



Technical Manual

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INSPECTION CHECKLIST

- Check the condition of the rope sheave grooves and bearings.
- Test all hold-down bolts with impact wrenches.
- Check rope guides and bails for wear.
- Inspect all rope for broken wire or diameter loss.
- Check the auto lube system for loose or damaged fittings and for injector condition.
- Inspect the drag bucket for cracks.



DANGER: Remove electric power from the machine whenever inspecting the center journal, collector rings, rails or the roller circle. Use extreme care in removing guards and protective devices.

- Check the condition of the roller circle, rails and gearing.
- Check the main swing gear hold-down bolts and re-tighten if necessary.
- Test all hold-down bolts on the rotating frame components such as the swing gearcases, electric motor mounts, machinery pedestals and air compressors.
- Examine all brakes, clutches and their linings for excessive wear.
- Check the center journal, secure all guards and protective devices that were removed.



DANGER: REMOVE ELECTRICAL POWER FROM THE MACHINE BEFORE PERFORMING ANY OF THE FOLLOWING INSPECTIONS.

- Inspect the electrical cabinets; any discolored wires or components indicate overheating conditions have occurred.
- Look for moisture, fungus or mildew in the electrical cabinets. If found, clean with compressed air or approved solvents only.
- Check all electrical cabinets for messy or torn fasteners, cable armor or grommets, or loose insulation.
- Inspect electrical motors for discolored commutators or worn brushes.

These inspection points are representative of a typical preventive maintenance routine. Use Section 8 - MAINTENANCE INSPECTION SCHEDULE as a detailed guide for all machine inspection and for suggested scheduled periods.

SECTION 2

OPERATION

2.1 GENERAL

This section provides the operator with the location and explanation of the controls, instructions for machine operation, and certain maneuvering techniques.

Throughout this section and manual, 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.

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

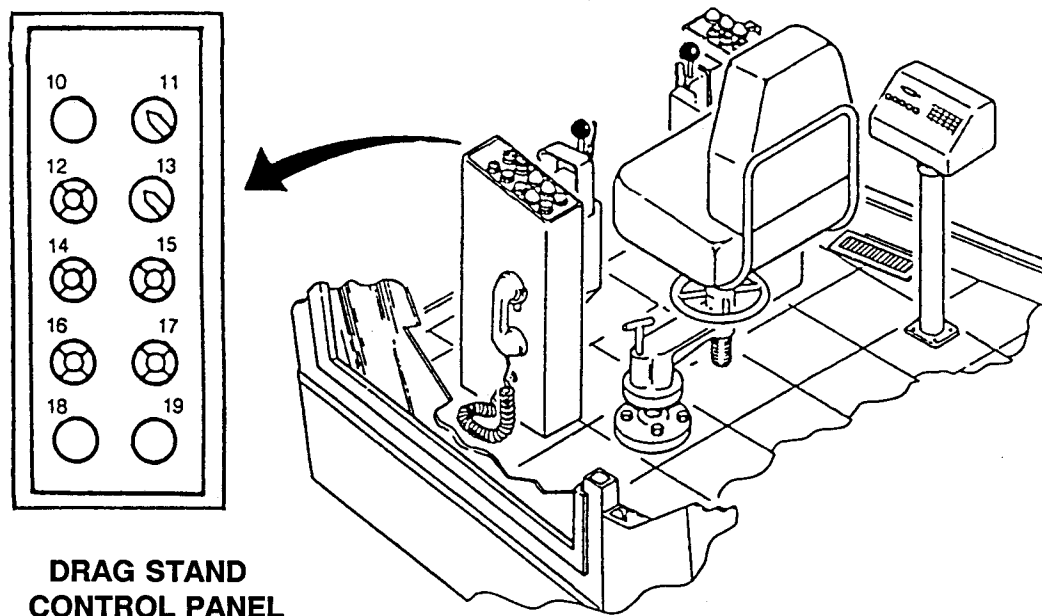
The operator's seat has adjustments for positioning it to the best location to suit individual operators. The operator should always adjust the seat to suit before taking over the controls. See the adjustment procedure following later in this section.



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, swing, and propel - are activated by the operator using the two lever controllers positioned to the right and left of the operators seat, and the swing pedals on the floor in front of the seat. These are the primary controls. Moving any of these off their neutral position, when the drives are activated, will initiate motion.

The secondary controls are the ones mounted in the console next to the operator. They are the necessary lights, switches, pushbuttons, and controller programs to support the primary controls. Also located here are components that signal the operator and announce faults in selected systems on-board.



The following items are on the drag stand control panel:

10. WINDOW - A three position selector switch used to open or close the retractable front cab window. **BE SURE TO UNLOCK FRONT CAB WINDOW BEFORE OPERATING WINDOW MECHANISM WITH THIS SWITCH.**

To OPEN window, move switch to its UP position from its SEAL position and wait a little bit for the seal to deflate. Depress button and hold it down until the window is fully retracted into the cab above the operator. The window will stop raising whenever the button is released.

To CLOSE the window, move the switch to its DOWN position. Press the button and hold it down until the window is fully lowered into the cab window frame. The window will stop lowering whenever the button is released. After the window is closed, move the switch to its SEAL position to reinflate the window seal. Relock the cab window to the frame.

11. WIPER - OFF/ON - A two position selector switch for controlling the electrically powered wiper assembly on the front cab window.

MAINTENANCE NOTE ON WIPER: Maintain wiper sweep by adjusting the rod between the gear reducer and the wiper pivot. The wiper pressure on the glass is adjusted by the nut on the spring rod located at the top of the wiper arm outside the window.

2.6 TYPICAL START-UP

To start up the machine from a completely shutdown condition, use the following procedure. DO NOT start this machine unless you are completely familiar with the various controls. Perform the Pre-Start Inspection given on the previous page.

1. All the circuit breakers for the applicable controls and equipment must be closed and power on before proceeding with start-up. These are located primarily on the outside of the Power Control Room (PCR) and in the Operator's Cab/Anteroom.



CAUTION: DO NOT use circuit breakers as ON/OFF switches. Make sure that all the circuit breakers are ON before starting the machine.

2. Go to the rear of the PCR and to the Starting and Metering Cabinet. Observe the various meters and the start-up controls and that the PHASE CHECK light is on.
3. If the selector switches for the two Air Compressors are not already set at AUTO, position both of them there now to activate both compressors.

IMPORTANT NOTE: During each component start-up, always be ready to immediately stop it if there are any unusual sounds, smells, or visual effects. Always let the system being started come up to its normal operating speed before starting the next system. Any time a problem arises, check the ANNUNCIATOR PANEL in the Operators cab for assistance.

4. Start the motor blowers by pressing and releasing the START pushbutton. These blowers are used in cooling the DC motors. Check that the green indicator is lit and for the sound of the blowers.
5. Start the exciter set by fully pressing and releasing the START pushbutton. Observe that the green indicator is lit and that the DC voltmeter indicates the exciter is up to operating speed. Set the FRAME EXHAUST FANS control to AUTOMATIC.
6. Start the No.1 M.G. Set by fully pressing and releasing the START pushbutton. Be sure that both green indicators are lit and that all meters are stabilized.
7. Start the No.2 M.G. Set in a similar manner to the No.1 M.G. Set.

IMPORTANT NOTE: If the vacuum breaker for the synchronous motor on the M-G set does not stay closed when the start button is released, repeated attempts to start the set should not be made. On a motor of this type, Nema standard permit two successive starts if the motor is at ambient temperature. Before attempting another start, the vacuum breaker starting circuitry or mechanism should be inspected by qualified personnel and its proper operation verified.

2.10 SHUTDOWN

PARTIAL SHUTDOWN

A partial shutdown, for shift change or a lunch break, begins with a full machine rotation to reposition the roller circle and promote even wear.

Lower the bucket to the ground. Place both controllers in their neutral position. Place hoist, drag, propel, and swing brake selectors in the SET position (red indicator lights out). De-activate the controller circuits by pushing STOP button on Operator Console (green light in START button will go out).

COMPLETE SHUTDOWN

A complete shutdown procedure starts with the steps listed under PARTIAL SHUTDOWN. Then the operator must go to the controls at the START-UP AND METERING cabinet located outside the power control room (PCR).

To completely shut down the machine perform the following to the controls on the START-UP panel:

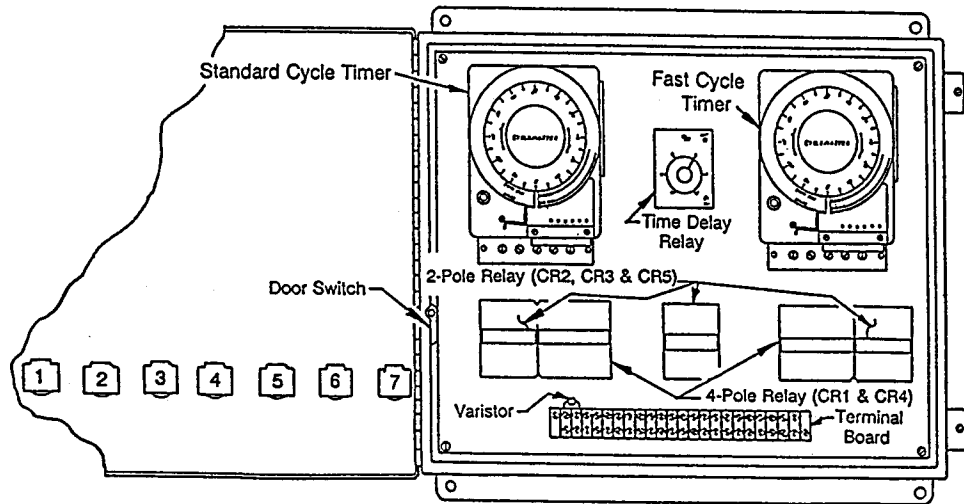
- Press the M-G set STOP buttons.
- Press the motor blowers STOP buttons.
- Move each filter fan selector switch to STOP.
- Turn each air compressor selector to OFF only if machine is to be stopped for an extended period of week or over.
- Set anti-condensation heater selector to suit ambient conditions:
 - to AUTO if damp or cold;
 - to OFF if not required.

The machine is now shutdown and ready for inspection, maintenance, etc.



CAUTION: INCOMING ELECTRICAL POWER EXISTS TO THE TRANSFORMERS, CABINETS, COLLECTOR RINGS, ETC. SO OBSERVE CORRECT CAUTIONS AND WARNINGS, AS INDICATED THROUGHOUT THE MACHINE AND SPECIFIC EQUIPMENT MAINTENANCE MANUALS. SAFETY FIRST IS BEST.

NOTE: Pages 3.3.4, 3.3.5, 3.3.6 and 3.3.7 do not apply to machines equipped with Programmable Control Panels. Refer to Manual No. 2159 for adjustments and settings.



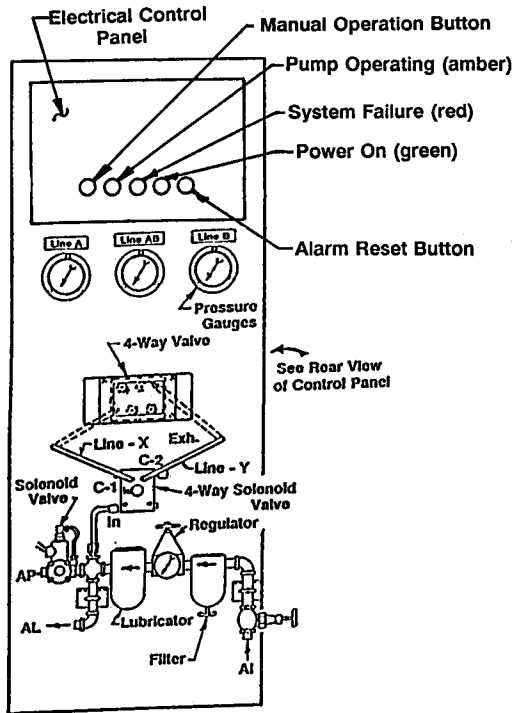
**CONTROL PANEL - ROTATING FRAME & OPEN GEARS
(Shown with door open)**

Two of these panels are used. One for the Rotating Frame MPG system and the other for the Open Gears system. The panel design provides for standard cycle time while digging and fast cycle time during propel. Each panel has 2 timers as well as indicators for both proper operation and failure to cycle. Set the control panels per the chart below:

	Rot. Frame (MPG)	Open Gears (OGL)
Standard Cycle Time (minutes)	20	10
Fast Cycle Time (minutes) (Outside pins to be 4 pin spaces behind the inside pins)	2.5	2.5
Alarm Timer - Time Delay Relay (seconds) . .	100	90
Air Pressure Regulator (PSI)	80	80
End-of-Line Pressure Switches (PSI)	2500	2500

NOTE: See page 3.3.7 for the electrical schematics.

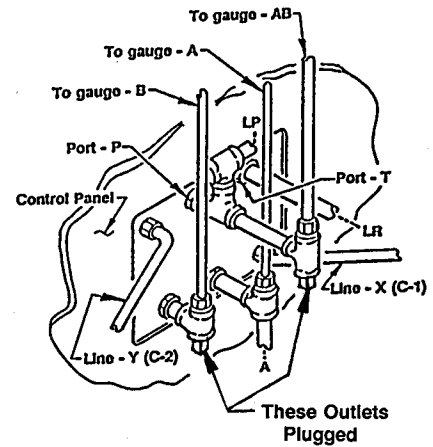
CONTROL PANEL SETTINGS



LEGEND

AI - Air Inlet.
 AP - Air to Pump.
 AL - Air to Lifter.
 A - Lube supply A.
 LP - Lube from Pump.
 LR - Lube Return.

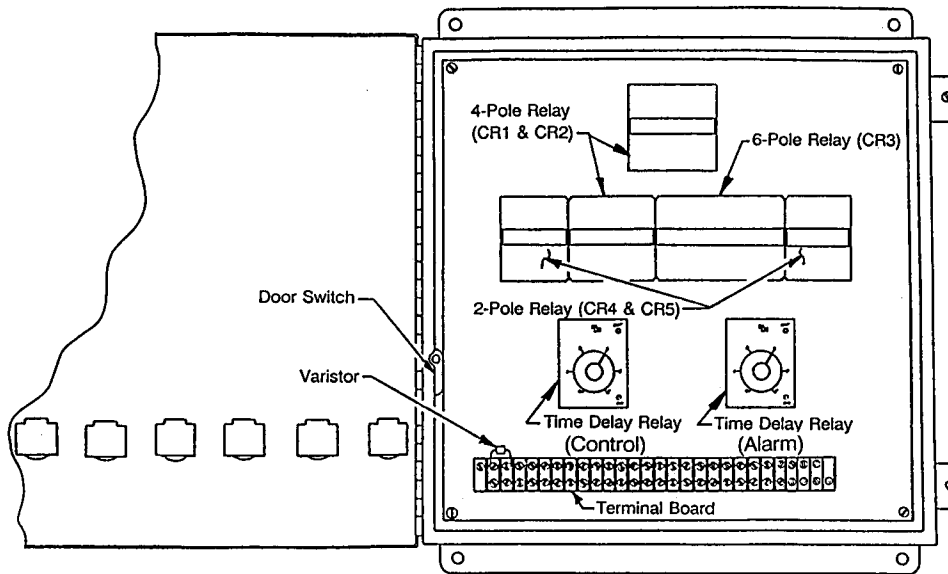
AUTO LUBE CONTROL PANEL



REAR VIEW OF 4-WAY VALVE ON CONTROL PANEL

AUTO LUBE CONTROL PANEL PIPING

NOTE: Pages 3.7.4 and 3.7.5 do not apply to machines equipped with Programmable Control Panels. Refer to Manual No. 2159 for adjustments and settings.



**PROPEL BEARINGS CONTROL PANEL
(Shown with door open)**

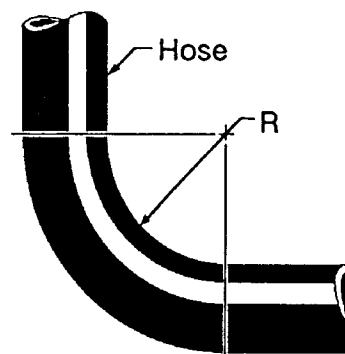
This control panel is designed to provide adjustable control of the directional control valves and lubricant pumps of the dual-line Propel autolube system. This panel has indicators for proper operation and failure to lubricate. When the machine is in normal operation, the Propel Machinery is not lubed. During PROPEL mode, the Propel machinery is constantly fed with lubricant. A green light indicates that the system is operating in the propel mode. Set the control panels per the chart below:

	Propel (MPG)
Control Timer - Time Delay Relay	40
Alarm Timer - Time Delay Relay (seconds) .	60
Air Pressure Regulator (PSI)	60
End-of-Line Pressure Switches (PSI)	2500

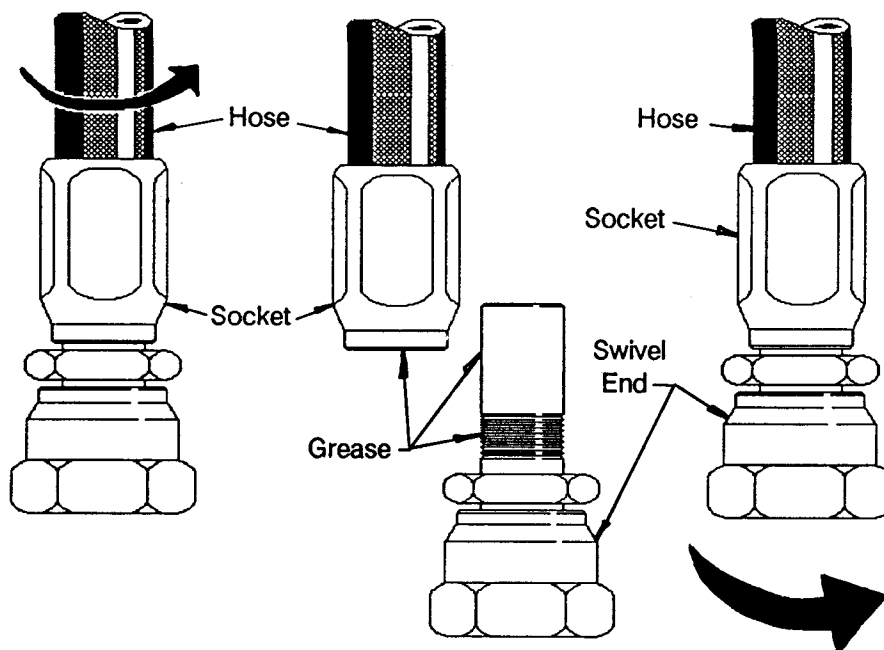
CONTROL PANEL SETTINGS

MINIMUM HOSE BEND RADIUS

MPSD HOSE NO.	MINIMUM BEND RADIUS (R)	
	inch	mm
R5-5	3.38	86
R2-8	7	178
R2-12	9.5	241
R2-16	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
CENTER JOURNAL					
Center Journal Bearing	Anti-Friction	4	In top of Bearing Retainer	MPG	Automatic
Center Journal Bushing	Bushing	8	In top of Bearing Retainer	OGL or MPG	Automatic
Collector Ring Mount - Bottom	Nylatron Bushing	2	In bracket below Housing	MPG	By hand, 12 months
Collector Ring Mount - Top	Oilite Bushing	1	In top of Housing	--	Self-lubricating
Collector Ring Mount - Bottom Thrust	Nylatron Bushing	2	Top of Sleeve Flange	MPG	By hand, 12 months
ROTATING MACHINERY (5 places)					
Main Rotating Gear Case	--	--	Fill at Air Filter to oil level in side of case	GL	Check weekly 360 gal (1362 litersr)
Main Rotating Shaft Top Brgs.	Anti-Friction	2	From Gear Case	GL	--
Motor Extension Shaft Bearings	Anti-Friction	2	From Gear Case	GL	--
Rotating Motor Coupling	Gear	2	Plug in Coupling Flange	MPG	3 months,by hand keep coated
Rotating Pinion And Gear	Pinion	2	Drip on	OGL	Automatic, keep coated
Intermediate Shaft Bearings	Anti-Friction	2	From Gear Case	GL	--
Rotating Brake	Bushing	6	In Linkage and Shoe Pins	MPG	By hand, weekly

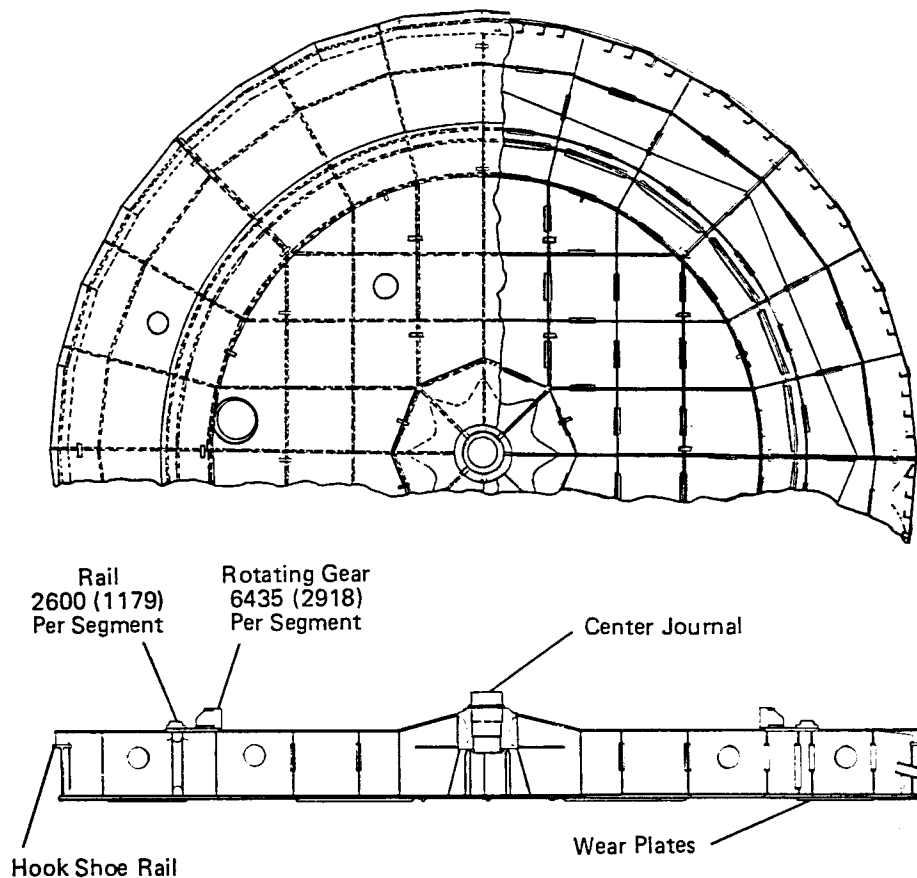
SECTION 4

MECHANICAL MAINTENANCE

4.1 TUB

The TUB or BASE FRAME ASSEMBLY requires little maintenance. Manholes in the top plate and bulkheads provides access for inspection. No access holes are provided in bulkheads beneath the roller circle, as all access to the interior of the tub, both inside and outside the roller circle, is through the top plate.

