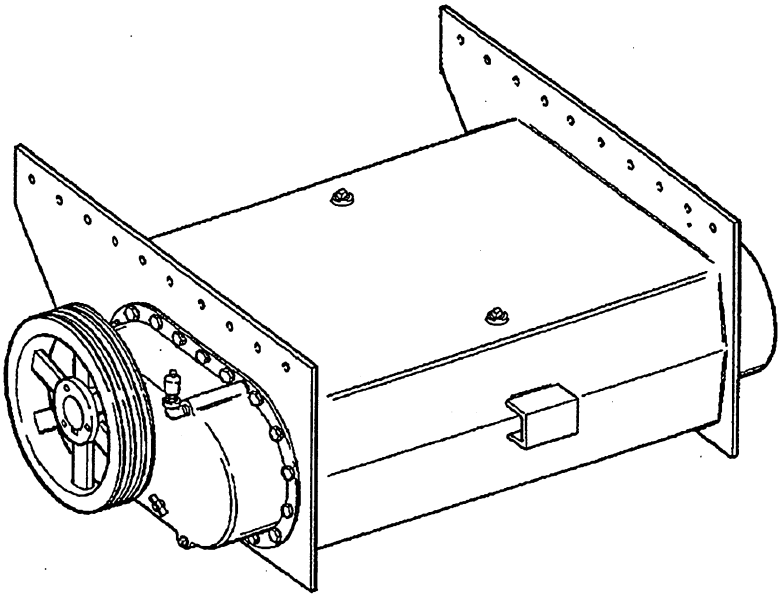
Type HF Vibrating Unit Repair and Overhaul

Models 180HF, 220HF and 280HF



Issue Date: 1/94, Rev. 1

SAFETY

Read and fully understand the safety precautions in Chapter 1 before operating or servicing the vibrating unit. Also refer to the inside front cover for important safety information.

Important Refer to the *Telsmith Quarry Equipment Safety Guide* for important quarry safety information. If your copy of the *Safety Guide* is missing, contact the Telsmith Parts Department at 1-800-688-6601 for a replacement copy.

WARNING !!!

All rotating power products are potentially dangerous and must be properly guarded. Placement of guards and other safety equipment is the user's responsibility. Such equipment must be installed wherever appropriate, and maintained as required.

It is the responsibility of the purchaser to install and use quarry equipment in a safe and lawful manner. All quarry equipment must be operated in compliance with applicable health and safety laws and general standards of reasonable care.

WARNING !!!

If you must repair the vibrating unit without removing it from the feeder or screen, always lock out power and tag controls. Loosen and remove drive belts. Alert all personnel that vibrating unit is being serviced.

Failure to follow these precautions may result in serious injury or death!

Foreword

INTRODUCTION

This manual will help you achieve maximum performance from your Telsmith Type HF vibrating unit. It contains repair and overhaul information for the following models:

- 180 HF
- 220 HF
- 280 HF

Because this manual covers more than one model, some features described may not be present on your particular unit. Some equipment shown may be optional and/or available only on selected models.

This manual is based on the latest information available at the time of publication. Due to Telsmith's policy of continuous improvement, features and specifications are subject to change without notice. Actual dimensions, clearances, weights, and other specifications may vary due to fabrication variables, optional equipment, or custom engineering.

If this manual is damaged or incomplete, new copies are available from your dealer, or by contacting the Telsmith Parts Department. Be sure to have your vibrating unit model and serial numbers ready when ordering.

HOW TO CONTACT TELSMITH

Use the following phone numbers when calling Telsmith:

- 414-242-6600 (Service Department)
- 800-688-6601 (Parts Department)
- 414-242-7861 (Fax)

Send all written correspondence to:

Telsmith, Inc.
10910 N. Industrial Drive
P.O. Box 539
Mequon, WI 53092-0539
U.S.A.

ORDERING REPLACEMENT PARTS

Refer to the separate parts catalog furnished with your vibrating unit when ordering Telsmith "Safe-Bet" replacement parts. If your catalog is missing or incomplete, replacement copies are available from your dealer, or by contacting the Telsmith Parts Department.

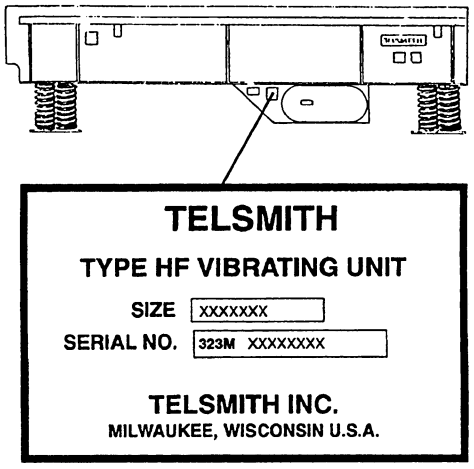
REQUESTING SERVICE ASSISTANCE FROM TELSMITH

If your require service assistance or have questions about repair procedures in this manual, please contact your local dealer for advice. If additional guidance is necessary, contact the Telsmith Service Department.

Telsmith's factory-trained service technicians are available from 8 a.m. to 4:30 p.m., Central Standard Time, Monday through Friday.

IDENTIFYING MODEL AND SERIAL NUMBERS

The model number (size) and serial number are located on the gear end of the vibrating unit. Always use these numbers whenever ordering parts or requesting service assistance.



SERVICE BULLETINS

To inform customers of the latest repair and maintenance procedures, Telsmith periodically issues service bulletins. Some of these bulletins may have been included with this manual.

To inquire about the latest service bulletins that apply to your vibrating unit, contact the Telsmith Service Department.

Chapter 1

SAFETY

INTRODUCTION

Safety Precautions

Safety is basically common sense. There are standard safety rules, but each situation has its own peculiarities which can not always be covered by rules. Therefore, always watch possible safety hazards and correct any deficiencies promptly.

Lack of attention to the WARNING, CAUTION and DANGER statements in this manual can result in accidents, personal injury, reduced efficiency, and loss of life. Refer to Figure 1-1 for example of the precautionary statements used throughout this manual.

⚠ WARNING !!!

It is the responsibility of the equipment owner and operator to exercise safety practices and procedures in the operation of machinery. This responsibility includes placement of guards and other safety equipment, instruction to operators and other personnel in contact with the machinery, and operation in compliance with applicable health and safety laws, regulations and general standards of reasonable care.

A careful operator is the best insurance against an accident. The complete observance of the following precautions will prevent many serious injuries:

1. Be sure all personnel operating or servicing the vibrating unit read and fully understand the contents of this manual, including the safety information discussed in this chapter. Be sure all personnel read and thoroughly understand the manuals for all other machinery which they operate and maintain.

2. Be sure that all personnel working around processing machinery read and fully understand the *Telsmith Quarry Equipment Safety Guide* furnished with your machine. If your copy of the *Safety Guide* is missing or incomplete, new copies are available from your dealer, or by calling Telsmith at 1-800-688-6601.

3. Never make any checks, adjustments, or repairs of any kind while machinery is in operation.

4. Be sure all guards and other protective devices are in place, secured, and not damaged. Never tamper with safety devices or warning systems.

Precautionary Statements

Throughout this manual, the use of the following precautionary statements has been emphasized. These statements are based on five different levels of concern.

- Note
- Important
- CAUTION
- WARNING
- DANGER

Refer to Figure 1-1 for examples of typical precautionary statements used in this manual.

Note and Important Statements

The **Note** and **Important** statements are advisory statements relating to equipment maintenance, operation and general service procedures. They are used to draw attention to procedures and practices.

A **Note** is a basic statement of procedures. An **Important** is used to draw attention to a procedure that needs to be followed to prevent machine damage.

Statements

These statements are intended to notify workers of dangerous areas or situations. All of these notices are preceded by the SAFETY ALERT SYMBOL. The

⚠ DANGER !!!

Never walk onto bridged materials. The bridge may break free at any time. Failure to observe this precaution will likely result in serious injury or death!

⚠ CAUTION !!!

Allow time for oil to cool before draining. Hot oil can cause burns.

1

⚠ WARNING !!!

If overhaul of the vibrating unit is necessary without removing it from the feeder or screen, always lock out power and tag controls. Loosen and remove drive belts. Alert all personnel that vibrating unit is being serviced. Never stand under, beside or on top of any vibrating equipment while it is operating.

Important: Handle the seal collar with care. Impact with any hard object can cause damage to the labyrinth grooves.

Note: Items (39), (40), (41), and (43) are held in place with epoxy. Do not remove these items unless they are damaged.

Figure 1-1. Sample Precautionary Statements

SAFETY ALERT SYMBOL is meant to draw attention to a dangerous situation.

Be sure to read and follow all instructions whenever the SAFETY ALERT SYMBOL could result in SERIOUS PERSONAL INJURY or DEATH.

The CAUTION statement involves safe operating procedures. If the procedure associated with a CAUTION statement is ignored, personal injury may result.

The WARNING statement involves procedures which are potentially hazardous. Failure to follow a WARNING statement could result in SERIOUS INJURY or DEATH.

The DANGER statement involves procedures which are the most hazardous if not properly performed. Failure to follow the instructions associated with a DANGER statement will likely result in SERIOUS INJURY or DEATH.

MAINTENANCE AND REPAIR SAFETY

⚠ WARNING !!!

If you must make repairs to the vibrating unit without removing it from the feeder or screen, always lock out power and tag controls. Loosen and remove drive belts. Alert all personnel that vibrating unit is being serviced. Never stand under, beside or on top of any vibrating equipment while it is operating.

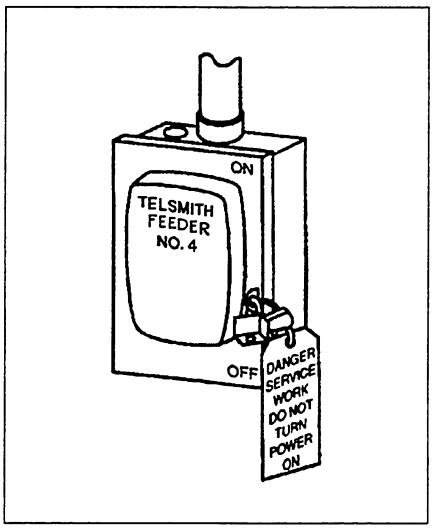


Figure 1-2. Tagged Controls

Electrical Systems

- Always read, understand, and follow appropriate electrical system troubleshooting, maintenance and repair instructions in machinery manuals.
- Allow only trained and licensed electricians to service electrical equipment.
- Whenever troubleshooting or repairing the electrical system, work with the power locked out and tagged, if possible. See Figure 1-2.
- If it is not possible to service the equipment with the power locked out, tag all controls and alert all personnel.

⚠ WARNING !!!

All Telsmith equipment has been designed with the proper size of electrical components. Any modifications to the power supplies or equipment on Telsmith machinery must be approved in writing by the Telsmith service department. Be sure to follow all electrical specifications when installing power supplies.

Hydraulic Systems

- Whenever service work is to be performed on any hydraulic system, be sure that all system pressure has been relieved. Be sure that all controls and the power supply have been locked out and tagged before beginning any service procedure. After the power has been shut off, cycle control levers in all direction to relieve system pressure.
- Never have your face near, or stand directly in front of a hydraulic line when cracking a fitting. Always assume that the line has pressure.
- Always clean up any spilled hydraulic fluid, especially on elevated metal work platforms or walkways. Spilled hydraulic fluid is extremely slippery.
- The adjustments and settings of all hydraulic systems must be done according to the procedures outlined in this manual.

Welding On Machinery

- While all welding should be performed in a properly ventilated area, special concern should be exercised when welding chromium, manganese, cadmium, copper, cobalt, lead and nickel, as these materials are considered to be potentially carcinogenic.
- Be sure there is adequate ventilation when welding inside enclosed areas.
- Always follow all standard safety procedures if welding is necessary. Be sure that all systems are shut down, power is locked out, and controls are tagged.
- Do not weld near flammable liquids or hydraulic oils.
- Do not weld lifting eyes or hooks to manganese steel castings. If necessary, use a stainless steel or manganese weld rod. Use extreme caution to keep personnel clear of castings being lifted or supported by these devices.
- Never ground the welder so that the electrical power will flow through bearings, hydraulic components or electrical equipment.

HAZARDOUS MATERIALS

- To avoid potential health hazards, persons in regular contact with hydraulic oils must be aware of the importance of thorough hygiene, and the proper methods for handling mineral oils.
- Mineral-based hydraulic oils act as solvents on the natural oils of the skin. Frequent and prolonged skin contact can cause dermatitis or severe irritation.
- Always wear suitable protective clothing when handling hydraulic oil.

- Be sure protective clothing and proper wash-up facilities are available to all personnel that may come in contact with mineral based hydraulic fluids.
- Always dispose of rags or paper towels in the correct and safe fashion.

DISPOSAL OF EXCESS FUELS, LUBRICANTS AND LIQUIDS

- It the responsibility of the machine users to properly dispose of unused fuels, used lubricating oils, used hydraulic oils, and other toxic materials. DO NOT dump these materials in an unapproved manner.

PROPER HOISTING AND HANDLING OF EQUIPMENT

Wire Ropes

Wire ropes require careful use, handling, and maintenance to ensure long life and safe operation. Always observe the following precautions:

- Be sure that the correct wire rope is being used for the application.
- Be sure that the ropes are inspected regularly following the manufacturer's guidelines.
- Avoid sudden loading in cold weather.
- Never use frozen wire ropes.
- Use suitable padding to protect wire rope from sharp corners or edges.
- Avoid dragging the rope from under loads or over obstacles.
- Never use a wire rope that has been cut, badly kinked, frayed or crushed.
- Avoid reverse bends.
- Be sure that the rope ends are properly sized.
- Use thimbles in eye fittings at all times.
- Watch for local wear. Reposition or shorten rope to remove worn section from the area of lifting tension.
- Follow the manufacturer's instructions for lubrication if the wire ropes are used for lifting procedures.

Connecting Or Clamping Wire Ropes

When connecting or clamping wire ropes, use one of the following:

- **Clamp and thimble connections** combine both the clamp and thimble in one unit. Clamp and thimble connections are capable of supporting 80% rated wire rope load.
- **Cable clips** are the most common way to secure a rope to a piece of equipment or to make an eye. The cable clip or "Crosby Clip" is made of a U-bolt and saddle. If this type of clip is used to make an eye, the use of a properly sized thimble is mandatory. If not, the cable may kink, forming a permanent weak spot.

