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Technical Manual

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RUNNING CLEARANCE FOR JOURNAL BUSHINGS

Shaft Nom. Diam.	Running Clearance	Shaft Nom. Diam.	Running Clearance
1	.006 .010	5	.011 .020
1-1/4	.005 .010	5-1/4	.011 .020
1-1/2	.008 .013	5-1/2	.012 .020
1-3/4	.008 .013	5-3/4	.012 .021
2	.007 .012	6	.012 .021
2-1/4	.006 .013	6-1/4	.012 .021
2-1/2	.006 .013	6-1/2	.012 .021
2-3/4	.008 .015	6-3/4	.013 .022
3	.008 .015	7	.013 .022
3-1/4	.008 .015	7-1/4	.013 .022
3-1/2	.008 .015	7-1/2	.014 .022
3-3/4	.011 .019	7-3/4	.016 .024
4	.011 .019	8	.015 .024
4-1/4	.010 .019	8-1/4	.015 .024
4-1/2	.010 .019	8-1/2	.016 .025
4-3/4	.014 .022	8-3/4	.016 .025

GL - GEAR LUBRICANTS (OIL TYPE)

CODE OR SYMBOL NO.	ASTM or TEST	GL-90	GL-140	GL-200	GL-250
Pour Point °F. Max.	D-97	0	10	20	30
Flash Point °F. Min.	D-92	410	410	410	410
Viscosity @ 100°F. SUS (Min.)	D-446	1100	2000	3500	4500
Viscosity @ 210°F. SUS	D-446	80-120	120-180	180-210	210-260
Viscosity Index (Min.)	D-567	80	80	80	80
Equiv. AGMA Lubricant No.	–	6 EP	7-8 EP	8 EP	8a
SAE Viscosity No.	–	90	140	140/250	250
EP Timken, Min. OK	–	65	65	65	65
Copper Corrosion Max.	D-130	2	2	2	2

Gear Lubricant	Oil Temperature °F. Min.	Max.
GL-90	0	105
GL-140	10	125
GL-200	20	140
GL-250	30	150

NOTE: The automatic lubrication systems of the 192-M machine are especially designed for an individual machine and conditions. Hence, the statements made in the next few paragraphs may or may not apply to your machine, but the general principle does apply.

Air line lubrication (micro-fog) will substantially increase the life of the valve. No other lubrication is required.

If the valve fails or becomes inoperative the entire valve should be replaced. These valves should be rebuilt at the vendor's factory.

The whistle valve is similar without pilot operation.

ANTI-FREEZER

The anti-freezer unit is installed between the air cleaner and the compressor to prevent icing and freeze-up conditions in the air system in severe weather conditions (which may be either low temperature or high humidity near the freezing point). This unit introduces (alcohol) vapor into the air supply which mixes with the water vapor in the air entering the compressor.

This unit contains a (alcohol) chamber at the bottom and a vapor chamber at the top. Plug 2, at the top of the unit is fitted with a central rod. This rod is covered with a tubular wick 5, which carries the alcohol up into the vapor chamber as fast as it evaporates into the air flow. Adjusting sleeve 4, is mounted over the wick. By means of loop 1, the sleeve may be raised or lowered to increase or decrease the amount of wick exposed in the vapor chamber.

In severe weather, the sleeve should be lowered to the maximum depth, leaving the wick completely exposed in the vapor chamber. As the temperature moderates, the sleeve should be raised to reduce the amount of wick exposed, thus vaporizing less alcohol. When the temperature is above freezing, the sleeve should be raised to the maximum height which will cut off the alcohol supply to the vapor chamber. The frequency of refilling depends on weather conditions and the hours the machine is operated. One quart capacity.

NOTE: Do not use ethyl alcohol or radiator anti-freeze (ethylene glycol). In certain areas the use of alcohol in air systems is forbidden. Use "Kill Frost" or "Freeze Ban".

