

---

# Operating and Maintenance Manual

## OWNER'S MANUAL

### MIKRO-ACM<sup>®</sup> MODEL 10

Customer:  
Serial No.:

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

# **FOREWORD**

The MIKRO-ACM™ PULVERIZER is a high speed, close tolerance mechanical impact Air Classifying Mill with exceptional grinding efficiency and output. The ACM features an integral classifying wheel (separator) mounted above the grinding chamber.

The ability to regulate both the air flow through the mill and the classifier wheel speed allows the selection of the conditions required to produce the desired classification.

## **IMPORTANT:**

**Before installing, operating or maintaining this equipment, carefully read this Manual and follow the Safety recommendations in Section II.**



## **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.

### **AFTERMARKET SERVICES**

For technical assistance, please call us at (908) 273-6360. You may request to speak directly to the departments listed below. Additional information about our services is available from the Aftermarket Services Department.

#### **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

# TABLE OF CONTENTS

## SECTION

SECTION I	-	PROCESS DESCRIPTION
SECTION II	-	SAFETY
SECTION III	-	EQUIPMENT DESCRIPTION
SECTION IV	-	INSTALLATION
SECTION V	-	START-UP
SECTION VI	-	MAINTENANCE
SECTION VII	-	PARTS LIST & SPARE PART LIST
SECTION VIII	-	LIST OF DRAWINGS

# SECTION I

## PROCESS DESCRIPTION

## 1.1.- PROCESS DESCRIPTION:

Grinding and pulverizing are processes in which materials are reduced in size as they are impacted by high speed rotating hammers. The term "pulverizing" is applied to fine grinding and derives from the word "polvo" (dust).

ACM Hammer Mills are made in a number of different configurations, but consist essentially of two vertical rotating shafts, the Rotor shaft and the Separator shaft.

These shafts may be either "in-line" or "co-axial". The Rotor shaft turns the rotor assembly which consists of a disc and hammers that are designed in different sizes and shapes depending on the application. The Separator shaft turns the Separator Wheel or "classifier". The two shafts rotate in the same direction, but are driven by separate motors. The speed of the Rotor is usually constant, while the speed of the Separator is variable, to provide for the particle sizing capability of these mills.

The rotor and separator assemblies are attached to a common housing which contains liners or grinding tracks to form the grinding chamber. A baffle and shroud assembly guides the flow of air and material through the grinding chamber during the pulverizing process.

Movement of air through the ACM is essential for its operation. The air flow is usually provided by a fan, located at the discharge end of a suitable dust collector which "filters" the air and collects the product from the mill.

The most important variables in the pulverizing operation are:

- The size, power, and configuration of the Rotor.
- The tip speed and type of the hammers.
- The speed and configuration of the Separator wheel.
- The air flow through the mill.
- The condition of the grinding and impact surfaces.
- The characteristics of the material to be processed.

The size, power, and configuration of the ACM; along with the feed material size and required particle size of the finished product, determines the grinding capacity of the mill.

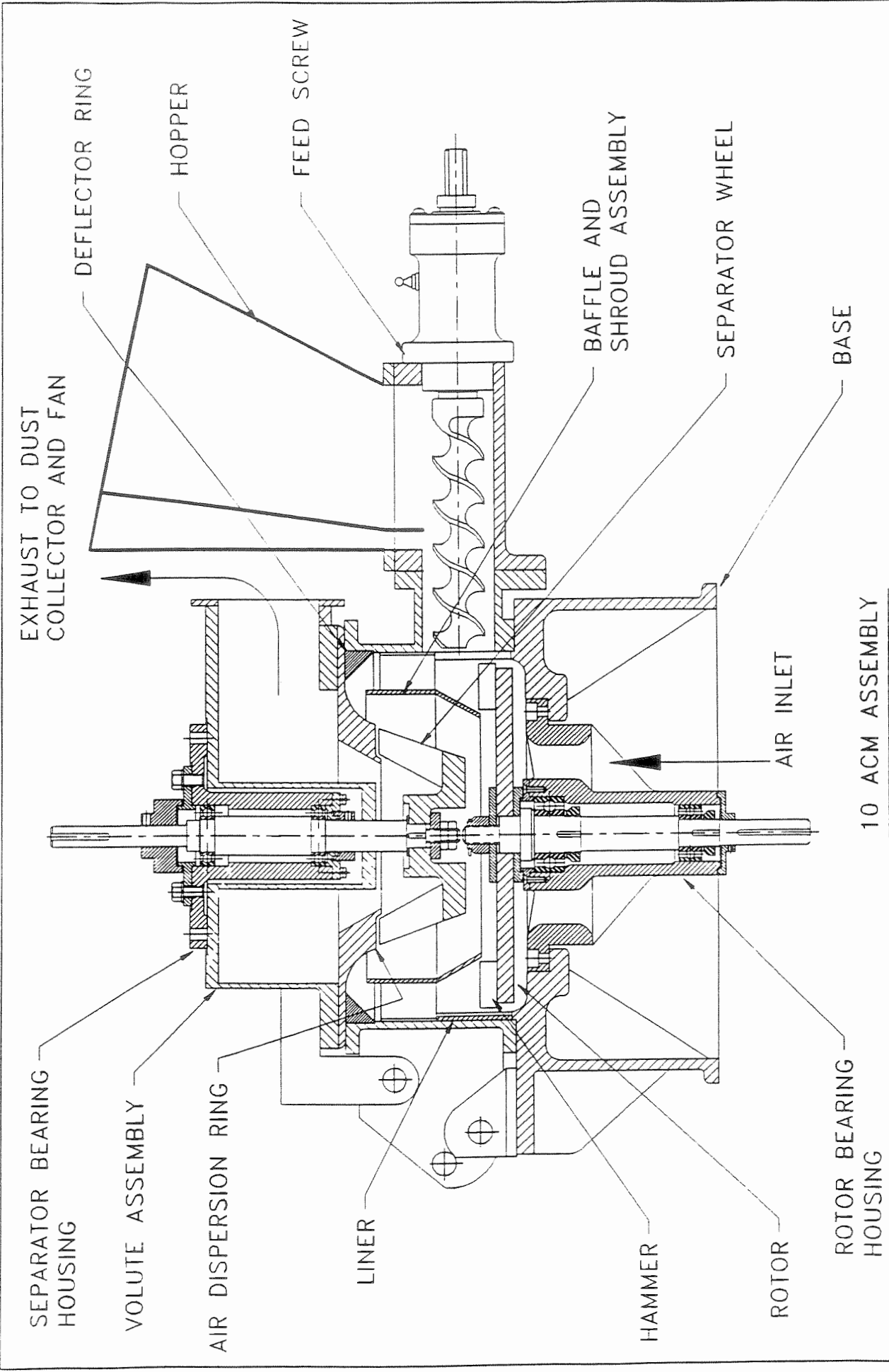
The speed of the hammers and separator wheel, as well as the air flow through the mill are the factors which affects the fineness of the product. Higher separator speed and lower air flow produce finer product.

Generally, the process can be summarized as follows (Refer to Fig. 1):

The material is fed into a hopper mounted above the Feed Screw. A variable speed drive conveys the material in a uniform fashion to the grinding chamber.

The hammers impact the material as it enters the grinding chamber propelling it toward the liner. This action fractures the material. The air, entering at the bottom of the mill, conveys the partially ground material around the baffle and shroud assembly, toward the separator wheel, and lets the fine particles through and rejects the coarser material. This coarser material drops back into the rotor chamber for further reduction as the material is impacted by the hammers. The material continues to be recirculated in this manner until all the particles have been reduced to a fineness that allows them to pass through the separator wheel.

After the separator wheel, the air conveys the fine material to the dust collector, where the conveying air is filtered and the product collected. The clean air is discharged to the atmosphere through the exhaust fan.



10 ACM ASSEMBLY

FIG. 1

## SECTION II

### SAFETY

2-1 GENERAL	PG. II-1
2-2 EQUIPMENT SAFETY FEATURES	PG. II-2
2-3 WARNING SIGNS	PG. II-3

## 2-1.- GENERAL:

**NOTE:** Before installing, operating, or maintaining this equipment, carefully read this Manual and the following Safety recommendations.

- Follow all plant Working Rules and use recommended Safety Equipment.
- Read Operating Manual.
- The area around the ACM can be dusty. Use suitable respirator per plant policy and OSHA recommendations.
- While working around the mill, steel toe safety shoes and safety goggles or safety glasses with side shields must be worn at all times.
- The ACM produces a noise level somewhat higher than the acceptable limit of 85 dba at 1 meter from the noise source. OSHA approved ear protection must be worn while working around the mill.
- Keep hands and clothing clear of Feed Hopper, Mill openings, Air inlets or any moving parts.
- To eliminate the possibility of sparking occurring within the mill, all metallic scrap must be separated from the feed material before it enters the grinding chamber.
- Be sure the mill is electrically grounded.
- Wire motors permanently to an approved NEMA enclosure in accordance with all local codes and the National Electric Code.
- Before the mill is opened for inspection or repairs, make sure the main power is disconnected and the switch is locked out.

- When operating the mill, all safety guards must be in place.
- Should abnormal levels of vibration or noise develop, immediately shut off the equipment, investigate the problem and do not re-start the unit until the problem has been corrected. Contact MPS Service Department for assistance.

## 2-2.- EQUIPMENT SAFETY FEATURES:

The MIKRO-ACM™ PULVERIZER incorporates the following safety features:

- **Fabrication:**  
Our mills are designed and built with safety in mind. All materials used have been carefully selected. All our mills are inspected by our Quality Control personnel during fabrication and assembly.
- **Housing Cover Limit switch:**  
This Limit Switch is interlocked with the Main Drive so that the Main Drive Motor cannot run if the Volute Assembly is not in place.
- **Electric Interlock between Motors:**  
The Main Drive Motor and Feed Screw Motor are interlocked so that the Feed Screw Motor cannot be started unless the Main Drive Motor is running.
- **V-Belt Guards:**  
All V-Belt Drives are protected with OSHA approved guards.
- **Moving Parts:**  
All moving parts are enclosed.