Chains

Chains require careful use, handling and maintenance to ensure long life and safe operation.

- Be sure that the correct size chain is being used for the application.
- Be sure that the chains are inspected regularly following the manufacturer's guidelines.
- Avoid sudden or shock loading (DO NOT jerk load upright).
- Use suitable padding to protect the chain from sharp corners or edges.
- Avoid dragging the chain from under loads or over obstacles.
- Use the proper fittings at all times.
- Watch for local wear. Reposition or shorten chain to move worn section from the area of tension.
- Inspect links to determine the amount of wear. Refer to manufacturer's specifications for wear tolerance ranges.
- Be sure that all connections between chain sections are completed with properly sized hardware and lifting hooks.

⚠ CAUTION !!!

Always follow proper rigging procedures as provided by the chain manufacturer. The angle of rigging may decrease the rated lifting capacity.

Fiber Or Synthetic Slings

Slings require careful use, handling and maintenance to ensure long life and safe operation.

- Be sure that the sling is rated or coded for the hitch or application.
- Be sure that the slings are inspected regularly following the manufacturer's guidelines.
- Do not use synthetic slings in temperatures exceeding 180 °F.
- Slings may be safely used in a temperature range of 20 to 180 °F without decreasing load limits. For temperatures beyond this range or for wet/frozen slings, follow manufacturer's instructions for load reductions.
- Avoid sudden or shock loading (DO NOT jerk load upright).
- Use suitable padding to protect the sling from sharp corners or edges.
- Avoid dragging the sling from under loads or over obstacles.
- Use the proper fittings at all times.
- Watch for local wear. Reposition or shorten sling to eliminate worn section.
- Inspect connection links to determine the amount of wear. Refer to manufacturer's specification for wear tolerance ranges.

1

NOTES

Chapter 2

GENERAL INFORMATION AND SPECIFICATIONS

EQUIPMENT DESCRIPTION

The Type HF vibrating unit is used on all Telsmith VF/VGF feeders and some Telsmith horizontal screens. Each Type HF vibrating unit contains two counter-rotating eccentric shafts that create the continuous vibrating action essential for effective aggregate processing.

When attached to a VF or VGF feeder, the Type HF vibrating unit is "bottom mounted" below the feeder pan. When attached to a horizontal screen, it is "top-mounted" above the screen decks. Refer to the maintenance manual provided with your feeder or screen for vibrating unit removal instructions.

Drive power may be supplied by an electric motor or a hydraulic motor. On vibrating units with hydraulic motor drive, the hydraulic motor is mounted directly to the vibrating unit housing. Vibrating units with electric motor drive use a spring-loaded motor base that is mounted separately from the vibrating unit.

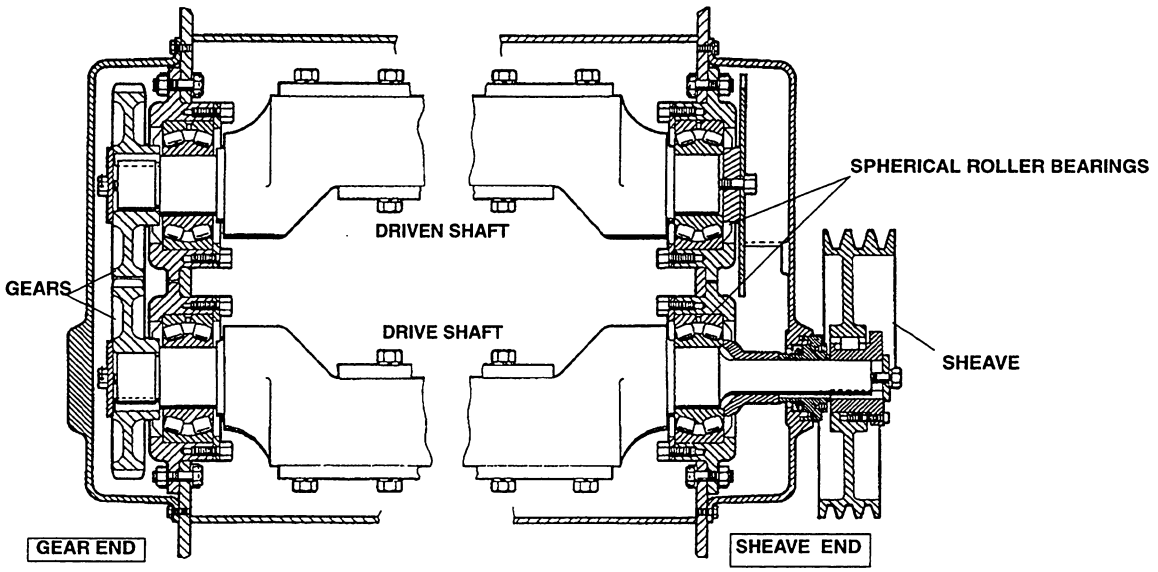
Oil contained inside the vibrating unit housing provides lubrication to the gears, bearings and other internal parts. An optional circulating oil system is available for especially demanding applications. It provides a continuous flow of filtered and cooled oil supplied by an external hydraulic pump and reservoir.

Type HF vibrating units are available in three basic sizes and several different widths:

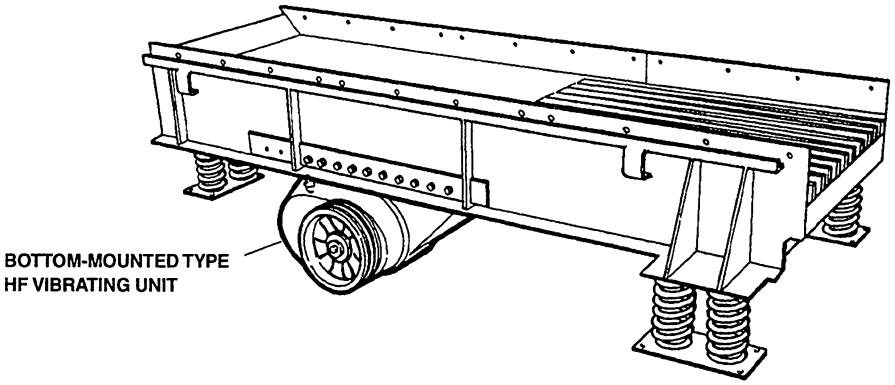
- 180HF (3, 3.5, & 4 feet wide)
- 220HF (3, 3.5, 4, 4.5, 5 & 6 feet wide)
- 280HF (4, 5 & 6 feet wide)

Overhaul and repair procedures are similar for all sizes and widths.

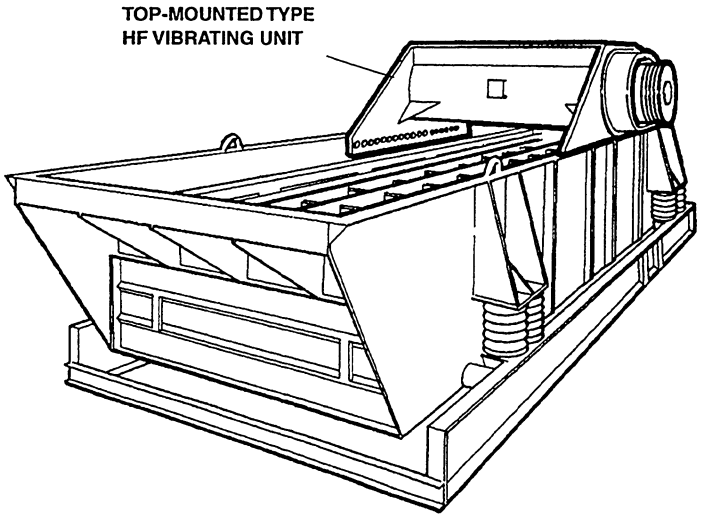
Note: See Figure 4-2 in Chapter 4 for an exploded view of the Type HF vibrating unit.



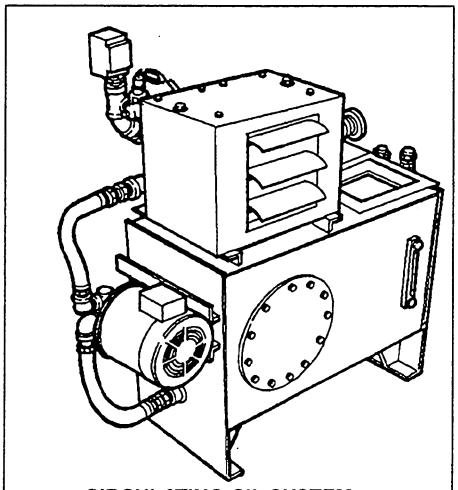
CUTAWAY VIEW OF TYPE HF VIBRATING UNIT



VGF FEEDER



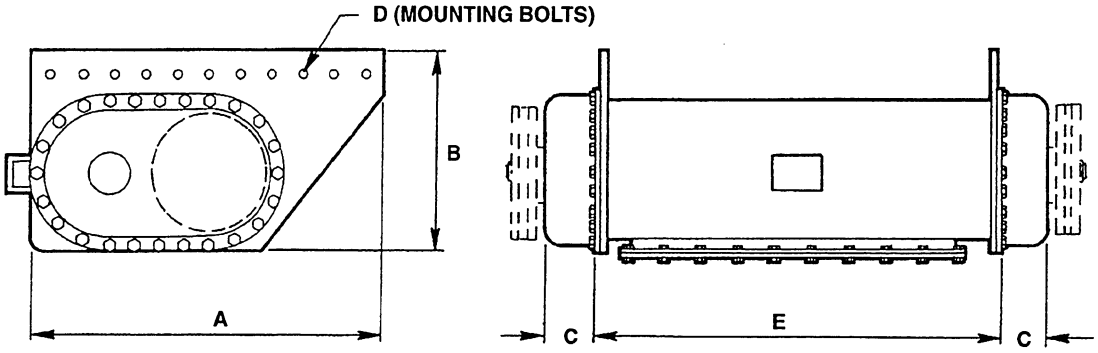
HORIZONTAL FEEDER



CIRCULATING OIL SYSTEM
(OPTIONAL)

Figure 2-1. Type HF Vibrating Unit

DIMENSION		180HF	220HF	280HF
A		3' - 4-1/2"	3' - 9-1/4"	5' - 10-3/4"
B		2' - 1"	2' - 3-1/2"	2' - 11-1/8"
C		6' - 5/16"	7' - 7/16"	7' - 11/16"
D		3/4"	3/4"	1"
E	3 ft wide	3' - 1/2"	3' - 1/2"	-
	3.5 ft wide	3' - 6-1/2"	3' - 6-1/2"	-
	4 ft wide	4' - 1/2"	4' - 1/2"	4' - 1/2"
	4.5 ft wide	-	Contact Telsmith	Contact Telsmith
	5 ft wide	-	5' - 1/2"	5' - 1/2"
	6 ft wide	-	6' - 1/2"	6' - 1/2"



NOTE: RIGHT-HAND DRIVE IS STANDARD. LEFT HAND DRIVE IS AVAILABLE AS AN OPTION.

Figure 2-2. Type HF Vibrating Unit Dimensions

VIBRATING UNIT SIZE (FEET)	WEIGHTS (LBS)		
	MODEL 180HF	MODEL 220HF	MODEL 280HF
3	1675	1935	----
3.5	1900	2260	----
4	2130	2580	3700
4.5	---	Contact Telsmith	Contact Telsmith
5	---	2875	4160
6	---	3170	4775
Note: Weights listed in this table are for a standard vibrating unit without couterweights or lubricating oil.			

Table 2-1. Type HF Vibrating Unit Weights

NOTES

Chapter 3

GENERAL OVERHAUL INSTRUCTIONS

WORK SAFELY AND USE COMMON SENSE

- Read Chapter 1 for important safety information. Also refer to the *Telsmith Quarry Equipment Safety Guide* for additional safety precautions.
- Follow all precautionary statements (DANGER, WARNING, CAUTION, IMPORTANT & Note) included within the overhaul procedures.
- Be sure all lifting devices and supports are of adequate rated capacity. See Chapter 2 for weights.
- Keep cleaning solvents and other combustibles away from heat and open flame.
- Be careful when handling hot parts. To prevent burns and other injuries, wear appropriate eye and hand protection.
- Wait for oil to cool before draining oil. Hot oil can cause burns.
- Keep work area clean and tools organized. Be sure you have adequate space for the job.
- If you need service advice, contact your dealer or the Telsmith Service Department.

HAVE TOOLS AND SUPPLIES READY

Below is a general list of common tools, shop equipment and supplies required to repair and overhaul the Type HF vibrating unit. You may already have some of these items in your shop.

If additional guidance is required, contact the Telsmith Service Department.

- Chain Puller (6000 lb capacity)
- Impact wrenches
- Set of sockets and breaker bars, minimum 3/4" drive with sockets up to 3-1/2"
- Cold steel chisel, 3/4"
- Hammers
- Impact wrench, 3/4" drive minimum, 1" preferred
- Caulking gun
- Cables, slings and chains
- Crane or hoist of adequate capacity (Refer to Chapter 2 for weights)
- Feeler gauge and micrometer
- Cleaning solvent
- Flushing oil

HAVE SEALANTS AND LUBRICANTS READY

See Table 3-1 for a list of required sealants and lubricants. Have all sealants and lubricants ready before overhauling the vibrating unit. Apply to parts as directed in the overhaul procedures.

TAG AND MARK PARTS AS THEY ARE REMOVED

- Attach identification tags and match-mark parts during removal and disassembly. Parts must be reinstalled in the exact same location and position as removed.
- If possible, use a camera to take photographs of the vibrating unit as it is disassembled. During reassembly, use these photographs to check that all parts are correctly installed.

HANDLE SEALS AND MACHINED PARTS CAREFULLY

- Be careful not to cut or damage oil seals during installation.
- Handle shafts and gears carefully to prevent damage. Do not nick or mar finished surfaces.
- If shafts or other machined items are to be removed from the vibrating unit for more than a few days, cover machined surfaces with a protective coating of rust-preventative lubricant.

