



Technical Manual

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SECTION 2
AIR SYSTEM AND COMPONENTS

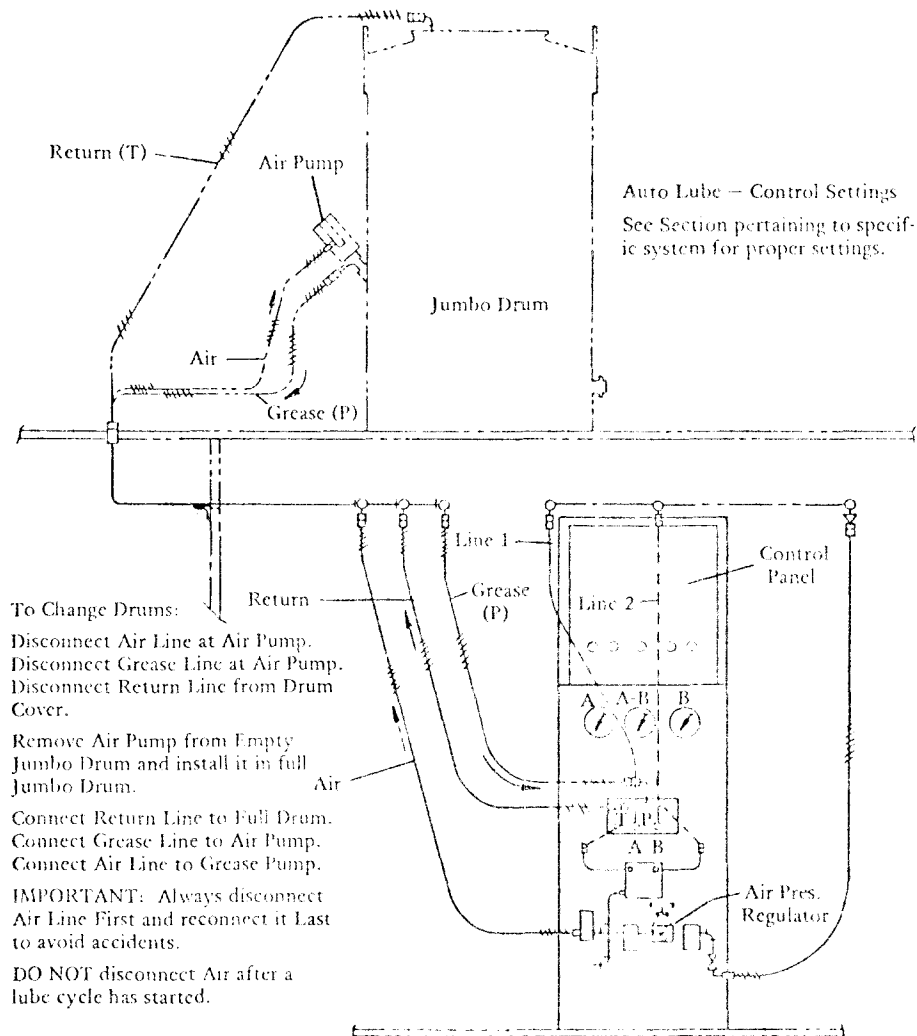
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LUBRICATION SPECIFICATIONS

SPECIFICATION - GREASES

CODE OR SYMBOL NO.	ASTM or TEST	MPG	RGL	OGL	TYPE B	TYPE H
Penetration Worked 60X Summer, NLGI Winter, NLGI	D-217	2 1	semi- fluid		1 0	-
Penetration Worked 5000X, Max. Change	D-217	10%	-		-	-
Dropping Point, Min. °F.	D-566	350	-		325	-
Base Oil Viscosity (@ 210°F., Min.	D-446	75 SUS	140 SUS		200 SUF	200 SUF
Oxidation Stability Max. psi Drop - 100 hrs.	D-942	10	-		-	-
Water Resistance Max. Loss @ 100°F.	D-1264	20%	-		10%	10%
Texture	Visual	Buttery	-		Adhesive	Tacky
EP Timken, Min. OK	-	35 lbs.	-		35 lbs.	35 lbs.



The amount of lube supplied to each point, during each cycle, is controlled by the number and size of injector(s) serving that point. Make further adjustments by controlling the time cycle and/or adjusting the screw located atop each injector.

