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Technical Manual

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PREVENTIVE MAINTENANCE

Machine downtime is costly to owners in lost production. Preventive maintenance is the task of identifying, replacing or repairing machine components before they fail so that downtime is minimized.

CAUTION: **Do not perform inspection activities while machine is in operation.**

Due to variations in operational wear rates of machine components and machine application conditions, component life cycles are different. A scheduled program of machine inspection with accurate record keeping can identify machine component and their rates of wear.

A continuous careful inspection routine can spot unusual conditions or fatiguing components before a failure occurs. Maintenance, repair and component replacement schedules should conform to scheduled machine shutdowns. If during daily, weekly or monthly inspection routines any part shows wear or distortion beyond expected normal patterns replace them with genuine Marion parts at the next scheduled maintenance interval. The cost of parts is small when compared to unscheduled breakdowns with their resulting lost manhours and machine production.

Machines which operate 24 hours, 7 days per week should have a scheduled 8-hour preventive maintenance period each 7-day period. See Section 8 for recommended inspection schedules.

Preventive maintenance inspection procedures listed below are suggested as an example of specific typical inspection activities. Each owner should establish his own preventive maintenance inspection schedule based on machine application conditions and production cycle.

CAUTION: **Maintenance and operating personnel should be aware of mechanical and electrical hazards inherent in servicing this machine.**

INSPECTION CHECKLIST

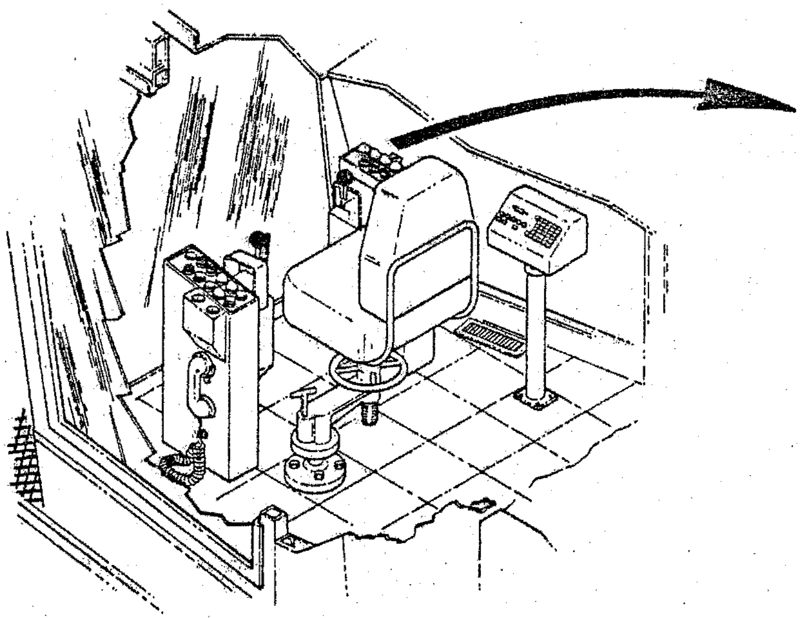
- Check condition of rope sheave grooves and bearings
- Test all hold down bolts with impact wrenches
- Check rope guides and bails for wear
- Inspect all rope for broken wire or loss in diameter
- Check auto-lube system for loose or damaged fittings and injector condition
- Inspect dipper/bucket for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

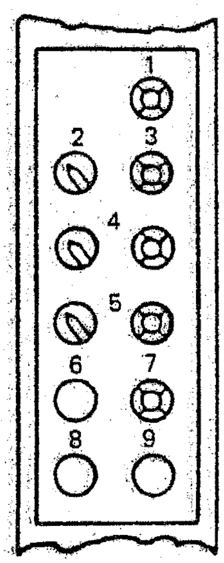
DANGER: **Remove electrical power from machine whenever inspection of center journal, collector rings, rails or roller circle is performed. Use extreme care in removing guards and protective devices.**

back into the power source, thus preventing heat created by mechanical friction brakes.

If hoist or drag controllers are returned to neutral with machine in motion, the control automatically plugs that motion to slow it down and finally come to rest.

CONTROL PANELS on top of each controller stand contains push buttons, selector switches and indicator lights; all clearly marked.





Hoist Stand

The panel located on top of hoist stand (right hand) contains five lights, three selector switches and three push buttons. They are:

1. Propel Brake. This red light will come on when the propel brakes are set.

2. Drag-Propel Brake. This switch will either set or release the drag or propel brakes depending on which mode the machine is in.

3. Drag Brake. This red light, when lit, indicates the drag brakes are set.

4. Swing Brake. Moving this switch to the left sets the swing brakes and right movement releases them. The red light will come on when the brakes are set.

5. Hoist Brakes. This switch either releases or sets the hoist brakes. The red light, when lit, indicates the hoist brakes are in the set position.

HOUSE CHECK LIST (continued):

Main house crane hoist is not parked on a crossover

All limit switches work correctly

FRONT END CHECK LIST — Check the following items:

Check bucket for wear, worn, broken or missing teeth, loose or missing pins, weld cracks

Boom for cracks, bent pipes

Condition of boom support ropes

Intermediate boom support ropes for proper tension

Condition of hoist and drag ropes

Condition of fairlead components

NOTE: If any problems are found after going thru the above check lists, notify maintenance AT ONCE, so correction can be made.

TYPICAL START-UP from a completely shutdown machine. Use the controls on outside of power control room to start the air compressor, exciter set, motor blowers, M-G sets and filter fans.

All starters are protected by circuit breakers for overload protection and to open circuits for maintenance.

CAUTION: DO NOT use breakers as an Off-On switch. Make sure ALL breakers **are On before start-up.**

Observe that the green "Phase Check" light is lit.

Start the air compressor units first by turning switch On.

