
OPERATING AND MAINTENANCE MANUAL

Mikro-ACM[®] CX Models 200 and 300

Record the model and serial number of your equipment and always refer to them when ordering replacement parts or requesting service assistance.

For replacement parts or service, call (800) 526-4491.



HOSOKAWA MICRON POWDER SYSTEMS

10 Chatham Road, Summit, NJ 07901 • Tel. (908) 273-6360 • Fax (908) 273-7432

Aftermarket Services

Thank you for choosing Hosokawa Micron Powder Systems as your supplier of powder processing equipment.

As a Hosokawa Micron Powder Systems customer, you receive much more than high quality equipment and spare parts. Your purchase is supported by our extensive resources and more than seventy years of applications experience, all of which are combined in our Aftermarket Services team.

We will work with your operators, engineers and managers to keep your powder processing lines up and running. When you're ready to automate, integrate, modernize or expand, call us—we're ready to help.

PROCESS TECHNOLOGY

Our Process Technology Department consists of engineers who are dedicated to providing state-of-the-art powder processing assistance.

- System optimization
- Process troubleshooting
- Technical seminars
- Installation consultation
- System upgrades

MECHANICAL FIELD SERVICE

Our Mechanical Field Service group has been through extensive training and has experience providing:

- Mechanical start-up
- Mechanical repair
- Maintenance seminars
- Mechanical inspections/evaluations

ELECTRICAL DESIGN/CONTROLS

Our Electrical Design/Controls Department designs all of our control systems, from basic relay logic to automated PLC-based systems.

- Electrical start-up assistance
- Electrical repair or troubleshooting
- Control System consultation
- Control System upgrades

SPARE PARTS

Our Spare Parts Department works closely with our Procurement and Manufacturing personnel to ensure promptness of spare parts order deliveries.

- Blanket spare parts orders
- In-house factory repair
- In-house rebuilds/refurbishing
- Quantity discounts
- 24-hour delivery of stock items

Contents

<u>INTRODUCTION</u>	<u>INSTALLATION</u>	<u>BILL OF MATERIALS</u>
Grinding Variables 1	Unloading & Inspection 7	Fig. 9. Cross Section 15
	Locating the Mill 7	Fig. 10. Feed Screw 16
	Assembly 7	Fig. 11. Bearing Housing 17
<u>PROCESS DESCRIPTION</u>	Initial Startup 7	
Fig. 1. Grinding & Classifying Zones. 2	Initial Lubrication 8	
<u>SAFETY</u>	<u>STARTUP/SHUTDOWN</u>	
General Safety 2	Modes of Operation 8	
Safety Limit Switches 2	Pre-Startup Checklist 9	
Hazards 3	Startup Sequence 9	
Safety Features 3	Shutdown Sequence 9	
Safety Labels 4	Emergency Shutdown 9	
Fig. 2. Label Arrangement 4		
<u>EQUIPMENT DESCRIPTION</u>	<u>MAINTENANCE</u>	
Feed System 5	Temperature 10	
Grinder and Classifier 5	Vibration 10	
Fig. 3. Cross Section of Grinding and Classifying Zones 5	Lubrication 10	
Supporting Structure 5	Fig. 5. Recommended Lubricants 10	
Motors and Drives 5	Fig. 6. Lubrication Chart 11	
Electric Controls 5	Changing Bearings 11	
Fig. 4. Top & Side Views 6	Fig. 7. Bearing Housing 12	
	Replacing Parts 13	
	Troubleshooting 14	

INTRODUCTION

The Mikro-ACM® is a mechanical impact air classifier mill that achieves particle size reduction and classification in an efficient, adjustable, high-capacity operation. Material is ground by impact with rotating hammers, then delivered to a classifying zone where fine particles are extracted.

The Mikro-ACM® CX operates with two

coaxial rotating shafts: the grinding rotor shaft performs size reduction; the separator shaft performs classification. Both rotor and separator shafts turn in the same direction but are driven by separate motors.

The rotor shaft speed is constant; it operates the rotor assembly, which consists of

a disc fitted with hammers. The separator shaft speed is variable to permit particle sizing during operation.

This manual includes safety, operating and maintenance instructions for the standard coaxial Mikro-ACM® CX models 200 (200 horsepower main motor) and 300 (300 horsepower main motor).

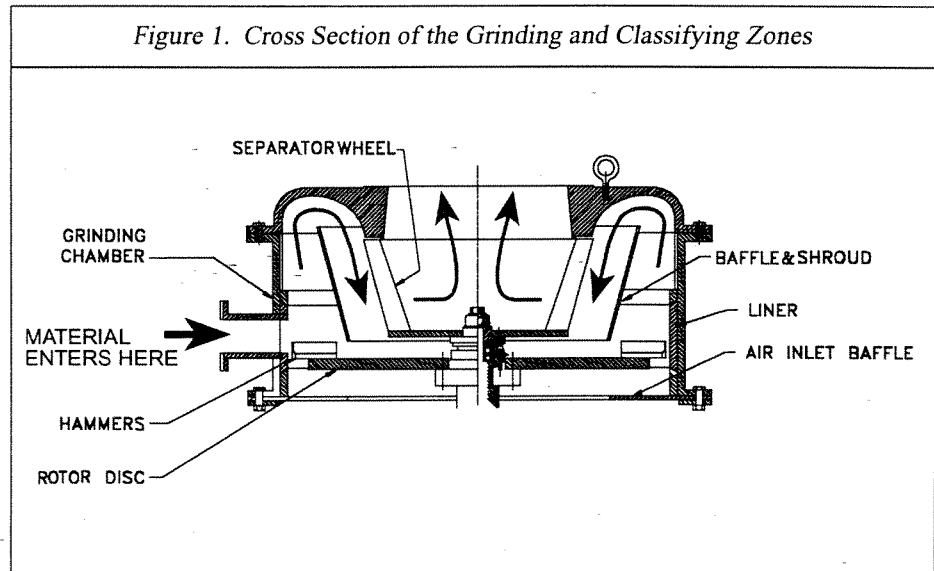
GRINDING VARIABLES

- Size, power, and configuration of the grinding rotor
 - Hammer type
- Feed material size
- Product particle size required
- Airflow through the mill

DESIGN DATA	Mikro-ACM® Model 200	Mikro-ACM® Model 300
Main Motor	200 HP	300 HP
Rotor Disc Speed (max.)	2,000 RPM	2,000 RPM
Separator Drive Motor	25 HP	30 HP
Clearances between separator blades and dispersion ring (min./max.)	.090 inches / .125 inches	.090 inches / .125 inches
Required Airflow (nominal)	13,000 CFM	13,000 CFM
Operating range for static pressure loss across the mill	25 inches - 40 inches W.G.	25 inches - 40 inches W.G.
Power Requirements	Refer to General Arrangement Drawing	
Weight (approximate)	14,650 lbs.	16,350 lbs.
Floor Area Required (approximate)	60 sq. ft. (12 ft. x 5 ft.)	60 sq. ft. (12 ft. x 5 ft.)
* All design data is for the standard unit. For information specific to your mill, refer to the general arrangement drawing.		

PROCESS DESCRIPTION

During operation, material is fed into the hopper and conveyed via the feed screw to the grinding chamber. In the grinding chamber, hammers impact the material, propelling it toward the liners that surround the grinding chamber—this contact with the hammers and liners fractures the material. Air enters the grinding chamber from the bottom of the mill and conveys the ground material around the baffle and shroud assembly, toward the separator wheel. Particles that are of acceptable fineness pass through the separator blades, whereas coarse particles are rejected and drop back into the grinding chamber for further reduction. Material is continually circulated in this manner until all particles have passed through the separator wheel.



SAFETY

GENERAL SAFETY

Before installing or operating this equipment, all individuals involved in its installation, operation and maintenance (including supervisory and management personnel) must carefully read and understand the contents of this Operating Manual.

The safety procedures and recommendations itemized in these pages must be followed and the potential hazards clearly understood. Safety features and safety guards must be in place and operational at all times.

It is the responsibility of all individuals working on or around this equipment to work safely. It is the responsibility of the owners of this equipment to see that all employees are trained in the operation of this equipment.

Do not override any safety switches or safety features of this equipment. Do not operate this equipment without safety guards in place.



If this equipment has been supplied to you without any of the components described below, all safety features and safety labels associated with those components (as described in the "Equipment Safety Features" and "Safety Labels" sections) must be in place prior to operation or maintenance: motors; drives; belt guards; feed hopper with magnetic safety grating; feed mechanism/feed trough; safety switches; safety labels.

All safety features must conform to the OSHA and ANSI standards pertaining to such safety devices and features.