AN AUTO-LUBE ALARM SOUNDS indicating:

- A main supply line break to the injector(s)
- Lack of proper air supply
- Block lube line
- Empty or cavitated lube supply drum
- Faulty pump or control system

NO.	NAME OF PART	TYPE	NO. OF POINTS	LOCATION	LUB. SYM.	METHOD & FREQUENCY (HRS.)
38.	Hoist Motor	Anti-Friction	8	In Motor End Bell	EMG	Hand - See Electrical Section
39.	Hoist Rope and Lagging	—	—	Spray	WRL	Automatic
<u>LUBRICATION OF DRAG MACHINERY</u>						
40.	Drag Drum Support	Anti-Friction	2	In Side of Bearing Retainer	MPG	Automatic
41.	Drag Gear Case	—	2	Fill to Mark on Dip Stick	GL	Capacity 110 gallons (1 of 2) Check daily
42.	Drag Motor Extension Shaft Bearing	Anti-Friction	8	Lubricated from Gear Case	GL	
43.	Inter. Drag Shaft (Outside)	Anti-Friction	2	Lubricated from Gear Case	GL	
44.	Inter. Drag Shaft (Inside)	Anti-Friction	2	In Bearing Retainer	MPG	Automatic
45.	Inter. Drag Pinion and Drum Gear	—	—	Drip on Face of Gear	OGL	Automatic
46.	Drag Motor Coupling	—	—	Fill Thru Plug in Side of Hub	MPG	Capacity 10 lbs. Keep Filled

between the seal and the bore. It also holds the seal in place and prevents the seal from turning in the bore.

Split seals are furnished as a replacement seal where major disassembly of the machine would be required to install solid seals.

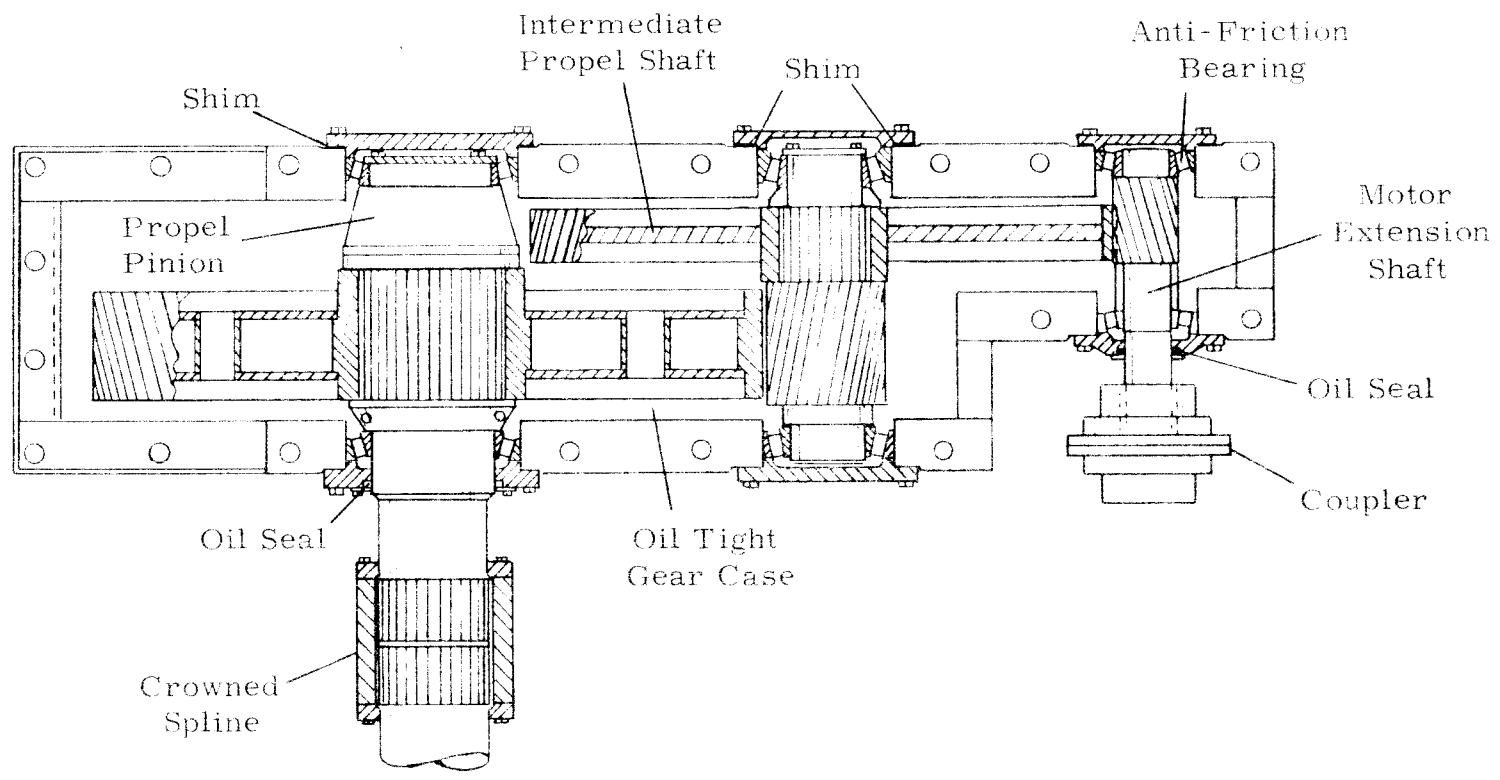
Warning: Do not cut a solid seal to make a split seal. Split seals are especially made with an interference at the butt and must be installed with compression at the joint. Split seals should be considered as an expedient until a solid seal can be installed at a major overhaul.