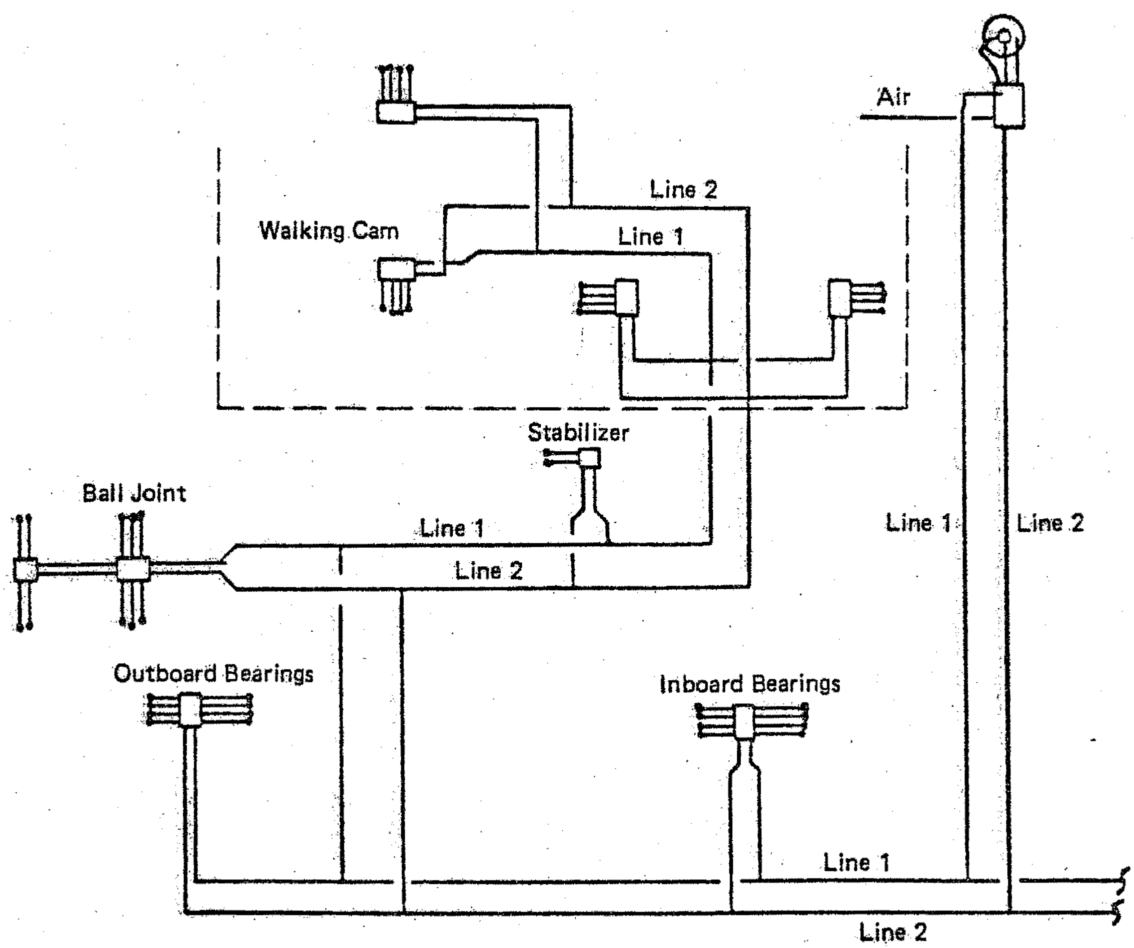
SECTION 3

LUBRICATION

INDEX

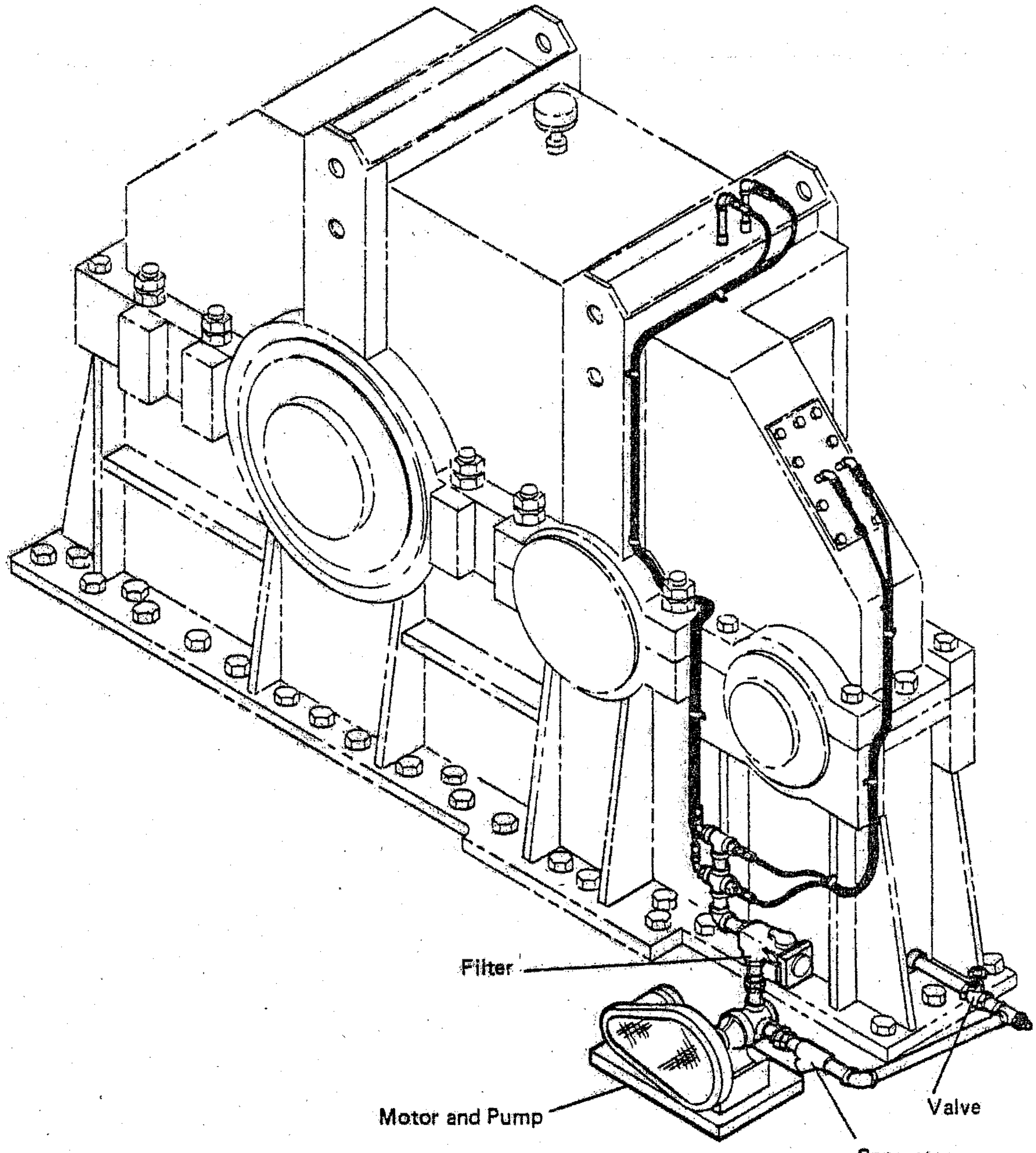
NAME OF PART	TYPE	NO. OF POINTS	LOCATION	LUB. SYM.	METHOD & FREQUENCY
			LUBRICATION OF PROPEL MACHINERY (1 of 2)		
Walking Arm Eccentric	Bushing	16	In O.D. of Bushing	WCL	Automatic
Stabilizer Arm, Top	Bushing	1	In End of Pin	WCL	Automatic
Stabilizer Arm, Bottom	Bushing	1	In O.D. of Bearing Boss	WCL	Automatic
Shoe Swivel Ball Joint	Bushing	6	In O.D. of Spherical Bushing	WCL	Automatic
Lateral Ball Joint Shaft	Bushing	4	In End of Shaft	WCL	Automatic
Main Propel Outer Bearing	Bushing	8	In O.D. of Bearing Boss	WCL	Automatic
Main Propel Inner Bearing	Bushing	8	In O.D. of Bearing Boss	WCL	Automatic
Main Propel Pinion Bearing	Anti-Friction	2	Piped to Side of Bearing Housing	MPG	Hand, 500 Hrs.
Propel Gear and Pinion	—	8	Drip on Gear	OGL	Automatic
Propel Shaft Spline (In Eccentric)	—	1	Use Molycote M-8800 before Assembly	—	—
			Use OGL Type B after Assembly; at Inside Spoke of Eccentric	OGL	6 Mo., Hand Keep Coated

AUTO LUBE FOR PROPEL MACHINERY supplies main propel shaft inboard and outboard bearings. It also supplies the walking cam, stabilizer and shoe swivel on each walking arm. This dual line system operates during propel or walking cycle only and its control is set to provide 20 seconds between pumping cycles. Alarm timer set for 60 seconds sounds on failure. Air pressure is regulated at 80 psi and system pressure switch setting is 2500 psi. The system uses a 400 pound drum of WCL.



Total Points Serviced – 88

SCHEMATIC
AUTO LUBE – PROPEL



NOTE: Typical installation, left hand and right hand Propel Gear Cases.

PROPEL GEAR CASE LUBRICATION SYSTEM

Principal Weights (cont.) Lbs.

Hoist/Drag Machinery Weights (cont.):

Drag Drum Bearing	544
Hoist Drum Assembly (Less Gears)	113520
Hoist Motor	19500
Hoist Motor Brake	1475
Hoist Drum Lagging	26880
Hoist Drum End	24537
Hoist Drum Gear	29924
Hoist Drum Bearing Housing	3774
Hoist Drum Bearing	544
Hoist/Drag Intermediate Shaft Assembly	25324
Hoist Gear Case (Left)	105000
Hoist Gear Case (Right)	63290