SAFETY LIMIT SWITCHES

Follow the instructions below to verify operation of safety limit switches. Never test operation of limit switches while the mill is running.

1. Lock out the main power to the mill.
2. For each limit switch, use a multimeter to measure continuity across the switch terminals.
3. Deactivate the limiting conditions. If the switch is operating properly, you should no longer be able to measure continuity across the terminals.

SAFETY

HAZARDS

The principle hazards associated with operation of this equipment are:

ELECTRIC SHOCK

Electric shock will result from contact with an energized electric circuit.

Before this equipment is opened for maintenance or repair, the main power must be disconnected, the switch locked out and tagged out with an approved locking device. The motor(s) must be permanently wired to an approved NEMA enclosure, in accordance with all local codes and the National Electric Code (NEC). This equipment must be electrically and physically grounded.

DUST EXPOSURE

The area around this equipment may contain airborne dust. This dust may irritate air passages and, depending on the material, cause severe injury or death.

After consulting plant safety rules, use a suitable respirator to protect airways. Refer to the Material Safety Data Sheet (MSDS) for further safety recommendations.

NOISE LEVELS

This equipment may produce a noise level higher than the acceptable OSHA time-weighted average of 85 dBA at one meter distances. OSHA approved ear protection must be worn when working around this equipment.

FLYING PARTICLES AND OBJECTS

This equipment operates with high speed rotating parts, which may cause injury or death from flying particles or objects.

While working around this equipment,

steel-toe safety shoes and safety goggles (or safety glasses with side shields) must be worn at all times.

DUST EXPLOSION, FLAMMABILITY

Dust explosion and dust-fueled fire may cause injury, burns and death.

To reduce the possibility of static charges and sparks, this equipment must be electrically and physically grounded. To reduce the possibility of sparking in the unit, all metallic scrap and other tramp material must be separated from the feed material before it enters the unit.

Smoking and other ignition sources should be prohibited in the presence of this equipment.

HOT SURFACES

During operation, the dispersion ring surface may reach temperatures that can cause injury from burns. Before touching any part of this equipment, check surface temperatures with a thermocouple.

PINCH POINTS, SHARP EDGES

Due to high speed rotating parts, loss of fingers and hands is possible.

Keep hands and clothing clear of the feed entry, openings, air inlets and all moving parts. Do not wear loose fitting clothing around this equipment. Do not wear jewelry or gloves around this equipment.

VIBRATION

Excessive vibration is a sign of potential problems. Refer to the table "Vibration Velocity Limits." Vibration analysis and diagnosis can be performed by Hosokawa Micron Powder Systems.

SAFETY FEATURES

All equipment is designed and built with safety in mind. Component parts are carefully selected and inspected by Quality Control Personnel during fabrication and assembly. Use only genuine Hosokawa Micron Powder Systems replacement parts in your equipment. To protect individuals working on or around this equipment, a number of safety features are incorporated into its design.

SAFETY LIMIT SWITCHES

Limit switches for the dispersion ring and grinding chamber access door prevent operation of this equipment when not in place. Never bypass these switches.

ELECTRIC MOTOR INTERLOCK

The main drive motor and feed screw motors are interlocked so that the feed screw motor cannot operate unless the main drive motor is running.

MAGNETIC HOPPER GRATE

The magnetic hopper grating reduces the chance of ferrous tramp material entering the grinding chamber and prevents fingers from entering the feed mechanism and grinding chamber. This grate must always be installed with its bars parallel to the feed screw shaft.

V-BELTS AND MOVING PARTS

All v-belts are protected with safety guards. All moving parts are enclosed.

Vibration/Velocity Limits (inches per second)	
< 0.15	Ideal
0.15 – 0.20	Normal
0.20 – 0.40	Correct source of vibration
> 0.40	Stop the mill; do not restart until the vibration is corrected

SAFETY (continued)

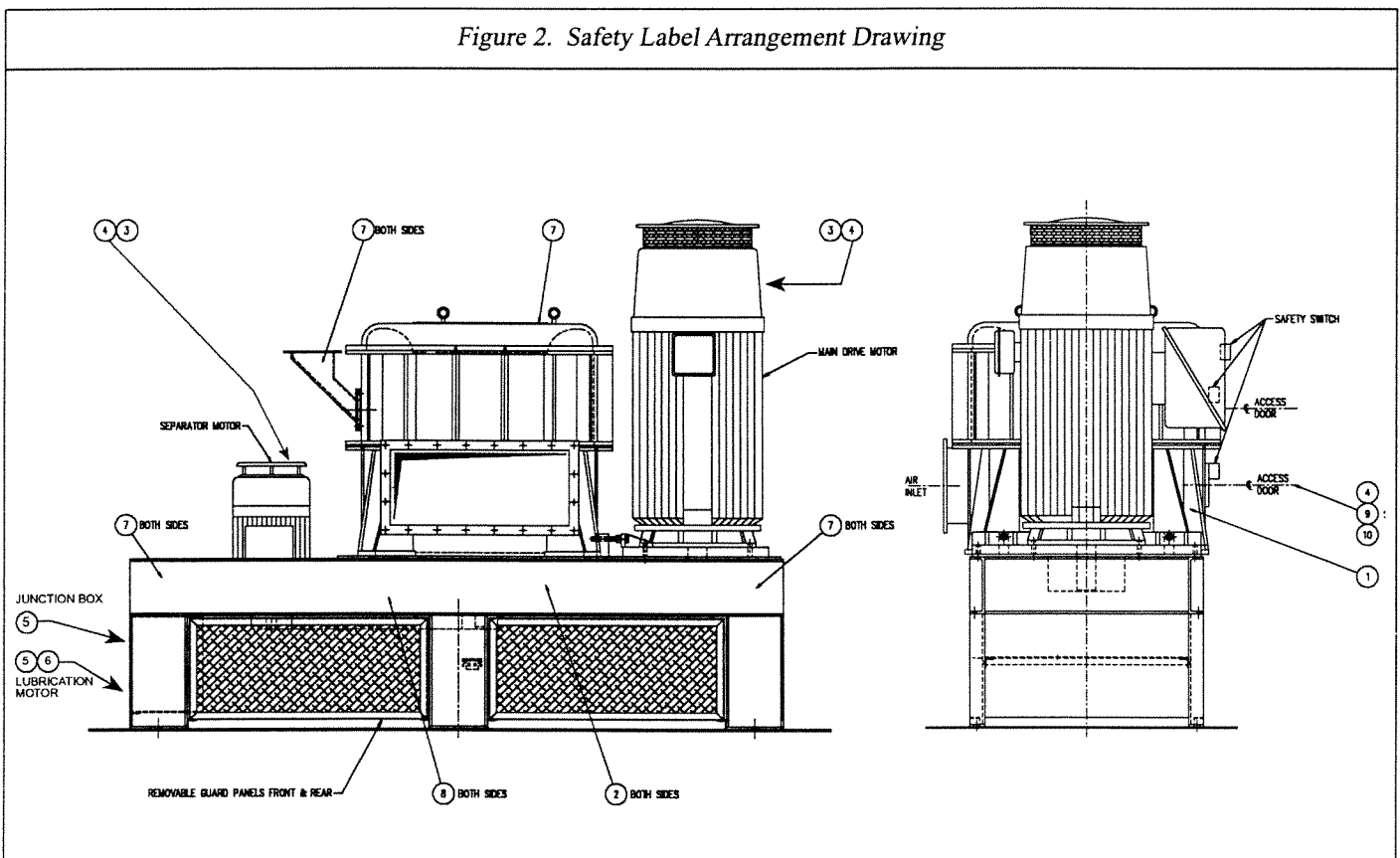
SAFETY LABELS

This sheet depicts the placement of safety labels on this equipment at the time of shipment from the factory. Safety labels are intended to supplement the discussion of safety procedures and potential hazards in this sheet and in the operating manual.

Safety labels must not be removed or defaced. Contact Hosokawa Micron Powder Systems if any of the labels depicted in this arrangement are not present; reference Safety Label Arrangement Drawing #261673.

Safety Labels for Mikro-ACM Models 200 and 300 Refer to Figure 2					
Item		Item		Item	
3		6		8	
4		7		9	
5				10	

Figure 2. Safety Label Arrangement Drawing



EQUIPMENT DESCRIPTION

Refer to Figures 3 and 4.

FEED SYSTEM

The hopper (A) has a nominal capacity of 0.88 cubic feet and is bolted to the feed screw mechanism (B) that conveys material to the grinding chamber. The feed screw mechanism is comprised of two screws (F) housed in a feed trough, driven by a motor (C), gear reducer (D) and adjustable speed drive (E). A suction control gate (Z), located in front of the hopper and above the feed trough, regulates the amount of air entering the grinding chamber with the feed material—closing the gate increases suction and, thereby, the feed rate; opening the gate has the opposite effect.