Check this structure at regular intervals for; cracks, broken welds, deformed bottom plates or bulkheads, any of which may be caused by working over rocks or uneven ground. Note particularly any bent or damaged plates in the roller circle area, rotating gear or center journal. Look for the effect on flatness or alignment of components. Repair ALL damage promptly. Keep the tub area clean and DRY.



TUB - BASE FRAME ASSEMBLY

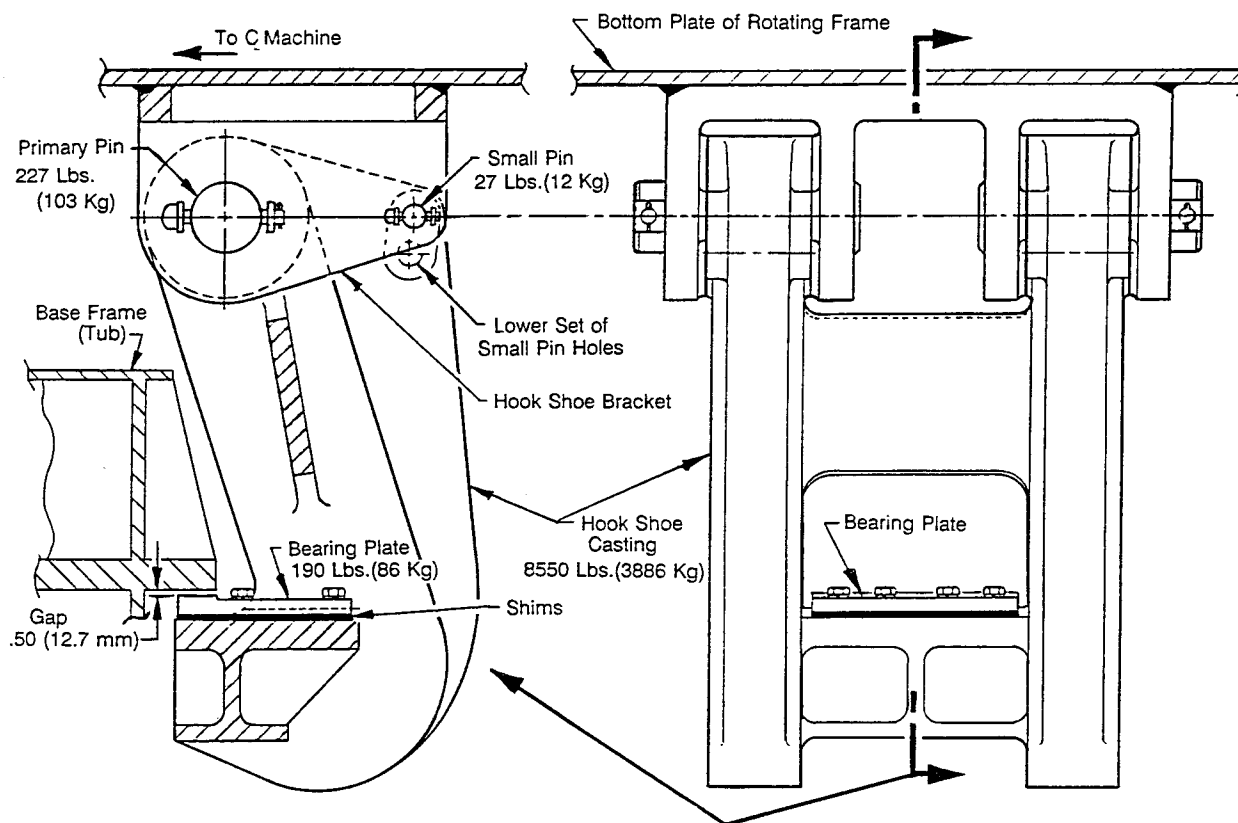
4.4 HOOK SHOES

Two HOOK SHOES lift the leading edge of the tub during the walking step. Each hook shoe is pinned to support brackets that are welded into the bottom plate of the rotating frame, toward the rear of the machine.

There should be a running clearance of .50 inch (12.7 mm) between the hook rail on the tub and the bearing plate on the hook shoe. To adjust this running clearance, add or remove shims between the bearing plate and the hook shoe casting.

To disengage the hook shoe:

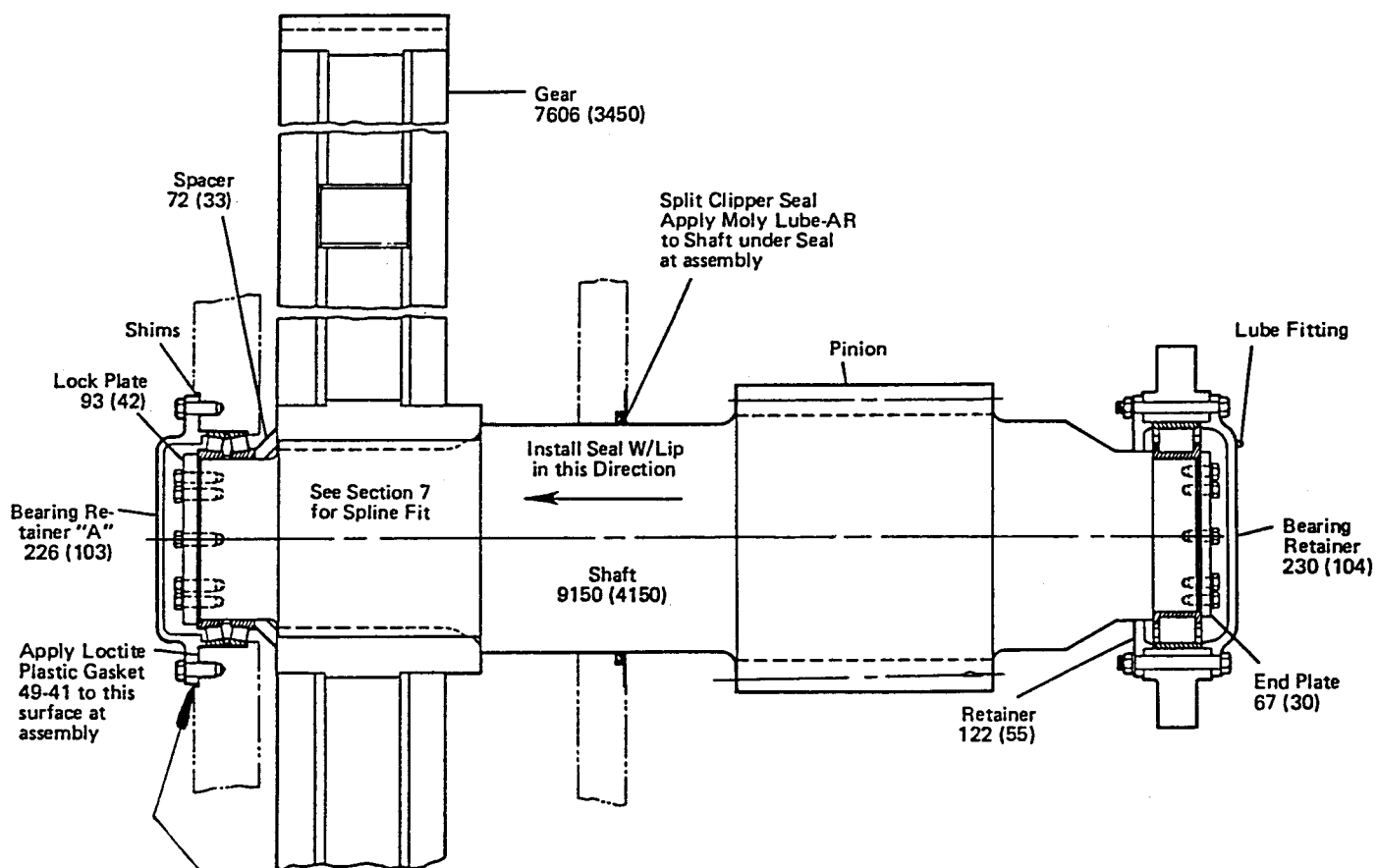
1. Remove the 2 small rear pins by pulling their cotter pins and T-Head pins.
2. Swing the hook shoe CASTING toward the rear of the machine (away from the CL Machine).
3. Insert the same 2 pins back thru the hook shoe BRACKET and on thru the bottom set of holes in the hook shoe CASTING.



HOOK SHOE INSTALLATION

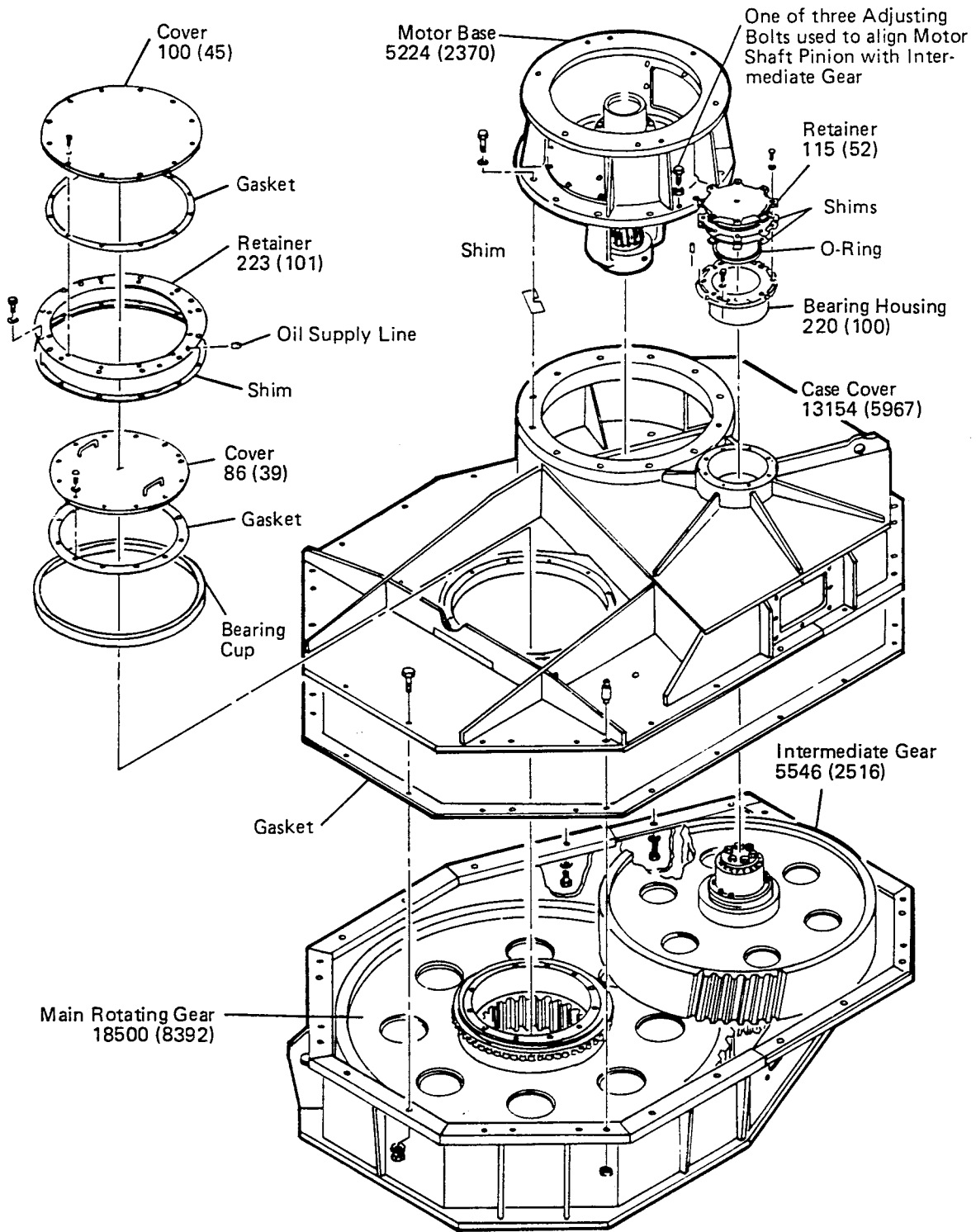
SECOND INTERMEDIATE PROPEL SHAFT ASSEMBLY

The SECOND INTERMEDIATE PROPEL SHAFT ASSEMBLY is a large diameter helical gear splined to the propel pinion shaft which drives the main propel shaft. No eccentrics are provided with this assembly.



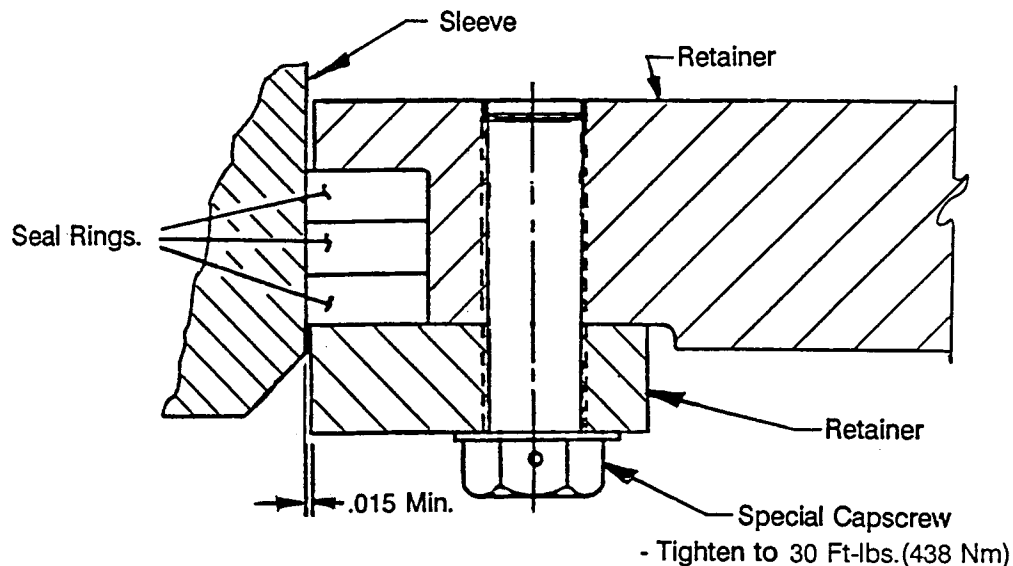
Assemble the bearing retainer without shims, using 6 equally spaced capscrews. Tighten the screws evenly to seat the bearing cup. Measure the gap between the case and the retainer flange, average the dimensions and install the required shims to fill the gap.

SECOND INTERMEDIATE PROPEL SHAFT



ROTATING GEARCASE ASSEMBLY
 (Exploded view of top portion of gearcase)

MAIN ROTATING SHAFT SEAL INSTALLATION



VIEW - C

NOTES:

1. Verify that clearance exists all around between the sleeve and the retainer after assembly.
2. Coat the I.D. of the sleeve with a silicone grease (valve seal lubricant or equal).
3. Insert the seal rings with their splits 120° apart.
4. The seal rings are pre-cut to the correct length - DO NOT CUT OR OVERLAP ENDS. The seal ends should match - the ends can be stretched or squeezed back to make the ends match.
5. Initial compression in the seal rings to be .12 inch.
6. Tighten the capscrews to 30 Ft.Lbs. and wire lock in pairs.

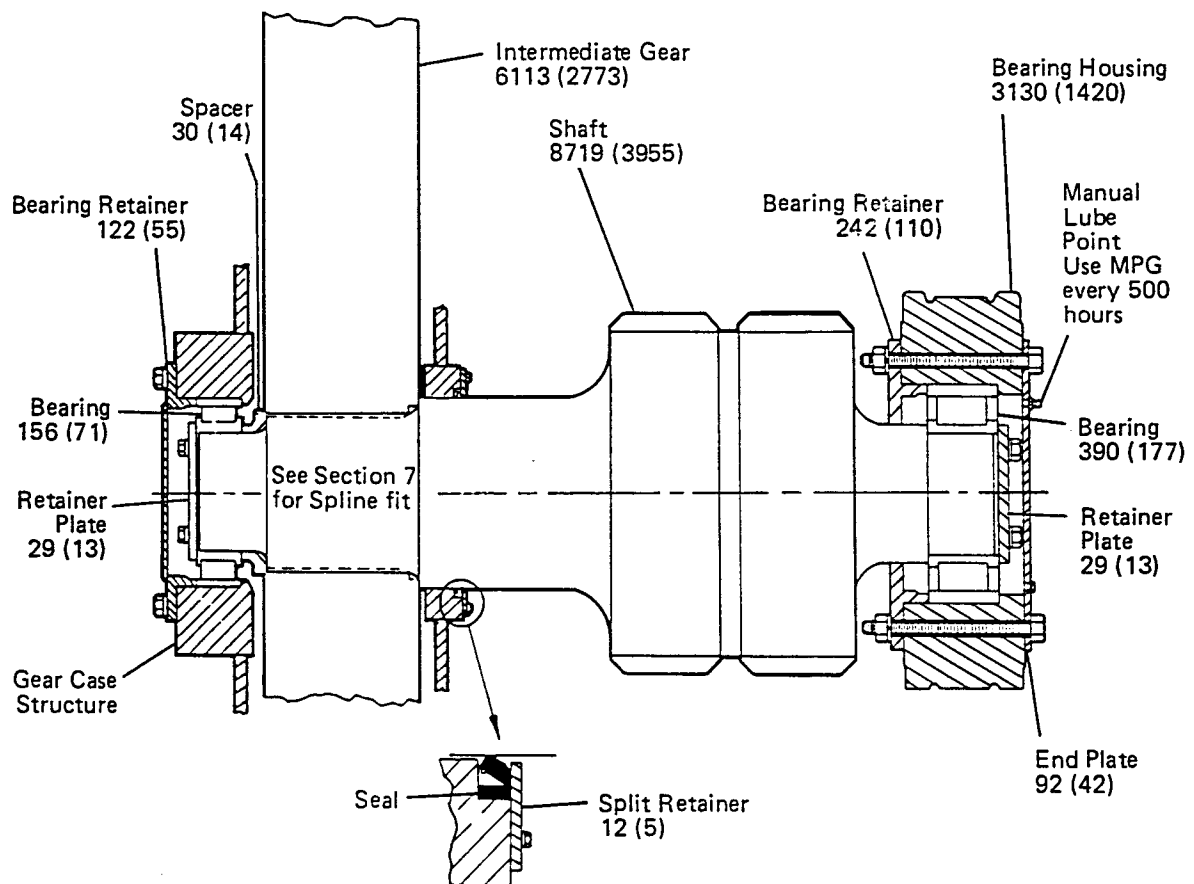
DRUM LAGGING

Drum lagging repairs are normally performed with the drum in place. When lagging repairs are required, contact the Dresser Marion Division, Service Representative or Service Department for assistance.

