Technical Manual

SECTION 1

ENGINEERING DATA

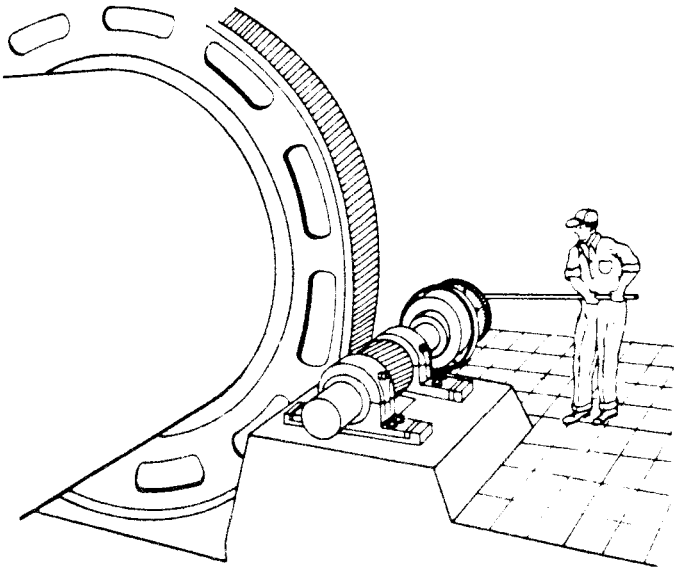
INDEX

Shaft Nom. Diam.	Shaft O.D.	Running Clearance	Shaft Nom. Diam.	Shaft O.D.	Running Clearance
25-3/4	25.750 24.745	.037 .055	29-3/4	29.750 29.745	.041 .059
26	26.000 25.995	.037 .055	30	30.000 29.995	.041 .059
26-1/4	26.250 26.245	.037 .055	30-1/4	30.250 30.245	.041 .059
26-1/2	26.500 26.495	.037 .055	30-1/2	30.500 30.495	.042 .060
26-3/4	26.750 26.745	.038 .056	30-3/4	30.750 30.745	.042 .060
27	27.000 26.995	.038 .056	31	31.000 30.995	.042 .060
27-1/4	27.250 27.245	.038 .056	31-1/4	31.250 31.245	.042 .060
27-1/2	27.500 27.495	.038 .056	31-1/2	31.500 31.495	.045 .064
27-3/4	27.750 27.745	.039 .057	31-3/4	31.750 31.745	.045 .065
28	28.000 27.995	.039 .057	32	32.000 31.994	.043 .065
28-1/4	29.250 28.245	.039 .057	32-1/4	32.250 32.244	.043 .065
28-1/2	28.500 28.495	.039 .057	32-1/2	32.500 32.494	.044 .066
28-3/4	28.750 28.745	.039 .057	32-3/4	32.750 32.744	.044 .066
33	33.000 32.994	.044 .066	37	37.000 36.994	.049 .071
33-1/4	33.250 33.244	.044 .066	37-1/4	37.250 37.244	.049 .071
33-1/2	33.500 33.494	.046 .068	37-1/2	37.500 37.494	.049 .071
33-3/4	33.750 33.744	.046 .068	37-3/4	37.750 37.744	.051 .073
34	34.000 33.944	.046 .068	38	38.000 37.994	.051 .073
34-1/4	34.250 34.244	.046 .068	38-1/4	38.250 38.244	.051 .073