HANDLE BEARINGS CAREFULLY

- Use clean tools in clean surroundings
- Use clean solvents and flushing oils
- Remove any dirt from vibrating unit before exposing bearings.
- Handle bearings with clean, dry hands.
- Use only clean lint-free rags.
- Install new bearings as removed from packaging without washing. Do not remove bearings from packaging until ready to use.
- Wash used bearings in a tank of clean solvent. Clean bearings as required after soaking in solvent. Hand wash bearings and blow them dry with filtered, moisture-free compressed air. Dip bearings in oil immediately after drying to prevent rust.

⚠ WARNING!!!

Always wear eye protection and face shield when using compressed air. Do not spin the bearings by hand or by air pressure after the bearing surfaces have dried.

INSPECT COMPONENTS BEFORE ASSEMBLY

- Do a visual check of all components. Be sure they are clean, not cracked and free of nicks and burrs.
- Check clearances and dimensions as instructed in the procedures.
- Replace any excessively worn or damaged parts.

ITEM #	SEALANT TYPE	DESCRIPTION
1	Silicone Sealant	Must meet or exceed requirements of Mil Spec. MIL-A-46106A, ASTM C920-79
2	Thread Locking Compound (service-removable)	Loctite 242 or equivalent
3	Anti-Seize Compound	Bostik Never-Seez #NS160 or equivalent
4	Pipe Joint Compound	Permatex #51D or equivalent
5	Epoxy Adhesive	CIBA-GEIGY Furane Aerospace Products Epibond 1210A & 1210B or equivalent

Table 3-1. Sealant Specifications

SPECIFICATION	
NLGI Grade Number	2
Worked Penetration @ 77 °F (60 Strokes)	285
Worked Penetration @ 77 °F (100,000 Strokes)	300
Dropping Point, °F	365
Copper Corrosion Test, 14 Days	Pass
Wheel Bearing Test @ 275 °F	Pass
Timken OK Load	50 lbs
Note: The above grease must contain an extreme pressure (EP) agent that is not harmful to bronze, brass or lead. For satisfactory lubrication, grease must be absolutely free from any ingredients which could cause corrosion, and from gritty material which could produce wear. Grease should also be uniform in texture, consistency, structure, stability, flow characteristics and lubricating characteristics.	

Table 3-2. Lubricant Specifications - Grease

SPECIFICATION	AMBIENT TEMPERATURE		
	BELOW 40 °F (4.5 °C)	40 to 80 °F (4.5 to 27 °C)	ABOVE 80 °F (27 °C)
ISO Grade (International Standards Organization)	C-100	C-150	C-220
AGMA Gade #250.04 (American Gear Manufacturer's Association)	3EP	4EP	5EP
Viscosity SUS @ 100 °F	469-575	709-871	1047-1283
Viscosity SUS @ 210 °F	61-67	74-82	90-101
Viscosity Index (V.I.)	95+	95+	95+
Timken OK Load (lbs)	60+	60+	60+
Extreme Pressure (EP) Agent	Yes	Yes	Yes
Rust and Oxidation Agent	Yes	Yes	Yes
Anti-Foaming Agent	Yes	Yes	Yes
Copper Strip Corrosion Test	Pass	Pass	Pass
• Oil must not be corrosive to metals generally used in bearings, gears, shaftings, pumps, and housings. • Oil must have no effect on rubber seals, synthetic seals, packings and hoses.			

Table 3-3. Lubricant Specifications - Oil

APPROXIMATE OIL CAPACITIES GALLONS			
SIZE OF VIBRATING UNIT	WIDTH IN FEET	TOP-MOUNTED UNIT	BOTTOM-MOUNTED UNIT
180HF	3 3.5 4	7 8 9	9 10 16
220HF	3 3.5 4 4.5 5 6	8 9 10 --- 13 15	13 15 17-1/2 20 22 26
280HF	4 5 6	14 18 22	22-1/2 28 33
Note: Actual oil capacities may be different. To ensure proper oil level, always fill vibrating unit only oil just flows from petcocks on both sides. Do not overfill. **Important:** Oil capacities in this table apply only to standard HF vibrating units without the circulating oil system. Do not add oil to the vibrating unit if equipped with the circulating oil system. See screen or feeder maintenance manual for more information.			

Table 3-4. Oil Capacities

Notes

Chapter 4

OVERHAUL PROCEDURES

BEFORE YOU BEGIN

1. Read Chapter 3, General Overhaul Instructions.

2. Remove vibrating unit from screen or feeder. See Screen or Feeder Operation and Maintenance Manual for removal instructions.

3. Remove any dirt from exterior of vibrating unit.

⚠ CAUTION !!!

Allow time for oil to cool before draining. Hot oil can cause burns.

4. Drain all oil from vibrating unit.

5. Place vibrating unit on suitable supports as shown in Figure 4-1.

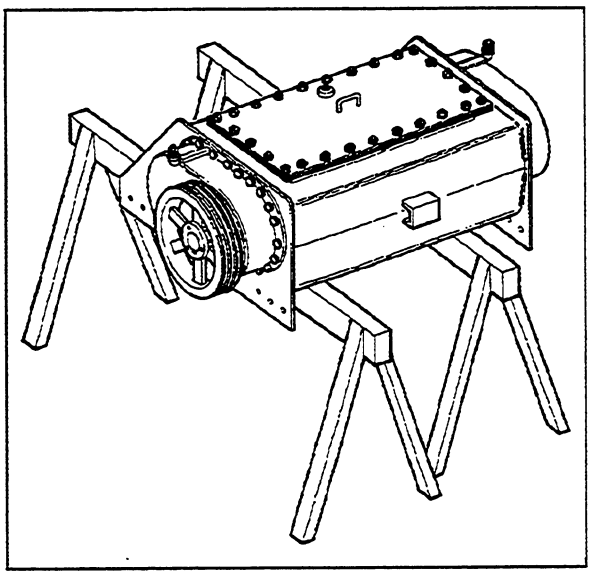


Figure 4-1. Vibrating Unit on Supports

⚠ WARNING!!!

If overhaul of the vibrating unit is necessary without removing it from the feeder or screen, always lock out power and tag controls. Loosen and remove drive belts. Alert all personnel that vibrating unit is being serviced.

VIBRATING UNIT DISASSEMBLY

Note: Part numbers in parenthesis (. . .) refer to Figure 4-2. Use this illustration to identify parts during disassembly of the vibrating unit.

1. Remove nuts (26), washers (27), and capscrews (28). Remove cover (25). Remove and discard gasket (24).

2. Remove capscrews (16), washers (17), and remove counterweights (15). See Figure 4-3.

3. At the **sheave end** of shaft (48), remove capscrew (59), washer (58) and retaining washer (57).

4. Remove the sheave assembly (55) as follows:

   A. Remove the three capscrews.

   B. Insert the capscrews in the tapped holes in the bushing and use them as jackscrews to drive sheave off the sheave hub.

   C. When the sheave hub is loose, slide the hub and key (56) from the shaft.

   D. Remove the sheave.

5. Pull labyrinth seal collar (53), and wear sleeve (52) from shaft (48). Remove key (54) from the shaft.

Important: Handle the seal collar with care. Impact with any hard object can cause damage to the labyrinth grooves.

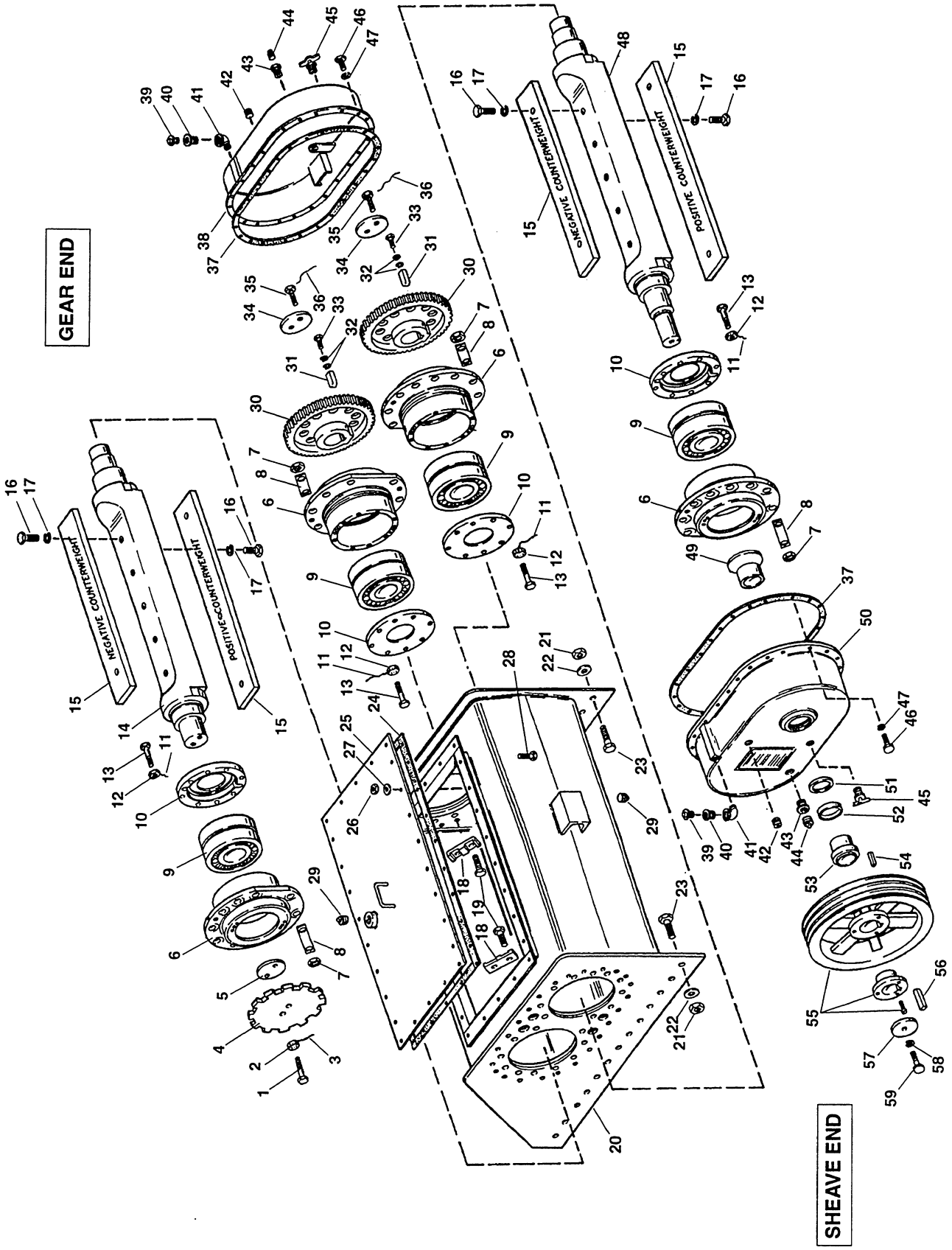


Figure 4-2. Type HF Vibrating Unit - Exploded View

LEGEND FOR FIGURE 4-2

1. CAPSCREW
2. LOCKING CLIP
3. TIE WIRE
4. OIL WHEEL
5. RETAIING CAP
6. BEARING HOUSING
7. NUT
8. NUT
9. ROLLER BEARING
10. BEARING RETAINER
11. TIE WIRE
12. LOCKING CLIP
13. CAPSCREW
14. DRIVEN SHAFT
15. COUNTERWEIGHT
16. SCREW
17. WASHER
18. BOLT RETAINER
19. CAPSCREW
20. VIBRATOR HOUSING
21. NUT
22. WASHER
23. CAPSCREW
24. GASKET
25. COVER PLATE
26. NUT
27. WASHER
28. CAPSCREW
29. PIPE PLUG
30. GEAR
31. HUGGER KEY
32. LOCKWASHER
33. CAPSCREW
34. RETAINING WASHER
35. CAPSCREW
36. TIE WIRE
37. GASKET
38. END COVER (Gear End)
39. BREATHER
40. REDUCER BUSHING
41. ELBOW
42. PIPE PLUG
43. REDUCER BUSHING
44. MAGNETIC PIPE PLUG
45. DRAIN COCK
46. CAPSCREW
47. WASHER
48. DRIVE SHAFT
49. SPACER COLLAR
50. END COVER (DRIVE END)
51. OIL SEAL
52. WEAR SLEEVE
53. LABYRINTH SEAL COLLAR
54. KEY (SEAL COLLAR)
55. SHEAVE ASSEMBLY
56. KEY (SHEAVE)
57. RETAINING WASHER
58. WASHER
59. CAPSCREW

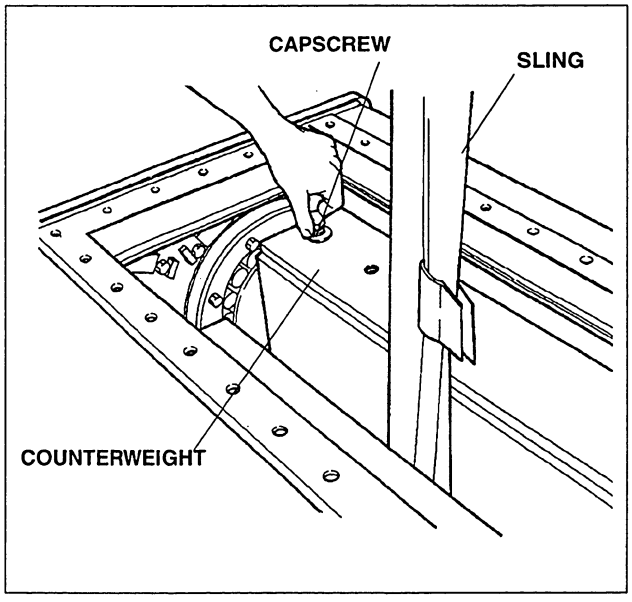


Figure 4-3. Removing Counterweights

Important: Do not strike the aluminum cover (50) with a hammer during removal. Use a gentle prying force with two screwdrivers, if necessary.

6. Support cover (50) so it can not fall and remove the cover by removing capscrews (46) and washers (47). Remove and discard gasket (37).

Note: Items (41), (42), (43), and (45) are held in place with epoxy. Do not remove these items unless they are damaged.

