



Parts Manual

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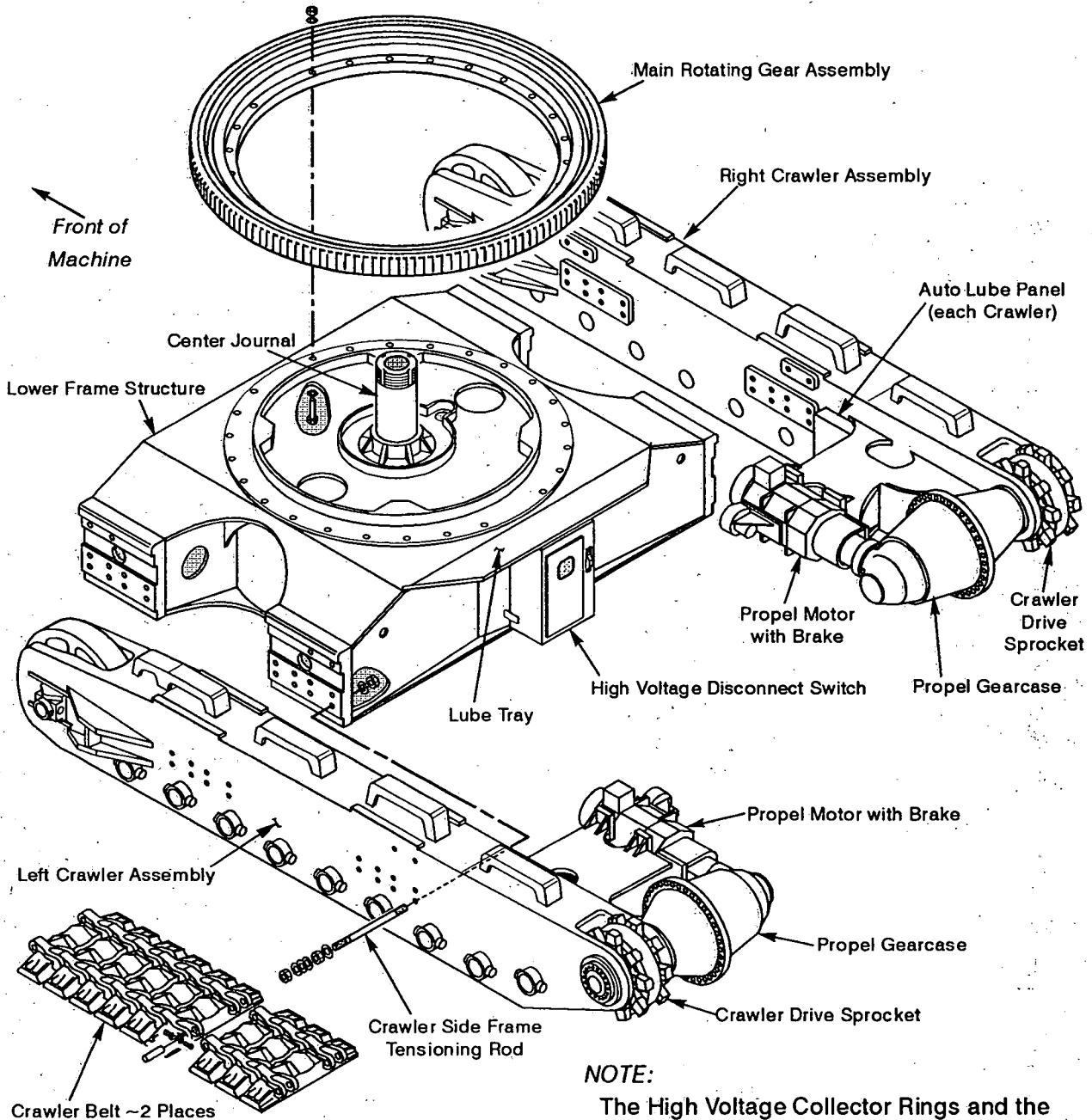
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TRUCK FRAME AND CRAWLERS

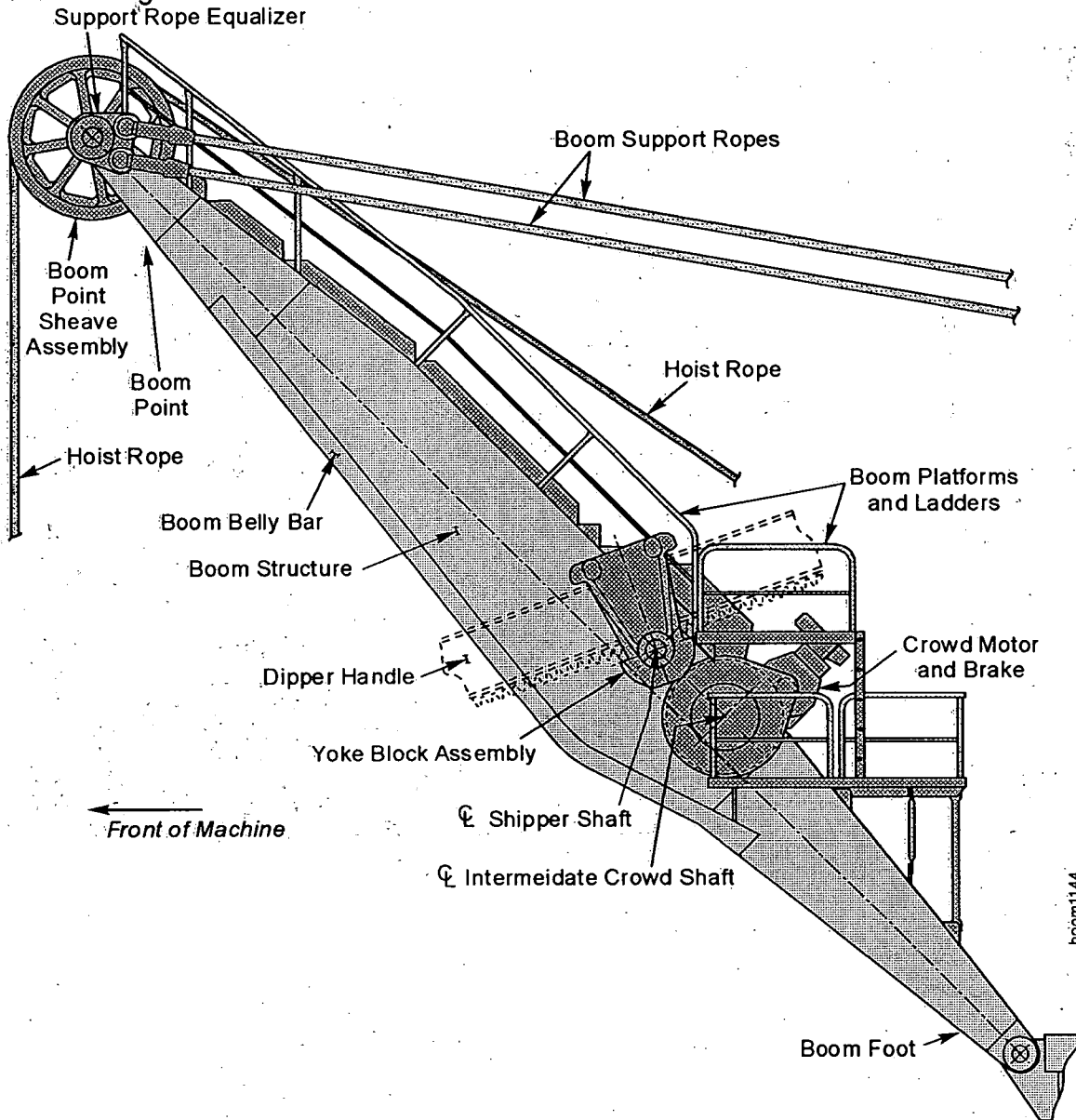


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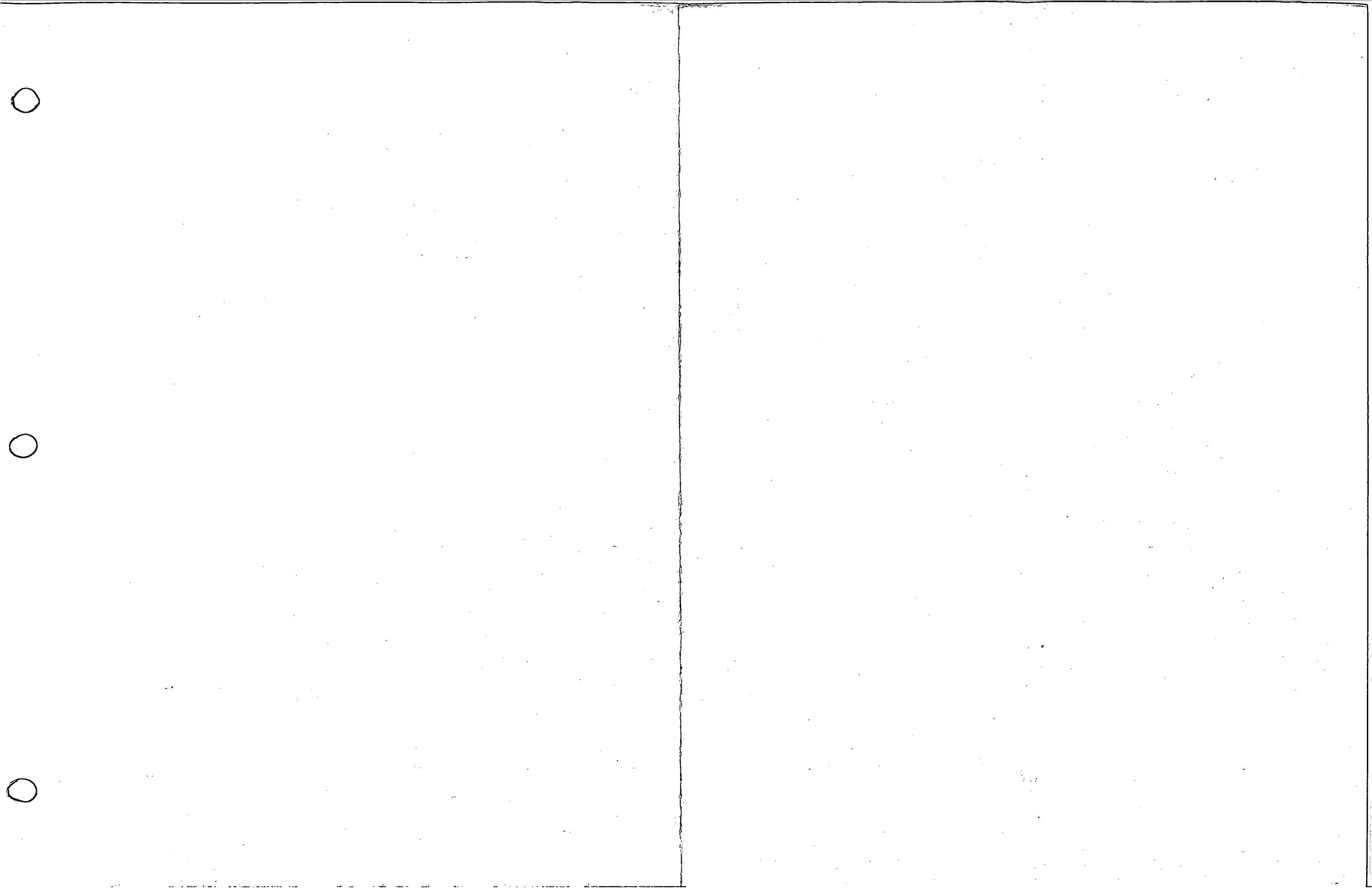
NOTE:
The High Voltage Collector Rings and the optional Cable Reel are not shown for clarity.

BOOM

The boom is a welded steel structure consisting of twin box girders integrally connected at the boom point and in the lower section between the shipper shaft and boom feet. Impact resistant steel is utilized, coupled with 100% penetration and UT quality welds on all main splice joints. Design optimization has resulted in heavier outside skin plates, minimizing the need for internal diaphragms. This reduction in weld related stress concentrations further enhances structural life. Open manholes have been incorporated in the boom as a standard feature permitting periodic structural inspection. Integral "ladders" within the upper boom sections permit internal access without lowering the boom.



The boom is supported by four pre-stressed suspension (structural) strands attached to equalizer links on the A-frame. These inherent long life structural strands carry the working loads of the front end equipment. A boom limit switch with soft setdown prevents boom jacking shock loads.



- D. BACKREST TILT - angle of the backrest is adjustable from vertical by lifting the lever up on the left side to release the backrest.
- E. SEAT INCLINATION - angle of inclination adjustment handle. Lift up to release. The front of the seat can be varied to tip up or down.
- F. LUMBAR - adjust for back comfort using the knob.

