings). This will give approximately 50% rated current. There are also sprays available to help dry out motors. Relubricate motor before start-up when in storage six months or more. When gear drive models have been in storage for more than a year, the condition of the gear lubricant needs to be inspected (see Section 7, Lubrication).

## SECTION 2 MOUNTING

2.1 Flange mount: Standard 150 # flanges are provided. Refer to the Data Sheet in the front of this manual for the specific size supplied. A gasket needs to be installed between the tank nozzle and the mixer flange to stop leakage of tank contents and keep tank pressurized. Using lock washers or double nutting the mounting bolts is recommended to prevent bolts from loosening by equipment vibration.

2.2 Mounting structure must be stable and strong enough to hold the full mixer weight, torque, and overhung moment. Please contact Sharpe Mixers for these values if they are not listed on the outline drawing in the front of the manual.

Mounting to an unstable support may cause unacceptable mixing, damage to the equipment, tank, or other hazards.

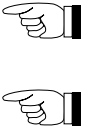
2.3 Side Entry Flange mount: Tie rods are normally provided with side entry mixers. The tie rods need to be positioned approximately 45° above horizontal and 45° from the mixer shaft centerline. These aid in the support of the mixer and need to be attached securely (see paragraph 2.2 for mounting strength requirements). If pipe legs are supplied, see specific mixer outline drawing else where in this manual for pipe leg size required.

## SECTION 3 INSTALLING THE MIXER SHAFT & IMPELLER (refer to pages 10 or 11)

**WARNING:** Always lockout power before installing or removing mixer shaft or impeller.

3.1 The mixer shaft will have one end (marked: motor end) ground to fit the drive bearing and coupling. Slide the impeller(s) onto the opposite end with the concave side of the blades facing AWAY from motor end of shaft. A single impeller is best mounted at the end of the shaft or 1-2 prop diameters above tank bottom. The upper impeller (if supplied) is normally mounted a minimum of 2 impeller diameters below the liquid surface. Tighten the set screws securely. High horsepower units will have "divots" into which the set screws should be tightened. FOR SIDE ENTRY MIXERS, skip paragraph 3.2 as the mixer shaft is installed at the factory.

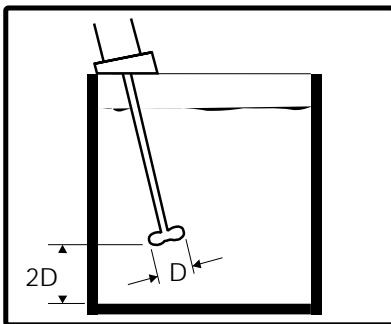
3.2 Remove the service window (512) from the mixer spool so the bearing and coupling are visible (see page 10 or 11). Rotate the coupling until the two coupling bolts (651) are accessible. Install the mixer shaft (with the end marked motor end) up through the shaft seal packing, lip seal, bearing, and into the drive coupling (650). Be sure of full engagement of the shaft into the split coupling. DO NOT use oil to aid in assembly or slippage may occur. Using the 3/16" hex wrench supplied, **TIGHTEN THE TWO BOLTS IN THE COUPLING (651)**, gripping the mixer shaft in position. Tighten SECURELY as these bolts transmit the mixer torque. **TIGHTEN THE TWO BEARING SET SCREWS (310)** using the 1/8" hex wrench provided.



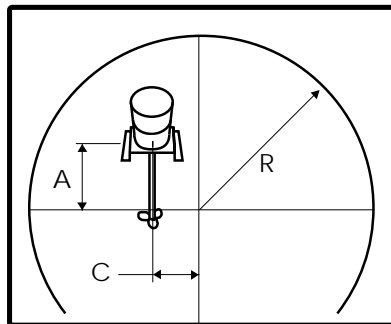
## SECTION 4 POSITIONING

**WARNING:** Always lockout power before positioning or repositioning the mixer.

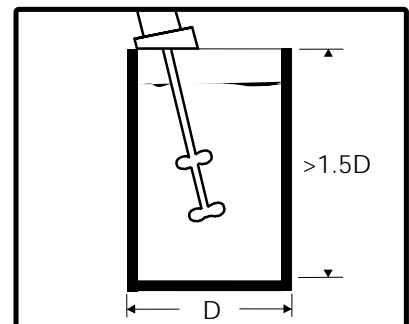
4.1 The following drawings are for reference only. If there is any question concerning the proper position of your F-series mixer, please contact your Sharpe Mixers representative or the factory as your specific application may be different than recommendations shown.



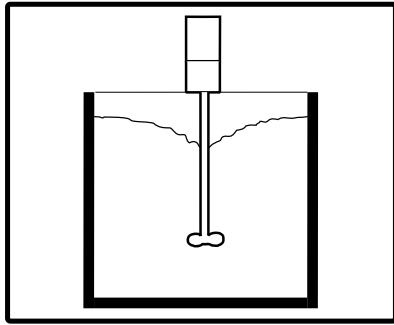
4.2 If tank diameter is approximately equal to liquid depth, use 1 prop, placed at least 2 prop diameters from the bottom of the tank.



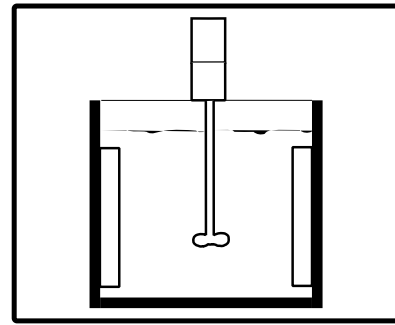
4.3 See drawing A2787 in section 14 for angular offset mounting dimensions. Consult factory for special applications, including square/rectangular tanks.



4.4 If tank height is greater than 1.5x the diameter, use 2 props. Position lower prop at least 2 prop diameters from bottom. Place upper prop halfway between bottom and top of liquid level.



4.5 For drawing down light powders, position mixer in center of tank to create a vortex. A vortex may not be recommended for some products. Depth of prop will vary vortex.



4.6 Baffles may be used to prevent vortexing when mixer is mounted on center. Baffling may not be required with more viscous products or square/rectangular tanks.

## SECTION 5 INSTALLING THE STEADY BEARING (optional equipment)

5.1 This section is for those mixers which include the optional steady bearing to accommodate longer than standard mixer shafts. A steady bearing must be installed only after the drive assembly and lower mixer shaft have been assembled and firmly bolted in place. **DO NOT** predetermine the exact bearing location from tank and mixer outline dimension drawings. The vertical center line of the steady bearing must coincide with the shaft's axis of rotation to minimize bearing preload (see Figure 5.1). This axis may not necessarily be at the center of the tank. The mixer shaft must be hand rotated (using input shaft coupling or motor fan) with a fixture attached to the shaft to mark a line on the tank bottom. **NEVER**

**APPLY POWER WITHOUT STEADY BEARING INSTALLED.** The center of this inscribed area will be the location for the center of the steady bearing.

5.2 The steady bearing must be securely installed, with its vertical centerline coincident with the axis of rotation, as established. The amount of lateral movement required to bring the shaft into proper alignment with the final steady bearing location will vary, depending upon the shaft length and diameter.