7. Press oil seal (51) out of cover (50) and discard the seal.

8. Slide spacer (49) off shaft (48).

9. At the **gear end** of vibrator housing (20), support cover (38) so it can not fall. Remove capscrews (46) and washers (47). Remove cover (38).

Note: Items (41), (42), (43), and (45) are held in place with epoxy. Do not remove these items unless they are damaged.

10. Break lockwire (36) and remove capscrews (35). Remove the two gear retaining washers (34).

Note: Gear keys (31) are of two-part construction, consisting of an external square key with a drilled center bore and a tapered expander pin. (Refer to Figure 4-4.)

11. Remove keys (31) as follows:

A. Remove two lockwashers (32) and capscrew (33) mounted in the tapped end of the expander pin portion of key (31).

B. Install flat plate shown in Figure 4-4. The plate will prevent gear (30) from falling off in Step C.

C. Using a slide hammer, or suitable puller, remove the expander pin from the external portion of the key. Then remove the square outer half of the key.

D. Remove flat plate installed in Step B.

Important: Do not re-use expander keys (31). Discard and replace at assembly.

12. Remove gears (30) from each shaft. The gears should slide off the shafts easily. If necessary, use wooden wedges to break the gears free.

Note: Inspect both gears carefully in good light. Replace gears if pitted, scored, galled, cracked, or discolored. Also replace the gears if they have one or more broken teeth.

Important: It is recommended that both gears be replaced as a set, even if only one gear appears damaged. Replacing both gears will help ensure

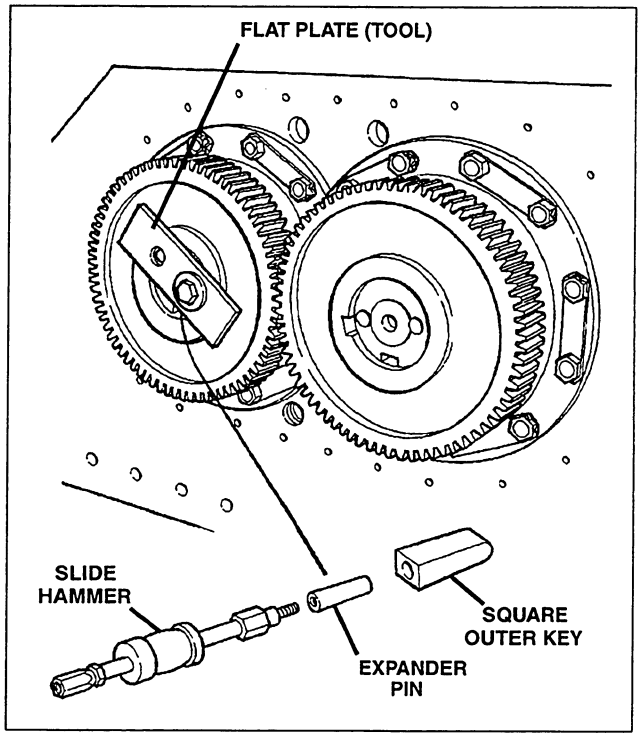


Figure 4-4. Removing Expander Pin

maximum durability. If both gears appear free of damage, wrap them individually in heavy paper and store them in a clean, dry place until reinstallation.

13. Attach a sling to shaft (48) and support the shaft so that it can not fall. (Run the sling through the cover opening in the housing.)

14. At the **gear end** of the vibrator housing, unbolt bearing housing assembly (6) by bending nut locks (8) and removing nuts (7).

Note: Use a chisel to bend nut locks (8). If necessary, heat nuts (7) with a torch.

Important: Discard nut locks (8).

15. Increase tension on the hoist sling as required to remove the weight of shaft (48) from bearing housing (6). At the **gear end**, remove capscrews (19) and bolt retainers (18) from inside the vibrator housing so that bearing housing assembly (6) is free on shaft (48).

⚠ WARNING!!!

Before attempting to remove shaft (48) as described in Step 16 , place metal plate on the end of shaft (48) and bolt it into the tapped holes on the end of the shaft with two 5/8 x 1-1/2" capscrews. This will prevent the bearing housing from falling off the shaft if it tilts while being removed from the vibrator housing. If necessary, install spacers between metal plate and bearing housing. See Figure 4-9. Failure to follow these instructions can result in serious personal injury.

Note: Two persons are required to remove shaft (48).

16. Remove shaft (48) as follows:

A. With a person at each end, tap the sheave end of shaft (48) with a soft mallet and guide the shaft through the **gear end** of the vibrator housing.

Note: Bearing housing (6) on **gear end** will be removed with shaft (48).

B. When the shaft protrudes slightly less than halfway from the housing, lower the shaft until it rests in the bore of the housing.

C. Reattach the sling outside the housing, at the approximate center of gravity of the shaft.

D. Lift the shaft out of the housing, and set it on suitable blocking.

17. At the **sheave end** of shaft (14), break tie wire (3) and remove locking clips (2) and capscrews (1). Remove oil wheel (4).

Note: Retaining cap (5) will come off when oil wheel (4) is removed. Do not allow it to fall.

18. Use the same procedure as described in steps 13 thru 16 to remove shaft (14). Place the shaft on suitable blocking.

19. Remove flat plates and slide bearing housing assemblies (6) off of shafts (48) and (14).

20. At the **sheave end** of the vibrator housing, unbolt bearing housing assemblies (6) by bending nut locks (8) and removing nuts (7).

Note: Use a chisel to bend nut locks (8). If necessary, heat nuts (7) with a torch.

Important: Discard nut locks (8).

21. Remove capscrews (19) and bolt retainers (18) from inside the vibrator housing and remove bearing housing assemblies (6) from **sheave end** of vibrator housing.

22. Remove and disassemble bearing housings (6) as follows:

Note: Mark/tag each bearing housing so that the bearing housings can be installed in the identical position during assembly.

A. Break lockwire (11) and remove capscrews (13) and locking clips (12). Bearing retainer (10) will now be free.

B. To remove the bearing from the housing, cut a circular disc out of 3/8 inch metal (slightly smaller than the bore of the bearing housing, but large enough to contact the outer race of the bearing). Press the bearing out of the housing, pressing from the flange end of the housing and applying pressure against only the outer race of the bearing.

Note: Bearing (9) is a light press fit in bearing housing (6). An arbor press is the preferred method of removal. If a hammer is used, use only a babbitt-style hammer or a shock-resistant hammer. Tap against the outer race only and rotate the blows around the circumference of the bearing to prevent "cocking" of the bearing in the housing bore.

23. Inspect the bearings for wear or damage. Replace bearings that are worn or damaged in any way. If the bearings appear reusable, wrap them individually in heavy waterproof paper and store in a clean, dry place until reassembly.

24. Inspect all parts for signs of wear or damage. If a bearing housing bore is out of round by more than 0.001 inch, replace the housing.

25. Remove and discard oil seal (51) from cover (50). Inspect wear sleeve (52) and replace if it is grooved or worn. Remove the wear sleeve from seal collar (53) by heating, or by the careful use of a blunt chisel.

VIBRATING UNIT ASSEMBLY

Assemble the vibrating unit as described below. Note that a partially disassembled vibrating unit can be reassembled by beginning at the appropriate step in the procedure.

Important: Always discard seals, gaskets, or other rubber parts that were removed during disassembly. Never attempt to reuse these parts. To ensure reliable operation, always install only **new** rubber parts during vibrating unit reassembly.

1. Subassemble the four bearing housings (6, Figure 4-2) as follows:

A. Check that all of the bearings on shafts (14 and 48) are a slip fit on the journals. Check the shaft shoulders and bearing seats to be sure there are no chips on the face of the shaft shoulder that would prevent the bearing from sliding fully into place against the shoulder.

B. Clean the bores of bearing housings (6) thoroughly. Be sure there are no high points on the bearing seats, and that the bearing bore is within the tolerances listed in Table 4-1.

MODEL	ALLOWABLE CLEARANCES IN INCHES
180HF	7.4779 to 7.4797
220HF	9.4460 to 9.4472
280HF	11.8079 to 11.8091

Table 4-1. Bearing Bore Clearance

Note: The above dimensions should be checked with a micrometer for out of round, taper, or undersize. If the bore exceeds 0.001" out of round or taper, replace or recondition the housing.

C. Lower bearing (9) into the bore of bearing housing (6). Be sure that the bearing enters the bearing housing from the bearing retainer (10) end.

D. Press the bearing into the housing using a circular disc of 3/8 inch metal slightly smaller than the bore in the bearing housing, but large enough to bear against the outer race of bearing (9). (Refer to Figure 4-5.) Apply mounting pressure ONLY against the outer bearing race. Continue to press the bearing into the bearing housing until it is fully seated against the shoulder of the bearing housing. Use a 0.001" feeler gauge to make certain the outer bearing cone is fully seated against the shoulder of the housing.

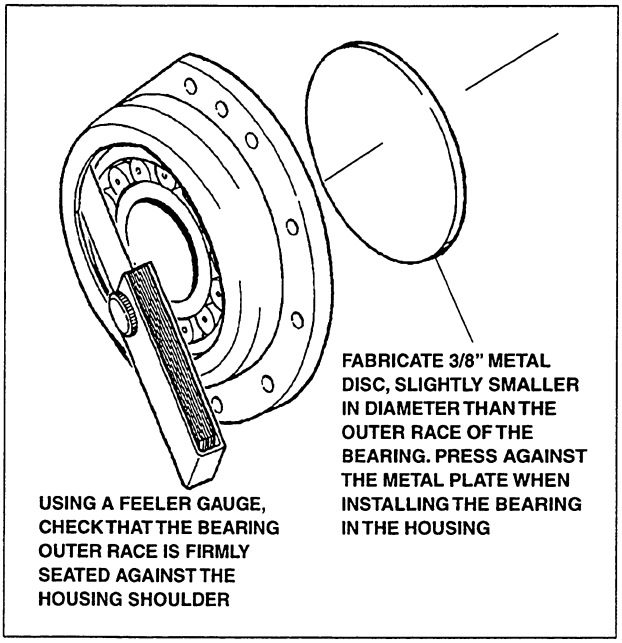


Figure 4-5. Installing Shaft Bearings into Bearing Housing

Important: Be sure that bearing (9) is not cocked during assembly.

E. Place bearing retainer (10) on bearing housing (6), and secure it to the bearing housing with locking clips (12) and capscrews (13). Refer to Appendix A for correct torque values. Use tie wire (11) to secure the locking clips.

F. Using feeler gauge, check the internal clearance between the top bearing roller and the bearing outer race (Figure 4-6). Before installation in the vibrator housing, the clearance should be as shown in Table 4-2.

2. Install two of the subassembled bearing housings (6) in the **sheave end** of vibrator housing (20) as follows:

Note: The bearing housings (6) must be reinstalled in the positions from which they were removed.

A. Clean the bearing housing mounting surfaces on vibrator housing (20) and carefully install the subassembled bearing housings in the **sheave end** bores on vibrator housing (20). The flats on the bearing housing must butt against each other.

Note: Always use new nut locks (8) in Step B. Do not attempt to reuse old nut locks.

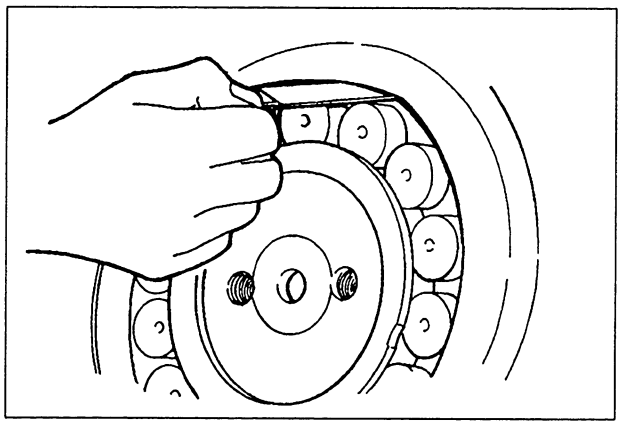


Figure 4-6. Checking Bearing Clearance

MODEL	ALLOWABLE CLEARANCES IN INCHES
180HF	0.0053 to 0.0071
220HF	0.0064 to 0.0083
280HF	0.0075 to 0.0095

Table 4-2. Bearing Clearances

B. Secure bearing housings (6) using two capscrews (19) inserted through each of the five bolt retainers (18). From inside the vibrator housing (20), push capscrews (19) in each bolt retainer through housing (20), and out through bearing housing (6) until all are installed as shown in Figure 4-7. Lubricate the facing surfaces of nut locks (8) with grease (see Table 3-2) and place the nut locks over the ends of capscrews (19). Install nuts (7) and tighten sufficiently to secure the unit in position.

Important: Do not final tighten nuts (7) at this time.

C. Using feeler gauge as shown in Figure 4-8, check the installed clearance between the top bearing roller and outer race. It should be as shown in Table 4-3.

3. Place anti-seize compound (refer to Table 3-1, Item 3) on the bearing journals of shaft (14) and slide an assembled bearing housing (6) on the **gear end** of the shaft. It may be necessary to tap the bearing housing with a babbitt hammer to align it so it will slide on the shaft.