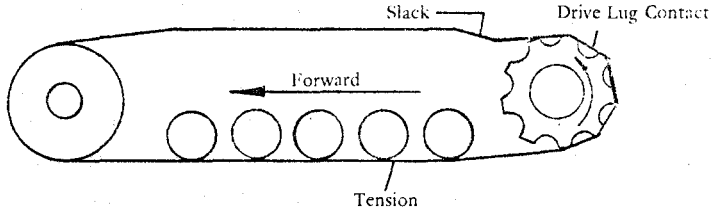
crawler side frame. After the tread belt has been properly adjusted, insert shims between the adjusting block and the rear wall of the rectangular opening, completely fill the space. Use the same kind and number of shims at both sides of the crawler side frame.

Remove the jacks and place all the remaining shims in the space in front of the adjusting block. Before replacing the cover, apply light oil or grease to all parts.

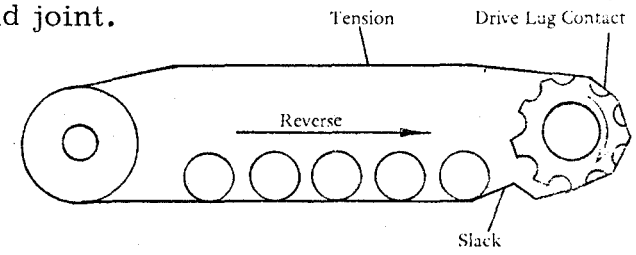
BELT TENSION

The affect of improper belt tension directly affects the life of propel drive components and subsequently the propel motion. Abrupt and continuous fast propelling with loose belts will cause different belt reactions for each direction. The end result, however, is the same, rough and looping motions.

In the forward motion, a loose and stretched belt will have the tendency to climb out of the drive sprocket cavities. In doing so, the shoes are forced to ride about a larger diameter. Wedging occurs, with the results of additional stretch due to forced elongation of shoe lugs and pin bending.

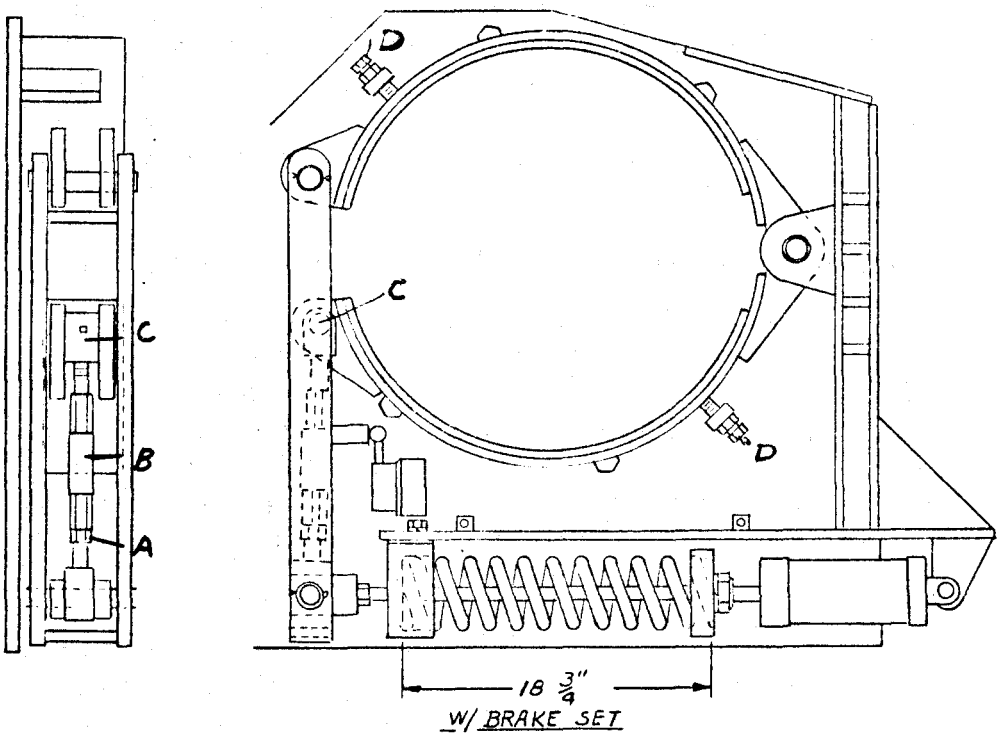


In the reverse motion, a loose belt will tend to buckle rapidly between support rollers causing multiple contact between rollers and joint.