Seals should be stored in a cool, clean, dry area away from extreme heat, ozone or direct sunlight. Do not open the shipping container until the seal is to be used. Keep the seal clean.

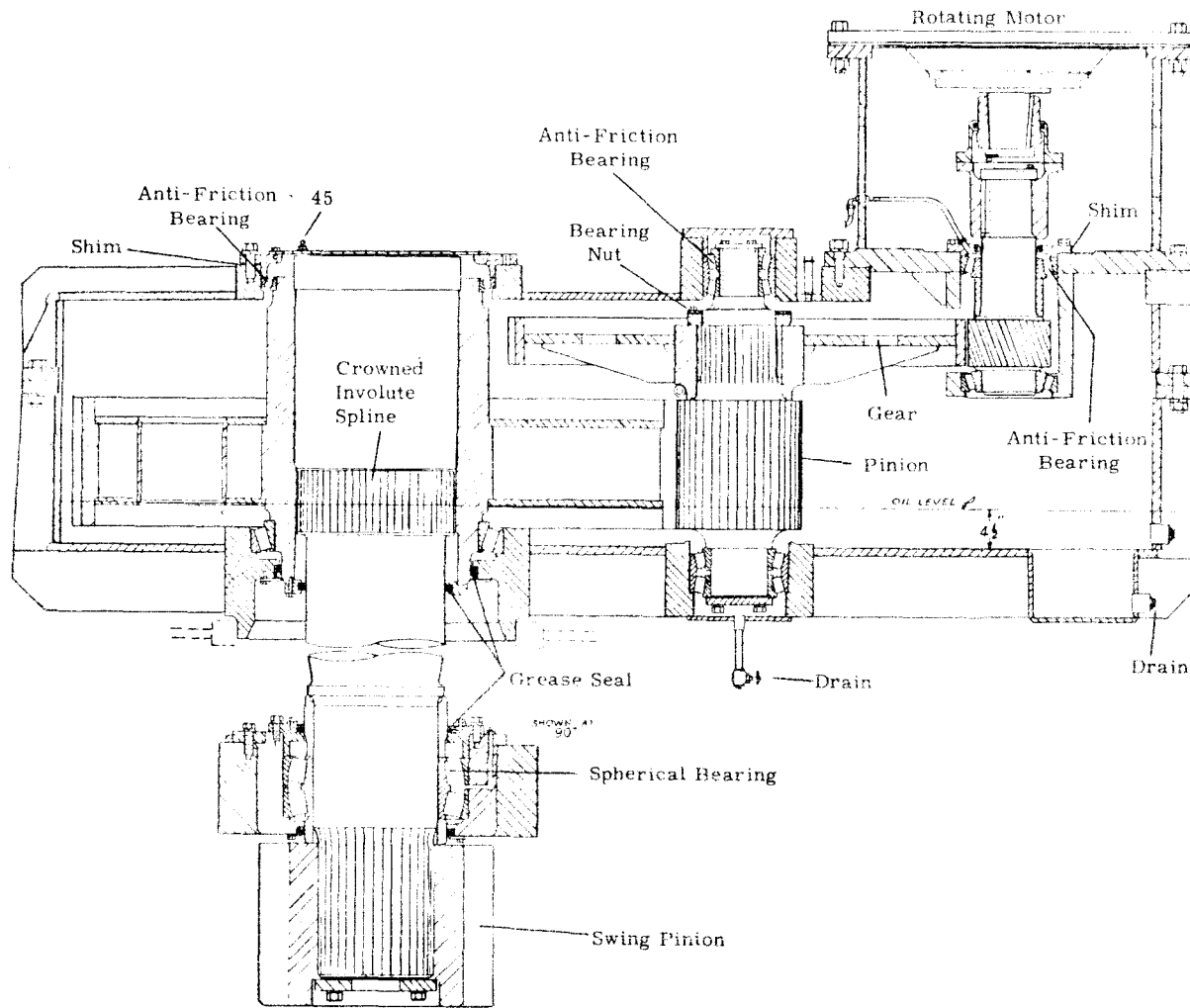
The following procedure should be used to install solid oil or grease seals:

1. Carefully inspect the seal for cuts, breaks or nicks. Rub the fingertip over the O.D. and the lip to detect any roughness or pits that may result in a leak path. Do not install a damaged seal. Be sure the proper size seal is used.
2. Inspect the shaft for scratches, burrs or any roughness that may cut or score the lip of the seal. Inspection should include the area over which the seal must be installed, especially keyway and splines. Use a thimble or protective tape over the keyway and splines.
3. Inspect the bore for burrs or any roughness that may cut or scrape the O.D. of the seal when the seal is pressed into place. The bore and the shaft should have a 1/16" chamfer. If not, carefully break the corner of the seal.
4. Determine the proper position of the lip. Should the seal be used to retain fluid or grease in a bearing or case? Or should the seal exclude contaminants from the bearing or case? Position the seal with the lip turn-