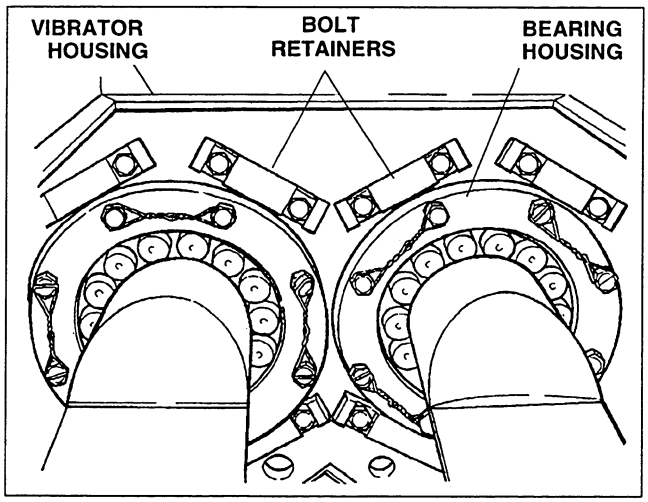


Figure 4-7. Bolt Retainers Installed

MODEL	ALLOWABLE CLEARANCES IN INCHES
180HF	0.0039 to 0.0067
220HF	0.0047 to 0.0081
280HF	0.0056 to 0.0092

Table 4-3. Installed Bearing Clearance

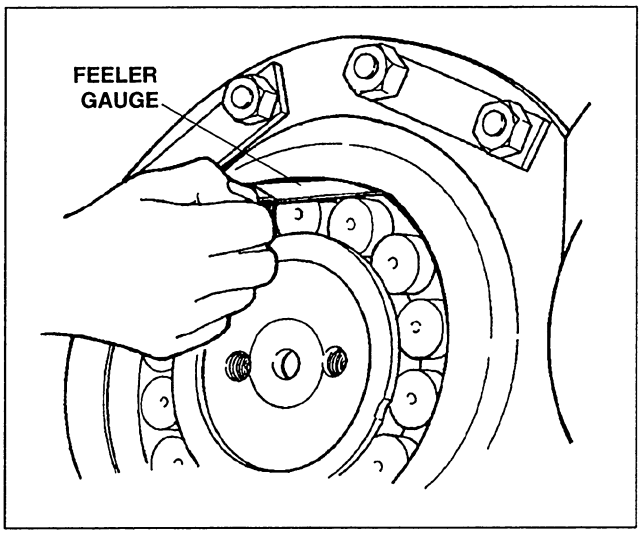


Figure 4-8. Checking Installed Bearing Clearance

⚠ WARNING!!!

Before attempting to install shaft (14) as described in Step 4, place a metal plate (Figure 4-9) on the end of shaft (14) and bolt it into the tapped holes on the end of the shaft with two 5/8 x 1-1/2" capscrews. This will prevent the bearing housing from falling off the shaft if it tilts while being moved to the vibrator housing during installation. If necessary, install spacers between the metal plate and the bearing housing. Failure to follow these instructions can result in serious personal injury.

4. Attach a sling at the center-of-gravity of shaft (14). Raise the shaft slightly to assure it is balanced in the sling.

5. Lift the shaft and transport it to the housing for assembly.

6. Two people are required to install shaft (14) in vibrator housing (20). Proceed as follows:

A. With the shaft suspended in the sling, insert the shaft through the **gear end** of the vibrator housing bore (see Figure 4-10).

B. Rest the shaft on the bore of the vibrator housing (20) and re-attach the sling to the shaft through the cover opening.

C. Guide the shaft into the bore of bearing (9) on the **sheave end** of housing (20). If necessary, tap bearing (9) with a soft mallet to align the bore with the shaft end.

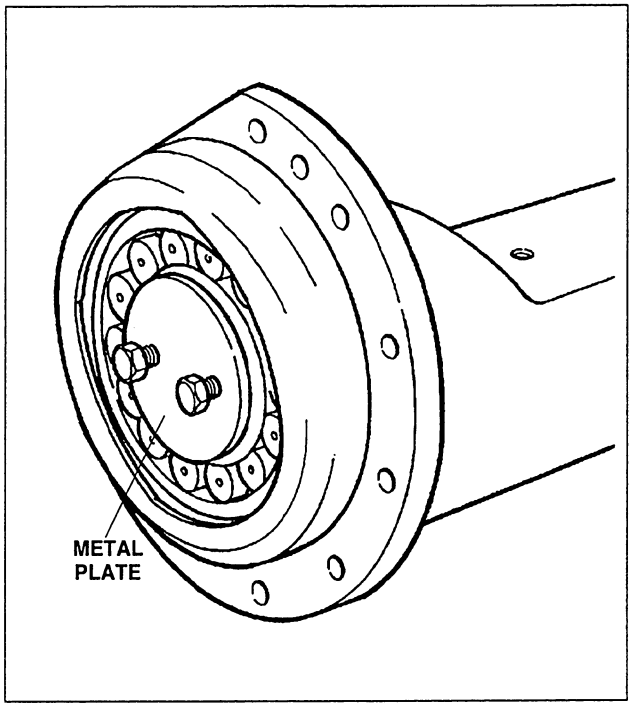


Figure 4-9. Metal Plate

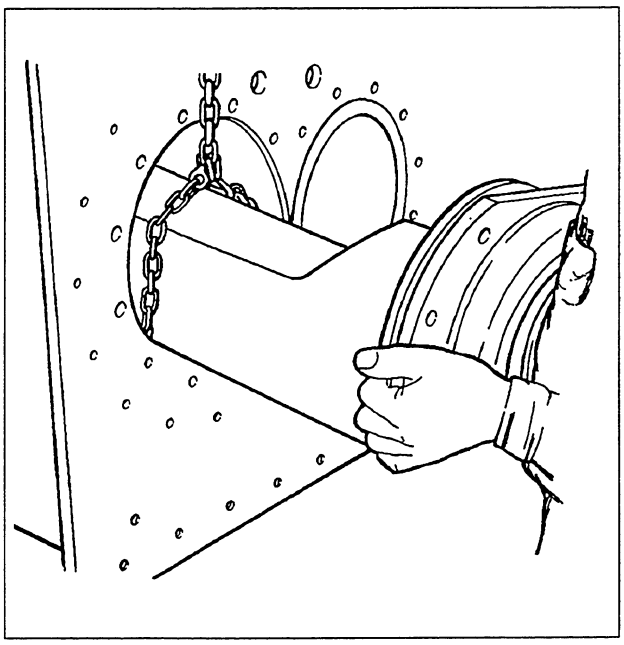


Figure 4-10. Pushing Shaft into Housing Bore

D. Install the bearing housing on the **gear end** of the housing in the manner described in step 2.

7. Repeat steps 3 thru 6 to install shaft (48). Before beginning step 3, be sure to check the installed bearing roller to outer race clearances as described in Step 2C.

8. Install a dial indicator as shown in Figure 4-11 and check shaft end play on shaft (14). Install the dial indicator on the other end of shaft (48) and check end play in the same manner. End play should be within the limits listed in Table 4-4.

9. Check gear backlash as follows:

A. Slide two gears (30) onto the ends of shafts (14 and 48). Either gear may be used on either shaft. Be sure to align the match marks on the gears as shown in Figure 4-12.

B. Check gear backlash using feeler gauges as shown in Figure 4-13. Backlash should be within the limits listed in Table 4-5.

C. Remove the gears for later reinstallation.

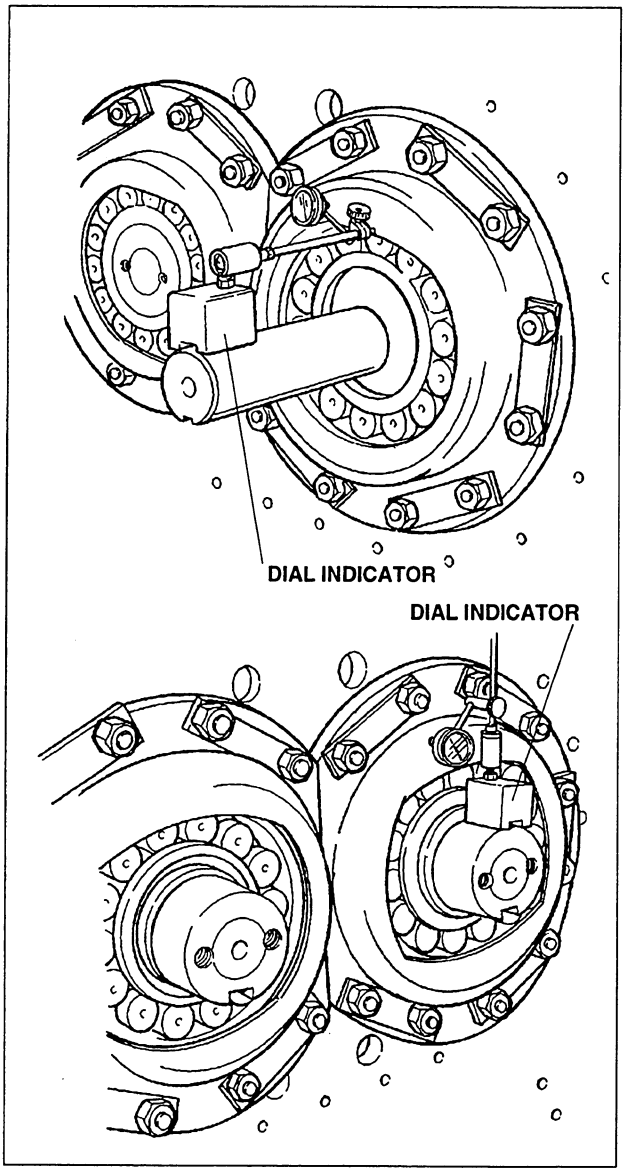


Figure 4-11. Checking Shaft End Play

MODEL	ALLOWABLE END PLAY IN INCHES
180HF	0.101 -0.235
220HF	0.119 - 0.159
280HF	0.190 - 0.234

Table 4-4. Allowable Shaft End Play

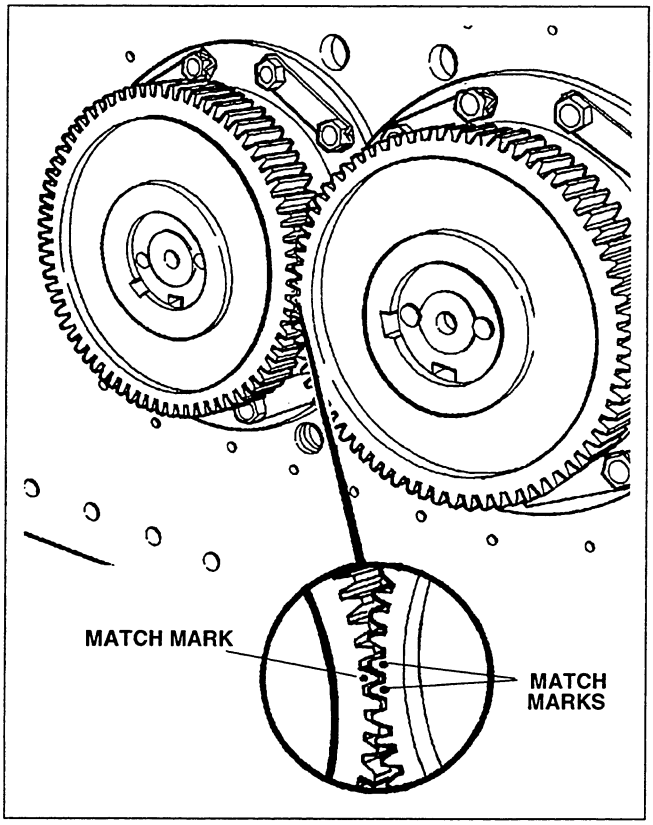


Figure 4-12. Gear Match Marks

MODEL	ALLOWABLE BACKLASH IN INCHES
180HF	0.017 to 0.021
220HF	0.017 to 0.021
280HF	0.021 to 0.026

Table 4-5. Allowable Backlash

Note: When torquing nuts (7) in step 10, stop turning when the nuts are in a position to allow proper bending of nut locks (8).

10. Using a torque wrench, apply final torque to the nuts (7) in accordance with the torque values listed in Appendix A (use only dry grade 5 values). Using a

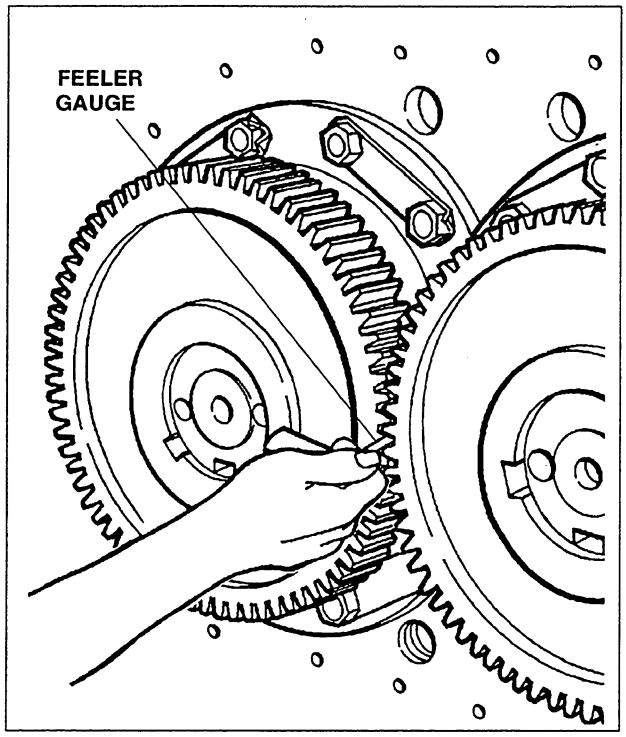


Figure 4-13. Checking Gear Backlash

sharp chisel and a hammer, bend the tabs on new nut locks (8) to prevent nuts (7) from moving. See Figures 4-14 and 4-15.

11. Install gears (30) on the ends of shafts (14 and 48). Be sure the center punched match marks on the gears are properly aligned (the single center punch on one gear must be between the two center punch marks on the second gear). See Figure 4-12.

12. Rotate the gear on shaft (14) until the gear keyway is aligned with the shaft keyway.

13. Install a flat metal plate on the end of shaft (14) to take up all clearances in the assembly and to keep the gear keyway aligned with the shaft keyway as the shaft-to-gear hugger key (31) is installed. See Figure 4-16.

14. Install shaft-to-gear hugger key (31) as follows:

Note: Key (31) is made in two parts: a) a square outer key with radiused end and drilled opposite end, and b) a tapered expander pin which is driven into the drilled end of the key to prevent key movement under vibrating load.

A. Check that the square outer key fits into the aligned shaft/gear keyway. Grind the key to fit, if necessary. Install the square outer key in the key slot.