2-3.- WARNING SIGNS:

WE RECOMMEND THE INSTALLATION OF THE FOLLOWING SAFETY SIGNS IN THE VICINITY OF THE MIKRO ACM™ PULVERIZER:

CAUTION  
WEAR EAR  
PROTECTION

CAUTION  
SAFETY GLASSES  
REQUIRED IN  
THIS AREA

CAUTION  
WEAR  
RESPIRATOR

NOTICE  
DO NOT OPERATE  
WITHOUT GUARDS

## SECTION III

### EQUIPMENT DESCRIPTION

3-1 FEED SYSTEM	PG. III-1
3-2 PULVERIZER	PG. III-1
3-3 PULVERIZER DRIVES	PG. III-3
3-4 PULVERIZER SUPPORT	PG. III-3
3-5 ELECTRICAL CONTROLS	PG. III-4
3-6 EQUIPMENT DATA	PG. III-4

### 3-1.- **FEED SYSTEM:**

(Refer to Drawings #10ACM-N64145-M1)

The **Model 10 ACM FEED SYSTEM** consists of the following items:

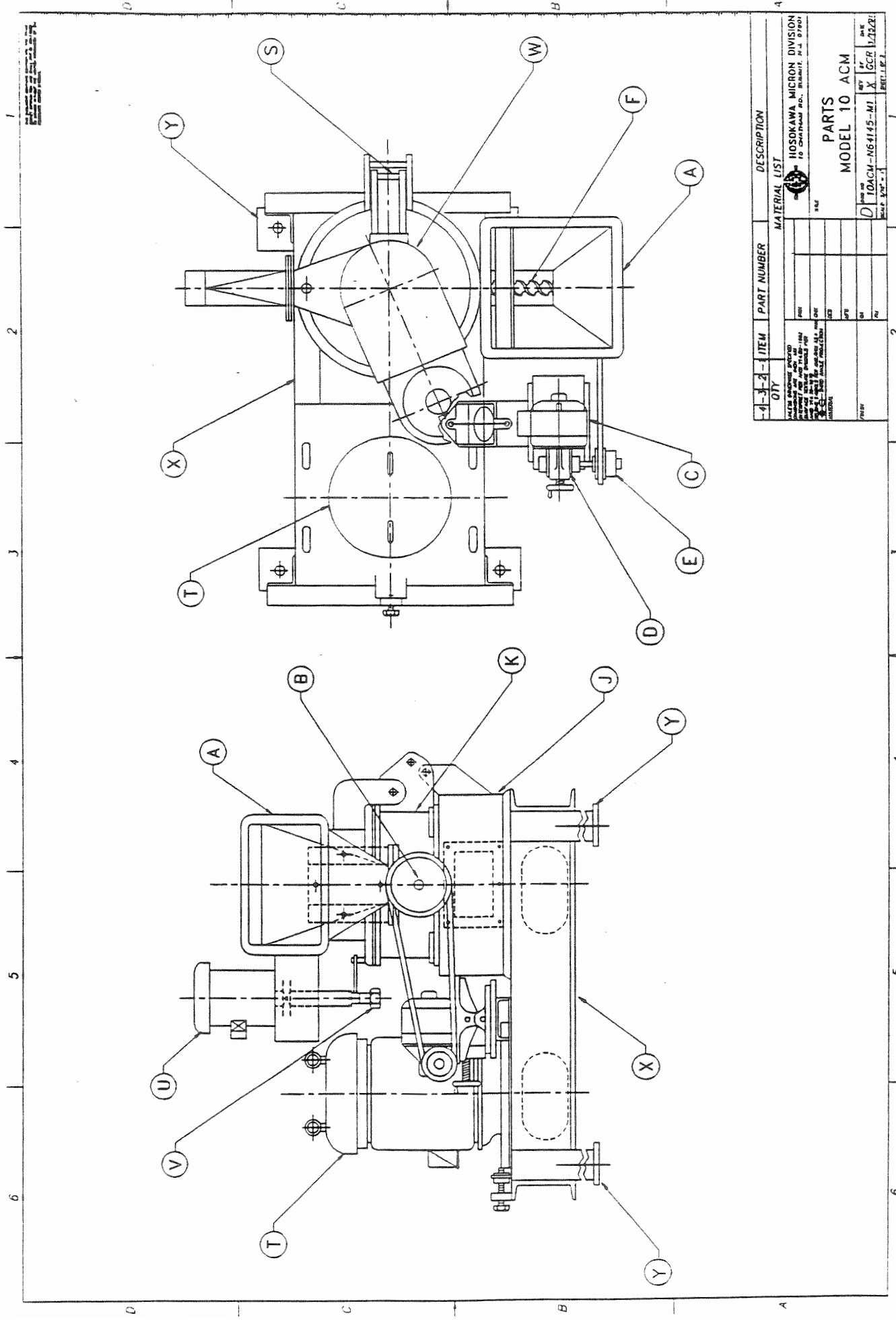
- The **FIAC Hopper (A)** ("Feed Inlet Air Control Hopper), has a nominal capacity of 0.5 cu. ft. Hopper (A) is bolted to Feed Screw Mechanism (B). The FIAC Hopper is designed with an internal baffle plate which divides the hopper into a large and a small section. The large section feeds material to the mill. The small section allows air to enter the grinding chamber with the feed material to "break" the suction at the feed entry point.
- The **Feed Screw Mechanism (B)** is a single screw conveyor consisting of **Motor (C)**, driving **Gear Reducer (D)**, **Adjustable Speed Drive (E)**, and single **Screw (F)**.

### 3-2.- **PULVERIZER:**

(Refer to Drawings #10ACM-N64145-M1)

The **MILL** itself consists of the following major components:

- The **Rotor Bearing Housing (G)** with **Rotor (H)** and **Hammers (I)** is bolted to the **Grinding Chamber Base (J)** and the **Grinding Chamber (K)**.
- The **Separator Bearing Housing (M)** with **Separator Wheel (N)**, is mounted inside the **Volute Assembly (Q)** and over the Grinding Chamber (K). Between the Volute Assembly (Q) and the Grinding Chamber (K) there is a **Deflector Ring (O)** and an **Air Dispersion Ring (P)** to deflect and guide the pulverized material to the classification zone between the Separator Wheel (N) and the **Baffle and Shroud (R)**, which rests on the **Liner (L)**. The Baffle and Shroud (R) provides a path for rejected coarse particles to return to the hammers for further size reduction.



1. This drawing is the property of  
 2. It is to be used only for the purpose  
 3. specified in the contract.  
 4. It is not to be distributed, copied,  
 5. or otherwise used without the written  
 6. consent of the manufacturer.

QTY	ITEM	PART NUMBER	DESCRIPTION
<b>MATERIAL LIST</b> HOSOKAWA MICRON DIVISION 10 CHATHAM RD., BRAINT, N. J. 07001			
<b>PARTS MODEL 10 ACM</b>			
10ACM-1064145-M1 X GCR 1/12ZP			
Part X-2-1-1			

1  
 2  
 3  
 4  
 5  
 6

- The curved fins attached to the outside surface of the Baffle and Shroud (R) serve two purposes: One is to bridge the gap between the baffle ring and the wall of the grinding chamber. The second is to direct the airflow through the mill so that it is parallel to the separator blades.
- The **Liner (L)** is secured to the inner radius of the Grinding Chamber (K) and along with the Hammers (I), provide the impact surfaces where the grinding takes place.
- The Volute Assembly (Q) and the Grinding Chamber (K) are pivoted on **Pins (S)**, for easy cleaning, maintenance, and disassembling of the various components.

**Notes:**

- a.- Two different Rotor assemblies are available depending on the grinding application. One utilizes **Pins** and the other utilizes **Bar hammers** to grind the product. The Pin type rotor produces a coarser particle distribution and is primarily used when grinding non-abrasive crystalline materials, such as sugar. Bar hammers are used to produce finer particle distributions and when grinding moderately abrasive materials. The bars can be faced with a variety of abrasive resistant tippings.
- b.- Two types of liners are available in a variety of materials. One is the **Multiple Deflector (MD) Liner** and the other is the **Smooth Liner**. The MD liners are used for most materials, while the smooth liner is used for gummy materials or to achieve a coarser particle distribution.
- c.- Separator Wheels are available in three configurations: **24 Short Blade Type**; and **24 and 48 Long Blade**. The Separator Wheels can be made from carbon steel, 304 or 316 Stainless Steel.



- Different separator wheel configurations may result in slight changes in particle size distribution and/or capacity. Contact Micron Powder Systems to discuss your particular application.

3-3- **PULVERIZER DRIVE:**  
(Refer to Drawings #10ACM-N64145-M1)

The PULVERIZER DRIVES consist of the following items:

- The Rotor (H) is driven by **Main Motor (T)** through a constant speed **V-Belt drive** (Not shown).
- The Separator Wheel (N) is driven by **Motor (U)** through a **Variable Speed V-Belt drive (V)**. The V-Belt Drive (V) is enclosed by a **Safety Guard (W)**.

3-4.- **PULVERIZER SUPPORT:**  
(Refer to Drawings #10ACM-N64145-M1)

The PULVERIZER SUPPORT consists of the following items:

- **Structural Mill Base:**  
The Feed Screw Mechanism Drive (B), the Grinding Chamber Base (J) and the Rotor Drive Motor (T) are bolted to a common **Base (X)**.
- **Supporting Legs:**  
Base (X) is bolted to four 12" long **Stand Legs (Y)** which support the mill. These Legs (Y) should be anchored to suitable floor or foundation.(See Section IV, Par.4-1)

3-5.- **ELECTRIC CONTROLS**

Mikro-ACM™ Pulverizers are normally sold as part of a system that at a minimum includes a control panel and dust collector. A limit switch is provided with the ACM to prevent operation of the mill if the volute assembly is not properly closed.

