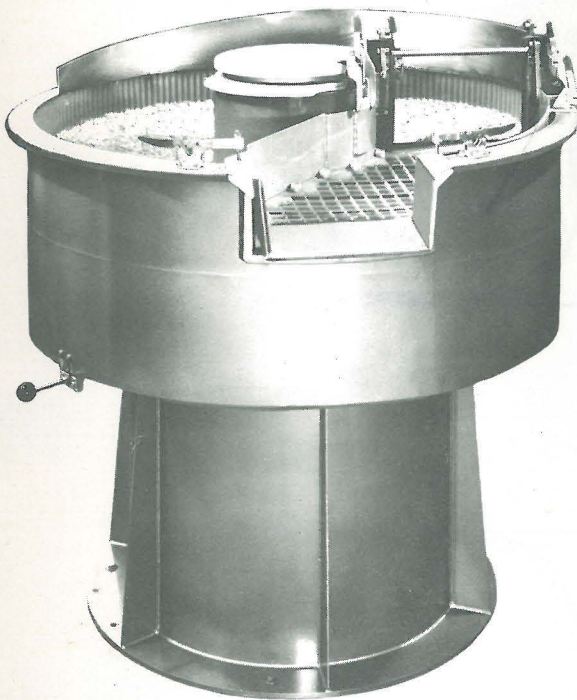


FMD-20 HA

*twenty cu. ft.
model*

SWECO® Vibro-Energy FINISHING MILL



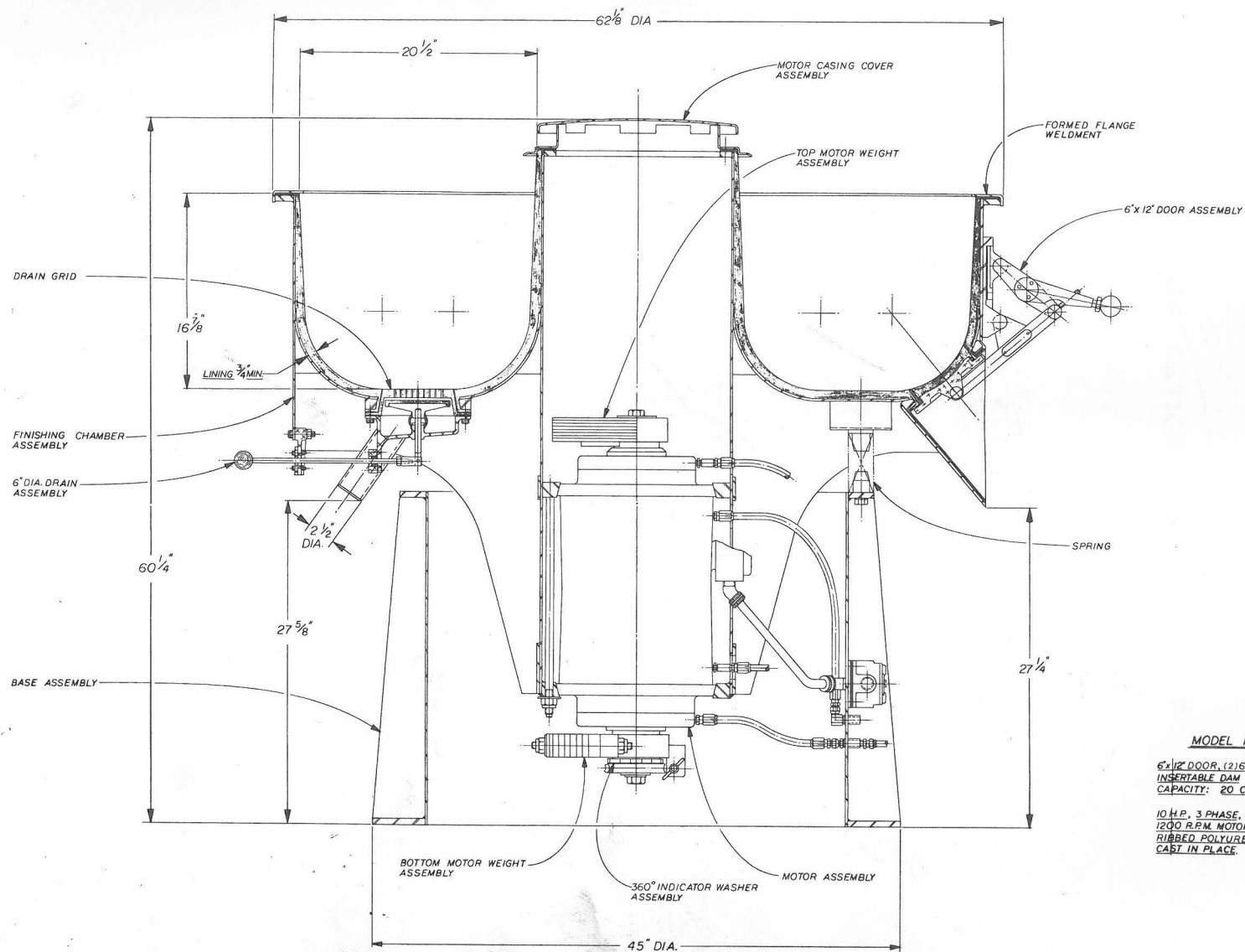
*a manual
of directions
for*

INSTALLATION

OPERATION

MAINTENANCE





MODEL FMD 20 H.A.

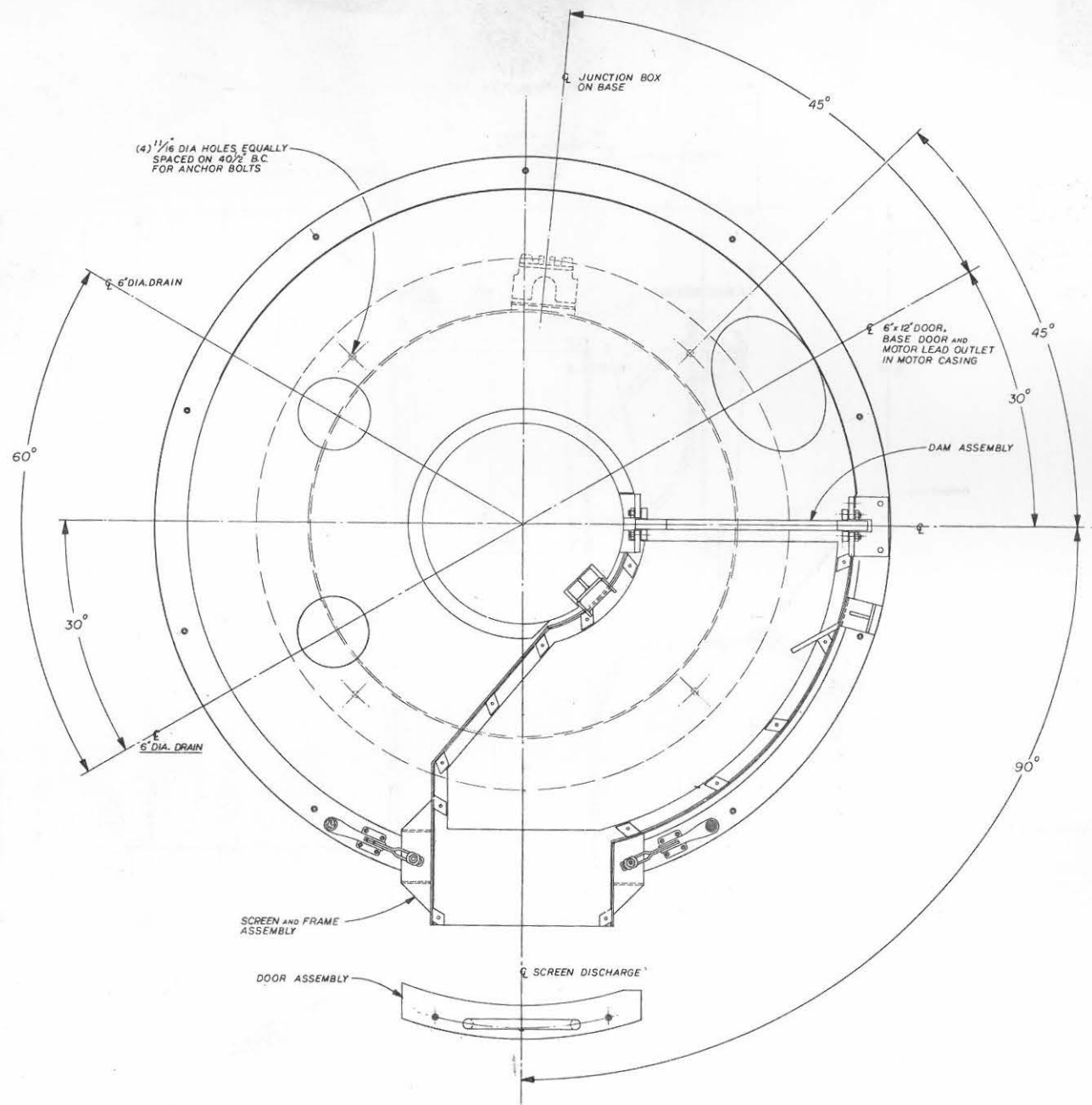
SWECO, INC.
6' x 12' DOOR, (2) 6" DIA. DRAINS AND
INSERTABLE DAM
CAPACITY: 20 CU. FT. BY VOLUME

10 H.P., 3 PHASE, 60 CYCLE, 230/460
1200 R.P.M. MOTOR
RIBBED POLYURETHANE LINING
CAST IN PLACE



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FMD-20 HA IOM MANUAL

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I. INSTALLATION

A. Mounting

1. Remove the finishing mill and control panel lube system from their wooden shipping pallets and place them on foundation or floor in the desired location.
2. Level the mill as accurately as possible, using shims as necessary.
3. Anchor the mill firmly to the foundation or floor with four 5/8" bolts through the mounting holes in the mill base.
4. Remove the four red shipping brackets connected to the base and tank.

CAUTION: SHIPPING BRACKETS MUST BE REMOVED BEFORE WIRING OR OPERATING MOTOR.

B. Wiring

1. FMD-20-HA SWECO Finishing Mills are furnished with a totally enclosed 10 hp, 3-phase, 60 cycle, 230/460 or 550 volt, 1200 rpm motor. Your unit has been wired for one of these voltages per your instructions, with a standard (4) lead cable connected to the base junction box, (3) leads to power and (1) green to ground.

CAUTION: DO NOT CHANGE THE POSITION OF THE LEAD WHERE IT ENTERS THE JUNCTION BOX.