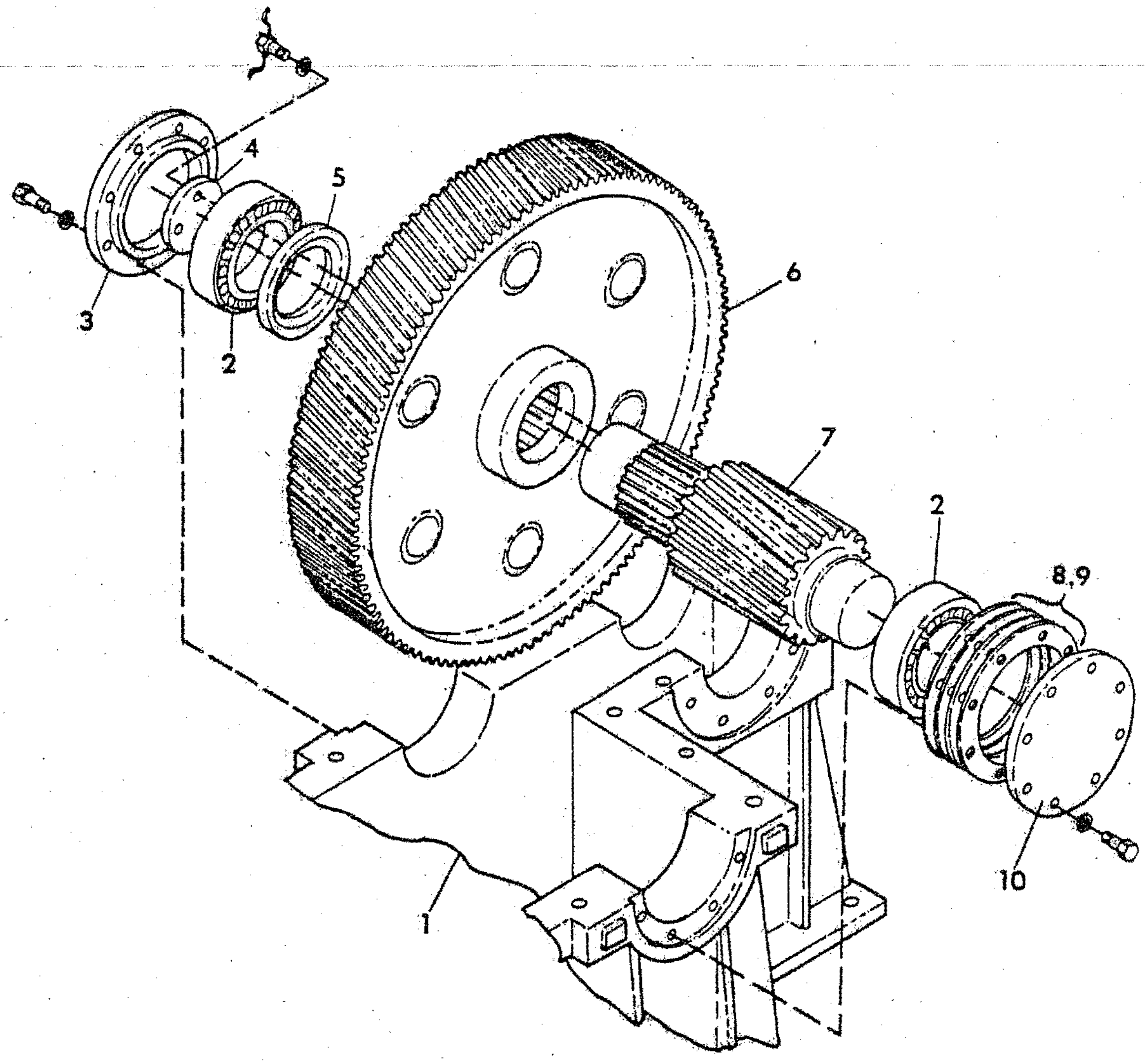
Boom Point Sheave Assembly Weights:

Shaft	3960
Sheave	11610
Bearing	300
Trunnion	10930
Front Bearing Block	1400
Rear Bearing Block	4440
Trunnion Assembly	47280

Fairlead Assembly Weights:

Upper Sheave	14310
Lower Sheave	10460
Swivel Frame	21680
Upper Swivel Shaft	476
Lower Swivel Shaft	1066

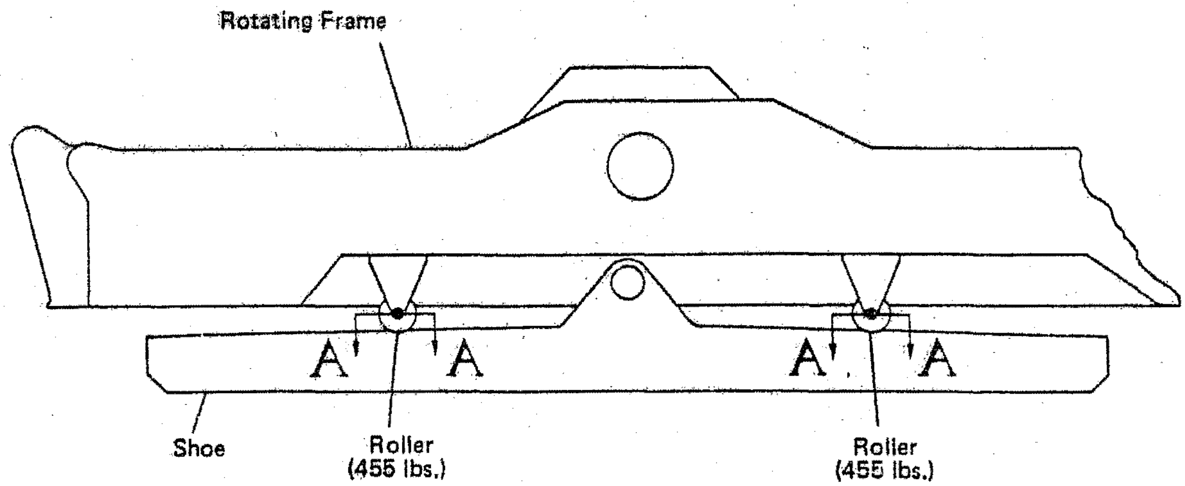
FIRST INTERMEDIATE PROPEL SHAFT ASSEMBLY is a large diameter helical gear splined to a shaft with an integral pinion which drives second intermediate shaft assembly. Shaft bearings are not mounted in eccentric housings in this assembly.

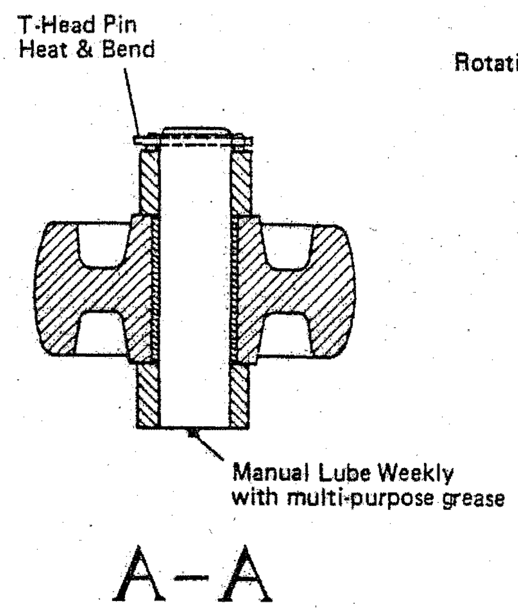


1 Gear Case	6 Gear
2 Bearing	7 Propel Shaft
3 Retainer	8 Shim
4 Retainer	9 Shim
5 Spacer	10 Retainer

FIRST INTERMEDIATE PROPEL SHAFT ASSEMBLY

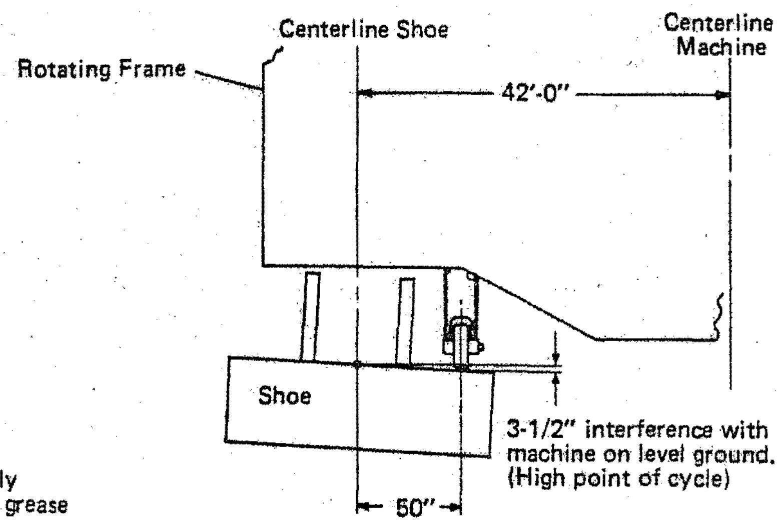
WALKING SHOE ROLLERS are mounted on the rotating frame at two places above each shoe assembly. These rollers keep shoes aligned parallel to the rotating frame when the shoes are in the park position. The rollers also keep shoes from flopping when the swing motion is slowed or stopped by "plugging".





