Technical Manual

FIRE PREVENTION

Always have a "charged" fire extinguisher on hand and know how to use it. Inspect and service the extinguisher as indicated on its instruction plate.

DO NOT smoke while handling flammables or when near batteries.

Inspect all lines, tubes, and hoses carefully. Tighten all connections to the recommended torque. See the Visual Inspection Schedule for the walk around inspection procedure.

Loose or damaged lines, tubes, and hoses, which leak, can cause a fire.

Make certain that all clamps, guards, and shields are replaced correctly so as to prevent vibration and the rubbing of one part against another which might result in heat build-up during operation.

DO NOT carry flammable fluids such as gasoline or solvents on board the machine.

DO NOT over-bend or strike pressurized hose lines. *DO NOT* install bent or damaged lines, tubes, or hoses. Replace them with new immediately.

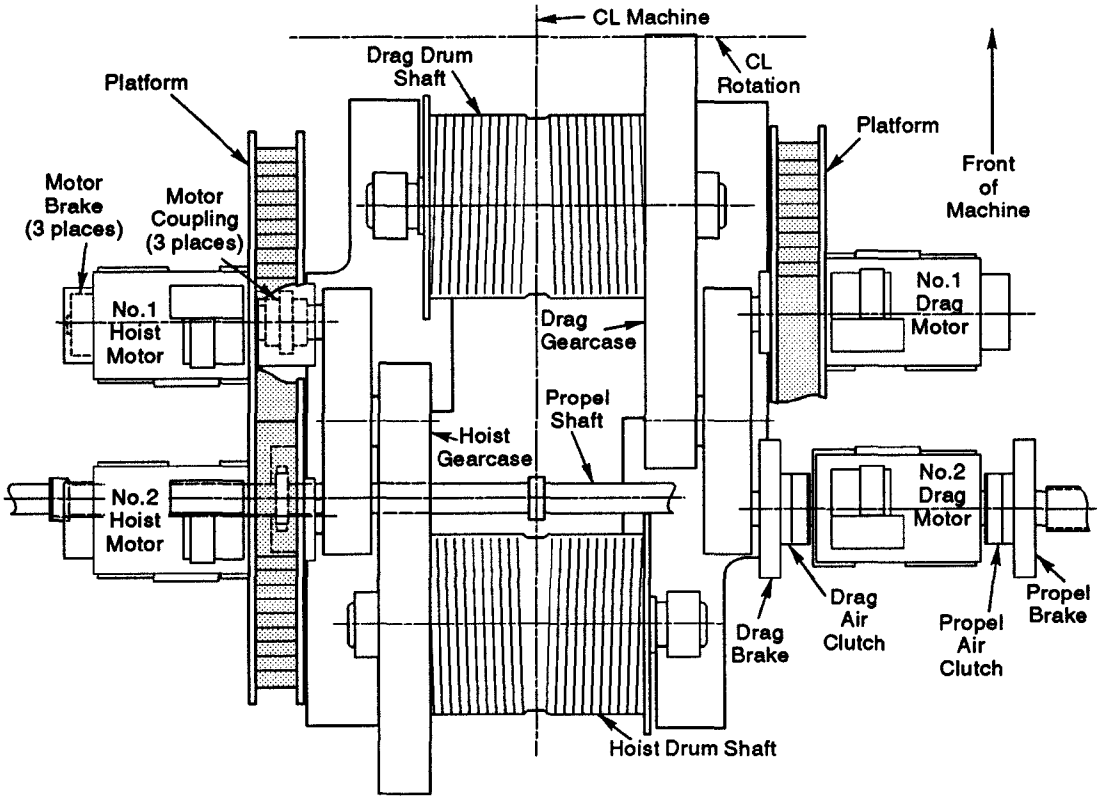
DO NOT start the machine or move any of the controls if a warning tag is attached to the controls or the start panel.

Keep all cleaning rags properly stored. *DO NOT* discard them into a pile on board.

Keep all structural frame compartments, walkways, and work areas clean and free of lubricant residue.

NEVER weld, burn, or perform service on the machine alone.

If a motor or other component is running hot, shutdown the machine until it has cooled and/or the cause eliminated.



7820 HOIST and DRAG MACHINERY

Section 2

Operation

2.1 GENERAL INFORMATION

This section is designed to assist the owner in the operation of this machine. It provides the operator with the location and explanation of the controls, instructions for machine operation, and certain maneuvering techniques.

Throughout this section, and the remainder of the manual, the use of the terms "*LEFT, RIGHT, FRONT,* and *REAR*" refer to machine locations as viewed by the operator sitting in the operator's seat in the cab.

OPERATOR'S CONTROLS

The operating controls for this walking dragline are all grouped around or are a part of the operator's station in the cab. The machine start-up controls are located inside the machinery house.

The operator's seat has adjustments for positioning it to the best location to suit individual operators. The operator should always adjust the seat to suit before taking over the controls. See the adjustment procedure following later in this section.

DANGER: DO NOT ATTEMPT TO OPERATE THIS MACHINE UNLESS YOU UNDERSTAND ALL THE MACHINE CONTROLS. NEVER LEAVE THE OPERATOR'S SEAT WITHOUT FIRST SETTING ALL MOTION BRAKES AND "DROPPING OUT" (DE-ENERGIZING) LINE EXCITATION (LE) BY PUSHING THE LE STOP PUSHBUTTON.

The machine's operating motions - *HOIST, DRAG, PROPEL* and *SWING* - are activated by the operator using the 2 levers positioned to the right and left of the operator's seat and also 2 foot pedals. These are the primary controllers. Moving any of these off their neutral position, when the drives are activated, will initiate motion.

The secondary controls are mounted in the console on each side of the operator. They are the necessary lights, switches and pushbuttons to support the primary controls. To the right of the operator is an annunciator stand which includes pushbuttons for the Hoist and Drag rope positions, the Propel Crank position, and to calibrate the Hoist and Drag ropes.

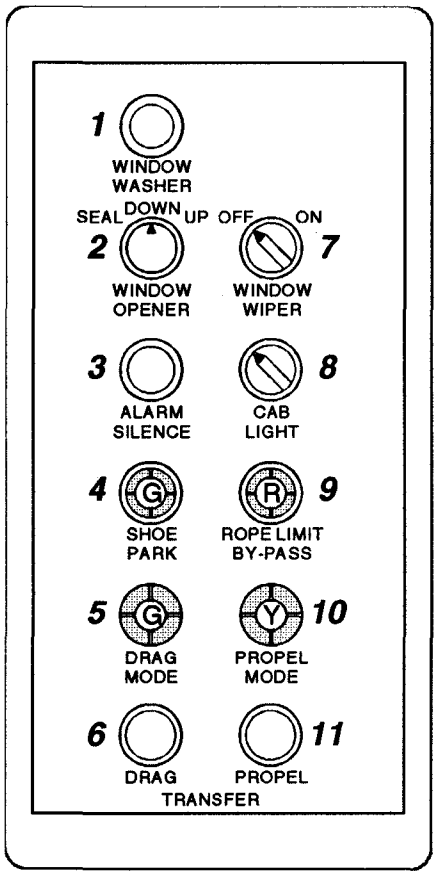
In the rear wall of the operator's cab is an annunciator panel with all the fault lights and temperature monitoring controls.

PLUGGING THE MOTION

"*PLUGGING*" machinery motion is the use of motor torque, applied in the opposite direction of motor rotation, to slow or stop the motion. This process is recommended only on the swing motion on this machine. Plugging is accomplished when the operator positions the controller to swing in the opposite direction from the present motion. As the machine slows to a stop, the amount of plugging effort is gradually reduced to provide a smooth stop. Continued plugging effort will reverse the direction of the motion. Plugging rapidly dissipates the energy of heavy moving parts by regenerating into the power source. When the hoist or drag controllers are returned to neutral with the machinery in motion, the motions automatically plug to slow the machinery. Only a small amount of plugging is required for the hoist and drag motions.

SECONDARY CONTROLS

The secondary controls are located on the control panels beside the operator's primary controllers. They consist of the necessary lights, switches, and pushbuttons to support the primary controls. A fault warning buzzer, a signal bell, and indicator lights notify the operator of potential machine problems or get his attention. The phone set for the operator is mounted on the left control console.



LEFT CONTROL PANEL

Two pairs of jacks are located on the right control console. They are wired into the Power Control Room and are used to monitor the circuits for boom lowering, etc.

The following items are on the *LEFT CONTROL PANEL*:

1. *WINDOW WASHER* - A pushbutton to operate the windshield washer.

2. *WINDOW OPENER* (SEAL/DOWN/UP) - A selector switch to unseal and open, or close and seal, the front cab window.

   To open the window, first manually unlock the 3 lower window locks. Rotate the switch to the *UP* position then press the button. To close the window, rotate the switch to *DOWN* and press the button. After the window has closed, manually lock the 3 lower window locks and move the switch to the *SEAL* position.

M.G. SET NO.1 CONTROLS:

21. *STOP* - A pushbutton to stop MG Set No.1.

22. *START* - A pushbutton to start MG Set No.1.

23. *STARTING* - A yellow light that when lit indicates that MG Set No.1 is starting.

24. *VCB CLOSED* - A red light that when lit indicates that MG Set No.1 VCB's have closed.

25. *FIELD APPLIED* - A green light that when lit indicates that MG Set No.1 is operating.

M.G. SET NO.2 CONTROLS:

26. *STOP* - A pushbutton to stop MG Set No.2.

27. *START* - A pushbutton to start MG Set No.2.

28. *STARTING* - A yellow light that when lit indicates that MG Set No.2 is starting.

29. *VCB CLOSED* - A red light that when lit indicates that MG Set No.2 VCB's have closed.

30. *FIELD APPLIED* - A green light that when lit indicates that MG Set No.2 is operating.

31. *OVER/UNDER FREQUENCY RELAY* - Trips when an over or under frequency is detected.

32. *WATTHOUR METER* - Records the total machine power used.

2.8 GROUND PREPARATION

Ground preparation is very important. The walking dragline requires a properly prepared ground base for operation. The tub and walking shoes must have full contact with the ground when the machine is digging or propelling. With the machine weight distributed over the entire tub bottom or the partial tub bottom and the two walking shoes area, moderate ground bearing pressure is obtained and the machine components are less stressed.

The ground supporting a walking dragline must be as near level as possible, firm, and dry. Sand, clay, and topsoil can be leveled easily with a dozer or grader. Sharp rocks and boulders cause point loading which will damage the tub and shoes structures and should be removed if possible. Where this is impractical, cover the working area with fill dirt to a sufficient depth that will eliminate the effects of the rocks.

This walking dragline can be propelled up or down a grade or ramp. Ramping the machine, moving it from one level to another, requires exercising great care because this situation subjects the tub and rotating frame to stresses much greater than experienced while digging. For a new machine, ramping should be restricted to no greater than a 5% grade (See Note). Later, this can be increased up to a 10% grade maximum. It is possible to traverse (cross) a 5% grade with this machine; however, *AVOID CROSSING ANY GRADE IF POSSIBLE.*

NOTE: When beginning to propel the machine, the transition from one grade to the next should gradual, no more than 2% over the length of the walking shoes (for this machine is approx. 55.75 feet). For example, starting from level ground, the machine should travel at least 3 shoe lengths before reaching a 5% grade.

The dragline design incorporates a calculated balance between boom length, boom angle, allowable bucket load, machine weight, and ballast used. During normal digging cycles, the center of gravity shifts from the front to the rear within a specific area called the "kern". The machine maintains stability and relatively even ground bearing pressure over the entire tub area. If, for any reason, the digging radius or load increases to cause the center of gravity to extend out of the kern to the tub perimeter, an undesirable rocking motion will occur due to the cone shape that will develop in the ground under the tub. This results in an unstable machine and concentrated ground bearing pressure at the center of the tub. This condition is very detrimental to the machine and must be eliminated. Contact Marion for consultation on this problem immediately.

Page

13. PROPEL-MANUAL - Pushbutton to manually cycle the Propel Bearing lube system.

14. MANUAL PROPEL - A yellow pushbutton that changes the 2 autolube systems from *DRAG* timing to *PROPEL* timing. When in the *PROPEL* mode press this button to test the propel system's operation. When in the *DRAG* mode, press this button and Propel/Manual button (13) to test the propel system's operation.

15. PROPEL-FAULT - Red light that indicates a cycle timing fault in the Propel Bearing lube system. A flashing light indicates an incorrect interval setting or faulty wiring.

16. PROPEL MODE - Amber light which indicates the machine is operating in *PROPEL.*

17. LINE 1 - An amber light that indicates that Line 1 is activated for the Propel Bearing lube system.

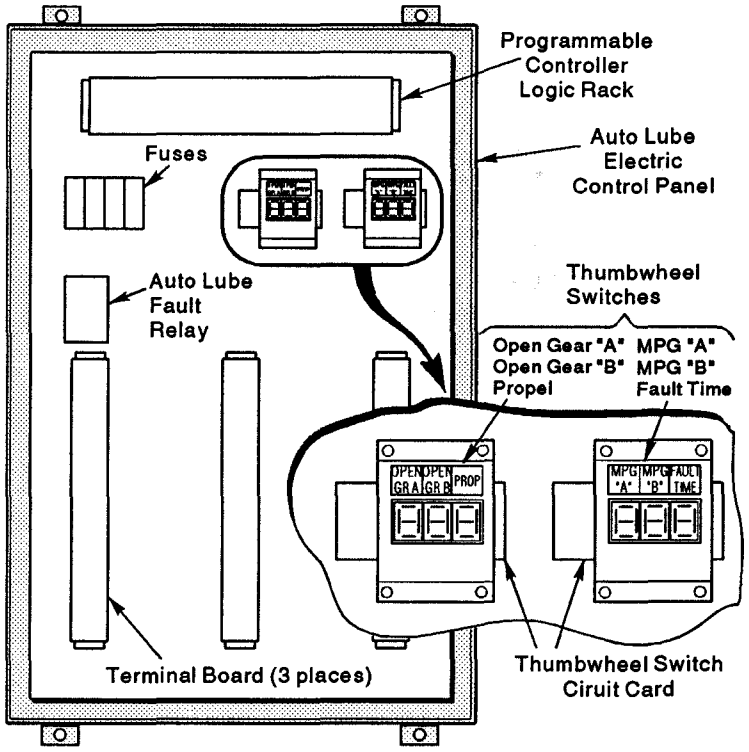
18. LINE 2 - An amber light that indicates that Line 2 is activated for the Propel. Press the Fault Reset button (3) and hold for 5 seconds to clear the 4-way directional valve if stuck at Line 1.

OPERATION

a. The lube interval timers are de-activated when LE is de-energized.

b. If the control panel power has not been removed, the interval timers will continue timing from the point when stopped - when LE is energized.

c. If the control panel is not activated when LE is energized, a fault will be annunciated with a flashing light and audible alarm in the operator's cab. The operator can silence the audible alarm but the annunciator light will remain on until the control cabinet power switch is turned on.



AUTOLUBE ELECTRIC CONTROL PANEL
(Interior Layout)

d. When the control cabinet power is turned on, the interval timers are reset to zero.

e. For time interval adjustment, refer to the Marion Programmable Systems manual No.2190.

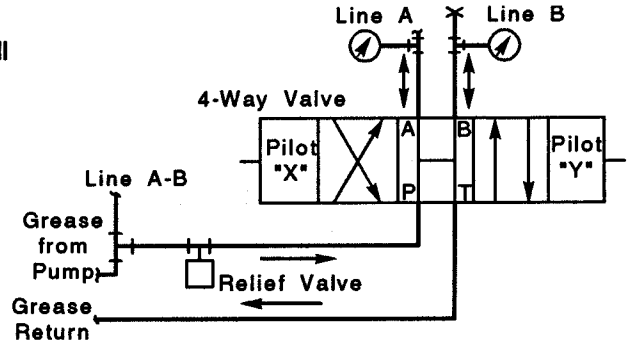
3.3 AUTO LUBE FOR ROTATING FRAME (MPG)

NOTES:

1. The 4-Way hydraulic valve operation will be fouled if the operator filter is left in place. Check and remove from new valves at installation.

2. LINE - A supplies MPG to the Boom, Gantry, Mast, Swing Bearings and Floating Sheaves.

3. LINE - AB supplies MPG to the Center Journal bushings.



SCHEMATIC - Autolube Panel GREASE

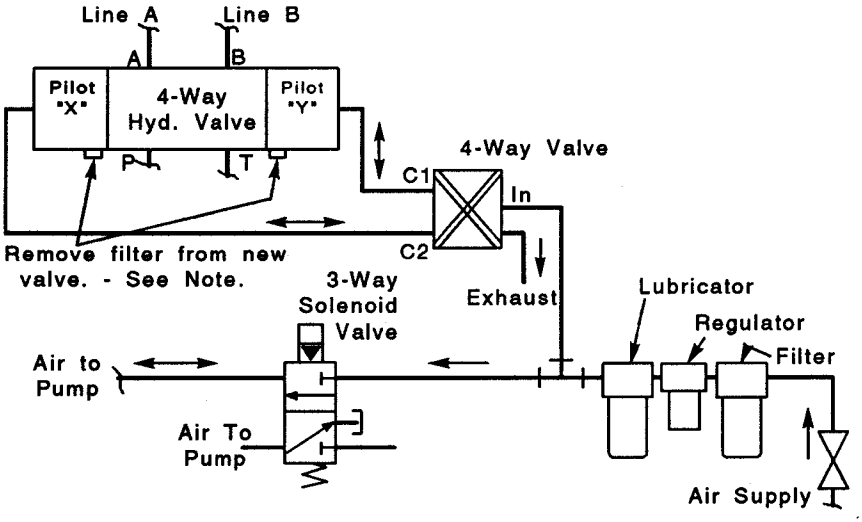
4. LINE - B is plugged. Air pressure to pilot X activates line A-B. Air pressure to pilot Y activates lines A & A-B.

