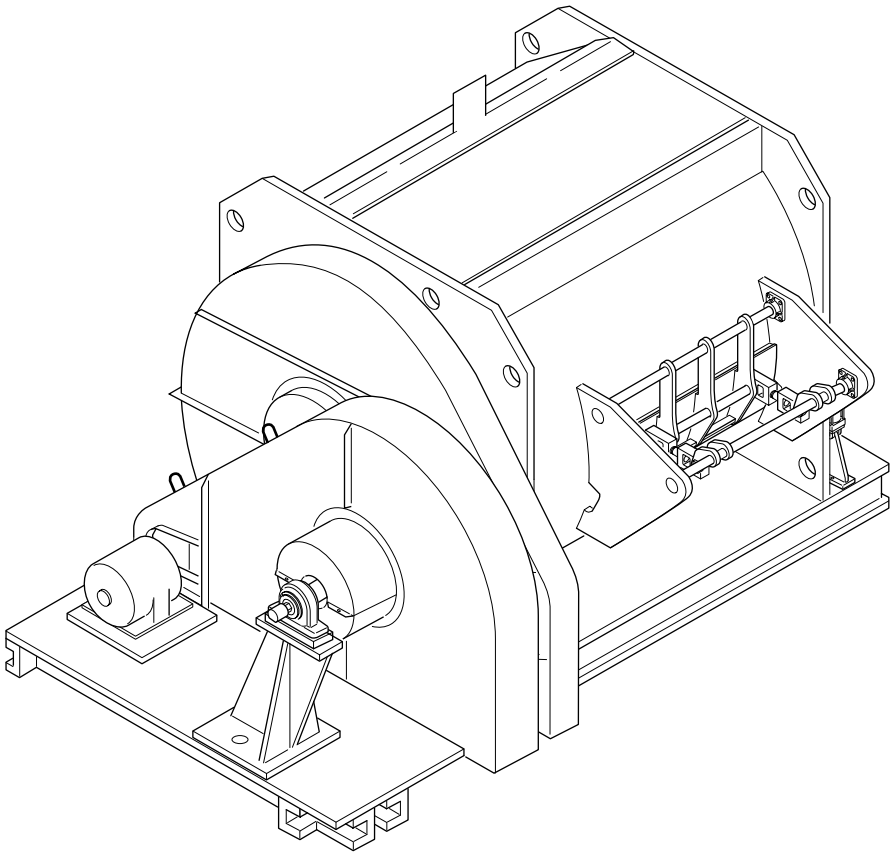
BESSER

MIXER

80/100/120 CUBIC FOOT



MAINTENANCE/OPERATION CATALOG
466363F9902

JULY 1999 • US$250

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Phone (517) 354-4111

BESSER

COMPANY NAME: .....

SERIAL NUMBER: .....

ASSEMBLY NUMBER: .....

WIRING DIAGRAM NUMBER: .....

INSTALLATION DRAWING NUMBER: .....

80/100/120 CUBIC FOOT
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NOTICE

Information in this manual is subject to change. Updates will be provided when safety issues arise, or when information becomes outdated. The Besser Company drawings and prints provided with your equipment and machinery are current to the date of manufacture.

Illustrations in this manual are provided to help you understand the instructions. The illustrations have not been drawn to scale. Please read and understand this manual and the Operation/Maintenance Manual before operating this machinery. Observe all safety signs and OSHA-approved lockout and tagout procedures. If you have questions about these safety procedures, please contact your Besser Sales and Service Representative before start-up of the machine.

80/100/120 CUBIC FOOT SPECIFICATIONS

SPECIFICATIONS	80 CU FT	100 CU FT	120 CU FT
SHIPPING WEIGHT (APPROXIMATE)	22,000 lb [9979 kg]	22,500 lb [10,206 kg]	23,500 lb [10,660 kg]
OVERALL DIMENSIONS	W: 9 ft 2 3/4 in. [2810 mm] L: 14 ft 2 in. [4.32 m] H: 6 ft 8 in. [2.03 m]	W: 9 ft 2 3/4 in. [2810 mm] L: 14 ft 2 in. [4.32 m] H: 6 ft 8 in. [2.03 m]	W: 9 ft 2 3/4 in. [2810 mm] L: 14 ft 2 in. [4.32 m] H: 6 ft 8 in. [2.03 m]
PRODUCTION CAPACITY			
Maximum volume	80 cu ft [2.27 m^3]	100 cu ft [2.8 m^3]	120 cu ft [3.4 m^3]
Maximum weight	8000 lb [3628.8 kg]	10,000 lb [4536 kg]	12,000 lb [5443 kg]
MIXER ELECTRICAL MOTOR RATING	75 hp [56 kW]	100 hp [74.57 kW]	125 hp [93.13 kW]
BLADE SHAFT SPEED (RPM)	18	18	18
MIXER AIR REQUIREMENTS			
Air inlet supply	1/2 in. NPT	1/2 in. NPT	1/2 in. NPT
Air clutch, each actuation,	1 1/4 cu ft [0.035 m^3] at 40 to 45 psi	1 1/4 cu ft [0.035 m^3] at 45 to 50 psi	1 1/4 cu ft [0.035 m^3] at 50 to 55 psi
Discharge gate, each open/close cycle, at 120 psi [827.4 kPa]	1 3/5 cu ft [0.045 m^3] (23.2 SCFM)	1. 3/5 cu ft [0.045 m^3] (23.2 SCFM)	1 3/5 cu ft [0.045 m^3] (23.2 SCFM)
MIXER WATER REQUIREMENTS			
Water supply inlet	1 1/2 in. [38 mm] ID	1 1/2 in. [38 mm] ID	1 1/2 in. [38 mm] ID
Gallons [liters] per batch	58 [220]	72 [272.5]	86 [326]
SENSOR AND CONTROL PANEL OPERATING RANGES			
Ambient operating temperature	32° to 131° F [0° – 55° C]	32° to 131° F [0° to 55° C]	32° to 131°F [0° to 55°C]
Humidity range	5 to 95 percent, noncondensing	5 to 95 percent, noncondensing	5 to 95 percent, noncondensing
Line voltage	85 to 132 VAC, 50/60 Hz	85 to 132 VAC, 50/60 Hz	85 to 132 VAC, 50/60 Hz
OPERATING CONDITIONS	Besser Company machinery and equipment is designed to comply with the essential health and safety regulations (EHSR) that apply to directives which are applicable to an industrial environment. The buyer shall utilize this equipment in a manner consistent with its design, and only in an industrial environment.		

Table A *80/100/120 Cubic Foot Mixer Specifications*

NOTE:
SCFM means standard cubic feet per minute.

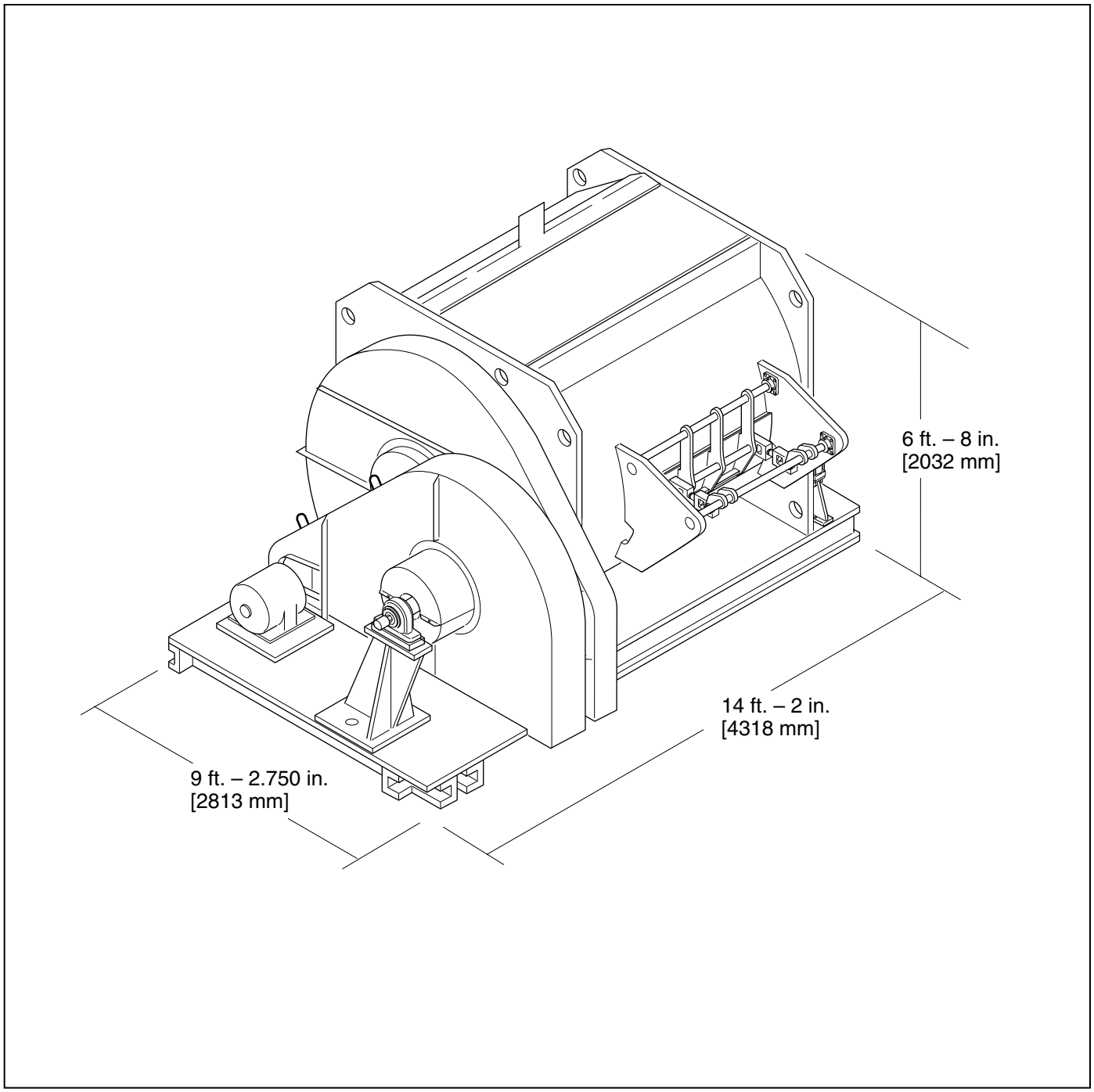

Figure A *Primary Mixer Dimensions*

80/100/120 CUBIC FOOT
ELECTRICAL DATA

The caution below applies to the 80, 100, and 120 cubic foot mixer electrical data.

CAUTION:

To Comply with Articles 110-9 110-10 of the National Electrical Code:

- The customer shall supply a branch circuit protective device to protect the control panel. The protective device shall have a short circuit interrupting rating of no less than the available short circuit current. Failure to do so could result in a rupture of the protective device while personnel are attempting to clear a fault.
- Besser Company recommends the use of protective devices with interrupting ratings of no less than 200,000 amps RMS symmetrical.

80 CUBIC FOOT
ELECTRICAL DATA

PLANT POWER SUPPLY (VOLTS)	BRANCH CIRCUIT DISTRIBUTION SWITCH (AMPS)	BRANCH CIRCUIT FUSE FRS-R (AMPS)	BRANCH CIRCUIT FEEDER THHN	BRANCH CIRCUIT FEEDER CONDUIT	SHORT CIRCUIT INTERRUPTING CAPACITY (AIC)	MOTOR AMPS	TOTAL AMPS
208V 60HZ	400	350	350 KCMIL	2.5 IN 64 MM	200,000	203.80	206.20
220V 50HZ	400	300	350 KCMIL	2.5 IN 64 MM	200,000	193.80	195.27
230V 60HZ	400	300	350 KCMIL	2.5 IN 64 MM	200,000	184.80	186.17
380V 50 HZ	200	200	3/0 AWG 85 MM^2	1.5 IN 38 MM	200,000	112.00	113.32
415V 50 HZ	200	175	2/0 AWG 67.5 MM^2	1.5 IN 38 MM	200,000	103.00	104.20
440V 50HZ	200	125	1 AWG 42.4 MM^2	1.25 IN 32 MM	200,000	101.2	102.2
460V 60 HZ	200	150	1 AWG 42.4 MM^2	1.25 IN 32 MM	200,000	92	93
575V 60 HZ	200	125	2 AWG 33.6 MM^2	1.0 IN 25 MM	200,000	73.5	74.4

Table B *80 Cubic Foot Mixer Electrical Data*

This information is the same for all 80 Cubic Foot Mixers.

TOTAL HORSEPOWER: 75

NUMBER OF MOTORS/HORSEPOWER: 1/75

TOTAL KILOWATTS: 55.93

NUMBER OF MOTORS/KILOWATTS: 1/55.93

CONTROL PANEL TRANSFORMER: 500 volt-amps (If Used)

Please consult the table above to find the appropriate electrical data for your 80 cubic foot Mixer. First, find your corresponding plant power supply in the left column. Then find the corresponding electrical data on the same row as your power plant supply.

NOTE:
Fuses and wire and conduit are sized for 125% of motor full load amperes.
Full load amperes may vary from one motor to another.

Example: Your power plant supply is 460V at 60 Hz. According to the table, you will then get these values:

PLANT POWER SUPPLY: 460 volt – 3-phase – 60 hertz

BRANCH CIRCUIT

Distribution Switch Recommended:	200 amp
Fuse Recommended [FRS–R]:	150 amp
Feeder Recommended [THHN]:	No. 1 AWG – [42.4 sq. mm]
Feeder Conduit Recommended:	1.25 in – [32 mm]
Short Circuit Interrupting Capacity:	200,000 AIC

TOTAL AMPERE LOAD: 93

MIXER MOTOR

Total Horsepower	75
Number of Motors/Horsepower	1/75
Total Kilowatts	55.93
Number of Motors/Kilowatts	1/55.93
Amperes	92

CONTROL PANEL TRANSFORMER: 500 volt-amps (If Used)

ELECTRICAL DATA NOTES

For safety purposes, Besser Company requires that this equipment be connected to a lockable electrical disconnect.

100 CUBIC FOOT
ELECTRICAL DATA

PLANT POWER SUPPLY (VOLTS)	BRANCH CIRCUIT DISTRIBUTION SWITCH (AMPS)	BRANCH CIRCUIT FUSE FRS-R (AMPS)	BRANCH CIRCUIT FEEDER THHN	BRANCH CIRCUIT FEEDER CONDUIT	SHORT CIRCUIT INTERRUPTING CAPACITY (AIC)	MOTOR AMPS	TOTAL AMPS
208V 60HZ	600	450	4/0 AWG* 107 MM^2	2 IN* 51 MM	200,000	275.00	277.40
220V 50HZ	400	400	3/0 AWG* 85 MM^2	1.5 IN* 38 MM	200,000	250.00	252.27
230V 60HZ	400	400	3/0 AWG* 85 MM^2	1.5 IN* 38 MM	200,000	239.00	241.17
380V 50 HZ	400	250	250 KCMIL	2 IN 51 MM	200,000	160.00	161.32
415V 50 HZ	400	225	4/0 AWG 107.2 MM^2	2 IN 51 MM	200,000	145.00	146.20
440V 50HZ	200	175	2/0 AWG 67.5 MM^2	1.5 IN 38 MM	200,000	131.45	132.45
460V 60 HZ	200	200	3/0 AWG 95 MM^2	1.5 IN 38 MM	200,000	120.00	121.08
575V 60 HZ	200	150	1/0 AWG 53.5 MM^2	1.25 IN 32 MM	200,000	96.0	96.87

Table C *100 Cubic Foot Mixer Electrical Data*

NOTE:
✻2 sets of wires
✻2 runs of conduit

This information is the same for all 100 Cubic Foot Mixers.

TOTAL HORSEPOWER: 100

NUMBER OF MOTORS/HORSEPOWER: 1/100

TOTAL KILOWATTS: 74.57

NUMBER OF MOTORS/KILOWATTS: 1/74.57

CONTROL PANEL TRANSFORMER: 500 volt-amps (If Used)

Please consult the table above to find the appropriate electrical data for your 100 cubic foot Mixer. First, find your corresponding plant power supply in the left column. Then find the corresponding electrical data on the same row as your power plant supply.

NOTE:
Fuses and wire and conduit are sized for 125% of motor full load amperes.
Full load amperes may vary from one motor to another.

Example: Your power plant supply is 460V at 60 Hz. According to the table, you will then get these values:

PLANT POWER SUPPLY: 460 volt – 3-phase – 60 hertz

BRANCH CIRCUIT

Distribution Switch Recommended:	200 amp
Fuse Recommended [FRS–R]:	200 amp
Feeder Recommended [THHN]:	No. 3/0 AWG – [85 sq. mm]
Feeder Conduit Recommended:	1.5 in – [38 mm]
Short Circuit Interrupting Capacity:	200,000 AIC

TOTAL AMPERE LOAD: 121.08

MIXER MOTOR

Total Horsepower	100
Number of Motors/Horsepower	1/100
Total Kilowatts	74.57
Number of Motors/Kilowatts	1/74.57
Amperes	120

CONTROL PANEL TRANSFORMER: 500 volt-amps (If Used)

ELECTRICAL DATA NOTES

For safety purposes, Besser Company requires that this equipment be connected to a lockable electrical disconnect.

120 CUBIC FOOT
ELECTRICAL DATA

PLANT POWER SUPPLY (VOLTS)	BRANCH CIRCUIT DISTRIBUTION SWITCH (AMPS)	BRANCH CIRCUIT FUSE FRS-R (AMPS)	BRANCH CIRCUIT FEEDER THHN	BRANCH CIRCUIT FEEDER CONDUIT	SHORT CIRCUIT INTERRUPTING CAPACITY (AIC)	MOTOR AMPS	TOTAL AMPS
380V 50 HZ	400	300	300 KCMIL	2 IN 51 MM	200,000	199.66	200.98
415V 50 HZ	400	250	250 KCMIL	2 IN 51 MM	200,000	181.66	182.86
440V 50HZ	400	225	4/0 AWG 107.2 MM^2	2 IN 51 MM	200,000	164	165
460V 60 HZ	400	250	250 KCMIL	2 IN 51 MM	200,000	149	150
575V 60 HZ	200	200	3/0 AWG 85 MM^2	1.5 IN 38 MM	200,000	119.2	120

Table D *120 Cubic Foot Mixer Electrical Data*

This Information is the same for all 120 Cubic Foot Mixers.

TOTAL HORSEPOWER: 125

NUMBER OF MOTORS/HORSEPOWER: 1/125

TOTAL KILOWATTS: 93.21

NUMBER OF MOTORS/KILOWATTS: 1/93.21

CONTROL PANEL TRANSFORMER: 500 volt-amps (If Used)

Please consult the table above to find the appropriate electrical data for your 120 cubic foot Mixer. First, find your corresponding plant power supply in the left column. Then find the corresponding electrical data on the same row as your power plant supply.

NOTE:
Fuses and wire and conduit are sized for 125% of motor full load amperes.
Full load amperes may vary from one motor to another.

Example: Your power plant supply is 460V at 60 Hz. According to the table, you will then get these values:

PLANT POWER SUPPLY:	460 volt – 3-phase – 60 hertz

BRANCH CIRCUIT

Distribution Switch Recommended:	400 amp
Fuse Recommended [FRS–R]:	250 amp
Feeder Recommended [THHN]:	No. 250 kcmil
Feeder Conduit Recommended:	2 in – [51 mm]
Short Circuit Interrupting Capacity:	200,000 AIC

TOTAL AMPERE LOAD:	150

MIXER MOTOR

Total Horsepower	125
Number of Motors/Horsepower	1/125
Total Kilowatts	93.21
Number of Motors/Kilowatts	1/93.21
Amperes	149

CONTROL PANEL TRANSFORMER:	500 volt-amps (If Used)

ELECTRICAL DATA NOTES

For safety purposes, Besser Company requires that this equipment be connected to a lockable electrical disconnect.

Due to the high current required, use of 230 VAC or less is not recommended.

SAFETY BULLETIN

This notice is issued to advise you that some previously accepted shop practices may not be keeping up with changing Federal and State Safety and Health Standards. Your current shop practices may not emphasize the need for proper precautions to insure safe operation and use of machines, tools, automatic loaders and allied equipment and/or warn against the use of certain solvents or other cleaning substances that are now considered unsafe or prohibited by law. Since many of your shop practices may not reflect current safety practices and procedures, particularly with regard to the safe operation of equipment, it is important that you review your practices to ensure compliance with Federal and State Safety and Health Standards.

IMPORTANT

The operation of any machine or power-operated device can be extremely hazardous unless proper safety precautions are strictly observed. Observe the following safety precautions:


Always be sure proper guarding is in place for all pinch, catch, shear, crush and nip points.


Always make sure that all personnel are clear of the equipment before starting it.


Always be sure the equipment is properly grounded.


Always turn the main electrical panel off and lock it out in accordance with published lockout/tag-out procedures prior to making adjustments, repairs, and maintenance.


Always wear appropriate protective equipment like safety glasses, safety shoes, hearing protection and hard hats.


Always keep chemical and flammable material away from electrical or operating equipment.


Always maintain a safe work area that is free from slipping and tripping hazards.


Always be sure appropriate safety devices are used when providing maintenance and repairs to all equipment.


Never exceed the rated capacity of a machine or tool.


Never modify machinery in any way without prior written approval of the Besser Engineering Department.


Never operate equipment unless proper maintenance has been regularly performed.


Never operate any equipment if unusual or excessive noise or vibration occurs.


Never operate any equipment while any part of the body is in the proximity of potentially hazardous areas.


Never use any toxic flammable substance as a solvent cleaner.


Never allow the operation or repair of equipment by untrained personnel.


Never climb or stand on equipment when it is operational.

It is important that you review Federal and State Safety and Health Standards on a continual basis. All shop supervisors, maintenance personnel, machine operators, tool operators, and any other person involved in the setup, operation, maintenance, repair or adjustment of Besser-built equipment should read and understand this bulletin and Federal and State Safety and Health Standards on which this bulletin is based.