GRINDER AND CLASSIFIER

The grinding chamber (J) is faced with the liners (K) that aid in size reduction. The grinding rotor assembly is housed in the grinding chamber and is comprised of hammers (I) that are bolted to the rotor disk (H). The grinding rotor assembly is mounted on the upper end of the rotor shaft (M). The grinding rotor shaft (M) is enclosed in the bearing housing (G), which is bolted to the grinding chamber base (L).

The separator shaft (N) is located inside the hollow rotor shaft (M). At the upper end of the separator shaft, the separator wheel (O) is mounted just above the rotor disc. During the grinding and classifying operation, the air dispersion ring and cover (P) serve to guide material upward from the grinding chamber to the classification area, the perimeter of which is bounded by the baffle-and-shroud (Q). The baffle-and-shroud (Q) surrounds the separator wheel concentrically and guides coarse particles (those that have been rejected by the separator wheel) back to the grinding chamber. Curved fins are attached to the outside surface of the baffle-and-shroud

and serve two purposes: to bridge the gap between the baffle ring and the wall of the grinding chamber; and to direct air through the mill.

SUPPORTING STRUCTURE

The grinding chamber base (L), the rotor drive motor (S) and the separator motor (U) are bolted to the common base (X). The base (X) is bolted to six 24-inch stand legs (Y) that support the mill. Stand legs (Y) must be anchored to a suitable floor or foundation.

MOTORS AND DRIVES

The grinding rotor is driven by a motor (R) and connected to a driven pulley (S) by v-belts. The separator wheel is driven by a separate motor (U) through a variable speed v-belt drive connected to a driven pulley (V). A protective screen (W) is installed around the structural base to guard against contact with the drive belts.

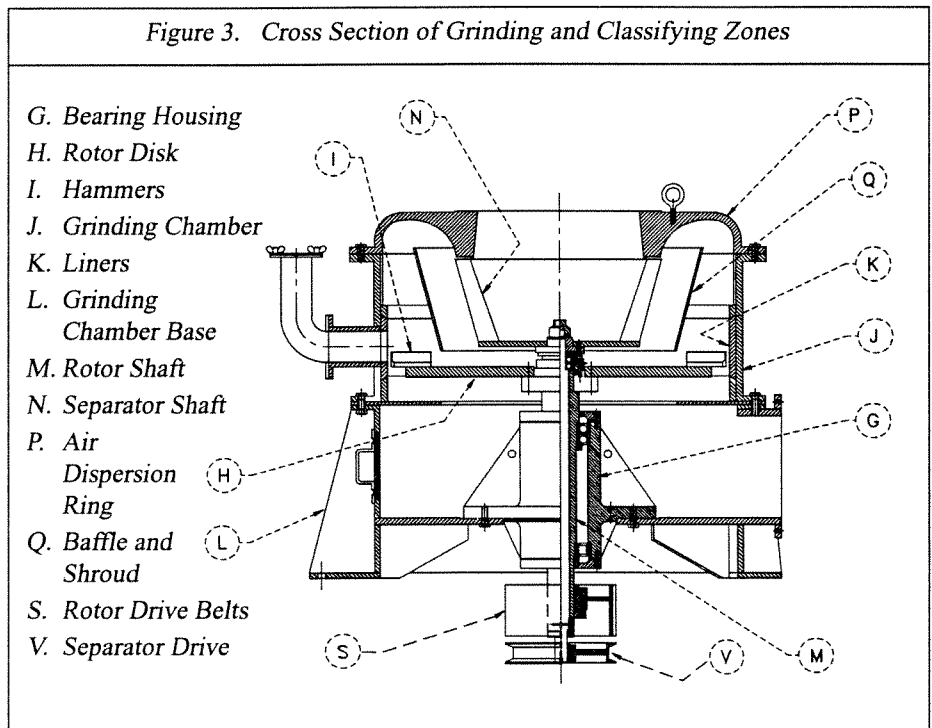
ELECTRIC CONTROLS

The Mikro-ACM® is typically sold as part of a system that includes a control panel. A limit switch prevents operation of the mill if the air dispersion ring and cover are not properly secured to the base. Ammeters and tachometers monitor motor loading and the RPM of the grinding and separating rotors. In addition, devices to monitor pressure differential across the mill and dust collector are incorporated in the control panel.

If electric controls are not supplied by H MPS, they should be designed in accordance with all local codes and the National Electric Code. Safety devices, as described in the safety section of this manual, must meet all OSHA and ANSI standards.

The system components should be started according to the procedure described in the Startup section of this manual.

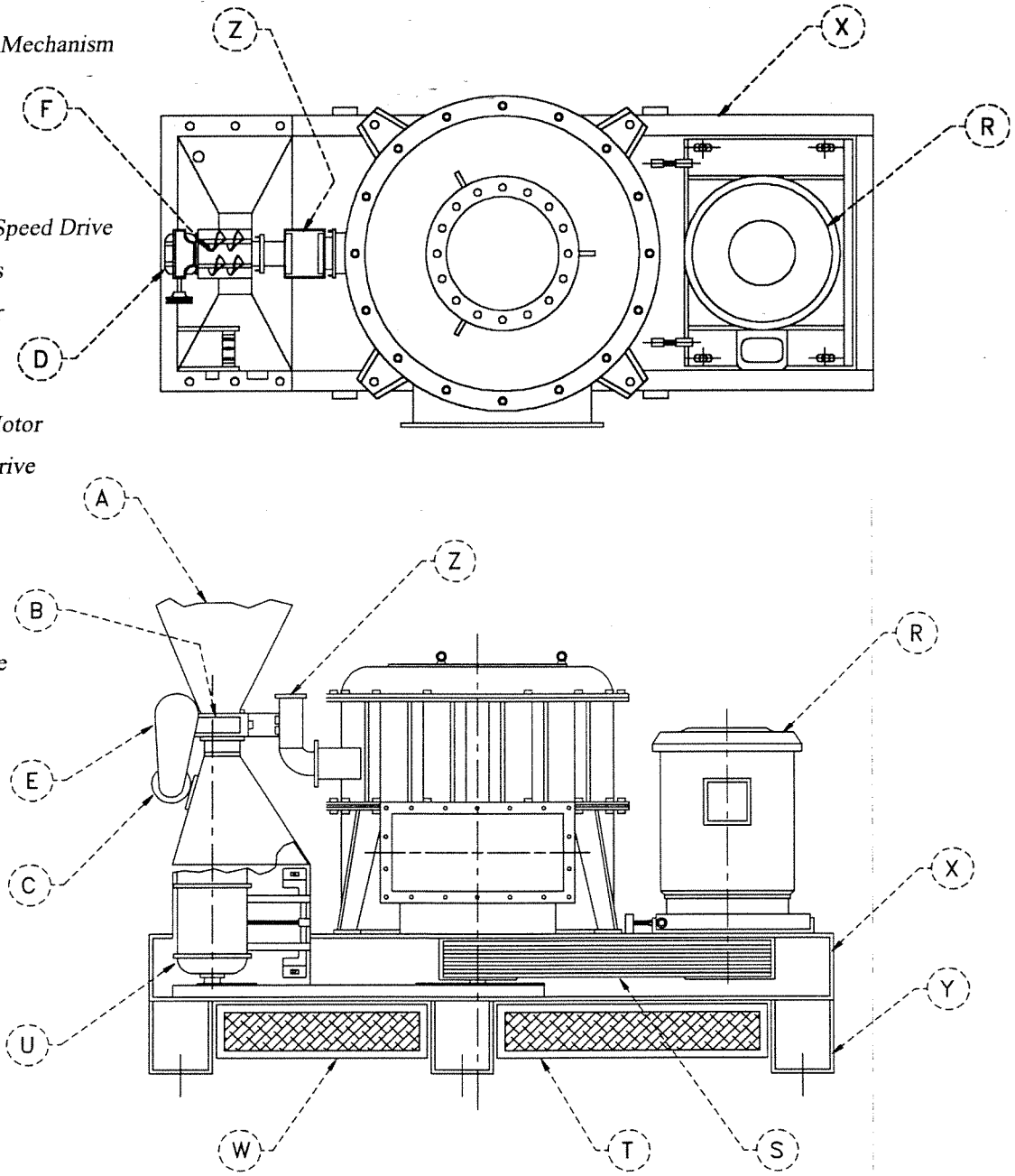
Figure 3. Cross Section of Grinding and Classifying Zones



EQUIPMENT DESCRIPTION (continued)

Figure 4. Top and Side Views

- A. Hopper
- B. Feed Screw Mechanism
- C. Feed Motor
- D. Gear Reducer
- E. Adjustable Speed Drive
- F. Feed Screws
- R. Rotor Motor
- S. Rotor Drive Belts
- U. Separator Motor
- V. Separator Drive
- W. Screen
- X. Base
- Y. Stand Legs
- Z. Suction Control Gate



INSTALLATION

CAUTION

This mill was designed to grind dry material and the seals were selected accordingly. When cleaning the unit, water and steam should be avoided as moisture will work past the seals causing damage to bearings and other internal components.

