Technical Manual

LUBRICATION OF GEARS (Open or Semi-enclosed)

It is important to make sure every rotating or movable part is properly lubricated. The pinions and gears on hoist and crowd machinery, as well as racking on the dipper handle, and on all other gears and pinions which are not enclosed should also be kept coated with a good grade of gear lubricant as recommended in Lubrication Instructions. Oil should be kept at the proper level in all enclosed gear cases.

EXTREME TEMPERATURE OPERATION

The lubrication specifications in this manual covers the lubrication requirements of the machine when operating within an ambient temperature range from -20 degrees to 110 degrees F.

If this machine is to be operated at temperatures below -20 degrees F. or above 110 degrees F., contact the Marion Power Shovel Company, Inc., Marion, Ohio or local supplier for special lubrication recommendations. Give full particulars concerning your conditions of operation.

NOTE:

Dusty and dirty atmosphere, high humidity and/or extreme temperatures can alter the effective life of a lubricant. Therefore, it shall be the responsibility of the operator and/or owner to determine the most effective lubrication interval in accordance with existing environmental conditions for all components, bearings (plain and anti-friction), gears, gear cases, etc.

INTRODUCTION-AUTOMATIC LUBRICATION SYSTEM

Automatic lubrication, when furnished with the machine is usually arranged to lubricate the bronze bushings and plain bearings in the lower frame and crawlers, the roller circle, the upper frame and front end.

The lower frame and crawlers can be serviced from the upper frame supply and the roller circle lubricated by means of a Quick Disconnect or Hook-On-System. The upper frame and front end can then be turned on for full automatic lubrication controlled by a timing device.

ADJUSTMENT

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 ofwick 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.

Alcohol - Use only METHYL alcohol, distilled from wood. Thorough investigations prove that Ethyl Alcohol is unfit for use. DO NOT USE RADIATOR ANTI-FREEZE.

ROTARY AIR SEAL

The rotary air seal forms a connection between the air lines and the rotating shafts.* The rotary seals are lubricated at the factory for the life of the seal. No attention is required. When installing a new rotary air seal, the short piece of flexible hose attached to the seal must be used to prevent any distortion which might cause the rotary seal to bind. Make sure the gasket is in place.

*Intermediate crowd shaft, intermediate hoist shaft and center journal. The rotary seal at the center journal is a special 2-way for air and grease.

CRAWLER TRACTION ROLLERS (Cont'd)

prevent entrance of dirt and grit into the bearings. Bearings are lubricated through the end of the shaft.

To disassemble a crawler traction roller, run the crawler over a hole sufficiently deep to allow the roller to clear the underside of the crawler frame. Slack off on the crawler belt and force the slack belt into the hole far enough to disconnect the belt. Remove the roller shaft lock bolt and block the roller. Drive out the shaft toward the outside of the frame. (The shaft is stepped diameters and must be removed to the outside only.)

To reassemble a crawler traction roller, clamp the thrust washers tight against the roller with springs and dowel in place. Enter the roller assembly between the bearing bosses in the crawler frame. Align the bore and insert the shaft from the outside, small end first. Lock in place and reconnect and adjust the tread belt.

LUBRICATION OF ROTATING GEAR CASE

(QUANTITIES FOR 1 GEAR CASE)*

LOCATION NO	NAME OF PART	TYPE	NO. OF FTGS	LOCATION OF FITTINGS	LUB SYM	LUB PERIOD IN HRS
	1st Intermediate Rotating Shaft, Bearings & Gears	Anti-Friction	-	Gear Case Oil	Oil Bath	
	Main Rotating Shaft Bearings & Gears (In Gear Case)	Anti-Friction	-	Gear Case Bath	Oil Bath	
30	Main Rotating Shaft Bearing Bottom of Upper Frame	Anti-Friction	-	Gear Case Oil	Oil Bath	
	Rotating Gear Case	- - -	-	Oil level plug in side of case (Cap. 101 Gal.)	SAE 90 (Winter & Summer)	Check Daily
31	Rotating Motor Bearings	Anti-Friction	-	Refer to Manufacturer's Recommendations		
33	Rotating Foot Pedal Shaft Bearings	Anti-Friction	1	In top of Bearing Boss	MPG	500

MAIN ROTATING GEAR CASE

The swing movement of the machine is powered by two vertical mill type electric motors. Each motor is mounted on a gear case located at the front of the upper frame. Both gear cases are the same.

The first intermediate rotating shaft is mounted on anti-friction bearings and has a large diameter helical gear at the top which meshes with the motor pinion and an integral spur pinion on the bottom. The main rotating shaft has a large spur pinion at the top. At the bottom of the shaft, which extends through the upper frame, is the swing pinion which meshes with the main rotating gear on the lower frame. The direction of swing is determined by the direction of rotation of the rotating motors.

The bottom of the main rotating shaft is supported by two double row tapered roller bearings that are lubricated from the gear case. A drain is provided to remove oil from the shaft housing and bearings.

The main rotating gear case is lubricated by emersion. The gear case capacity is 101 gallons of (GL) lubricant (See Specifications). The oil level plugs are located in the cover, one on each side. A globe valve located near the swing pinion below the frame is provided to drain the lubricant from the case.

