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Technical Manual

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- 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.

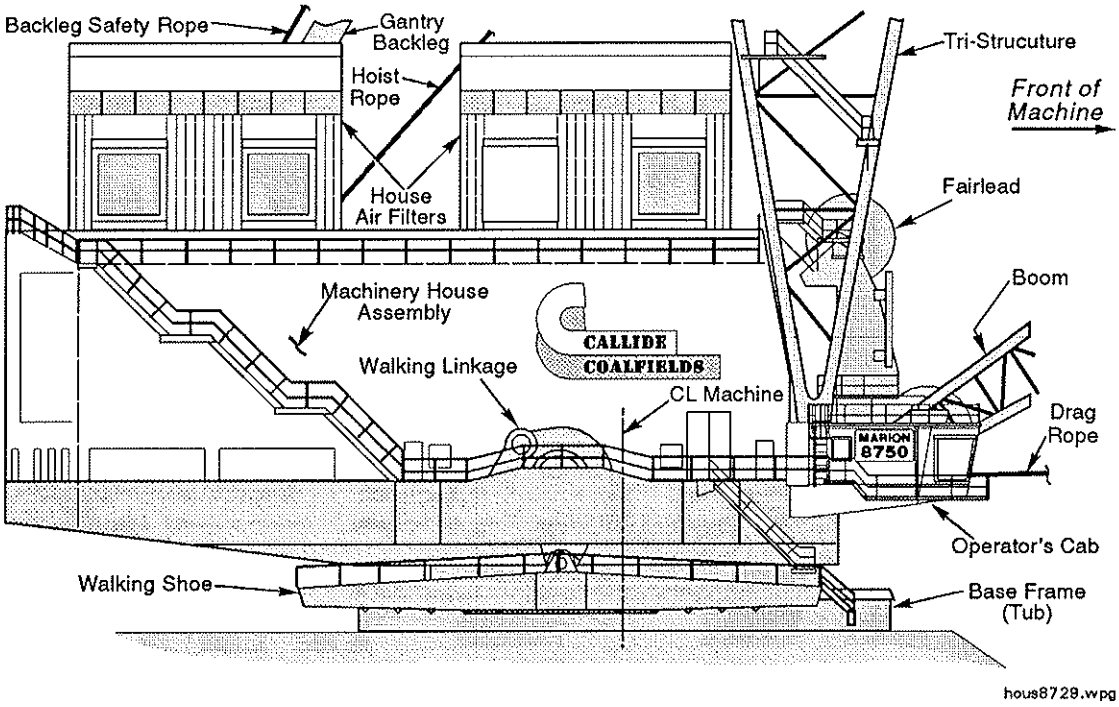
- Be sure to promptly reinstall safety devices, guards or shields after adjusting and/or servicing the machine.

- 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 MACHINERY HOUSE

The operators cab has a phone system connected to receivers located at strategic points inside the machinery house and around the machine. This system provides easy communication between persons in the cab and elsewhere about the machine.

A combination heater-defroster/air conditioning unit is mounted on the cab roof. Ducts from it to the floor area surround the operator for comfort and visibility. The control for this unit is on forward side of the operators cab rear wall.

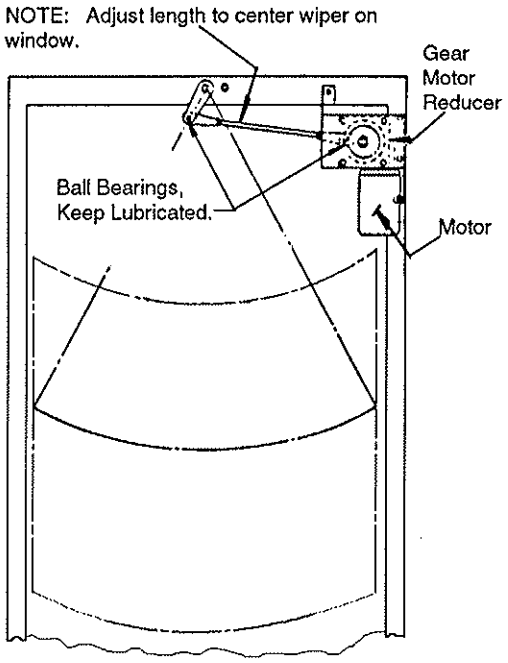
The ceiling, walls and floor of both rooms are insulated. Adequate lighting is provided and the control switches are conveniently placed. The vinyl covered ceiling and walls are easily cleaned. The floor covering deadens sound and is easily maintained.

The front windshield is sloped out at top to reduce reflection, dirt adherence, and rain streaks. The safety-glass area extends from the cab floor to almost ceiling level for boom and ground visibility. The electric motor driven windshield wiper has a 64 inch wiping ability.

WINDSHIELD WIPER

The Windshield Wiper is controlled by an on/off selector switch located on the left control panel. This switch has an interlock so that the wiper cannot be turned on with the window in the up position. The motor and gear reducer mounts on the upper right hand corner on the inside of the window. Adjust the rod from the gear reducer to center the wiper blade on the window.

Maintain pressure of the wiper on the glass with the adjusting nut on the spring rod located at the top of the wiper arm on the outside of the window.



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WINDSHIELD WIPER MECHANISM

The components on the OIT are:

DISPLAY SCREEN - The particular computer program that is presently accessed is shown on the display screen. Each display on the OIT has unique indicators shown across the screen above function keys F1 through F10 that clearly label each key's function in that particular program.

26/10/93 MARION	K-87529, CALLIDE COALFIELDS PTY.LTD.	14:51:38 MARION

8750 DRAGLINE
INTEGRATED MONITOR AND CONTROL SYSTEM

PRESSURE		GENIUS		ROPE LENGTH	
SYSTEM AIR	105.0 PSI	BUS CHAN #1	OK	HOIST	33.44 METERS
HIBS #1	3000.0 PSI	BUS CHAN #2	OK	DRAG	42.66 METERS
HIBS #2	3005.0 PSI	COMMUNICATIONS	OK	TOTAL	76.00 METERS
HIBS #3	2899.0 PSI				
HIBS #4	3102.0 PSI				

LH SHOE POSITION = 1 DEG	SHOE ERROR = 5 DEG	RH SHOE POSITION = 6 DEG

EVENT MONIT.	TEMP MONIT.	BOOM RSE/LWR	PROPEL MONIT.					HELP	SET CLOCK
F1	F2	F3	F4	F5	F6	F7	F8	F9	F10

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Sample **OIT MAIN MENU SCREEN**

FUNCTION KEYS - These are used by the operator to send instructions to the computer. Keys F1 through F10 are clearly labeled on the screen above them as to their function in each program.

When in the main screen, the F10 function key is used to set the time or date. When in other screens, the F10 function key will return the CRT to the previous screen. Pushing the F10 function key repeatedly will return the CRT to the main screen or show the viewer all the screens available. Any program available can be located in this manner by the operator.

OPERATION

A typical lube cycle operation for any of the circuits occurs in the following manner:

When a cycle is initiated by the Programmable Controller (PC), manually, or when LE is energized - the appropriate lube pump air valve solenoid and system directional valve solenoid are energized. Air to the pump causes the pump to pump lubricant to the distribution injectors. As the lubricant pressure builds in the supply line, the injectors operate and push a metered amount of lubricant to the bearings, bushings, or open gearing. The lubricant pressure continues to build until it is sufficient to close the contacts in the pressure switch(es) in the system. When these contacts close, the controller de-energizes the air valve, shuts off the pump and vents the lube supply line to the reservoir. The lubricant pressure in the system decreases, allowing the injectors to recharge for the next cycle.

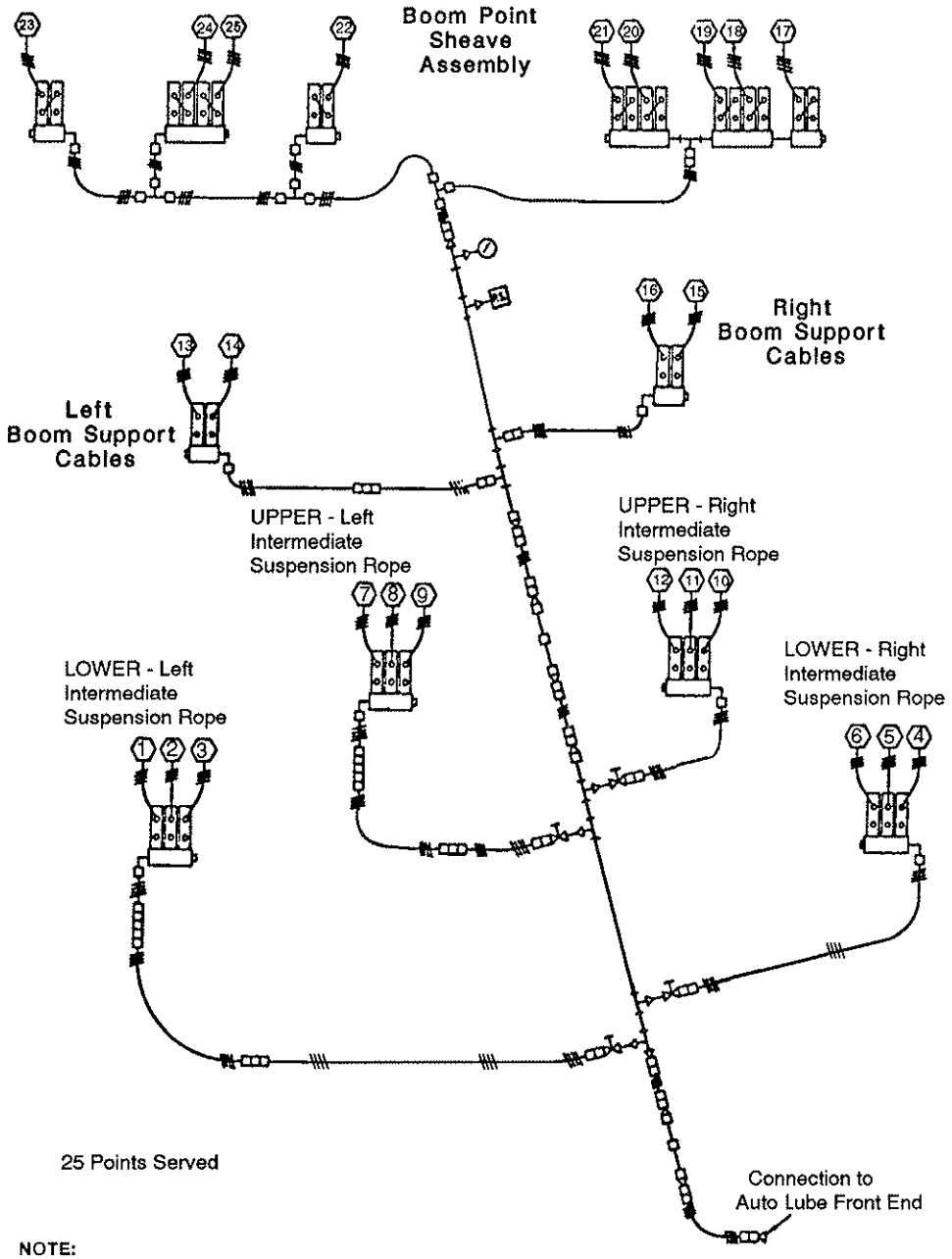
IMPORTANT NOTES on SYSTEM OPERATION

- ✓ A cycle time is the interval between the initiation of lube cycles. The cycles will continue as long as LE is energized and *NO* fault is detected in the lube supply circuit.
- ✓ The lube system Programmable Controller (PC) is programmed to operate the MPG, WCL and OGL circuits.
- ✓ In the propel mode the programmable controller will cycle the rotating frame (MPG) line B, the propel bearing (WCL) lines 1 & 2 and the open gear (OGL) line B circuits.
- ✓ In the dig mode the programmable controller will cycle the front end (MPG) line A, the rotating frame (MPG) line A and the open gear (OGL) line A circuits.
- ✓ A pressure switch located in each line terminates the lube cycle when the maximum operating pressure is reached.
- ✓ If any automatic lubrication supply circuit is operating at the time the machine's drive system control is changed from DRAG to PROPEL, DRAG to BRAKES SET, etc., the circuit(s) operating will complete its (their) cycle before being deactivated.

Any of the lubricant supply circuits can be cycled *MANUALLY* when power is *ON* the control panel, regardless of the machine control mode selection. The pushbuttons on the front of the control panel are used for manual operation. Manual operation of a lube supply circuit is useful for purging the lube lines, supplying additional lubricant to components or investigating a fault. It can also be used to verify or clear a fault. For manual operation, select the circuit desired on the auto lube control cabinet. Push the Manual Cycle *START* button to start the lube cycle. More than one lube supply circuit can be operated at the same time.

Once activated manually, a lube supply circuit will run until one of the following occurs:

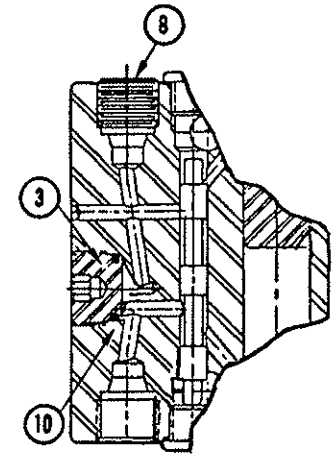
a. The contacts in the pressure switch(es) in the operating circuit *CLOSE*.
b. The alarm time for that system is exceeded and a fault is indicated.
c. The power button (No. 1) is pushed.



Auto Lube Schematic, FRONT END ~BOOM (MPG) *Line-A*

LUBE DISTRIBUTOR

1. Discharge bore plug
2. Double outlet porting plug
3. Single outlet porting kit
4. Visual indicator kit
5. Copper washer - main bore
6. Copper washer - pilot piston
7. Inlet bore plug
8. Hex. sock. pipe plug
9. O-Ring seal
10. O-Ring seal
11. Indicator stem
12. Spiral pin



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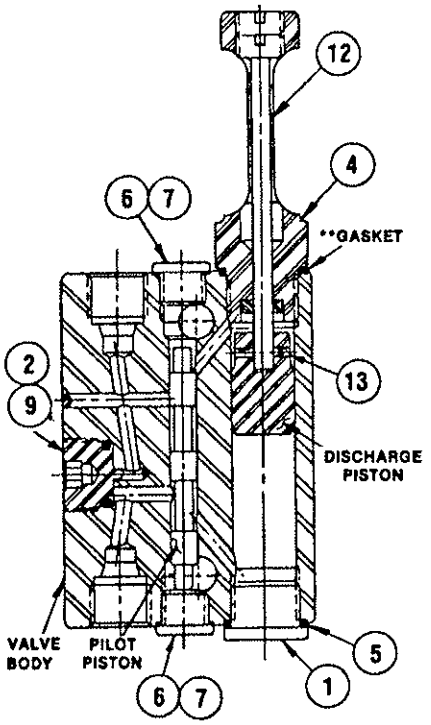

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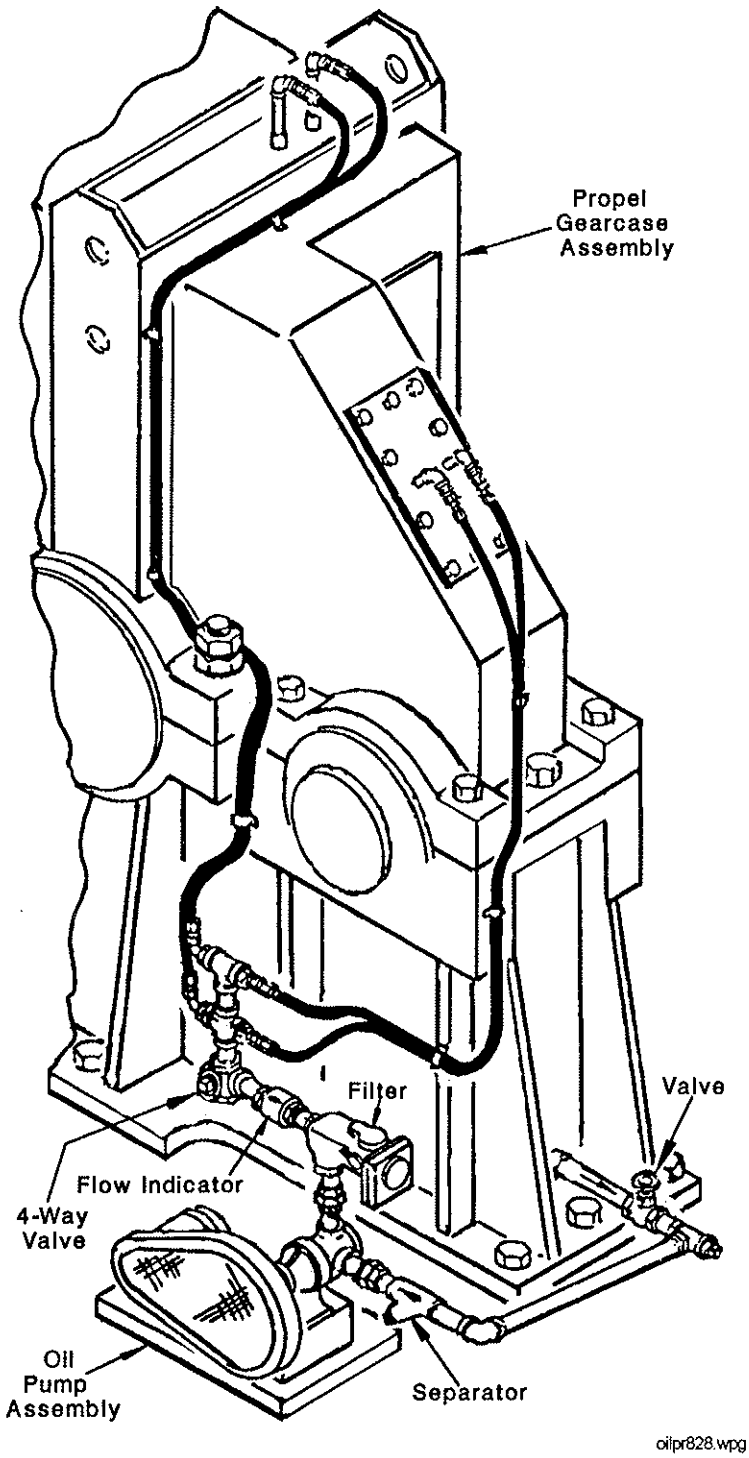
** Gasket is included with item 4.

Valve with Indicator Stem and Adjustment



LUBE SYSTEM ~PROPEL GEARCASE
(Typical)

Tighten the locknut to 100 Ft.Lbs. This is equal to a 100 Lb. load applied 1 foot from the locknut. Bend one tang of the lockwasher into the slot of the locknut. If the tang does not line up with the slot, tighten the locknut until it does. Failure to tighten the locknut or engage the lockwasher tang could result in early bearing failure and cause damage to the rest of pump.

Remove the length of hardwood or brass from port opening. Adjust the pump end clearance. Refer to "Thrust Bearing Adjustment".

Lubricate the grease fitting over the seal chamber with petroleum jelly, petrolatum (Vaseline) or other similar low melting point lubricant. Lubricate all other grease fittings with multipurpose grease, NLGI #2.

DANGER: BEFORE STARTING THE PUMP, BE SURE ALL DRIVE EQUIPMENT GUARDS ARE IN PLACE. Failure to properly mount guards may result in SERIOUS INJURY or DEATH.

THRUST BEARING ADJUSTMENT

1. Loosen the setscrews over the outer and inner end caps. Two for H and HL size pumps, 4 for all other sizes.

2. Turn the inner end cap clockwise, viewed from shaft end, until it projects slightly from the bracket, exposing approximately 3 threads.

3. Turn the outer end cap clockwise until the rotor is tight against the head and the rotor shaft cannot be turned.

4. Make a reference mark on the bracket end, opposite a notch on the outer end cap. Back off outer end cap 9 notches.

5. Tighten the inner end cap with a spanner wrench. Tap the spanner wrench lightly but *DO NOT OVER TIGHTEN* as it will only damage the threads.

6. Tighten all setscrews that hold the inner and outer end caps to prevent their turning in the bracket.

7. The rotor and shaft should turn smoothly by hand 1 complete revolution. If the rotor and shaft don't turn smoothly, go back and repeat Steps 1 through 7.