4-Way Valve Functions:

1. When coil-1 (C1) and coil-2 (C2) are de-energized, air pressure is applied to pilot X and Y to center the valve spool. Lines A, B, A-B and the lube pump are vented to the lube reservoir.

2. When coil-1 (C1) is energized and coil-2 (C2) is de-energized, air pressure at pilot X shifts the valve to supply lube to line A.

3. When coil-2 (C2) is energized and coil-1 (C1) is de-energized, air pressure at pilot Y shifts the valve to supply lube to line B.



SCHEMATIC - Autolube Panel AIR

Starting with 50 PSI air pressure, adjust the air regulator to obtain 2500 PSI lube pressure at the boom point pressure switch. Additional adjustment will be required with a change in temperature and/or lubricant.

3.6 LINCOLN SL-1 TYPE LUBRICANT INJECTORS

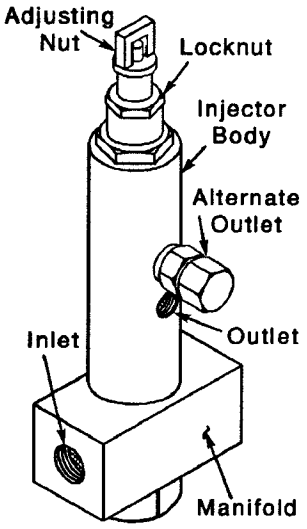
These pressure operative, spring reset, series installed injectors are supplied in banks mounted on manifolds. Each injector expels a measured amount of lubricant from its outlet port each cycle. Dual outlet ports on each injector permit them to be piped together for increased lube supply to a common point. The quantity of lube to each point has been carefully calculated by MARION engineers for proper coverage. Each injector output can be adjusted, but MARION recommends they be set and used at their maximum setting. To set an injector for *maximum output:*

1. Loosen locknut.
2. Turn adjusting nut until there is a small gap at the top of the stem.
3. Orient the adjusting nut so that the opening is toward the front of the injector.
4. Tighten the locknut.

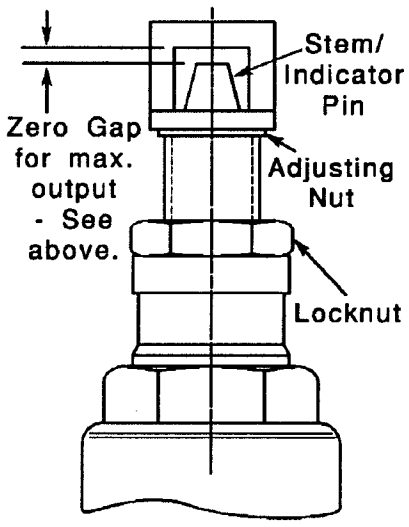
To reduce injector output:

1. Loosen locknut.
2. Turn adjusting nut clockwise (CW) until desired discharge rate is obtained. This will force stem into body, retarding its movement.
3. Set locknut.

CAUTION: **Do not turn adjusting nut down clockwise more than five (5) full turns from maximum discharge setting. Check output flow from injector then to insure it is still operating. If not, back off adjusting nut until injector does consistently operate. Inspect adjusted injector for operation for 3 or 4 cycles after returning machine to work to make sure it is functioning.**



LINCOLN INJECTOR



NOTE: Replace the injector if the indicator pin does not move when the lube system is cycled.

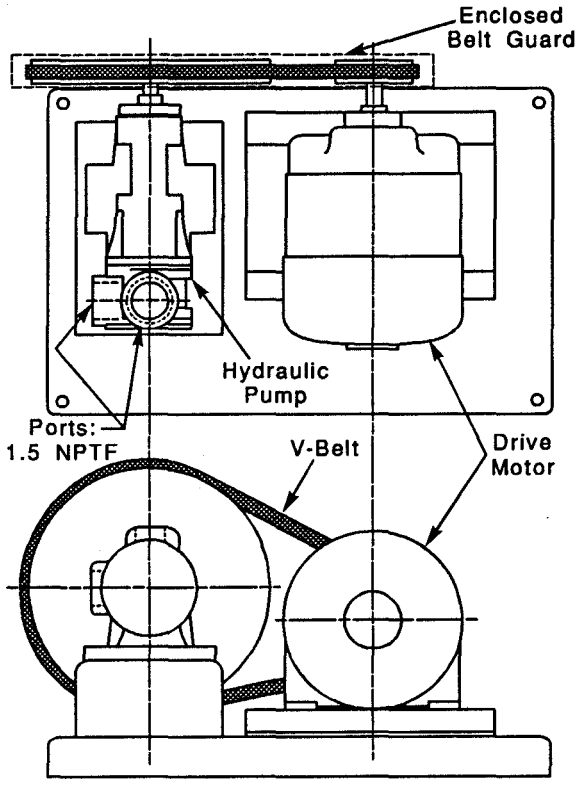
3.9 GEARCASE LUBRICATION SYSTEM

Lubrication of the *SWING* gearcases is accomplished by circulating filtered oil to the gear trains and upper swing case bearings. Each gearcase has a separate system which consists of a pump, flow indicator, sediment collector, 149 micron filter with dirt indicator and shut off valve.

Inspect the systems daily for proper operation. When cleaning the sediment collector or the filter element, shut off the pump and close the shutoff valve. Clean the sediment collector weekly.

CAUTION: After performing maintenance, be sure the shutoff valve is open before the pump is started.

Inspect the pump drive belt for wear or fraying. Replace as required.



LUBE OIL PUMP ASSEMBLY (Typical)

CAUTION: All gearcase lubrication systems must be in operation when the dragline is in operation.

3.10 LUBRICATION SPECIFICATIONS

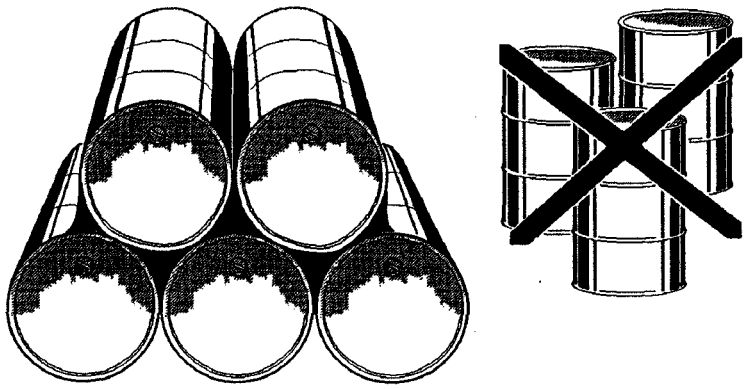
The selection of the proper lubricants for use on this machine is critical to its reliability. Improperly lubricated bearings, gears, couplings, and other precision parts quickly fail. For this reason, *LUBRICANTS SELECTED IN ACCORDANCE WITH THE "American Standards Testing Material" (ASTM) standards are recommended.* These standards were compiled in cooperation with major petroleum suppliers to insure the consumer of an exact supply to specific requirements, regardless of source.

We recommend you advise your petroleum supplier of the following information to assist him in selecting the proper product for each application of this machine.

- **USE ONLY CLEAN AND PROPER LUBRICANTS - KEEP IT CLEAN !**
- **DO NOT MIX TYPES OR BRANDS OF LUBRICANTS**

Final acceptance of all lubricants supplied to this standard will be based upon their satisfactory performance in the intended application, and does not relieve the supplier of performance responsibility for brand name products.

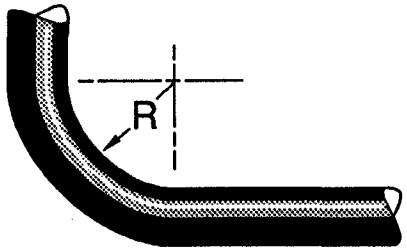
Operation of this machine in extreme temperatures (below -20°F/-29°C or above 110°F/44°C) requires special lubrication. Note the temperature ranges on the following lubricant specification sheets. Contact your local supplier, your Marion representative, or the Service Department in Marion for recommendations if you require additional information or advice.



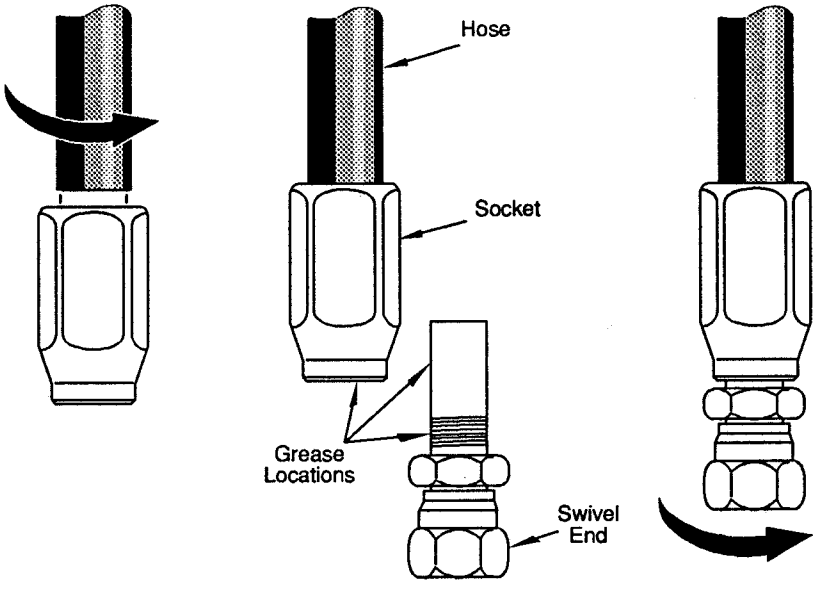
Please store lubrication drums on their side,
with the opening toward the top.
FILTER ALL OIL BEFORE ADDING IT TO THE SYSTEM.

MINIMUM HOSE BEND RADIUS

Marion Hose No.	Minimum Bend Radius (R)	
	Inch	mm
R 5-5	3.38	86
R 2-8	7	178
R 2-12	9.5	241
R 2-16	11	279



ASSEMBLY OF HOSE FITTINGS



Step 1: - Cut the end of the hose square with a fine tooth saw or cut-off wheel.

- *DO NOT* cut back outer cover of hose.

- Secure the socket. Screw the hose counterclockwise onto the socket until the hose bottoms. Back off 1/4 turn.

Step 2: - Liberally grease the nipple threads and the inside of the hose.

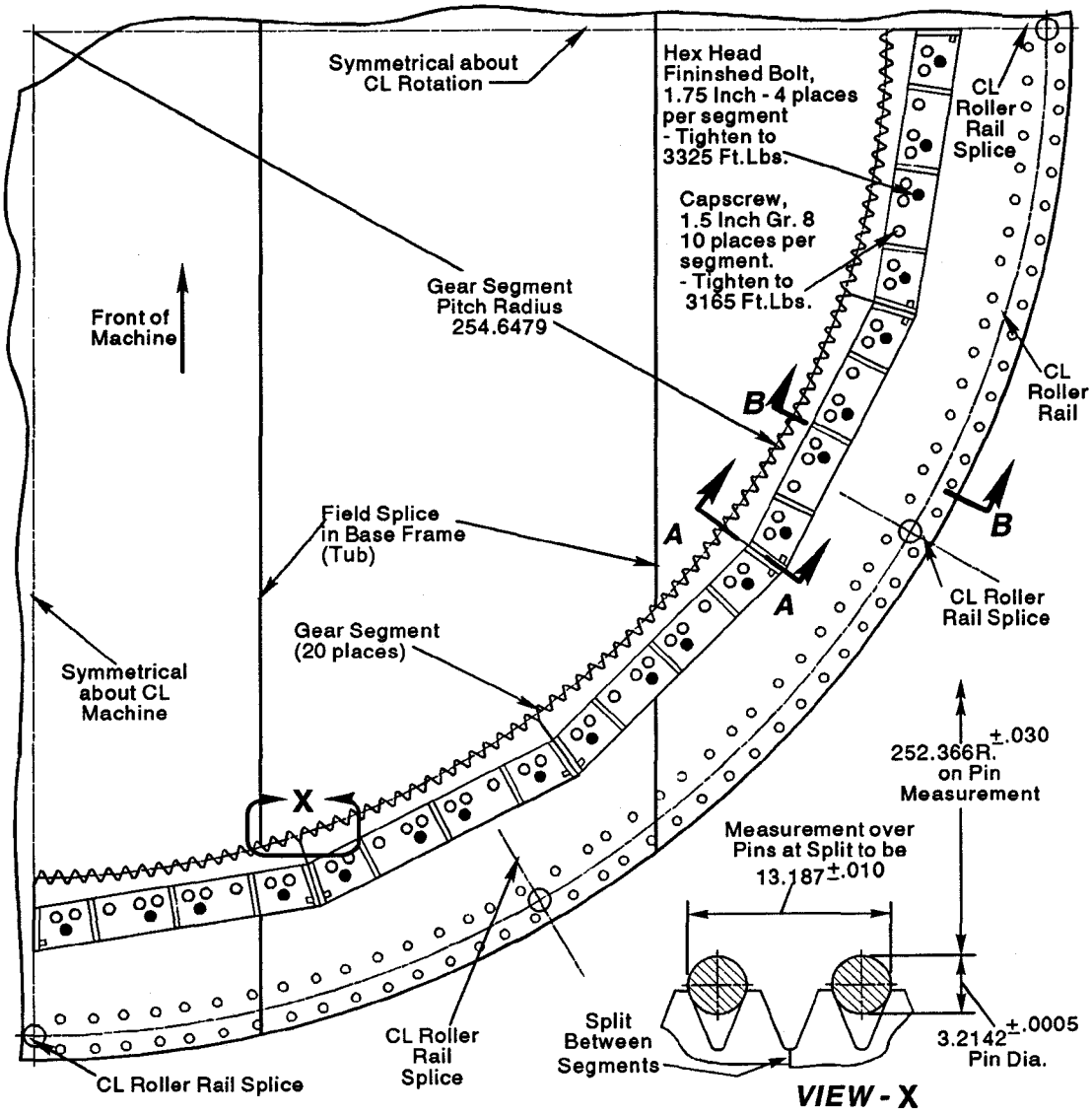
Step 3: - Screw the nipple clockwise into the socket and the hose. Tighten until snug against the socket.

NAME OF PART	TYPE	NO. OF POINTS	LOCATION	LUBE SYM.	METHOD & FREQUENCY
Auxiliary Rope Winch	(Refer to Manufacturer's Manual)				
Front Window Opening Mechanism	Pins	12	Hinge Points	HL	Manual lube, 500 Hours
Operator's Seat	Jack Screw	1	Under Seat	HL	Manual lube, 500 Hours
Swing Levers	Bushing	2	Under Cab Floor	MPG	Manual lube, 500 Hours
Swing Lever Links	Spherical Bushing	4	Under Cab Floor	HL	Manual lube, 500 Hours
Swing Lever Crank Shaft	Anti-Friction	2	Under Cab Floor	MPG	Manual lube, 500 Hours

AUTO LUBE RESERVOIRS

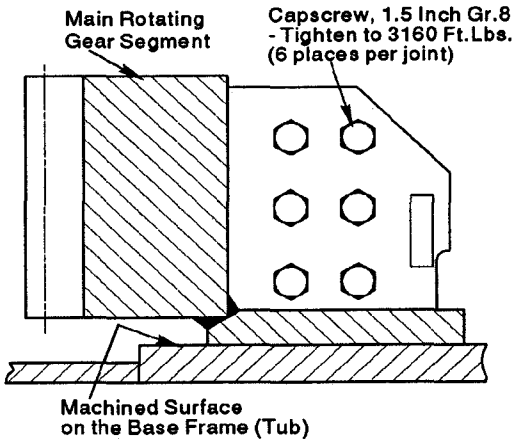
Rotating Frame	---	---	---	MPG	55 Gal. (Drum)
Open Gears	---	---	---	OGL	55 Gal. (Drum)
Propel Bearing	---	---	---	OGL	55 Gal. (Drum)
Wire Rope	---	---	---	WRL	55 Gal. (Drum)

4.3 ROTATING GEAR AND RAIL SEGMENTS



7820 ROTATING GEAR SEGMENTS

The Main Rotating Gear consists of 20 segments bolted to a finished pad on the base frame (tub). Inspect the teeth for lube, wear and damage. To replace a gear segment or the entire rotating gear it will be necessary to raise the rotating frame. *Contact Marion for assistance.*