Ammeters and tachometers are recommended to monitor motor loading and the RPM of the separator and/or rotor. In addition, devices to monitor pressure differential across the mill and dust collector should be incorporated in the control panel.

If the customer elects to supply his own electrical controls, they should be designed to start the system's components in the following sequence: airlock, separator, dust collector fan and solenoid timer board, rotor, and feeder. Shutdown is in the reverse order.

### 3-6.- EQUIPMENT DATA

#### DESIGN DATA:

MAIN DRIVE MOTOR (ROTOR) .....	10 HP
ROTOR DISC SPEED (MAX) .....	7000 RPM
SEPARATOR DRIVE MOTOR .....	1 HP
SEPARATOR WHEEL SPEED (MAX) .....	4000 RPM
CLEARANCES BETWEEN SEPARATOR BLADES AND DISPERSION RING (MAX/MIN) .....	.045"/.035'
AIRFLOW REQUIRED (NOMINAL) .....	500 CFM
OPERATING RANGE FOR STATIC PRESSURE LOSS ACROSS MILL .....	10" TO 20" W.G.
POWER REQUIREMENTS .....	Per Specs.
WEIGHT (APPROX.) .....	1150 LBS
FLOOR AREA REQUIRED .....	16 SQ. FT. (4 FT x 4 FT)

## SECTION IV

### INSTALLATION

4-1	FOUNDATION REQUIREMENTS	PG. IV-1
4-2	CLEARANCE REQUIREMENTS	PG. IV-1
4-3	UNLOADING EQUIPMENT	
4-3.1	Crates and Equipt. Inspection	PG. IV-1
4-3.2	Unloading	PG. IV-1
4-4	ASSEMBLY INSTRUCTIONS	PG. IV-2
4-5	INITIAL LUBRICATION	PG. IV-4

#### 4-1.- FOUNDATION REQUIREMENTS:

(For location of Supporting Legs, refer to drawing #10ACM-N64145-M)

The static load carried by the four Supporting Legs is 1,150 lbs.

The floor or foundations where the ACM is to be located must be level. The floor must be at least 6" reinforced concrete on firm soil base. If concrete piers are used, they must be at least one foot square and not more than 6" high.

#### 4-2.- CLEARANCE REQUIREMENTS:

There should be a minimum of six feet of clearance on all four sides of the mill once it is installed and there must be enough headroom to allow for installation of appropriate rigging to assist in routine maintenance of the mill.

#### 4-3.- UNLOADING EQUIPMENT:

##### 4-3.1 CRATES AND EQUIPMENT INSPECTION:

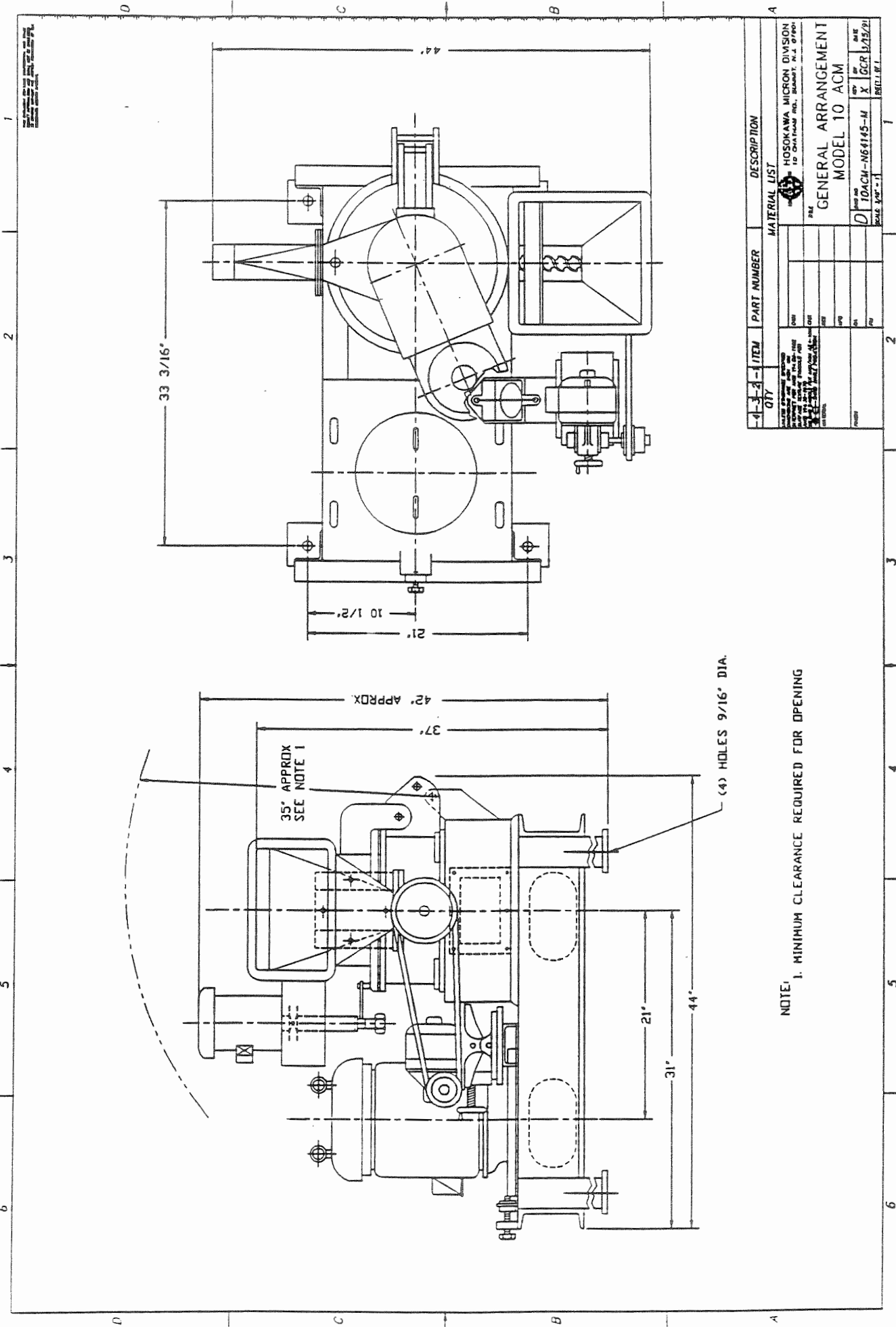
Inspect all the crates visually before opening them to identify any damage during transportation.

Inspect the appearance of all painted items.

Check for hardware that may have loosened during transport. Tighten any loose hardware.

##### 4-3.2 UNLOADING:

Use a 1 Ton (2,000 lb) capacity hoist for unloading and assembling the ACM.



NOTE: 1. MINIMUM CLEARANCE REQUIRED FOR OPENING

QTY	ITEM	PART NUMBER	DESCRIPTION
			<b>MATERIAL LIST</b>
HOSOKAWA MICRON DIVISION 10 SHANTUNG RD., SUZUKI, TOKYO, JAPAN			
<b>GENERAL ARRANGEMENT            MODEL 10 ACM</b>			
REV	BY	CHK	DATE
D	TOACH-N64145-M	X	GCR 1/13/91
DRAWN BY			SCALE
REVISED BY			DATE
APPROVED BY			
PROJECT			
SHEET NO.			TOTAL SHEETS
1			1

When handling the 10 ACM Assembly, (Drawing #10ACM-N64145-M), use nylon straps around the frame and the four legs. Do not route the straps near the feed screw or feed hopper.

- NOTES:**
- 1.- DO NOT PUT SLINGS OR STRAPS AROUND THE SEPARATOR DRIVE MOTOR OR DRIVE GUARD.
  - 2.- DO NOT USE THE MAIN MOTOR EYE BOLTS TO LIFT THE ACM. THESE ARE EXCLUSIVELY FOR LIFTING THE MOTOR.
  - 3.- DO NOT BOUNCE OR HIT ASSEMBLY DURING LIFTING.
  - 4.- MAKE SURE LOAD IS WELL BALANCED.

#### **4.4.- ASSEMBLY INSTRUCTIONS:**

**NOTES:** - For assembly instructions refer also to Section III, "EQUIPMENT DESCRIPTION".

- Check Foundation level.
- Lift and locate the assembly over the Foundation, using nylon straps around Frame as indicated in Section 4-3.2. Make sure load is well balanced.
- Secure Legs to Floor or Foundation using 1/2" anchor bolts.
- Level and square Pulverizer Frame.
- Rotate the Rotor by hand to make sure that it rotates freely. If it does not, refer to Section VI "Maintenance" Par 6-3.2 and 6-3.4 to determine the cause. Call MPS Service Department if you are unable to positively identify the cause.
- Rotate the Separator by hand to make sure that it rotates freely. If it does not, refer to Section VI "Maintenance" Par 6-3.3 and 6-3.5 to determine the cause. Call MPS Service Department if you are unable to positively identify the cause.