UNLOADING & INSPECTION

Before opening crates, inspect them to identify any damage that may have occurred during transportation.

Use a hoist to unload and assemble the mill. Nylon straps may be used around the frame and the six legs. Do not route the straps near the feed screws or feed hopper. Do not put slings or straps around the separator drive motor or drive guard. Do not use the main motor eye bolts to lift the mill (these bolts are to be used only to lift the motor).

Be certain all items called out on the bill of materials or packing list are present. Inspect the appearance of all painted items. Tighten any loose hardware.

LOCATING THE MILL

The foundation on which the mill is to be operated must be level, reinforced concrete. If piers are used, they must be concrete, at least one foot square and not more than six inches high.

There should be a minimum of six feet of clearance on all sides of the mill once it is installed. There must be enough headroom to permit installation of the rigging necessary for routine maintenance.

Installation of a 2½-ton monorail mounted hoist over the center of the mill will facilitate routine maintenance.

ASSEMBLY

1. Check foundation level.
2. Lift and locate the mill over the foundation using nylon straps around the frame.
3. Secure the legs to the floor or foundation using 7/8-inch anchor bolts.
4. Level and square the mill frame.
5. Turn the grinding and separating rotors by hand to make sure they rotate freely. If not, refer to the maintenance section of this operating manual for further instructions.
6. Check the v-belt tension of the rotor motor. Proper belt tension will cause a deflection of 3/16-inch when the belt is subjected to a 5 lb. load centered between the sheaves. Correct the belt tension if necessary by adjusting the motor on its slide rails, then tightening the motor locking bolts.
7. Be certain the feed screw flight is turning toward the grinding chamber.
8. Connect the ducting from the mill to the dust collector.
9. Install the protective screen on the structural base to guard the belt drives.
10. Check all lubrication points as directed below in "Initial Lubrication".
11. Connect the power to the motor starters. Switch the power on.
12. Jog the main motor and separator motor to check the direction of rotation. Both must rotate counterclockwise when viewed from above. Change the rotation if it is not correct.
13. Verify operation of the safety limit switches according to the procedure described in the safety section of this operating manual.
14. Conduct initial run-in for motors as directed by motor manufacturer.

INITIAL STARTUP

1. Start the mill according to the startup procedure and run it empty for ½ hour.
2. Check bearing temperature. If it is more than 140° F the bearings require attention.
3. Listen for any unusual noise or vibration. Refer to the Table of Vibration/Velocity limits in the safety section of this manual.
4. Record the rotor motor and the separator motor idle load amperage readings for future reference. These readings will be used to adjust the

Rotor idle load amperage: _____ @ _____ RPM Separator idle load amperage: _____ @ _____ RPM
--

feed rate and to maximize grinding efficiency.

5. After the run-in period, recheck all bolts and fasteners for tightness.
6. Before beginning a production run, conduct a motor run-in period as instructed by the motor manufacturer.

INSTALLATION

INITIAL LUBRICATION

SEPARATOR BEARINGS

The separator bearings are provided with grease fittings that must be greased before starting the unit. Refer to the maintenance section of this operating manual.

FEED SCREW ASSEMBLY

The feed screw assembly is equipped with two alemite grease fittings. Grease the fittings before running the mill. Refer to the maintenance section of this operating manual.

COMMERCIAL ITEMS

All commercial items, such as motors and pulleys, should be lubricated according to the manufacturers' specifications.

ROTOR BEARING LUBRICATOR

The rotor bearings are lubricated by an oil circulation system. Before operating the mill for the first time, follow the procedures described below.

Flush the Oil Supply Line

Refer to the maintenance section of this operating manual for instructions.

Adjust Oil Pressure

The lubrication system is supplied with a pressure adjustment screw, located on the oil reservoir. To adjust pressure, loosen the knurled nut, then turn the screw. Turning the screw clockwise increases oil pressure; turning the screw counterclockwise decreases oil pressure.

Verify Low Oil Pressure Interlock Operates

Refer to the maintenance section of this

operating manual for instructions.

Calibrate the Oil Pump

1. Disconnect the oil return line from the bearing housing and start the lubricator.
2. Adjust the pressure (as directed above) to 80 PSI.
3. Wait for the oil to flow from bearing housing, approximately 30 to 45 minutes.
4. Use the pressure adjustment screw to adjust the flow of oil to 55-60 drops per minute.
5. Reconnect the oil return line. Refill the oil reservoir.
6. Start the lubricator and record oil pressure. The lubricator is now calibrated and ready for service.

STARTUP/SHUTDOWN

System controls for typical Mikro-ACM® are designated for either manual or automatic operation. These operation modes may be achieved through a local control panel, or through a DCS (Distributed Control System), or both.

If system controls are not supplied by Hosokawa Micron Powder Systems, they must be configured as described below.

Three safety limit switches (located on the dispersion ring/housing cover and each of the two inspection doors) shall be incorporated into both the manual and auto operation modes. Operation shall not be permitted when safety limit switches are open (fail safe mode).

MODES OF OPERATION

The operating sequence described in this manual includes components a typical Mikro-ACM® grinding system. Additional components may be included in the sequence as process requirements dictate.

MANUAL MODE

The manual mode of operation is to be used for maintenance only. In this mode, individual system components can be activated and deactivated by the START and STOP pushbuttons designated on the control panel. In manual mode, the auto opera-

tion mode is locked out. Operating personnel must always be present at the local control panel.

AUTO MODE

In the auto mode of operation, all system components function automatically via the SYSTEM START and STOP pushbuttons. Individual component START and STOP pushbuttons are rendered inoperative in automatic mode.

All components will start and stop in a sequential order, as described below, with delays of a few seconds between components.

STARTUP/SHUTDOWN (continued)

STARTUP SEQUENCE

- Rotor bearing lubrication system starts.
Oil flow is sensed by two pressure switches, low flow and high flow. The LOW FLO (line blockage) and HI FLO (line breakage) switches permit rotor operation. The TANK LOW LEVEL switch activates an alarm for a predetermined period of time before initiating the system shut-down sequence.
- Dust collector discharge rotary airlock starts.
- Exhaust blower starts.
- Dust collector pulse starts.
- Separator starts.
Separator speed is controlled by a variable frequency drive. Speed (rpm) is measured by a speed sensor mounted at the separator shaft.
- Rotor (main drive) starts.
The operation interlock between the rotor and the bearing lubrication system, as described above in Item 1, must be in place.
- Material feeder starts.

PRE-STARTUP CHECKLIST

Before starting up check each of the following items:

- √ All bolts are properly tightened.
- √ All lubrication points have been checked. Refer to Figure 6.
- √ All safety guards are in place and safety precautions are being observed.
- √ Verify all safety limit switches are operational. Refer to the safety section of this operating manual.

SHUTDOWN SEQUENCE

Sequential shut-down occurs in the reverse order of sequential startup.

Sequential shut-down can be initiated by the operator at any time during operation. Shut-down will be automatically be initiated by any of the interlock or alarm conditions described below.

PRIMARY INTERLOCKS

Under conditions described below, the shut-down sequence is preceded by precautionary measures that prevent damage to the system.

Lubrication system failure

Main drive and material feeder stop immediately, then sequential shutdown is activated.

Main drive failure

Material feeder stops immediately, then sequential shutdown is activated.

Separator failure

Material feeder and main drive stop immediately, then sequential shutdown is activated.

Blower failure

Material feeder stops immediately, then sequential shutdown is activated.

ALARM CONDITIONS

The shutdown sequence will be initiated under any of the alarm conditions described below.

- Dust collector discharge valve operation failure
- Lubrication system high/low flow
- Lubrication tank low level
- Dust collector pulse air supply low pressure
- Dust collector high differential pressure
- Exhaust blower motor overload tripped

Optional Alarm Conditions

- Dust collector hopper high level
- Separator motor overload tripped; frequency controller fault; zero speed
- Main drive motor overload tripped; motor high temperature; rotor bearing high temperature; rotor zero speed
- Mill high vibration

EMERGENCY SHUTDOWN

Activation of any of the safety limit switches or the E-stop pushbutton (which is to be hard-wired) will initiate immediate shutdown of the entire system.