5.3 The steady bearing is a wearing part and should be checked periodically for wear.

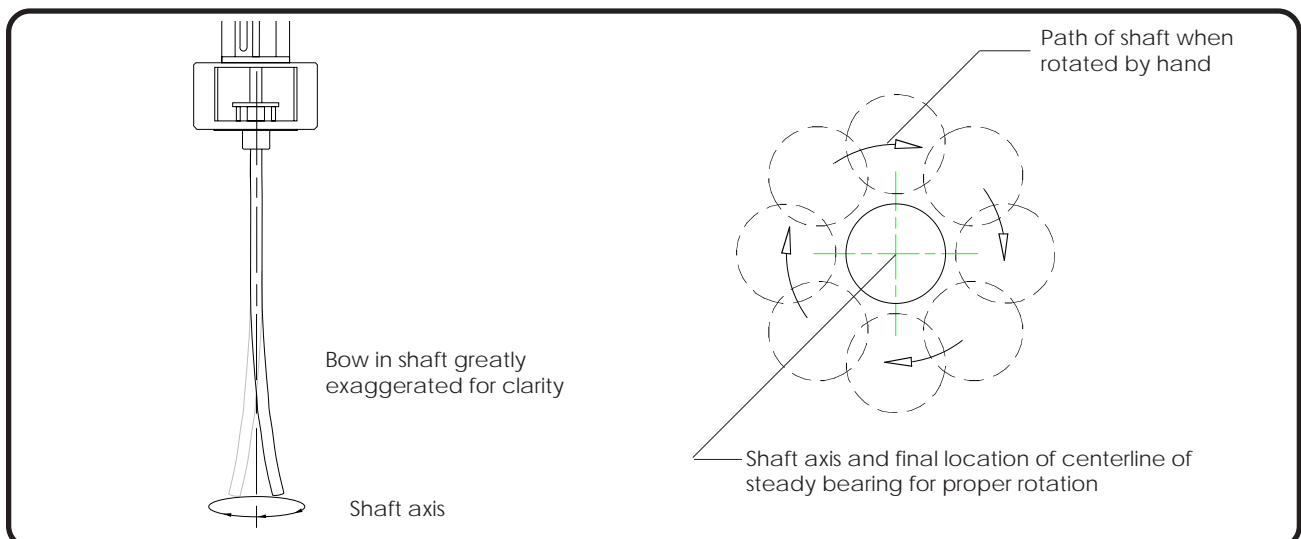


FIGURE 5.1

## SECTION 6 MOTOR CONNECTIONS

**WARNING:** High voltage and rotating parts can cause serious or fatal injury. Electric machinery can be hazardous. Installation, operation, and maintenance of electric machinery should be performed by qualified personnel. Familiarity with NEMA safety standards, National Electric Code and local building codes are required.

**6.1 Wiring:** Starting and overload control devices must be matched to motor rating. Follow control manufacturer's instructions for proper connections and installation.

**6.2** Electrical connections must conform to National Electrical code and all local regulations. Line voltage and wire capacity must match motor rating stamped on motor nameplate.

**6.3 Electric motors - single phase:** If your mixer is supplied with a single phase motor it may be wired by the factory with a ten foot cord and an on/off switch. If no cord or switch is provided refer to the wiring diagram on the motor for correct connections. Check that the switch is in the off position before plugging the cord into a 110 volt outlet. *Check rotation!*

**6.4 Electric motors - 3 phase:** Motors requiring 3 phase power should be wired according to the wiring diagrams on the motor.

Rotation of the propeller must be clockwise looking down. Interchange lines if necessary for proper rotation.

**6.5 Electric Variable Speed:** Electric motors using an SCR or variable frequency controller must be wired following the instructions supplied with the controller. Many adjustments are often required to the controller and instructions should be read carefully before applying power. Adjust the controller to limit the maximum speed to the motor nameplate R.P.M. ( or refer to the motor speed in the data sheet at the front of this manual ).

**6.6 Air motors:** Air driven mixers must always have a filter, lubricator and moisture trap installed in the air line ahead of the motor to prevent damage. Use the same size or next size pipe size larger than intake port of motor. A regulator can be used to govern the mixer speed. Install the air line in the proper port to provide clockwise rotation of the propeller shaft when viewed from above. The muffler is always installed at the factory in its proper position.

**WARNING:** Damage to equipment or serious injury to personnel can result if speed limitations are not followed.

## SECTION 7 LUBRICATION

**6.1** Your mixer has been lubricated at the factory with the proper type and amount of lubrication for mixer service (gear drive units only). This lubricant needn't be changed under normal conditions for a period of 3 years. Under extreme conditions it is recommended that the lubricant in the gear box be

changed more frequently. Remove motor to repack gearbox. Refer to the chart below for the lubricant recommended for temperatures in your area. When changing to a different lubricant, clean gearbox with mineral spirits before repacking.

SERVICE	LUBRICANT	CHEVRON EQUIVALENT
32°F (0°C) and up	oil based EP Semi fluid grease	Black Pearl NLGI 1 (standard from factory)
Down to -20°F (-29°C) and up to 300°F (149°C)	Synthetic EP	ULTI-PLEX synthetic grease EP
Food grade	Food grade EP-2	Chevron FM grease EP2

**6.2 Electric motor bearings** are usually sealed and need no relubrication. If zirc fittings are present relubricate with a No. 2 consistency lithium soap base and petroleum compound (every 6 months to 3 years depending on usage). Open and clean drains. Add grease until new grease is forced out drain. Remove excess grease and replace input plugs. Run motor one half hour before replacing drain plugs. Mixer shaft bearings are sealed and need no relubrication.

**6.3 Air motor lubrication:** Lubricator needs to be adjusted to feed one drop of oil for every 50 - 75 CFM of air through the motor. Use a detergent SAE #10 automotive engine oil.

**6.4 Seal lubrication:** Vapor seal and high pressure packed glands need to be lubricated. A zirc fitting is present on the mounting flange and needs to be greased every day. A weight loaded lubricator or other self lubricating device is available from Sharpe Mixers to aid in seal lubrication.

## SECTION 8 SEAL START-UP AND OPERATION

8.1 The purpose of packing is to control leakage, not prevent it. Packings must leak to perform properly, otherwise they will burn up. TFE packings are especially sensitive in this respect.

8.2 **DO NOT OVER TIGHTEN!** Permit generous initial leakage on side entry units. Gradually take up gland nuts 1/6 turn (1 flat in hex nuts) at a time. Watch the temperature. **NEVER PERMIT HEAT TO DEVELOP - IF HEAT DOES DEVELOP, BACK OFF GLAND NUTS.** For top entry mixers, the temperature must be monitored carefully for overheating during start-up since there is no leakage of liquid. For side entry mixers, tighten gland at 15 minute intervals until leakage is controlled without developing heat. For a 1" diameter shaft, permit 5 to 20 drops per minute, a 2" diameter shaft would be allowed to leak twice as much. TFE packings must be permitted to leak 30 drops per minute on a 1" diameter shaft.

8.3 **PROVIDE LUBRICATION**, particularly when mixing non-lubricating liquids. A zirc fitting is standard from the factory for lubrication, see section 7.3 for lubrication instructions. For flushing, remove the 1/8" npt zirc fitting and replace with flushing lines (not included). Whenever flushing through a seal, a clean liquid having lubricating properties must be used.

8.3.1 **SEALING ABRASIVE LIQUIDS:** Abrasives is a term describing slurries, congealing liquids and crystallizing salts. These applications may damage the equipment, and present a sealing challenge for packing glands. The solution involves flushes, purges, and temperature controls. Sharpe Mixers recommends shaft hardening, or hard facings such as Stellite, Chrome, Ceramic, or Tungsten Carbide for these applications.