DRAG INTERMEDIATE SHAFT ASSEMBLY

The Intermediate Shaft Assembly consists of a double helical gear, a double helical pinion shaft, bearings and a bearing housing.

The intermediate gear is splined to the intermediate shaft with integral pinion which is supported by two single row roller bearings. The bearing on the gear end of the shaft is mounted in the boss of the gear case while the other bearing is mounted in a housing which is pinned to the gear case structure.



DRAG INTERMEDIATE SHAFT ASSEMBLY

Notes:

1. Install the seal with the split at the top of the shaft assembly.
2. Coat the shaft in the seal area with Molycote M-8800.
3. For installation of O-Ring Seal Refer to Page 4.8.27.

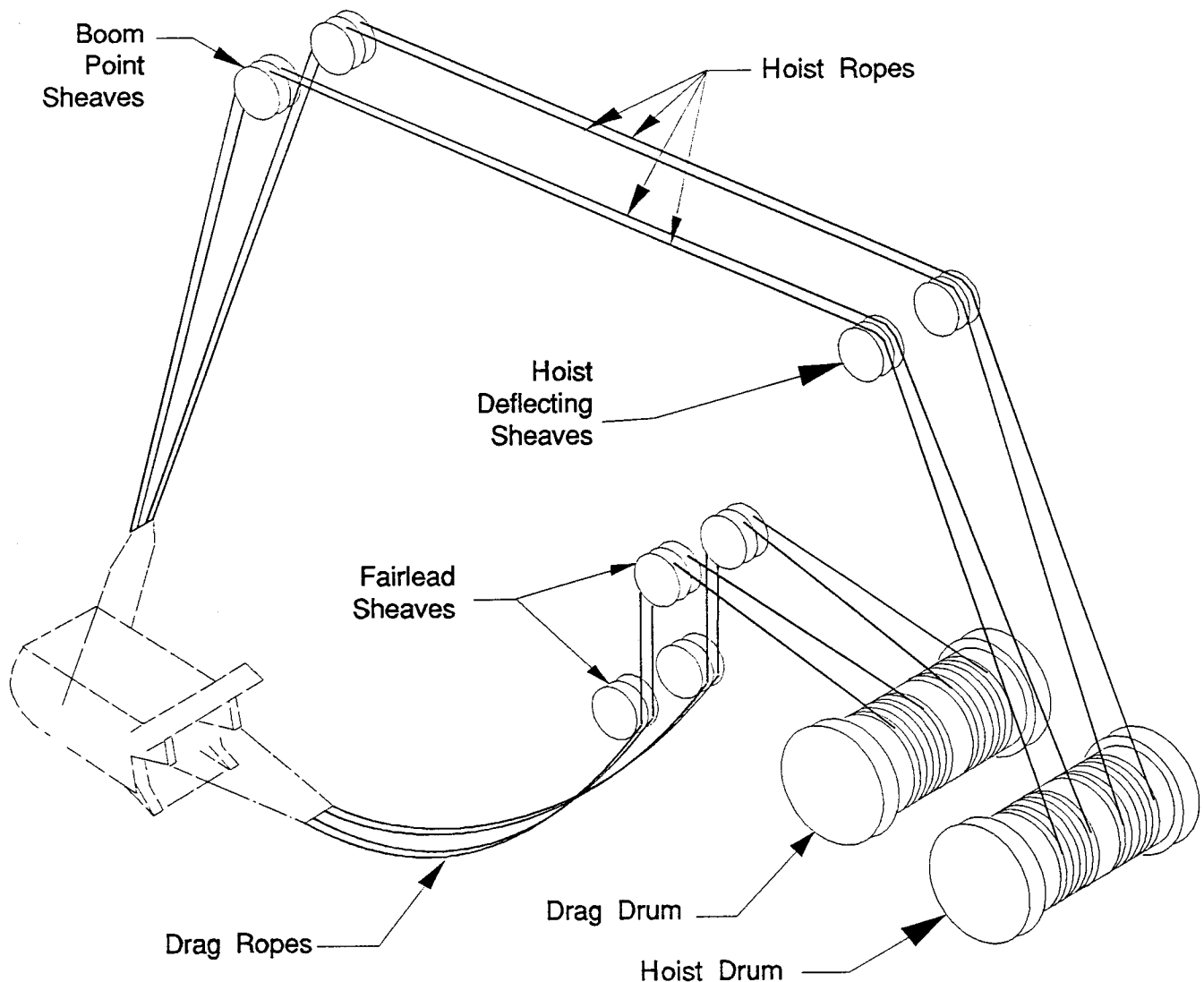
4.9 HOIST & DRAG ROPES

The Hoist and Drag ropes are subjected to the greatest wear at or near the bucket. If the ropes show excessive wear in this area, the worn section should be cut off. Be sure to reset drum limit switch.

HOIST & DRAG ROPE REEVING

The hoist and drag ropes are expendable wear items. The operator should make a habit of watching the ropes for damage during the digging cycle. Resocket or replace ropes before they fail completely.

There are 4 hoist and 4 drag ropes required per machine. They are all 3.0 inches diameter, 6 x 37 class, I.W.R.C., E.I.P.S., preformed, Langlay with a Becket loop on each end to assist in reeving and handling.



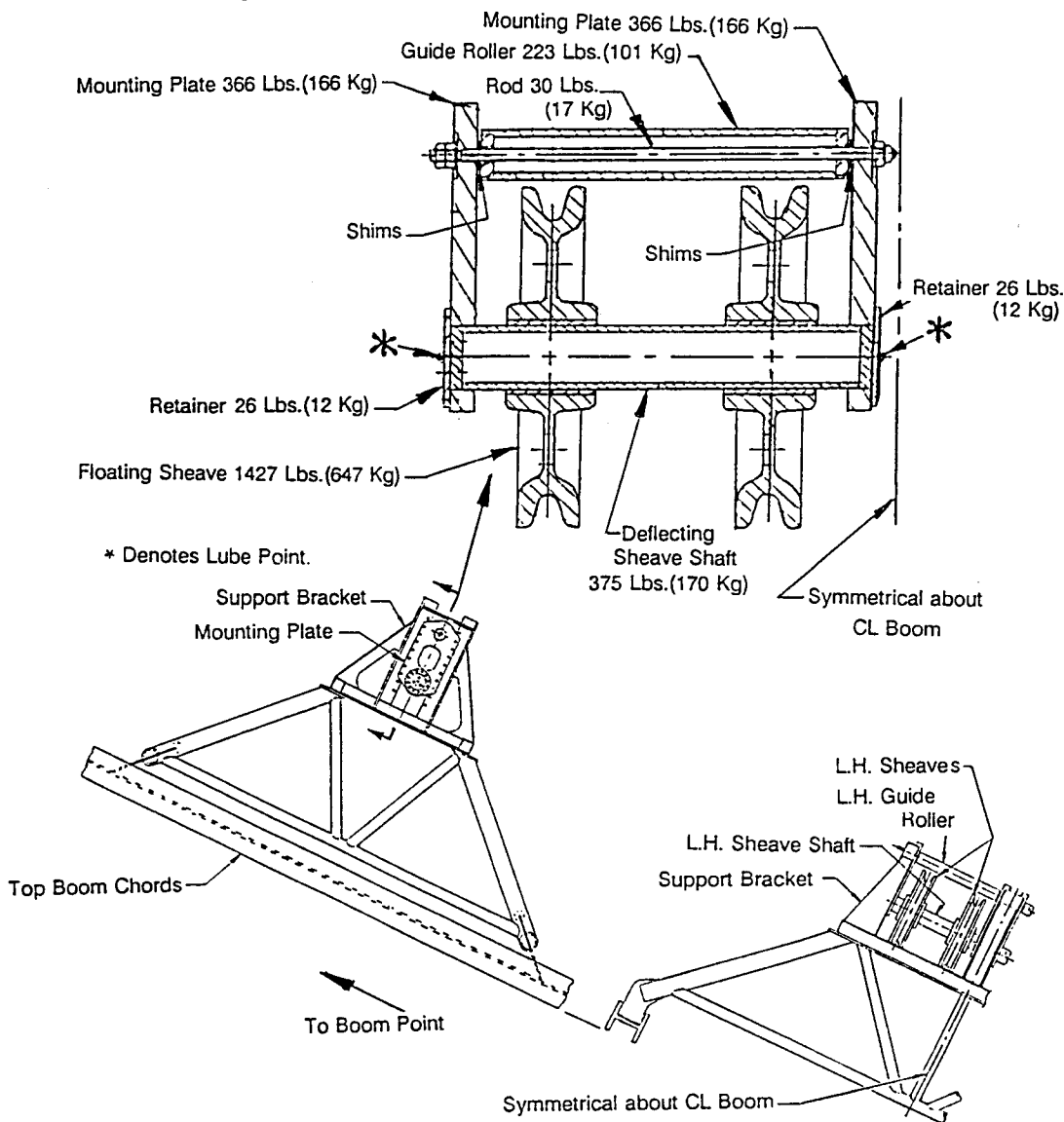
REMOVAL OF BOOM POINT SHEAVE ASSEMBLY

1. Lower boom to horizontal position, supporting it with cribbing suitably placed on ground. See METHOD OF LOWERING THE BOOM in this section.
2. Remove the rope guard from the boom point and disconnect any auto lube lines from sheave assemblies. Plug and cap lines and lube entry points to guard against contamination.
3. Secure the two sheaves so they cannot oscillate on the shaft during removal.
4. Loosen the boot clamps at each end of the point shaft and move the boots toward the sheaves so they are out of the way.
5. Remove the front torsion bar support with bushing for both sheave assemblies.
6. Remove the cap plate, lock plate, and three shims from the rear of each torsion bar. Slide the torsion bars out of their front lock plate. DO NOT scratch or dent surface of torsion bars while handling. Protect them carefully at all times.
7. Thread the two lifting eye bolts originally supplied with the point shaft thru each bearing cap into the holes in the shaft. The eye bolts are 20 ton (18.2 metric tons) capacity with 1.75-5UNC-2A threads (Dresser-Marion P/N 147584-3).
8. Attach suitable lifting equipment to the eye bolts and snug it up enough to support the sheave assembly.
9. Loosen the bolts holding the retainers on each end of the shaft and remove the four capscrews holding the two bearing caps to the boom point structure.
10. Lift the point shaft assembly from the boom. The weight of this combined assembly is 39560 lbs (17942kg). Place it in a support rack for transport to a shop. Remove the bearing caps from the shaft for reassembly to the boom point.

9. Lift both sheaves out of the support bracket and lower them to the ground.
10. Attach the shaft to lifting equipment, finish withdrawing it from the outboard mounting plate, and lower it to the ground.
11. Finish disassembling the parts as needed for inspection and repair/replacement.
12. Repeat procedure to remove other two sheaves.

Reassembly is the reverse of disassembly.

- a. Fill the cavity of the sheave shaft with MPG lube.
- b. Use shims at the ends of the guide roller to reduce its end play.
- c. Purge the air from the lube lines when reconnecting them and lube all the bushings in the assembly before start-up.



HOIST ROPE DEFLECTING SHEAVES ON THE BOOM

ACCUMULATOR RECHARGE

To recharge an accumulator, the hydraulic pressure in the system **must** be vented.

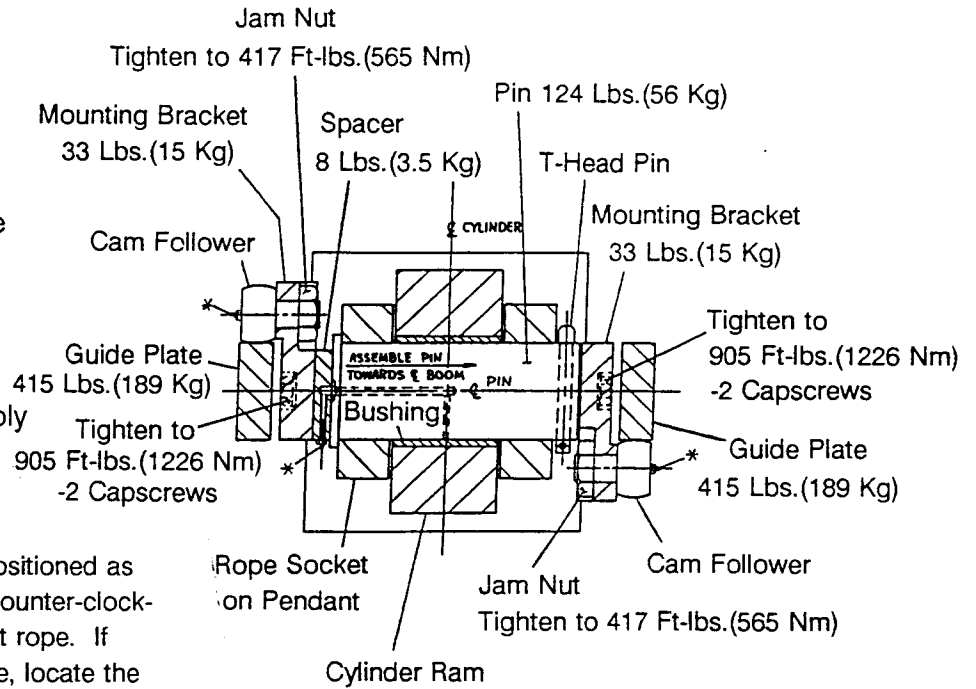
After performing steps 1 thru 6 on page 4.10.21 to check the charge;

7. Remove the plug from the gas supply control valve near the intermediate boom support cylinder on the boom and connect the hose end of the nitrogen charging assembly to the valve. Be sure the valve is CLOSED.
8. Take the cap off the charging valve on the end of the accumulator and connect the gas valve on the nitrogen charging assembly to the charging valve. The bleed valve should be CLOSED and the gas valve handle turned OUT.
9. If the gas charge pressure in the accumulator is **too high**, proceed as follows.
 - a. Turn the nut on the gas valve counter-clockwise 3 or 4 turns. This nut is designated "*" on page 4.10.22.
 - b. Turn the handle on the gas valve in.
 - c. Open and close the bleed valve repeatedly, letting the nitrogen exhaust, until the specified charge is obtained.
 - d. Turn the handle on the gas valve out.
10. If the gas charge pressure in the accumulator is **too low**, proceed as follows.
 - a. Open the delivery valve on the nitrogen bottle inside the machinery house. Be sure the bleed valve there is CLOSED.
 - b. Open the gas supply control valve on the boom.
 - c. Open the bleed valve on the nitrogen charging assembly for 30 seconds or so to bleed any air from the nitrogen supply line.
 - d. Close the bleed valve.
 - e. Turn the nut on the gas valve counter-clockwise 3 or 4 turns. This nut is designated "*" on the accompanying illustration.
 - f. Turn the handle on the gas valve in.
 - g. Nitrogen from the bottle will flow into the accumulator. When the specified charge pressure is reached, turn the handle on the gas valve out.

LINES LEGEND:

- A - Air Supply
- P - Hydraulic Pressure
- T - Tank Return
- B - Breather Air
- N - Dry Nitrogen Supply

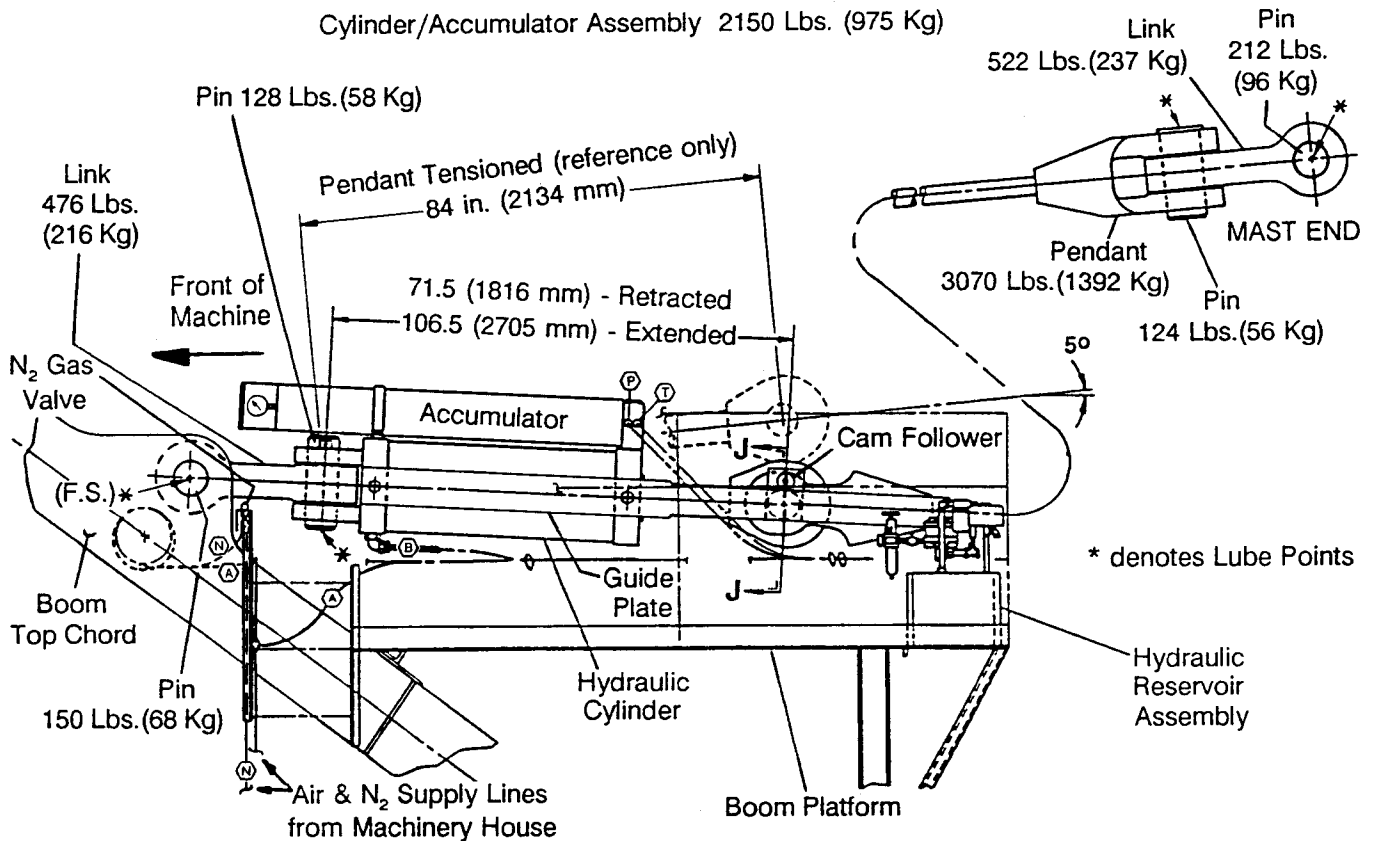
NOTE: Cam followers positioned as shown counter-act the counter-clockwise twist of the pendant rope. If the rope twists clockwise, locate the cam followers 180° from the position shown.



