



Technical Manual

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SECTION 2

AIR SYSTEM AND COMPONENTS

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WIRE ROPE PENDANT LUBRICATION

Experience has shown the most likely point of failure of boom point support bridge strand rope to be that area at, or adjacent to the socket connection.

This is the area where the greatest deflection occurs. The movement of strand against strand will dislodge the lubrication enough to permit the entrance of moisture, which eventually causes deterioration of the rope.

To avoid this condition and increase the useful life expectancy of the bridge strand support rope, wire rope lubricant is applied in the area of the socket by hand. Use hand spray.

SELECTION OF LUBRICANTS

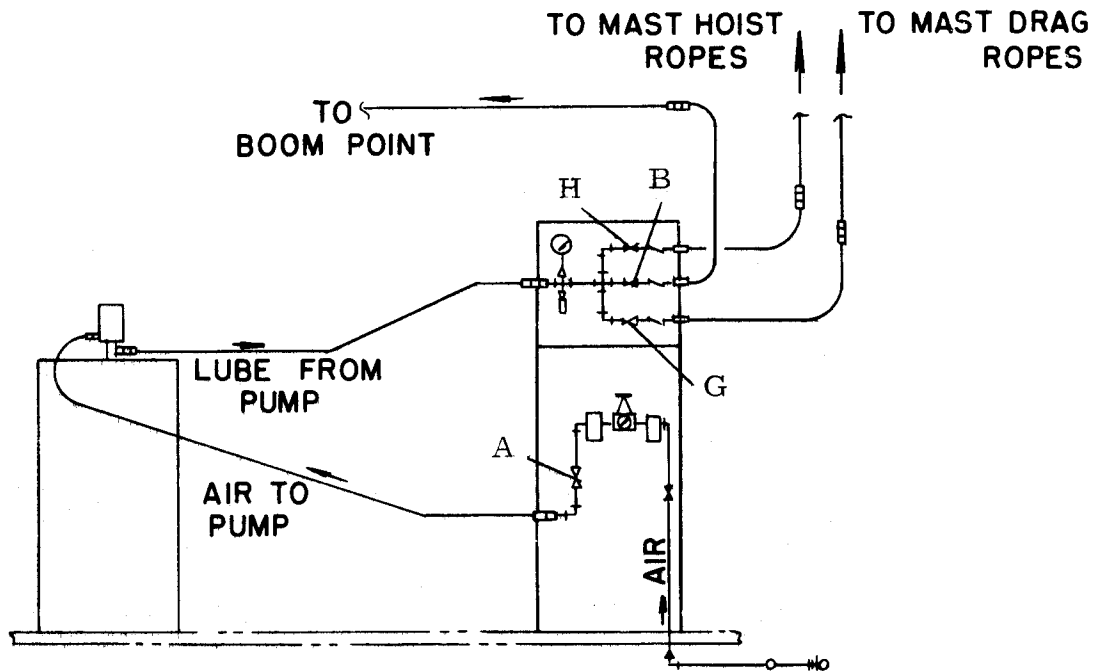
The lubricants recommended for this machine have been selected according to the ASTM specification standards. These standards have been compiled through the cooperation of major petroleum suppliers so the consumer may be supplied with the exact lubricant to fit specific requirements, regardless of the source of supply.

We recommend that the following information be made available to your petroleum supplier to assist him in selecting the proper product for each application on your machine.

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

SEMI-AUTOMATIC LUBRICATION OF HOIST AND DRAG ROPE (Optional)

This system provides spray-on lubrication (WRL) for the hoist and drag rope. The system consists of three (3) lines. Line "B" provides lubricant to the four (4) (one (1) each rope) spray nozzles mounted over the boom point sheaves. Line "H" provides lubricant to the four (4) spray nozzles mounted



CABLE SPRAY

above the hoist deflector sheaves at the top of the gantry. The third line "D" provides lubrication to four (4) spray nozzles mounted over the top fairlead sheaves.

To operate the system, open valve "A" to activate the pump. Then open one of the valves "B", "H" or "G", only one valve "B", "H" or "G" must be opened at one time.

Lubricate the rope while the rope is paying out (during the digging cycle).

Lubricate each rope every eight (8) hours. However, environmental conditions and rope requirements will determine proper interval.