- Check the V-Belt tension of the Rotor Motor. Correct it if necessary by adjusting the Rotor Motor on its Slide Rails and then tighten the Motor locking bolts.
- Proper V-Belt tension is a belt deflection of 3/16" when the belt is subjected to a 5 lb. load centered between the sheaves.
- Install the V-Belt Safety Guard.
- Install the Hopper over the Feed Screw Mechanism. Make sure the mating surfaces are clean. Use a gasket if necessary for a good seal.
- Connect power to the motor starters. Refer to Section III, par. 3-5.
- Check lubrication of Feed Screw Assembly. Refer to Section VI, par. 6-1 "Preventive Maintenance" for instructions and lubricant specifications.
- Make sure the machine is clear of all foreign objects and that all bolts are properly tightened.
- Switch the power ON
- Jog the Main Motor and Separator Motor to check the direction of rotation. Both must rotate counter clockwise (See Fig.1, Section I). Change the Rotation if it is not correct.
- Jog the Feed Screw Mechanism Motor. Make sure the screw flight is turning toward the grinding chamber.
- Verify that the Safety Limit Switch operates properly (See par. 3-5).
- **DO NOT verify the limit switch operation by running the mill,** but check it according to the following procedure:
- Lock out the main power to the mill. When the mill cover is properly closed, use a multimeter to measure continuity across the limit switch terminals.
- Open the mill Volute Assembly slightly and verify that you can no longer measure continuity across the terminals.
- Reinstall mill Volute Assembly.
- Connect the ducting from the mill to the Dust Collector.
- Start the motors in the following sequence:
  - Airlock - Separator Wheel - Exhaust Fan - Rotor - Feeder.

- Run the ACM empty for 1/2 hour to check bearing temperature (see par. 6-1.2), and listen for any unusual noise or vibration.

Record the rotor motor and the separator motor idle load amperage readings for future reference. These two readings are used to adjust the feed rate and to maximize grinding efficiency.

Rotor idle load amperage: \_\_\_\_\_ @ \_\_\_\_\_ RPM

Separator idle load amperage: \_\_\_\_\_ @ \_\_\_\_\_ RPM

- After the run-in period, re-check all bolts and fasteners for tightness.

#### 4-5.- INITIAL LUBRICATION:

The **Rotor** and **Separator** assemblies are provided with sealed bearings. No further lubrication is required for the life of these bearings.

The **Feed Screw** assembly is equipped with one (1) Alemite grease fitting. The Feed Screw must be properly greased before running the unit.

For grease recommendations, see Section VI "Preventive Maintenance", par. 6-1.1 and 6-1.2 of this Manual.

All commercial items such as motors, variable speed-pulleys, etc. should be lubricated as per manufacturers specifications.

## **SECTION V**

### **START UP**

- 5-1 PRECAUTIONS BEFORE  
START UP** **PG. V-1**
- 5-2 START UP** **PG. V-1**
- 5-3 SHUTDOWN** **PG. V-4**
- 5-4 EMERGENCY SHUTDOWN** **PG. V-5**
- 5-5 POWER FAILURE** **PG. V-5**

### 5-1.- PRECAUTIONS BEFORE START-UP:

Before starting up **after** the Run-In period, make sure that:

- All bolts are properly tightened.
- The Volute Assembly is properly closed and that the **Limit Switch is satisfied**.
- The Volute Assembly Safety Limit Switch functions properly. (See page IV-4, par. 4-4)
- The Feed Screw has been greased.
- No tools have been left around the machine and drives.
- The Safety Guards are in place.
- Operators are using all the safety equipment required and are following all plant safety rules and regulations. (See Section II "Safety", for required safety equipment).
- Operators have been properly trained in the operation of the 10 ACM. Contact the MPS Service Department to request training classes.

### 5-2.- START-UP:

Note: MPS provides control panels with manual and/or automatic modes depending on customer requirements. The sequence of operation is identical in either mode.

To start a grinding cycle (Manual Mode):

- Start Airlock.
- Start the Separator Drive Motor by pushing the START Push-button for the Separator Motor.
- Adjust the Separator to the desired RPM.
- Start the Fan Motor.
- Start the Rotor Motor by pushing the START Push-button for the Rotor Motor. Adjust the rotor speed if applicable.
- Insure that all motors reach "idle load" amperage.
- Start the Feed Screw Motor with the hopper empty. The Feed Screw RPM should be initially set to its lowest speed.
- Feed raw material into the Hopper. DO NOT feed any material in the "feed inlet air" chamber of the Hopper. This chamber MUST be kept clean at all times.  
**CAUTION: The unit is designed to grind dry material and the seals were selected accordingly. When cleaning the unit, water and steam should be avoided as the moisture will work past the labyrinths and other seals and cause damage to bearings and shafts.**
- Motor loading for the rotor and separator is indicated by their respective ammeter readings. The characteristics of the material being processed will determine whether rotor or separator amperage will limit the feed rate.

- Increase the feed rate according to the limiting motor load. **Recommended Maximum feed rate is determined by monitoring the Ammeter. Do not exceed 95% of name plate full load amperage for the motor.**
- Adjust the Exhaust Fan Damper to keep the static pressure drop across the mill at 20" W.C.
- Adjust Separator speed to produce the required particle size distribution. Increasing the separator speed will result in a finer product; decreasing the separator speed will result in a coarser product.

NOTE: Separator wheel speed and airflow through the mill are the two most important variables that effect particle size. High separator wheel speed and low air velocity produce a finer particle size. The primary means of controlling particle size is separator wheel speed. If the separator is running at its maximum speed, and a finer product is required, the air velocity can be reduced by closing the damper on the fan. Reducing airflow will have the undesirable effect of reducing capacity. There will also be a point where the reduced airflow will no longer convey the product through the system.

In most cases, the distribution of the grind can be changed by altering the rotor speed. Reducing the rotor speed will usually lessen the amount of ultra fine particles produced by the mill.

- Stop the system at the end of the pulverizing cycle. **Follow Shut-Down Procedure.**

### 5-3.- SHUT-DOWN:

Note: All control panels provided by MPS with automatic mode are designed to shutdown by pushing the process stop push button. Required time delays are incorporated in the panel design.

At the end of the grinding cycle or at any time during operation, the pulverizer can be stopped using the following manual mode shut down procedure.

- Stop feeding the ACM by pushing the STOP push-button of the Feed Screw Motor.
- Continue to run the ACM until ammeter readings for both the rotor and separator motors reach their idle load readings. The grinding chamber is now empty.

Note: Refer to Section 4-4, pg. IV-5 for idle load amperage readings.

- Stop the Rotor motor.
- Stop the Fan motor.  
Note: A time delay is initiated after the fan is stopped which locks out the separator stop push button and allows the airflow to stop before stopping the separator.
- Push the stop push button for the Separator motor approximately 15 seconds after the fan stop was initiated.
- The Separator motor is turned off after the fan stops to prevent oversized material from being transported through the mill by any residual air flow.

- Make sure that the Separator Wheel comes to a complete stop before attempting any disassembly or inspection.
- After all material has been discharged from the dust collector, stop the Airlock.
- The System can be restarted by following the aforementioned start-up procedure (Par. 5-2).

#### 5-4.- **EMERGENCY SHUT-DOWN:**

Control Panels supplied by MPS have emergency STOP buttons which immediately cut power in case of emergency. If the customer provides his own control panel, he must insure that there are provisions for emergency stops in the panel and in close proximity to the mill and other system components. The mill cover limit switch or mill cover proximity switch will function as an emergency stop if the mill is opened.

#### **CAUTION:**

**Before opening the Mill, make sure that the Main Power Switch is disconnected, properly tagged out and locked out.**

Before restarting, open the Mill and remove any material in the grinding chamber. The rotor should be started from an unloaded condition. Follow the aforementioned Start-Up procedure. (Par. 5-2)

When power is shut off to all components simultaneously, it is likely that some oversized material will be transported to the dust collector as the separator wheel slows down. If a small amount of oversized particles in the final product is unacceptable, the dust collector should also be emptied before the system is restarted.

#### 5-5.- **POWER FAILURE:**

MPS Control Panels are designed so that the equipment will not restart automatically when power is restored. Customer designed panels must be designed similarly to prevent serious injury and equipment damage.

Before attempting to restart the System all product must be removed from the grinding chamber.

When power is shut off to all components simultaneously, it is likely that some oversized material will be transported to the dust collector as the separator wheel slows down. If a small amount of oversized particles in the final product is unacceptable, the dust collector should also be emptied before the system is restarted.

#### **CAUTION:**

**Before opening the Mill, make sure that the Main Power Switch is disconnected, properly tagged out and locked out.**

Restart the mill by following the Start-up procedure (Par. 5-2).

**SECTION VI**  
**MAINTENANCE**

<b>6-1</b>	<b>PREVENTIVE MAINTENANCE</b>	<b>PG. VI-1</b>
6-1.1	Lubrication	PG. VI-1
6-1.2	Daily Preventive Maintenance	PG. VI-2
<b>6-2</b>	<b>VIBRATION LIMITS</b>	<b>PG. VI-2</b>
<b>6-3</b>	<b>ASSEMBLY INSTRUCTIONS</b>	
6-3.1	Changing Liners	PG. VI-2
6-3.2	Changing Rotor and Hammers	PG. VI-4
6-3.3	Changing Separator Wheel	PG. VI-5
6-3.4	Changing Rotor Bearings	PG. VI-6
6-3.5	Changing Separator Bearings	PG. VI-7
6-3.6	Changing Feed Screw	PG. VI-8
6-3.7	Changing V-Belts	PG. VI-9
<b>6-4</b>	<b>TROUBLESHOOTING</b>	<b>PG. VI-10</b>

## 6-1.- PREVENTIVE MAINTENANCE

Maintenance of the 10 ACM is very simple and only requires a small amount of planned maintenance time.

### 6-1.1 LUBRICATION:

Refer to "Lubrication Chart" and "Lubrication Graph" in this SECTION.