SAFETY SIGNS

To order safety decals, contact your local Besser representative or the Besser Central Order Department.
Thank you!

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1

Large: 113236F0409
High Voltage
Width 4 1/2 inch
Height 9 5/8 inch
Small: 113236F0204
High Voltage
Width 2 inch
Height 4 1/8 inch

2

113237F0410
Mixer Blade Hazard
Width 4 1/2 inch
Height 10 1/4 inch

3

Vertical: 113240F0307
Crush Hazard
Width 3 1/2 inch
Height 7 1/2 inch
Horizontal: 113239F0604
Crush Hazard
Width 6 5/8 inch
Height 4 inch

4

114692F1006
Nip Points
Width 5 3/4 inch
Height 9 1/2 inch

5

114688F0906
Crush Hazard
Width 6 1/4 inch
Height 9 1/2 inch

6

114689F0804
Fall Hazard
Width 4 1/2 inch
Height 7 3/4 inch

7

114690F0805
Falling Objects
Width 4 3/4 inch
Height 8 inch

8

Vertical: 113244F0410
Crush Hazard
Width 4 1/2 inch
Height 10 inch
Horizontal: 113245F1005
Crush Hazard
Width 10 inch
Height 5 3/4 inch

9

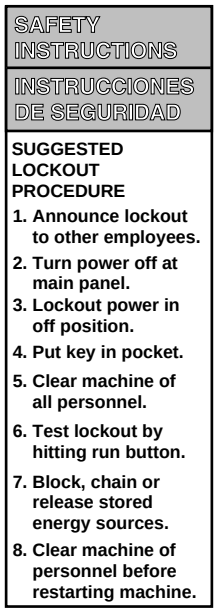
113242F0409
Crush Hazard
Width 4 1/2 inch
Height 9 5/8 inch

10

113243F0410
Falling Objects
Width 4 1/2 inch
Height 10 inch

11

114691F1006
Shear and Fall Hazards
Width 5 3/4 inch
Height 9 3/4 inch



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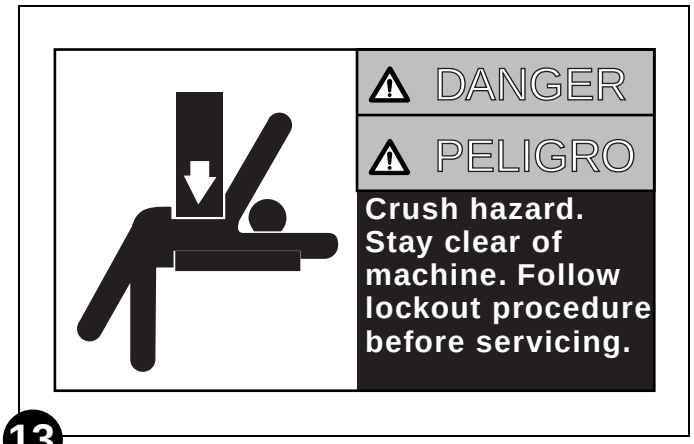
113249F0410
Safety Instructions Decal –
Suggested Lock-out Procedure
Width 4 inch
Height 10 inch

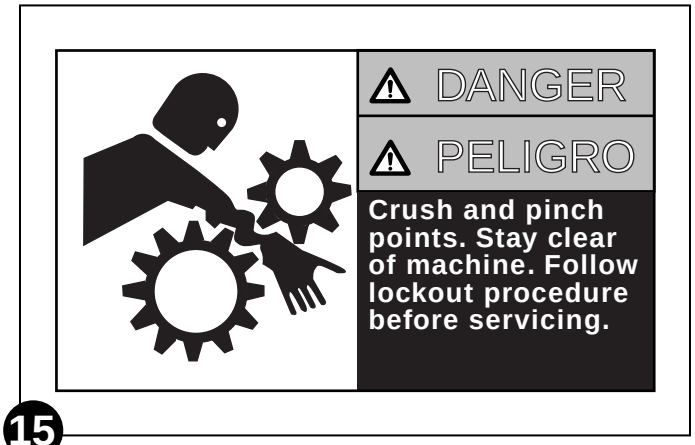


13

113238F1005
Crush Hazard
Width 10 inch
Height 5 3/4 inch

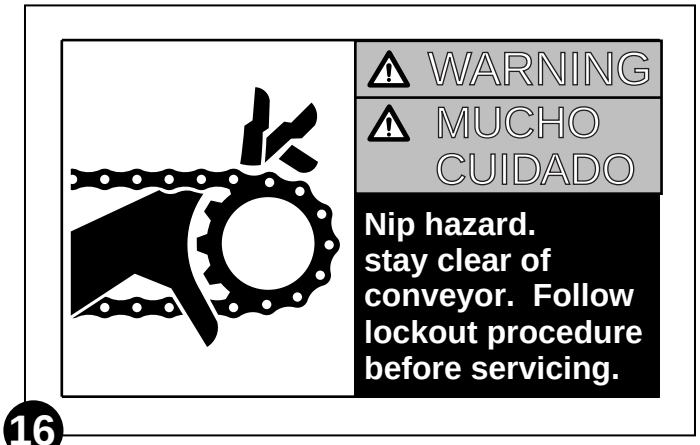
14

113248F1006
Crush Hazard
Width 10 inch
Height 6 inch



15

113241F0605
Crush and Pinch Points
Width 6 5/8 inch
Height 4 inch

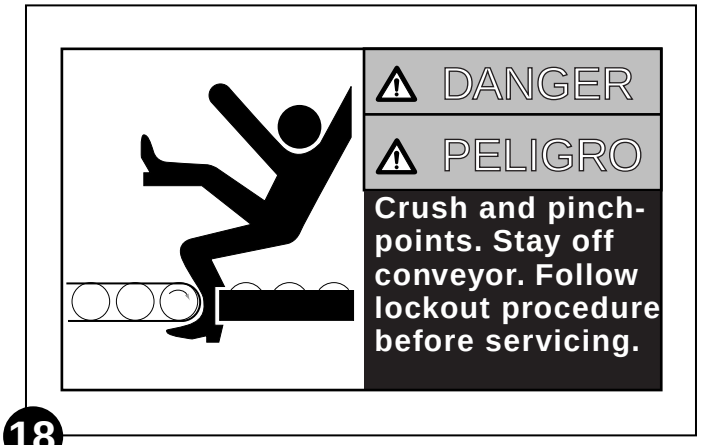


16

113246F0704
Nip Hazard
Width 7 inch
Height 4 1/2 inch

17

113247F1006
Crush Hazard
Width 10 inch
Height 6 inch



18

113250F1006
Crush and Pinch Hazard
Width 10 inch
Height 6 inch

LIFTING POINTS

Besser Company recommends that the customer use a professional rigging crew to hoist the heavy Mixer components. The method used to hoist this equipment may vary, depending upon available rigging equipment and the plant layout.

To ensure the safety of plant personnel during Mixer installation, the rigging system must have a lifting capacity that meets or exceeds the shipping weight of the Mixer as listed in Mixer Specifications at the front of this manual.

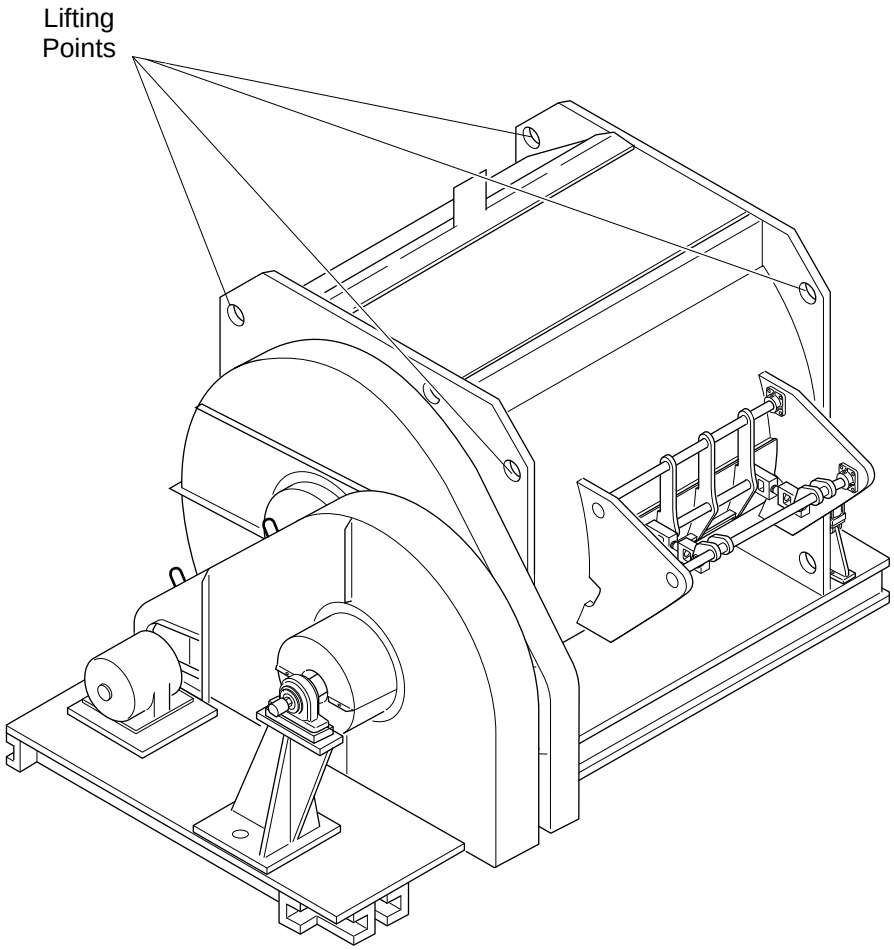


Figure B *Mixer Lifting Points*

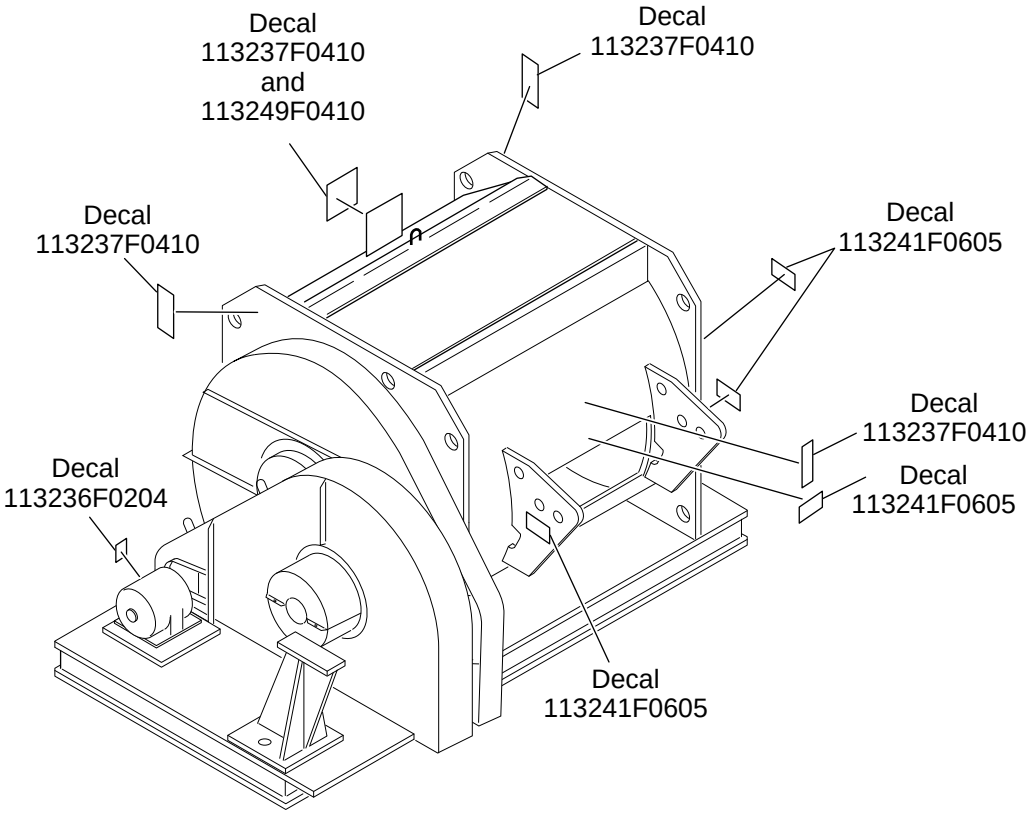


Figure C *Decals*

SECTION 1
MIXER OVERVIEW

1.1 INFORMATION ABOUT THIS MANUAL

WARNING:
This manual contains instructions and guidelines for the correct operation and maintenance of the Mixer. Operating the Mixer without fully understanding and following the material in this manual may result in serious injury to personnel or damage to machinery. If you have questions about any instructions, procedures or guidelines, contact your Besser Sales and Service Representative for assistance.

This manual covers operation and maintenance of a Mixer. The manual will help you operate and maintain the Mixer safely and correctly. Refer to the Installation Manual to determine the drive position.

Refer to Mixer Specifications and Mixer Electrical Data at the front of this manual to identify certain requirements of your Mixer. The Mixer model number is on the name and lubrication plate on the Mixer. For details about operating and maintaining the Mixer that might not be in this manual, refer to Besser Company drawings and information provided with the equipment.

1.2 ORGANIZATION OF THIS GUIDE

This guide includes procedures for properly operating and maintaining the Mixer. It's divided into the following major Sections:

- **Overview:** Provides an overview of the Mixer, identifying its major components.
- **Operation:** Describes the Mixer's sequence of operation, as well as its functional modes.
- **Maintenance:** Provides the recommended schedule for routine service, as well as lubrication, adjustment and repair procedures.

1.3 TERMS AND ABBREVIATIONS

The following terms and abbreviations are used throughout this manual.

- ACR — Auto Control Relay
- bar — Unit of Pressure
- CB — Circuit Breaker
- gpm — Gallons Per Minute
- lpm — Liters Per Minute
- LS — Limit Switch
- MCR — Master Control Relay
- Fu — Fuse
- PER — Photoelectric Cell
- PRS — Proximity Sensor
- psi — Pounds Per Square Inch
- UC — Unloading Conveyor
- vac — Volts, Alternating Current

1.4 SAFETY INFORMATION

Review the Safety Bulletin at the front of this manual before operating or working on the Mixer. Observe safe shop practices during all Mixer operation, troubleshooting and maintenance.

IMPORTANT:
Make sure any welding equipment is properly grounded.

IMPORTANT:
Wear the required protective gear and clothing when performing Mixer maintenance, welding, cleaning, etc.

IMPORTANT:
When possible, work in teams when doing Mixer maintenance.

IMPORTANT:
Observe the Confined Space Work Rules and Regulations of your company, locality, city and state, when doing maintenance within the Mixer drum.

Follow your plants lockout procedure before beginning any Mixer maintenance and troubleshooting. The following procedure is suggested for locking out the Mixer.

1.4.1 General Lockout for all Batching Controls

1. Announce lockout to other employees.
2. Turn power off at main panel.
3. Using your shop's authorized key and lock system, secure the main power switch in the lockout position.
4. Remove your key from the lock and keep the key with you at all times while performing system maintenance.
5. Tag lockout.
6. Clear equipment of all personnel.
7. Test lockout by hitting run button.

1.4.2 Lockout and Tag Equipment which Presents a Hazard to Personnel Working on the Mixer

1. Announce lockout to other employees.
2. Turn power off at main panel and motor starters.
3. Using your shop's authorized key and lock system, secure the main power switch in the lockout position.
4. Remove your key from the lock and keep the key with you at all times while performing system maintenance.
5. Tag lockout.
6. Clear equipment of all personnel.
7. Test lockout by hitting run button.
8. Block, chain, or release and lockout all stored energy sources.
9. Visually inspect equipment to make sure it is properly locked out and tagged.

1.4.3 Lockout and Tag Mixer

1. Announce lockout to other employees.
2. Turn power off at main panel, manual control station and Mixer motor starter(s).
3. Using your shop's authorized key and lock system, secure the main power switch in the lockout position.
4. Remove your key from the lock and keep the key with you at all times while performing system maintenance.
5. Tag lockout.
6. Clear Mixer of all personnel.
7. Test lockout by hitting run button.
8. Block, chain, or release and lockout, all stored energy sources, including but not limited to:
   - Discharge Gate – Block open with safety stop
   - Air Supply – Release pressure, lockout, and tag
   - Water Supply – Release pressure, lockout, and tag
   - Blades, blade arms, and drive train (bull gear, pulley, etc.) – Block and/or chain
9. Visually inspect Mixer to make sure it is properly locked out and tagged.
10. Clear machines of personnel before restarting machines.

WARNING:
This lockout procedure is a minimum precaution for the safety of servicing personnel. Do not attempt to avoid or shortcut these procedures.

1.5 DESCRIPTION OF MAJOR COMPONENTS

The following lists the major components of the Mixer. Component names followed by an asterisk (*) are items that may not be on the Mixer due to customer build specifications. Numbers before the component name indicate where in this manual the component is described. Refer to Figure 1.1 for relative locations of the major components, and check your Mixer so you know which components are on it.

- 1.5.1 Air-operated discharge gate
- 1.5.2 Circuit for switching contact protection (Inductive loads)
- 1.5.3 Drive shaft-with clutch*
- 1.5.4 Gear guard
- 1.5.5 Pulley guard
- 1.5.6 Removable head section
- 1.5.7 Enclosed drum
- 1.5.8 Cleaning rings*
- 1.5.9 Head scrappers*
- 1.5.10 Blade shaft covers*
- 1.5.11 Trough liners
- 1.5.12 LeSueur moisture system*
- 1.5.13 Ramsey moisture system*
- 1.5.14 ARC Moisture System – Ground probe liners*
- 1.5.15 ARC Moisture System – Microwave probe liners*
- 1.5.16 Blades with wear liners*
- 1.5.17 Bottom clean-out gate*

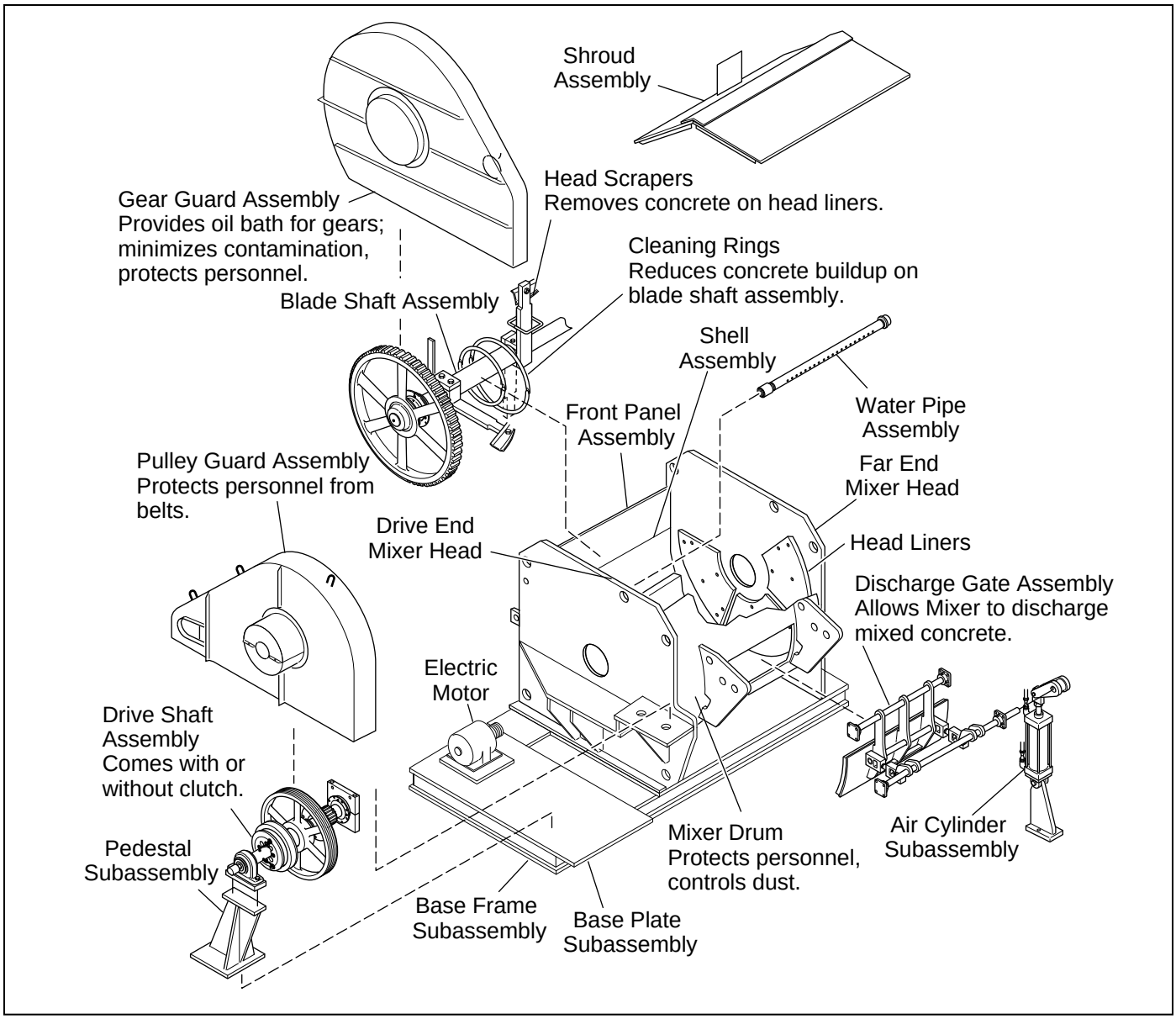


Figure 1.1 *Major Components of the Mixer*

1.5.1 Air-Operated Discharge Gate

A gate, operated by a pneumatic cylinder, enables discharge of mixed concrete from the Mixer. See Figure 1.2. The cylinder rod extends to open the gate, and retracts to close it. Most batching control systems require signals to indicate the open and closed gate positions. A magnet on the cylinder piston closes the contacts of proximity reed switches located on the cylinder to provide the signals. Table 1.1 lists the electrical characteristics of the reed switches and Section 1.5.2 gives switch circuit recommendations.