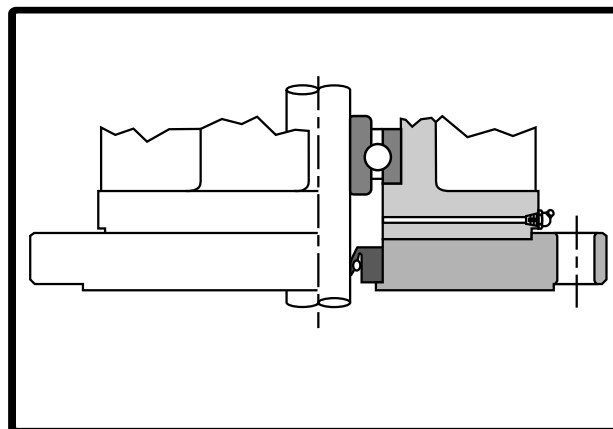
8.3.2 **SUSPENDED SOLIDS:** Examples of solids which are suspended in liquids include starch, contaminated or muddy water, sand, and other slurries. An external flush of liquid through a lantern ring is recommended. The flushing pressure needs to be 25 psi greater than the tank pressure.

8.3.3 **PRECIPITATING LIQUIDS:** Examples of precipitating liquids include caustic soda, calcium hydroxide, and ammonium nitrate. Precipitation occurs because of a change in concentration or temperature of the liquid. The resulting slurry can be very abrasive and destroy the packing. Sharpe Mixers recommends an external flush with clean fluid. The flushing pressure needs to be 25 psi greater than the tank pressure.

8.3.4 **EVAPORATING LIQUIDS:** Solids can form as a result of heat which promotes evaporation. Examples include any of the hot chemical salts - The chlorides, chlorates, sulfates and sulfides. Sharpe Mixers recommends an external flush with clean fluid. The flushing pressure needs to be 25 psi greater than the tank pressure.

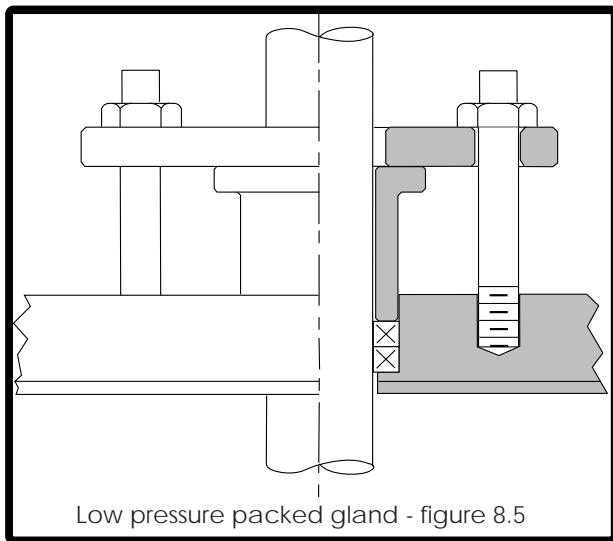
8.3.5 **CONGEALING LIQUIDS:** These liquids congeal because of a temperature decrease, or exposure to air. Sugar syrups fall into both categories. Good practice is to keep the fluid moving before congealing occurs. Control the process with heat. Asphalt and sugar syrups are typical of liquids which congeal during cooling. Be sure to heat thoroughly before start-up, during operation, and after shutdown if followed by a purge. Sharpe Mixers recommends an external flush or purge with clean fluid. The flushing pressure needs to be 25 psi greater than the tank pressure.

Some products such as glue, molasses, paint, and sugars harden to a solid state when exposed to air. An effective flush is a follower ring flush which will keep air out of the product. This type of flush does not enter the product, but only mixes with the product leakage. Sharpe Mixers recommends either an external flush with a non-hardening liquid or a purge using a solvent of the liquid being mixed.

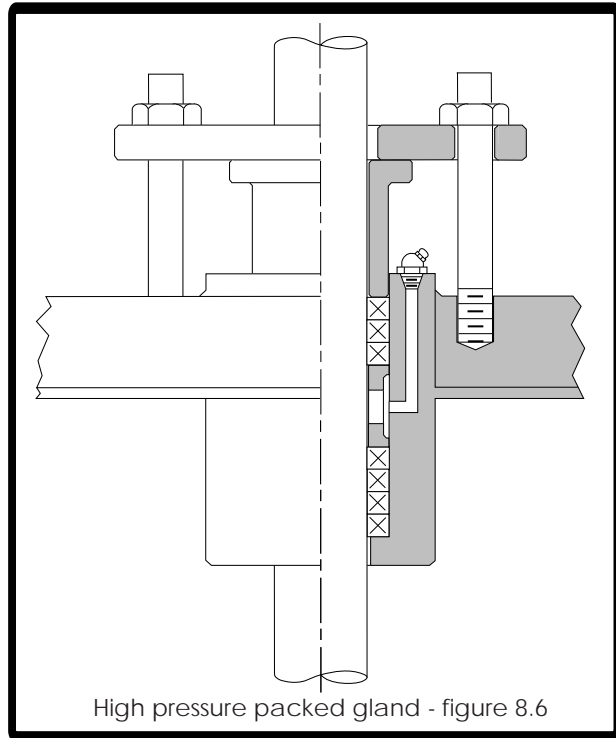


Vapor seal - figure 8.4

8.4 Vapor seals: Vapor seals normally come greased from the factory. This will keep in vapors from the product but will not hold pressure. See Section 7 for lubrication recommendations.



8.5 Low pressure packed gland: Two rings packing is standard from the factory. This gland is designed for 15 psi of tank pressure.



8.6 High pressure packed gland: Seven rings with lantern ring is standard from the factory. This gland is designed for 150 psi of tank pressure. See section 7 for lubrication recommendations. Side entry mixers are standard with high pressure packed glands.

## SECTION 9 OPERATION

**WARNING:** High voltage and rotating parts can cause serious or fatal injury. Lockout power before servicing.

9.1 Rotate mixer shaft by hand to check shaft straightness and to assure that the impeller is free of any obstructions in the tank.

9.2 **Always operate mixer with the lower impeller immersed** in the liquid by at least one prop diameter. Never operate mixer if fluid falls near the lower impeller.

9.3 The propeller rotates clockwise when viewed from above. Opposite rotation may cause overload and inefficient mixing.

9.4 Vortexing may occur if liquid level is too close to the upper impeller. This will cause aeration of the product and excessive vibration of the equipment. When mixing

4AM AIR MOTOR @ 1750 MAXIMUM R.P.M.					
H.P.	0.25	0.5	0.75	1.0	1.2
C.F.M.	14	22	30	39	48
P.S.I.	20	40	60	80	100

TABLE 9.1

products of dissimilar viscosities and/or specific gravities the lighter or less viscous material should be introduced first. Gradually add the heavier material or powders into the center of the tank while the agitator is running. Never dump large amounts of powder or solids into the mixing tank. This may create clotting or "sanding in" of impeller and cause damage to the equipment.

**CAUTION:** Do not start mixer with impeller buried in solids or with liquid solution solidified. Damage will occur.

9.5 If impeller is buried in solids prior to starting mixer, solids must be dispersed. This may be achieved with an air hose, a recirculating pump, or a large stirring stick if necessary.

9.6 Keep motors free from oil, dust, dirt, water, and chemicals. Keep air intakes and outlets

6AM AIR MOTOR @ 1750 MAXIMUM R.P.M.					
H.P.	0.5	0.5	1.0	2.2	2.6
C.F.M.	23	39	53	68	82
P.S.I.	20	40	60	80	100

TABLE 9.2

free from foreign material. Electric motors supplied, although designed for outdoor use, may be damaged due to weather. A rain hood or other protection may be necessary to prolong motor life. Consult factory for recommendations.