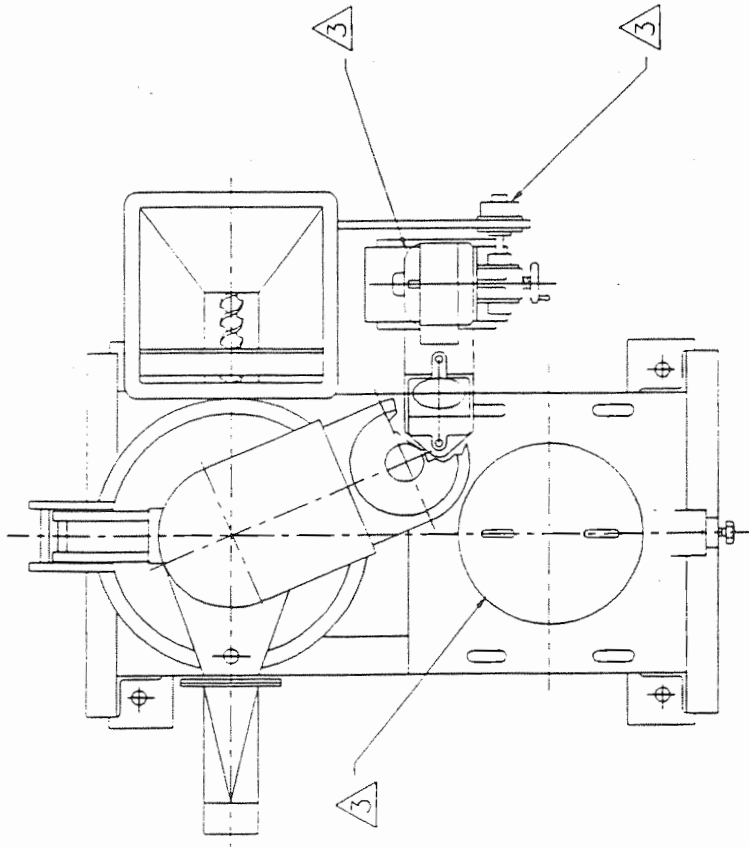
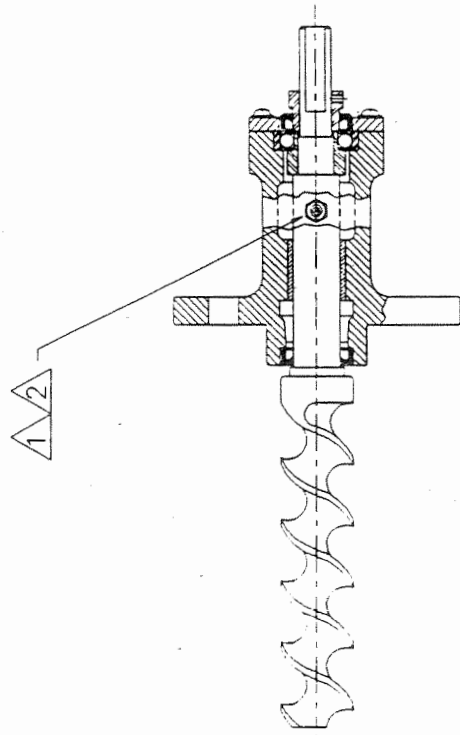
- Rotor Motor, Separator Motor and Feed Screw Motor:  
Follow recommendations of Motor Manufacturer.
- Rotor and Separator Bearings:  
The 10 ACM is equipped with sealed, lubricated bearings on both main Rotor shaft and Separator Wheel shaft. No further lubrication is required for the life of the bearings.
- Feed Screw Motor:  
Follow recommendations of Motor Manufacturer.
- Feed Screw System Reducer:  
Follow recommendations of Reducer Manufacturer.
- Variable Speed Pulleys:  
Follow recommendations of Pulley Manufacturer.
- Feed Screw Bearings:  
The Feed Screw Housing is equipped with one Alemite grease fitting, which should be lubricated once a week during normal use. Use a premium #2 grease.




**Recommended grease:** See Chart.

# LUBRICATION CHART

SYSTEM: 10 ACM

Equipment Section	Parts to be Lubricated	Method of Application	Lubricant Selection	Frequency	
				Replenish	Change
MILL	Bearings	SEALED BEARINGS - NO LUBRICATION REQUIRED			
FEED SCREW	Reducer	USE MANUFACTURER SPECIFICATIONS			
	Variable				
	Speed Pulley	USE MANUFACTURER SPECIFICATIONS			
	Screw Brgs.	Grease Fitting	Chevron Dura-Lith EP #2	Every week	Every 3 mo.
			Exxon Unirex #2		
			Mobil Mobilix #2		
			Shell Alvanla Grease #2		
			Sunoco Prestige 742EP		
			Texaco Multifak #2		



EVERY WEEK (GREASE)   
 EVERY 3 MONTHS (CHANGE)   
 PER MANUFACTURER SPECS. 

## 6-1.2 DAILY PREVENTIVE MAINTENANCE:

Check Rotor and Separator Bearing Housings for any unusual noise or temperature change. The mill must be shut down to take temperature measurements. Use a surface probe or carefully touch the bearing housing. If you cannot hold your hand to the bearing housing, it is too hot (over 140F) and requires attention.

While the unit is running under load, listen for any unusual noise. (DO NOT remove your ear plugs). If you hear any unusual noise or vibration, notify your supervisor immediately.

## 6-2.- VIBRATION:

### VIBRATION LIMITS:

The following Vibration Velocity Limits (in/sec) apply to unloaded conditions:

- 0.15 in/sec or less is NORMAL.
- 0.15 to 0.40 in/sec - Identify and correct the source of vibration.
- Greater than 0.40 in/sec - Shut down Mill. DO NOT run until the source of vibration is corrected.

## 6-3.- ASSEMBLY INSTRUCTIONS:

### 6-3.1 CHANGING LINERS (See Fig. 2):

(THIS PROCEDURE APPLIES ALSO FOR CHANGING BAFFLE AND SHROUD AND DEFLECTOR RING).

- Shut down the mill following the procedure in paragraph 5-3, pg. V-3.
- Disconnect the Main Power Switch, lock it out, and tag it out.

- Remove the Volute assembly bolts.
  - Pull up on the Volute Assembly and rotate it on the pivot shaft until it rests on its stop. The grinding chamber is now exposed for disassembly.
  - Pull straight up on the Deflector Ring to remove it.
  - Pull straight up on the Baffle and Shroud to remove it.
  - Remove the two sections of Liners by removing four (4) bolts from each section and lift out the liners.
  - Clean the area behind the liners and all other mating surfaces.
  - Align the new feed Liner section with the feed opening. Loosely install all bolts, starting with the center two.
- NOTE: When using Multiple Deflector Liners the orientation of the scalloped deflectors is critical for efficient operation of the mill. (See Fig. 2)**
- Locate the other Liner section against the wall and install all bolts, beginning with the center two.
  - Tighten all eight bolts securely.
  - Check Deflector Ring and Baffle and Shroud before reinstalling them. Replace them if they show signs of wear
  - Rotate the Volute assembly back onto the grinding chamber and install the bolts. Insure that the limit switch operates properly (See pg. IV-4, paragraph 4-4).
  - Connect Power and start the unit.

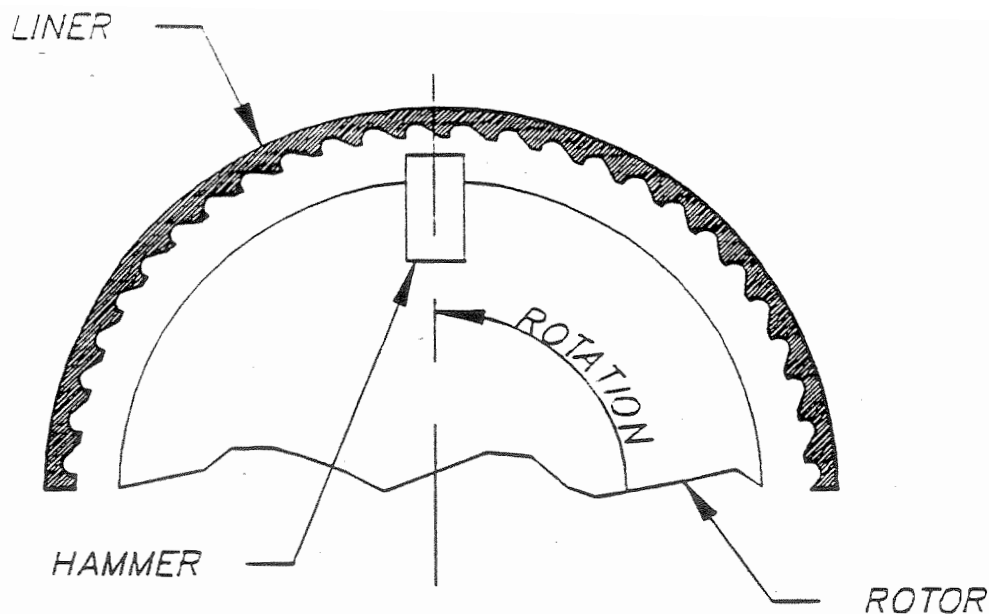


FIG. 2

### 6-3.2 CHANGING ROTOR AND HAMMERS:

**NOTE:** 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.

- Stop feeding the ACM. Keep the Mill running until the grinding chamber is empty.
- Stop Main Motor and the Separator Motor.
- Disconnect Main Power Switch, lock it out, and tag it out.
- Remove Volute assembly bolts.
- Pull up on the Volute Assembly and rotate it on the pivot shaft until it rests on its stop. The grinding chamber is exposed.
- Pull straight up on the Deflector Ring to remove it.
- Pull straight up on the Baffle and Shroud to remove it.
- If Bar-type Hammers are to be replaced, it is not necessary to remove the Rotor Disc. To remove the hammers simply loosen and remove the Allen screw from each hammer and lift the hammer and locating pin.

**Do not replace individual hammers.** Make sure that replacements are balanced pairs or complete balanced sets.

- When Pin-type Hammers become worn, the entire pin rotor assembly must be replaced.
- Remove the Cotter Pin from the castellated nut on the rotor shaft. Use a wooden wedge to fix the rotor in place.
- Loosen and remove the castellated nut.
- Remove the Clamp Washer and the Rotor Disc from the Rotor Shaft.
- Install a new Pin Rotor.
- Reverse the above procedure to close the mill.
- Restore Power and start the unit.