A–A

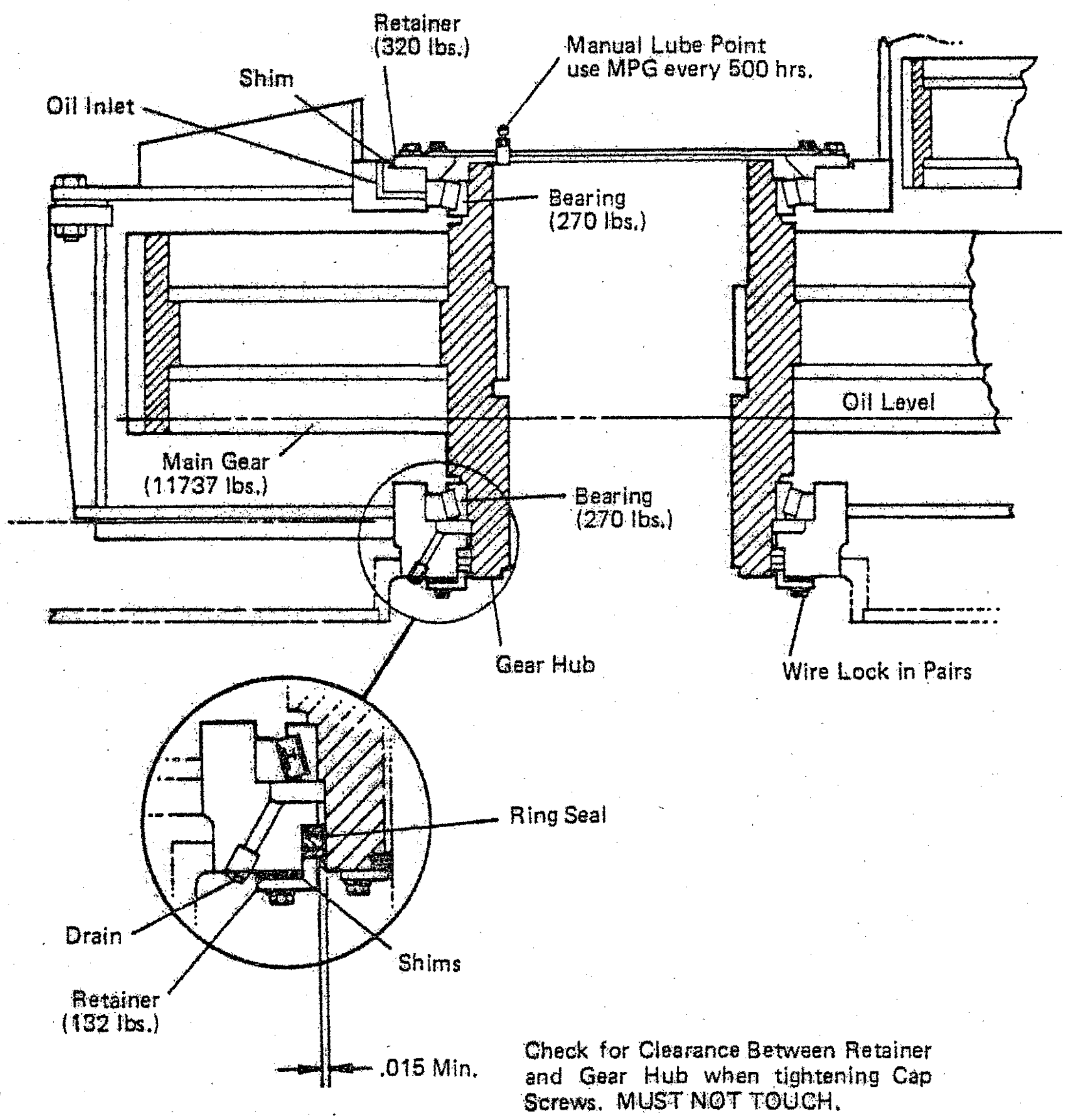
ROLLER AND SHAFT ASSEMBLY



MAIN DRIVE GEAR ASSEMBLY consists of a gear which rotates on two single row bearings. The main rotating shaft is splined to the drive gear in the center of the gear hub.

The **MAIN GEAR BEARINGS** are set up as follows with main shaft removed:

Complete assembly of bearings in case, then draw up top bearing retainer by torquing four equally spaced bolts to 90 ft. lbs. Turn gear as bolts are tightened to insure even loading. Measure gap between retainer and boss near each of four bolts. Take average dimension to determine shims required and install shims. Install and torque all retainer bolts. Wire lock bolts securely. After main rotating shaft is assembled in case, recheck for required gap between retainer and boss.



Check for Clearance Between Retainer and Gear Hub when tightening Cap Screws. MUST NOT TOUCH.

Disassemble drag gear case by removing gear guards and case cover bolts. Remove cap screws from top half of bearing retainers of intermediate shaft assemblies and from top half of eccentric housings of motor extension shaft assemblies. Loosen cap screws (about two turns) located in bottom half of bearing retainers and eccentric housings. Remove split oil seals from intermediate shaft assemblies. Lift case covers from case.

Remove split collars from intermediate shaft bearing housing pins and then remove pins.

Remove cap screws from lower half of bearing retainers and eccentric housings. Using sling around shaft, lift out intermediate shaft assembly while slowly rolling both intermediate shaft and hoist drum to allow intermediate shaft to roll out of engagement.

Next, disconnect motor couplings and remove motor extension shaft assemblies from case. Move No. 2 and No. 3 drag motors to remove those shafts. Drain and clean gear case and flush out with light oil. Reverse procedure to reassemble gear case. Reassemble motor shaft couplings in accordance with Engineering Data Section 7.

NOTES:

1. Remove locknuts, in alternating sequence as shown in Figure C, in increments of 1/4 of the exposed stud thread length.

CAUTION: If stud comes loose from mounting flange, clean stud threads thoroughly. Apply Loctite 277 or equivalent. Thread stud back into mounting flange hole until it bottoms.

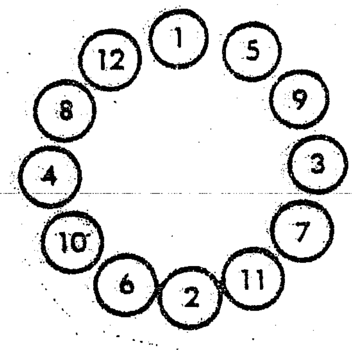


Figure C

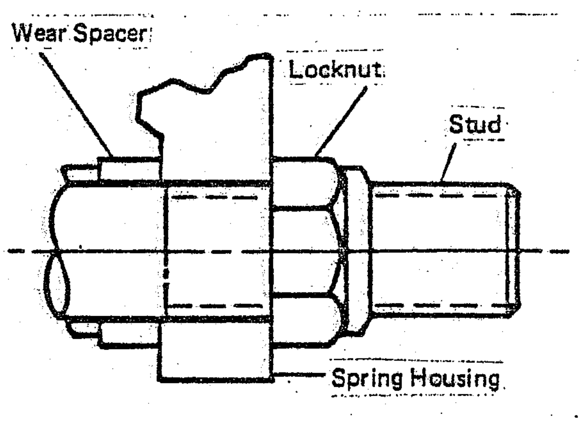


Figure D

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

3. Remove wear spacers from studs. See Figure D.

4. Reassemble the end plate, spring housing, and pressure plate on the studs as assembly with wear spacers now located on the outside of the spring housing. See Figure E.

5. Lubricate stud threads with 30 weight oil or "Never Seez". Assemble locknuts on studs and torque to 200 ft. lbs. (271 Nm) using sequence shown in Figure C.

CAUTION: After adjustment, a minimum of 0.040 inch (0.1016 cm) running clearance must exist between each friction disc and each disc.