9.9 Regular maintenance is the best assurance of trouble free, long life mixer operation. Inspect and relubricate at regular intervals. Frequency and thoroughness depends on operation, nature of service, and environment.

9.8 Do not drive air motors in above 1750 R.P.M.. See Table 9.1 and 9.2 for proper air consumption and pressures.

### 9.10 Start-Up Checklist

Prior and during start-up please check that the following things have been done:

- a. Manual has been read and followed
- b. Coupling bolts tight (3/16" hex "tee" wrench)
- c. Bearing setscrews tight (1/8" hex allen wrench)
- d. Impeller is immersed in liquid
- e. Sufficient protection of motor (if outdoors)
- f. Impeller(s) installed correctly (see Section 3)
- g. Impellers spaced correctly (if two or more)  
for maximum and minimum liquid level  
(see Section 3)
- h. Impeller bolts tight
- i. All mounting bolts tight
- j. Proper type and amount of lubricant  
(when serviced; see Section 7)
- k. Wiring correctly installed, grounded and  
insulated
- l. Proper shaft rotation (clockwise looking down)
- m. Proper seal lubrication (see Section 7)
- n. Proper seal run-in time allowed (see Section 8)
- o. Steady bearing installed correctly (see Section 5)
- p. Correct voltage/amperage upon starting  
(check against motor nameplate data)  
Record: \_\_\_\_\_ Volts \_\_\_\_\_ amps
- q. Excessive noise after start-up ?  
Record: \_\_\_\_\_ db \_\_\_\_\_ @3'
- r. Excessive vibration of mixer support ?

INSPECTOR \_\_\_\_\_

DATE \_\_\_\_\_

## SECTION 10 SIDE ENTRY RETRACTION

10.1 Side entry mixers are provided with "shaft retraction" device which allows repacking without draining the tank. The following procedure outlines the operation of "shaft retraction". Refer to pages 10 and 11 for parts identification.

10.2 Disconnect the power from the mixer.

10.2 Remove the service window (512). Loosen the two bearing setscrews (310) and the two lower coupling bolts (651). Do not loosen the two coupling bolts closest to the motor. Do not remove any of the setscrews.

10.3 Remove the two retraction bolts (673) installed in the bearing spool. Move the retraction collar (672) to within an inch of the bearing spool. Tighten the collar on the shaft, lining up the drilled holes in the collar with the tapped holes in the bearing spool. Reinstall the two bolts through the holes in the retraction collar and into the tapped holes in the spool. Tightening these retraction bolts (673) will pull the retraction collar (672) and mixer shaft in a direction out of the tank and further into the split coupling. The shaft will move approximately 1/8" before further retraction becomes difficult. This tightness indicates that the seal collar (674) and

gasket (675) has pressed tightly against the tank side of the mounting flange and a proper static seal is attained.

10.4 The mixer is now ready to have the stuffing box repacked (see Section 11).

10.5 To return the shaft to its original position, remove the retraction bolts from the retraction collar and the spool. Reinstall the bolts into the tapped holes in the retraction collar. These bolts (when tightened) will now press against the spool, and drive the shaft back into the tank. Move the mixer shaft back approximately 1/8" into its original position.

10.6 Tighten the two coupling bolts (651). Tighten the two bearing setscrews (310). Reinstall the service window (512) and gasket (513). Remove the retraction bolts from the collar (672). Move the collar away from the spool into its original position and tighten collar in place. Reinstall the two retraction bolts into the tapped holes in the spool for storage. The mixer is now ready for service. See Section 8 and 9 for start-up and operation.

## SECTION 11 STUFFING BOX REPACKING

11.1 PACKING TOOLS: Special flexible corkscrew tools specifically designed for packing make seal servicing an easy task. These tools are available from Sharpe Mixers.

11.2 Remove the old rings. If a lantern ring is present, there are (4) slots cut into the outside edges. This helps the packing tools "grab" the lantern ring for removal. Before installing the new rings, be sure that the new packing is the proper type and size for your application (see Data Sheet in front of manual).

11.3 If the packing rings are purchased from a vendor other than Sharpe Mixers, it is likely that the rings will have to be cut. To do this, wind the packing

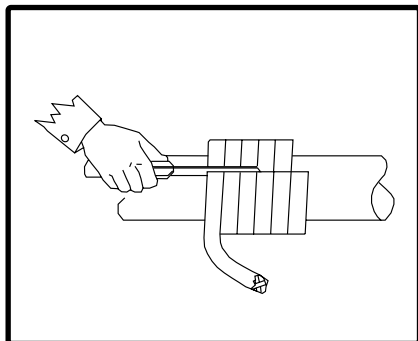


FIGURE 11.1

around a mandrel of the same diameter as the mixer shaft for the desired number of rings (see Figure 11.1). Cut rings by making a straight cut along the

mandrel as shown. When removing rings from mandrel, slip them off without opening the rings. This is especially important for metallic types. Do not open with a hinge-like action (see Figure 11.2).

11.4 Check condition of stuffing box and the shaft in the seal area. If either are rough or scored, it needs to be reworked or replaced. Without repairing the damaged areas, gland take-up would then result in distortion of the rings and over compression of the packing on the mixer shaft. The packing would not seal properly and burn out sooner, damaging the seal area more. If wearing in the seal area is evident contact the factory for recommendations.

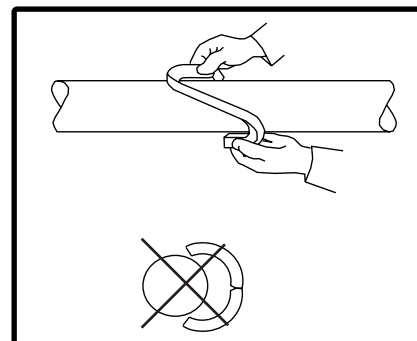


FIGURE 11.2

11.5 Coat new rings to be installed with a lubricant to assist installation and to help establish a proper initial break-in (Do not use on food grade packings, liquid oxygen service, nitric

acid, or any other non-compatible application). Check position of all gland parts against the applicable seal drawing. Replace all worn or damaged parts for proper seal.

11.5 Install rings over the shaft by twisting open as shown in Figure 11.2. This is especially important for metallic rings. NEVER open rings with hinge like action.

11.6 Insert rings one at a time with the joints staggered 90° apart (for 2-ring low pressure seals, stagger at 180°). Seat each ring individually, compressing in

place with a tamping tool or by using a split hollow cylinder. Turn mixer shaft occasionally to assist seating. Unless each ring is properly seated, the gland follower will not be able to tighten the packing set, as it will overcompress the outboard rings, nearest the follower ring. Except for abrasives, 70% of the wear normally takes place on the two packing rings nearest the follower ring. Proper seating and lubrication spreads the wear more evenly over the entire set of rings. Adjust the follower plate nut finger tight to begin seal break in. See Section 8 for seal start-up procedures.

## SECTION 12 DIRECT DRIVE DISASSEMBLY

12.1 Disconnect the power from the mixer.

**WARNING:** High voltage and rotating parts can cause serious or fatal injury. Lockout power before servicing.

12.2 Rebuilding the drive unit is best accomplished by removing the entire mixer from the tank. Remove the impeller from the shaft before removing the mixer from the mounting flange.

