



# Technical Manual

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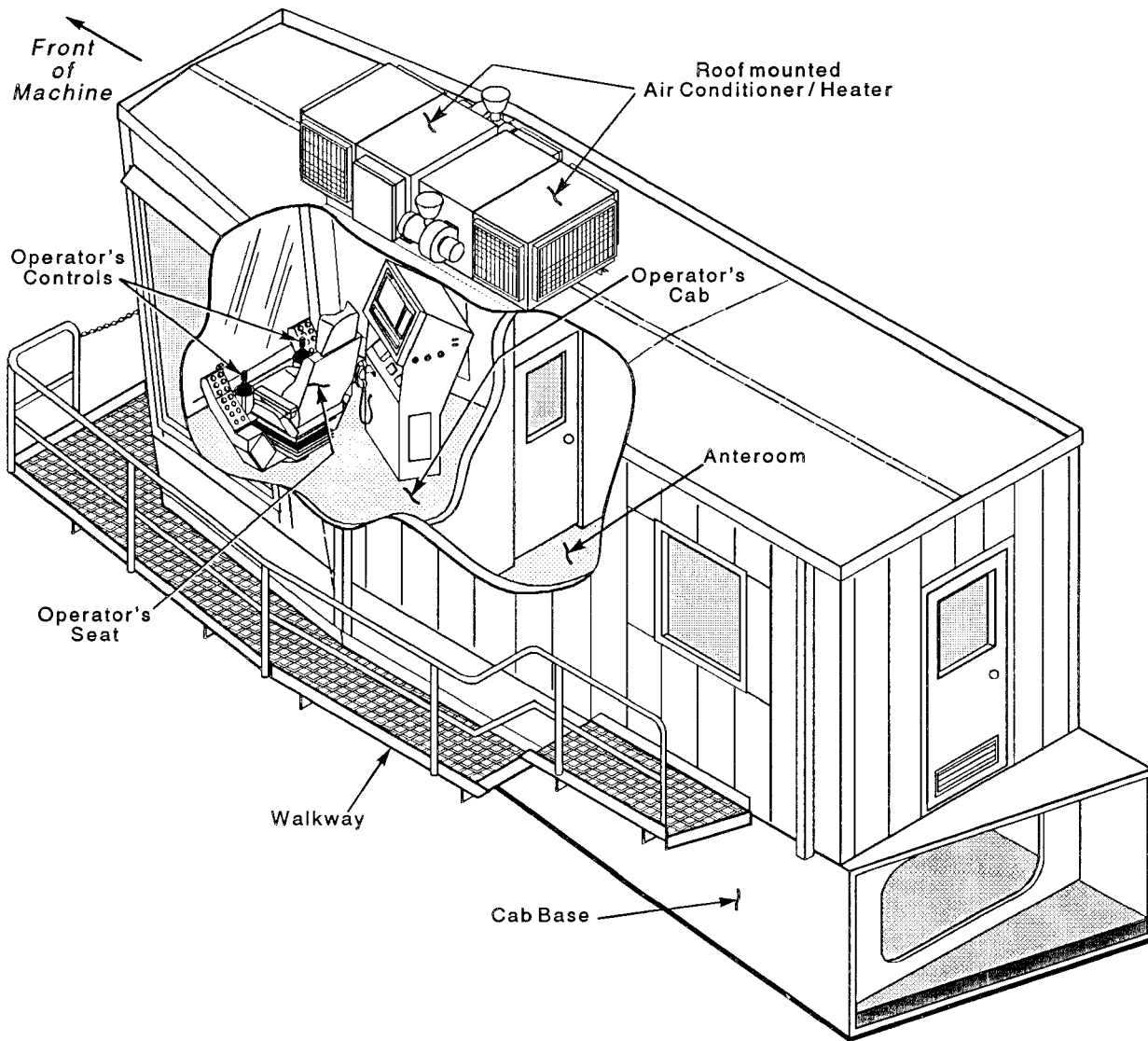
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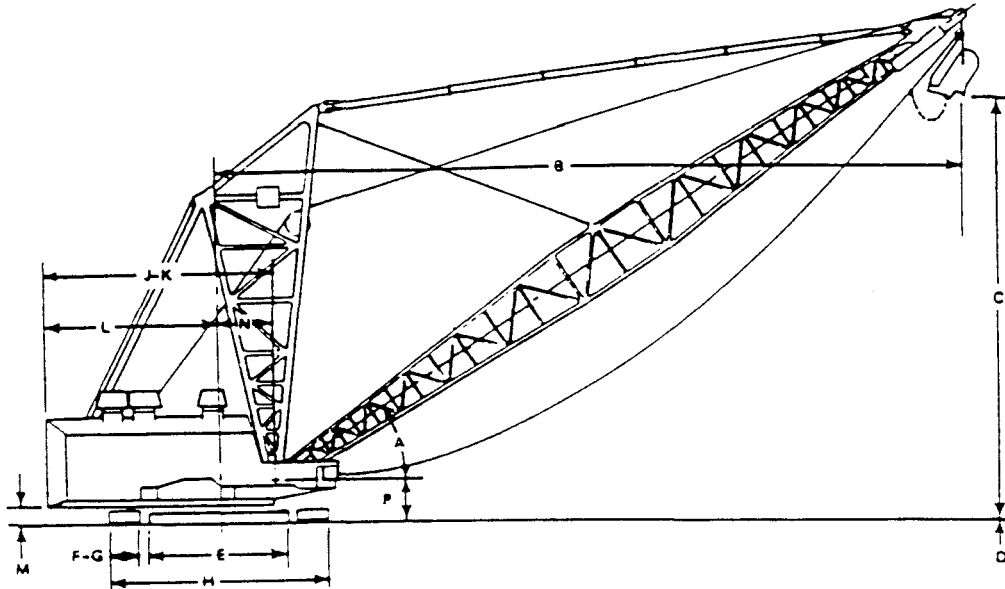
**8750 OPERATORS CAB AND ANTEROOM**

**Model: 8750 WALKING DRAGLINE**

**Specification: 8750-49A**

Description: Ward Leonard - Static Control - Independent Propel

No.: 645083091



**WORKING RANGES**

Boom Length	420'-0"
Boom Point Sheave, Pitch Diameter	150"
A- Boom Angle, Approx.	36.1°
B- Dumping Radius	370'-0"
C- Dumping Height	200'-0"
D- Depth	210'-0"
Maximum Allowable Load, Lbs.	525,000
Hoist Drum, Pitch Diameter	125"
Hoist Ropes, Twin, Single Hitch, Diameter	5.0"
Drag Drum, Pitch Diameter	125"
Drag Ropes, Twin, Single Hitch, Diameter	5.0"

**BASE**

E- Outside Diameter, Nominal	80'-0"
Bearing Area, Effective, sq. ft.	5026
Bearing Pressure, psi	19.0
Rail Circle, Mean Diameter	55'-0"
Circle Rollers, Mean Diameter	16"
Main Swing Gear, Pitch Diameter, Approximate	45'-8"

**WALKING TRACTION**

F- Width of Shoe	16'-0"
G- Length of Shoe	80'-0"
H- Width Over Both Shoes	116'-0"
Bearing Area of Both Shoes, sq. ft.	2560
Bearing Pressure @ 80% of Working Weight, psi	29.8
Length of Step, Approximate	8'-0"

**ROTATING FRAME**

J- Width @ Rear End	90'-0"
K- Length	124'-6"
Depth Sill Members	144"
L- Clearance Radius, Rear End	92'-6"
M- Clearance Under Frame	16'-6"
N- Center Rotation to Boom Foot	24'-0"
P- Ground to Boom Foot	22'-0"

**ELECTRICAL EQUIPMENT**

Hoist Motors, Six, 1430 hp each @ 520 V, Total hp	8,580
Drag Motors, Six, 1430 hp each @ 520 V, Total hp	8,580
Swing Motors, Twelve, 500 hp each @ 475 V, Total hp	6,000
Propel Motors, Four, 1150 hp each @ 520 V, Total hp	4,600
AC Driving Motors, Total hp	12,000

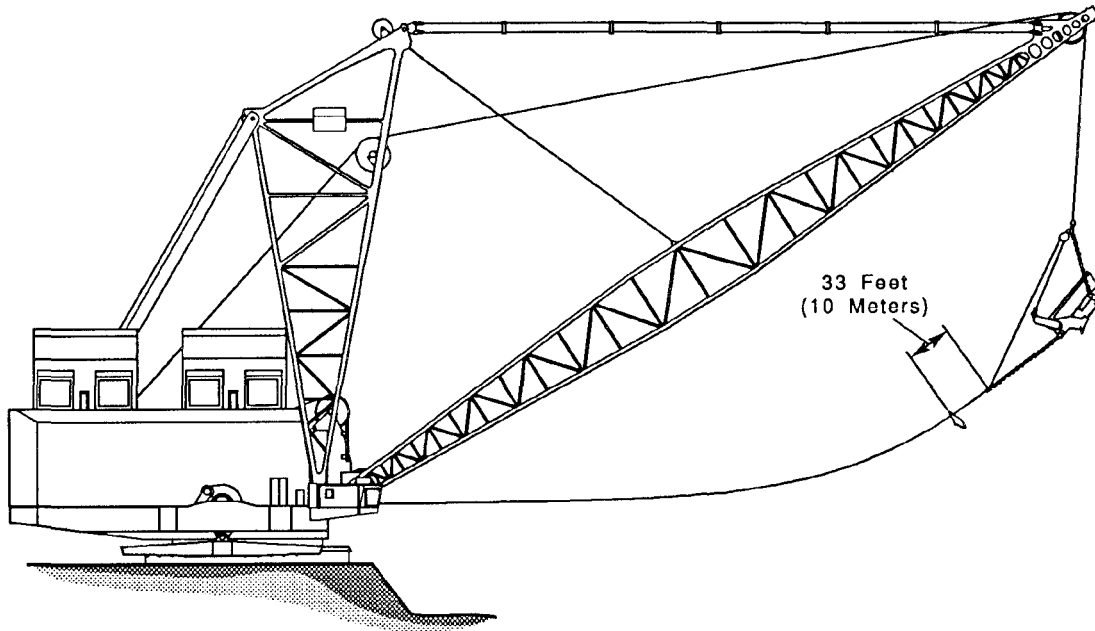
Motors are rated at 75°C and at voltage specified.

**WEIGHTS**

Domestic Shipping Weight (Inc Bucket), Lbs.	11,861,000
Working Weight, Lbs.	13,761,000
Ballast (Furnished by Purchaser), Lbs.	1,900,000

Shipping Weight Subject to 5% Variation.





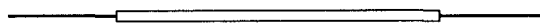
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## DRAG LIMIT

*To set the drag-in limit:*

1. Tie a flag on the drag rope 10 meters from the crows-foot socket and drag in the rope until the flag touches the lower fairlead sheave.
2. Set the hoist and drag brakes.
3. Place the drag controller to drag in and turn the rope zero switch to DRAG. Hold for 5 seconds. The OIT will indicate "10".
4. To set the drag-out limit, payout the drag rope until 2 turns of rope remain on the drum and repeat step 2.
5. Place the drag controller in the drag-out position and turn the rope zero switch to DRAG. Hold for 5 seconds. The OIT will indicate the length of rope payed out in meters.

After completing the above steps, the drag in and out limits are set and the machine can be returned to service.



***IMPORTANT NOTE:***

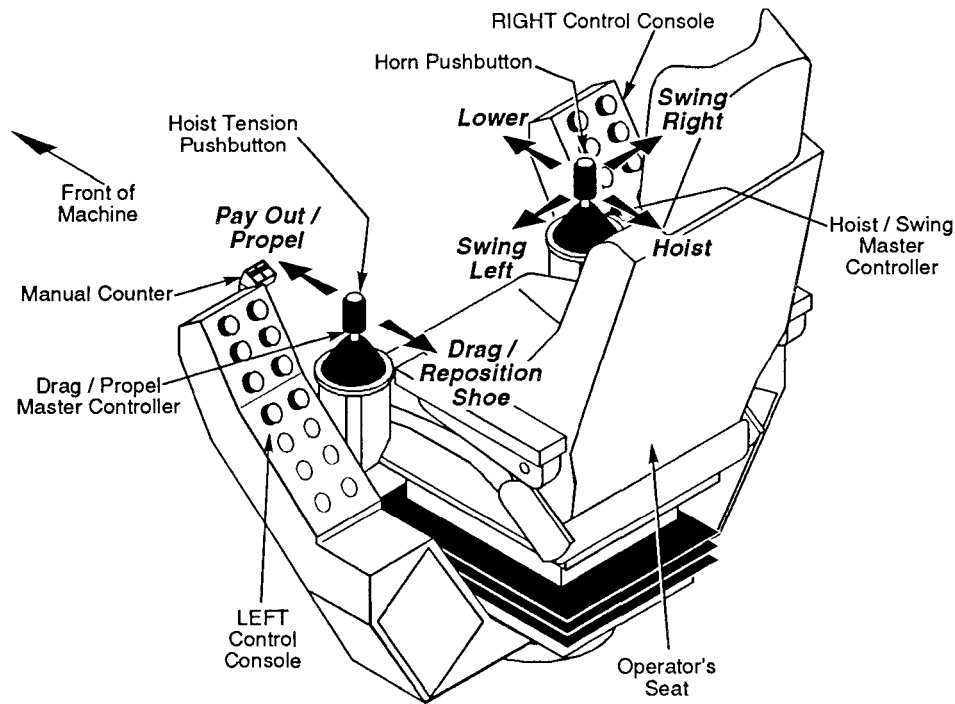
If the vacuum breaker for the synchronous motor on the M-G Set does not stay closed when the start button is released, repeated attempts to start the set **SHOULD NOT BE MADE**. On a motor of this type, Nema standard permits two successive starts if the motor is at ambient temperature. Before attempting another start, the vacuum breaker starting circuitry or mechanism should be inspected by qualified personnel and its proper operation verified.

5. Start the Machinery House Filter Fans. Move the selector switches to the *START* position momentarily and release. This will start the bleed duct fans. In approximately 5 seconds the main fans will automatically start and then the selector switch will light up. These fans introduce clean air into the machinery house to cool the dragline operating equipment. They also maintain a positive pressure within the house to prevent dust entry if all the access doors are kept closed.
6. When the above systems have been started and are operating correctly, go to the Operator's cab.
7. Sit into and adjust the operators seat.
8. Check the Hoist, Swing, Drag, and Propel Brake selector switches. If they are not at their *SET* positions, put all of them there now, even if the red light in the switch is on.
9. Check to be sure that the hoist and drag controllers are in their *NEUTRAL* position.

***IMPORTANT NOTE:***

This machine is equipped with an electronic rope limit control system. This system is designed to aid the operator in avoiding serious mechanical damage to the machine due to hoist or drag bucket over-travel or bucket tightlining. However, the system is not a substitute for careful operating procedures. The rope limit control system should be verified for proper operation on a daily basis. It is **EXTREMELY** important that the system be recalibrated after any rope or bucket rigging changes have been made. Refer to "Hoist / Drag Limit Calibration" in this manual for the proper procedures.

10. Note the air pressure on the main screen of the operator's OIT. The air pressure must be a minimum of 90 PSI or a fault will be announced on the OIT and an alarm will sound when LE is energized. The air system pressure should be from 100 to 120 PSI during machine operation.



### PRIMARY OPERATOR CONTROLS

As the first walking step commences and the shoes move off their *PARK* position, the swing and hoist brakes will automatically set if they had not already been set manually. During extended travel over long distances, it sometimes becomes necessary to alter the direction of travel or reposition the bucket. This can be done without transferring to the *DRAG* mode. Stop the walking shoes in their *PARK* position. Check that the *CLEAR TO SWING* indicator is lit and the drag/propel brakes are set. Release the Hoist and/or Swing brakes then press the *EXCITATION ON* pushbutton. To continue propelling, set the hoist and swing brakes, release the drag/propel brakes and press the *EXCITATION ON* pushbutton.

During walking, if a ground roll develops at the front edge of the tub, "heel" the bucket for a couple of steps. If the tub roll persists, swing the machine 30°-40° to one side and propel 1 or 2 steps. This will spread the roll over the ground. Then return to the line of travel desired.

When the machine is walking, both shoes should contact the ground at the same time. If one of the shoes sets down on a high spot, or does not contact the ground, or steps into a soft ground area that will not support it, then the machine will rotate in relation to the tub if the walking step is completed. If this occurs and the operator can, he should stop the step before the machine is lifted and reverse the shoes up to top dead center position. He can then change machine travel direction with the swing motion and walk around the problem ground area.

### 3.2 AUTOMATIC LUBRICATION SYSTEM

The system is divided into 4 separate systems, as follows:

1. OPEN GEARS (OGL)	96 points
2. PROPEL BEARING (WCL)	102 points
3. FRONT END (MPG)	59 points
4. ROTATING FRAME (MPG)	62 points

Total: 319 points

Each of these systems contains a lube reservoir, an air-operated pump, electrical and/or manual controls, and injectors or spray nozzles to meter the lube to points of application. The control panels and lube reservoirs, with pumps for each system, are located in the lube room at the front-left corner of the machinery house.

The Auto Lube system is protected by an alarm system. When a failure occurs and an alarm is activated, some of the more obvious causes to look for are:

- ✓ Any mainline-to-injector breaks or leaks.
- ✓ The supply line is blocked.
- ✓ Leaking Injectors.
- ✓ Lube tank empties and/or pumps cavitates.
- ✓ The air supply fails.
- ✓ A pump failure.
- ✓ The control system failure.

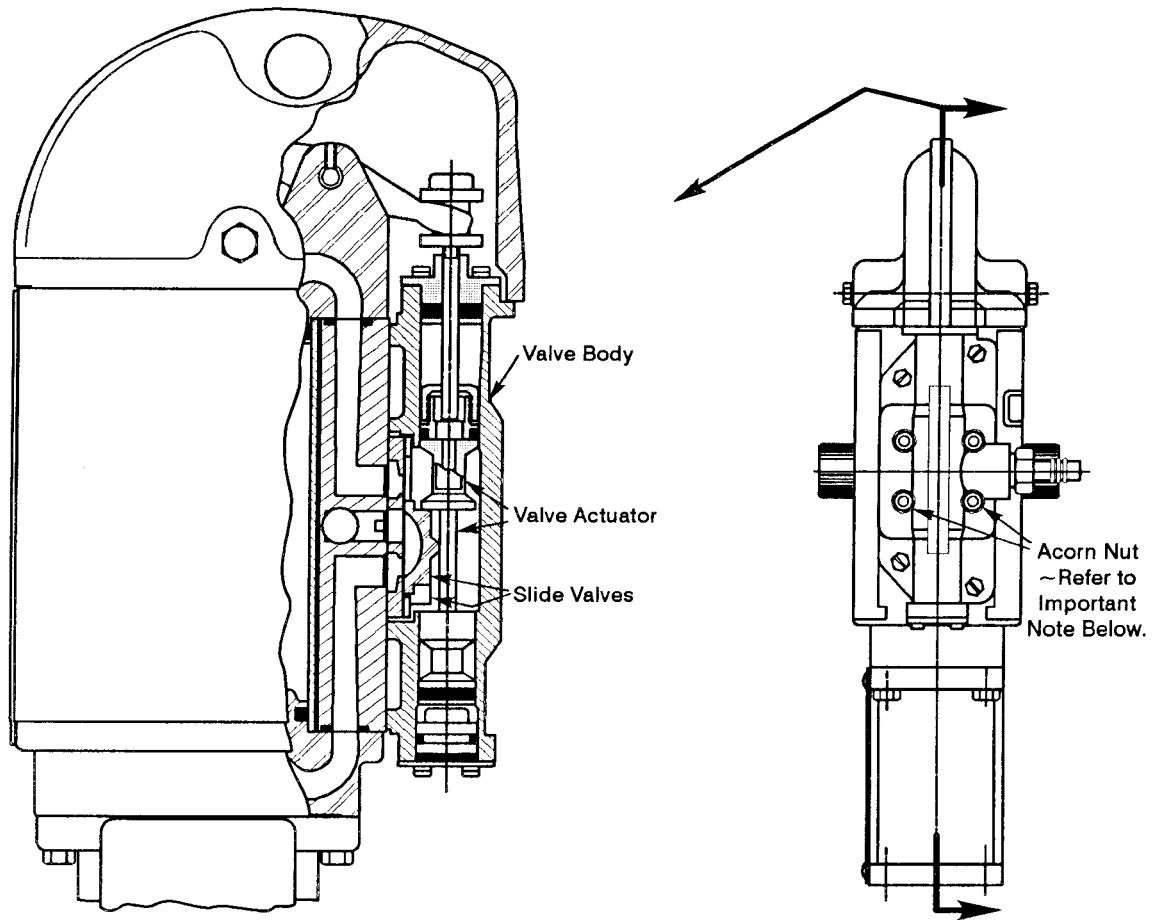
When installing, servicing or repairing auto-lube equipment: *KEEP IT CLEAN*. Keep ALL lines free of dirt. Bleed out air and pre-fill lines with lube before placing into operation.

To pre-fill, disconnect lines at the *bearing only*. Remove the cap on each injector face and expose the grease fitting. Fill the line from the injector to the bearing until lube flows from the hose. Connect the hose to the bearing and fill the bearing. (The auto-lube system is not designed to provide initial filling of bearings.)

Remove the plugs on the main supply line, one at a time, starting at those nearest the pump. Pump lube into the system until ALL air bleeds out and lube flows from the opening. Replace the plug and proceed until ALL the lube supply lines are filled.

**NOTE:** Do not use pipe unions on the boom or the gantry. Due to vibration and movement, hose and hose fittings work best in these areas. Allow slack where any structural movement is anticipated and avoid sharp bends.

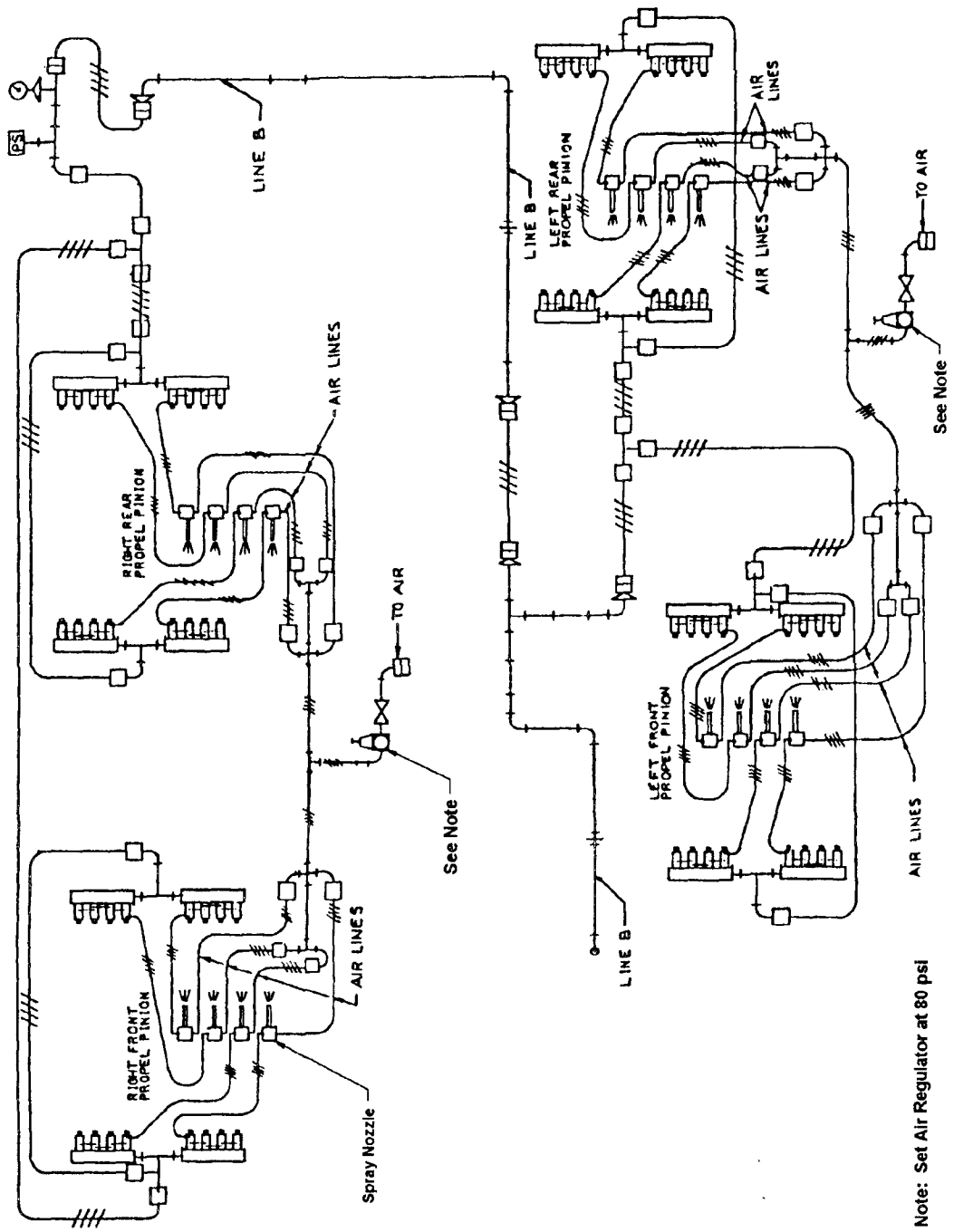
## Power Master 4:



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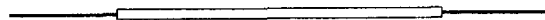
### **IMPORTANT:**

- When assembling the air valve components, make sure that the power slide valve, the pilot slide valve and the valve actuator are in their "down" positions. The valve actuator should bridge the slide valves without interference.
- If the acorn nuts are tightened with the valve parts misaligned, the valve actuator will be bent and the valve body will be ruined.



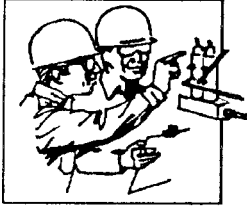
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Auto Lube Schematic ~PROPEL GEARS (OGL) Line - B



## SL-1 INJECTOR ADVANTAGES

### SIMPLICITY

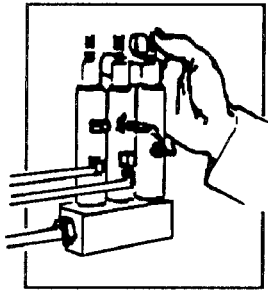


Lincoln Centro-Matic is not only simpler and less expensive to install than other systems - it is also much easier to understand. Your maintenance personnel will appreciate the ease with which they can learn the operation and service features of Centro-Matic.

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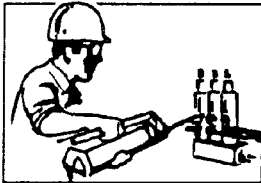
### EXTERNAL ADJUSTMENT

A micrometer-type adjustment makes each injector (metering device) adjustable externally, without special tools. The Lincoln Centro-Matic System permits lubricant adjustments to meet actual bearing requirements - not just an approximation, as with all other systems.



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### BUILT-IN GREASE FITTING



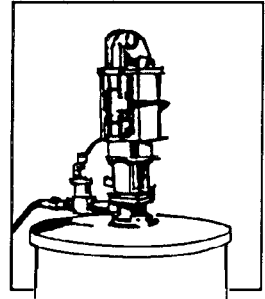
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Lincoln Centro-Matic is the only system that has a capped grease fitting on the injector. This permits easy filling of lines when the system is installed. It also allows hand lubrication of the machine in the event of a pump or power failure, damage to the supply line, or even a malfunction in the air system. **NO OTHER SYSTEM**

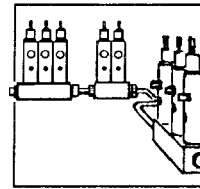
**OFFERS THIS!** The built-in grease fitting can also be used as an inspection system. When the cap is removed, the lubricant normally metered to a bearing will come out of the grease fitting head.

### POWERFUL PUMPING UNIT

Lincoln's Power-Master pump is widely recognized as a most powerful, trouble-free pump. So much so, that Lincoln Power-Master pumping units often are specified even where other centralized lubrication systems are used.



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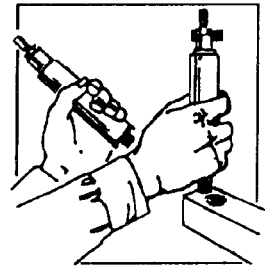
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### EXTREME PUMPING DISTANCE

Single-line design and powerful pumping unit permit installations at long distances from original refinery containers of bulk tanks to point of application. And if you plan to expand your operation, the Lincoln Centro-Matic System has the design and capacity that lets you do it - normally without adding booster pumps and controls.

### EASY INJECTOR REPLACEMENT

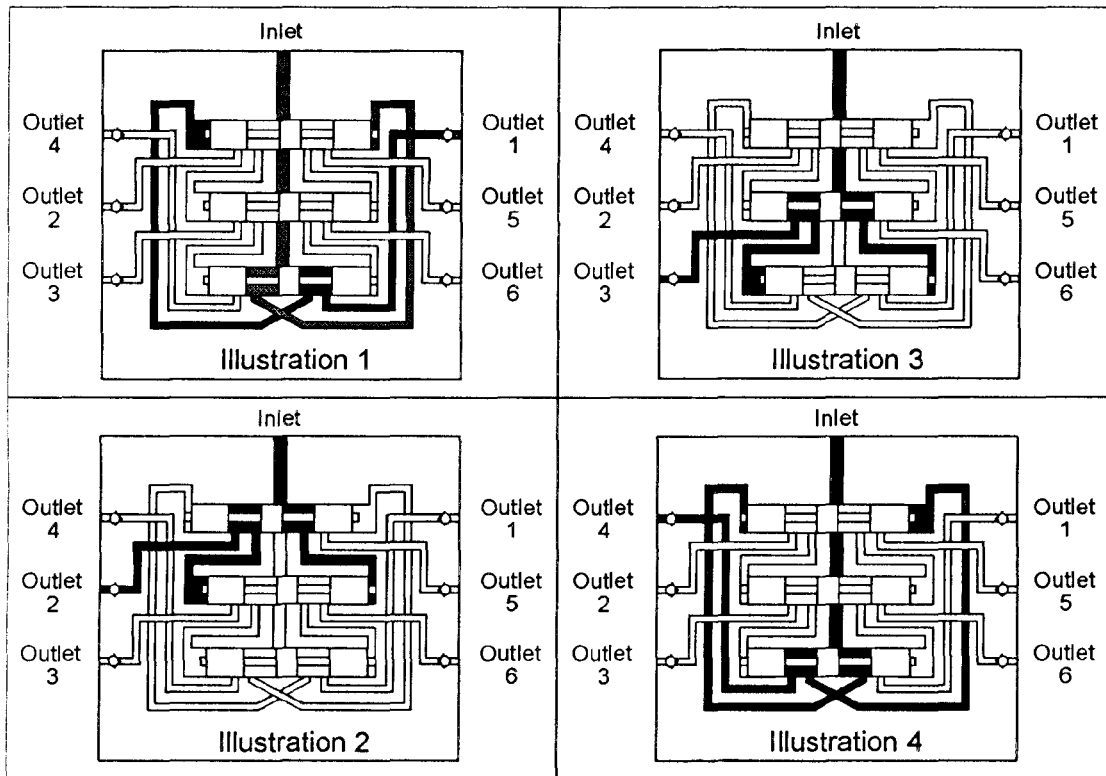
Should the Lincoln injector ever need replacing, it can be done quickly and easily without disturbing adjacent injectors or removing the supply line connections - does not require machine shutdown as do all other systems. As a matter of fact, injector replacement usually can be done between lubricating cycles, thus preventing lubricant loss or machine downtime.