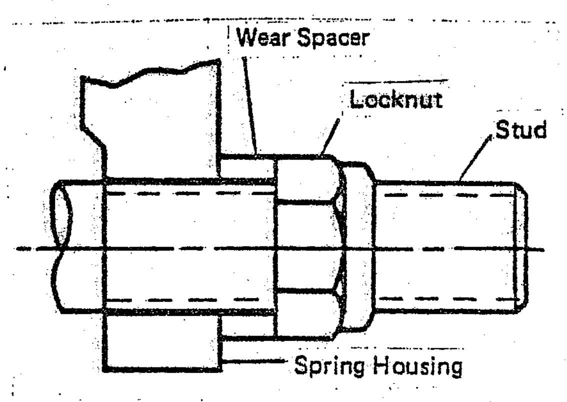


Figure E

6. Reinstall shield.

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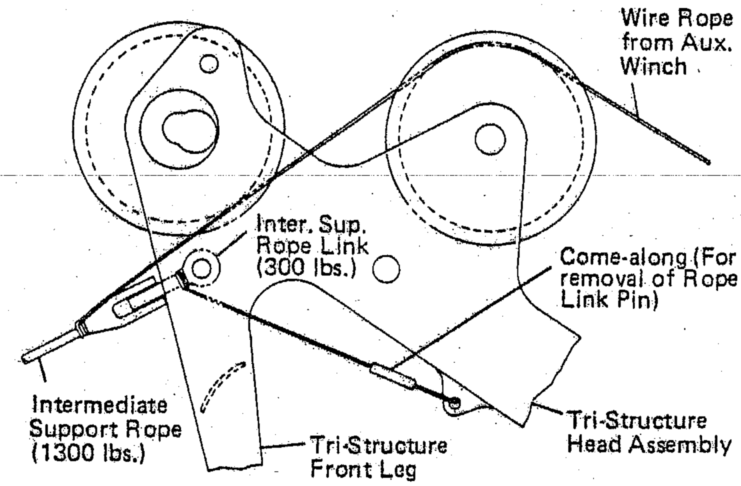
The following steps are applicable to both left and right sides of tri-structure and boom:



View C

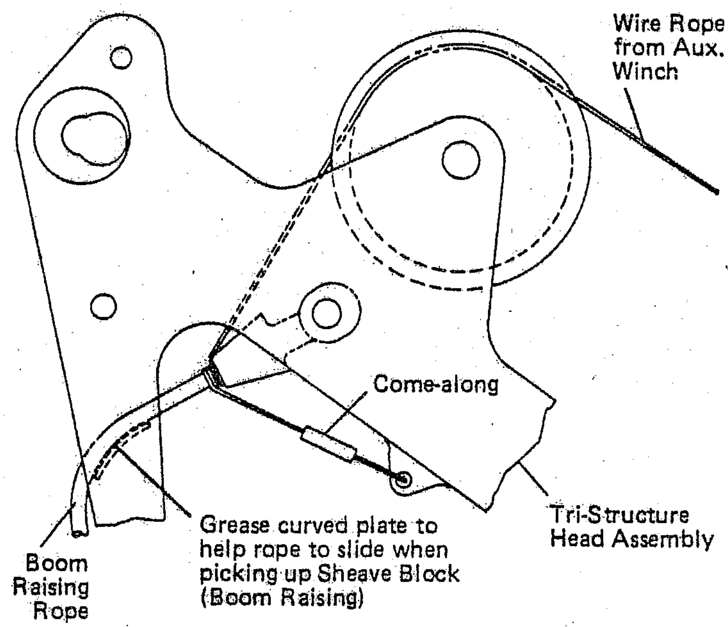
Reeve auxiliary winch wire rope over front and rear sheaves on top of tri-structure. Attach winch rope to intermediate support rope. Release tension on intermediate support rope, remove pins from rope link and lower rope to top of boom. Disconnect winch rope and secure intermediate rope to top of boom. See View C.

Attach winch rope to socketed end of boom raising rope (furnished by customer) and pin rope socket to dead end on tri-structure as shown in View D.

Use winch rope to reeve free end of boom raising rope around sheave on support rope bridle and over sheaves on tri-structure. See View E.

Clamp boom raising ropes to drag drum. Equalize ropes.

NOTE: Rope equalization is very important!

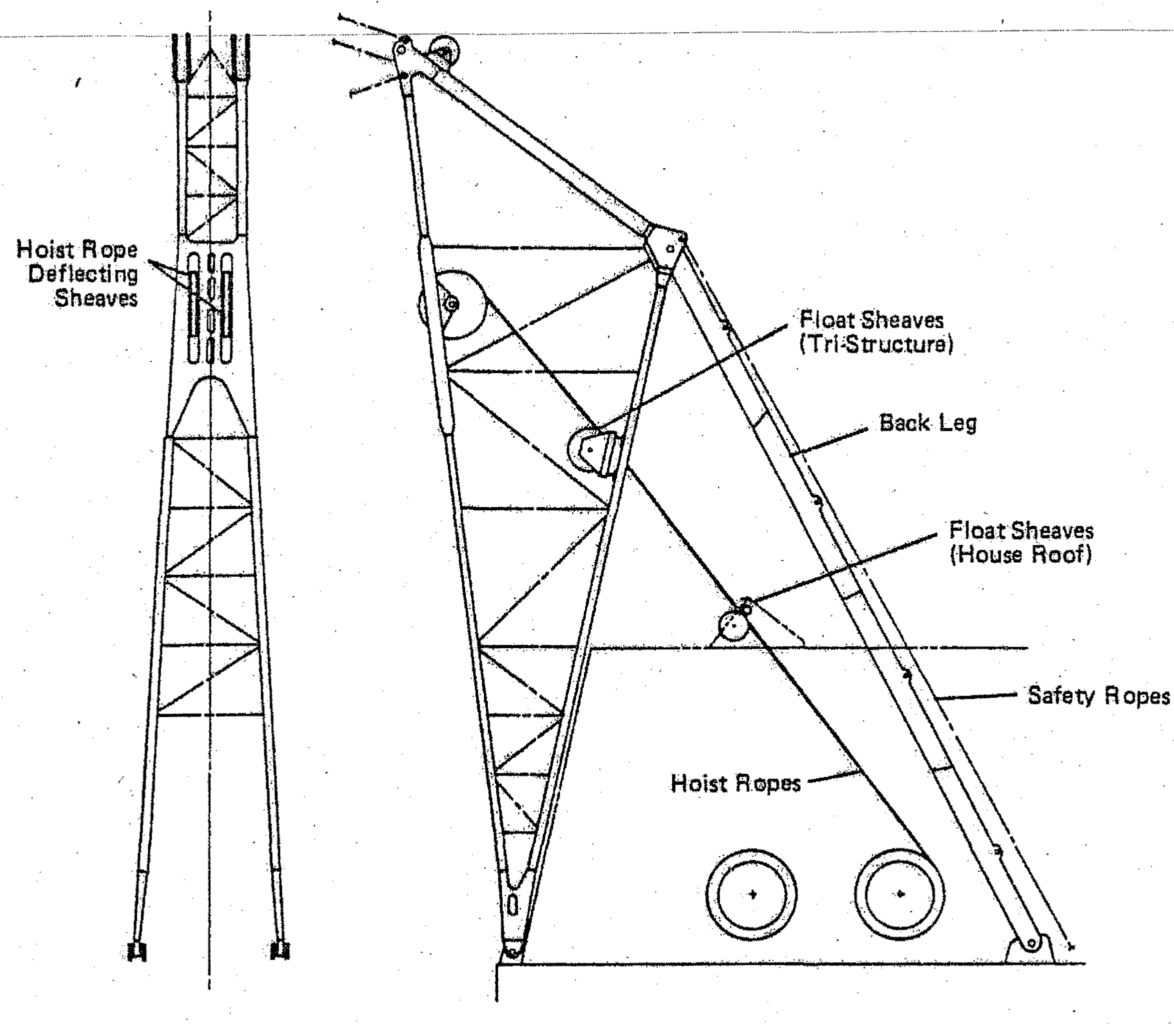


View D

CAUTION: Check drag brakes for proper shoe adjustment and maximum braking force.

Increase tension on boom raising ropes until support rope bridle pins can be removed. SLOWLY and CAUTIOUSLY lower boom to within three or four inches of desired ground position. SET BRAKES.

TRI-STRUCTURE ASSEMBLY is a welded structure connected by pins to front girder of rotating frame and to back leg assembly. Back legs and two safety ropes anchor tri-structure assembly to rotating frame deck. Boom support rope bridles and intermediate support ropes are attached to top of tri-structure. Hoist ropes are routed thru tri-structure over deflecting sheaves.

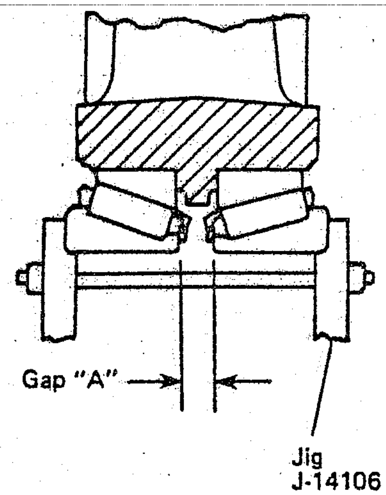


TRI-STRUCTURE ASSEMBLY

Two **HOIST ROPE DEFLECTING SHEAVES** are located in the upper front section of the tri-structure assembly. These sheaves lead the hoist ropes from the boom point to the hoist drum.