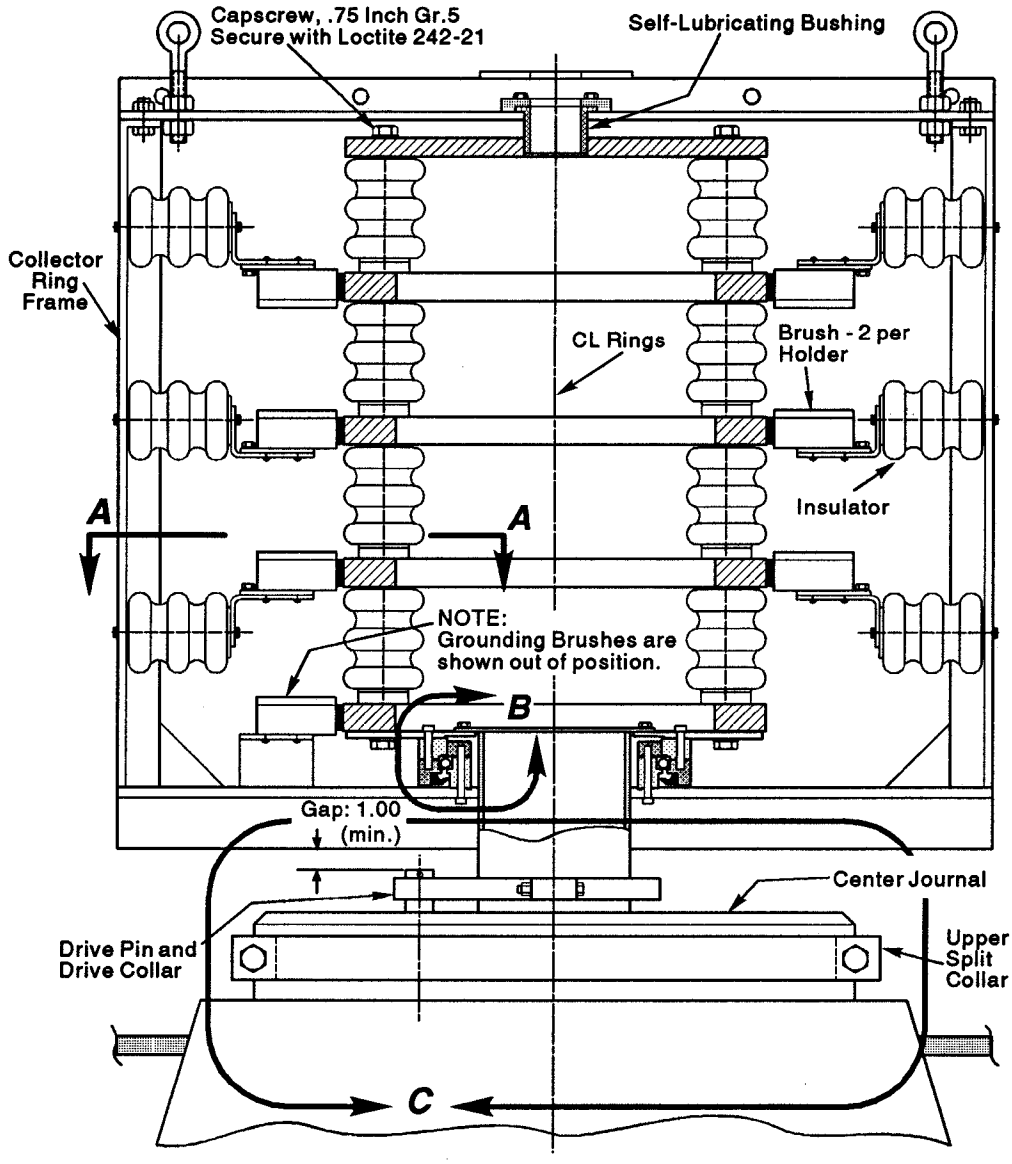


SECTION A-A

4.4 MAIN COLLECTOR RINGS

The main collector rings transmit incoming power from the tub to the rotating frame.

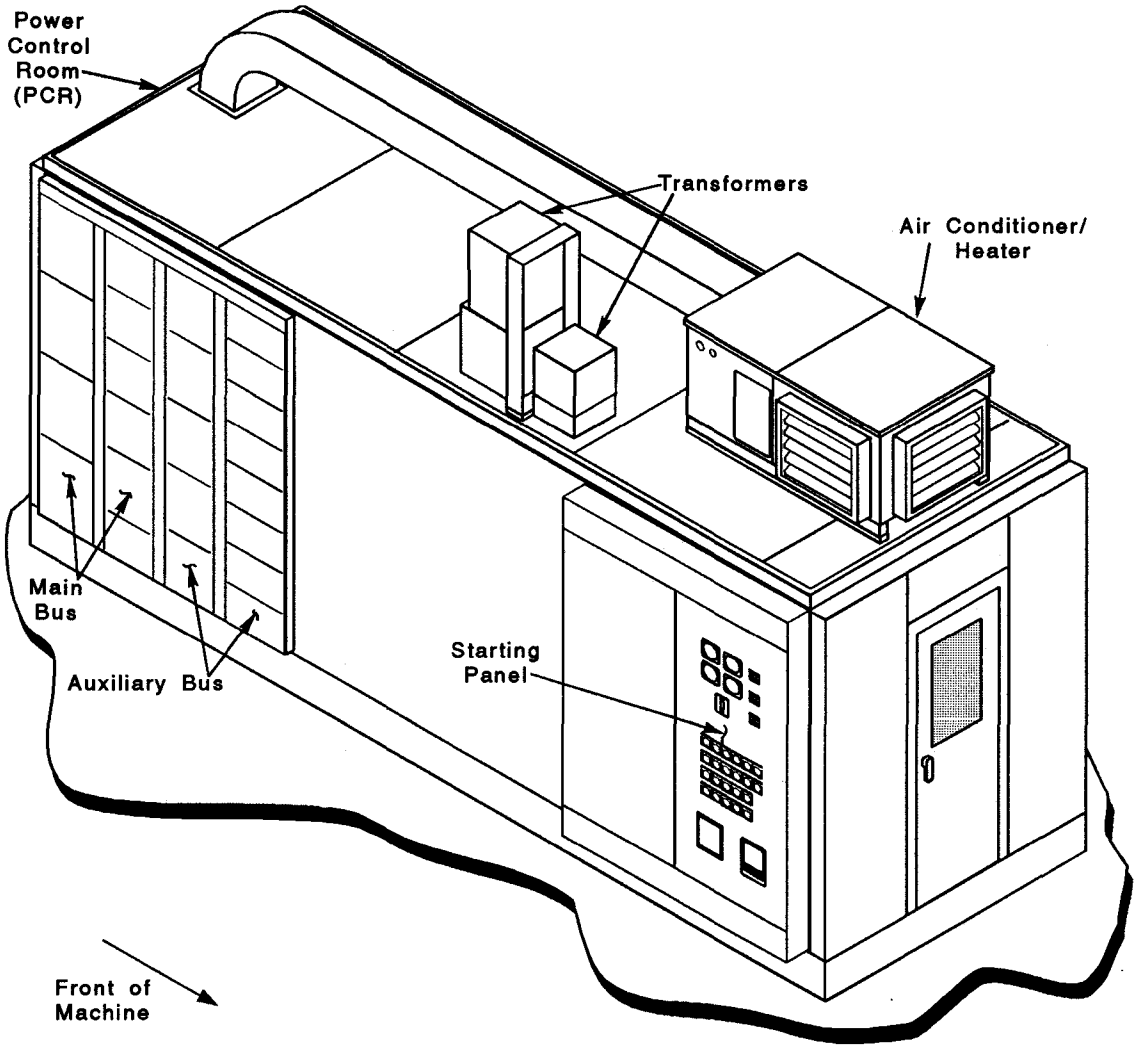
DANGER: ALWAYS DISCONNECT THE INCOMING POWER AT THE SOURCE WHEN SERVICING.



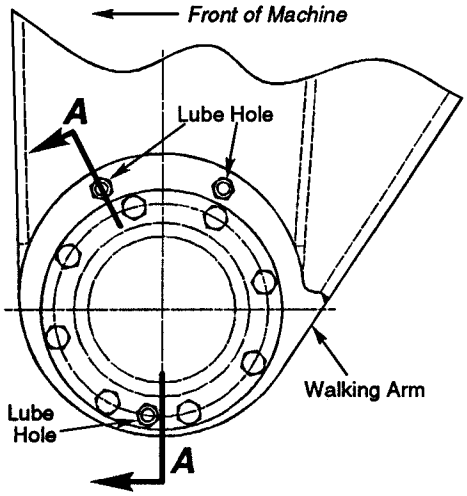
MAIN COLLECTOR RING ASSEMBLY

POWER CONTROL ROOM

The Power Control Room (PCR) encloses the electrical control components away from dirt, grease and dust. The segregation of control components into a room type module centralizes the responsibility of the electrician, thus improving control maintenance. The Power Control Room is supplied with a constant source of clean, filtered air which is under pressure to afford the ideal environment for the efficient operation of the electrical components. It is completely factory wired. Only the input and output connections must be made during field erection.



7820 POWER CONTROL ROOM

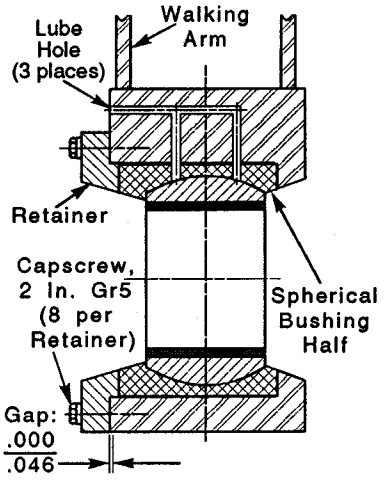


The propel linkage on each side of the machine connects the main propel shaft to the walking shoe. Check the walking arm and stabilizer link weekly for damage. Make repairs as soon as possible. Inspect the lube piping and lube coverage daily.

When performing maintenance of the propel linkage set the walking shoes on the ground, release the propel brake to remove any binding and reset.

NOTE:

The right and left walking arm spherical bushings and retainers are not interchangeable. Be sure all parts are match marked before disassembly. At assembly, align the lube holes. The split line between the bushing halves must be perpendicular to a line through the crank and lower pin bores. Check for proper lube flow before installing the shoe.



Section A-A

PROPEL DRIVE

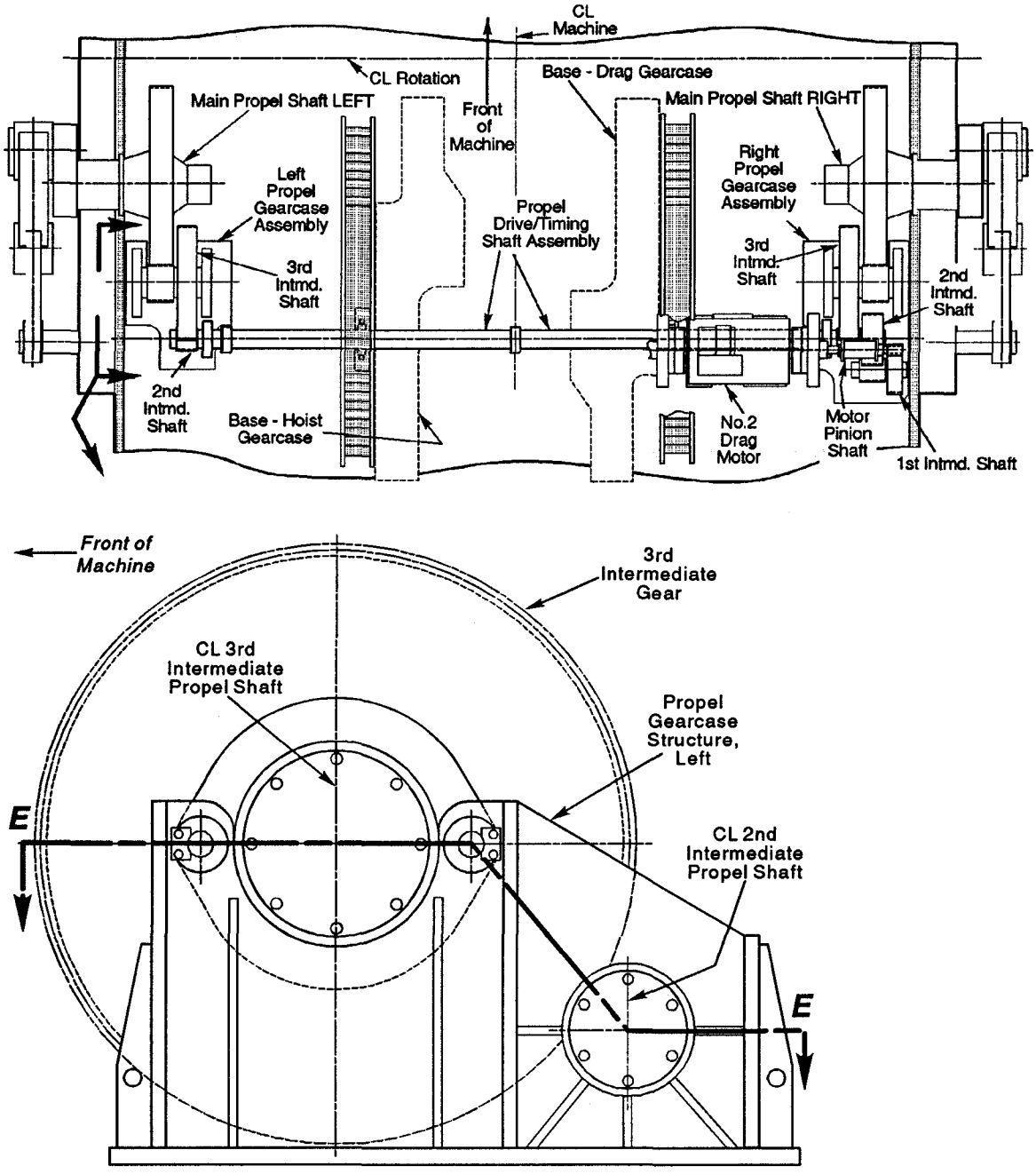
The propel drive is mounted on machined pads which are located on the rotating frame deck. When in *PROPEL* mode, the no. 2 drag motor is disengaged from the drag machinery and is engaged to the propel drive through an air operated clutch. With the exception of the main propel shafts (crankshaft), the propel shafts turn on anti-friction bearings. All gearing is lubricated with OGL.

The Propel Drive consists of:

- 1 Propel Motor.
- 1 Right hand, 4-Reduction Drive.
- 1 Left hand, 2-Reduction drive.
- 1 Drive / Timing shaft.
- 2 Main Propel (Crank) shafts.

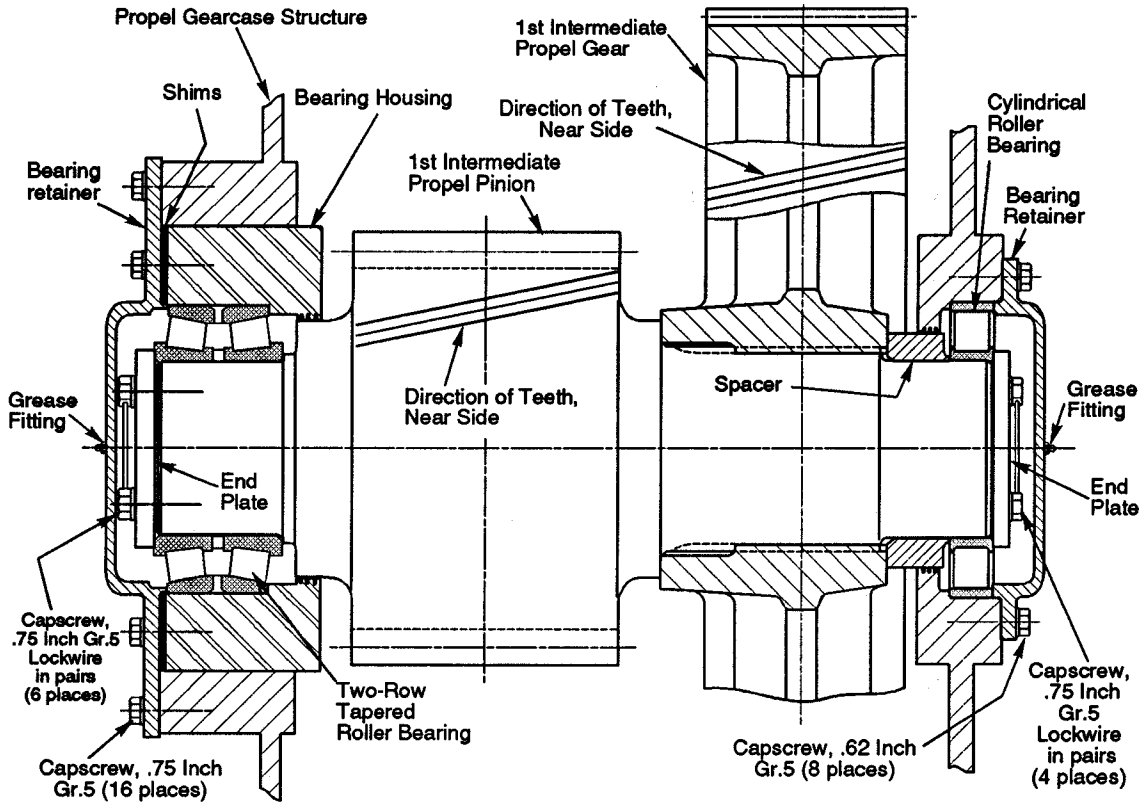
PROPEL GEARCASE - LEFT HAND

The left hand propel gearcase supports the 2nd and 3rd intermediate propel shafts. Both shafts are mounted on anti-friction bearings. The bearings are lubricated manually with MPG. The gears are enclosed in guards and lubricated with OGL from the automatic lube system. Alignment with the main propel shaft and propel drive/timing shaft is maintained with 4 - 2 inch body-fit bolts and also shims between the gearcase and mounting pads. 38 - 1.5 inch gr.8 bolts secure the gearcase to the deck. Check all bolts monthly. Tighten or replace as required.