The length of cable between the cord grips in the motor casing and base junction box is set by the factory at 26" to prevent wire damage.

2. Motor protection has been provided in the form of a magnetic starter with over-current protection heaters sized per motor running amperage in the unit's control panel. The panel also contains a lubrication safeguard for the motor bearings.
(See IOM Manuals for 10-HP Motor and for Panel and Lube System).
3. When everything has been connected push the MILL ON and MILL OFF switches to check the direction of rotation of the motor. See Figure 1. The bottom motor weight should be moving from left to right as it passes nearest the door as indicated by the arrow on the door at the base of the mill.

If rotation is incorrect, interchange any two main powerleads.

II. OPERATION AND ADJUSTMENT

A. Loading and Weight

The total gross charge including media and parts, for the FMD-20-HA Finishing Mill should not exceed 5,500 lbs.

Excessive charging of FMD-20-HA Finishing Mill will damage the motor. DO NOT EXCEED THE RATED LOAD. The SWECO warranty limits total gross load as described above.

When processing a few parts, the chamber should be at least 70% filled with media.

B. Selection of Media and Compounds

Standard known media and compounds in the industry today can be used in the SWECO cast polyurethane lined finishing mill.

Selection of media is dependent upon the configuration and material of parts to be finished.

Finishing compound is used to keep the media clean and to lubricate and improve the finishing process. In special applications, abrasive compounds or chemically active compounds, such as descaling agents, are used.

The cast polyurethane lining is the most abrasion resistant elastomer yet developed for this type of application. Chemically, it is quite inert being attacked only by aromatic and polar solvents and concentrated acid solutions. In laboratory tests, a 10% solution of nitric acid was found to be extremely damaging, therefore, AVOID THIS ACID.

Most commonly known finishing compounds and chemicals have been used with the polyurethane lining without obvious deteriorating effects. Hot water above 135°F softens polyurethane and will accelerate wear causing rapid deterioration.

For long wear life, keep the bowl temperature below 100°F.

If you have any questions about the use of compounds, chemicals, water and abrasives, contact your SWECO representative or the nearest SWECO office.

C. Machine Operation

Effective operation of your SWECO Finishing Mill is determined by a combination of three factors: (1) Lead Angle, (2) Motor Weight Plates, and (3) Type of Load.

1. Lead Angle

Spiral orbiting action is primarily affected by varying the angle or "lead" between the top and bottom motor weights. For the majority of applications, the lead is set at between 60° and 120° . If, however, a different flow pattern is desired, the lead angle of the lower weight may be changed without damage to the motor. Increasing the lead angle through 90° increases the horizontal rotary motion of the media mass. Decreasing the lead angle from 90° will increase the vertical rotary motion. Lead angle settings of 90° through 120° provide increasing lift in the finishing mass, when it is necessary for process or internal separation requirements. To change the lead angle of the lower weight: See Figure 2.

- a. Turn off power to the finishing mill and lock the circuit breaker.
- b. When vibration has ceased, remove the access door in the base.
- c. Manually rotate the eccentric weight by means of the worm gear setup on the end of the bottom weight until the slot on the side of the bottom weight aligns with the degree of lead desired on the indicator washer.
- d. Replace the access door.

2. Motor Weight Plates. See Figure 2.

- a. Your SWECO Finishing Mill is shipped with 4 top weight plates and 3 full size and 2 half size bottom weight plates at 90° lead angle between the weights. Four (4) additional top weight plates and 3 additional lower weight plates are attached to the base.

- b. Your SWECO representative will aid you in adjusting the weight plates if your process requires doing so.

3. Type of Load

Typical finishing media may be grouped by bulk weights as follows:

- 1) Plastic Medias: 50-60 lb/ft³
- 2) Preforms: 85-100 lb/ft³
- 3) Random Shapes: 130-150 lb/ft³
- 4) Steel Balls: 260 lb/ft³

Typical applications find the lighter medias used with non-ferrous (aluminum, magnesium) or more delicate parts, minimizing the possibility of part deformation. Heavier medias may be more aggressive in cutting, but are best used for more rugged parts.

D. INSERTION AND REMOVAL OF DAM AND SCREEN

Follow the instruction below to property insert and remove the dam and screen: See Figure 3.

1. With the mill running, line up the guide rails on the dam between the guide rollers on the center column and the top flange of the finishing chamber. Push down firmly on the dam until the toggle clamps can be engaged and locked to the brackets on the center column and the tank top flange. If the toggle clamps will not lock, media or parts are trapped between the dam and the bottom of the finishing chamber. Lift the dam enough to clear the parts or media and push down firmly again until the toggle clamps lock.

2. With the dam in place, run the mill long enough to permit the media level downstream of the dam to drop below the port opening. CAUTION: DO NOT REMOVE THE DOOR WITHOUT THE DAM IN PLACE AND THE MEDIA LEVEL BELOW THE PORT OPENING.
3. After the dam has been inserted and the media level is below the port opening, stop the mill. Unlock the two toggle clamps holding the parts discharge door in place and remove the door.
4. Insert the screen frame by guiding the two slots in the screen into the guide rails on the dam. Push the screen down into place and lock the toggle clamps on the screen and the two toggle clamps attached to the top flange of the finishing chamber at the port opening.
5. Start the mill to separate parts from media and unload parts.

CAUTION: IF THE SCREEN OR DAM RATTLES WHEN THE MILL IS STARTED, STOP THE MILL IMMEDIATELY AND CHECK ALL TOGGLE CLAMPS TO ASSURE THAT THEY ARE PROPERLY ADJUSTED AND FIRMLY LOCKED IN PLACE.
6. When all parts have been unloaded, stop the mill and remove the screen by reversing the procedure described in Step 2 above.

7. Replace the parts discharge door and lock the toggle clamps. Be sure to clean all media away from port opening before replacing the door.
8. With the parts discharge door locked in place, start the mill. Unlock the toggle clamps holding the dam in position. Lift the dam straight up and out of the mill.

The mill is now ready for another processing cycle.

CAUTION: BE SURE TO KEEP ALL TOGGLES ADJUSTED TO EXERT NECESSARY PRESSURE ON REMOVABLE COMPONENTS. IT IS PARTICULARLY IMPORTANT TO ADJUST PORT CLOSURE TOGGLES SO THAT THEY EXERT DOWNWARD PRESSURE AND HOLD THE PORT FIRMLY IN PLACE.

E. SCREEN CHANGING PROCEDURE

1. Using a Phillips-type screwdriver, remove the screws from the diamond-shaped polyurethane screen tie-downs and from the polyurethane media deflector.
2. Lift the screen out of the screen frame.
3. Insert the replacement screen.
4. Replace the screen tie-downs and the media deflector.

NOTE: Be sure all screws are tightened before starting the mill.

F. SIX-INCH DIAMETER DRAIN. See Figure 4.

The two drain outlets are used for the removal of liquids and residue.

2. With the dam in place, run the mill long enough to permit the media level downstream of the dam to drop below the port opening. CAUTION: DO NOT REMOVE THE DOOR WITHOUT THE DAM IN PLACE AND THE MEDIA LEVEL BELOW THE PORT OPENING.

3. After the dam has been inserted and the media level is below the port opening, stop the mill. Unlock the two toggle clamps holding the parts discharge door in place and remove the door.

4. Insert the screen frame by guiding the two slots in the screen into the guide rails on the dam. Push the screen down into place and lock the toggle clamps on the screen and the two toggle clamps attached to the top flange of the finishing chamber at the port opening.

5. Start the mill to separate parts from media and unload parts.

CAUTION: IF THE SCREEN OR DAM RATTLES WHEN THE MILL IS STARTED, STOP THE MILL IMMEDIATELY AND CHECK ALL TOGGLE CLAMPS TO ASSURE THAT THEY ARE PROPERLY ADJUSTED AND FIRMLY LOCKED IN PLACE.

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7. Replace the parts discharge door and lock the toggle clamps. Be sure to clean all media away from port opening before replacing the door.

8. With the parts discharge door locked in place, start the mill. Unlock the toggle clamps holding the dam in position. Lift the dam straight up and out of the mill.

The mill is now ready for another processing cycle.

CAUTION: BE SURE TO KEEP ALL TOGGLES ADJUSTED TO EXERT NECESSARY PRESSURE ON REMOVABLE COMPONENTS. IT IS PARTICULARLY IMPORTANT TO ADJUST PORT CLOSURE TOGGLES SO THAT THEY EXERT DOWNWARD PRESSURE AND HOLD THE PORT FIRMLY IN PLACE.

E. SCREEN CHANGING PROCEDURE

1. Using a Phillips-type screwdriver, remove the screws from the diamond-shaped polyurethane screen tie-downs and from the polyurethane media deflector.

2. Lift the screen out of the screen frame.

3. Insert the replacement screen.

4. Replace the screen tie-downs and the media deflector.

NOTE: Be sure all screws are tightened before starting the mill.

F. SIX-INCH DIAMETER DRAIN. See Figure 4.

The two drain outlets are used for the removal of liquids and residue.

To operate the 6" round drain, move the handle up to open and down to close.

CAUTION: NEVER LEAVE THE DRAIN HANDLE IN AN INTER-MEDIATE POSITION.

Always lock it in the open or closed position. Serious wear of the drain parts will result if the drain handle is left in the intermediate position while the mill is in operation.

This assembly uses a molded polyurethane grid. Bottom of the grid surface has a sealing bead molded in. A molded neoprene valve pad, forced against this bead, seals the fluid in the mill.

When grit is being drained from the finishing chamber, run additional clear water to wash accumulated grit from drain. Grit between the closing surfaces of the drain can prevent tight closure. If drain does not close tightly after thorough rinsing, the handle locking pressure may be insufficient. To adjust pressure loosen two mounting screws and lower the bottom lock plate a fraction of an inch at a time. Retighten the two mounting screws and recheck the drain closure. Lock plates must be properly positioned to guarantee firm locking force; preventing loosening of parts during mill operation. Too much locking force will cause part fatigue and valve failure.

G. 6" x 12" DISCHARGE DOOR - OVAL. See Figure 5.

To Open:

- a. Move the locking lever downward to release operating lever.

- b. Move the operating lever upward. Door will swing free of chamber.

To Close:

- a. Move operating lever downward until it snaps over center.
- b. Move the locking lever upward to secure the operating lever in the closed position.

THE DOOR MUST BE EITHER COMPLETELY OPEN OR COMPLETELY CLOSED AND THE LOCKING LEVER MUST BE IN THE UPWARD POSITION WHEN THE FINISHING MILL IS IN OPERATION.