Prolonged propel in the reverse direction is considered as the most serious contributing factor of propel drive failures. Reverse being defined as that direction of move when the drive sprocket is in front. In this mode, the top of the belt is in tension with 2 to 3 shoe lugs seated against the upper

The brake is adjusted by turning the adjusting bolt between the end castings of the inside link. The toggle should be adjusted so that the links are 5/8 of an inch from toggle when the brake is set tight.



PROPEL BRAKE

Loosen the locknut "A" and turn the adjusting bolt "B" until the links are 5/8 of an inch apart at the point "C".

For a quick check of the brake adjustment, lay a straightedge across the inside shoe live end boss and the spring rod connecting clevis, measure the space between the straightedge and the outside brake shoe live end boss. The measurement should be 5/8" to 3/4". As the brake lining wears the toggle will decrease. Do not allow the link to come in to full toggle.

Adjust the set screws at the sides of the band "D" to equalize the space between the shoes and the brake housing when the brake is in released position.

Assemble top bearing on intermediate shaft and housing. Pull down the bearing retainer ring without shims. Turn cap screw progressively until the bearing binds slightly when turned by hand. Back off ring until the shaft turns free. Measure the space between the retainer ring and the top of the bearing housing at three places, 120° apart, average the dimensions and install shims of this dimension under the retainer ring. One of nine shims is laminated in increments of .003". Separate the lamination with a sharp knife to obtain correct thickness. Tighten cap screw and lock with wire. (See Engineering Data).

Assemble top bearing on the main rotating gear hub. Pull down the retainer ring without shims. Turn the cap screw progressively until the bearing binds slightly when turned by hand. Back off the ring until the gear turns free. Measure the space between the retainer ring and the bearing housing at three places, 120° apart, average the dimension and install shim under the ring to this dimension. One of nine shims is laminated in increments of .003". Tighten cap screw and lock with wire.

Remove temporary hold down bolts and assemble gear case cover. Align parts with drive fit bolts. Use 1/16" velumoid gaskets.

Reverse the procedure to install gear case and motor on the machine.

TO REASSEMBLE MAIN ROTATING SHAFT

Assemble double row tapered bearings on end of shaft, measure the width of bearing assemble and measure the depth of bore in housing. A comparison of measurements will give indication when bearings are seated against flange of the bore. Coat the shaft spline (top) lightly with grease to facilitate assembly. Coat the seal bore of the bearing retainer with Permatex before installing the grease seals. Slip the bearing retainer ring with grease seals and "O" ring in place over the shaft before the lifting device is attached to the shaft.

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BOLTING PROCEDURE OF MAIN HOIST GEAR

Due to dead weight it is possible to have all the bolts tight (nuts will not turn anymore) and still have a gap at the bottom of the gear as the gear rotates. The changing position under load will cause the bolts to loosen and cause additional bending stress.

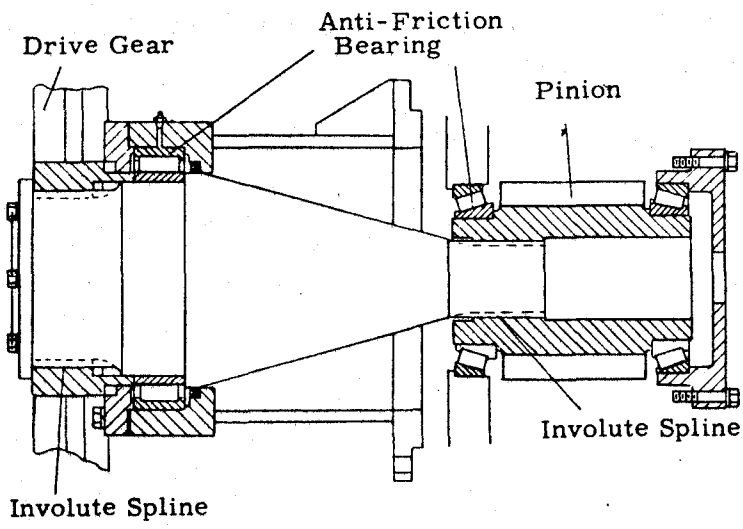
Use the following procedure to install gear:

1. Drum shaft must be free to turn with ropes slack and brake released.
2. Position drum with finish bolts at top center.
3. Loosen all other bolts (one to two turns).
4. Tighten all nuts by hand, keep lock washer loose, and slotted head tight against the flange.
5. Use air wrench, tighten two topmost center bolts only.
6. Rotate the drum 180° and tighten two topmost center nuts.
7. Rotate the drum 90° and tighten two topmost center nuts.
8. Rotate the gear 180° and tighten the two topmost center nuts.
9. Rotate the gear 45° and tighten the two topmost center nuts.
10. Rotate the gear 180° and tighten the two topmost center nuts.
11. Rotate the gear 90° and tighten the two topmost center nuts.
12. Rotate the gear 180° and tighten the two topmost nuts.
13. Tighten all remaining nuts.
14. Retighten all nuts, advancing one nut each time, rotate the drum so that each nut is at the top of the drum in turn.

Operate the machine 30 minutes under load and retighten.

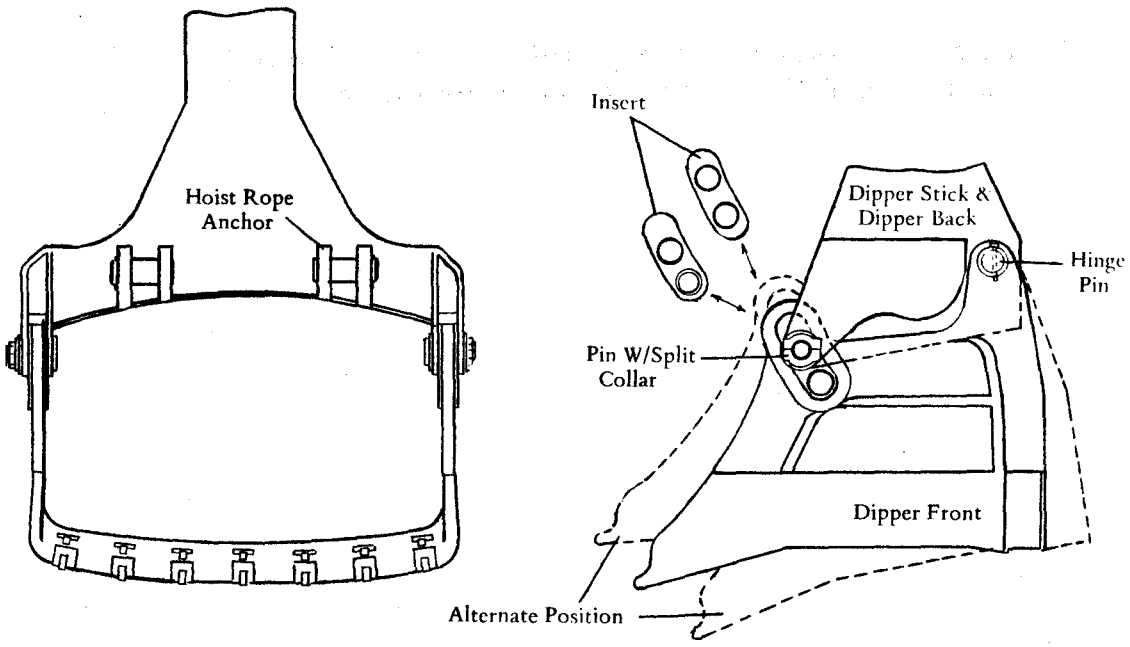
HOIST ROPE (STANDARD)

Two hoist ropes are required for this machine. Each rope is 2" in diameter by 280'-0" long, 6 x 41 improved plow steel, lang lay, IWRC with WR-37 becket loop each end.