LUBRICATION

- Thrust Bearing . . . . . MPG
- Seal Chamber . . . . . Petrolatum, Mobil Mobilarma 355 or equal

NOTE: Lube both areas every 500 hours.

Insufficient Liquid Delivered:

1. Air leaks in the inlet line.
2. Air leaks through the mechanical seal.
3. Speed too low.
4. Excessive lift at the inlet. Check this with a gauge at the pump inlet.
5. Viscosity of the liquid is too high for the size and length of the inlet pipe.
6. Foot valve or the end of the inlet pipe not immersed deeply enough into the liquid.
7. Foot valve, if used, too small, stuck or not working properly.
8. Partial air pockets or vapor lock.
9. Pump damaged by foreign matter or misalignment.
10. Excessive clearance in the pump caused by wear or corrosion.
11. Relief valve set too low, or stuck partially open.

Pump Takes Too Much Power:

1. Speed too high.
2. Liquid more viscous than previously anticipated.
3. Operating pressure higher than specified. Check this with a gauge at the pump outlet.
4. Outlet line obstructed.
5. Mechanical defect, such as a bent shaft, packing gland too tight or misalignment of the piping.
6. Relief valve not operating properly.

STANDARD LUBRICATION INSTALLATION

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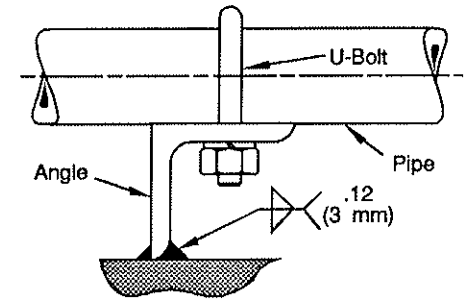

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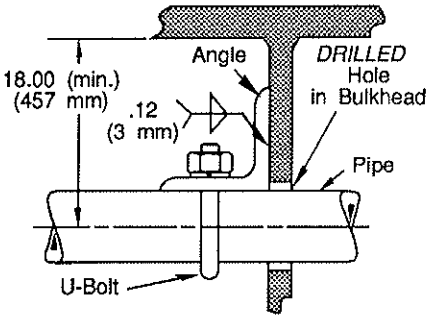

PIPE MOUNTING ~TYPICAL

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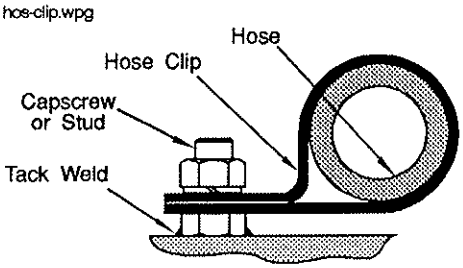
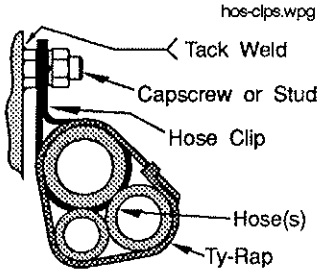


*Every 3 feet, or as required.

hos-clps.wpg

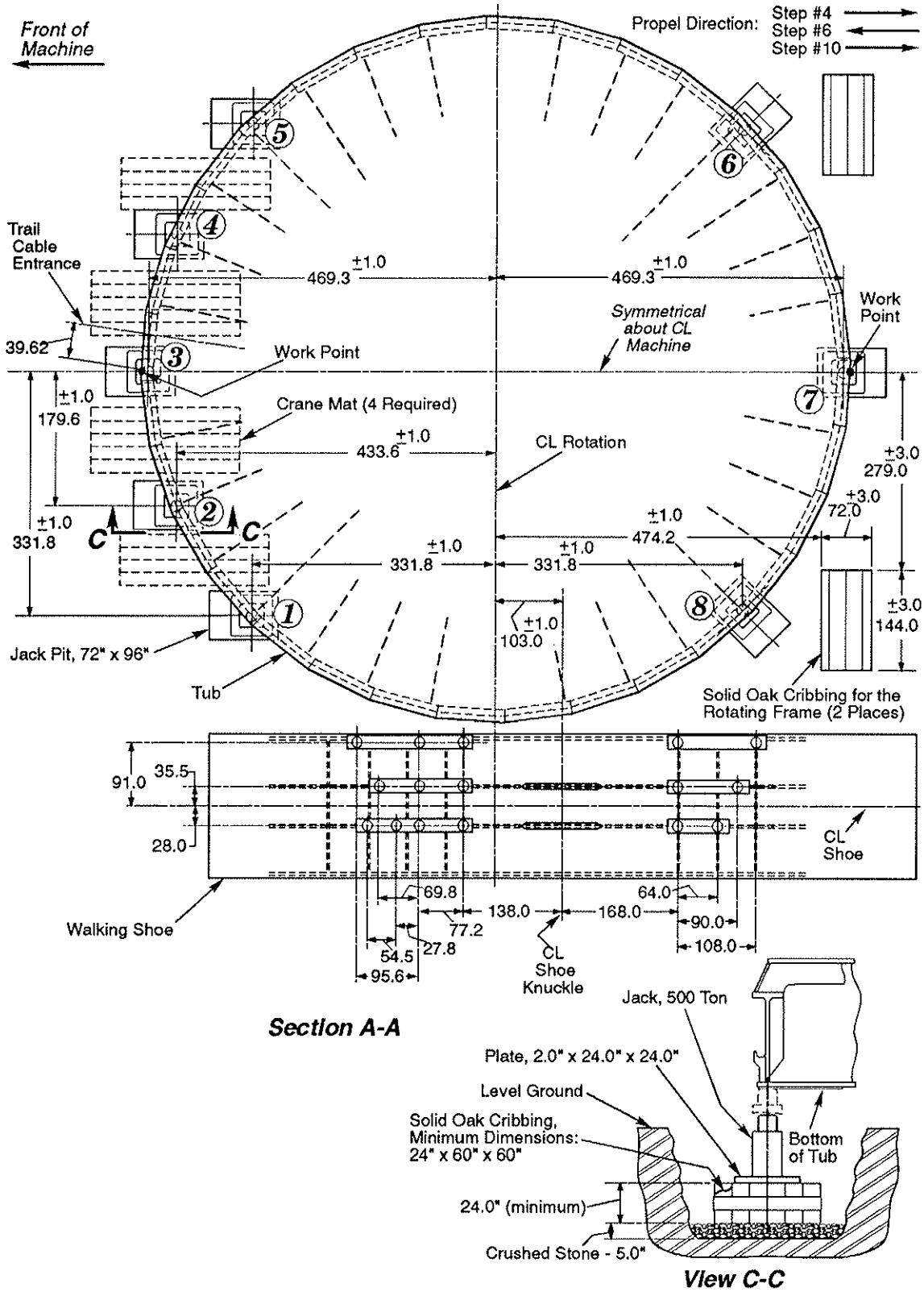


NOTE:

For more than one hose, clip one and secure the others to the 1st with Ty-Raps.

HOSE MOUNTING ~TYPICAL

NAME OF PART	TYPE	NO. OF POINTS	LOCATION	LUBE SYM.	METHOD & FREQUENCY
Boom Raising Sheaves (in Rope Assembly)	Bushing	2	In hub of sleeve	MPG	By hand, 6 months and before use.
Intermediate Support Ropes	Bushing	4	Sheave Hub	MPG	Automatic
Boom Raising Sheaves (Front)	Bushing	2	Sheave Hub	MPG	By hand - 6 months and before use.
Boom Raising Sheaves (Rear)	Bushing	2	Sheave Hub	MPG	By hand - 6 months and before use.
Hoist Deflecting Sheaves	Anti-Friction	2	End of Shaft	MPG	Automatic
Foot Pins	Plain	2	End of Pin	MPG	By hand, 150 hours
Backleg Pins	Plain	4	At gap between parts	MO	By hand, 150 hours
Hoist Deflecting Sheaves	---	2	Spray	WRL	Semi-Auto, 8 Hrs.
BOOM					
Point Sheaves	Anti-Friction	2	End of shaft	MPG	Automatic
Front Trunnion Bearing Block	Bushing	2	In hub of bearing block	MPG	Automatic
Rear Trunnion Bearing Block	Bushing	2	In hub of bearing block	MPG	Automatic
Rear Trunnion Thrust	Thrust Washer	3	In hub flange of brg. block	MPG	Automatic
Upper and Lower Intermediate Boom Support Systems	---	2	Boom and Machinery Deck	PO	60 gallons each reservoir


Front of Machine
Propel Direction:
Step #4
Step #6
Step #10
Trail Cable Entrance
469.3 ±1.0
469.3 ±1.0
Symmetrical about CL Machine
Work Point
39.62
Work Point
±1.0
179.6
Crane Mat (4 Required)
433.6 ±1.0
CL Rotation
±3.0
279.0
±3.0
72.0
±1.0
331.8
C
C
±1.0
474.2
±1.0
331.8
±1.0
331.8
±1.0
103.0
±3.0
144.0
Jack Pit, 72" x 96"
Tub
Solid Oak Cribbing for the Rotating Frame (2 Places)
91.0
35.5
28.0
CL Shoe
Walking Shoe
69.8
64.0
138.0
168.0
77.2
27.8
54.5
95.6
90.0
108.0
CL Shoe Knuckle
Section A-A
Jack, 500 Ton
Plate, 2.0" x 24.0" x 24.0"
Level Ground
Solid Oak Cribbing, Minimum Dimensions: 24" x 60" x 60"
Bottom of Tub
24.0" (minimum)
Crushed Stone - 5.0"
View C-C

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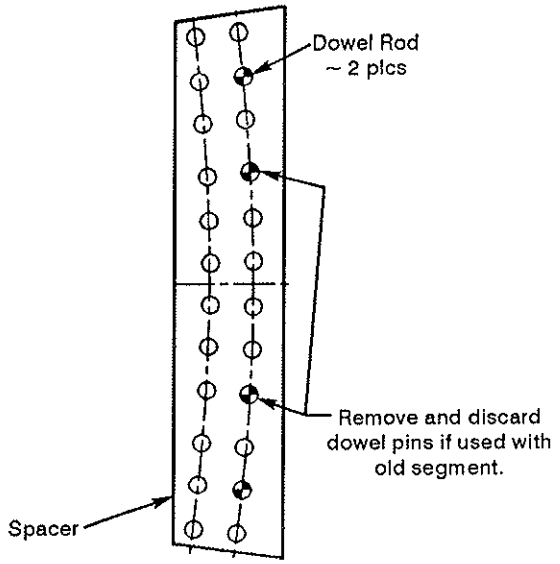

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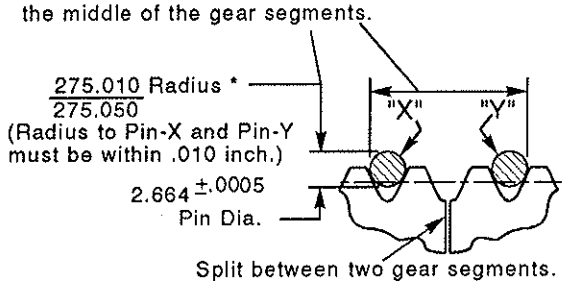
View C-C
SPACER

For NEW gear segments, the measurement over pins is $9.899^{\pm.005}$.

When aligning used segments, the measurement over pins at the split MUST be within .010 inch of the measurement taken at the middle of the gear segments.



* To ensure concentricity of the gear segments about the center journal, a tram is required. The Marion Part number is J-18188.

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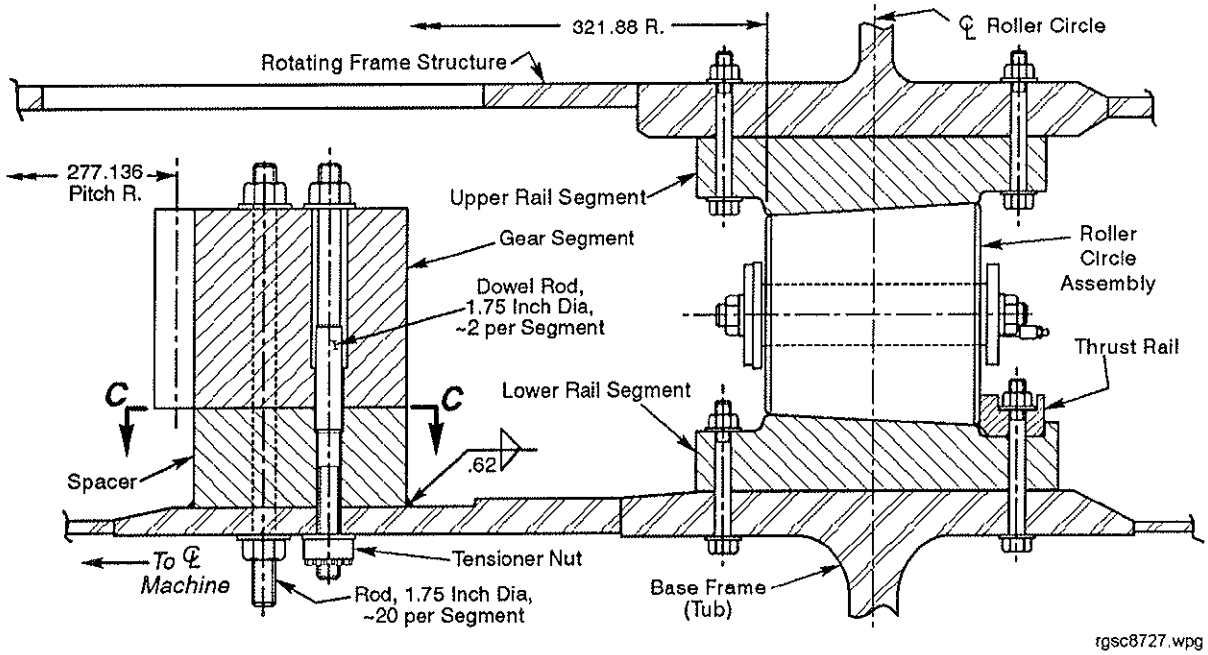
View - B
ACROSS-SPLIT MEASUREMENT



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Section A-A
RAILS and GEAR SEGMENTS

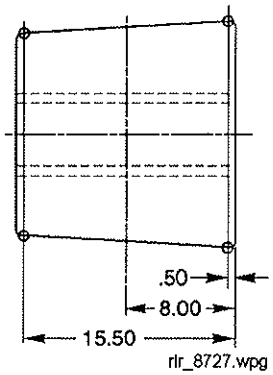
ROLLER CIRCLE

The *ROLLER CIRCLE* contains *122* tapered steel rollers. The rollers are held in place by retainers, splice bars and a thrust rail.

NOTE: To prevent damage to rails or other rollers, immediately remove a roller from the roller circle if it becomes chipped, broken or damaged in any way.

Remove the roller by rotating the machine until the damaged roller is directly below *one of the roller removal holes* in the rotating frame. Remove the 2 rods which secure the roller in the cage. Use suitable tongs or a sling to lift the roller from the roller circle.

The replacement roller diameter must be within ±.001 inch of the adjacent roller diameter. Measure the adjacent rollers in the locations shown and machine the new roller(s) as required. Apply a coating of grease paste to the surfaces indicated in the roller figures. Lower the new roller into place and install the retainers with capscrews. Make sure that the large end of the roller is toward the outside of the roller circle. Install the 2 mounting rods but *DO NOT* tighten. Rotate the machine to seat the roller against the thrust rail and align the pin. Tighten the rods to specification.



Measuring Roller Diameter

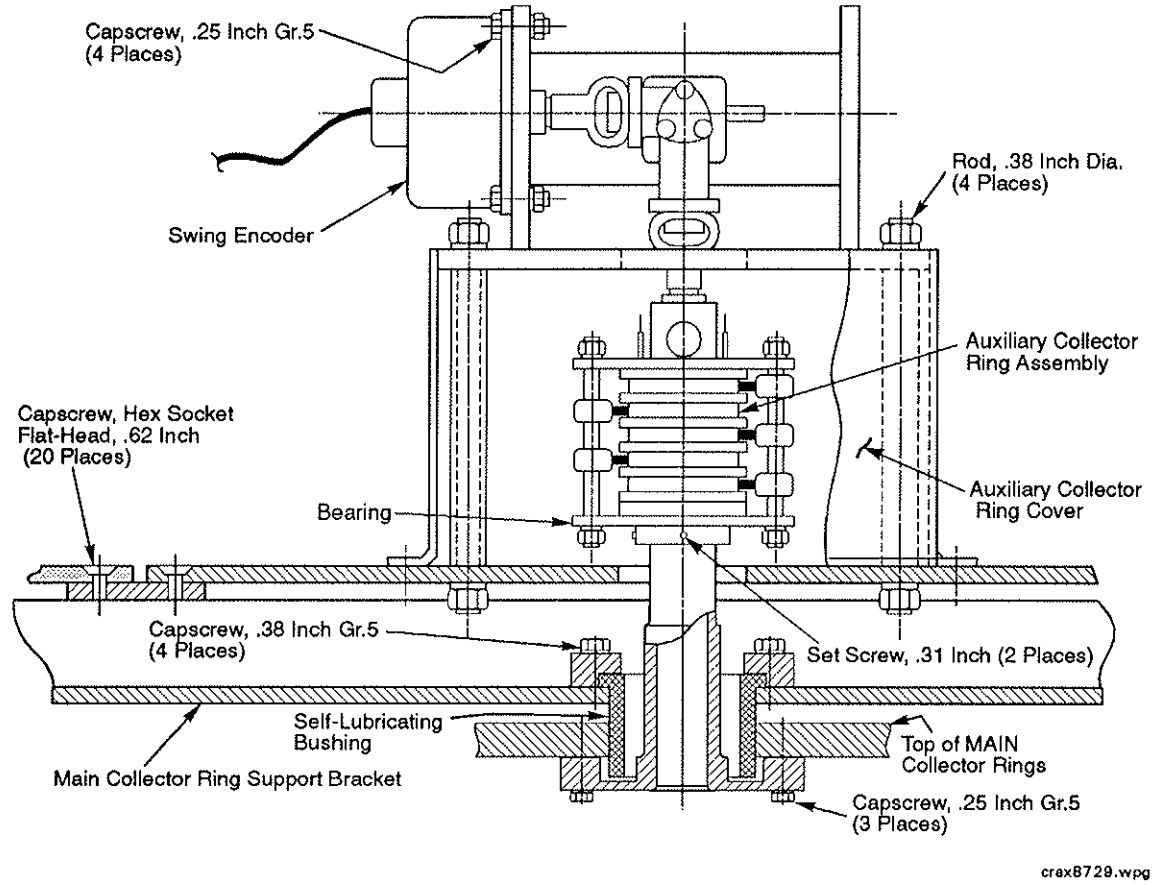
ASSEMBLY NOTES:

1. Pack cavity with MPG grease. Before start-up, lube each roller until grease appears around bushings.

2. Check that each pin can be freely turned in roller bore. Under no circumstance is a tight fit allowed.

3. Tighten the rod nuts to 1950 Ft.Lbs.

4. If the cage bars have been removed, note the match marks. Assemble the cage as it was assembled at erection. *DO NOT INTERCHANGE PARTS.*



AUXILIARY COLLECTOR RINGS

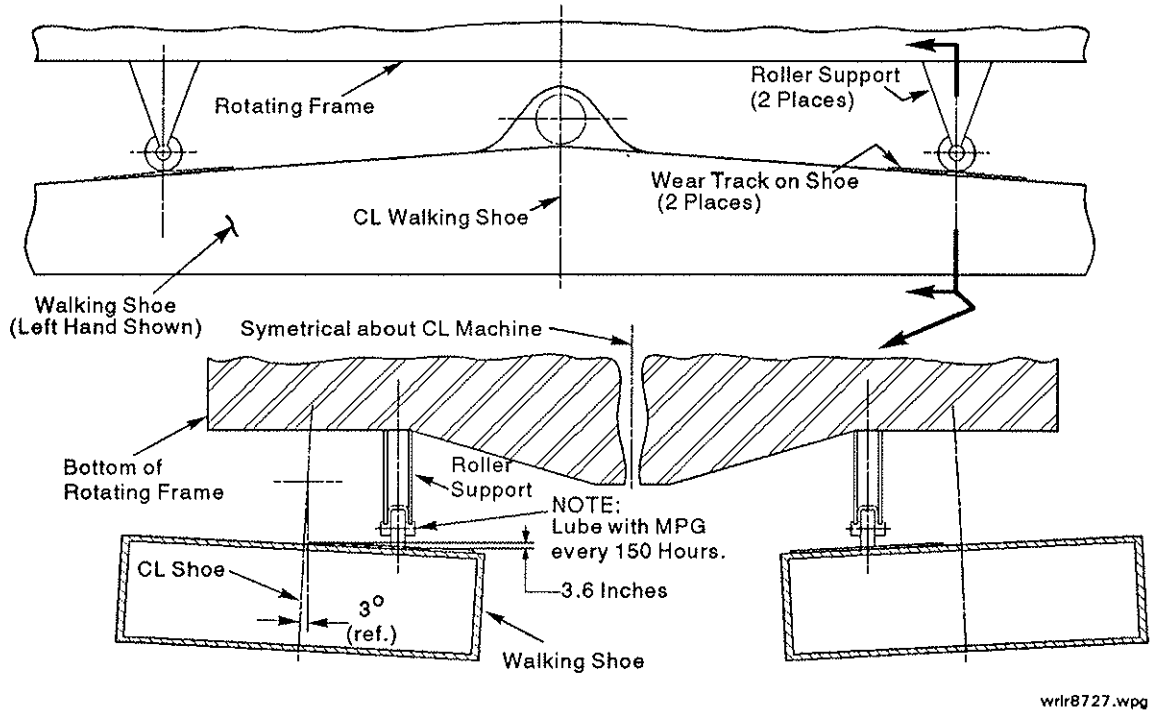
At installation:

Slide the collector assembly onto the drive shaft and tighten the 2 - .31 inch set screws. Use loctite #242-21 on the threads.