To Adjust Sealing Pressure:

The door gasket presses tightly against the tank to seal the door. As the gasket wears, it loses its sealing pressure. To increase gasket seal, adjust as follows:

- a. Open door.
- b. Remove the (6) socket head cap screws, taking care that the shims do not fall out.
- c. Add the necessary number of shims under the bracket to obtain sufficient gasket pressure. Extra shims are shipped with the mill.
- d. Replace the (6) socket head cap screws.
- e. Close door and check for leakage.

To Adjust the Locking Lever:

The entire locking mechanism can be repositioned counterclockwise

to increase the travel range of the locking lever. The locking pressure increases as the locking lever upward travel increases.

- a. Place the locking lever in the unlock position.
- b. Remove the three recessed socket head screws.
- c. Pull back the locking lever to the desired position.
- d. Replace the socket head screws and check the locking pressure.

CAUTION: DO NOT LUBRICATE ANY PART OF THE LOCKING ASSEMBLY, NEITHER THE KNOB NOR THE SPINDLE, AS THE LUBRICANT COULD WORK ITS WAY INTO THE FRICTION AREA.

III. MOTOR WEDGES: See Figure 6.

Motor wedges are clamps that secure the motor in the mill. These wedges should be inspected and retightened after the first 8 hours, the first 40 hours, and each 1000 hours of operation thereafter. The wedges tighten from below the motor and should be torqued to 100 foot pounds.

1. When replacing the wedges, insure that all bearing surfaces are clean and free of dirt, paint, grease, rust and foreign matter of any type, and use NEW "ESNA" nuts.
2. Position the wedges and tighten them securely and evenly, to insure centering of the motor.
3. With a short piece of shaft, or a heavy punch and hammer, firmly tap each wedge and re-tighten. This will aid in seating the wedges.
4. Use a torque wrench to insure that the wedges are tight.
5. After installation, inspect as noted above.

IV. MOTOR LUBRICATION:

The bearings on the 10 hp motor are very highly loaded during operation and require proper lubrication. All FMD 20 HA's are equipped with an automatic, fail-safe lubrication system and panel. See manual on PANEL & LUBE SYSTEM for information on motor lubrication.

V. REPLACEMENT OF MOTOR AND WEIGHT ASSEMBLIES. See Figure 6

A. To Remove Motor

1. Turn off power to mill and panel.
2. Remove motor casing cover and base door.
3. Remove all weight plates, and the bottom weight stud assembly.
4. Disconnect the power cable at the motor junction.
5. Remove the junction box.
6. Remove the four lubrication lines.
7. Remove the motor wedges.
8. Screw two 3/8 eye bolt into the top bearing end cap.
9. Hoist the motor assembly straight up and out of the mill.

B. To Remove Weight Assemblies:

1. Remove the weight retaining plates.
2. Slide off the weight assemblies.

C. To Install Weight Assemblies:

1. Slide the top weight and key on the shaft and bolt the retaining plate into place.
2. Remove the worm and bracket from the bottom weight.
3. Slide the bottom weight on the shaft.
4. Slide the indicator washer, worm gear and key on the shaft.

5. Bolt the retaining plate in place.
6. Bolt on the worm and bracket with shims as necessary.

D. To Install Motor:

1. Lower the motor into the center column and position it so that the motor "J" box centers in the cut-out in the front of the motor casing.
2. Connect the "J" box and lubrication lines. NOTE: Make sure the lines are clean and open.
3. Install and torque the motor wedges to 100 foot pounds. Use new ESNA nuts.
4. Connect the power cable to the motor leads. (See 10 HP Motor Manual for wiring.)
5. Pack the "J" box, fanning the leads between layers of the "J" box wafers.

CAUTION: IF THE LEADS ARE FREE TO VIBRATE IN THE "J" BOX, THE WIRE WILL FATIGUE AND/OR CHAFE AND SHORT OUT.

6. Install the bottom weight stud assembly and plates as required.
7. Set desired lead angle.
8. Replace the motor casing cover and base door.

VI. DISASSEMBLY OF SIX INCH DRAIN. See Figure 4.

1. Remove the two bottom cap screws and lift off the lower lock plate.
2. Unscrew the four cap screws and carefully lower the remaining drain assembly from the finishing tank.
3. If drain grid is removed from tank, replace the frame gasket. If not removed, replace the grid gasket. Note: If a drain grid is installed

it may protrude into the tank. This should be ground flush to the tank lining.

4. To replace the seal pad: Remove it from poppet and clean off old glue from poppet surface. Bond new seal pad to poppet with 3-M, EC-880 cement or equivalent.
5. To remove poppet: Loosen the two hose clamps and unscrew poppet from clevis.

VII. REPLACEMENT OF DAMAGED SPRINGS

1. Tilt the finishing chamber upward enough so the defective spring can be removed and replaced.
2. NOTE: Never use metal bars, hammers, etc. to force springs into place. Resulting nicks and scratches from such mishandling offer almost certain starting points for early fatigue failure of the spring.

VIII. PARTS LIST

How to Find a Part Number

The parts list for a particular assembly has the figure number and title at the top of the page. Item numbers running clockwise about the illustration call out individual parts. Locate the part and its callout number on the illustration then turn to the corresponding parts list. Under the ITEM column are the callout numbers in sequence followed by the PART NUMBER, DESCRIPTION and QUANTITY for each item.