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## OPERATING SEQUENCE of DIVIDER VALVES

- A. The inlet passageway is connected to all piston chambers at all times with only one piston free to move at any one time. With all pistons at the far right, lubricant from the inlet flows against the right end of piston 1. (See illustration 1)
- B. Lubricant flow shifts piston 1 from right to left dispensing piston 1 output through connecting passages to outlet 1. Piston 1 shift directs flow against right side of piston 2. (See illustration 2)
- C. Lubricant flow shifts piston 2 from right to left dispensing piston 2 output through valve ports of piston 1 and through outlet 2. Piston 2 shift directs lubricant flow against right side of piston 3. (See illustration 3)
- D. Lubricant flow shifts piston 3 from right to left dispensing piston 3 output through valve ports of piston 2 and through outlet 3. Piston 3 shift directs lubricant through connecting passage to the left right side of piston 1. (See illustration 4)
- E. Lubricant flow against left side of piston 1 begins the second half cycle which shifts pistons from left to right dispensing lubricant through outlets 4, 5 and 6 of the divider valve.



divalve.wpg

Note: the operation outlined is for a valve assembly with three twin outlet divider valves. The second and third divider valves on the assembly furnished are single output. Outlet 2 is blocked and the lube is diverted to outlet 5. Outlet 6 is blocked and lube is diverted to outlet 3.

Wash the bearings in clean solvent. Blow out the bearings with compressed air. Do not allow bearings to spin; turn them slowly by hand. Spinning bearings will damage the race and balls. Make sure the bearings are clean, then lubricate with non-detergent SAE 30 weight oil and check for roughness. Roughness can be determined by turning the outer race by hand. If the bearings have roughness, replace bearings.

Be sure the shaft is free from nicks, burrs and foreign particles that might damage the bracket bushing. Scratches on shaft in the seal area will provide leakage paths under the mechanical seal.

9. The casing can be checked for wear or damage while mounted on the bracket.

### **CIRCULATING PUMP ASSEMBLY**

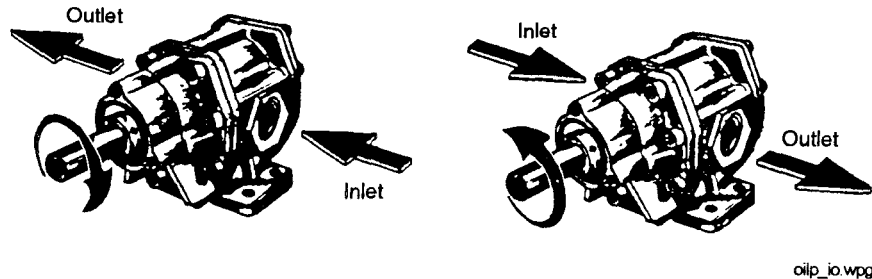
1. Install the bracket bushing. If the bracket bushing has a lubrication groove, install the bushing with the groove at the 6-o'clock position in the bracket. The bushing is carbon graphite, refer to "Installation of Carbon Graphite Bushings".
2. Coat the shaft of the rotor shaft assembly with non-detergent SAE 30 weight oil. Start the end of the shaft into the bracket bushing, turning from right to left, slowly pushing the rotor into the casing.
3. Place the packing retainer washer in the bottom of the packing chamber and pack the pump with new packing. Use packing suitable for the liquid being pumped. Install the packing, staggering the joints from one side of shaft to the other. Lubricate the packing rings with oil, grease or graphite to aid assembly. A length of pipe will help to seat each packing ring.
4. Install the packing gland, capscrews and nuts. Back the rotor and shaft out of the casing just far enough to insert the packing gland through the side opening of the bracket over the end of the shaft. Make sure the gland is installed square and the nuts are tightened evenly. Tighten the nuts wrench tight then back off until the gland is slightly loose.
5. Coat the idler pin with non-detergent SAE 30 weight oil and place the idler and bushing on the idler pin in the head.
6. Using a .010-.015 inch head gasket, install the head and idler assembly on the pump. The pump head and casing were marked before disassembly to insure proper reassembly. If not, be sure the idler pin, which is offset in the pump head, is positioned toward, and equal distance between, port connections to allow for proper flow of liquid through the pump.

If the pump is equipped with a jacketed head plate, install it at this time along with a new gasket. Tighten head capscrews evenly.

## DIRECTION of ROTATION

Prior to operating the pump, make sure that the shaft rotation is *counter-clockwise*, the pipe connections and relief valve position must be as follows:

**RELIEF VALVE POSITION** The relief valve adjusting screw must be toward the inlet of the pump.

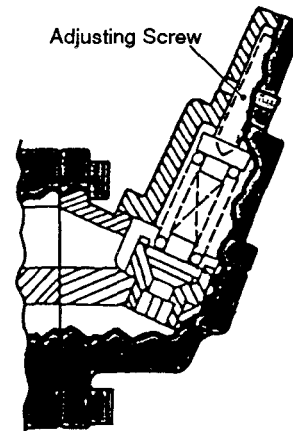


## PRIMING

Before starting the pump make sure that it is thoroughly primed. If at all possible, use a good grade of light lubricating oil. Failure to properly prime the pump could cause immediate damage to the working parts.

## RELIEF VALVE

The relief valve adjusting screw must always be located adjacent to the pump inlet port. When changing the direction of rotation, it will be necessary to change the position of the integral relief valve. Be sure that the relief valve cover is set to correspond with arrows indicating in and out. **FAILURE TO ENSURE THE PROPER POSITION WILL RENDER THE VALVE USELESS.** The relocation of the valve cover is accomplished by rotating the complete relief valve pump cover 180°.



Set the relief valve at 250 PSI. Since the maximum relief valve pressure depends upon the viscosity of the liquid and the flow rate (pump RPM), it may be necessary to change the initial relief valve setting.

## RELIEF VALVE ADJUSTMENT

Relief valves furnished with GEARIRON pumps are not pre-set at the factory and must therefore be set to the required pressure on the job. Before starting the pump, adjust the integral or in-line relief valve so that it is set at its lowest pressure. This is done by removing the bonnet or cap nut and rotating the adjusting screw counter-clockwise, until it is completely off the spring.

**SPECIAL PRODUCTS:**

*WRL* - Wire Rope Lubricant. May be of either solvent cut-back asphaltic water resistant type or penetrating oil type containing corrosion and rust preventatives, anti-wear, and other suitable polar additives. The former are preferred for wire rope operating in extremely wet environments, while the latter are preferred for normal shovel and dragline operations where contamination of the wire with highly abrasive dust particles is the primary problem.

*\*WCL* - Walking Cam Lubricant. A special product designed to lubricate bronze bushings. These bushings, up to 120" in diameter, are subjected to loads in excess of 2,000 PSI in projected areas.

**\*APPROVED PRODUCTS:**

- Jesco "Walking Cam Lubricant
- Mobil Oil "Mobiltac E"
- Bel-Ray "ALO-OpenGear Lubricant"
- Whitmore "Liquid Gear Composition"
- MOLUB-ALLOY 936

**GREASE SPECIFICATIONS**

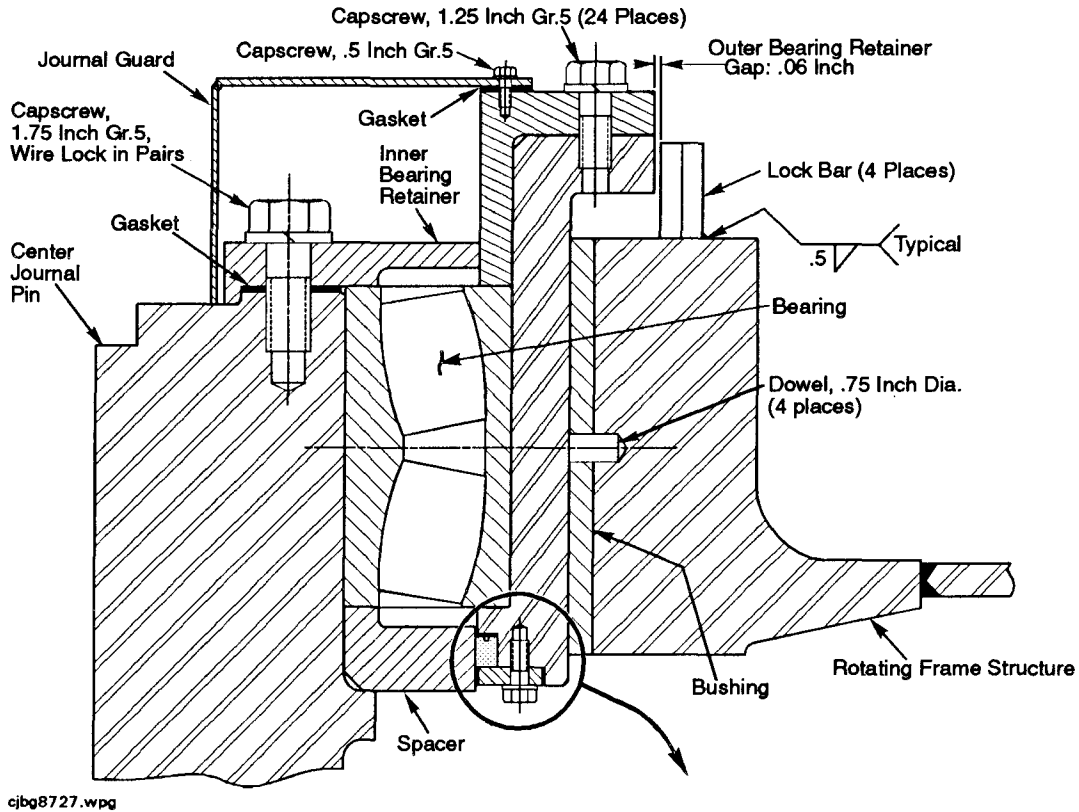
CODE OR SYMBOL NO.	ASTM	MPG or TEST	RGL	OGL TYPE-B	TYPE-H
Penetration worked 60X Summer, NLGI Winter, NLGI	D-271	2 1	semi- fluid	1 0	-- --
Penetration worked 10,000 Max change	D-217	10%	--	--	--
Dropping Point, min. °F(°C)	D-566	350(177)	--	325(163)	--
Base oil viscosity @ 210°F/99°C, min.	D-446	75 SUS	140 SUS	2000 SUS	2000 SUS
Oxidation stability Max. drop - 100 Hrs.	D-942	10 PSI/69 kPa	--	--	--
Water Resistance Max. loss @ 100°F/38°C	D-1264	20%	--	10%	10%
Texture	Visual	Buttery	--	Adhesive	Tacky
EP Timken, min. OK Lbs.(Kg.)	--	35 (16)	--	35 (16)	35 (16)

<b>NAME OF PART</b>	<b>TYPE</b>	<b>NO. OF POINTS</b>	<b>LOCATION</b>	<b>LUBE SYM.</b>	<b>METHOD &amp; FREQUENCY</b>
Propel Pinions	---	32	Drip On	OGL	Automatic
Propel Shaft Gear Hub Spline	---	8 (4 per Bush)	Through Shaft Retainer	OGL	Manual Lube, 6 Months
Propel Motor Coupling	---	4	Fill through plug in Flange	MPG	By hand, 3 months keep filled
Propel Gearcase	---	4	Thru inspection opening in cover	GL	360 gallons (1363 liters) Each case, check weekly at dipstick
Propel Motor Extension Shaft	Anti-Friction	---	From Gearcase	GL	--
1st and 2nd Intermediate Propel Shafts	Anti-Friction	---	From Gearcase	GL	--
Propel Motor	Anti-Friction	8	In Motor End Bell	EMG	by hand, See Elect. Section
Shoe Return Spring	---	20	In top of Spring Case	MPG	Weekly, by hand.
Shoe Roller	Bushing	4	In end of Roller Shaft	MPG	Weekly by hand

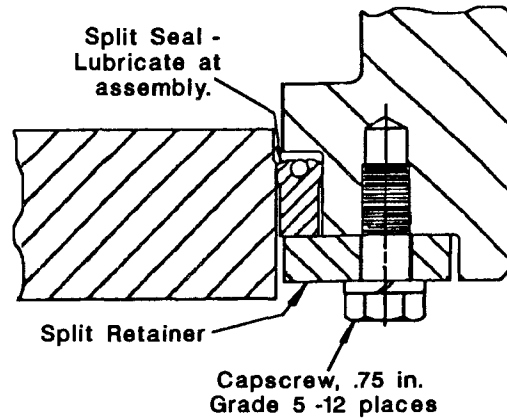
### **HOOK SHOE**

Hook Shoe Wear Plate	---	4	End of wear plate	MPG	Automatic
Hook Shoe Pin	---	4	O.D. of Bearing Boss	MPG	Automatic

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**Note:** When installing a new seal, cut the seal in two, wrap it around the spacer, overlap .75 inch and cut off the excess length. Remove the O-Ring. Wrap the seal around the journal and bond the ends together with Loctite 65-51 (P/N 130957-9). Install the O-Ring with the cut ends 180° from the bonded seal joint. Spray the spacer and seal cavity with Molycote M3402 or equal and install.



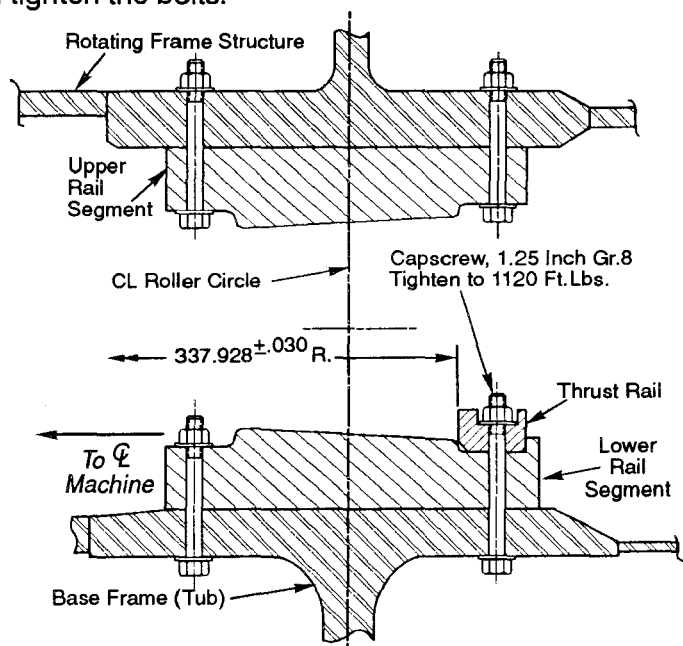
## ROLLER CIRCLE RAIL REPLACEMENT - LOWER

The lower roller circle rail is composed of 24 roller rail and thrust rail segments. When replacing the complete upper and lower rail assemblies, consult the Marion Service Department for the procedure and assistance. If only a few rails are to be replaced, use the following procedure:

1. Park the machine in a level, dry work area. Set the bucket on the ground and set all the brakes.
2. Remove one of the roller circle segments - a section of 7 or 8 rollers plus the inner and outer cage bars.
3. Rotate the machine to place the open space in the roller circle over the rail to be removed.
4. Set the swing brake and isolate the solenoid valves to prevent accidental release.

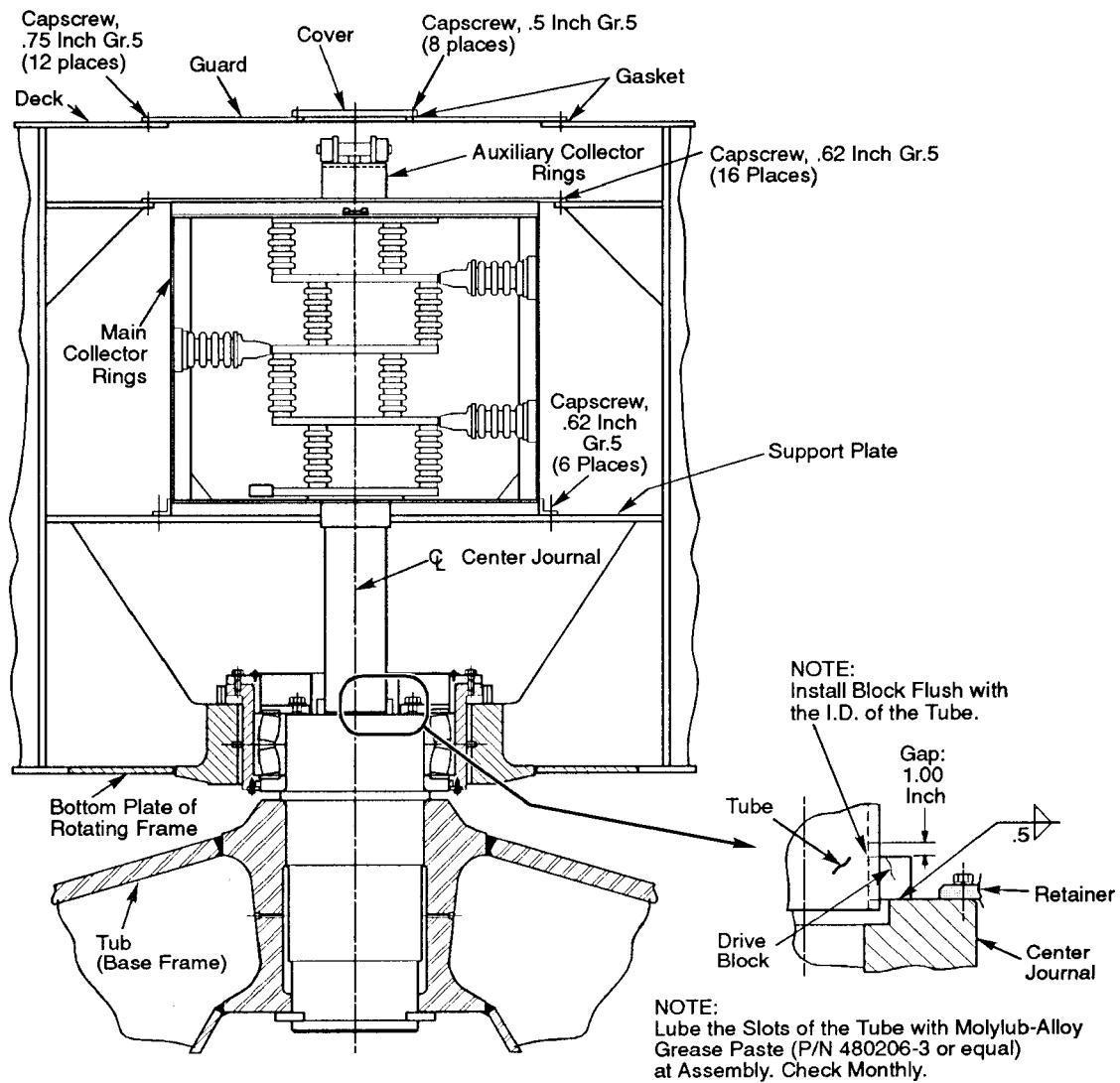
**NOTE:** Although 10 holes are provided in the segment, 8 of the lower rail segments use 9 - 1.25 inch rods for mounting. **DO NOT** attempt to install a rod in the unused locations.

5. Remove the roller rail and thrust rail and carefully clean the mounting surface of the rail and pad on the tub.
6. Set the new roller and thrust rail in place and install the inner and outer bolts at each end of each segment. **DO NOT** use the holes for the body-fit bolts. Wedge the thrust rail to the outside of the groove and tighten the bolts.
7. Check the radius dimension to the inner edge of the thrust rail.
8. The radius between the new and the existing thrust rails must be  $337.928 \pm .030$  inches and adjacent ends must have no more than .005 inch offset.



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## 4.4 COLLECTOR RING ASSEMBLY

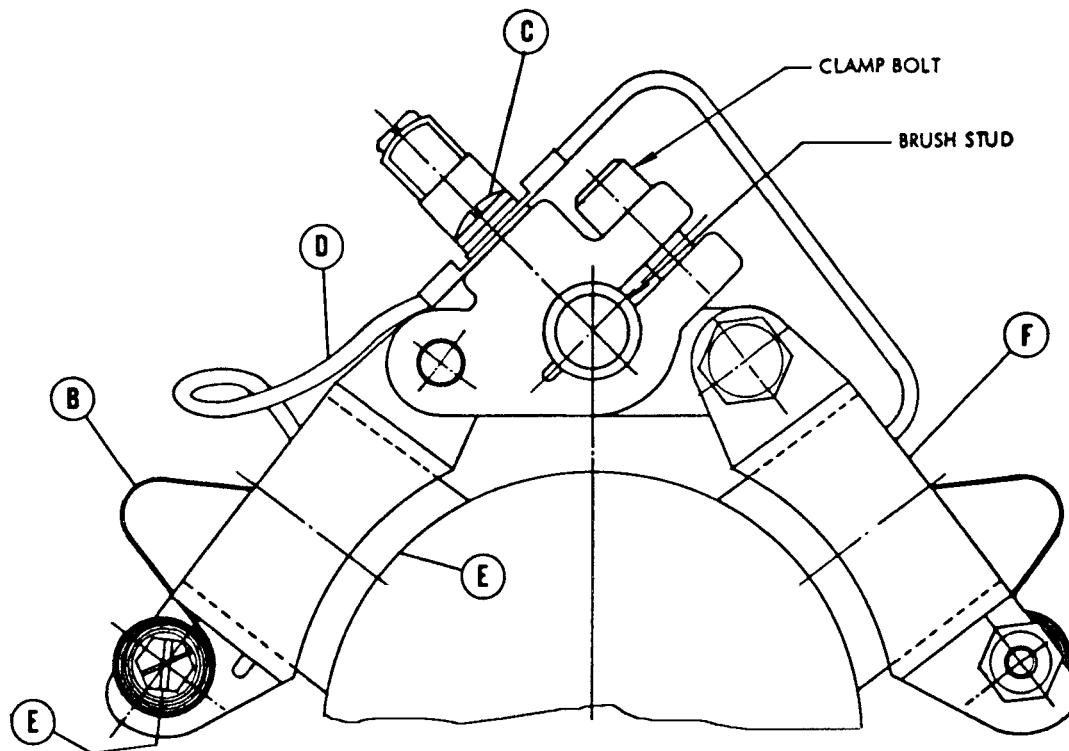


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### COLLECTOR RING ASSEMBLY

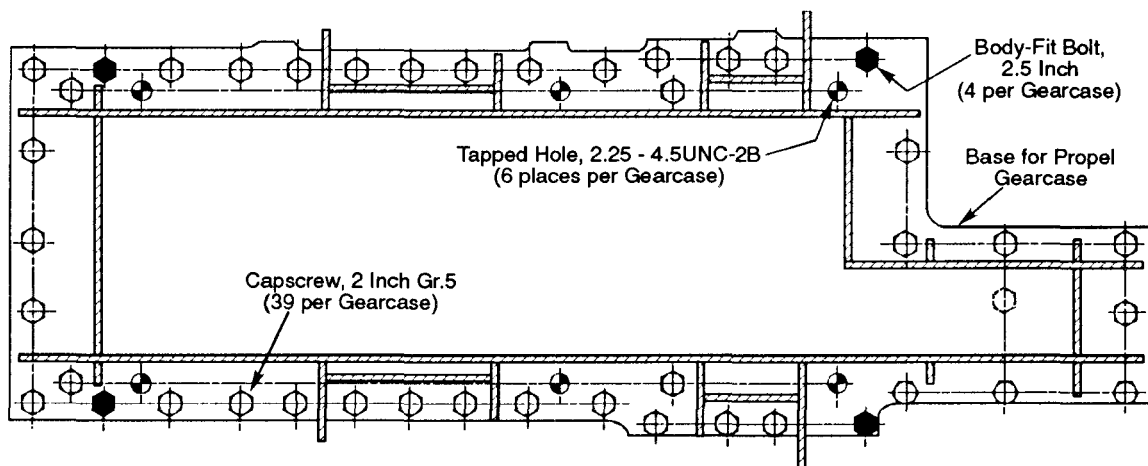
B. *Brush Holders with adjustable spring tension.*

1. Refer to the figure on the following page. Release the spring tension on the brush spring by holding the spring tension screw with a screwdriver at slot (a) and loosening spring tension nut on opposite side. Do not completely remove the nut, just loosen. The screws can be adjusted with a 9/32 wrench without removing from the stud.
2. Pull spring (B) up and out of the way and unscrew binder screw (C). Take off brush shunt connector (D) and remove brush (E).
3. Install a new brush, reversing the above procedure.
4. Tension is applied on the brush spring by holding the nut with a wrench and turning the screw with the screw driven clockwise until the inner coils are tight. Back off 1/4 turn, then tighten the nut. The spring should have a minimum of 1 pound pull at the brush. See *COLLECTOR RING INSPECTION AND ADJUSTMENT - BRUSH SPRINGS*.
5. To replace brush spring tension screw (A), simply take the spring tension screw nut off and pull the screw and spring out of the holes in brush holder (F). Use the above steps in reverse order to replace the spring tension screw.



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Section X-X

The propel gearcases are secured to the deck with 2.0 inch Gr.5 capscrews and 2.5 inch body-fit bolts. Shims between the gearcase and the deck pads provide adjustment when aligning the 2nd intermediate shaft to the main propel pinion shaft. Six - 2.25 inch diameter tapped holes are provided for jack screws to assist with alignment.

**NOTE:** Check all bolts monthly. Tighten or replace as required.

Before disassembling the propel gearcase, clean the case, cover, splined coupling and motor coupling of all dirt, dust, or grit. Disengage the splined coupling from the main propel pinion shaft. This is done by removing the outboard split retainer ring and sliding the splined coupling toward the gearcase.

Separate the motor coupling halves and remove the capscrews from the top half of all the bearing plates, eccentrics and flanged sleeves. Loosen the bottom capscrews about 2 turns.

Remove the gearcase cover. It may be necessary to drive a small wedge between the case and the cover to break the seal. Lift off the cover using the lifting holes provided.

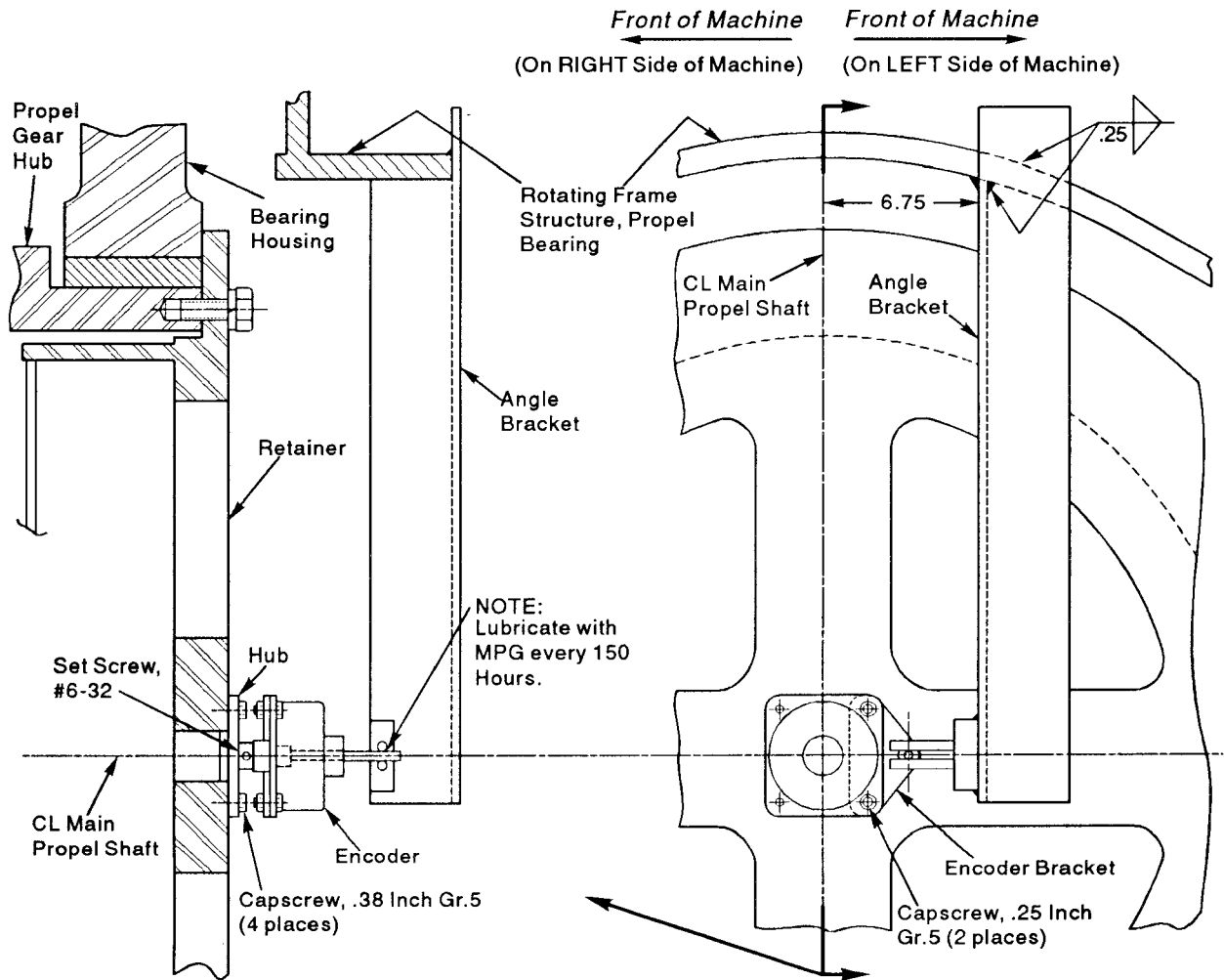


**CAUTION: THE GEARCASE COVER WEIGHS APPROX. 6600 LBS.**

Remove the bearing retainer plates and shims. Wire the shims to the retainers to prevent loss. Remove the capscrews from the bottom of the bearing housing. Start with the motor extension shaft, then go to the first intermediate shaft, and then the second intermediate shaft. Carefully lift the shaft assemblies from the gearcase. Drain the case and clean thoroughly. If the same parts are reassembled use the same shims **BUT**, if any parts are replaced use *new* shims.