PROPEL GEARCASE ASSEMBLY - LEFT HAND

1ST INTERMEDIATE PROPEL SHAFT



Section C-C
1ST INTERMEDIATE PROPEL SHAFT

To remove this shaft:

1. Park the machine in a level, dry area. Place the walking shoes on the ground and release the propel brake.

2. - Disconnect and plug all lube lines.
   - Remove the gear guards.
   - Remove the cover plate on the house side panel.

3. Remove the bearing retainers at the gear end of the shaft.

4. Support the gear with a hoist and pry between the pinion and the gear hub to remove the bearing.

5. Remove the outer row of capscrews (8 places) from the left hand retainer. Push or pull the shaft (approx. 2000 Lbs.) out of the gearcase and set it on cribbing.

PROPEL DRIVING/TIMING SHAFT ASSEMBLY

The Propel Driving/Timing Shaft assembly is situated on the machinery deck, just behind the CL Rotation. It runs from side to side, through the Hoist and Drag gearcases, and connects the Right and Left Propel Gearcase assemblies.

The shaft assembly is composed of 4 separate extension shafts, in line, connected to each other. Each end is connected, through a coupling and spacing collar, to the Right or Left Propel Gearcase.

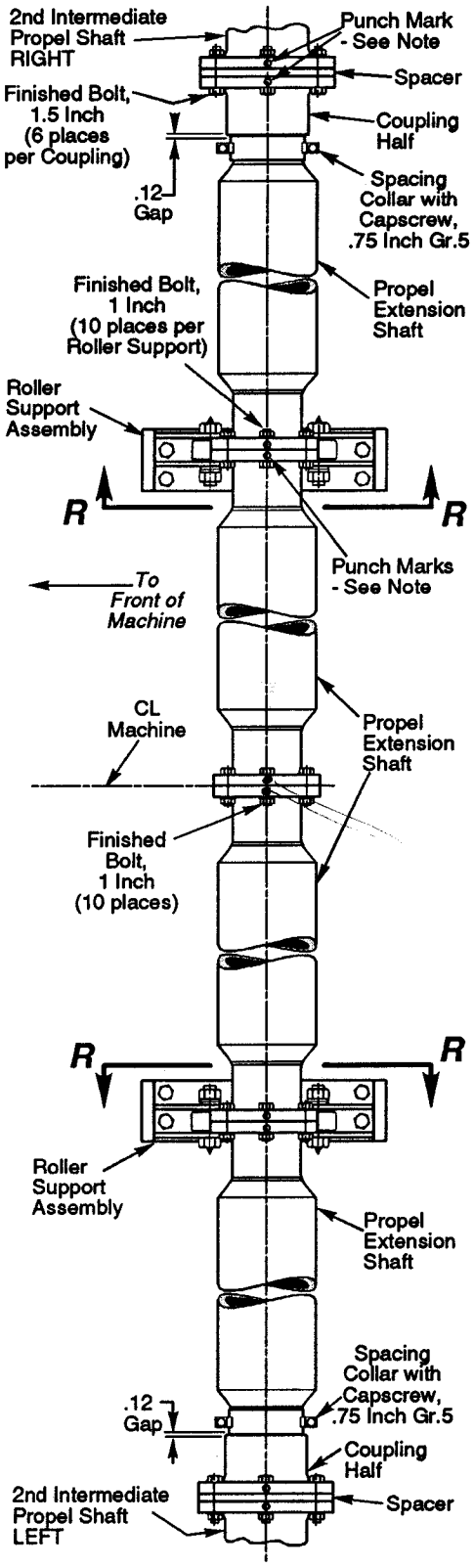
The center of the Propel Driving/Timing shaft is supported with 2 Support Roller Assemblies.

Removing any one of the extension shafts involves removing the 8 - 1 inch bolts at each end of the center shaft(s) and/or the 6 - 1.5 inch bolts at the gearcase end of the end shaft, and lifting the shaft out.

When installing any shaft, insure that the punch marks on the outside diameter of the shaft mounting flanges ALL line up.

To adjust the support rollers, remove the shear blocks, raise the shaft until all the flanges are in line vertically and horizontally. Position the roller assemblies against, and square to, the shaft flanges. Clamp the bracket to the deck, redrill the holes if required and install the 4 - 1 inch bolts in each bracket. Push the shear blocks tight against the bracket and weld per the procedure in the Section 7 - ENGINEERING DATA, in this manual.

NOTE: Lube the rollers weekly.



PINION SHAFT REMOVAL

1. Park the machine in a level area, set the bucket and rigging on the ground, set all brakes and *BLOCK THE DRUM TO PREVENT ROTATION.*

2. Have an electrician disconnect the motor wiring. Disconnect the brake and plug the air lines.

CAUTION: BEFORE DISCONNECTING ANY AIR LINES, REMOVE THE AIR PRESSURE. Failure to comply could result in personal injury.

3. Disconnect the coupling and either move the motor or remove the motor armature.

NOTE: If the motor is to be moved, drill and ream the motor pads for .5 inch tapered dowels before loosening the mounting bolts. Use 2 dowels in diagonally opposite pads.

4. If the eccentrics are stuck in their bores, or if the No.2 drag motor pinion is to be removed, follow the procedure for removing the intermediate shaft assembly. The intermediate shaft must be raised 2 inches to disengage the gear teeth.

5. Support the pinion through the view port and at the coupling half. Pull the eccentrics with retainers out of their bores and remove the pinion.

6. Clean and inspect all parts. Replace bearing and seals plus any damaged part.

7. Assembly is the reverse of removal.

NOTES:

A. Heat the sleeve to 245°F. above the ambient temperature. Install and hold in place until the sleeve cools.

B. Match the eccentric scribe lines with the lines on the gearcase and check the tooth contact pattern. Refer to Section 7 if adjustment is required. *Remove the dowel pin in each eccentric before attempting adjustment.*

C. Check that the sleeve run-out is within .005 total indicator reading.

D. Spray the sleeve with molylube 1200 in the seal area and install the retainer and seal.

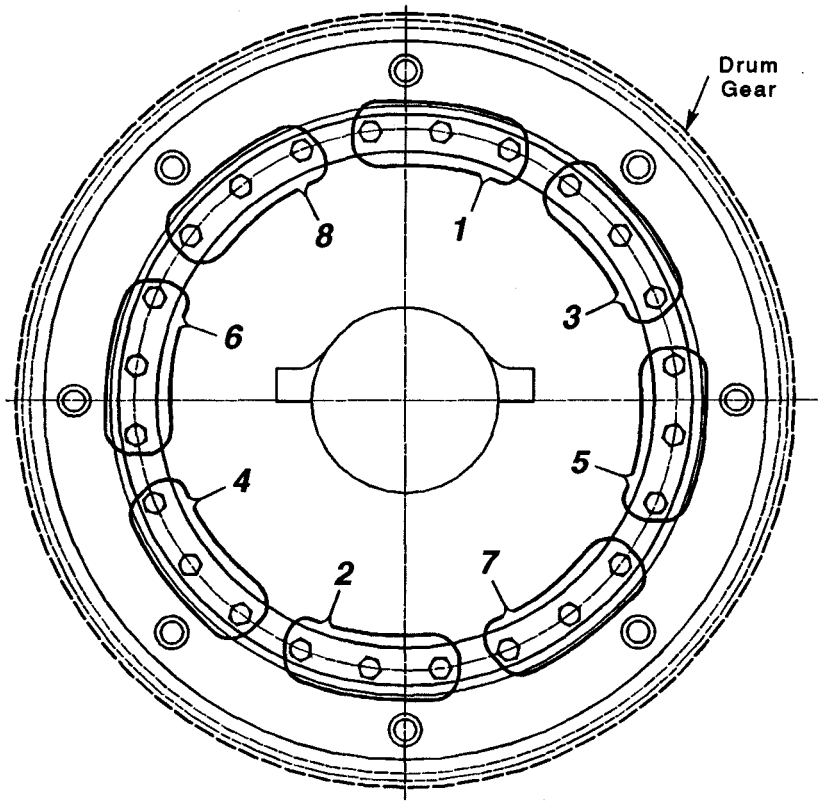
E. Heat the coupling hub to 175°F. and install with key.

F. Check the coupling alignment. Refer to Section 7 - ENGINEERING DATA, in this manual, for coupling data.

DRUM SHAFT ASSEMBLY

NOTES:

- Carefully clean all mounting surfaces, remove all nicks and burrs.
- Install and tighten the rods.
- After the drum assembly has been lowered into operating position, tighten the rods to specification. Use the sequence shown on this page with the rods being tightened on top.

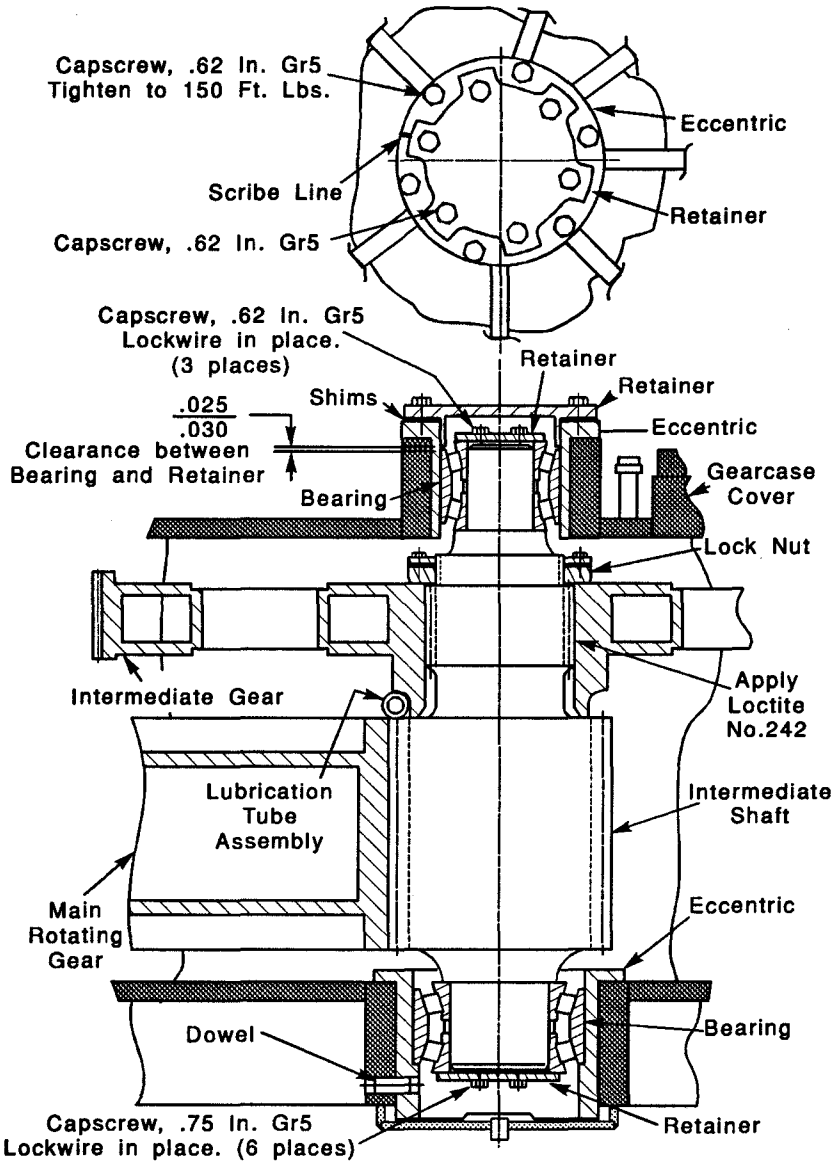


VIEW F-F
HOIST / DRAG GEAR TIGHTENING SEQUENCE

NOTE: The tightening sequence also applies to the lagging connections. Align the witness holes when assembling the laggings and gear.

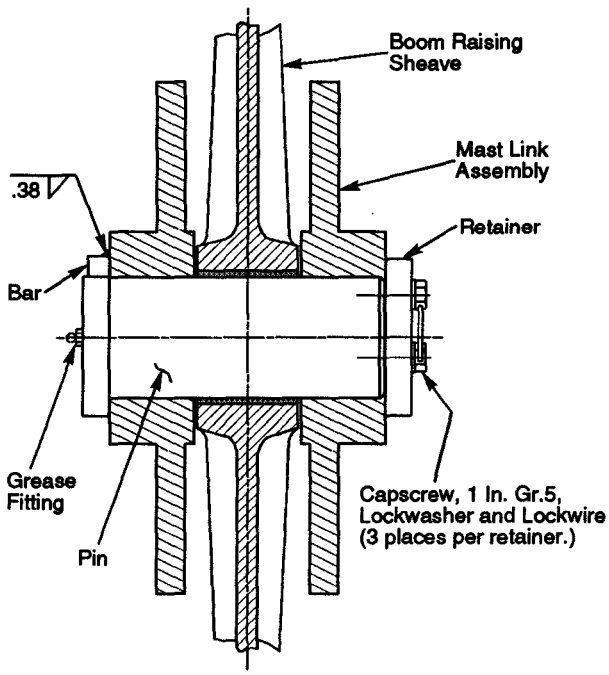
IMPORTANT: *Re-tighten the rods after 500 hours of operation.*

INTERMEDIATE SHAFT ASSEMBLY



INTERMEDIATE SHAFT ASSEMBLY
2500 LBS.
Section C-C

The intermediate shaft assembly consists of a gear, pinion shaft, two double-row bearings and retainers.



Section B-B
BOOM RAISING SHEAVE in MAST LINK

WARNING! **Since the Mast and the Mast Link are integral parts of the Boom Support System, ANY MAINTENANCE ON THE MAST LINK MUST BE UNDERTAKEN WITH EXTREME CAUTION.**

WARNING! **DO NOT REMOVE AND/OR REPLACE AND COMPONENTS ON THE MAST LINK UNTIL PROVISIONS HAVE BEEN MADE FOR BOOM SUPPORT.**

4. Remove the rope guard above the top swivel shaft from the gantry structure.

5. Remove the snubber assembly from the top of the swivel frame. Refer to procedure "*SNUBBER REPLACEMENT*" in this section.

6. From the upper sheave platform, remove the section directly above the swivel assembly. This platform is secured with 4 - .5 inch capscrews.

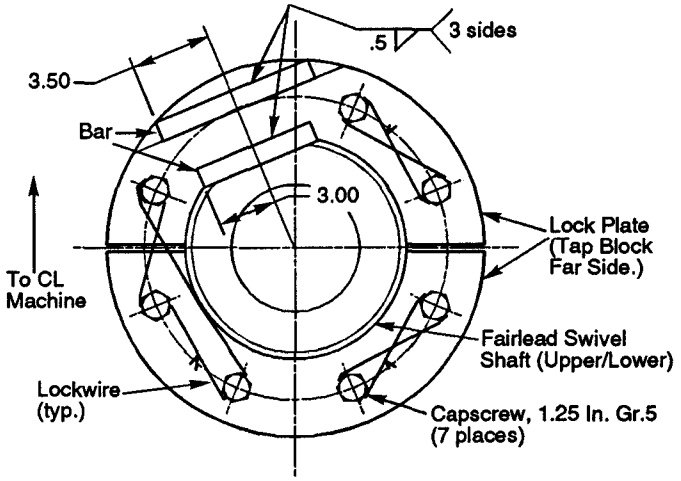
7. Attach slings to the swivel sheave and frame. Arrange the sling to place the centerline of lift approximately 16 inches behind the sheave pin.

8. Remove the upper split collar and thrust washer assembly.

9. Weld a bar across the end of the upper swivel pin. Attach a pulling bar and construct a bridge which will allow the pin to be pulled a minimum of 13.25 inches.

10. After attaching the pulling equipment, remove the shear bar and split retainer.

11. Use a similar arrangement to pull the lower swivel pin as used for the upper swivel pin. The lower pin must be pulled a minimum of 15 inches and the rigging must include a means of controlling the rate of pull.



Section K-K
SWIVEL PIN RETAINER
(Top and Bottom)

DANGER! **Depending on wear and/or corrosion, the lower pin could fall, require considerable pulling, or both, while being removed. FAILURE TO CONTROL THE PULLING OF THIS PIN COULD RESULT IN SERIOUS INJURY OR DEATH.**

12. Remove the lower swivel pin shear bar and split retainer.

13. Lift the swivel frame to remove any binding on the swivel pins and pull the pins.

14. Lift the swivel frame to just clear the lower wedge assembly and move it clear of the gantry structure.

    NOTE: Take care that the frame does not damage the anti-rotation dowels at the upper thrust washer.

15. Complete disassembling the parts as desired for inspection and repair/rebuild.

1. Set the sheave on cribbing so that the bore is horizontal.

2. Clean and coat the bearings with oil. Insert the bearing cups and cones. Hold in position with a bearing preload jig. Refer to the figure.

3. Tighten the rods uniformly while rotating the bearings. When the bearings start to bind check that the 3 rods are tightened to the same value.

4. Measure the distance between bearing cones ("X") in 3 places, 120° apart and calculate the average.

5. Grind the bearing spacer to the dimension calculated — +.001, -.000 inch.

   NOTE: The spacer ends must be parallel within .001 inch and finished to 125 RMS.

6. Remove the jig and bearings. Pack the bearings with MPG and install with the spacer and grease retainers. Secure these parts to the sheave.

CAUTION: **The bearings and grease retainers can fall out of the sheave bore during handling. FAILURE TO SECURE THESE PARTS COULD RESULT IN SERIOUS INJURY.**

HOIST ROPE DEFLECTING SHEAVE INSTALLATION

1. Set the sheave assembly into position on the gantry structure.

2. Install the inboard retainer on the large diameter end of the shaft. Tighten the 3 - 1.5 inch capscrews and lockwire in place.