CAUTION: **Be sure that the drive pins engage the holes in the collector bearing.**

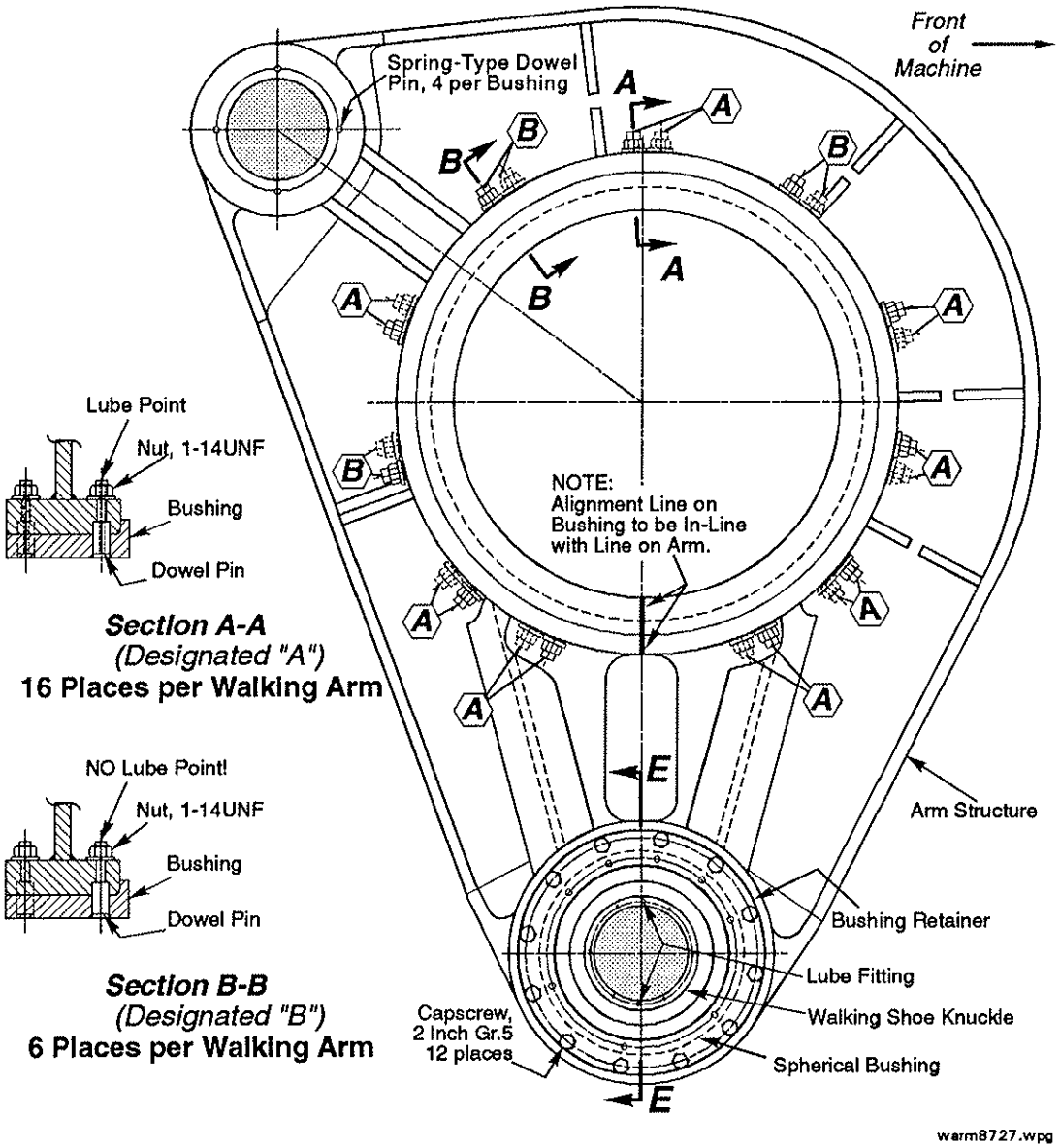
WALKING SHOE ROLLERS

The *WALKING SHOE ROLLERS* are mounted on the rotating frame at 2 places above each shoe assembly. The rollers hold the shoes steady when the swing motion is slowed or stopped by "plugging".



Section A-A
WALKING SHOES
(Shoes are Shown in "REST" or "PARK" Position)

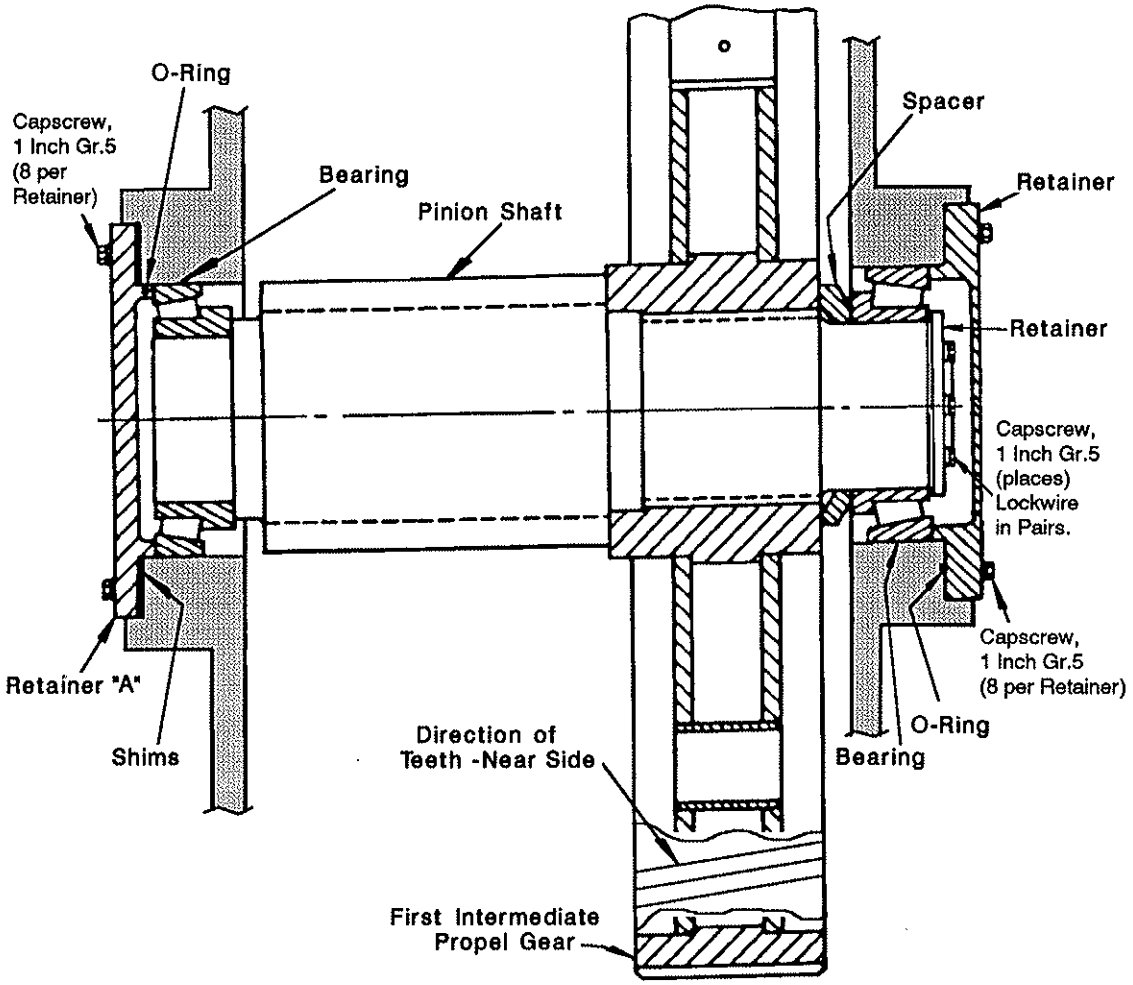
NOTE: The rollers are positioned to hold each shoe at a slight inward angle when the shoes are in their "*PARKED*" position. (As shown in Section A-A, the shoe displacement at the roller is approx. 3.6 inches.) If the shoes move during normal operation, increase the interference by adding plates to the top of the shoe. Make the plates 12 inches wider and longer than the roller path on the shoe.


Front of Machine
Spring-Type Dowel Pin, 4 per Bushing
A
B
NOTE:
Alignment Line on Bushing to be In-Line with Line on Arm.
E
Arm Structure
Bushing Retainer
Lube Fitting
Walking Shoe Knuckle
Spherical Bushing
Capscrew, 2 Inch Gr.5 12 places
Lube Point
Nut, 1-14UNF
Bushing
Dowel Pin
Section A-A
(Designated "A")
16 Places per Walking Arm
NO Lube Point!
Nut, 1-14UNF
Bushing
Dowel Pin
Section B-B
(Designated "B")
6 Places per Walking Arm
warm8727.wpg

Section D-D

FIRST INTERMEDIATE PROPEL SHAFT ASSEMBLY

The *FIRST INTERMEDIATE PROPEL SHAFT ASSEMBLY* consists of a helical gear splined to a shaft with an integral pinion which drives the second intermediate shaft assembly. The shaft bearings are not mounted in eccentric housings in this assembly.



Approx. Assembly Weight 5393 Lbs.

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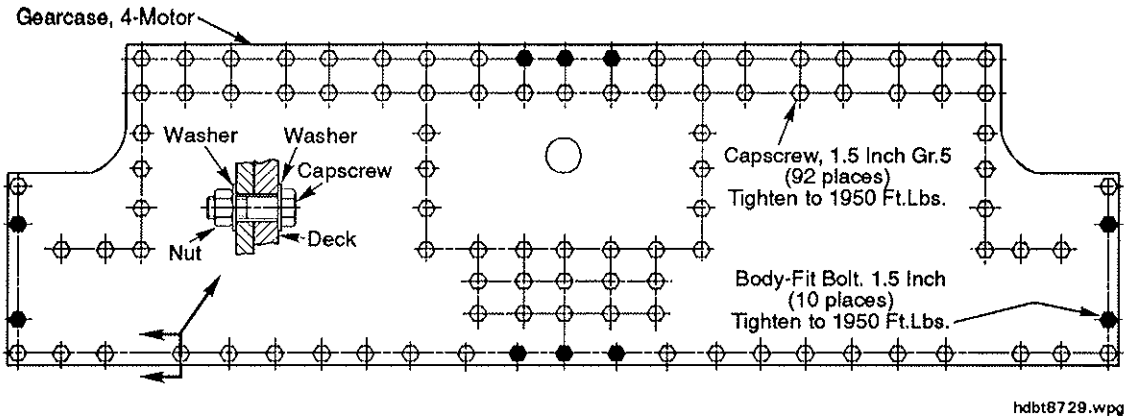
Section B-B
FIRST INTERMEDIATE PROPEL SHAFT ASSEMBLY

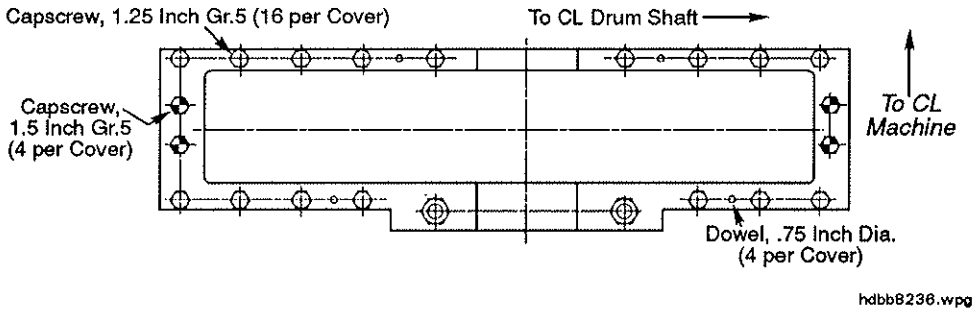
NOTE: For disassembly and assembly of the involute splined gears and shafts, refer to Section 7 - *ENGINEERING DATA*.

BEARING SET-UP PROCEDURE:

Install retainer "A" without shims with 3 equally-spaced capscrews. Tighten the capscrews equally until the bearings bind. Measure the gap between the retainer and the bearing housing in 3 places, average and subtract 003-.005 inch. Adjust the shim to the thickness calculated and install. Adjust the bearing preload when replacing the bearings and/or the shaft.



Section P-P
4-MOTOR GEARCASE BOLTS



View A-A
GEARCASE COVER BOLTS

HOIST or DRAG DRUM SHAFT BEARING REPLACEMENT

Bearing replacement on both drum shafts can use the same procedure:

1. Slacken the ropes to minimize the rope tension and tie off ahead of the drum.

CAUTION: THE ROPE MUST BE SECURED TO PREVENT DRUM ROTATION WHEN THE DRIVE GEARS ARE DISENGAGED.

2. Remove fouled rope limit trip wire and push the alarm silence button in the operator's cab.

3. Remove the drum gear guards, lube piping, foul rope limit, limit switch and limit switch drive shaft.

4. Remove the 4 bearing housing retainer pins.

5. Locate jacks and cribbing under the sun.

CAUTION: TAKE CARE TO POSITION THE CRIBBING TO PREVENT DRUM ROTATION. The cribbing must be constantly monitored as the drum is raised.

6. Raise the drum approximately 24 inches for the bearing housing clear the pedestal.

7. Remove the outside bearing retainer and bearing housing. Match mark the housing and gearcase before removing. The housings are not interchangeable.

8. Remove the bearing retainer on the end of the drum shaft and pull the bearing.

NOTE: Provision for hydraulic bearing removal is standard.

9. Inspect the shaft bearing surface and in the radius under the bearing spacer. Remove any nicks or rough surface.

10. Check the shaft diameter and bearing I.D. and heat the bearing to provide a clearance fit.

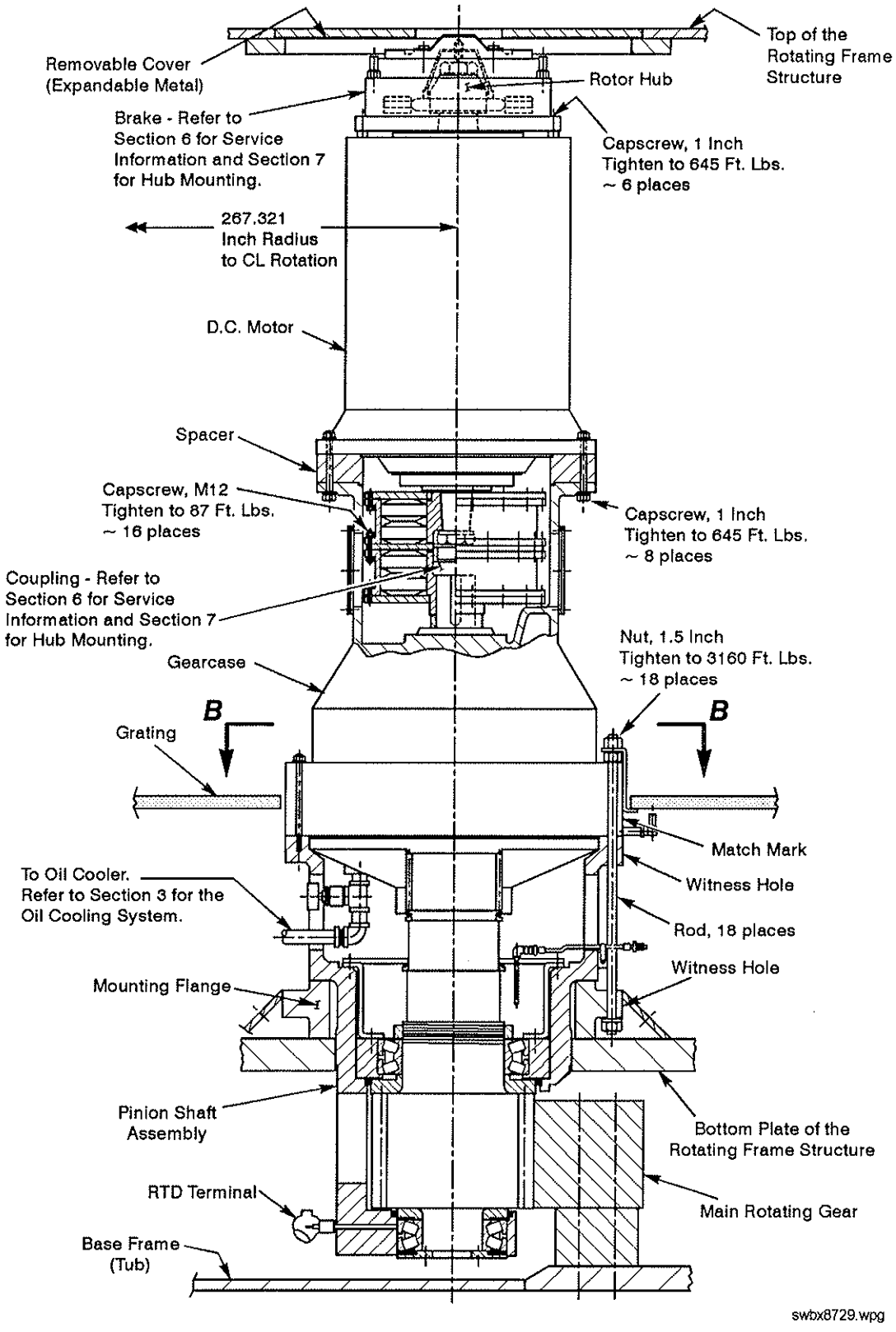
CAUTION: HEAT THE BEARING UNIFORMLY.