As the cylinder extends to open the gate, the piston magnet aligns with a reed switch at the top of the cylinder and its contacts close. When the contacts close, a signal is sent to the control system to indicate the gate is open. When the cylinder starts to retract to close the gate, the magnet moves away from the switch and its contacts open. As the cylinder fully retracts and closes the gate, the rod magnet now aligns with a switch at the bottom of the cylinder and its contacts close. When these contacts close, a signal is sent to the control system to indicate the gate is closed.

DANGER:
Crush and pinch points. Stay clear of machine. Follow lockout procedure before servicing.

WARNING:
Falling objects. Hard hat area.

DANGER:
Shear hazard. Fall hazard. Stay clear. Follow lockout procedure before servicing.

DANGER:
Crush hazard. Stay clear. Follow lockout procedure before servicing.

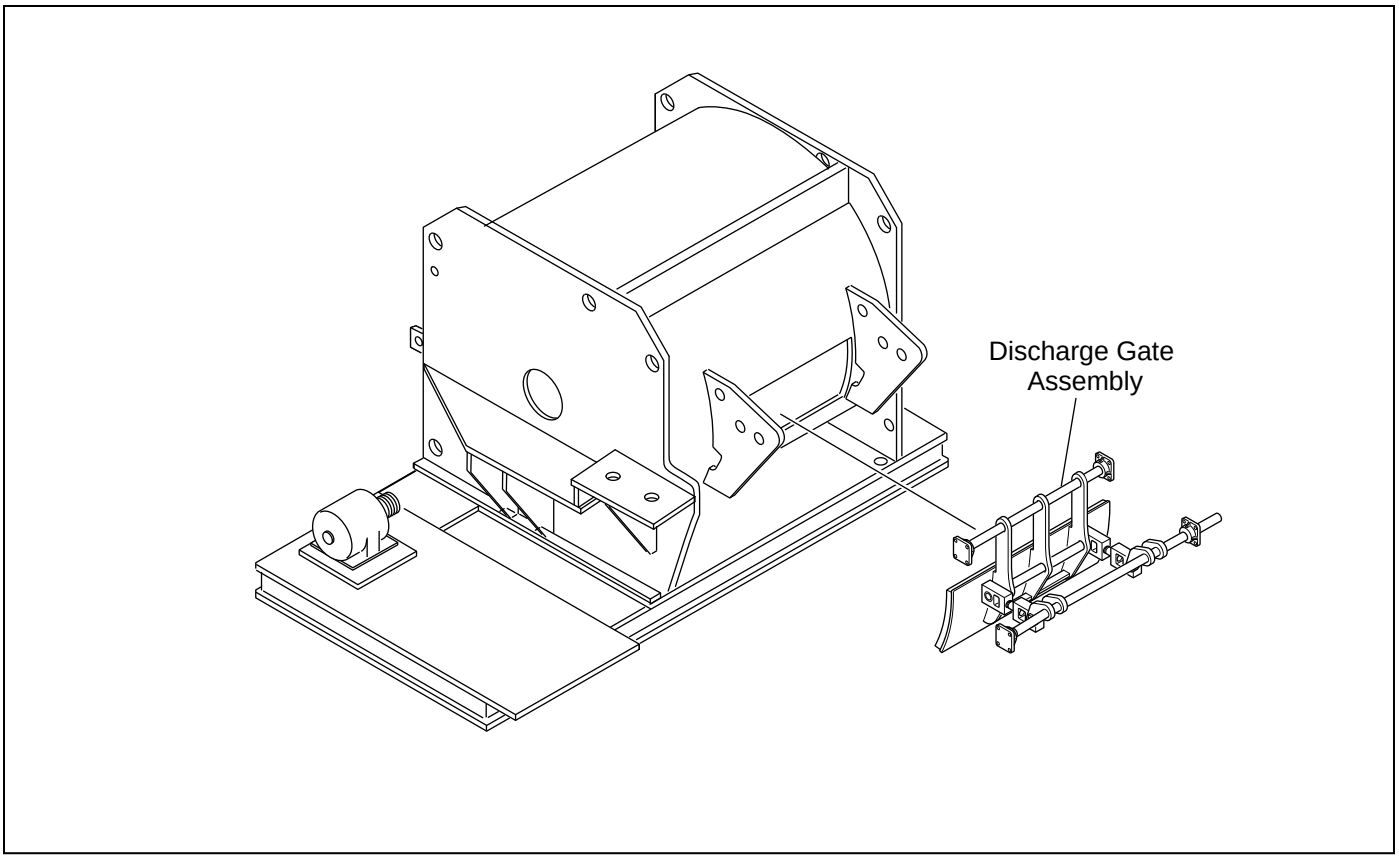


Figure 1.2 *Air-Operated Discharge Gate*

Switching Logic	Normally Open, SPST (Form A)
Supply Voltage Range	85 – 125 VAC or 5 – 30 VDC Polarity is restricted to DC operation, (+) to brown, (-) to blue. If these connections are reversed, the contacts will close, but the LED will not light.
On-State Voltage Drop	1.7 V Maximum
Power Rating	10 Watts (Resistive) 5 Watts (Inductive)
Switching Current Range	30 – 200 mA (Resistive) 30 – 100 mA (Inductive)
Leakage Current	0
LED Function	Red, Target Present
LED Turn-On Current, Minimum	18 mA
Operating Temperature	14° – 140° F (-10° – 60° C)
Storage Temperature	-4° – 140° F (-20° – 60° C)
Switching Response	300 Hz Maximum
Shock Resistance	30 g
Vibration Resistance	10 – 55 Hz 1.5 mm, Double Amplitude
Enclosure Protection	Meets IEC IP67
Lead Wire	2 conductor, 22 gauge, 39 in long

Table 1.1 *Reed Switch Electrical Characteristics*

1.5.2 Circuit for Switching Contact Protection (Inductive Loads)

Required for proper operation 24V DC

1. Put Diode parallel to loads following polarity. See Figure 1.3.

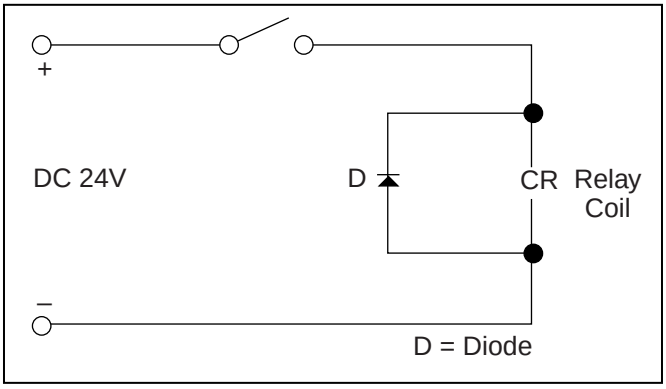


Figure 1.3 *Loads Following Polarity*

2. Select a Diode with the breakdown voltage and current rating according to the load.
3. Typical example
   - 100 Volt, 1 Amp Diode
   - CR: Relay coil (under 0.5 W coil rating)

Recommended for longer life 125 VAC

The operation for some 120VAC PLC's can overload the reed switch. The switch may fail to release after the piston magnet has passed. This problem may be corrected by the placement of a 700 to 1K OHM resistor between the switch and the PLC input terminal. Consult the manufacturer of the PLC for appropriate circuit.

1. Put a resistor and capacitor in parallel with the load.
2. Select the resistor and capacitor according to the load. See Figure 1.4.

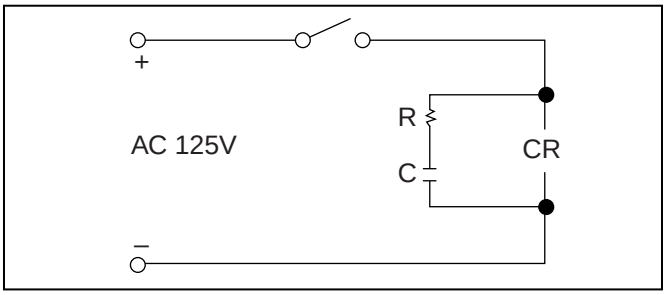


Figure 1.4 *Resistor and Capacitor*

3. Typical example:
   - CR: Relay coil (under 2 W coil rating
   - R: Resistor under 1 K Ω
   - C: Capacitor 0.1 µF

1.5.3 Drive Shaft with Clutch*

When fitted, the Mixer utilizes an air-operated clutch for drive operation. See Figure 1.5. The clutch requires the following air pressure for operation:

- 80 Cubic Foot – 8,000 lbs – 40 – 45 psi
- 100 Cubic Foot – 10,000 lbs – 45 – 50 psi
- 120 Cubic Foot – 12,000 lbs – 50 – 55 psi

The vendor's manual for the clutch is provided to assist in clutch installation, operation and maintenance.

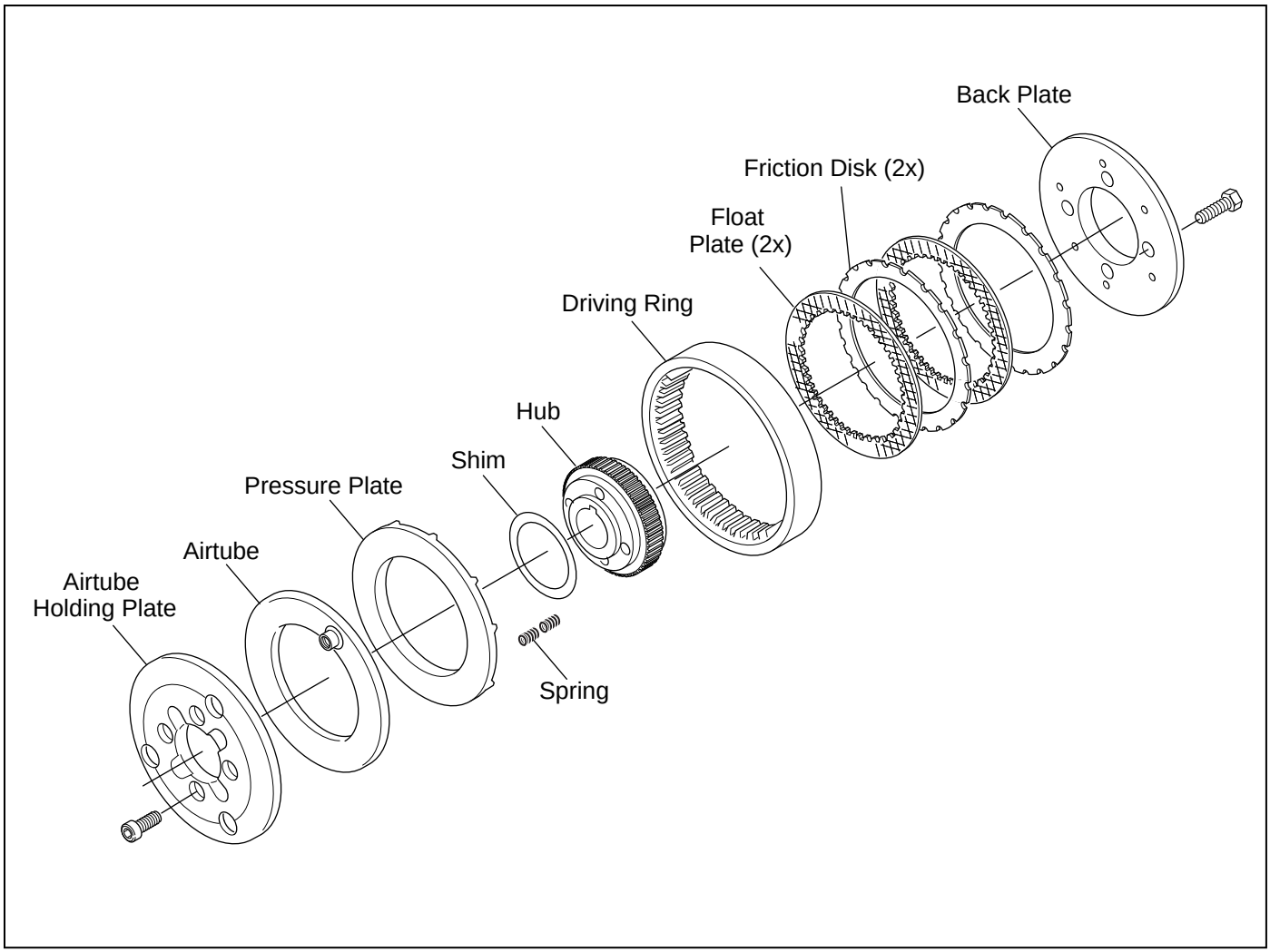


Figure 1.5 *Typical Air-Operated Drive Clutch*

1.5.4 Gear Guard

An oil retaining gear guard helps ensure proper Mixer operation. See Figure 1.1. The gear guard provides a continuous oil bath for the gears and minimizes gear contamination. In addition, the gear guard protects personnel from the moving gears and the crush and pinch points associated with the gears. The gear guard includes an oil fill pipe and dip stick and can hold about 12 qt [11.4 L] of oil. Refer to the name and lubrication plate on the Mixer or Section 3.12 for the type and grade of oil required.

DANGER:
Crush and pinch points. Stay clear of machine. Follow lockout procedure before servicing.

1.5.5 Pulley Guard

The pulley guard protects personnel from the moving drive belts and clutch components and the crush and pinch points associated with these moving parts. See Figure 1.6. The pulley guard can be disassembled in sections, as needed, to check and service the belts and clutch components. Two grease fittings can be reached by removing a section of the clutch guard. Replace guard section after lubricating bushings.

DANGER:
Crush and pinch points. Stay clear of machine. Follow lockout procedure before servicing.

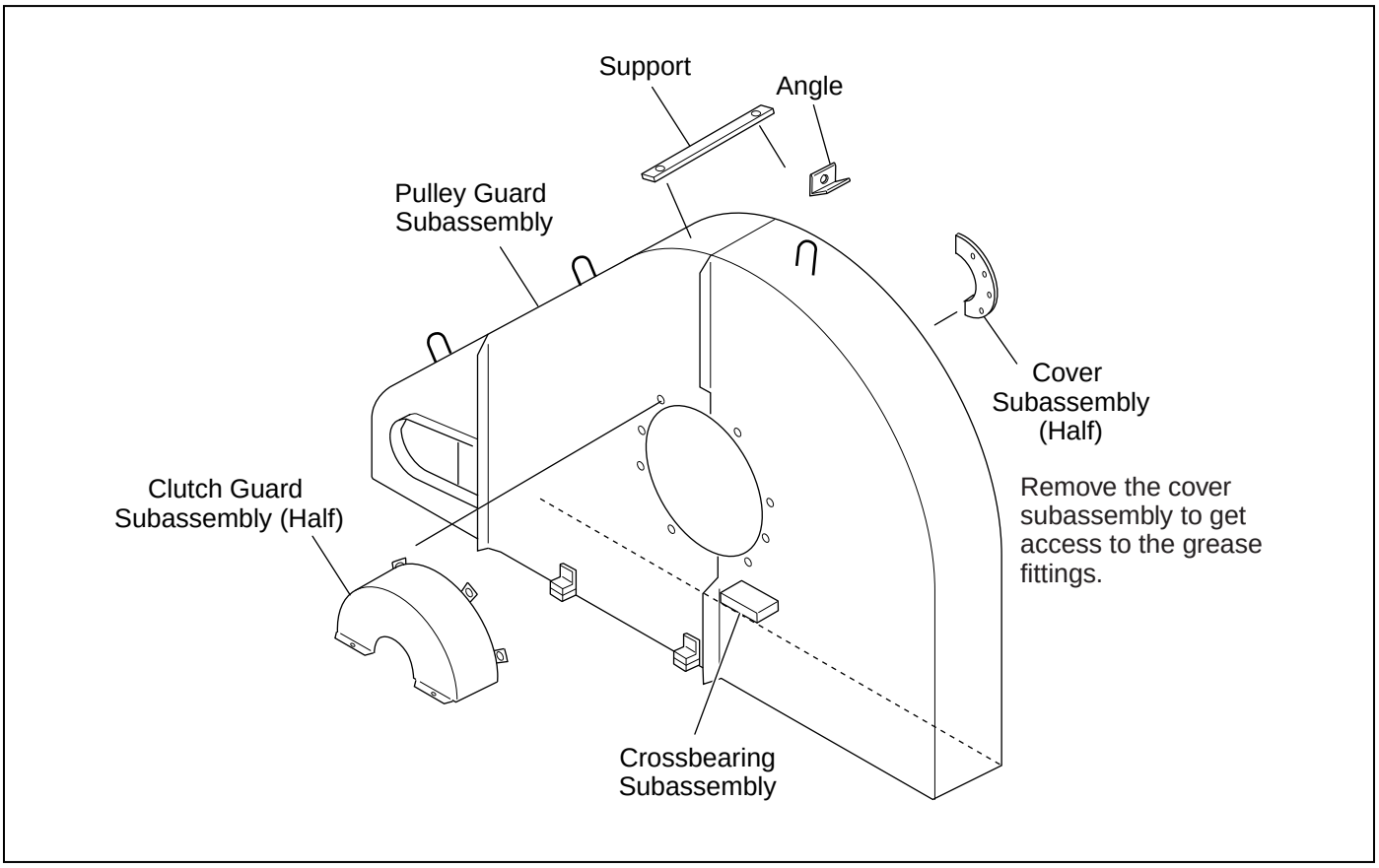


Figure 1.6 *Pulley Guard*

1.5.6 Removable Head Section

A removable section in each head plate enables service and maintenance for the Mixer blade shaft.

1.5.7 Enclosed Drum

The Mixer drum is fully enclosed to protect personnel and provide dust control.

DANGER:
Do not modify fully enclosed drum (front panel, shroud, drum etc.) in any manner. Modifications can create crush points, shear points, and other hazards.
Modifications to the shroud are allowed to provide for sand, aggregates, and cement charging. The shroud modifications, which allow for charging sand, aggregate, and cement, must be designed to eliminate all hazards. Customer to provide additional guarding as needed.

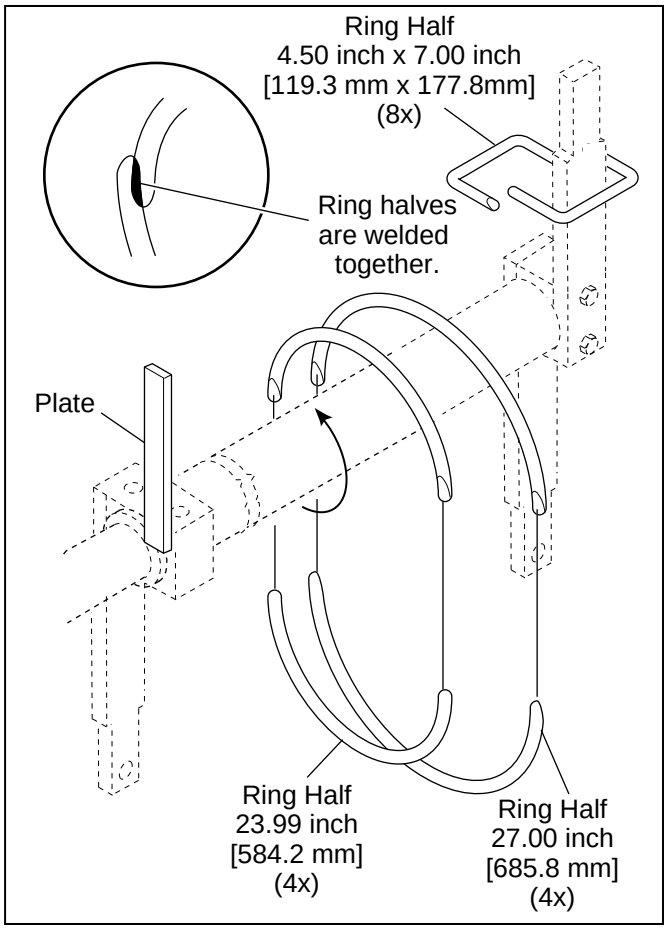


Figure 1.7 *Blade Shaft Cleaning Ring Assembly*

DANGER:
Mixer blade hazard. Close front panel and stay clear during operation. Follow lockout procedure before servicing.

1.5.8 Cleaning Rings*

Blade shaft cleaning rings help reduce the build-up of concrete on the blade shaft assembly and blade arms. See Figure 1.7. Cleaning rings are made from two metal rods that are shaped and welded together around the blade arms or shaft.

1.5.9 Head Scrapers*

Head scrapers help remove concrete buildup on the head liner at the end of the Mixer drum. See Figure 1.8.

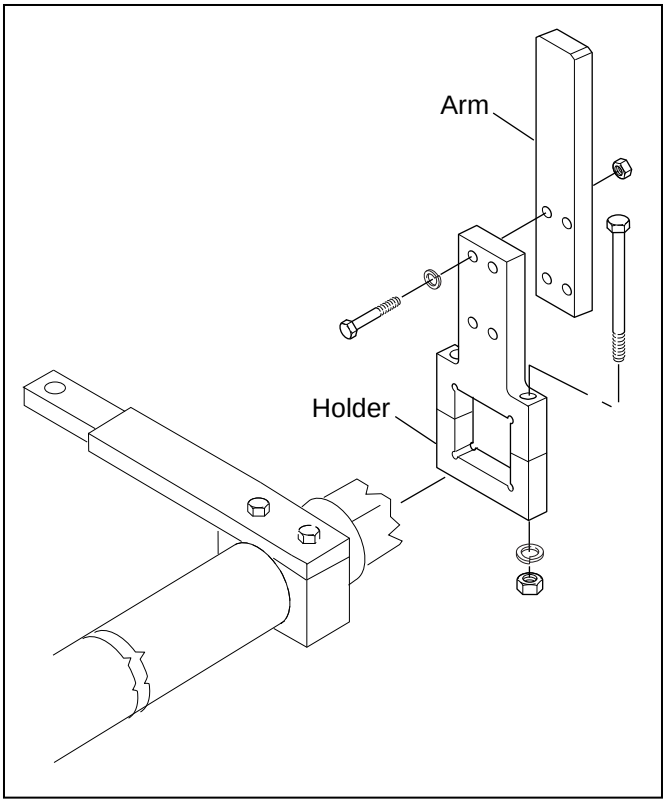


Figure 1.8 *Head Scraper Subassembly*

1.5.10 Blade Shaft Covers*

Blade shaft covers are replaceable wear components which help prolong the life of the blade shaft. Covers are made specifically for individual Mixers and are installed by welding the two halves of the blade shaft cover together around the blade shaft.