3. Push the shaft into position from the inboard side of the gantry, with the lube hole up, and install the sleeve in the outboard side of the gantry. Replace the platform section.

4. Rotate the sheave shaft with the larger retainer plate to align the retainer bolt holes. Install the 6 .75 inch capscrews which attach the retainer plate to the fairlead structure.

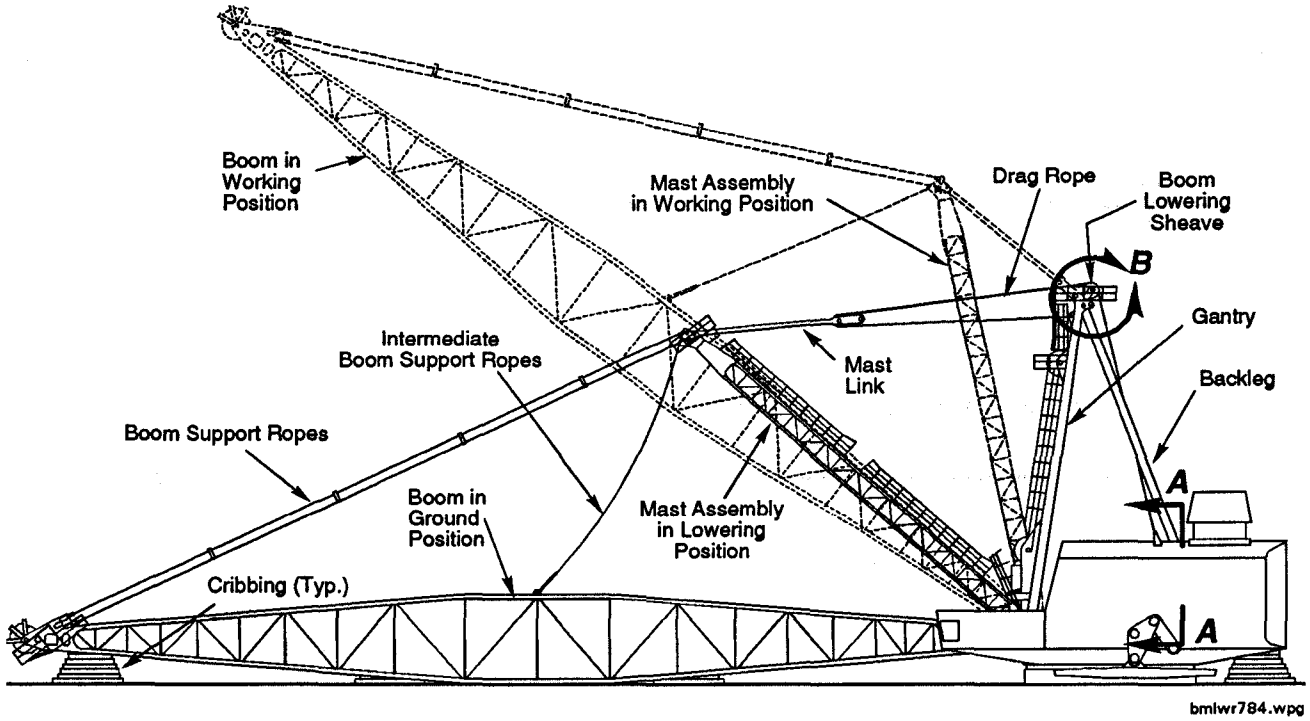
5. Install the outboard retainer plate. Tighten the 3 - 1.5 inch capscrews. and lockwire in place.

6. Manually lube the bearings, purge the auto-lube lines and reconnect.

7. Replace the hoist rope(s).

BOOM LOWERING PROCEDURE

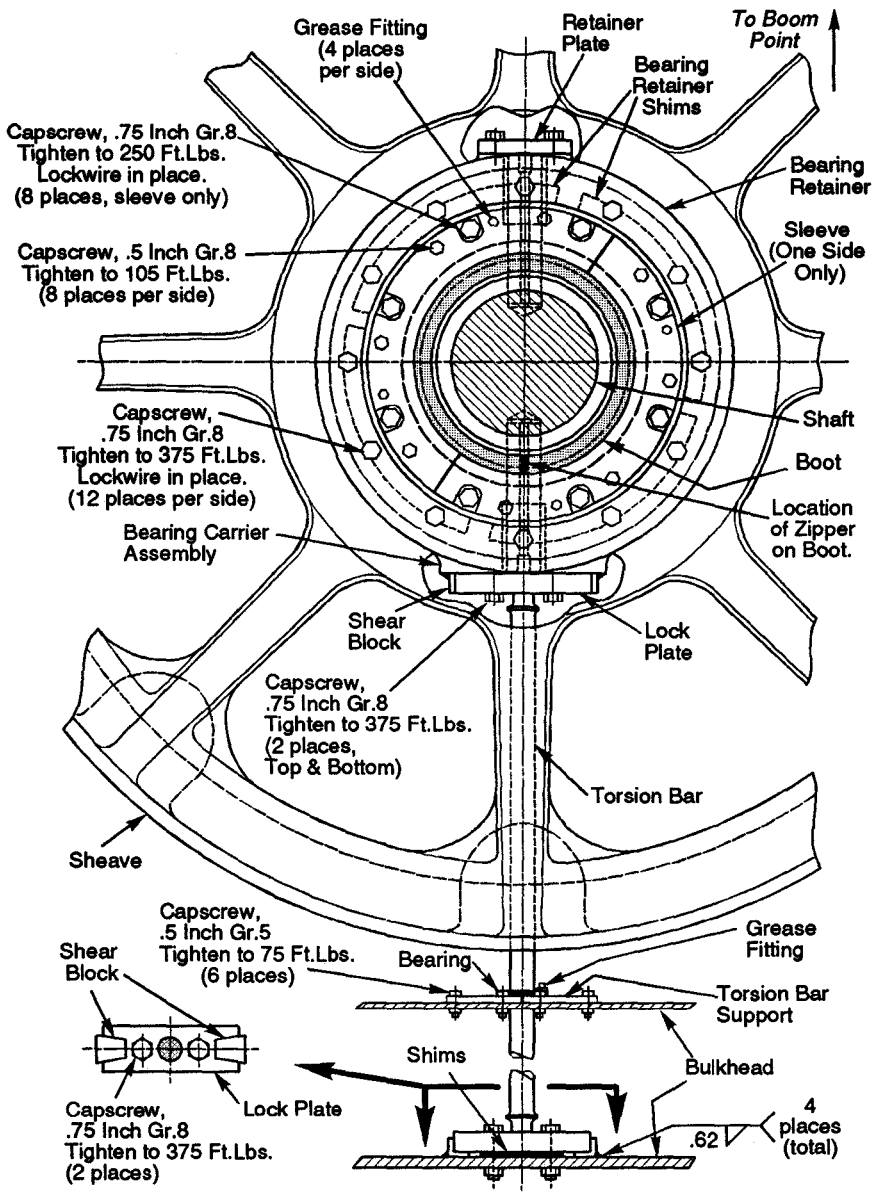
Lowering the boom to its horizontal position is a major undertaking that requires excellent planning, advance preparation, and experienced personnel. On this machine, the mast and mast link are used in the lowering process. Sufficient cribbing must be available to support the boom when it is lowered and also under the ballast sections of the rotating frame. A firm, level work area has to be prepared. It should be well drained, have good traffic access, and be out of the way from the other mining operations. The communication system on-board the machine must be in good working order so that personnel in the operator's cab, the machinery house, and the front end superstructures can readily talk with one another and anyone on the ground. *Never attempt to raise or lower the boom during inclement weather nor at night.*



7820 BOOM RAISING / LOWERING

Competent and experienced personnel are essential to the success of this event. Marion has qualified people who can advise you throughout every step in this major undertaking and make the job a lot easier for you. Contact the Marion Customer Service Department to arrange for this invaluable service.

CAUTION: ALWAYS USE A SAFETY HARNESS WHEN WORKING ON THE BOOM AND FRONT END SUPER-STRUCTURE.



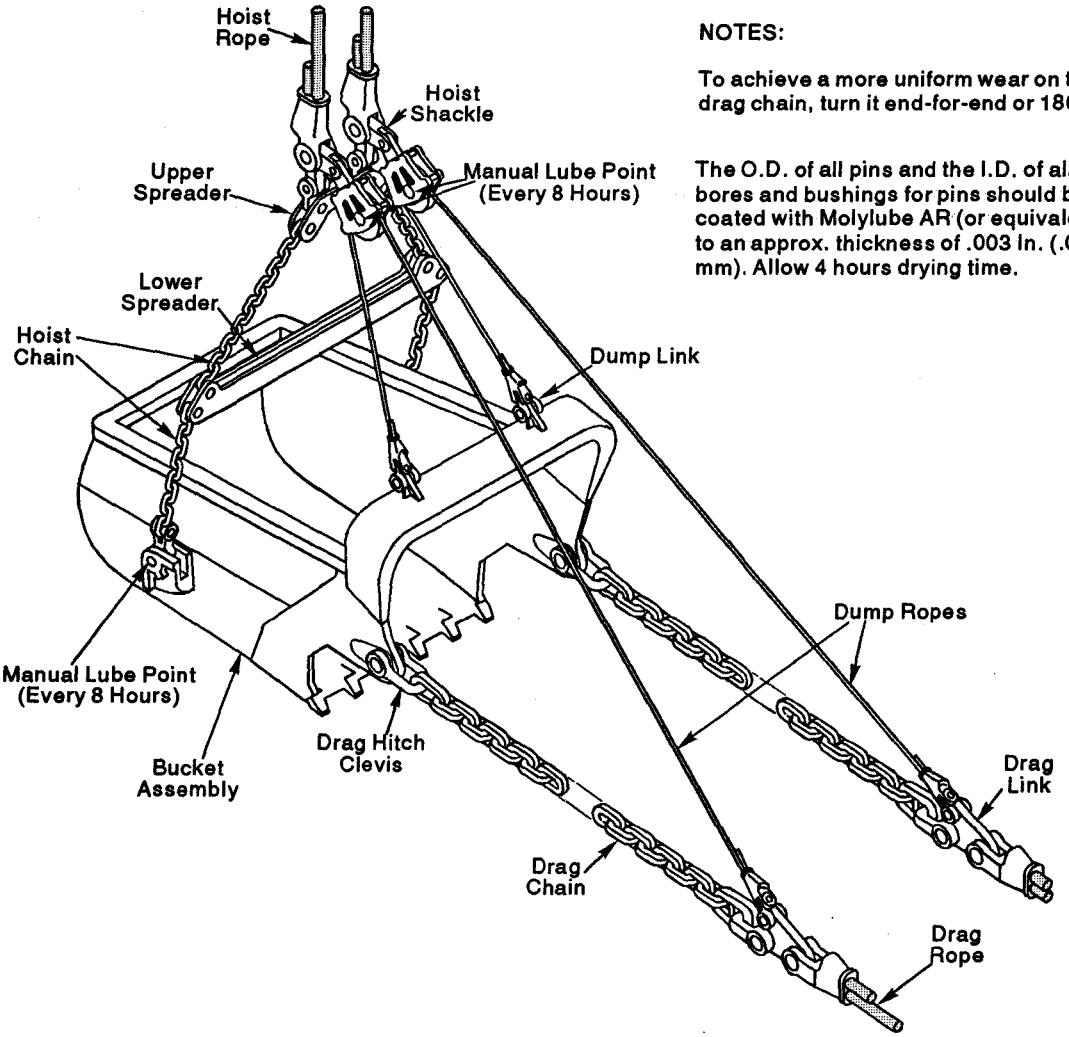
Section A-A
BOOM POINT SHEAVES - SIDE VIEW

CAUTION: **The Torsion Bar is inserted into the bearing carrier assembly. As the Boom Point Sheave assembly is pulled away from the boom, care should be taken to insure that the torsion bar remains inserted in the lock plate at the point structure end. THE TORSION BAR MAY BE DAMAGED IF REMOVED WITH THE SHEAVE ASSEMBLY.**

4.13 DRAGLINE BUCKET

Dragline Bucket digging characteristics are primarily determined by the calculated geometry incorporated into the design. The behavior of each dragline bucket can be established within close limits. However, digging conditions may cause every bucket to develop certain operating characteristics that affect bucket action. For this reason, the bucket has been provided with 2 points of adjustment:

- *HOIST CHAIN ATTACHMENT.*
- *LENGTH OF DUMP ROPE.*



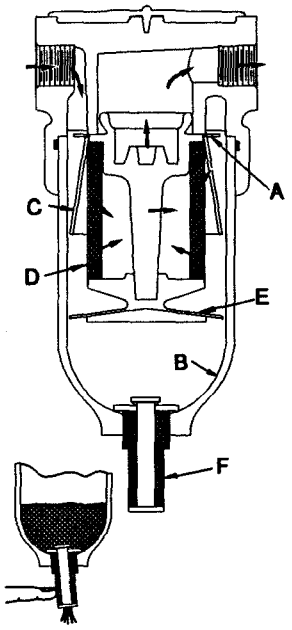
NOMENCLATURE - DRAGLINE BUCKET

The *LENGTH OF THE DUMP ROPE* determines the angle of bucket when carrying a load. Optimum bucket action is achieved largely by field experience in a specific application.

AIR LINE FILTERS

These filters are placed at strategic points in the air distribution system. They are designed to remove moisture, solid contaminants, pipe scale, rust, pipe dope, etc., which may plug small orifices or cause excessive wear and premature failure of pneumatic components. Each filter has a metal bowl with a sight gauge and is equipped with a manually activated drain that requires only finger tip touch to control. Each filter comes with a 40 micron plastic filter element that can be removed, cleaned, and reused.

First Stage Filtration: Air enters at inlet port and flows through deflector plate (A) which causes a swirling action. Liquids and coarse particles are forced to the bowl interior wall (B) by the centrifugal action of the swirling air. They then carry down the bowl wall by the force of gravity. Shroud (C) assures that the proper swirling action occurs and that the air does not pass directly through the filter element (D) until the large particles and liquids are removed. The baffle (E) separates the lower portion of the bowl into a "quiet zone" where the removed liquid and particles collect, unaffected by the swirling air, and are therefore not re-entrained into the flowing air.

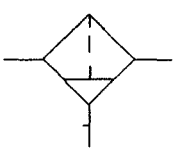


Second Stage Filtration: After liquids and large particles are removed in the first stage of filtration, the air flows through element (D) where smaller particles are filtered out and retained. The filtered air then passes downstream.

Collected liquids and particles in the "quiet zone" should be drained before their level reaches a height where they would be re-entrained in the flowing air. This can be accomplished by using the manual drain (F) which is actuated by pushing it to the side from any direction. It requires only a fingertip touch to drain the condensate, even in hard to reach places.

Element removal is accomplished by unscrewing the threaded bowl and then the baffle (E). Wash the element and bowl in mild soapy water and reinstall them. Check the unit for unwanted air leaks around seals, gaskets, or O-rings. Replacement kits are available for these filter units. Refer to the Parts Book.

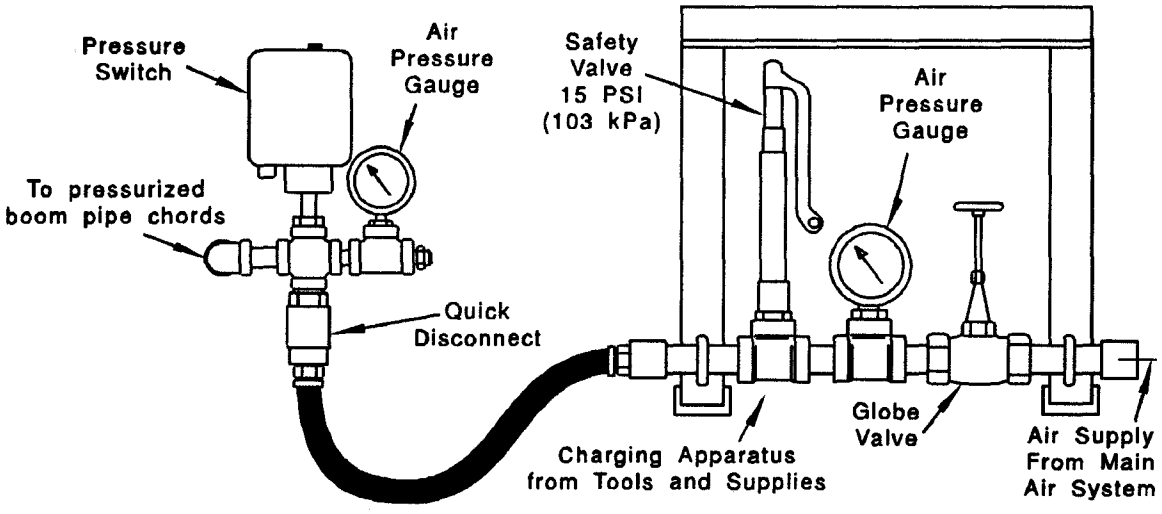
CAUTION: Do not use acetone, benzene, carbon tetrachloride, ethylene di-chloride, gasoline, toluene, or any other solvents to clean plastic components. These solvents will melt the plastic and are fire hazards.