12.3 Remove the service window (512). Loosen the two bearing setscrews (310) and the two lower coupling bolts (651). Loosen the follower nuts (457).

12.4 Remove the mixer shaft.

12.5 Remove the four bolts mounting the bearing spool (510) to the stuffing box housing (552). Remove the drive from the housing. The stuffing box can be repacked at this time, if needed (see Section 10).

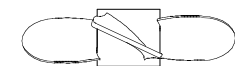
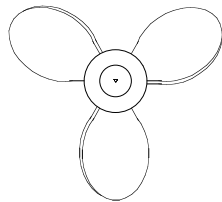
12.6 Remove the four 3/8" bolts mounting the motor to the spool and then the two may be separated.

12.7 **BEARING AND SEAL REMOVAL:** Place the mixer spool in a benchpress with the motor mounting face down. Use a 1 - 1/2" diameter arbor in the press on top of the lip seal (360) and press the lip seal and the bearing (301) down and out of the spool.

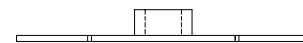
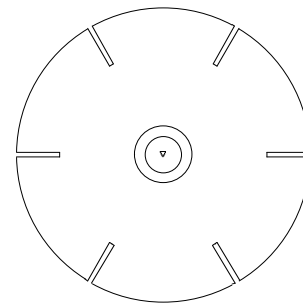
12.8 Reinstall the bearing from the inside of the spool, using LOCTITE sealant (609 or better) to hold the bearing in place. The lip seal (360) should be installed from the outside of the spool into position as shown in the drawing.

12.9 To reassemble, reverse procedure, being sure that the shaft has full engagement in the split coupling (650) and all fasteners are tight (for side entry units a gap of 1/16" must be maintained between the seal collar gasket and the flange).