NO.	NAME OF PART	TYPE	NO. OF POINTS	LOCATION	LUB. SYM.	METHOD & FREQUENCY (HRS.)
47.	Drag Motor	Anti-Friction	8	In Motor End Bell	EMG	Hand
48.	Drag Rope and Lagging	—	—	—	WRL	Automatic
<u>LUBRICATION OF BOOM POINT AND GANTRY</u>						
49.	Boom Point Sheave	Anti-Friction	4	In Each Retaining Ring	MPG	Automatic
50.	Point Sheave Ball Joint	Bushing	16	4 in Each Retaining Ring	MPG	Automatic
51.	Support Rope Pin	Plain	4	In End of Pin	MPG	Automatic
52.	Boom Raising Sheave	Bushing	2	In Hub of Sheave	MPG	Manual - As Used
53.	Guide Sheave	Bushing	4	In End of Pin	MPG	Manual - As Used
54.	Inter. Support Rope at Gantry	Plain	2	In End of Pin	MPG	Automatic
55.	Inter. Support Rope at Boom	Plain	6	In End of Pin	MPG	Automatic
56.	Hoist Rope Deflector Sheave	Anti-Friction	2	In End of Shaft	MPG	Automatic

ed toward the inside to retain grease or oil in the housing or toward the outside to keep out contaminants such as dust or dirt.

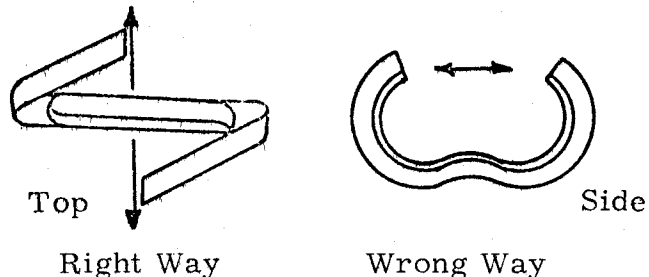
5. Lubricate the seal with light grease or oil on all surfaces of the seal, particularly the O.D. and the lip. Lubricate the shaft and the interior of the bore with a light coat of grease or oil.
6. Very carefully install the seal on the shaft. Be sure the lip is in the proper position and be sure the garter spring is in the slot. Move the seal from the end of the shaft to the bore with a spiral rotating motion.
7. Align the seal in the bore and tap lightly with a hammer and wood block. Alternate from side to side and around until the seal is firmly seated in the bore. No retainer plate is required.

Two seals may be installed in a bore, back-to-back, to retain grease or oil and at the same time exclude contaminants from the bearing. In this case fill the space between the seals with MPG grease.

SPLIT SEALS

Split seals are installed in much the same manner.

1. First remove the garter spring and separate at the hook and eye.
2. Open the seal to install on the shaft as shown in sketch.



3. Move the butt ends along the axis of the seal. Do not pull the ends apart so as to bend or break the back of the seal.

Nom. Diam.	Shaft		Running Clear- ance
	O. D.		
41	41.000	.054	
	40.994	.076	
41-1/4	41.250	.054	
	41.244	.076	
41-1/2	41.500	.054	
	41.494	.076	
41-3/4	41.750	.055	
	41.744	.077	
42	42.000	.055	
	41.994	.077	
42-1/4	42.250	.055	
	42.244	.077	
42-1/2	42.500	.055	
	42.494	.077	
42-3/4	42.750	.056	
	42.744	.079	

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If the same parts are reassembled after inspection of gears and anti-friction bearings, the original shims may be used. If a bearing or a shaft is replaced always install new shims as follows: Reassemble the shaft assemblies, slow speed shaft first, proceeding to the motor extension shaft. Assemble the gear case cover with Aviation Form-A-Gasket No. 3, Permatex Co., applying evenly to case approximately 1/100 inch thick.

Draw the bearing retainer plates, (3) on the input-output side of the case, up tight (no shims), lock cap screws.

The bearing clearance of the shaft assemblies is determined by placing shims between the bearing retainer cap and the bearing housing (side toward the center of the machine). Draw down the bearing retainer cap without shims, turning in the cap screws progressively until the bearing binds slightly when rotated. Measure the gap between the bearing retainer cap and the bearing housing at three places, 120° apart. Average the three measurements and install shim of this dimension plus .003 to .005 for the proper end play. Shims are furnished for each shaft, one shim is 1/32" thick, laminated in increments of .002 to .003. Peel off the lamination with a sharp knife to obtain the proper shim stock thickness.

Reassemble bearing retainer cap with shim and tighten cap screws. Lock cap screw with wire.

Replacement oil seal for input or output shafts are split seals. Seals can be installed without disassembling the couplers. Turn the lip of the seal in toward the case.

Lubricate the gear case with 51 gallons of "GL" to mark on sight gauge. See lubrication chart for seasonal change. Keep breather clean.

MAIN PROPEL DRIVE PINION (2nd Intermediate Extension)

The main propel drive pinion shaft is connected to the propel drive gear box output shaft by means of a crowned spline coupler. The coupler transmits the motor torque to the



ROTATING GEAR CASE

The rotation of the machine is powered by four (4) vertical mill type electric motors. Each motor is mounted on a double reduction gear case, located at the front of the machine.