### 6-3.3 CHANGING SEPARATOR WHEEL:

- Stop feeding the ACM. Keep the Mill running until the grinding chamber is empty.
- Stop Main Motor and the Separator Motor.
- Disconnect Main Power Switch, lock it out, and tag it out.
- Remove Volute assembly bolts.
- Pull up on the Volute Assembly and rotate it on the pivot shaft until it rests on its stop.
- To remove the Separator Wheel from its shaft, loosen the lower jam nut at the end of the Separator Shaft by holding the top one with a wrench.
- Remove both jam nuts and the Washer.
- Remove the Separator Wheel.  
NOTE: There are a number of shims (thin washers) behind the Separator which serve to adjust the gap between the Separator Wheel and the Air Dispersion Ring.
- Install the new Separator Wheel, the Separator Wheel Washer and the jam nuts.

- Using a feeler gauge, check the clearance between the Separator Wheel and the Air Dispersion Ring. It should be between 0.035" and 0.045". Adjust this clearance, if necessary, by adding or removing the Separator Wheel shims.
- Reverse above procedure to close the mill.
- Connect Power and start the unit.

#### 6-3.4 CHANGING ROTOR BEARINGS:

- Stop feeding the ACM but keep the Mill running until the grinding chamber is empty.
- Stop the Rotor Motor and the Separator Motor.
- Disconnect the Main Power Switch, lock it out, and tag it out.
- Remove Volute assembly bolts.
- Pull up on the Volute Assembly and rotate it on the pivot shaft until it rests on its stop. The grinding chamber is exposed.
- Pull straight up on the Deflector Ring to remove it.
- Pull straight up on the Baffle and Shroud to remove it.
- Remove the Cotter Pin from the castellated nut on the rotor shaft.
- Use a wooden wedge to fix the rotor in place.
- Loosen and remove the castellated nut.
- Remove the Clamp Washer and the Rotor Disc from the Rotor Shaft.
- Loosen the locking hardware for the Rotor Motor Base so that the Rotor V-belts can be removed.
- Remove V-Belts and Driven Pulley.
- Loosen and remove the socket headed Cap Screws holding the Impact Rotor Bearing Housing to the Grinding Chamber Base.
- Pull Rotor Bearing Assembly up and out of the grinding chamber.
- Remove the Upper Impact Bearing Flinger.
- Take out the Flat headed Screws from the Upper Rotor Bearing Retaining Collar and remove the Collar.
- Pull out the complete shaft with bearings from the bearing housing.

- Loosen and remove the locknut and lockwashers.
- Use a bearing puller behind the inner race of the bearing to remove it. The shaft journal should be inspected to verify proper dimensions. Should the bearing become seized on the shaft, other methods of removal may be necessary. If this becomes necessary, the shaft journals must be inspected prior to installing new bearings. Contact MPS Service Department for assistance.
- 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. In either case, 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 O.D. of four inches or less. The shoulder on the shaft should make contact with the inner race of the bearing.
- Clean all components before reassembling the bearing housing.
- Reverse the above procedure to reassemble the mill.
- Connect Power and start the unit.

#### 6-3.5 CHANGING SEPARATOR WHEEL BEARINGS:

- Stop feeding the ACM. Keep the Mill running until the grinding chamber is empty.
- Stop Main Motor and the Separator Motor.
- Disconnect Main Power Switch, lock it out, and tag it out.
- Remove Volute assembly bolts.
- Pull up on the Volute Assembly and rotate it on the pivot shaft until it rests on its stop.
- To remove the Separator Wheel from its shaft, loosen the lower jam nut the end of the Separator Shaft by holding the top one with a wrench.
- Remove both jam nuts and the Washer.
- Remove the Separator Wheel.

NOTE: There are a number of shims (thin washers) behind the Separator which serve to adjust the gap between the Separator Wheel and the Air Dispersion Ring.

- Loosen the Set Screws and remove the lower Flinger.
- Loosen the Bolts holding the Separator Bearing Housing to the Volute Assembly.
- Pull the Separator Bearing Assembly up and out of the Volute Assembly.
- Remove the Held Bearing Retainer.
- Loosen the Set Screw and Remove the Flinger at the other end of the shaft.
- Pull out the shaft from the bearing housing.
- Remove bearings using same procedure described under paragraph 6-3.4
- Clean all components before reassembling the bearing housing.
- Reverse above procedure to reassemble the mill.
- Connect Power and start the unit.

#### 6-3.6 CHANGING FEED SCREW:

- Stop feeding the ACM but keep the Mill running until the grinding chamber is empty.
- Stop the Rotor Motor and the Separator Motor.
- Disconnect Main Power Switch, lock it out, and tag it out.
- Remove the Belts on the Adjustable Speed Drive.
- Loosen the Bolts between the Feed Screw Housing and the Screw Bearing Housing.
- Rotate the Screw Bearing Housing and pull it out of the Feed Screw Housing.
- Clean the base pads and install a new Feed Screw Assembly.
- If the bearings are to be checked and/or replaced, place the Screw Bearing Housing on a clean bench.
- Remove the Driven Pulley.
- Loosen the Set Screw and remove the Feed Screw Retaining Collar.
- Loosen the bolts and remove the Bearing Retaining Plate.
- Pull the Feed Screw Shaft out of the Feed Screw Bearing Housing.

- Remove the bearings (Ball bearing and Bronze Bushing) and inspect and replace them, if required.
- Clean all components before reassembling.
- Reverse the above procedure to assemble the Feeder.
- Connect the Power and start the unit.

#### 6-3.7 CHANGING V-BELTS:

- Stop feeding the ACM. Keep the Mill running until the grinding chamber is empty.
- Stop the Main Motor.
- Disconnect the Main Power Switch, lock it out, and tag it out.
- Loosen the Belts by sliding the Main Motor on its rails.
- Remove the Belts and install a new **matched** set.
- Adjust the Belt tension. (See Page IV-3, Par. 4-4)

6-4 TROUBLESHOOTING CHART

SYSTEM: 10 ACM

Equipment Section	Symptoms	Possible Cause	Remedy
MILL	Mill stops - Starter heaters	a.- Feeding rate too high	Slow Feeder
	overload	b.- Rotating backwards	Reverse rotation
		c.- Foreign object jamming rotor	Remove object
		d.- Separator wheel too fast	Decrease wheel speed
Mill product not discharging	a.- Separator wheel too fast	Decrease wheel speed	
	b.- Exhaust fan malfunction	Check/start fan	
	c.- Insufficient Airflow	Adjust damper for 20" W.G.	
Material is blowing out of the mill	a.- Exhaust fan malfunction	Check/start fan	
	b.- Duct and/or Dust Collector is clogged or blinded.	Clean duct. Service dust collector.	
	c.- Incorrect rotation	Reverse rotation	
Change in product particle size	a.- Feed material has changed (in composition or size)	Adjust classifier speed	
	b.- Separator speed has changed	Check drive/adjust speed	

6-4 TROUBLESHOOTING CHART

SYSTEM: 10 ACM

PAGE: 2 OF 3

Equipment Section	Symptoms	Possible Cause	Remedy
MILL	Premature bearing failure	a.- Wrong bearing b.- Rotor imbalance c.- Improper hammer installation	Procure correct bearing Balance rotor Install hammers per instructions
		d.- Heavy and/or inconsistent feed material	Adjust feed mechanism to deliver material at a slower rate
		e.- Excessive V-belt tension	Adjust to proper tension
		f.- Possible contamination by material and/or water during washdown	Avoid water contact near shaft area
	Variation in Mill Motor load (amperage)	a.- V-belts slipping b.- Feed rate varying c.- Inconsistent feed material	Adjust belt tension (Sect. 4-4) 1. Check feed supply 2. Check feeder operation Modify preparation of feed material
	Reduce capacity	a.- Worn hammers b.- Worn liners c.- Reduced rotor speed	Replace with new set Replace with new liners Check drive for worn or loose V-belts. Replace belts with matched set.
		d.- Feed rate too slow	Increase feed screw speed to max. 95% of motor full load (See Section 5-2.)

6-4 TROUBLESHOOTING CHART

SYSTEM: 10 ACM

PAGE: 3 OF 3

Equipment Section	Symptoms	Possible Cause	Remedy
MILL	Reduced Capacity	e.- Low air flow	Increase airflow to produce a 20" water S.P. across the mill
FEED SCREW	Feed screw jam	Foreign object jamming screw	Clear object from feed screws
	Feeds too fast	Too much suction at feed	Check that the hopper air inlet chamber is clear.