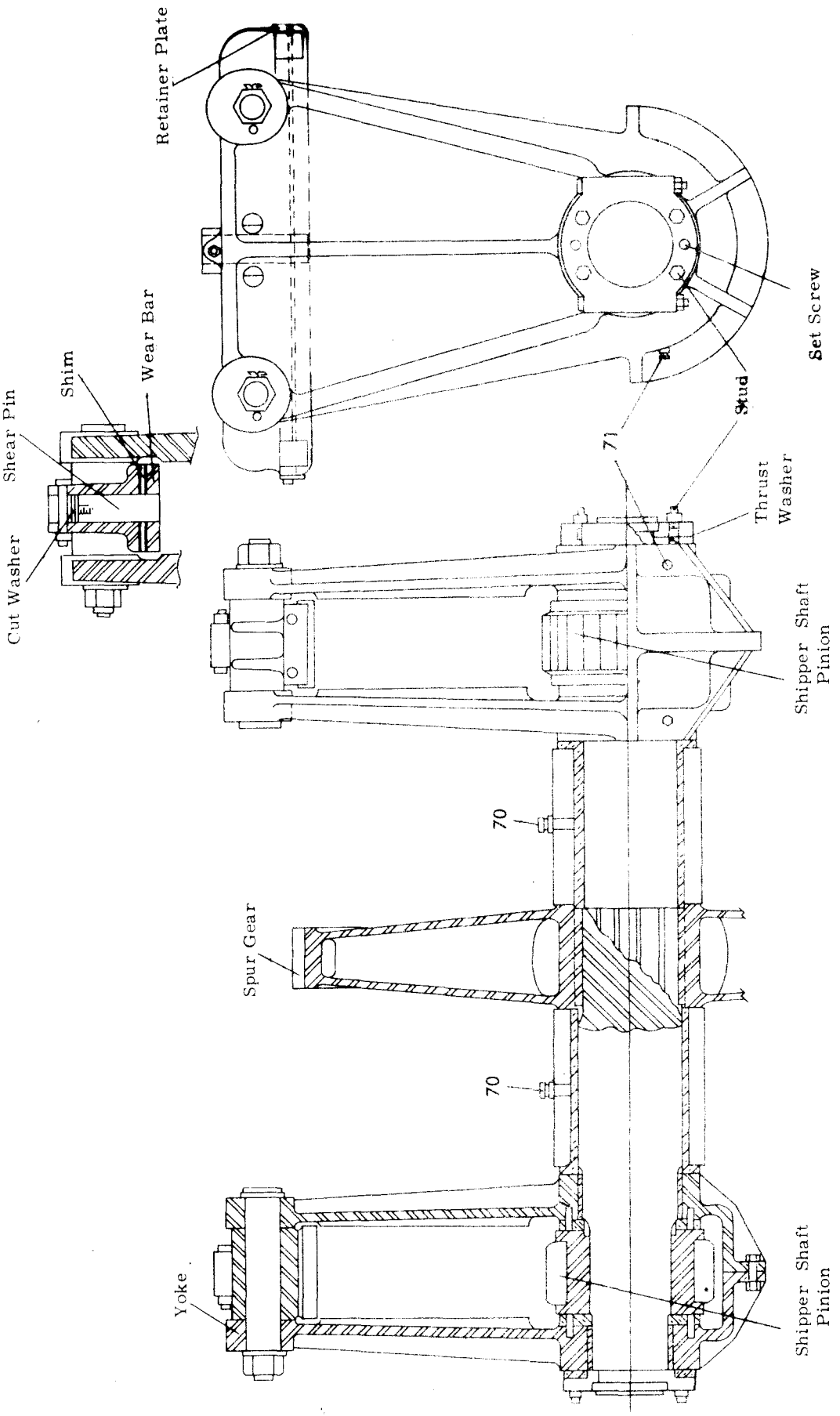
LUBRICATION OF HOIST CHECK BRAKE

LOCATION NO.	NAME OF PART	TYPE	NO. OF FTGS	LOCATION OF FITTING	LUB SYM	LUB PERIOD IN HRS
43	Lever for Hoist Check Brake (Live End)	Oilite Bushing	-	No Lubrication Required		
44	Hoist Check Brake Pins & Links	- - -	-	Apply to Part	MO	Keep Coated