Each sheave is supported by a fixed shaft and rotates on two single row roller bearings. Bearings are assembled into the sheave with a machined spacer between the cones for accurate alignment and adjustment.

To REPLACE UPPER SHEAVE BEARINGS, the following procedure is applicable to each upper fairlead sheave and set of bearings. Remember to matchmark parts for assembly.



1. Chill and install bearing cups in sheave.

2. Assemble cone/roller assembly and clamp with jig J-14106 and tighten jig bolts until bearings bind slightly when rotated.

3. Measure distance between cones (gap "A") with inside micrometer at 3 places 120 degrees apart. Calculate average dimension. Machine bearing spacer to calculated average dimension minus 0.002 to 0.004.

4. Remove jig and install sheave and bearings on shaft with machined spacer between bearings.

   Note: Hand pack bearings with multi-purpose grease before assembly.

5. Reinstall bearing retainers.

6. Lubricate shaft and bearing assembly thru shaft fitting.

NOTES:

Has speed increased or decreased for light loads?

Has speed increased or decreased for heavy loads?

Next, question other witnesses and determine what they saw or heard; getting every detail. Then make a quick visual inspection of equipment for obvious things as flashover, smoke or other evidence of over-heating or broken components. (One electrician checked for hours— then noticed the generator stopped.) Moral — look for the obvious.

After listening to witnesses and making the first inspection, stop and consider ALL the facts before proceeding. Valuable time is lost by going off quickly in the wrong direction. So, carefully examine the problem logically, using what you know about the system. Consider all the data collected. Do not make hasty decisions on what to use or what info to discard. Give special value to obvious facts, easily confirmed (a stopped generator) and reserve opinion on contradictory facts.

Barring the obvious, you gain a direction from all this and knowledge of the system. For example, if no motion operates; look in circuits common to all motions, such as: D.C. exciter or A.C. circuits. Likewise, if one motion is normal in one direction; but not in the other, check the components for the separate directions. A few minutes spent analyzing here saves time spent in false, misled direction later.

Once a founded suspicion exists as to which set of components or circuits is faulty, select a starting point for tests that meets the following:

You know approximate value expected here for test conditions; whether at stall, no-load, neutral, hoist, lower, etc.

No false indications exist, you've avoided points where reading is effected by a sneak circuit.

This point, logically, is in the suspected circuit.

Also, it allows checking as many circuits as possible at one time.

With proper instrument, measure at a selected point and compare to expected value. If measurement is correct, apparently all system parts leading to this point are correct. Trouble exists further down the line. With an incorrect reading, trouble probably lies further back toward start of the system.

Based on first test, proceed toward system start or end and seek expected reading. The trouble, of course, lies between points where correct and incorrect readings occur. In other words, the faulty stage has correct input, but incorrect output. Be positive the correct stage

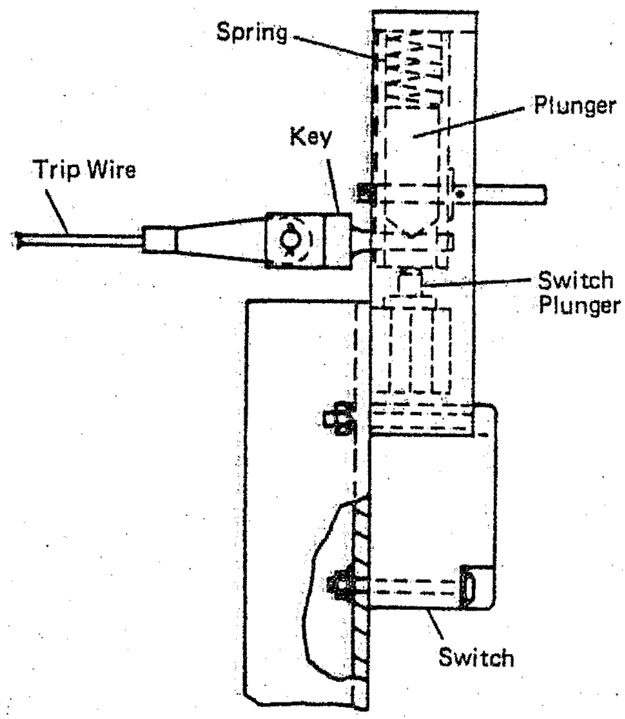
The **SLACK ROPE LIMIT SWITCH** operates to prevent excessive backlash when the hoist drum or drag drum rotates faster than the rope can be payed out.

The slack rope strikes the switch trip wire which pulls the key from the limit switch. Actuation of the limit switch shuts down the affected motion and sets the brake. The Slack Rope Limit Light will illuminate on the operator's annunciator panel.

A limit switch and trip wire are located under both hoist drum and drag drum. Operation of the switch should be checked weekly.

NOTES:

1. Lube all moving and sliding parts with MPG.
2. Adjust trip wire for 1.00 inch sag measured at center of wire.
3. To adjust switch, remove key so mechanism is in activated position. Then slide switch up or down until plunger on switch is depressed enough to actuate switch. Plunger must be depressed at least .05 inch to trip and has a permissable overall travel of .15 inch.



SLACK ROPE LIMIT SWITCH

SECTION 7

ENGINEERING DATA

INDEX

This section contains general information not specific to an individual machine. It is provided as general reference material for maintenance personnel.

Should additional specific data be required in these subject areas contact your Marion Service Representative.

Follow this installation procedure for split seals:

Remove garter spring and separate at the hook and eye

Open the seal ends sideways for installation on shaft as shown in Fig. 2 by moving the butt ends along the axis of the seal.

Lubricate spring and install around shaft. Connect ends and insert spring in lip groove with spring ends 90° away from butt joint.

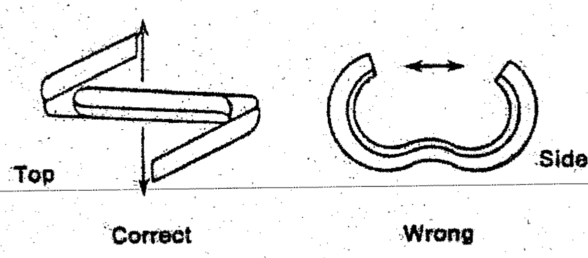


Figure 2
Split Seal Installation

CAUTION: Do not trim or cut ends of split seals or pull ends apart. This will destroy seal.

Gear case seals used for all oil tight gear case assemblies require surface preparation on one side of case flanges with a 1/100 inch thick Form-a-Gasket #3 (Permatex Co.) coating. If using a manila paper gasket always replace with a new one, never reuse. Apply Form-a-Gasket #3 to both sides of the paper gasket. Tighten gear case cover bolts until seal material "squeezes out" at joint.

When surface finishes range up to 250 microinches a compression type gasket seal is recommended. This material (VELLUMOID available in standard thickness inches (mm) 1/64 (.397), 1/32 (.794) 1/16 (.063) and 1/8 (.125) should also be installed with Permatex applied to both sides.

GEAR ALIGNMENT ECCENTRICS (Draglines Only)

There are two methods of sealing Marion gear alignment eccentrics. For eccentrics that are rigid (without o-ring seal) coat the surface of the eccentric with permatex liquid sealer FORM-A-GASKET No. 3 (MPSD 134562-1) Coating of sealer should be brushed over the total surface area of both contacting surface's according to the illustration and notes.

A. Coat this surface thoroughly with "Permatex" prior to assembly.

B. This contact surface may or may not receive a laminated shim depending on design. Coat this surface thoroughly prior to assembly and when shims are used coat surfaces on both sides of shim material.

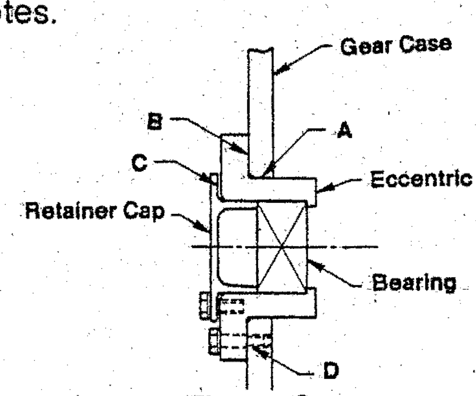


Figure 3
Eccentric Cartridge

ORIENTATION

Reference centerlines are selected relative to a plane defined by the pinion and gear axis of rotation as shown in Fig. 9A and 9B. They are selected for the pinion shaft ends only. One reference centerline is in the plane (X-X) and the other is perpendicular (Y-Y) to the plane.