1.5.11 Trough Liners

Mixer trough liners are wear components that can be replaced and are available with or without moisture probes, depending upon customer specifications. See Sections 1.5.13 – 1.5.16. Because moisture probes help improve the efficiency and quality of mixing operations, they are often factory-installed.

NOTE:
If your Mixer does not have moisture probes and you wish to install them, refer to Section 3.16 for installation information.

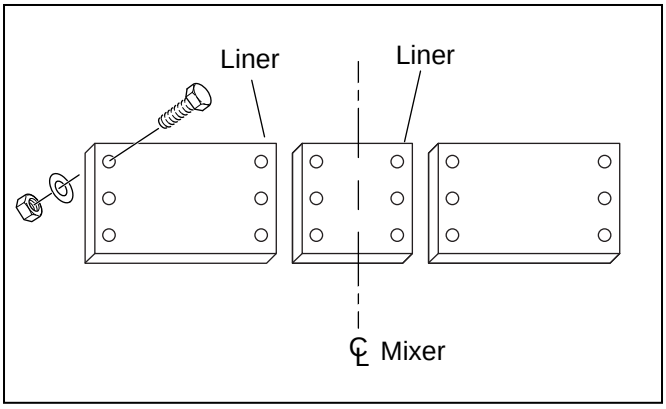


Figure 1.9 *Trough Liners without Moisture Probes*

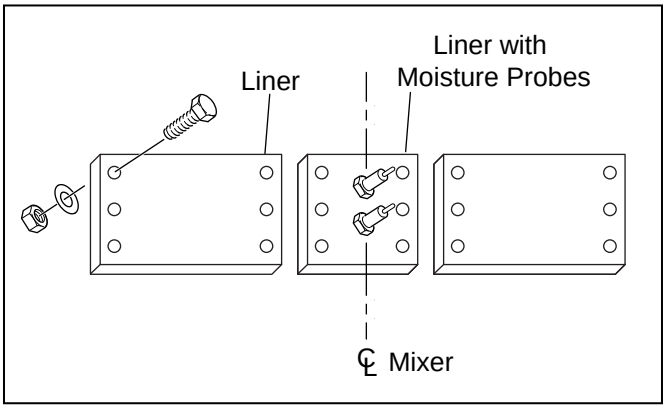


Figure 1.10 *Trough Liners with LeSueur Moisture Probes*

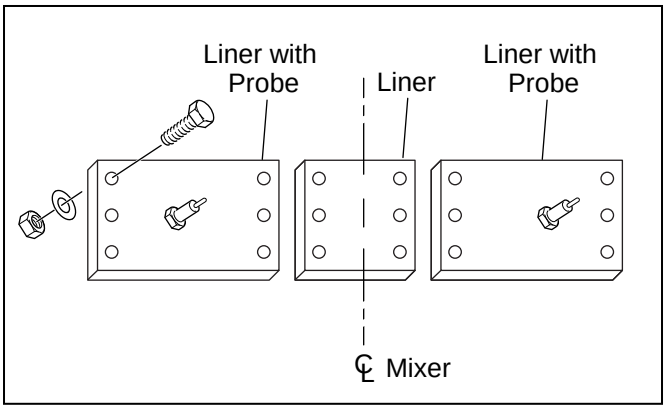


Figure 1.11 *Trough Liners with Ramsey Moisture Probes*

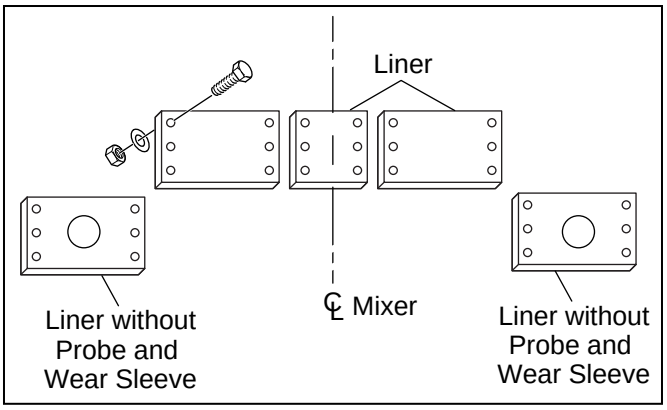


Figure 1.12 *Trough Liner with ARC Moisture Probes – Ground*

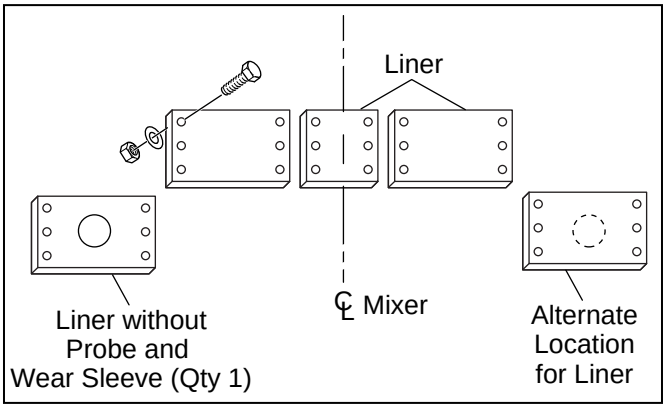


Figure 1.13 *Trough Liner with ARC Moisture Probes – Microwave*

1.5.12 LeSueur Moisture System*

LeSueur moisture probes determine the amount of water added to a batch of concrete and, thus, help improve the quality of the mix. When this system is fitted, a special liner with the moisture probes replaces a standard 12 inch [304.8 mm] liner. Besser Company drawing number 332752 shows the liners, along with the locations of the moisture probes and their liner. Usually, the moisture probes are installed at the factory per customer order specifications. If they are added after factory-build of the Mixer, or if they need to be replaced, refer to Figure 1.10, and the procedure in Section 3.2.7.

1.5.13 Ramsey Moisture System*

The Ramsey Moisture System includes one moisture probe located on either side of a standard liner. See Figure 1.11. If a Ramsey system is to be added after factory-build of the Mixer, refer to print number 323999.

1.5.14 ARC Moisture System – Ground Probe Liners*

The ARC Moisture System with ground probe liners are located on the outsides of the liners. See Figure 1.12. If an ARC ground moisture probe system is to be added after factory-build of the Mixer, refer to print number 467490.

1.5.15 ARC Moisture System – Microwave Probe Liners*

The ARC microwave moisture probe liner is similar to the ARC ground moisture probe liner except that it uses only one liner. The liner can be placed on either of the outside positions. If an ARC microwave moisture probe system is to be added after factory build of the Mixer, refer to print number 481202.

1.5.16 Blades with Wear Liners*

Figure 1.14 illustrates blades with wear liners. Liners are replaceable wear components that help protect the back-up blade from excessive wear. They help improve the cost-efficiency of Mixer operations by reducing the frequency of blade replacement. Even so, a common practice is to keep a right- and left-hand blade in stock for times when a blade does require replacement due to wear or damage. Such stocking can save costs associated with down time when blades need replacing.

1.5.17 Bottom Clean-Out Gate*

An optional bottom clean-out gate helps during Mixer cleaning and enables dumping the waste directly from the bottom of the Mixer instead of from the discharge gate.

WARNING:
When a bottom clean-out gate is on the Mixer, the gate must be closed before starting the Mixer. If it is open, aggregate may injure personnel who might be below the Mixer.

DANGER:
Crush and pinch points. Stay clear of machine. Follow lockout procedure before servicing.

WARNING:
Falling objects. Hard hat area.

DANGER:
Shear hazard. Fall hazard. Stay clear. Follow lockout procedure before servicing.

DANGER:
Crush hazard. Stay clear. Follow lockout procedure before servicing.

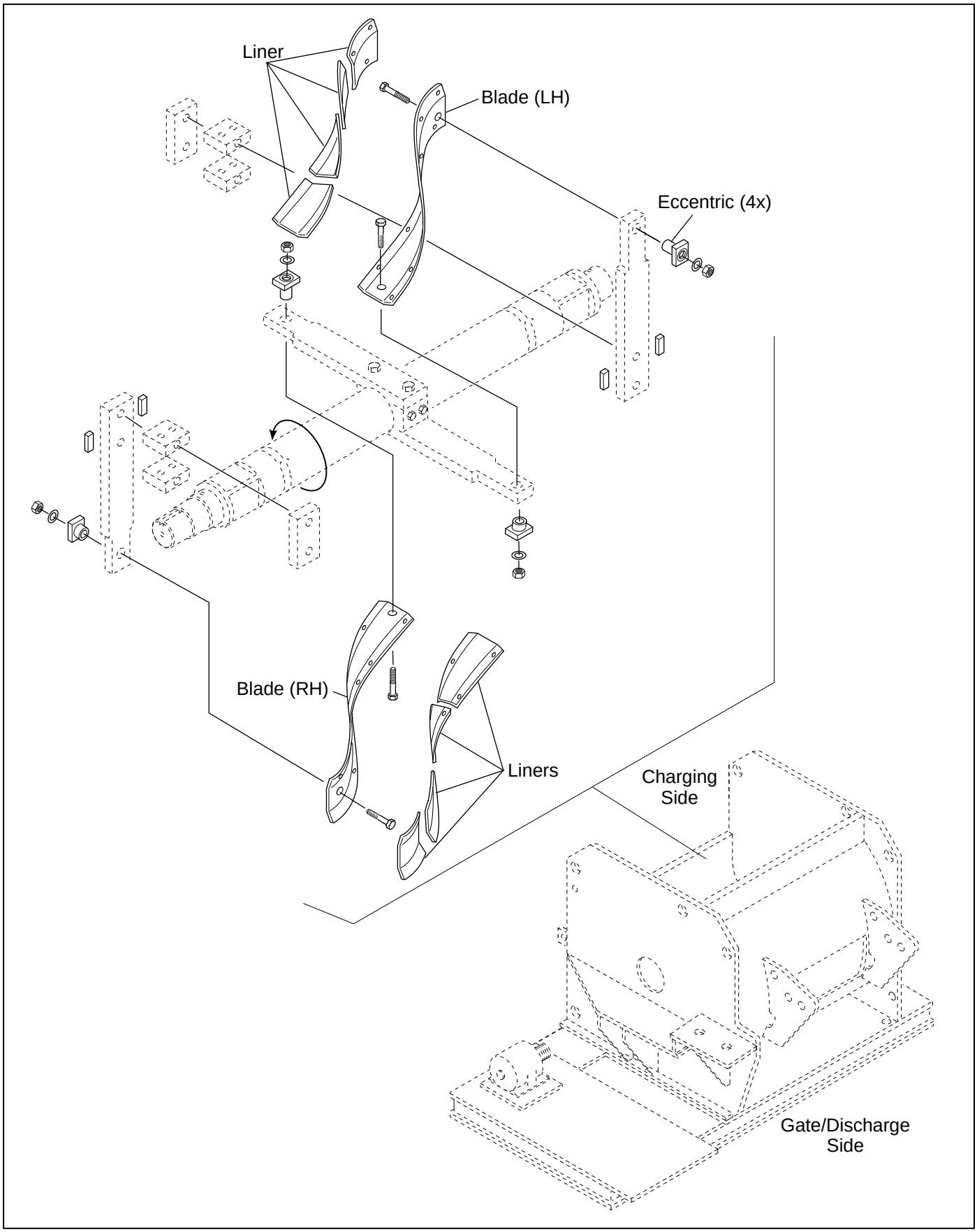


Figure 1.14 *Blades with Wear Liners*

SECTION 2
OPERATION

2.1 SAFETY INFORMATION

Review the Safety Bulletin at the front of this manual before operating or working on the Mixer. Observe safe shop practices during all Mixer operation, troubleshooting and maintenance.

IMPORTANT:
Make sure any welding equipment is properly grounded.

IMPORTANT:
Wear the required protective gear and clothing when performing Mixer maintenance, welding, cleaning, etc.

IMPORTANT:
When possible, work in teams when doing Mixer maintenance.

IMPORTANT:
Observe the Confined Space Work Rules and Regulations of your company, locality, city and state, when doing maintenance within the Mixer drum.

Follow your plants lockout procedure before beginning any Mixer maintenance and troubleshooting. The following procedure is suggested for locking out the Mixer.

2.1.1 General Lockout for all Batching Controls

1. Announce lockout to other employees.
2. Turn power off at main panel.
3. Using your shop's authorized key and lock system, secure the main power switch in the lockout position.
4. Remove your key from the lock and keep the key with you at all times while performing system maintenance.
5. Tag lockout.
6. Clear equipment of all personnel.
7. Test lockout by hitting run button.

2.1.2 Lockout and Tag Equipment which Presents a Hazard to Personnel Working on the Mixer

1. Announce lockout to other employees.
2. Turn power off at main panel and motor starters.
3. Using your shop's authorized key and lock system, secure the main power switch in the lockout position.
4. Remove your key from the lock and keep the key with you at all times while performing system maintenance.
5. Tag lockout.
6. Clear equipment of all personnel.
7. Test lockout by hitting run button.
8. Block, chain, or release and lockout all stored energy sources.
9. Visually inspect equipment to make sure it is properly locked out and tagged.

2.1.3 Lockout and Tag Mixer

1. Announce lockout to other employees.
2. Turn power off at main panel, manual control station and Mixer motor starter(s).
3. Using your shop's authorized key and lock system, secure the main power switch in the lockout position.
4. Remove your key from the lock and keep the key with you at all times while performing system maintenance.
5. Tag lockout.
6. Clear Mixer of all personnel.
7. Test lockout by hitting run button.
8. Block, chain, or release and lockout, all stored energy sources, including but not limited to:
   - Discharge Gate – Block open with safety stop
   - Air Supply – Release pressure, lockout, and tag
   - Water Supply – Release pressure, lockout, and tag
   - Blades, blade arms, and drive train (bull gear, pulley, etc.) – Block and/or chain
9. Visually inspect Mixer to make sure it is properly locked out and tagged.
10. Clear machines of personnel before restarting machines.

WARNING:
This lockout procedure is a minimum precaution for the safety of servicing personnel. Do not attempt to avoid or shortcut these procedures.

2.2 BATCHING CONTROL SYSTEM INFORMATION

Besser Company ships each Mixer fully assembled, except for a batching control system. A crucial part of the overall production unit, the batching control system helps regulate the operation and interaction of associated machinery, and increase production efficiency and levels. For information on operation and maintenance of the batching control system, contact the vendor of the system, or if purchased through Besser Company, contact your Besser Sales and Service Representative.

2.3 PRELIMINARY ADJUSTMENTS (BEFORE START-UP)

When a safety interlock (zero-speed) switch and an underspeed function relay are fitted on the Mixer, refer to Electrical Adjustments and adjust, as necessary, before initial start-up. See Section 3.2.

2.4 MIXER OPERATION

IMPORTANT:
The start-up of the Mixer depends upon its batching control system. See Section 2.3. Usually, Besser Company does not supply the control system and cannot predetermine how yours will function with the Mixer. Please contact the vendor of your system to perform initial start-up of the Mixer.

The following gives a manual operating procedure, along with descriptions of circuit functions. Be sure you are familiar with the procedural sequence. Use the procedure and electrical instruction drawings listed on Mixer documentation as a guide for operating the Mixer.

2.4.1 Initial Conditions

Check the gate and clutch air pressure regulators before start-up. Refer to the specifications and data at the front of this manual. Make sure the regulators are operational and set properly.

For normal operation make sure the clutch is engaged and the blade turning before the drum is charged with aggregate.

Do not overload the Mixer. Do not exceed the maximum weight and volume ratings of the Mixer. Refer to the specifications and data at the front of this manual.

Set the following initial conditions:

1. Confirm the Mixer is clear of personnel, then close and secure the front panel and all gates. See Section 2.1 Safety Information.
2. Turn electrical disconnect to on.
3. Set the clutch switch to off.
4. Pull out emergency stop switch(es).
5. Set the batcher/manual control switch to manual.
6. Press the MCR Reset button and the green power lamp will light.
7. The electrical power will be on.

2.4.2 Start-Up Procedure

1. Check and make sure the initial conditions have been set. See Section 2.4.1.
2. Press and release the Motor Start push-button. This energizes the motor starter to start the motor. When the pushbutton is released, the starter remains energized through the normally open contacts of ACR, and the closed contacts of 1TD and 2TD, parallel to the start button.
3. Set the clutch switch to on.
4. Verify that the motor remains running. If it is not, readjust the underspeed potentiometer, as indicated in Section 3.16. (PRS-5 presents a timed signal to the underspeed relay. When the motor is up to speed, this PRS-5 signal maintains the 1TD contacts closed which keeps the motor running.)
5. In the event that the Mixer slows down below 13.5 RPM, the underspeed relay will disable the 1TD timer, which in turn will disable the ACR Relay, stopping the motor.

CAUTION:
This circuit will not protect the motor if the Mixer is jogged thru any mix cycle.

2.4.4 Mixer Shut-Down

Follow the lockout procedures in Section 2.1.

2.5 MIXER CHARGING GUIDELINES

Centralized introduction of cement will improve mixing efficiency and reduce mixing time.

2.5.1 Optimum Charging Location

The center of the aggregate and cement charging area is located on the center of the Mixer drum and 12 inches [305 mm] in front of the Mixer shaft on the down stroke of the Mixer blade. See Figure 2.1 showing the charging area.

2.5.2 Recommended Charging Area

Introduce aggregate and cement within 30 inches [762 mm] to either side of the center of the Mixer drum and within 28 inches [711 mm] in front of the Mixer shaft on the down stroke of the Mixer blade. See Figure 2.1.

NOTE:
For charging location different than above consult Besser Company Engineering Department.

2.6 GROUTING PROCEDURE

The first batch for a Mixer with blade wear liners, is referred to as a “grouting batch.” The “grouting batch” fills the void between the backup blade and blade liners providing support to blade liners. Often, a Besser Sales and Service Representative runs the grouting batch. For more information about the grouting procedure, refer to Besser Company print number 360464.

To prepare your new Besser Mixer blades for operation, follow this grouting procedure for a good seating of Ni-hard liners to the Mixer blade:

1. Run a throw-away first batch a day or two before the start of actual production.
2. Use a fine grout mix made of:
   - 4,000 lbs very fine sand
   - 1,000 lbs cement
   - Water to make 7 – 9 inch slump.
3. Add cement and water at same time to make cement slurry.
4. Slowly add fine sand to make grout.
5. When mix is consistent, stop one blade in submerged position. Allow enough time for grout to hold in all spaces between backup blade and Ni-hard blade liners.
6. Submerge opposite blade.
7. Perform lockout. See Section 2.1.
8. Clean Mixer by hand to allow grout in blades to harden before start of production operation.

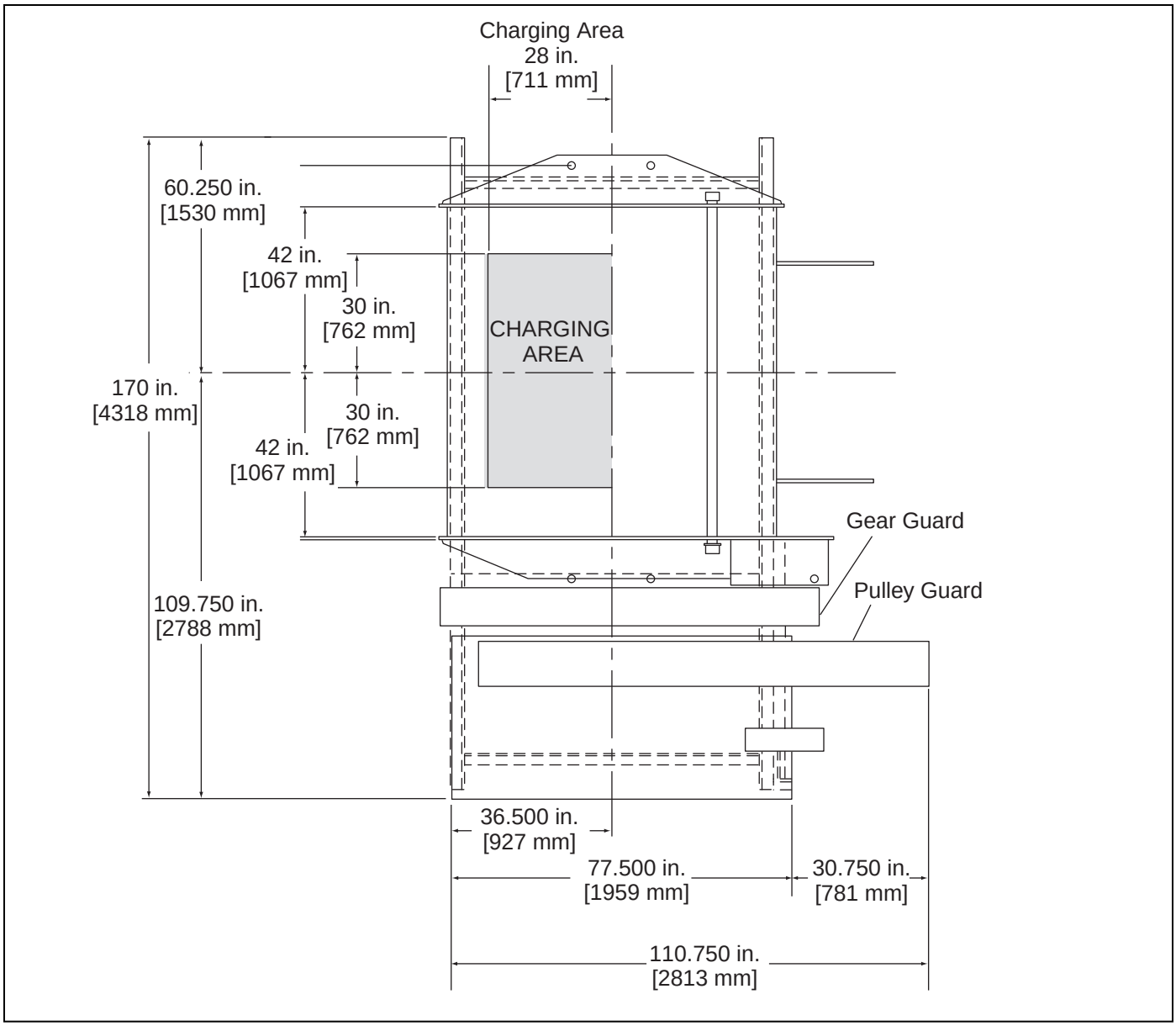


Figure 2.1 *Charging Area*

2.7 OPERATIONAL CONSIDERATIONS

The optimal operation of the Mixer is strongly affected by these additional considerations.