HOIST CHECK BRAKE

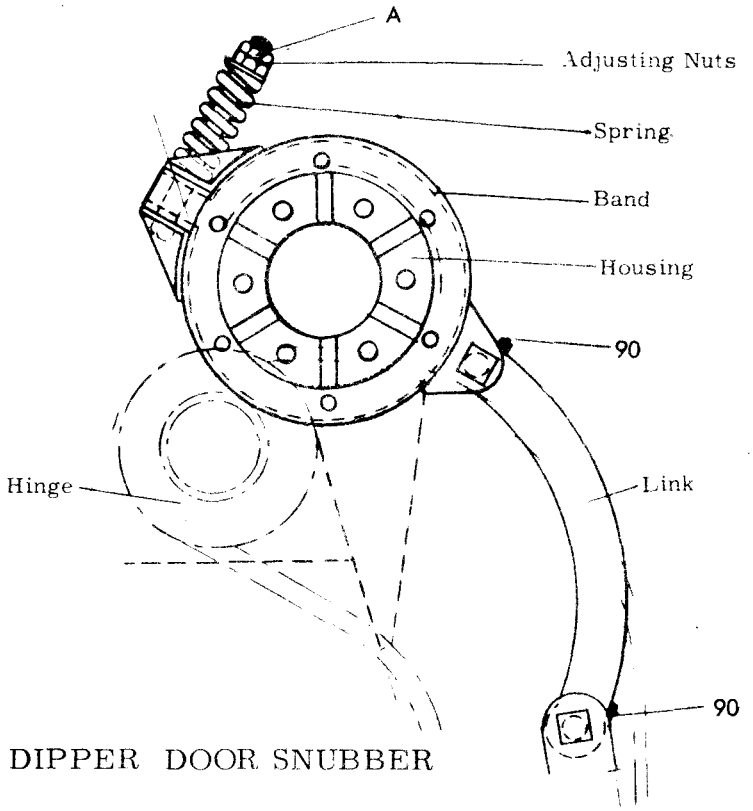
The hoist check brake acts on the housing mounted on the intermediate hoist shaft. The brake is spring set and is released by an air cylinder. The operating cylinder and spring are mounted on the deck directly below the brake housing. The band is adjusted by two bolts (A) that join the two halves of the band. The band should be adjusted so that operating lever (B) is 1/4" to 1/2" less than full toggle when the band is set. The band lifter springs must be adjusted so that clearance between band and brake housing is the same all around. There are two sets of nuts at the top of the band lifters. The larger set (D) holds the lifter bar and spring assembly in place on the lifter support while the smaller set (C) is used to adjust the length of the lifter spring rod.

Adjust the tension on set spring until the spring will hold the brake under all load conditions. Adjust the clevis on the piston rod so that piston will not bottom in either set or released position.



SHIPPER SHAFT

Inspect the dipper frequently for loose or worn teeth and inspect the tooth pins. **DO NOT DIG WITH A TOOTH MISSING** or the tooth base may become damaged and a tooth pin will not fit the base properly.



DIPPER DOOR SNUBBER

DIPPER DOOR SNUBBER

A brake housing and an external brake band is mounted on each side of center of the dipper back to control excessive swing of the dipper door when opened. Also to eliminate bounce and slamming of the door when closing which might prevent the latch bar from engaging in the latch plate and eventually cause damage to the door. The brake drum is bolted to a bracket on the dipper back and the band is pin connected to an arm which is pin connected to the door hinge. The arm pins are fitted with pressure gun fittings for lubrication

TO ADJUST THE DIPPER DOOR SNUBBER

Adjust the nut (A) so the spring will exert enough pressure through the band to prevent the door from closing. Loosen the adjusting nut one quarter turn at a time until the door will consistently close and latch when the dipper is lowered and retracted as in the normal digging motion. Tighten the jam-nut. Both snubber bands must be adjusted the same.

CONTROLS AND OPERATION FOR STANDARD SHOVEL (Cont'd)

To empty the dipper, press the dipper trip switch (C) (thumb operated) on the crowd controller to open the dipper door. The dipper door will close and latch itself when the dipper is lowered to a digging position near the crawlers or when the dipper handle is retracted with the dipper partly lowered.

An experienced operator will fill the dipper by combining the hoist and crowd motions. If the bank is high, as soon as the dipper is filled it should be retracted from the bank, and then start to rotate. If the bank is low, the rotation may be started while still hoisting as soon as the dipper clears the bank. After dumping the load, time will be saved by lowering the dipper while making the return rotation. In case of a power failure, the crowd brake, the hoist brake and the rotating brakes will automatically "Set".

To propel the machine, the dipper must be off the ground (See Note II). Move the crowd brake switch to "Set" and the swing brake switch to "Set". Place the hoist control lever at neutral. Move the pistol grip switch to "Propel". The propel clutch will be "Set" and the propel brake will be released. When the switch is moved to propel, the red light below the M.G. Set - "Stop" button, will be on until the propel brake is fully released. When the red light goes out, the propel brake is fully released and it is safe to propel without damage to the propel brake.

When the pistol grip switch is positioned to "Propel", the propel clutch will "Engage" before the propel brake is "Released". When the switch is moved out of "Propel", the propel brake will "Set" before the propel clutch is "Released". The hoist lever (A) operates as the propel lever. To propel forward, push the propel (hoist) lever forward (away from the operator). To propel rearward, pull the lever back. The operator should make certain there is sufficient slack in the trail cable before moving ahead and that he does not hit the cable when backing up or steering.

LUBRICATION OF BEARINGS (Cont'd)

wiped off until new grease appears. Finally clean off shaft thoroughly again after the machine has operated for 15 to 20 minutes. The new grease should appear first at the bottom hole but sometimes it comes out first along the shaft.

If possible, approximately once every two years the bearings should be disassembled and all old grease removed by a thorough cleaning with light lubricating oil or petroleum solvent.

Each time the bottom plug is removed, a clean wire should be pushed into the hole to make certain the grease has not hardened to plug the hole.

One measuring tablespoonful is equal to approximately one ounce of grease. Use General Electric Co. ball bearing grease, #D6A2A3 for General Electric Company equipment. Use Westinghouse Electric Corp. grease #1449556 for Westinghouse equipment.

CAUTION: DO NOT MIX GREASES UNLESS THEY ARE OF THE SAME BASE AND WILL MIX. CHECK WITH GREASE MANUFACTURER IF THERE IS ANY QUESTION.