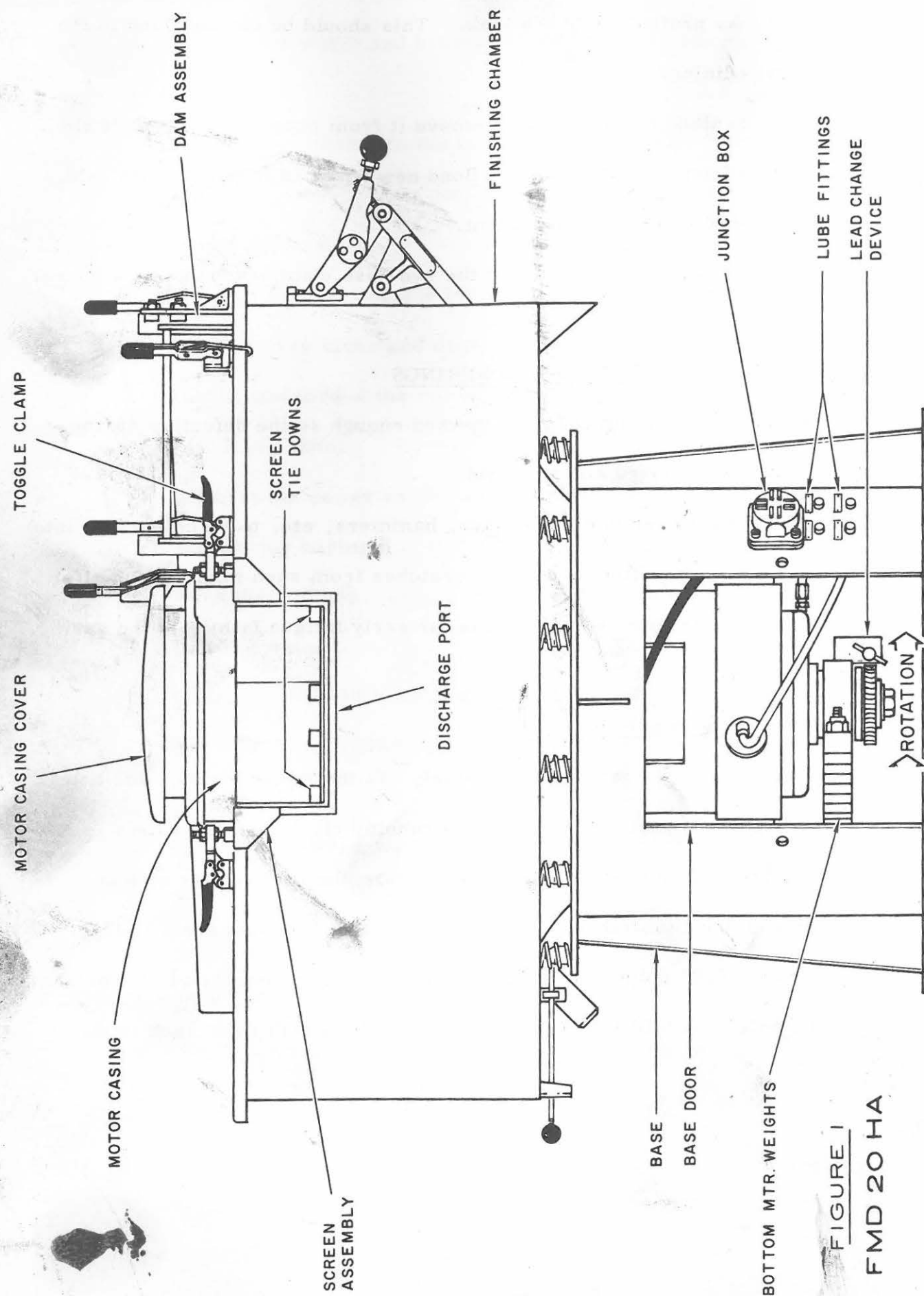


FIGURE 1
FMD 20 HA

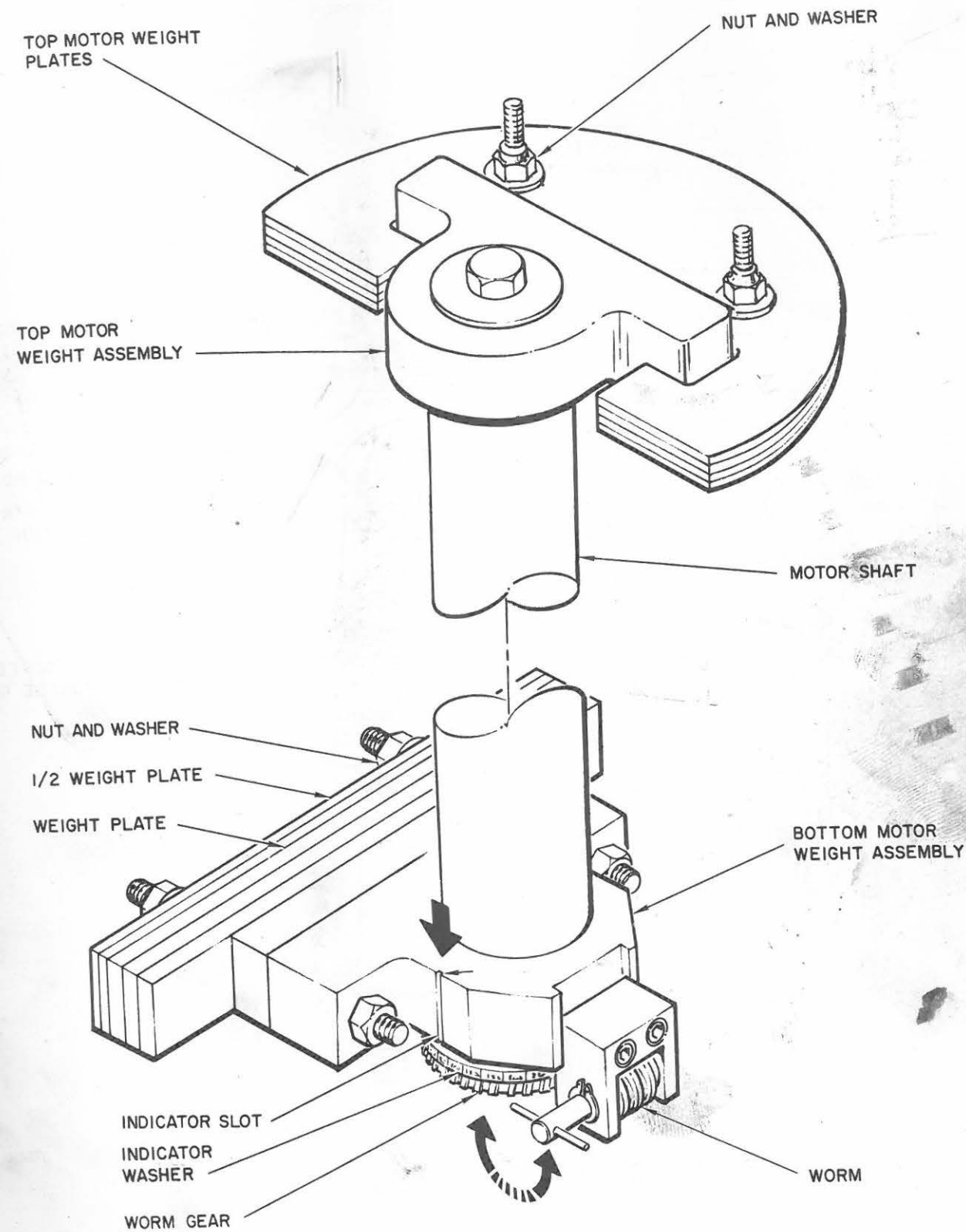


FIGURE 2
TOP AND BOTTOM MOTOR WEIGHTS
(WITH LEAD CHANGE DEVICE)