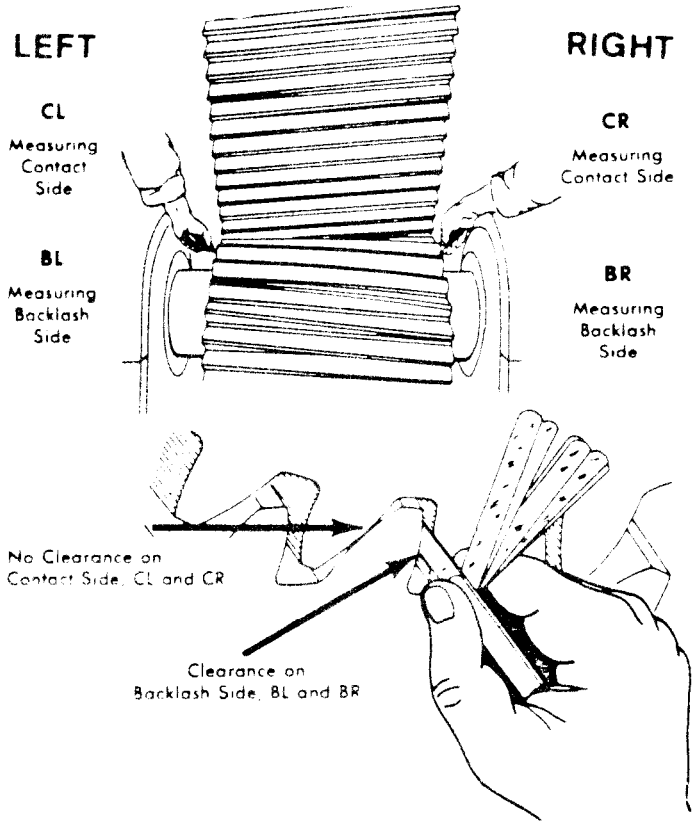
The table applies to course threads only.

Fastener Diameter		TORQUE (FOOT POUNDS) Marion Power Shovel Fastener Classifications			
Inch	(mm)	Bolt Screw A	Screw B	Screw C	Socket Head Cap Screw
1/4	(6.35)	6	10	12	14
5/16	(7.938)	12	18	28	30
3/8	(9.525)	20	30	46	50
7/16	(11.113)	30	50	75	80
1/2	(12.7)	46	75	115	120
9/16	(14.288)	65	110	170	180
5/8	(15.875)	95	150	230	240
3/4	(19.05)	150	250	370	400
7/8	(22.225)	200	380	590	630
1	(25.4)	300	580	890	960
1-1/8	(28.575)	480	780	1410	1520
1-1/4	(31.75)	660	1100	1960	2120
1-3/8	(34.925)	890	1460	2630	2840
1-1/2	(38.1)	1060	1750	3150	3400
1-3/4	(44.45)	1890	3110	5610	6050
2	(50.8)	2720	4500	8100	8750
2-1/4	(57.15)	3420	6500	11700	12600
2-1/2	(63.5)	4380	7150	16200	17400
2-3/4	(69.85)	7320	12100	22450	23500
3	(76.2)	9450	15750	28450	30600

PLACE PINION ASSEMBLY IN POSITION: Bring pinion shaft into approximate parallel with the gear axis by leveling and preliminary shimming of bearing pedestals. NEXT, place pinion into mesh with the gear for setting of contact and backlash. If gearing is single helical, REMOVE bearing caps. MAKE SURE the thrust ring is in correct pedestal. CHECK the free bearing in center of its axial float. When using locknuts to secure bearing, CHECK for tightness and MAKE SURE the washer lock tab is secure.



TORQUE PINION TO GEAR: Fix gear to prevent rotation and torque pinion to gear in actual direction it operates. (See sketch) If a herringbone gear, MAKE SURE pinion apex centers on gear apex. DO THIS by leveling pinion back and forth endwise, checking it FREE to float within the bearings. Antifriction bearings float free and center in their pedestals when pinion centers against apex of gear. Establish ALL backlash values with LOAD on gearing. Apply cable load to the drum by raising an empty bucket/dipper.

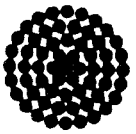


CHECKING TOOTH CONTACT AND BACKLASH: Set the contact and backlash at the SAME time. Select recommended backlash requirements from table 3 and proceed as follows.

With pinion torqued firmly to gear CHECK the contact and backlash side of teeth at the mesh point. DRAW a feeler gauge between teeth as shown in bottom sketch. ADJUST pedestal until obtaining a near zero feeler gauge reading at CL and CR, and a near equal backlash (within recommended range) at BL and BR. TAKE measurements at four points on the gear, 90 degrees apart.

HANDLING AND INSTALLATION OF STRAND BOOM PENDANTS – Bridge or structural strand may be seen as layers of wires around a center wire. This forms a symmetrical section. Additional layers increase the strand diameter. The packaging and handling of the strands, especially during installation, requires great care in preventing damage or possible disturbance of these outer wires.

Boom strand pendants normally are shipped in one of three manners; coils, reels or laid out straight on flat cars. A number of common precautions, to all three, need to be followed; even though each packaging unit requires special handling.