MAINTENANCE

CAUTION

Before performing maintenance on this equipment, always disconnect the power, lock it out and tag it out.

TEMPERATURE

Periodically check the mill for excessive temperatures that may signal other problems. The mill must be shut down to take temperature measurements. Use a surface probe on the housing—temperatures over 140° F require attention.

VIBRATION

While the unit is running under load, periodically check the rotor bearing housing for any unusual noise or vibration. Do not remove ear plugs. Refer to the table of Vibration/Velocity Limits in the safety section of this operating manual.

LUBRICATION

FEED SCREW ASSEMBLY

Feed Screw Mechanism

The feed screw mechanism is packed with grease at the factory. This grease will last for the life of the unit.

Feed Screw Bearings

The feed screw bearing housing is equipped with four grease fittings that should be checked monthly. Change the grease annually; use a premium #2EP grease as instructed in Figure 7.

Triple Feed Screw

If the mill is equipped with a triple feed screw mechanism, contact Hosokawa Micron Powder Systems for lubrication instructions.

ROTOR BEARING LUBE SYSTEM

The rotor bearings are lubricated by an automatic continuous oil lubricator, which regulates the flow of oil by means of an adjustable screw. Oil is supplied at a constant rate, however pressure will vary with the changing oil temperature (due to changes in the oil viscosity). Oil should be maintained at the level marked on the sight glass

This lubrications system requires the scheduled maintenance outlined below and in Figure 8. Before attempting to service any component of the automatic continuous lubrication system, all external surfaces should be cleaned to prevent contamination of the lubricant.

Every Three Months

- Examine control unit for clogging. Replace if necessary
- Verify oil pressure interlock operates

Every Twelve Months (or 2,000 hours of operation)

- Replace control unit
- Verify operation of oil pressure interlock
- Flush the oil supply line
- Change oil and filters

FLUSHING OIL LINES

The oil supply lines for the rotor bearing lubrication system must be flushed periodically, as indicated above.

1. Fill the oil reservoir to the mark indicated in the sight glass.
2. Disconnect the oil supply line from the control unit and remove the control unit from the bearing housing.
3. Start the lubricator and allow it to operate for one minute to purge the supply line of any foreign material.

4. Inspect, clean and reinstall the control unit to the oil supply line and the bearing housing.

OIL PRESSURE INTERLOCK

Operation of the oil low pressure interlock should be checked monthly.

Decrease oil pressure to below 40 PSI by adjusting the screw on the oil reservoir, as directed above. This should cause the lubricator pump to stop, activating the shut-down sequence.

If the shutdown sequence is not activated, do not resume operation—contact Hosokawa Micron Powder Systems for assistance.

SEPARATOR BEARINGS

The upper and lower separator bearings are equipped with grease fittings. Grease them monthly and change the grease annually.

COMMERCIAL ITEMS

For commercial items, such as motors and variable speed pulleys, follow the manufacturer's instructions.

Figure 5: Recommended Lubricants

Commercial Items	per manufacturer's instructions
Feed Screw Bearings	Chevron Dura-Lith EP#1 Exxon Unirex #2 Mobil Mobilix #2 Shell Alvania Grease #2 Sunoco Prestige 742EP Texaco Multifak #2
Separator Bearings	Chevron SRI Poly-Urea Texaco #1939 Premium PB Hydroxy Stearate Mobil Lithium #2 Shell Alvania #2
Rotor Bearings	Non-foaming, non-detergent (SAE 20) oil

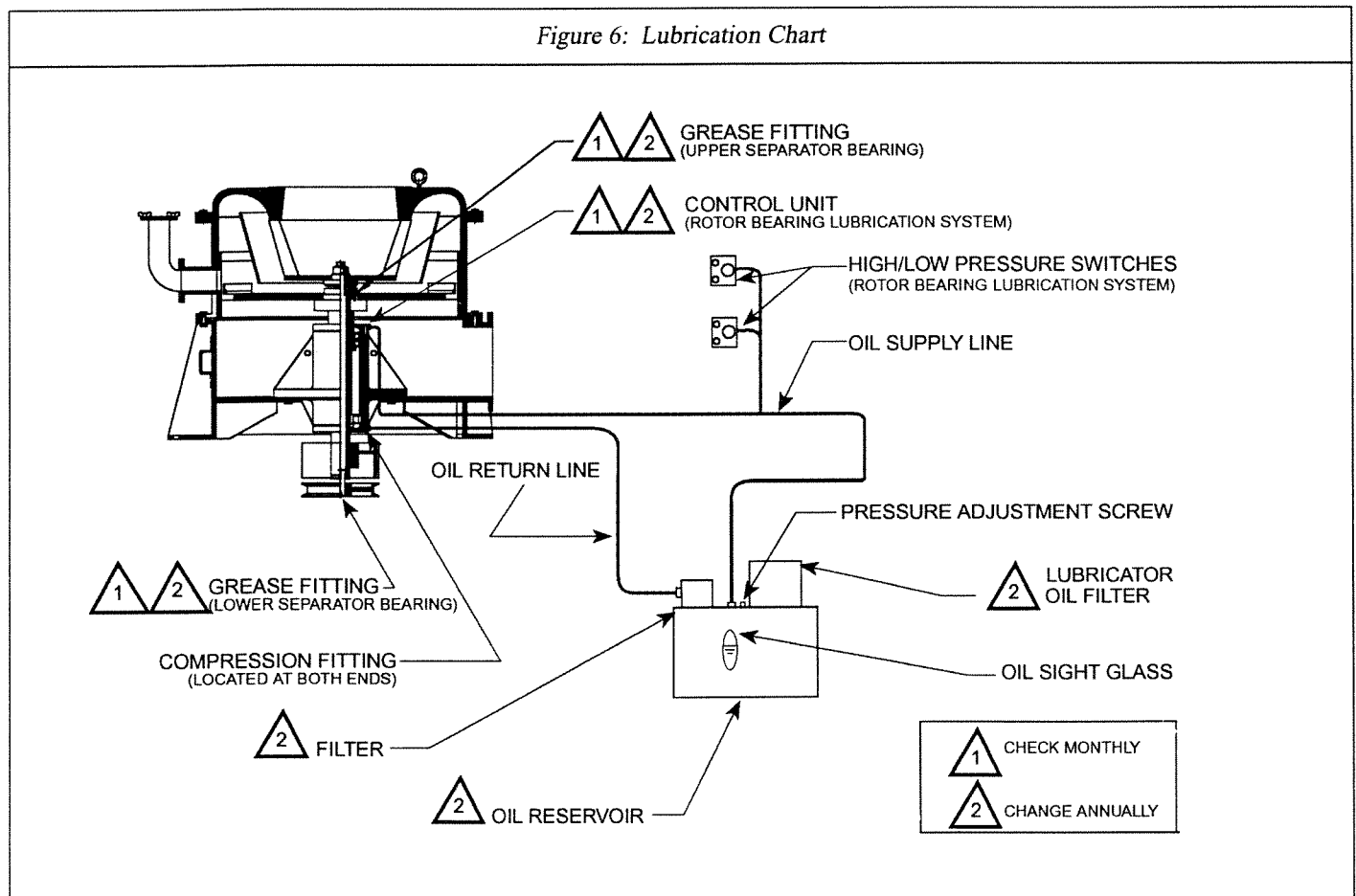
MAINTENANCE (continued)

CHANGING BEARINGS

Important: All bearings, seals, and o-rings should be replaced at the same time. The bearing retainer ring and upper housing cover are fitted at the factory. They must be reinstalled in their original orientation.

1. Shut down according to the standard procedure. Disconnect the main power switch, lock it out, and tag it out.
2. Disconnect ductwork to the dust collector and fan.
3. Remove the housing cover bolts and remove the cover
4. Remove all bolts securing the baffle and shroud. Lift it out using the appropriate lifting equipment.
5. Remove the separator wheel as instructed above.
6. Remove the grease fitting located above the rotor disc.
7. Loosen and remove the rotor disc screws and remove the rotor disc.
8. Loosen the rotor motor adjustment bolts and slide the motor toward the rotor shaft. Remove the screen guards.
9. Loosen the separator motor adjustment bolts and slide the motor toward the separator shaft.
10. Remove v-belts and driven pulley from the separator and rotor shafts.
11. Remove the upper and lower oil lubrication lines from the bearing housing.
12. Remove the bolts holding the bearing housing to the grinding chamber base. They are located under the grinding chamber base.
13. Carefully lift the bearing housing straight up and set the assembly on a cradle. Move the bearing housing to a clean workspace for disassembly.