Shaft		Running Clearance	Shaft		Running Clearance
Nom. Diam.	O. D.		Nom. Diam.	O. D.	
33	33.000	.044	37	37.000	.049
	32.994	.066		36.994	.071
33-1/4	33.250	.044	37-1/4	37.250	.049
	33.244	.066		37.244	.071
33-1/2	33.500	.046	37-1/2	37.500	.049
	33.494	.068		37.494	.071
33-3/4	33.750	.046	37-3/4	37.750	.051
	33.744	.068		37.744	.073
34	34.000	.046	38	38.000	.051
	33.944	.068		37.994	.073
34-1/4	34.250	.046	38-1/4	38.250	.051
	34.244	.068		38.244	.073
34-1/2	34.500	.046	38-1/2	38.500	.051
	34.494	.068		38.494	.073
34-3/4	34.750	.046	38-3/4	38.750	.051
	34.744	.068		38.744	.073
35	35.000	.046	39	39.000	.051
	34.994	.068		38.994	.073
35-1/4	35.250	.046	39-1/4	39.250	.051
	35.244	.068		39.244	.073
35-1/2	35.500	.046	39-1/2	39.500	.051
	35.494	.068		39.494	.073
35-3/4	35.750	.048	39-3/4	39.750	.052
	35.744	.070		39.744	.074
36	36.000	.048	40	40.000	.052
	35.994	.070		39.994	.074
36-1/4	36.250	.048	40-1/4	40.250	.052
	35.244	.070		40.244	.074
36-1/2	36.500	.048	40-1/2	40.500	.052
	36.494	.070		40.494	.074
36-3/4	36.750	.049	40-3/4	40.750	.054
	36.744	.071		40.744	.076