Bridge or Structural Strand

Coiled or reeled strands have the socket at one end tagged, STARTING END. This means to start uncoiling or unreeling with THIS socket.

ON ALL strands with end fittings attached each fitting is tagged to identify FRONT END or REAR END.

COMMON PRECAUTIONS:

ATTACH lifting slings to socket ends when unpacking strand pendants in field. Use either a nylon or wire rope sling if necessary to lift on body of strand assembly. When using a wire rope sling, cover the strand with protection such as belting, rubber tire, etc. This act prevents damage to the zinc coating or the nicking of strand outer wires.

When lifting the strand body is the only way, use great care to allow the radius of the strand curvature at lift point to be large and thereby minimize any wire displacement.

Please do not pull strand over sharp edges. Any short bend during handling might result in permanent damage to arrangement and surface of the wires in the strand. Particular care must be used to insure that nothing done in handling causes nicks in strand outer wires. Wood planks or timbers are recommended for use to prevent strands from contacting the ground when these strands are laid out before installation or for storage.

Correct high or displaced wires noticed during handling, particularly in large diameter strands, BEFORE installing strand assembly. This condition indicates that during unreeling [illegible] handling, one or more outer wires suffered from squeezing or were forced out of normal position on the other wires in the strand. It does not mean defective manufacture. These displaced wires may be restored to proper position while the strand is stretched out by using a hardwood block and a hammer or rubber mallet. Please do not use anything that might cut the wires or damage the coating on outer strand wires.

Tap the wires back into position. Often this means moving other outer wires to replace the high wire into original position.

TABLE 1 (cont.)

COMPONENT PART	MATERIAL – MPS SYMBOL
Walkway (Note 1)	F
Crawler Axle	CB, CK, CL5, CN, F, FK, KO, SE1
Crawler Frame	CB, CN, F, FK, FT1
Crawler Shoe,	CFE, CH, CK-Q, AISI-4330, 4340, 8630
Crowd Handle	F, FHL, FK, FT1
Dipper	CH, CL4B, CN, FCHN, FHL, FK, FT1
Dipper Handle	F, FHL, FK, FT1
Racking	CC2A, CC2A-Q, CH, CK-QS, FT1, 8630

TABLE 2

BUCKET COMPONENT PART	MATERIAL – MPS SYMBOL
Anchor Bracket	FK, FHL
Angles	FT1
Arch	FHL
Basket Plates	FHL
Cheek Casting	CL4B
Cheek Runner	FR4
Corner Radius Casting	CK-Q
Liner Plates	FR4
Lip Casting	CL4B W/FT1 Closing Plates
Ribs	FHL

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.

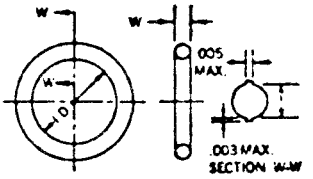
Individually packaged rings seem to have unlimited shelf life. Some maintenance shops use peg boards for individual packages of shop stock used daily. These are arranged by size on each board, but with ONLY ONE compound type per board.

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

Nominal	*Actual*
1/16	0.070 ±0.003
3/32	0.103 ±0.003
1/8	0.139 ±0.004
3/16	0.210 ±0.005
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.

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.