## PROPEL LIMIT SWITCHES

The Right and Left Propel Limit Switches are connected to the end of each Main Propel Shaft. These switches are components of the *MARION* Programmable System. For a description and calibration information refer to the *MARION PROGRAMMABLE SYSTEM INSTRUCTION MANUAL*.



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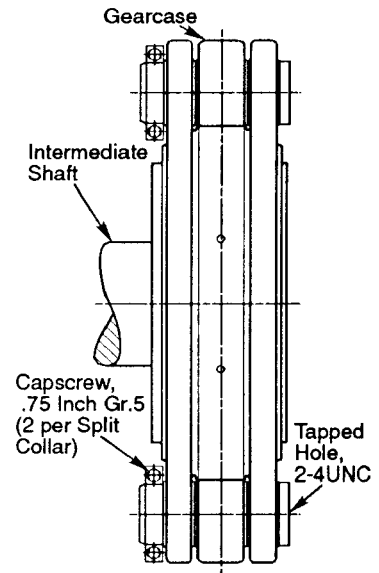
PROPEL LIMIT SWITCH

*To remove the intermediate shaft:*

1. Set the hoist / drag brakes. If all the intermediate shaft, hoist or drag, are to be removed, block the drum to prevent rotation.
2. Isolate the brake solenoids to prevent accidental brake release.
3. Remove the gearcase cover and guard over the intermediate shaft pinion.
4. Remove the inboard bearing housing retainer pins and *match-mark the housing with the gearcase*.

**NOTE:** The retainer pins and bores are machined for a .000/.003 loose fit.

5. Remove the retainer from the gear end of the shaft.
6. Attach slings to support the shaft and carefully lift it several inches. Remove the gear end outer bearing race. Lift the shaft assembly clear of the gearcase. Allow the shaft to rotate around the drum gear and out of engagement.
7. Clean and inspect all parts. Replace all seals, bearings and worn or damaged parts.



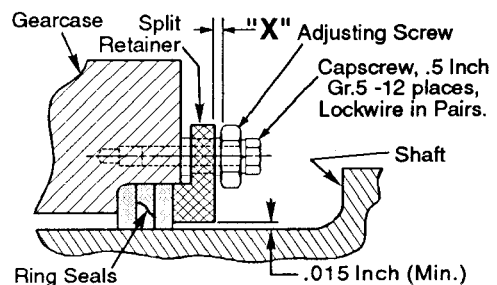
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**View M-M**

Installation is the reverse of removal.

*To install the shaft seal:*

1. Clean the seal cavity and shaft.
2. Coat the shaft with silicone grease in the seal area.
3. Insert the 3 seals with the split end 120° apart. Use a block of wood to push each seal into place.



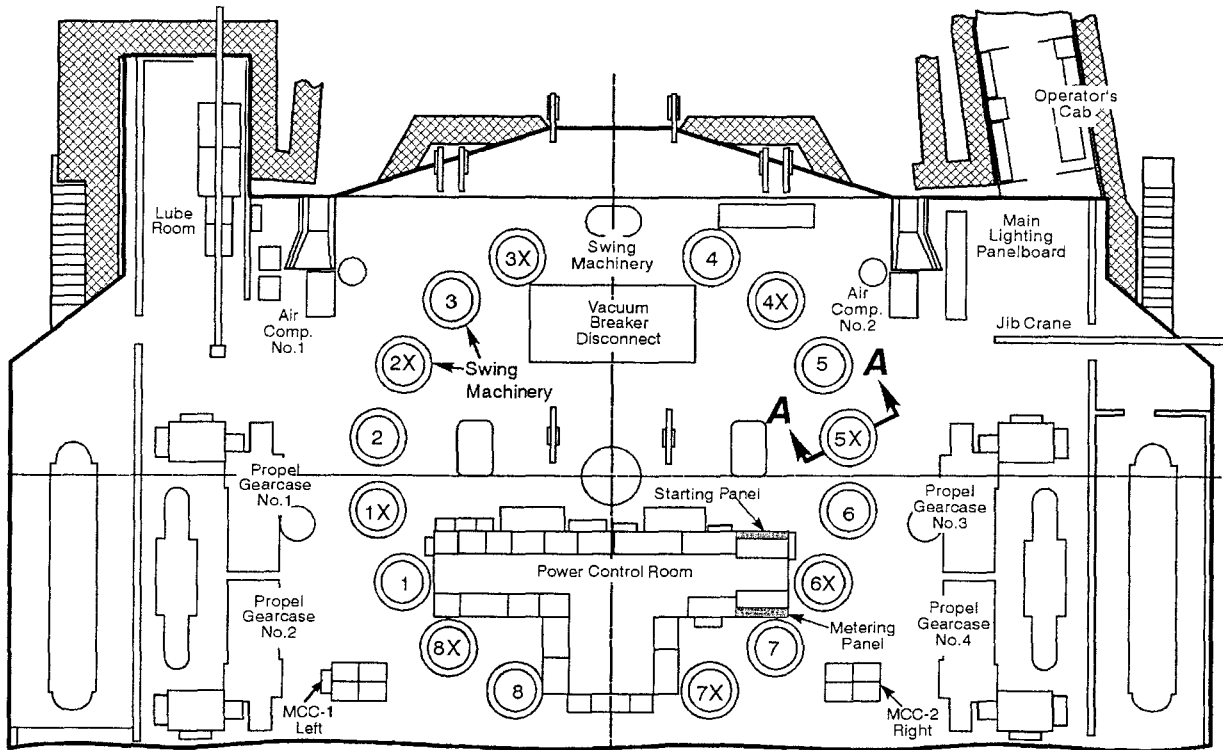
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**View - P**

**NOTE:** The seals are pre-cut to length. Make sure the ends are butted together. **DO NOT** cut or overlap the ends.

## 4.7 ROTATING (SWING) MACHINERY

The swing machinery consists of 16 separate assemblies. Each assembly is made up of a 500 HP D.C. motor coupled to a double reduction planetary gearcase which drives the main rotating pinion. Each motor is fitted with a spring set air released disc brake.



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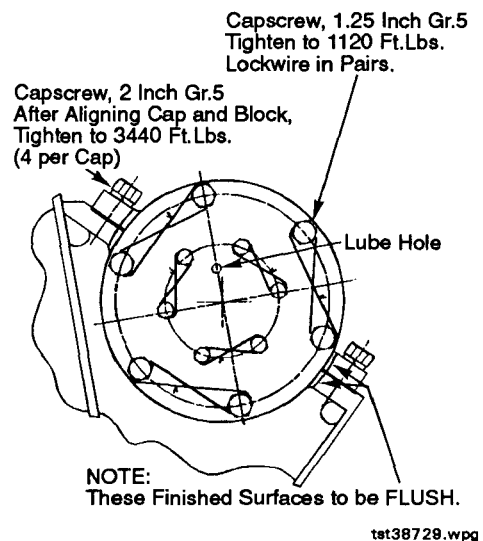
5. Disassemble the sheave, pack the bearings with MPG. Do not mix bearing parts.
6. Reassemble the sheave including the predetermined shim pack.

**NOTE:** Install a new face seal on the large diameter of the shaft first.

7. Tighten the 6 - 2 inch capscrews to 3440 Ft.Lbs. in the sequence noted and lockwire in place.
8. Install the retainer on the large diameter end of the shaft. Tighten the 6 - 2 inch capscrews to 3440 Ft.Lbs. and lockwire in place.
9. Install a new face seal over the shaft sleeve with the lip toward the sheave.

### HOIST ROPE DEFLECTING SHEAVE INSTALLATION

1. Set the sheave assembly (approx. 25,000 Lbs.) into position on the Tri-Structure.
2. Rotate the sheave shaft with retainer plate to align the bolt holes and position the lube hole. Install and tighten the 3 capscrews which attach the retainer plate to the Tri-Structure.
3. Install the bearing caps and 3 remaining capscrews in the retainer plate. Snug these capscrews to pull the bearing cap tight against the retainer plate.
4. Tighten the 4 - 2 inch capscrews in each bearing cap to 3440 Ft.Lbs.
5. Tighten the 6 - 1.25 inch retainer plate capscrews to 1120 Ft.Lbs. and lock wire in pairs.
6. Tighten the 2 inch capscrews which secure the shaft to the retainer to 3440 Ft.Lbs. and lockwire in pairs.
7. Manually lube the bearings, purge the auto lube lines and reconnect.
8. Place the hoist rope on the sheave.



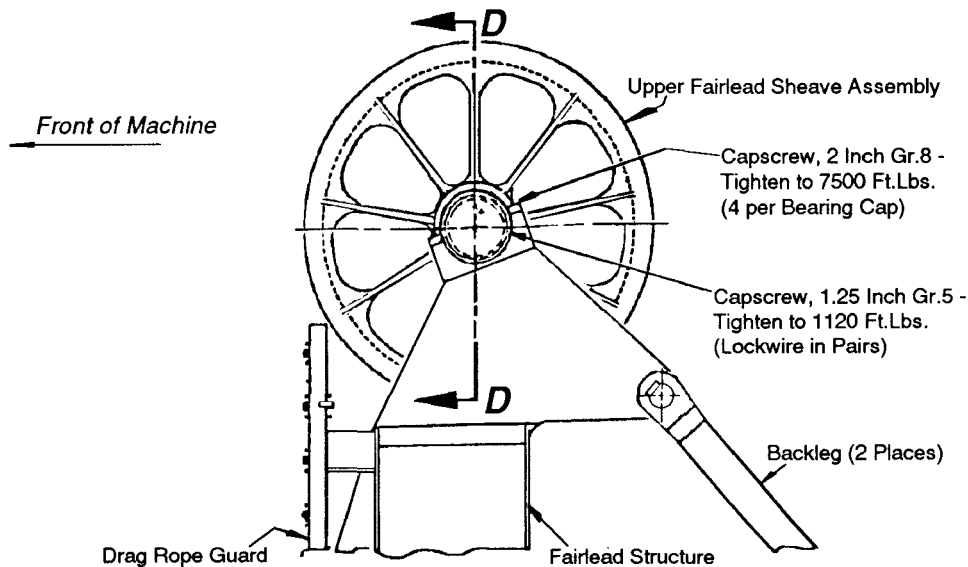
5. Disassemble the sheave, pack the bearing with MPG and reassemble the sheave.

**NOTE:** Before installing the shaft retainer, install the face seal. Install the face seal on the opposite end before attaching the bearing cap. ALWAYS use new face seals.

6. Tighten the 6 - 2.0 inch capscrews to specification and lockwire.
7. Install the bearing caps in the same place as removed.

### UPPER FAIRLEAD SHEAVE ASSEMBLY

The two Upper Sheave Assemblies are located in the top of the fairlead assembly. Each sheave is supported by a fixed shaft and rotates on 2 single-row rollers.



fids6828.wpg

1. Slacken the drag rope. Lift off the sleeve, move it aside to clear the sheave and secure. Add padding where the rope contacts the structures.
2. Disconnect the lube lines from the end of the shaft. Plug and cap the ports and lines to protect against contamination.
3. Attach a sling to the sheave and tighten to remove the slack.
4. Remove the 6 - 1.25 inch capscrews which secure the retainer plate to the fairlead frame and bearing cap. Loosen the 6 - 2 inch capscrews which secure the same retainer plate to the shaft.

## FAIRLEAD SWIVEL SNUBBER - HOW it WORKS

Referring to the Fairlead Snubber Section, the neoprene and cord actuating tube is contained within a steel rim which is drilled for mounting reaction bracket. As air pressure is applied to the air actuating tube, the tube inflates, forcing the friction shoe assemblies uniformly against the drum which is attached to the fairlead. The friction shoe assemblies, which consist of friction blocks attached to aluminum backing plates, are guided by torque bars which are secured to side plates. As actuating air is exhausted, release springs assure positive disengagement.

## ELEMENT ADJUSTMENT

The elements are completely self adjusting and automatically compensate for lining and drum wear. Lubrication is not required. The torque developed is dependent upon applied air pressure.

## TORQUE, RPM and PRESSURE LIMITS

The developed torque is directly proportional to the applied air pressure. If the developed torque seems inadequate, check for oil, grease or dust contamination.



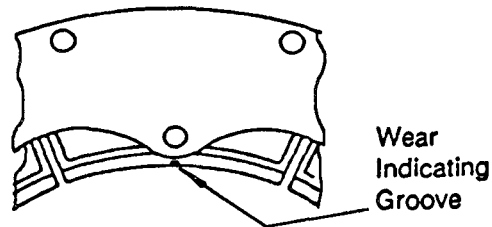
**CAUTION:** Maximum applied air pressure is 125 PSI. OPERATION AT PRESSURES EXCEEDING 125 PSI MAY RESULT IN DAMAGE TO THE ELEMENT. Consult the factory if operation at pressures greater than 125 PSI is desired.



**CAUTION:** The non-asbestos friction material used in AIRFLEX VC units may not develop rated torque initially, as a short "wear in" period is required. IT IS VERY IMPORTANT THAT CLUTCH OR BRAKE OPERATION BE MONITORED CLOSELY TO PREVENT EXCESSIVE HEAT GENERATION FROM SLIPPAGE.

## FRICITION SHOE LINING WEAR

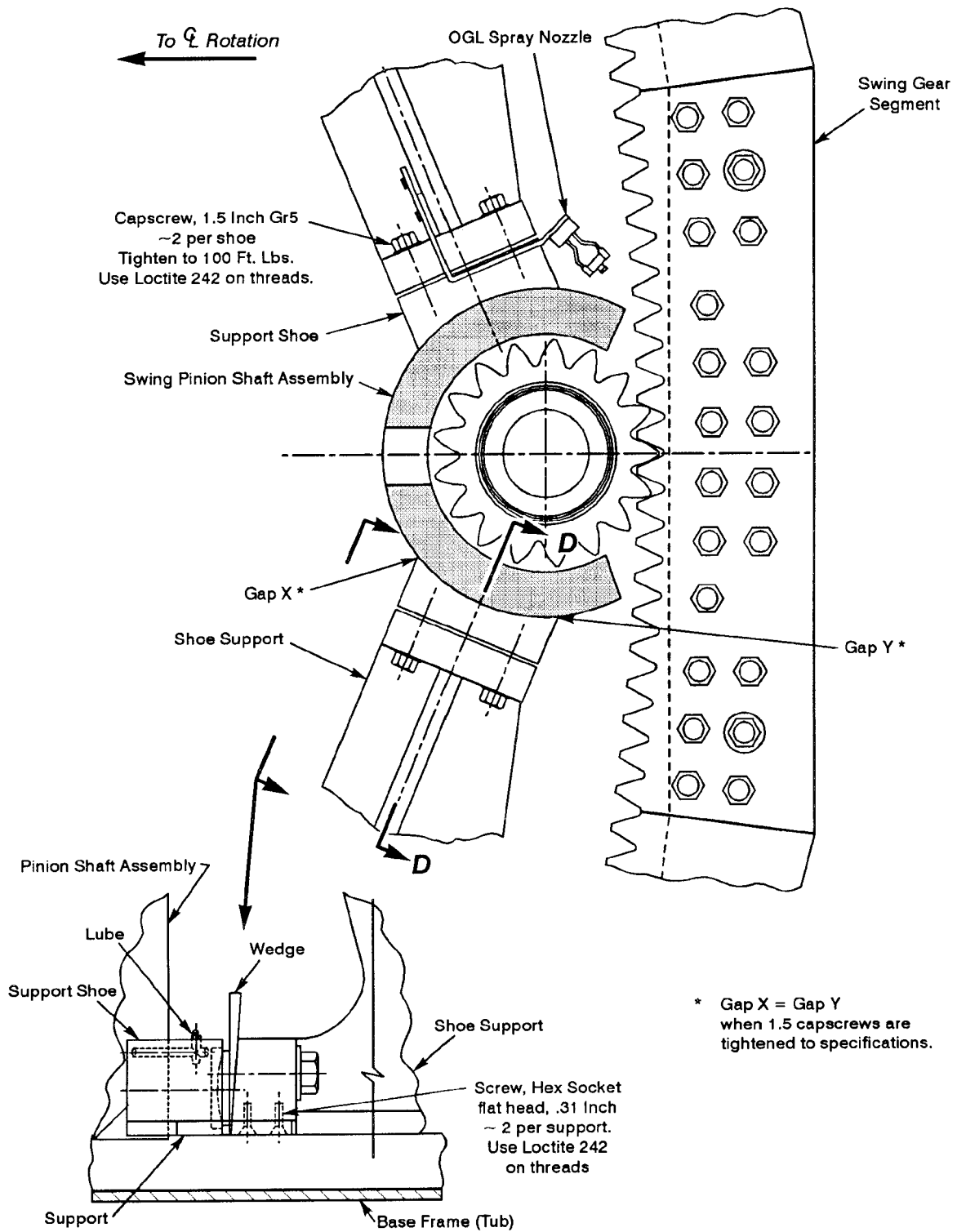
Check the lining thickness and compare to the values shown on Table below. If the linings have worn to minimum allowable thickness or less, they must be replaced as a complete set.



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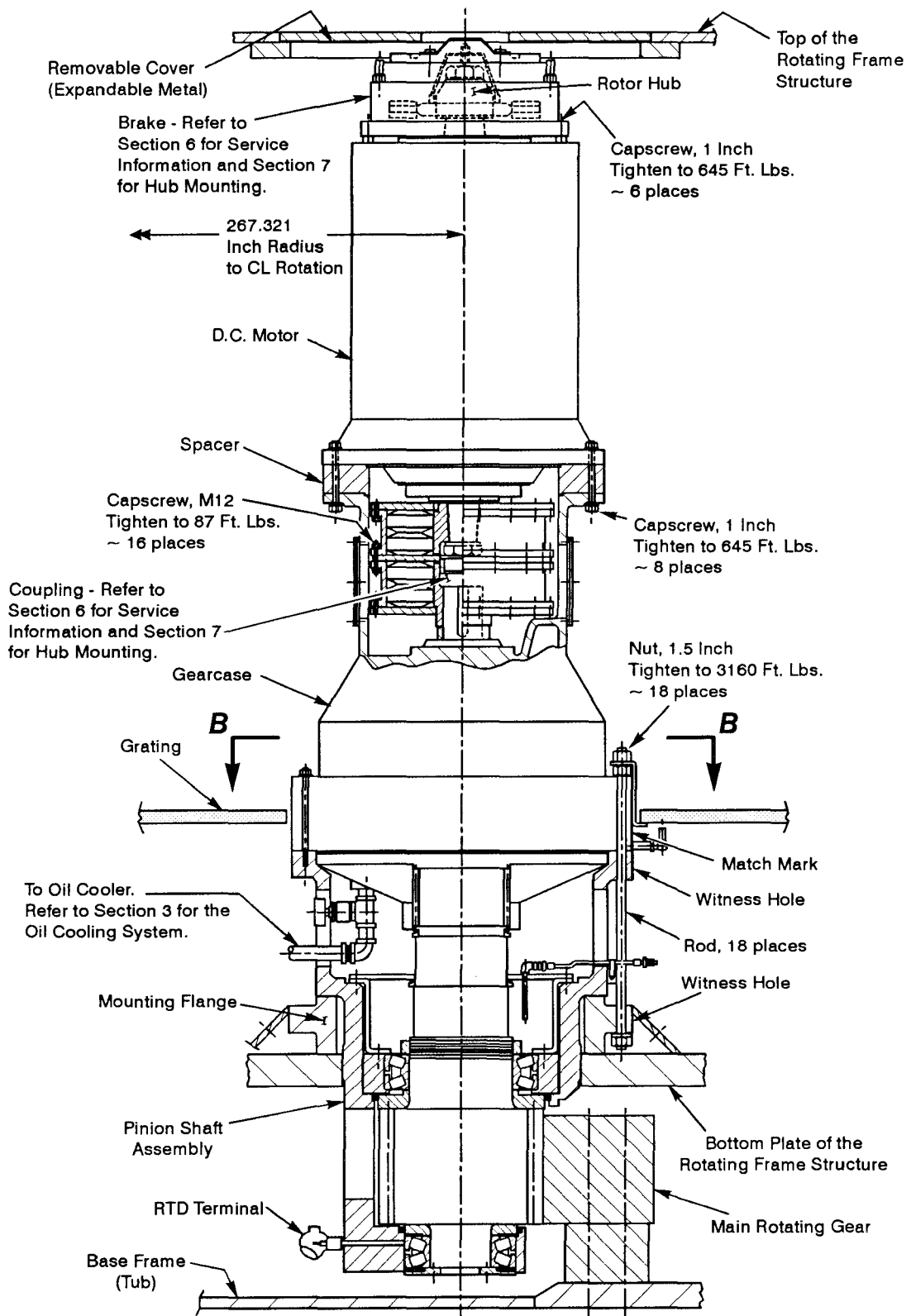


**CAUTION:** OPERATION WITH FRICTION MATERIAL WORN TO LESS THAN MINIMUM ALLOWABLE THICKNESS WILL RESULT IN DAMAGE TO THE DRUM.



**Section C-C**

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## REMOVAL and INSTALLATION of I.B.S. PENDANTS and CYLINDERS

The Intermediate Suspension Pendants should be replaced in sets, the cylinders can be replaced individually. The following procedure applies to either system.

1. Set the bucket and rigging on the ground and shut down the machine.
2. If the machine is equipped with a Boom Support Rope Dampener, disconnect the dampener pendants at the boom. Refer to page 4.10.5 for the proper procedure.



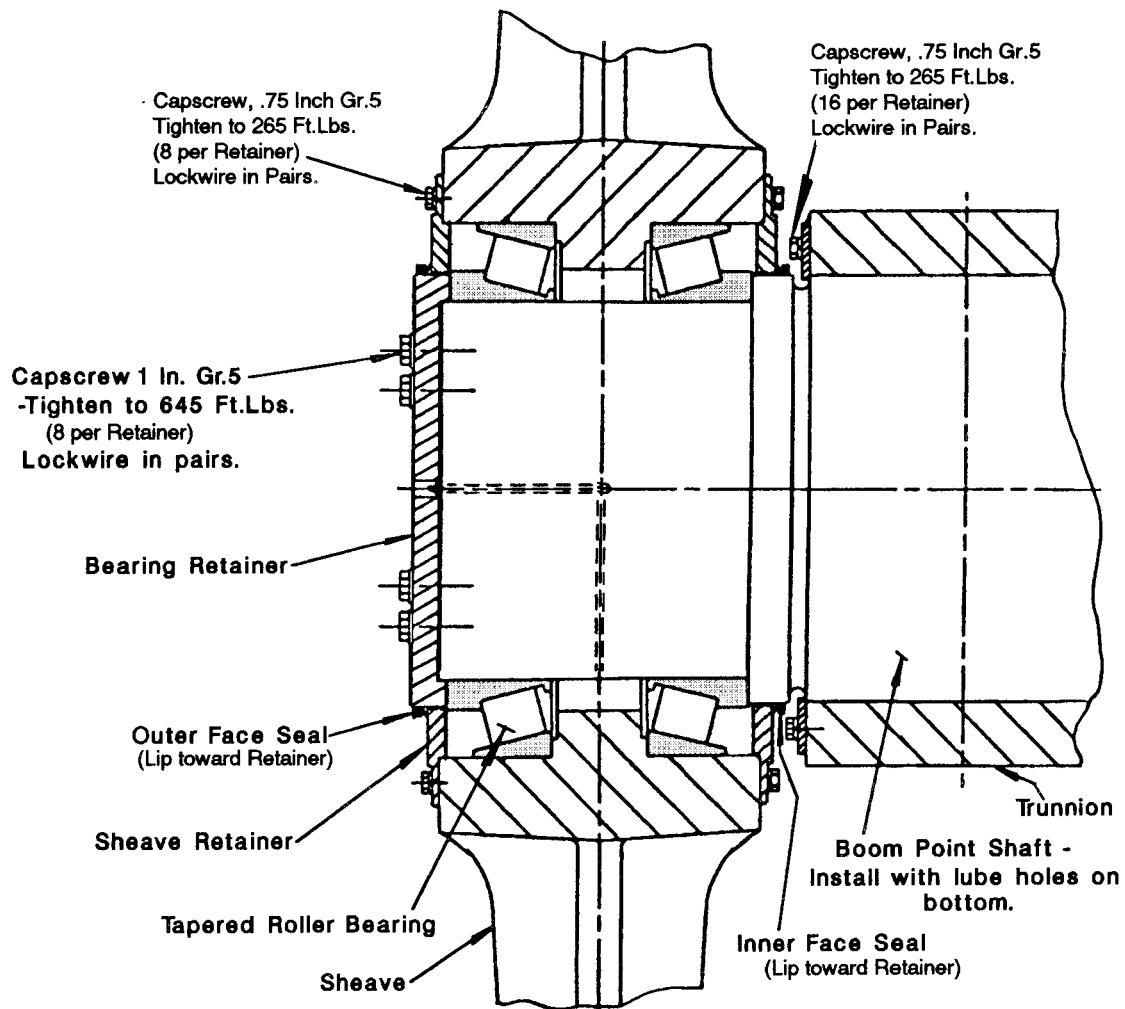
**CAUTION: FAILURE TO FOLLOW THE PROCEDURE ON PAGE 4.10.5  
COULD RESULT IN SERIOUS INJURY.**

3. At the reservoir supplying the pendants to be serviced, record the air pressure and close the air supply valve to shut down the hydraulic pump. Open the cylinder drain valve on the hydraulic manifold at the bottom of both accumulators in the system.
4. Permit the hydraulic system to vent off pressure. The mid-section of the boom may settle as the intermediate support ropes lose tension. The low pressure warning will be announced in the operator's cab.

**IMPORTANT NOTE:** It is best that both sides of the boom be relaxed (and/or tensioned) at the same time even though only one cylinder assembly is to be replaced.

6. Disconnect the auto lube lines from any pins to be removed. Cap and plug all the lines and ports to guard against contamination.
7. Support the cylinder and attach the Boom Point Winch rope to the pendant near the socket *at the cylinder end of the pendant*.
8. Loosen the anti-rotation ropes and remove the capscrews which secure the anchor bracket to the pendant socket pins. Lay the ropes along the boom chord. Carefully remove the pendant pin.
9. Lower the free end of the pendant down through the boom apex until it hangs vertically from the head of the Tri-Structure.
10. Choke the pendant near the socket *at the Tri-Structure end of the pendant* with a sling and attach it to lifting equipment.
11. Carefully remove the pin from the pendant to link joint at the Tri-Structure head, lifting it out of the way when free.
12. Lower the Tri-Structure end of the pendant to the ground through the boom apex, using a tractor or truck attached to control the free end.





**Section B-B - BOOM POINT SHEAVE**  
*(Typical Both Sheaves)*

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### REASSEMBLY of the BOOM POINT SHEAVE ASSEMBLY

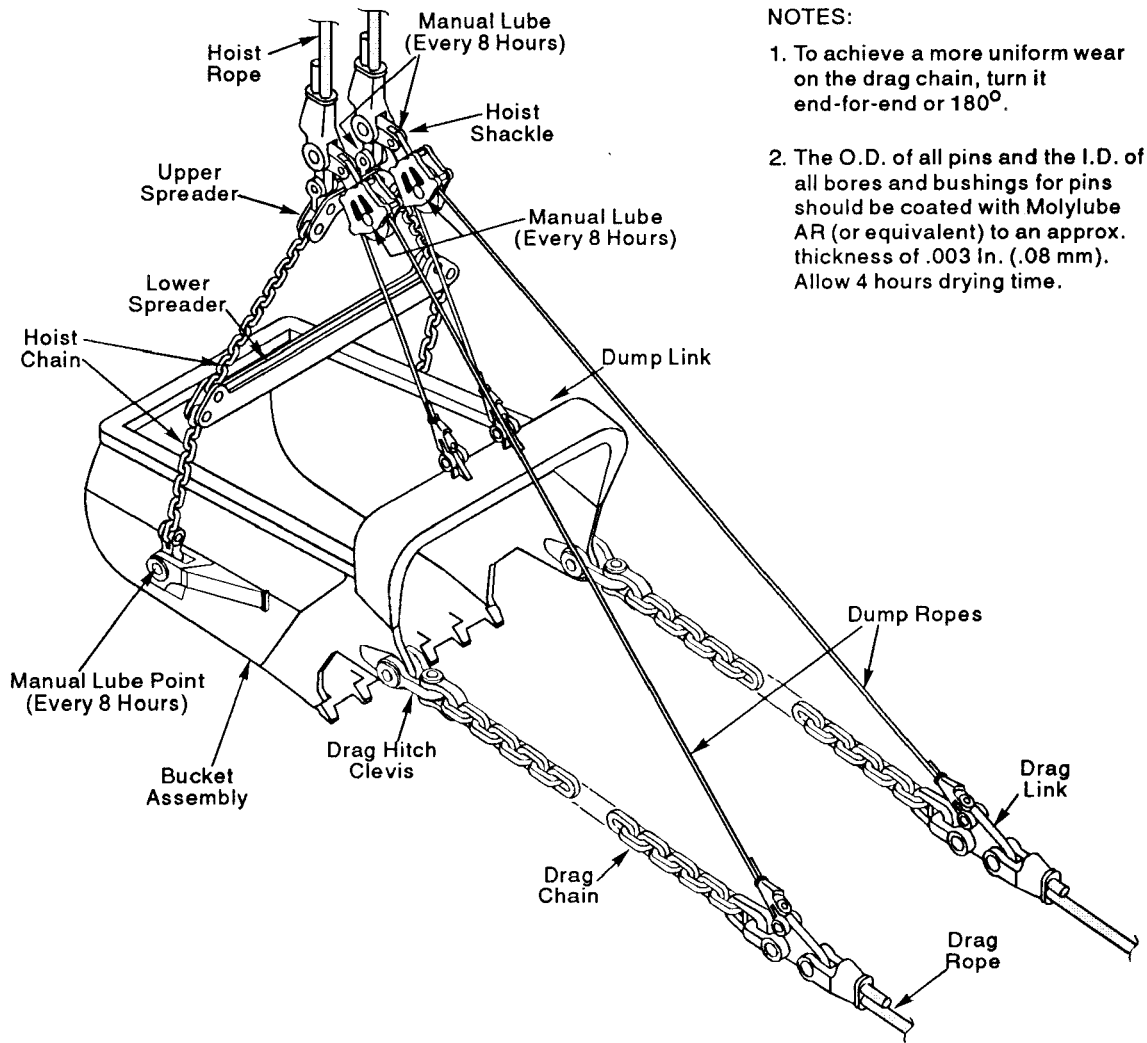
1. Install the shaft in the trunnion and secure with the retainers.