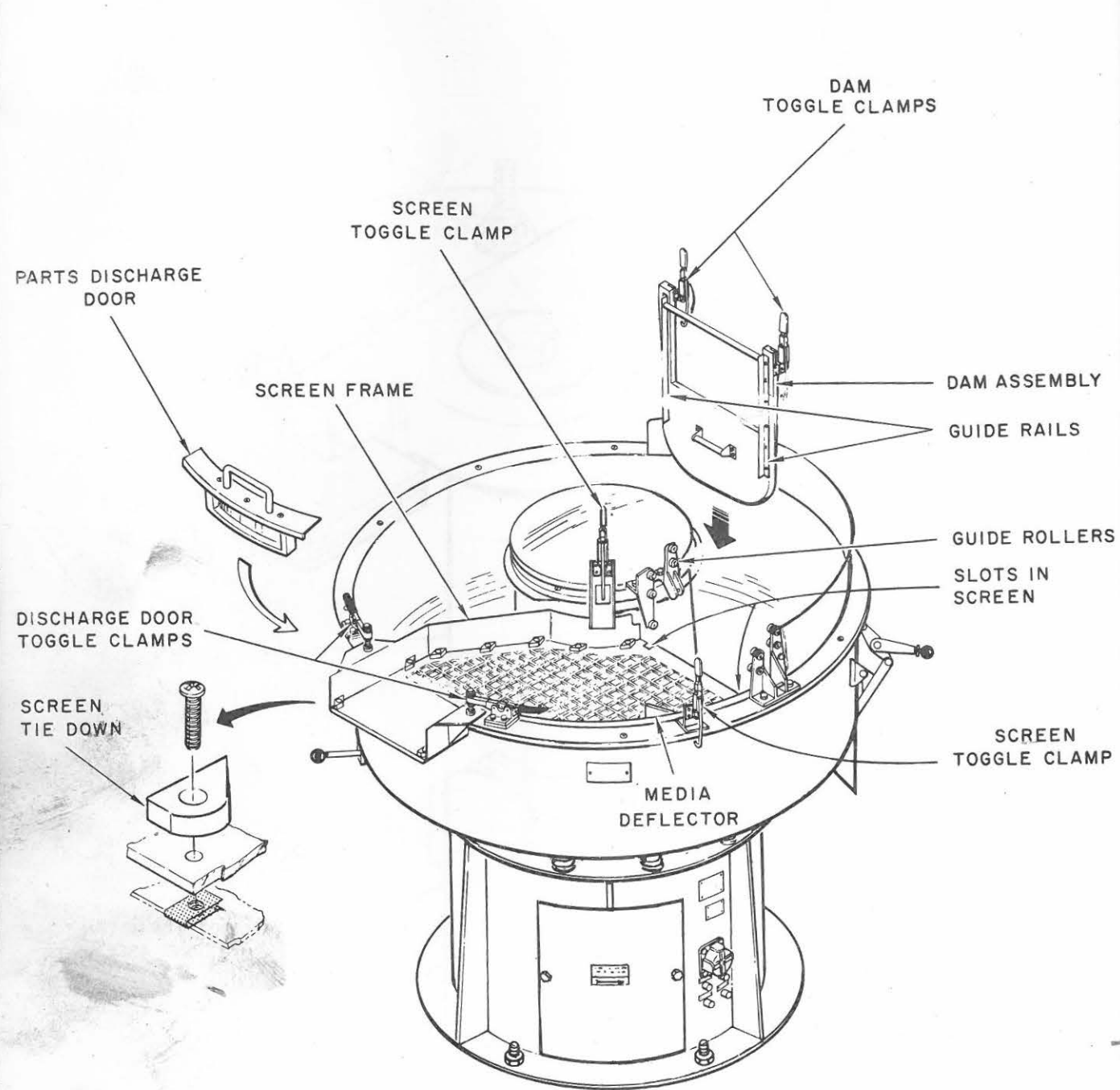


FIGURE 3
INSERTION AND REMOVAL
OF DAM AND SCREEN
FMD 20 HA

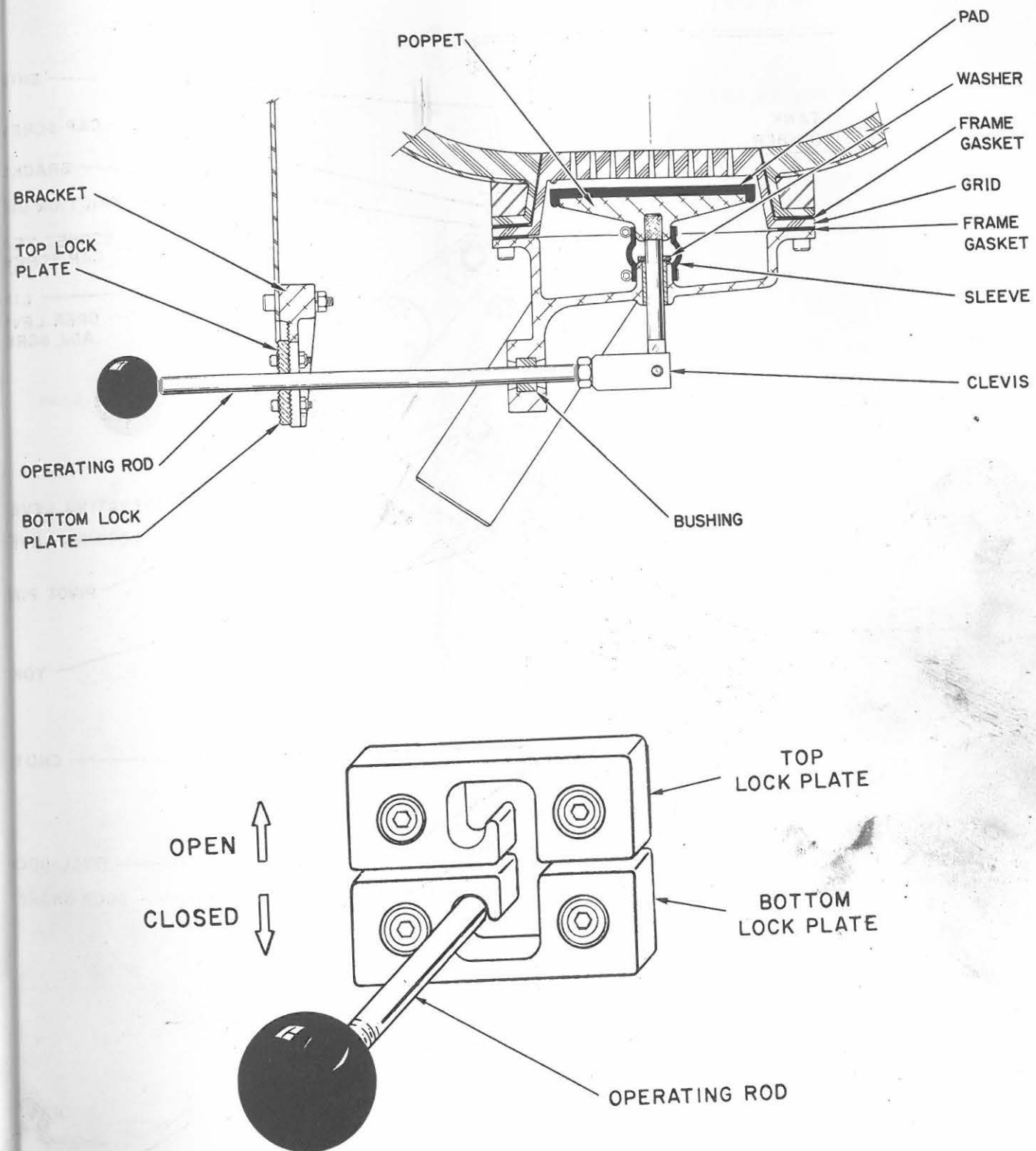


FIGURE 4
6 IN. DIA. DRAIN

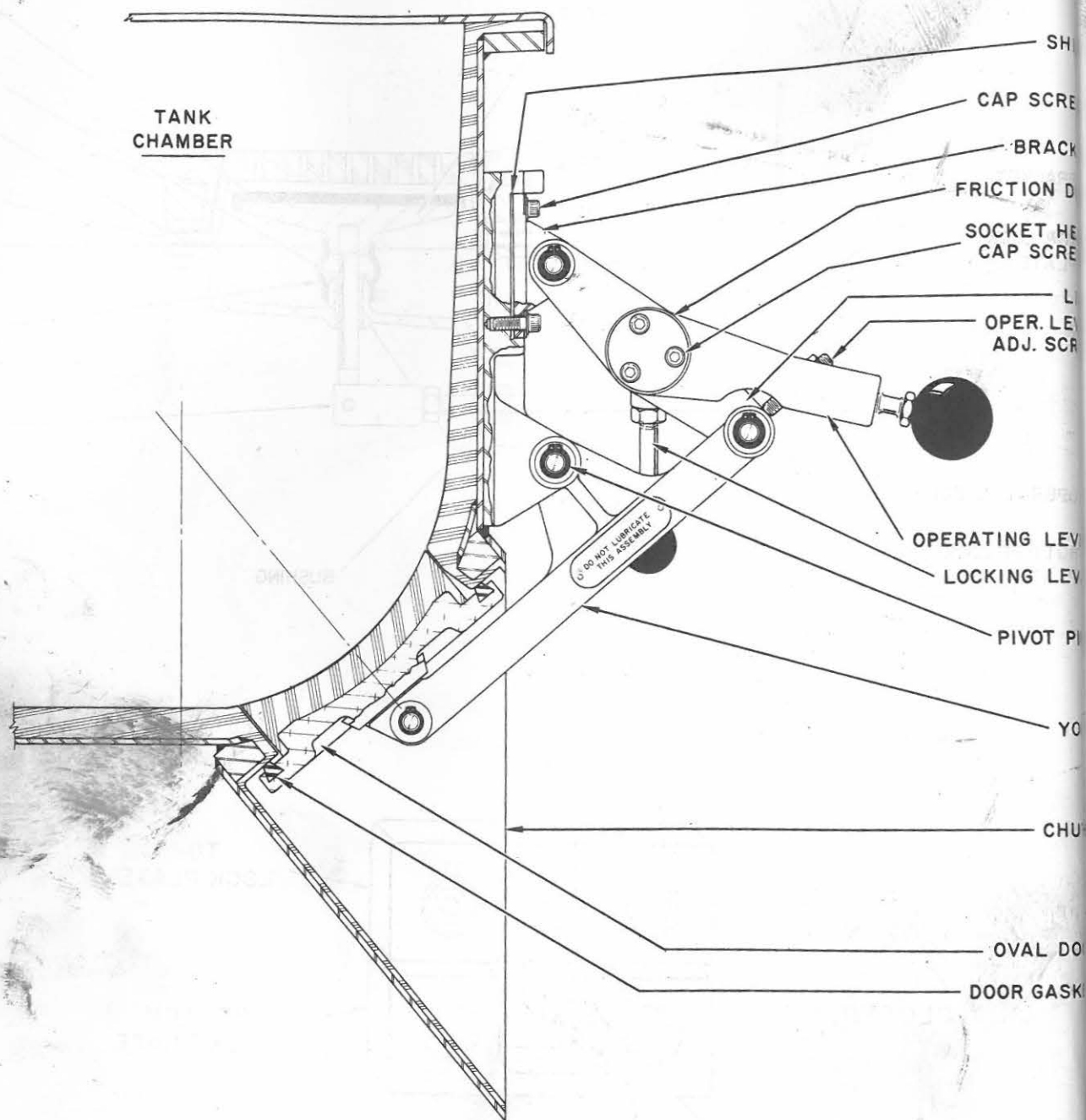


FIGURE 5

6 IN. X 12 IN. DISCHARGE DOOR

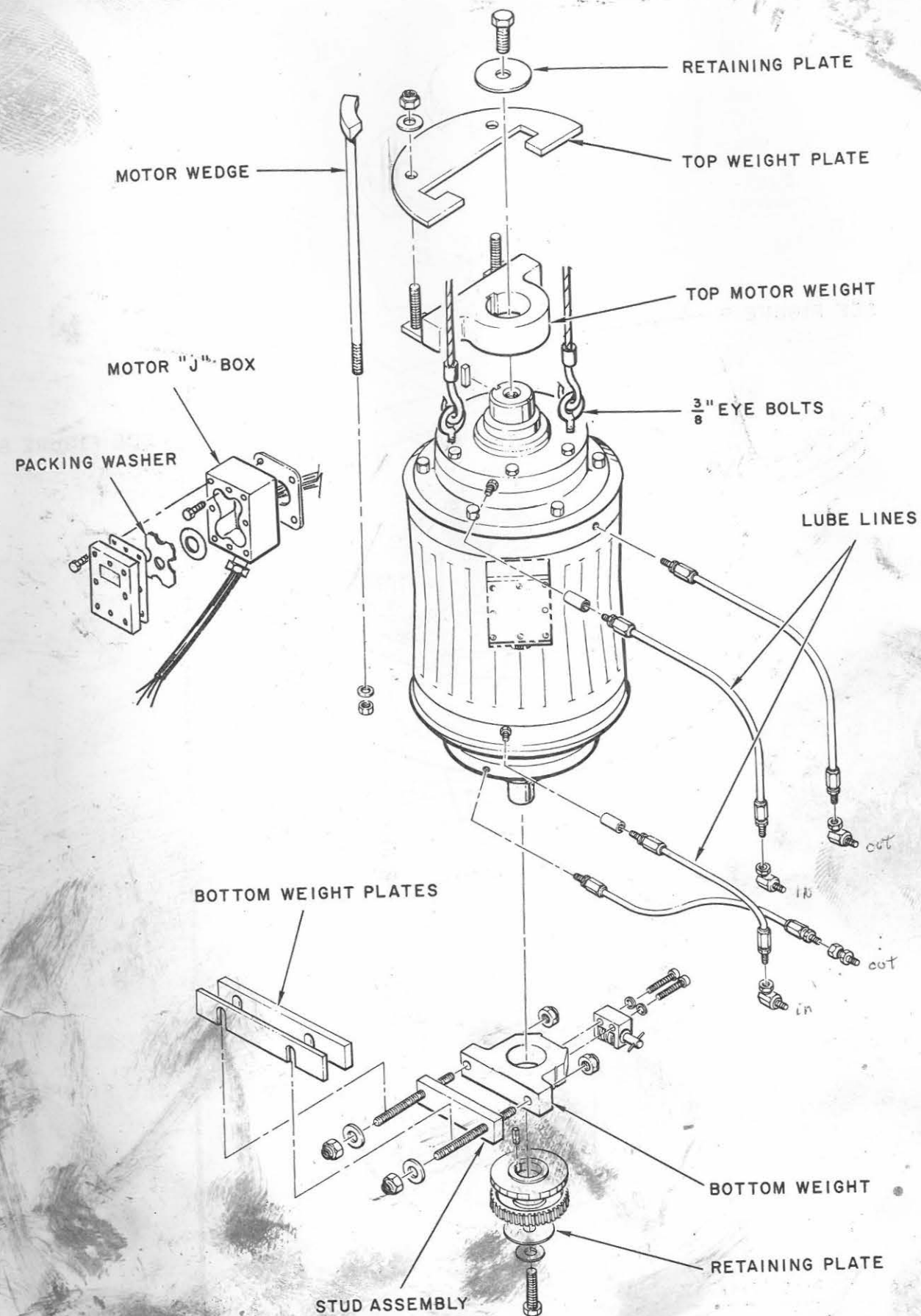


FIGURE 6

10 HP MOTOR, WEIGHTS & WEDGES

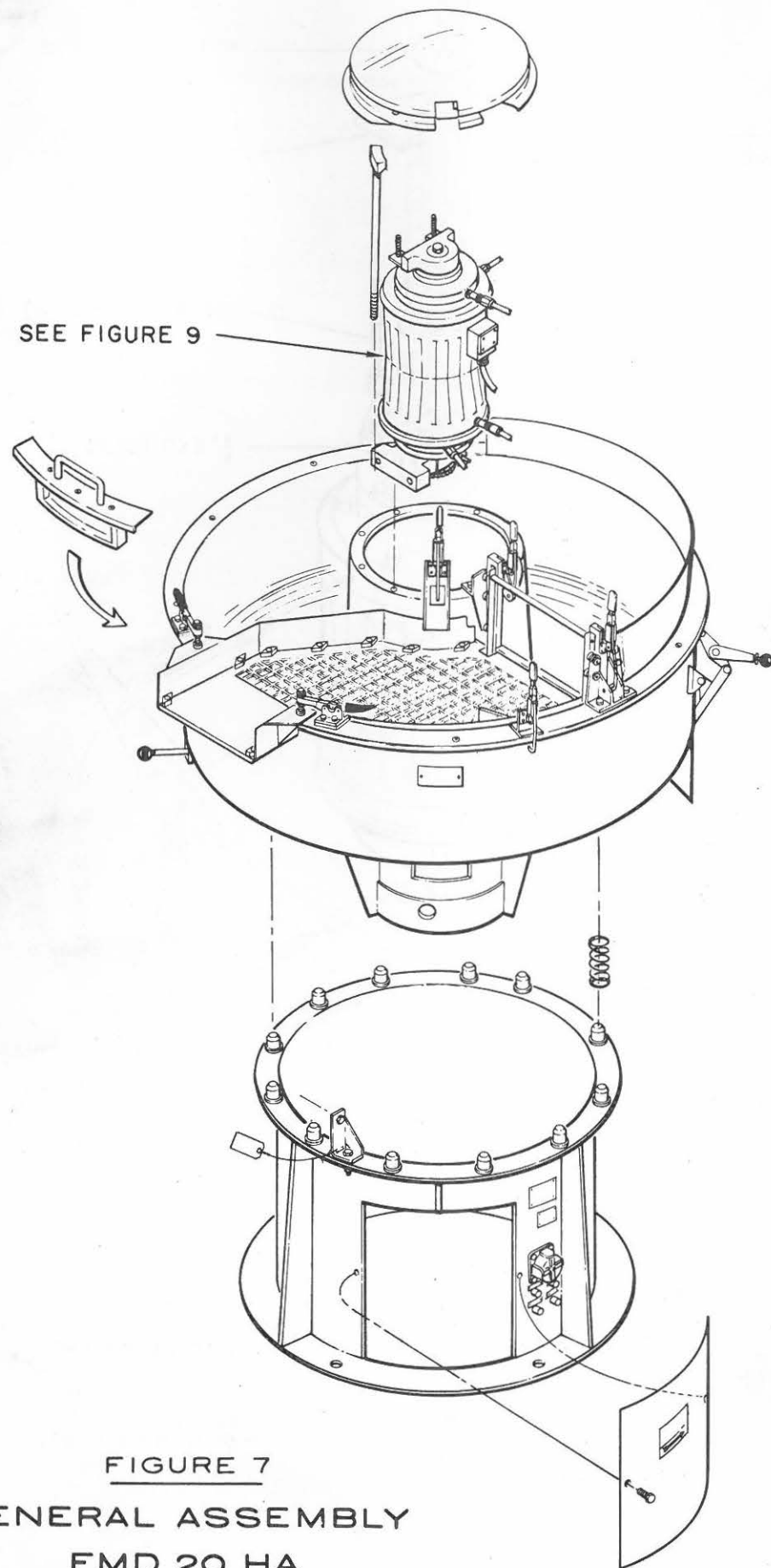


FIGURE 7
GENERAL ASSEMBLY
FMD 20 HA

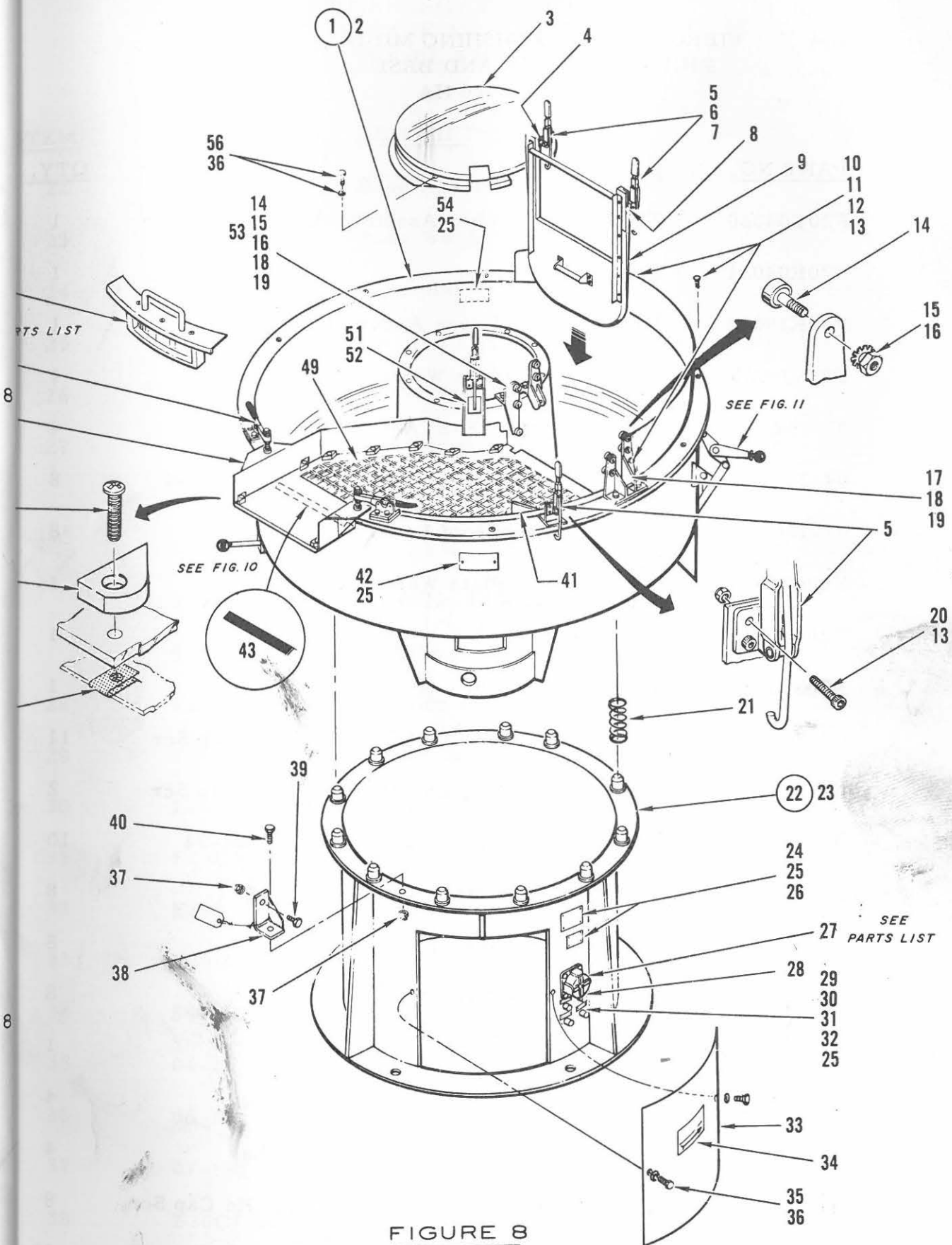


FIGURE 8
TANK AND BASE
FMD 20 HA

VIBRO-ENERGY FINISHING MILL
FIGURE 8 - TANK AND BASE
MODEL FMD 20 HA

VIBRO-ENERGY FINISHING MILL
FIGURE 8 - TANK AND BASE (Continued)
MODEL FMD 20 HA

ITEM	PART NO.	DESCRIPTION	QTY.	ITEM	PART NO.	DESCRIPTION	QTY.
1	F20C04020	Finishing Chamber Assembled, Complete	1	22	F20C01000	Base Assembled Complete	1
2	F20K04021	Tank, Lined	1	23	F20C01001	Base Weldment	1
3	F20K19004	Motor Casing Cover Assembly	1	24	F01S19000	Nameplate - Data	1
4	F20S09003	Inner Roller Plate Weldment	1	25	04-110	4 x 3/16" Lg Cad Pl Stl Type "U" Dr Scr	14
5	07-162	Toggle Clamp DE-STA-CO 351	4	26	F20C17068	Motor Nameplate	1
6	04-251	10-24 NC x 3/8" Lg Cad Stl Hex Hd Cap Scr	8	27	F20K19025	Junction Box Assembled	1
7	05-126	10 NOM Shakeproof Lockwasher	8		M18C01906	Junction Box Gasket	1
8	F20S09005	Outer Roller Plate Weldment	1		04-264	1/4-20 NC x 5/8 Lg Cad Pl Stl Soc Hd Cap Scr	4
9	F20K09000	Dam Assembly	1		05-113	1/4" Cad Pl Stl Split Lockwasher	4
10	F20S04027	Flange Weldment	1		01-149	3/4" Thd. Protector Plug	2
11	04-306	1/4-20 NC x 3/4" Lg SS Flat Soc Hd Cap Scr	11	28	F20K19007	Junction Box Label	1
12	04-505	10-24 NC x 1" Lg Cad Pl Stl Hex Hd Cap Scr	2	29	F20K19030	"Top Bearing Inlet" Nameplate	1
13	07-119	10-24 NC "ESNA" Hex Locknut 22-NM-04	10	30	F20K19031	"Bottom Bearing Inlet" Nameplate	1
14	09-107	Cam Follower "McGill" CFH- 7/8-S	8	31	F20K19032	"Top Bearing Outlet" Nameplate	1
15	05-138	7/16" SS Shakeproof Lockwasher	8	32	F20K19033	"Bottom Bearing Outlet Nameplate	1