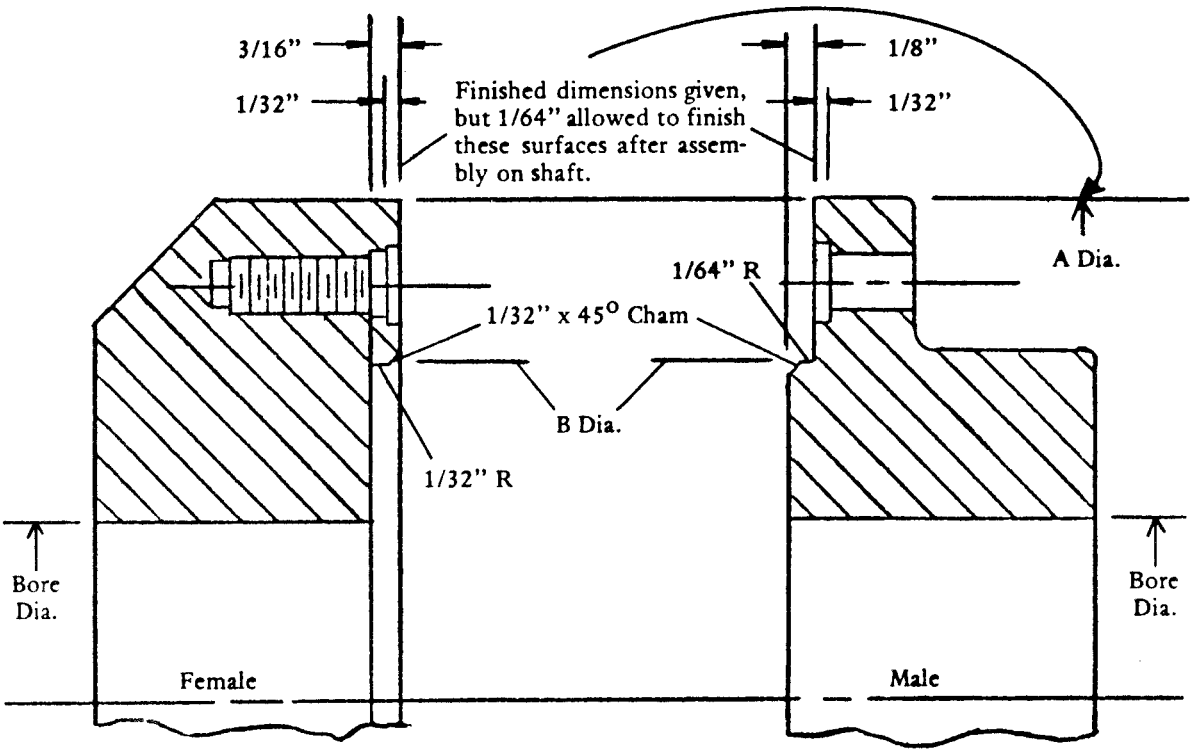
DO NOT INSTALL a dry O-ring on a dry shaft.

FINISHING AND RECOMMENDED FITS – Unless otherwise called for, replacement coupling's have a finished bore and 1/64 inch of material on face, rabbet diameter and O.D. to be removed after assembly on shaft.

Keyed couplings usually have an interference fit between .5 to 1. mil per inch of diameter.

Keyless couplings need an interference fit of 1. mil per inch of diameter.

Measure the rabbet diameter and finish machined surfaces to match mating half coupling using fit from line to line to .001 inch interference. (See sketch.)



CHECKING COUPLING ALIGNMENT requires secure bolting of M-G set base to deck in operating position. Follow the step by step procedure and accurately record ALL readings. This is important. When checking more than one M-G coupling, always start at coupling nearest the two-bearing unit, (usually the motor.)

THE SOLIDLY COUPLED SETS PROCEDURE IS:

1. Loosen ALL coupling bolts to point they do not hold valves together.

2. Start at coupling at two-bearing unit (usually the motor) or near middle of a long set. Two diametrically opposed bolts need careful adjustment to be loose and YET NOT

LUBRICATION SPECIFICATIONS

SPECIFICATION–GREASES

CODE OR SYMBOL NO.	ASTM or TEST	MPG	RGL	OGL TYPE B	OGL TYPE H
Penetration Worked 60X					
Summer, NLGI	D-217	2	semi-	1	–
Winter, NLGI		1	fluid	0	–
Penetration Worked 5000X, Max. Change	D-217	10%	–	–	–
Dropping Point, Min. ^{O}F.	D-566	350	–	325	–
Base Oil Viscosity @ 210^{O}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^{O}F.	D-1264	20%	–	10%	10%
Texture	Visual	Buttery	–	Adhesive	Tacky
EP Timken, Min. OK	–	35 lbs.	–	35 lbs.	35 lbs.

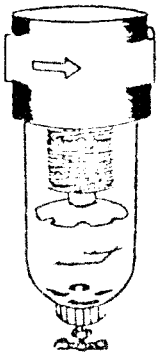
SPECIFICATIONS–OILS

CODE OR SYMBOL NO.		ASTM or TEST	OILS MO	OILS PO
Pour Point ^{O}F. Max.	Summer	D-97	5	15
	Winter		0	15
Flash Point ^{O}F. Min.	Summer	D-92	450	410
	Winter		420	410
Viscosity @ 100^{O}F. SUS		D-446	–	150 Min.