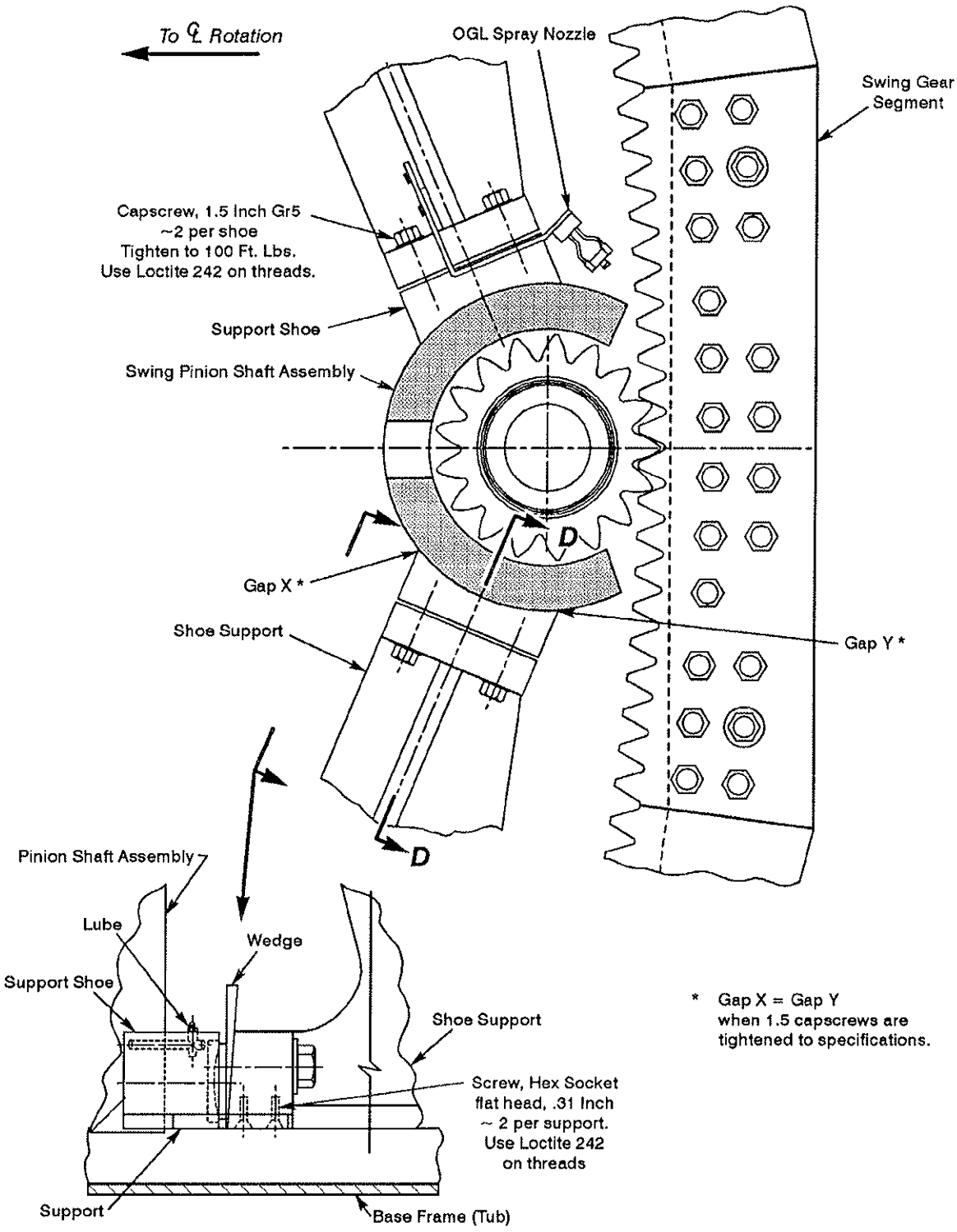
11. Install the bearing spacer and inside retainer.

12. Install the bearing, bearing retainer and lockwire the capscrews.

13. Install the bearing housing and outer retainer.

NOTE: Replace the limit switch drive shaft seal if the retainer housing this part was removed.


Removable Cover
(Expandable Metal)
Top of the
Rotating Frame
Structure
Rotor Hub
Brake - Refer to
Section 6 for Service
Information and Section 7
for Hub Mounting.
Capscrew, 1 Inch
Tighten to 645 Ft. Lbs.
~ 6 places
267.321
Inch Radius
to CL Rotation
D.C. Motor
Spacer
Capscrew, M12
Tighten to 87 Ft. Lbs.
~ 16 places
Capscrew, 1 Inch
Tighten to 645 Ft. Lbs.
~ 8 places
Coupling - Refer to
Section 6 for Service
Information and Section 7
for Hub Mounting.
Nut, 1.5 Inch
Tighten to 3160 Ft. Lbs.
~ 18 places
Gearcase
B
B
Grating
Match Mark
Witness Hole
To Oil Cooler.
Refer to Section 3 for the
Oil Cooling System.
Rod, 18 places
Witness Hole
Mounting Flange
Pinion Shaft
Assembly
Bottom Plate of the
Rotating Frame Structure
RTD Terminal
Main Rotating Gear
Base Frame
(Tub)
swbx8729.wpg


To ℄ Rotation
OGL Spray Nozzle
Swing Gear Segment
Capscrew, 1.5 Inch Gr5
~2 per shoe
Tighten to 100 Ft. Lbs.
Use Loctite 242 on threads.
Support Shoe
Swing Pinion Shaft Assembly
D
Gap X *
Shoe Support
Gap Y *
D
Pinion Shaft Assembly
Lube
Wedge
Support Shoe
Shoe Support
Screw, Hex Socket
flat head, .31 Inch
~ 2 per support.
Use Loctite 242
on threads
Support
Base Frame (Tub)
* Gap X = Gap Y
when 1.5 capscrews are
tightened to specifications.
sw2X8729.wpg

Section C-C

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 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

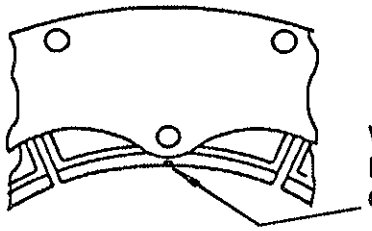
The developed torque is directly proportional to the applied air pressure. If the developed torque seems inadequate, check for oil, grease or dust contamination.

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.**

FRICTION 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.**

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

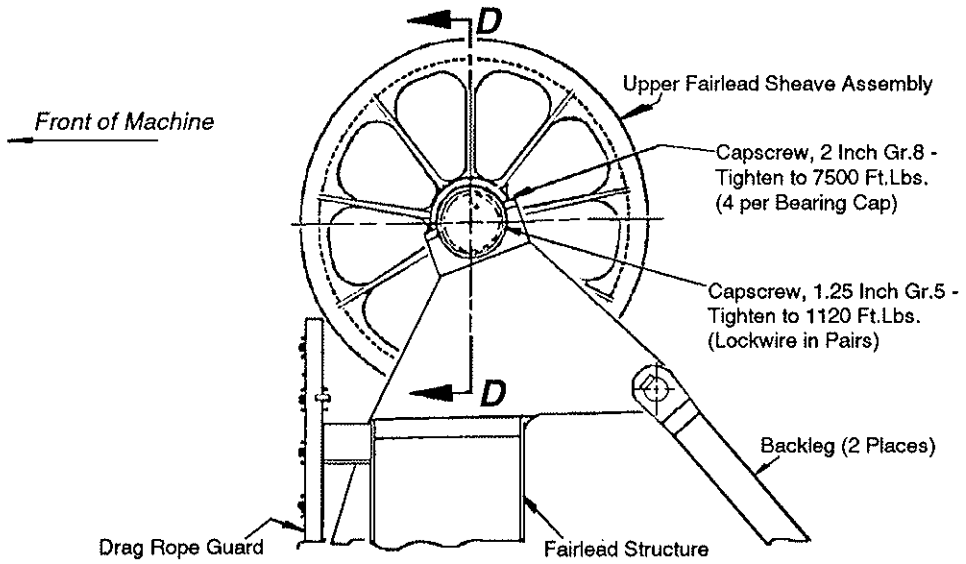
NOTE: Before installing the shaft retainer, install the face seal. Install the face seal on the opposite end before attaching the bearing cap. ALWAYS use new face seals.

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.



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.

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.

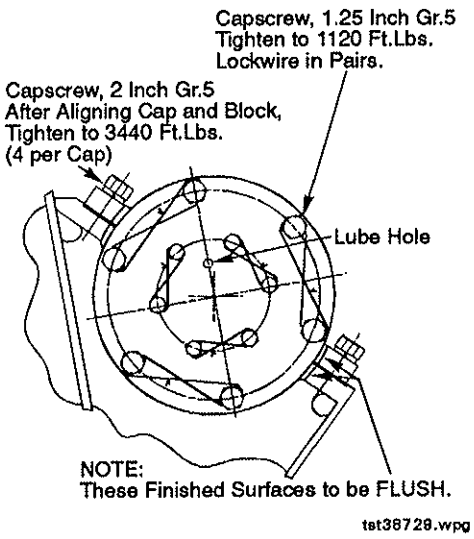
9. Install a new face seal over the shaft sleeve with the lip toward the sheave.

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. Install new filters and the clean bowl to the filter head. Pre-lube the O-rings with clean, filtered oil.

6. Open the air valve to start the pump.

7. Purge the right hand cylinder piping of air and close the cylinder drain valve.

8. Open the left hand cylinder drain valve and purge any air from the hydraulic lines and close the valve. Repeat the above steps for the other hydraulic system as required. Open the needle valve in line "C".

9. With all cylinder drain valves closed, the intermediate boom support pendants will retension. The machine is ready for operation.

The hydraulic line from each cylinder to the tank has a return line filter. This filter is mounted on top of the reservoir assembly and is a spin-on canister type with a paper element rated at 10 microns. The filter has a by-pass circuit that permits the oil to flow around the filter if it is plugged. The canister should be replaced after the first 50 hours of use following the replacement of an accumulator or cylinder assembly. Replace after every 1000 hours of operation.

To replace the 10 micron element in the return line filter:

1. Set the bucket on the ground and shut down the machine.

2. Loosen the hose fitting at the inlet port of the filter to be serviced to vent any residual pressure and then, with a strap wrench, unscrew and remove the canister from the filter head. Dispose of the canister element and its contents in compliance with local codes.

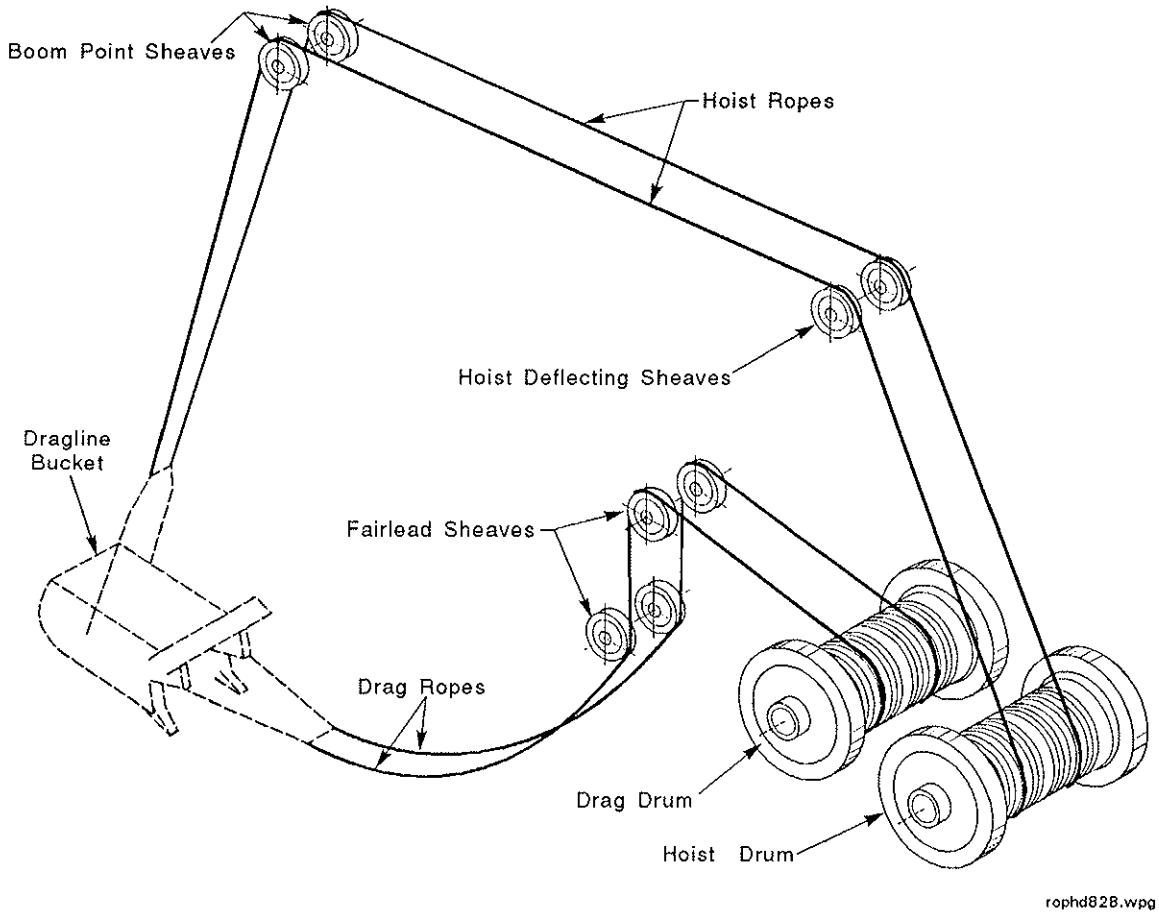
3. Apply a thin film of clean, filtered oil to the new canister seal and install it onto the filter head. Tighten it in place by hand only, making sure it will not leak.

4. Re-tighten the hose end on the return line at the filter inlet. The machine can be returned to operation.

The tank breather mounted on the reservoir assembly contains a 10 micron rated, dry, polyester media element having a wrap-around prefilter. At the reservoir, remove the weather hood once per month and inspect the element. When its outside surface appears to be evenly coated with dirt, remove it for cleaning. Plug the tank access port in the filter to guard against contamination while cleaning element. Take the wrap-around prefilter off the element. Clean the prefilter in warm water. Shake or blow off any dirt deposits from the element. It can be cleaned in a warm, mild detergent solution and then thoroughly rinsed in warm water if needed. Allow the prefilter and element to dry before reassembly. If either the prefilter or element is torn or ruptured or in an unacceptable condition, replace it.

4.14 HOIST and DRAG ROPES

The drag ropes are subjected to the greatest wear at or near the bucket. If ropes show excessive wear in this area, the worn area should be seized, cut off and re-socketed. Be sure to reset the drag rope limits.



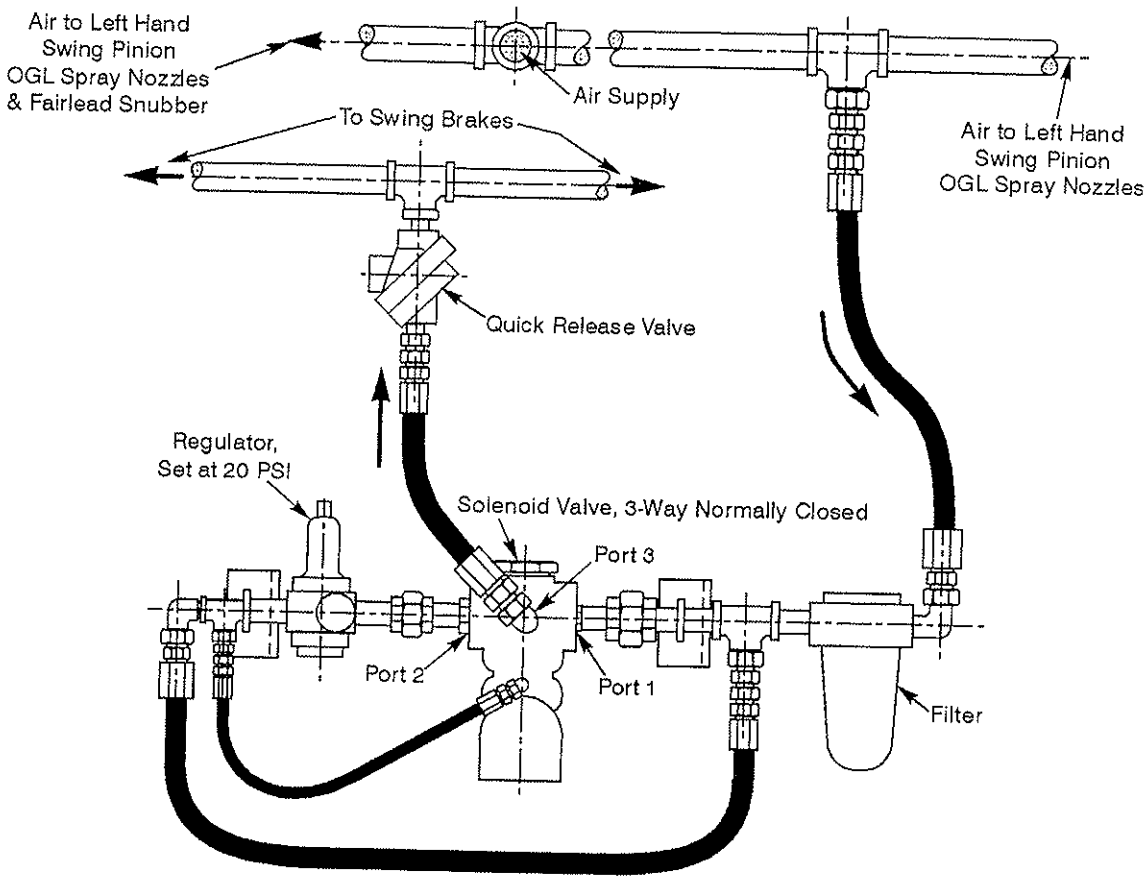
HOIST AND DRAG ROPE REEVING

The ropes are wear items. The operator should make a habit of watching the ropes during the digging cycle for damage, broken wires and wear.

There are *2* hoist and *2* drag ropes required per machine. They are all 5.00 inch diameter, 6 x 70 class, I.W.R.C. right lang lay, I.P.S., preformed ropes. The ropes have a becket loop at each end to assist in reeving.

NOTE: After raising the boom, 15 feet can be cut off the *socketed end* of each boom lowering/raising rope. The ropes can then be used as drag ropes. Return the sockets to the vendor for inspection and re-use.

Rope Anchors: The hoist and drag ropes are anchored at the center of the drum with 7 rope clamps for each rope. Thread the rope through the clamps and allow at least 16 inches of rope to extend past the last clamp. Keep the active length of ropes matched in pairs. Reeve at least *2* dead wraps onto the drum.



Section F-F *(From page 5.1.2)*

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SWING BRAKE AIR SYSTEM

The Swing Brake Air System is designed to reduce the swing brake effort when the machine is in the *propel* mode. The reduced effort limits the maximum loading on the swing machinery.

When the machine is in *drag* mode, full air system is available for the swing brakes. The brakes are released when the solenoid valves (16 places) are energized. Pressure switches located at each solenoid valve must close at 75 PSI before the swing system is operable. If any switch fails to close, an event will be recorded on the PLC and an alarm will sound in the operator's cab.

In *propel* mode, the solenoid valve shown in Section F-F is energized when the swing brake solenoids (16 places) are energized. System air is directed through the regulator reducing the air pressure to 20 PSI. System air pressure trapped in the air lines is quickly reduced to 20 PSI by the quick exhaust valve.

Pressure switches located at each of the brake solenoid valves will activate an alarm in the operator's cab as well as show an event at the computer terminals in the operator's cab and power control room. The propel will not be deactivated due to low air pressure.

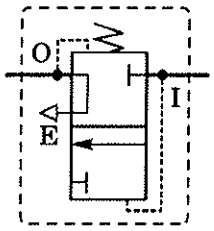
QUICK RELEASE VALVE

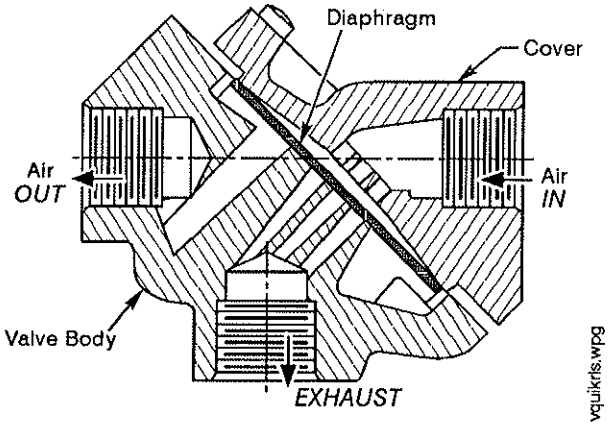
This valve is used to quickly reduce the air pressure in the swing brakes when the machine is switched from the drag to the propel mode.