Figure 6: Lubrication Chart



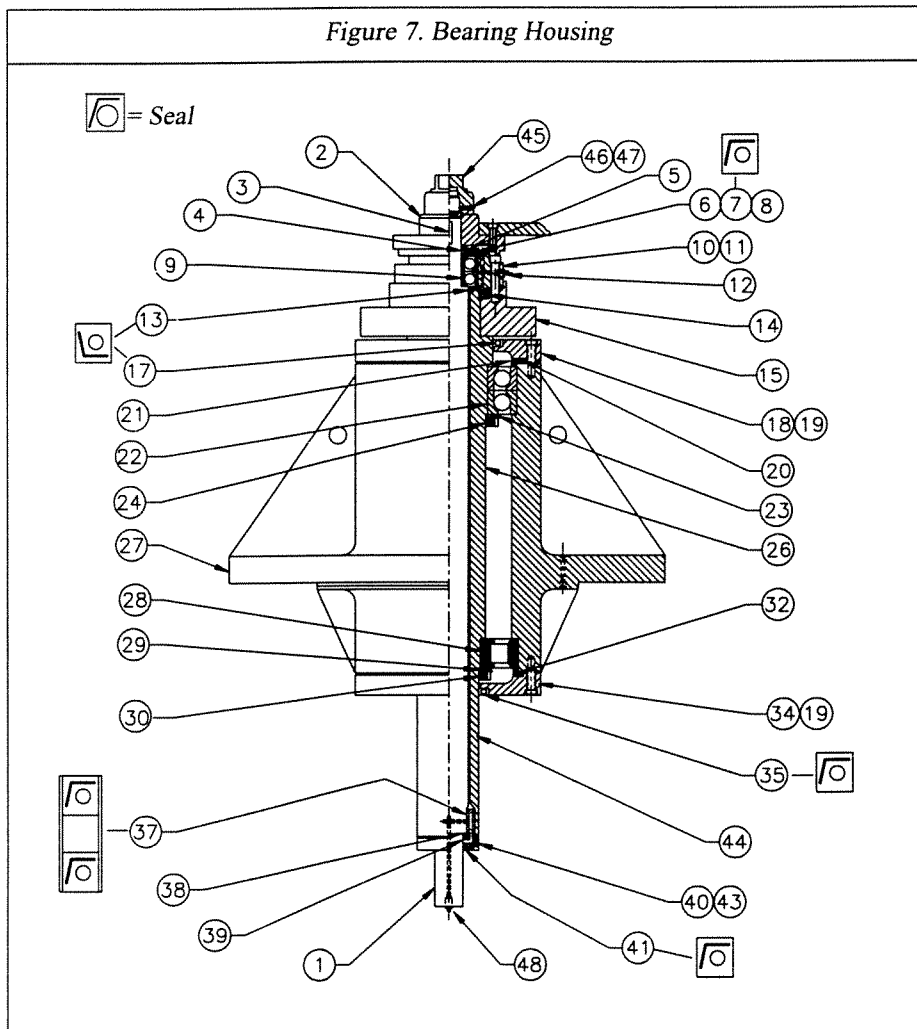
MAINTENANCE (continued)

BEARING HOUSING DISASSEMBLY

Refer to Figure 7.

- a. Remove separator wheel hub (2), key (3), and hub support ring (4).
- b. Remove the two inner seals (5), bearing retaining ring (6) and one outer seal (7).
- c. Remove the separator shaft lower bearing retaining ring (40), grease fittings (12, 48), and seal (41).
- d. Remove the bolts (11) from the top of separator bearing housing (10) and remove the housing.
- e. Remove the lower bearing locknut (38) and lockwasher (39).
- f. Support the separator shaft (1) on stable surface to prevent damage. Push the separator shaft out through the rotor shaft (26).
- g. Use a bearing puller to remove the two upper bearings (9) from the separator shaft (1).
- h. Extract the lower separator needle bearing (37) from the rotor shaft bore.
- i. Remove the lower housing cover (34) with seal (35), o-ring (20), and bearing retainer ring (32).
- j. Remove the locknut (30), lockwasher (29), and the lower rotor bearing (28).
- k. Remove the seal (13), rotor hub locking ring (14), and hub key (16) from the top end of the bearing housing.
- l. Remove the upper cover (18), o-ring (20), and bearing retainer ring (21).
- m. Remove rotor shaft (26) from the bearing housing (27).
- n. Remove the lockwasher (23) and locknut (24).
- o. Remove the two upper bearings (22) using a bearing puller.
- p. Before reassembling the bearing housing, inspect all bearing bores and journals.
- q. Once the shaft journal has been determined to provide a proper fit, the new bearing may be installed using a press and sleeve or a sleeve and a hammer.

Figure 7. Bearing Housing



The sleeve must fit against the outside wall of the inner race. A film of light oil will aid in the installation. This applies only to bearings with an outer diameter of four inches or less. The shoulder on the shaft should make contact with the inner race of the bearing.

Bearings with a diameter of four inches or more should be heated to 250° F with a induction heater or in an oil bath. Contact the Hosokawa Micron Powder Systems for assistance if necessary.

MAINTENANCE (continued)

REPLACING PARTS

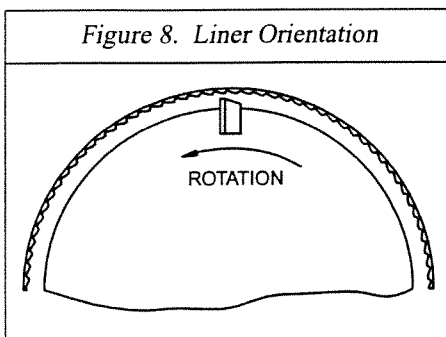
LINERS AND BAFFLE&SHROUD

1. Shut down according to the standard procedure.
2. Disconnect the main power switch, lock it out, and tag it out.
3. Disconnect the ductwork from the dust collector and fan.
4. Remove the housing cover bolts. Remove the housing cover/air dispersion ring and place it on a cradle.
5. Secure rigging equipment to the baffle and shroud.
6. Remove all bolts holding the baffle and shroud to the grinding chamber. Remove the baffle and shroud.
7. Remove the retaining ring, located just above the liners, and lift out the liners.
8. Clean the area behind the liners and locate the new liners.

When using multiple deflector liners, note the orientation of the scalloped deflectors relative to the rotation of the hammers.

Refer to Figure 5.

9. Inspect the housing cover/air dispersion ring and the baffle and shroud before reinstalling them. Replace them if they are worn.



REPLACING BAR HAMMERS

Worn hammers can significantly reduce output capacity. A spare set of hammers should be kept on hand in the event an unscheduled replacement is required.

Never replace individual hammers. Hammers must be replaced in a complete balanced set.

1. Shut down according to the standard procedure.
2. Disconnect the main power switch, lock it out, and tag it out.
3. Access bar hammers through the grinding chamber access door.
4. Loosen and remove the allen screw from each hammer. Lift and remove the hammer and locating pin.
5. Replace each hammer 180 degrees from its balanced mate. Never install individual hammers—always replace hammers in a complete balanced set.

SEPARATOR WHEEL

1. Shut down according to the standard procedure.
2. Disconnect the main power switch, lock it out, and tag it out.
3. Disconnect the ductwork to the dust collector and fan.
4. Remove the dispersion ring bolts. Remove the dispersion ring and place it on a cradle.
5. Loosen the jam nut at the end of the separator shaft while holding the bottom pulley with a wrench.
6. Remove the washer.
7. Remove the separator wheel and shims. Set aside the shims so they can be reinstalled as a set. This will maintain separator wheel/dispersion ring clearances.

8. Install the new separator wheel, the separator wheel washer and the jam nuts.
9. Reinstall the baffle and shroud and the air dispersion ring.
10. Using a feeler gauge, check the clearance between the separator wheel and the air dispersion ring. It should be between 0.09-inch and 0.125-inch. If necessary, adjust this clearance by adding or removing shims behind the separator wheel.
11. Reverse this procedure to close the mill.

FEED SCREW

1. Shut down according to the standard procedure. Disconnect the main power switch, lock it out, and tag it out.
2. Remove the belts on the feed drive.
3. Remove the feed hopper.
4. Loosen and remove the bolts between the feed screw housing and the feed trough.
5. Clean the base pads and install a new feed screw assembly.
6. If bearings are to be inspected or replaced, place the feed screw bearing housing on a clean surface.
7. Remove the driven pulley.
8. Loosen the set screw and remove the feed screw retaining collar.
9. Loosen bolts and remove bearing retaining plate.
10. Pull the feed screw shaft out of the feed screw bearing housing.
11. Remove bearings (ball bearing and bronze bushing) and inspect and replace them, if required.
12. Clean all components before reassembly.
13. Reverse above procedure to complete the assembly.