BOARDING STAIRS

The boarding stairs are located on the left side of the machine at the rear of the walkway. The stairs are counter weighted to remain in the up position when the machine is in operation or down where boarding the machine. When the stairs are pulled down 3 to 4 inches a limit switch will trip and drop out line Excitation (LE) which will stop the machine. Refer to the figure on the following page.

To board when the machine is in operation:

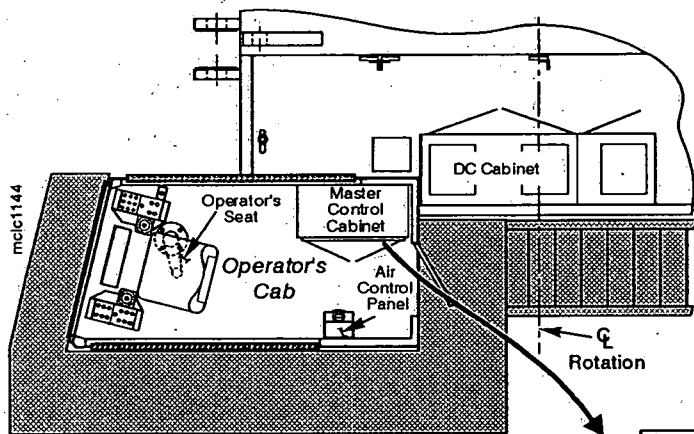
1. Pull one of the two signal chords at the rear of the ballast bar and wait for the operator to bring the machine to a halt.
2. Lower the stairway.



WARNING: DO NOT ATTEMPT TO LOWER THE STAIRS WITHOUT SIGNALING THE OPERATOR FIRST. When the ladder is pulled down 3 to 4 inches, all brakes will set on the machine. FAILURE TO HEED THIS WARNING COULD RESULT IN DAMAGE TO THE MACHINE AND/OR RESULT IN PERSONAL INJURY.

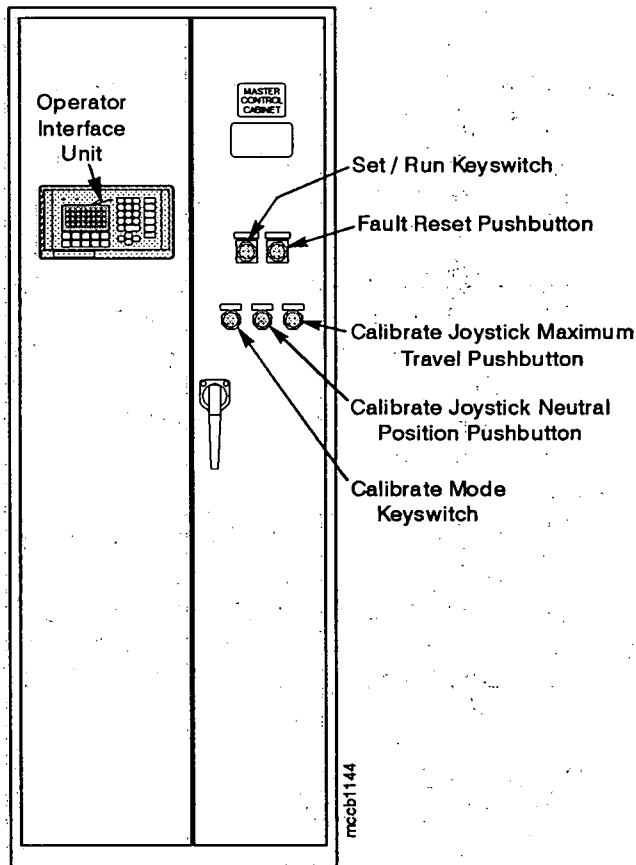
3. After boarding the machine, raise the stairs to their full UP position. The machine will not be operable until the stairs are completely in the UP position.

MASTER CONTROL PANEL



The OPERATOR INTERFACE UNIT (OIU) is located in the Master Control Cabinet on the right side of the operator's cab. The LCD display screen and its accompanying keys permit the operator to access the on-board control, monitoring and diagnostic computer.

This computer contains an annunciator system that monitors selected machine functions and components, and alerts the operator to any detected faults with audible and visual alarms.



PRE-START INSPECTION

Before starting or operating the machine, know the emergency stop and proper operating procedures. Become familiar with all the controls and sound the signal horn to alert coworkers in the pit area of the intent to operate or move the machine. *Prior to boarding, and before entering the operator's cab, inspect the areas listed below:*

Dipper

- Rope & Equalizer Sheave
- Teeth & Pins
- Adapters
- Dipper & Bail Structures for Cracks
- Trip Mechanism & Snubber
- Dipper Latch Bar
- Lubrication Fittings

Front End

- Condition of Boom
- Hoist Sheaves
- Crowd Machinery
- Handle/Yoke Block Clearance
- Lube Coverage
- Hoist Ropes for Wear or Damage
- Boom Support Pendants
- Air & Lube Lines & Connections
- Loose Pins or Retainers
- Walkways & Railings

Lower Frame

- Trail Cable & Cable Reel Condition
- Swing Gear & Pinions for Lube & Damage
- Guarding
- Cracks in Structure
- Roller Circle Condition
- Lube Coverage
- Air & Lube Lines & Connections



DANGER! **HIGH VOLTAGE!** DO NOT contact the high voltage areas of the trail cable or collector rings. NEVER perform electrical or mechanical repairs or maintenance in these areas without disconnecting the trail cable power supply. - Failure to disconnect trail cable power supply could result in severe bodily injury or death.

When the dipper is full, pull the LEFT joystick to the rear to retract the dipper from the bank. Continue to hoist the dipper to its dump height. Stop the hoist by returning the RIGHT joystick to neutral and moving this joystick left or right for the direction of swing desired.



DANGER! When swinging, the dipper must be raised to clear all obstructions. Always be aware of the necessary swing clearance at the rear of the machine. Do not start the swing until the dipper clears the bank.

Start swinging slowly to avoid excessive side thrust on the boom and dipper handle. As you approach the dump point, change the RIGHT joystick either left or right in the opposite direction of swing travel to slow and stop swing motion. Use swing motion as needed to keep dipper over haul truck and steady to dump.

Open the dipper door by using the pushbutton on top of the LEFT joystick. Hold the switch down long enough to release the latch bar, which opens door.

To return to the face for the next dig cycle, move the RIGHT joystick forward and either left or right to move the machine toward the face. This will lower the dipper to the toe of the bank as it swings. Use CROWD motion as required to position the dipper out from the boom.



CAUTION: Stop the swing motion before beginning to dig into the bank. **DO NOT USE THE DIPPER TO STOP the SWING MOTION.**

MOTION LIMITS

There are motion limits built into this mining shovel to protect the machinery against over travel or over use. These limits and the procedure used to get out of each is explained here.

The Boom Jacking Limit is activated when the boom is raised out of its normal position by the crowd motion. This results in a loss of crowd out effort and motion. To get out of this limit, reverse the LEFT joystick to RETRACT. This will permit boom to settle down onto its support ropes and the crowd out drive will be restored.

Crowd Extend/Retract Limits can be activated by either crowding the dipper handle out too far or retracting it in too much. Getting into either limit results in the loss of effort and motion to the dipper handle in whatever direction it was moving. To get out of either limit condition, move the LEFT joystick in the reverse direction from that in which the dipper handle was operating. This will activate the drive in the opposite direction and move the dipper handle out of the violated limit.

The Hoisting Limit is activated when the dipper handle is raised too high and is near the sheaves at the boom point. This results in a loss of hoist and lower effort and motion and in the hoist brake setting. To get out of this limit, return the RIGHT joystick to NEUTRAL. Press the EXCITATION START pushbutton on the operator's left control stand to release the hoist brake, then lower the dipper handle out of the limit with the hoist joystick.



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IMPORTANT NOTES ON SYSTEM OPERATION

1. A lube cycle is the interval between the initiation of lube cycles. The cycles will continue as long as L.E. is energized and NO fault is detected in the lube supply circuit.
2. The lube system is programmed to operate one lube system at a time. No 2 systems will operate simultaneously.
3. The Lower Frame Lube system has 2 cycle times. The cycle time selected is dependent on the machine operating mode. When in the PROPEL mode the number of lube cycles is increased to provide additional lube to the crawlers.
4. The Lower Frame lube system has two pressure switches to insure lubricant dispersal. (Refer to the system schematic.) Both pressure switches must open to terminate a lube cycle.
5. When L.E. is energized, one of the 3 systems will cycle. The timers in the other 2 systems will reset to zero. The program will cycle a different system each time L.E. is energized.
6. If any automatic lubrication supply system is operating at the time the machine's drive system control is changed from DIG to PROPEL, DIG to BRAKES SET, etc., the system operating will be interrupted to allow the Lower Frame system to operate.
7. The alarm time must be greater than the cycle duration and less than the preset cycle time.

Any of the lubricant supply circuits can be cycled manually when power is ON the control panel, regardless of the machine operating mode. There are pushbuttons on the front of the control panel used for manual operation. Manual operation of a lube circuit is useful for purging the lube lines, supplying additional lubricant to components or investigating a fault. The circuits must be manually cycled to clear a fault.

For manual operation, select the circuit desired by pressing one of the 3 pushbuttons provided on the auto lube control cabinet. Push the Manual Cycle START button to start the lube cycle. Only one lube supply system can be operated at a time.

Once activated, a lube cycle will run until one of the following occurs:

- a. The contacts in the pressure switch(es) in the operating circuit opens.
- b. The alarm time for that system is exceeded and a fault is indicated.
- c. The Manual Cycle STOP button is pushed.

LINCOLN TYPE SL-1 LUBRICANT INJECTORS

These pressure operative, spring reset, series installed injectors are supplied in banks mounted on manifolds. Each injector will expel a maximum of .08 cu. inch of lubricant from its outlet port each cycle. Dual outlet ports on each injector permit the injectors to be piped in series for increased lube supply to a common point. The quantity of lube to each point on this machine has been carefully designed by our engineers for proper coverage. Each injector output can be adjusted, however Bucyrus recommends they be set and used at their maximum setting.

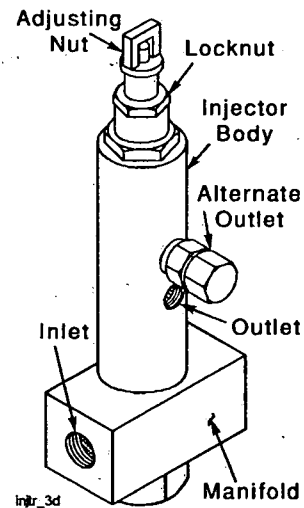
- NOTE:** MAXIMUM Operating Pressure: 3,500 PSI
 RECOMMENDED Operating Pressure: 2,500 PSI
 MINIMUM Operating Pressure: 1,850 PSI
 MAXIMUM Recharge Pressure: 600 PSI

To set an injector for *maximum output*:

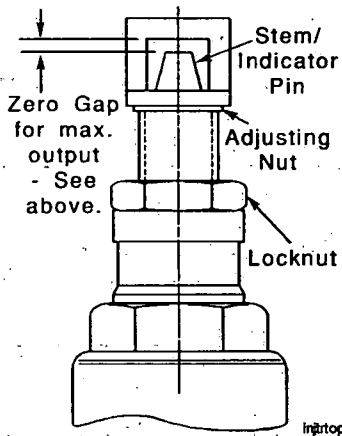
1. Loosen locknut.
2. Turn adjusting nut until there is a small gap at the top of the stem.
3. Orient the adjusting nut so that the opening is toward the front of the injector.
4. Tighten the locknut.

To reduce injector output:

1. Loosen locknut.
2. Turn adjusting nut clockwise (CW) until desired discharge rate is obtained. This will force stem into body, retarding its movement.
3. Set the locknut.



LINCOLN INJECTOR



CAUTION:

Do not turn adjusting nut down clockwise more than 5 full turns from maximum discharge setting. Check output flow from injector then to insure it is still operating. If not, back off adjusting nut until injector does consistently operate. Inspect adjusted injector for operation for 3 or 4 cycles after returning machine to work to make sure it is functioning.