The rotating machinery consists of a rotating gear case and the main rotating shaft. The main rotating shaft extends from the bottom of the gear case, through the rotating frame structure to a crowned pinion that engages the rotating gear on the top of the tub.

The rotating gear case consists of the motor extension shaft, the intermediate rotating shaft and the rotating shaft drive gear. The shaft and gear are mounted in an oil tight gear case on anti-friction bearings.

The rotating shaft drive gear is mounted on two (2) single row, tapered roller bearings. The bearing cones are pressed on the ends of the gear hub and are held in place by a retainer ring bolted to the top of the gear case.

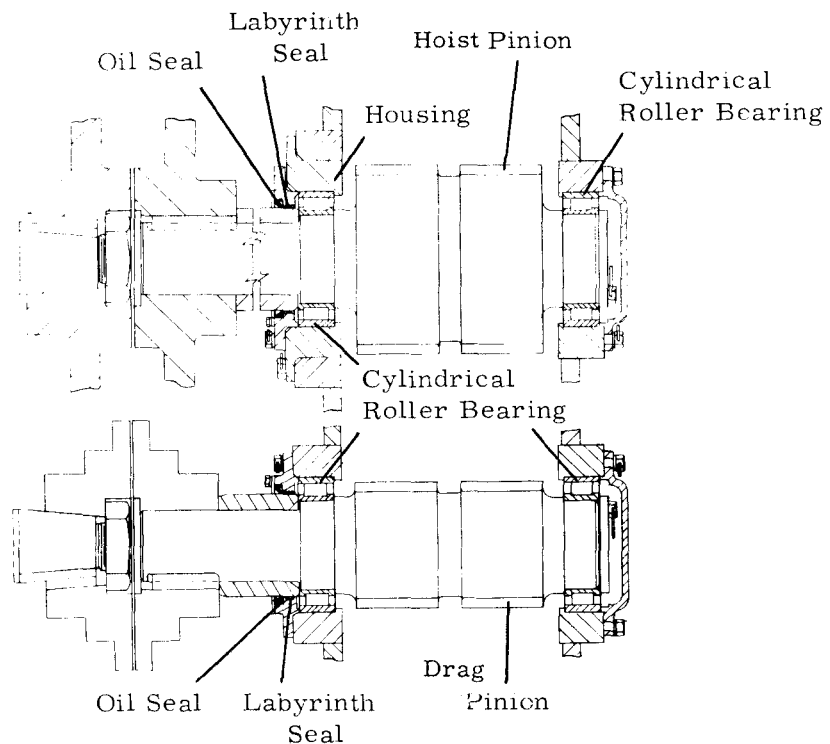
The intermediate shaft assembly is mounted in the case on two double row, tapered roller bearings and held in place by a bearing retainer cap with shims.

The intermediate shaft consists of a shaft with integral pinion and a large diameter helical gear attached to the top of the shaft by means of involute splines. This is a permanent fit spline and is assembled with a resin adhesive (Loc-tite CVV-82). Follow procedure described in Engineering Data Section. The gear is held in place by a bearing nut and locked with four (4) pinch bolts. Apply Loc-tite CVV-82 to pinch bolts. The double row tapered roller bearing cones are secured to the shaft by a retainer plate and cap screws. Use spring lock washers and lock wire.

Assemble the drive gear and intermediate shaft in the gear case. Be sure the bottom bearings are firmly seated in the bearing housings.

Install the gear case cover, using Form-a-gasket No. 3 apply a film 1/100" thick. See Engineering Data Section.

Install bearing retainer ring over drive gear top tapered



MOTOR EXTENSION SHAFTS

Remove or relocate the electric motor to permit removal of extension shaft assembly.

Remove cap screws and take off the bearing retainer cap from drum side of case and remove bearing retainer end plate from end of shaft. Remove cap screw from bearing housing only at coupler side of case. Press out hoist motor extension shaft assembly. The bearing on the drum side will remain in the gear case bearing boss. The bearing labyrinth seal will be removed with the shaft.

Use the same procedure to remove the drag motor extension shaft, except there is no bearing housing (see illustration) on the coupler side of case, remove cap screw from the bearing retainer seal ring.

Clean gear case before re-installing the shaft assemblies.

PRESSURIZED WELDMENTS

The weldments in critical areas, such as apex pipe chord, of the boom and gantry back legs are hermetic weldments that are charged with dry compressed air as a monitoring system to detect any breaks or cracks in the parent metal or weld failure.

In case of failure of these parts the reduction in pressure of the air escaping through a crack or break is detected by a sensitive pressure switch which alerts the operator.

In case of failure, the pressure drop will be quite rapid to the atmospheric pressure, hence the pressure switch must be set to deactivate the contacts at a pressure below the charging pressure which is compatible to the lowest anticipated ambient temperature.