SECTION J-J

Pendant Anti-Rotational Device

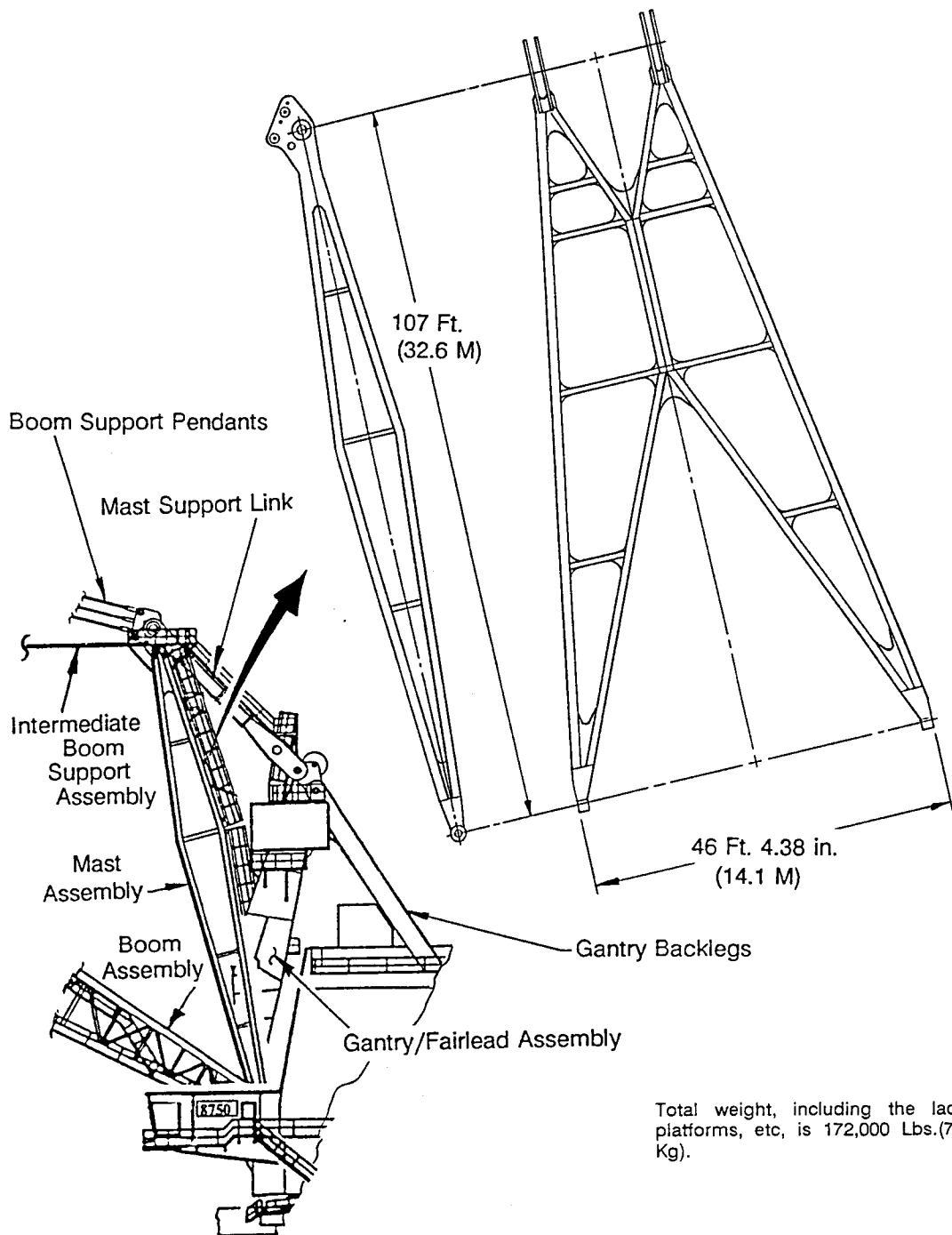
Cylinder/Accumulator Assembly 2150 Lbs. (975 Kg)



VIEW OF THE INTERMEDIATE BOOM SUSPENSION
(Left hand side shown)

4.11 MAST ASSEMBLY

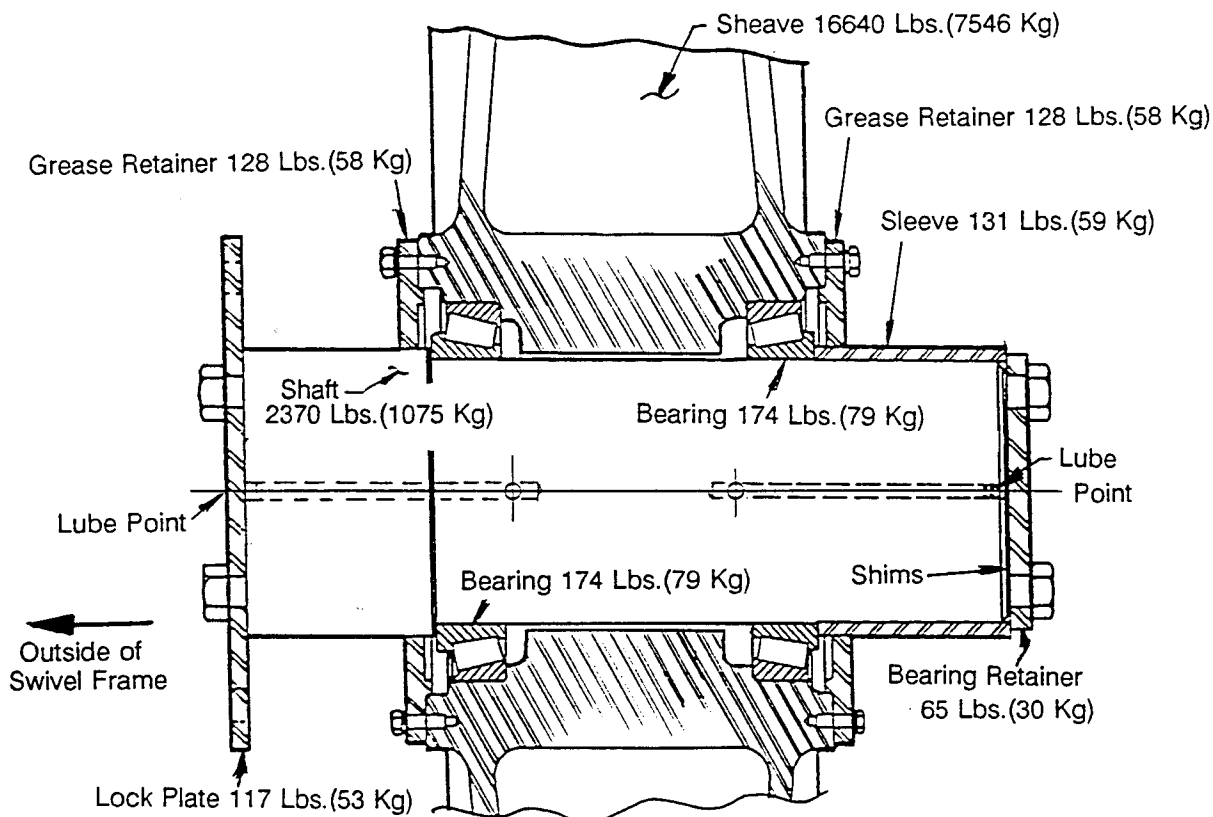
The Mast Assembly is a welded structure, pin connected to the front girder of the rotating frame just inside the boom foot lugs. It is a part of the boom support system. The main and intermediate boom support ropes are attached to the top of the mast. The mast is held in place by the support link that connects it to the head of the gantry.



Total weight, including the ladders, platforms, etc, is 172,000 Lbs.(78,000 Kg).

MAST ASSEMBLY

Note: The gap "x" between the top of the thrust collar and the machined boss in the gantry structure is dependent upon the amount the contact plate extends above the groove in the collar. The contact plate must always protrude from the thrust collar. When both the top and bottom thrust washers are new and the contact surfaces on the swivel frame and gantry are not worn any, then shimming under the contact plate halves so it protrudes .12 inches (3 mm) above the thrust collar will provide the minimum running clearance for the swivel frame of .03 inches (.8 mm) when installed.



SECTION C-C
LOWER FAIRLEAD SHEAVE ASSEMBLY
 (Right side shown as viewed from the front of the machine)

LOWER FAIRLEAD SHEAVES

Two identical Lower Fairlead Sheaves are assembled, one each, into the frames located on the front, lower portion of the gantry structure. Each sheave is supported by a fixed shaft and rotates on two single-row, tapered roller bearings. They are double-grooved sheaves and support two drag ropes each.

11. Lift the sheave and pull it into place in the gantry structure. Insert the shaft thru them from the outside. BE SURE THE BEARINGS ARE NOT INTERMIXED DURING THIS ASSEMBLY.
12. Insert the sleeve into the inboard bore of the gantry structure and assemble the prepared shimpack from step 8 and the bearing retainer to the end of the shaft. Just snug up the capscrews at this time.
13. Assemble the lock plate to the outboard end of the shaft and gantry. Torque the capscrews equally in a diametrical pattern using intermittent tightening steps to 1800 lb-ft (2439 N.M). Lockwire them in pairs.
14. Tighten the nine bearing retainer capscrews equally in a diametrical pattern using intermittent torquing steps to 1800 lb-ft (2439 N.M). Rotate the sheave one or two revolutions between each tightening step to insure the bearings are properly seated. Lockwire them in pairs.

IMPORTANT: When assembled, there should be no end play between the sheave and the shaft. To be safe, one should recheck the shim gap by repeating steps 4 thru 8 during this assembly to the gantry structure to insure the shim-pack thickness is correct before performing step 14.

15. Finish pre-lubing the bearings by pumping MPG into them thru the access ports in the shaft. Reconnect the auto lube lines. Be sure to purge the air from them during reassembly.
16. Reassemble the rope guard to the gantry structure.
17. Remove all blocking, tools, and lifting equipment from the machine.
18. Install the two drag ropes removed. See the procedure in section 4.9 of this manual. The machine is now ready for operation.

Cracks or breaks in the main body of the chain links can be repaired by welding. Follow the weld procedure for CFE material (500° preheat, 11018 or 9018 weld rod). Failure to use the proper preheat will result in weld failure.

WEIGHT OF MARION BUCKET & COMPONENTS

Below is a list of weights for the bucket supplied on this Model 8750:

	Lbs.	Kgs.
Naked Bucket w/wear Package	116500	52835
Wear Package	13600	6170
Rigging	65200	29570
for Hoist Ropes	34020	15440
Each Dump Block Assembly	1590	720
Each Dump Rope	1000	450
for Drag Ropes	26000	11790
Tooth Assembly - each of 8	570	259
Tooth Tip	124	56
 Total Wt. of Bucket Assembly	 186260	 84470

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.
4. Open the air valve slowly and observe both gauges simultaneously for a positive reading.
5. Set the pressure as determined by ambient temperature (see the chart below), close the air valve and separate the quick disconnect coupling.

AMBIENT TEMP.		GAUGE PRESS.		AMBIENT TEMP.		GAUGE PRESS.	
°F	(°C)	PSI	(kPa)	°F	(°C)	PSI	(kPa)
-30	-34.5	9.5	65	60	15.5	14.5	100
-20	-29.0	10.0	69	68	20.0	14.5	100
-10	-23.0	10.5	72	80	26.5	14.5	100
0	-18.0	11.0	76	90	32.0	14.5	100
10	-12.0	11.5	79	100	37.5	14.5	100
20	-6.5	12.5	86	110	43.5	14.5	100
30	-1.0	13.0	90	120	49.0	14.5	100
40	4.5	13.5	93	130	54.5	14.5	100
50	10.0	14.0	97	140	60.0	14.5	100

PROCEDURE WHEN LOSS OF AIR OCCURS

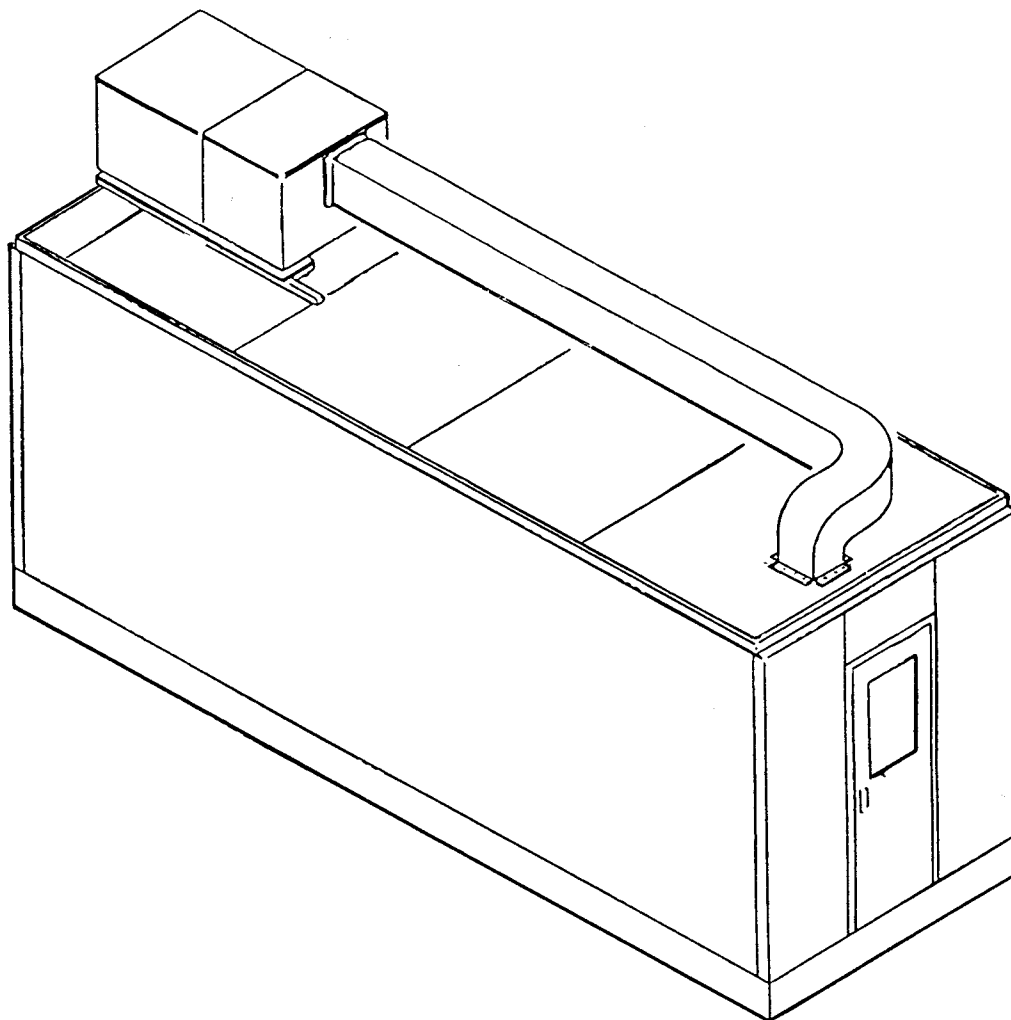
1. Reset the air pressure.
2. Check all charging and monitoring hardware for leaks.
3. Check all weld seams over the intire weldment for air leaks.
4. Make any necessary repairs.
5. Repeat the charging procedure.

6.3 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.

The PCR is completely factory wired. Only the input and output connections must be made during field erection.



**Refer to the
ELECTRICAL INSTRUCTION MANUAL
for Detailed Electrical Information**

**Refer to the
MARION PROGRAMMABLE SYSTEM
for DRAGLINE PROTECTION
Manual No.2158**

**Refer to the
MARION PROGRAMMABLE SYSTEM
for AUTOMATIC LUBRICATION
Manual No.2159**

Dresser provides (under separate cover) a parts book from the electrical manufacturers in addition to the information supplied in this section and the above sources.

**TABLE 1
RUNNING CLEARANCES FOR BRONZE BUSHINGS
Inches (Millimeters)**

Nominal Diameter	Shaft Outside Diameter	Running Clearance	Nominal Diameter	Shaft Outside Diameter	Running Clearance
35.00 (889.0)	35.000-34.994 (889.000-888.847)	.046-.068 (1.168-1.727)	39.25 (996.95)	39.250-39.244 (996.950-996.797)	.051-.073 (1.295-1.854)
35.25 (895.35)	35.250-35.244 (895.350-895.197)	.046-.068 (1.168-1.727)	39.50 (1003.3)	39.500-39.494 (1003.300-1003.147)	.051-.073 (1.295-1.854)
35.50 (901.7)	35.500-35.494 (901.700-901.547)	.046-.068 (1.168-1.727)	39.75 (1009.65)	39.750-39.744 (1009.650-1009.497)	.052-.074 (1.320-1.879)
35.75 (908.05)	35.750-35.744 (908.050-907.897)	.048-.070 (1.219-1.778)	40.00 (1016.0)	40.000-39.994 (1016.000-1015.847)	.052-.074 (1.320-1.879)
36.00 (914.4)	36.000-35.994 (914.400-914.247)	.048-.070 (1.219-1.778)	40.25 (1022.35)	40.250-40.244 (1022.350-1022.197)	.052-.074 (1.320-1.879)
36.25 (920.75)	36.250-36.244 (920.750-920.597)	.048-.070 (1.219-1.778)	40.50 (1028.7)	40.500-40.494 (1028.700-1028.547)	.052-.074 (1.320-1.879)
36.50 (927.1)	36.500-36.494 (927.100-927.947)	.048-.070 (1.219-1.778)	40.75 (1035.05)	40.750-40.744 (1035.050-1034.897)	.054-.076 (1.371-1.930)
36.75 (933.45)	36.750-36.744 (933.450-933.297)	.049-.071 (1.244-1.803)	41.00 (1041.4)	41.000-40.994 (1041.400-1041.247)	.054-.076 (1.371-1.930)
37.00 (939.8)	37.000-36.994 (939.800-939.647)	.049-.071 (1.244-1.803)	41.25 (1047.75)	41.250-41.244 (1047.750-1047.597)	.054-.076 (1.371-1.930)
37.25 (946.15)	37.250-37.244 (946.150-946.997)	.049-.071 (1.244-1.803)	41.50 (1054.1)	41.500-41.494 (1054.100-1054.947)	.054-.076 (1.371-1.930)
37.50 (952.5)	37.500-37.494 (952.500-952.347)	.049-.071 (1.244-1.803)	41.75 (1060.45)	41.750-41.744 (1060.450-1060.297)	.055-.077 (1.397-1.955)
37.75 (958.85)	37.750-37.744 (958.850-958.697)	.051-.073 (1.295-1.854)	42.00 (1066.8)	42.000-41.994 (1066.800-1066.647)	.055-.077 (1.397-1.955)
38.00 (965.2)	38.000-37.994 (965.200-965.047)	.051-.073 (1.295-1.854)	42.25 (1073.15)	42.250-42.244 (1073.150-1073.997)	.055-.077 (1.397-1.955)
38.25 (971.55)	38.250-38.244 (971.550-971.397)	.051-.073 (1.295-1.854)	42.50 (1079.5)	42.500-42.494 (1079.500-1079.347)	.055-.077 (1.397-1.955)
38.50 (977.9)	38.500-38.494 (977.900-977.747)	.051-.073 (1.295-1.854)	42.75 (1085.85)	42.750-42.744 (1085.850-1085.697)	.056-.079 (1.422-2.003)
38.75 (984.25)	38.750-38.744 (984.250-984.097)	.051-.073 (1.295-1.854)	43.00 (1092.2)	43.000-42.994 (1092.200-1092.149)	.056-.079 (1.422-2.003)
39.00 (990.6)	39.000-38.994 (990.600-990.447)	.051-.073 (1.295-1.854)			

OBJECTIVE

The "life" of any gear set is directly effected by the contact pattern between mating teeth. Therefore, it is desirable to obtain the best possible contact pattern.

However, allowable manufacturing tolerances and load deflections complicate attempts at controlling the contact pattern. Of course, it is cost prohibitive to completely eliminate the effects of tolerance and deflections. But, there is a method of optimizing the contact pattern.

If the pinion shaft (see typical gear set shown in Fig. 7) could be manipulated to optimize the contact pattern, the effects of tolerances and deflections could be minimized.

Figure 7 shows an eccentric cartridge on each end of the pinion shaft that provides a means of adjusting the shaft ends. Although each shaft end can only be moved along one axis, the axis on one end is perpendicular to axis on the other end. With two directional adjustments, the pinion shaft may be positioned in any attitude to optimize the contact pattern.