**NOTE:** Install the shaft so that the lube holes point downward, perpendicular to the CL Boom and CL Trunnion.

2. Install the sheave bearings and sheaves in accordance with the method described.
3. Install the front and rear bearing blocks and retainers.

## 4.15 DRAGLINE BUCKET

Dragline Bucket digging characteristics are primarily determined by the calculated geometry incorporated into the design. The behavior of each dragline bucket can be established within close limits. However, digging conditions can alter the bucket operating characteristics. Advise Marion of any problem and request assistance.



DRAGLINE BUCKET

bckt8727.wpg

The *LENGTH OF THE DUMP ROPE* determines the angle of the bucket when carrying a load. Optimum bucket action is achieved by field experience.

## Section 5

# Compressed Air Systems

### 5.1 AIR COMPRESSOR SYSTEM

The air compressor system and the house air filter system for this machine are covered in this section. Compressed air is used to operate the following: the Hoist, Drag, Swing and Propel brakes; the signal horns; and the lube pumps and directional valves in the auto lube system.

The Air System consists of 2 air compressors; supply lines to components; control valves, flow regulators; filters, deicer; automatic drain valves and pressure switches for monitoring the system. The compressor ON/OFF buttons and pressure gauges are located on the Compressor Control Panel. Refer to the manufacturer's instruction manual inserted at the end of this section for the complete control panel instrumentation.



**CAUTION:** Air pressure is critical to the safe operation of this machine. It is monitored by the annunciator system on board and, if it drops below 100 PSI, an audible and visual alarm is activated in the panel above the operator in the cab. **SHUT DOWN THE MACHINE AND INVESTIGATE THE CAUSE.**

As an option, any viable compressed air supply can be provided. The one described here is standard for this machine. All systems provided will function in the same manner.

### AIR COMPRESSOR

The 2 Air Compressors are mounted on the deck forward of the propel machinery (one on each side of the machine). Each is a self contained, rotary screw type compressor, equipped with an intake filter, driven by an A.C. electric motor. Each separately mounted 242 gallon receiver is equipped with a manual shutoff valve for the delivery line, and an automatic drain valve for moisture removal.

#### NOTES:

1. The compressor operating range is 100 PSI to 120 PSI.



**CAUTION:** DO NOT EXCEED THIS OPERATING RANGE. Air pressure less than 100 PSI or greater than 120 PSI will result in damage to the brakes.

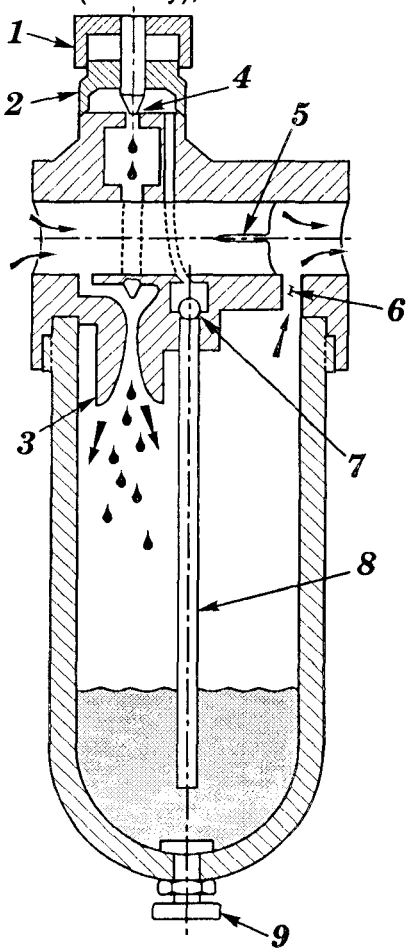
2. These compressors are designed for Loader/Unloader and Start/Stop operation. If the air demand is high, the compressor will load and unload to maintain the air pressure range. If the air demand is low and the compressor runs 4 - 5 minutes unloaded, the compressor motor will stop.

#### **IMPORTANT NOTE:**

For AIR and HYDRAULIC QUALITY RECOMMENDATIONS and QUALITY MAINTENANCE PROCEDURES, refer to Section 7 - ENGINEERING DATA in this manual.

## AIR LINE LUBRICATORS

Lubricators inject a finely divided "fog" of oil into a flowing stream of compressed air to automatically provide internal lubrication for the operating components in the air system. Oil feed density is controlled by the drip rate adjusting knob (It.#1) on top of the unit. This knob is integral with a sight feed dome. Counter-clockwise rotation (CCW) of the knob *increases* oil flow (density), and clockwise rotation (CW) *decreases* it.



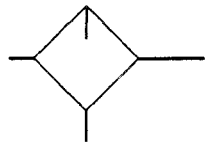
The lubricator utilizes a flexible flow sensor (It.#5) to control the flow of a small amount of inlet air into the reservoir through fog generator (It.#3) in proportion to the air flow past the sensor. The high velocity air flowing through the generator aspirates oil up the siphon tube (It.#8) into the sight-feed dome (It.#2), where it drips downward through needle valve (It.#4) into the generator. The oil drops are then atomized and mixed with the air flowing through the generator into the reservoir. Most of the larger oil particles return to the reservoir. The finer particles ("fog") remain airborne and are carried through passage (It.#6) into the downstream system. Only a small portion of the drops visible in the sight-feed dome are delivered downstream to the operating components. Check ball (It.#7) keeps the siphon tube full during periods of no air flow.

The lubricator used in this air system has a 2 quart (1.9 liter) capacity metal bowl with a manual drain cock (It.#9) and a sight glass. It cannot be filled under pressure. To add type PO lube to the bowl, exhaust the air pressure from the circuit and then remove the oil fill plug from the bowl. Add oil to the prescribed level indicated on the sight glass. Replace the fill plug.

Adjust the oil flow rate to satisfy the lubrication requirements of the operating components in the air system downstream. The bowl reservoir can be removed and cleaned with a mild soapy water solution.

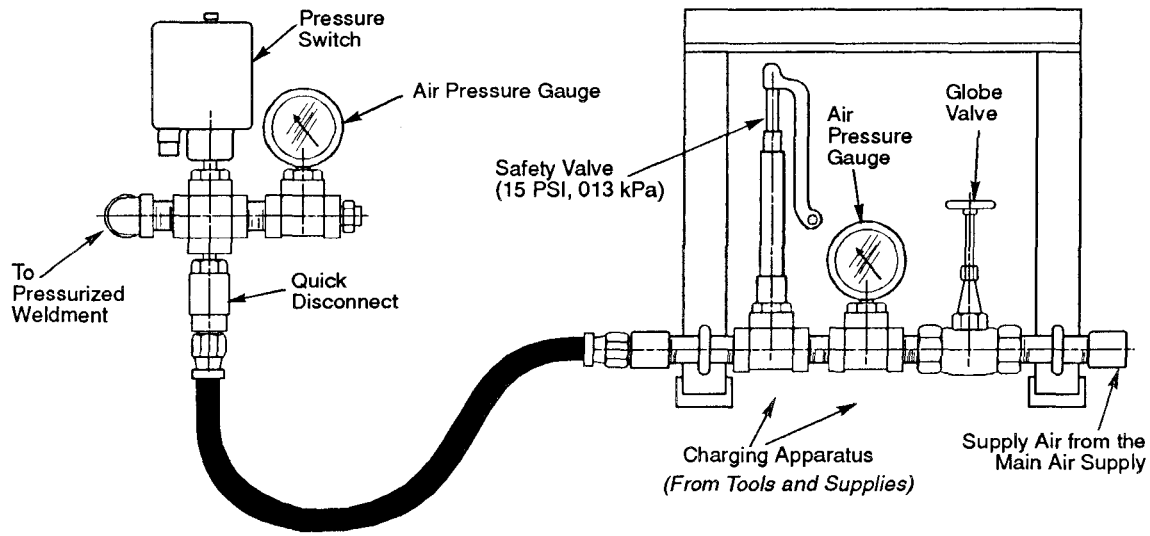
Lubricator.wpg

**Graphic Symbol:**



## 5.4 PRESSURIZED WELDMENTS

The Boom Apex pipes, Tri-Structure back legs and Tri-Structure head beam are pressurized with dry, compressed air. A loss of air pressure will indicate a break in the parent metal or welds. The operator is alerted to the failure through a switch which is activated when the pressure in the weldment drops. If pressure is lost, check the air piping for leaks. If none are found, check the structure for cracks, make any necessary repairs and re-charge the system.



wldpequp.wpg

### CHARGING APPARATUS for PRESSURIZED WELDMENTS

The charging apparatus furnished consists of: a pressure gauge, a safety release valve - set at 15 PSI (103 kPa), a globe valve, and a section of hose with a quick connect coupler.

### CHARGING PROCEDURE ~ PRESSURIZED WELDMENTS

1. Blow out the air line from the machine compressor before attaching to the "AIR CHARGING APPARATUS" to remove any water contamination.
2. With the valve on the "AIR CHARGING APPARATUS" closed, attach a compressed air line.
3. Attach an air supply hose leading from the "AIR CHARGING APPARATUS" to the weldment using a quick disconnect coupling and charging equipment located on the weldment.

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### Section 6 **MAINTENANCE**

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19	6.6 PARTS REPLACEMENT AND ADJUSTMENT PROCEDURES
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## Section 2

# DESCRIPTION

it matches the amount of air being used. The control system functions continually in this manner, between the limits of 100 to 110 PSIG (689 to 758kPa), in response to varying demands from the service line.

The pressure regulator has an orifice which vents a small amount of air to the atmosphere when the pressure regulator controls the inlet valve. The orifice also bleeds any accumulated moisture from the control lines.

### UNLOAD - IN EXCESS OF 110 PSIG (758kPa) LINE PRESSURE

When no air is being used, the service line pressure rises to the setting (cut-out pressure) of the pressure switch. The pressure switch opens, interrupting the electrical power to the solenoid-type pilot valve. At this time, the pilot valve allows dry sump tank air pressure to be applied directly to the inlet valve piston and keeping it closed. Simultaneously, the pilot valve sends a pneumatic signal to the blowdown valve. The blowdown valve opens to the sump to the atmosphere reducing the sump pressure to approximately 20 to 30 PSIG (138 to 207kPa). The check valve in the air service line pressure prevents line from returning to the sump.

When the line pressure drops to the low setting (cut-in pressure) of the pressure switch (usually 100 PSIG [689kPa]), the pressure switch closes, re-energizing the 3-way pilot valve and allowing the blowdown valve to close. The re-energized pilot valve again prevents line pressure from reaching the inlet valve. Should the pressure begin to rise, the pressure regulator will resume its normal function as previously described.

For a compressor with varied periods of time when there are not air requirements, a "Dual-Control" option is available. This option allows you to set the compressor in an automatic position whereby the compressor will shut down when no compressed air requirement is present and restart as compressed air is needed.

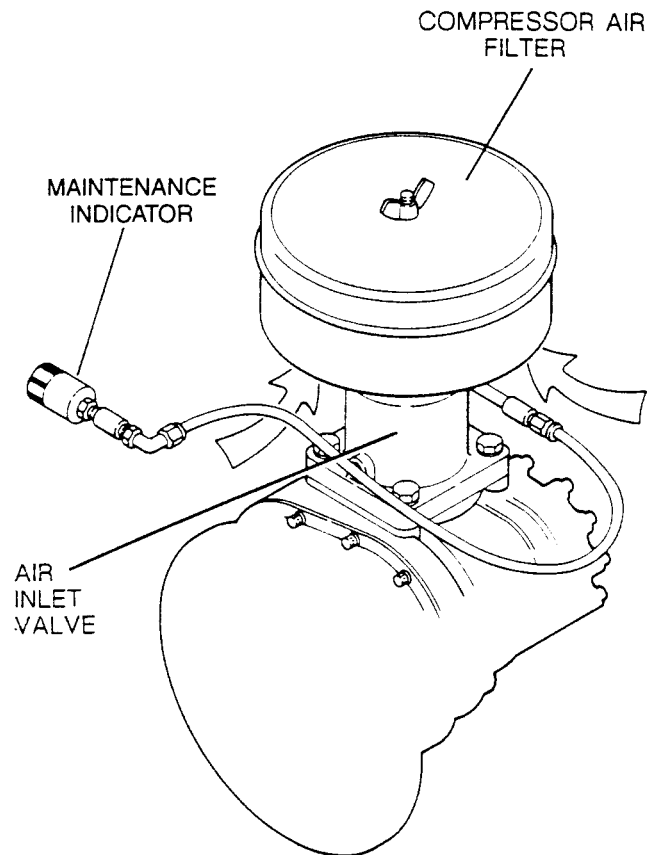
### 2.7 AIR INLET SYSTEM, FUNCTIONAL DESCRIPTION

Refer to Figure 2-6. The compressor inlet systems consists of a dry-type air filter, a restriction gauge and an air inlet valve.

The restriction gauge, (located on the compressor inlet pipe), indicates the condition of the air filter by showing red when filter maintenance is required. This indicator must be manually reset after the air filter has been serviced.

The poppet-type modulating air inlet valve directly controls the amount of air intake to the compressor in response to the operation of the pressure regulator (par. 1.6).

Figure 2-6 Air Inlet System



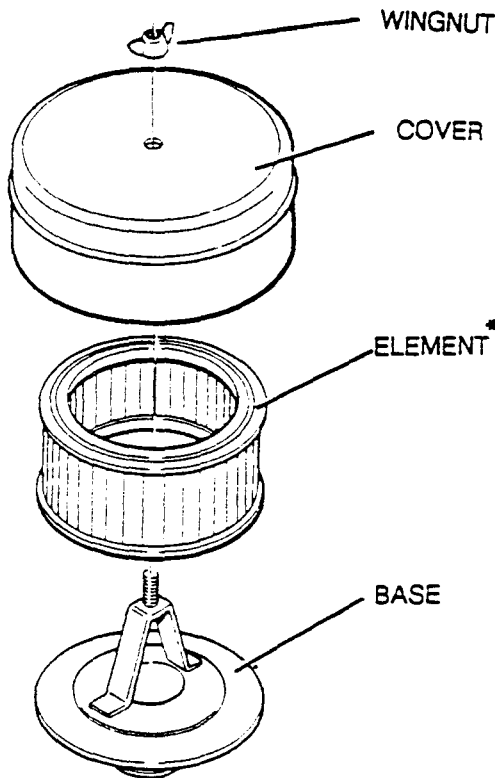
### 2.8 INSTRUMENT PANEL GROUP, FUNCTIONAL DESCRIPTION

Refer to Figure 2-7. The instrumentation for the 25, 30 and 40HP air compressors consists of a panel group which continually monitors the operating condition of the compressor. The panel group has the following gauges: a sump pressure gauge, line pressure gauge, compressor fluid temperature gauge, hourmeter, air filter restriction indicator, separator maintenance gauge and a fluid filter maintenance gauge.

- The sump pressure gauge continually monitors the sump pressure at the various load and/or un-load conditions.
- The line (terminal) pressure gauge is connected to the dry side of the receiver downstream from the check valve. It continually monitors the air pressure.
- The fluid temperature gauge monitors the temperature of the fluid in the sump. The normal reading should be approximately 170°F (77°C) with 70°F (21°C) ambient.

## Section 6 MAINTENANCE

Figure 6-2 Air Filter Element Replacement  
(P/N 410036)



\* Replacement Element P/N 042445

1. As indicated by the filter maintenance indicator.
2. Every 6 months.

Below you will find procedures on how to replace and how to clean the air filter element.

### AIR FILTER ELEMENT REPLACEMENT

1. Clean exterior of air filter housing.
2. Remove the air filter cover by loosening the wingnut securing the cover.
3. Remove element and clean interior of housing using a damp cloth. **DO NOT** blow dirt out with compressed air.
4. At this time clean or replace the element.
5. Replace cover.
6. Reset the filter maintenance indicator.

### AIR FILTER ELEMENT CLEANING

The air filter element is cleanable by using compressed air. When cleaning the element with com-

pressed air, never let the air pressure exceed 30 PSI (207kPa). Reverse flush the element by directing the compressed air up and down the pleats in the filter media from the "clean side" of the element. Continue reverse flushing until all dust is removed. Should any fluid or greasy dirt remain on the filter surface, the element should then be replaced. When the element is satisfactorily cleaned, inspect thoroughly prior to installation (see Element Inspection).

### ELEMENT INSPECTION

1. Place a bright light inside the element to inspect for damage or leak holes. Concentrated light will shine through the element and disclose any holes.
2. Inspect all gaskets and gasket contact surfaces of the housing. Should faulty gaskets be evident, correct the condition immediately.
3. If the clean element is to be stored for later use, it must be stored in a clean container.
4. After the element has been installed, inspect and tighten all air inlet connections prior to resuming operation.

### SEPARATOR REPLACEMENT

Refer to Figure 6-3. The separator must be changed when indicated by the maintenance gauge, or once a year whichever occurs first. Order separator element repair kit, No. 250034-112 for 25 and 30HP compressors and repair kit No. 250034-114 for 40HP compressors. Follow the procedure explained below for separator element replacement.

1. Relieve all pressure from the sump tank and all compressor lines.
2. Disconnect all piping connected to the sump cover to allow removal (return lines, service lines, etc.).
3. Loosen and remove the hex head capscrews from the cover plate.
4. Lift the cover plate from the sump.
5. Remove the separator element.
6. Scrape the old gasket material from the cover and flange on the sump. Be careful not to let the scraps fall in the sump.
7. Install the new gaskets; one on the sump tank the other on top of the element.
8. Reinsert the separator element into the sump taking care not to dent it against the tank opening.
9. Clean the cover plate, washers and capscrews. Torque to 55 ft./lbs. (75 Nm).
10. Reconnect all piping making sure return line tube extends to the bottom or  $\frac{1}{2}$ " above the bottom of the separator element. This will assure proper fluid return flow to the compressor.
11. Clean the return line strainer before restarting the compressor.

### INLET VALVE MAINTENANCE

Refer to Figure 6-4. The inlet valve (P/N 250025-654) maintenance usually requires the replacement of the piston spring, piston o-ring, seal ring, and check valve spring. Use repair kit No.

Section 6  
**MAINTENANCE**

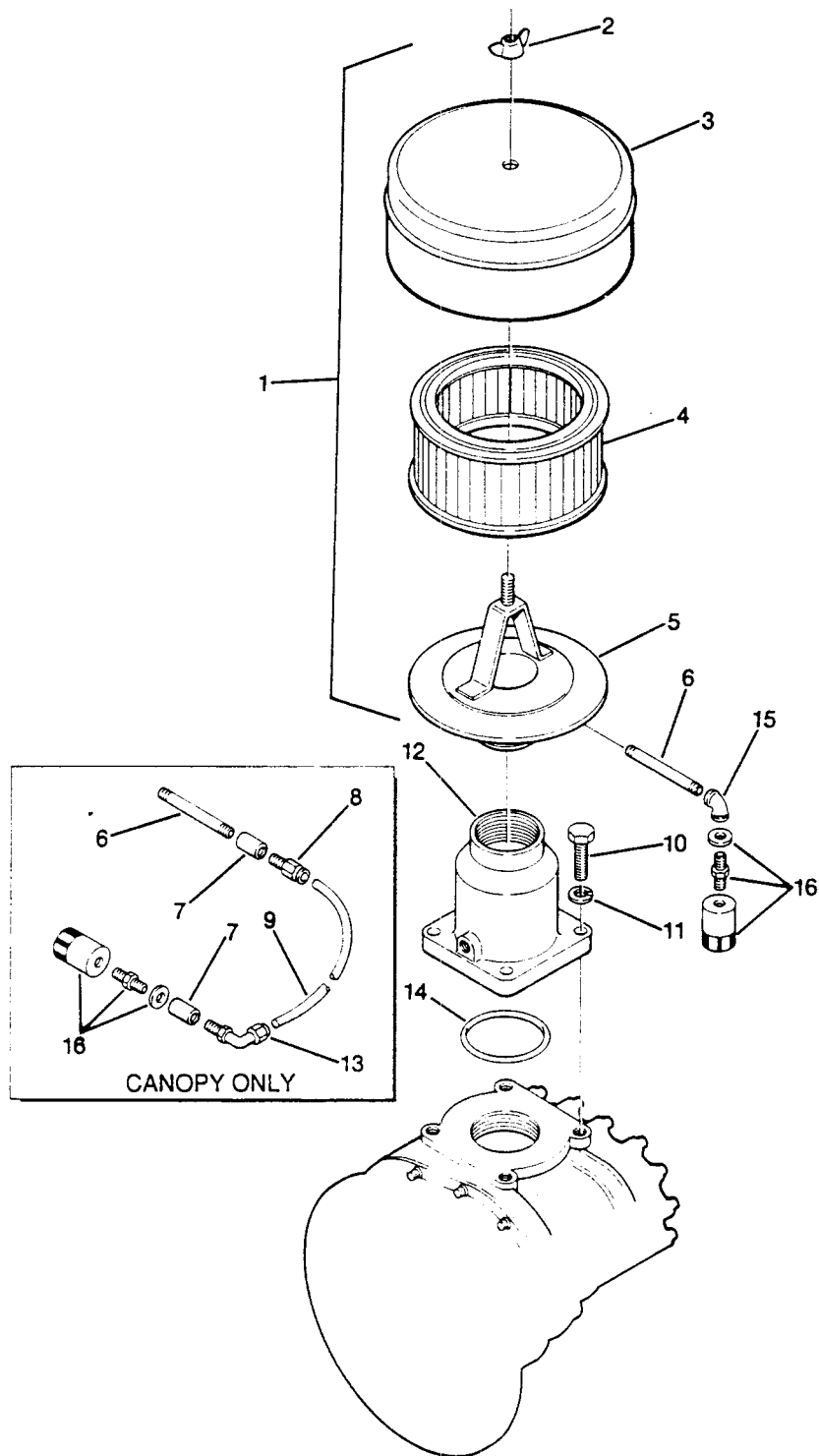
**6.8 MAINTENANCE RECORD**

MODEL NO. \_\_\_\_\_ SERIAL NO. \_\_\_\_\_

DATE	HOURMETER	MAINTENANCE PERFORMED	WORK PERFORMED BY	AUTHORIZED BY

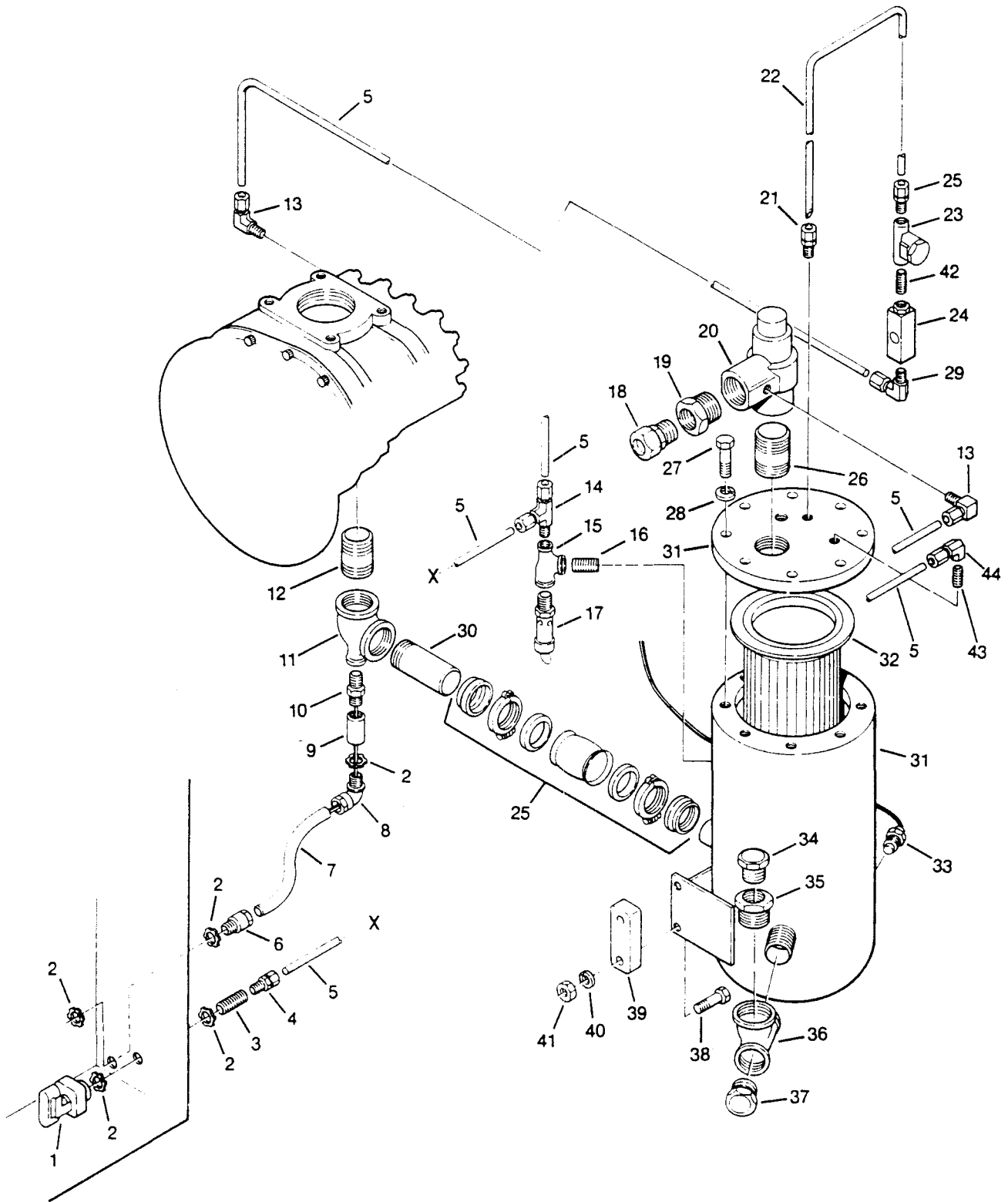
# Section 1 ILLUSTRATIONS AND PARTS LIST

## 1.4 AIR INLET SYSTEM



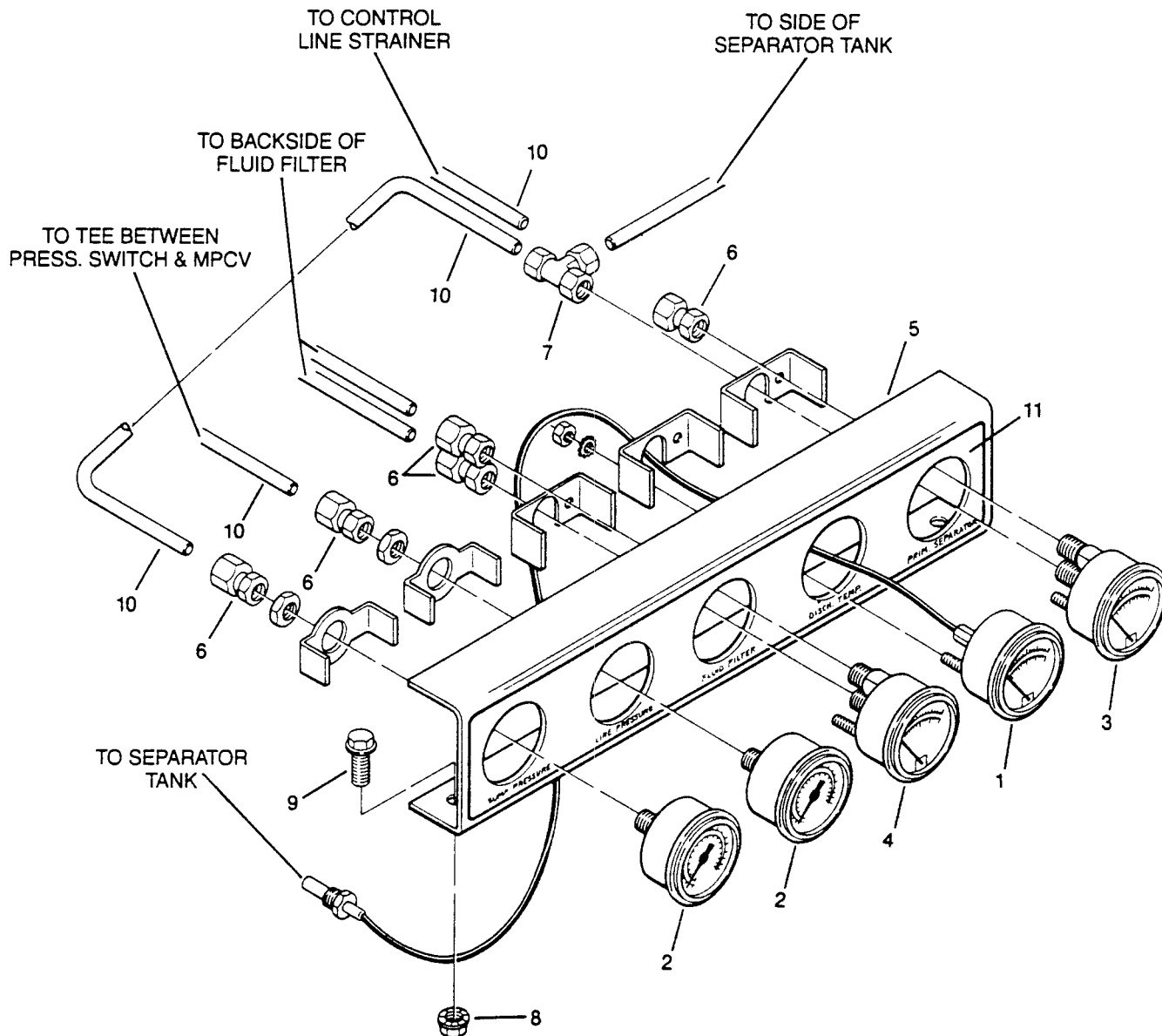
# Section 1 ILLUSTRATIONS AND PARTS LIST