PROPEL GEAR CASE



MAIN ROTATING GEAR CASE

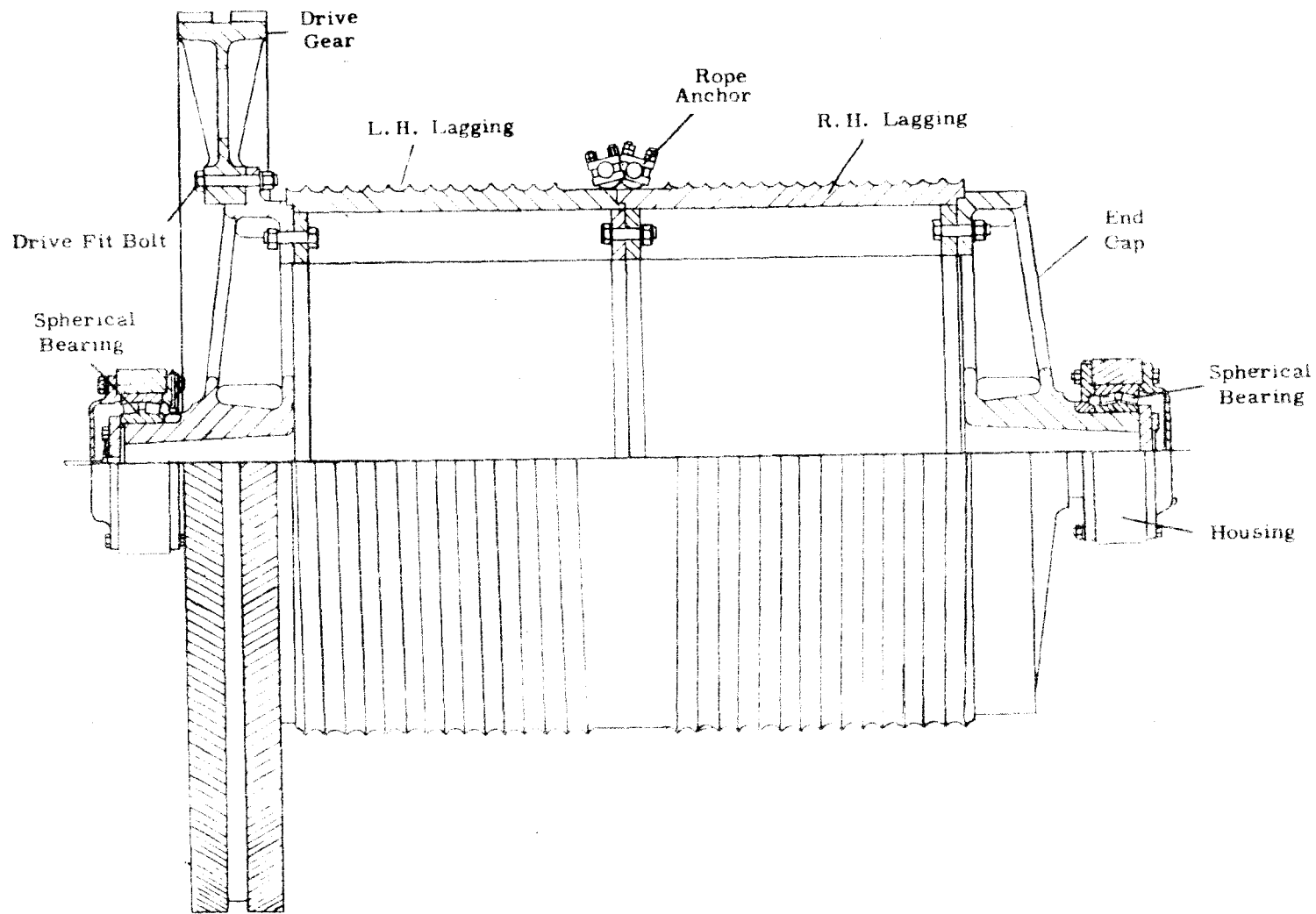
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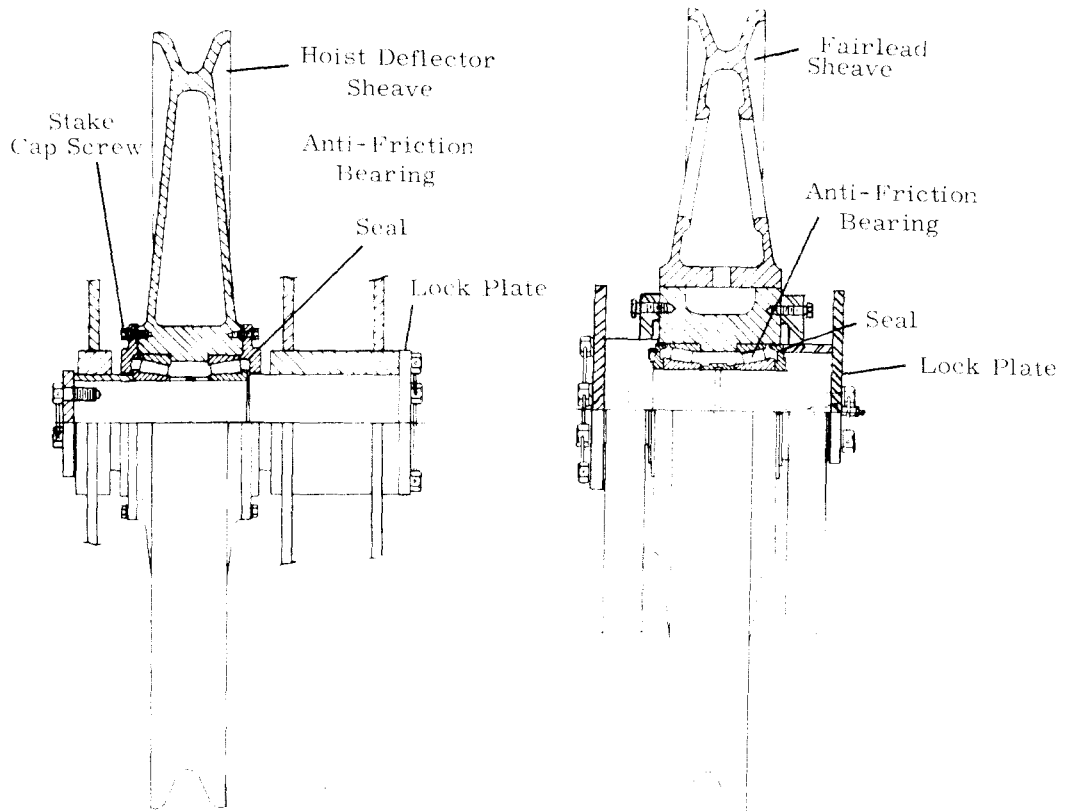
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HOIST-DRAG DRUM

UPPER FAIRLEAD SHEAVE

To replace the tapered roller bearings, use the same procedure as previously described for hoist deflection sheaves. Note the difference in labyrinth seal as shown in illustration.