LUBRICATION SPECIFICATIONS

GREASE SPECIFICATIONS

CODE or SYMBOL NO.	ASTM	MPG or TEST	RGL	OGL TYPE - B	OGL 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 At 210°F/99°C, min.	D-446	75SUS	140 SUS	2000 SUS	2000 SUS
Oxidation stability Max. drop 100 Hrs.	D-942	10 PSI/69 kPa	-	--	-
Water Resistance Max. loss at 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)

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OIL SPECIFICATIONS

CODE or SYMBOL NO.		ASTM or TEST	MO	OIL PO
Pour point Max. °F (°C)	Summer Winter	D-97	5(-15) 0(-18)	15(-9) 15(-9)
Flash point Min. °F (°C)	Summer Winter	D-92	450(232) 420(216)	410(210) 410(210)
Viscosity at 100°F (38°C) SUS		D-446	-	150 min.
Viscosity at 210°F/99°C, min.	Summer Winter	D-446	60-68 51-55	43 43
Viscosity index, min.		D-567	90	101
Rust test - 48 hrs. Syn. sea water		D-665	NONE	-
Sae viscosity No.	Summer Winter	-	30 20W	10 10
Analine point min.		D-611	-	215

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Name of Part	Type	No. of Points	Location	Lube Sym.	Frequency
--------------	------	---------------	----------	-----------	-----------

BOARDING STAIRWAY

Top Sheave Bushing	Oilite	2 (1 each side)	Pin	HL	Semi-Annually (2500 hrs.)
Counter-Balance Rope	Wire	2 (1 each side)	At top sheave	WRL	Semi-Annually (2500 hrs.)
Counter-Balance Weights	Sliding	2 (1 each side)	Apply to weight and guide tube	MPG	As needed
Stairway Rollers	Integral Nylatron	4 (2 ea. side)	Roller I.D. Bushing	HL	Semi-Annually (2500 hrs.)
Rope Link at Moveable Stairway	Oilite Bushing	2 (1 ea. side)	Pin	HL	Semi-Annually (2500 hrs.)

OPERATOR'S CAB

Operator's Seat	Jack Screw Shaft	1	Apply to Part under Seat	HL	Semi-Annually (2500 hrs.)
Operator's Seat	Swivel Assembly	1	Apply to Parts in Base	HL	Semi-Annually (2500 hrs.)
Cab Door	Hinges	3	Apply to Part	HL	Annually (5000 hrs.)
Cab Door	Latch	1	Apply to Part	HL	Annually (5000 hrs.)

SWING MACHINERY

Rotating Motors	Anti-Friction	4 (2 each)	Motor Bell Housings	EMG	Semi-Annually (2500 hrs.)
Rotating Gear Cases	Enclosed	2	Fill thru Breather Port to Level on Dip Stick	GL	Check Weekly (100 hrs.): Change Semi-Annually (2500 hrs.)
Cap. Ea. - 51.5 US Gal. (195 liters)					

NOTE: Change oil in new or rebuilt rotating gearcase after initial 150 hours of machine operation. Thereafter, change it every 2500 hours or as indicated by oil sample analysis. Maximum replacement interval is semi-annually. Flush gearcase before refilling it with new oil.



A *Tightening* operation should be done on all connections that have worked loose due to vibration, etc. Loose parts are a definite hazard because they may fall out of place and damage nearby components. The importance of firm mounting and tight connections cannot be overemphasized. Always replace missing or broken bolts with proper size and use the correct tools.

Adjusting should be done when inspection indicates that it is required to maintain normal operating conditions. Specific adjustment is contained in the "Mechanical Adjustment Section" of this manual, the electrical manual or the component manufacturer's manual.

Lubrication refers primarily to the application of *CORRECT LUBRICANT* in the *CORRECT AMOUNT* to bearings and other rotating parts. It also means the application of a light oil to door hinges or other sliding surfaces. Use only clean and proper lubricant.

Planned maintenance, common sense and good judgment is less costly and more effective than panic maintenance. Action taken on recommendations made on the following suggested inspection Check List, or Lists by your maintenance department, should reduce repair, maintenance cost, and increase production.

Replacing worn components with genuine Bucyrus parts on a scheduled basis will avoid costly downtimes and emergency repairs. The cost of parts is small when compared to unscheduled breakdowns that result in excessive overtime man-hours and lost machine production.

Whenever a problem is indicated, the inspector should briefly explain it on the maintenance report (a suggested form is at the end of this section) along with his signature. Then, an authorized person should briefly explain a solution to the problem. Finally, *CORRECT THE PROBLEM*.



SHOVEL NO.:

DATE:

INSPECTION SCHEDULE	SERVICE HOURS			REMARKS
	250	500	1000	
5. AIR SYSTEM: (cont.) b) Check setting on air system regulator: 120 PSI (830 kPa).			X	
c) Air and Lube lines - check for deterioration and leaks. Repair/replace as required. Run systems up to pressure first.		X		
d) Grease/Air Swivel - check for air or lube leaks (found on top of the slip rings).	X			
6. HOUSE ROOF: a) Handrails, Platforms and Walkways - examine for cracks and damage. Repair and replace as required.		X		
b) Filter Fan Housing - check for cracks and loose panels. Clean dirt from fan hub, blades, and exhaust ducts.	X			
c) Hoist Rope wear pads - check condition, replace if required.	X			
d) Dipper Trip - check for correct operation; check for noises; check rope condition - replace if required.	X			
7. OPERATOR'S CAB: a) Operator's Cab - check the following: - windows and seals - door and seal - curtain rails - seats - operation of air conditioners - upper deck of cab	X			

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GANTRY STRUCTURE

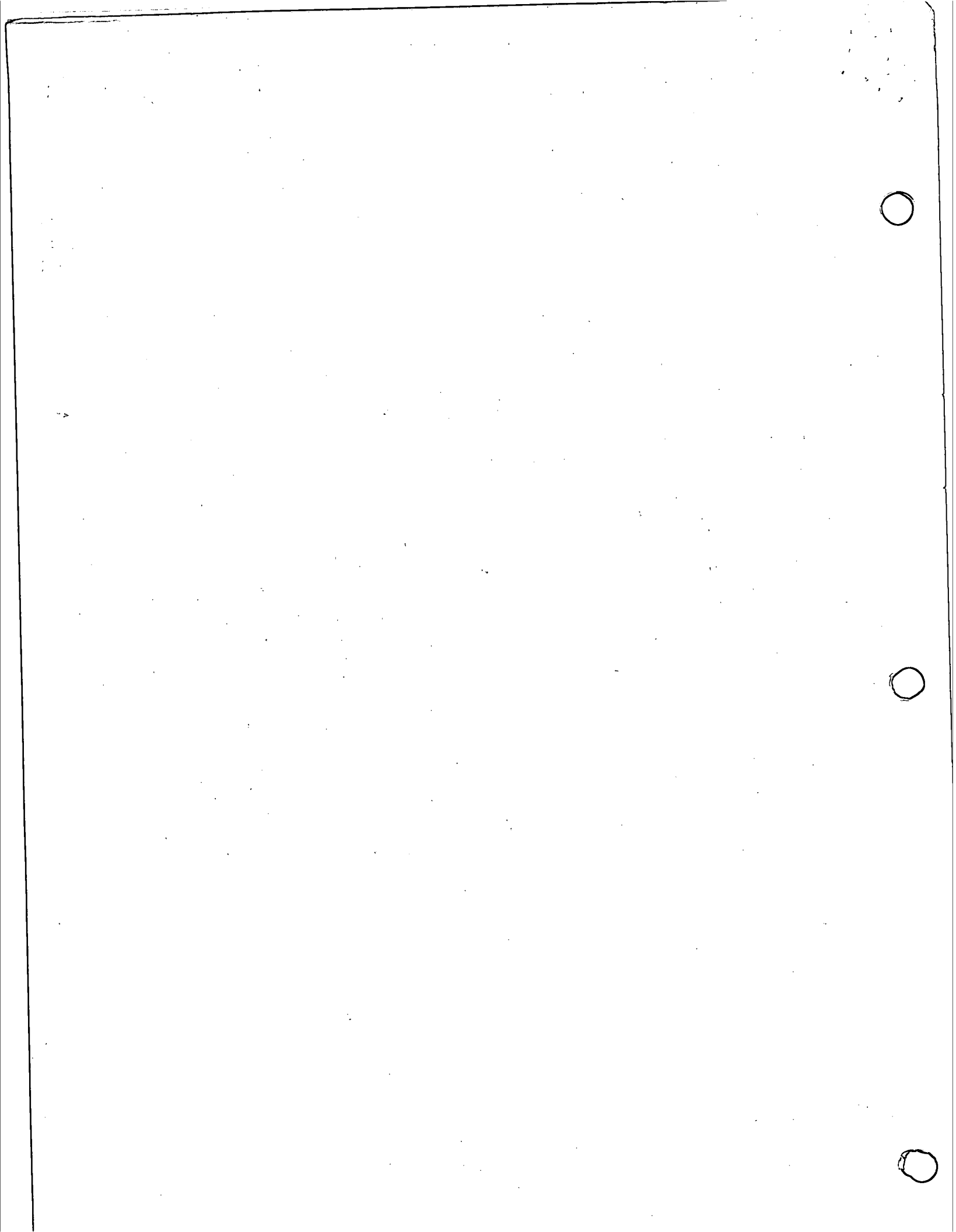
1. Structural cracks?
2. Connecting pins?
3. Bushings?
4. Lubrication?
5. Ladders and walkway damage?