- Mixing Water
- Ratio of Cement to Aggregate
- Mixing Hard Aggregates
- Mixing Lightweight Aggregates

2.7.1 Mixing Water

Both quantity and quality of mixing water affect the making of quality block. Knowledge of the amount of mixing water added is the only means to make batching adjustments.

The quantity of water can be determined only if some sort of water gauging or metering device is used. A good water meter properly trapped and periodically checked for accuracy will assist in a quality control conscious plant. See Figure 2.2.

Water used for making quality concrete should be pure enough for drinking. Water should be added evenly from several discharge points.

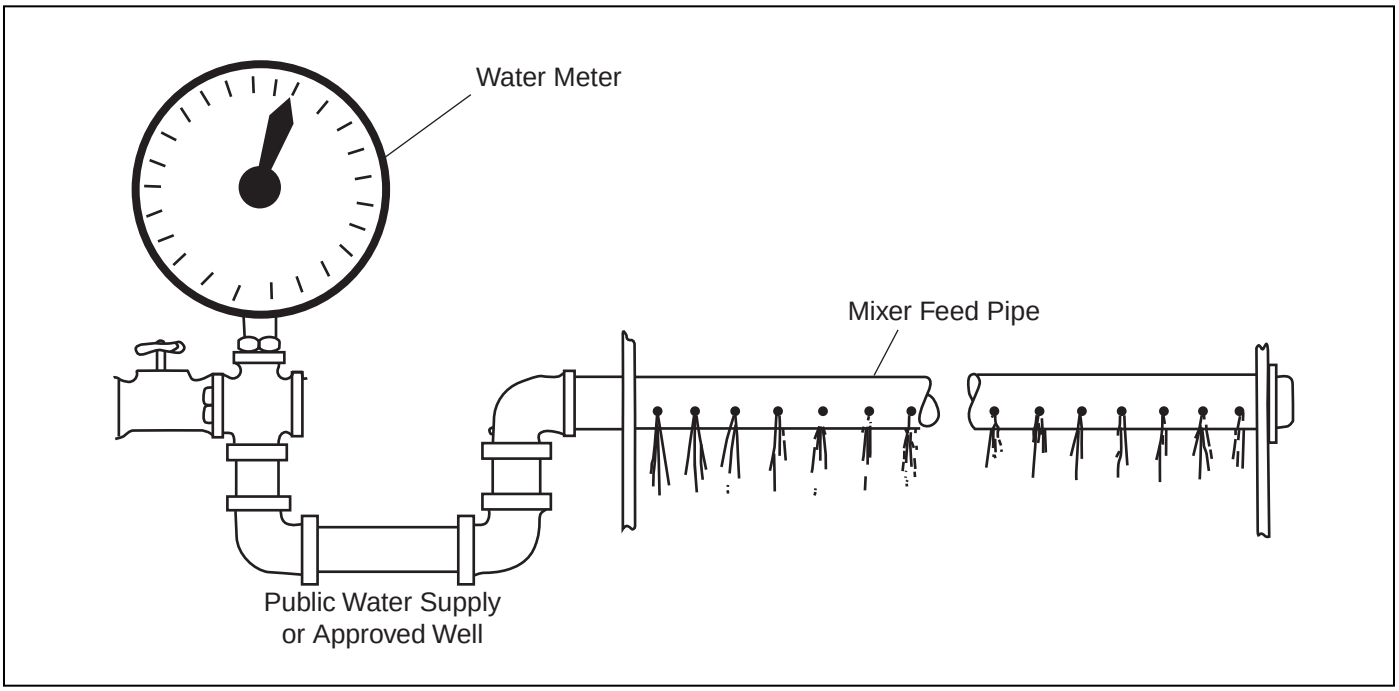


Figure 2.2 *Water Meter*

Type of Aggregate	Range of Mixes Cement to Aggregate Ratio
Sand and Gravel	1:8 to 1:12
Cinders	1:6 to 1:8
Clay (Expanded)	1:6 to 1:9
Limestone	1:7 to 1:12
Pumice	1:4 to 1:6
Slag (Expanded)	1:5 to 1:7
Slag (Air Cooled)	1:8 to 1:12
By Weight Only	

Table 2.1 *Range of Cement Ratio*

2.7.2 Ratio of Cement to Aggregate

Table 2.1 shows the range of cement to aggregate ratio for the most widely used aggregates. Hard type aggregates, such as sand and gravel, limestone and slag (air cooled) have a wider and more lean range of cement to aggregate ratio than the lightweight aggregates.

The method of calculating cement to aggregate ratio is as follows:

Example (sand and gravel):

4500 lbs aggregate + 500 lbs cement = 5000 lbs total batch.

$$\frac{4500}{500} = 9 \text{ parts of aggregate to 1 part of cement.}$$

or

$$\frac{500}{94} = 5.32 \text{ sacks of cement per batch}$$

NOTE:
The cement to aggregate ratio figure is always expressed with the cement first i.e. 1:9.

Assuming the sand and gravel block to weigh 40 lbs, the batch yield would be:

$$\frac{5000}{40} = 125 \text{ blocks per batch}$$

or

$$\frac{125}{5.32} = 23.5 \text{ blocks per sack of cement}$$

2.7.3 Mixing Hard Aggregates

Correctly mixing hard type aggregate can improve the quality characteristics of the concrete product. Follow this recommended procedure for hard aggregates:

1. Charge Mixer with all aggregate.
2. Add all cementitious materials (like cement, fly ash or lime).
3. Dry mix combined materials for one minute.
4. Add all required mixing water.
5. Continue mixing for an absolute minimum of two to four minutes.
6. When tempering water is required to bring mix to consistency, mix for an additional one minute.

2.7.4 Mixing Lightweight Aggregates

Mixing lightweight aggregate is similar to the procedure for hard type aggregate, however the water is added more gradually to keep consistency. Follow this recommended procedure for lightweight aggregate, various highly absorbent limestones and other similar type aggregates:

1. Charge Mixer with all lightweight aggregate.
2. Add 1/2 to 2/3 total mixing water.
3. Mix 30 seconds.
4. Add all cementitious material (like cement, fly ash or lime).
5. Add balance of required mixing water.
6. Continue mixing for an absolute minimum of two to four minutes.
7. When tempering required to bring mix to right consistency, mix for an additional one minute.

SECTION 3
MAINTENANCE

3.1 OVERVIEW

This Section of the manual highlights important service and maintenance procedures required to maximize the Mixer operating life and ensure optimum performance.

Major topics include:

- Safety Information
- Maintenance Tools
- Maintenance Schedule
- General Lubrication
- Pneumatic Guidelines
- Electrical Adjustments
- Pump Maintenance
- Bearing Maintenance
- Discharge Gate Safety Stop
- Standard Gate Adjustment
- Seal Alignment to Drive Shaft
- Pinion and Gear Alignment
- Cleaning Rings Replacement
- Blades with Wear Liners
- LeSueur Trough Liners Replacement
- Maintenance Reference Drawings and Notes

3.2 SAFETY INFORMATION

Review the Safety Bulletin at the front of this manual before operating or working on the Mixer. Observe safe shop practices during all Mixer operation, troubleshooting and maintenance.

IMPORTANT:
Make sure any welding equipment is properly grounded.

IMPORTANT:
Wear the required protective gear and clothing when performing Mixer maintenance, welding, cleaning, etc.

IMPORTANT:
When possible, work in teams when doing Mixer maintenance.

IMPORTANT:
Observe the Confined Space Work Rules and Regulations of your company, locality, city and state, when doing maintenance within the Mixer drum.

Follow your plants lockout procedure before beginning any Mixer maintenance and troubleshooting. The following procedure is suggested for locking out the Mixer.

3.2.1 General Lockout for all Batching Controls

1. Announce lockout to other employees.
2. Turn power off at main panel.
3. Using your shop's authorized key and lock system, secure the main power switch in the lockout position.
4. Remove your key from the lock and keep the key with you at all times while performing system maintenance.
5. Tag lockout.
6. Clear equipment of all personnel.
7. Test lockout by hitting run button.

3.2.2 Lockout and Tag Equipment which Presents a Hazard to Personnel Working on the Mixer

1. Announce lockout to other employees.
2. Turn power off at main panel and motor starters.
3. Using your shop's authorized key and lock system, secure the main power switch in the lockout position.
4. Remove your key from the lock and keep the key with you at all times while performing system maintenance.
5. Tag lockout.
6. Clear equipment of all personnel.
7. Test lockout by hitting run button.
8. Block, chain, or release and lockout all stored energy sources.
9. Visually inspect equipment to make sure it is properly locked out and tagged.

3.2.3 Lockout and Tag Mixer

1. Announce lockout to other employees.
2. Turn power off at main panel, manual control station and Mixer motor starter(s).
3. Using your shop's authorized key and lock system, secure the main power switch in the lockout position.
4. Remove your key from the lock and keep the key with you at all times while performing system maintenance.
5. Tag lockout.
6. Clear Mixer of all personnel.
7. Test lockout by hitting run button.
8. Block, chain, or release and lockout, all stored energy sources, including but not limited to:
   - Discharge Gate – Block open with safety stop
   - Air Supply – Release pressure, lockout, and tag
   - Water Supply – Release pressure, lockout, and tag
   - Blades, blade arms, and drive train (bull gear, pulley, etc.) – Block and/or chain
9. Visually inspect Mixer to make sure it is properly locked out and tagged.
10. Clear machines of personnel before restarting machines.

3.2.4 Tools

Tool	Part Number
Belt and sheave gauge	#112541
Belt tension gauge	#106666
Multiple lockout device	#111140
Padlock	#111139

Table 3.1 *Tools*

3.3 TWO HOUR MAINTENANCE

Assembly	Component	Special Instructions
Blade Shaft – General	Manual lubrication dust seals	Lubricate dust seals.

Table 3.2 *Two Hour Maintenance*

3.4 EACH USE MAINTENANCE

Assembly	Component	Special Instructions
Interlocks	Mixer disconnect interlock	Test Mixer disconnect interlock.
Electric Motor and Power – General	Input power disconnect switch and lockout	Test input power disconnect switch and lockout
Air System	Lockout valve	Test lockout valve.

Table 3.3 *Each Use Maintenance*

3.5 DAILY MAINTENANCE (8 HOURS)

Assembly	Component	Special Instructions
Mixer Drum – General		Clean.
	Trough liners and bolts	Clean trough liners. Inspect liners for cracks and wear.
	Head liners and bolts	Clean head liners. Inspect liners for cracks and wear.
	Blade liners and bolts*	Clean blade liners and bolts. Inspect liners for wear, cracks and fastener tightness.
	Blades and bolts	Clean blades and bolts. Inspect blades for cracks, wear, distortion and fastener tightness.
	Head scrapers and bolts	Clean head scrapers and bolts. Inspect parts for cracks, wear, distortion and fastener tightness.
	Blade arms and bolts	Clean blade arms and bolts. Inspect parts for cracks, wear, distortion and fastener tightness.
	Blade arm covers	Clean blade arm covers. Inspect cover and welds for cracks, wear and distortion.
	Tension strap and liner*	Clean tension strap and liner. Inspect parts for cracks, wear, distortion and welds for wear and cracks.
	Blade shaft	Clean blade shaft. Inspect parts for cracks, wear and distortion.
	Blade shaft covers	Clean blade shaft covers. Inspect cover and weld for cracks, corrosion, wear and distortion.

Table 3.4 *Daily Maintenance (8 Hours)*

Assembly	Component	Special Instructions
	Arm cleaning rings	Clean arm cleaning rings. Inspect rings and weld for cracks, corrosion, wear and distortion.
	Shaft cleaning rings	Clean shaft cleaning rings. Inspect rings and weld for cracks, corrosion, wear and distortion.
	Cleaning ring retainer	Clean cleaning ring retainer. Inspect rings and weld for cracks, corrosion, wear and distortion.
	Moisture probes*	Clean moisture probes. Inspect for wear.
	Shell, shroud and components	Clean shell, shroud and surrounding components. Inspect for cracks, wear and distortion.
	Front panel	Clean front panel. Inspect for cracks, wear and distortion.
Water Pipe		Clean water pipe. Inspect for cracks, corrosion, wear and distortion.
Discharge Gate Assembly – General		Clean discharge gate assembly. Inspect parts for cracks, corrosion, wear, distortion and welds for wear and cracks. Test discharge gate assembly.
	Discharge gate and cylinder assembly.	Clean discharge gate and cylinder assembly Inspect parts for cracks, corrosion, wear and distortion.
	Gate shafts and bearings	Clean gate shafts and bearings. Inspect parts for cracks, corrosion, wear, distortion and welds for wear and cracks.
	Gate links	Clean gate links. Inspect welds for wear and cracks.
	Cylinder arm	Clean cylinder arm. Inspect parts for cracks, corrosion, wear and distortion.
	Cylinder bracket	Clean cylinder bracket. Inspect parts for cracks, corrosion, wear and distortion.
	Gate safety stop	Clean gate safety stop. Inspect parts for cracks, corrosion, wear and distortion. Test gate safety stop.
	Discharge chute	Clean discharge chute. Inspect parts for cracks, corrosion, wear and distortion.

Table 3.4 *Daily Maintenance (8 Hours) – Continued*

Assembly	Component	Special Instructions
Clean Out Gate – General*		Clean clean out gate. Inspect parts for cracks, corrosion, wear and distortion. Test clean out gate.
	Clean out gate assembly	Clean clean out gate. Inspect parts for cracks, corrosion, wear and distortion.
	Clean out gate cylinder	Clean clean out gate cylinder. Inspect parts for cracks, corrosion, wear and distortion.
Blade Shaft – General		Clean blade shaft. Inspect parts for cracks, corrosion, wear, distortion and welds for wear and cracks.
	Roller and thrust bearing housings	Clean roller and thrust bearing housings. Inspect parts for cracks, corrosion and distortion.
	Dust seals	Inspect parts for cracks, corrosion, wear and distortion.
Drive Shaft – General		Clean drive shaft. Inspect parts for cracks, corrosion, wear and distortion.
	Roller and Spherical Bearing Housings	Clean bearing housings. Inspect parts for cracks, corrosion, wear and distortion.
	Belt tension **NOTE:** Daily First Week then Weekly.	Inspect parts for cracks and wear. Adjust belt tension. See specific manual section for more information.
Air System	Filter	Drain water from filter. Inspect parts for cracks, corrosion, wear and distortion.
Air System – Gate	Pressure setting	Inspect for correct setting.
Air System – Clean Out Gate	Pressure setting	Inspect fastener for tightness.
Air System – Clutch – Pressure Switch	Pressure setting	Inspect fastener for tightness.
Guards		Check that guards are properly assembled with no modifications (holes or cracks)
	Pulley	Inspect parts for cracks, corrosion, wear and distortion.

Table 3.4 *Daily Maintenance (8 Hours) – Continued*

Assembly	Component	Special Instructions
	Gear	Inspect parts for cracks, corrosion, wear and distortion.
	Front panel	Inspect parts for cracks, corrosion, wear and distortion.
	Shroud	Inspect parts for cracks, corrosion, wear and distortion.
Trabon System* (See Section 3.17)		Clean trabon system. Inspect parts for cracks, corrosion and damage. Test trabon system. See Section 3.17.
Electric Motor and Power – General		Clean electric motor. Inspect parts for cracks, corrosion, wear and damage.
	Electric motor	Clean electric motor. See Section 3.16.
Switches	Gate open and close	Inspect parts for cracks, corrosion, wear and distortion. Confirm switch functions properly.
	Under speed	Inspect parts for cracks, corrosion, wear and distortion. Confirm switch functions properly.
	Zero speed	Inspect parts for cracks, corrosion, wear and distortion. Confirm switch functions properly.

Table 3.4 *Daily Maintenance (8 Hours) – Continued*

3.6 WEEKLY MAINTENANCE (40 HOURS)

Assembly	Component	Special Instructions
Drive Shaft – General	Gears	Check oil level.
	Roller bearing	Lubricate roller bearing. See Section 3.12.4.
	Spherical bearing	Lubricate spherical bearing. See Section 3.12.4.
	Plain bearings	Lubricate plain bearings. See Section 3.12.4.
Air System – Discharge Gate	Regulator	Clean regulator. Inspect parts for cracks, corrosion and damage.
	Directional valve	Clean directional valve. Inspect parts for cracks, corrosion and damage.
	Flow control valve	Clean flow control valve. Inspect parts for cracks, corrosion and damage. Confirm valve is properly adjusted and locked.

Table 3.5 *Weekly Maintenance (40 Hours)*

Assembly	Component	Special Instructions
Electric Motor and Power – General	Electric motor base	Clean electric motor base. Inspect parts for cracks, corrosion wear and distortion.
Air System – Clean Out Gate	Flow control valve	Clean flow control valve. Inspect parts for cracks, corrosion and damage. Confirm valve is properly adjusted and locked.
	Directional valve	Clean directional valve. Inspect parts for cracks, corrosion and damage.
Air System – Clutch	Directional valve	Clean directional valve. Inspect parts for cracks, corrosion and damage.
	Regulator	Clean regulator. Inspect parts for cracks, corrosion and damage.
Air System Clutch – Pressure Switch	Clutch pressure switch	Inspect parts for cracks, corrosion and damage. Confirm switch funtions properly.
Mixer Drum – General	Blade liners to trough liner space*	Inspect blade liner to trough liner space. Adjust blade liner and blades as necessary.
	Blade to trough liner space	Inspect blade to trough liner space. Adjust blade to trough liner.
	Blade to head liner space	Inspect blade to head liner space. Adjust blade to head liner.
	Head scraper to head liner space	Inspect head scraper to head liner space. Adjust head scraper to head liner.
Interlock	Pressure switch interlock	Confirm pressure switch interlock works properly.
Discharge Gate Assembly – General	Gate shaft bearings	Lubricate gate shaft bearings. See Section 3.12.
	Bushings – link end bushings	Lubricate bushings and link end bushings. See Section 3.12.
	Cylinder and gate arm pin	Lubricate cylinder and gate arm pin. See Section 3.12.
Blade Shaft – General	Gears	Check oil level. See Section 3.12.3
	Roller and thrust bearings	Lubricate the roller and thrust bearings.

Table 3.5 *Weekly Maintenance (40 Hours) – Continued*

3.7 MONTHLY MAINTENANCE (160 HOURS)

Assembly	Component	Special Instructions
Blade Shaft – General	Thrust bearing end play	Inspect part for cracks, corrosion, wear, distortion and welds for wear and cracks. Test thrust bearing end play. Adjust thrust bearing end play. See Section 3.18.
	Bull gear	Inspect parts for cracks, corrosion, wear and distortion.
Drive Shaft – General	Pinion gear	Inspect parts for cracks, corrosion, wear and distortion.
Electric Motor and Power – General	Electric motor starter	Inspect parts for cracks, corrosion, wear and distortion.
	Input power disconnect switch and lockout	Inspect parts for cracks, corrosion, wear and distortion.
	Conduit and wire	Inspect parts for cracks, corrosion, wear and distortion.

Table 3.6 *Monthly Maintenance (160 Hours)*

3.8 QUARTERLY MAINTENANCE (480 HOURS)

Assembly	Component	Special Instructions
Air System – Discharge Gate	Air lines	Clean air lines. Inspect parts for cracks, corrosion, wear and distortion.
Air System – Clean Out Gate	Air lines	Clean air lines. Inspect parts for cracks, corrosion, wear and distortion.
Air System – Clutch	Air lines	Clean air lines. Inspect parts for cracks, corrosion, wear and distortion.
	Rotary union	Clean rotary union. Inspect parts for cracks, corrosion, wear and distortion.
Drive Shaft – General	Pulley	Clean pulley. Inspect parts for cracks, corrosion, wear and distortion.
	Sheave	Clean sheave. Inspect parts for cracks, corrosion, wear and distortion.
	Belts	Inspect parts for cracks and wear

Table 3.7 *Quarterly Maintenance (480 Hours)*

3.9 YEARLY MAINTENANCE (1920 HOURS)

Assembly	Component	Special Instructions
Mixer Structure		Inspect for loose fasteners. Inspect parts for cracks, corrosion, wear, distortion and welds for wear and cracks.
Blade Shaft – General	Roller bearing	Inspect part for cracks, corrosion, wear, distortion and welds for wear and cracks. See Section 3.18.
Drive Shaft – General	Roller bearing	Inspect part for cracks, corrosion, wear and distortion. See Section 3.18.
	Spherical bearing	Inspect part for cracks, corrosion, wear and distortion. See Section 3.18.

Table 3.8 *Yearly Maintenance (1920 Hours)*

3.10 SEE MANUAL SECTION FOR MAINTENANCE

Assembly	Component	Special Instructions
Electric Motor and Power – General	Electric Motor	Inspect parts for cracks, corrosion, wear, distortion and welds for wear and cracks. See Section 3.12.5.
Blade Shaft – General	Gears	Change and flush oil in the blade shaft gears. See Section 3.12.3.
Drive Shaft – General	Gears	Change and flush oil in the blade shaft gears. See Section 3.12.3.

Table 3.9 *See Manual Section for Maintenance*

3.11 MAINTENANCE AT DISASSEMBLY

Assembly	Component	Special Instructions
Drive Shaft – General	Clutch	Inspect parts for cracks, corrosion, wear and distortion.
	Drive shaft	Inspect parts for cracks, corrosion, wear and distortion.