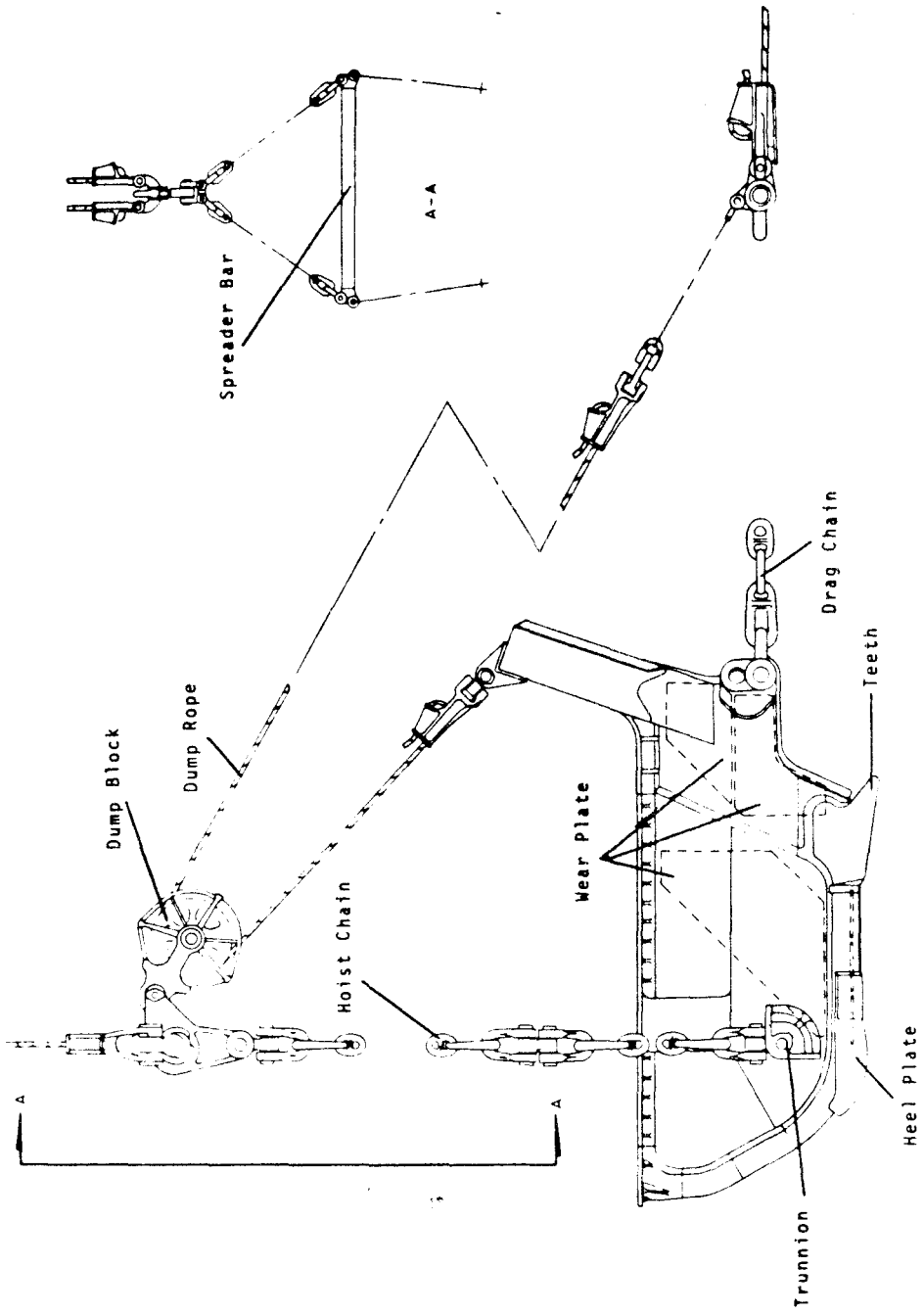
HOIST DEFLECTOR SHEAVE

FAIRLEAD SHEAVE

LOWER FAIRLEAD SHEAVE

Two lower fairlead sheaves are located at the front of the machine at the machinery deck level. Each sheave is mounted in a swivel casting that permits the sheave to follow the lead of the drag rope.

The installation of the sheaves and tapered roller bearing is similar to the hoist deflector sheave. The difference is noted in the illustration. Use the same procedure as previously described.



DRAGLINE BUCKET

This brake holds machine when not operating or while propelling. The swing brake automatically SETS when shoes move off the parked position.

The two pedals operate the swing controller and link together so that only one pedal can be pressed down at a time. These pedals neutralize without pressure on one.

To swing machine right, press right pedal. To swing machine left, press left pedal. To stop or retard swing, return pedal to neutral and press opposite pedal for new direction desired. As machine comes to rest, both pedals must be returned to neutral or machine starts to rotate in opposite direction. If pedals are returned to neutral with machine swinging, the machine will continue to coast and will be slowed down only by the friction losses of the sliding machinery.

Swing acceleration is determined by the amount the pedal is depressed. ALWAYS apply swing power gradually so swing motion accelerates or decelerates smoothly. This eliminates excessive and unneeded swinging of bucket and ropes.

PLUGGING THE CONTROLS

The hoist, drag, swing and propel brakes are holding brakes and NOT intended to stop or retard rotation or motion, except in case of emergency.

In normal operation, the rotation of the D.C. drive motor is stopped by moving the controller lever or pedal in opposite direction, thus reversing the current in the generator field. This field reversing acts as a braking force that stops motion. At the same time the motor armature reaches zero rotation, the controller must be returned to neutral position.

In this way, the energy of the heavy rotating part is rapidly dissipated in this form of regenerated current that is fed back into the power source. The heat created by mechanical friction brakes is not a problem.

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

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.

PINION TEMPERATURE MUST NEVER BE ABOVE 190°C. (340°F.)

To check the temperature of the pinion use a Centigrade or Fahrenheit thermometer by placing putty over the bulb and hold it against the pinion. Heat the pinion a few degrees above the desired temperature before removing it from the oven.