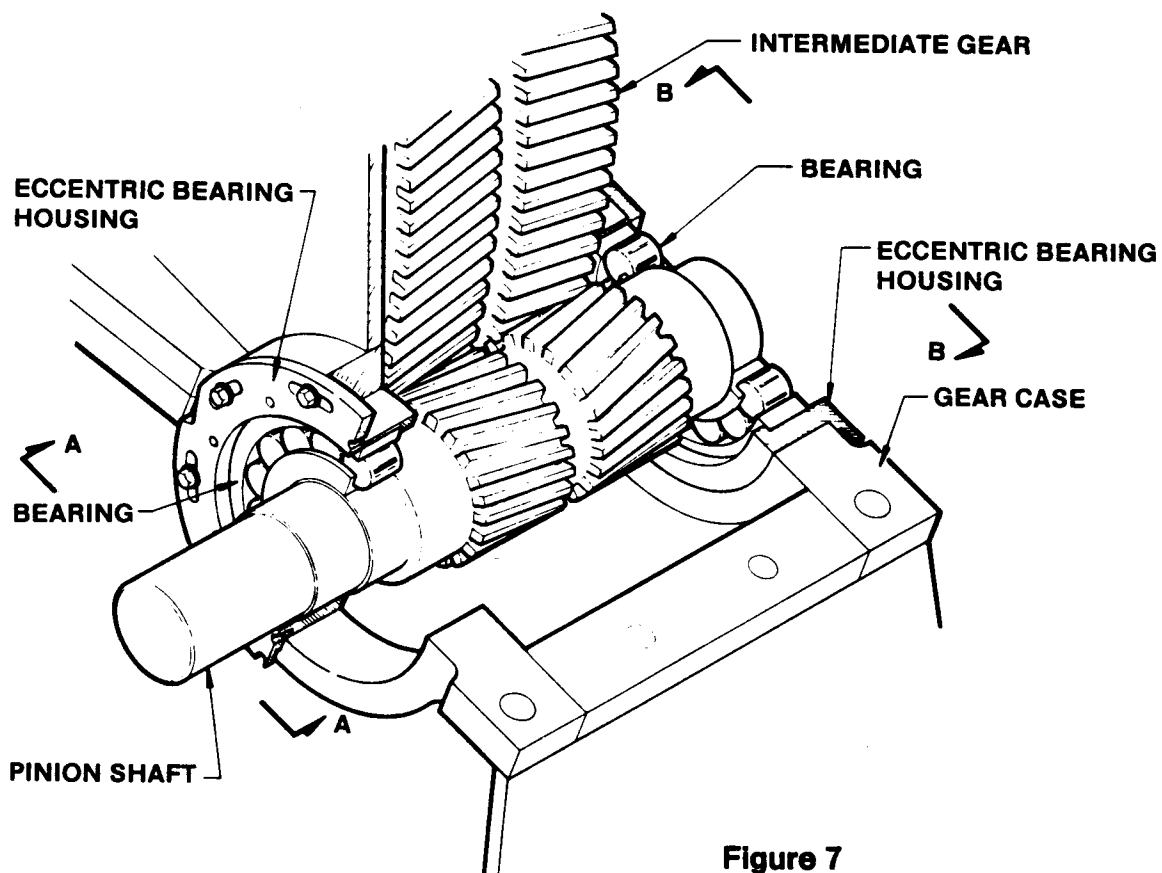
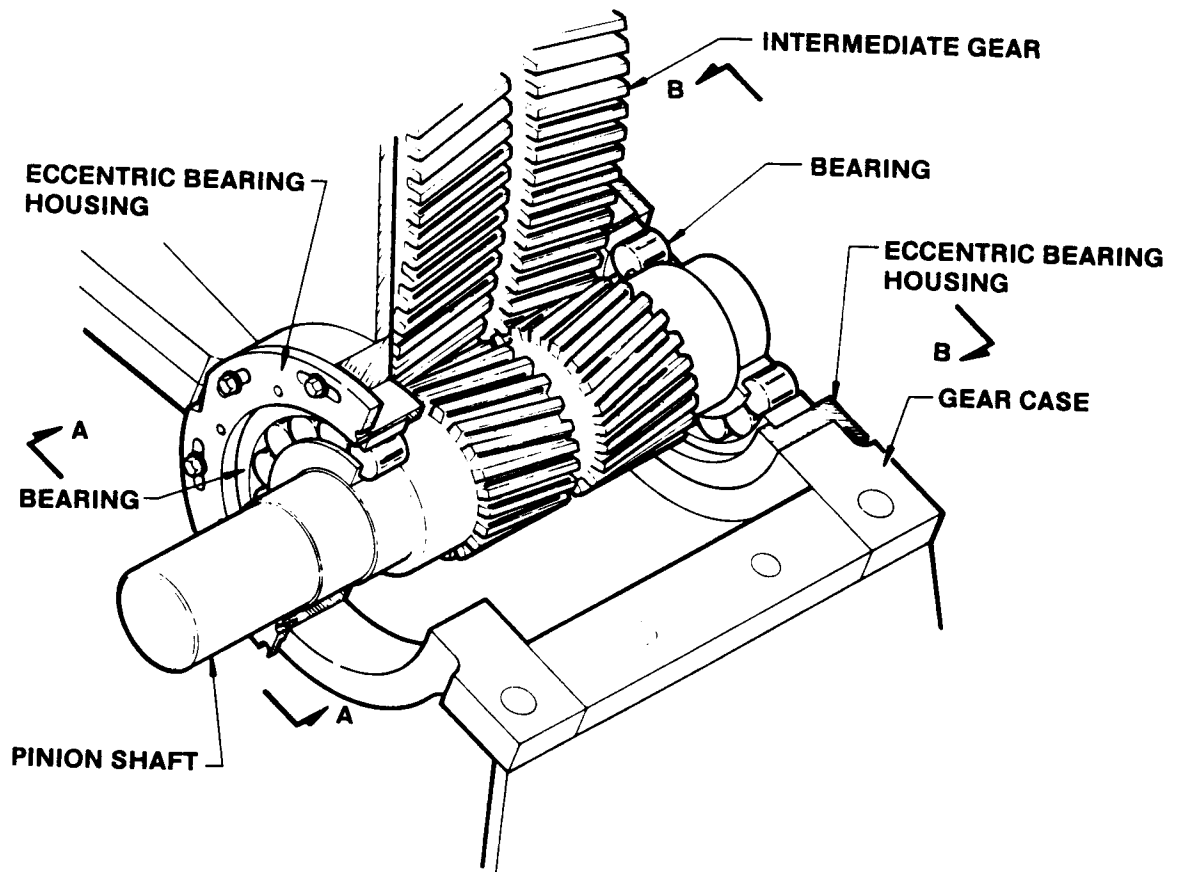
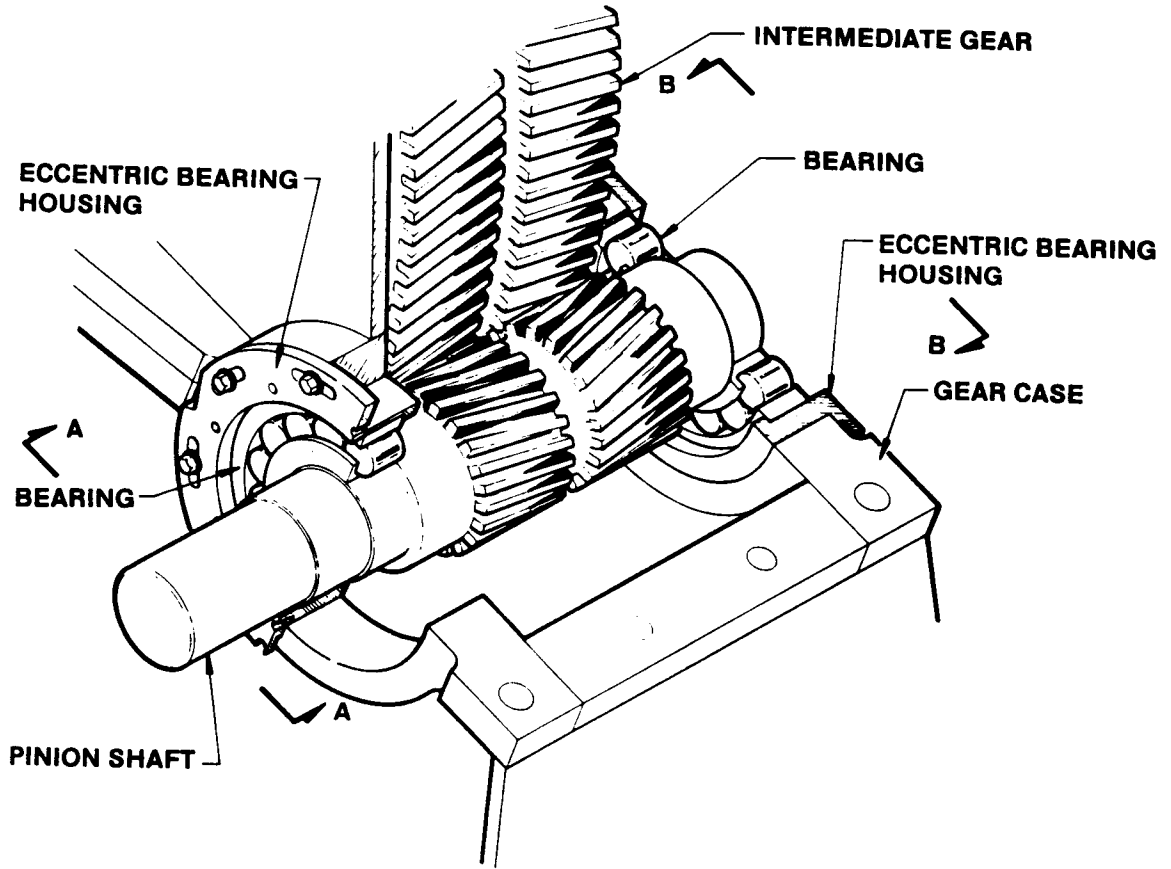


Figure 7





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7.8 SHRINK FIT COMPONENTS

Instructions for installation and removal of shrink fit components with tapered bores:

INSTALLATION

1. Thoroughly clean the seating surface on the shaft and the tapered bore of the component using a recommended standard safety solvent such as the "Stoddard" type solvents, and wipe dry with a cloth.
2. Remove any scoring or high spots on either part and check with "Bluing" by spotting the cold component on the shaft by hand to obtain at least 75% fit.

In case you do not have 75% fit the component should be scraped until desired fit is indicated by repeating bluing and cold fitting.

3. Break all sharp edges of the key with a fine file so there will be approximately .015 inch radius at each edge. Fit the key to the shaft, taking care to avoid upsetting the metal of the shaft next to the key. The key should be tight in the shaft but not so tight that it must be hammered in place.
4. The cold component must be tried on the shaft to make certain it does not bind on the key.
5. Mount the component cold on the shaft and snap it into position by hand.
6. Measure the cold position using a micrometer depth gauge as indicated in the detail. Record the measurement. Mark where the depth gauge was resting so measurements can be made from the same position after the component has been mounted.
7. Remove the component from the shaft and thoroughly clean all bluing marks from the bore and shaft. Remove or protect seals or other items that may be damaged by heat.
8. With the component removed, heat in a suitable oven or other means of dry heat. Control the temperature as directed using values indicated in the table.
 - A. Do not use oil or water to heat component.
 - B. Component temperature must never exceed 350 degrees F. (177 degrees C.).

Drastic loss in rope diameter and lay lengthening.

Outer wire abrasion.

Broken wires.

Corroded wires.

Marks indicating mechanical abuse, distortion or crushing.

Inspect rope sheaves often. Check sheaves and drums for proper alignment.

Do not allow wear at rope sheave groove. An old rope wears a groove to a reduced radius. This groove crushes or deforms a newly installed rope.

Avoid sheave groove or drum lagging from assuming rope lay shape. Alternate right and left hand lays, if needed. Keep sheaves and drum free of rough spots, nicks and burrs. Never use cracked or chipped sheave.

Maximum rope life and the best service evolves from extreme care in handling and installation. This is important. Working a new rope at reduced loads gives the rope lay time to acquire a permanent set. Slow acceleration and deceleration of load and eliminating sudden actions are good habits to develop. Avoid overstressing a rope by jerking or catching a heavy, falling load.

Lubrication remains the most important item in rope care. All rope is lubed when manufactured. Generally thin and filmy, this lube eases the manufacture rather than preserve the rope. This film dries rapidly or dissipates thru surrounding conditions.

Lubricate every rope at installation and keep coated thru continued service. Lubricant serves to reduce internal friction wear and the outer wire wear against sheave or drum. Lube protects rope from weather and corrosive air, too.

Marion recommends a light, penetrating type lubricant (WRL) containing anti-rust and corrosion agents and anti-wear additives. This lube saturates rope interior thus reducing internal friction providing a protective outer coating.

The rope lubricant selected may be an asphaltic type containing volatile solvent or diluent which allows strand and core penetration. This lube type works well for operations in highly abrasive material or water submersion.

One method of rope lubrication utilizes an automatic system that provides a drip fixture above sheaves on boom point, gantry, and fairlead.

STEP 4 - Preparation of the defective or worn part

Proper preparation is half the job, therefore, it is important to evaluate each part on its own merit. Some points to consider are as follows:

1. How large is the crack or defect?
2. Is the crack completely through the thickness?
3. Will distortion be a factor?
4. Can 2 welders weld opposite each other in order to control distortion, or must all the repair be done from one side?
5. Will the welder be able to withstand the preheat if required?
6. Can the welder get into a position to do a proper job?
7. Does the cost of repairing the part compare favorably to buying a new part?

These points are important factors when evaluating how the defect should be prepared for welding. A welder can repair most defects, add modification or repair worn parts as long as good equipment is available to him, such as; the correct clothing, head gear, exhaust systems or respirators, and platforms for the job. If the welder is kept comfortable and given the required equipment and consideration, a quality job can be expected.

Methods of metal removal to be considered are:

1. Air carbon arc gouging.
2. Grinding.
3. Machining.
4. Oxyfuel burning.

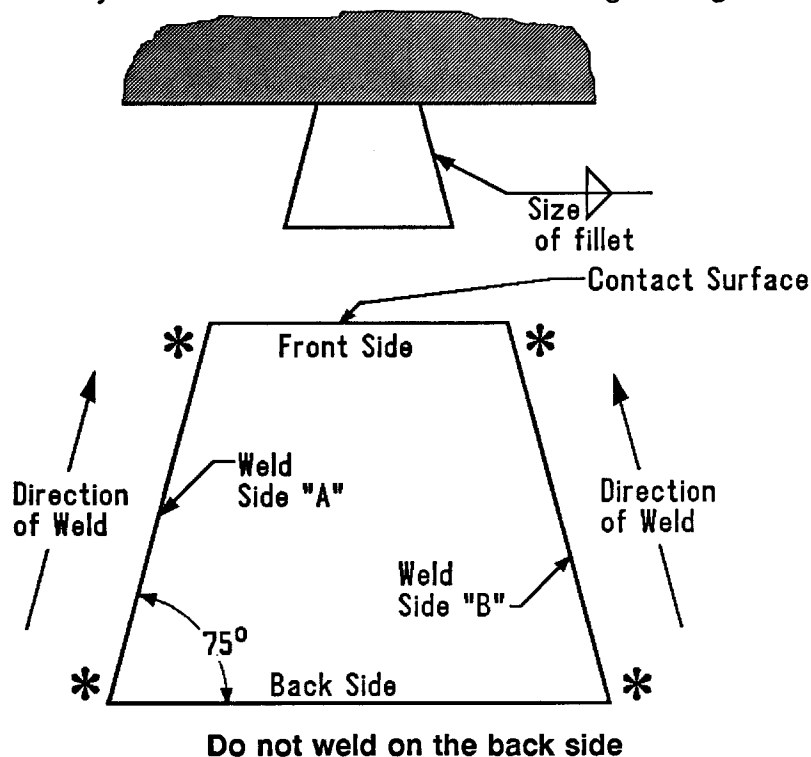
Before any weld repair is started, a survey should be made of the area and all safety considerations satisfied, such as; fuel tanks, oil lines, electrical cables, and toxic materials.

A decision should be made whether the part will be repaired on the machine, or disassembled and repaired in a shop, or repaired on the mine floor.

SHEAR BLOCK INSTALLATION

WELDING PROCEDURE:

1. Do not weld shear blocks until after the bolted component has been accurately checked for location and the bolts have been tightened to their proper pre-tension.
2. Position the shear blocks on the weld surface and against the contact surface per the engineering drawing. Check for a solid contact fit: hand grind if necessary.
3. Hold the blocks tightly in place (use a hydraulic jack or equal) and tack weld. Set up and tack all blocks for each component prior to starting the final weld. (See the figure below for tack weld areas.) Check the contact surface with a .005 (.127 mm) feeler gauge. If the gauge can be inserted between the contact surfaces, the block must be removed and reinstalled.
4. Fillet weld sides "A" and "B" only, starting from the back and advancing toward the contact side - alternating equal weld deposits on both sides. This will maintain the desired tight contact as well as balance the shrinkage stress. Stop the weld deposit short of the contact surface, ie: never weld the shear block to the component being restrained.
5. Do not weld on the back side of the shear block.
6. A typical weld symbol and notes are shown on the engineering drawing as follows:



* Denotes tack weld areas.

LUBE FITTINGS—Cover halves have 3/8 NPT lube holes. Use a standard grease gun and lube fitting.

LUBRICATION—Adequate lubrication is essential for proper operation of the coupling. Refer to Installation Data Table for the amount of lubricant required. It is recommended that the coupling be checked once a year and lubricant added if required. For extreme or unusual operating conditions, check more frequently.

LUBRICANT SPECIFICATIONS—Refer to Falk Manual 428-010 for recommended lubricants. The following specifications apply to lubricants for Falk couplings which are lubricated annually and operate within ambient temperatures of 0 degrees to 150 degrees F (-18 degrees to +66 degrees C). For temperatures beyond this range, consult the MPSD Service Representative.

DROPPING POINT—300 degrees F (149 degrees C) or higher.

CONSISTENCY—NLGI No. 2 with worked penetration value in the range of 250 to 300.

SEPARATION and RESISTANCE—Low oil separation rate and high resistance to separation from centrifuging.

LIQUID CONSTITUENT—To possess good lubrication properties equivalent to a high quality, well refined petroleum oil.

INACTIVE—Must not corrode steel or cause swelling or deterioration of synthetic seals.

CLEAN—Free from foreign inclusions.

SEMI-PERMANENT LUBRICATION—Up to eight years between lubrication checks may be obtained thru the use of "still-bottom" asphaltic based lubricants. Refer to Falk Service Manual 428-012 for details.

INSTALLATION—Only standard mechanics tools, wrenches, a straight edge and feeler gauge are required to install Falk Steelflex couplings. Couplings are furnished for an INTERFERENCE FIT without set screws. Heat hub in an oil bath to a maximum of 275 degrees F (135 degrees C) to mount. Oil flashpoint must be 350 degrees F (177 degrees C) or higher. Detailed mounting instructions follow:

3. Measure the gap between the coupling faces at 4 points (90° around the coupling rim) with a feeler gauge, to the nearest .001 inch. The maximum variation may not exceed .002 inch between any 2 readings.
4. Rotate the coupling 90°, 180°, 270°, and 360° and take similar readings. The maximum variation may not exceed .002 inch.
5. Correct any horizontal misalignment by loosening the foot bolts, removing the dowel pins, and bumping the frame into position. Correct any vertical misalignment by shimming under the feet. Check and maintain ALL internal clearances (air gaps, bearing covers, fans, baffle clearances) equally around the circumference. Some abuse in shipping and handling often causes misalignment, or even distorting dowel pins to the point of needing re-doweled.
6. Repeat steps 2,3,4 and 5 for each coupling while working away from the 2-bearing unit.
7. Recheck the couplings of the long sets after completing the previously mentioned checks, due to the possibility that shimming on previous units will effect units already checked. After aligning the set within specified limits, carefully tighten ALL coupling bolts.

TORQUE VALUES

Recommended torque values for tightening coupling bolts:

.75 in. bolts: 500 Ft.Lbs.
1.0 in. bolts: 770 Ft.Lbs.

25,000 HOUR MAINTENANCE INSPECTION SCHEDULE
VISUAL CHECK POINTS
DAILY — EVERY 24 HOURS

MACHINE IDENTIFICATION			
MODEL	S/N		
SHIFT	1	2	3
OPERATOR			
INSPECTOR			

DESCRIPTION	STATUS		ACTION / REMARKS
	YES	NO	
1. Walkways and Ladders	<input type="checkbox"/>	<input type="checkbox"/>	Keep clear and clean
2. All Gear Cases	<input type="checkbox"/>	<input type="checkbox"/>	Check oil levels and general condition of all cases, oil circulation system and filter condition as required.
3. Brakes for all Motions	<input type="checkbox"/>	<input type="checkbox"/>	Check operation with manual valve.
4. Wire Rope on Hoist and Drag Drum	<input type="checkbox"/>	<input type="checkbox"/>	Pay out rope/inspect drums grooving and rope clamps.
5. Air System	<input type="checkbox"/>	<input type="checkbox"/>	Check anti-freeze level, lubricator oil levels, line filters (liquid/dirt).
6. Compressor(s)	<input type="checkbox"/>	<input type="checkbox"/>	Check sump oil level and drain tank moisture. Check tank pressure-shut off 130 psi; turn on 100 psi.
7. Auto Lube System	<input type="checkbox"/>	<input type="checkbox"/>	Check supply in drums. Verify control valve operation. Check warning/reset circuits. Verify pump cycle timing/shutoff.
8. Structural Components	<input type="checkbox"/>	<input type="checkbox"/>	Check backleg/boom apex. Pressure gauges — check tension of backleg safety cable.
9. Lighting System	<input type="checkbox"/>	<input type="checkbox"/>	Check all working lights.
10. Filter Fans	<input type="checkbox"/>	<input type="checkbox"/>	Check bleed duct fan operation and filter fan operation for noise or vibration.
11. Main Transformer(s)	<input type="checkbox"/>	<input type="checkbox"/>	Check oil level site gauge.
12. Motor Generator Set(s)	<input type="checkbox"/>	<input type="checkbox"/>	Check site gauge for bearing lubricant.
13. Power Control Room	<input type="checkbox"/>	<input type="checkbox"/>	Verify air conditioning operational.