Table 3.10 *Maintenance at Disassembly*

3.12 GENERAL LUBRICATION

Regularly lubricating the Mixer's moving parts is vital to ensure optimum performance and a long operating life. Table 3.12 lists the recommended frequency of lubrication as well as lubricant specifications. Note that the numbers in the "Item" column correspond to the item number in Figure 3.1.

Bearings are factory-lubricated with a lubricant which is suitable for most applications. Extra protection may be required if the bearing is subject to excessive moisture, dust or corrosive vapor. In these cases, the bearing should contain as much grease as operating speed permits. (A full bearing with consequent slight leakage through the seal is the best protection against contaminants.)

In extremely dirty environments, the bearing should be purged daily to flush out contaminants. For added protection, shroud the bearing from falling material.

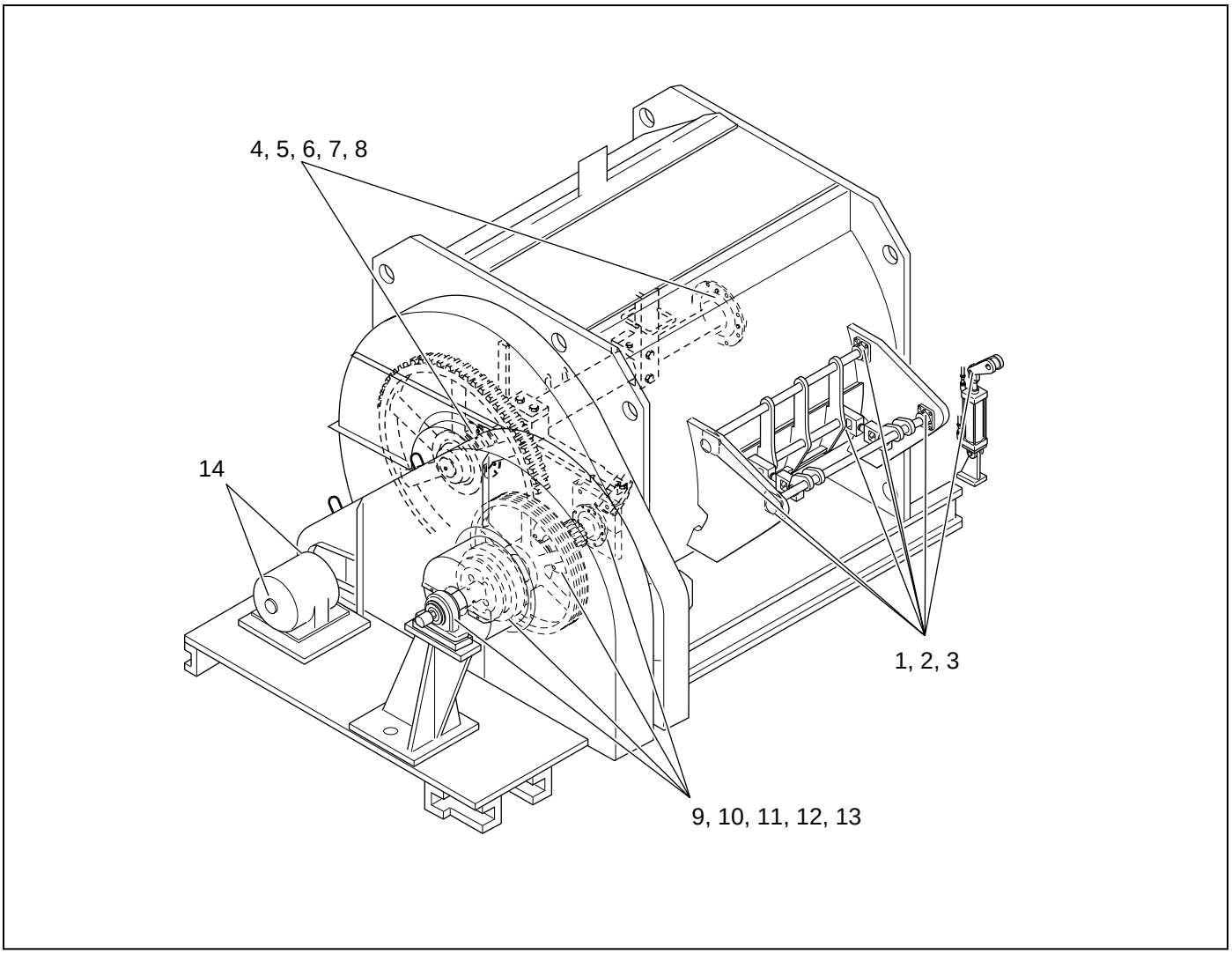


Figure 3.1 *Mixer Lubrication Points*

Item	Equipment/Component	Lubricant Type	Scheduled Maintenance
	Discharge Gate Assembly		
1.	Gate Shaft Bearings	Purge with EP#1 grease as needed See Section 3.12.1.	Weekly
2.	Link End Bushings	Purge with EP#1 grease as needed See Section 3.12.1.	Weekly
3.	Cylinder and Gate Arm Pin	Purge with EP#1 grease as needed See Section 3.12.1.	Weekly
	Blade Shaft – Assembly		
4.	Roller Bearing	EP#1 Grease – See Section 3.12.2	Weekly
5.	Thrust Bearing	EP#1 Grease – See Section 3.12.2	Weekly
6.	Gear Oil	Check oil level and top off as needed. See Section 3.12.3.	Weekly
7.	Gear Oil	Change and flush oil at regular intervals See Section 3.12.3 for recommended frequency.	
8.	Dust Seals	EP#1 Grease – See Section 3.12.2	Every 2 Hours
	Drive Shaft – Assembly		
9.	Gear Oil	Check oil level and top off as needed. See Section 3.12.3.	Weekly
10.	Gear Oil	Change and flush oil at regular intervals See Section 3.12.3 for recommended frequency.	
11.	Roller bearing	EP#1 Grease – See Section 3.12.4	Weekly
12.	Spherical bearing	EP#1 Grease – See Section 3.12.4	Weekly
13.	Plain bearings	EP#1 Grease – See Section 3.12.4	Weekly
14.	**Electric Motor**	Refer to Motor Manufacturer Information. See Section 3.12.5.	

Table 3.12 *Mixer Lubrication Points and Schedule*

3.12.1 Discharge Gate Assembly

Use EP#1 grease to lubricate the following parts weekly:

- Gate shaft bearings
- Link end bushings
- Cylinder and gate arm pin

1. Clean grease fitting.
2. Slowly pump grease into bearing until clean grease appears at seal or pin. The viscosity of the oil in the grease should be 3,400 to 3,500 SUS at operating temperature (ambient temperature plus 50° F).

3.12.2 Blade Shaft Assembly

Use EP#1 grease to lubricate the following parts weekly:

- Roller bearings
- Thrust bearings

1. Clean grease fitting.
2. Slowly pump grease into bearing until clean grease appears at seal or pin. The viscosity of the oil in the grease should be 3,400 – 3,500 SUS at operating temperature (ambient temperature plus 50° F).
3. Pack the bearing full and the cavity half full when assembling.

Use EP#1 grease to lubricate the following every two hours:

- Dust seal

1. Clean grease fitting.
2. Slowly pump grease into bearing until clean grease appears at seal or pin. The viscosity of the oil in the grease should be 3,400 – 3,500 SUS at operating temperature (ambient temperature plus 50° F).
3. Pack the dust seal full when assembling.

3.12.3 Gear Oil

1. Check the oil level weekly on the dip stick for the blade shaft and the drive shaft.
2. Change and flush the oil after 500 hours of operation or 4 weeks, whichever comes first. After the first time, change the oil after 2,500 hours of use or 6 months, whichever comes first.
3. Use approximately 3 gallons of oil to fill the gear case. Choose the appropriate gear oil for the temperature of your operation:
   - AGMA grade #6 for 50° F to 125° F (ISO Grade 320, Shell Omala 320 or equivalent)
   - AGMA grade #5 for 15° F to 50° F (ISO grade 220, Shell Omala 220 or equivalent)

3.12.4 Drive Shaft Assembly

Use EP#1 grease to lubricate the following parts weekly:

- Roller bearing
- Spherical bearing
- Plain bearings

1. Reach grease fittings for the plain bearings by removing one section of the pulley guard. See Section 1.5.6.
2. Clean grease fitting.
3. Slowly pump grease into bearing until clean grease appears at seal or pin. The viscosity of the oil in the grease should be 1,650 – 1,750 SUS at operating temperature (ambient temperature plus 50° F).
4. After lubrication is complete, reassemble the pulley guard.

3.12.5 Electric Motor

Refer to motor manufacturer information. Do not over lubricate bearings; bearings may overheat with too much grease. Many manufacturers lubricate bearings for life at assembly.

3.13 GENERAL PNEUMATIC MAINTENANCE GUIDELINES

3.13.1 Pneumatic Maintenance Precautions

Follow the lockout procedure in Section 3.2. Before removing any air line component, be sure to lockout and tag the air supply source.

3.13.2 Periodic Pneumatic Maintenance

Pneumatic components on the Mixer require little periodic maintenance other than the following items. Be sure to follow lock out procedures before doing maintenance on the Mixer.

Drain water at the air compressor, air filters, and regulators at the beginning of each day. Change the air filters regularly. A shop maintenance schedule should be developed by considering run times, air supply quality, and environmental factors.

Clean out the air lines of foreign matter and water build-up. Cleaning can be done during normal Mixer down times.

3.13.3 Air Supply System

Check the pressure settings at each regulator to see that they are in the acceptable range. Make sure gauges are working properly. Be sure the air supply system maintains the required pressure for correct Mixer operation. Refer to the Mixer Specifications at the front of this manual for air supply requirements.

3.13.4 Checking for Air Leaks

Remember the following when you suspect an air leak and need to check for its location.

WARNING:
Never check for air leaks with your hand, or get your face close to a suspected leak. High pressure air can cause serious injury.

Check for an air leak by visually looking at and around the air line from a distance. Look for blowing dust and listen for the hiss of a leak from a distance.

Once an air line has been verified to have a leak, be sure to lock out the Mixer and air supply before replacing the line or component.

3.14 ELECTRICAL ADJUSTMENTS

Before doing any electrical maintenance on the Mixer, follow the lockout procedure in Section 3.2.

Use a batching control panel electrical disconnect that is lockable and visible from the Mixer location. If other types of controls are used in place of the batching control panel, a lockable electrical disconnect must be used to enable locking out Mixer operation. Observe all local, state and federal regulations regarding lockouts.

When the optional safety interlock (zero-speed) switch and underspeed function relay are fitted on the Mixer, do the following procedures to adjust, as necessary, before initial start-up and as noted in the adjustment procedures.

3.14.1 Zero-Speed Interlock Safety Switch

WARNING:
To prevent serious injury, do not open the front panel or enter the Mixer drum before shutting off and locking out all electrical power to the unit. Do not open the front panel or enter the drum until the blade shaft has completely stopped moving. See Section 3.2 General Lockout Procedure.

When fitted, the zero-speed interlock safety switch will not let the front panel be opened until the blade shaft assembly has slowed to a speed of less than 0.25 rpm. See Figure 3.1. Before the Mixer can start, the front panel must be closed with the switch actuator blade inserted into the switch. A zero-speed proximity sensor controls the electrical release of the actuator blade via the zero-speed relay. With the Emergency Stop switches open (pulled out) and the MCR circuit de-energized, when the sensor senses a blade shaft speed of less than 0.25 rpm, the zero-speed switch releases and the front panel can be opened.

WARNING:
For personnel safety, the zero-speed switch must not be bypassed.

3.14.2 Zero-Speed Switch Adjustment

Check and adjust, as needed, the zero-speed interlock safety switch before initial start-up of the Mixer, and any time the motor off-time required for front panel opening is incorrect for your operation. See Figure 3.2.

Do the following to adjust the switch.

1. With the Mixer not running, set the zero-speed relay control to speed range x1.
2. Adjust the underspeed potentiometer of the zero-speed relay to minimum.
3. Adjust the Delay Set potentiometer to “A”.
4. With the Emergency Stop switches open (pulled out), and MCR de-energized, check that the front panel opens. This indicates that the switch has released the actuator blade.
5. Close and secure the front panel.
6. Start the Mixer.
7. With the Mixer running, check to make sure the actuator blade is locked in place.
8. Turn off the Mixer.
9. Check the motor off-time that occurs before the front panel can be opened. Adjust the underspeed pot to ensure the blade shaft speed is 0.25 rpm or less before the front panel can be opened.

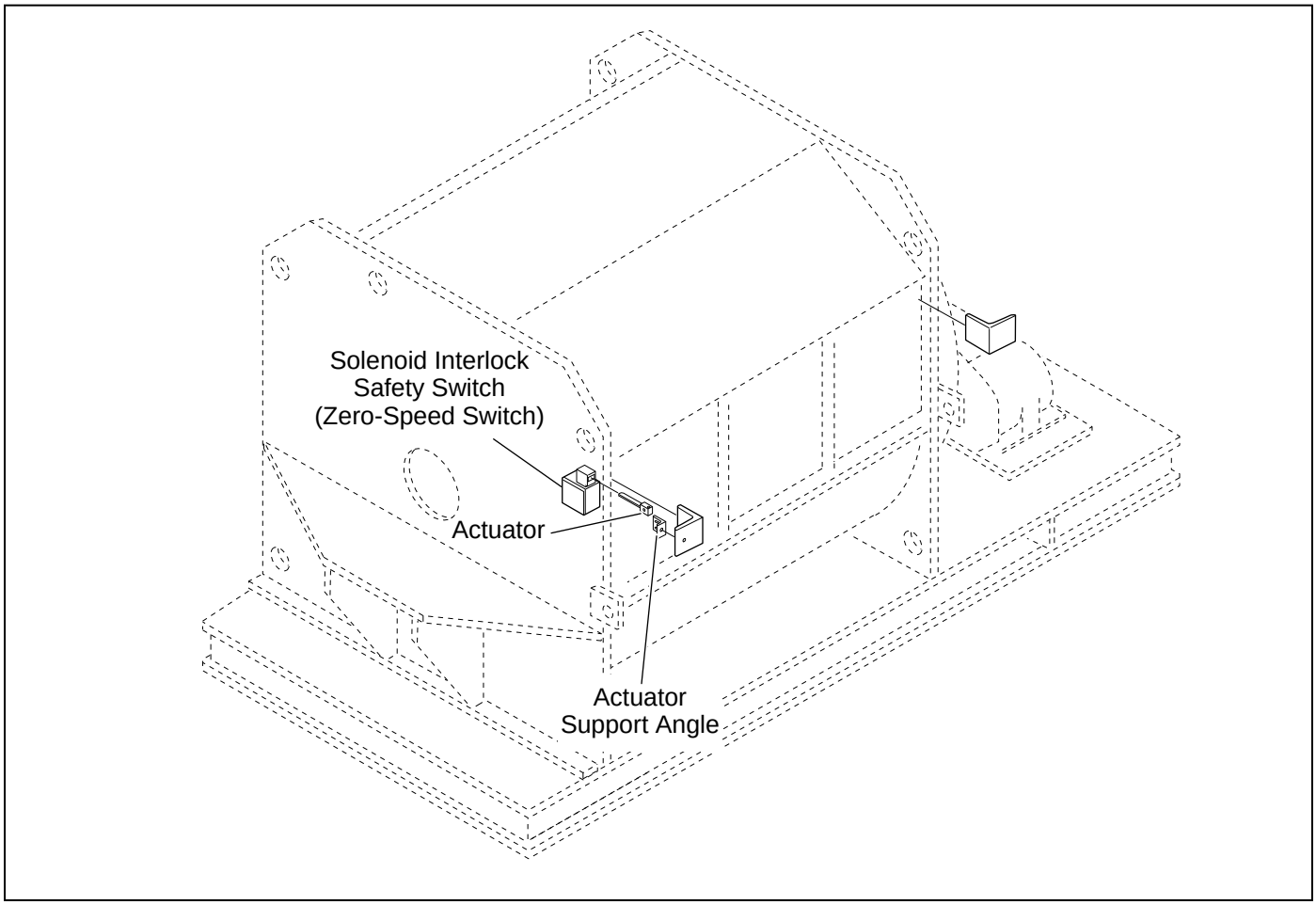


Figure 3.2 *Zero-Speed Switch and Actuator*

3.14.3 Underspeed Relay Function

The underspeed relay function automatically stops the Mixer motor if the Mixer speed drops to less than a preset value, or if the Mixer stalls. This action helps prevent damage to the clutch if foreign matter becomes lodged beneath the blades, or the Mixer is accidentally charged with an overload. If the motor speed decreases below the set point of the underspeed relay, the relay de-energizes the 1TD coil and, in turn, de-energizes the ACR. This drops out the starter and removes power from the motor.

3.14.4 Underspeed Adjustment

Adjust the underspeed setting before initial start-up of the Mixer, and any time the motor speed is insufficient for correct operation.

1. With the Mixer not running, set the underspeed range to x10.
2. Adjust the underspeed adjust potentiometer to between 10 and 15.
3. Adjust the Delay Set potentiometer to “C”.
4. Set 1TD for about 1 – 3 seconds delay.
5. Set 2TD on the delay timer for 0.2 second delay.
6. Start the Mixer.
7. While the Mixer is running, slowly turn the underspeed adjust potentiometer clockwise (CW) until the Mixer motor starter drops out.
8. Back off the underspeed adjust potentiometer by turning it 1/8 turn counterclockwise (CCW).
9. Start the motor.
10. Check that the motor stays running. If it drops out, repeat Steps 6 thru 10.

3.15 ELECTRICAL INTERLOCKS TO BATCH CONTROLS

3.15.1 Mixer Disconnect Function

All batch controls are to be disabled with the use of the Mixer Disconnect Interlock. This interlock will be electrically open when the Mixer disconnect is in the “off” and “lockout” position.

3.15.2 Pressure Switch Interlock (Clutch) Function

All air operated clutch Mixers require a Pressure Switch Interlock. This interlock will be electrically open when the clutch is not engaged to prevent loading of the Mixer. See print number 384561.

3.16 ELECTRIC MOTOR

The electric motor is designed for a reliable, low-maintenance service life. Refer to the motor manufacturer's service information and the name and data plate on the motor for specific maintenance that may be required. Table 3.13 lists general maintenance guidelines.

3.16.1 Electric Motor

An electric motor drives the Mixer using a sheave and pulley belted drive configuration. See Figure 3.3. Refer to the electrical data at the front of this manual, and to the name and data plate(s) on the motor for motor specifications, requirements, maintenance information, and safe operating instructions.

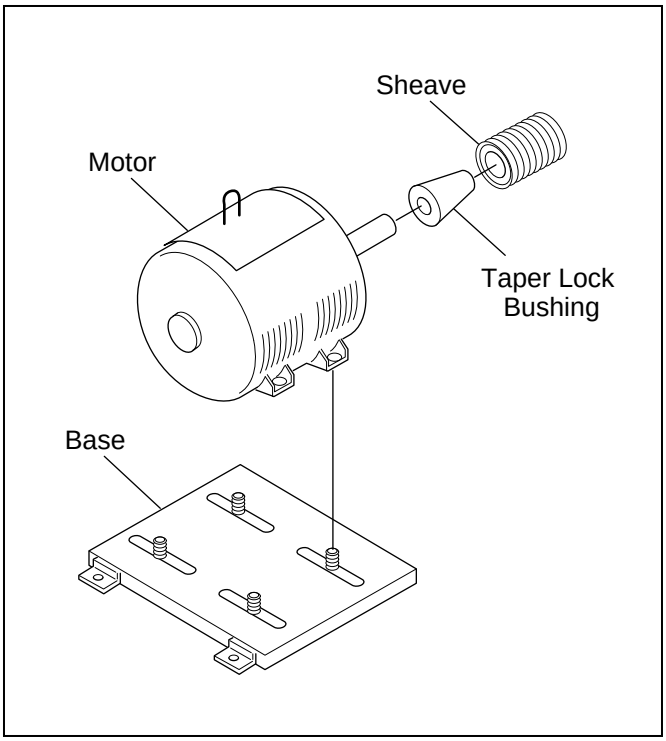


Figure 3.3 *Electric Motor and Motor Base (Typical)*

DANGER:
For safety reasons, Besser Company requires that the power source for the motor is routed through a lockable electrical disconnect.

DANGER:
High voltage. Follow lockout procedure before servicing panel or machine.

Type of Maintenance	Special Instructions	Scheduled Maintenance
Clean	• Use moderate air pressure to blow out dirt from the windings. Clean slip rings.	Every six months
Inspect connector	• Inspect and tighten all connections on motor and controls. • Repair or replace any damaged connections and wiring.	
Check current	• Check current draw and compare with normal load rating.	
Check mounting	• Inspect the mounting bolts and hardware for damage. • Retighten all mounting bolts. With motor running, verify that motor operation is smooth and vibration-free.	

Table 3.13 *Electric Motor Maintenance*

3.16.2 Electric Motor Troubleshooting

Table 3.14 lists possible motor operating problems along with probable causes and corrective actions.