### STANDARD DIRECT DRIVE IMPELLERS:

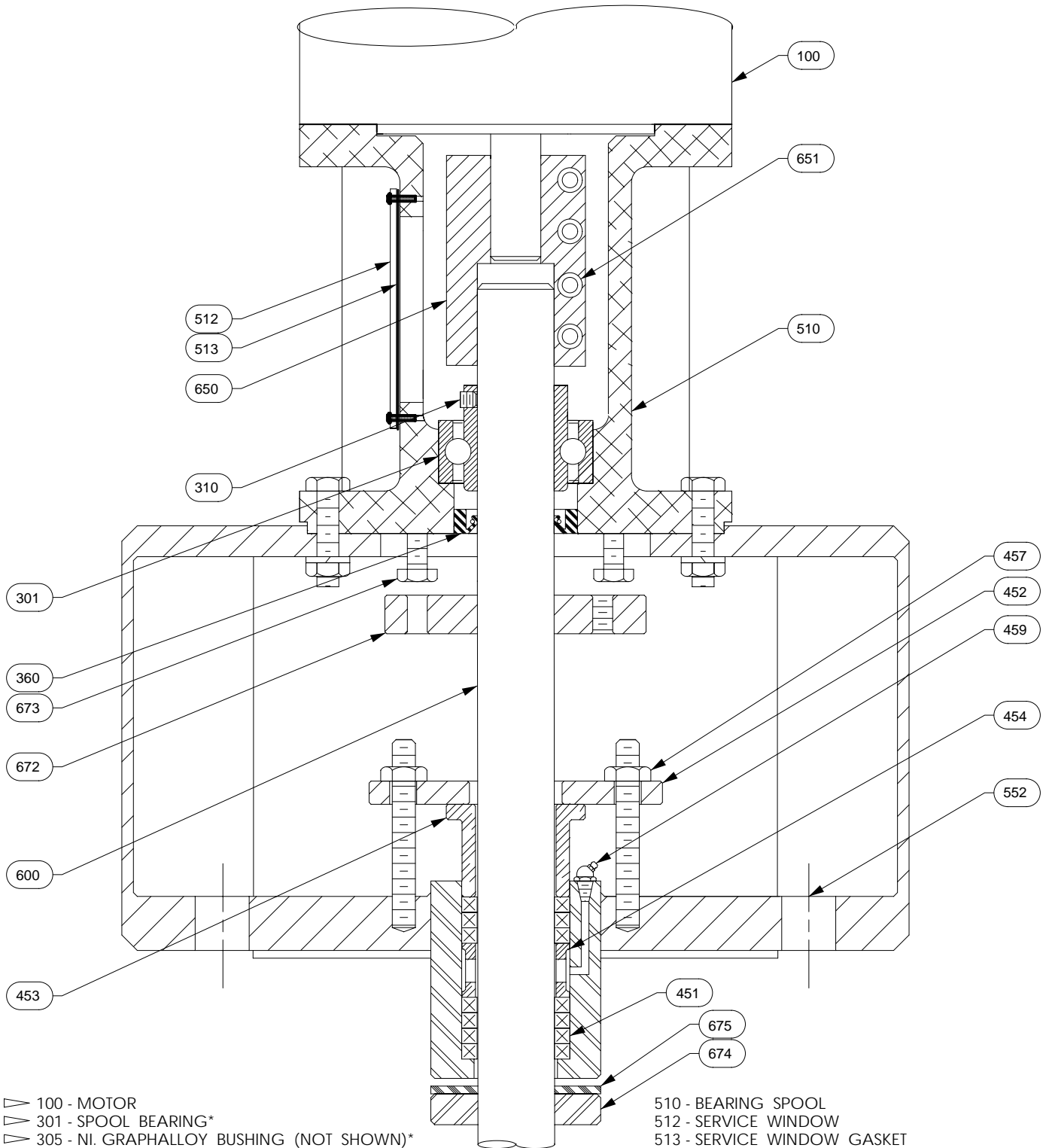


MARINE PROPELLER



HIGH SHEAR

# DIRECT DRIVE 'F' SERIES



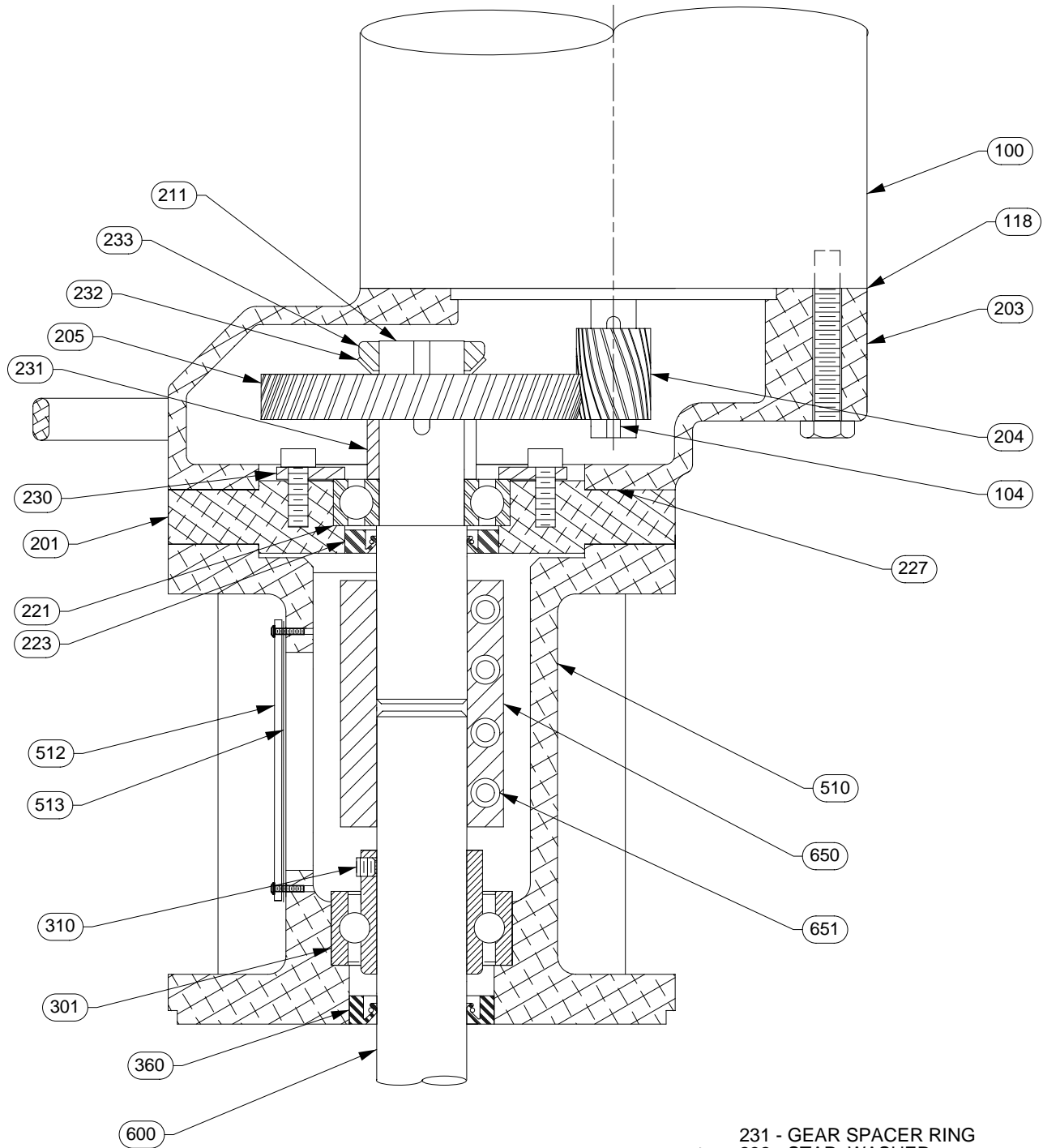
- ▷ 100 - MOTOR
- ▷ 301 - SPOOL BEARING\*
- ▷ 305 - NI. GRAPHALLOY BUSHING (NOT SHOWN)\*
- ▷ 310 - (2) S. S. BRASS TIPPED SET SCREWS
- ▷ 360 - SPOOL LIP SEAL\*
- ▷ 451 - PACKING\*
- ▷ 452 - FOLLOWER PLATE\*
- ▷ 453 - FOLLOWER RING\*
- ▷ 454 - LANTERN RING\*
- ▷ 456 - FOLLOWER STUDS
- ▷ 459 - GREASE FITTING

- ▷ 510 - BEARING SPOOL
- ▷ 512 - SERVICE WINDOW
- ▷ 513 - SERVICE WINDOW GASKET
- ▷ 552 - MOUNTING FLANGE HOUSING\*
- ▷ 600 - MIXER SHAFT\*
- ▷ 650 - COUPLING\*
- ▷ 651 - (4) SPLIT COUPLING BOLTS
- ▷ 672 - RETRACTION COLLAR\* (SIDE ENTRY ONLY)
- ▷ 673 - RETRACTION BOLT (SIDE ENTRY ONLY)
- ▷ 674 - SEAL COLLAR (SIDE ENTRY ONLY)
- ▷ 675 - SEAL COLLAR GASKET (SIDE ENTRY ONLY)
- ▷ 750 - IMPELLER (SEE OPPOSITE PAGE)

\* NOTE - HIGH PRESSURE SEAL SHOWN. SEE DATA SHEET FOR YOUR SPECIFIC SEAL APPLICATION.  
 - WHEN ORDERING PARTS, GIVE SERIAL NO. AND SHAFT SIZE.

▷ DENOTES RECOMMENDED SPARE PART

# GEAR DRIVE 'F' SERIES



- |                          |   |
|--------------------------|---|
| ▽ 100 - MOTOR            | ▽ 231 - GEAR SPACER RING                  |
| ▽ 104 - PINION GEAR KEY  | ▽ 232 - STAR WASHER                       |
| ▽ 118 - C-FACE GASKET    | ▽ 233 - GEAR NUT                          |
| ▽ 201 - BEARING PLATE    | ▽ 301 - SHAFT BEARING*                    |
| ▽ 203 - GEAR HOUSING     | ▽ 310 - (2) S. S. BRASS TIPPED SET SCREWS |
| ▽ 204 - PINION GEAR      | ▽ 360 - SHAFT LIP SEAL*                   |
| ▽ 205 - HELICAL GEAR     | ▽ 510 - BEARING SPOOL                     |
| ▽ 211 - GEAR SHAFT       | ▽ 512 - SERVICE WINDOW                    |
| ▽ 221 - GEARBOX BEARING  | ▽ 513 - SERVICE WINDOW GASKET             |
| ▽ 223 - GEARBOX LIP SEAL | ▽ 600 - MIXER SHAFT*                      |
| ▽ 227 - GEARBOX GASKET   | ▽ 650 - COUPLING*                         |
| ▽ 230 - BEARING RETAINER | ▽ 651 - (4) SPLIT COUPLING BOLTS          |

\* NOTE - WHEN ORDERING PARTS, GIVE SERIAL NO. AND SHAFT SIZE.

▽ DENOTES RECOMMENDED SPARE PART

## SECTION 13 GEAR DRIVE DISASSEMBLY

13.1 Disconnect the power from the mixer.

**WARNING:** High voltage and rotating parts can cause serious or fatal injury. Lockout power before servicing.

13.2 Rebuilding the drive unit is best accomplished by removing the entire mixer from the tank. Remove the impeller from the shaft before removing the mixer from the mounting flange.

13.3 Remove the service window (512). Loosen the two bearing setscrews (310) and the two lower coupling bolts (651). Loosen the follower nuts (452).

13.4 Remove the mixer shaft.

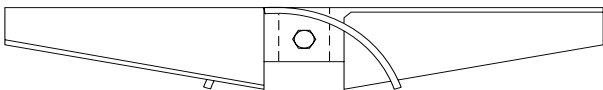
13.5 Remove the four bolts mounting the bearing spool (510) to the stuffing box housing (552). Remove the drive from the housing. The stuffing box can be repacked at this time, if needed (see Section 11).

13.6 Remove the three motor bolts and the motor may be lifted off the gear head assembly. Remove the four (4) 3/8" gear head assembly bolts and lift off the gearbox housing (203). The bearing plate (201) may now be removed with the gear, gear shaft and coupling assembled. Clean the assembly of grease and rinse with mineral spirits. Handling the gear shaft sub-assembly is best accomplished using a piece of round bar the same diameter as the mixer shaft. Clamp the round bar in a bench vise and tighten the drive coupling (650) onto the round bar. If a round bar is not available clamp the coupling in the vise using two pieces of wood so as not to damage the coupling. To remove the gear nut (233) first bend down the locking tab on the star washer from the slot in the gear nut. Using a spanner wrench, loosen the gear nut from the shaft. Remove the gear nut and the star washer. The slow speed gear (205) may be removed using a gear puller if it is too tight to remove by hand. Gear teeth are hardened and are easily chipped. Use care when handling. Loosen the upper two coupling bolts and remove the gear shaft/bearing plate assembly from the coupling. Place the subassembly in a press with the threaded end of the

shaft pointing up. Remove the spacer ring (231) from the gear shaft. Press the gear shaft (211) down, out of the bearing plate. Remove the four 1/4" cap screws and the bearing retaining ring (230). Turn the bearing plate upside down so that the lip seal (223) is on top. Using a 2" diameter arbor press the lip seal and the bearing out of the bearing plate. See Section 12.7 for removal of bearing and lip seal in the pool.