In cold weather, if the machine is shut down long enough to cool off, it is advisable to run the hoist, swing and crowd motors, without digging, to warm them up, and establish lubrication before starting to dig. In extremely cold weather, the motor bearings may be warmed up with a radiant type heater. As each set of motors is warmed up, they should be run light to maintain lubrication while the next set of motors is being warmed.

OIL STARTING SWITCH

It is important that the starting switch levers be handled in a snappy and decisive manner. Slow deliberate handling of levers will result in serious burning of the contact fingers and jaws, necessitating shut downs for frequent renewal of these parts. Burning may be eliminated largely by closing and opening the starting lever quickly as this cuts out the destructive arcs.

25. Operate machinery unloaded and make all final adjustments, mechanically and electrically.

26. Operate machine lightly during first 24 hours of operation. Make frequent checks of all bushings and bearings to make certain they are adequately lubricated. Check gearing frequently for adequate lubrication and correct operating pattern.

27. After 24 hours break in period, machine is ready for standard operation provided no previous difficulties have been encountered.

COAT AND INSERT SLEEVE

Coat the internal and external surfaces of the split sleeve with white lead and insert into an alignment hole (located near the bore) with the flange to the top as shown in Figure 4. below. Seat flange portion against counter bore.

INSERT BOLT

Insert the tapered alignment bolt into the sleeve with the small end of the taper down.

SEAT BOLT

Tap the alignment bolt down until it seats in the sleeve. Use a lead hammer to avoid damage to threads.

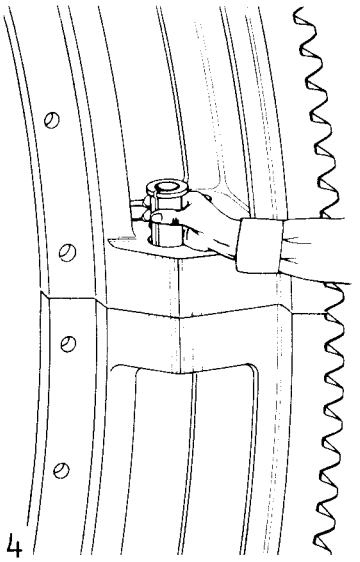


Figure 4

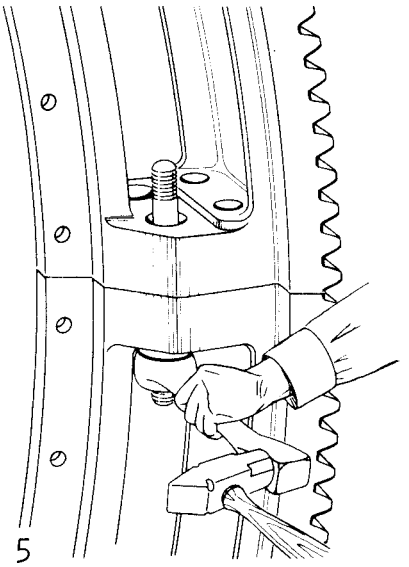


Figure 5

DRAW BOLT SECURELY INTO SLEEVE

Place a washer over the bottom end of the alignment bolt and run on a standard nut. Tighten with a wrench and then sledge so that the nut is rotated approximately 2 1/2 to 3 flats. See Figure 5. Position the top washer, run on the top standard nut and tighten with wrench and sledge. Retighten lower nut to make certain that the bolt has not pulled loose in the sleeve. Run lock nut on lower thread and tighten with wrench and sledge. Run second lock nut on top thread and tighten with wrench and sledge.

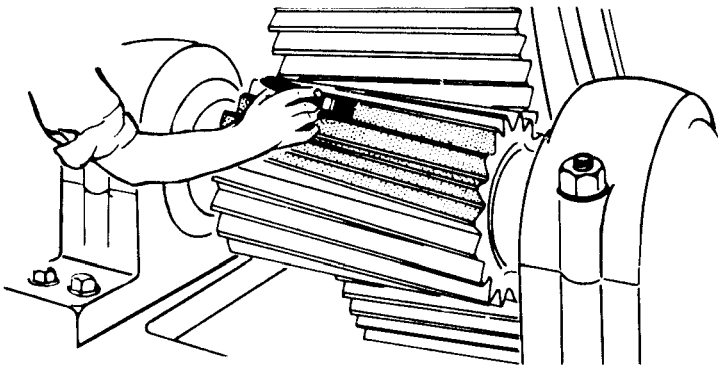
INSTALL REMAINING ALIGNMENT BOLTS

Follow the same procedure to install the three remaining bolts. Install both bolts for one split before proceeding to the other split.

CHECK ALIGNMENT

With a small parallel and feeler gauge, check the alignment on the rim faces of the gear halves. They should align themselves within approximately .003".

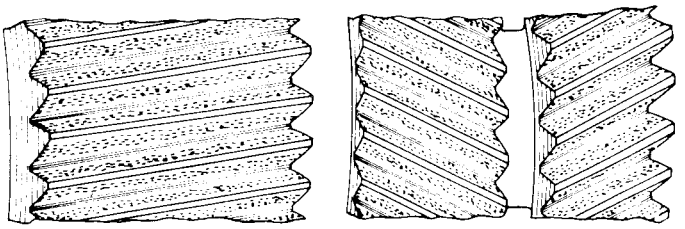
Figure 13



FINAL CHECK FOR UNIFORM CONTACT PATTERN

After establishing pinion alignment with pedestals firmly secured, make a final check for tooth contact to assure accurate gear alignment. Apply a very thin, smooth coat of Prussian blue pigment, lamp black, or red lead, to five or six pinion teeth, previously cleaned, as shown above, making sure entire profiles of teeth are covered across face. Roll pinion back and forth through the mesh several times to trace contact pattern on gear teeth. If motor power is not available use a torque arm, and "bump" teeth on both sides as pinion is rolled back and forth. The contact pattern may be scattered but should show across at least 80% of the gear face, as sketches below show.