When air pressure is applied at the air inlet, the exhaust port is closed and air is directed to the outlet. A reduction in inlet air pressure will cause the exhaust port to open, exhausting air on the outlet side of the valve, until the inlet and outlet pressure is equal.

This valve is non-adjustable. If it does not function properly, disassemble it and clean it. Inspect for damaged parts and replace any that are damaged or worn. A repair kit is available that contains the most frequently replaced parts. Refer to the Parts Book.

Graphic Symbol:

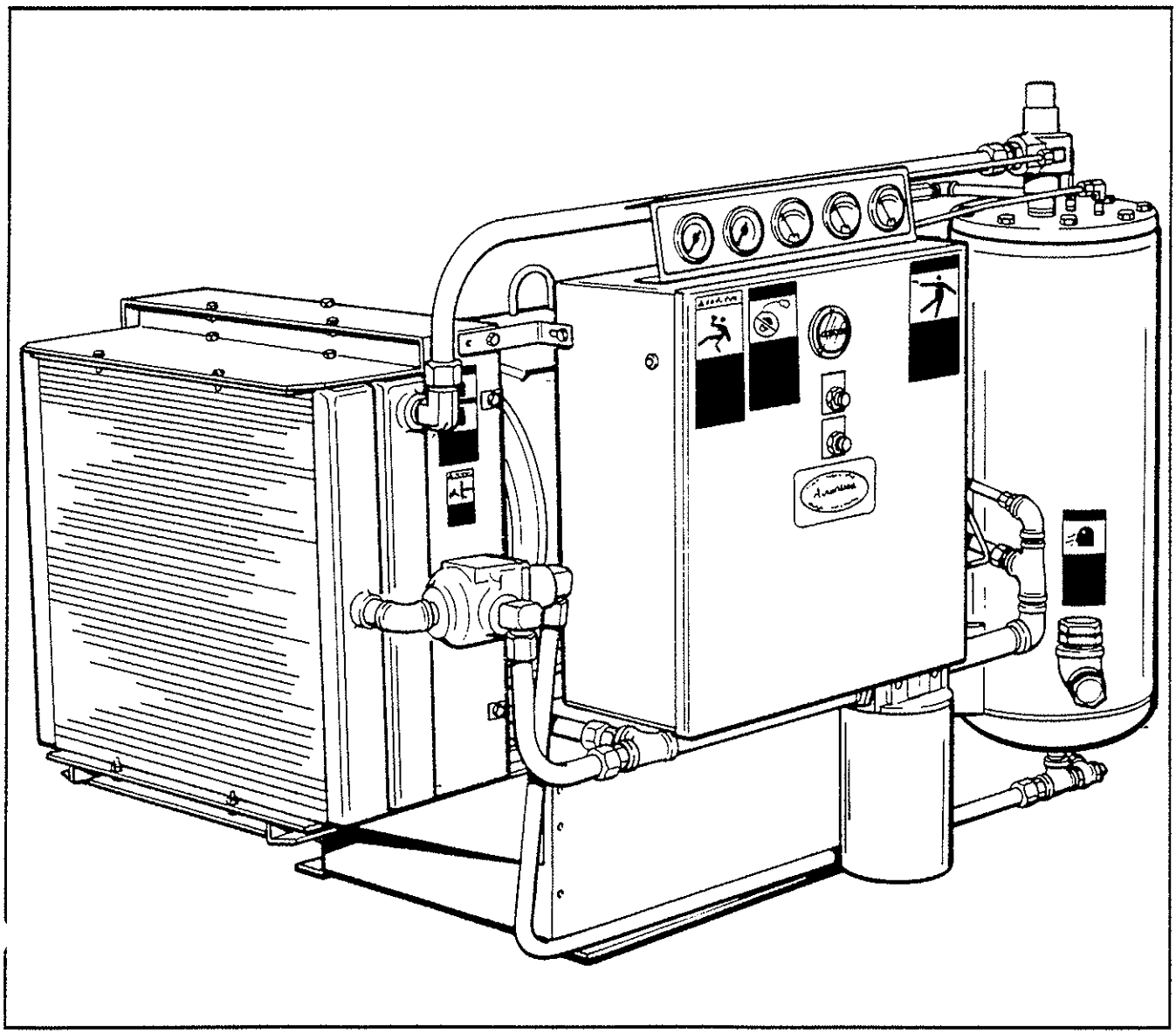




Operator's Manual

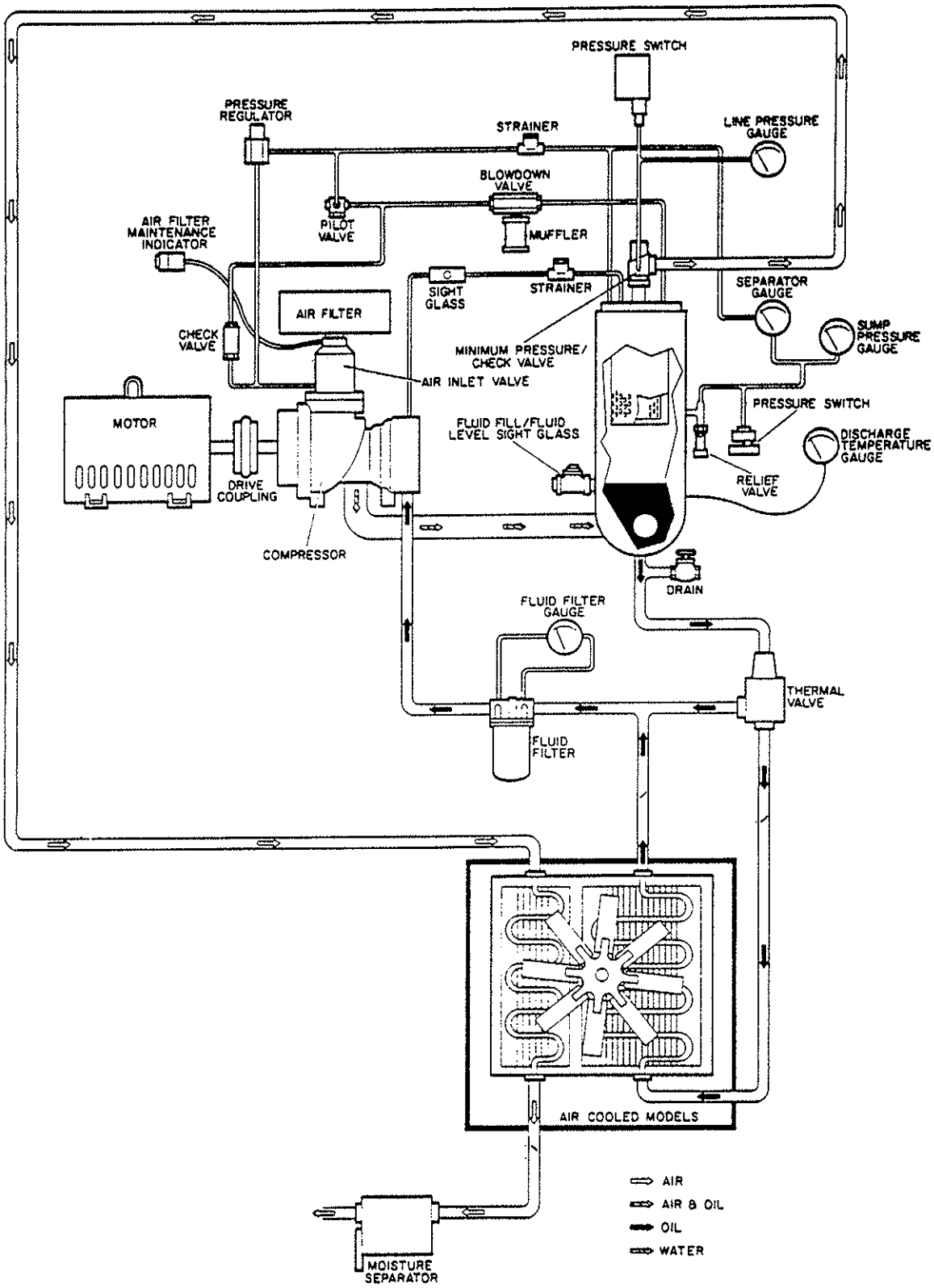
SULLAIR®
COMPRESSOR

Series 10B Open 25, 30, 40HP Standard & 24KT
Industrial Rotary Screw Air Compressor



Part Number 250039-640
©Sullair Corporation, 1990
Effective 9/90

Figure 4-1 Piping and Instruments



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Section 1
ILLUSTRATIONS AND PARTS LIST

1.8 COMPRESSOR DISCHARGE SYSTEM

key number	description	standard part number	24KT part number	quantity
1	switch, pressure 10-250# spot open	250017-991	250017-991	1
2	locknut, conduit ½"	847200-050	847200-050	2
3	nipple, conduit ½" x 1½"	250007-169	250007-169	1
4	connector, tube-m ¼" x ⅛"	810204-012	810204-012	1
5	tubing, steel ¼" 20 gauge (ft.)	841115-004	841115-004	2
6	connector, ½"	846400-050	846400-050	1
7	conduit, ½"	846215-050	846215-050	3
8	elbow, 90° conduit	846600-050	846600-050	1
9	coupling, conduit	250007-179	250007-179	1
10	probe, temperature (24KT) • probe, temperature (std.)	046867 040588	046867 040588	1 1
11	tee, reducing 1½" x ½" x 1½"	802206-026	802206-026	1
12	nipple, close 1½" x close (25 & 30HP) • nipple, close 1½" x 3" (40HP)	822224-000 822124-030	822224-000 822124-030	1 1
13	elbow, tube 90° ¼" x ⅛"	810504-012	810504-012	2
14	tee, tube ¼" x ¼"	810904-025	810904-025	1
15	tee, reducing ½" x ¼" x ½"	802202-012	802202-012	1
16	nipple, close ½"	822208-000	822208-000	3
17	valve, pressure relief ½"	250006-938	250006-938	1
18	connector, tube-m 1" x 1"	810216-100	810216-100	1
19	bushing, reducing hex 1¼" x 1"	802105-040	802105-040	1
20	valve, minimum pressure **(I)**	241581	241581	1
21	connector, flex ¼" x ¼"	020169	020169	1
22	tube, return line	220700	220700	1
23	strainer, v-type **(II)**	241771	241771	1
24	glass, oil sight	046559	046559	1
25	coupling, Flexmaster (std.) **(III)** • coupling, Flexmaster (24KT) **(IV)**	040033 250007-544	040033 250007-544	1 1
26	nipple, pipe 1¼" x 2½"	822120-025	822120-025	1
27	capscrew, hex gr5 ½"-13 x 1¼"	828608-125	828608-125	8
28	washer, springlock ½"	837508-125	837508-125	8
29	elbow, tube-m 90° ¼" x ¼"	810504-025	810504-025	1

(continued on Page 17)

(I) For maintenance on minimum pressure valve No. 241581, order seal kit No. 250026-758.

(II) For maintenance on v-type strainer No. 241771, order repair kit No. 241772.

(III) For maintenance on Flexmaster coupling no. 040033, order gasket kit no. 040517.

(IV) For maintenance on Flexmaster coupling no. 250007-544, order gasket kit no. 250007-559.

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

Section 1
ILLUSTRATIONS AND PARTS LIST

1.16 HEAVY DUTY FILTER OPTION

key number	*description*	*standard part number*	*24KT part number*	*quantity*
1	nipple, close 2½"	822240-000	822240-000	1
2	elbow, reducing 2½" x 2" (25, 30HP)	801610-080	801610-080	1
	• elbow, pipe 90° 2½" (40HP)	801515-100	801515-100	1
3	nipple, half 2" x 3" (25, 30HP)	822832-030	822832-030	1
	• nipple half 2½" x 3" (40HP)	822840-030	822840-030	1
4	clamp, hose 1⅞" x 2¾" (25, 30HP)	040083	040083	2
	• clamp, hose 3" (40HP)	040343	040343	2
5	elbow, rubber (25, 30HP)	044634	044634	1
	• elbow, rubber (40HP)	041960	041960	1
6	indicator, air filter maintenance	045757	045757	1
7	bracket, air filter	015718	015718	1
8	filter, air (25, 30HP) (I)	043333	043333	1
	• filter, air (40HP) (II)	040595	040595	1
9	screw, hex serrated washer 5/16" x ¾"	829705-075	829705-075	2
10	band, mounting (25, 30HP)	043370	043370	1
	• band, mounting (40 HP)	040598	040598	1
11	nut, hex serrated washer plated 5/16"-16	825305-283	825305-283	2

(I) For maintenance on air filter No. 043333, order replacement element No. 043334.

(II) For maintenance on air filter 040595, order replacement element No. 040596.

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

LUBRICATION SCHEDULE										
SHAFT SIZE INCHES	OPERATING SPEED (RPM)									
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	RELUBRICATION CYCLE (MONTHS)									
1/2 thru 1	6	6	6	6	6	6	4	4	2	2
1 1/16 thru 1 7/16	6	6	6	6	6	6	4	4	2	1
1 1/2 thru 1 3/4	6	6	6	4	4	2	2	2	1	1
1 7/8 thru 2 3/16	6	6	4	4	2	2	1	1	1	
2 1/4 thru 2 7/16	6	4	4	2	2	1	1	1		
2 1/2 thru 3	6	4	4	2	1	1	1			
3 7/16 thru 3 1/2	6	4	2	1	1	1	Consult manufacturer for specific recommendations.			
3 15/16 thru 4	6	4	2	1	1					

SPECIAL LUBRICATION High Temperature and High Moisture	
AIRSTREAM TEMPERATURE	HOURS
To 250°F	4500
To 350°F	1500
To 500°F	1000
Wet Atmosphere at Room Temperature	1000 to 1500

Storage of Equipment

Fan Bearings

Since bearings tend to "breathe" on equipment stored in areas with other than a constant temperature, moisture will condense internally. Therefore, it becomes necessary to keep the bearings completely full of grease and periodically rotated to make certain that all internal parts are coated with grease. Even a full bearing will eventually pick up moisture and, therefore, must be periodically purged with new grease.

Grease should be purged from bearings to remove condensed moisture, and fan wheel rotated by hand every thirty (30) days. This practice should be done more often if weather is severe or if there is a wide variation in temperature.

CAUTION IN PURGING: The fan should be rotated while greasing, and high pressure pneumatic greasers should be avoided. See section on LUBRICATING INSTRUCTIONS FOR FAN BALL BEARINGS.

For rotating, follow the procedure listed below:

The blade marked number 1 should be rotated to top center. The blade number and date should be recorded in a log book which is to be stored in a protective pouch attached to the fan. During storage, the fan impeller should be rotated by hand at least ten (10) revolutions every thirty (30) days to circulate the lubricant in the bearings in the motor or on the fan shaft. After the tenth revolution stop with a blade at top center which is not the same one as is listed for the previous date in the log book.

Fans which are V-belt driven should be prepared for storage as follows. Carefully remove the belts, coil them (without kinks) in matched sets, and place them in a heavy carton. Mark carton with fan identification and store carton in a dry, well-ventilated area. Belts must not be left exposed to sunlight or subjected to storage ambient conditions exceeding 85°F., 70% relative humidity. Belts which show signs of deterioration should be replaced prior to start-up. Before reinstalling belts, review section on BELT TENSION.

NOTE: Procedures for storage of Aerovent equipment as outlined above are intended as a general guide only. Storage conditions will vary depending on the location. Common sense and practical experience should determine to what extent the above procedures will be followed.

Motors

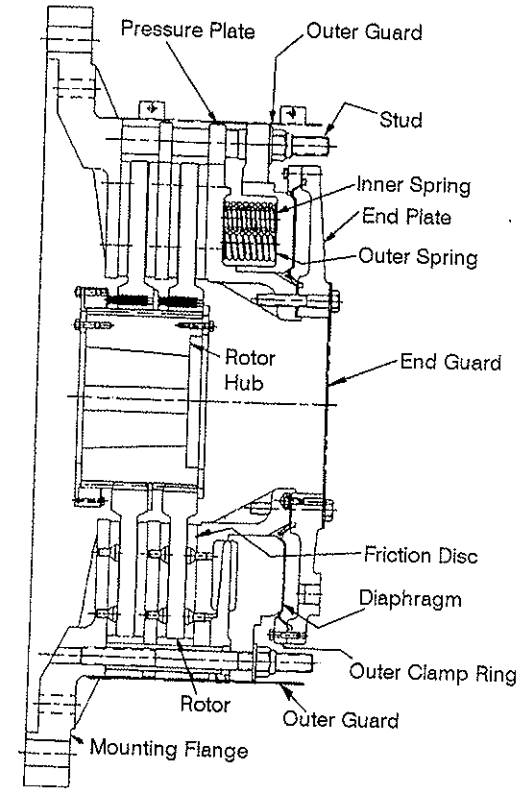
Motors must be stored under cover in a clean, dry, vibration free location. Remove sufficient packaging material to allow circulation of air around motor. Maintain the temperature of the windings a few degrees above that of the surrounding air to protect against condensation. If the motor is equipped with internal heaters, the heaters should be energized throughout the storage period to prevent this condensation. If the motor does not have internal heaters, this can be accomplished using any other safe, reliable method of heating. Measure and record monthly the ambient air temperature and winding temperature.

In the event that the motor is not equipped with internal heaters and space heating equipment is unavailable, wrap the motor as tightly as possible with heavy-duty polyethylene. Enclose bags of desiccant (such as silicagel) with the motor to minimize moisture problems. Check the desiccant regularly and replace it periodically as dictated by climate requirements.

To prevent rusting of bearing parts, the rotor must be rotated at regular intervals (30 days) to assure these parts are well covered with oil or grease.

Prior to energizing the motor, it is to be inspected and meggered by a motor manufacturer's field service engineer. The charges for this service to the customer will be in accordance with manufacturer's published service rates in effect at the time of inspection.

In addition, it is strongly recommended that the motor manufacturer be contacted for specific long-term storage instructions.



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HOIST, DRAG and PROPEL BRAKE
DUAL ROTOR

The *HOIST*, *DRAG* or *PROPEL* brake assembly is a dual-rotor brake mounted on the commutator end of each hoist, drag and propel motor frames. For installation and maintenance refer to the end of this section.

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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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WEAR ADJUSTMENT PROCEDURE

Brake adjustment is required as the friction material wears. To determine when adjustment is required, measure the gap "X" between the pressure plate and the mounting flange with the brake engaged (air released). Compare the measure gap to the values listed in Table 1. Adjust the brake by re-arranging the wear spacers and spacer plates to the appropriate positions pre the following procedures.

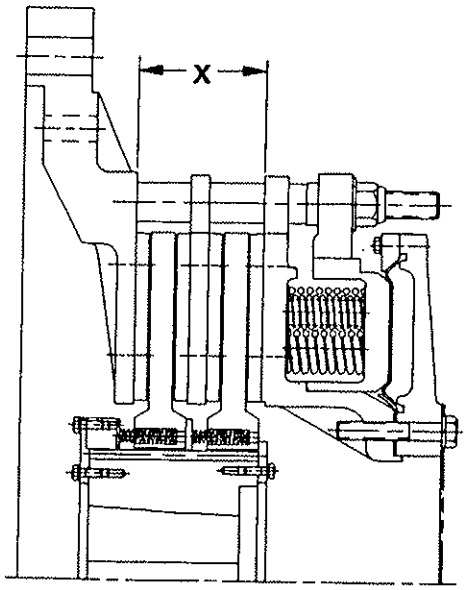

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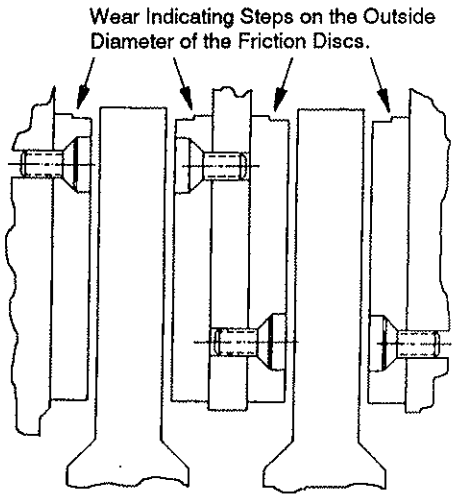
Table 1 - WEAR ADJUSTMENT

Measured Gap "X"	Component	Spacer Plates (95, 97)		Wear Spacers (25)	
	Location[1]	A, B	C[2]	D	E
Greater than 4.76"	Quantity	3	0	3	0
Less than or Equal to 4.76"		2	1	2	1
Less than or Equal to 4.50"		1	2	1	2
Less than or Equal to 4.24"		0	3	0	3

[1] Refer to the figures for spacer locations.
[2] The quantity specified is for each spacer (95, 97).