B. Install a capscrew (with two nuts threaded on it) into the threaded end of the expander pin as shown in Figure 4-17.

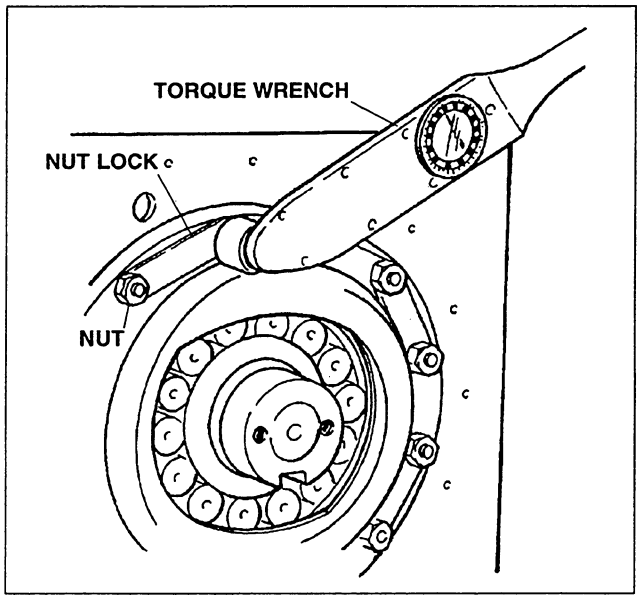


Figure 4-14. Torquing Nuts

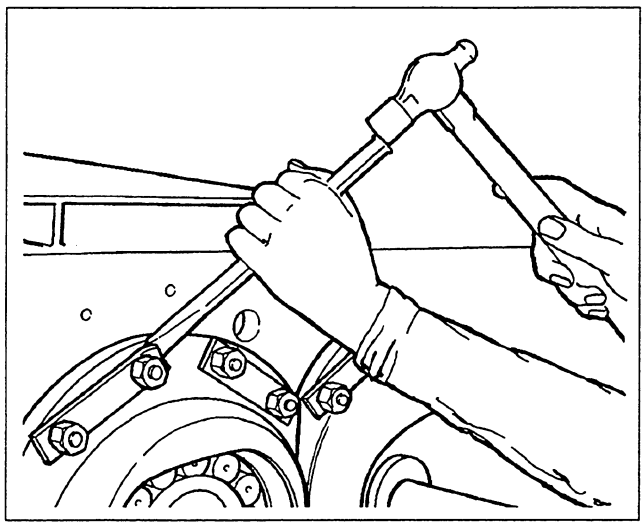


Figure 4-15. Bending Nut Lock Tabs

C. Place the expander pin in the drilled end of the square key, and drive the expander pin into the interior of the square outer key. Strike the capscrew until the key is fully bottomed in the key slot and the expander pin is fully inserted into the square key.

D. Remove the capscrew and nuts used to install the expander pin. Remove the metal plate.

15. Install two lockwashers (32) over capscrew (33) and turn capscrew (33) into the internal bore of the expander pin until the head of capscrew (33) is flush with, or just below, the outer surface of gear (30).

Note: When retaining washer (34) is installed, capscrew (33) must be tight against washer (34) to prevent key movement during machine operation.

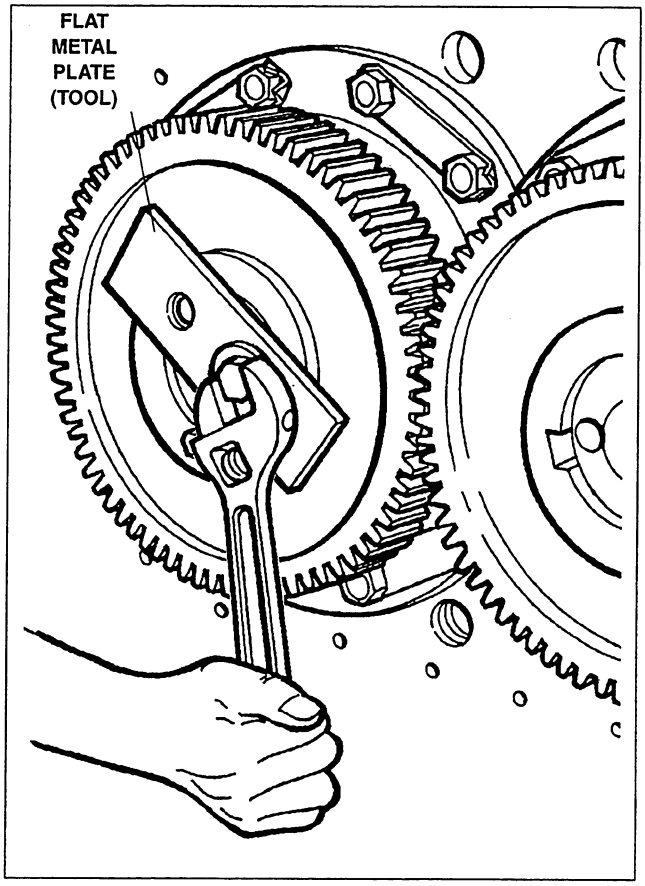


Figure 4-16. Installing Metal Plate

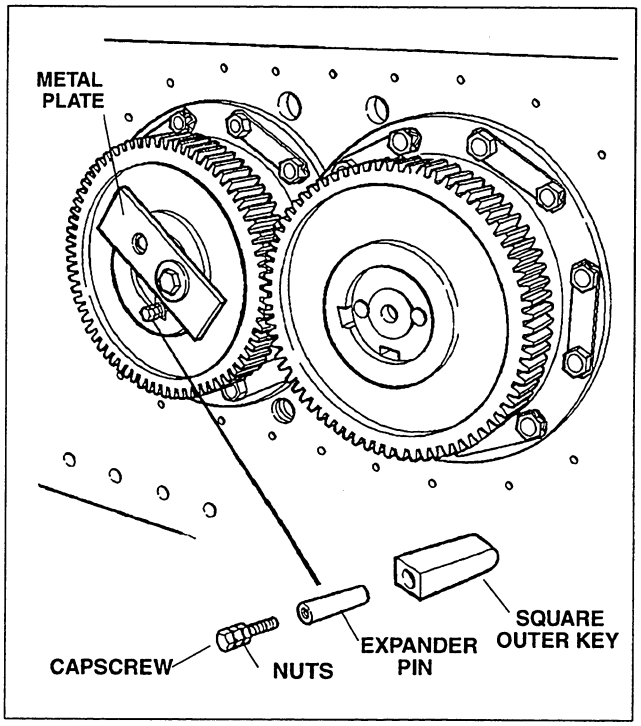


Figure 4-17. Installing Hugger Key

Refer to Appendix A for appropriate capscrew torque values (use Dry-Grade 5 Values).

16. Install key (31) to secure the second gear (30) to shaft (48) as follows:

A. Attack a sling around shaft (14) and attach a sling to the hoist. Upward movement of the hoist rope will turn the shaft. See Figure 4-18

B. Slowly move the hoist rope upward until the shaft turns sufficiently to line up the keyway of gear (30) and the keyway of shaft (48).

C. Check to be sure the gear center punched match marks are properly aligned as shown in Figure 4-12 (a single center punch on one gear between two marks on the second gear).

D. Install key (31) in shaft (48) in the same manner as described in steps 14 and 15.

17. Install retaining washers (34) on shafts (14 and 48) and secure with capscrews (35). Block shafts (14 and 48) so they can not turn. Tighten the capscrews in accordance with the torque chart in Appendix A

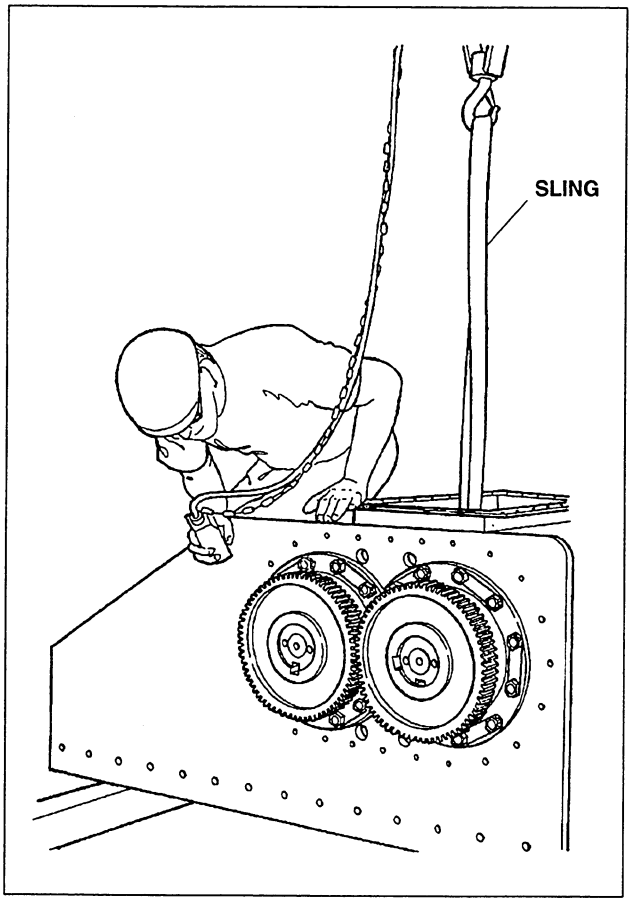


Figure 4-18. Turning the Shaft Using a Hoist and Sling

(use dry-grade 5 Values). Secure capscrews (35) with lockwire (36).

18. Place nut locks (2) on capscrews (1) and push the capscrews through oil wheel (4) and retaining cap (5). Tighten the capscrews in accordance with the torque chart in Appendix A (use dry-grade 5 values). Secure nut locks (2) with lockwire (3).

19. Install end cover (38) to the **gear end** of vibrator housing (20) as follows:

A. Install 3 evenly spaced dowels in the cover bolt holes of vibrator housing (20).

B. Place new gasket (37) and cover (38) on the dowels.

C. Inject silicone sealant (refer to Table 3-1, Item 1) into each cover bolt hole of vibrator housing (20).

D. Center cover (38) on the dowels, and install capscrews (46) and washers (47) around the circumference of the cover. Remove the dowels used to support the cover and inject silicone sealant (refer to Table 3-1, Item 1) into the holes and install capscrews (46) and washers (47).

E. If removed from cover (38), install elbow (41), pipe plug (42), reducer bushing (43), and drain cock (45) using epoxy adhesive (refer to Table 3-1, Item 5).

Note: Apply anti-seize compound (refer to Table 3-3, Item 3) to the threads of parts (40) and (44) before installing in Step F.

F. Install reducer bushing (40), breather (39), and magnetic pipe plug (44).

20. Assemble cover (50) to the **sheave end** of vibrator housing (20) as follows:

Important: The spring within the rubber portion of oil seal (51) is visible from one side only. (Gently push the rubber seal aside to see the spring.) The side from which the spring can be seen must face toward the interior of the cover. (See Figure 4-19.)

A. Grease the seal with a light coat of multipurpose grease (refer to Table 3-2).

B. Press the seal (51) into the cover bore until it is fully seated against the shoulder of the bore. Be very careful not to damage the seal.

C. Check that there is no clearance between the seal and the cover bore shoulder using feeler gauges (refer to Figure 4-20).

21. Install cover (50) on vibrator housing (20) as follows:

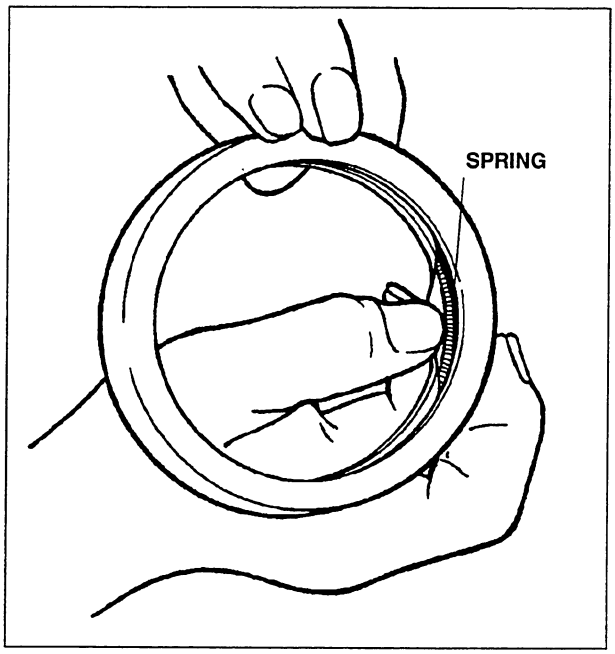


Figure 4-19. Oil Seal Spring

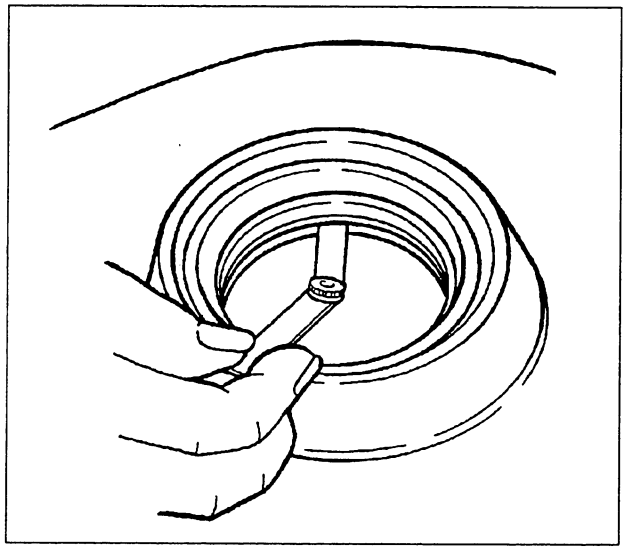


Figure 4-20. Checking for Contact Between Seal and Cover Bore

A. Slide spacer collar (49) on the protruding end of shaft (48).

B. Install 3 evenly spaced dowels in the cover bolt holes.

C. Place gasket (37) and cover (50) on the dowel pins.

D. Inject silicone sealant (refer to Table 3-1, Item 1) into open cover bolt holes of vibrator housing (20).

E. Center cover (50) on the dowels and loosely install capscrews (46) and washers (47) around the circumference of the cover.

F. Remove the dowels used to support the cover and inject silicone sealant (refer to Table 3-1, Item 1) into the remaining cover bolt holes. Loosely install remaining capscrews (46) and washers (47).

G. Tighten all capscrews (46) only enough to allow adjustment of cover in Step H. Do not final tighten at this time.

H. Place labyrinth seal collar (53) on the end of shaft (48), as shown in Figure 4-21. Adjust the cover, as required, to obtain equal clearance at four points spaced at 90 degrees apart between seal collar (53) and cover (50). This will ensure that oil seal (51) is centered between shaft (48) and cover (50).