Figure 14



Single Helical **Double Helical**

TYPICAL CONTACT PATTERNS

After a satisfactory contact pattern is established for the initial position of the gear, the same contact check should be made at three more points on the gear, spaced 90° apart. A minor adjustment to the pinion may be necessary to produce the best average contact on the gear.

INSPECTION

Dowel all bearing pedestals and recheck all bolts to secure gear setting. Inspect gear teeth and remove all metal upsets and burrs which may have occurred in handling or assembly. Clean gear teeth and enclosures thoroughly before enclosing gears.

WELDING INFORMATION FOR MAINTENANCE OF MARION MACHINES

Austenitic Manganese Steel - MPS Symbol CH and FCHN

When welding or flame cutting manganese steel the temperature 1/2 inch back from the edge of the joint should never exceed 500° F., otherwise an embrittled heat affected zone may result. Interpass temperature between each bead or layer should not exceed 600° F.

Normally, manganese is non-magnetic, but work hardened manganese may be slightly magnetic. Work hardened areas should be removed by grinding before welding.

Cast Iron

Parts - Friction Housings

Welding - Permanent repair by welding is not recommended on these parts. Temporary repair may be made by bronze welding or brazing. Use general preheat. The entire part should be slowly preheated to a mimimum of 400° F., heat maintained during welding, slowly cooled after welding.

When the application does not permit brazing, the repair weld may be made using the electric arc process using nickel or nickel - iron electrodes (such as "ni-rod" or "55"). General preheat applies.

WELDING INSTRUCTIONS

Welding Rod Selection - Welding rod type shown by Table #2 is classified according to the American Welding Society standard system. Any reputable brand of electrodes conforming to the AWS type shown may be used. We recommend the "low hydrogen - lime ferritic" rod which is the AWS EXX15, 16 or 18 type for all repair work. These rods must be kept dry and used according to manufacturer's recommendation for best results. When possible electrodes should be baked in an oven for a period of 1 hour at 700° F., then placed in a holding oven at 350° F. until electrodes are used.

RECOMMENDATION FOR REPAIR OF CASTINGS ON MARION MACHINES

(Continued)

Note ends of all sections veed out shall be tapered to allow proper fusion and accessibility to the parent metal.

(e) Cracks with overall dimensions of over 12 inches

Where possible, the middle one-third of the section to be repaired will be veed out to bottom of crack. Repair of this section to be completed with each successive layer applied in a cascade manner on both ends of the section being repaired.

After center portion is repaired, vee out either of the remaining ends. Taper end of vee out for proper fusion and accessibility. Complete weld of this section.

Complete weld on final one-third of repair section.

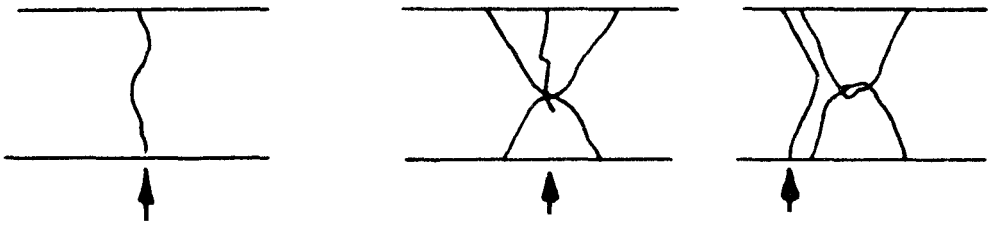


Plate or casting crack | Center bead crack | Fusion line crack

(f) After arc out, the joint should be magnafluxed to determine if all of the crack has been removed. Particular attention should be given to the walls of the bevels since it is possible for cracks to have various patterns and the arc out may appear crack free when it actually isn't.

MANUAL 1047A

191-M
ELECTRIC
MAINTENANCE
AND
OPERATION

MARION POWER SHOVEL DIVISION ■ DRESSER INDUSTRIES, INC.

Printed in U.S.A.

ADJUSTMENT

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.

Alcohol - Use only METHYL alcohol, distilled from wood. Thorough investigations prove that Ethyl Alcohol is unfit for use. DO NOT USE RADIATOR ANTI-FREEZE.

ROTARY AIR SEAL

The rotary air seal forms a connection between the air lines and the rotating shafts.* The rotary seals are lubricated at the factory for the life of the seal. No attention is required. When installing a new rotary air seal, the short piece of flexible hose attached to the seal must be used to prevent any distortion which might cause the rotary seal to bind. Make sure the gasket is in place.

*Intermediate crowd shaft, intermediate hoist shaft and center journal. The rotary seal at the center journal is a special 2-way for air and grease.

CRAWLER TRACTION ROLLERS (Cont'd)

prevent entrance of dirt and grit into the bearings. Bearings are lubricated through the end of the shaft.