## 1.8 COMPRESSOR DISCHARGE SYSTEM



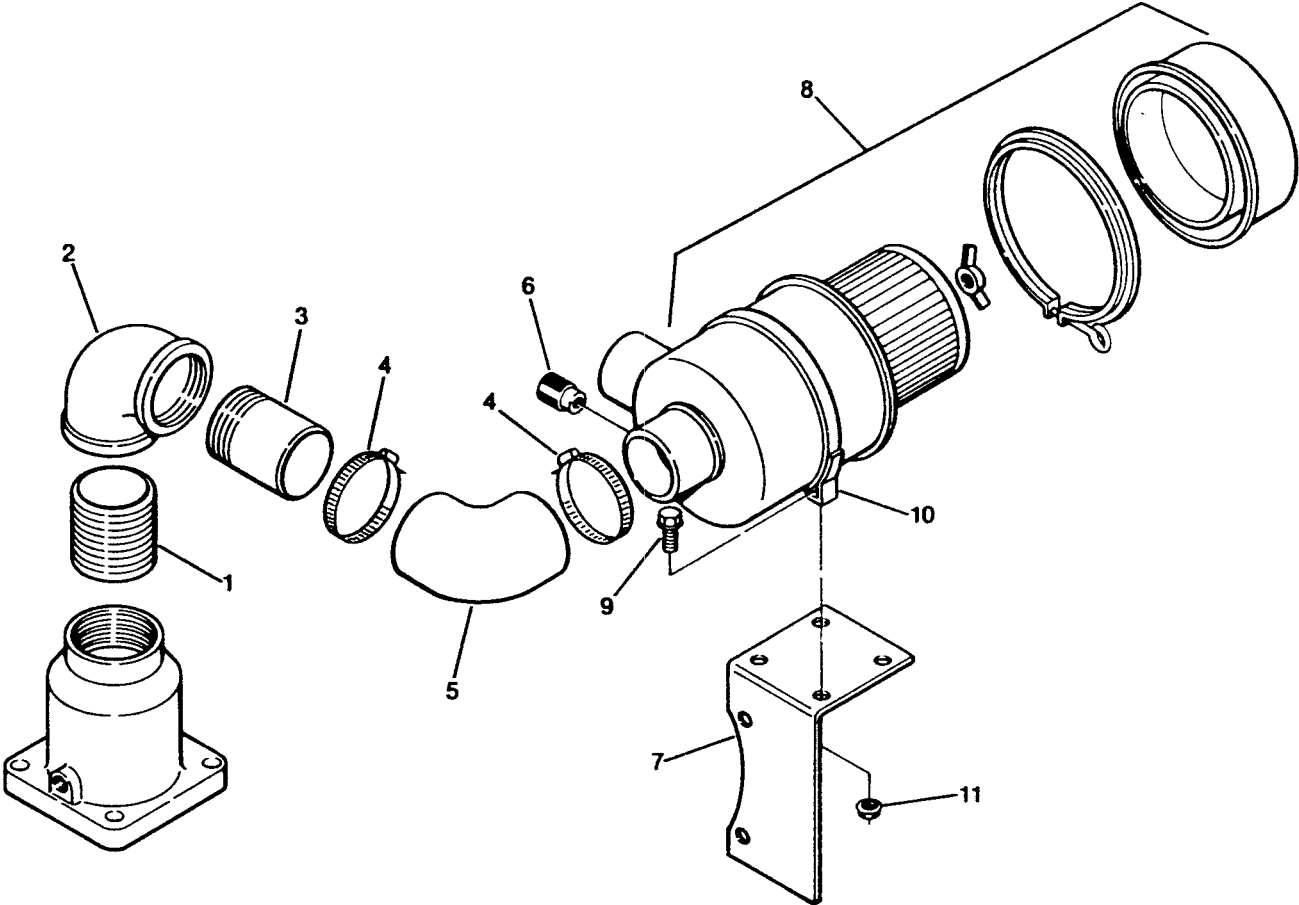
# Section 1 ILLUSTRATIONS AND PARTS LIST

## 1.11 INSTRUMENT PANEL - OPEN AND ENCLOSURE OPTION



# ILLUSTRATIONS AND PARTS LIST

## 1.16 HEAVY DUTY FILTER OPTION

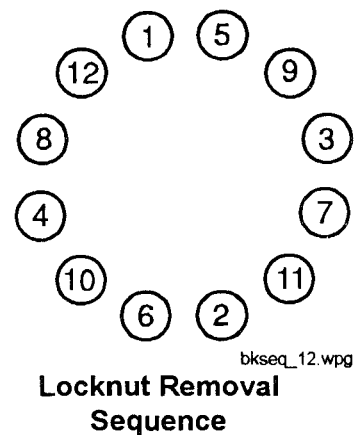


Insert page 2-4 from file BI005974-00\_2b.pdf here

7. Lubricate the stud threads with 30 weight oil or "Never Seize".
8. Assemble the locknut"s" in same alternation sequence as they were removed. Tighten the locknut to 200 ft/lbs. (271 Nm).
9. If applicable, center the rotor disc between the friction discs, using procedure given previously.
10. Reinstall the outer shield around the brake.

### Dual Rotor Brakes:

1. Remove the locknuts in an alternating sequence shown here and in increments of one quarter of the exposed stud thread length. If a stud comes loose from the mounting flange, clean the stud threads thoroughly. Apply Loctite 277 or equivalent. The stud must be threaded in until it bottoms in the mounting flange.
2. With the locknuts removed, the end plate, spring housing, and pressure plate can be removed as an assembly.
3. Remove the springs, clamp tube, rotor discs, and reaction plate. With these parts removed, all friction discs are accessible.
4. Inspect the rotor for wear. If either surface of the rotor is worn more than .03 inch (.76 mm), replace the rotor.
5. Remove the old friction discs and replace them with new discs and NEW screws. Tighten the screws to 20 ft.lbs. (27 Nm).
6. Reassemble the springs (on every other stud), clamp tubes, rotor discs, and reaction plate. Improper spring assembly will result in cocking of the reaction plate and uneven brake release.
7. Reassemble the wear spacers and then the end plate, spring housing, and pressure plate as an assembly. Take care to install the wear spacers behind the spring housing.
8. Lubricate the stud threads with 30 weight oil or "Never Seize". Assemble the locknuts using the same sequence in which they were removed. Tighten the locknuts to 200 ft.lbs. (271 Nm).
9. Reinstall the outer shield around the brake.



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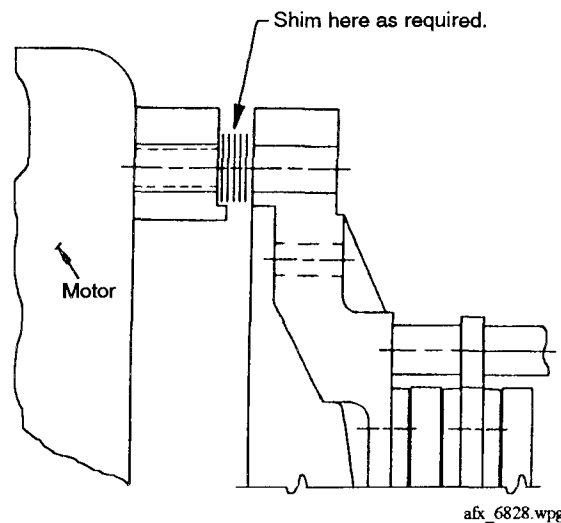
- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

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11. Install two hex head screws (99) and lockwashers (100) in the remaining two holes in the end plate. Tighten these two screws one turn at a time, in an alternating sequence, until the end plate contacts the end of the hub.
12. Remove the two 3/8-16NC2 x 1.75 screws, replacing them with hex head screws (99) and lockwashers (100). Tighten all four screws to 44 Ft.Lbs., dry.
13. Measure the gap between the mounting flange friction surface and the face of the first rotor. This gap should measure approximately .060".
14. If necessary, shim the mounting flange by installing an equal number of shims (101) at each of the four mounting points, to adjust the gap to  $.060 \pm .010$ ".

**NOTE:**

The shimming procedure described is for preliminary set-up only. The operation of the brakes should be monitored during initial start-up to check for proper alignment. Due to various influences including gearing, couplings, or alignment of the motor to the pinion, the motor shaft may drift away or oscillate from the centered position, forcing the brake discs against the friction material. If the discs tend to favor one side (mounting flange or pressure plate), or remain in constant contact with the friction material, shim adjustment may be necessary. The discs should rotate freely, with no contact to the friction material while the brake is fully disengaged.

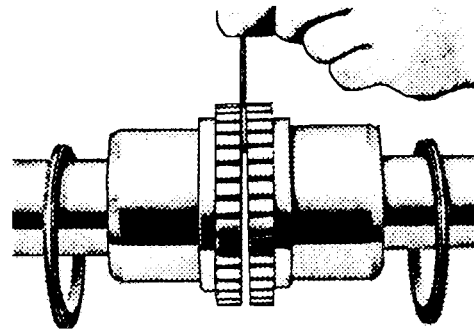


**WARNING: FAILURE TO SHIM THE BRAKE PROPERLY MAY CAUSE PREMATURE WEAR OF THE BRAKE COMPONENTS. Excessive heat may be generated from improper shimming, resulting in damage to the brake and possible loss of torque.**

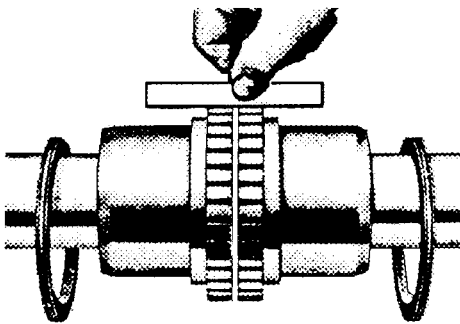
15. Tighten the 1.5-6NC Grade 8 mounting fasteners to 800 Ft.Lbs., dry.
16. Lubricate the exposed threads on the ends of the studs with 30 wt. oil or "Never-See".

## 2. Gap and Angular Alignment

Use a spacer bar equal in thickness to the gap specified. Insert the bar, as shown here, to the same depth at 90° intervals and measure clearance between bar and hub face with feelers. The difference in minimum and maximum measurements must not exceed the *ANGULAR* limit specified. *NOTE: The motor shaft must be at the mid-point of its end play when measuring the gap.*



cplggrd4.wpg



cplggrd5.wpg

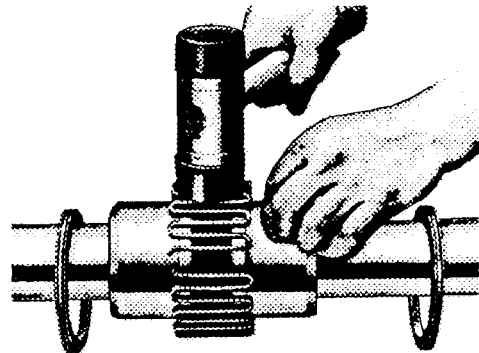
## 3. Offset Alignment

Align hubs so that a straight edge rests squarely (or within the limit specified) on both hubs as shown here. Check at 90° intervals with feelers. The clearance must not exceed the *OFFSET* limit specified. Tighten all foundation bolts and repeat Steps 2 and 3. Realign coupling if necessary.

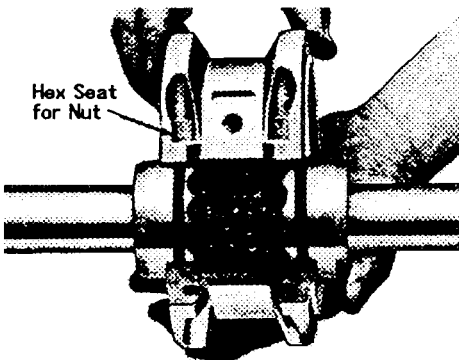
*NOTE:* Use a dial indicator for more accurate alignment.

## 4. Insert Grids

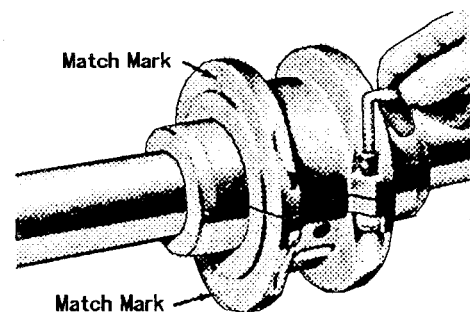
Pack gap and grooves with specified lubricant before inserting grids. Install grid segments so that all cut ends extend in the same direction; this will assure correct grid contact with non-rotating pin in cover halves. Spread grid segments slightly to pass over the coupling teeth and seat with a soft mallet.



cplggrd6.wpg



cplggrd7.wpg



cplggrd8.wpg

**RUNNING CLEARANCES FOR BRONZE BUSHINGS**  
Inches (Millimeters)

Nominal Diameter	Shaft Outside Diameter	Running Clearance	Nominal Diameter	Shaft Outside Diameter	Running Clearance
9.50 (241.3)	9.500-9.497 (241.300-241.224)	.016-.027 (.406-.686)	13.75 (349.25)	13.750-13.747 (349.250-349.174)	.021-.034 (.533-.864)
9.75 (247.65)	9.750-9.747 (247.650-247.574)	.016-.027 (.406-.686)	14.00 (355.6)	14.000-13.997 (355.600-355.524)	.022-.035 (.559-.889)
10.00 (254.0)	10.000-9.997 (254.000-253.924)	.016-.027 (.406-.686)	14.25 (361.95)	14.250-14.247 (361.950-361.874)	.022-.035 (.559-.889)
10.25 (260.35)	10.250-10.247 (260.350-260.274)	.016-.027 (.406-.686)	14.50 (368.3)	14.500-14.497 (368.300-368.224)	.022-.035 (.559-.889)
10.50 (266.7)	10.500-10.497 (266.700-266.624)	.016-.027 (.406-.686)	14.75 (374.65)	14.750-14.747 (374.650-374.574)	.023-.036 (.584-.914)
10.75 (273.05)	10.750-10.747 (273.050-272.974)	.016-.027 (.406-.686)	15.00 (381.0)	15.000-14.997 (381.000-380.924)	.024-.036 (.610-.914)
11.00 (279.4)	11.000-10.997 (279.400-279.324)	.017-.028 (.432-.711)	15.25 (387.35)	15.250-15.247 (387.350-387.274)	.024-.036 (.610-.914)
11.25 (285.75)	11.250-11.247 (285.750-285.674)	.017-.028 (.432-.711)	15.50 (393.7)	15.500-15.497 (393.700-393.624)	.024-.036 (.610-.914)
11.50 (292.1)	11.500-11.497 (292.100-292.024)	.017-.028 (.432-.711)	15.75 (400.05)	15.750-15.747 (400.050-399.974)	.024-.036 (.610-.914)
11.75 (298.45)	11.750-11.747 (298.450-298.374)	.017-.028 (.432-.711)	16.00 (406.4)	16.000-15.997 (406.400-406.324)	.026-.039 (.660-.991)
12.00 (304.8)	12.000-11.997 (304.800-304.724)	.017-.028 (.432-.711)	16.25 (412.75)	16.250-16.246 (412.750-412.648)	.026-.040 (.660-1.016)
12.25 (311.15)	12.250-12.247 (311.150-311.074)	.017-.028 (.432-.711)	16.50 (419.1)	16.500-16.496 (419.100-419.024)	.026-.040 (.660-1.016)
12.50 (317.5)	12.500-12.497 (317.500-317.424)	.017-.028 (.432-.711)	16.75 (425.45)	16.750-16.746 (425.450-425.348)	.026-.040 (.660-1.016)
12.75 (323.85)	12.750-12.747 (323.850-323.774)	.019-.030 (.483-.762)	17.00 (431.8)	17.000-16.996 (431.800-431.724)	.027-.041 (.685-1.041)
13.00 (330.2)	13.000-12.997 (330.200-330.124)	.020-.033 (.508-.838)	17.25 (438.15)	17.250-17.246 (438.150-438.024)	.027-.041 (.685-1.041)
13.25 (336.55)	13.250-13.247 (336.550-336.474)	.020-.033 (.508-.838)	17.50 (444.5)	17.500-17.496 (444.500-444.398)	.027-.041 (.685-1.041)
13.50 (342.9)	13.500-13.497 (342.900-342.824)	.020-.033 (.508-.838)	17.75 (450.85)	17.750-17.746 (450.850-450.748)	.027-.041 (.685-1.041)

*Draw the Rod Securely Into the Sleeve -*

Assemble a small bore washer and nut on the bottom end of the alignment rod and tighten the nut to 4380 Ft.Lbs.

*Install the Remaining Alignment Rod -*

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

*Check the Alignment -*

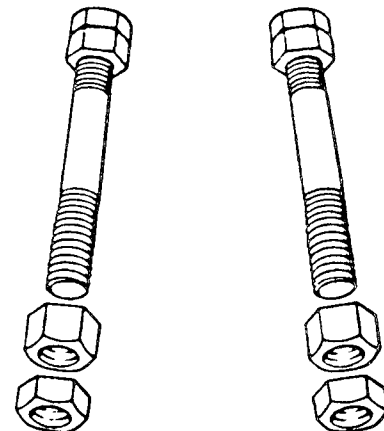
With a small parallel and feeler gauge, check the alignment on the rim faces of the gear halves. They should align themselves within approximately .003".

grsplit-4.wpg

**INSTALLATION of CLEARANCE RODS**

*Position the Clearance Rods -*

After the rods have been inserted, adjust top and bottom nuts so that equal portions extend above and below the split. Remove the bottom nut, making sure that it rotates freely. Slip the rod out of the hole so that the entire unthreaded portion is exposed. **DO NOT DAMAGE THE THREADS.**



**Clearance Rods**

*Rod Heating -*

If the rod can be installed after both gear halves are joined, heat the rod, with a full nut on each end, in a rod oven to obtain a temperature of 227°F. above the ambient temperature at installation. If the rods must be heated while on the gear, heat the *unthreaded* portion only and as uniformly as possible. Use a pyrometer to monitor the temperature.

## ORIENTATION

Reference centerlines are selected relative to a plane defined by the pinion and gear axis of rotation as shown in *Figures 3A* and *39B* on the previous page. They are selected for the pinion shaft ends only. One reference centerline is in the plane (X-X) and the other is perpendicular (Y-Y) to the plane.

It does not matter if the reference centerlines were opposite from those selected in *Figure 3B*, as long as one reference centerline is in the plane and the other one is perpendicular to the plane.

From the previous section on eccentric cartridge theory, shaft end No. 1 will move perpendicular to the reference centerline, that is, along the X-X axis. This movement could also be described as moving shaft end No. 1 "into" or "out of" -mesh. Obviously then, shaft end No. 2 would move in a direction perpendicular to end No. 1 or along the Y-Y axis. This movement is often referred to as the "cross-bearing" adjustment.

## OUT-OF-PLANE ADJUSTMENT

When shaft end No. 2 is moved along the Y-Y axis (*Figure 3B*) the adjustment is called out of plane because it seems to move out of the plane of interest.

## OUT-OF-PARALLEL ADJUSTMENT

When shaft end No. 1 is moved along the X-X axis (*Figure 3B*) the adjustment is called out of parallel because it seems to move the shafts out of parallel.

## COMMENT

It is recognized that both of the aforementioned adjustments seem to move the shafts out of parallel. However, to identify the direction of adjustment the "out of parallel" and "out of plane" nomenclature are used.

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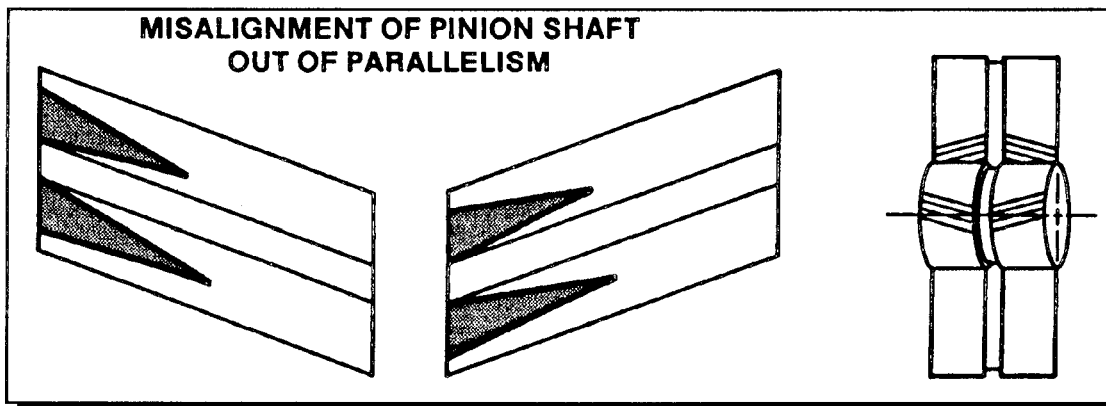
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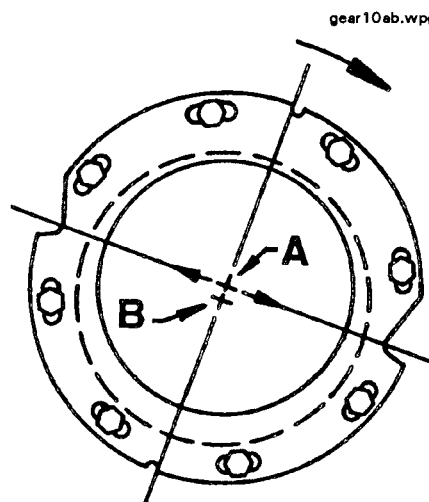
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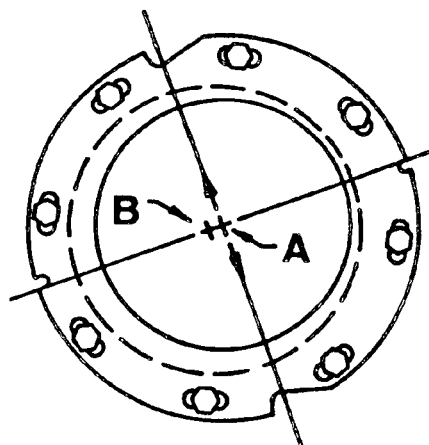
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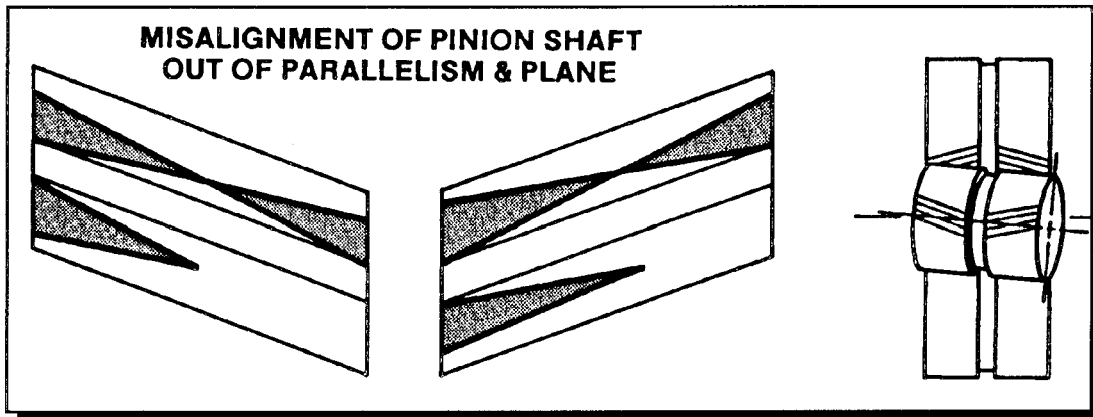
**CORRECTIVE ADJUSTMENT:**

**VIEW A-A**  
ADJUST ECCENTRIC IN  
CLOCKWISE DIRECTION.



**VIEW B-B**  
NO ADJUSTMENT REQUIRED.





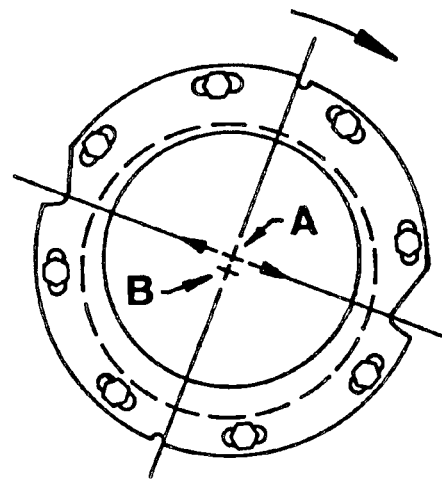
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**CORRECTIVE ADJUSTMENT:**

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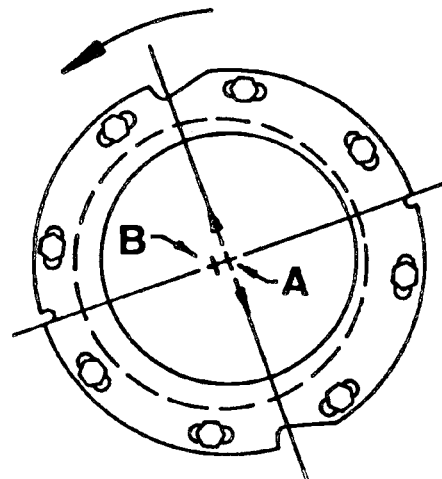
**VIEW A-A**

**ADJUST ECCENTRIC IN  
CLOCKWISE DIRECTION.**



**VIEW B-B**

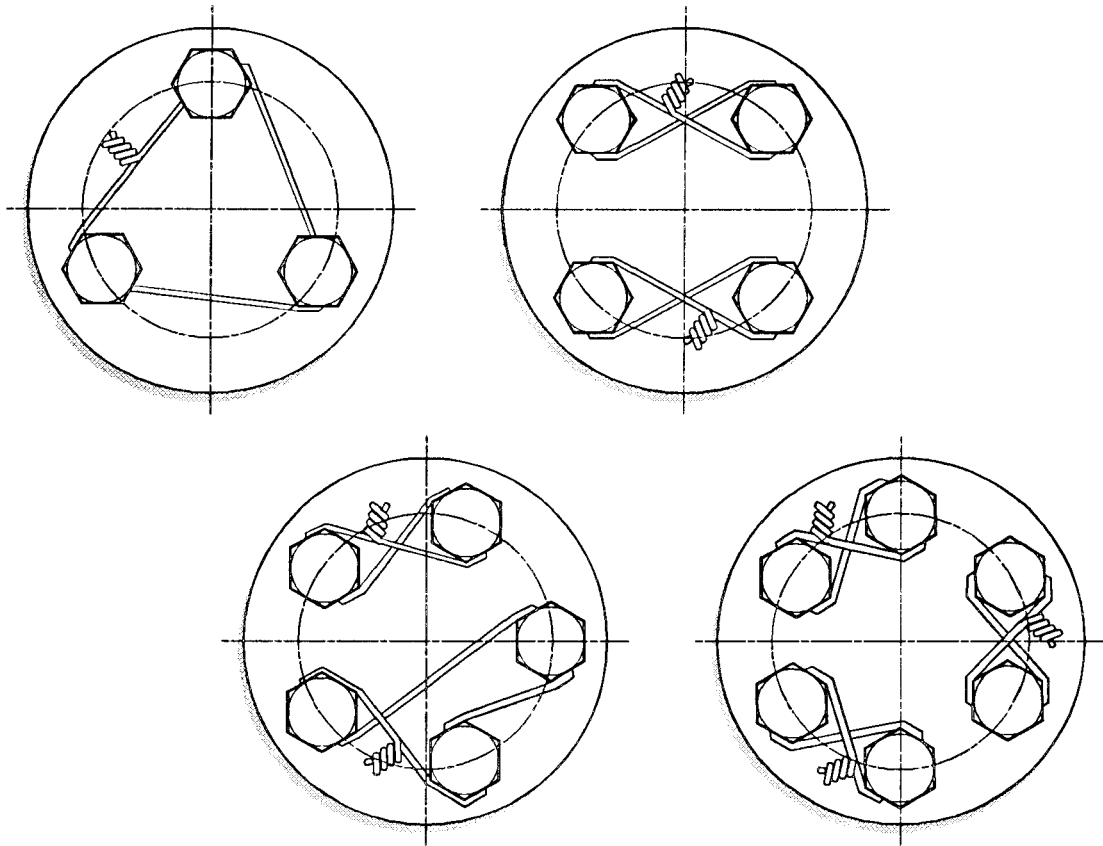
**ADJUST ECCENTRIC IN  
COUNTER-CLOCKWISE DIRECTION.**



## WIRE LOCKING CAP SCREWS

Wire locking of cap screws is used when maximum lock assurance is required when periodic visual inspection is not possible.

The illustrations below show the recommended wire locking methods for various right hand thread cap screw patterns. For patterns not shown, wire lock the screws "in pairs". For odd numbered patterns, wire lock the screws in pairs except the remaining 3 capscrews wire lock together.



wirelock.wpg

**PATTERNS for WIRELOCKING CAPSCREWS**

Use 14 gauge soft annealed lockwire. Thread the wire through the capscrew head so that tightening stress on the wire will exert a tightening torque on the direction of cap screw thread. (The illustrations show lock wire threading for right hand threaded capscrews. Reverse the lock wire patterns shown for left hand capscrews.)

When repairing a part in the field or shop, all the convenient facilities are not available for preheating. Probably the most common preheating device is a heating torch which uses oxygen and some type of fuel or another preheating device such as resistant heaters. It is important when using a preheating torch to allow the heat to soak into the part gradually, a minimum of 3 inches (76 mm) beyond the repair area in all directions. The surrounding repair area should be covered with an insulating blanket to keep the heat from dissipating too fast. A temporary furnace can be made to preheat large parts. All repairs should be sheltered from cold drafts. This can be done by building a temporary shelter around the part if it can not be taken to a shop.

Do not short change the repair by skimping on the preheat. It is always better to preheat than to repair a job without preheat plus the chances of a successful repair are better. The only steel where preheating temperatures can be detrimental to the repair is austenite manganese steel. This type of steel may be used on bucket or dipper lips, track pads, drive tumblers and dipper racks. The preheat and interpass temperature should never go beyond 400°F(204°C). This steel can be quickly determined by the use of a magnet since it is a nonmagnetic material.