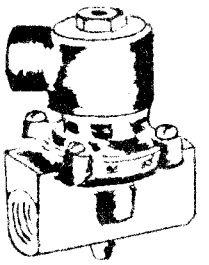
NO.	NAME OF PART	TYPE	NO. OF POINTS	LOCATION	LUB SYM.	METHOD AND FREQUENCY
3.	Boom Point Sheave	Anti-Friction	1	On Side of Hub	MPG	Manual 500 Hrs.
4.	Fairlead Guide Roller	Bushing	4	In Pin End	MPG	Manual 4-8 Hrs. Automatic Lube
5.	Fairlead Vertical Sheaves	Bushing	2	In Pin End	MPG	Manual 4 Hrs. Automatic Lube
6.	Fairlead Sheaves Horizontal	Bushing	2	In Pin End	MPG	Manual 4 Hrs. Automatic Lube
7.	Fairlead Swivel Bracket	Bushing	2	In Pin End	MPG	Manual 4 Hrs. Automatic Lube
8.	Boom Support Ropes – Gantry	Bushing	3	In Pin End	MPG	Manual 4 Hrs.
9.	Boom Support Ropes – Boom	Bushing	4	In Pin End	MPG	Manual 4 Hrs.
10.	Boom Deflector Sheave	Bushing	5	Hub of Sheave and Shaft End	MPG	Manual 24 Hrs.
11.	House Deflector Sheave	Bushing	5	Hub of Sheave and Shaft End	MPG	Manual 24 Hrs.
12.	Hoist Rope	–	Drip	Boom Point	–	Manual 4-8 Hrs.
13.	Drag Rope	–	Drip	Fairlead	–	Manual 4-8 Hrs.

nect piston rod and air lines. Then, remove cylinder head and push the piston out until cup is exposed. Remove cap screw and lift off the packing cup. BEFORE reassembly of piston and NEW cup, coat ALL parts with graphite grease. READJUST brake after reassembly is complete.

AIR FILTERS placed in line so flow direction matches the arrow on body. They hang so moisture drains down into bowl. Solids and liquids are trapped here. Element removal is easy, when needed for cleaning in mild soap and water. Unscrew threaded bowl and element cartridge. Take apart cartridge by unscrewing lower baffle. Remove element to service. Put back together and replace. Make certain ALL gaskets are properly placed. Compressed air dries element quickly, if blown on inside. DO NOT use acetone, benzene, carbon tetrachloride, ethylene dichloride, gasoline, toulene or the like. They damage plastic bowls AND storing them is not safe.