Problem	Indication/Cause	Corrective Action
Motor fails to start	• Blown fuse or open circuit breaker	• Replace fuse or reset circuit breaker.
	• Overload tripped	• Check and reset overload.
	• Improper line connection	• Check connection against prints.
	• Open circuit in winding or starting switch	• Evidenced by a humming sound from motor when switch is closed. Check inside motor to determine if switch is closed. Check for loose connections.
	• Improper current supply	• Check to determine that power supply matches motor name plate specifications.
	• Mechanical failure	• Determine that motor and drive turn freely. Check bearings.
	• Short circuited stator	• Indicated by blown fuses. Motor must be rewound.
	• Poor stator coil connection	• Remove end bells and locate with a test lamp.
	• Defective rotor	• Look for broken bars or end rings. Replace rotor.
	• With 3-phase power source, one phase may be open	• Check line for open phase. Locate and repair.
	• Defective capacitor	• Replace capacitor.
Motor stalls	• Low line voltage	• Check across AC line and correct if possible.
Motor runs and then stops	• Partial loss of line voltage	• Check for loose connections. Check for proper main power supply.
	• Stator shorts when motor warms up	• Replace stator.
Motor does not come up to speed	• Voltage too low at motor terminals	• Check across AC line an correct if possible.
	• Broken rotor bars	• Look for broken bars or end rings. Replace rotor.
Motor takes too long to accelerate	• Loose connections	• Check connections and tighten where necessary

Table 3.14 *Electric Motor Troubleshooting*

Problem	Indication/Cause	Corrective Action
Motor overheats above nameplate specification	• Motor fan may be clogged with dirt preventing proper ventilation	• Remove fan cover and clean.
	• With 3-phase power source, one phase may be open	• Check to insure that all connections are tight.
	• Partially shorted stator coil	• Rewind motor.
	• Line voltage too high	• Check across AC line and correct. Consult power company. Step-down transformer may be required.
	• Line voltage too low	• Check across AC line. Consult power company. Step-up transformer may be required.
	• Rotor rubs stator bore	• Replace bearings and seals.
	• Worn bearings	• Replace bearings and seals.
Motor vibrates	• Motor mounting bolts are loose	• Tighten mounting bolts.
	• Drive equipment is unbalanced or worn	• Check balance, repair or replace drive equipment.
	• Worn motor bearings	• Replace bearings and seals.
	• 3-phase motor is running on single phase	• Check for open circuit and correct.
	• Bent motor shaft	• Replace shaft or rotor.

Table 3.14 *Electric Motor Troubleshooting – Continued*

3.17 TRABON PUMP MAINTENANCE

The adjustments covered in this section are:

- Pump in-feed pressure.
- Pump stroke
- Flow control
- Filling the grease pump.

For more complete instructions on the Trabon pump, refer to *Trabon Pump Owner's Service Manual* (Part Number 437629F913).

WARNING:
Be very careful while adjusting or troubleshooting the lube system that the machine is not turning, and the main drive motor is off.

3.17.1 Trabon In-Feed Pressure Adjustment

The Trabon pneumatic pump has an air-to-lube ratio of 30 to 1. The Trabon in-feed air pressure on many Besser Vibrapacs is supplied from the Bescodyne main drive brake air regulator. In this case when the brake regulator adjustment is changed, it also affects the Trabon pump. The Trabon pump pressure ideally should be 60 – 80 psi [4.1 – 5.5 bar], which can develop at least 1800 psi [124 bar] pumping pressure.

Note:
It may be advantageous to connect your Trabon pump to the Bescodyne main drive clutch rather than to the brake. The clutch air pressure adjustment is higher than the brake. Starting in 1991, Besser block machines have a separate air regulator supplied to the Trabon pumps. The plastic air solenoids on double acting pumps may not operate with less than 70 psi [4.8 bar].

3.17.2 Trabon Piston Stroke Adjustment

AL-5M Pump stroke adjustment for Besser block machines:

On AL-5M pumps, we recommended in the past a setting of .020 which would be 20 thousandths cubic inches of grease per stroke or .328 cubic centimeters. .020 is the middle of three calibration marks.

On the right side of the pump, remove the calibrated silver cap. Put the open end of the cap up against the locknut. The stroke is how far the screw sticks out and matches the calibrations on the cap. To adjust the stroke, loosen the locknut on the adjustment screw. Turn the screw inward or clockwise to reduce the stroke. Turn the screw outward or counterclockwise to increase the stroke. The locknut has to be retightened and the cap placed up against it again to recheck the settings after you change them. After final adjustment, tighten locknut, then tighten silver cap onto the adjustment screw.

L-25M Pump stroke adjustment:

On AL-25M pumps used on block machines, set the pump stroke on the mark between the 30 line and the .075 line. This will be a setting of approximately .052 cubic inches which is equal to .853 cubic centimeters. The method of adjustment is described and shown in the Pump owner's manual on page 4-2 and 4-3.

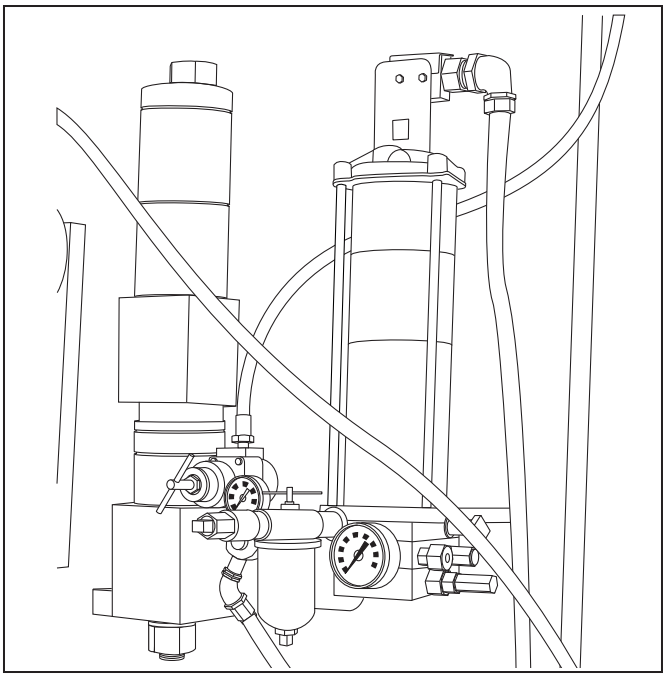


Figure 3.4 *The Trabon Lube Pump*

AL-25M Pump stroke adjustment for Besser slump mixers:

Set the stroke adjustment for .030 cubic inches, .492 cubic centimeters for AL-5M and AL-25M pumps.

3.17.3 Trabon Solenoid Flow Control Adjustment for ALS Pumps

The solenoid flow adjustment controls the speed at which the Trabon air piston shifts. The solenoid flow controls should be adjusted to get a gentle but positive shift of the piston without slamming.

Single acting ALS pumps have one flow adjustment which controls the in-feed air into the SA port. Depending on the air plumbing, you may have to use an offset screwdriver to adjust the flow control.

Turn the solenoid adjusting screw clockwise all the way in. Back the adjusting screw out 1/16 to 1/4 turn. Press the manual shifting override button on the air solenoid.

You should be able to hear the air piston shifting and the exhaust air exiting the DA port. Adjust the solenoid as slow as possible while still getting a positive shift of the piston. If you place your hand on the air cylinder of the Trabon pump, you should also be able to feel it shifting.

3.17.4 Trabon Solenoid Flow Control Adjustment for ALJ Pumps

On the double-acting pumps when the solenoid flow controls are adjusted, the exhaust air flow is also adjusted. When the Trabon air piston shifts forward, air flows in the SA port and out the DA port. So, to adjust the speed of the piston shift forward, turn the front or right hand flow control which adjusts the air coming out of the DA port. Loosen the locknuts and turn both screws all the way clockwise to shut off the flow. Start by backing both screws out 1/2 turn and testing the pump shift with the plastic manual override button. The reverse speed is controlled by air for the most part, but the return spring will also be helping. The reverse speed is controlled by the exhaust air coming out of the SA port which is the back or left hand flow control. Set both flow control adjustments to obtain a positive shift without a hard, slamming action. When adjustments are completed, tighten the locknuts so the adjustment screws cannot move out of adjustment.

3.17.5 Filling the Grease Pump

Grease To Use:

We recommend Lithium based EP#1 grease, such as Shell Alvania EP#1, or Mobilux EP#1. In colder climates and/or in colder months, Shell Alvania EP#0, Mobilux EP#0, or grease with equivalent specifications may be used.

Filling the Pump:

The Trabon Pump, on the average, should be filled with grease after 35 hours of operation. It is best if the pump never runs out of grease because excessive air can be introduced into the system. Before filling the pump, turn the filter handle a few times to clean it. Attach a filling pump hose to the fill stud quick disconnect located just ahead of the filter.

WARNING:
If a high pressure supply pump is used to fill the Trabon grease reservoirs, wear safety glasses. Pressure could build up high enough to fracture the reservoir and send particles flying.

Note:
If air does get into the automatic greasing system, refer to the proper sections:

1. To bleed air from the Reservoir, refer to Section 1 in Pump owner's manual.
2. To bleed air from the Pump, refer to Section 6 in Pump owner's manual.
3. To bleed air from the Feeder Blocks and Grease Lines, refer to Section 9 in Pump owner's manual.

Operate the filler pump at a steady speed to allow air-free filling of the reservoir. Filling the pump too fast may form air pockets. Also to avoid inducing air into the pump, make sure there is enough grease in the supply source to fill the reservoir without disconnecting and reconnecting the filler hose. While filling the pump, watch the grease level rise. Stop adding grease when the level reaches the air bleed hole.

Note:
Never fill over the air bleed hole; this will cause a vapor lock in the system. The air bleed hole is found about 2/3, the way up the plastic reservoir on the right. When filling is complete, turn the supply source off and disconnect supply line from the fill stud. Install the plastic dust cap over the fill stud to keep dirt out of the lube system.

3.18 BEARING MAINTENANCE

Remember these Do's and Don'ts when handling bearings:

	DO:	DON'T:
1.	Remove all outside dirt from housing before exposing bearing.	Work in dirty surroundings.
2.	Treat a used bearing as carefully as you would a new one.	Use dirty, brittle or chipped tools.
3.	Work with clean tools in clean surroundings.	Use wooden pallets or work on wooden bench tops.
4.	Handle with clean, dry hands, or preferably with clean canvas gloves.	Handle with dirty, moist hands.
5.	Use clean solvents and flushing oils.	Use gasoline containing tetraethyl lead, as they may be injurious to health.
6.	Lay bearings out on clean paper.	Spin unclean bearings.
7.	Protect disassembled bearings from rust and dirt.	Spin bearings with compressed air.
8.	Use clean lint-free cloths or rags to wipe bearings.	Use cotton waste or dirty cloths to wipe bearings.
9.	Keep bearings wrapped in oil proof paper when not in use.	Expose bearings to rust or dirt.
10.	Clean inside of housing before replacing bearing.	Nick or scratch bearing surface faces.

3.18.1 Lubrication Tips

Lubrication is essential for the proper operation of bearings. Grease and oil are both used over a considerable range of speeds and operating temperatures. The choice of the type of lubricant should be made only after careful consideration of the several factors involved.

1. Keep lubricants clean. Dirt causes most bearing failures, and one easy way for it to get to bearings is to be put there in the grease. Keep covers tight on all grease cans. Use only clean dishes and clean spatulas with grease. Keep grease stored away from all dust, dirt, and metal chips,
2. Standardize your greasing procedures. Make sure all maintenance personnel understand proper greasing methods. Do not let inexperienced personnel take over greasing; it is too important. Establish precise instructions regarding cleaning of greasing equipment, grease fittings, grease cups (before refilling them). Oil cups and grease fittings can be marked with colored paints to systemize your relubrication.
3. Relubricate on schedule. Do not wait for trouble to signal the need for additional lubrication. Relubrication schedules should be posted on machines.
4. Use only high grade grease in bearings. Low grade grease is a false economy. Its use usually results in shortened bearing life. Also, try to use the grease recommended by the machine manufacturer.
5. Over-greasing is bad. It causes churning of the lubricant and subsequent overheating. If bearing runs hot after relubrication, open the drain plug and let some of the grease run out while the bearing is operating. Never fill end-bells more than 1/3 full when re-greasing.
6. Never start a new machine until the bearings have been lubricated according to directions.

3.18.2 Watch for Dirt

The most important precaution to be observed in handling or using bearings is to keep them clean. Dirt is the greatest enemy of bearings. It causes wear, destroys their accuracy, and shortens their life. To the bearing user, metal chips, grit, abrasive, dust, etc., are all dirt. Avoid them.

3.18.3 Preventive Maintenance

Have a perfectly clean work bench on which to place bearings before and after cleaning. Place the bearing in a degreaser or in a container of appropriate solvent such as standard solvent, kerosene, methyl-chloroform, or similar solvents. “Swirl” the bearing around in the cleaning solvent allowing it to wash through the bearing, carrying away any grit particles and dissolving all oil or grease. Finally, slowly revolve the inner ring so the cleaning solvent reaches all parts of the bearing. Do not allow the bearing to rest on the bottom of the container. Cleaning of a bearing interior around the balls or rollers is often done with a normal paint brush. This is a satisfactory practice although care should be taken to use a good quality brush which does not lose its bristles, and that none of the bristles become lodged between the balls or rollers and separators or rings. A piece of bristle can be as harmful as a steel chip.

Once in, dirt is hard to get out. A clean bearing placed on a dusty bench always becomes contaminated. Dirt, once entrenched in the separator, is exceedingly difficult to remove. Make cleanliness your first rule for working with bearings.

Bearings with closures on both sides should not be cleaned by dipping, spraying and the like, which would wash out the grease. The outer surfaces of such bearings may be carefully wiped with a lint-free cloth and light oil or solvent, after which they can be lightly coated with a protective lubricant, and wrapped to protect against dirt and corrosion.

Throughout the cleaning process, and especially where a bearing has been solvent cleaned, remember that corrosion can be caused by perspiration from hands.

So if a bearing has been solvent cleaned, wipe it carefully before applying a protective oil coat.

CAUTION:
Never use unfiltered air. Make sure all traces of water and dirt in the air line are trapped out. Dirty air can blow dust into the bearing ruining careful cleaning work. Never allow the air blast to spin a bearing. If you must use air, hold bearing and hose carefully.

3.18.4 Relubricate After Cleaning

Always re-lubricate bearings immediately after they have been cleaned. Immerse in light clean oil and rotate the inner ring very slowly until all the solvent has been removed. Oil has a tendency to slip away from metal surfaces already wet with solvents, leaving the bearing surfaces unprotected and in danger of rust and corrosion.

3.18.5 Rewrap After Cleaning

Immediately after re-lubricating the bearing, wrap well in clean polyethylene or oiled paper. Replace in its box, making sure that inside of box is also clean. Reseal the box. A good shop practice is to write on the sealing tape the date of cleaning, the type of lubricant, and the name of the person cleaning the bearing.

3.18.6 Bearing Removal

Bearings may have to be removed as part of an overhaul program to service another part, or to replace the bearing. In any case, even if the bearing is an obvious failure, it should be removed with care to avoid damage to the shaft, housing or other machine parts and to avoid obliterating the cause of failure.

As mentioned before, at least one of the bearing rings is press fitted sometimes to a very tight fit. At this point, we are concerned largely with the proper handling of press fitted parts.

The first basic principle is that no press fit should be broken unless it is essential to the job being done. Many roller bearings are separable and when it is certain the bearing itself has not been damaged, it is best to leave the press fitted member in place. In addition to the time and trouble involved, removal may cause damage to the bearing seat. However, if any failure is evident, the entire bearing should be replaced. The second basic principle is that, in removing a ring, the driving force be directed through the inner or outer ring which is being removed, and not be transmitted through the balls, rollers, separators, closures and the like.

The familiar arbor press is a very good machine for removing (or installing) bearings. if action is rapid, smooth and positive. In addition, it can supply a greater force than most other means. Further, it is a useful shop accessory for many other types of work. Unfortunately, space restrictions prevent its use in many jobs.

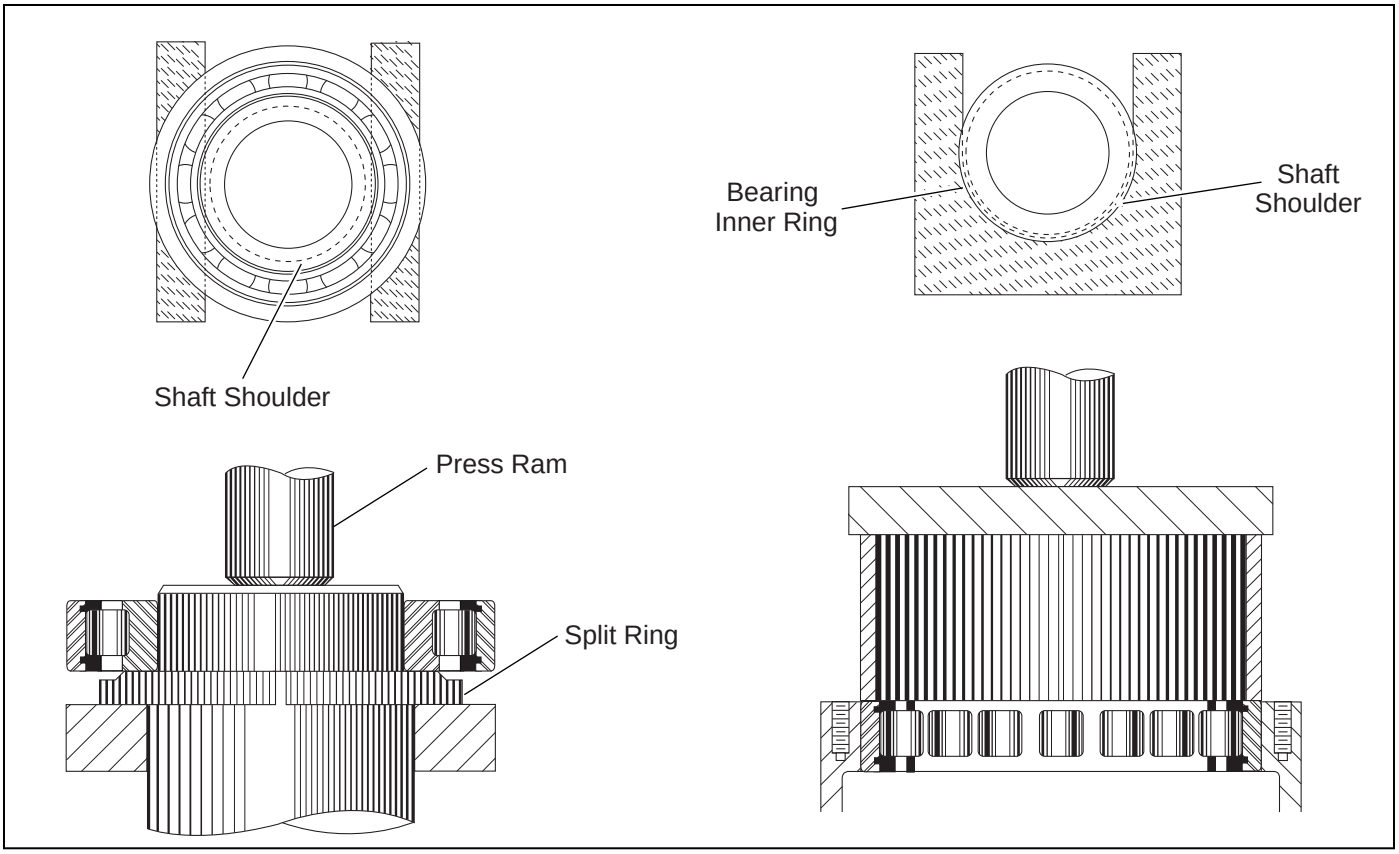


Figure 3.5 *Bearings*

The arbor press requires various fixtures as an aid to removing or installing bearings. Although some of these aids are not inexpensive to make, their use is justified by the saving in time and by the freedom from damage to the equipment under repair. This is especially true if the job is a repetitive one.

The best fixture for pressing off inner rings from a shaft is a split ring with the outer area relieved. For most roller bearings, flat bars or U-shaped washers as shown here are quite satisfactory. They are not recommended for ball bearings since the outer ring or the closure may project beyond the inner ring face a small amount. A possible solution to this problem is to insert a small piece of shim stock about 0.01 inch [0.25 mm] thick between the fixture and the inner ring face. Also, an interference condition can be checked by oscillating the outer ring while applying a little pressure.

The arbor press can also be used to remove outer rings from housings in those cases where the housing can be handled in the arbor press and where a portion of the outer ring is exposed. In the event the entire outer ring is exposed, a section of tubing capped by a flat bar can be used as illustrated. In other cases, where there is axial space restriction, a fiat bar can sometimes be inserted to bear against the face.

Next to the arbor press, the puller is the best removal tool and is often necessary because of size and space restrictions in the arbor press. Pullers are made in different configurations and sizes and with accessories to make them adaptable to various jobs. Larger sizes are available with a hydraulic piston and hand pump.

As with the arbor press, the pressure must be applied directly through the press fitted member. In addition, where screw adjustments to the arms are made, care should be taken to pull the press fitted part off straight and true. It is advisable to use a piece of soft metal in the shaft center to prevent scoring due to the pressure of the puller screws.

The least desirable method is removal of inner and outer rings by driving with a hammer. Where machine shop facilities are available, it may be worth the effort to build a simple puller adapted to the job, especially if it is repetitive.

The use of a hammer and drift directly in the ring is very bad practice. An auxiliary fixture as shown here should be used.

Large roller bearing inner rings are particularly difficult to remove by any of the methods given here. Usually, these rings are separable and it is necessary to destroy them by heating or splitting. No specific instructions can be given here except that ail attempts should be made to prevent damage to the shaft.

3.18.7 Identification Damage and Failure on Bearings

INSPECTION:

When a machine or other piece of equipment is down for repair, the objective of the maintenance personnel is to repair it and get it going as soon as possible. However, some knowledge of bearing failure and damage identification is required to determine:

1. Whether the bearing is suitable for further service.
2. If there is some underlying cause for failure so that corrective measures can be applied before installing a new bearing. Here are some inspection tips and techniques to be used before or during machine dismantling Before removing or replacing a “noisy” bearing, try to determine if the bearing is the cause. To start with, a common complaint is that the bearing is “noisy”. This is a natural reaction of machine users to unusual noise emanating from a machine. Generally, a noisy bearing produces a continuous whine. A pulsating noise is usually the result of a malfunction of some other part. It must be remembered too that all ball and roller bearings have some noise level. Bearings in good condition tend to produce a pleasant sound compared to a harsh sound from one that is not functioning properly. Another point to remember is that a noisy machine is not always a sign of imminent bearing failure, but may indicate the need for lubrication.

   On dismantling a machine, it is often possible to make pertinent examination of the bearing without removing it from the shaft or housing.