NOTE: FOR ANY PROBLEMS NOT IDENTIFIED HERE, PLEASE CONTACT MPS SERVICE DEPARTMENT

## SECTION VII

### PARTS LIST

7-1 BASIC 10 ACM PULVERIZER

7-2 10 ACM ROTOR BEARING HOUSING

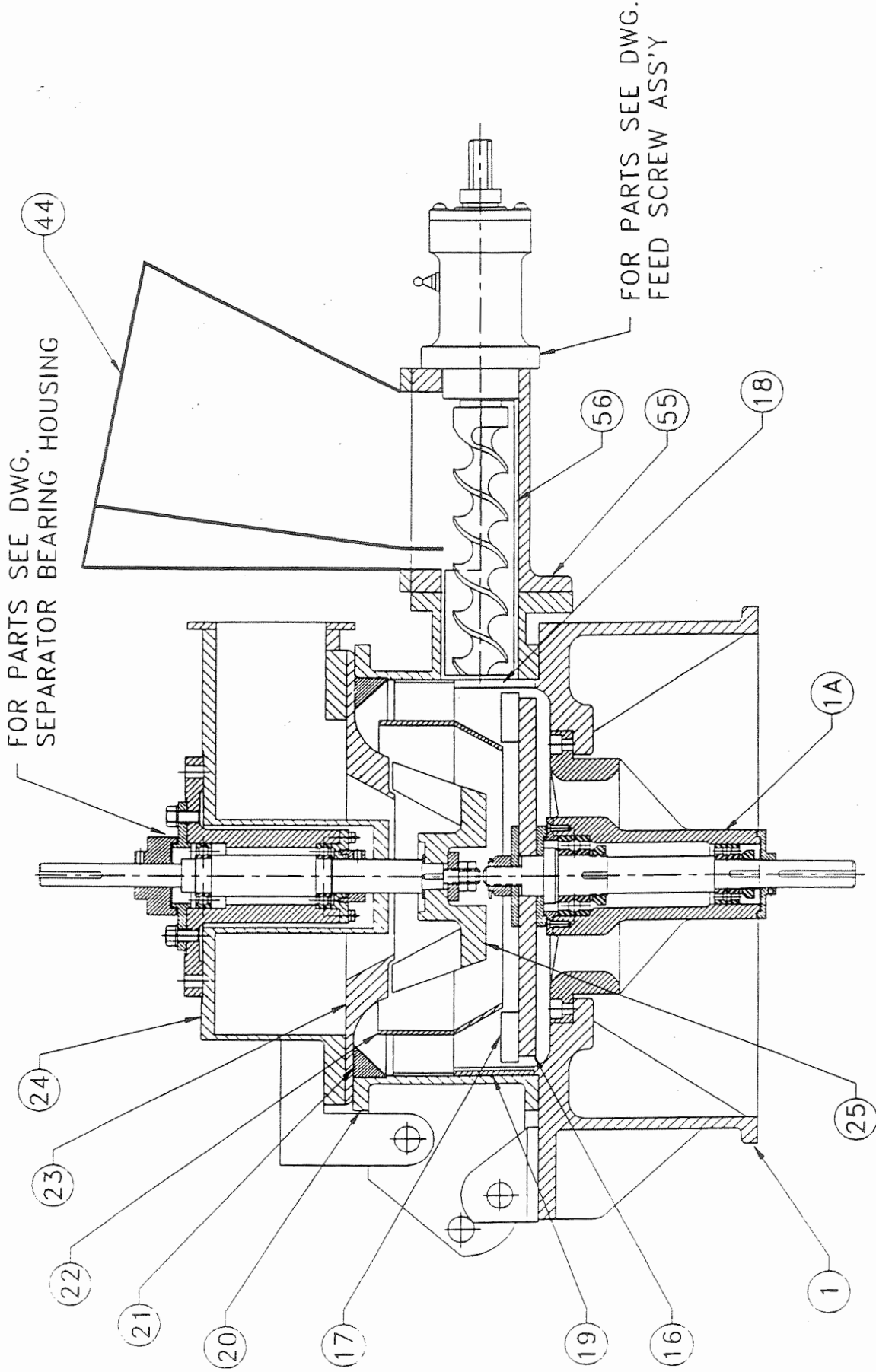
7-3 10 ACM SEPARATOR BEARING HOUSING

7-4 10 ACM FEED SCREW ASSEMBLY

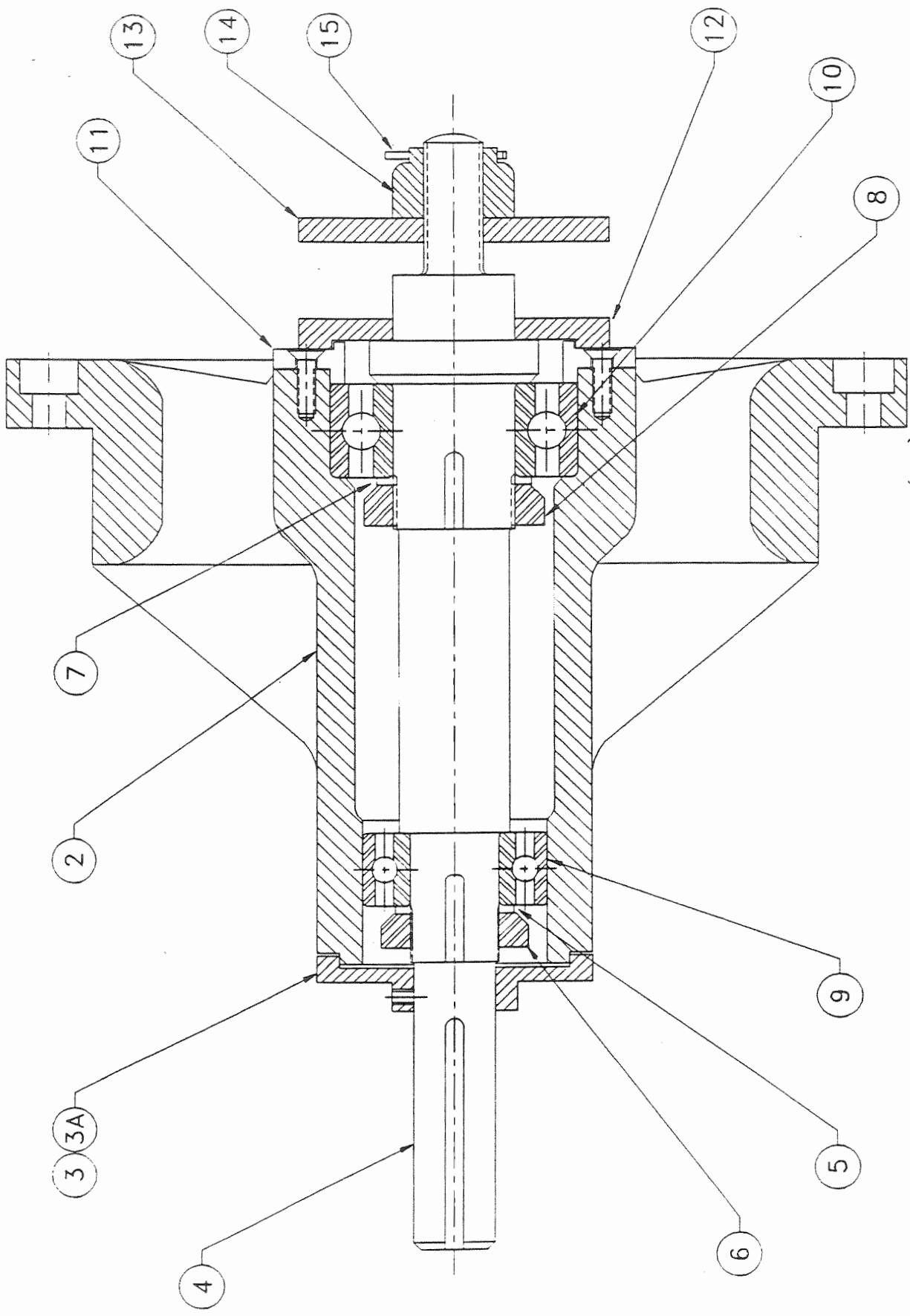
7-5 BILL OF MATERIAL

AND

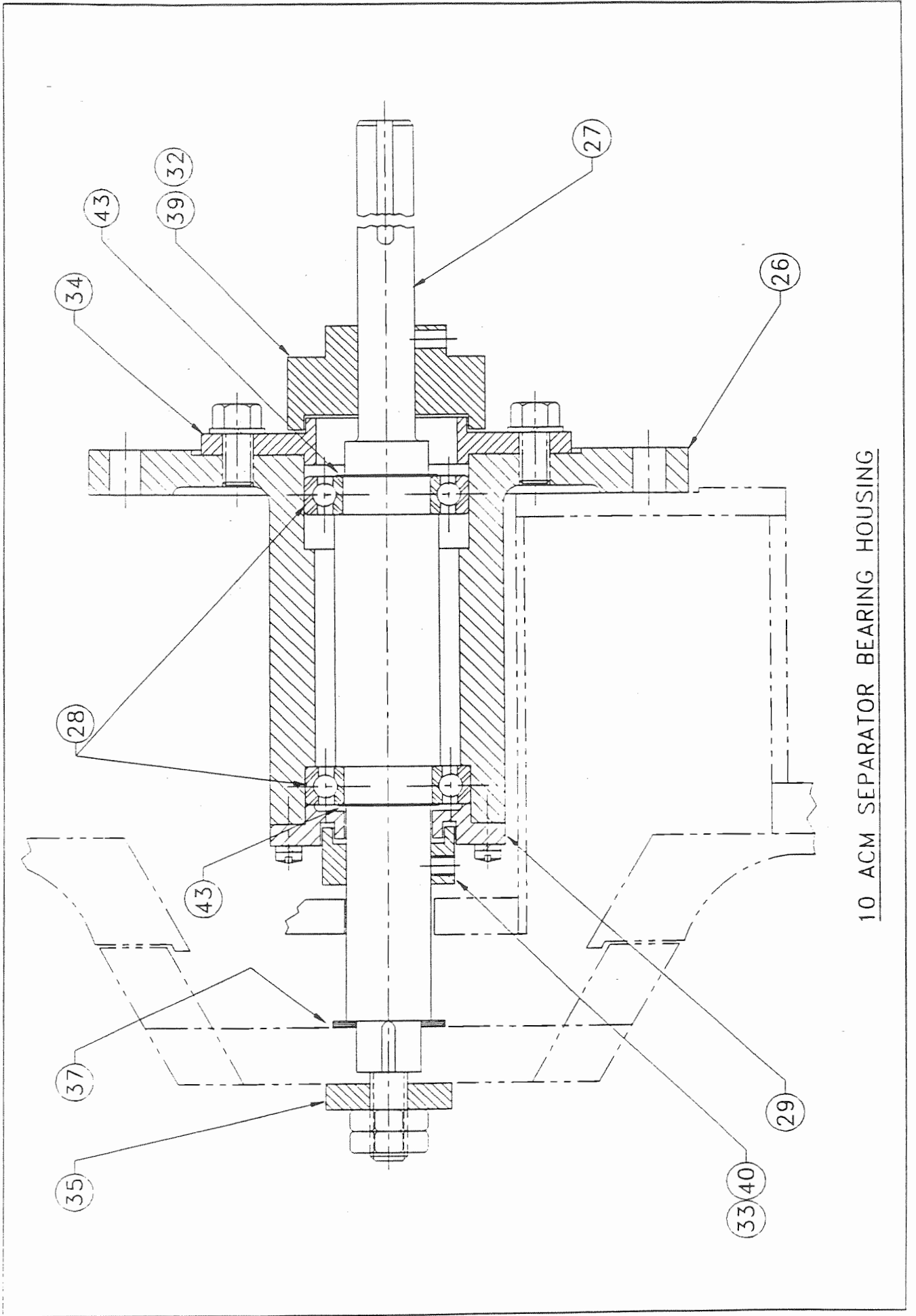
SPARE PARTS LIST



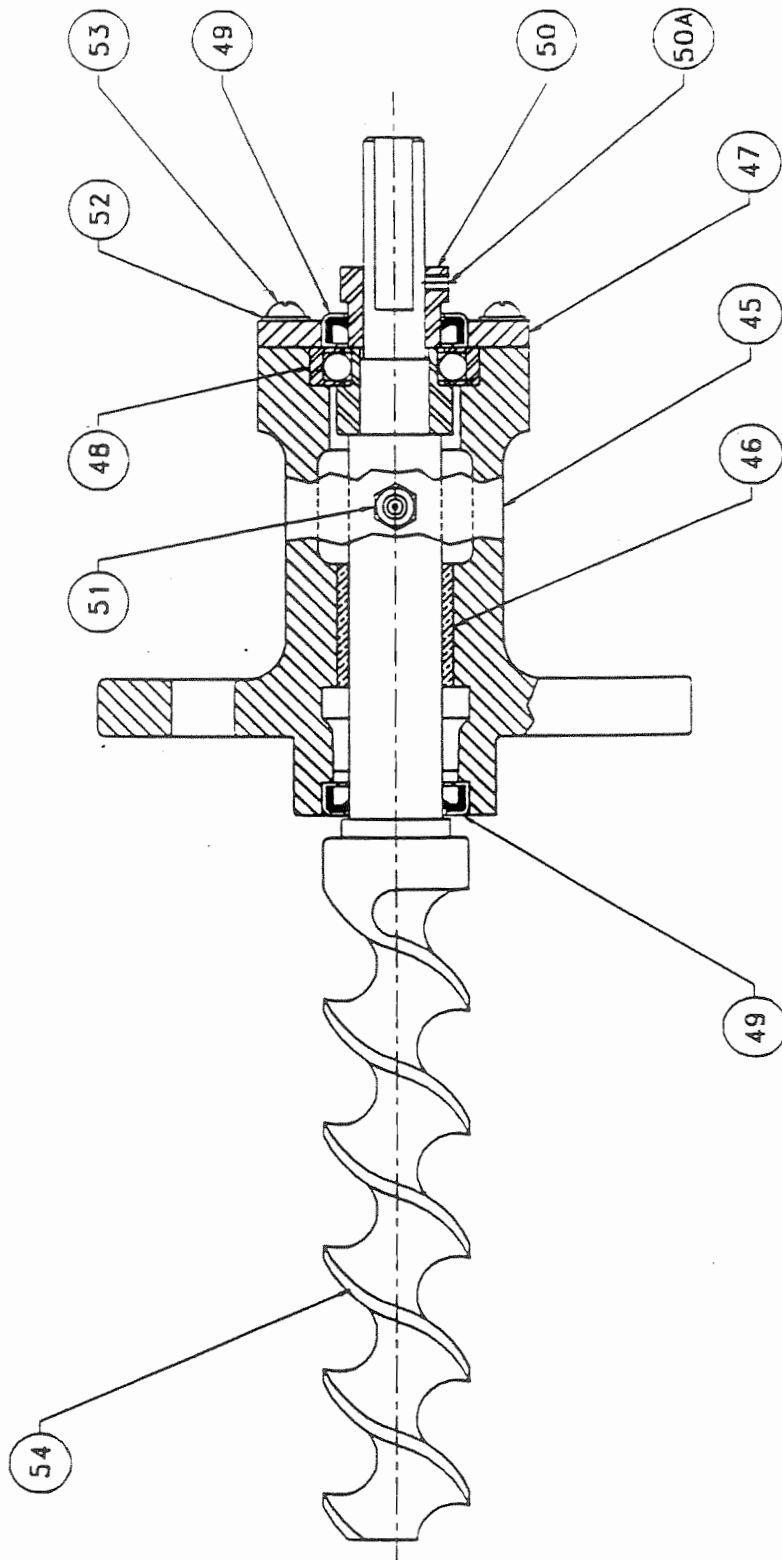
10 ACM ASSEMBLY



10 ACM ROTOR BEARING HOUSING (1A)



10 ACM SEPARATOR BEARING HOUSING



10 ACM FEED SCREW ASSEMBLY

7-5 BILL OF MATERIAL

SYSTEM: 10 ACM

Equipment Section	Assembly Type	Ref. Number	Part Description/Name	Qty. Req'd.	Stock Number
MILL	10 ACM Ass'y	19	Liner Plate - Opposite Feed Entry		
		20	Grinding Chamber		
		21	Deflector Ring		
		22	Baffle Ring		
		23	Air Dispersion Ring		
		24	Volute Assembly		
		25	Separator Wheel		
	Separator Brg.	26	Separator Bearing Housing		
		27	Separator Shaft		
		28	Bearing		
		29	End Cover		
		32	Flinger (Upper)		
		33	Flinger (Lower)		
		34	Held Bridge Retainer		
		35	Separator Wheel Washer		
		37	Shims - 7/8" ID x 1 3/8" OD		

Equipment Section	Assembly Type	Ref. Number	Part Description/Name	Qty. Req'd.	Stock Number
MILL	Base	1	Grinding Chamber Base		
		1A	Impact Rotor Bearing Housing Assembly		
	Rotor Brg. Ass'y.	2	Impact Rotor Bearing Housing		
		3	Lower Impact Bearing Flinger		
		3A	1/4" Allen Set Screw x 1/4" Long		
		4	Impact Rotor Shaft		
		5	Bearing Lockwasher		
		6	Bearing Locknut		
		7	Upper Rotor Bearing Lockwasher		
		8	Upper Rotor Bearing Locknut		
		9	Bearing		
		10	Upper Rotor Bearing		
		11	Upper Rotor Bearing Retaining Collar		
		12	Upper Impact Bearing Flinger		
		13	Clamp Washer		
		14	3/4"-16NF Castellated Nut		
		15	1/8" Cotter Pin		
	10 ACM Assembly	16	Impact Rotor Disc		