NOTE: Failure to adjust the cover as described in Step 21H will result in rapid wear of seal (51).

I. Tighten all cover capscrews (46). Refer to Appendix A for torque values (use dry grade 5 values).

Note: If wear sleeve (52) requires replacement, remove it by heating, or by careful use of rounded, blunt chisel.

22. Remove seal collar (53) from the shaft and grease the labyrinth grooves with a light coating of multipurpose grease (refer to Table 3-2). Place the seal collar in the cover and secure it to shaft (48) with key (54). The labyrinth grooves of the seal collar should slide freely into the grooves in the end cover.

23. If removed from cover (50), install elbow (41), pipe plug (42), reducer bushing (43), and drain cock (45) using epoxy adhesive (refer to Table 3-1, Item 5).

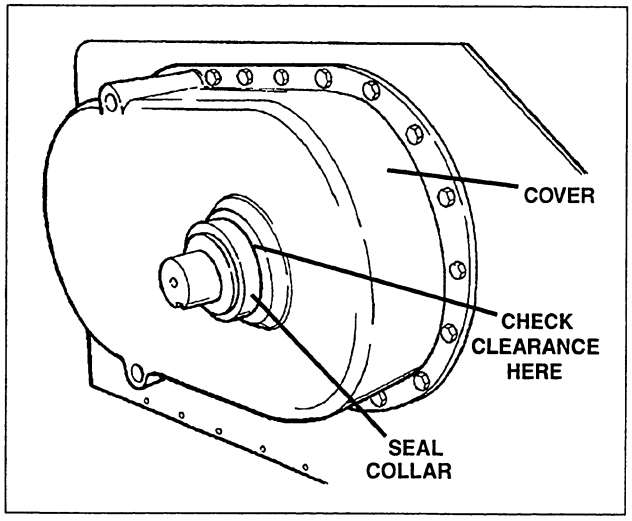


Figure 4-21. Using Seal Collar to Adjust Cover Position

Note: Apply anti-seize compound (refer to Table 3-3, Item 3) to the threads of parts (40) and (44) before installing in step 24.

24. Install reducer bushing (40), breather (39), and magnetic pipe plug (44).

25. Slide drive sheave (55) onto shaft (48). Install the sheave hub on the shaft, with the keyway in the hub aligned with the shaft keyway. Position the sheave so that the tapped holes in the sheave hub align with the tapped holes in the sheave hub, and install the three hub mounting capscrews finger tight. Install key (56). See Figure 4-22.

26. Tighten the capscrews. Refer to Appendix A for torque values (use Dry-Grade 5 Values).

27. Install retaining washer (57) and secure with capscrews (59) and washers (58). Tighten to the torque value listed in Appendix A (use Dry-Grade 5 Values).

28. Install the counterweights (15) using capscrews (16) and washers (17).

Note: See Chapter 6 for additional counterweight installation instructions.

29. Place new gasket (24) on the mounting flange of vibrator housing (20), and place cover (25) on the gasket. Install capscrews (28) from beneath the mounting flange and secure them with washers (27) and nuts (26). Tighten the nuts to the torque value listed in Appendix A.

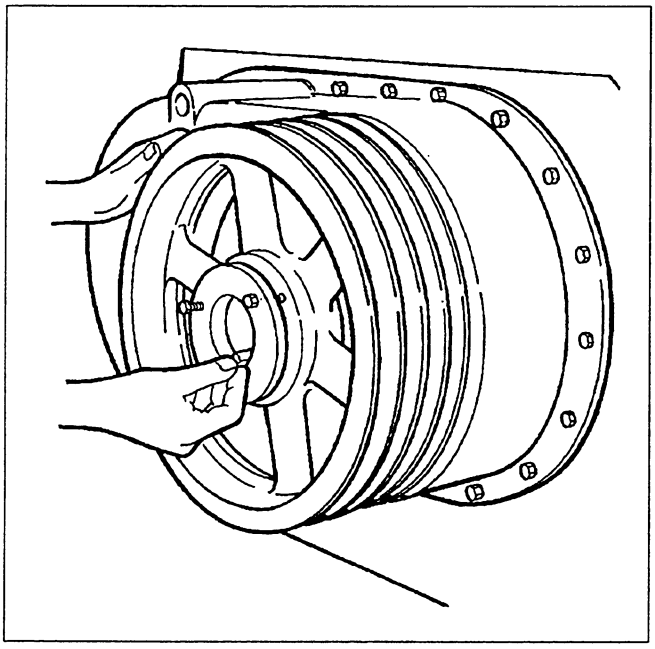


Figure 4-22. Installing Sheave Hub Key

30. If removed, reinstall pipe plugs (29).

31. Install the vibrating unit as described in the Operation and Maintenance manual for your feeder or screen.

Note: Step 32 applies to all models, except if equipped with optional circulating oil system. See Tables 3-3 and 3-4 for oil specifications and approximate oil capacities.

32. Open petcocks on both sides of the vibrating unit. Fill vibrating unit with oil until oil just flows from petcocks. Close petcocks.

Note: Apply pipe joint compound (refer to Table 3-1, Item 4) to threads of oil line fittings during Step 33.

33. Reconnect oil lines, if equipped with circulating oil system.

34. Run feeder or screen without material flow. Verify that speed and stroke are within acceptable limits. See Operation and Maintenance manual for speed and stroke specifications.

NOTES

Chapter 5

TIMING THE GEARS

⚠ WARNING!!!

Always lock out power and tag controls before performing any maintenance or repairs to the vibrating unit. Loosen and remove drive belts. Alert all personnel that the vibrating unit is being serviced. Never stand under, beside, or on top of any vibrating equipment while it is operating.

⚠ CAUTION !!!

Wait for the oil to cool before draining oil. Hot oil can cause burns.

Note: This procedure is necessary only if new timing gears are being installed.

1. Drain all oil from the vibrating unit.

2. Refer to Figure 5-1 and remove nuts, washers, and covers. Remove and discard gasket.

3. Remove timing gears as described in Chapter 4.

4. Refer to Figure 5-2 and determine the line in the chart that applies to your vibrating unit (Model 180HF, 220HF, or 280HF).

5. Lay the two gears on a workbench in the approximate position shown in Figure 5-2. Be sure that the keyways are at approximately 45 degrees, as shown.

Note: For gears assembled on the left hand side of the vibrator, the 45 degree angle must be to the right. For gears assembled on the right hand side of the vibrator, the 45-degree angle must be to the left.

6. Refer to Figure 5-2, column A, and determine the number of gear teeth to count for the left gear.

7. Starting at a line through the keyway, count teeth in a counter-clockwise direction. Place a punch mark on the correct tooth.

Important: Be sure the punch mark is on the side of the gear that will face out when the gears are assembled on the shaft so that the mark will be visible.

8. Refer to Column B in Figure 5-2 and determine the count for the right gear. Note that the count includes "1/2," which places the count in a valley between two teeth.

9. Starting at a line through the keyway, count teeth clockwise and center-punch the teeth on either side of the appropriate valley.

Note: If timing is being performed on a vibrating unit that has been removed from the machine, be sure the unit is in the same relative position as it is when mounted on the machine.

10. Block the shafts in the vibrator unit so that the keyways are approximately in the same position as the gears on the workbench - to the right for a left-hand assembly, or to the left for a right-hand assembly.

11. Slide the gears onto the shafts so that they mesh with the single center punch mark is between the two marks on the other gear. Refer to Figure 5-2.

12. Rotate the gears slightly until the key can be inserted between the shaft and left gear.

13. Rotate the left gear assembly slightly in either direction until the second key can be inserted between the right gear and its shaft.

14. . With keys installed, remove the blocks under the shafts and allow the shafts to swing freely. The shafts should come to rest at a 45-degree angle toward the feed end of the machine.

15. Refer to Chapter 4 to complete installation.

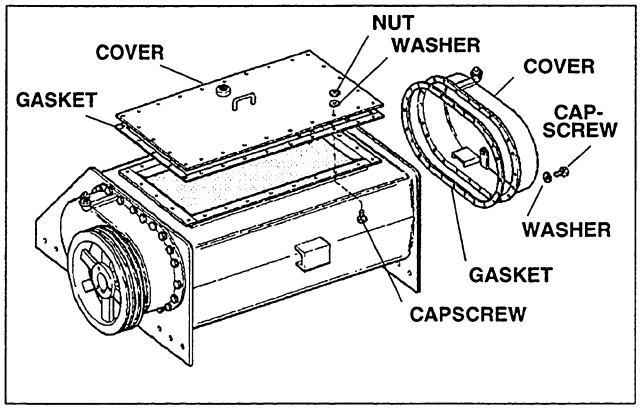
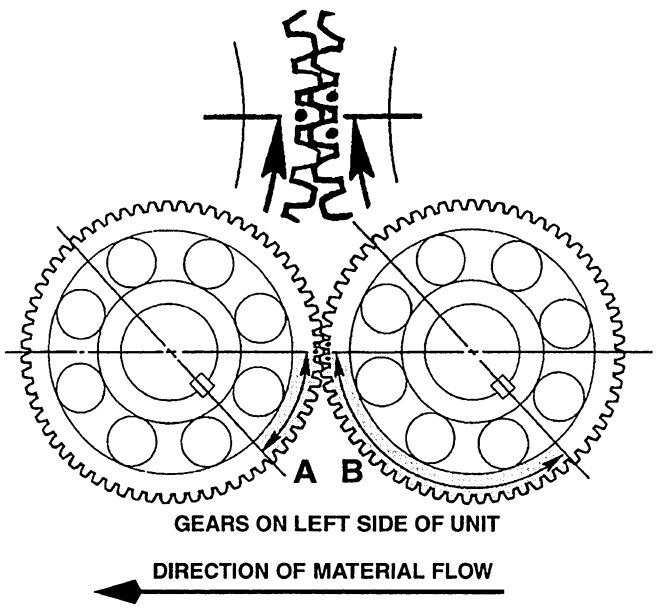
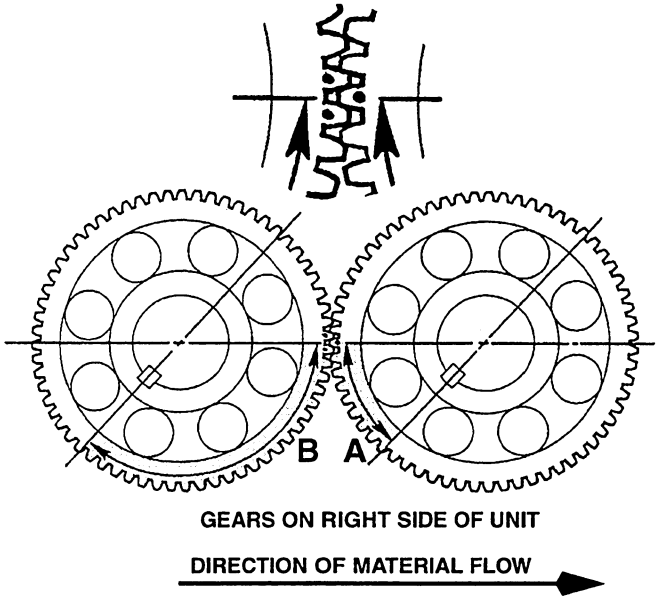


Figure 5-1. Accessing the Timing Gears

5





1. DETERMINE THE LINE IN THE CHART THAT APPLIES TO YOUR VIBRATING UNIT.

2. LAY THE TWO GEARS ON THE WORKBENCH AS SHOWN. BE SURE THE KEYWAYS ARE AT APPROXIMATELY 45 DEGREES, AS SHOWN.

3. REFER TO THE THE TABLE AND DETERMINE THE NUMBER OF TEETH TO COUNT FOR "A."

4. STARTING FROM A LINE THROUGH THE KEWAY, COUNT THE NUMBER OF TEETH TO REACH THE "A" TOOTH.

5. MAKE A SINGLE PUNCH MARK ON THE GEAR TOOTH.

6. REFER TO THE TABLE AND DETERMINE THE NUMBER OF TEETH TO COUNT FOR "B." NOTE THAT THE COUNT END IN "1/2." THIS WILL PLACE THE END OF THE COUNT IN A VALLEY BETWEEN TWO TEETH.

7. STARTING FROM A LINE THROUGH THE KEYWAY, COUNT THE NUMBER OF TEETH TO REACH THE "B" LOCATION.

8. MAKE TWO PUNCH MARKS, ONE ON EITHER SIDE OF THE DESIGNATED VALLEY, AS SHOWN.

UNIT SIZE	TOTAL NUMBER OF TEETH ON GEAR	TOOTH COUNT	
		A	B
180 HF	56	7	21-1/2
220 HF	72	9	27-1/2
280 HF	88	11	33-1/2

Figure 5-2. Determining Timing Punch Mark Locations

Chapter 6

INSTALLING AND REMOVING COUNTERWEIGHTS (STROKE ADJUSTMENT)

The stroke produced by the Type HF vibrating unit can be adjusted to suit different processing requirements. This is done by adding or removing counterweights, as required.

⚠ WARNING!!!

Always lock out power and tag controls before performing any maintenance or repairs to the vibrating unit. Loosen and remove drive belts. Alert all personnel that the vibrating unit is being serviced. Never stand under, beside, or on top of any vibrating equipment while it is operating.

⚠ CAUTION !!!

Wait for oil to cool before draining oil. Hot oil can cause burns.

1. Drain all oil from the vibrating unit.

2. Remove nuts, washers, and cover. Refer to Figure 6-1.

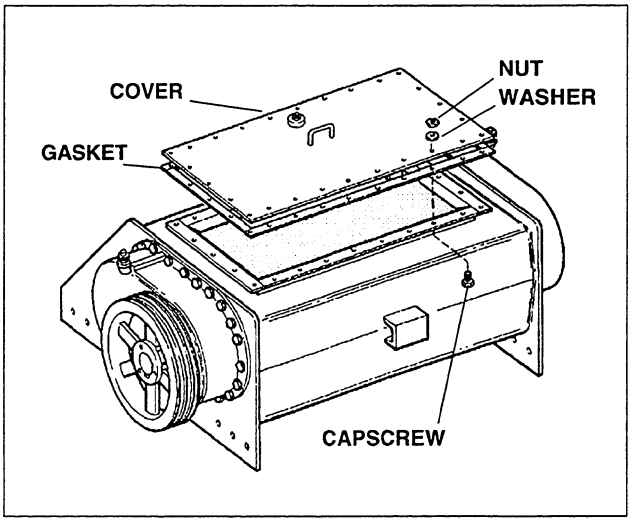


Figure 6-1. Removing Cover

⚠ CAUTION !!!