#### **STEP 7 -- Welding Techniques.**

The first and most important part of a repair procedure is to pick your best welder or welders who will follow explicit welding repair procedures. This type of welder is a person who enjoys such challenges even when he is in an uncomfortable position and the preheat is uncomfortable.

A technique highly recommended for a repair is to butter the groove with weld metal. What is buttering and what does buttering do for you? Buttering is the addition of one or more layers of weld metal to the face of the joint or surfaces to be welded. Every weld repair of a large structure can be considered a high restraint joint, therefore, buttering is highly recommended. If we examine the mechanical properties of parent material and weld metal, we find the weld metal will have the best ductility. We know when weld metal cools shrinkage stresses will be created, therefore, when the center joining passes are put in, the weld metal will be pulling on the butter passes instead of the parent material which has less ductility.

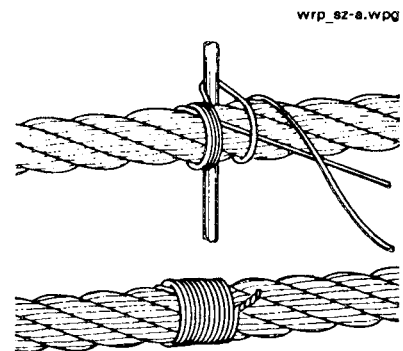
The buttering assures all finish weld beads will be made only into previously deposited weld metal resulting in maximum tempering of previously created fusion and heat affected zones in the base materials. Buttering can also be used to reduce the high preheat required for high alloy steels. Many times a repair does not require the hardenability or heat treatment of the parent material, therefore, high strength electrodes are used for the repair. The parent material can be buttered with two layers of weld metal at the recommended preheat for the parent material and then the preheat can be lowered to about 200°F (93°C) for the comfort of the welder. A good example would be the changing of racks on dipper handles. The racks are usually made of an alloy steel which requires a preheat of 450°F (232°C) to 500°F (260°C). The rack bevel could be preheated and buttered with a layer of the required weld metal. The racks would then be installed on the dipper handle and then preheated to about 200°F (93°C) to 250°F (121°C) and welded eliminating the high preheat required to weld the assembly.

## SEIZING WIRE ROPE

While there are numerous ways to cut wire rope, in every case, certain precautions must be observed. For one thing, proper seizings are always applied on both sides of the place where the cut is to be made. In a wire rope, carelessly or inadequately sized, ends may become distorted and flattened, and the strands may loosen. Subsequently, when the rope is put to work, there may be an uneven distribution of loads to the strands; a condition that will significantly shorten the life of the rope.

The two widely accepted methods of applying seizing are illustrated. The seizing itself should be soft, or annealed wire or strand. Seizing wire diameter and the length of the seize will depend on the diameter of the wire rope. But the length of the seizing should never be less than the diameter of the rope being seized. Normally, for preformed ropes, one seizing on each side of the cut is sufficient. But for ropes that are not preformed, a minimum of two seizings on each side is recommended; and these should be spaced six rope diameters apart.

Lay one end of the seizing wire in the groove between two strands; wrap the other end *tightly* in a close helix over a position of the groove using a seizing iron (a round bar 1/2" to 5/8" diam. x 18" long) as shown above. Both ends of the seizing wire should be twisted together tightly, and the finished appearance as shown below. Seizing widths should not be less than the rope diameter.



Seizing METHOD A

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### 3. *Reduction in rope diameter:*

Any marked reduction rope diameter indicates degradation. Such reduction may be attributed to:

- Excessive external abrasion.
- Internal or external corrosion.
- Loosening or tightening of rope lay.
- Inner wire breakage.
- Rope stretch.
- Ironing or milking of strands.

In the past, whether or not a rope was allowed to remain in service depended to a great extent on the rope's diameter at the time of inspection. Currently this practice has undergone significant modification.

Previously, a decrease in the rope's diameter was compared with published standards of minimum diameters. The amount of change in diameter is, of course, useful in assessing a rope's condition. But, comparing this figure with a fixed set of values can be misleading. These long-accepted minimums are not, in themselves, of any serious significance since they do not take into account such factors as:

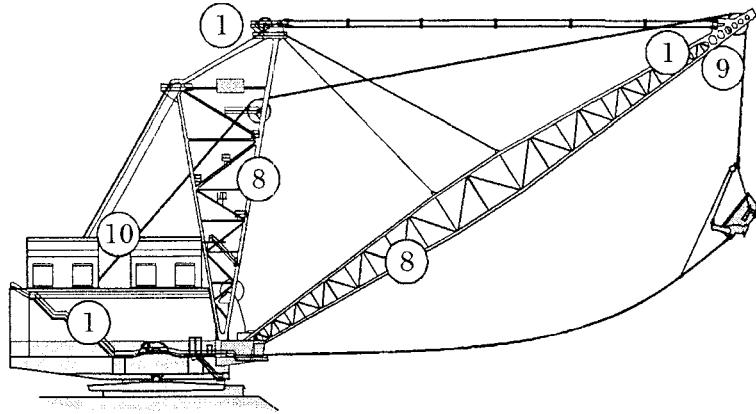
- 1) Variations in compressibility between IWRC and Fiber Core.
- 2) Differences in the amount of reduction in diameter from abrasive wear, or from core compression, or a combination of both.
- 3) The actual original diameter of the rope rather than its nominal value.

As a matter of fact, all ropes will show a significant reduction in diameter when a load is applied. Therefore, a rope manufactured close to its nominal size may, when it is subjected to loading, be reduced to a smaller diameter than stipulated in the minimum diameter table. Yet, under these circumstances, the rope would be declared unsafe although it may, in actuality, be safe.

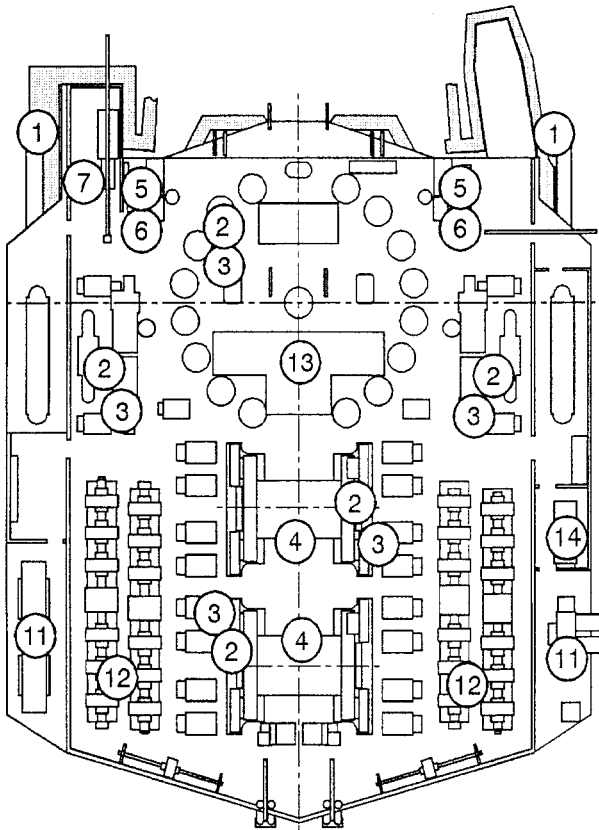
As an example of the possible error at the other extreme, we can take the case of a rope manufactured near the upper limits of allowable size. If the diameter has reached a reduction to nominal or slightly below that, the tables would show this rope to be safe. But it should, perhaps, be removed.

Today, evaluations of the rope diameter are first predicated on a comparison of the original diameter—when new and subjected to a known load—with the current reading under like circumstances. Periodically, throughout the life of the rope, the actual diameter should be recorded when the rope is under equivalent loading and in the same operation section. This procedure, if followed carefully, reveals a common rope characteristic: after an initial reduction, the diameter soon stabilizes. Later, there will be a continuous, albeit small, decrease in diameter throughout its life.

Daily —

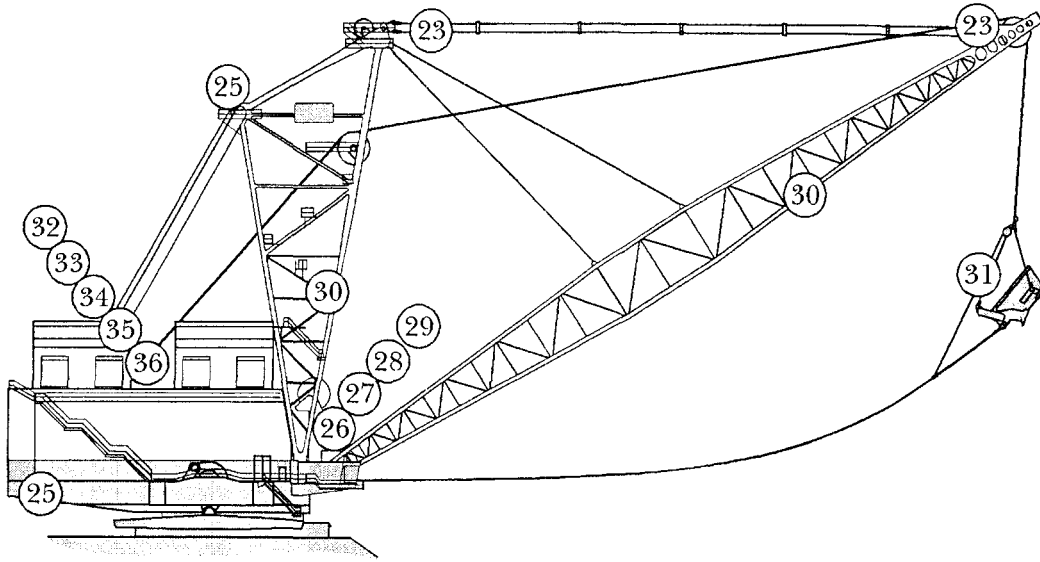


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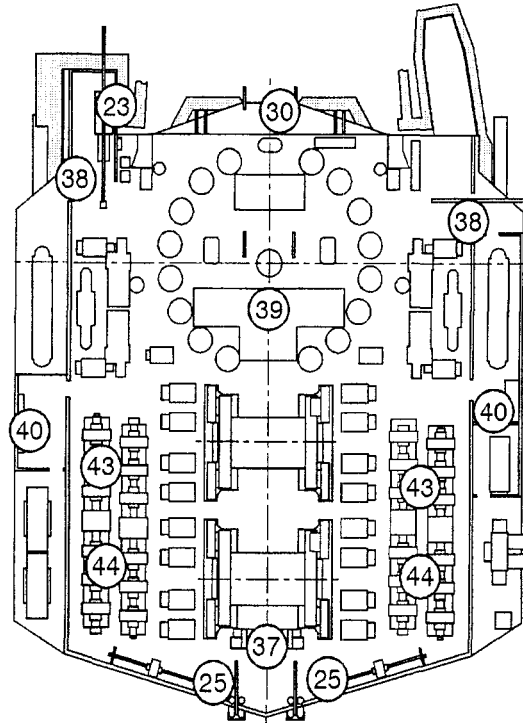


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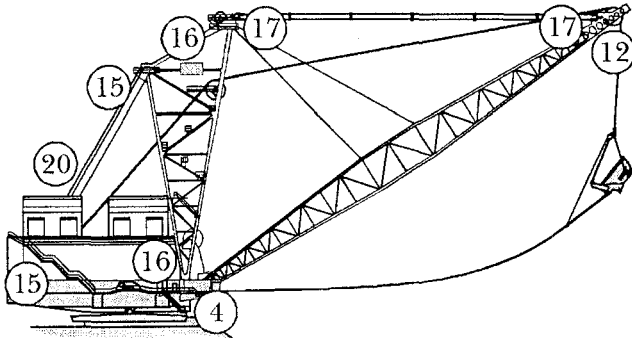
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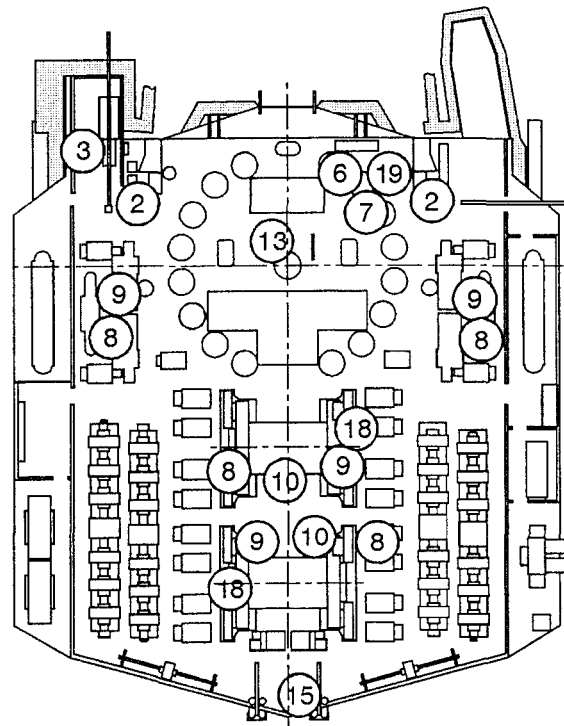
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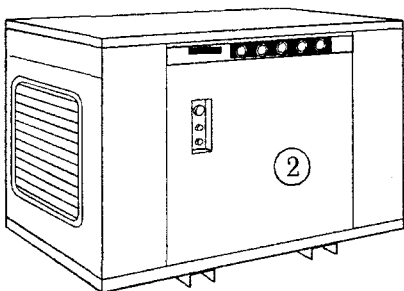
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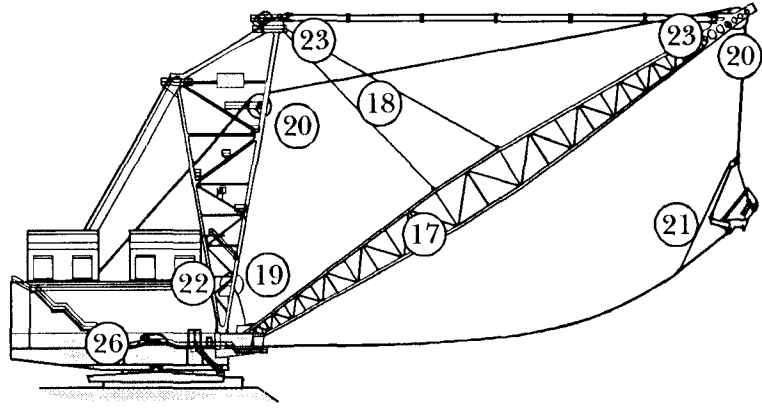


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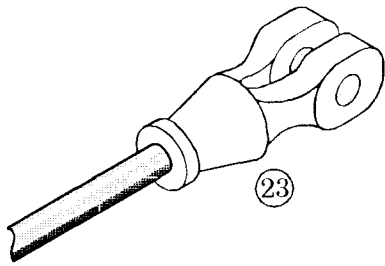


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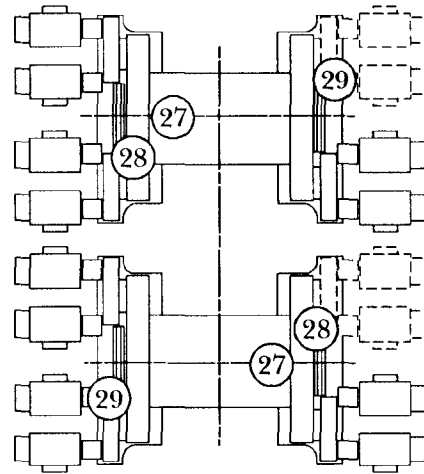
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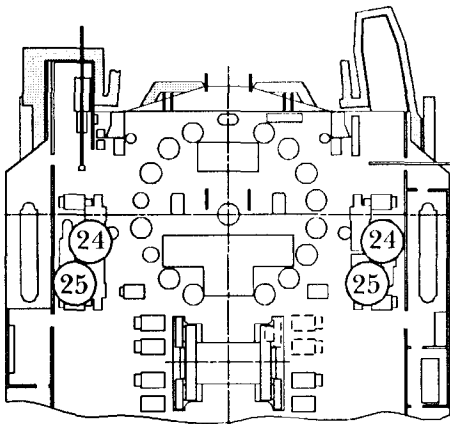
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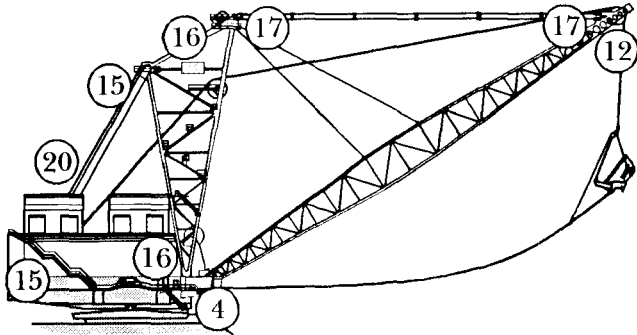
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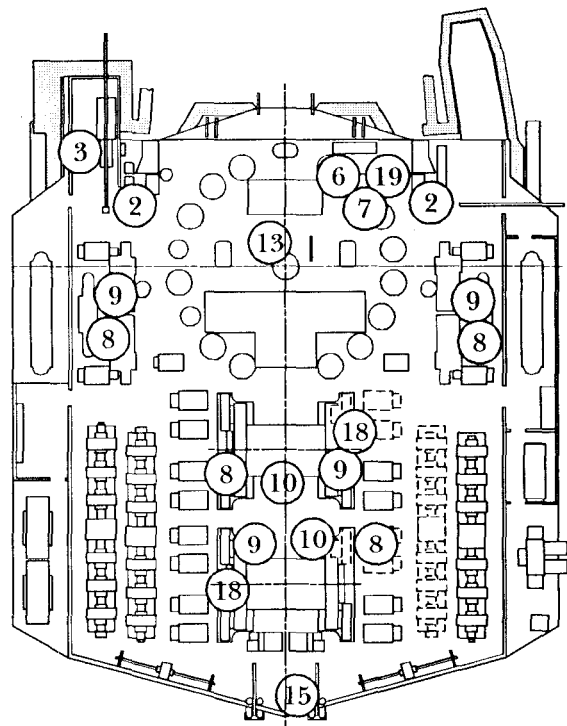
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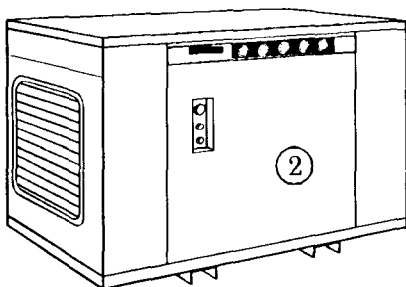
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8729\_820.wpg



d8729820.wpg



ac829820.wpg



The following, accurate and properly maintained, test equipment is also needed.

- ✓ D.C. Voltmeter for 125 to 600 volts.
- ✓ D.C. Millivoltmeter for 600 millivolts.  
(Zero center meters preferred.)
- ✓ Volt-ohm-milliamp meter or multi-meter.  
(example: Simpson 260)
- ✓ A.C. Voltmeter, unless the multi-meter is accurate.
- ✓ Quality tachometer.
- ✓ 500 volt D.C. megger test.

Know the capabilities and the limitations of each instrument to keep repair and replacement costs reduced. Most test equipment failures are due to incorrect connections rather than from mechanical damage.

## INVESTIGATION

When trouble occurs, the operator is the *expert witness*, so he should be the first contact for any answers to the following important questions:

- How many motions are affected?
- Are the motions dead or just retarded?
- Are the motions intermittent or continuous?
- Did the trouble develop slowly or suddenly?
- What happened just before the failure?

*POWER* complaints require the following answers:

- Will the machine lift as heavy a load as before?
- Has speed increased or decreased for light loads?
- Has speed increased or decreased for heavy loads?

**AIR CONDITIONER**  
**POWER CONTROL ROOM**  
**P/N 209572-6**

2.4 MAIN CONTROL CUBICLE (Refer Drawing T2134012)

SYSTEM		M10	M15	M20
Model Number (110 Volt Control)		MEWM4	MEWM5	MEWM5
Model Number (240 Volt Control)		N/A	MEWM6	MEWM6
ITEM	STATUS	DESCRIPTION		
Mounting Type	STD	Remote or unit mounted electrics		
System Cooling Capacity	STD	10kW	15kW	20kW
System Heating Capacity (Elec. Elem)	STD	6kW	9kW	12kW
Construction	STD	Stainless Steel 304 Rittal type enclosure		
Main Isolation	STD	Lockable. Full Load Rated		
Fuses	STD	Control and Heater only		
Overload Protection	STD	Siemens combined CB/TOLS		
Contactors	STD	Siemens 3TB42 Series		
Power Circuit	STD	415VAC/3 Phase/50 Hz with Neutral		
Control Circuit	STD	110VAC/50Hz via transformer		
	OPT	240VAC/50Hz via Neutral or Transformer		

The Main Control Cubicle contains all necessary electrical controls and safety devices (except switches and thermostat) required to operate each system. The Main Isolating Switch is door mounted with a mechanical interlock. The switch can be pad locked for security. The cubicle can be remote mounted or mounted directly to either the roof top evaporator or condenser unit as dictated by servicing requirements and/or installation constraints.

- Electrical Schematic with Pumpdown - Drawing AE207051
- Electrical Schematic without Pumpdown - Drawing AE207077

**4.3 Hose Run Installation. Cont'd**

- c) All fittings on the hoses should be installed by a qualified refrigeration mechanic as incorrect installation can be detrimental to the performance of the air conditioning unit. It is strongly recommended that these interconnecting hose assemblies be acquired from Sigma Industries. Avoid leaving an open ended hose line on a dirty floor as dust and other foreign particles may gather within the bore causing a blocked filter drier during operation. During installation, all hoses should be appropriately sealed from any moisture or foreign particles that may gather within the bore. If there is any doubt as to the cleanliness of the bore, dry nitrogen should be blown through the hose to eject any foreign matter. All unit connections should be via bulkhead fittings located on the unit.
- d) Securely weld all hose clamps to fixed panels, ensuring that the welding is of good quality. If welding is not possible, bolting the clamps down is the other alternative. To avoid any unnecessary movement of the hose runs, weld on clamps should be spaced approximately 2 per 1200 -1500mm run. If a run over a sharp edge is unavoidable, it is preferred to have a weld-on clamp welded on the corner and run the hoses through the clamp.
- e) Ensure that there is no suction loop which will trap oil and thus starve the compressor, and ensure that there is always a positive drop to the condensing unit, allowing for all the oil to return back to the compressor sump.

**4.4 COMMISSIONING INSTRUCTIONS.**

Before despatch, the plant completes a pre-delivery check including the following:-

- Leak Testing
- Vacuum Drying
- Initial Charging
- Full Test Run
- Adjustment of Pressure Settings
- Pump Down.

The following installation procedures are required on-site prior to initial start-up:

After mounting the unit and connection of duct work and mains electrical supply to the control panel has been completed, proceed as follows for initial start-up :

1. Evacuate interconnection lines through evaporator service ports. Check for leakage.

**6.2 REPLENISHING REFRIGERANT.**

Refer to Sigma Industries Manual SM227-2160 for full details on refrigerant HFC134a.

"Flashing" in the liquid line sight glass of a previously charged system indicates an inadequate charge of refrigerant and replenishment is accomplished with the plant running.

To replenish proceed as follows:-

1. Loosely connect the charging line from the cylinder of refrigerant to either the suction service valve situated on the compressor or access valves in evaporator. Purge the system.
2. Ensure that the charging line connection to the cylinder is fully secure and that the cylinder is vertical.
3. Tighten the charging valve/charging line connection.
4. Open the charging valve slowly.
5. Add refrigerant until a steady liquid flow in the sight glass indicates a fully charged condition. This can be accomplished by adding a small amount of refrigerant at a time.

**CAUTION: PARTICULAR CARE SHOULD BE TAKEN WHEN  
ADDING REFRIGERANT AS AN OVERCHARGE OF  
REFRIGERANT CAUSES EXCESSIVE HEAD  
PRESSURES WHICH IN TURN CAN CAUSE  
CONSIDERABLE DAMAGE.**

6. Backseat the suction service valve, but do not disconnect the cylinder at this stage.
7. Allow running conditions to stabilise and check the sight glass and discharge pressure. Add more refrigerant should flashing occur.
8. On completion of the replenishment, tightly backseat the suction service valve and remove the charging line. Fit a sealing cap to the line before storing.

## 7.2 TROUBLE ANALYSIS CHART NOTES.

### 7.2.1 Clogged Strainer or Filter.

Occasionally the strainer or filter in the liquid line may become clogged with foreign material left in the system during erection. When this happens, the liquid line leaving the strainer will feel cooler than the liquid entering. If it is badly clogged, some sweat or frost may appear at the strainer. Bubbles in sight glass usually accompany this fault.

### 7.2.2 Thermal Expansion Valve Leaks.

A leaky expansion valve may allow the evaporator to fill with liquid which will be "slugged" into the suction line and into the compressor when the system starts. "Liquid slugging" within the compressor is detrimental to valves, gaskets, etc. and should be avoided.

### 7.2.3 Thermal Expansion Valve Stuck in Open Position.

If the expansion valve is stuck in an open position, there will be an excessive amount of sweating on the suction line and compressor crankcase due to the large amount of liquid being passed into the suction line. Expansion valve should be checked for loss of charge or faulty thermal bulb contact with the suction line.

### 7.2.4 Power Element.

The power element of an expansion valve consists of the thermal bulb, capillary tube and the bellows or diaphragm which actuates the valve pin. If this power element is defective or has lost its charge, the valve will either maintain an almost closed position or may close completely. To test for a defective power element, the thermal bulb should be removed from the suction line and warmed by holding it tightly in the hand. The valve will open if the power element is not defective. If the power element is defective, the valve will remain closed.

### 7.2.5 Thermal Expansion Valve Improperly Adjusted.

If the expansion valve is adjusted for too low a superheat, too much liquid will be passed to the evaporator. The suction line will be abnormally cold and liquid may "slug" back to the compressor. If the expansion valve is adjusted to too high a superheat, too little liquid line be passed to the evaporator and the suction line will be abnormally warm. Superheat should always be adjusted carefully using thermometer and suction gauge.

## **SECTION 9.0    WARRANTY**

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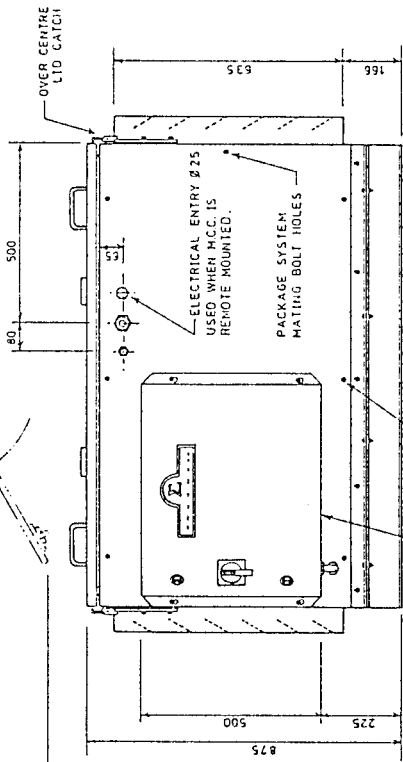
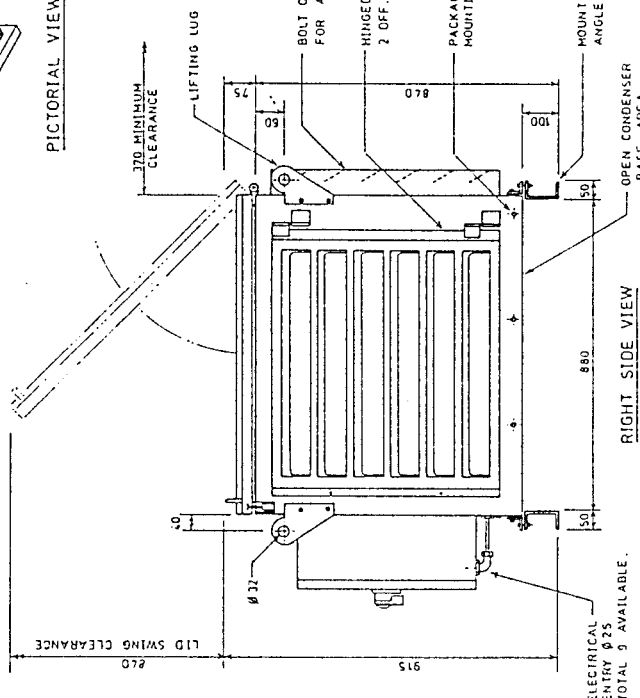
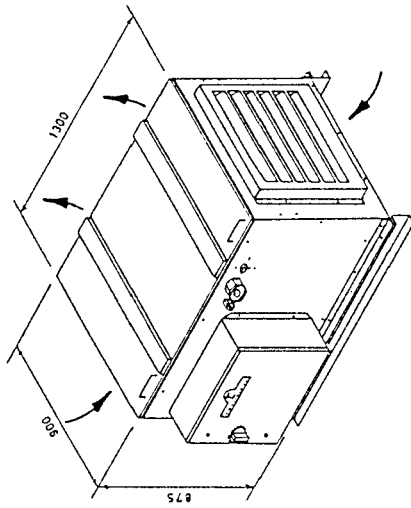
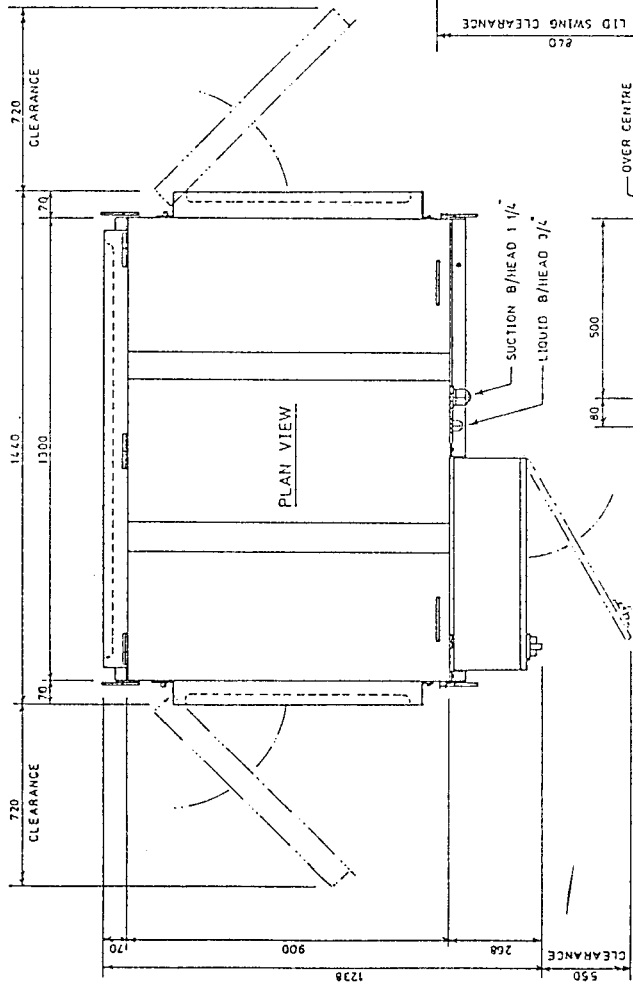
The Sigma units supplied in this instance are covered by the following Warranty Clause:

"We warrant all units to be of good material and undertake to replace any part proven defective in workmanship or material within a period of 12 months from the date of start-up or 15 months from the date of despatch, whichever occurs first. During this warranty period, we will repair or replace, at our option, faulty parts or faulty workmanship without labour charge; should field service be required, travelling time, transport costs including hiring of trucks, fork lift trucks, cranes, mechanical handling equipment and any overtime payment will be to the purchaser's account. This warranty does not cover the fusion of electric motors caused by the failure of electric overload protection control devices, even where such motors or devices form part of the equipment supplied by us. Warranty claims will not be accepted on loss of refrigerant or failure of drive belts during operation. Interference with the equipment by unskilled or unauthorised personnel, alterations to normal factory settings of controls, or failure to observe normal installation, start-up maintenance and/or service instructions as delineated in the appropriate Manual, or as considered normal practice for air conditioning equipment, will void this Warranty. Fair wear and tear, damage by misuse or operating the equipment at ambient temperatures or with electrical power characteristics outside of the ranges indicated in the Specification shall be excluded as shall be consequential damage".