25,000 HOUR MAINTENANCE INSPECTION SCHEDULE

OPERATIONAL CHECK POINTS

WEEKLY — EVERY 150 HOURS

MACHINE IDENTIFICATION			
MODEL	S/N		
SHIFT	1	2	3
OPERATOR			
INSPECTOR			

DESCRIPTION	STATUS		ACTION / REMARKS
	YES	NO	
23. Rope Lube and Autolube System(s)	<input type="checkbox"/>	<input type="checkbox"/>	Verify operation of injectors.
24. Electrical Cable Runs (Not Shown)	<input type="checkbox"/>	<input type="checkbox"/>	Check condition.
25. Backleg Connection and Structure	<input type="checkbox"/>	<input type="checkbox"/>	Check pins.
26. Fairlead	<input type="checkbox"/>	<input type="checkbox"/>	Climb to inspect.
27. Fairlead Snubber Adjustment	<input type="checkbox"/>	<input type="checkbox"/>	Measure band thickness.
28. Fairlead Sheaves	<input type="checkbox"/>	<input type="checkbox"/>	Check bearing and lube.
29. Rope Lube and Autolube System	<input type="checkbox"/>	<input type="checkbox"/>	Verify operation of injectors.
30. Structure Condition	<input type="checkbox"/>	<input type="checkbox"/>	Check for cracks.
31. Bucket	<input type="checkbox"/>	<input type="checkbox"/>	Clean and inspect condition.
32. House Filter Units	<input type="checkbox"/>	<input type="checkbox"/>	Climb to house roof and inspect general condition.
33. Filter Unit V-Belt Drive	<input type="checkbox"/>	<input type="checkbox"/>	Check and adjust as required.
34. Filter Unit Motor Bolts	<input type="checkbox"/>	<input type="checkbox"/>	Tighten as required.
35. Filter Unit Fan	<input type="checkbox"/>	<input type="checkbox"/>	Check for bearing noise.
36. Filter Unit Structure	<input type="checkbox"/>	<input type="checkbox"/>	Check for cracks.
37. Auxiliary Winches	<input type="checkbox"/>	<input type="checkbox"/>	Operate and lubricate.
38. House Cranes	<input type="checkbox"/>	<input type="checkbox"/>	Operate, check rail system and lubricate.
39. Power Control Room and Electrical Cabinets (Qualified Individual Only)	<input type="checkbox"/>	<input type="checkbox"/>	Check general condition of wiring and operation of all latches.
40. Electrical Contactors (Qualified Individual Only)	<input type="checkbox"/>	<input type="checkbox"/>	Check operation/excess arc.
41. Electrical Limit Switches	<input type="checkbox"/>	<input type="checkbox"/>	Verify operation.
42. Hoist/Propel Transfer Switch	<input type="checkbox"/>	<input type="checkbox"/>	Verify operation.
43. Cable Routings (Not Shown)	<input type="checkbox"/>	<input type="checkbox"/>	Check for frayed insulation.
44. M-G Set Brushes and Commutators	<input type="checkbox"/>	<input type="checkbox"/>	Verify contact, identify arcing.
45. M-G Set Motors, Generators, Exciters	<input type="checkbox"/>	<input type="checkbox"/>	Clean with air.

7,200 HOURS CONTINUED (SEE ILLUSTRATIONS PREVIOUS PAGE)

- | | | |
|---|---|--|
| 17. Non-Destructive Test on Tri-Structure
Top Eyes and Pins | <input type="checkbox"/> <input type="checkbox"/> | Perform by qualified metallurgist and record. |
| 18. Non-Destructive Test on Boom Support Rope
Sockets, Eyes and Pins | <input type="checkbox"/> <input type="checkbox"/> | Perform by qualified metallurgist and record. |
| 19. Non-Destructive Tests on Hoist and Drag
Drum End Stub Shafts | <input type="checkbox"/> <input type="checkbox"/> | Perform by qualified metallurgist and record. |
| 20. Non-Destructive Test on Main Rotating Shafts | <input type="checkbox"/> <input type="checkbox"/> | Perform by qualified metallurgist and record. |
| 21. Backleg Safety Cable | <input type="checkbox"/> <input type="checkbox"/> | Test to specified tension. (See erection documentation.) |

**25,000 HOUR MAINTENANCE INSPECTION SCHEDULE
OPERATIONAL CHECK POINTS
BIENNIAL — EVERY 15,000 HOURS**

MACHINE IDENTIFICATION			
MODEL	S/N		
SHIFT	1	2	3
OPERATOR			
INSPECTOR			

DESCRIPTION	STATUS		ACTION / REMARKS
	YES	NO	
1. T-Joint Weld in Tub	<input type="checkbox"/>	<input type="checkbox"/>	Inspect and repair cracks.
2. T-Joint Weld in Upper Frame	<input type="checkbox"/>	<input type="checkbox"/>	Inspect and repair cracks.
3. Hook Shoe Path on Tub	<input type="checkbox"/>	<input type="checkbox"/>	Inspect with square trueness, straighten/flatten with shims.
4. Propel Linkage Area Structures	<input type="checkbox"/>	<input type="checkbox"/>	Check for fatigue.
5. Walking Arm Structures	<input type="checkbox"/>	<input type="checkbox"/>	Check for fatigue.
6. Stabilizer Arm Structures	<input type="checkbox"/>	<input type="checkbox"/>	Check for fatigue.
7. Walking Cams	<input type="checkbox"/>	<input type="checkbox"/>	Check for fatigue.
8. Boom	<input type="checkbox"/>	<input type="checkbox"/>	Lower boom to cribbing and inspect.
9. Non-Destructive Test Boom Chords	<input type="checkbox"/>	<input type="checkbox"/>	Perform by qualified metallurgist and record.
10. Non-Destructive Test Boom Point Structure	<input type="checkbox"/>	<input type="checkbox"/>	Perform by qualified metallurgist and record.
11. Boom Point Shaft Assembly	<input type="checkbox"/>	<input type="checkbox"/>	Disassemble and inspect for loose or worn parts.

9.2 START-UP INSTRUCTIONS

Before shipping, the plant completes a pre-delivery check including the following:

- Leak Testing
- Vacuum Drying
- Initial Charging

The following installation procedures are required on site prior to initial start-up:

After mounting the unit, ductwork and connection of main electrical supply to the control panel has been completed, for initial start-up, proceed as follows:

- a) Ensure that both compressor suction and discharge valves and the liquid receiver outlet valve are all open.

NOTE: THE COMPRESSOR SUCTION AND DISCHARGE VALVES SHOULD BE FULLY OPENED, THEN CLOSED BACK HALF A TURN. This is to allow pressure to the high and low pressure controls. All valve caps and rings must be replaced after any adjustment to stop any leakage of refrigerant.

- b) Check high and low pressure control settings, which should be set at:

High Pressure (for R12 only):	
Cut out setting:	1850 kPa (268 psig)
Fixed differential:	345 kPa (50 psig)
Cut in pressure = (1850-345)kPa = 1505 kPa (218 psig)	
Low Pressure (for R12 only):	
Auto Reset	
Low Pressure cut out:	138 kPa (20 psig)
Low Pressure cut in:	276 kPa (40 psig)
Differential:	138 kPa (20 psig)

NOTE: Field experience may indicate a variation to these settings and care should be taken to ensure that nuisance tripping does not occur. However, the low pressure control setting should ensure that evaporator coil does not ice up, while the high pressure control should ensure damage does not occur to the high side of the system.

Compressor - Removal From System

The compressor must be removed from the system to fit a replacement compressor. Proceed as follows:

- a) Evacuate the compressor (See previous subsection COMPRESSOR - GENERAL).
- b) Close the suction valve and gauge valves and isolate the system electrically.
- c) Remove the HP/LP safety switch lines from the compressor.
- d) Undo the compressor mounting bolts.
- e) Slacken off suction line and allow refrigerant charge to escape. Remove suction line and discharge line complete with discharge valve. Remove the compressor.
- f) If the unit is to be left without the compressor for a time, seal both suction and discharge lines carefully.

Compressor - Replacement

To replace compressor proceed as follows:

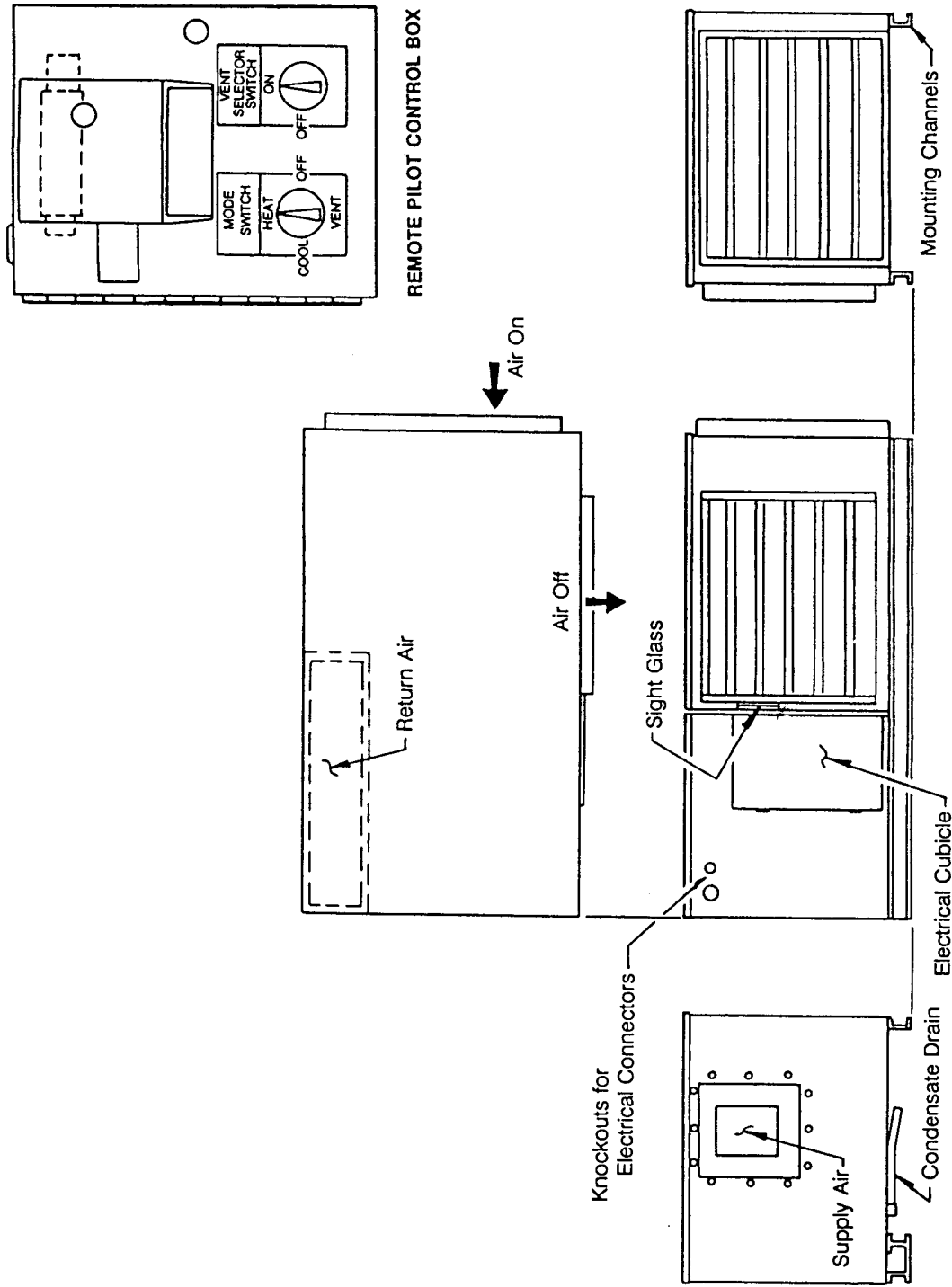
- a) Position and secure the compressor.
- b) Connect suction and discharge line to the compressor.
- c) Reconnect gauge and pressure control lines and open valves.
- d) Vacuum dry and recharge the system after reconnecting electrically. See the Mechanical Maintenance sections VACUUM DRYING and FIELD CHARGING PROCEDURE.

Air Cooled Condenser

Air cooled condensers must be regularly cleaned of all dust and dirt that collects on the fins. If a condenser is in a dirty condition it will cause an increase in the condensing pressure and consequently reduce the refrigeration system efficiency.

Cleanliness of the condenser must be borne in mind when checking condenser pressures.

The condenser should be cleaned by spraying water over the condenser face to remove deposited dirt. It may be necessary to use warm water and detergent. If deposits cannot be removed in this way, use a stiff brush, but take care not to damage the fins.

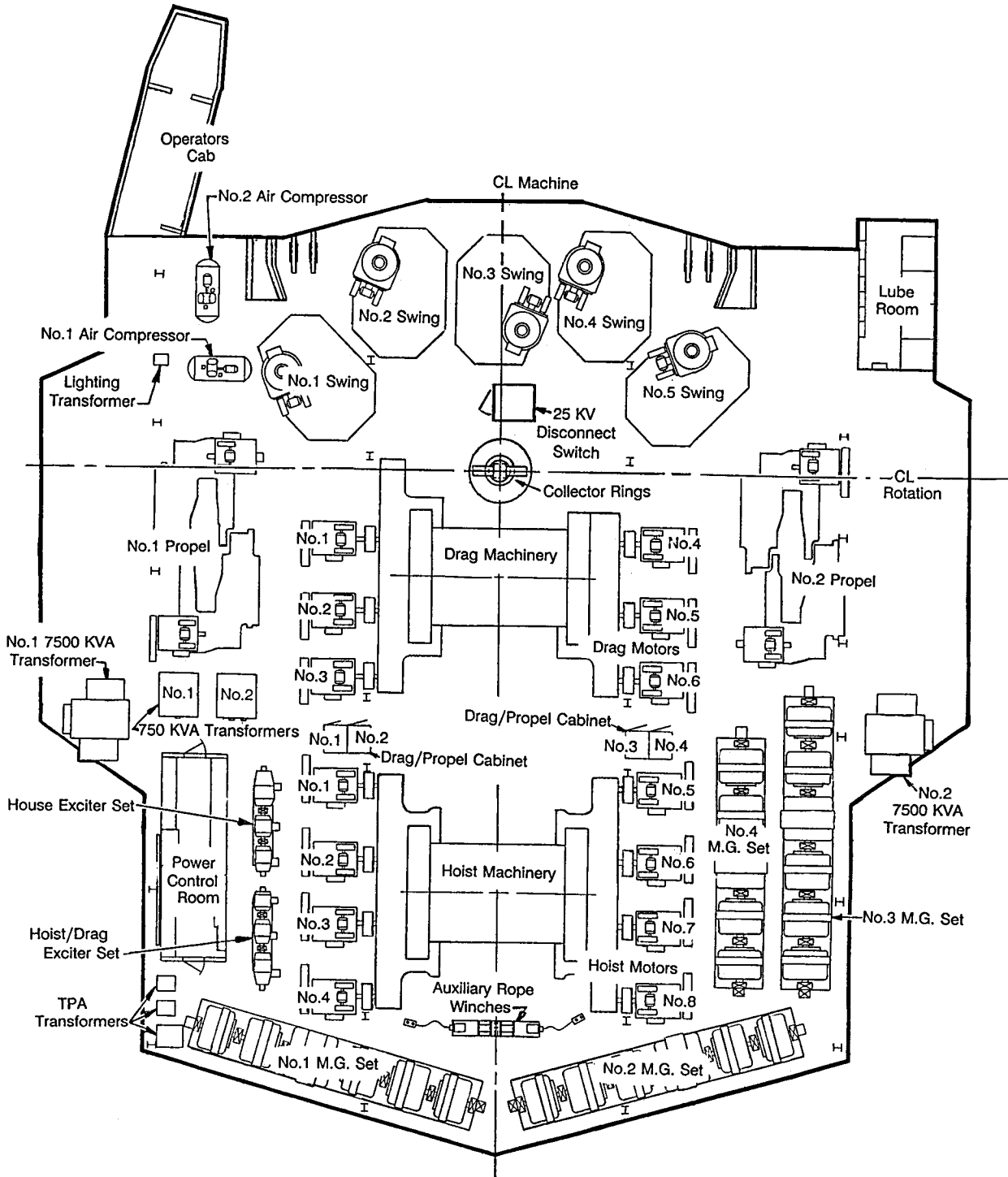


**DRESSER/SIGMA AIR CONDITIONER
MOUNTED ON THE POWER CONTROL ROOM (PCR)**

APPENDIX - A

SWING RECORDER

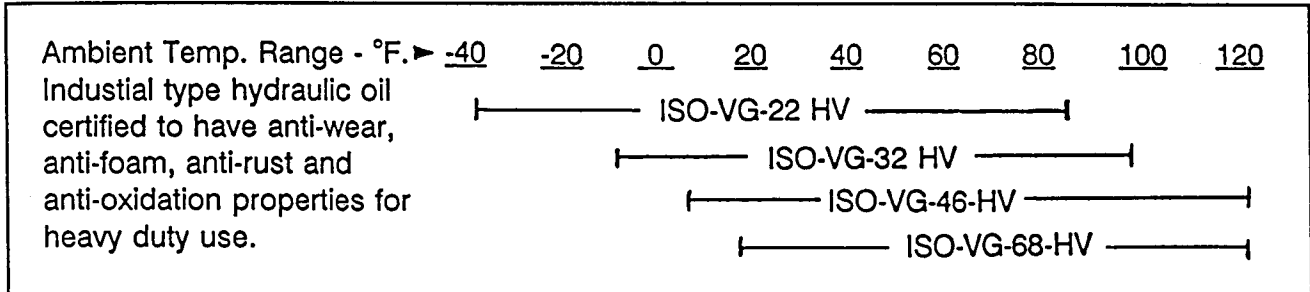
GENERAL INSTRUCTIONS



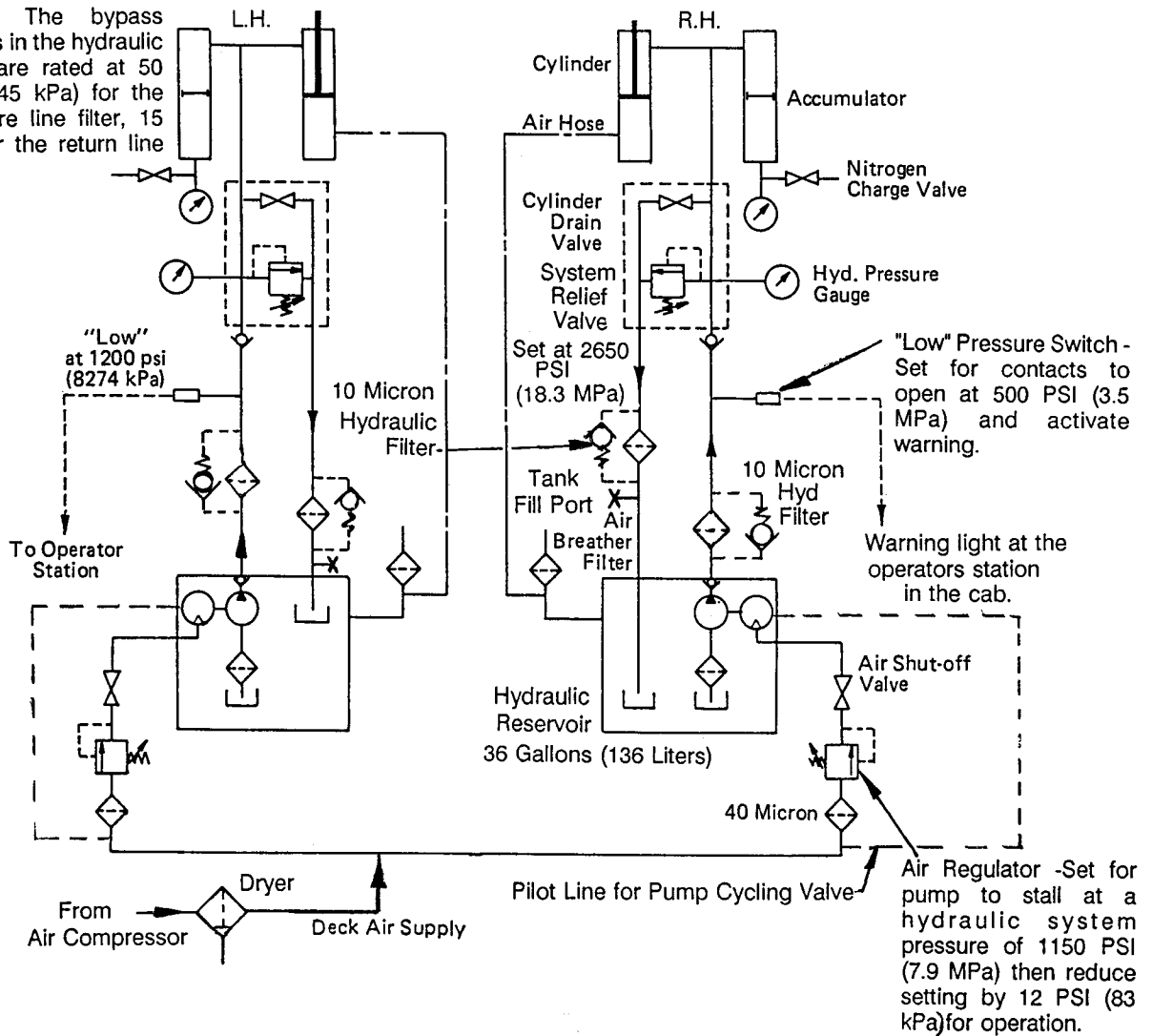
DECK PLAN

INTERMEDIATE BOOM SUPPORT - HYDRAULIC SYSTEM OIL

VISCOSITY RANGE




NOTE: The bypass springs in the hydraulic filters are rated at 50 PSI (345 kPa) for the pressure line filter, 15 PSI for the return line filter.