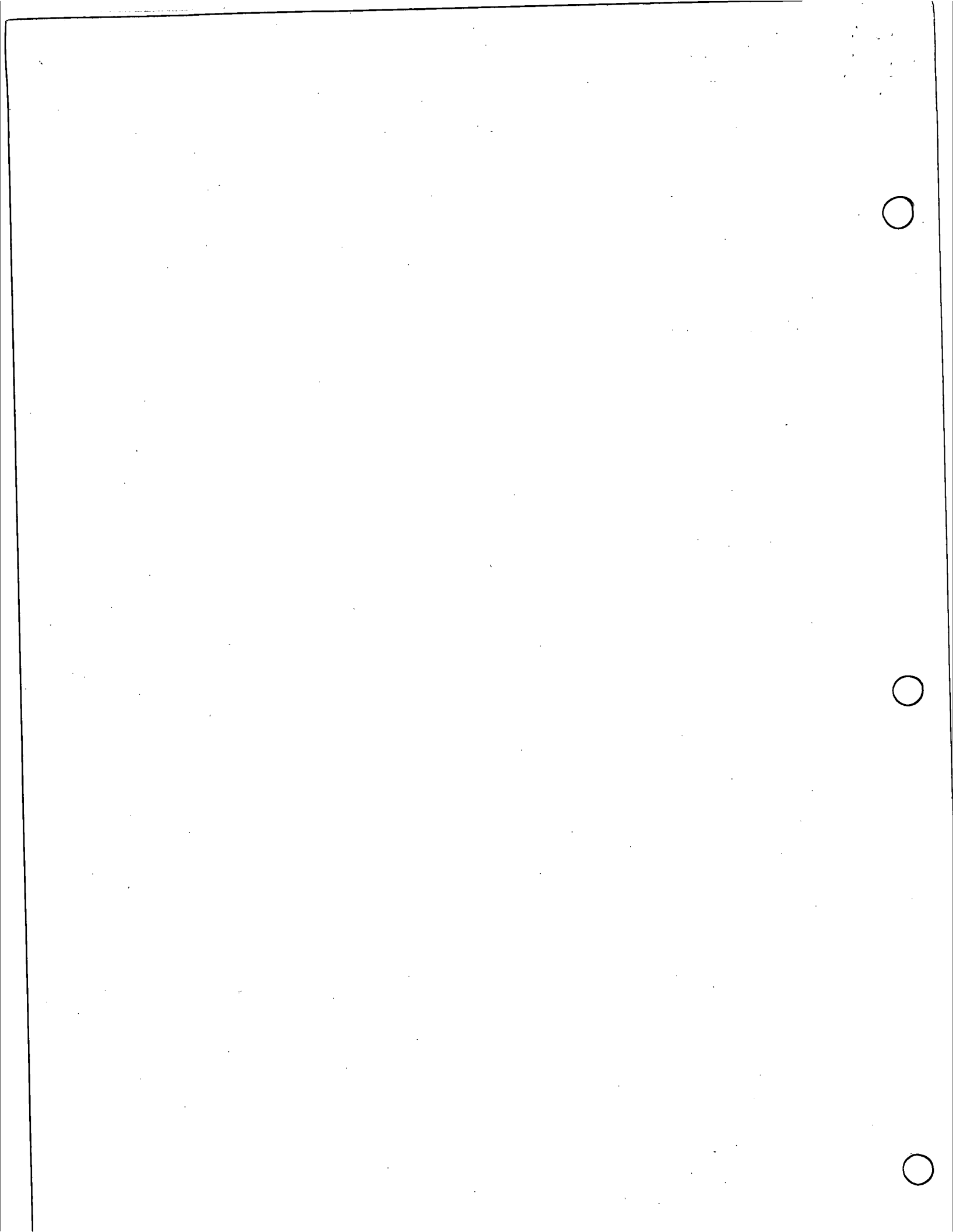
LUBRICATION SYSTEMS

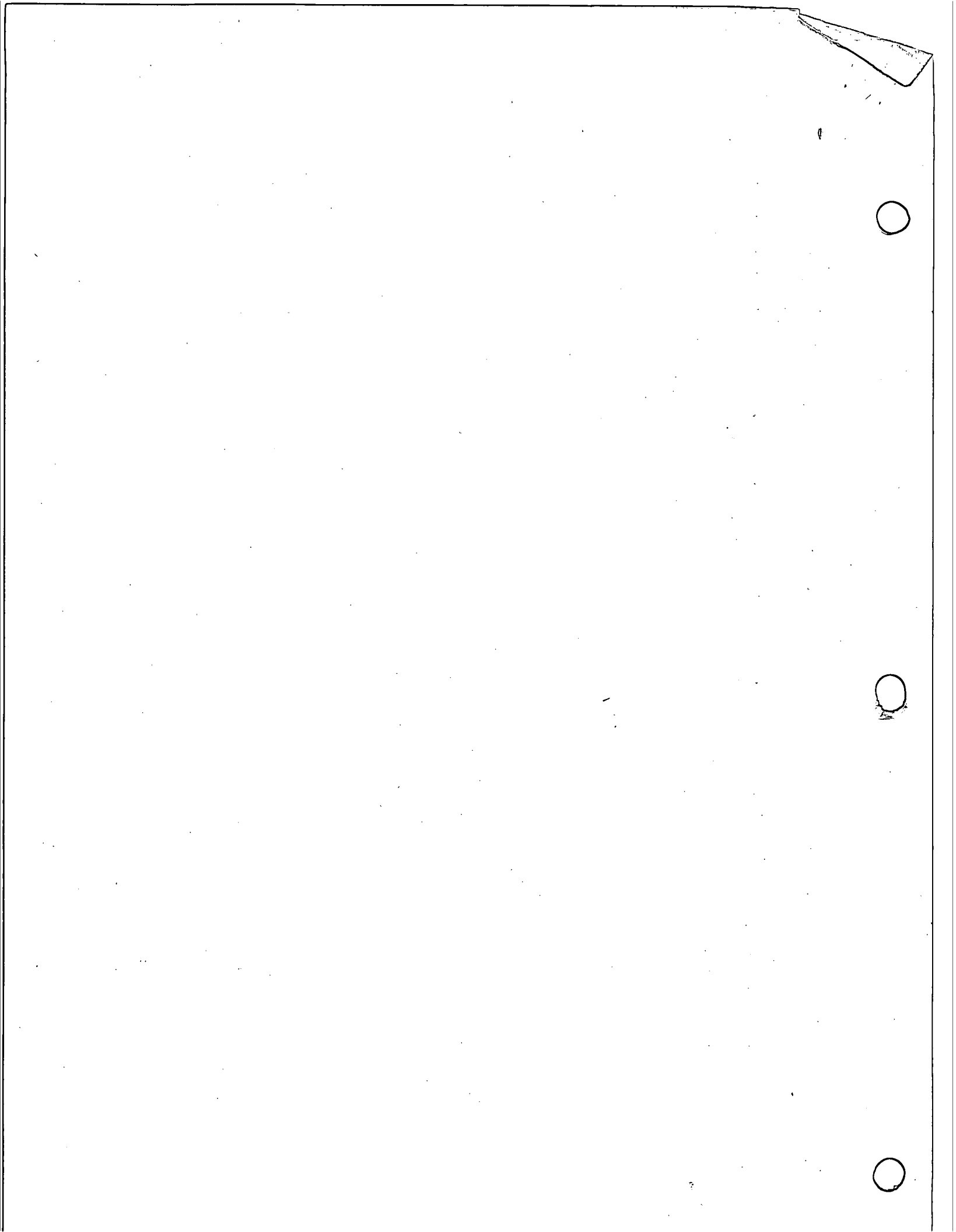
1. Are all grease tanks filled with correct grease?
2. Grease pump operation?
3. Injector operation?
4. Grease line damage?
5. Do all systems cycle properly?

AIR COMPRESSOR

1. Air compressor operating properly?
2. Compressor and motor mounting bolts?
3. Crankcase oil level?
4. High and low operating pressures to specification?
5. Air filters?
6. Guards in position and secure?
7. Air leaks?
8. Air line damage?
9. Drain water from reservoir?
10. Tanner deicer filled?









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ROLLER CIRCLE ROLLER REPLACEMENT

When inspection of the roller circle assembly identifies a failed roller, it should be removed from the roller circle as follows:

1. Move the machine to a level work area.
2. Remove the roller circle guard at one side of the machine.



DANGER! HIGH VOLTAGE! CHECK THAT THE HIGH VOLTAGE COLLECTOR RING GUARD IS IN PLACE. If the guard is missing, isolate the machine from the mine substation and confirm the collector rings have been grounded by a qualified electrician and replace the guard. Failure to comply with these instructions could result in serious injury or death.

NOTE: The roller circle guards on each side of the rotating frame are welded in place. Remove and plug the OGL line to the roller circle rollers. Remove the roller circle guard by cutting the welds which attach the guard to the rotating frame.

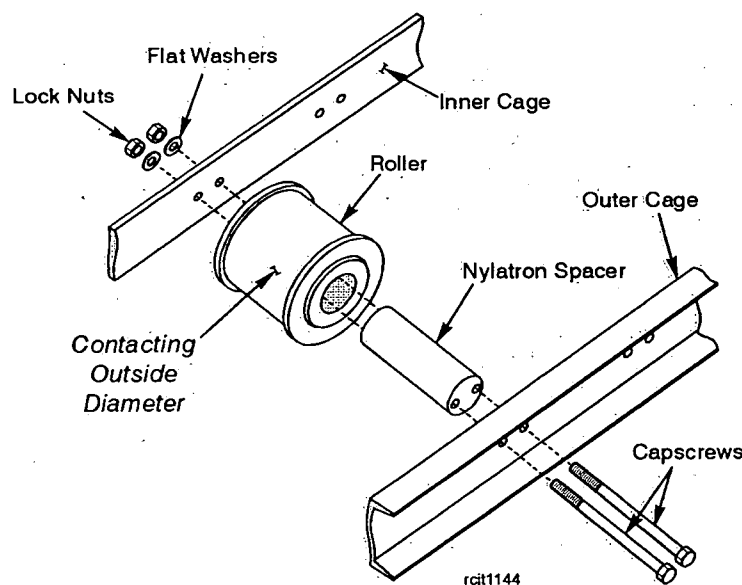


CAUTION: Protect the rollers and rails when cutting the guard(s) loose.

3. Mark the location of the damaged roller(s) and rotate the machine to place the roller in the open area at the side of the rotating frame.
4. Shut down the machine and tag the controls with a notice that the machine is not in service.



DANGER! IF THE MACHINE IS OPERATED WHILE PERSONNEL ARE WORKING ON THE ROLLER CIRCLE, INJURY OR DEATH COULD RESULT. ALWAYS LOCK OUT THE MACHINE CONTROLS AND LINE EXCITATION WHEN SERVICING THE MACHINE.



5. Remove the 2 capscrews which secure the roller spacer to the roller circle cage.

NOTE: If the capscrew head is toward the inside of the roller circle, push the capscrew in, cut off the head and remove it toward the outside of the roller circle.

6. Clean and inspect the roller. If necessary to replace, be sure to check the correct part number in the parts book for this machine.

CRAWLER BELT TENSION ADJUSTMENT

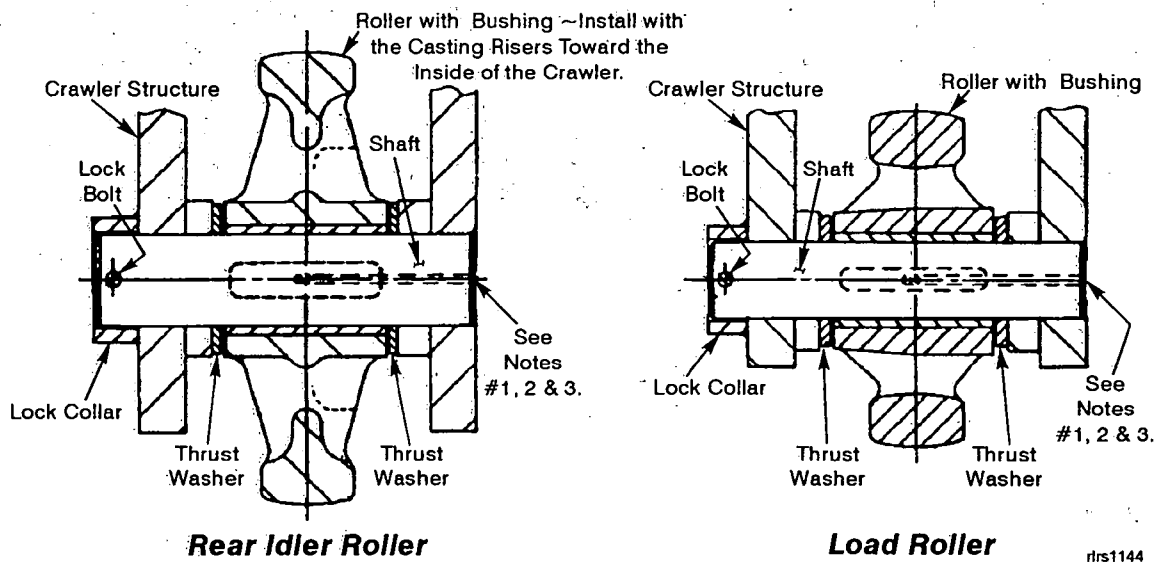
NOTES:

- BEFORE the drive lugs on the shoes touch the top of the crawler frame, replace or rebuild the slide bars to their original height.
- To check for the correct belt tension - while propelling the machine, insure that the crawler shoes effectively engage the drive sprocket. This is achieved when there is a minimum of radial shoe movement as it enters the load area of the drive sprocket.
- BOTH CRAWLER BELTS SHOULD BE ADJUSTED TO THE SAME TENSION AND THE SAME OVERALL LENGTH. This is to insure that the machine will propel in a straight line. The machine will have a tendency to turn toward the shorter belt when propelling forward.

Correct tension of the crawler belt requires repositioning the idler adjusting block in the crawler side frame. Forward-movement tightens the belt, rearward movement loosens the belt. The idler bearing blocks fit in a rectangular opening, inboard and outboard, in each crawler side frame. Shims in front of each idler adjusting block are spares for use in tensioning the belt as pins and shoe bores wear and belt stretches. A fixture welded to each frame provides a base for hydraulic jacks which are used to reposition the idler adjusting blocks during adjustment of the crawler belt.

To prepare the machine for crawler belt adjustment:

1. Propel the machine forward on level ground until nearly all the slack in the belt is located between the front idler and the first slide bar. Park the machine.
2. Place one hydraulic cylinder at each side of the front idler between the adjusting block and frame support provided.
3. Remove the shim retainer bars, both sides.
4. Remove the shims of various thickness from the storage space provided in the front of the idler adjusting block.
5. Slowly pressurize the hydraulic cylinders. Maintain equal distance across both cylinders to prevent idler misalignment.
6. Tighten the belt until dimension "A" is 20 to 25 mm (.75 to 1.00 inch). Dimension "A" is measured with a straight edge on the pins of one shoe to the pins of an adjacent shoe, between the front idler and the first slide bar, as shown in VIEW K-K.



Rear Idler Roller

Load Roller

rfs1144

NOTES:

1. Install the shaft with the Lubrication Hole toward the Inside of the Crawler.
2. The Flat of the Shaft and the Lube Hole Indicated by the Punch Mark is to be toward the Front of the Crawler.
3. The Flat of the Shaft is to be toward the Front of the Crawler.

FRONT IDLER ROLLER

The FRONT IDLER ROLLER functions as the tensioner for the crawler belt. Its removal and/or replacement will be required when the bronze bushing or thrust washers wear out or the idler roller requires repair or replacement.