NOTE: Friction discs worn to or beyond the wear indicating step must be replaced. If any of the friction discs are replaced, it is recommended that all four friction discs be replaced as a set, and the brake adjusted to the original position, as described in the section on INSTALLATION.



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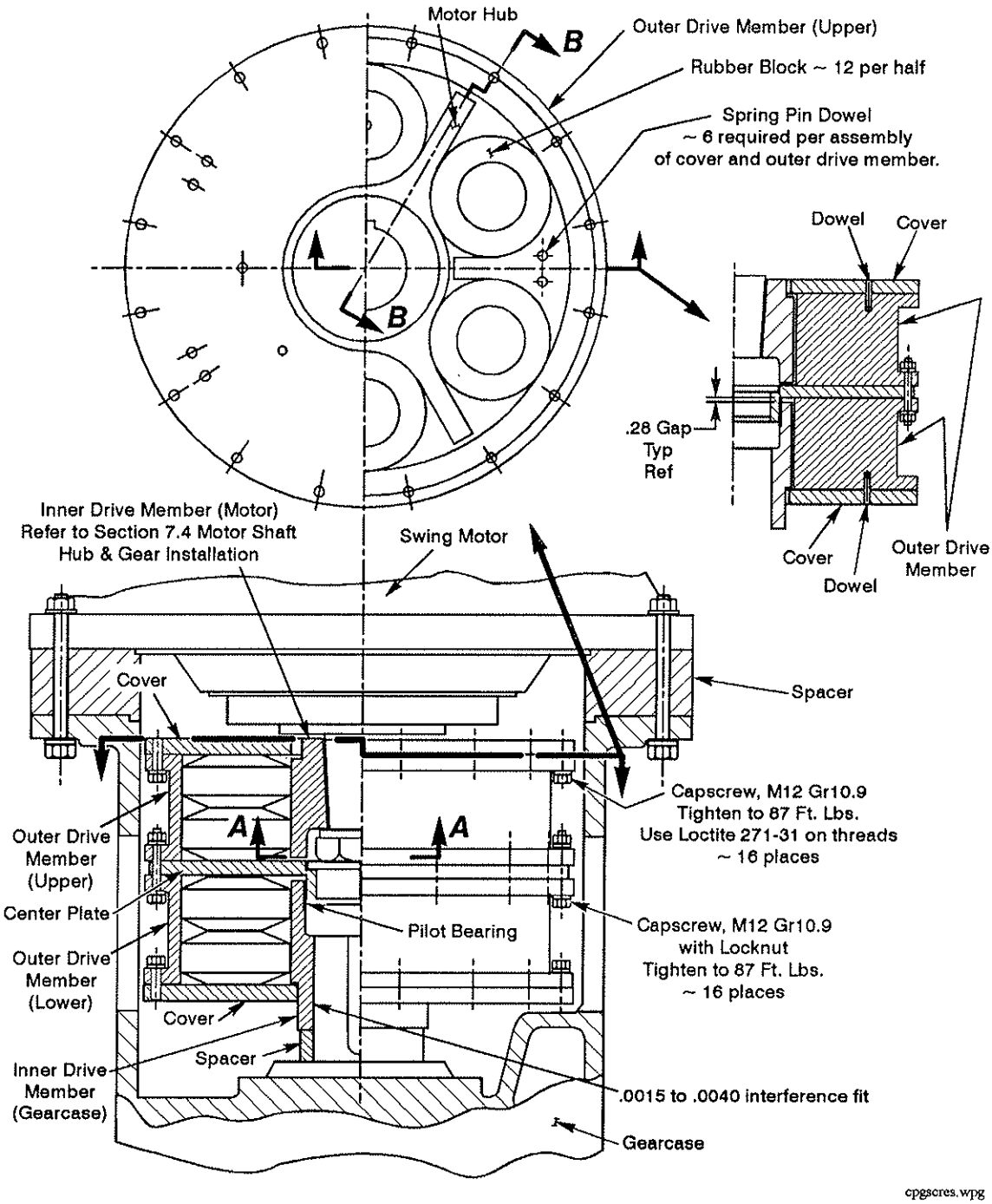
WARNING: IF WEAR ADJUSTMENT IS NOT MADE WHEN REQUIRED, THE BRAKE TORQUE MAY DETERIORATE TO THE POINT WHERE THE EQUIPMENT WILL NOT STOP PROPERLY.

WARNING: PREMATURE ADJUSTMENT OF THE BRAKE MAY RESULT IN INSUFFICIENT RUNNING CLEARANCES BETWEEN THE DISCS AND THE FRICTION DISCS.

SWING MOTOR COUPLING

The Swing Motor Coupling consists of inner and outer drive members, which transmit motor torque to the gearcase through special rubber blocks. The design dampens system vibration by changing the natural frequency so that is does not coincide with the frequency at operating speed.



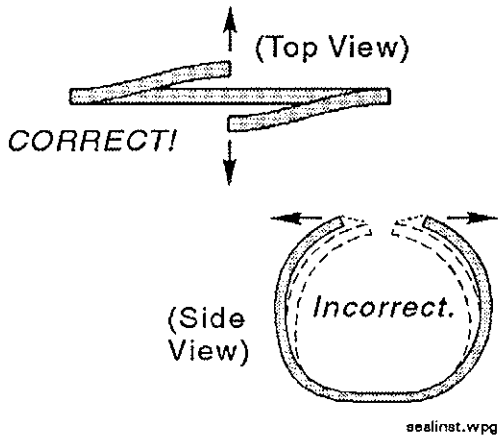
COUPLING ASSEMBLY

Determine the correct direction for lip installation and start the seal into the cavity by finger pressure, then tap evenly all around until seated or flush with the housing face. (Tap only on outer edge of seal with hammer on wood block.)

A double seal, installed back to back can be used to retain grease or oil plus be more effective in preventing egress of contaminants.

Follow this installation procedure for split seals:

- Remove garter spring and separate at the hook and eye.
- Open the seal, ends sideways, for installation on shaft as shown by moving the butt ends along the axis of the seal.
- Lubricate spring and install around shaft. Connect ends and insert spring in lip groove with spring ends 90° away from butt joint.



SPLIT SEAL INSTALLATION

CAUTION: DO NOT TRIM OR CUT ENDS OF SPLIT SEALS OR PULL ENDS APART. THIS WILL DESTROY SEAL.

Gear case seals used for all oil tight gear case assemblies require surface preparation on one side of case flanges with a 1/100 inch thick Form-a-Gasket #3 (Permatex Co.) coating. If using a manila paper gasket always replace with a new one, never reuse. Apply Form-a-Gasket #3 to both sides of the paper gasket. Tighten gear case cover bolts until seal material "squeezes out" at joint.

When surface finishes range up to 250 micro-inches, a compression type gasket seal is recommended. This material (VELLUMOID) available in standard thickness inches (mm) 1/64 (.397), 1/32 (.794), 1/16 (.063), and 1/8 (.125) should also be installed with Permatex applied to both sides.

INSPECTION PROCEDURES

Method of Checking the Rim Face Run-out of a Gear -

If the gear can be rotated without end float, place an indicator squarely against the rim face stamped (000) at station stamped 1 and set it to zero.

Revolve the gear slowly, record readings at each station. After one complete revolution, the indicator should read within ±.002 inch. If not, recheck. The allowable rim face run-out is shown in Table 1. The total rim face run-out is the algebraic difference between the maximum plus (+) and maximum minus (-) readings.

EXAMPLE:

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

The total rim run-out of .020 inch is obtained between station 3 with a maximum (+) reading of +.005 inch and station 9 with a maximum minus (-) reading of -.015 inch. This is within the allowable .022 inch shown in Table 1 below.

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

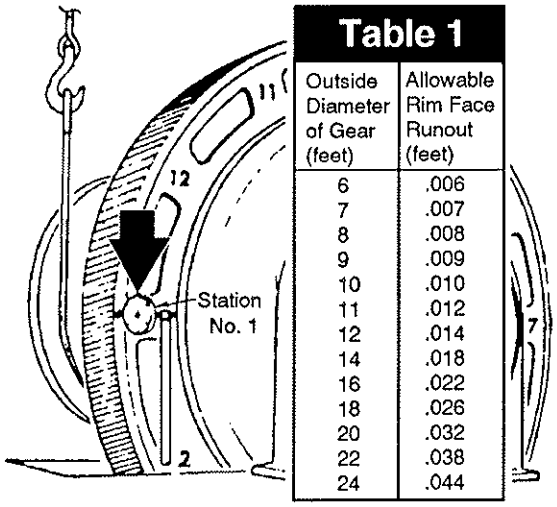


Table 1

Outside Diameter of Gear (feet)	Allowable Rim Face Runout (feet)
6	.006
7	.007
8	.008
9	.009
10	.010
11	.012
12	.014
14	.018
16	.022
18	.026
20	.032
22	.038
24	.044

grsplt-6.wpg

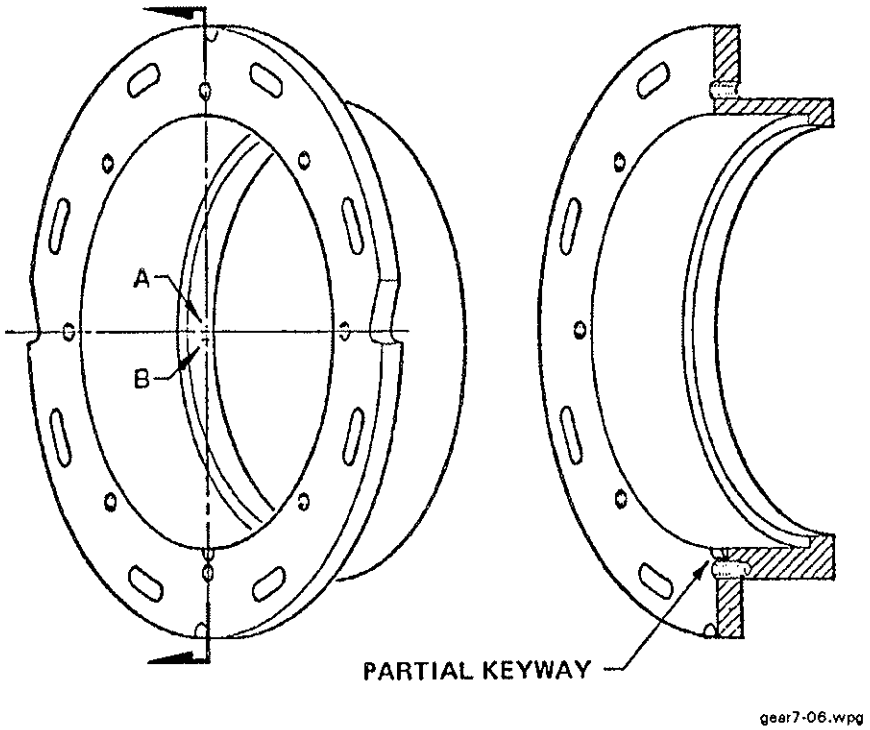


Figure 6

Figures 6 and *7* indicate other locations for the partial keyway rather than the location shown in *Figure 4*. However, the partial keyway has the same meaning regardless of its location.

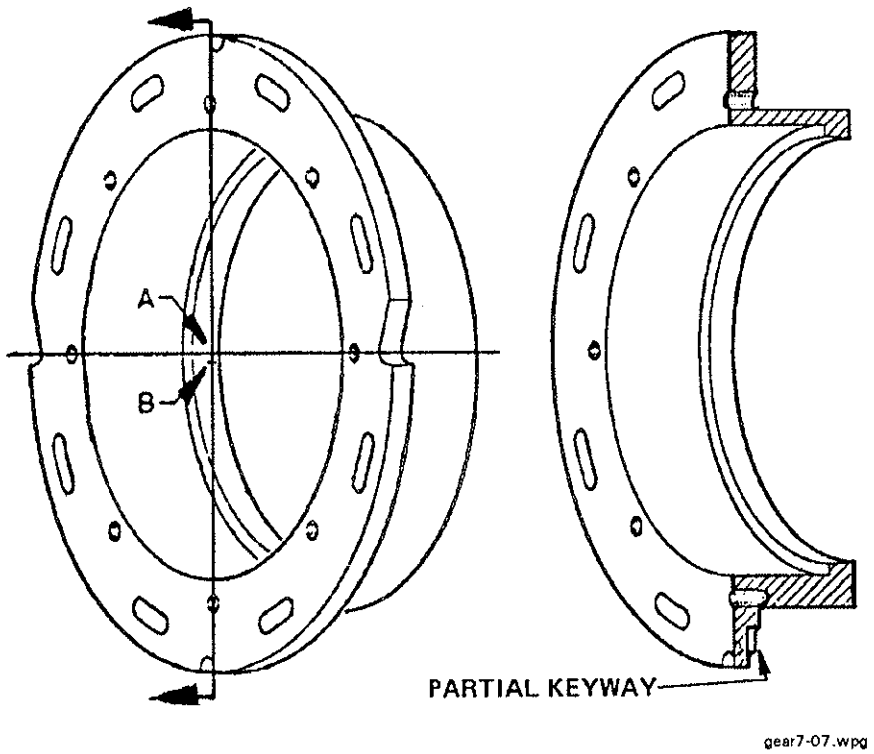


Figure 7

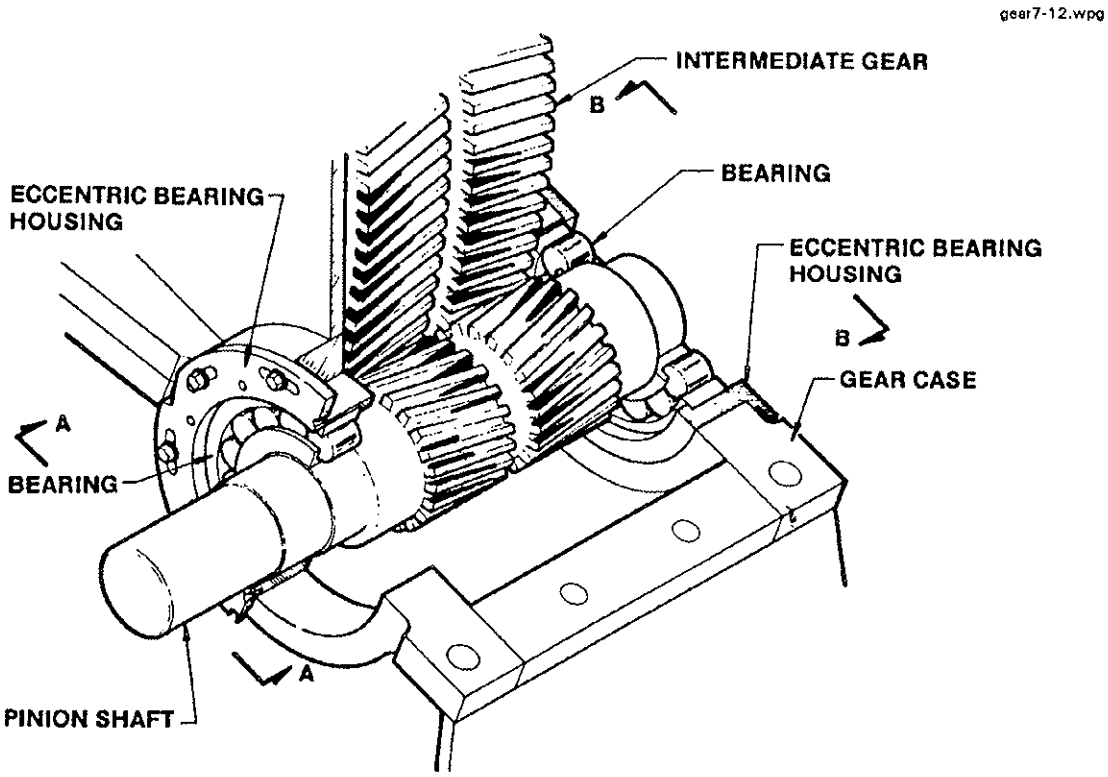


Figure 12

MISALIGNMENT OF PINION SHAFT
OUT OF PLANE

SPLINES

Cured splines disassemble by breaking the bond with puller, press or hydraulic jack and then removing. Temperatures at least 400 °F. (204 °C.) *(NOT TO EXCEED 650 °F. or 343 °C.)* weaken the bond also. Apply pressure and remove while hot.

INVOLUTE SPLINE ASSEMBLY

Involute spline assemblies develop a permanent fit with adhesive as indicated by Class #2 design. The approved adhesive is Loctite CVV 82 (key fit). Standard parts joined with involute splines assemble with a liquid adhesive that hardens when confined in the absence of air.

Anti-friction bearings installation on a shaft requires an interference fit, assemble BEST by shrinking the inner race onto the shaft. This means creating a difference in temperature between shaft and the inner race. Heating the bearing is easier than cooling the shaft. Heat the bearing in a suitable oven or other means of dry heat.

NOTE: DO NOT APPLY HEAT DIRECTLY TO THE BEARING.

WARNING: Do not use a water or oil bath to heat bearings. DO NOT HEAT ABOVE 250 °F.

STEP 1 -- Clean the Worn or Fractured Part or Area to be Repaired or Rebuilt.

One of the most important considerations of a welding repair procedure is to clean the fractured area or worn part of all oil, grease, paint, moisture, dirt, rust spalled material, or any other material that may be detrimental to a weld.

Hydrogen has a bad effect on the properties of weld metal and can be found in most of the mentioned contaminates. As molten weld metal cools and solidifies, the hydrogen is rejected from the solution and becomes entrapped in the solidifying weld metal. It will collect at grain boundaries or at discontinuities of any type where it will create high pressures, which will in turn cause high stresses within the weld. Theoretically, these pressures and stresses could lead to minute cracks in the weld metal which could develop into larger cracks. Hydrogen will gradually escape from the solid steel over time.

Any spalled material should be air carbon arc gouged off or ground off because contaminates can be trapped under the spalled material. The spalled material may not allow the welding arc to penetrate to solid material.

Inspect the worn or fractured areas closely by visual inspection and/or nondestructive testing such as magnetic particle inspection or dye penetrant inspection. This will help determine the extent of the fracture. If one of the NDT techniques are used, make sure instructions on proper use are followed.

After testing decide whether to replace the part or risk the possibility of a potential future failure.

Some methods of cleaning a part are steam cleaning, blasting, or burning off the oils and greases with a torch. The cleaning process must be analyzed depending on how and where the part will be repaired and the type of material that requires cleaning. If heating torch should be used, make sure the operator of the torch is supervised closely. The flame should not be concentrated in one spot for long periods of time, but should be swept back and forth across the part. The burned ash can then be brushed off with a wire brush. Clean a large enough area around the fracture or worn part so that no contaminates reach the repair area.

STEP 2 -- Analyze and Inspect the Fractured or Worn Component for Proper Reporting.

The initial task is to seek out and compile as complete a history as possible of the failed or worn part. The following is a list of items that will be useful in analyzing the failure.

1. Determine when, where and how the failure occurred. Interview the operators.

2. What is the service history? Length of service? Was an accident involved? Have there been other similar failures?

EXAMPLES OF CORRECT WELD REPAIRS:

A sheave with a rope groove worn. Rebuild and keep as a spare.

STEP 1: Clean the sheave of all grease and oils for inspection of any fractures and clean it of contaminates that would be detrimental to welding.

STEP 2: Inspect the sheave visually and with magnetic particle inspection for signs of any other fractures. Compare the cost of rebuilding the groove with a new sheave. The decision is made to send the sheave to the manufacturer for rebuilding.

STEP 3: A review of the print shows the material is MN-MO cast material.

STEP 4: The sheave will be prepared for welding by sending it to the machine shop for a light clean-up cut to machine off any spalled material. The sheave will then be mounted on a welding positioner for rebuilding. Make a template to use as a guide to measure the depth of the weld metal.