It does not matter if the reference centerlines were opposite from those selected in Fig. 9B, as long as one reference centerline is in the plane and the other one is perpendicular to the plane.

From the previous section on eccentric cartridge theory, shaft end No. 1 will move perpendicular to the reference centerline, that is, along the X-X axis. This movement could also be described as moving shaft end No. 1 "into" or "out of" mesh. Obviously then, shaft end No. 2 would move in a direction perpendicular to end No. 1 or along the Y-Y axis. This movement is often referred to as the "cross-bearing" adjustment.

OUT OF PLANE ADJUSTMENT

When shaft end No. 2 is moved along the Y-Y axis (Fig. 9B) the adjustment is called out of plane because it seems to move out of the plane of interest.

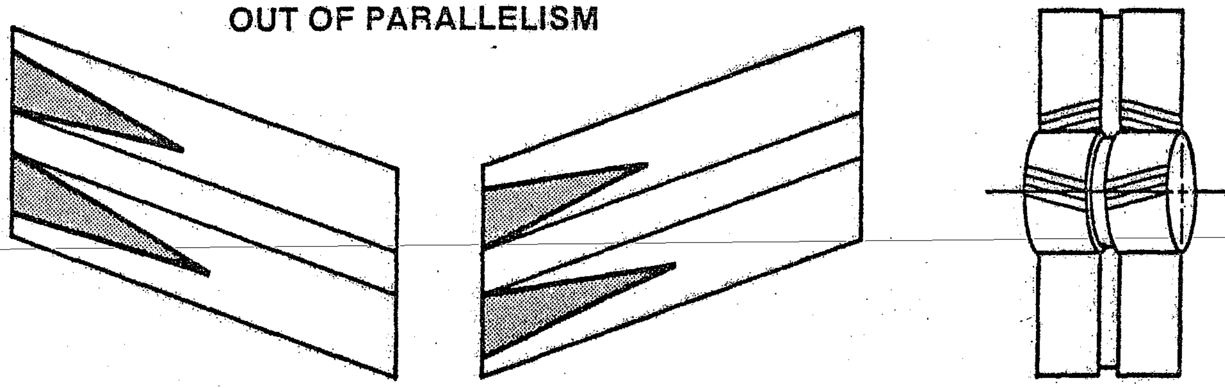
OUT OF PARALLEL ADJUSTMENT

When shaft end No. 1 is moved along the X-X axis (Fig. 9B) the adjustment is called out of parallel because it seems to move the shafts out of parallel.

COMMENT

It is recognized that both of the aforementioned adjustments seem to move the shafts out of parallel. However, to identify the direction of adjustment the "out of parallel" and "out of plane" nomenclature are used.

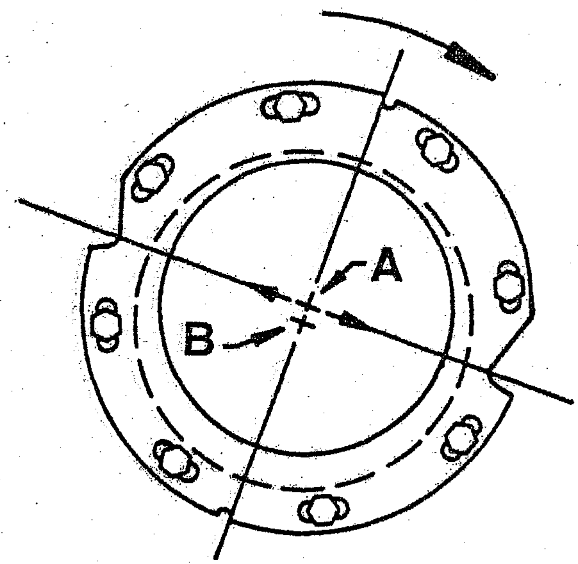
MISALIGNMENT OF PINION SHAFT
OUT OF PARALLELISM



CORRECTIVE ADJUSTMENT

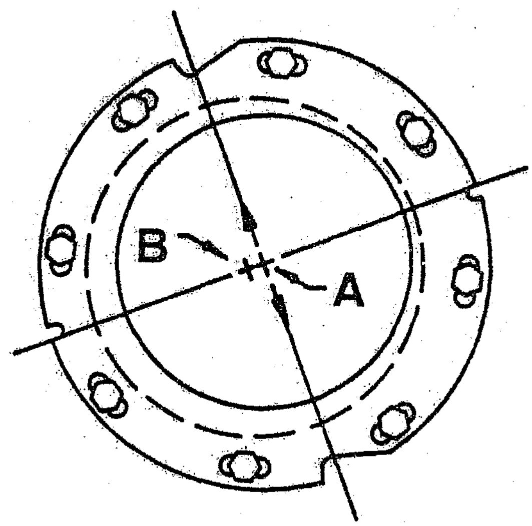
VIEW A-A

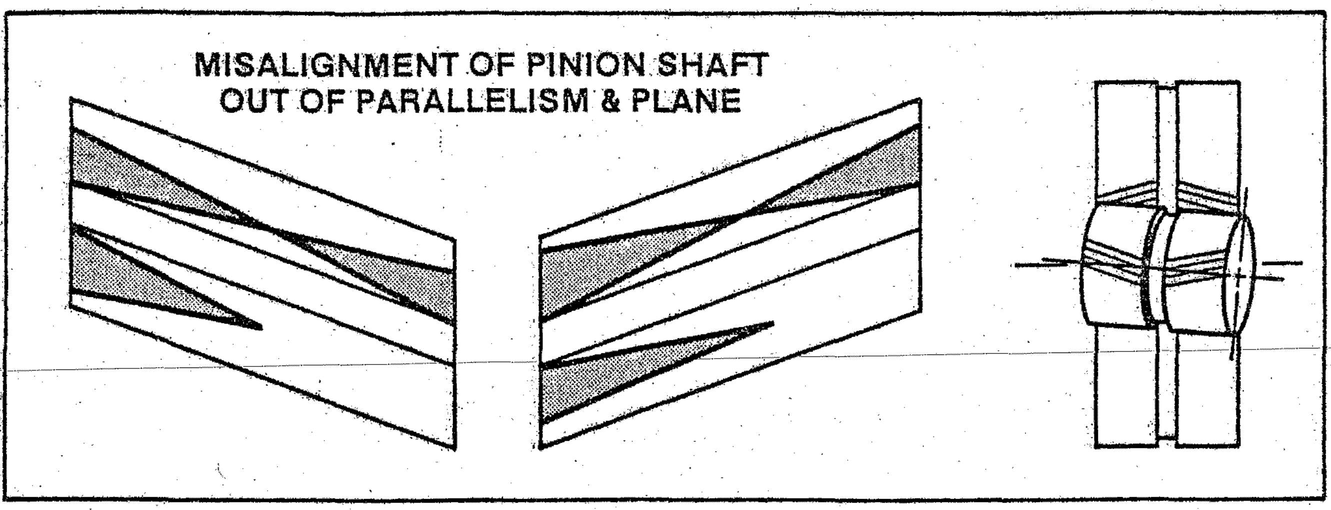
ADJUST ECCENTRIC IN
CLOCKWISE DIRECTION.



VIEW B-B

NO ADJUSTMENT REQUIRED.