		17	Set of Impact Hammers		
		18	Liner Plate - Feed Entry		

7-5 BILL OF MATERIAL

SYSTEM: 10 ACM

Equipment Section	Assembly Type	Ref. Number	Part Description/Name	Qty. Req'd.	Stock Number
MILL	Separator Brg.	39	1/4" Allen Set Screw - 1/2" long		
		40	1/4" Allen Set Screw - 3/8" long		
		43	Retaining Ring		
	Hopper	44	FIAC Hopper		
FEEDER	Feed Screw Assembly	45	Feed Screw Bearing Housing		
		46	Bronze Bushing - 7/8" ID x 1 1/8" OD x 1 1/4" long		
		47	Bearing Retaining Plate		
		48	Bearing		
		49	Seal		
		50	Feed Screw Retaining Collar		
		50A	1/4" Allen Set Screw		
		51	1/8" Alemite Fitting		
		52	1/4" Lockwasher		
		53	1/4" Rd. Hd. Screw 3/4" long		
		54	Twisted Flight Feed Screw		
		55	Feed Trough		
		56	Feed Trough Sleeve		

**SPARE PARTS**

**SYSTEM: 10 ACM**

Equipment Section	Drawing Number	Ref. Number	Part Description/Name	Qty. Req'd.	Cost	Lead Time	Stock Number
Mill			Hammers				
			Liners				
			Separator Bearings				
			Rotor Bearings				
			Rotor Disc				
			Separator Wheel				
			Air Dispersing Ring				
			Deflector Ring				
			Baffle Ring				
			Hub Shims				
Feeder			Feed Screw Bearings				
			Feed Screw Shaft				
Drive (All)			V-Belts				

**SECTION VIII**

**DRAWINGS LIST**

**DRAWING LIST**

**SYSTEM: 10 ACM**

**PAGE: 1 OF 1**

Manual Section	Drawing Number	Drawing Title	Revision	Latest Date/Revision
I	FIG. 1	10 ACM-ASSEMBLY (Mill Cross Section)		
III	N64145-M1 Sht. 1	10 ACM-PARTS (Description)		
III	N64145-M1 Sht. 2	10 ACM-PARTS (Description)		
III		10 ACM-TYPICAL ELECTRICAL WIRING DIAGRAM		
IV	N-64145-M	10 ACM-GENERAL ARRANGEMENT (Main Dimensions)		
VI		10 ACM-LUBRICATION GRAPH		
VI	FIG. 2	MULTIPLE DEFLECTOR LINER ORIENTATION		
VII		10 ACM-ASSEMBLY		
VII		10 ACM-ROTOR BEARING HOUSING		
VII		10 ACM-SEPARATOR BEARING HOUSING		
VII		10 ACM-FEED SCREW ASSEMBLY		