To remove the front idler:

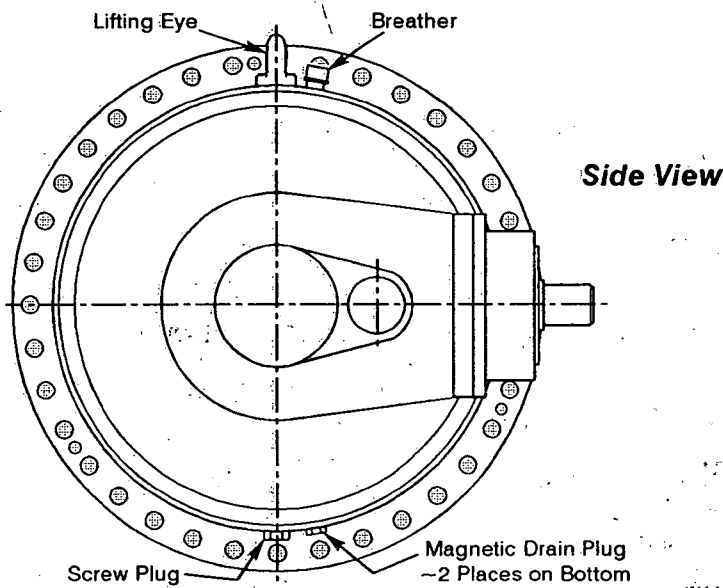
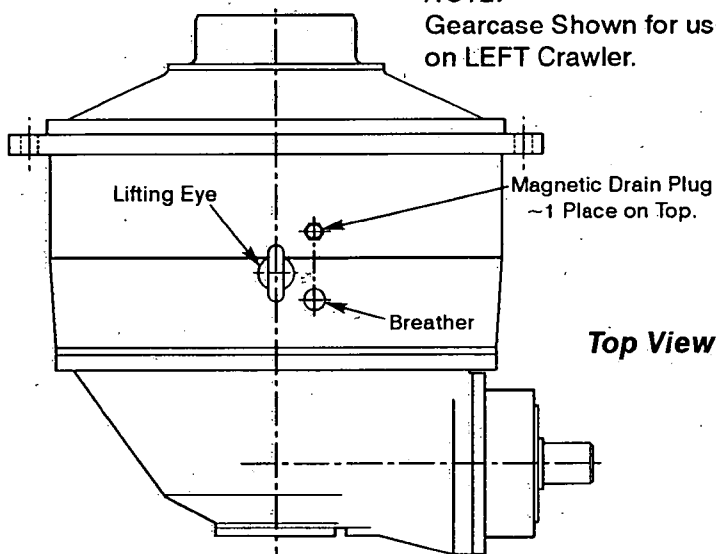
1. Park the machine on a level work area.
2. Rotate the upper frame to give clear access to a crane line for handling the crawler belt and idler.
3. Release the belt tension and separate the belt behind the top of the front idler roller.



DANGER! SECURE THE CRAWLER BELT BEFORE SEPARATING IT SO UNEXPECTED MOVEMENT UNDER ITS OWN WEIGHT IS PREVENTED. FAILURE TO SECURE THE BELT COULD RESULT IN BODILY INJURY OR DEATH.

4. If present, remove the optional cable reel.
5. Drain the oil from the gearcase using both plugs located at the bottom of the gearcase. Both drains are required to be unplugged to completely drain the gearcase and to remove all debris.
6. Remove the guard from the propel motor coupling.
7. Open the propel motor coupling and remove the grid. Note the match marking on the coupling covers.
8. Remove the inspection cover from the housing on the crawler bell housing for viewing the main propel shaft/gearcase junction.

NOTE:
Gearcase Shown for use
on LEFT Crawler.

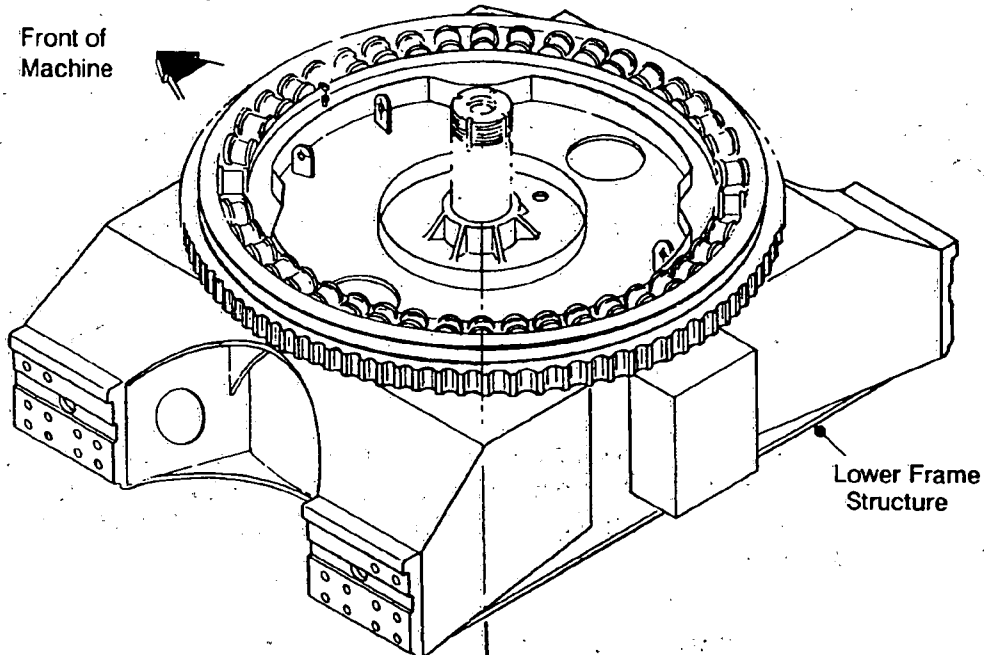


9. Support the gearcase using the lifting eye on the gearcase.
10. Remove the 36 capscrews which secure the gearcase to the crawler side frame bell housing. Match marks on the gearcase and crawler bell housing flange are for coupling alignment assistance - if the SAME gearcase is reinstalled.
11. Use three M36 x 4 capscrews inserted in the tapped holes in the flange of the gearcase as jacking screws to evenly withdraw the gearcase from the pilot bore in the crawler bell housing.
12. Remove the gearcase from the splines of the main propel shaft, and lift the gearcase away from the crawler to cribbing.
13. If a new or exchange gearcase is to be installed, use a bearing puller to remove the coupling hub from the input shaft.

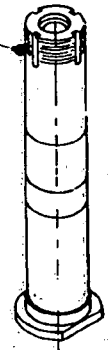
pgt1144

MAIN PROPEL SHAFT ASSEMBLY

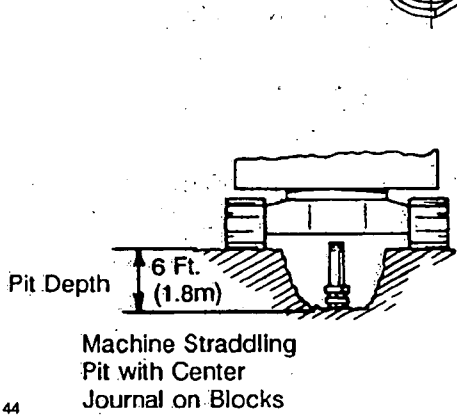
1. Install the inboard spacer.
2. The double-row tapered bearing installation requires heat to install this bearing on the propel shaft. Use a dry heat source and do not permit temperature of the bearing to exceed 149 oC (300 oF). Install the outboard spacer and bearing nut. Tighten the bearing nut snug against the outboard spacer. Allow the bearing to cool to ambient before continuing.
3. Remove the bearing nut.
4. Install the inboard bearing cartridge and bearing retainer with lip seal. Spray the lip seal area with Molyube 1200AR (Part No. 170025-1) or equivalent.
5. Shim gap at bearing retainer according to below procedure:
 - Install retainer and tighten socket head capscrews to 110 NM (80 Ft.Lbs.) for gap measurement.
 - Measure gap at three places equally spaced around outside diameter of retainer.
 - Take average of these three measurements and subtract .03 to .08 mm (.001 - .003 inches) to obtain shim thickness.
 - Install shims and retainer. Tighten four socket head screws to 440 NM (325 Ft.Lbs.).
6. Install the outboard spacer. Reinstall the bearing nut. Tighten the bearing nut snug against the outboard spacer.
7. Install two locking capscrews in bearing nut and tighten to 160 NM (115 Ft.Lbs.).
8. Fill bearing cavity with multipurpose grease.



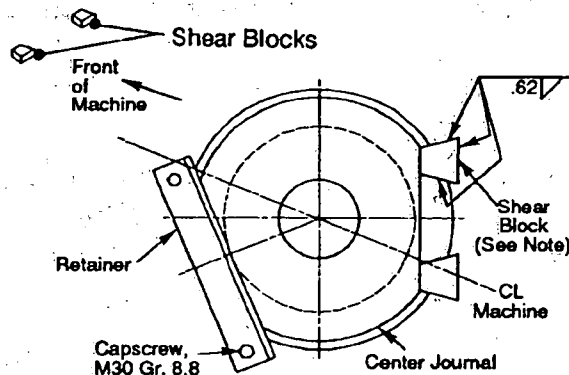
Center Journal
less Nut and Lock
Plate - 4658 lbs.
(2113 kg)



NOTE: When welding the shear blocks, NO gap should exist between the Lower Frame and the Center Journal Pin Flange.



ffay1144



View from Beneath the Center Journal

Center Journal Installation



5. Disconnect the air and auto lube lines from the dual rotoseal above the auxiliary collector rings housing. Cap and plug the lines and ports to keep the systems free of contaminants.



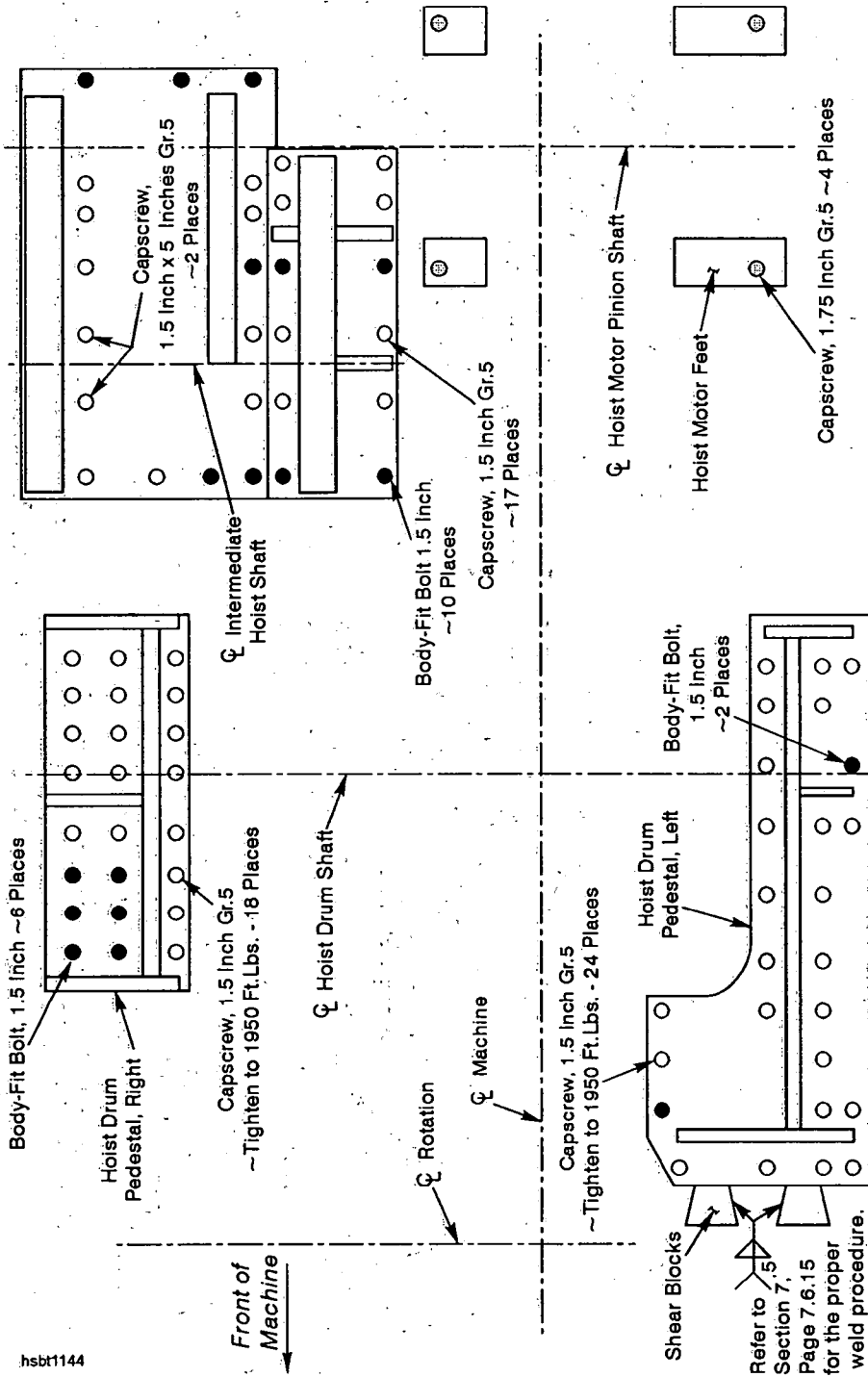
CAUTION: BLEED OFF THE AIR PRESSURE BEFORE DISCONNECTING THE HOSES.