SHIPPER SHAFT PINION

wear bar should be installed. Replace the end plate and lower the shear pin to the full depth of the wear bar plus new and old shims. Place 3" cut washers on top of the shear pin to completely fill the space between the top of the pin and the lock bolt. Replace lock bolt.

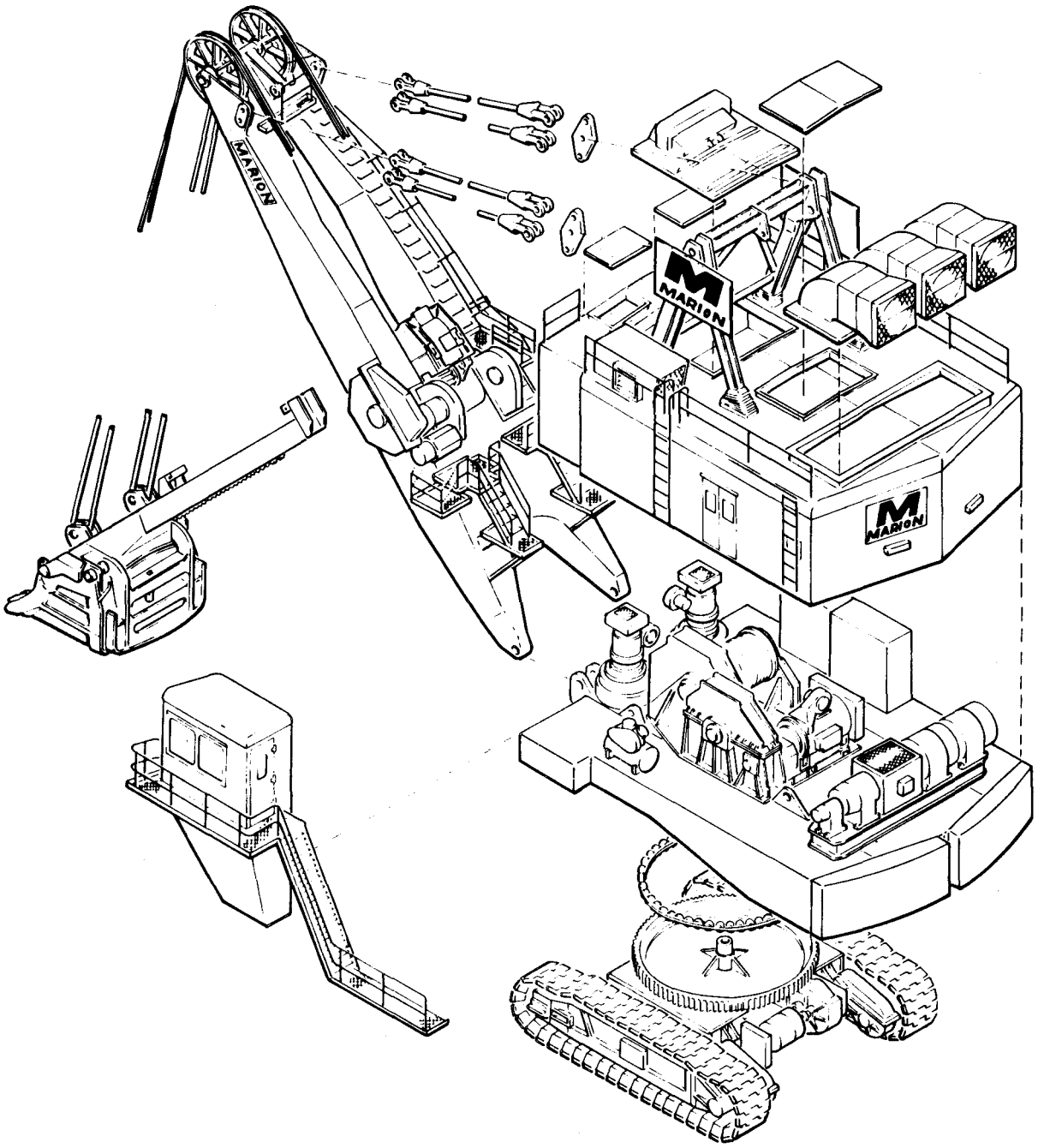


DIPPER PITCH ADJUSTMENT

The auxiliary collector rings consist of ten galvanized steel rings with P.C.V. cover 36" in diameter, stacked vertically inside the main collector ring. The rings are attached to the main rotating frame and the brushes are mounted on the lower frame. The auxiliary collector rings conducts the control circuits of the lower frame.

The D.C. collector rings that are mounted at the bottom of the center journal within the lower frame, conduct the D.C. current from the upper frame to the propel motor. The collector ring consists of five brass eings and four brushes for each ring. The rings are supported by a support plate fastened to the air tube through the center journal. The rings are attached to the plate with phenolic resin rod bolts and spacers.

Addendum No. 1
192-M Manual 1074 A



192-M ELECTRIC SHOVEL
WITH
201-M FRONT END EQUIPMENT

diameter should be investigated carefully and its' cause determined. In the event there is any doubt about the safety of the rope, it should be replaced.

When corrosion is present, the remaining strength cannot be calculated with safety, nor is there any reasonable way to judge whether or not the rope is safe for further service except by the judgement of the inspector. Where corrosion is present, all the known methods for estimating the remaining strength of a wire rope become useless. It is, therefore, absolutely essential that corrosion be controlled, which can be done by proper and sufficient lubrication so that additional safe rope service may be obtained.

It is not possible to estimate definitely the remaining strength for all conditions of service. From the examination of worn ropes from a particular installation, together with actual tests for remaining strength of the worst worn rope lay, data can be accumulated which will eventually allow reasonably close estimates to be made.

The number of broken wires which develop in a wire rope is the usual reason for removal. This can be considered the "safety value" that should be evident by visual inspection. The rope lay containing the greatest number of broken wires is usually the weakest section of the rope and is comparable to the "weak link" in a chain, except that the condition is visible.

Experience has indicated that the condition of the worst rope lay is a safe guide for rope removal. A rope lay is that length of rope in which one strand makes one complete revolution about the core. The examinations of this worst lay for abrasion and broken wires should give sufficient information to permit a close estimate of the remaining strength. The estimate can be checked by an ultimate strength test.