SCHEMATIC - INTERMEDIATE BOOM SUSPENSION



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5. Place seal on the shaft with lip turned toward the pressure and install garter spring in the slot with the hook and eye, 90 degrees from split. Butt seal ends together. If desired, apply to the split a small amount of Loctite #404 or Eastman #910 adhesive; but be very careful to keep adhesive AWAY from shaft, bore and seal edge. START seal into bore with the split at top of shaft. Tap seal into bore with hammer and wood block. Alternate from side to side until seal firmly seats in the bore. (Might be an idea to read the solid seal installation).

INSTALL OIL AND GREASE SEALS with the following procedure:

1. Carefully inspect seal for cuts, nicks or breaks. Rub a finger over lip and edges to feel roughness or pits that might cause a leak. A damaged seal is not worth installing. A properly sized seal is.
2. Check shaft for scratches, burrs or roughness that may cut or score the lip of seal. Look closely at area over which seal installs. Keyway and splines need a thimble or protective tape to safeguard seal.
3. Inspect bore for roughness or burrs that might cut or scrape seal when pressed into place. The bore and shaft need 1/16" chamfer. If not, carefully break the corner of seal.
4. Determine proper position of lip. (Ask the question: Is seal used to retain fluid or grease IN or rather to keep other material OUT). Position seal with lip turned to INSIDE when retaining oil or grease. Place seal with lip to OUTSIDE when other material OUT of bearing or case.
5. Lube the seal with light coat of oil or grease on ALL surfaces, particularly the lip and O.D. Lube shaft and bore also.
6. CAUTIOUSLY install seal on shaft. Be sure garter spring is IN SLOT and lip is TURNED correctly. Move seal from the shaft end to bore with a spiral motion.
7. Align seal in bore and tap LIGHTLY with hammer on wood block. Change from side to side around the seal until firmly seated in bore. No retainer plate is needed.

TWO SEALS INSTALLED back to back retain grease or oil and keep out other material at the same time. Where this practice exists, fill the space between the two with MPG.

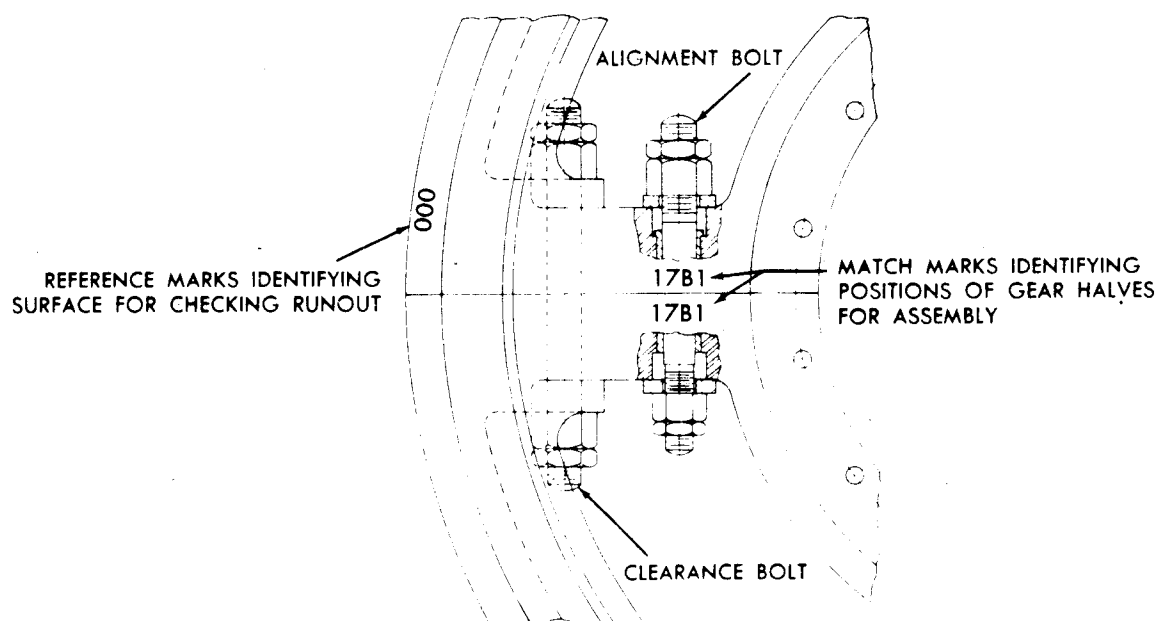
GEAR CASE SEAL used for ALL oil tight gear cases requires a coat on one surface of the gear case cover with aviation Form-a-Gasket #3 (Permatex Co.). Apply 1/64" thick. If using a paper gasket at cover, ALWAYS replace with a NEW manila paper gasket .010" thick. Apply aviation Form-a-Gasket #3 to BOTH sides of the gasket. Tighten the gear case cover bolts until the seal material extrudes from the joint.

PRELIMINARY INSTRUCTIONS FOR GEAR INSTALLATION

For long life and optimum performance, install all gears properly and align accurately. These instructions show in simple steps; how to check alignment and tooth contact during the process of installing single helical, herringbone, or spur ring gears with generated teeth. The steps outlined herein should be read and referred to by erectors and mechanics before and during gear installation.

CLEAN all teeth, mounting, and mating surfaces thoroughly before installation. Nicks, bumps and burrs occur in transit and must be removed to insure proper assembly and tooth contact.

FIND THE MATCH MARKS. Split gear halves assemble with mating surfaces in the SAME position as when the teeth were cut. To assure this result, **MATCH** the identical numbers and letters stamped on one split of each gear half, in line with an alignment bolt, as shown in sketch. These match marks are also stamped on one shaft end of the mating pinion. When assembled in the correct operating position, the match marks on **BOTH** gear and pinion appear on the **SAME** side.



BEFORE MOUNTING THE COUPLING HUB on herringbone pinions with symmetrical shaft extensions, refer to gear arrangement or assembly drawing to assure that hub is pressed



BOLTING PROCEDURE (Gear to Drum) -- Due to dead weight only, it is possible to have all bolts tight (i.e., the nuts will not turn anymore) and still have a gap increasing from 0 at topmost center to a maximum at bottommost center. As drum rotates under hoist rope load, this gap changes position and in turn bolt becomes loose and introduces an additional bending load and possible stress concentration in the bolt.

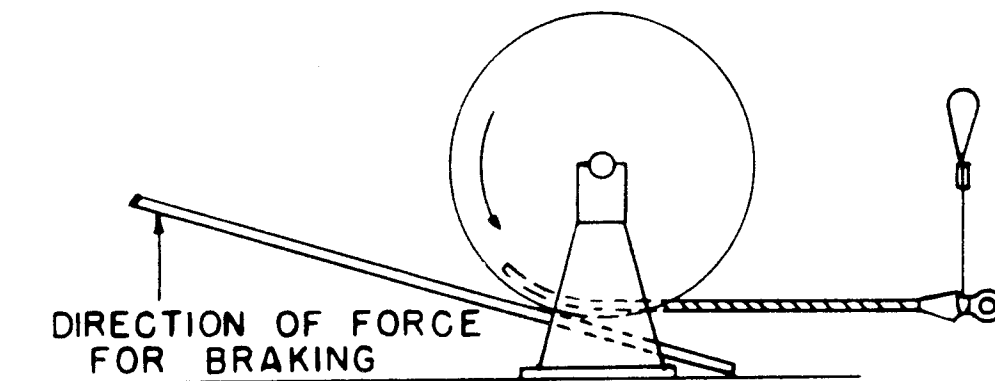
1. Drum shaft must be free to rotate under no load. Hoist ropes must be slack. Hoist brake must be in released position.
2. Drum must be positioned with two finished bolts at extreme top center.
3. Loosen all bolts not being replaced at joint in question.
4. Replace bolts as required, keeping nuts loose. Make sure that slotted nut side of bolt is up tight against flange.
5. Tighten all nuts hand tight, keeping all locknuts loose.
6. Using an air wrench, tighten two topmost center bolts only -- do not tighten locknuts until No. 15 below.
7. Rotate drum 180° and tighten two finished bolts now on topmost center.
8. Rotate drum 90° and tighten two finished bolts now on top center.
9. Rotate drum 180° and tighten two finished bolts now on top center. All finished bolts are now tightened.
10. Now rotate drum 45° and tighten two rough bolts on topmost center -- tighten bolts in outer bolt circle only.
11. Rotate drum 180° and tighten two topmost rough bolts.
12. Rotate drum 90° and tighten two topmost rough bolts.
13. Rotate drum 180° and tighten two topmost rough bolts.
14. Now proceeding from this point rotate drum, advancing one bolt at a time and retighten each bolt as it reaches topmost center point.
15. Install all locknuts in outer bolt circle and tighten. Drum does not have to be rotated.
16. Now install eight bolts making up inside bolt circle and tighten nuts. Drum does not have to be positioned or rotated.
17. Install locknuts on these eight bolts and tighten.
18. Operate machine under load for thirty minutes and repeat Steps 1,2 and 6 thru 17.



Position socket tagged, FRONT END (remove first) AS CLOSE to bottom of reel as practical and pull this free end away from reel. Pulling hitch or sling is recommended to attach to socket. Where sling must attach on strand; use great care to avoid kink or dogleg in the strand at socket base. DO NOT nick or damage wires here. Keep the longitudinal stripe aligned also.

Usually an area of the reel is BLOCKED OUT, thru necessity, for positioning and securing the socket during shipment. Use normal care when removing sockets from this BLOCKED OUT area.

During unwinding from reel, pull the strand in a straight line and please DO NOT pull over sharp edges or object(s) on ground.



After strand is unwound from reel, remove socket tagged, REAR END.

If more than one strand is packed on the reel, remove lengths in order in which they are tagged, using the procedure as outlined.

Please use Common Precautions here also.



The following data shall serve as a guide for the proper selection and application of electrodes and preheat temperatures for welding all MARION ferrous materials. Standard electrodes specified hereafter supersede listings in drawing bills of material. These specifications in no way countermand specific instructions or procedures for specific weldments or materials developed by the Welding Engineer or indicated with the weld symbol on drawings.

Descriptions and Brinells shown are approximate for welding purposes only; refer to "Marion Symbol Specifications" for latest complete published data.

Welds joining materials of different mechanical properties shall utilize electrodes specified for the lower strength material determined by lower minimum brinell hardness indicated. Preheat temperatures shall be governed by material requiring higher temperature.

When major field repairs are anticipated, contact MARION Service Representative for specific instructions prior to initiation of work.

ELECTRODES: **Alternate** electrodes may be used where high restraint requires greater ductility in the weld metal, or where recommended preheats cannot be maintained. (Latter condition not recommended — use with caution at your own risk.)

Low hydrogen electrodes shall be placed in 250 degree F. (121 degree C.) holding ovens immediately upon the opening of sealed containers.

Electrodes exposed to atmosphere exceeding 4 hours shall be rebaked at 700 degrees F. (371 degrees C.) for one hour minimum then placed in holding ovens at 250 degrees F. (121 degrees C.).

Electrode Reference to Semi-Automatic Materials:

E70XX, E7018	— E70T-1 or Equivalent Chemistry
E8018-CI	— McKay 85-CI or Equivalent Chemistry
E9018M	— E90T (McKay 95) or Equivalent Chemistry
E11018M	— McKay 105 or Equivalent Chemistry

PREHEATS AND POSTHEATS: When practical, preheat the entire part, when not practical heating is required 18" from weld joint in all directions.

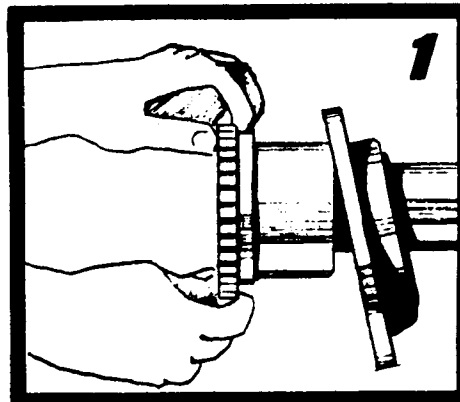
Preheat temperatures indicated are minimum; maximum preheat and interpass temperatures should not exceed those listed for over 2" by more than 100 degrees F. (37.7 degrees C.). Avoid excessive local temperatures which could cause distortion, embrittlement, or other detrimental effects.

Weldments containing conditions of high restraint may require the use of higher preheats or the use of lower strength electrodes as specified by MARION Welding Engineer.

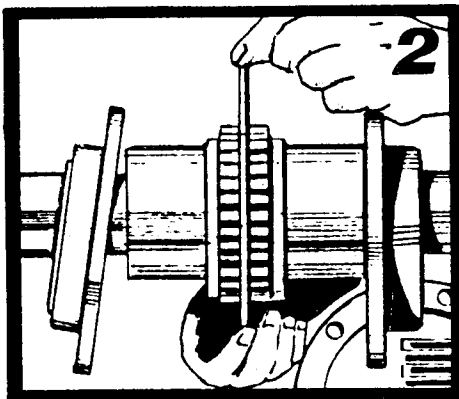
FALK COUPLINGS

F TYPE

1. Mount cover with seal ring and hub on shaft. Press or shrink hubs on respective shafts so hub face is flush with shaft end. Tighten set screws on BOTH hubs on sizes 3 thru 11. (See chart.)

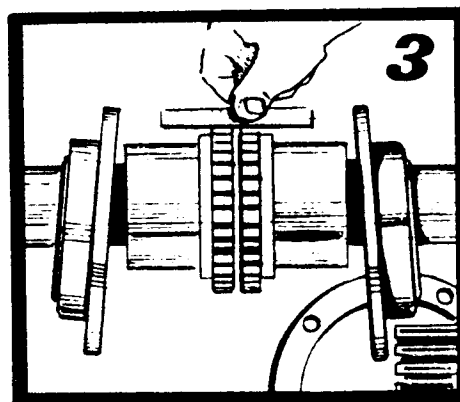


2. Check gap and angular alignment. Set coupling for normal gap. Align shafts by placing spacer block equaling gap between hub faces, and at right angles to it. Check using feelers.



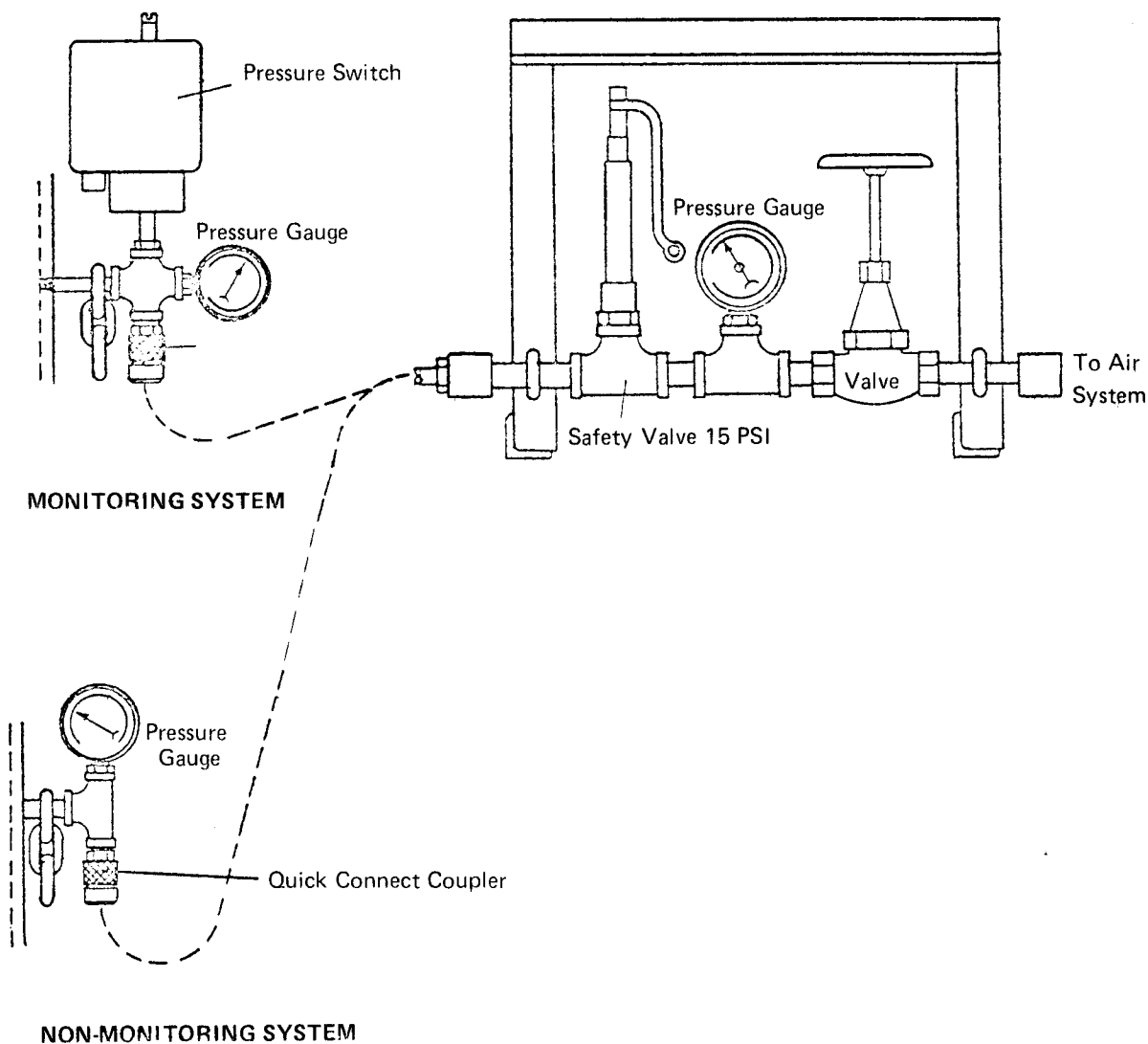
Maintain normal coupling gap where possible. To insure best performance, **DO NOT EXCEED** minimum and maximum gaps. Consult company if limited axial float is needed. Provide for shaft end play in coupling gap when using sleeve bearing units. Once mounted, position free unit so coupling gap is between minimum and maximum limits with **BOTH** shafts in extended or retracted position. With gap set and shafts aligned, tighten unit foundation bolts and **RECHECK** alignment.

3. Check parallel alignment so a straight edge rests squarely on **BOTH** hubs at right angles. Fasten foundation bolts and **RECHECK** alignment and gap.



PRESSURIZED WELDMENTS are air tight and charged with dry compressed air in a monitoring system. Critical areas, such as; boom apex pipe chord and gantry back legs use this system to detect any breaks in parent metal or weld. Failure alerts the operator thru a sensitive switch that operates when this pressure drops. Naturally the pressure drop indicates a crack and leak. This pressure drop is rapid, so set the pressure switch to de-activate the contacts **BELOW** the charging pressure at a point compatible to **LOWEST** ambient temperature anticipated.

Each weldment is equipped with a pressure switch, gauge and quick coupler. The charging apparatus, furnished, consists of a pressure gauge, safety release valve set at 15 psi, globe valve and hose section with quick connect coupler.





DESCRIPTION OF OIL AND GREASE CLASSIFICATION

CODE	NAME	DESCRIPTION
MPG	Multipurpose Grease	<p>A well manufactured E.P. grease having good resistance to both heat and water, possessing good mechanical stability and oxidation resistance. It must be suitable for use in Farval, Lincoln and Trabon automatic dispensing systems. It shall be free of corrosive and deleterious foreign matter of any kind. Special products not meeting the requirements of the Engineering Standard may be required for operation at sub-zero ambient temperatures. MPS Co. should be consulted regarding products intended for service at low ambient temperatures.</p> <p>USES—Anti-friction bearings both packed and gun lubricated, chassis and plain bearings and central lubricating systems.</p>
RGL	Regular Gear Lubricant	<p>Semi-fluid greases having just enough body to retain them in a semi-enclosed case. It must have good adhesive, load carrying and non-channeling properties.</p> <p>USES—Semi-enclosed gear cases.</p>
OGL	Open Gear Lubricants	<p>Either of two types of product may be specified. They are intended for use on open gearing where retention is a problem. Both must be adhesive in nature and resist dripping from or flinging off the exposed gearing either idle or in motion. They must be water and corrosion resistant and have E.P. properties.</p> <ol style="list-style-type: none"> 1. Type B must be suitable for application without heat or diluent and should be suitable for use in automatic dispensing systems if required.