6. Disconnect the air and auto lube lines from the bottom of the auxiliary collector rings/rotoseal assembly. Cap and plug the lines and ports to keep the systems free of contaminants.
7. Have a qualified electrician disconnect the wiring from the junction boxes above and below the auxiliary collector ring assembly. Remove the junction box from the side of the collector ring housing.
8. Use slings, etc. to attach lifting equipment to the lifting lugs provided on the top of the auxiliary collector ring assembly.
9. Remove the 6 capscrews under the collector housing that hold the assembly to the top of the center journal. Note the match markings between the center journal and the mounting flange of the auxiliary collector rings/rotoseal assembly.
10. Carefully lift the auxiliary collector ring/rotoseal assembly out of the center journal and then out of the machinery house. Place it on cribbing to transport it to a shop for any repairs.



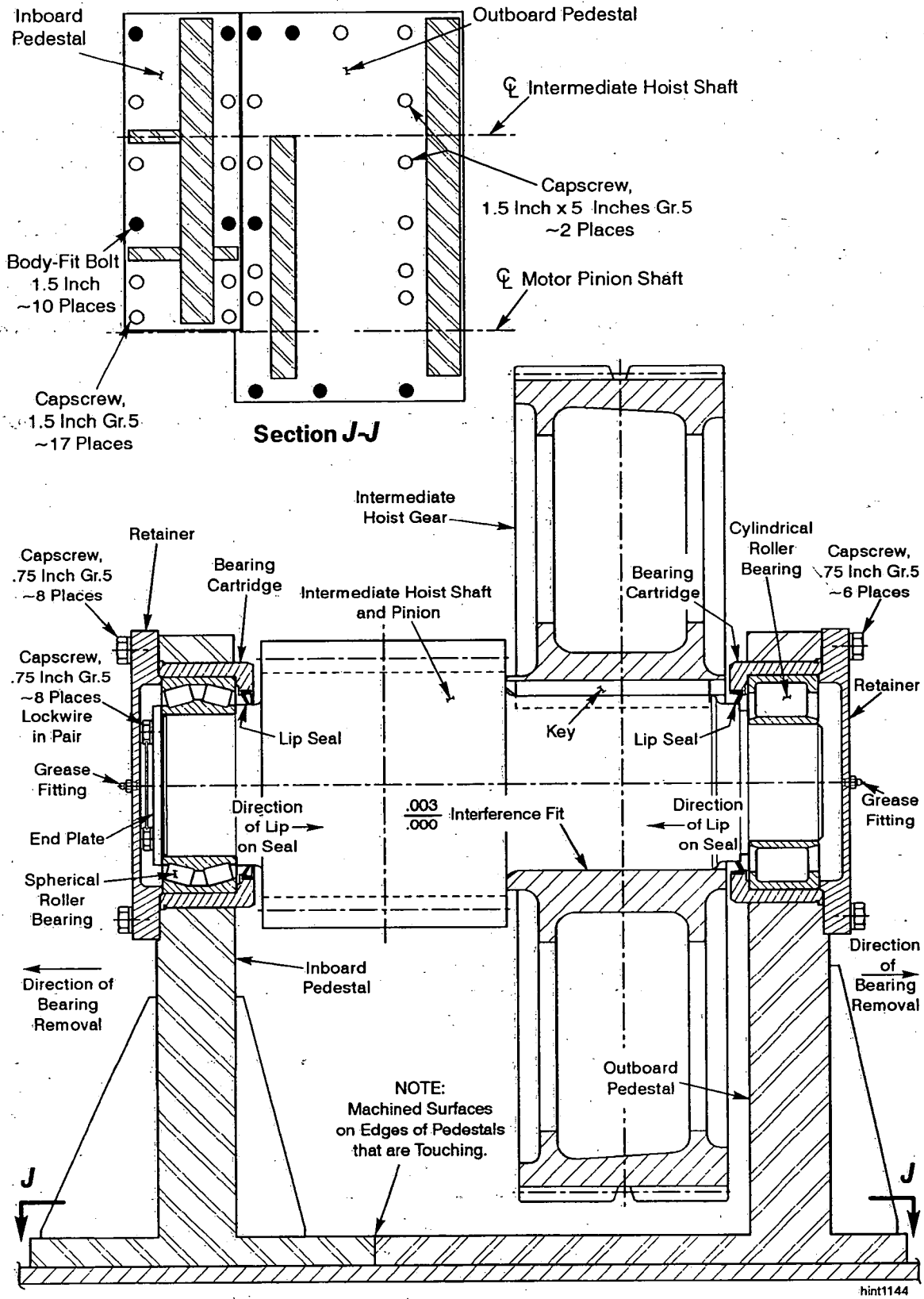
Reinstallation of the auxiliary collector rings/rotoseal assembly is the reverse of the above procedure.





Section B-B
BOLT PATTERN for the HOIST MACHINERY ASSEMBLY

INTERMEDIATE HOIST SHAFT



Hoist Intermediate Shaft Assembly - Section View

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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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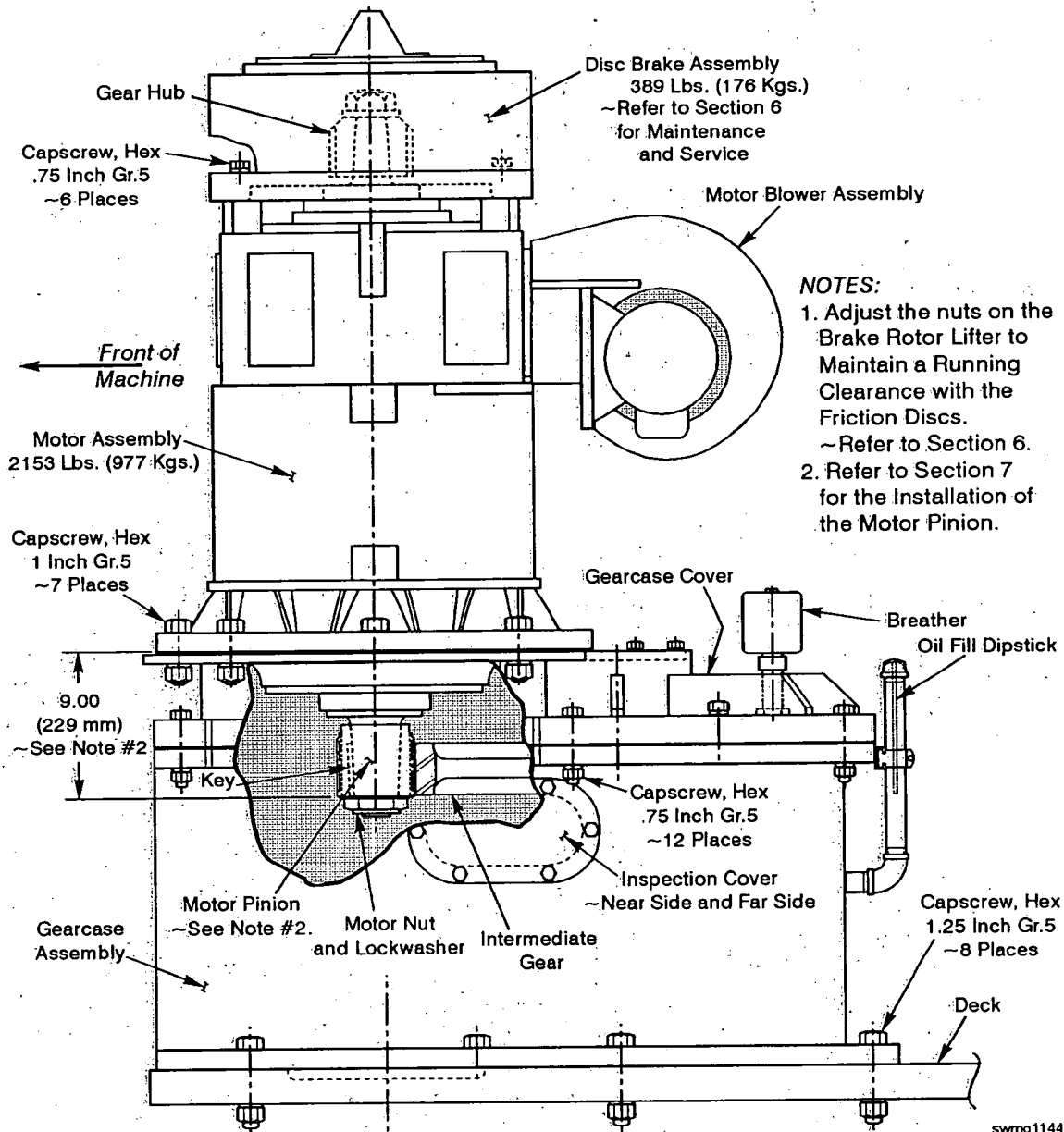
SWING MOTOR ASSEMBLY

SWING MOTOR REMOVAL

Swing motor removal requires lifting crane with 3000 Lbs. (1364 kg) at radius of 15 feet.



DANGER! HIGH VOLTAGE! ONLY A QUALIFIED ELECTRICIAN SHOULD PERFORM THE DISCONNECTION OF THE SWING MOTOR. FAILURE TO COMPLY WITH THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH.



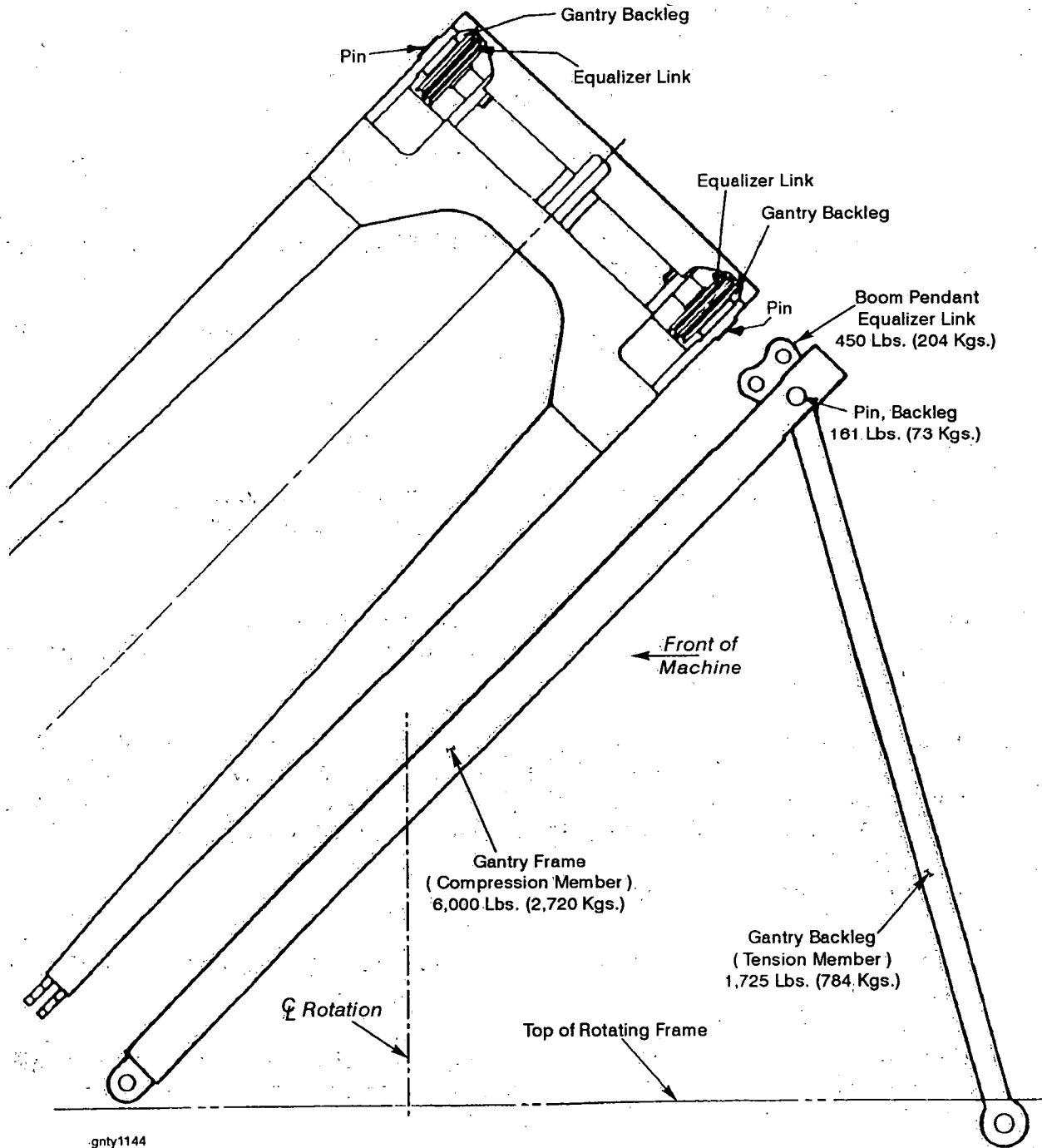
- NOTES:**
1. Adjust the nuts on the Brake Rotor Lifter to Maintain a Running Clearance with the Friction Discs. ~ Refer to Section 6.
 2. Refer to Section 7 for the Installation of the Motor Pinion.