MAINTENANCE (continued)

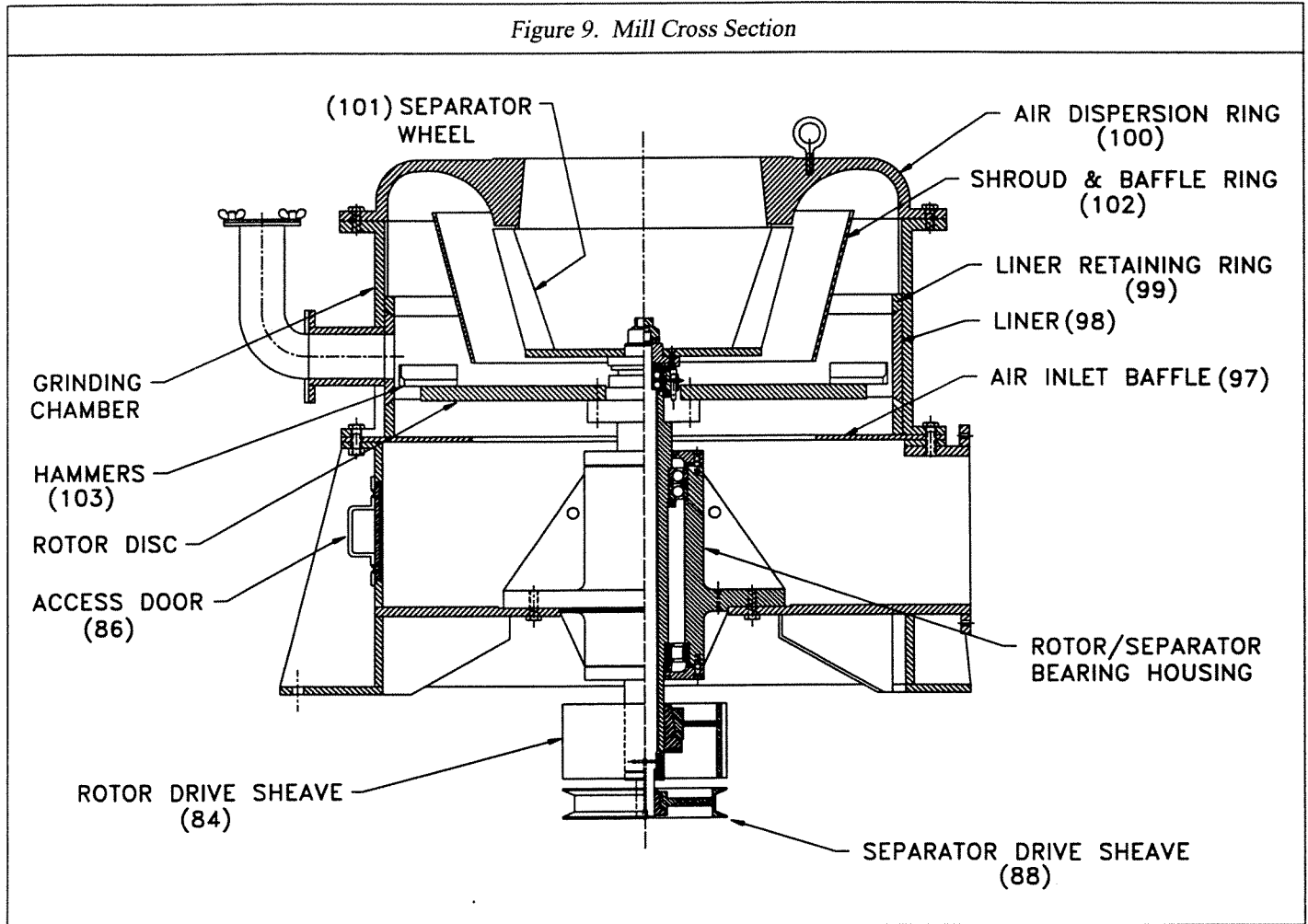
TROUBLESHOOTING

Symptoms	Possible Cause	Remedy
Mill stops, starter heaters overload	Feed rate too high	Slow feeder
	Rotation backward	Reverse rotation
	Foreign object jamming rotor	Remove object
	Separator wheel too fast	Decrease separator wheel speed
	Product not discharging	See below
Product not discharging	Separator wheel too fast	Decrease wheel speed
	Exhaust fan malfunction	Check fan then restart fan
	Fan damper is closed	Adjust damper for 30 inches W.G. minimum
Material is blowing out of the mill	Exhaust fan malfunction	Check fan then restart fan
	Duct or dust collector is clogged or blinded	Clean duct, service dust collector
	Incorrect rotation	Reverse rotation
Change in product particle size	Feed material has changed in size or composition	Adjust classifier speed
	Separator speed has changed	Check drive and adjust speed
Premature bearing failure	Wrong bearing	Install correct bearing
	Rotor imbalance	Balance rotor
	Improper hammer installation	Install hammers according to instructions
	Heavy or inconsistent feed material	Adjust feed mechanism to deliver material at a slower rate
	Excessive belt tension	Adjust belt to proper tension
	Contamination by material or water	Replace bearings and avoid contact with water

Symptoms	Possible Cause	Remedy
Variation in mill motor load (amperage)	V-belts slipping	Adjust belt tension to a deflection of 3/16-inch under a five-pound load centered between the sheaves
	Feed rate varies	Check feed supply; check feeder operation
	Inconsistent feed material	Modify preparation of feed material
Reduced capacity	Worn hammers	Replace hammers
	Worn liners	Replace liners
	Reduced rotor speed	Check drive for worn or loose v-belts. Replace and adjust to the proper tension.
	Feed rate too slow	Increase feed screw speed to 95% of motor full load amperage
	Low air flow	Increase airflow to produce a minimum 30-inch water S.P. across the mill
Feed screw jammed	Foreign object jamming screw	Clear object from feed screws
Feeds too fast	Too much suction at feed end	Adjust air inlet

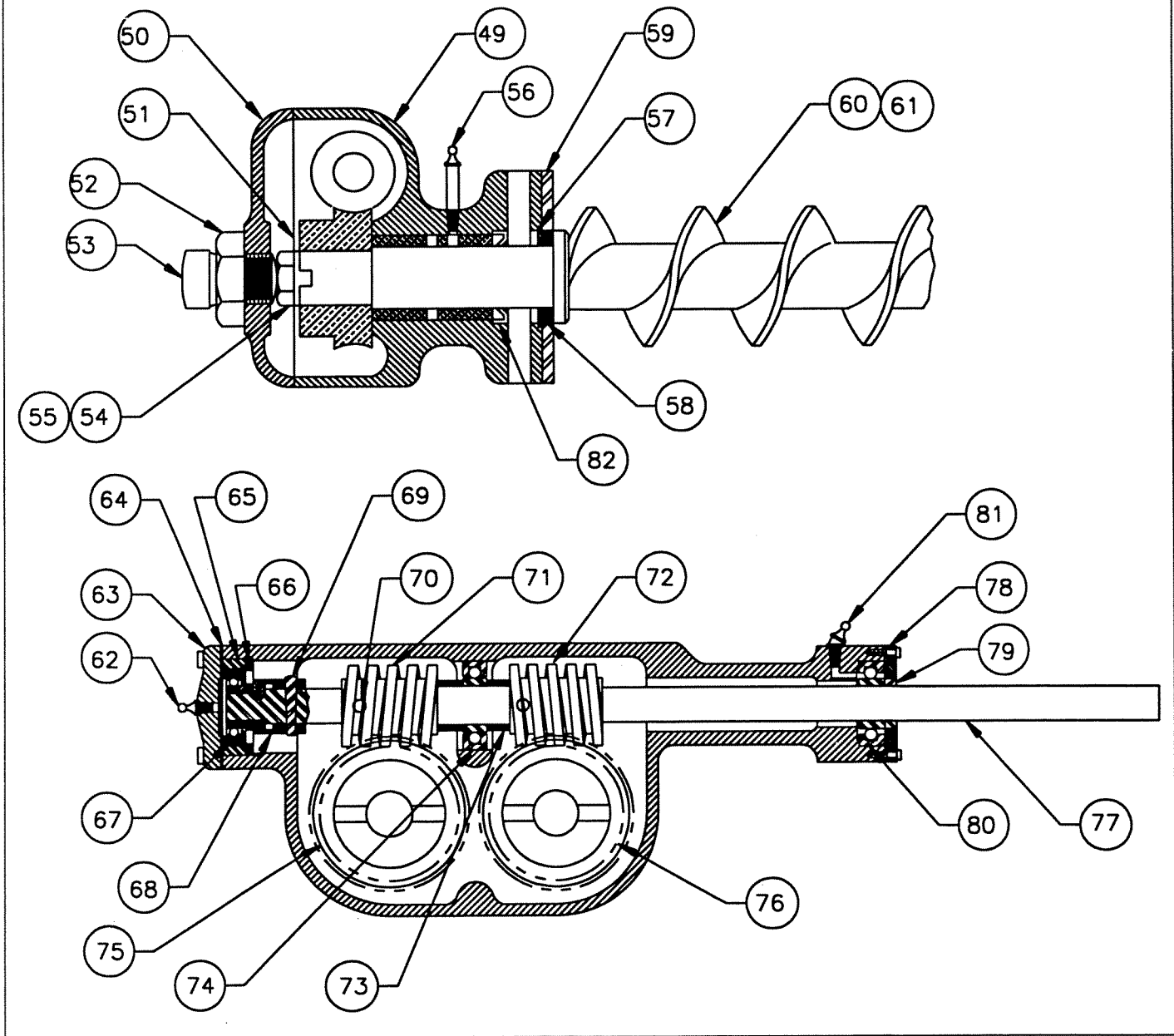
For problems not described here, contact Hosokawa Micron Powder Systems