Each weldment is equipped with a pressure switch, a pressure gauge and a quick connect coupler.

Furnished with each machine is a charging apparatus that consists of a pressure gauge, a safety release valve (set at 20 psi) and a globe valve. A piece of pressure hose with a quick disconnect coupler for attaching to the weldment and a handy carrying frame.

CHARGING PROCEDURE

1. Blow out moisture from the air line from machine air compressor before attaching to the charging apparatus.
2. With valve on charging apparatus closed, attach compression air line and pressurize.
3. Attach air hose to weldment using quick disconnect coupler.
4. Open air valve slowly, observe both pressure gauges for positive reading.

NOTE: (If both gauges do not correspond, determine the faulty gauge and replace).

5. Charge weldment to pressure as shown on chart.

of entry of the bucket teeth is decreased with a more line of pull suitable for hard digging, breaking rock, etc.

The hoist chain* is attached to each side of the bucket. This point is to the rear of, and below the center of gravity of the loaded bucket. When the distance from the center of gravity (cg) is increased, the dumping response is faster but the load on the dump rope is greater and the amount of tension required on the drag rope to carry the load is increased.

When the hoist chain is attached near the "cg" the dump action is sluggish but the drag rope pull is less.

The length of the dump rope determines the angle of bucket when carrying the load.

The optimum is achieved largely by trial and error. Once this condition is established, the hoist chain trunnion is welded securely in place and all other positions become fixed. No further adjustment is required.

*Does not apply to all dragline buckets.

WEAR PLATES

Marion dragline buckets are provided with replaceable wear plates, on the bottom and cheeks, inside the bucket. The thickness of the wear plates vary according to the location and the wear concentration.

Wear bars for the lip shroud, cheek plates and heel plates are replaceable. Remove worn plates by air arcing away the weld and replace with new parts, weld in place. (See CI-851).

BUCKET TEETH

Bucket teeth can be replaced. Each tooth is held in place on the tooth base by a wedge pin.

Drive out the wedge from the bottom and replace tooth. Bucket teeth can be reversed to even wear without changing angle of entry.

GROUND PREPARATION

It is important that the ground on which the walking dragline operates is properly prepared and as level as possible. This includes not only the work area but the roadway and erection site.

It is essential that the tub and the walking shoe make full contact with the ground. When the weight of the machine is evenly distributed over the entire area of the tub or walking shoes a moderate ground bearing pressure is obtained.

If the ground supporting the dragline consists mainly of sand, clay or top soil it may be leveled with a grader or a blade. All rock or rock formations should be removed. Rock or rocks just under the surface, that can not be removed, must be covered with fill dirt of sufficient depth so there are no protruding rocks after the dirt has settled under the weight of the machine. Sharp rock will cause point-loads which can cause damage to the bottom plates and bulkheads of the tub and walking shoes.

Marion draglines are so designed that a calculated balance exists between the boom length, boom angle and allowable load and the machine weight and ballast. During the normal digging cycle the center of gravity of the machine will shift according to the load from front to back within a specific area around the center of the tub called the Kern. As long as the center of gravity is over this area, the machine is stable and the ground bearing pressure is relatively even over the entire bottom of the tub.

If for any reason the digging radius or the load is increased, the center of gravity will approach the perimeter of the tub and fall outside the Kern. The increased rim pressure will cause the edge of the tub to cut into the ground. Rotating the machine in this condition will cause the ground supporting the tub to cone. The cone will result in an unstable machine, also cause concentrated ground bearing pressure at the center of the tub and damage to the plates and bulkheads.

SECTION 7

ELECTRICAL MAINTENANCE

CARE OF D. C. MOTORS AND GENERATORS

One of the most essential points to watch regarding the care of the electrical equipment, especially D.C. equipment, is absolute cleanliness. Too much emphasis cannot be given to pointing out the necessity of keeping the motors and generators clean and free from dirt, oil or grease.

There are a few troubles common to both motors and generators which the operator should be able to recognize and remedy. Normally the D.C. motors and generators give very little trouble, but there are times when something happens that can be taken care of quickly by anyone. The most serious trouble should be handled by a competent electrician. If the commutation is bad and cannot be corrected by simple remedies, the electrical equipment manufacturer should be consulted.

BRUSHES

If there is an excessive amount of arcing between the brushes and commutator while the machine is operating under normal loads and speeds, the brushes should be inspected and checked for the following:

- a. See that they are not sticking in the holders.
- b. Make certain the contact surfaces of the brushes are clean and the brushes are making full contact on the commutator.

NOTE: This can be determined by removing the brush and looking at the brush surfaces. Where the brush has been rubbing the surface is smooth and polished. Any portion which is not in contact with the commutator will have a dark, rough appearance.

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