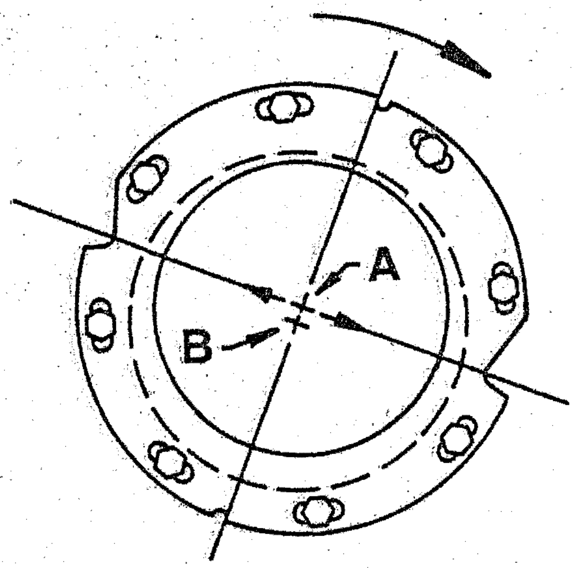




CORRECTIVE ADJUSTMENT

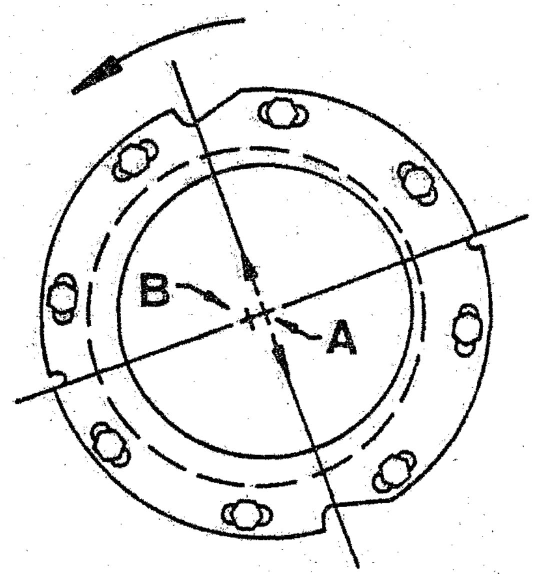
VIEW A-A

ADJUST ECCENTRIC IN CLOCKWISE DIRECTION.



VIEW B-B

ADJUST ECCENTRIC IN COUNTER-CLOCKWISE DIRECTION.



WIRE ROPE CARE

Wire rope manufacture uses the finest material available. Wire rope is more vulnerable to abuse and neglect than any other component on this machine. By comparison to other industrial applications, wire rope on mining equipment remains relatively short lived and hence considered an expendable item. Replacement of hoist and support ropes represents a sizeable investment; so every effort must be applied to extend the useful life of ropes.

The vulnerability to abuse and mishandling may cause a new rope permanent damage during installation. Improper removal from reel or coil often causes kinks. Pulling on rope until loop radius reduces to point where wire rope bends beyond the metal elastic limit creates these kinks. Pulling rope over a small sized sheave causes a kink also. Even when kink appears straightened, the strand damage and weakness remains.

Abrasion or nicks caused by pulling a rope over sharp objects weakens the rope. Wire rope needs protection from possible damage when a winch or lifting device attaches to strands forming a dogleg bend in the rope.

A coil of rope correctly unwound is rolled, (like a hoop), along a smooth surface and away from the rope end.

When removing rope from reel, place a heavy shaft or pipe thru reel center and raise until reel turns freely. Allow this free turning as rope end is carried straight away from the reel. Use a wedge block or plank against the flange to act as a brake. Whenever possible, transfer rope directly from reel to drum. (See sketch). In case of overwind, transfer rope from top of reel to top of drum. Likewise, for underwind; transfer rope from bottom of reel to bottom of drum. Avoid any methods where a reverse bend in rope might occur.

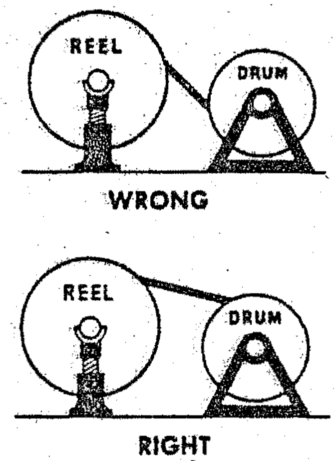


Figure 17
Rope Coiling Procedure

A good operator and maintenance crew develops the habit of watching ropes during work cycle to determine any damage in rope appearance caused by accident, broken wires, etc. Inspection determines, by careful measurement and comparison with a new rope, any loss in rope diameter. This loss at isolated spots indicates core failure. Where core failure occurs, the rope collapses and lay length (one full strand wrap) increases.

Diameter loss over a large area indicates normal outer wire wear. Wires wear more rapidly on a new rope due to minimum surface contact of each wire. As these wires wear, they present a flattened surface and the rate of normal wear decreases.

Step three 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 forgings. 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 forgings can be categorized the same way; (1) low carbon, (2) medium strength and wear, and (3) high strength and wearability.

The electrode tensile strength and the preheat parallel the material categories as follows:

Type of Steel	Electrode	Preheat
Mild Steel	E70XX	70°F (21°C) to 150°F (66°C)
Medium Strength Steel	E70XX, E80XX	70°F (21°C) to 250°F (121°C)
High Strength and Wearability Steels	E90XX, E100XX, E110XX	150°F (66°C) to 300°F (149°C)
Castings & Forgings		
—Low Carbon	E70XX	70°F (21°C) to 150°F (66°C)
—Medium Carbon	E70XX, E80XX	100°F (38°C) to 450°F (232°C)
—High Strength and Wearability	E90XX, E100XX, E110XX	250°F (121°C) to 600°F (316°C)

Lower and upper frames of draglines and mining shovels are usually made of structural mild steel. The boom and its components are made of medium strength steel. Buckets and dippers use high strength wear resistant type steels. There are very few castings made of low carbon steel. The majority of steel castings can be classified as to the job they perform. Hubs and bearing supports can be considered as medium strength and wear while gears, sheaves, shafts, bucket castings are high strength, high wear components.

Brake shoe components are usually made of cast iron, therefore, it is not recommended to weld on these parts because of the product liability risk and the poor reliability of the weld.

Do not weld or tack any lifting lugs, aligning lugs, or hold down lugs on any parts unless you know the type of material. The lugs could pull out at the weld because the right procedure was not used. This could cause damage to a part, a person, or some other parts. Do not over-weld when adding attachments such 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. Visual inspect the completed repair job. Use the template during the welding operation to check on any distortion.

STEP 8: Postheat by holding the heat at 550°F (288°C) for one hour after welding has been completed.

STEP 9: Allow the gear to slow cool at a rate of 50°F (10°C) per hour until it reaches 150°F (66°C). After it reaches ambient temperature, grind the root contour.

STEP 10: Inspect the repair visually and with magnetic particle inspection. Check all critical dimensions. Check the hardness of the tooth.

A weld repair can be very successful if it is thought out carefully and these repair weld procedures are followed.

Keep in mind: Dust is one of the meanest abrasives, mostly since it is hard to see.

Ozone, oxygen and moisture; over a long period of time act on O-rings also. Most manufacturers now add chemicals to slow or eliminate the effects; but correct storage is still needed.

Excessive heat is a problem, so storing O-rings on the top shelf near the tin roof is not good. Besides that, sunlight and flourescent light tends to age rings earlier. Use Polyethylene or brown glass jars to keep light out.

Contact between rings lying together in bulk or on hooks or pegs damages seal surfaces. When stored in the open, they collect dust and dirt. Also, bulk shipments often cannot be numbered. Keep rings away from steam pipes, heater conduits and areas where contact with water, oils, grease, solvents and other damaging fluids seems likely. Add replacement O-rings to the bottom or back of a bin as older parts move to the top or front to assure issue before a brand new one.

Individually packaged rings seem to have unlimited shelf life. Some maintenance shops use peg boards for individual packages of shop stock used daily. These are arranged by size on each board, but with ONLY ONE compound type per board.

BASIC THINGS TO REMEMBER:

Select the proper O-ring ONLY by part number.

Keep all parts clean.

Use compatible fluids and rings.

Use either individual containers or provide LABELED, clean, low light, storage.

DO NOT USE hardened steel tools when removing or installing rings.

Be sure new rings are not mixed or contaminated when put into labeled storage.

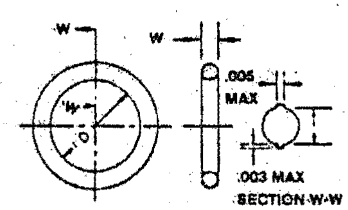
DO NOT INSTALL a dry O-ring on a dry shaft.

O-rings are almost always dimensioned in terms of cross-section diameter and inside diameter either in decimals or fractions.

Example:

Standard Size Cross Sections

Actual mm	Nominal	Actual (inch)
1.7780±0.0762	1/16	0.070±0.003
2.6162±0.0762	3/32	0.103±0.0003
3.5306±0.1016	1/8	0.139±0.004
5.3340±0.1270	3/16	0.210±0.005
6.9850±0.1524	1/4	0.275±0.006



Standard inside diameters for these various cross sections range anywhere from 1/32 to 26 inches.

All in all, there are slightly more than 300 standard O-ring sizes.

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