It should be specifically noted that the Warranty is null and void if the units are operated with incorrect electrical characteristics, if the filters are not cleaned as set out here-in and if the control settings are altered from those laid down in this Manual.

DIMENSIONS IN MILLIMETRES

DO NOT SCALE



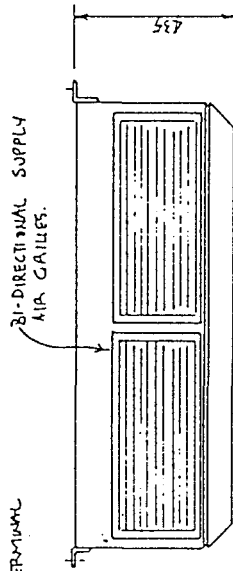
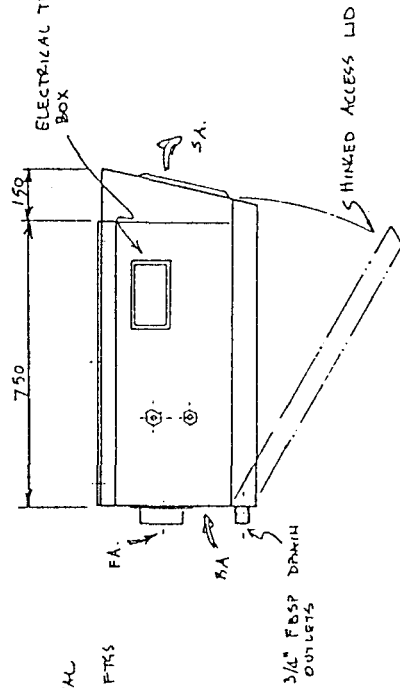
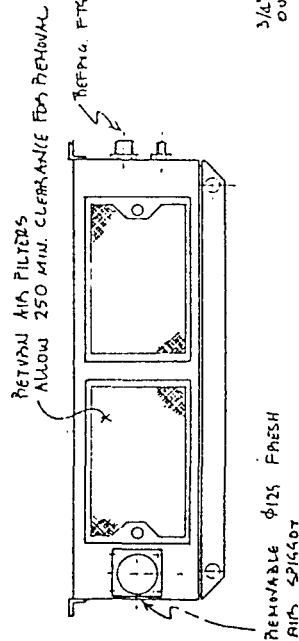
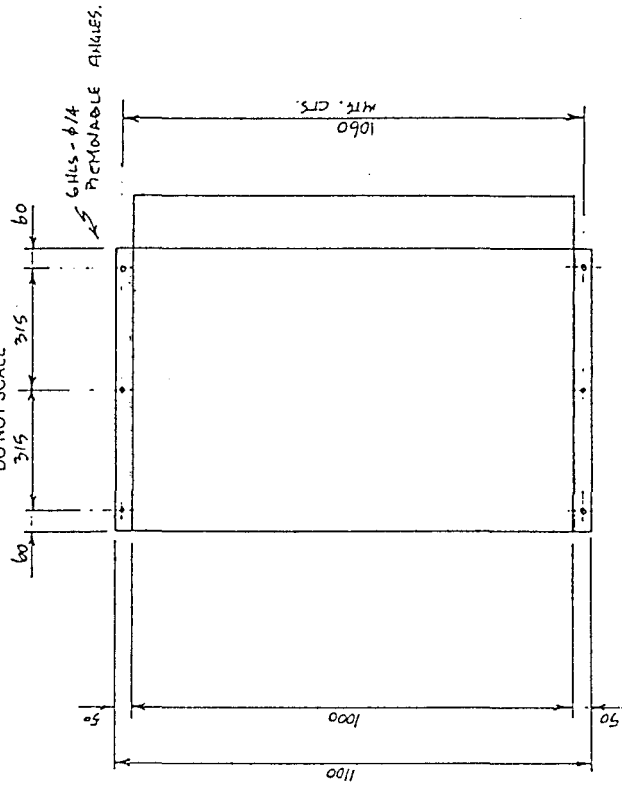
MAIN CONTROL CUBICLE (M.C.C.)  
 (CAN BE REMOTE MOUNTED)

REAR COVER PANEL FASTENING BOLTS,  
 PANEL REMOVED FOR PACKAGE SYSTEM

ITEM	PART NO	DRG NO	DESCRIPTION	QTY
<p><b>ADDITIONAL NOTES FOR TYPICAL INSTALLATION ARRANGEMENTS SEE DRG. T2324005</b></p>				
PHOT	PIWD	SALES	ALL RIGHTS RESERVED	
DATE	4-3-93			
CHECKED				
APPROVED				
SCALE	1:10			
<p><b>Sigma Air Conditioning Pty. Ltd.</b>                  inc. NSW</p>		<p><b>M SERIES - MODEL M20/C, M15/C, M10/C</b></p>		
<p><b>SPLIT SYSTEM CONDENSER PARAMETERS</b></p>		MATERIAL	NEXT ASSY	SHEET OF
		QTY	T 2324 004	A2

DIMENSIONS IN MILLIMETRES

DO NOT SCALE



ISS	CR No	ZONE	AMENDMENTS	BY	DATE
B			PEDRALAJI	T.M.	3/6/81

ADDITIONAL NOTES		ITEM	PART No.	DWG No.	DESCRIPTION	QTY
PROJ.	PROD.	SALES	DATE	CHECKED	APPROVED	SCALE
			24/6/81			
<p>ALL RIGHTS RESERVED</p> <p>© SIGMA AIR CONDITIONING PTY. LIMITED</p> <p>The design and other information is intended only for the purpose for which it is supplied and no other use or any reproduction, copying or communication is permitted without the written permission of Sigma Air Conditioning Pty. Limited</p>						
<p><b>Sigma Air Conditioning Pty. Ltd.</b> INC. NSW</p> <p>PARAMETER DRG FOR CEILING MTD. EVAPORATORS</p> <p>MODEL NO. MFV10M1, MFV10M1, MFCSMT1, M10/11</p>						
MATERIAL		QTY	NEXT ASSY.	SHEET OF		A2
T5025001		110		110		

2.3 EXTERNAL MOUNTED CONDENSER (Refer Drawing T2134017)

MODEL NO		M7-A/C
ITEM	STATUS	DESCRIPTION
Case Construction	STD	Stainless Steel Grade 304
Mounting Type	STD	Roof or floor mounted coil
Cooling Capacity	STD	7 kW
Cooling Capacity (HFC124a)	OPT	5kW (High Ambient)
Coil Construction	STD	BAP - Brass ends/Al fins/Passivated finish
	OPT	BCE - Brass ends/Cu fins/Electrotin finish
	OPT	EPOXY - Coating finish for any coil
Refrigerant (High Ambient Operation)	STD	HFC134a
	OPT	HFC124a
Suction Fitting	STD	-16
Liquid Fitting	STD	-8
Fan Type	STD	Multi Blade Axial - Blow through
	OPT	Multi Blade Axial - Draw through
Fan Motor Type	STD	1 Speed 4 Pole TEAOM Class F
Air Intake Cover	STD	Louvre type
	OPT	Punched grille
	OPT	Mesh wire grille
Compressor Pumpdown	OPT	Automatic on 'OFF' cycle
Compressor	STD	Suction Cooled Semi Hermetic
Crankcase Heater	OPT	Electric Element - Continuous operation
Pressure Gauges	OPT	Oil Dampened HP and LP gauges

The condensing unit (or high side) contains all necessary components, including safety devices to compress the refrigerant gas, condense it to a liquid and store it prior to being supplied to the evaporator unit. Drawings enclosed give details of its overall size, together with clearance required for air entry and discharge and to permit maintenance work to be carried out. The condenser can be located directly to the external evaporator as a package system or remote mounted and connected to either the external or internal evaporators with refrigeration hoses or piping. The Main Control Cubicle can be remote mounted or bolted directly to the unit.

## SECTION 4.0 INSTALLATION AND COMMISSIONING INSTRUCTION.

---

### 4.1 UNIT INSTALLATION.

This section is aimed at being a general guide to ensure that fundamental installation principles are followed. Refer Drawing T2134014 for typical roof top mounting details. Refer to Sigma Industries for complete installation details if required.

#### 4.1.1 Condenser.

The condenser must be located in a position that satisfies the following.

- a) has plenty of fresh air to reduce the possibility of recirculation.
- b) is level
- c) has access for service

It should be located:

- a) as close as possible to the evaporator to reduce hose runs and hence line pressure drops.
- b) in a position where dust build up/fall out is minimal. (Even though we utilise coarse fin pitch, louvres and an open base a clean air environment will decrease maintenance requirements)
- c) with ready access to the electrical cubicle.

Condenser air flow is reversible.

#### 4.1.2 Evaporator.

The evaporator can be ceiling, roof, wall or remotely mounted and any combination of supply and return air options utilised.

For rooftop mounting see Drawing T2134018 for cutout and preparation details.

For correct installation it is most important to ensure that:

- a) space is allocated for service
- b) fresh air inlet is in a clean environment and ideally only ambient air and not pre-heated by a previous process. Dust loading should also be considered
- c) mounting is to a solid and rigid structure

## 5.2 CONTROL INDICATORS.

Each pilot control box is fitted with six lights to indicate operating mode. The lights are fitted with a press to tests facility to check bulbs.

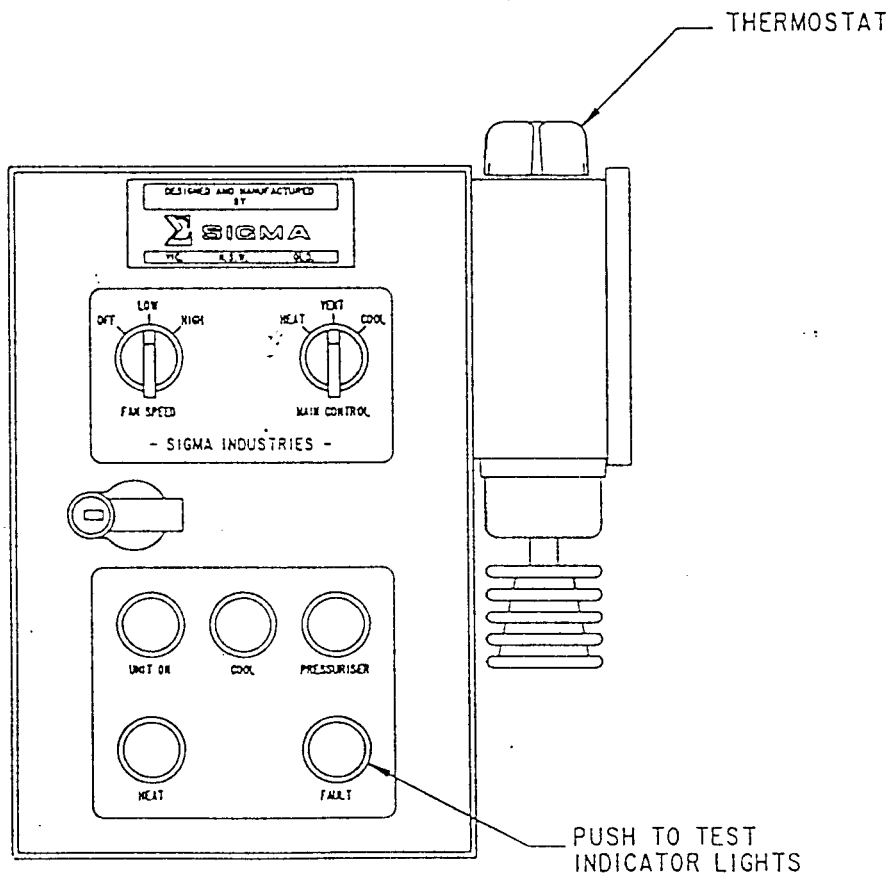
The fault light indicates the following.

- a circuit breaker tripped
- compressor out on HP/LP, oil pressure (when fitted), or compressor internal thermal overload.

NOTE: 1. For compressor fault, fault light will only illuminate when thermostat calls for cooling.

2. As LP is auto-reset fault light may cycle on and off.

Figure 5.0 Pilot Control Box Facia.



7.1.5 Compressor is Noisy Cont'd

	<u>POSSIBLE CAUSE</u>	<u>SYMPTOMS</u>	<u>RECOMMENDED ACTION</u>
6.	Expansion valve stuck in open position.	Abnormally cold suction line, compressor may knock.	Repair or replace
7.	Liquid 'Slug Back'.	Abnormally cold suction line, compressor may knock.	Reset superheat. Valve may be too large or bulb loose on suction line. Air entering evap. coil too cold for complete evap. of liquid. .
8.	Excessive head pressure.	Compressor will knock.	Reduce head pressure. See items under complaint 7.1.7.

7.1.6 System Short of Capacity.

	<u>POSSIBLE CAUSE</u>	<u>SYMPTOMS</u>	<u>RECOMMENDED ACTION</u>
1.	Improper superheat adjustment.	Continuous running. Warm suction High superheat.	Adjust expansion valve.
2.	Flash gas in line.	Expansion valve hisses.	Add refrigerant.
3.	Expansion valve too small.	Continuous running. Low suction, warm High superheat.	Replace with larger valve.
4.	Expansion valve stuck on obstructed.	Continuous running. Low suction, High Superheat.	Repair or replace.
5.	Clogged strainer.	Cold liquid line beyond strainer. Bubbles in sight glass.	Clean or replace.
6.	Excess pressure drop in evap.	Superheat too high.	Adjust expansion valve.
7.	Ice or dirt on evap. coil.	Reduced air flow.	Clean coil or defrost. Check suction press.
8.	System short of refrigerant.	Low suction pressure. Continuous running.	Check system. Find and repair leak. Add refrigerant.

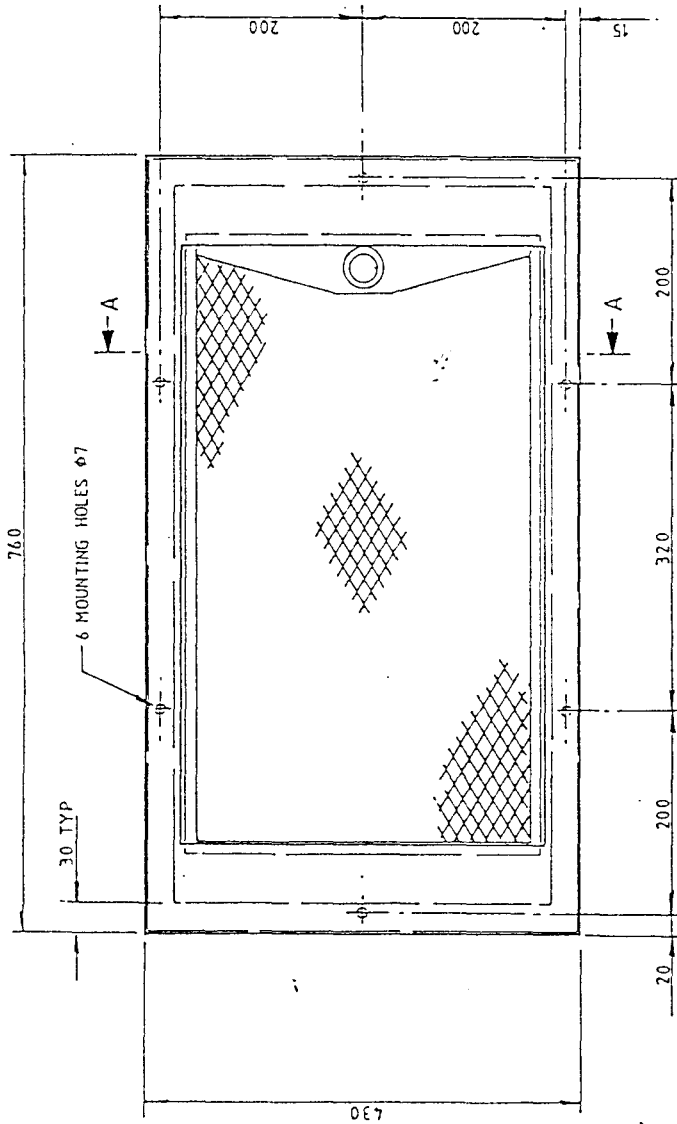
8.3 Condenser Units Spare Parts. Cont'd.

8.3.2 Fan/Motor and Casing.

MODEL NUMBER				M7-A/C
DESCRIPTION	STATUS	LOCATION	QTY	PART NO.
Fan (Blow Through)	STD	Fan/Mtr	1	UF125
Fan (Draw Through)	OPT	Fan/Mtr	1	420165
Condenser Fan Motor	STD	Fan/Mtr	1	310114
Cond. Fan Motor (2 Speed)	OPT	Fan/Mtr	1	319070
Cond. Fan Motor Mount	STD	Case	1	AS213242
Access Lid	STD	Case	1	AS213411
Lid Buffer	STD	Case	2	971160
Lid Seal	STD	Case	3.3	862217
Hinge Pin	STD	Case	2	872884
Lid Prop	STD	Case	2	AS207013
Lid Prop Pivot	STD	Case	2	AS207054
Vent Panel (Louvre)	STD	Case	2	S2134043
(Punched Grille)	OPT	Case	2	S2134037
(Mesh Grille)	OPT	Case	2	AS213458
Louvre (Coil Cover)	STD	Case	1	AS502913
Antivibration Mount (Comp)	STD	Case	4	UC269
Overcentre Catch	STD	Case	2	UC310
Mounting Channel	STD	Case	2	AS2134104
Tie Plate (package)	OPT	Case	2	S2134087

DIMENSIONS IN MILLIMETRES

DO NOT SCALE



SECTION A-A

6

5

4

3

2

1

A

B

C

D

ITEM		PART No.	DRG. No.	DESCRIPTION	QTY.
<b>Sigma Air Conditioning Pty. Ltd.</b> Inc. NSW					
DRAWN		AJB	M7 and M10 RETURN AIR PLENUM		
DATE		12. 6. 91			
CHECKED					
APPROVED		<i>[Signature]</i>			
SCALE		1:5			
MATERIAL					
NEXT ASSY.		AS502919			
SHEET OF					
T 2134 009					
A3					

ADDITIONAL NOTES

PROT. PROD. SALES

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ISS C.R No. ZONE AMENDMENTS BY DATE



# CONTENTS

## **FIRE INDICATOR PANEL PLACING INTO OPERATION**

1. DESCRIPTION \*
2. MULTIPLE 8070
3. MOUNTING
4. MAINS CONNECTION
5. DETECTOR WIRING
6. COMMON FACILITIES & ANCILLARY WIRING
7. COMMON ALARM OUTPUTS
8. BATTERY CONNECTION
9. SETTING UP
10. SWITCHING ON
11. LABELLING

## **FIRE INDICATOR PANEL INSTRUCTIONS TO OPERATORS**

12. DESCRIPTION OF SYSTEM
13. SPECIFICATIONS
14. OPERATION UNDER ALARM CONDITIONS
15. OPERATION UNDER FAULT CONDITIONS
16. OPERATING INSTRUCTIONS & ROUTINE/TEST PROCEDURE
17. ACTION IN THE EVENT TO AN ALARM
18. ACTION IN THE EVENT OF A FAULT ALARM

(VII) The Plant Monitoring system has facilities for Momentary or Latched Fault and Tripped indication.

Designated P.F. and P.T., respectively, on the Motherboard, they are factory set to Momentary indication, and Latching indication respectively. (O)

(VIII) For multiple 8070 systems observe the master and slave motherboard jumper selection. (P)

Replace the Power Supply heatsink assembly and connect the Transformer Secondary to the Termination board terminal strip. Connect the Cable (D).

The colour code is as follows:-

Top	8 Orange
	9 Blue
	6 Yellow
	5 Red
	4 Black
	3 Black
	2 Brown
Bottom	1 Brown

Replace cable (C). Ensure it is fully home and the ejector clips lock over the top of the strain relief on the connector.

Place circuit cards in position and lock the guides over cards. (E)

Place the 50 way cable into the retainer at the top of the cabinet and secure. (A)

## 10. SWITCHING ON

Temporarily remove connection to Brigade, Bell and Plant Shutdown.

Connect the batteries - audible Sounder will be activated with the main door open. Press sounder isolate to silence the audible alarm. If this does not, check the cabling between the key pad and Motherboard.

The following indicators should be lit:

1. Bell isolated plant isolated-flashing
2. Sounder Isolated
3. Plant Fault - plant disconnected
4. Battery Fault - batteries below 22 volts

Now switch the power on.

The 'power on' indicator should now be lit.

Adjustment of Plant Fault window can now be made. Suggested settings are for lower limit with 200 ohm installed from Plant Master Output, to +24V, and the upper limit set for 1K.

Adjustments are 2R28 for upper limit and 2R33 for lower limit.

Depending on equipment connected, these levels may not be suitable, and so identification of required levels must be obtained.

If in doubt contact the factory.

### TEST THE SYSTEM

Leave the main door half open.

See keypad identification. Fig. 10.

Press button Alarm Zone 1, then button Alarm Test until Alarm Zone 1 Alarm and Common Alarm light illuminates, this will take approximately 2.5 secs.

- (c) Circuit cards on Motherboard removed (except those that have had their jumper plug removed).
- (d) If the main cable connecting the two main circuits is not fitted (or fitted incorrectly).
- (e) Cable between keypad and motherboard not fitted correctly.

Accompanied by Fault Sounder.

**PLANT ISOLATED YELLOW**

Indicator illuminates when the door is opened.

**BELL ISOLATED YELLOW**

Indicator illuminates when the door is opened.

**PLANT TRIPPED RED**

Indicator illuminates when the Master Relay is energised, i.e. Alarm condition, when the door is closed.

**PLANT FAULT YELLOW**

Indicator illuminates when any of the following occur:-

- (a) Plant supervisory wiring is removed or open circuit.
- (b) Plant supervisory wiring is short circuit.
- (c) PLANT TRIPPED relay is short circuit.

Accompanied by Fault Sounder.

**ROUTINE TEST PROCEDURE**

The following test procedure should be carried out weekly :-

- (1) Observe the front of panel and check that the "POWER ON" lamp is illuminated.
- (2) Open the main door. Bell and Plant Isolated indicators will illuminate (plant flashing).
- (3) Press "BATTERY TEST" button and observe battery fault indicator. If illuminated this should be regarded as a fault.
- (4) With the door open, press alarm zone number push button then alarm test button and check that the appropriate 'RED' alarm and common alarm indicators are illuminated. Alarm Test Button will require pressing for a period of 2-5 seconds.  
However, if AZMII is installed and Alarm Verification Feature is activated, you will hear two relay click sound separated approximately 15 seconds apart. Then you have to press Alarm Test Button for another 2-5 seconds before you can get the above indicators illuminated. The total time delay in that case is approximately 22 seconds. Please refer to CIRCUIT DESCRIPTION for AZMII for detail.
- (5) Press the "RESET" button and red indicators should be cancelled.
- (6) Communicate with Brigade for confirmation and completion of test (see 3).
- (7) Log the test results and the number of the alarm zone. A different alarm zone should be tested daily in rotation.

9.

## SYSTEM COMPONENTS

FFE Fire Indicator Panel 8070 series

Hochiki SLK-A Photo-Optical Smoke Detectors

Hochiki SIH-A Ionisation Smoke Detectors

FFE Stop Gas/Manual Release Station

FFE "Evacuate Area" Signs

FFE "Gas Discharge Do Not Enter" Signs

REDFORD C2028 Horn Speaker

FFE/KIDDE 45 kg CO2 Cylinders

KIDDE 270157 Cylinder Support Brackets

KIDDE 872450 Discharge Head Plain Nut

KIDDE 890181 Electric Control Head 24 Volt D.C.

KIDDE 873752 Pressure Switch

KIDDE 251821 Gas Discharge Hoses

KIDDE 930067 VENT NOZZLES (under floor space)

KIDDE 919309 VENT NOZZLES (room space)



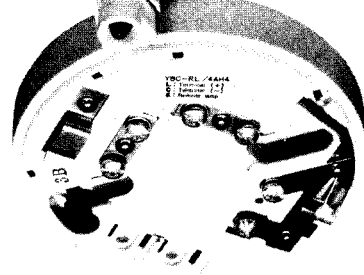
## YBC-RL/4AH4 YBA-R/3A COMMON MOUNTING BASE

Hochiki—the problem-solver.

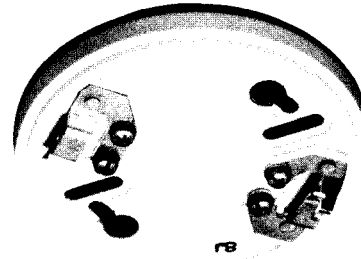
Hochiki's thoroughgoing technology in the field of smoke and heat detection has solved yet another problem — that of having to change the base everytime you wish to change the type of detector head you are using in your detector system layout — with development of its common mounting base. Hochiki's Common Mounting Bases — Model YBC-RL/4AH4 and Model YBA-R/3A — afford complete interchangeability of all Hochiki detector heads to save you time, manpower and cost in whatever changes you wish to make. But these are only several of their many outstanding benefits. Other benefits are listed below for your consideration.

### Both models share many identical features

1. In addition to allowing easy interchangeability of all Hochiki detector heads, these common bases have a mounting pitch that ranges from 48 to 72mm so they can be easily installed on any kind of outlet box. In addition, they are lightweight and have a wafer-like thinness that minimizes their protrusion from the ceiling once installed.



YBC-RL/4AH4

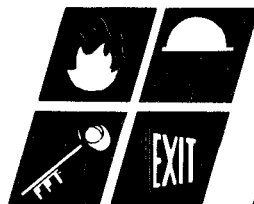


YBA-R/3A

2. Solderless lugs enable quick, easy and secure wiring; while bayonet slots permit immediate connection and/or disconnection of detectors to the bases.
3. Both models are fully monitored for disconnection-wiring and the availability of two models gives the user a choice of a base with or without a built-in alarm indicator lamp to more adequately meet different alarm system requirements.
4. Apart from having these outstanding features in common, Model YBC-RL/4AH4 with LED alarm indicator lamp also has built-in holding and noise-suppression circuitry for use in heat and other kinds of detector system applications, S-terminals for remote indication and a mounting arrangement of the LED alarm indicator lamp.

Recommendation: Impedance of detection circuit of control panel is Approx. 330ohm.