Graphic Symbol

PRESSURIZED WELDMENTS

The Boom Apex pipes, tri-structure back legs and tri-structure head beam are pressurized with dry, compressed air. A loss of air pressure will indicate a break in the parent metal or welds. The operator is alerted to the failure through a switch which is activated when the pressure in the weldment drops. If pressure is lost, check the air piping for leaks. If none are found, check the structure for cracks, make any necessary repairs and re-charge the system.



CHARGING APPARATUS FOR PRESSURIZED WELDMENTS

The charging apparatus furnished consists of: a pressure gauge, a safety release valve - set at 15 PSI (103 kPa), a globe valve, and a section of hose with a quick connect coupler.

CHARGING PROCEDURE - PRESSURIZED WELDMENTS

1. Blow out the air line from the machine compressor before attaching to the "AIR CHARGING APPARATUS" to remove any water contamination.

2. With the valve on the "AIR CHARGING APPARATUS" closed, attach a compressed air line.

3. Attach an air supply hose leading from the "AIR CHARGING APPARATUS" to the weldment using a quick disconnect coupling and charging equipment located on the weldment.

DANGER: NEVER USE EMERY CLOTH OR EMERY PAPER. Emery conducts electricity. Serious injury to personnel and equipment results.

Commutation not corrected by simple remedies should be reported to the electrical equipment manufacturer.

PROPER LUBRICATION

Proper lubrication of bearings requires following this established procedure for all general conditions. First, be cautious against over-greasing. Establish a happy medium, keeping in mind that excess lube accumulates on armatures and windings, causing electrical failure. Lubricate all bearings on new equipment according to the chart below for the first day of service, and every 6 months of actual operation after that. Add lubricant until a small amount of lube appears at the shaft, or starts out the bottom drain hole in the bearing housing (with the plug removed). After the first day of service, lube the equipment while it is at operating temperature.

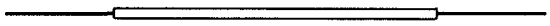
NOTE: Many small motors use sealed bearings that require no lube for 2 to 3 years. Add lube with the units stopped and the drain plug removed. Run the generator or motor with the bottom plug removed for a few minutes to allow ALL the excess lube to flow out. *REPLACE THE DRAIN PLUG.* In most cases, the main hoist, drag and swing motors have no plug to remove. Surplus grease flows out in the pocket beneath the bearing housing.

On vertical and a few horizontal motors, remove the plug as is done with generators. As mentioned in the 6 month lube procedure, these bottom plugs are removed before lubing, to see that excess lube escapes. Probing with a clean wire assures that the old grease has not hardened and blocked the passage. *REPLACE THE DRAIN PLUG.*

Shaft Dia.		Lube	
(inches)	(mm)	(ounces)	(grams)
1	25.4	.5	14.2
2	50.8	2	56.7
2.5	63.5	3	85.0
3	76.2	4.5	127.5
3.5	88.9	6	170.0
4	101.6	8	226.8
4.5	144.3	10	283.5
5	127.0	12.5	354.4
5.5	139.7	15.5	439.4
6	152.4	18	510.3

In conclusion, a good troubleshooter attack plan includes:

- Adequate preparation including:
    - — Understanding the system and its components.
    - — Availability of wiring diagrams and test data.
    - — Quality test equipment designed for the job.
- Preliminary investigation to determine the effect of the fault.
- Estimation of the probable cause.
- Testing for determining the faulty part.
- Correction of the failure.
- Preventive maintenance.



7.2 SEALS

Oil and grease seals are critical to machine availability. Careless storage, handling, removal and installation can contribute to reduced service life of machine components and higher cost of operation.

Seals come in all sizes, shapes and materials. Wherever possible, Marion has specified the use of the most common solid molded element type seals for use on Marion machines.

All types of oil and grease seals have a limited shelf life. Store seals in a cool, dry location protected from direct sunlight. Keep in sealed containers or packaging until ready to use. Seals keep lubricant clean and contained in their respective housings, bearings or passageways. Always handle seals carefully to prevent exposure to nicks, bends or pinching. Do not wash them in solvents as some solvents may destroy properties of the seal.

SEAL INSTALLATION

Solid molded seals are installed at time of manufacture with interference fit between seal and bore. This method of installation creates an oil tight fit. When partial disassembly of a machine component involves removal of solid molded seal before reassembly inspect it carefully for cuts, nicks or cracking. Replace with a split seal if complete disassembly is inconvenient or with a new solid molded seal. Split seals, especially those made with interference fit at butt, also install with compression at the joint. Split seals used as substitutes for solid molded seals should be replaced at next major component overhaul.

CAUTION: Do not cut a solid seal and reuse for a split seal.

Check shaft for scratches, burrs or surface roughness that may cut or score the lip of seal. Be aware of sharp threads key-ways or splines over which the seal must travel. Protect seal lip by covering these interferences with tape.

Inspect the bore area for surface roughness, dirt or burrs. Remove and clean as required. The bore and shaft need .0625 in. (1.588 mm) chamfer to accommodate a leak free installation. If shaft or bore do not have chamfer, carefully provide one by trimming inside flange of seal.

INSPECTION PROCEDURES

Method of Checking the Rim Face Runout of a Gear.

If gear can be rotated without end float, place indicator squarely against the rim face stamped (000) at station stamped 1 and set to zero.

Revolve gear slowly, record readings at each station. After one complete revolution, indicator should read within ±.002". If not, recheck. The allowable rim face runout is shown in Table 1. The total rim face runout is the algebraic difference between the maximum plus (+) and maximum minus (-) readings.

EXAMPLE:

Readings for a 16 foot diameter gear are listed in the chart at the right.

The total rim runout of .020" is obtained between station 3 with a maximum (+) reading of +.005" and station 9 with a maximum minus (-) reading of -.015". This is within the allowable .022" shown in Table 1 below.

Indicator Reading	Station No.
.000	1
+.004	2
+.005	3
+.004	4
.000	5
-.005	6
-.010	7
-.014	8
-.015	9
-.014	10
-.010	11
-.005	12
.000	1

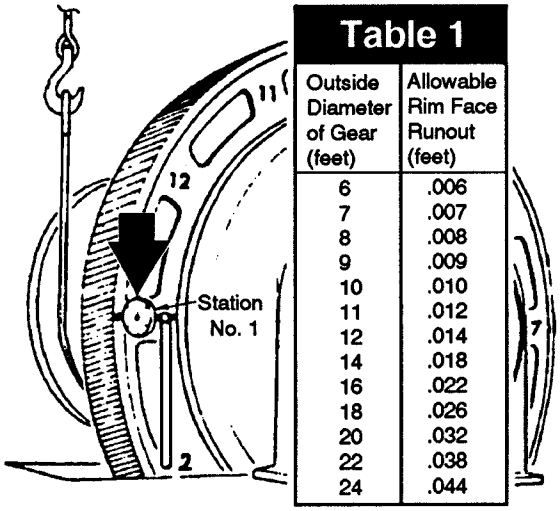


Table 1

Outside Diameter of Gear (feet)	Allowable Rim Face Runout (feet)
6	.006
7	.007
8	.008
9	.009
10	.010
11	.012
12	.014
14	.018
16	.022
18	.026
20	.032
22	.038
24	.044

grsplt-6.wpg

TYPICAL ECCENTRIC CARTRIDGES

Figure 4 (on the previous page) is a typical eccentric cartridge that is utilized in Marion gear cases. Note the built-in eccentricity. Locate the centerline, to the case bore and the shaft bearing housing bore. It's the centerline through which the section is taken. This centerline contains Points "A" and "B". Point "A" represents the shaft end and Point "B" represents the end view of case bore centerline. These are the very same Points "A" and "B" of *Figure 2*. Therefore if this eccentric cartridge is rotated about Point "B", Point "A" will move perpendicular to the centerline that contained Points "A" and "B" prior to any movement.

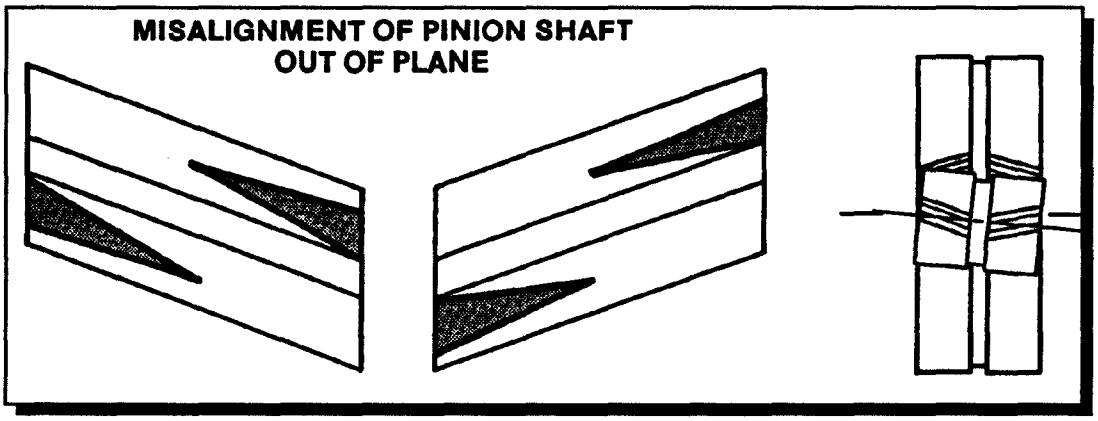
After the two reference centerlines are selected for the gear case (review the section on orientation and *Figure 3*) the eccentrics are installed with the centerline of the eccentric (that is common to Points "A" and "B") in-line with the reference centerline. These are factory set with very sensitive optical equipment.

Figure 5 shows the cross-sections of both eccentrics as they are installed relative to the reference centerlines. Notice that the centerline containing Points "A" and "B" and the reference centerlines are in line.

It is entirely possible to determine the direction of shaft end movement (when the eccentric is rotated) by locating any one of several tell-tale signs. First, *Figure 4* shows a partial keyway on the bottom of the outside flange which indicates that the eccentric cartridge centerline contacting this partial keyway contains Points "A" and "B" and that Point "B" is closest to the keyways. Therefore if the cartridge is rotated clockwise the shaft end will move to the right as indicated in *Figure 4*. Counterclockwise rotation produces movement in the opposite direction.

Another indicator is the "thick" and "thin" portions of the cartridge. The centerline containing Points "A" and "B" of the cartridge runs from "thin" to "thick" portions. The "thick" portion reveals the same information as the partial keyway. This "thick" portion can be located by looking inside the case through the inspection openings.

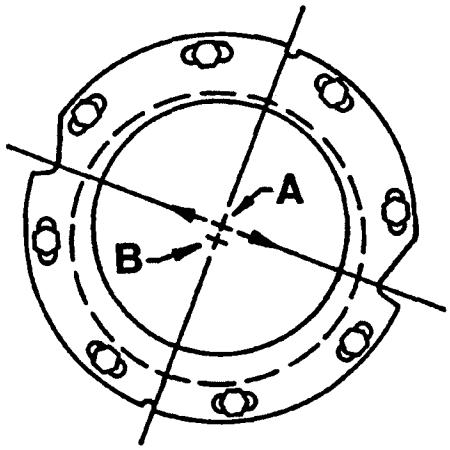
NOTE: *Figures 6* and *7* are shown on the next page. They point out two additional locations for the partial keyway. The partial keyway location for a given cartridge depends on the machine model and/or function. However, the partial keyway has the same meaning regardless of its location.



CORRECTIVE ADJUSTMENT:

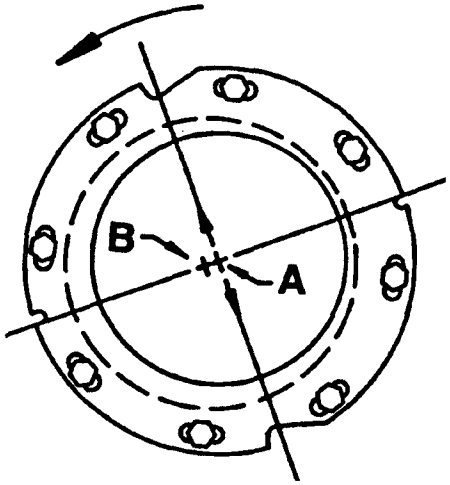
VIEW A-A

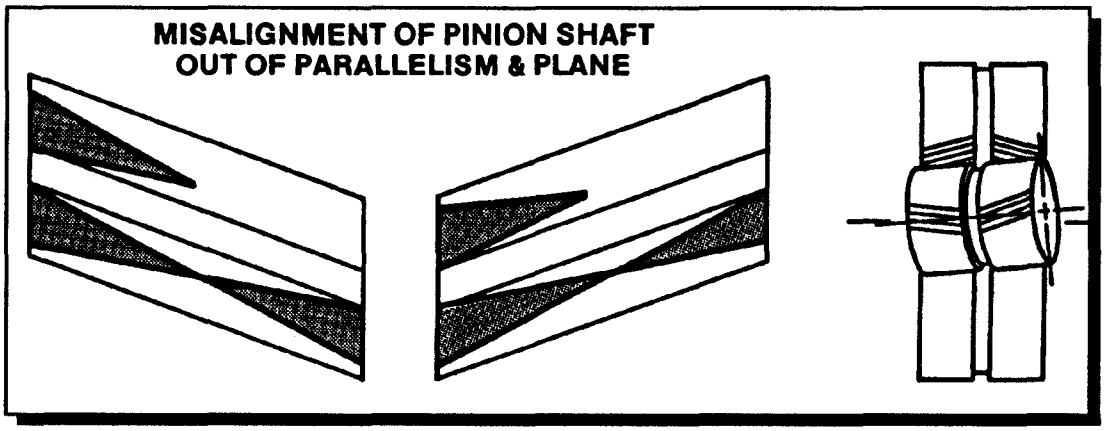
NO ADJUSTMENT REQUIRED.



VIEW B-B

ADJUST ECCENTRIC IN COUNTER-CLOCKWISE DIRECTION.

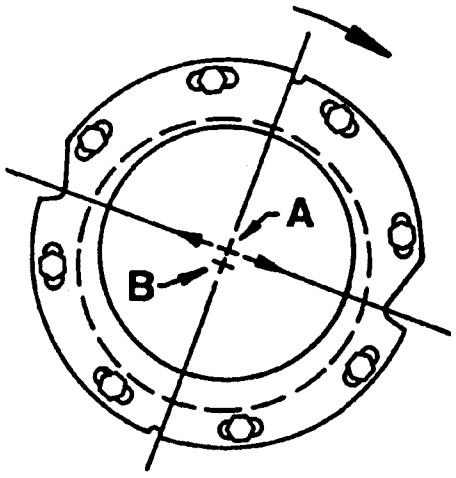




CORRECTIVE ADJUSTMENT:

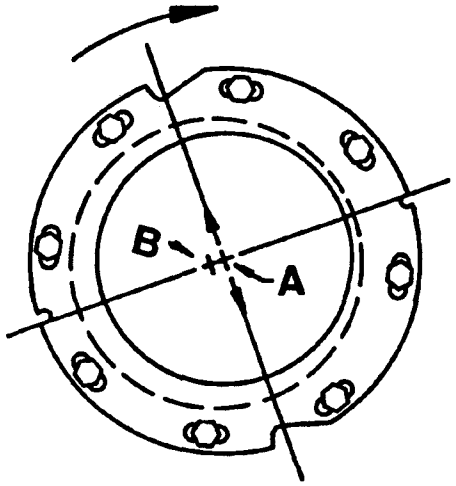
VIEW A-A

ADJUST ECCENTRIC IN CLOCKWISE DIRECTION.



VIEW B-B

ADJUST ECCENTRIC IN CLOCKWISE DIRECTION.



6. Install the end plate assembly consisting of the end plate, spring housing, and pressure plate onto the mounting flange studs.

7. Lubricate the stud threads with 30 weight oil or "Never Seeze".

8. Assemble the locknut"s" in same alternation sequence as they were removed. Tighten the locknut to 200 ft/lbs. (271 Nm).

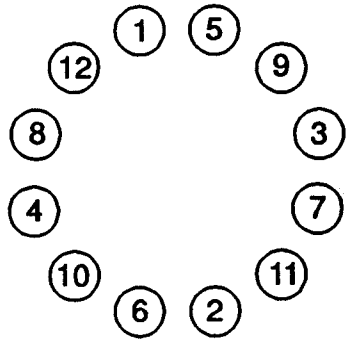
9. If applicable, center the rotor disc between the friction discs, using procedure given previously.

10. Reinstall the outer shield around the brake.

Dual Rotor Brakes

1. Remove the locknuts in an alternating sequence shown here and in increments of one quarter of the exposed stud thread length. If a stud comes loose from the mounting flange, clean the stud threads thoroughly. Apply Loctite 277 or equivalent. The stud must be threaded in until it bottoms in the mounting flange.

2. With the locknuts removed, the end plate, spring housing, and pressure plate can be removed as an assembly.



Locknut Removal Sequence

3. Remove the springs, clamp tube, rotor discs, and reaction plate. With these parts removed, all friction discs are accessible.

4. Inspect the rotor for wear. If either surface of the rotor is worn more than .03 inch (.76 mm), replace the rotor.

5. Remove the old friction discs and replace them with new discs and NEW screws. Tighten the screws to 20 ft.lbs. (27 Nm).

6. Reassemble the springs (on every other stud), clamp tubes, rotor discs, and reaction plate. Improper spring assembly will result in cocking of the reaction plate and uneven brake release.

7. Reassemble the wear spacers and then the end plate, spring housing, and pressure plate as an assembly. Take care to install the wear spacers behind the spring housing.

11. Install two hex head screws (99) and lockwashers (100) in the remaining two holes in the end plate. Tighten these two screws one turn at a time, in an alternating sequence, until the end plate contacts the end of the hub.