3.19 DISCHARGE GATE SAFETY STOP

3.19.1 Safety Stop Insertion

1. Follow complete lockout procedures. See Section 3.2.
2. Properly lockout automatic gate controls.
3. Clear area around discharge gate of personnel.
4. Manually open discharge gate using gate valve pushbutton.
5. While keeping hands away from gate arm and cylinder clevis. Refer to print number 466318:
   - Remove quick release pin
   - Position safety stop in locked position
   - Insert quick release pin as shown at “B”
6. Clear area around gate of personnel.
7. Exhaust air to gate valve and gate cylinder using dump valve. Refer to print number 467493. Gate arm should lower against safety stop. If gate does not lower against safety stop, correct the problem.
8. Lockout dump valve.
9. Using your shop’s authorized key and lock system, secure the main power switch in the lockout position.
10. Remove your key from the lock and keep the key with you at all times while performing system maintenance.
11. Test lockout.

3.19.2 Safety Stop Removal

1. Properly lockout automatic gate controls.
2. Clear area around discharge gate of personnel.
3. Remove dump valve lock.
4. Provide air to gate cylinder and cylinder valve by manually positioning dump valve. Refer to print number 467493.
5. Manually open discharge gate using gate valve pushbutton.
6. While keeping hands away from gate arm and cylinder clevis Refer to print number 466318:
   - Remove quick release pin
   - Position safety stop in unlock position and insert quick release pin at “C”
7. Reposition guards, etc.
8. Remove automatic gate control lockout.

3.20 STANDARD GATE ADJUSTMENT

1. Lockout the machinery and observe the safety precautions, making sure the correct lockouts and tags are in place. See Section 3.2.
2. With gate in closed position and cylinder rod bottomed, adjust link rods so gate closes uniformly.
3. Place a straight edge across the top of the gate operating shaft and pin as shown. Dimension between straight edge and pin should be 3/8 inch as shown in Figure 3.6 at point A.
4. If dimension is not 3/8 inch, it is first necessary to estimate adjustment required. A 1/4 inch dimension of the rod end will result in approximately 5/16 inch movement of pin.
5. Operate cylinder to partially open gate.
6. Lockout air supply.
7. Remove cotter pin from pin as shown in Figure 3.6 at point B.
8. Remove pin.
9. Loosen locknut.
10. Turn rod-end to obtain 3/8 inch dimension.
11. Reassemble and check for 3/8 inch dimension.
12. If 3/8 inch cannot be accomplished with above procedure, shim as shown in Figure 3.6 at point C as necessary.

3.21 SEAL ALIGNMENT TO DRIVE SHAFT

1. Lockout the machinery and observe the safety precautions, making sure the correct lockouts and tags are in place. See Section 3.2.
2. Verify the seal alignment on the drive shaft.
3. The seal should be centered on drive shaft within .003 inches TIR.
4. If necessary, correct as required. Refer to Besser drawing #481199.
5. After starting Mixer, check seal for leakage. Correct seal to shaft alignment as needed.
6. Check for seal leakage every hour of first day of operation. Align seal to shaft as necessary.
7. If seal performs properly, check seal for leakage daily.

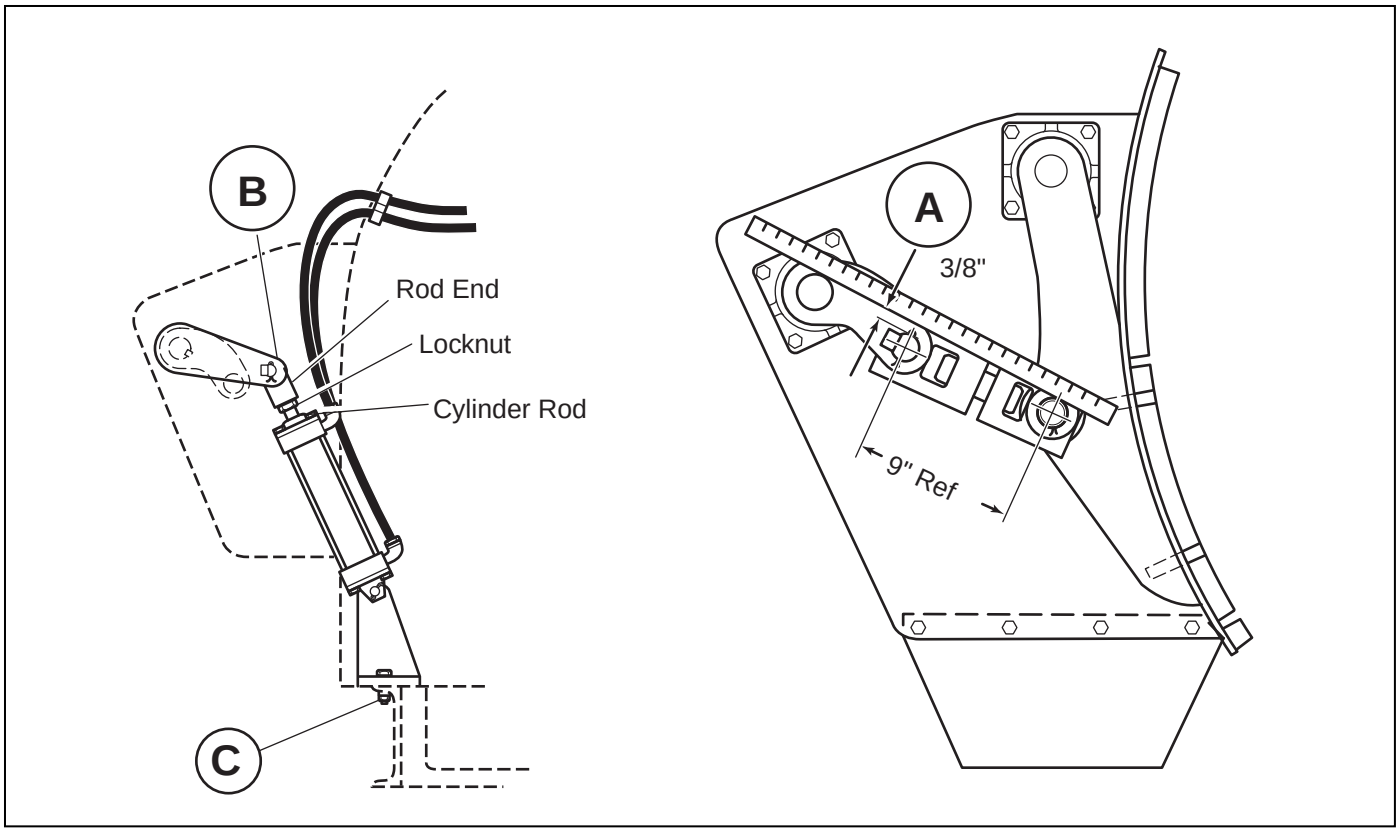


Figure 3.6 *Adjusting Standard Gate*

3.22 PINION AND GEAR ALIGNMENT

If the pulley shaft pinion on your Mixer is not in proper alignment with the gear, it will cause excessive wear on one side of the pinion.

The following procedure is a simple method for aligning the pinion and gear.

1. Lockout the machinery and observe the safety precautions, making sure the correct lockouts and tags are in place. See Section 3.2.
2. After the pulley shaft has been assembled in place on the Mixer, leave the bearing holder bolts loose, then check to be sure there is a .020 ± .005 inch clearance between the pinion and gear as shown in Figure 3.7 at point A. This clearance should be checked at 90° intervals being careful to remain within the tolerances as shown.

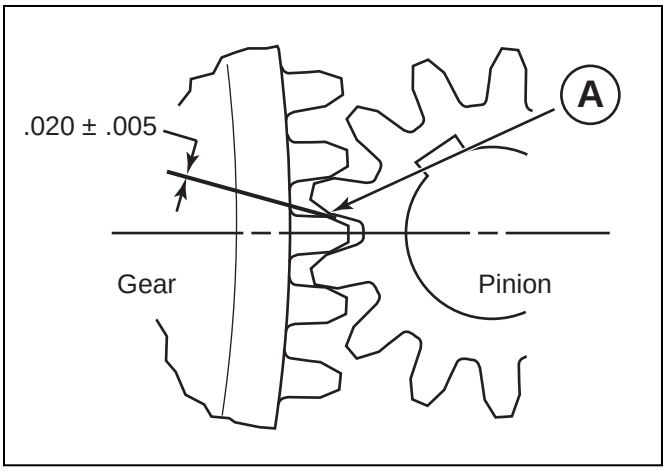


Figure 3.7 *Mixer Gear and Pinion*

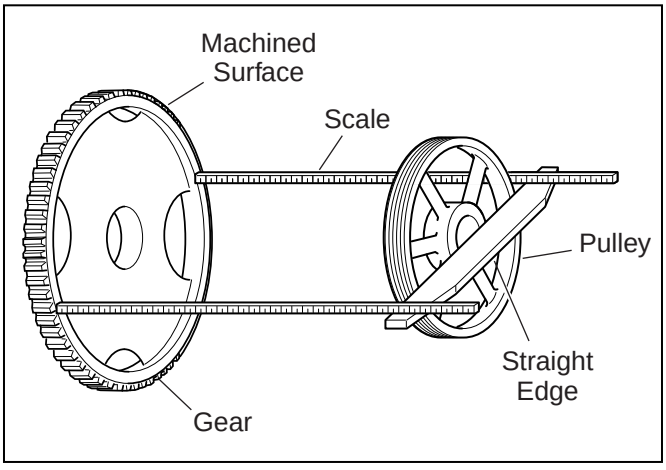


Figure 3.8 *Positioning Horizontally*

3. Place a straight edge horizontally across the face of the pulley and measure the distance from the machined edge of the gear to the straight edge on both sides of the pulley, as shown in Figure 3.8. If these two distances are of equal length, the pinion and gear will be in alignment horizontally.
4. To align vertically, follow the same procedure as above using the straight edge in a vertical position as shown in Figure 3.9.
5. After the above alignments have been made, tighten the bearing holder bolts.

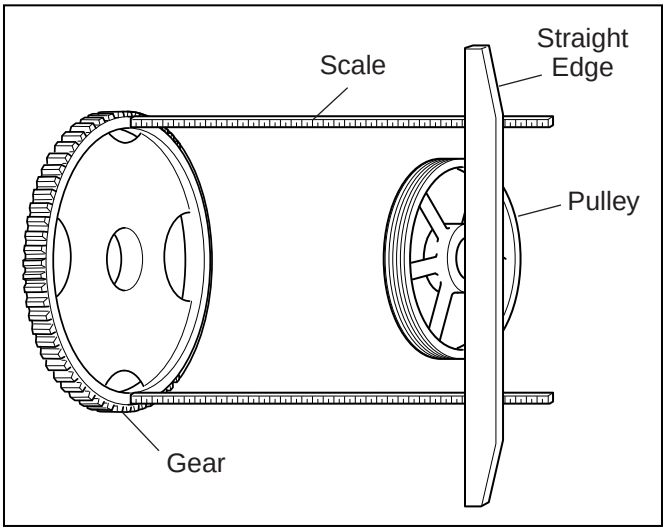


Figure 3.9 *Positioning Vertically*

3.23 CLEANING RINGS REPLACEMENT*

Besser Company drawing number 292016 and Table 3.15 show the ring sizes and their Mixer locations.

Cleaning rings must be replaced when worn to a thickness of 3/4 inch [19.05 mm] at any point on the ring. To replace rings:

1. Lock out the machinery and observe the safety precautions, making sure the correct lock outs and tags are in place. See Section 3.2.
2. Remove the worn cleaning rings
3. Weld the two halves of the new cleaning rings together around the shaft or arm. See Figure 3.10. Refer to print numbers 420979, 420980 and 448328 for welding instructions.
4. Weld plates to blade arms (292016). See Figure 3.10.

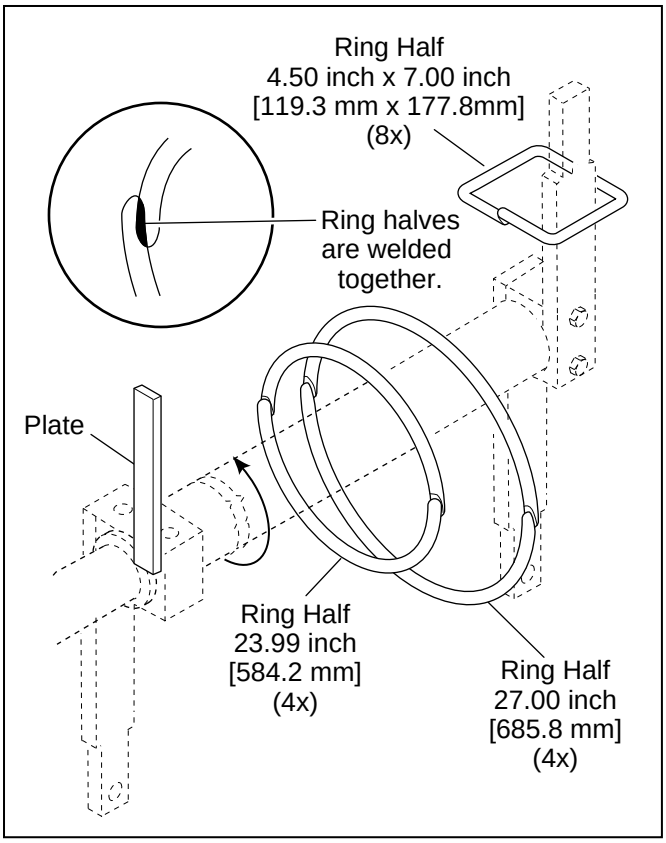


Figure 3.10 *Blade Shaft Cleaning Ring Assembly*

Location	Dimensions	Quantity Required
Blade shaft	23 inch [584.2 mm] Dia	4
Blade shaft	27 inch [685.8 mm] Dia	4
Blade arm	4.5 inch x 7 inch [114.3 mm x 177.8 mm] Dia	8

Table 3.15 *Cleaning Ring Dimensions and Locations*

3.24 BLADES WITH WEAR LINERS*

The first batch for a Mixer with blade wear liners, is referred to as a "grouting batch." The "grouting batch" fills the void between the backup blade and blade liners providing support to blade liners. Often, a Besser Sales and Service Representative runs the grouting batch. For more information about the grouting procedure, refer to Besser Company print number 360464, and Section 2.6.

3.25 LESUEUR TROUGH LINERS REPLACEMENT*

This procedure is specifically for the LeSueur probe liners. It can be adapted for other liners. Replace liners when cracked or worn down to the bolt head. See Section 3.2.6.

1. Remove and discard the probe liner. This liner measures about 12 inch [304.8 mm] x 15 inch [381 mm] and is located just below the discharge door near the Mixer center. Cut two 4 inch [101.6 mm] diameter holes, as needed, to let the raised portion of the rear of the liner pass through the Mixer shell.
2. Check and clean the Mixer shell where the new LeSueur plate will be installed. The shell must be clean before installing the LeSueur electrode plate.
3. Connect the electrode circuit wires from the LeSueur Moisture Master to the threaded connection in the probe bolt stem on the rear of the electrode plate. This can be done by clamping a piece of #10 gauge stranded copper wire in the connector, and then soldering the #10 wire to the wire from the Moisture Master.
4. Adjust the Mixer blades to the largest diameter aggregate used to minimize wear. Re-adjust the Mixer blades when spacing between the electrode plate and Mixer blade equals two times the diameter of the largest aggregate. If the spacing exceeds this amount due to component wear, moisture error will occur.

IMPORTANT:
Be careful when tightening the liner mounting bolts. Tighten the bolts only to where the lock washers are flat. Do not tighten the bolts past that point. Although the plates are made from very hard material (Ni-Hard), they are fragile and can be easily broken.

5. Tighten the mounting bolts.

3.26 MIXER MAINTENANCE REFERENCE DRAWINGS AND NOTES

NOTE:
Drawings listed below are current when catalog was produced, check your group part list for the drawings for your Mixer.

	Description	Drawing Number
	Decals	
1.	Decals and Nameplates – Location a. Replace when safety sign is damaged or not readable.	431251
	Liners	
2.	Trough Liners – All a. Do not over-tighten bolts. Torque bolts to just flatten lockwasher. b. Replace liners when cracked. c. Replace liners when worn down to bolt head.	332752
3.	ARC Moisture Probe Liners – ground (No Probes) a. Adjust blade to probe gap to maintain proper moisture probe operation.	467490
4.	ARC Moisture Probe Liners – Microwave (No Probes) a. Adjust blade to probe gap to maintain proper moisture probe operation.	481202
5.	Ramsey Probe Liners a. Adjust blade to probe gap to maintain proper moisture probe operation.	——
6.	Lesueur Probe Liners a. Adjust blade to probe gap to maintain proper moisture probe operation.	——
7.	Head Liners a. Replace when thickness is 1/4 inch or less	——
	Blades, Blade Arms, Cleaning Rings, Etc.	
8.	Blades – One Piece a. Assembly instruction b. Adjust blades to maintain blade to trough liner gap to minimize concrete build up and proper moisture probe operation. • Blade to trough liner space equals 5/8 inch – 1 inch. • Blade to head liner space equals 5/8 inch – 1 1/4 inch. c. Besser does not recommend welding blades. Replace blades if cracking or breakage occurs. d. Replace blades, head liners and/or trough liners when the specifications (5/8 inch – 1 inch or 5/8 inch – 1 1/4 inch) above cannot be met.	245002 361545
9.	Blades – with Liners a. Assembly instruction b. Blade grout procedure c. Adjust blades to maintain blade to trough liner gap to minimize concrete build up and proper moisture probe operation. • Blade to trough liner space equals 5/8 inch – 1 inch. • Blade to head liner space equals 5/8 inch – 1.25 inch.	347528 361545 360464

Table 3.16 *Mixer Reference Drawings*

	Description	Drawing Number
	d. Besser does not recommend welding blades. Replace blades if cracking or breakage occurs. e. If one blade liner breaks, it can be replaced if the new liner can be adjusted even with the other liners. f. Replace blades, blade liners, head liners and/or trough liners when the specifications (5/8 inch – 1 inch, or 5/8 inch – 1 1/4 inch) above cannot be met.	
10.	Blade Shaft Assembly with Arms	312507
11.	Blade Shaft Bearings a. If Mixer is equipped with auto lube system, check if grease is supplied to both bearings. b. Listen for bearing rough running noises and look for wobble in blade shaft as it rotates. c. Any excess heat in a bearing indicates problems. d. The bearings should be removed from housing, cleaned, and visually inspected yearly.	
12.	Blade Shaft Subassembly	312506
13.	Cleaning Ring Assembly a. Replace rings when welds or ring are cracked. b. Replace rings when ring is less than 3/4 inch diameter in any location. c. For welding instructions refer to: • Blade shaft cleaning rings • Blade arm cleaning rings	292016 420979, 420980 448328
14.	Blade Shaft covers a. Replace when welds or cover are cracked. b. Replace when less than 1/8 inch thick in any location.	313565
15.	Head Scrapers a. Adjust scraper to maintain head scraper to head liner gap of 1/4 inch – 1/2 inch to minimize concrete build up. b. Inspect for straightness and thickness. Replace scraper when it is 1/2 inch or less thick. c. Assemble 90° in back of (following) leading end of Mixer blade.	262742
16.	Dust Hub Seals a. Check for leakage at blade shaft b. If mixer is equipped with auto lube system, check if air and grease are supplied to dust hub.	312507
	Drive	
17.	Drive Shaft Assembly – with Clutch a. Oil seal – split – gear case – install b. Clutch – See Section 1.5.3 c. Gear alignment d. Pressure switch – air clutch e. Solenoid valve assembly – air clutch	356462 481199 110034 072975 383834 467494

Table 3.16 *Mixer Reference Drawings – Continued*

	Description	Drawing Number
	f. Belts • Check belt tension. • Replace belts in complete set.	——
	g. Sheaves	——
18.	Drive Shaft Assembly – without Clutch	363501
	a. Oil seal – split – gear case – install	481199
	b. Gear alignment	072975
	c. Belts • Check belt tension • Replace belts in complete sets	——
	d. Sheaves	——
19.	Drive Shaft Bearings (Spherical, Roller, and 2 Plain Bearings)	
	a. Spherical and roller bearings • If Mixer is equipped with auto lube system, check if grease is supplied to the bearings. • Listen for bearing rough running noises and look for wobble in drive shaft as it rotates. • The bearings should be removed from housing and visually inspected yearly.	
	b. Plain bearings (inside guard) • Check to determine if they have been manually lubricated. • Listen for bearing rough running noises and look for wobble in pulley as it rotates. Pulley wobble should not exceed .093 inch. Check pulley wobble with belts removed every time belts are changed.	
	c. Any excess heat in a bearing indicates problems.	
20.	Electric Motor – (See Section 3.16)	
	Discharge Gate	
21.	Safety Stop – Discharge Gate (See Section 3.12)	466318
22.	Air Cylinder Subassembly – Discharge Gate	265776
23.	Discharge Gate Assembly – Eccentric – with Chute a. Make sure the gate is opening and closing properly. Adjust if necessary. See Section 3.19 and 3.20.	234088
24.	Solenoid Valve Assembly – Gate	467493
	Bottom Cleanout Gate	
25.	Manual Mechanical Cleanout Gate a. Make sure the gate is opening and closing properly. Adjust if necessary.	257212
26.	Manually Actuated, Air Operated, Cleanout Gate a. Make sure the gate is opening and closing properly. Adjust if necessary.	266644
	Lubrication System (Optional)	
27.	Weekly, make sure the pump is filled with the proper grease and observe the pump to see that it is pumping grease. Inspect the master feeder block, and the lubrication lines to confirm that they are properly supplying grease to all of the lube points. (See Section 3.17).	437629F9103

Table 3.16 *Mixer Reference Drawings – Continued*

	Description	Drawing Number
	Electrical (See Electrical Section)	
28.	Check All Switch Settings Daily	
29.	Mixer Gate and Clutch Control Circuit	283723
30.	Electric Interlock to Batch Controls	384561
31.	Elementary Wiring Diagram – Zero Speed, Underspeed, etc.	472068

Table 3.16 *Mixer Reference Drawings – Continued*