16	03-165	7/16-20 NF SS Hex Jam Nut	8	33	F20C01007	Base Door	1
17	F20K19010	Outboard Guide Bracket	1	34	S48K01921	Warning Label	1
18	04-212	3/8-16 NC x 1" Lg SS Hex Hd Cap Scr	4	35	04-227	5/16-18 NC x 3/4" Lg Cad Pl Stl Hex Hd Cap Scr	2
19	05-115	3/8 NOM Cad Pl Stl Split Lockwasher	4	36	05-114	5/16" Cad Pl Stl Split Lockwasher	7
20	04-420	10-24 NC x 5/8" Lg Cad Pl Stl Soc Hd Cap Scr	8	37	07-186	5/8-11 NC "ESNA" Hex Locknut 52, NE-101	6
21	F20C02001	Spring	12	38	F20C19001	Shipping Bracket Weldment	3
				39	04-133	5/8-11 NC x 1 1/2" Lg Stl Hex Hd Cap Scr	3
				40	04-161	5/8-11 NC x 2" Lg Stl Hex Hd Cap Scr	3

VIBRO-ENERGY FINISHING MILL
FIGURE 8 - TANK AND BASE (Continued)
MODEL FMD 20 HA

ITEM	PART NO.	DESCRIPTION	QTY
41	F10K10101	Media Deflector	1
42	F20S19020	Nameplate - Name	1
43	F20K04030	Door Seal Gasket	54
44	07-131	Speed Nut "Tinnerman" C-1303-1420-24 Cad Pl	55
45	F10K10120	Screen Tie Down	56
46	04-442	14 x 1 1/4 Lg Cad Pl Stl Type "Z" Binding Hd Phillips Metal Screw	13
47	F20K10000	Screen and Frame Assembled Complete (Specify Screen Size)	1
48	F20K10002	Screen Frame Lined	1
49	F20K10001	Polyurethane Screen 5/8" Opening	1
	F20K10001	Polyurethane Screen 7/8" Opening	1
	F20K10001	Polyurethane Screen 1" Opening	1
	F20K10001	Polyurethane Screen 1 3/8" Opening	1
50	F20C04025	Toggle Clamp Assembled Complete	1
	07-176	Toggle Clamp DE-STA-CO Model 235 U	2
	03-140	3/8-16 NC SS Hex Jam Nut	6
	F20K04026	Toggle Spindle	2
	04-503	5/16-24 NF x 1/2" Lg Cad Pl Stl Soc Hd Cap Scr	8
	05-137	5/16" SS Shakeproof Lockwasher	8
51	F20S19026	Bracket	1
52	04-276	5/16-18 NC x 3/4" Lg Cad Pl Stl Flat Soc Hd Cap Scr	2
53	F20K19008	Inboard Guide Bracket	1

VIBRO-ENERGY FINISHING MILL
FIGURE 8 - TANK AND BASE (Continued)
MODEL FMD 20 HA

PART NO.	DESCRIPTION	QTY.
F20S19019	Lining Warning Plate	1
F20K06005	Door Assembly	1
04-227	5/16-18 NC x 3/4" Lg Cad Pl Stl Hex Had Cap Scr	5