Always install or remove the same quantity of counterweights on both shafts. Be sure counterweights are located in the same position(s) on each shaft and that they are of the SAME SIZE AND THICKNESS. See the parts catalog for a description of the counterweights available for your vibrating unit.

⚠ CAUTION !!!

Rotate shafts as required to gain access to the counterweights. Before working inside housing, install wooden blocking or use a sling to hold the shafts in position (Refer to Figure 6-2). To prevent being hit by falling parts, have all personnel stay clear of area under vibrating unit.

3. To increase the stroke, install positive counterweights to the outer (offset) portion of both shafts. To decrease the stroke, remove positive counterweights from the outer (offset) portion of both shafts. Secure counterweights with capscrews and washers. Tighten the capscrews to torque value shown in Appendix A.

4. To further reduce the stroke, remove all positive counterweights and add negative counterweights (as required) to the indented side of both shafts. Secure with capscrews and washers. Tighten capscrews to torque value shown in Appendix A.

Important: Always remove all positive counterweights before installing negative counterweights. Never use negative and positive counterweights at the same time.

5. Secure cover with washers and nuts. Tighten nuts to the torque value shown in Appendix A.

Note: Step 6 applies to all models except if equipped with optional circulating oil system. See Tables 3-3

and 3-4 for oil specifications and approximate oil capacities.

6. Open petcocks on both sides of the vibrating unit. Fill the vibrating unit with oil until oil just flows from the pet-cocks. Close the petcocks.

NOTE: Apply pipe joint compound (refer to Table 3-1, Item 4) to threads of oil line fittings during step 7.

7. Reconnect oil lines if equipped with the circulating oil system.

8. Run feeder or screen without material flow. Verify that speed and stroke are within acceptable limits. See feeder or screen, Operation and Maintenance manual for speed and stroke specifications.

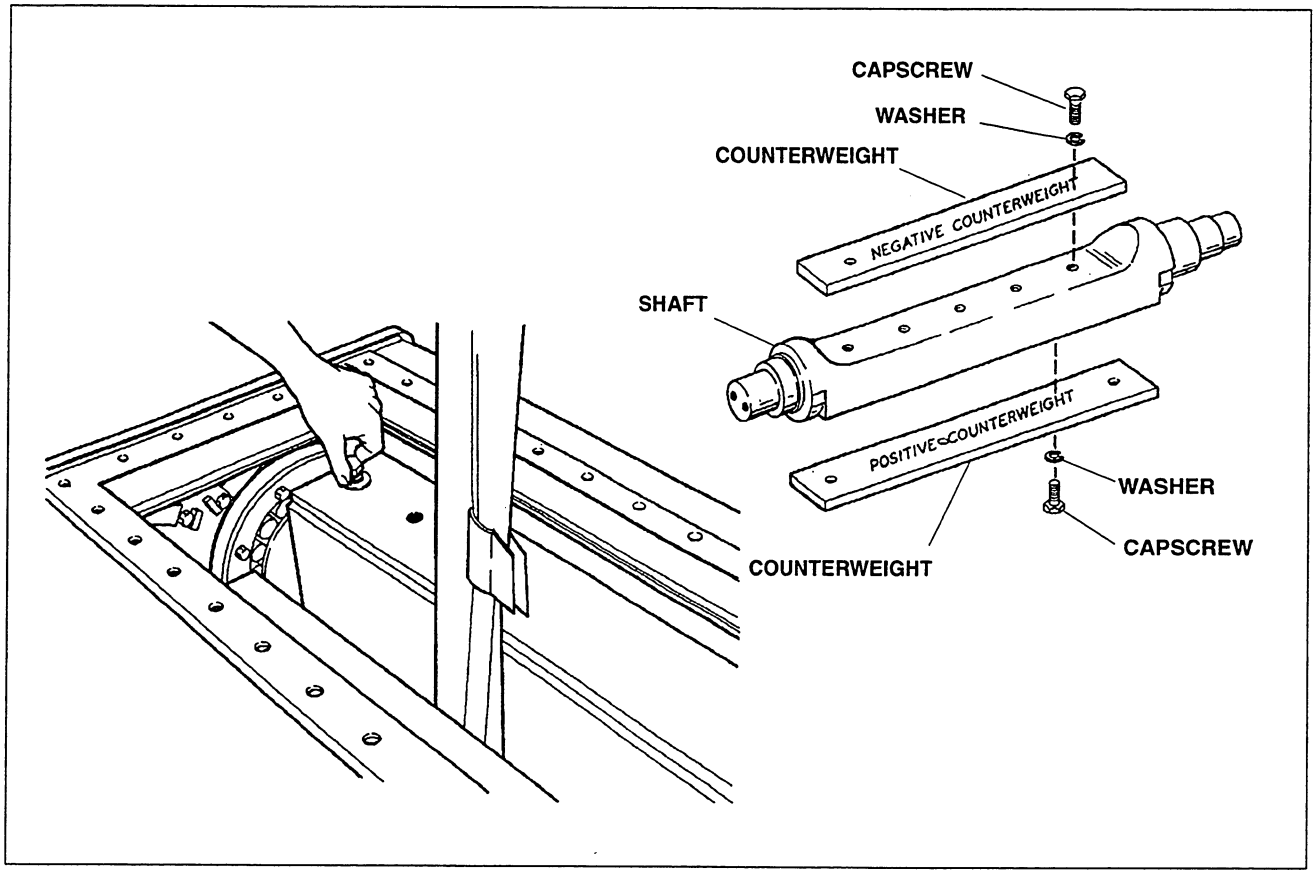


Figure 6-2. Installing and Removing Counterweights

APPENDICES

TORQUE CHART (APPENDIX A)

CONVERSION TABLES (APPENDIX B)

RECOMMENDED MAXIMUM TORQUE VALUES ±5%

Identification Mark												
Grade	2			5			7			8		
ASTM/SAE Spec.	SAE J429			ASTM A449			SAE J429			ASTM A354		
ISO Designation	R898 Class 4.6			R898 Class 8.8			——			R898 Class 10.9		
Dia – Thr'd. Series	Torque** Dry	Torque** Lube	Clamp* Load #	Torque** Dry	Torque** Lube	Clamp* Load #	Torque** Dry	Torque** Lube	Clamp* Load #	Torque** Dry	Torque** Lube	Clamp* Load #
1/4 – 20 UNC	5	4	1.31	8	6	2.02	10	8	2.49	12	9	2.86
1/4 – 28 UNF	6	5	1.50	10	7	2.31	12	9	2.85	14	11	3.26
5/16 – 18 UNF	11	8	2.16	17	13	3.33	21	16	4.11	24	18	4.70
5/16 – 24 UNF	13	10	2.39	19	15	3.69	24	18	4.56	27	21	5.21
3/8 – 16 UNC	20	15	3.19	31	24	4.93	38	29	6.08	44	34	6.95
3/8 – 24 UNF	23	17	3.61	35	27	5.58	43	33	6.90	49	38	7.88
7/16 – 14 UNC	32	25	4.37	49	38	6.76	61	47	8.35	70	54	9.55
7/16 – 20 UNF	36	27	4.89	55	42	7.55	68	52	9.33	78	60	10.68
1/2 – 13 UNC	49	38	5.83	75	58	9.03	93	72	11.15	105	82	12.75
1/2 – 20 UNF	55	42	6.59	85	65	10.20	105	80	12.58	120	90	14.38
9/16 – 12 UNC	70	54	7.07	110	84	11.58	135	105	14.30	155	120	16.35
9/16 – 18 UNF	78	60	7.90	120	93	12.93	150	115	15.95	170	132	18.25
5/8 – 11 UNC	92	71	8.79	150	115	14.40	185	145	17.75	210	165	20.30
5/8 – 18 UNF	105	81	9.95	170	130	16.30	210	160	20.10	240	185	23.00
3/4 – 10 UNC	165	125	13.20	270	205	21.31	330	250	26.30	375	290	30.00
3/4 – 16 UNF	180	140	14.52	295	230	23.75	365	280	29.30	420	320	33.50
7/8 – 9 UNC	200	155	13.82	395	305	27.00	530	405	36.30	605	455	41.50
7/8 – 14 UNF	225	170	15.25	435	335	29.80	585	450	40.00	670	515	45.80
1 – 8 UNC	300	230	18.15	590	455	35.40	795	610	47.70	905	695	54.50
1 – 12 UNF	340	260	20.35	660	510	39.70	890	685	53.50	1030	785	61.20
1 1/8 – 7 UNC	430	330	22.85	795	610	42.30	1125	865	60.00	1285	990	68.70
1 1/8 – 12 UNF	480	370	25.60	890	685	47.50	1260	970	67.30	1440	1110	77.00
1 1/4 – 7 UNC	605	465	29.00	1120	860	53.80	1590	1225	76.30	1820	1400	87.20
1 1/4 – 12 UNF	670	515	32.10	1240	955	59.59	1765	1355	84.40	2010	1550	96.50
1 3/8 – 6 UNC	795	610	34.60	1470	1130	64.20	2085	1600	91.00	2380	1830	104.00
1 3/8 – 12 UNF	905	670	39.40	1670	1290	73.00	2370	1830	103.50	2710	2085	118.30
1 1/2 – 6 UNC	1050	810	42.20	1950	1500	78.00	2765	2130	110.80	3160	2430	126.50
1 1/2 – 12 UNF	1186	915	47.30	2190	1690	87.70	3110	2400	124.50	3555	2730	142.20
1 3/4 – 5 UNC	1660	1280	56.80	3075	2370	105.50	4370	3360	149.50	4980	3810	171.00
2 – 4 1/2 UNC	2500	1920	75.00	4620	3550	138.50	6550	5050	196.70	7480	5760	225.00

* Clamp loads are shown in 1000 pounds ** All torque values are given in foot–pounds

APPENDIX B - CONVERSION TABLES

LINEAR MEASURE		
To Convert	**Into**	**Multiply By**
Inches	Centimeters	2.54
Feet	Meters	0.3048
Centimeters	Inches	0.3937
Millimeters	Inches	.0394
Meters	Inches	39.37
Meters	Feet	3.2808

SQUARE MEASURE		
To Convert	**Into**	**Multiply By**
Sq. Inches	Sq. Centimeters	6.452
Sq. Miles	Sq. Kilometers	2.59
Sq. Centimeters	Sq. Inches	0.15499
Sq. Meters	Sq. Inches	1549.9
Sq. Meters	Sq. Feet	10.763

CUBIC MEASURE		
To Convert	**INTO**	**Multiply By**
Cu. Inches	Cu. Centimeters	16.387
Cu. Feet	Cu. Meters	0.0283
Cu. Centimeters	Cu. Inches	0.06102
Cu. Meters	Cu. Inches	610233779.0
Cu. Meters	Cu. Feet	35.314

WEIGHT		
To Convert	**Into**	**Multiply By**
Kilograms	Pounds	2.2046
Pounds	Kilograms	0.4536
Pounds/Sq. Inch	Kilograms/Sq. Centimeter	0.0703
Pounds/Sq. Foot	Kilograms/Sq. Meter	4.8824

DEGREES FAHRENHEIT TO DEGREES CENTIGRADE

F	C	F	C	F	C	F	C	F	C
-30	-34.44	+20	-6.67	+55	+12.78	+90	+32.22	+225	+107.22
-28	-33.33	21	-6.11	56	13.33	91	32.78	230	110.00
-26	-32.22	22	-5.56	57	13.89	92	33.33	235	112.78
-24	-31.11	23	-5.00	58	14.44	93	33.89	240	115.56
-22	-30.00	24	-4.44	59	15.00	94	34.44	245	118.33
-20	-28.89	25	-.3.89	60	15.56	95	35.00	250	121.11
-18	-27.78	26	-3.33	61	16.11	96	35.56	255	123.89
-16	-26.67	27	-2.78	62	16.67	97	36.11	260	126.67
-14	-25.56	28	-2.22	63	17.22	98	36.67	265	129.44
-12	-24.44	29	-1.67	64	17.78	99	37.22	270	132.22
-10	-23.33	30	-1.11	65	18.33	100	37.78	275	135.00
-8	-22.22	31	-0.56	66	18.89	105	40.55	280	137.78
-6	-21.11	32	0.00	67	19.44	110	43.33	285	140.55
-4	-20.00	33	+0.56	68	20.00	115	46.11	290	143.33
-2	-18.89	34	1.11	69	20.56	120	48.89	295	146.11
0	-17.78	35	1.67	70	21.11	125	51.67	300	148.89
+1	-17.22	36	2.22	71	21.67	130	54.44	305	151.67
2	-16.67	37	2.78	72	22.22	135	57.22	310	154.44
3	-16.11	38	3.33	73	22.78	140	60.00	315	157.22
4	-15.56	39	3.89	74	23.33	145	62.78	320	160.00
5	-15.00	40	4.44	75	23.89	150	65.56	325	162.78
6	-14.44	41	5.00	76	24.44	155	68.33	330	165.56
7	-13.89	42	5.56	77	25.00	160	71.11	335	168.33
8	-13.33	43	6.11	78	25.56	165	73.89	340	171.11
9	-12.78	44	6.67	79	26.11	170	76.67	345	173.89
10	-12.22	45	7.22	80	26.67	175	79.44	350	176.67
11	-11.67	46	7.78	81	27.22	180	82.22	355	179.44
12	-11.11	47	8.33	82	27.78	185	85.00	360	182.22
13	-10.56	48	8.89	83	28.33	190	87.78	365	185.00
14	-10.00	49	9.44	84	28.89	195	90.55	370	187.78
15	-9.44	50	10.00	85	29.44	200	93.33	375	190.55
16	-8.89	51	10.56	86	30.00	205	96.11	380	193.33
17	-8.33	52	11.11	87	30.56	210	98.89	385	196.11
18	-7.78	53	11.67	88	31.11	215	101.67	390	198.89
19	-7.22	54	12.22	89	31.67	220	104.44	395	201.67