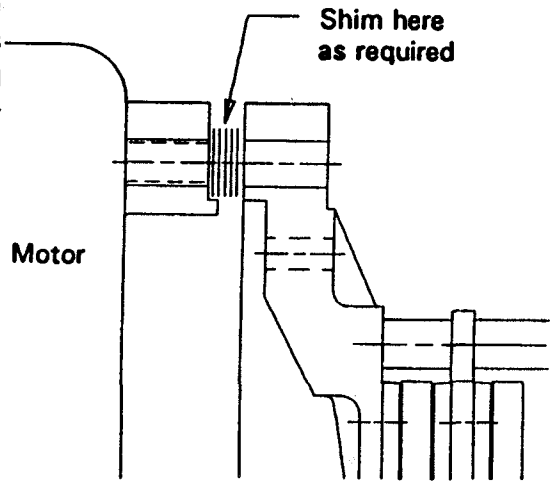
12. Remove the two 3/8-16NC2 x 1.75 screws, replacing them with hex head screws (99) and lockwashers (100). Tighten all four screws to 44 ft.-lb., dry.

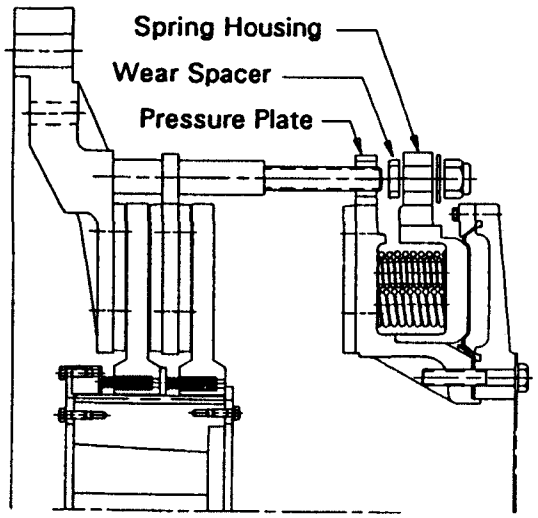
13. Measure the gap between the mounting flange friction surface and the face of the first rotor. This gap should measure approximately .060".

14. If necessary, shim the mounting flange by installing an equal number of shims (101) at each of the four mounting points, to adjust the gap to .060" +/- .010".

15. Tighten the 1.5-6NC Grade 8 mounting fasteners to 800 ft.-lb., dry.

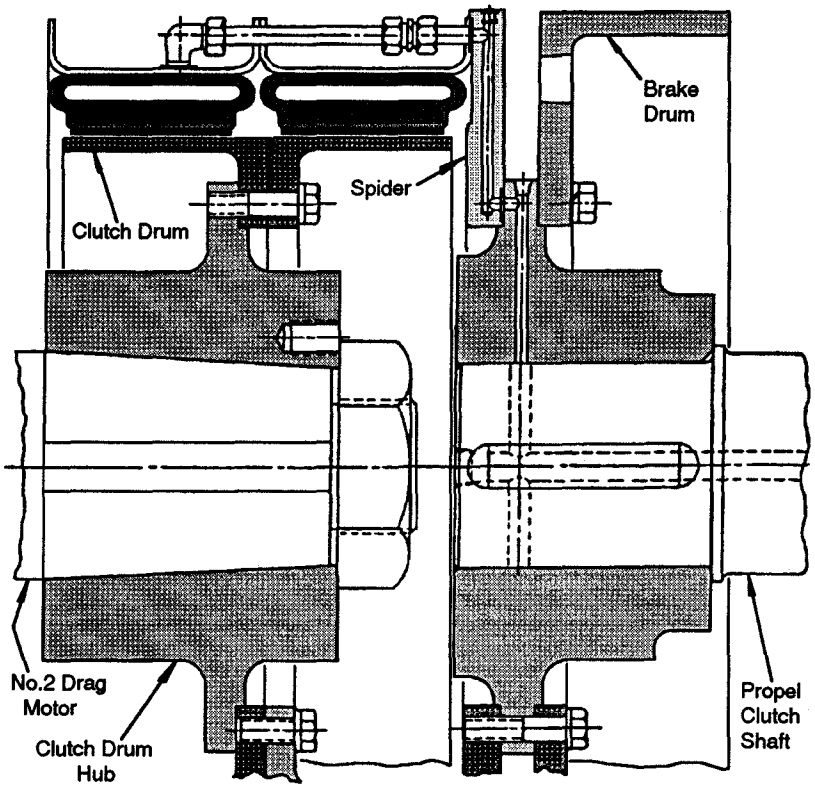
16. Lubricate the exposed threads on the ends of the studs with 30 wt. oil or "Never-Seez".



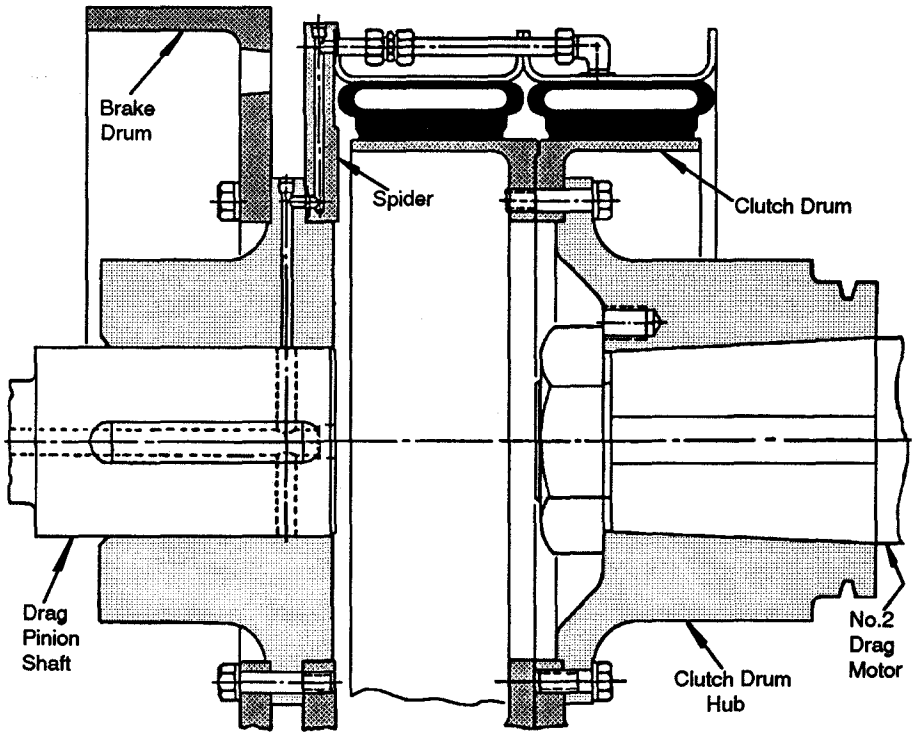


17. Noting the position of the air inlets, hoist the end plate, spring housing and pressure plate assembly into position and slide it over the clamp tubes, placing the wear spacers (25) onto the studs between the pressure place and spring housing. See Figure 6. The wear spacers will not pass through the holes in the pressure plate.

DRAG/PROPEL CLUTCHES



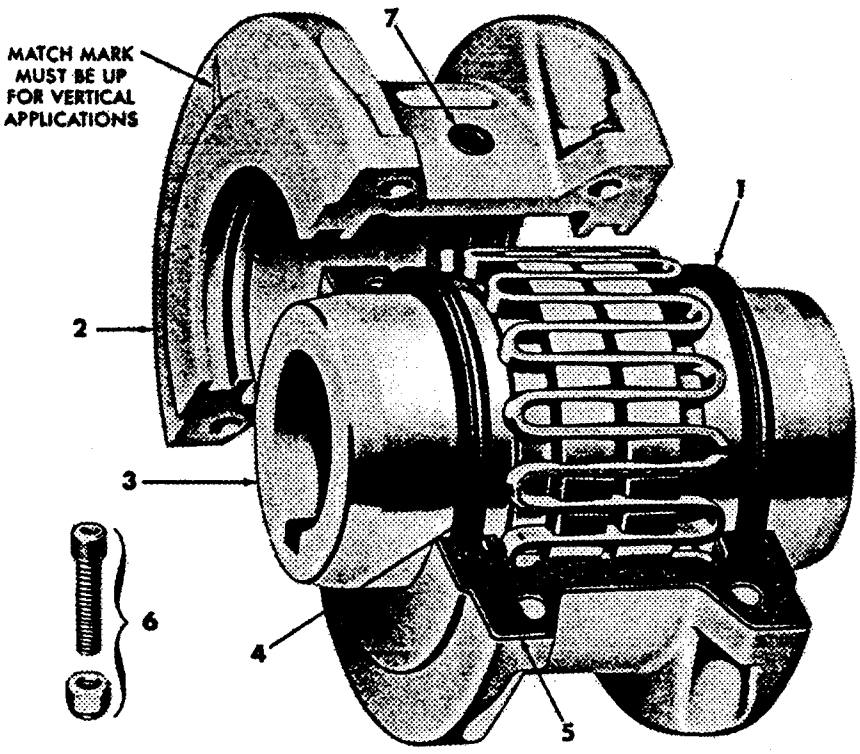
PROPEL CLUTCH



DRAG CLUTCH

7.6 COUPLINGS

GRID COUPLINGS



Part Numbers

1.Seal (T10)
2.Cover (T10)
3.Hub (Specify bore and keyway)
4.Grid
5.Gasket (T10)
6.Fasteners(T10)
7.Lube Plug

INTRODUCTION

These instructions apply to Tapered Grid Couplings. They are designed to operate in either the horizontal or vertical position without modification. However, for vertical applications, the match mark shown above, must be up. The performance and life of the couplings depend largely upon how you install and service them. Carefully follow these instructions for optimum performance and trouble free service.

PARTS IDENTIFICATION

All coupling parts have identifying part numbers as shown above. When ordering parts, always SPECIFY SIZE and TYPE shown in the coupling data table in this section.

LUBE FITTINGS

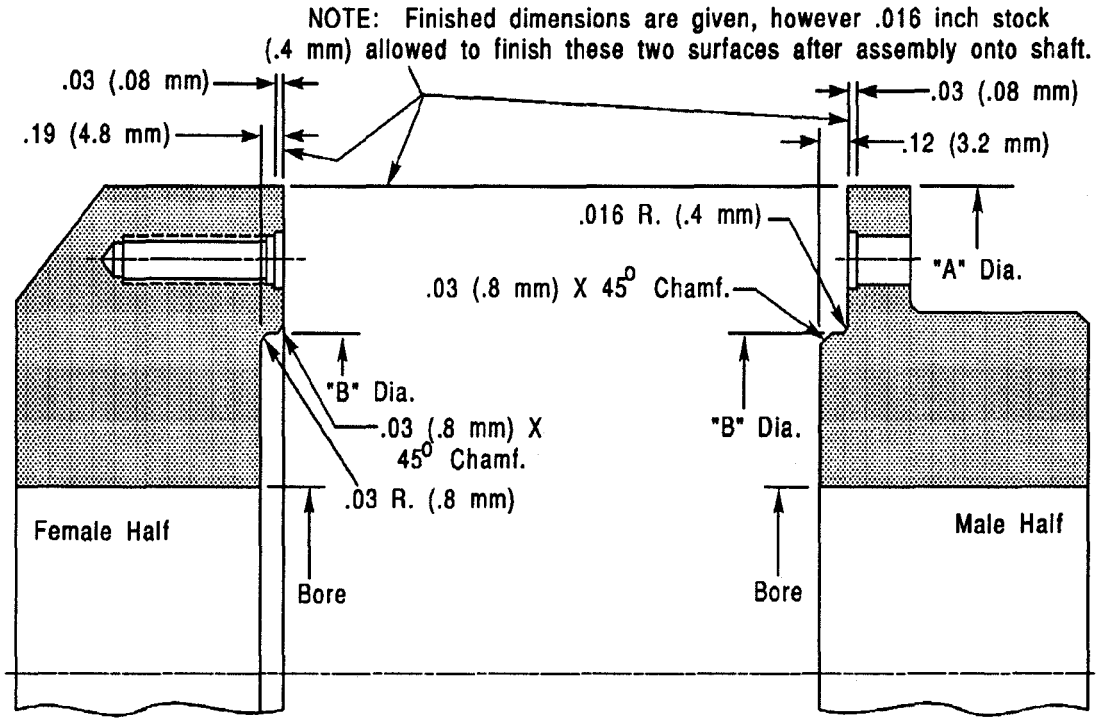
Cover halves have 1/8 NPT lube holes. Use a standard grease gun and lube fitting.

Unless otherwise called for, replacement couplings have a finished bore and .015 inch (0.4 mm) of material on the face, rabbet diameter and O.D. to be removed after assembly onto the shaft.

Keyed couplings usually have an interference fit of .0005 to .001 inch per inch of diameter.

Keyless couplings need an interference fit of .001 inch per inch of diameter.

Measure the rabbet diameter and finish machined surfaces to match the mating coupling using the fit from line to line to .001 inch interference. (See sketch below.)



TOLERANCE FINISH BORE

Checking the coupling alignment requires secure bolting of the M.G. set base to the deck in operating position. Follow the step-by-step procedure and accurately record ALL readings. This is important. When checking more than one M.G.Set coupling, always start at the coupling nearest the 2-bearing unit - usually the motor.

3. Examine the part visually. Prepare sketches and take photographs to provide a complete record.

4. Where is the failure located? (Base metal? Heat affected zone? Weld metal?)

The everyday mechanic that is not familiar with metallurgy can look for certain defects in a fracture such as incomplete penetration. If a part has completely fractured, you can see small chevron-like arrows pointing to the stress concentrator.

There are two non-destructive testing methods the average mechanic can learn to use to get a better idea of severity of the failure in a part or to help examine a visual indication.

Method one is dye penetrant testing where a red dye is sprayed over an indication. This red dye will penetrate into any crack. After the dye is left to penetrate for a time, it is wiped clean. A white developer is then sprayed over the indication area. If an indication is evident, the red dye will show through the developer. This is perhaps the easiest and quickest way of determine the extent of the problem.

Method two is magnetic particle inspection testing. An A/C yoke and iron powder is all that is required plus some training. The yoke, when placed across a suspected defect, will create a magnetic field. IF there is a defect in the area, the magnetic field will be interrupted. The iron powder, when sprinkled over the area, will align with the defect.

STEP 3 -- Determine the Material that will be Repaired.

Most of the materials used to build mining equipment can be weld repaired. However, there are materials that are more difficult to weld successfully if their full service characteristics are to be retained. It is important to know the type of material so the repair procedure specifies the correct preheat and electrode.

Some methods of determining the material are:

1. Check with the manufacturer's service department.

2. Drill out shavings or cut off a small piece of material and take it to a lab for analysis.

Method 2 is perhaps the best possible method of determining the material. If the above methods are not feasible and it is determined the risks are minimal, an analysis of the equipment can be made by categorizing the parts. The categories would be structural components such as plates, beams and bars, castings, and forging. The structural components (plates, beams, and bars) can be divided into four areas; such as, (1) mild steel, (2) medium strength steel, (3) high strength steel, and (4) wear resistant type steels. Steel castings and forging can be categorized the same way: (1) low carbon, (2) medium strength and wear, and (3) high strength and wearability.

A second example of weld repair is a broken tooth in a rotating gear of a shovel which needs repair and have available as a spare part.

STEP 1: Remove the gear and clean off grease, oil and any other contaminates.

STEP 2: Inspect the gear for any other fractures. The reason for the tooth breakage was a rock fell in between the gears as they meshed. The tooth broke out at the root. Since the tooth is the only serious problem, the decision is to repair it.

STEP 3: The material is AN ANSI 8630 cast steel material per the manufacturer's service manual.

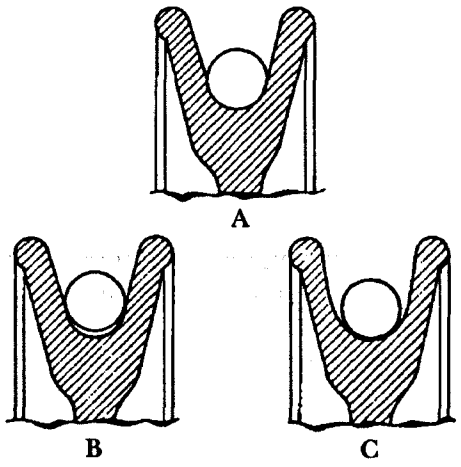
STEP 4: Since a local preheat of 500°F (260°C) to 550°F (288°C) is required for this material and weld metal shrinkage is involved, some type of fixture is required to control distortion. Burn, machine and drill a 1-1/2 inch (37.5 mm) thick half moon plate that will fit the inside I.D. of the gear. Make a steel template that will cover the contour of three teeth to use to align the broken tooth. Double bevel the tooth at a 45°-50° angle leaving an approximate 1/8 inch (3 mm) root face. Grind any burning serrations on the tooth and any notches in the gear rim. Align the tooth with the steel templates. Tack a stiffener across three teeth on each side of the gear, one of them being the broken tooth, to hold it in alignment during welding.