STEP 5: Since the manufacturer has flame hardening equipment, a heat treatable type electrode will be used such as 4130 flux cored electrode and a constant voltage power source.

STEP 6: Use two preheating torches while rotating the welding positioner to preheat to 350°F (177°C). Use a temperature indicating device to continually check the preheat throughout the welding operation.

STEP 7: With automatic welding equipment, start welding at the center of the groove and as the groove builds up, start each layer at the groove walls and work to the center. Clean each pass of slag. Use the template to determine the correct amount of weld metal build up for machining. Once preheating has begun, do not stop until the job has been completed.

STEP 8: Since the part cannot be stress relieved in a furnace because of the machined hub, continue postheating the groove area for one hour. Keep the heat at 350°F (177°C) to 450°F (232°C).

STEP 9: Slow cool by turning the torches down while the sheave is still rotating so it cools at a rate of 50°F (10°C) per hour until it reaches 150°F (66°C).

STEP 10: After the sheave has cooled down to ambient temperature, inspect the weld visually and by magnetic particle inspection.

STEP 11: Send the sheave to a machine shop for re-machining to the contour of the drawings.

STEP 12: Flame harden the groove.

HOW to APPLY WIRE ROPE CLIPS

The following is the recommended method of applying U-Bolt clips to get the maximum holding power of the clip:

1. Turn back the specified amount of rope from the thimble. Apply the first clip one base width from the dead end of the wire rope (U-bolt over dead end—live end rests in clip saddle). Tighten nuts evenly to recommended torque.

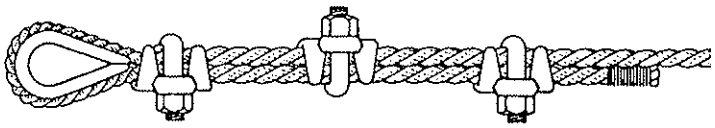
2. Apply the next clip as near the loop as possible. Turn on nuts firm but do not tighten.

3. Space additional clips if required equally between the first two. Turn on nuts—take up rope slack—tighten all nuts evenly on all clips to recommended torque.

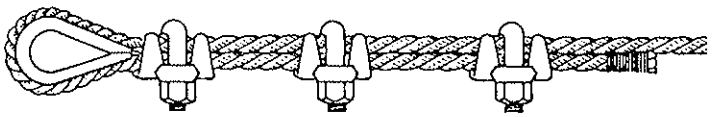
4. *NOTE:* Apply the initial load and re-tighten nuts to the recommended torque. The rope will stretch and be reduced in diameter when loads are applied. Inspect periodically and re-tighten to recommended torque.

A termination made in accordance with the above instructions, and using the number of clips shown has an approximate 80% efficiency rating. This rating is based upon the nominal strength of wire rope. If a pulley is used in place of a thimble for turning back the rope, add one additional clip.

RIGHT WAY for Maximum Rope Strength.



WRONG WAY: Clips Staggered.



WRONG WAY: Clips reversed.

wrp_clp3.wpg

U-BOLT ATTACHING METHOD

The number of clips shown is based upon using right regular or lang lay wire rope, 6 x 19 class or 6 x 37 class, fiber core or IWRC, IPS or EIP. If seal construction is to be used for sizes 1 inch and larger, or similar large outer wire type construction in the 6 x 19 class, add one additional clip.

The number of clips shown also applies to right regular lay wire rope, 8 x 19 class, fiber core, IPS, sizes 1-1/2 inch and smaller; and right regular lay wire rope, 18 x 7 class, fiber core, IPS or EIP, size 1-3/4 inch and smaller.

13. *Fatigue Fracture:*

Wires that break with square ends and show little surface wear, have usually failed as a result of fatigue. Such fractures can occur on the crown of the strands, or in the valleys between the strands where adjacent strand contact exists. In almost all cases, these failures are related to bending stresses or vibration.

If diameter of the sheaves, rollers or drum cannot be increased, a more flexible rope should be used. But, if the rope in use is already of maximum flexibility, the only remaining course that will help prolong its service life is to move the rope through the system by cutting off the dead end. By moving the rope through the system, the fatigued sections are moved to less fatiguing areas of the reeving.

14. *Broken Wires:*

The number of broken wires on the outside of a wire rope are an index of 1) its general condition, and 2) whether or not it must be considered for replacement. Frequent inspection will help determine the elapsed time between breaks. Ropes should be replaced as soon as the wire breakage reaches the numbers given in Table 13. Such action must be taken without regard to the type of fracture.

15. *Electric Arc:*

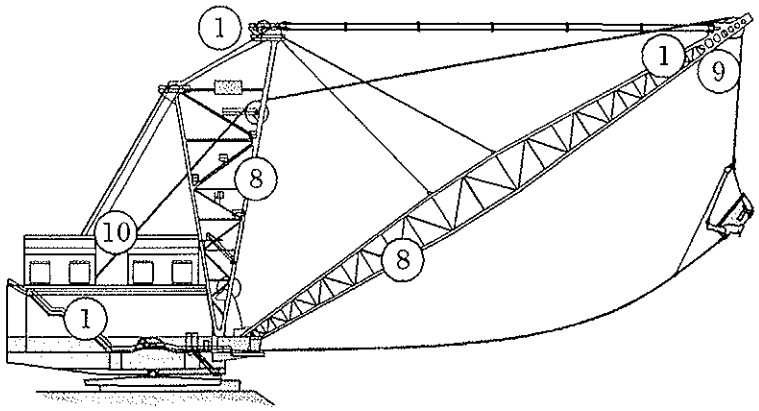
Rope that has either been in contact with a live power line or been used as "ground" in an electric welding circuit, will have wires that are fused, discolored and/or annealed, and must be removed.

On occasion, a single wire will break shortly after installation. However, if no other wires break at that time, there is no need for concern. On the other hand, should more wires break, the cause should be carefully investigated.

On any application, valley breaks—i.e., where the wire fractures between strands—should be given serious attention. When two or more such fractures are found, the rope should be replaced immediately. (Note, however, that no valley breaks are permitted in elevator ropes.)

It is well to remember that once broken wires appear—in a rope operating under normal conditions—a good many more will show up within a relatively short period. Attempting to squeeze the last measure of service from a rope beyond the allowable number of broken wires, will create an intolerably hazardous situation.

Daily —



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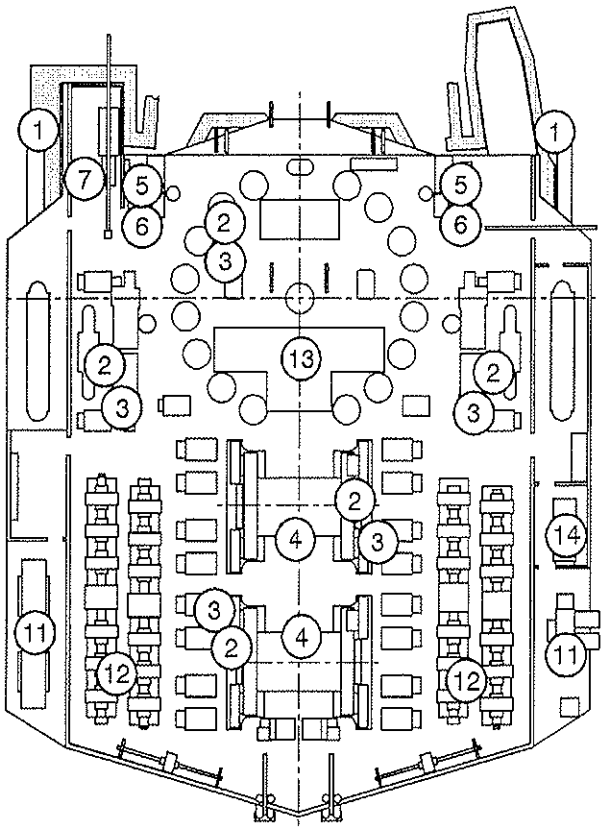

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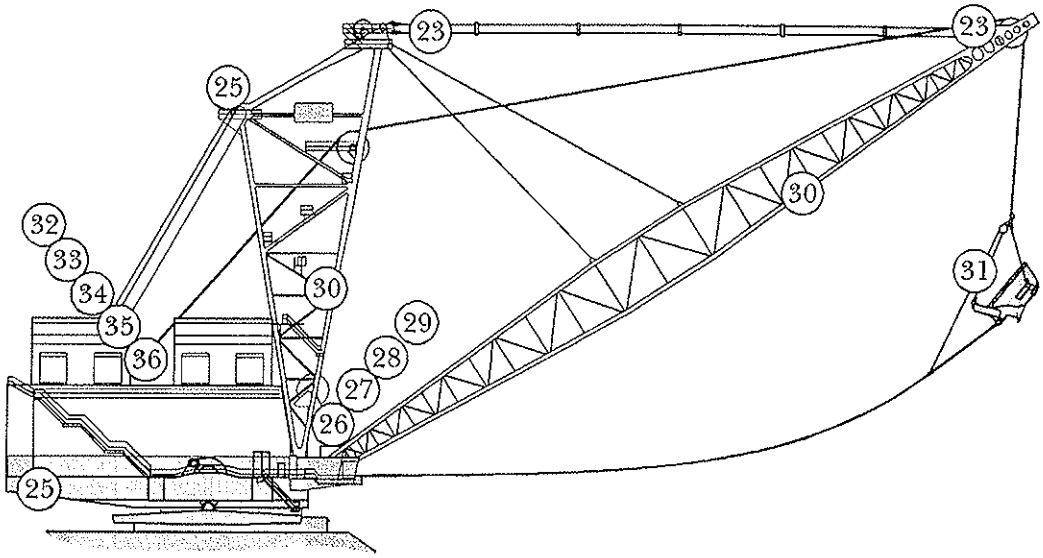
Weekly —



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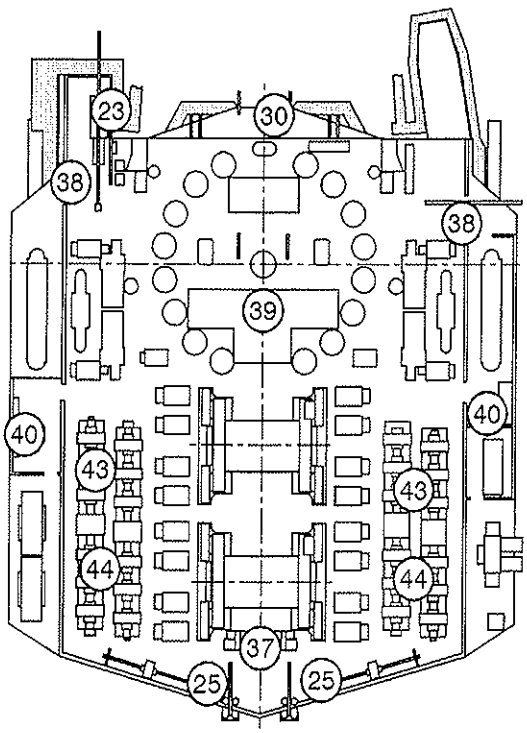

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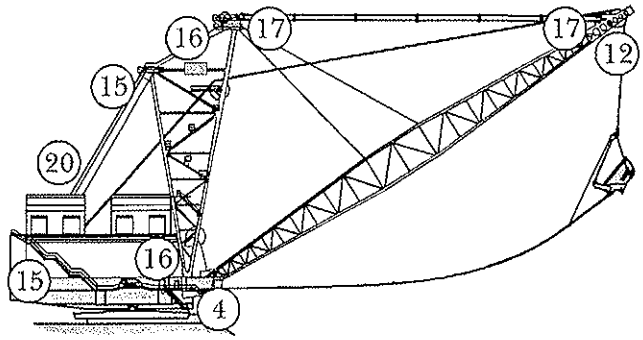
Annual —



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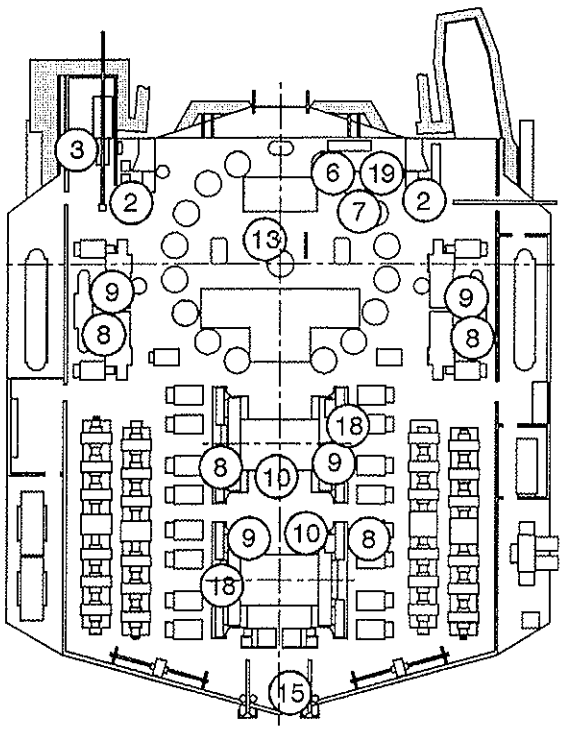

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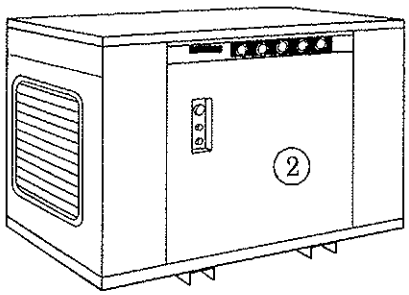

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DANGER: NEVER USE EMERY CLOTH OR EMERY PAPER. Emery conducts electricity. Serious injury to personnel and equipment results.

Commutation not corrected by simple remedies should be reported to the electrical equipment manufacturer.

PROPER LUBRICATION

Proper lubrication of bearings requires following this established procedure for all general conditions. First, be cautious against over-greasing. Establish a happy medium, keeping in mind that excess lube accumulates on armatures and windings, causing electrical failure. Lubricate all bearings on new equipment according to the chart below for the first day of service, and every 6 months of actual operation after that. Add lubricant until a small amount of lube appears at the shaft, or starts out the bottom drain hole in the bearing housing (with the plug removed). After the first day of service, lube the equipment while it is at operating temperature.

NOTE: Many small motors use sealed bearings that require no lube for 2 to 3 years. Add lube with the units stopped and the drain plug removed. Run the generator or motor with the bottom plug removed for a few minutes to allow ALL the excess lube to flow out. *REPLACE THE DRAIN PLUG*. In most cases, the main hoist, drag and swing motors have no plug to remove. Surplus grease flows out in the pocket beneath the bearing housing.

On vertical and a few horizontal motors, remove the plug as is done with generators. As mentioned in the 6 month lube procedure, these bottom plugs are removed before lubing, to see that excess lube escapes. Probing with a clean wire assures that the old grease has not hardened and blocked the passage. *REPLACE THE DRAIN PLUG*.

Shaft Dia.		Lube	
(inches)	(mm)	(ounces)	(grams)
1	25.4	.5	14.2
2	50.8	2	56.7
2.5	63.5	3	85.0
3	76.2	4.5	127.5
3.5	88.9	6	170.0
4	101.6	8	226.8
4.5	144.3	10	283.5
5	127.0	12.5	354.4
5.5	139.7	15.5	439.4
6	152.4	18	510.3

In conclusion, a good troubleshooter attack plan includes:

- Adequate preparation including:
    - — Understanding the system and its components.
    - — Availability of wiring diagrams and test data.
    - — Quality test equipment designed for the job.
- Preliminary investigation to determine the effect of the fault.
- Estimation of the probable cause.
- Testing for determining the faulty part.
- Correction of the failure.
- Preventive maintenance.

2.6 **Pressuriser.** Cont'd.

This fresh air pressurisation pack consists of a pre-cleaner and final filter element working together to give a three stage filtering process. The pre-cleaner cleans the larger of the dust contaminants, the medium weight particles are caught by the end cup while the final filter element provides 99.9% cleaning efficiency to the air entering the evaporator and thus the operators cabin. The pack is normally mounted on the evaporator unit blowing fresh air into the return air chamber to mix it before being passed through the coil for conditioning. It can be remote mounted and ducted if required.

2.6.2 MODEL FVF90K1/M1 (Refer Drawing T5003001)

SYSTEM		M10	M15	M20
Model Number (240 VAC Operation)		FVF90K1	FVF90K1	FVF90K1
Model Number (415 VAC Operation)		FVF90M1	FVF90M1	FVF90M1
ITEM	STATUS	DESCRIPTION		
Mounting Type	STD	Floor mounted and ducted.		
Construction	STD	Stainless Steel 304.		
Airflow	STD	110 l/s max		
Filter	STD	Sub micron single pass bag.		
Filter Accessory	OPT	Gas phase Purafil filter bed.		
Power Supply	STD	240VAC/1 Phase/50Hz.		
	OPT	415VAC/3 Phase/50Hz.		
Control Circuit	STD	110VAC/50 Hz via Transformer		
	OPT	240VAC/50Hz via Neutral or Transformer		

This fresh air pressurisation pack is a self cleaning single pass, sub-micron efficient filtration unit designed as a stand alone unit. It can be ducted to any application required and be controlled by the air conditioning control system. Self cleaning is a reverse flush system controlled electrically by adjustable timers within the unit. For full details see Service Manual SM146-2071.

4.4 Commissioning Instructions. Cont'd

9. Leak test all joints under operation. (See section 4.5)

10. Ensure that system cycles thermostatically.

11. After 3 hours operation, shut the system down and check all motor mounts and fan attachment screws.

6.4.1 *Compressor - General*

It is essential that the compressor is evacuated before any connection is broken for inspection. Proceed as follows:-

1. By-pass compressor low pressure safety cut-out.

2. Close the liquid receiver outlet valve.

3. Start the compressor, observing the test gauge suction side, which must be fitted prior to test and reduce the pressure down to 2 psi (.2Kg/cm^2) and then stop compressor.

   NOTE:

   A. Stop the compressor several times during the operation to prevent excessive foaming of the oil as the refrigerant boils out. Violently foaming oil may be pumped from the crankcase.

   B. If the pressure should accidentally be taken lower than 2 psi (.2Kg/cm^2), refrigerant can be bled into the compressor to raise the pressure to the desired value.

4. Close the discharge valve.

5. Permit all adjacent parts to warm up to room temperature before breaking the connections. This prevents moisture from condensing on the inside of the system if air is accidentally admitted.

6. Following assembly, it is necessary to purge the compressor of air with refrigerant vapour by "cracking" the liquid receiver outlet valve and venting the compressor through the discharge gauge connection on the compressor.

6.4.2 *Compressor - Removal from System.*

The compressor must be removed from the system to fit a replacement compressor. Proceed as follows:-

1. Evacuate the compressor and pump down (refer Section 6.4.1) assuming that it is still operational. If not proceed to step 2.

2. Close the suction and discharge valves and isolate the system electrically.

7.2 Trouble Analysis Chart Notes. Cont'd

7.2.10 Overcharge of Refrigerant.

An overcharge of refrigerant will cause high head pressure. Liquid will back up in the condenser and decrease the amount of surface available for condensing and as a result, the head pressure will rise. In extreme cases, it may rise to a point where the thermal overload elements in the compressor motor or the high pressure cut-out will stop the compressor. This may result in "short cycling", (compressor cycles too frequently).

7.2.11 Air in System.

If air or other non-condensable gases are present in the system, they will tend to move toward and collect at the condenser. The head pressure will rise to a point above the pressure corresponding to the temperature at which the vapour is condensing. In extreme cases, the pressure may rise to a point where either the high pressure cut-out or the thermal overload elements in the compressor motor may stop the compressor.

7.2.12 Broken Valves in Compressor.

Broken or leaky discharge valves in a compressor are generally indicated by the suction pressure rising rapidly as soon as the machine is stopped. If the suction pressure rises faster than 13 kPa per minute, it is an indication that the compressor discharge valves are not holding. Before the compressor is opened however, it should be determined that the pressure rise is not due to other causes such as a leaky expansion valve.

NOTES: Items 7.2.6 and 7.2.7 should not occur and we strongly recommend that the Factory be contacted if this fault is suspected.