To disassemble a crawler traction roller, run the crawler over a hole sufficiently deep to allow the roller to clear the underside of the crawler frame. Slack off on the crawler belt and force the slack belt into the hole far enough to disconnect the belt. Remove the roller shaft lock bolt and block the roller. Drive out the shaft toward the outside of the frame. (The shaft is stepped diameters and must be removed to the outside only.)

To reassemble a crawler traction roller, clamp the thrust washers tight against the roller with springs and dowel in place. Enter the roller assembly between the bearing bosses in the crawler frame. Align the bore and insert the shaft from the outside, small end first. Lock in place and reconnect and adjust the tread belt.

LUBRICATION OF ROTATING GEAR CASE

(QUANTITIES FOR 1 GEAR CASE)*

LOCATION NO	NAME OF PART	TYPE	NO. OF FTGS	LOCATION OF FITTINGS	LUB SYM	LUB PERIOD IN HRS
	1st Intermediate Rotating Shaft, Bearings & Gears	Anti-Friction	-	Gear Case Oil	Oil Bath	
	Main Rotating Shaft Bearings & Gears (In Gear Case)	Anti-Friction	-	Gear Case Bath	Oil Bath	
30	Main Rotating Shaft Bearing Bottom of Upper Frame	Anti-Friction	-	Gear Case Oil	Oil Bath	
	Rotating Gear Case	- - -	-	Oil level plug In side of case (Cap. 101 Gal.)	SAE 90 (Winter & Summer)	Check Daily
3	Rotating Motor Bearings	Anti-Friction	-	Refer to Manufacturer's Recommendations		
33	Rotating Foot Pedal Shaft Bearings	Anti-Friction	1	In top of Bearing Boss	MPG	500

MAIN ROTATING GEAR CASE

The swing movement of the machine is powered by two vertical mill type electric motors. Each motor is mounted on a gear case located at the front of the upper frame. Both gear cases are the same.

The first intermediate rotating shaft is mounted on anti-friction bearings and has a large diameter helical gear at the top which meshes with the motor pinion and an integral spur pinion on the bottom. The main rotating shaft has a large spur pinion at the top. At the bottom of the shaft, which extends through the upper frame, is the swing pinion which meshes with the main rotating gear on the lower frame. The direction of swing is determined by the direction of rotation of the rotating motors.

The bottom of the main rotating shaft is supported by two double row tapered roller bearings that are lubricated from the gear case. A drain is provided to remove oil from the shaft housing and bearings.

The main rotating gear case is lubricated by emersion. The gear case capacity is 101 gallons of (GL) lubricant (See Specifications). The oil level plugs are located in the cover, one on each side. A globe valve located near the swing pinion below the frame is provided to drain the lubricant from the case.

LUBRICATION OF HOIST CHECK BRAKE

LOCATION NO	NAME OF PART	TYPE	NO. OF FTGS	LOCATION OF FITTING	LUB SYM	LUB PERIOD IN HRS
43	Lever for Hoist Check Brake (Live End)	Oilite Bushing	-	No Lubrication Required		
44	Hoist Check Brake Pins & Links	- - -	-	Apply to Part	MO	Keep Coated

HOIST BRAKE

The hoist brake is a band type external brake that acts on the housing located at the left end of the intermediate hoist shaft assembly. The brake is spring set and is released by an air cylinder.

The hoist brake is a parking brake which locks the drum when the controls are de-engerized. Stop the rotation of the hoist drum by "plugging" the hoist motor. The brake must be adjusted to hold the suspended loaded dipper.

TO ADJUST THE HOIST BRAKE

When adjusting the brake after initial installation, replacement of parts or relining the band, use the following procedure: Loosen the band lifters to prevent restriction of the band, clamp the band to the housing using three or more "C" clamps. Make sure the band is in full contact with the housing all around the band. Release the compression on the set spring so that the linkage moves freely.

Remove the pin from the clevis at the live end of the band. Loosen the lock nut on the adjusting clevis and turn the clevis until the links are within 5/8" to 1/2" of toggle when the clevis is pinned to the live end connector. Tighten the lock nut and install cotters in the pins.

LUBRICATION OF SHOVEL FRONT END

LOCATION NO	NAME OF PART	TYPE	NO. OF FTGS	LOCATION OF FITTING	LUB SYM	LUB PERIOD IN HRS
65	Boom Point Sheaves	Anti-Friction	2	Above Shipper Shaft	MPG	500
66	Equalizer Sheave	Bushing	1	In end of Shaft	MPG	4 - 8
67	Rack & Pinion	- - -	-	Apply to Racking	OGL	Keep Coated
68	Dipper Handle	- - -	-	Apply to Handle	OGL	Keep Coated
70	Shipper Shaft Bearings in Boom	Bushing	2	In top of Boom	MPG	4 - 8
71	Shipper Shaft Reach Block	Bushing	8	2 in each side of each reach block	MPG	4 - 8
72	Shipper Shaft Gear	- - -	-	Apply to Teeth	OGL	Keep Coated
73	Boom Foot Pins	Bushing	4	Both ends of each pin	MPG	4 - 8
74	Crowd Limit Switch	Anti-Friction		In Case	GL	1/2 Gal. Capacity

SHOVEL BOOM

The boom is an all welded box girder and is made of alloy steel. The foot is wide spread for stability and to take side loads encountered in fast swing cycles. Wide bars are provided to insure alignment of the crowd handle and the shipper shaft pinions and to reduce bending loads on the shipper shaft. The boom point is open throat to take the extra large point sheaves mounted on anti-friction bearings. The boom support lugs are mounted integrally with the point section for maximum strength.