BILL OF MATERIALS



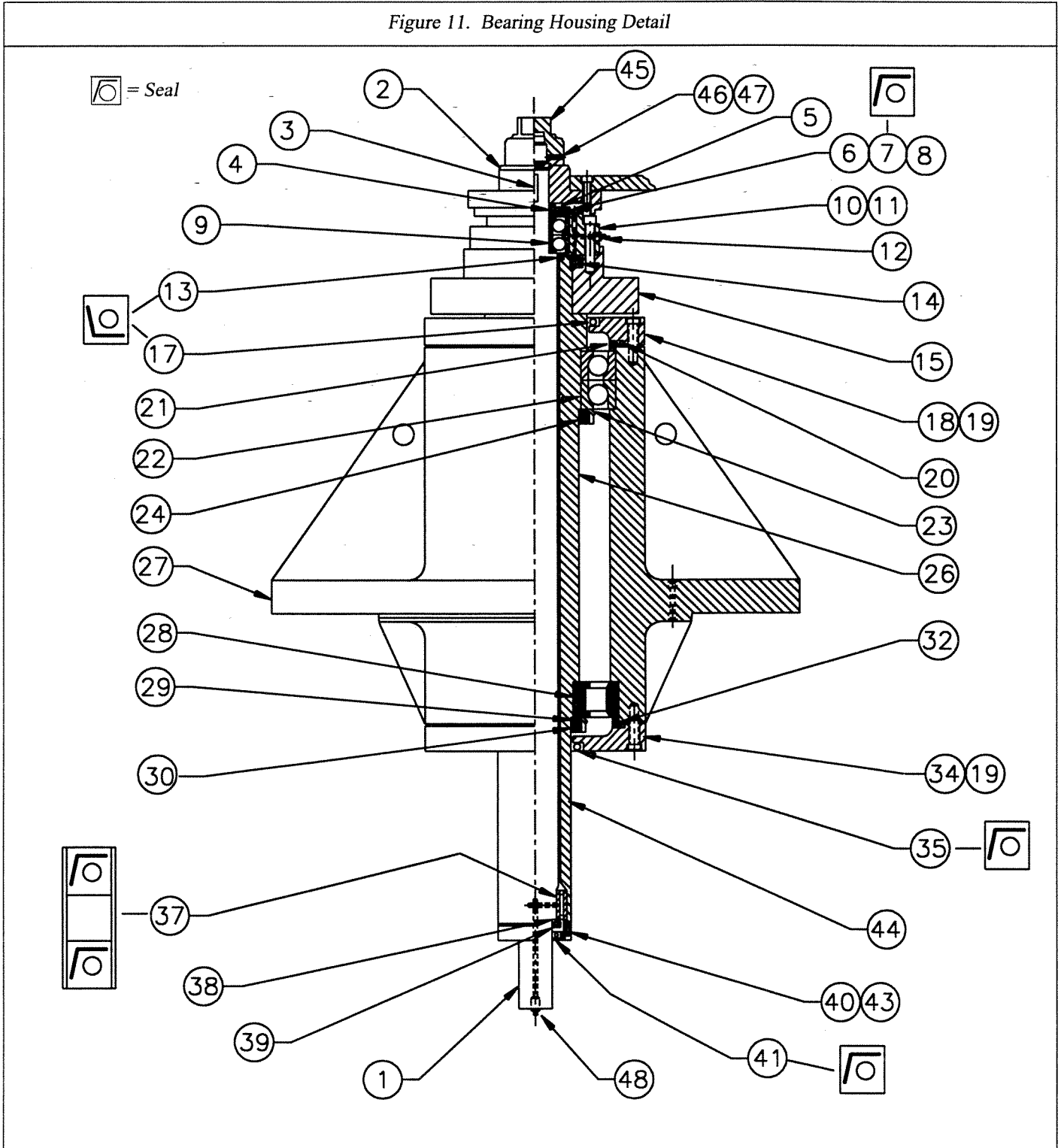
BILL OF MATERIALS (continued)

Figure 10. Feed Screw Detail



BILL OF MATERIALS (continued)

Figure 11. Bearing Housing Detail



BILL OF MATERIALS (continued)

Equipment Assembly	Ref.	Description
Mill Bearing Housing	1	Separator Shaft
	2	Separator Hub
	3	Separator Hub Key
	4	Separator Hub Support Ring
	5	Seal
	6	Bearing Retaining Ring
	7	Seal
	8	1/4"-20 NC x 1-1/4" Lg. Soc. Hd. Cap Screw
	9	Separator Shaft Upper Bearing
	10	Separator Bearing Housing
	11	1/2"-12 NC x 2-3/8" Lg. Soc. Hd. Cap Screw
	12	Grease Nipple 1/8" NPT
	13	Seal
	14	Rotor Hub Locking Ring
	15	Rotor Hub
	16	Rotor Hub Key
	17	Seal
	Mill Separator Housing	18
19		3/8"-16 NC x 1-3/4" Lg. Soc. Hd. Cap Screw
20		Housing Cover "O" Ring Seal
21		Bearing Retaining Ring
22		Upper Rotor Shaft Bearing
23		Lock Washer
24		Lock Nut
25		Separator Pulley Key
26		Rotor Shaft
27		Main Bearing Housing
Mill Separator Housing	28	Lower Rotor Shaft Bearing
	29	Lock Washer
	30	Lock Nut

Equipment Assembly	Ref.	Description
Mill Separator Housing	32	Bearing Retaining Ring
	34	Lower Housing Cover
	35	Seal
	37	Separator Shaft Lower Bearing
	38	Lock Washer
	39	Lock Nut
	40	Bearing Retaining Ring
	41	Seal
	43	#10-24 NC x 1-3/8" Lg. Soc. Hd. Cap Screw
	44	Main Drive Pulley Key
	45	Separator Shaft Nut
	46	3/8" - 16 NC x 1/2" Lg. Set Screw
	Mill Bearing Housing	47
48		1/8" NPT Grease Fitting (Special) 1-1/4" Lg.
Feed Screw Assembly	49	Gear Box with Bushings
	50	Gear Box Cover
	51	Key Washer
	52	Lock Nut
	53	Hardened Set Screw
	54	Hardened Cap Screw - RH Thread
	55	Hardened Cap Screw - LH Thread
	56	Alemite Fitting 1/8" Straight Long Shank
	57	Packing Retaining Washer
	58	1/4" Sq. Flax Packing Ring JM 3C-189
	59	Split Face Plate
	60	Feed Screw RH
	61	Feed Screw LH
	62	Alemite Fitting 1/8" Straight Short Shank
	63	Bearing Retaining Cover

BILL OF MATERIALS (continued)

Equipment Section	Ref.	Description
Feed Screw Assembly (continued)	92	3" PD Feed Drive Sheave (Feed Shaft)
	93	7" PD Feed Drive Sheave (Feed Shaft)
	94	V-Belt (Feed Drive)
	95	Separator Tachometer
	96	Tachometer Drive Adaptor
Internal Components	97	Air Inlet Baffle
	98	Liner Assembly
	99	Liner Retaining Ring
	100	Dispersion Ring
	101	Separator Wheel
	102	Baffle and Shroud
	103	Rotor Assembly with Hamemrs