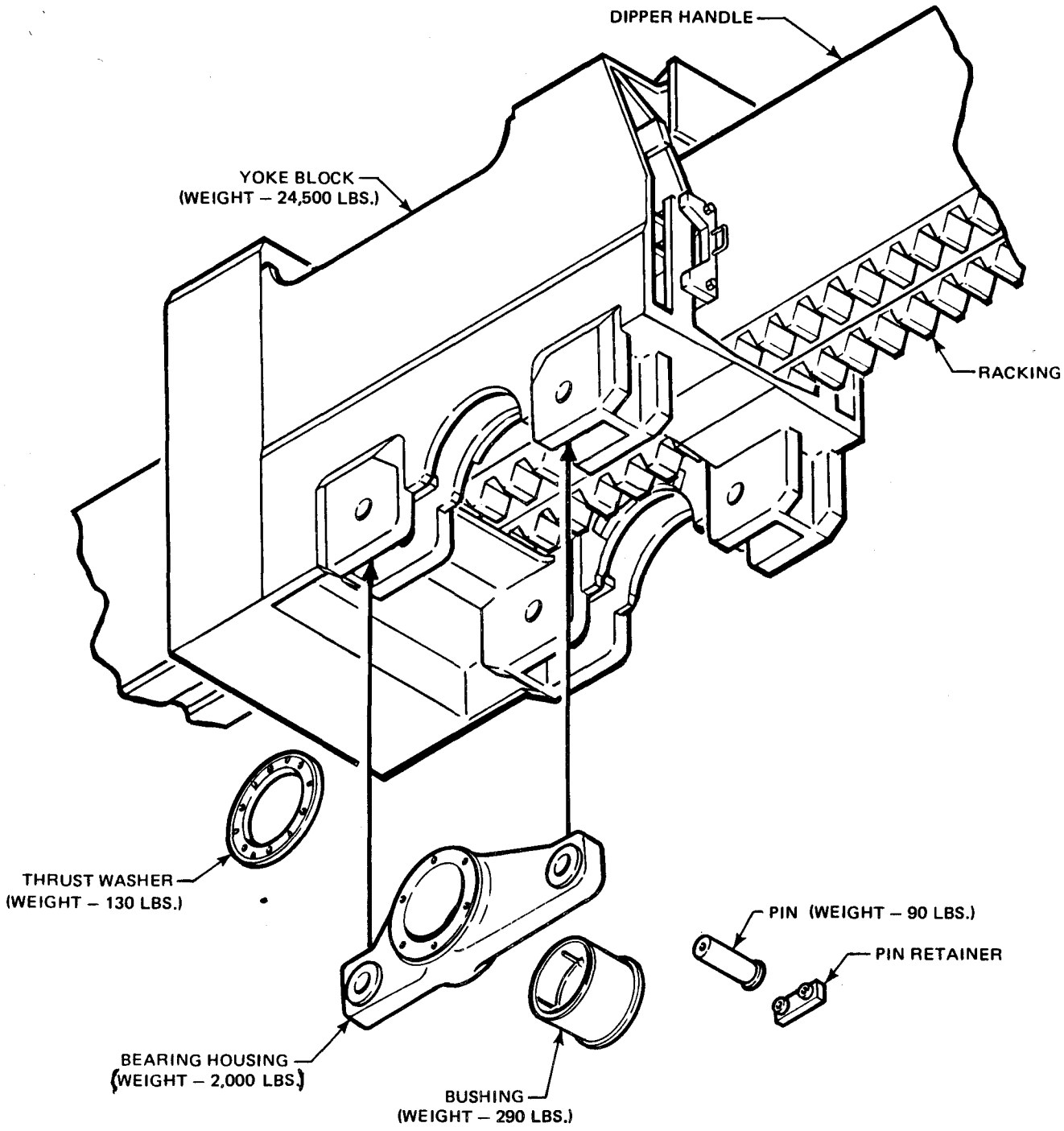
TO REPLACE BOOM SUPPORT ROPES:

1. Run cable or sling through boom point sheaves and lift boom with crane to slacken support ropes.

   NOTE: Ropes to be replaced one at a time.

2. Attach crane whip line to support rope at either end. Remove hardware and pin and lower rope to ground. Repeat procedure at other end of rope.

3. Pick up one end of new rope with whip line, lift it into place and pin. Pick up and pin opposite end of rope. When installed, painted line on rope must be straight, not twisted. Repeat procedure for each rope to be replaced. Equalizers will adjust for any difference in rope lengths.



YOKE BLOCK AND BEARING HOUSING DETAILS

TO INSTALL INTERMEDIATE SHAFT:

1. Pressemble shaft, outer bearing, spacer and cone of inner bearing. See Section 2 of 192-M Manual 1074A for information on bearing installation. Attach shaft lifting tool.

   IMPORTANT: Install bearing cup and bearing cage in boom housing. Do not install on shaft.

2. Pack shaft housing with MPG multi-purpose grease.

3. Insert shaft assembly into boom housing and inner bearing. Start outer bearing into housing, then remove lifting tool and complete shaft installation.