13.7 To remove the pinion gear (204) from the motor shaft, first clean the pinion gear of grease. Support the motor shaft with a soft block to prevent damage when removing the pinion gear. The pinion gear may be removed from the motor shaft using a gear puller. Use care not to chip the teeth of the hardened gear. Apply heat to break the adhesion of the Loctite®.

13.8 To reassemble a new gear on an existing motor, clean all parts and trial fit the pinion gear on the shaft. Never pound the pinion gear into place. Assemble gear and key flush with the end of the motor shaft using Loctite® # RC-680 compound. Remove any excess Loctite® from the gear, especially from the gear teeth. If replacing both the motor and pinion gear, Sharpe Mixers will normally supply the motor with the pinion gear installed. Pack the gearbox full of the appropriate lubricant (see Section 7).

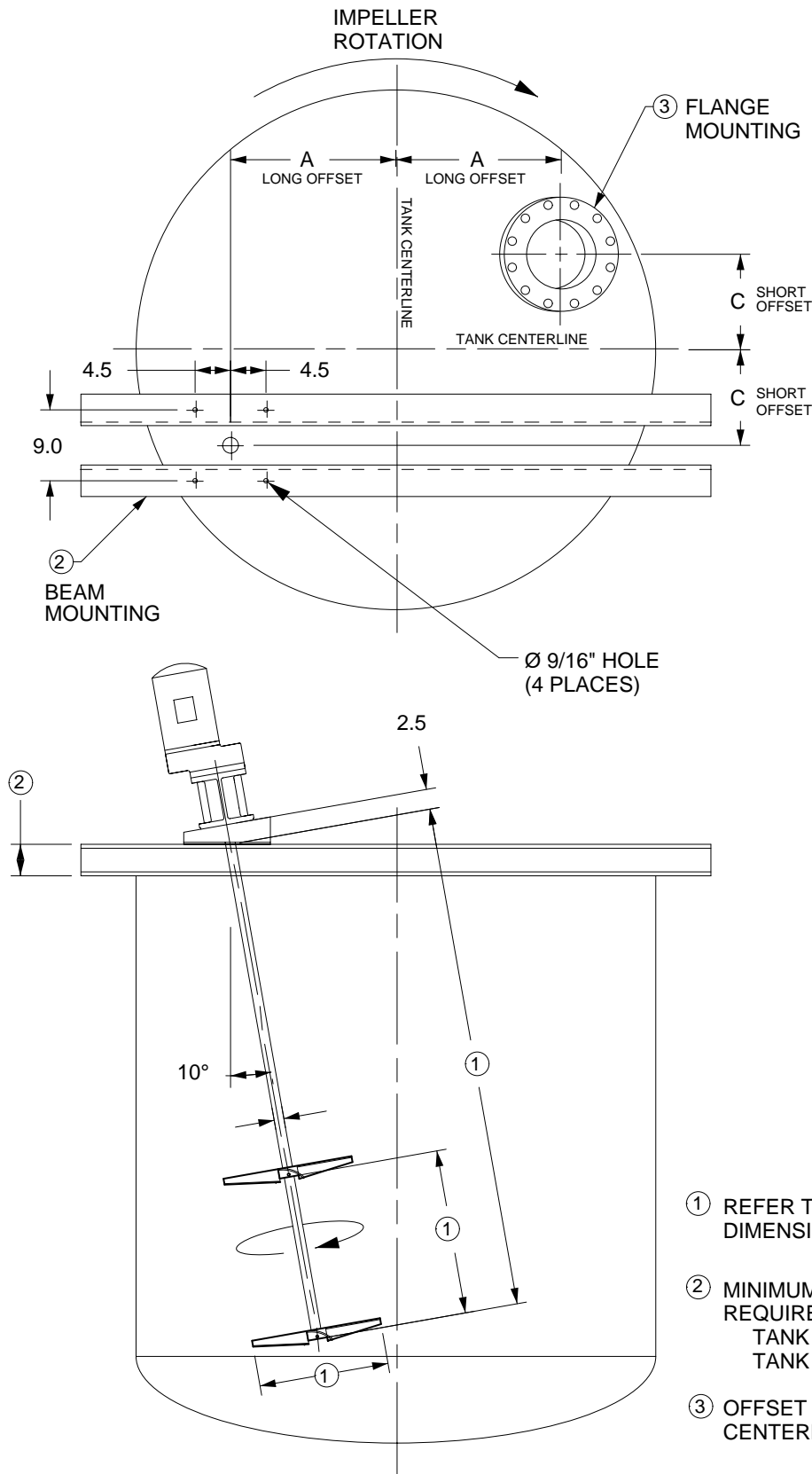


HYFLO II ENERGY EFFICIENT IMPELLERS ARE  
STANDARD ON GEAR DRIVE F-SERIES MIXERS

Always reference mixer serial number when making a parts inquiry or placing an order. This serial number is located on the Sharpe Mixer nameplate and on the front cover of the service manual.

## SECTION 14 MIXER OFFSET GUIDE

\*TANK\_MNT\_ANGLE\_OFFSET.S by:KWS 11/97 revision: 1 - 7-20-04\_JDH Dimensions are for reference only. Use certified prints for construction. Dimensions are in inches.



TANK DIA.	A	C
24	4.88	2.88
27	6.25	3.63
30	7.38	4.25
33	8.50	4.88
36	9.75	5.63
39	10.88	6.25
42	11.88	6.88
45	13.25	7.63
48	14.13	8.13
51	15.38	8.88
54	16.5	9.50
57	17.5	10.13
60	18.88	10.88
63	20.0	11.50
66	21.0	12.13
69	22.13	12.75
72	23.38	13.50
75	24.5	14.13
78	25.5	14.75
81	26.63	15.38
84	27.88	16.13
87	29.0	16.75
90	30.13	17.38
93	31.25	18.13
96	32.50	18.75
99	33.50	19.38
102	34.63	20
105	35.75	20.75
108	36.88	21.38
111	38.13	22
114	39.25	22.63
117	40.38	23.38
120	42.18	24
126	43.88	25.38
132	46.13	26.63
138	48.38	28
144	50.88	29.25
150	53.0	30.63
156	55.25	32
162	57.50	33.25
168	59.88	34.63

TANK DIA.	A	C
-----------	---	---

- ① REFER TO DATA SHEET FOR DIMENSIONS.
- ② MINIMUM MOUNTING CHANNEL REQUIRED:  
TANK DIA. UP TO 96" - 4" x 7.25#  
TANK DIA. OVER 96" - 6" - 8.2 #
- ③ OFFSET DIMENSIONS ARE TO CENTERLINES ON TOP OF FLANGE.