SHIPPER SHAFT

The shipper shaft is the horizontal shaft mounted near the mid-point of the boom. On this shaft are two pinions driven by an independent electric motor through the intermediate crowd shaft.

These pinions mesh with a rack welded to the underside of each of the two dipper handle members which crowd the dipper into the bank or retract the dipper toward the machine. The dipper rack is held in engagement with the

DIPPER DOOR LATCH BAR

The dipper door latch bar holds the dipper door closed while filling and swinging to the dump area. The latch bar should bear on the dipper door latch plate approximately 1-1/4" when the release lever is bottomed. Make sure the latch bar moves freely in the guides. Wear plates are provided in both the top and bottom guides and can be replaced by removing the latch bar from the dipper door.

TO ADJUST THE LATCH BAR

The latch bar is adjusted by adding or removing shims between the fulcrum bracket and the reinforcing rib.

Loosen the two bolts that secure the fulcrum bracket. Raise the fulcrum to obtain the proper latch bar engagement and add shims between the bracket and the rib.

Lubricate the latch bar and guides with motor oil (MO) as required.

DIPPER TEETH

The dipper is provided with six reversible tooth points connected to the tooth bases by two piece pins. The half pin fitted with two bosses is set to the rear of the tooth, the bosses fitting in the recess of the tooth base with the small end up. The other half pin is set in from the top side with the small end down. This half pin should be set in tight.

The pins have matching grooves and the friction of the grooves hold the pins tight. To remove the tooth pins, force the front half of the pin out from the underside of the tooth.

The dipper teeth can and should be reversed so the wear will be equalized and the proper angle of entry will be maintained.

CONTROLS AND OPERATION FOR STANDARD SHOVEL (Cont'd)

hoisting the dipper to prevent the dipper equalizer block from striking the boom point sheaves. When lowering the dipper, care should be exercised to prevent striking the crawlers.

To crowd the dipper, the crowd brake switch must be at "Off". To crowd the dipper out, push forward on the crowd lever (B). (See Note 1). When the dipper has been crowded out as far as desired, bring the crowd lever back until the dipper stops, then return the lever to neutral. To retract the dipper, pull back on the crowd lever (B). When the dipper is back as far as desired, move the crowd lever forward until the dipper stops, then return the lever to neutral. Care should be exercised to prevent racking the handle so far as to strike the stop casting on the handle against the pinions on the shipper shaft. Avoid racking in so far as to cause the handle spreader to strike the underside of the boom excessively. The dipper may be held out, for short periods, by applying just enough crowd power to prevent the dipper drifting back. To hold the dipper from moving for a long period of time, the crowd brake should be "Set".

To rotate the machine the rotating brake switch must be at "Off". To rotate to the right, press on the right foot pedal (D). To stop the machine while rotating to the right, press the left foot pedal (E). Just as the machine comes to rest, neutralize both pedals. To rotate the machine to the left, press on the left foot pedal (E). To stop the machine while rotating to the left, press on the right foot pedal (D). Just as the machine comes to rest, neutralize both pedals. The foot pedals will neutralize themselves if both feet are removed. If the machine is not on level ground, it may tend to rotate to one side or the other without the application of rotating power. The machine should be held steady while digging by pressing lightly on the foot pedal opposite the direction the machine is drifting. If the machine must be held for longer periods, the rotating brake switch should be "Set". Do not attempt to rotate the machine while the dipper is on the ground or while in the bank. Make certain the rotating brake switch is "Off" before rotating.

LUBRICATION OF BEARINGS (Cont'd)

bottom drain hole (plug removed) of the bearing housing. After the first day of service, greasing should be done with the equipment at operating temperature.

Shaft Diameter	Amount Grease
1"	1/2 oz.
2"	2 oz.
2-1/2"	3 oz.
3"	4-1/2 oz.
3-1/2"	6 oz.
4"	8 oz.
4-1/2"	10 oz.
5"	12-1/2 oz.
5-1/2"	15-1/2 oz.
6"	18 oz.

NOTE: Many small motors use sealed bearings that require no lubrication for two to three years.

The above lubricant should be added with the units at rest and the drain plug removed. After the lubricant has been added, the generator or motor should be run with the bottom plug removed for approximately one half hour to make certain all excess grease flows out. Do not forget to replace the plug.

In most cases, the main hoist, crowd and swing motors have no plug to be removed, but surplus grease will blow out in a pocket beneath the bearing housing. On vertical motors and some type of horizontal motors, plugs must be removed the same as for the generators.

As mentioned in the 250 hour interval procedure, the bottom plugs should always be removed before greasing to see that surplus grease escapes. Do not forget to replace the plug.

Approximately once every year, or after 7500 hours operating time, the bearing should be "purged" by pumping sufficient grease through the bearing while running so new grease appears either at the shaft or at the bottom plug. If the grease comes out along the shaft, it is very important that this be kept

18. Install boom and suspension cables. Pin boom feet and lay boom out horizontally on cribbing. If machine is equipped with boom hoist, use boom hoist for raising boom. If machine is not equipped with boom hoist, use mobile crane. Approximate weight (47' boom) 70,000 lbs.