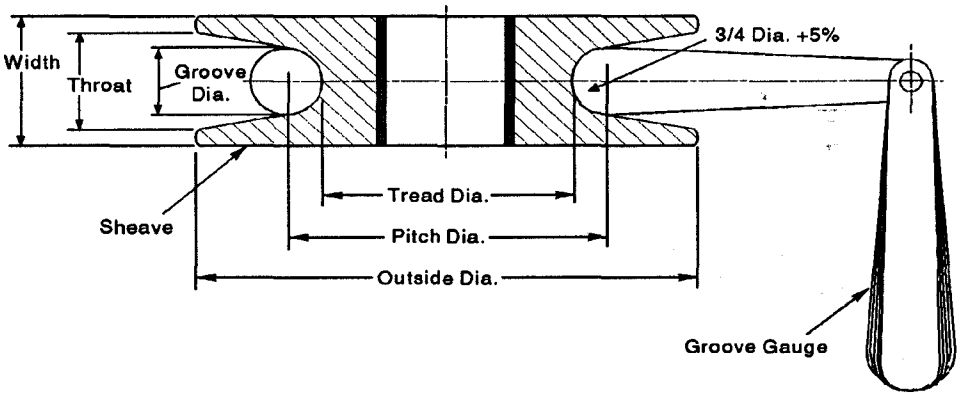
STEP 5: In Step 3 the material was determined to be ANSI 8630 which, in its normalized condition, is about a 1000,000 PSI. Therefore, it is recommended that a 100,000 PSI tensile strength electrode should be used because of the function of the tooth. Because of the length of weld and the shape of the gear, the shielded metal arc process would be recommended using an AWS E10018 type electrode. Use small diameter electrodes such as 1/8 inch (3 mm) and 5/32 inch (4 mm) diameter.

STEP 6: Slow preheat the gear and tooth to 550°F (288°C) at the repair area. Pack insulation or heat blankets around the repair area to help hold in the heat. Do not concentrate the heat on the broken tooth or allow the heat to go above the heat treating properties or you will lose the hardness of the tooth. Make sure the repair can be completed once preheating has been started.

STEP 7: Weld two passes in one side of the groove and back gouge to sound metal. Weld second side to the same width as the first side and then use a balance welding technique by alternating a pass on each side of the tooth. Do not weave but use a stringer bead technique. Clean each pass of slag. If a GTAW welding machine is available, blend in the last two layers with this process. Peen each bead except for the first bead and last layer. Visually inspect the completed repair job. Use the template during the welding operation to check on any distortion.

These sheave-groove cross-sections represent three wire rope seating conditions: "A" is a new rope in a new groove; "B" is a new rope in a worn groove; and "C" is a worn rope in a worn groove.





Using a Groove Gauge on a Sheave

BREAKING in a NEW WIRE ROPE

A new wire rope requires careful installation and close adherence to following all the appropriate procedures previously noted. After the rope has been installed and the ends secured in the correct manner, the mechanisms should be started carefully and then permitted to run through a cycle of operation at very slow speed. During this trial operation, a very close watch should be kept on all working parts—sheaves, drums, rollers—to make certain that the rope runs freely, and without any possible obstructions as it makes its way through the system. If no problems appear in running the rope, the next step should include several run-through's of the normal operational cycle under light load and at reduced speed. This procedure allows the component parts of the new rope to make a gradual adjustment to the actual operating conditions.

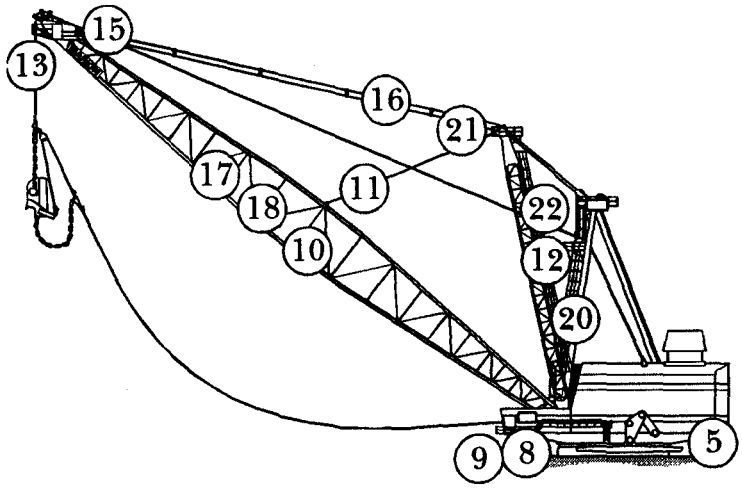
Section 8

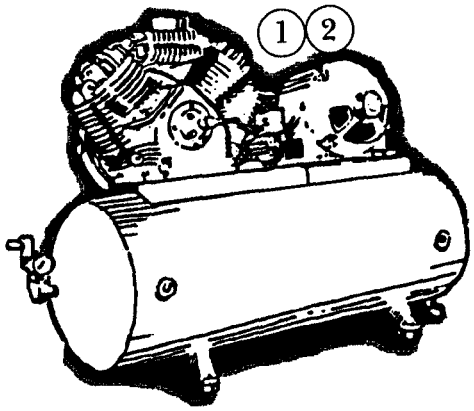
7820 Series Dragline

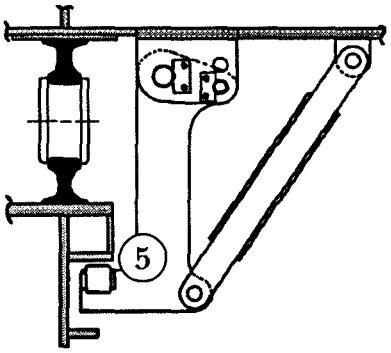
25,000 Hour Maintenance Inspection Schedule

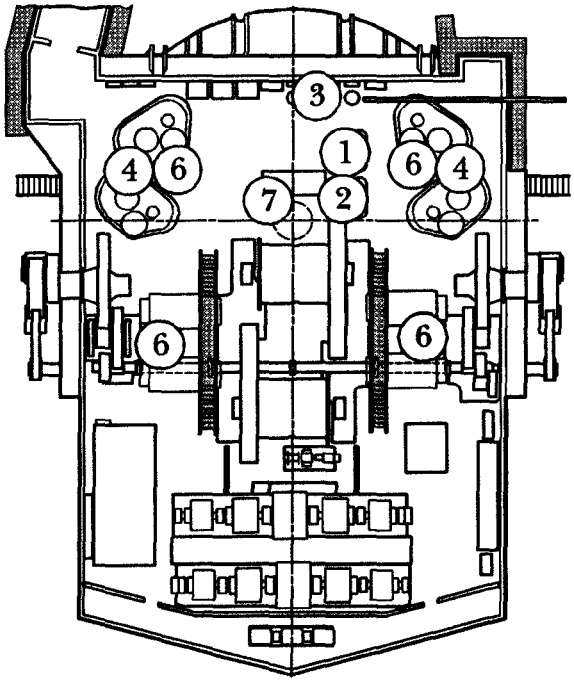
— Table of Contents —

Weekly —

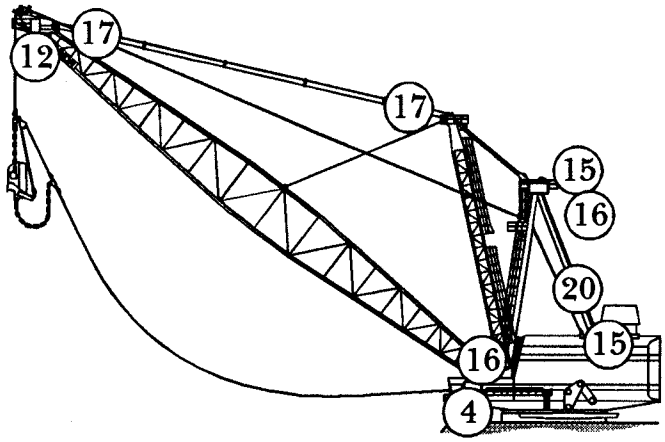


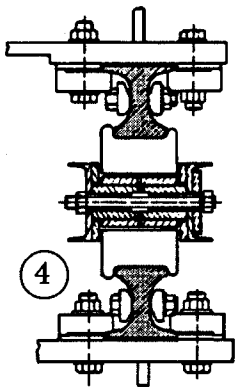


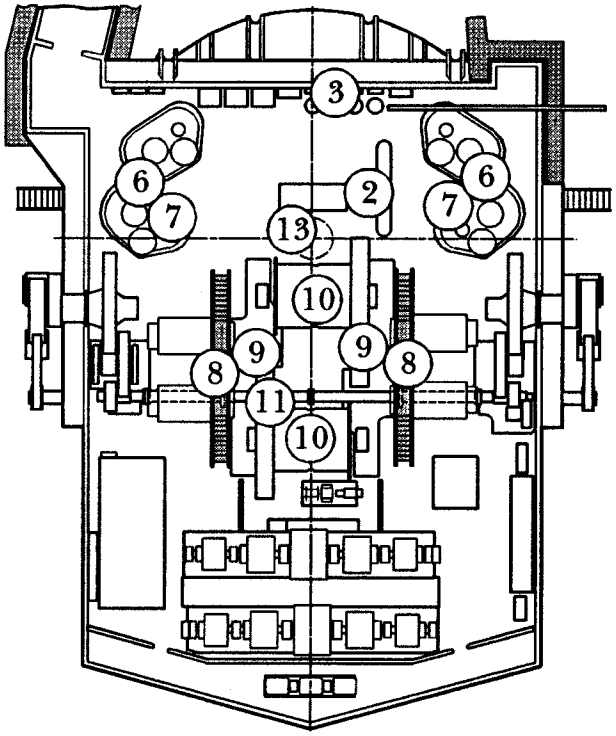


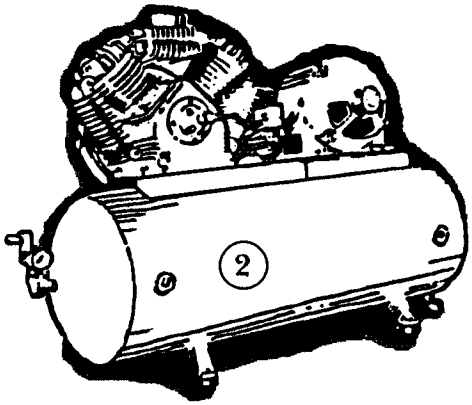


Annual —









The liquid then passes into the coil where it is vaporized due to the absorption of the heat through the walls of the coil tubing and also as the line pressure is reduced.

The vaporized refrigerant then leaves the evaporator coil, through the suction interconnecting line to the compressor where it is then compressed and fed into the condenser coil where subsequent heat transfer from the hot refrigerant gas to the air being passed over the coil results in the vapor condensing into liquid refrigerant.

This liquid is then fed into the liquid receiver and the cycle is repeated.

CONDENSING UNIT

The condensing unit (or high side) contains all necessary components, including safety devices, to compress the refrigerant gas, condense it to a liquid and store it prior to being supplied to the evaporator unit. Drawings enclosed give details of its overall size, together with clearance required for air entry and discharge and to permit maintenance work to be carried out (also see *START-UP INSTRUCTIONS*).

COOLING (EVAPORATOR) UNIT

The cooling unit (or low side evaporator unit) comprises the cooling coil, thermostatic expansion valve (or throttle), circulating fan and motor, filters and electric heating elements if required.

Air is drawn from the inside of the cabin through mechanical mesh filters, passed over the cooling coil and returned to the cabin.

Refrigerant enters this unit as a liquid and returns to the condenser unit as a gas to complete the cycle. It is the change of state from a liquid to a gas in the cooling coil which results in the absorption of heat from the air being passed over the coil.

FRESH AIR, PRESSURIZATION PACK

The fresh air, pressurization pack consists of a pre-cleaner and final filter element working together to give a three-stage filtering process. The pre-cleaner cleans the larger of the dust contaminants, the medium weight particles are caught by the end cup while the final filter element finish cleans, or final filters, the air entering the evaporator and thus the operator's cabin.

COMPONENT MAINTENANCE

Specific instructions for the maintenance of components are listed below. The instructions are not exhaustive and reference should be made to the Manufacturer's Handbook for each component where necessary.

NOTE: Before opening the refrigerant circuit to remove or replace any components, pump down the circuit as described below.

Compressor - General

It is essential that the compressor is evacuated before any connection is broken for inspection. Proceed as follows:

a) By-pass compressor low pressure safety cut-out.

b) Close the liquid receiver outlet valve.

c) Start the compressor, observing the test gauge suction side which must be fitted prior to test, and reduce the pressure down to 2 psi (.2 Kg/cm^2). Then stop compressor.

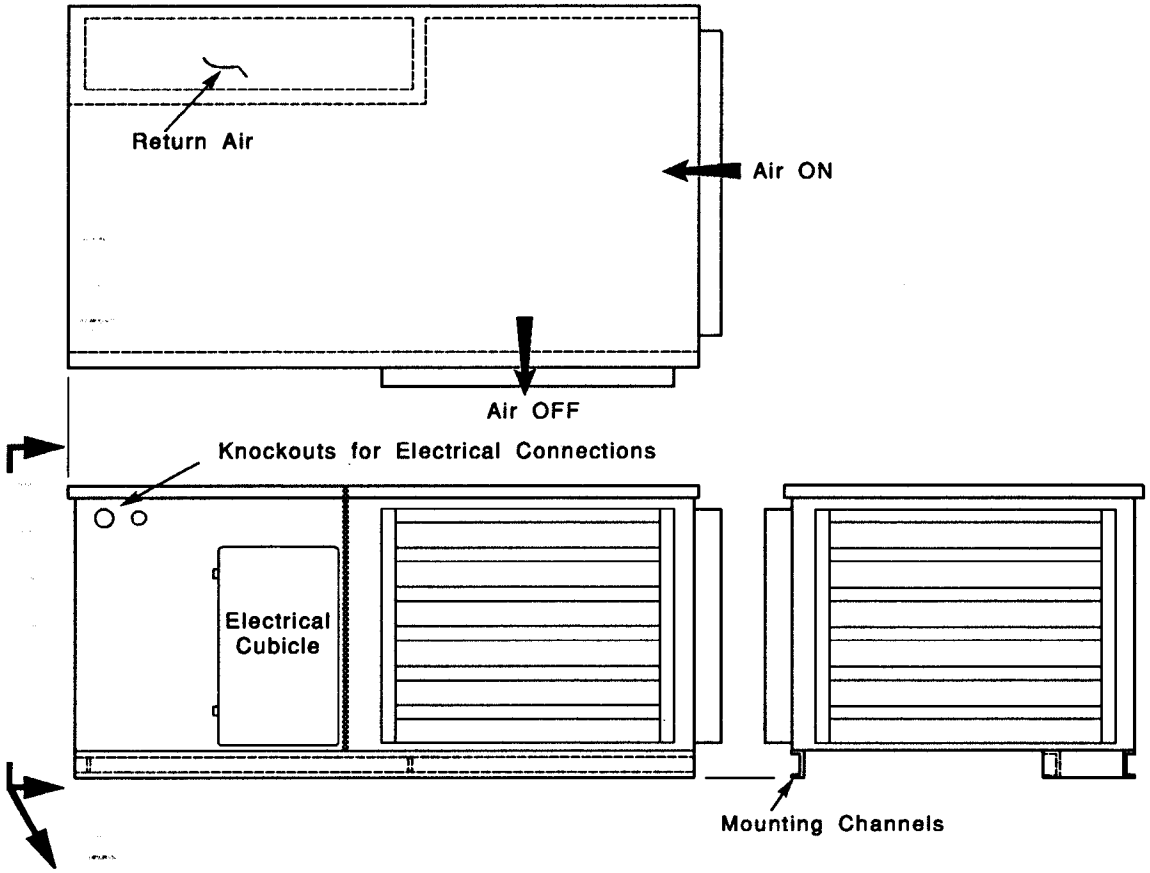
NOTE: 1. Stop the compressor several times during the operation to prevent excessive foaming of the oil as the refrigerant boils out. Violently foaming oil may be pumped from the crankcase.

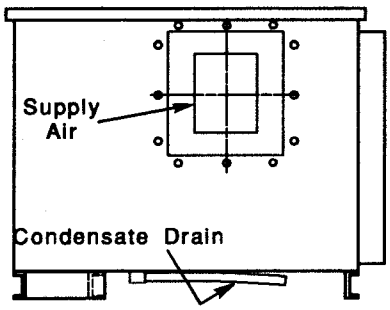
2. If the pressure should accidentally be taken lower than 2 psi (.2 Kg/cm^2), refrigerant can be bled into the compressor to raise the pressure to the desired value.

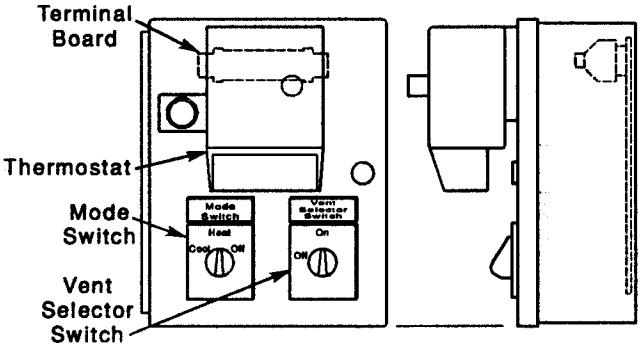
d) Close the discharge valve.

e) Permit all adjacent parts to warm up to room temperature before breaking the connections. This prevents moisture from condensing on the inside of the system if air is accidentally admitted.

f) Following assembly, it is necessary to purge the compressor of air with refrigerant vapor by "cracking" the liquid receiver outlet valve and venting the compressor through the discharge gauge connection on the compressor.







REMOTE PILOT CONTROL BOX

AIR CONDITIONER
MPR14 series