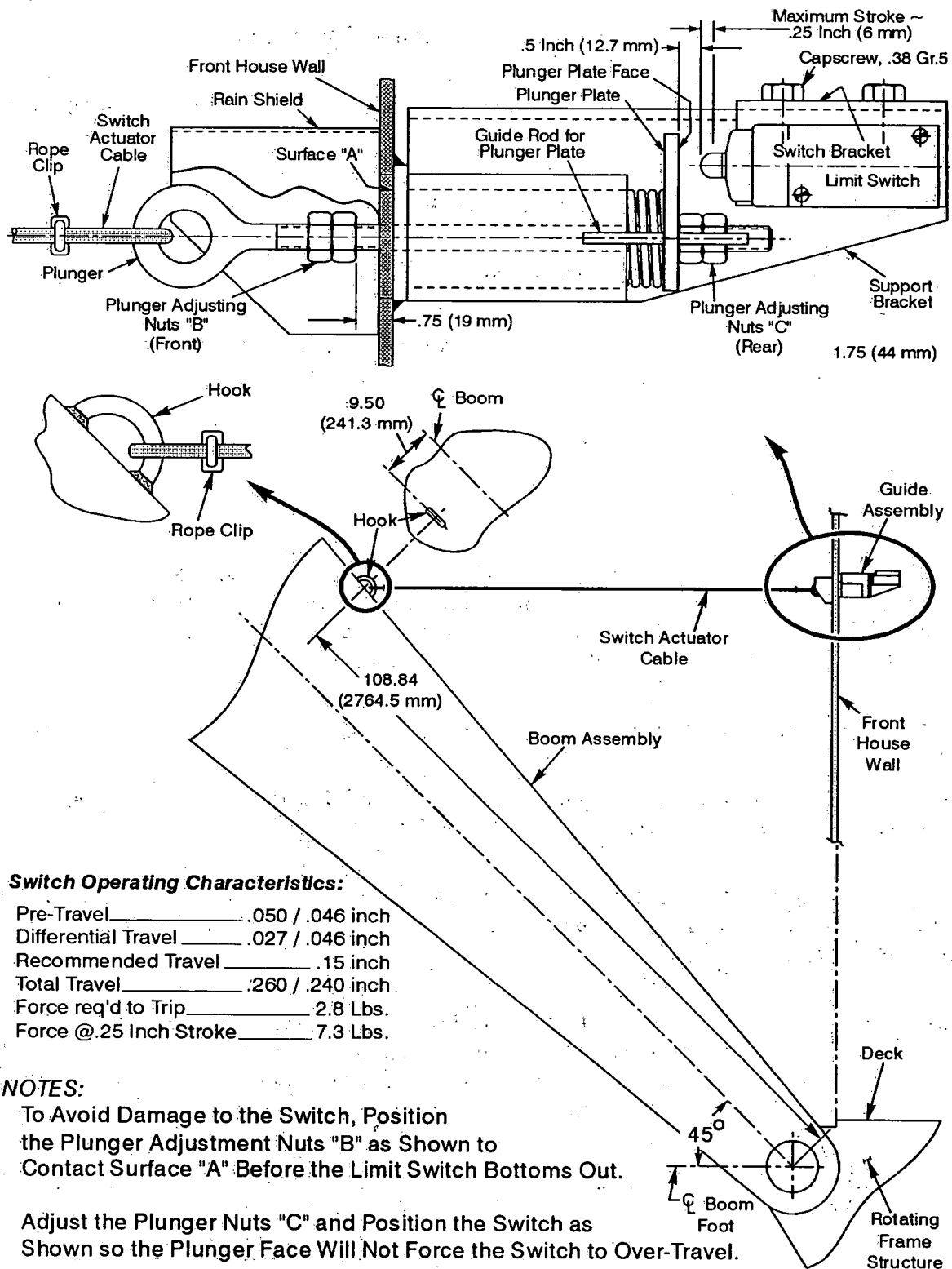
Swing Motor

swmg1144

GANTRY

The GANTRY supports the boom via four boom support ropes. Each rope (two per side) is pin connected to equalizer links at each side of the gantry frame and to both sides of the boom point shaft. Each pin is lubricated by the automatic multipurpose grease system. The equalizer links distribute boom loads evenly to each rope.





Switch Operating Characteristics:

Pre-Travel	.050 / .046 inch
Differential Travel	.027 / .046 inch
Recommended Travel	.15 inch
Total Travel	.260 / .240 inch
Force req'd to Trip	2.8 Lbs.
Force @ .25 Inch Stroke	7.3 Lbs.

NOTES:

To Avoid Damage to the Switch, Position the Plunger Adjustment Nuts "B" as Shown to Contact Surface "A" Before the Limit Switch Bottoms Out.

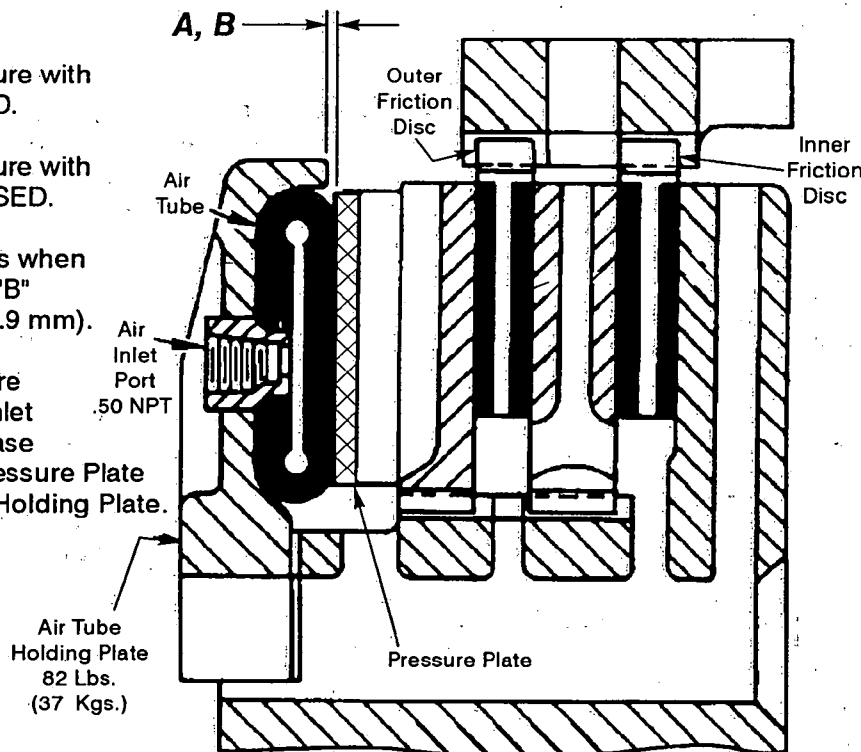
Adjust the Plunger Nuts "C" and Position the Switch as Shown so the Plunger Face Will Not Force the Switch to Over-Travel.

bimt1144

Boom Jacking Limit Switch

NOTES:

- Dimension "A": Measure with Air Pressure APPLIED.
- Dimension "B": Measure with Air Pressure RELEASED.
- Replace Friction Discs when Dim. "A" minus Dim. "B" exceeds .62 Inch (15.9 mm).
- Measurements Require Bleed Off Air at the Inlet Port so that the Release Springs Move the Pressure Plate Toward the Air Tube Holding Plate.



cfd1144

CLUTCH PRELIMINARY STEPS

Any work on the OVERLOAD CLUTCH will require an elevated work platform at the left side of the boom (high-lift truck) for access to, and handling of, the overload clutch components during disassembly. The first steps in performing any procedure on overload clutch are:

1. Park the machine in a flat work area and position the dipper on the ground so that the handle members do not interfere with removal of the overload clutch. SHUT DOWN MACHINE.
2. Shut off the air compressor and bleed out the tank air. Disconnect the air line at the roto seal to the clutch.



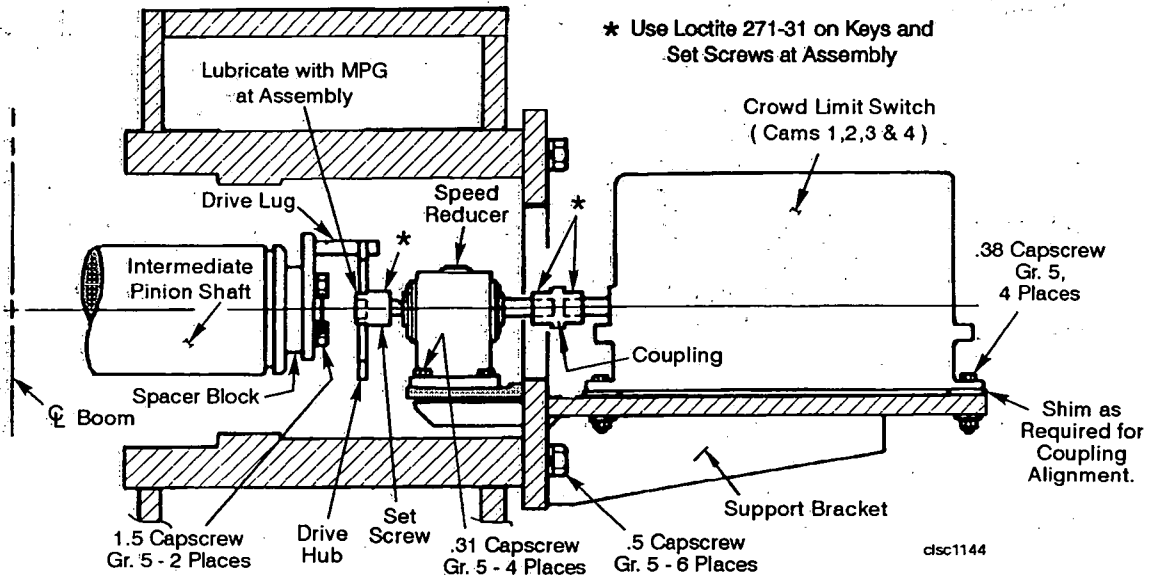
CAUTION: RELEASE THE AIR PRESSURE TO THE CLUTCH BEFORE DISCONNECTING THE AIR LINE. Plug the line immediately after disconnecting. Failure to comply could result in personal injury.

3. Remove the guard from the overload clutch.
4. Bleed off air from the overload clutch by loosening the air line between the check valve and the air inlet port.