SECTION 3.0 TECHNICAL DATA AND CONTROL SETTINGS.

3.1 REFRIGERATION SYSTEM SETTINGS. (Refer Drawing T2134019)

3.1.1 Pressure Controls

LP1	-	Low Pressure Control :	Cut in :	210 kPa
			Cut out:	105 kPa
			Type :	Auto Reset
HP1	-	High Pressure Control :	Cut out:	1950 kPa
			Type :	Manual Reset
HP2	-	High Pressure Control :	Cut in :	1450 kPa
			Cut out:	1100 kPa
			Type :	Auto Reset

Switch Adjustment.

A. COMPRESSOR PRESSURE SWITCH (HP1/LP1)

To adjust the "cut-out" setting, proceed as follows:-

1. Remove the locking plate securing the pressure range adjusting screw.
2. Use a screw-driver to adjust the pressure range adjusting screw.
3. The pressure indicated on the range indicator scale should correspond to the pressure quoted above.

NOTE:

The differential between high pressure "cut-in" and "cut-out" is fixed and therefore cannot be adjusted, i.e. the control has to be reset manually by pressing the "reset" button.

To adjust the low pressure "cut-in" setting, adopt the same procedure as for high pressure "cut-out" adjustment.

The differential on the low pressure side can be altered. Use a screw driver to adjust the low pressure differential to the value quoted above.

NOTE: Cut-in - Cut-out = Differential.

4.4 Commissioning Instructions. Cont'd

9. Leak test all joints under operation. (See section 4.5)

10. Ensure that system cycles thermostatically.

11. After 3 hours operation, shut the system down and check all motor mounts and fan attachment screws.

6.4.1 *Compressor - General*

It is essential that the compressor is evacuated before any connection is broken for inspection. Proceed as follows:-

1. By-pass compressor low pressure safety cut-out.

2. Close the liquid receiver outlet valve.

3. Start the compressor, observing the test gauge suction side, which must be fitted prior to test and reduce the pressure down to 2 psi (.2Kg/cm^2) and then stop compressor.

   NOTE:

   A. Stop the compressor several times during the operation to prevent excessive foaming of the oil as the refrigerant boils out. Violently foaming oil may be pumped from the crankcase.

   B. If the pressure should accidentally be taken lower than 2 psi (.2Kg/cm^2), refrigerant can be bled into the compressor to raise the pressure to the desired value.

4. Close the discharge valve.

5. Permit all adjacent parts to warm up to room temperature before breaking the connections. This prevents moisture from condensing on the inside of the system if air is accidentally admitted.

6. Following assembly, it is necessary to purge the compressor of air with refrigerant vapour by "cracking" the liquid receiver outlet valve and venting the compressor through the discharge gauge connection on the compressor.

6.4.2 *Compressor - Removal from System.*

The compressor must be removed from the system to fit a replacement compressor. Proceed as follows:-

1. Evacuate the compressor and pump down (refer Section 6.4.1) assuming that it is still operational. If not proceed to step 2.

2. Close the suction and discharge valves and isolate the system electrically.

7.2 Trouble Analysis Chart Notes. Cont'd

7.2.10 Overcharge of Refrigerant.

An overcharge of refrigerant will cause high head pressure. Liquid will back up in the condenser and decrease the amount of surface available for condensing and as a result, the head pressure will rise. In extreme cases, it may rise to a point where the thermal overload elements in the compressor motor or the high pressure cut-out will stop the compressor. This may result in "short cycling", (compressor cycles too frequently).

7.2.11 Air in System.

If air or other non-condensable gases are present in the system, they will tend to move toward and collect at the condenser. The head pressure will rise to a point above the pressure corresponding to the temperature at which the vapour is condensing. In extreme cases, the pressure may rise to a point where either the high pressure cut-out or the thermal overload elements in the compressor motor may stop the compressor.

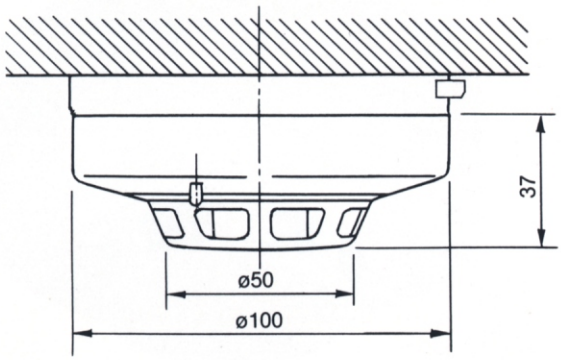
7.2.12 Broken Valves in Compressor.

Broken or leaky discharge valves in a compressor are generally indicated by the suction pressure rising rapidly as soon as the machine is stopped. If the suction pressure rises faster than 13 kPa per minute, it is an indication that the compressor discharge valves are not holding. Before the compressor is opened however, it should be determined that the pressure rise is not due to other causes such as a leaky expansion valve.

NOTES: Items 7.2.6 and 7.2.7 should not occur and we strongly recommend that the Factory be contacted if this fault is suspected.

SECTION 10 REFERENCE DRAWINGS.

DRAWING NO.	ISSUE	DESCRIPTION
T2134015	0	Package System Parameter
T2134016	0	External Evaporator Parameter
T5102001	A	Internal Evaporator Parameter
T2134017	0	Condenser Parameter
T2324005	0	Typical Installation Arrangement
T2134007	0	System Connection Details
T2134018	0	Roof Mounting Installation Details
T2134014	0	General Roof Mounting Arrangement
T2134019	A	Refrigeration Schematic
AE207051	E	Electrical Schematic c/u Pumpdown
AE207077	0	Electrical Schematic w/o Pumpdown
T2134011	A	Pilot Control Box Parameters
T2134012	A	Main Control Cubicle Parameter
T2134008	0	Supply Air Plenum Parameters
T2134009	0	Return Air Plenum Parameters
AS162629	A	FVV80 Pressuriser Parameters
T5003001	A	FVF90 Pressuriser Parameters
AE500310	D	FVF90 Wiring Schematic (240V)
AE500311	0	FVF90 Wiring Schematic (415V)
T2132008	0	Condensate Heater Parameters

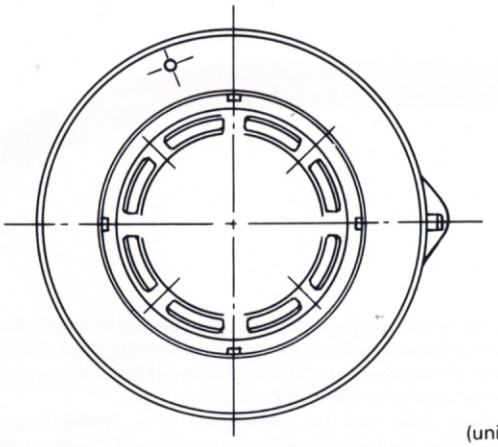


Operation

The Hochiki's SIH-AM Ionization Smoke Detector has two sampling chambers, an outer ionization chamber and an inner ionization chamber. Smoke or invisible combustion gasses can freely penetrate the outer chamber, but the inner chamber is virtually closed to prevent easy entry. With both chambers ionized by a radioactive source (AM241), very small current flows in the circuit. The presence of visible smoke or invisible gasses greatly influences the current flow in the outer chamber to change the voltage ratio between chambers. This difference is then amplified inside the detector and transmitted to the fire alarm control unit.

Applications

The unique features enable Hochiki's SIH-AM to be used in any location where temperature, humidity and /or noise would combine to make conventional detectors inappropriate. The units can be connected to a fire alarm control panel using a 2-wire loop circuit with end-of-line resistor or using a 4-wire loop circuit. In addition, other types of detectors can be used on the same line because the Hochiki common base is interchangeable.



(unit: mm)

Specifications

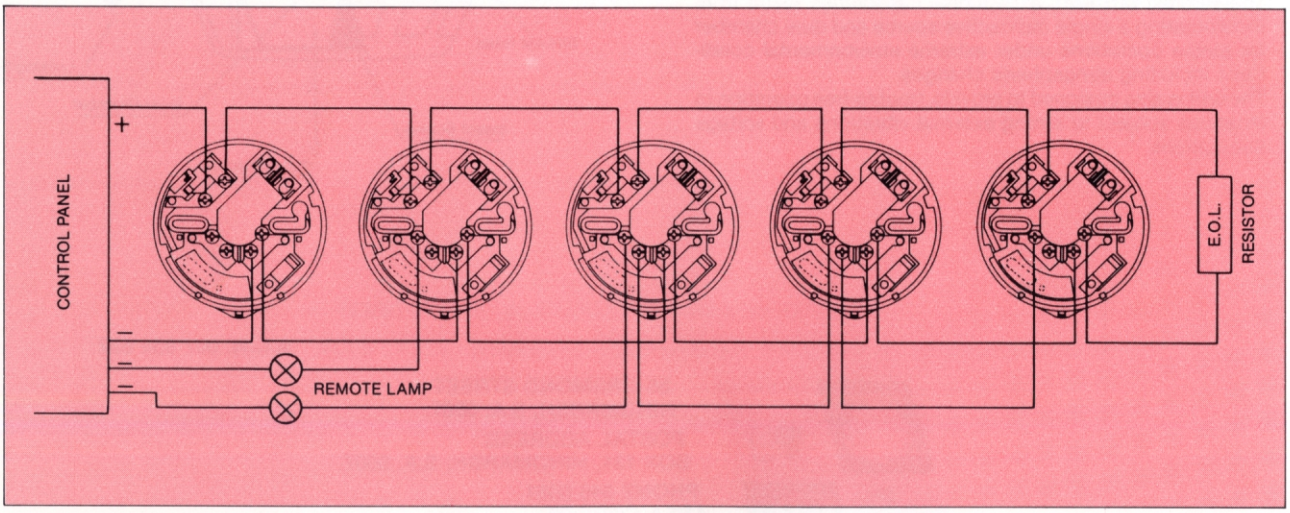
Radioactive source:	Americium 241 0.5μCi
Line voltage	
Nominal rated voltage:	24 VDC
Working voltage:	15.0 ~ 30.0 VDC
Supervisory current:	25 μA (AT 24V, 25°C)
Surge current:	200 μA (AT 24V, 25°C)
Maximum alarm trip current:	250 mA (AT 25°C)
Minimum alarm trip current:	6 mA (AT 25°C)
Ambient temperature:	−20°C ~ +60°C
Test feature:	Use magnet
Mounting Holes:	48 ~ 74 mm in pitch
Weight:	83g without base
Color:	White

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT ANY OBLIGATION ON THE PART OF THE MANUFACTURER.

Typical wiring diagram

Model YBC-R/3A (without lamp): Wiring should be made as shown. Model YBF-RL/4AH4 (with lamp): In this arrangement, any detector in the group will operate the alarm indicator lamp.

Refer to the diagram for wiring detectors with and without a remote lamp. In the case of disconnection-wiring, an end-of-line resistor must be wired to the last base in the line.



HOCHIKI CORPORATION

Section 12

Parts Deviations

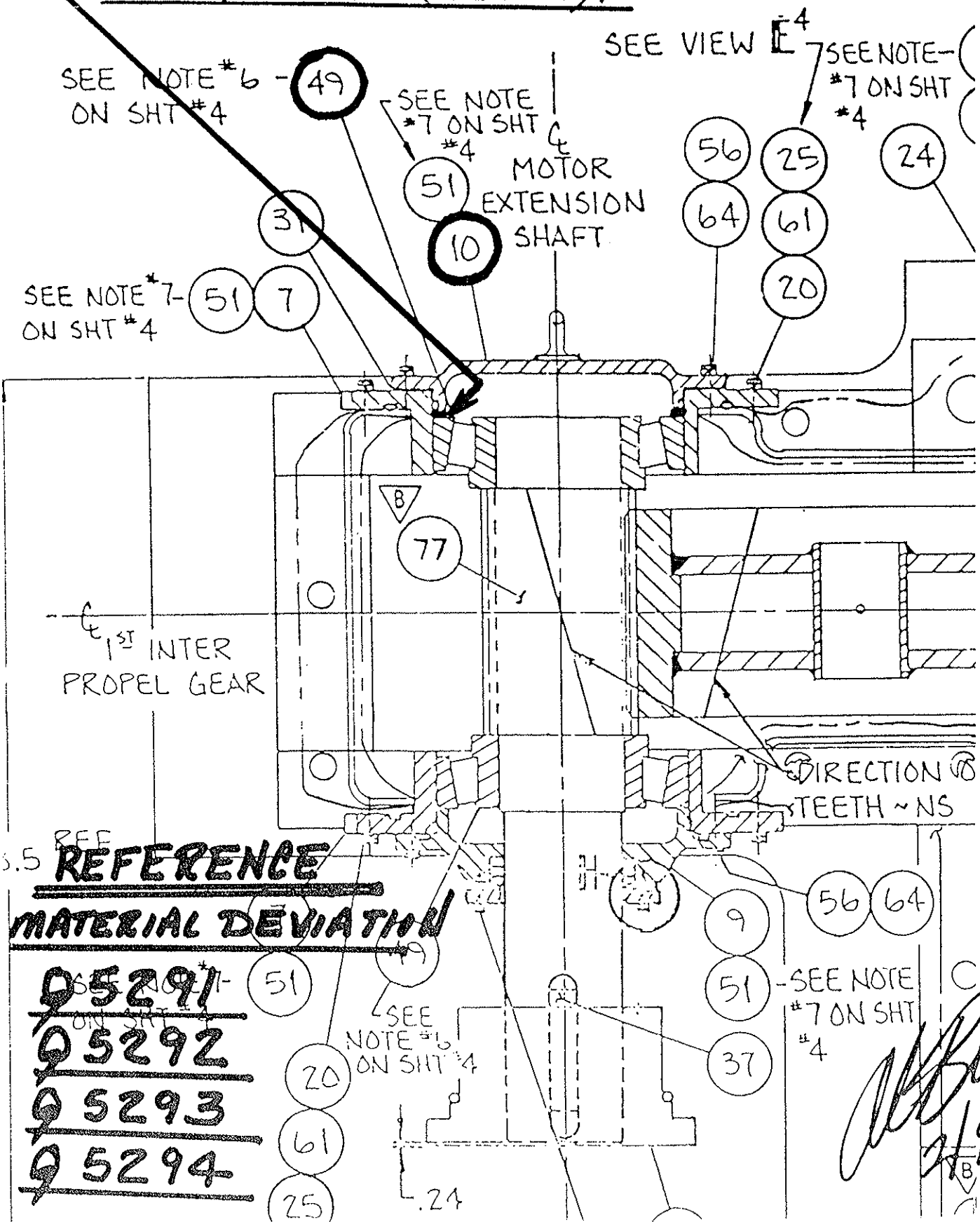
Material Deviation Reports

BI624119

206456 & 206458 GEARCASE ASSY-PROPEL

299908

INSTALL SPACER (892919-0) BETWEEN BEARING (ITEM 49) AND RETAINER (ITEM 10).



REFERENCE MATERIAL DEVIATION

Q5291
Q5292
Q5293
Q5294

2/9/93

HYTORC OPERATIONS/MAINTENANCE MANUAL

Series SL, XL & ULC

GENERAL

All **HYTORC** Torque Machines are supplied completely assembled, ready for use. A hydraulic Power Pack, for use with your **HYTORC** machine, is employed to provide the speed and pressure that makes your **HYTORC** System efficient and accurate. The same Power Pack can also be used in conjunction with hydraulic jacks or pulleys you might want to employ.

IMPORTANT: When employing equipment other than your **HYTORC** Torque Machine with your **HYTORC** Power Pack, set the pressure of your **HYTORC** Power Pack so that it does not exceed the recommended maximum operating pressure of such equipment.

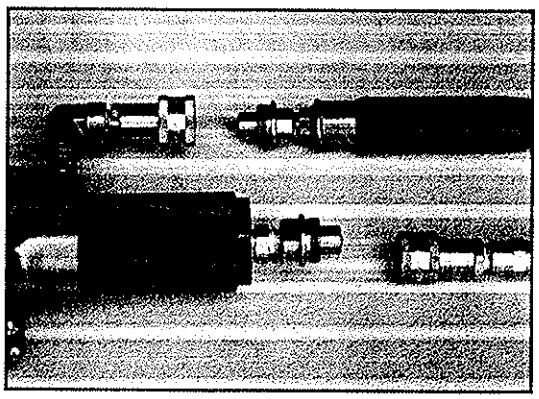
CONNECTING THE SYSTEM

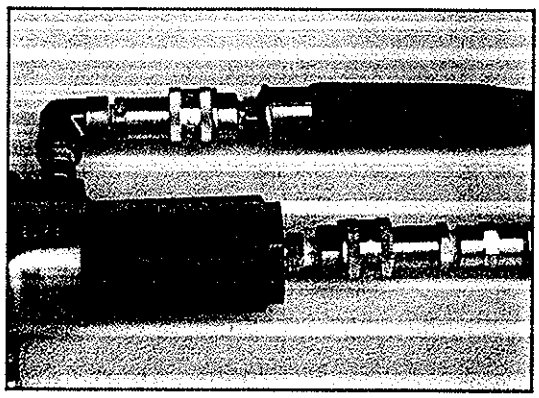
The wrench head and power pack are connected by a 10,000 PSI operating twinline hose assembly. Each end of the hose will have one male and one female connector. Each hose of the twinline hose assembly will have like connectors, (either male or female) on both ends of the same hose.

IMPORTANT: **DO NOT** switch the connectors from **one** side of hose so that you have the same hose with a male connector on one end and a female connector at the other.

Set screw in universal fitting (XL & ULC Series) must not be tampered with. It is factory set for safety purposes, and adjustments should not be attempted.

Connect the twinline hose to the wrench head and pump.





INSURE THE CONNECTORS ARE FULLY ENGAGED AND SCREWED SNUGLY AND COMPLETELY TOGETHER.

Releasing the remote control button will retract the cylinder, and the tool will automatically reset itself. Each time the cylinder is extended and retracted, it is called a cycle. Successive cycles are made until the tool "stalls" at the preset PSI/Torque with an accuracy of ±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 reaction pawl release mechanism. Releasing the remote control button while continuing to hold back on the release mechanism will allow the tool to be removed easily.

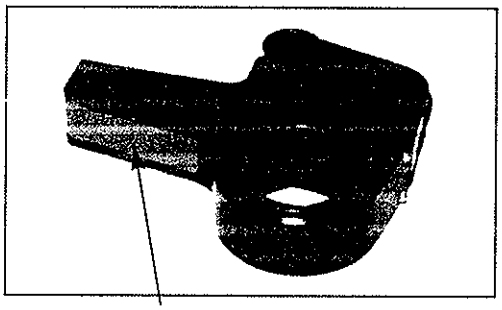
LOOSENING PROCEDURES with the XLCT Series and Square Drive Link

First, set the pump to 10,000 PSI. Set the tool for loosening and attach the socket. Make sure the reaction arm abuts squarely off a solid reaction point. Press and hold the remote control button down. Pressure will build up as the socket begins to turn. When the cylinder is fully extended, the socket will no longer turn. Release the remote control button, the cylinder will automatically retract. Repeat this process until the fastener can be removed by hand.

NOTE: If the bolt does not loosen using the above procedure it is an indication that you will require the next larger size tool to loosen the bolt.

OPERATING THE XLCT Series with the Low Clearance Ratcheting Link

Select the appropriate size low clearance ratcheting link and insert it into the tool (*See INSERTING THE LINKS*).


Reaction Block

Tool operation, bolt tightening and loosening, is exactly the same as with the square drive cartridge links except for the use of the reaction arm. The ULC Low Clearance Ratchet Links are supplied complete with a reaction block. This reaction block is designed to react against an adjacent nut on most normal flange type applications. Prior to operating the tool, place the tool with the low clearance link on the nut to be tightened/loosened. If the reaction block abuts against an adjacent nut or to some other secure stationary object, then use of the reaction block is appropriate.

If, however, bolt spacing is such that the reaction block does not reach an adjacent bolt, use of the short reaction arm is indicated. This will allow reaction to be taken against the side of the flange. To attach the short reaction arm, remove the standard link retaining pin, align the holes of the short reaction arm with that of the reaction block and insert the long retaining pin to secure. Insure that the arm extends in the appropriate direction: right for tightening; left for loosening. (see photos on following page).

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