4. Install eight capscrews through split retainer to secure outer bearing.

5. Install spacer over shaft splines and against cone of inner bearing.

6. Install inner bearing retainer with eight capscrews.

7. Install intermediate gear on shaft splines and against spacer. Install gear retainer with three capscrews.

CROWD MOTOR REMOVAL – Disconnect electrical power from machine. Disconnect electrical wiring from crowd motor. Identify wires and cover connectors, using cambric and rubber tape. Disconnect air line to crowd motor brake.

Remove gear and pinion guard. Remove motor as a unit with brake and pinion installed. Weight of unit is approximately 3,140 pounds. Weight of motor with blower is 2,755 pounds.

CAUTION: Carefully loosen and work motor from mounting to avoid damage to motor pinion.

Lower motor onto cribbing at ground level and protect it from weather and dirt.

A. POINTS TO CHECK WHEN INSPECTING THE BRAKE

CAUTION: Set and block the machine in a safe position to prevent hazards when inspecting the brake. Disconnect all electrical power.

1. The condition of the friction surface of the brake drum.

   a. If the drum surface is badly grooved or worn, the surface may be remachined. The machined diameter should not be smaller than that shown below.

Brake Model	Minimum Diameter
169G80C	11.94"

CAUTION: If drum diameter is below the minimum allowable drum diameter, torque will diminish even though friction lining is only partially worn.

2. The condition of the friction linings.

   a. Linings that have been worn to the minimum allowable thickness shown below must be replaced.

Brake Model	Minimum Thickness
169G80C	.156"

CAUTION: The friction linings do not normally wear evenly but must be replaced when the minimum thickness is attained at any point of the working friction material surface.

   b. If friction lining is glazed, this condition can be corrected by sanding the friction lining to remove the glaze.

3. Oil or grease on the friction surface.

   a. A cloth dampened with solvents such as VM and P Naptha or petroleum ether may be used to wipe grease or oil off the friction lining. Severely saturated lining must be replaced.

TABLE 1

OPERATION AND ADJUSTMENT OF CAMS

Break Off Cam Section No.	Closed Range (in degrees)		Open Range (in degrees)	
	Min.	Max.	Min.	Max.
Full cam	10	175	185	350
No. 1	175	255	105	185
No. 1, 2	255	295	65	105
No. 1, 2, 3	285	315	45	65
No. 1, 2, 3, 4	315	325	35	45
No. 1, 2, 3, 4, 5	325	335	25	35

For ease in snapping off the cam portions at the scored points it is recommended that an adjustable wrench be used. (See figure 2.) Extra care should be used when snapping off cam portion No. 4 (leaving portions No. 5 and 6) to avoid breaking off cam portion No. 5. It is recommended that a second adjustable wrench be used.

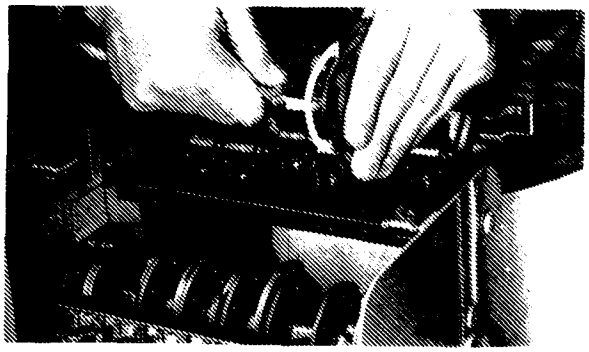


FIGURE 2. RECOMMENDED METHOD OF SNAPPING OFF CAM SECTIONS

Place the two scored cams on each cam holder and align the cams to give the approximate desired contact opening and closing. When placing the cams on the shaft, be sure that the cams are placed back-to-back with the markings of each cam facing outward. This will prevent an interrupted cam surface and also prevent the roller from striking a broken cam surface. Secure the cams to the cam holder at 180-degree intervals with the two bolts and lock washers furnished. Before tightening the bolts, finer cam adjustment can be made, if required, by lining up the start of the cam rise with respect to the cam-holder indicating marks at the desired points of contact opening and closing.

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