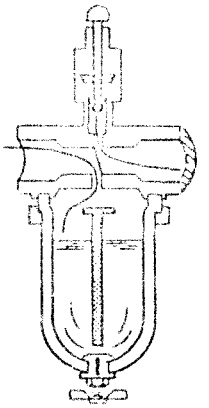


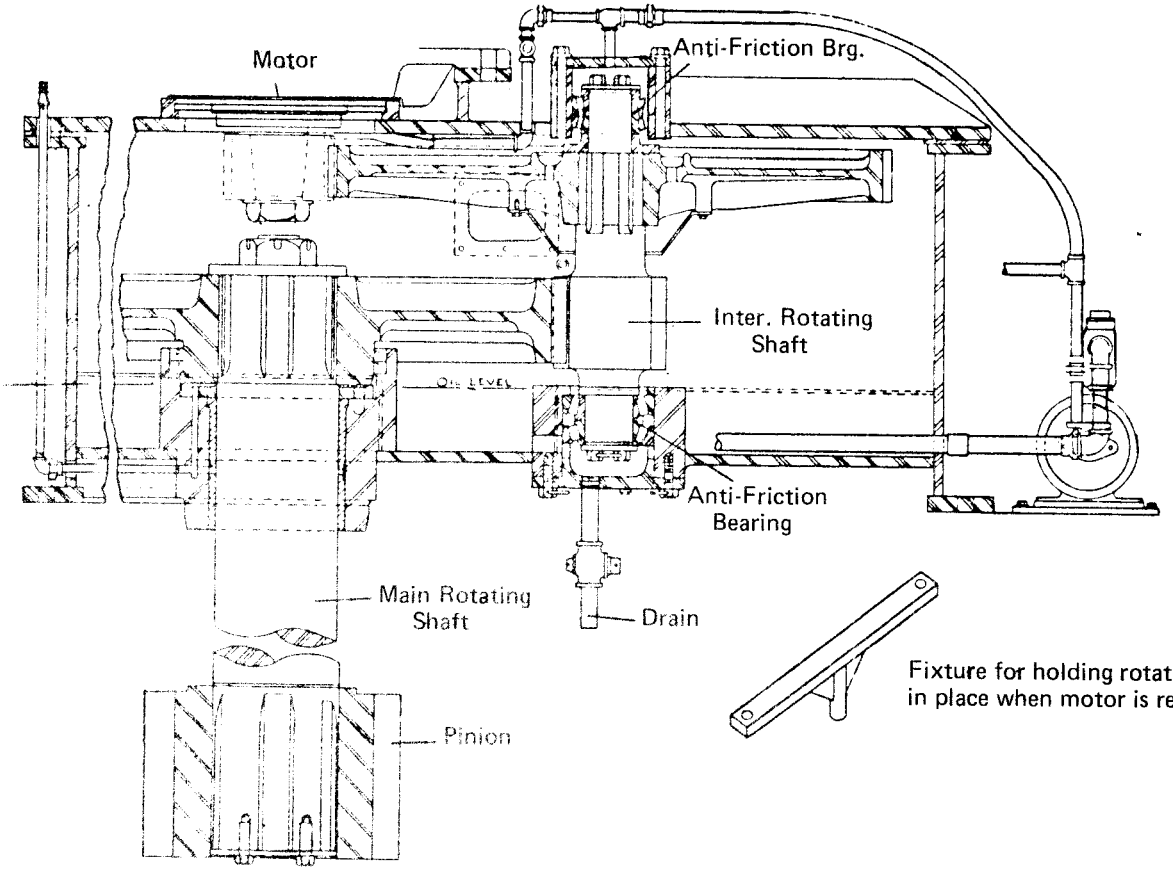
AIR VALVES are electrically controlled (some with manual override), pilot operated, non-compensating and normally closed. When valve fails to shut off or admit proper air volume, clean out dirt and scale that cause it to leak. Open and close valve manually several times. This attempt to clean usually postpones disassembly and cleaning. When this first-aid remedy fails; dismantle, clean and replace worn or damaged parts. All parts for normal maintenance and repairs are available in a repair kit.



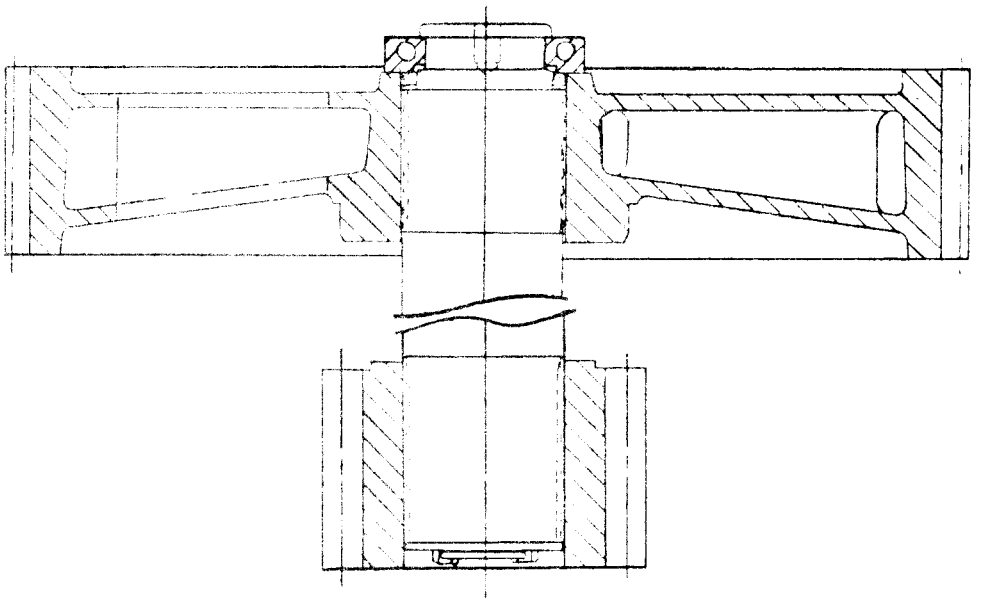
The valve disassembles from machine without removing it from piping. Remove two socket head cap screws, then use flat screwdriver in body notch to lift from base. Remove pan head screw and cartridge retainer plate to remove cartridge. Clean parts completely and apply film of zinc base grease sparingly before rebuilding valve.