VIBRO-ENERGY FINISHING MILL
FIGURE 9 - 10 HP MOTOR, WEIGHTS & WEDGES
(INCLUDES LEAD CHANGE DEVICE)
MODEL FMD 20 HA

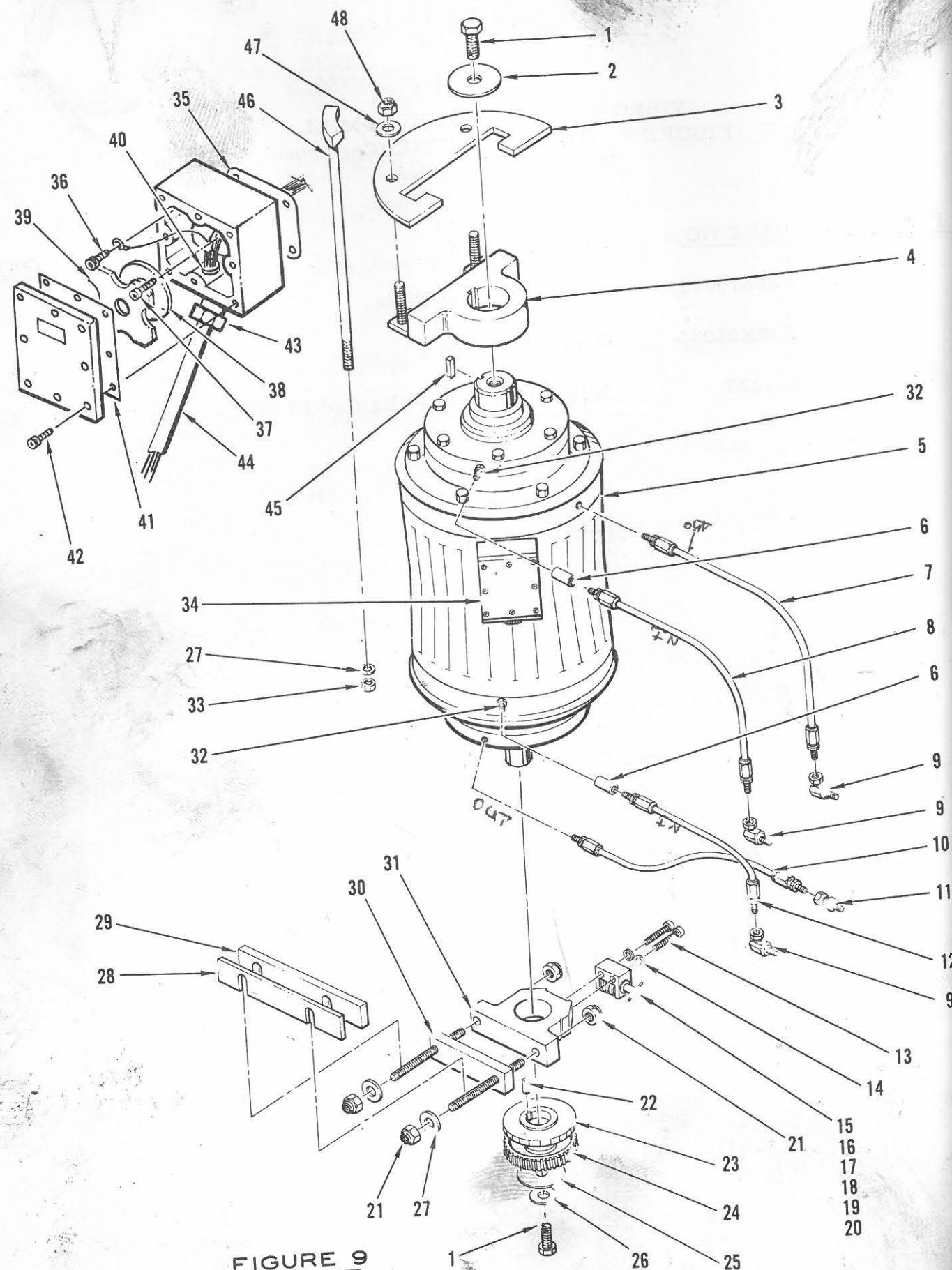


FIGURE 9
10 HP MOTOR, WEIGHTS, WEDGES
& LEAD CHANGE DEVICE

ITEM	PART NO	DESCRIPTION	QTY
1	04-449	5/8 - 11 NC x 1 1/2" Cad Pl	2
2	F20C07003	Retaining Plate	1
3	F20C07002	Top Weight Plate	8
4	F20C07001	Top Motor Wt. Weldment	1
5	F20C17051	Motor, 10 HP, 3-Phase, 60 Cycle 230/460 Volt, 1200 rpm	1
6	02-107	1/8" Std Steel Full Pipe Coupling	2
7	F20K19022	Top Outlet Hose	1
8	F20K19021	Top Inlet Hose	1
9	10-479	Parker 1/4-1/4-2017-1 Male Elbow, Female Swivel	3
10	F20K19024	Bottom Outlet Hose	1
11	10-476	Parker 1/4-1/4-0107-1 Swivel	1
12	F20K19023	Bottom Inlet Hose	1
13	04-460	3/8-16 NC x 1 1/2 lg Cad Pl "NYLOK" Soc Hd Cap Scr	2
14	05-101	3/8 Stl Shakeproof Lockwasher (Ext Patt)	2
15	F20K07014	Worm Bracket	1
16	F20S07015	Worm Shaft	1
17	09-178	Worm Gear, "Boston", G-1076 K	1
18	09-168	Retaining Ring, "Weldes Truarc", 5160-75	2
19	06-130	Spring Pin, 1/4 Dia x 2 3/4 Lg	1

FIGURE 9 - 10 HP MODEL FMD 20 HA (Continued)

ITEM	PART NO.	DESCRIPTION	QTY
20	F20C07016	Worm Key	1
21	07-172	3/4 - 16 NF "ESNA" Locknut 52 NE-126	4
22	F20C07017	Indicator Key	1
23	F20C07022	360° Indicator Washer Assembly	1
24	F20C07013	Worm Gear	1
25	05-140	1" Steel Flat Washer	1
26	05-159	5/8" Steel Flat Washer	1
27	05-148	3/4" Stl Flat Washer	2
28	F20C07012	Light Weight Plate	2
29	F20C07011	Weight Plate	6
30	F20C07010	Bar Weldment	1
31	F20C07009	Bottom Motor Weight	1
32	00-171	Oil Spray Fitting Alemite 381283-1	2
33	07-173	3/4-10 NC "ESNA" Locknut 52 NE-120	6
34	F20C17100	Junction Box Assembled	1
34 (Sub)	F20C17082	Junction Box, Machined	1
34 (Sub)	F20C17084	Junction Box Cover, Machined	1
34 (Sub)	F20K19028	Voltage Label (230 V)	1
34 (Sub)	F20K19029	Voltage Label (460 V)	1
35	F20C17081	Gasket, Junction Box	1
36	04-459	10-24 NC x 3/8 Lg Cad Pl "NYLOK" Soc Hd Cap Scr	1

FIGURE 9 - 10 HP MODEL FMD 20 HA (Continued)

ITEM	PART NO	DESCRIPTION	QTY
37	04-343	1/4 x 20 NC x 7/8" Lg Cad Pl "NYLOK" Hex Hd Cap Scr ("J" Box Mounting)	4
38	F20K17102	Packing Washer	1
39	F20K17101	"J" Box Packing Washer	5
40	01-192	Insuliner Sleeve 1" T&B 424	1
41	F20C17086	Gasket, Junction Box Cover	1
42	04-342	1/4 x 20 NC 1" Lg Cad Pl "NYLOK" Soc Hd Cap Scr	8
43	01-115	Cable Grip Connector Crouse-Hinds CGD 296	1
44	F20K19015	Motor Cord	1
45	F20C07004	Top Motor Key	1
46	F20C19012	Motor Wedge Weldment	6
47	05-141	1/2 Stl Flat Washer	2
48	07-178	1/2-13 NC Cad Pl Stl "ESNA" Locknut, 52-NE-083	2