NO.	NAME OF PART	TYPE	NO. OF POINTS	LOCATION	LUB. SYM.	METHOD & FREQUENCY
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LUBRICATION OF MAST

75.	Boom Support Ropes	Bushing	14	End of Pin	MPG	Automatic
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LUBRICATION OF BOOM

76.	Point Sheaves	Anti-Friction	5	In Each Retainer	MPG	Automatic
77.	Point Sheave Ball Joint	Bushing	10	5 in Each Retainer	MPG	Automatic
78.	Point Support Rope	Bushing	8	End of Pin	MPG	Automatic
79.	Int. Support Ropes	Bushing	6	End of Pin	MPG	Automatic

LUBRICATION OF DRAGLINE BUCKET

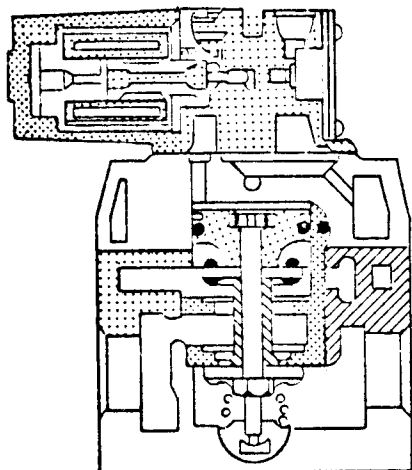
80.	Dump Block Sheave	Anti-Friction	1	In End of Shaft	MPG	500 Hrs. (Purge)
81.	Dump Block Anchor	Plain	1	End of Pin	MPG	Hand - 24 Hrs.

LUBRICATION OF MISC. POINTS

82.	Filter House	Anti-Friction	5	In Motor End Bell	EMG	Hand - 500 Hrs.
83.	Filter Ducts	Anti-Friction	10	In Motor End Bell	EMG	Hand - 500 Hrs.
84.	House Hoist Floating Sheaves	Plain	8	In End of Shaft	MPG	Hand - 8 Hrs.
85.	Boom Hoist Floating Sheaves	Plain	8	In End of Pin	MPG	Hand - 8 Hrs.



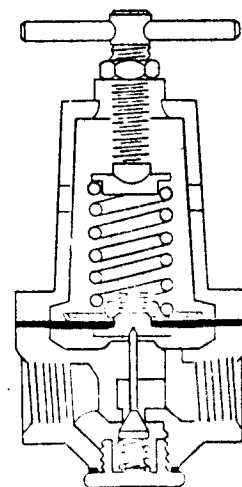
filling; **NEVER REFILL THRU WICK CAP.** Use methyl alcohol only. (Permanent anti-freeze types do not evaporate fast enough for good protection).



MAGNET VALVES need little or no maintenance. Dirt and scale cause a leaky valve sometimes. Try opening and closing it several times quickly by turning the small screw on top. Cleaning this way often avoids disassembly. If not, **DISMANTLE, CLEAN, and REPLACE** worn or damaged parts. Lube with a small amount of MPG.

These electrically operated (on and off) valves are normally closed when de-energized. A spring loaded plunger shuts OFF air from supply to cylinder while the exhaust port from the cylinder to atmosphere is OPEN. Energizing the coil moves the plunger down, CLOSING the exhaust port and OPENING the port from supply to the brake release cylinder.

PRESSURE REGULATORS consist of a spring loaded diaphragm that moves a cone shaped seat which opens and closes, allowing air to pass thru the valve. A spring under this seat keeps it against the diaphragm. A T-handle on top screws in and out to adjust diaphragm spring tension. Right (clockwise) increases and left (counter-clockwise) decreases the tension; and the air pressure. When used in connection with clutches, the setting is at tank pressure low end to soften action and protect the clutch or parts. **NEVER USE MORE** pressure than needed to handle a fully loaded bucket. When used elsewhere, a pressure gauge reading shows needed operating setting.

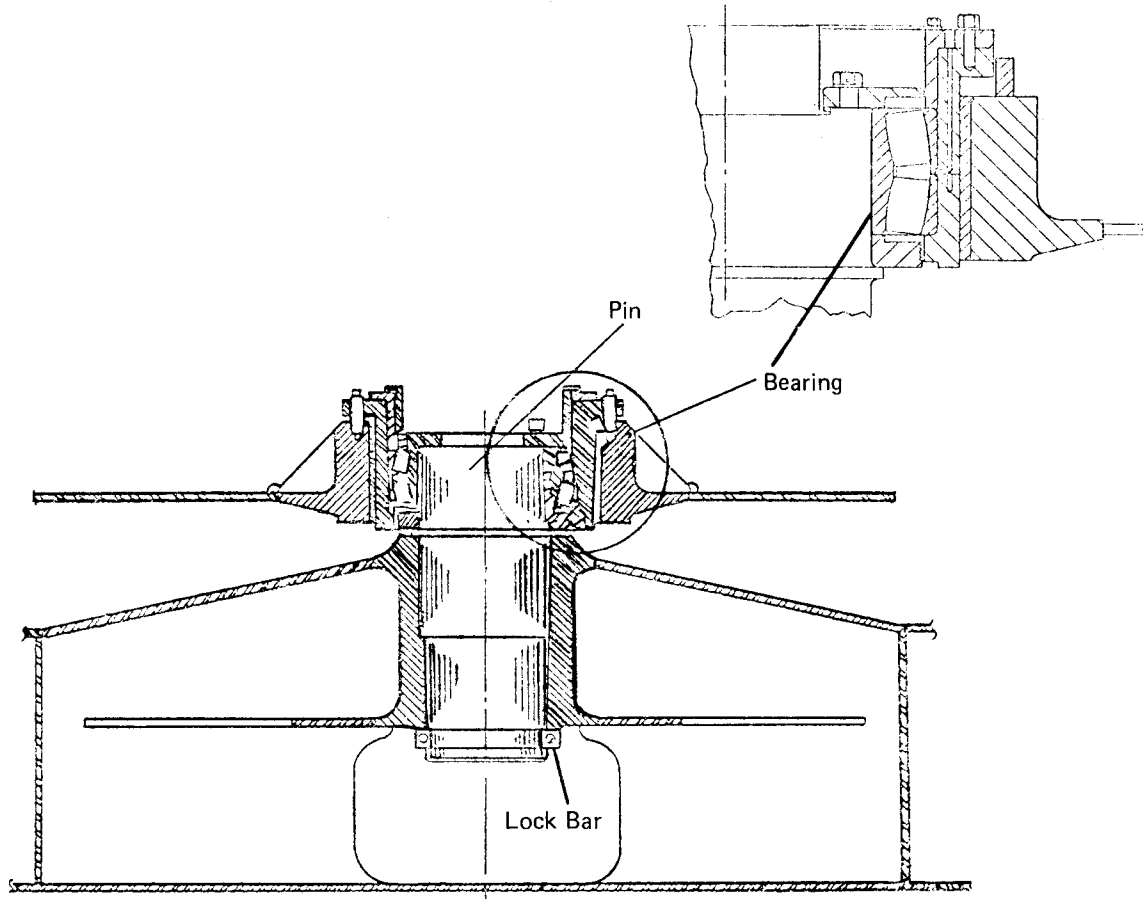


The **ROTO SEAL** carries air pressure from the line to rotating shafts in clutch operations. Lubed at the factory, it needs little or no maintenance. If this unit leaks or fails; replace it. Always use a short piece of flex hose when installing this seal to prevent binding.

AIR CYLINDER VALVES actuate the brakes and are spring set; air released. A sleeve retains the spring and threads into the open cylinder end. A set screw locks this sleeve. To pack cylinder, unlock set screw and turn out sleeve to release return spring tension. Discon-



The **CENTER JOURNAL** pin transfers the drag pull reaction to the tub while digging and holds the rotating frame and tub in concentric alignment at the center of rotation.



The pin is assembled and is secured by two lock bars in a heavy integral boss in the tub structure. The rotating frame turns around the pin on a large diameter spherical roller bearing. The bearing cone (inner race) is clamped against the lower labyrinth grease seal and a flange on the pin by a bearing retainer plate. Place shims under bearing plate so bearing is snug when retainer is down tight.

The spherical bearing cup is assembled in a flanged sleeve, that mounts in the rotating frame bearing boss. A retainer ring holds bearing cup in place.

The sleeve is prevented from turning by four shear bars welded to the bearing boss across the flats of the sleeve flange. When machine weight is resting evenly on all rollers maintain a clearance between bearing boss and bottom of sleeve flange, to allow a complete revolution of rotating frame without binding.

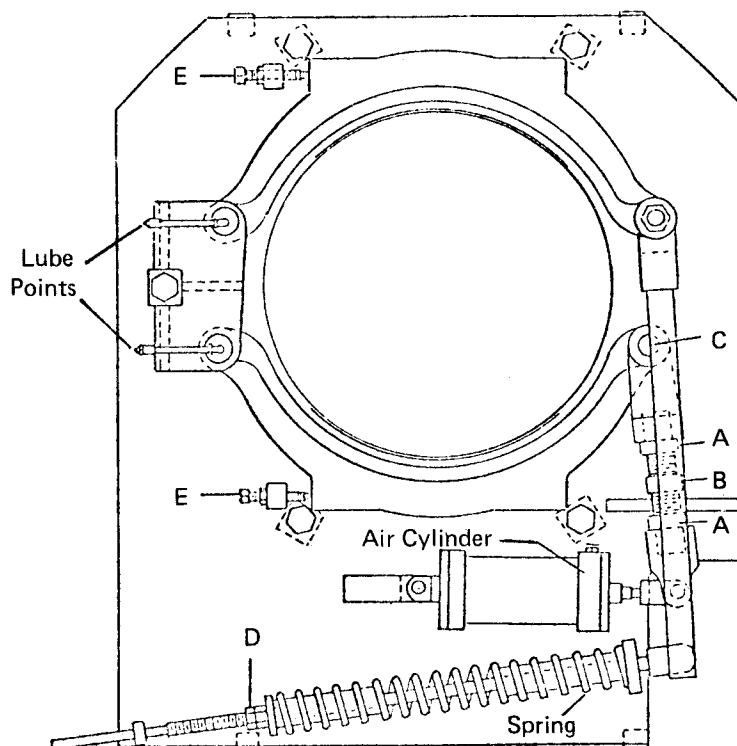
DISCONNECT incoming power at source before removing collector ring assembly to reach center bearing.



intermediate lower bearing housing. After draining case, clean and flush with light oil. Close all valves and replace 360 gallons of (GL) gear lubricant.

A ROTATING BRAKE mounts atop of each rotating motor. The brake wheel keys to the motor armature shaft. An air cylinder releases the brake and it is set by a compression spring. The brake is a holding brake and not intended to stop or retard machine rotation, except in case of emergency. In normal operation swing is stopped by "plugging" or reversing the motor.

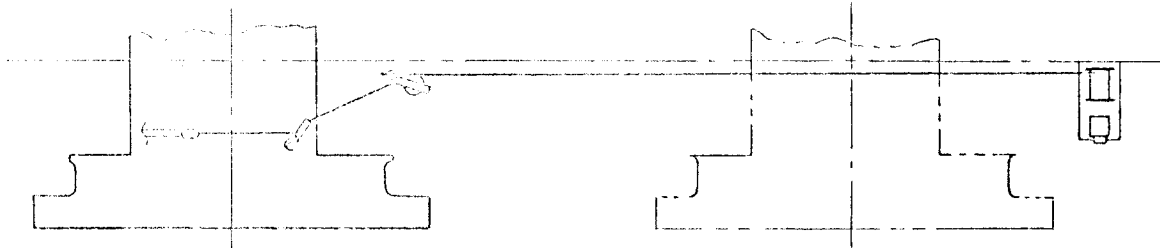
The brake is set by moving the two operating links into near toggle position. Adjust the position by turning the adjusting bolts between end castings of inside link.



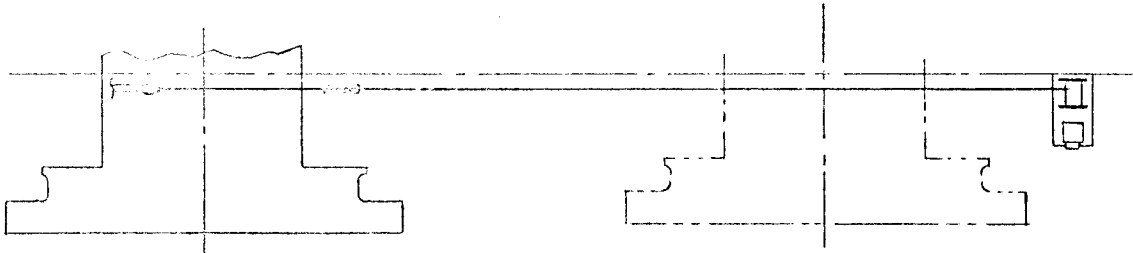
ADJUST ROTATING BRAKE in set position. First loosen the two locknuts (A) on the adjusting bolt. Turn bolt (B) until links are $5/8$ inch from full toggle position when measured at point (C). Turn nuts (D) on spring rod until spring measures 27- $1/2$ inches.

Release brake and adjust set screw (E) against brake shoe so space between shoes and brake wheel is same on each side of wheel.

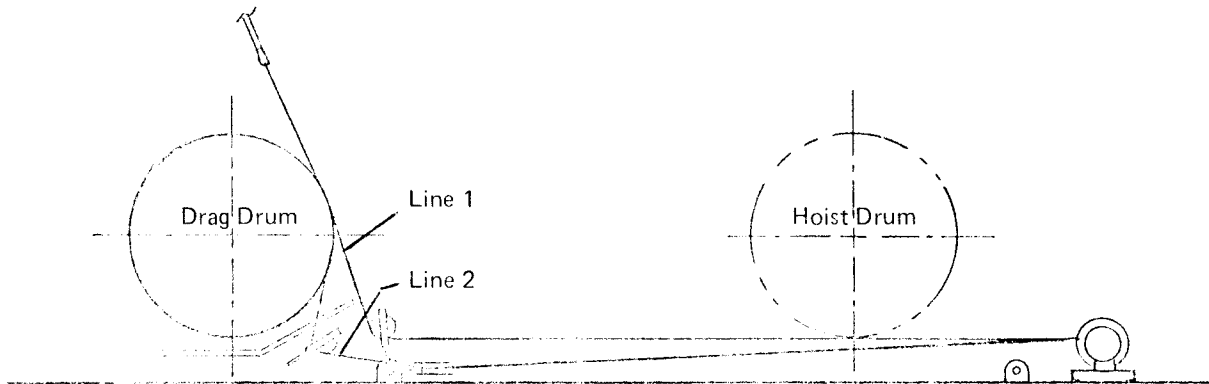
Adjust clevis on brake cylinder piston rod so that piston DOES NOT bottom in cylinder in either set or released position.



TOP VIEW
(Showing Line 2)



TOP VIEW
(Showing Line 1)



DRAG ROPE REEVING

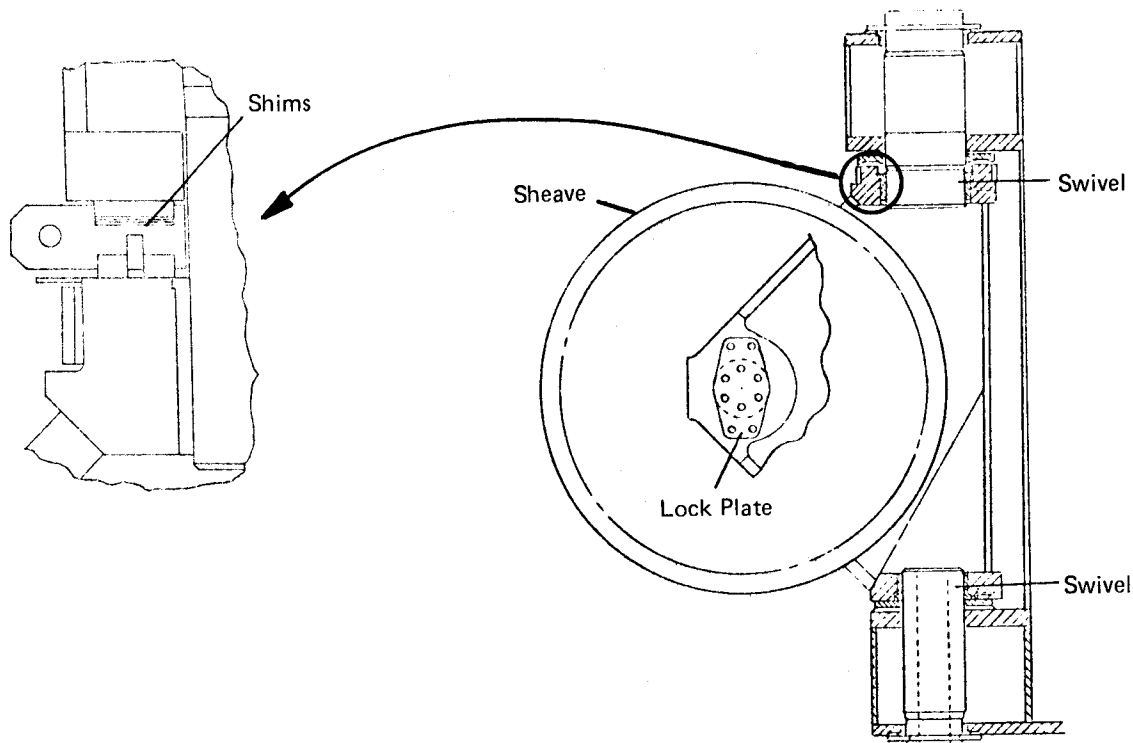


Two **LOWER FAIRLEAD SHEAVES** are located at front of machine at deck level. Each sheave mounts on a swivel casting that allows sheaves to follow the lead of the drag rope.

The sheave case turns on two bushings and thrust bearing.

Installation of bearing is similar as previously described.

The wear bars on inside of fairlead sheave bracket are replaceable.



PROCEDURE FOR ASSEMBLING FAIRLEAD SWIVEL PINS INTO MOUNTING BRACKETS —

1. Assemble lower swivel pin (solid pin) into lower bracket.
 - A. Pack pin in dry ice for a minimum of 12 hours, circulate the air inside the box to provide even cooling of the whole pin.
 - B. Locate bracket so that pin may be removed from cooling box and installed into bracket in a minimum amount of time. Suggest a dry run before freezing pin to practice handling.
 - C. After installing frozen pin, maintain pressure to hold pin against shoulder in bracket while it warms to room temperature.



ELECTRICAL TROUBLE SHOOTING—

A job well done generally comes from an established procedure, whether written or a mental process. A procedure carries thru the steps from PREPARATION to INVESTIGATION, then on to PERFORMANCE. The absence of this procedure only wastes time. Using a good one cuts down time and ends in a satisfactory job.

PREPARATION: Before efficient trouble shooting begins; a background knowledge of the system is necessary, particularly what happens and how it happens from start to finish.

Practically all electric machines use the same system, whether Amplidyne, Rototrols, Magamps, Amplistats, controlled rectifiers or contactors. That is, when the operator initiates a motion by moving the controller, he produces an output from the master switch. This output connects to the control system containing many simple or complex devices. The control system output feeds into the generator for amplifying and then on to the motor. So, the system simply is a master switch, control, generator and motor.

Knowing the general system is step one. Next, a fair understanding of components and what and how each function is needed.

Motors, for example, convert electric energy into mechanical energy. This is done thru armature current interaction and field flux. Before a motor can turn, enough of each of these quantities must exist to overcome the load. Generators are the opposite of motors since they convert mechanical energy into electric energy. Generators require BOTH rotation and field flux to produce output.

Control components often are quite complex. The Instruction Book for the electrical equipment discusses them completely and reading it is a must. However, one can learn to isolate components or part groups without knowing exactly how each device operates.

Another preparatory step requires the wiring diagrams and test data be at hand. If unavailable, contact Marion for a supply. An understanding of the drawing is needed and often re-drawing helps this learning process. The test data helps greatly since the normal electrical readings are listed. A major deviation from this recorded data indicated trouble and often pinpoints the location. Test sheets include stall or maximum generator armature current, no-load or open circuit, generator and control exciter field currents and certain measurements made in the control circuit. Other data considered helpful may be obtained from the machine when operating under normal conditions. Each of the items is listed only to easily locate trouble. Learning how to use the data speeds the process.



Marion's **POWER CONTROL ROOM (PCR)** encloses 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.



POWER CONTROL ROOM

The PCR is supplied with a constant source of clean filtered air under pressure affording the ideal environment for efficient operation of electrical components.

PCR is completely factory wired and only the input and output connections must be made during field erection.

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