9. After the pinion has been removed from the oven wait a few times until the pinion has cooled to the temperature desired, remove the thermometer and quickly mount the pinion as described below.
10. After making sure the bore is clean, quickly locate the pinion in the same angular position on the shaft as when cold. When the pinion is nearly engaged with the taper fit, but not actually in contact, snap it forceably into place with a quick push. It is important that the hot pinion be instantly snapped into position before it has cooled appreciably. Otherwise, the pinion will immediately freeze to the shaft and cannot be adjusted further.
11. Check the hot or shrunk-on position of the pinion on the shaft using the micrometer depth gauge as before.

The actual advance is the difference between the depth gauge reading at the hot and cold positions. To control the stresses in the pinion the advance must be within the limits specified in the table on Page 3. IF THE ADVANCE IS NOT WITHIN THE LIMITS GIVEN THE PINION SHOULD BE PULLED AND REMOUNTED.

12. After the pinion has been properly shrunk on the shaft, assemble the lock washer and nut.
13. Before locking the lock washer make certain the shoulder on the nut does not bottom before the main part of the nut tightens on the locking plate. In case the shoulder on the nut bottoms before tightening on the locking plate the nut should be removed and the shoulder ground or turned off so clearance is available.
14. After it is certain that the nut is securely tight against the locking plate and pinion, turn up the locking plate on at least two faces of the nut.

It should be kept in mind that the pinion fit on the shaft and the fit of the key are the important points in doing a good job of holding the pinion on the shaft. The locking plate simply serves to hold the nut on the shaft. With the correct fit between the pinion shaft there is no load on the nut and locking plate.

Pinion Removal

When removing the pinion from a motor armature, always use a suitable pinion puller to avoid causing damage to either the pinion, motor frame, bearings or armature shaft. Do not heat the pinion before pulling and do not use wedges between the pinion and the bearing cap. In order to prevent damage to anti-friction bearings, avoid the use of a sledge hammer on the pinion puller.

EXAMPLE

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

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

The total radial runout of .020" is obtained between station 3 with a maximum (+) reading of +.005" and station 9 with a maximum minus (-) reading of -.015". This is within the allowable .026" shown in Table 2.

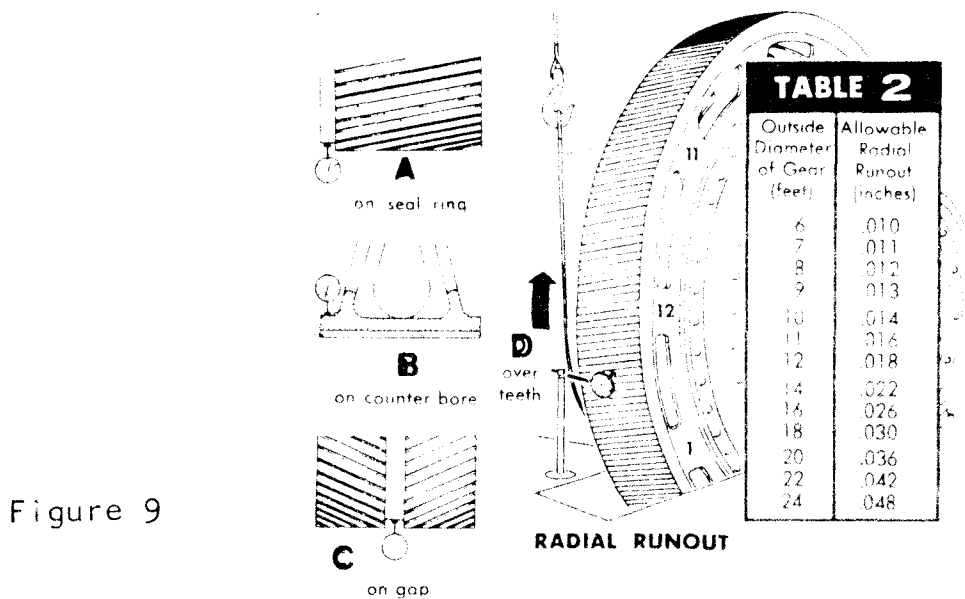


Figure 9

RECOMMENDED BACKLASH

The required backlash for gear applications of this type varies with diametral pitch, and these backlash requirements are given in Table 3. It should be noted that all values of backlash are given in the normal plane. Therefore, if backlash is checked with a dial indicator, the indicator must be set perpendicular to the helix of the teeth.

All backlash values are to be established with load on the gearing. This is to be accomplished with cable load applied to the drum by raising an empty dipper or bucket.

1. Fill the lines leading to the bearings first. To do this, go to the distributor section serving these bearings and remove the plug which is adjacent to the lube line. Put a lubrication fitting in this tapped port and pump lubricant with a hand gun until lubricant comes out the bearing. Follow this procedure with each section until all of the lines going to the bearings are filled with lubricant.
2. Next remove the line leading into the inlet of those distributor assemblies which were just filled with lubricant. Go to the section which discharges lubricant into this line and again remove the plug adjacent to this line and pump lubricant into the line until it is discharged out the other end. Then reconnect the line into the inlet port.

The distributor assembly which serves the bearings are normally called secondary distributors, and the manifolds which feed lubricant to the secondary distributors are known as master distributors. (In the event there are three levels of distributors, repeat Step 2 before proceeding.)