**TANK DETAIL FOR ANGULAR-OFFSET PLATE MOUNTING**

DWG NO.: **A2787**

## SECTION 15 TROUBLE SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	SOLUTION
<ul style="list-style-type: none"> <li>• Shaft will not fit into drive</li> </ul>	<ul style="list-style-type: none"> <li>• Wrong end of shaft (only one end fits)</li> <li>• (2) bearing set screws (310) extend into bearing bore</li> <li>• (2) coupling bolts (651) too tight</li> <li>• Shaft over size (proper dia. 0.001" - 0.002" under nominal dia.)</li> <li>• Wrong size shaft (600), coupling (650), or bearing (301)</li> <li>• Damaged shaft (600), coupling (650), or bearing (301)</li> </ul>	<ul style="list-style-type: none"> <li>• Install end marked "motor end"</li> <li>• Loosen set screws</li> <li>• Loosen bolts</li> <li>• Measure and consult factory</li> <li>• Consult factory</li> <li>• Consult factory</li> </ul>
<ul style="list-style-type: none"> <li>• Mixer will not start</li> </ul>	<ul style="list-style-type: none"> <li>• Incorrect wiring</li> <li>• Loose connections</li> <li>• Blown fuse</li> <li>• Incorrect voltage</li> <li>• Mechanical jamming</li> <li>• Water damage to motor</li> <li>• Wrong size heaters in starter</li> </ul>	<ul style="list-style-type: none"> <li>• Check wiring diagram and wire correctly</li> <li>• Check and tighten connections</li> <li>• Replace fuse</li> <li>• Wire for correct voltage</li> <li>• Free all debris for rotation</li> <li>• Service or replace motor</li> <li>• Replace heaters</li> </ul>
<ul style="list-style-type: none"> <li>• Mixer will not reach correct speed</li> </ul>	<ul style="list-style-type: none"> <li>• Overload of motor</li> <li>• Loose drive coupling bolts (651)</li> <li>• Air motor vanes/ports dirty</li> <li>• insufficient pressure for air motor</li> <li>• See all items under "Mixer will not start"</li> </ul>	<ul style="list-style-type: none"> <li>• Check amperage against nameplate data</li> <li>• Check coupling bolt tension (coupling and/or shaft may be damaged if mixer has been run with slipping coupling)</li> <li>• Flush air motor with non-combustible solvent - relubricate</li> <li>• increase air line/compressor size, decrease compressor distance from air motor</li> </ul>

PROBLEM	POSSIBLE CAUSE	SOLUTION
<ul style="list-style-type: none"> <li>• Motor runs hot</li> </ul>	<ul style="list-style-type: none"> <li>• Low or high voltage</li> <li>• Amperage overload</li> <li>• Product too viscous</li> <li>• Restricted ventilation</li> <li>• Frequent starting and stopping</li> <li>• Unbalanced voltage between phases</li> <li>• Incorrect rotation</li> <li>• Air motor not properly lubricated</li> <li>• Impeller upside down</li> <li>• Exceeding maximum speed</li> </ul>	<ul style="list-style-type: none"> <li>• Wire for correct voltage</li> <li>• Contact factory</li> <li>• Check viscosity and specific gravity of product, consult factory</li> <li>• Clear vents</li> <li>• Check with factory - a special motor may be required</li> <li>• Consult electrician</li> <li>• Change motor leads per nameplate instructions</li> <li>• Lubricate (see Section 7)</li> <li>• Reinstall in correct position</li> <li>• Adjust variable speed drive to limit R.P.M.</li> </ul>
<ul style="list-style-type: none"> <li>• Noisy</li> </ul>	<ul style="list-style-type: none"> <li>• Loose drive coupling bolts (651) or bearing set screws (310)</li> <li>• Insufficient lubricant</li> <li>• Foreign material in lubricant</li> <li>• Incorrect lubricant</li> <li>• Worn or faulty bearings or gears</li> <li>• Dry lip seal (360) in spool</li> </ul>	<ul style="list-style-type: none"> <li>• Check and tighten coupling bolts and set screws (possible damage if run loose)</li> <li>• Fill proper amount of lubricant</li> <li>• Change lubricant</li> <li>• Change to correct lubricant</li> <li>• Check bearings/gears replace if necessary</li> <li>• Apply lubricant to lip seal</li> </ul>
<ul style="list-style-type: none"> <li>• Bearing failure</li> </ul>	<ul style="list-style-type: none"> <li>• High temperature product</li> <li>• Excessive overhung load</li> <li>• Water damage</li> <li>• See all items under "Noisy"</li> </ul>	<ul style="list-style-type: none"> <li>• Provide heat shield</li> <li>• Consult factory</li> <li>• Replace bearing (check all other parts)</li> </ul>
<ul style="list-style-type: none"> <li>• Gear failure</li> </ul>	<ul style="list-style-type: none"> <li>• Excessive loading (check amps)</li> <li>• Lack of (or improper) lubrication</li> <li>• Start-stop-start loading (product burying impeller with solids)</li> <li>• Foreign material in lubricant</li> </ul>	<ul style="list-style-type: none"> <li>• Consult factory</li> <li>• Fill with recommended lubricant or equivalent (see Section 7)</li> <li>• Free impeller of any solids at start-up (pre stir with air hose or paddle)</li> <li>• Replace lubricant</li> </ul>
<ul style="list-style-type: none"> <li>• Oil leakage</li> </ul>	<ul style="list-style-type: none"> <li>• Excessive lubricant</li> <li>• Damaged/broken gasket</li> <li>• Loose bolts around side plates</li> <li>• Seals worn or damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Check manual for proper amount lubricant and drain excess</li> <li>• Replace gasket</li> <li>• Check and tighten bolts</li> <li>• Replace seals</li> </ul>

PROBLEM	POSSIBLE CAUSE	SOLUTION
<ul style="list-style-type: none"> <li>• Shaft vibration</li> </ul>	<ul style="list-style-type: none"> <li>• Impeller not immersed in liquid</li> <li>• Impeller too close to surface</li> <li>• Bent mixer shaft</li> <li>• Unstable mounting platform</li> <li>• Operating at critical speed</li> </ul>	<ul style="list-style-type: none"> <li>• Fill tank</li> <li>• Fill tank or lower impeller (see Section 3)</li> <li>• Consult factory <ul style="list-style-type: none"> <li>• Reinforce platform</li> </ul> </li> <li>• Consult factory</li> </ul>
<ul style="list-style-type: none"> <li>• Seal leakage</li> </ul>	<ul style="list-style-type: none"> <li>• Proper amount of leakage</li> <li>• Worn packing</li> <li>• Scored shaft</li> <li>• Insufficient/incorrect lubrication</li> <li>• Excessive heat in gland</li> <li>• Worn vapor seal</li> <li>• Split in packing rings not off-set</li> </ul>	<ul style="list-style-type: none"> <li>• See Section 8</li> <li>• Replace packing</li> <li>• Replace shaft and packing check stuffing box also for possible scoring</li> <li>• Lubricate properly (see Section 8) check for scoring - replace if necessary</li> <li>• Back off gland nuts (replace packing if necessary) check for scoring - replace if necessary</li> <li>• Replace lip seal</li> <li>• Remove packing, reinstall at off-set (see Section 11)</li> </ul>

## SECTION 16 ACCESSORIES

AIR FILTER, REGULATOR, LUBRICATOR



An air filter, regulator, and lubricator must be used with air drive portable mixers. If your system already has a filter, regulator, and lubricator, a needle valve is used for motor speed adjustment. These are available from Sharpe Mixers.



A "Mixer Fixer Kit" is available for rebuilding your Sharpe Mixers portable mixer. This kit includes all bearings, seals, (gears, when applicable) and other recommended spare parts as shown on pages 10 and 11 of this manual (motor optional). Call Sharpe Mixers for current prices.