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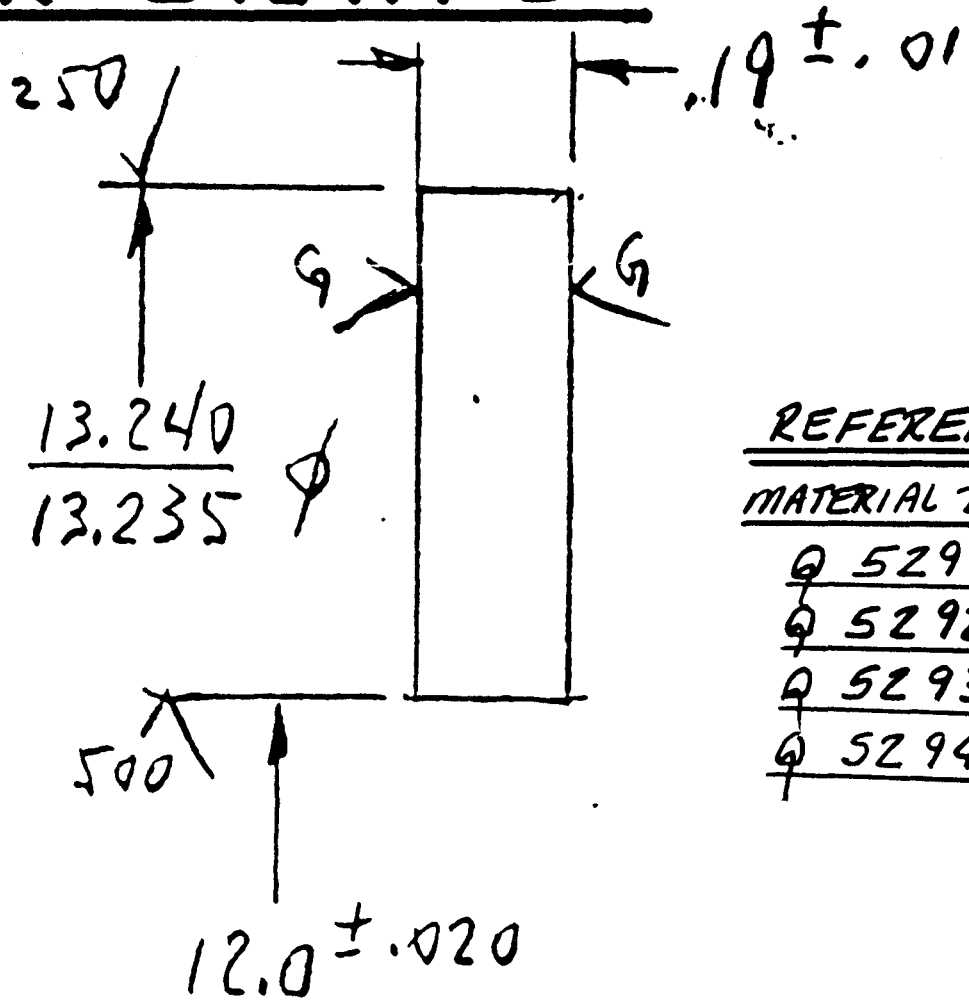


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AREA CODE 08

# SPACER~892919-0



REFERENCE
MATERIAL DEVIATION
<u>Q 5291</u>
<u>Q 5292</u>
<u>Q 5293</u>
<u>Q 5294</u>

CRT PRINTOUT ON MSY4 - 02/09/93 13:56:11.  
 PROD CODE 892919-0 DEPT: QUANT: 01 T/C: GS PAGE 01  
 RL- OS- PS-  
 PART DESC K87529 PINION SPACERS STD/REP: C AUD-FLAG: A  
 OPER LINE COMPONENT PART DESC & SIZE U/M DEST QTY/REQ O/H-STATUS  
 10 0000A 853368-6 4-1/2X60X20FT F PLATE 14.500 X 14.500 PC 0090 1.00  
 \*\* END OF B-O-M RECORDS \*\*

CRT PRINTOUT ON MSY4 - 02/09/93 13:56:25.  
 PROD CODE 892919-0 PART DESC: K87529 PINION SPACERS T/C RT PAGE  
 ORIG: 02/04/93 S/R: C MAT: F AUD.FLAG: A NDC  
 OPER LINE TOOL DEV STD-HRS DESCRIPTION TOOLING  
 10 90 408 7882 .900 BURN 13 3/4 OD X 11 1/4 ID, \*892919-REM  
 110A STAMP ID \*  
 120 90 434 0000 .120 SMOOTH UP \*  
 130 94 080 0000 .063# STRESS RELIEVE \*  
 140 002 171 7877 6.300 BORE 12.0 DIA PLUS OR MINUS \*  
 140A .020, TURN 13.240/13.235 DIAM.  
 140B CUT-OFF TO .250 THICK, 6 PIECES.  
 150 0 0 2669 2.400 SURFACE GRIND TO .190 THICK, \*  
 150A PLUS OR MINUS .010, 6 PCS, BSE.  
 155 004 0 0000 1.000 INSPECTION CHECK \*

*Blue*  
 2/9/93

## APPLYING THE TORQUE MACHINE — SL/XL Series

Place the proper size impact socket on the square drive and secure properly with a locking ring and pin.

**NOTE:** The **HYTORC** Model HY-10SL does not have a hole in its drive for a locking pin.

Place the tool and the socket on the nut making sure that the socket has fully engaged the nut and that the square drive is fully into the socket.

Make sure the reaction arm is firmly abutted against a stationary object (i.e. an adjacent nut, flange, equipment housing, etc.)

**IMPORTANT:** When positioning the wrench, make sure that the hose connections from the tool do not hit a stationary object prior to the reaction arm abutting against its reaction point as this may result in snapping a hose connection.

Apply momentary pressure to the system to ensure proper tool placement.

## OPERATING THE TORQUE MACHINE — SL/XL Series

By pushing down on the remote control button, the rear of the tool will be pushed back until its reaction arm will contact its reaction point. Continue to hold down the button as the socket turns until you hear an audible “click” which will signify that the hydraulic cylinder inside the tool is fully extended and will not turn the socket further. There will be a rapid buildup of pressure to the point of where the pressure was preset prior to applying the wrench.

**IMPORTANT:** This rapid buildup of pressure **after** the cylinder is extended **DOES NOT INDICATE** that this pressure (torque) is being applied to the bolt. It only indicates that the cylinder is fully extended and cannot turn the socket further until the tool automatically resets itself.

Releasing the remote control button will retract the cylinder, and the tool will automatically reset itself and the operator will hear an audible “click” indicating he can again push the remote control button and the socket will turn. Each time the cylinder is extended and retracted, it is called a cycle. Successive cycles are made until the tool “stalls” at the pre-set PSI/Torque with an accuracy of  $\pm 3\%$ .

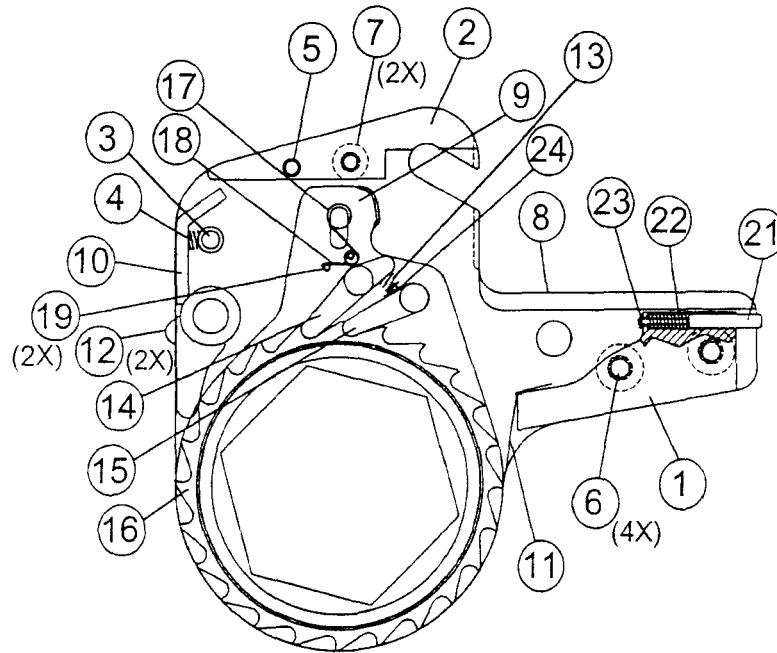
**IMPORTANT: ALWAYS ATTEMPT ONE FINAL CYCLE TO INSURE THE “STALL” POINT HAS BEEN REACHED.**

Should the tool “lock on” after the final cycle, push down on the remote control button once more (to build pressure) and while maintaining this pressure pull back on the release mechanism. Releasing the remote control button while continuing to hold back on the release mechanism will allow the tool to be removed easily.

## **PREVENTIVE MAINTENANCE —Hydraulic Power Packs**

**HYTORC's** Hydraulic Power Packs are precision-built hydraulic units and, as such, do require a certain amount of care and maintenance.

- 1) **Hydraulic Oil:** Oil should be completely changed after every 40 hours of operation, or at least twice a year. Always make sure the reservoir is filled with fluid. If additional oil is required, use only high-grade hydraulic oil, such as SHELL Tellus 46.
- 2) **Quick-Disconnects:** Fittings should be checked periodically for leaks. Dirt and foreign materials should be kept away from fittings. Clean before use.
- 3) **Hydraulic Gauge:** **HYTORC** Gauges are liquid filled. Should this liquid level drop, it indicates external leakage, and replacement is necessary. Should the Gauge fill with hydraulic oil, it indicates internal failure and should be discarded.
- 4) **Filter on Pump:** The filter should be replaced twice a year for normal use, and more often if Pump is in daily use.
- 5) **Directional Control Valve:** Should malfunctioning occur, disassemble, inspect, and clean.
- 6) **Motor:** (Air and Electric) The motor shaft and bearings should be flushed and lubricated once a year.
- 7) **Remote Control:** (Air Unit) The air line to the remote control unit should be checked for obstructions or kinks in the line periodically. If there is a bend or break in the line, it must be replaced. The spring-loaded buttons on the remote handle should be checked in the event of operating difficulties.
- 8) **Air Valve:** This valve should be checked twice a year.
- 9) **Brushes and Brush Holders:** (Electric Unit) Check and replace, if worn.
- 10) **Armature:** (Electric Unit) Check yearly.
- 11) **Pumping Unit:** The Pumping Unit should be overhauled every 2 years. This can be done by **HYTORC** or by a qualified hydraulic service center.



## XLCT HEX LINK PARTS LIST

NO.	DESCRIPTION	14XLCT	30XLCT
1	REACTION BLOCK SPACER	XLCT-14-45	XLCT-30-45
2	TOP SPACER	XLCT-14-46	XLCT-30-46
3	REACTION PAWL SPRING SPACER	XLCT-14-47	XLCT-30-47
4	REACTION PAWL SPRING	XLCT-14-37 HX	XLCT-30-37 HX
5	SIDE PLATE ROLL PIN	XLCT-14-48	XLCT-30-48
6	SIDE PLATE SCREW BOTTOM	XLCT-14-50	XLCT-30-50
7	SIDE PLATE SCREW TOP	XLCT-14-51	XLCT-30-51
8	SIDE PLATE * #	XLCT-14-52	XLCT-30-52
9	DRIVE PLATE *	XLCT-14-35	XLCT-30-35
10	REACTION PAWL *	XLCT-14-36	XLCT-30-36
11	SHROUD *	XLCT-14-43	XLCT-30-43
12	SHROUD SCREW	XLCT-14-44	XLCT-30-44
13	DRIVE PAWL SPRING	XLCT-14-27 HX	XLCT-30-27 HX
14	DRIVE PAWL PRIMARY	XLCT-14-22 HX	XLCT-30-22 HX
15	DRIVE PAWL SECONDARY	XLCT-14-23 HX	XLCT-30-23 HX
16	HEX RATCHET *	XLCT-14-28 HX	XLCT-30-28 HX
17	DRIVE PIN	XLCT-14-33	XLCT-30-33
18	DRIVE PIN SPRING	XLCT-14-34	XLCT-30-34
19	DRIVE SPRING ROLL PIN	XLCT-14-32	XLCT-30-32
20	LINK PIN SHORT >	XLCT-14-10	XLCT-30-10
20	LINK PIN LONG +	XLCT-14-11	XLCT-30-11
21	PIN RETAINER BUTTON	XLCT-14-56 HX	XLCT30-56 HX
22	PIN RETAINER SPRING	XLCT-14-57 HX	XLCT-30-57 HX
23	PIN RETAINER CLIP	XLCT-14-59	XLCT-30-59
24	SPRING SEAT	XLCT-14-49	XLCT-30-49

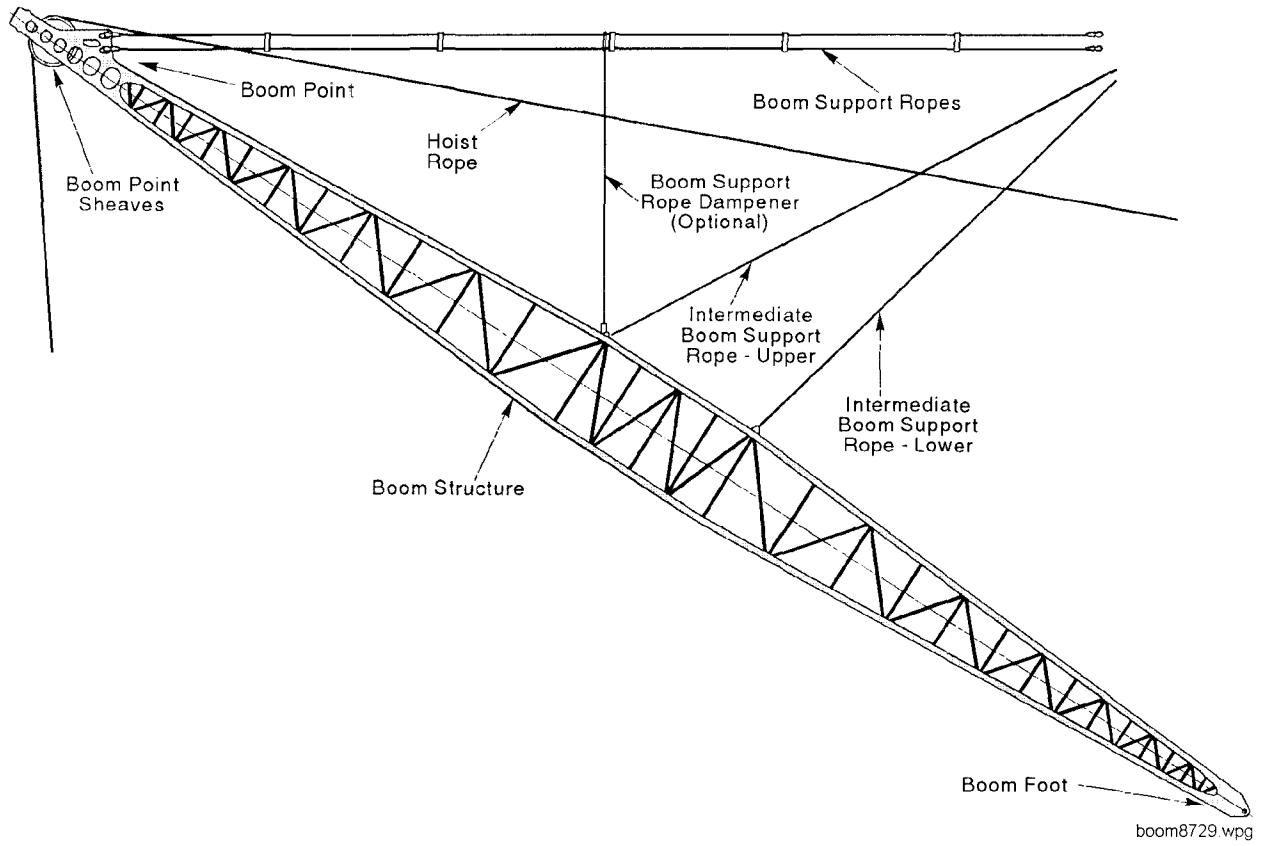
\* DESIGNATE A.F. SIZE OF THE RATCHET

# DESIGNATE LEFT OR RIGHT SIDE PLATE

> HEX LINK USED WITHOUT HEX LINK REACTION PAD

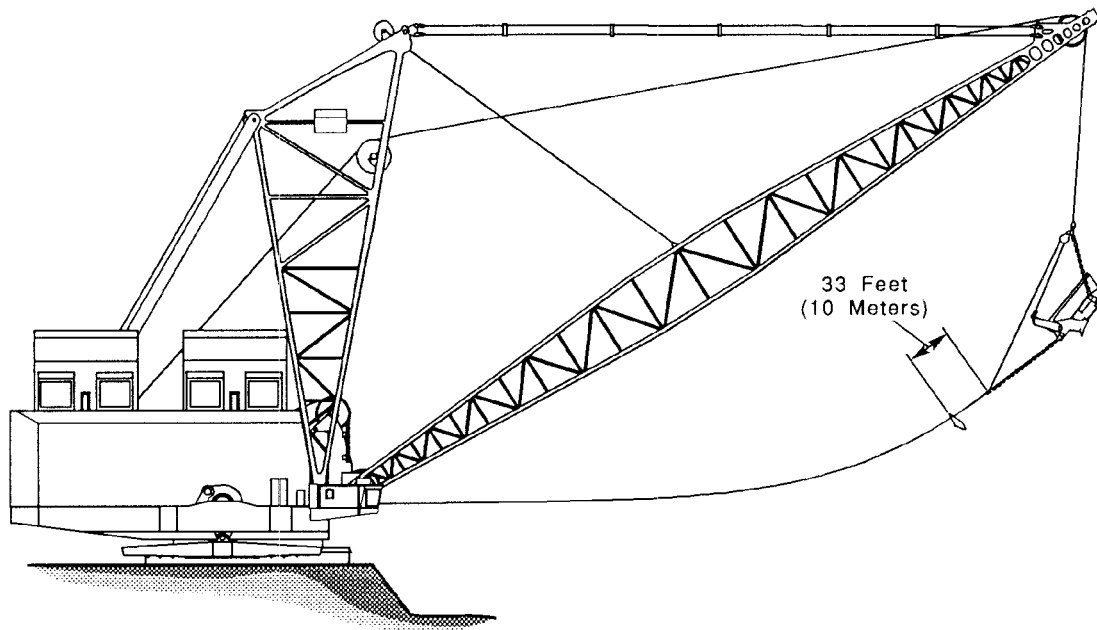
+ HEX LINK USED WITH HEX LINK REACTION PAD

- If a heavy item begins to fall, let it fall, don't try to catch it.
- When disassembling machine, be sure to use safety stands and adequate cribbing to prevent tipping or rollover of components.
- Keep work area organized and clean. Wipe up oil or spills of any kind. Keep tools and parts off of the ground. Eliminate the possibility of a fall which could result in serious injury.
- Floors, walkways and stairways must be clean and dry. After draining operations be sure all spillage is cleaned up. Electrical cords and wet metal floors make a dangerous combination.
- Check all wire ropes for telltale signs of early wear or failure. Look for and secure any loose bolts or locking devices.
- Use extreme caution while working near any electrical lines or equipment whether it be high or low voltage. Never attempt electrical repairs unless qualified. Check limit switches for proper operation.
- When using an acetylene torch, always wear welding goggles and gloves. Keep a "charged" fire extinguisher within reach. Be sure the acetylene and oxygen tanks are separated by a metal shield and are chained to the cart. Do not weld or heat areas near transformers or electrical cabinets and utilize proper shielding around lubrication lines.
- Use pullers to remove bearings, bushings, gears, cylinder sleeves, etc. when applicable. Use hammers, punches and chisels only when absolutely necessary. Then, be sure to wear safety glasses.
- Be careful when using compressed air to dry parts. Use approved air blow guns, do not exceed 30 PSI (207 kPa), wear safety glasses or goggles and use proper shielding to protect everyone in the work area.
- Be sure to promptly reinstall safety devices, guards or shields after adjusting and/or servicing the machine.
- After servicing, be sure all tools, parts or servicing equipment are removed from the machine, or secured in an appropriate storage area.
- Protective eye goggles should be worn at all times when working on the air conditioning system. Work on the air conditioning system only in a well ventilated area.
- Wipe away excess lubricants around bearings and gears. Never lubricate parts in motion.
- Operate machine on level ground and be constantly aware of swing clearance. Never hold a load longer than needed in the dump cycle. Use swing brakes only when machine is stopped.



**8750 BOOM ASSEMBLY**





lmtdg828 wpg

## DRAG LIMIT

*To set the drag-in limit:*

1. Tie a flag on the drag rope 10 meters from the crow's-foot socket and drag in the rope until the flag touches the lower fairlead sheave.
2. Set the hoist and drag brakes.
3. Place the drag controller to drag in and turn the rope zero switch to DRAG. Hold for 5 seconds. The OIT will indicate "10".
4. To set the drag-out limit, payout the drag rope until 2 turns of rope remain on the drum and repeat step 2.
5. Place the drag controller in the drag-out position and turn the rope zero switch to DRAG. Hold for 5 seconds. The OIT will indicate the length of rope payed out in meters.

After completing the above steps, the drag in and out limits are set and the machine can be returned to service.

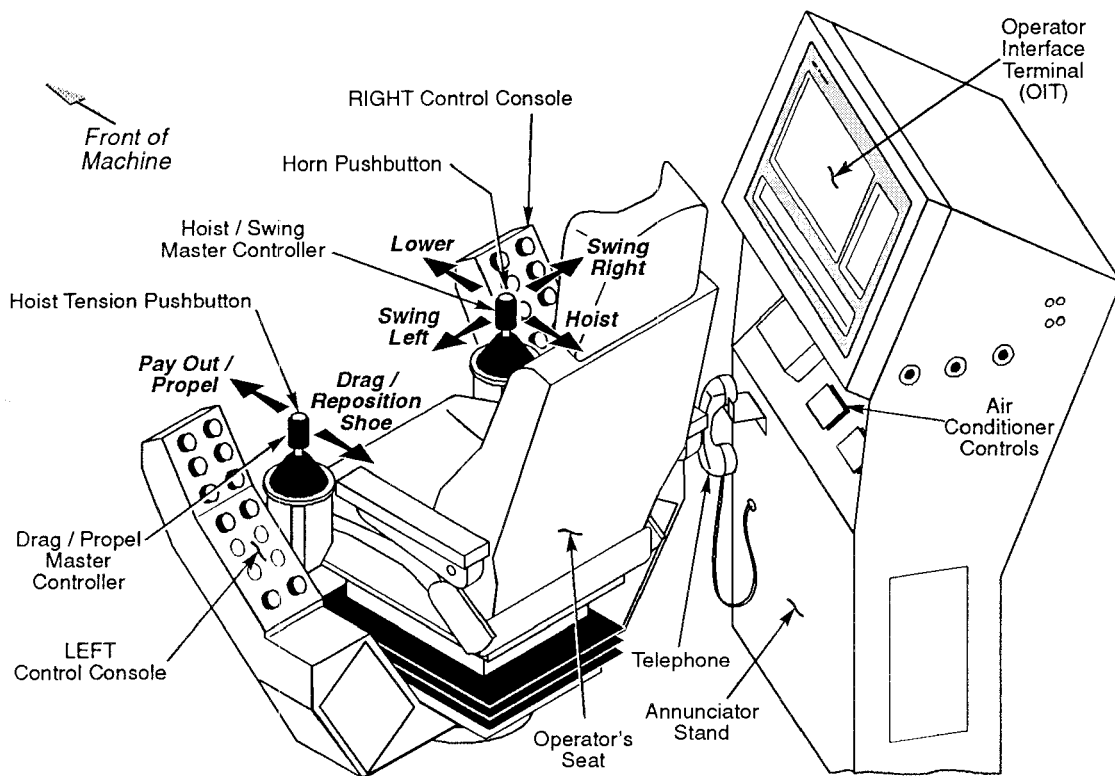


**IMPORTANT NOTE:** If the vacuum breaker for the synchronous motor on the M-G set does not stay closed when the start button is released, repeated attempts to start the set should not be made. On a motor of this type, Nema standards permit two successive starts if the motor is at ambient temperature. Before attempting another start, the vacuum breaker starting circuitry or mechanism should be inspected by qualified personnel and its proper operation verified.

5. Start the Machinery House Filter Fans. Move the selector switches to the *START* position momentarily and release. This will start the bleed duct fans. In approximately 5 seconds the main fans will automatically start and then the selector switch will light up. These fans introduce clean air into the machinery house to cool the dragline operating equipment. They also maintain a positive pressure within the house to prevent dust entry if all the access doors are kept closed.
6. When the above systems have been started and are operating correctly, go to the Operator's cab.
7. Sit into and adjust the operators seat.
8. Check the Hoist, Swing, Drag, and Propel Brake selector switches. If they are not at their *SET* positions, put all of them there now, even if the red light in the switch is on.
9. Check to be sure that the hoist and drag controllers are in their *NEUTRAL* position.

**IMPORTANT NOTE:** This machine is equipped with an electronic rope limit control system. This system is designed to aid the operator in avoiding serious mechanical damage to the machine due to hoist or drag bucket overtravel or bucket tightlining. However, the system is not a substitute for careful operating procedures. The rope limit control system should be verified for proper operation on a daily basis. It is **EXTREMELY** important that the system be recalibrated after any rope or bucket rigging changes have been made. Refer to the MARION Protection System operation manual for proper procedures.

10. Note the air pressure on the main screen of the operator's OIT. The air pressure must be a minimum of 90 PSI or a fault will be announced on the OIT and an alarm will sound when LE is energized. The air system pressure should be from 100 to 120 PSI during machine operation.



### PRIMARY OPERATOR CONTROLS

As the first walking step commences and the shoes move off their *PARK* position, the swing and hoist brakes will automatically set if they had not already been set manually. During extended travel over long distances, it sometimes becomes necessary to alter the direction of travel or reposition the bucket. This can be done without transferring to the *DRAG* mode. Stop the walking shoes in their *PARK* position. Check that the *CLEAR TO SWING* indicator is lit and the drag/propel brakes are set. Release the Hoist and/or Swing brakes then press the *EXCITATION ON* pushbutton. To continue propelling, set the hoist and swing brakes, release the drag/propel brakes and press the *EXCITATION ON* pushbutton.

During walking, if a ground roll develops at the front edge of the tub, "heel" the bucket for a couple of steps. If the tub roll persists, swing the machine 30°-40° to one side and propel 1 or 2 steps. This will spread the roll over the ground. Then return to the line of travel desired.

When the machine is walking, both shoes should contact the ground at the same time. If one of the shoes sets down on a high spot, or does not contact the ground, or steps into a soft ground area that will not support it, then the machine will rotate in relation to the tub if the walking step is completed. If this occurs and the operator can, he should stop the step before the machine is lifted and reverse the shoes up to top dead center position. He can then change machine travel direction with the swing motion and walk around the problem ground area.

<b>NAME OF PART</b>	<b>TYPE</b>	<b>NO. OF POINTS</b>	<b>LOCATION</b>	<b>LUBE SYM.</b>	<b>METHOD &amp; FREQUENCY</b>
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### CENTER JOURNAL

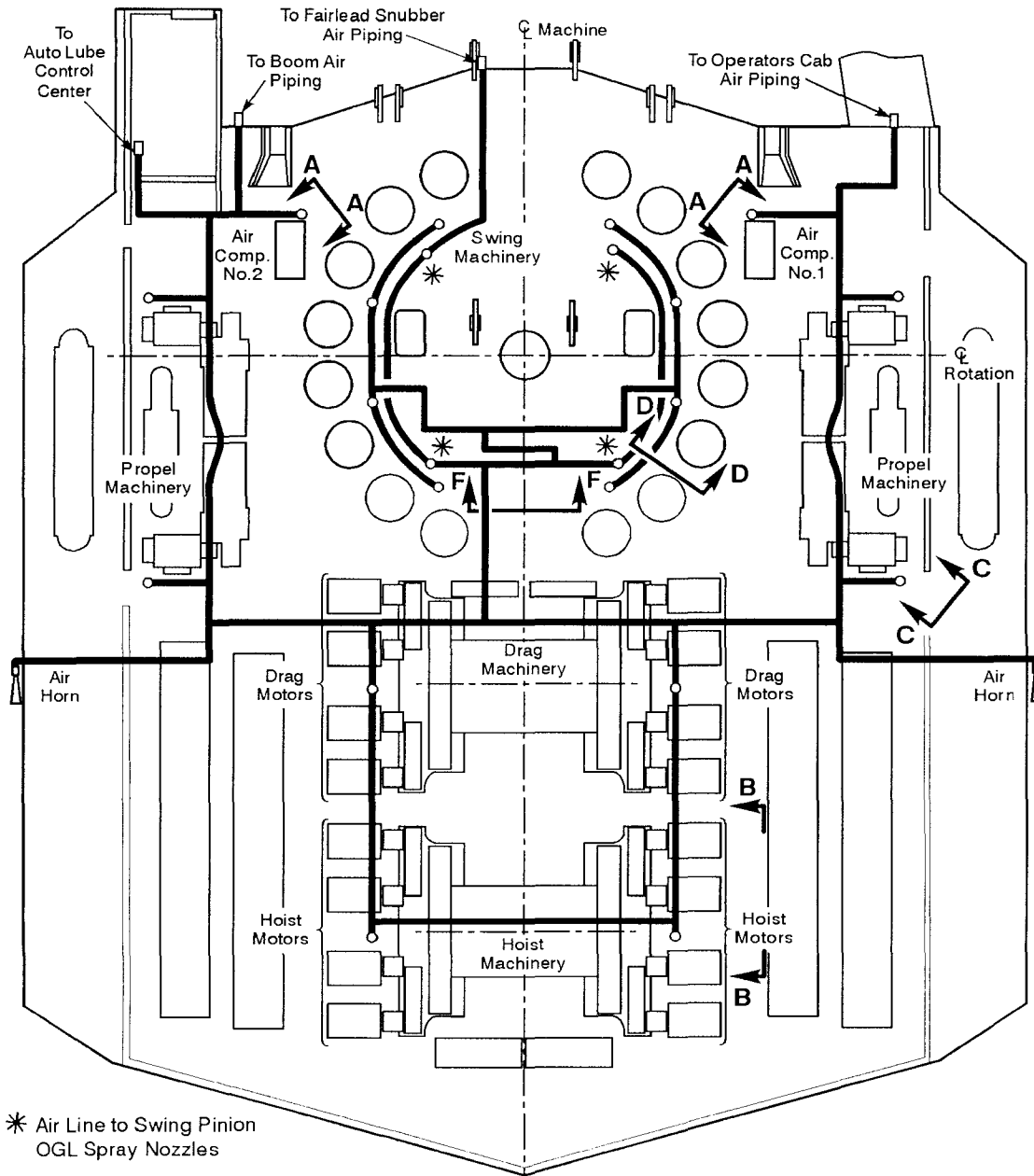
Center Journal Bearing	Anti-Friction	4	In top of Bearing Housing	MPG	Automatic
Center Journal Bushing	Bushing	8	In top of Bearing Housing	MPG	Automatic
Main Collector Ring Bottom Bushing	Bushing	2	O.D. of Housing	MPG	By hand, 500 hours
Main Collector Ring	Thrustwasher	2	Thru insulator support inside cabinet	MPG	By hand, 500 hours
Main Collector Ring Top	Oilite Bushing	1	In top of Housing	---	Self lubricating
Auxiliary Collector Ring	---	1	---	---	None req'd

### ROTATING MACHINERY

Main Rotating Gearcase	---	16	Fill to oil level in side of case.	HGL	Check weekly 52 gal. per gearcase (197 liters)
Main Rotating Pinion Shaft Top Bearings	Anti-Friction	16	Through Pinion Housing	MPG	Automatic
Main Rotating Pinion Shaft Bottom Bearing	Anti-Friction	16	Through Pinion Boss	MPG	Automatic
Rotating Motor Coupling	---	16	Plug in Coupling Flange	MPG	3 months, by hand
Rotating Pinion and Gear	---	16	Spray	OGL	Automatic
Pinion Shaft Support Shoe	---	32 (2 per Shaft)	Through Top of Shoe	OGL	Automatic

NOTES:

- All piping shown is below deck.
- For Views A-A, B-B, C-C and D-D refer to the following pages.



airp8729.wpg

**PIPING, COMPRESSED AIR SYSTEM**

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