3. The next step in filling the system is to remove the line from the inlet to the master distributor and pump lubricant with the Trabon pump until it is discharged from the end of the tube, then reconnect to the inlet of the master. This procedure expels all air from the lube lines and sections.

If a new line is installed in the field, be sure it is filled with lubricant before starting the machine. This same procedure should be followed.

It is necessary to disconnect the lines leading to the inlet ports of the distributors before filling, in order to avoid pumping air into the units. It is, of course, necessary that all lines be completely filled with lubricant to assure that lubricant is delivered immediately when the pump is first started.

WIRE ROPE

(Guide to Long Life Through Proper Handling and Care)

GENERAL

Wire rope is one of the most critical and costly parts of the machine and must be considered as such.

Wire rope is manufactured with the finest material available, it is engineered with the precision of a fine watch and fabricated to the most exacting standards.

However, wire rope is more vulnerable to abuse and neglect than any other part of the excavator.

By comparison of other industrial applications the wire rope on an excavator is relatively short lived, and must be considered an expendable item.

Replacement of hoist, drag and support ropes is a sizeable investment and every effort must be applied to extend the useful life of the ropes.

SELECTION OF ROPES

The type of rope selected for each application is based on four factors:

- Strength
- Flexibility
- Abrasion Resistance
- Resistance to Crushing and Distortion

STRENGTH

The maximum load carrying capacity of the rope is the primary factor when determining the diameter and material of the rope, plus the safety ratio of the strength of the rope over the working load. A safety ratio of five times the working load or greater is desired. The selection must be a balance of safety and economy.

FLEXIBILITY

Rope which performs in static service, such as boom sup-

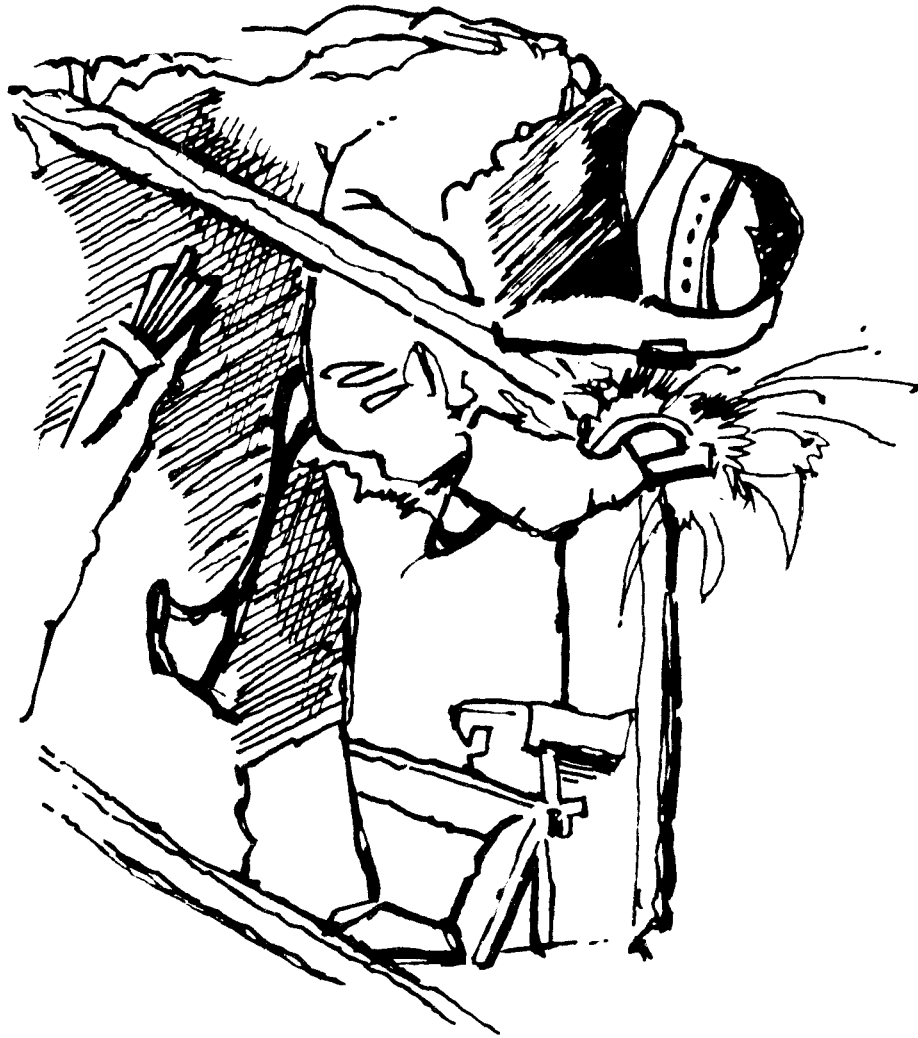


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CUSTOMER INFORMATION

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WELDING INFORMATION



FOR MAINTENANCE OF MARION MACHINES

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