19. Connect coupling halves between hoist motor and hoist motor extension shaft. Make certain coupling halves are aligned and with running clearance 1/4" between driving and driven member.

20. Connect all air piping. Adjust all clutches and brakes.

21. Lubricate machine thoroughly per specifications.

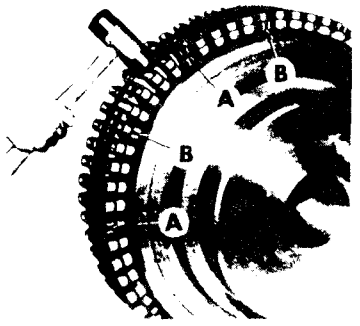
22. Complete wiring, test and establish electrical values. Make certain all auxiliary rotating equipment is rotating in the correct direction. Make certain MG set rotates in correct direction and hoist, crowd and swing motors rotate in correct direction with respect to controller throw. MG set must be checked for alignment and balance by vendor representative before testing. Testing and establishing electrical values is accomplished by Marion Power Shovel Company, Inc. and vendor representatives.

23. Remove stop casting from dipper handle and install handle in saddle blocks. Thoroughly lubricate racks and pinions before installation. Reinstall stop casting. Approximate weight of dipper handle (30' effective length) 27,500 lbs. approximate bucket weight (Marion Power Shovel Company, Inc. general use 15 yd. bucket with equalizer sheaves) 46,000 lbs.

24. Install hoist ropes and dipper trip rope.

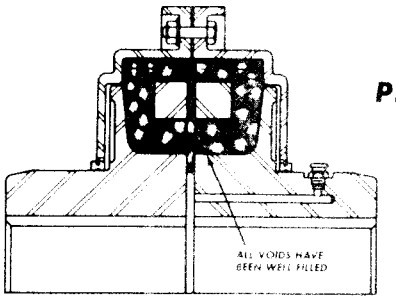
INSTALLATION AND REMOVAL OF GRIDMEMBER

INSTALLATION — Gridmember rungs are truly radial, therefore it is necessary to spread the gridmember slightly so that it will pass over the coupling tooth at its outside diameter. To accomplish this with a minimum amount of spreading, start the gridmember at either end and tap the rungs only part way into the grooves. After all of the rungs are partially in their respective grooves, tap the gridmember all the way into place. When installing a two-layer gridmember, center the sections of the outer layer over the free ends of the inner layer, see A above, and extend all free ends in the same direction, see A and B above.

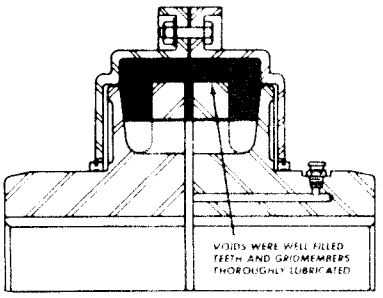


REMOVAL — A round rod or screw driver that will conveniently fit into the open loop ends of the gridmember is all that is required in the way of tools. Begin at the open end of the gridmember section and insert the rod or screw driver into the loop ends. Use the teeth adjacent to each loop as a fulcrum and pry the gridmember out radially in even, gradual stages. Proceed alternately from side to side lifting the gridmember about half way out until the end of the gridmember is reached. By following the same procedure once again, the gridmember will clear the teeth.

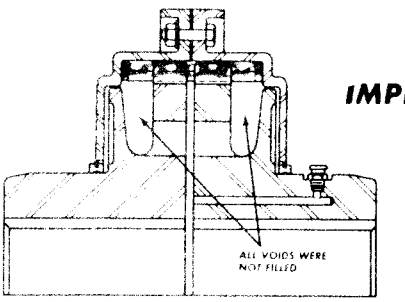
LUBRICATION OF COUPLING DURING ASSEMBLY



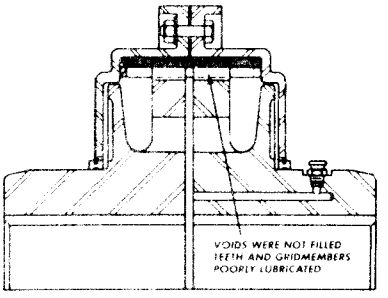
PROPERLY FILLED
Coupling has been well filled with lubricant. Air pockets have been reduced to a minimum by careful packing.



Centrifugal force causes the lubricant in the reservoir to flow outward, thus completely lubricating the coupling.



IMPROPERLY FILLED
Note the large number of air pockets and the complete absence of lubricant on the interior surfaces of the coupling.



Centrifugal force throws the lubricant outward. Surfaces left without lubricant are thus subject to needless wear.

LUBRICATION FITTINGS AND GUN NOZZLES FOR STEELFLEX COUPLINGS

42030
81459

A 1184
5700

The 200 thru 260F coupling hubs are fitted with Alemite A-1184 or Lincoln 5700 button head type lubrication fittings. The Alemite gun nozzle, 42030 and the Lincoln gun nozzle, 81459 can be used on either lubrication fitting.

The 270 thru 300F coupling hubs have openings in the hub flange for lubrication. Remove the covering plate, shown at left, and add lubricant with a paddle or open nozzle type gun.

LUBRICATE COUPLINGS AT LEAST ONCE EVERY SIX MONTHS

Vent coupling cover when lubricating.