LUBRICATORS, placed in line so flow matches arrow on body, deliver lube proportionate to air supply. Removing fill plug vents bowl pressure allowing a refill without air supply shutdown. Fill to visible bowl rim. Replace plug, seat firmly. Turn opens pressurizing valve. Extra torque is unneeded. An adjusting screw on top alters the flow; clockwise leans and counter-clockwise richens. Counting drops per minute in site dome helps adjust. (25 drops per minute equals 1 ounce per hour). Clean bowl in mild soap and water. DO NOT use any of the solvents mentioned in Air Filters above.





Fixture for holding rotating shaft in place when motor is removed.



MAIN ROTATING GEAR CASE

Install output shaft in similiar manner. Draw cylinderical bearing retainer plate up snug.

Assemble the outside (double row, tapered) bearing retainer plate without shims. Draw up cap screws progressively until bearing binds slightly when turned by hand. Measure space between retainer plate and gear case bearing boss and add shim(s) plus .003 inch. Bearing shim(s), laminated in .003 increments and separate easily with a sharp knife to obtain proper thickness.

LUBRICATE COUPLING with two pints of GL, SAE 90. DO NOT OVERFILL. Excess oil runs out when coupling is at rest. Tighten plugs. Check oil level at regular intervals. Maintain proper oil level at ALL times.

MOTOR COUPLING ALIGNMENT requires first placing support ring on shaft and motor armature shaft. Force hubs on shaft and armature. Use shrink fit procedure for motor hub (see Engineering Data).

Align motor and input shaft so hubs are parallel. Keep 1-13/16 inch separating hub with motor in place.

First, position motor on subbase in exact lateral and longitudinal alignment. Scribe, drill and ream holes for motor holddown bolts. Bolt motor in place and check critical alignment. Add shim under foot pads as required to obtain vertical alignment. Always check alignment with holddown bolts tight. Drill tapered holes and drive in dowels.

The **PROPEL MACHINERY** is driven by the drag motor. A sliding jaw clutch on the left hand end of the drag drum shaft engages the propel drive pinion sleeve. This pinion drives the main propel drive gear. The main propel gear is splined to the lateral shaft that mounts at deck level behind the center of rotation. The shaft turns the propel crank at each side of the rotating frame.

The **PROPEL JAW CLUTCH** attaches with shifter fork and an air cylinder. The air cylinder attaches to the bracket bolted to the left hand drag drum pedistal. Adjust clutch release by turning stop screw below the shifter fork pivot bearing. Keep 3/4 inch clearance between the jaw clutch members in released position. Adjust release spring to release jaw clutch promptly. Before engaging jaw clutch, align mating member of jaw clutch. It may be necessary to move drag drum shaft slowly until jaw snaps into place.

POWER DATA FOR ELECTRIC WALKING DRAGLINES

Type	7500		7620		7820	
M.G. Set Drive Motor(s) Rating	1000 hp Syn.	1250 hp Syn.	2500 hp Syn.	2500 hp Syn.	3000 hp Syn.	2500 hp Syn.
Transformer Capacity Recommended	1000 KVA	1250 KVA	2500 KVA	2500 KVA	3000 KVA	2500 KVA
15 Min. Demand (Ave.) KW	575 to 625	600 to 675	1100 to 1250	1200 to 1400	1500 to 1700	1200 to 1400
Peak Demand KW	1800 to 2000	2100 to 2300	3600 to 4000	4000 to 4500	4800 to 5300	4000 to 4500

Trail cables should be type SHD-GC or equal. Neutral resistance grounding should be used in distribution systems. Federal Coal Mine Health and Safety Act standards should be recognized.

All cables to be three conductor, except where marked 6C for six conductor with two in parallel per phase.

Transformer and cable sizes listed are the minimum recommended and suitable for up to 3000 feet between transformer and machine. For longer distances, special voltages and weak power systems; refer to home office.

Recommended transformer capacities, not necessarily standard sizes, are intended only to indicate the needed capacity for a given machine.

Voltages listed are considered maximum available at machine.

NOTE: This information obtained from MPS Power Data Sheet EE-111-B.