VIBRO-ENERGY FINISHING MILL
FIGURE 10 - 6 IN. DIA. ROUND DRAIN
MODEL FMD 20 HA

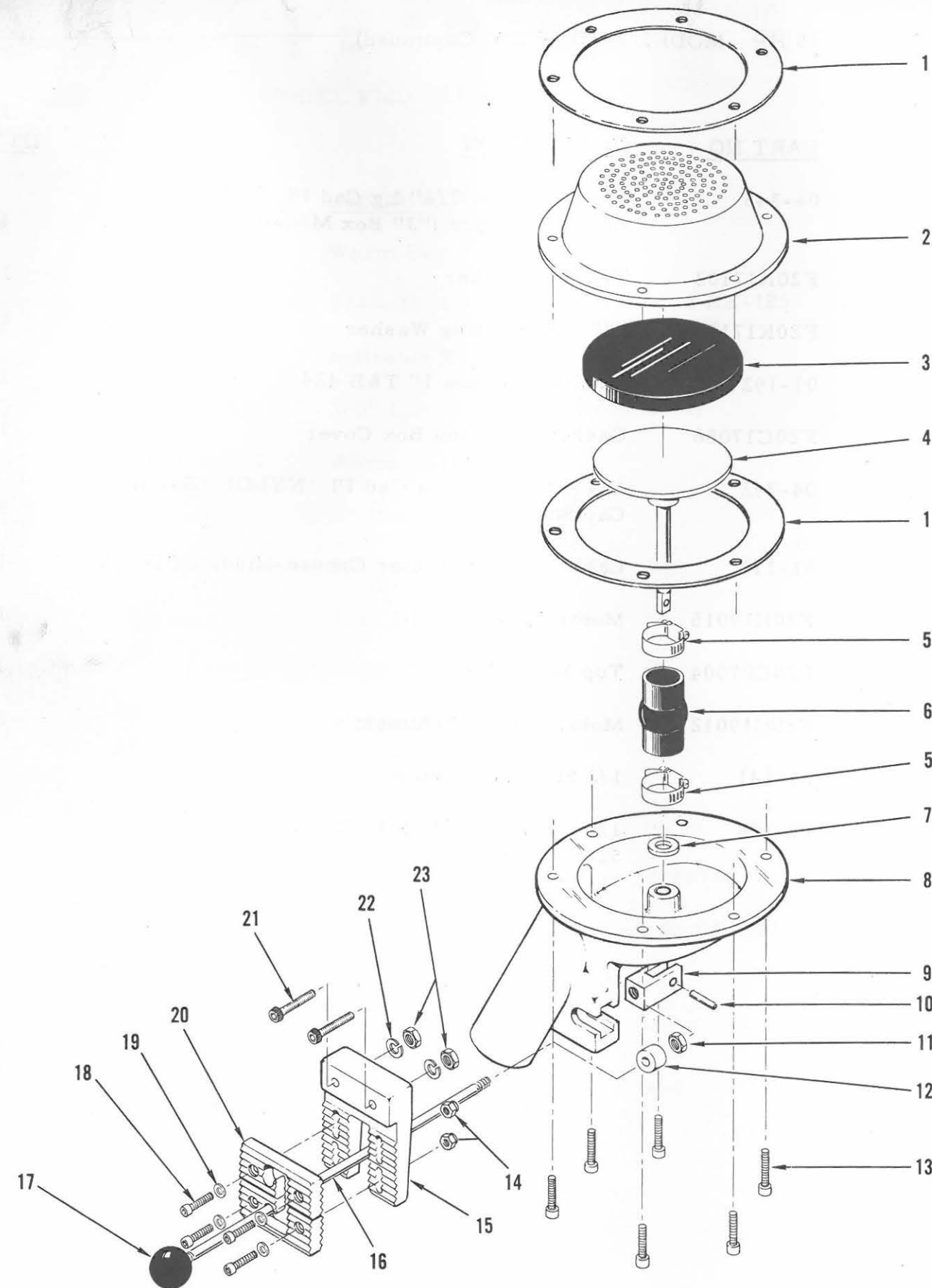


FIGURE 10
6 IN. DIAMETER DRAIN

ITEM	PART NO.	DESCRIPTION	QTY.
1	F20N05013	Drain Gasket	2
2	F20K05000	Drain Grid 1/8" Dia Holes	1
3	F20N05010	Seal Pad	1
4	F20K05008	Poppet	1
5	10-455	15/16 - 1 3/4" Dia Worm Gear Hose Clamp	2
6	F20N05011	Sleeve	1
7	F20K05012	Poppet Washer	1
8	F20K05005	Drain Body, Machined	1
9	08-105	Rod Clevis "Allenair Corp" 1545	1
10	06-120	5/16" Dia x 1" Lg Oversize Precision Dowel Pin	1
11	03-161	1/2 - 13 NC Type 304 SS Hex Jam Nut	1
12	F20K05017	Bushing	1
13	04-361	5/16 - 18 NC x 1 1/2" Lg Soc Hd Cap Scr Cad Pl	6
14	07-119	10-24 NC "Esna" Light Hex Nut #22 NM-04	8
15	F20K05019	Drain Bracket	1
16	F20K05015	Operating Rod	1
17	12-310	1 7/8" Dia Ball Knob w/1/2-13 Tapped Hole	1
18	04-319	10-24 x 1" Lg Soc Hd Cap Scr Cad Pl	4
19	05-147	10 Cad Pl Stl Flat Washer	4
20	F20K05018	Lock Plate	2
21	04-479	5/16 - 18 NC x 1 5/8" Lg Soc Hd Cap Scr Cad Pl	2
22	05-114	5/16" Cad Pl Stl Split Lockwasher	2
23	03-122	5/16-18 NC Cad Pl Stl Hex Nut	2

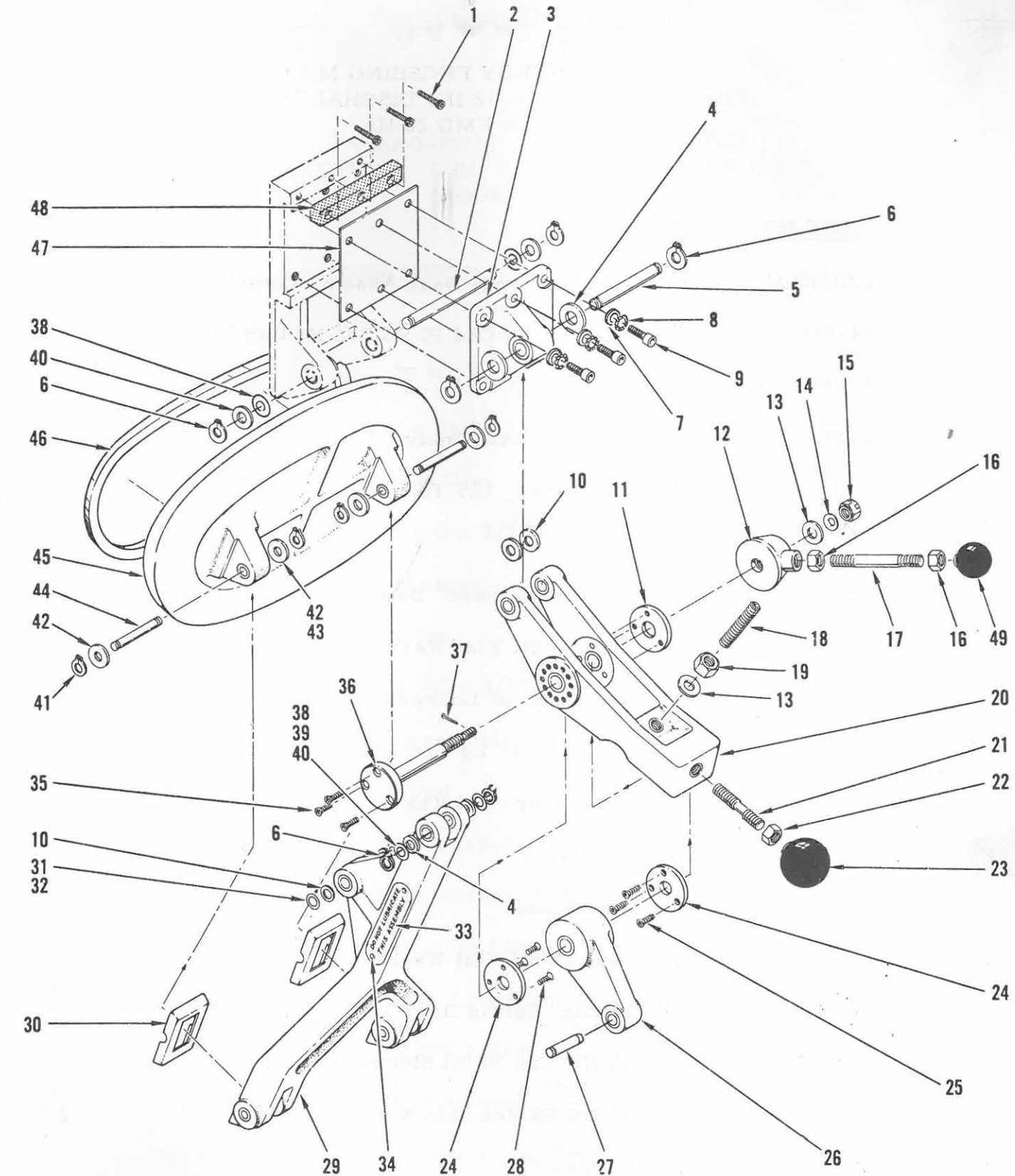


FIGURE II
6 IN. X 12 IN. DISCHARGE DOOR

VIBRO-ENERGY FINISHING MILL
FIGURE 11 - 6 IN. x 12 IN. DISCHARGE DOOR
MODEL FMD 20 HA

ITEM	PART NO.	DESCRIPTION	QTY.
	F20K06000	6" x 12" Discharge Door Assem. Complete	
1	04-324	10-24 x 7/8" Lg Cad Pl Stl Soc Hd Cap Scr	3
2	F10S06036	Pivot Pin	1
3	F10K06045	Small Bracket Assembly	1
4	F10K06029	Thrust Washer .125 Thk	6
5	F10K06037	Pivot Pin	1
6	09-162	5101-50 MF "Truarc" Bowed Retainer Ring	6
7	05-142	1/4" Cad Pl Stl Flat Washer	6
8	05-127	5/16" Shakeproof Lockwasher Int.	6
9	04-289	5/16-18 NC x 1" Lg Cad Pl Stl Soc Hd Cap Scr	6
10	F10K06027	Thrust Washer .125 Thk	4
11	F10K06035	Bronze Disc	1
12	F10S06017	Knob Machined	1
13	05-144	3/8" Cad Pl Stl Flat Washer	2
14	07-134	"Belleville" Spring B.S. 11/16-3/8 x 0.7	1
15	03-175	3/8-16 NC Cad Pl Stl Slotted Hex Nut	1
16	03-161	1/2-13 NC SS Hex Jam Nut	2
17	F10S06040	Handle Stud	1
18	04-323	3/8-16 NC x 2" Lg Cad Pl Stl Soc Set Scr Oval Pt	1
19	03-131	3/8-16 NC Cad Pl Stl Hex Nut	1
20	F10K06047	Handle Assembly	1

VIBRO-ENERGY FINISHING MILL
FIGURE 11 - 6 IN. x 12 IN. DISCHARGE DOOR
MODEL FMD 20 HA

ITEM	PART NO.	DESCRIPTION	QTY.
21	F10S06022	Stud	1
22	03-164	1/2-20 NC SS Hex Jam Nut	1
23	12-312	Plastic Ball Knob 1 7/8" Dia. 1/2-20	1
24	F10K06021	Friction Disc	2
25	04-322	10-24 NC x 9/16" Lg Cad Pl Stl Flat Hd Soc CapScr	3
26	F10S06019	Link Assembly	1
27	F10S06038	Pivot Pin	1
28	04-304	10-24 NC x 3/8" Lg Cad Pl Stl Flat Hd Soc CapScr	3
29	F10K06014	Arm Assembly	1
30	F10N06025	Door Pad	2
31	F10K06030	Thrust Washer .062 Thk	A/R
32	F10K06032	Thrust Washer .032 Thk	A/R
33	F10S06023	Lubrication Plate	1
34	04-110	4 x 3/16 Lg Cad Pl Type "U" Dr Scr	2
35	04-303	1/4-20NC x 5/8" Lg Cad Pl Stl Flat Hd Soc CapScr	3
36	F10C06043	Shaft, Machined	1
37	06-112	3/32 Dia x 1" Lg Type 304 SS Cotter Pin	1
38	F10K06026	Thrust Washer .032 Thk	A/R
39	F10K06031	Thrust Washer .062 Thk	A/R
40	F10K06034	Shim 33/64 ID	A/R

VIBRO-ENERGY FINISHING MILL
FIGURE 11 - 6 IN. x 12 IN. DISCHARGE DOOR
MODEL FMD 20 HA

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
41	09-163	5101-37 MF "Truarc" Bowed Retainer Ring	4
42	F10K06028	Thrust Washer	4
43	F10S06033	Shim 25/64 ID	A/R
44	F10S06039	Pivot Pin	2
45	F20K06001	Door, Lined	1
46	F10N06024	Door Gasket	1
47	F10S06016	Shim	A/R
48	F20N06002	Door Bumper	1
49	12-308	Plastic Ball Knob 1 3/8" Dia. 1/2-20	1

A/R = As Required