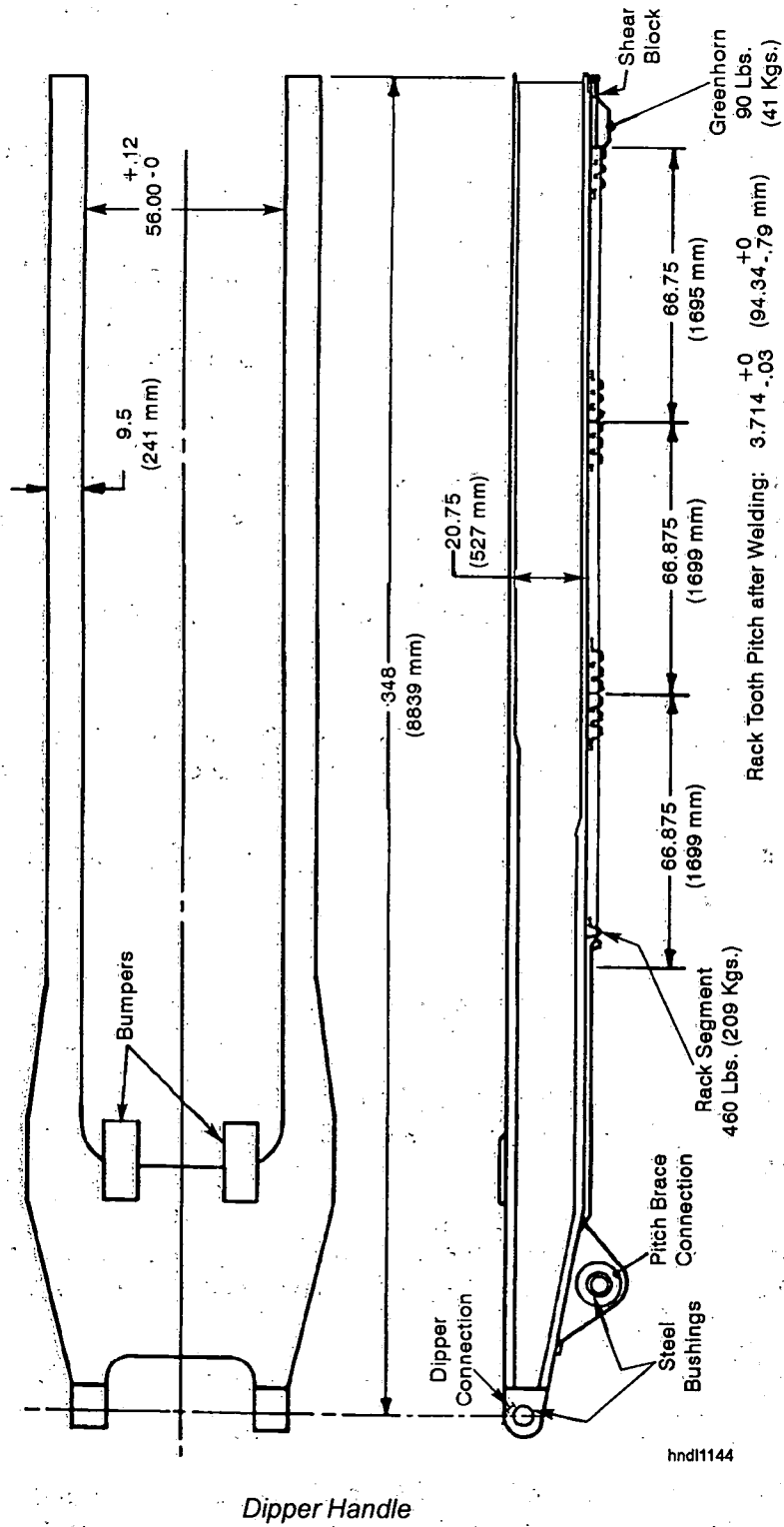
IMPORTANT: Use caution in this procedure to prevent injury.

CROWD LIMIT SWITCH



NOTE: The speed reducer requires ½ pint of the listed oil. Check the oil level every 200 hours and change it at 2500 hours.

Note:
Check the Spacing Between Legs at
36 Inch Intervals. Straighten as Required.



hndl1144

LATCH BAR ADJUSTMENT

1. Check the amount of latch bar engagement with the dutchman. Normal engagement is 1.5 inches.
2. Block the door trip lever to relieve the weight from the wear plate. Remove the .38 x 2.5 inch capscrew and pull out the retaining pin.
3. The shims provided are .25 and .12 inches thick. The latch bar engagement will vary the same as shim thickness added or removed. Adjust the shims to obtain 1.25 to 1.50 latch bar engagement.
4. Reinstall the shim retainer pin and the .38 inch capscrew.

NOTE: When replacing the wear plate, the chamfer must be up to prevent interference with the door trip lever.

LATCH BAR REMOVAL

1. Lower the dipper to the ground.
2. Disconnect the trip chain shackle from the end of the door trip lever.
3. Support the latch bar end of the latch lever and remove all the shims and the wear plate from the latch bracket. Refer to the Latch Bar Adjustment procedures.
4. Lower the left end of the door trip lever so that the guide pin aligns with the hole in the latch bracket.
5. Withdraw the guide pin using a .5-13 UNC threaded rod with a handle.
6. Remove the 170 lb door trip lever to the right side of the door until clear of the latch bar.
7. Support the 290 lb latch bar, remove the .5 plate and lower the latch bar out of the door.

NOTE: 48 inches of clearance below the door will be required.

Assembly is the reverse of the removal procedure.



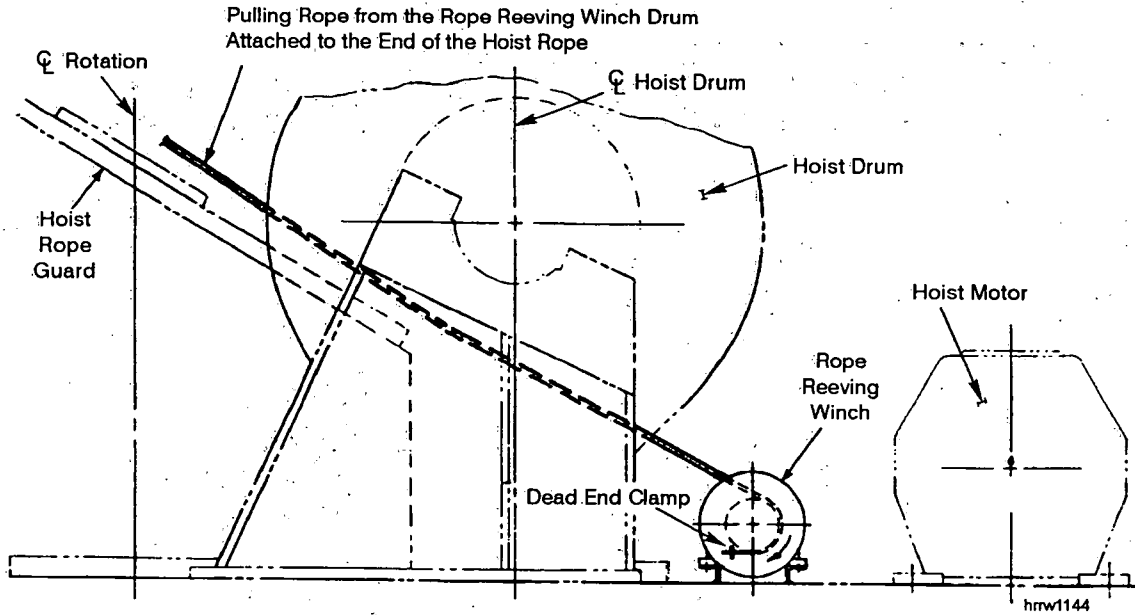
CAUTION: The upper and lower wear shoes could fall out and the latch bar is removed. Be prepared to catch these parts.

ROPE REEVING WINCH

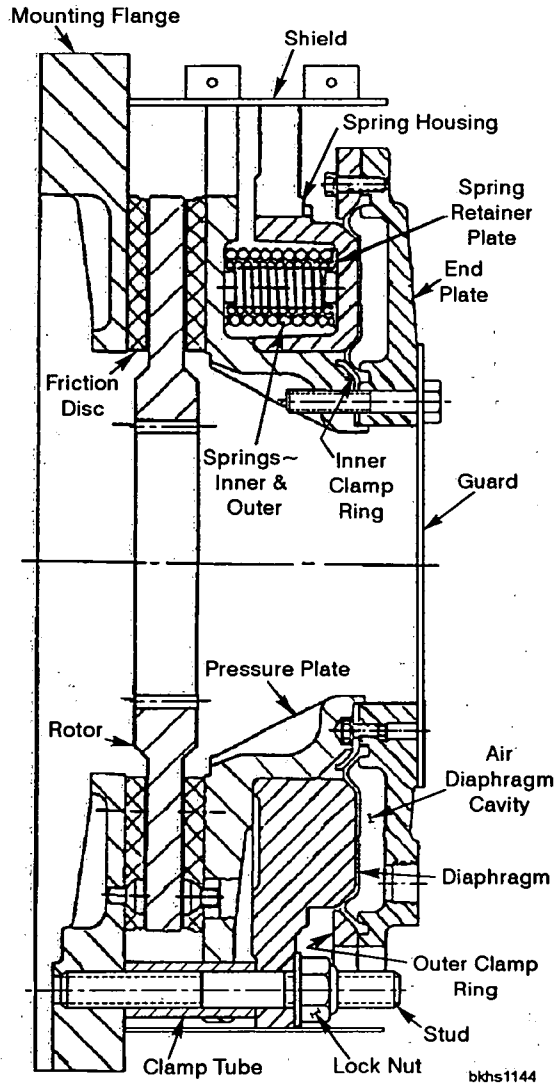


DANGER! ISOLATE THE POWER FROM THE WINCH AT THE CIRCUIT BREAKER WHEN THE WINCH IS NOT IN USE.

The rope reeving winch is operated by an electric motor and is used to reeve the hoist rope onto the hoist drum. The rope reeving winch is mounted to the deck behind the hoist drum.



Hoist Rope Reeving Winch Installation



*Hoist Brake Assembly
Single-Rotor.*

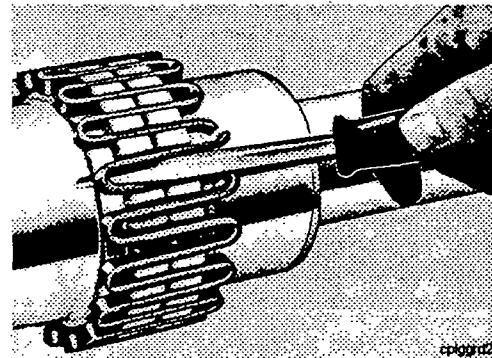
The Hoist brake assembly is a single-rotor brake mounted on the commutator end of the hoist motor frame. For installation and maintenance refer to the end of this section.

LUBRICATION

Adequate lubrication is essential for proper operation of the coupling. Refer to Table 9 for the amount of lubricant required. It is recommended that the coupling be checked once a year and lubricant added if required. For extreme or unusual operating conditions, check more frequently. Grid couplings initially lubricated with LTG will not require re-lubrication until the connected equipment is stopped for servicing.

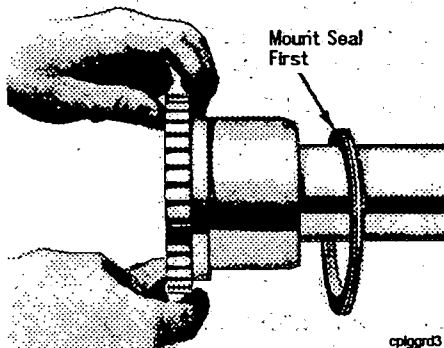
COUPLING DISASSEMBLY AND GRID REMOVAL

Whenever it is necessary to disconnect the coupling, remove the cover halves and grid. A round rod or screwdriver that will conveniently fit into the open loop ends of the grid is required. Begin at the open end of the grid section and insert the rod or screwdriver into the loop ends. Use the teeth adjacent to each loop as a fulcrum and pry the grid out radially in even, gradual stages, proceeding alternately from side to side.



GRID COUPLING INSTALLATION

Only standard mechanics tools, wrenches, a straight edge, and feeler gauges are required for installation. For instructions on mounting to a drive motor, refer to the appropriate motor shaft installation instructions in this manual.



1. Mount Seals and Hubs

Clean all parts. Heat hubs in an oven or use suitable dry heat. **DO NOT** rest gear teeth on container bottom or apply flame directly to gear teeth. **DO NOT** heat hubs over 275°F (135°C) for mounting.

Lightly coat seals with grease and place them on shafts **BEFORE** mounting hubs. Mount hubs on their respective shafts so the hub face is flush with the end of its shaft.



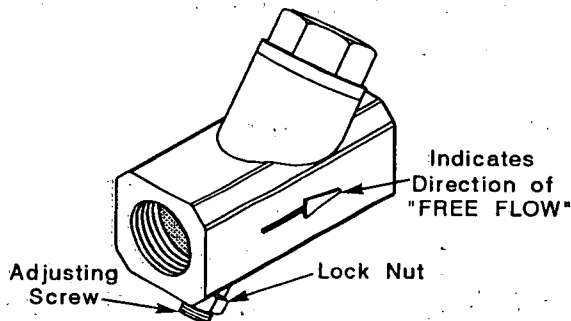
When a valve fails to shut off or admit the proper air volume, clean out the dirt and scale that cause it to leak. Open and close the valve manually several times. This procedure to clean it usually postpones its disassembly for cleaning. When this first-aid remedy fails, dismantle it and clean and replace any worn or damaged parts. All parts for normal maintenance and repairs are available in a repair kit. Refer to the Parts Book.

NOTE: These valves all require a minimum pilot pressure of 5 PSI (35 kPa) to operate. If a valve leaks on compressor start-up after a shutdown period or maintenance interval, especially those near the end of the supply circuit, and will not function, close the delivery line valve at the air receiver. Permit the pressure in the receiver to reach the maximum system operating pressure before reopening the delivery line valve. This will provide the proper pilot pressure to the valves and they should all be functional then. If not, clean or replace them.

 **CAUTION:** Reset the manual override on all air valves so equipped, prior to machine startup, to assure proper brake and component operation.

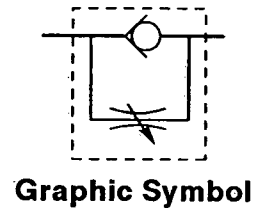
FLOW RATE CONTROL VALVES

An adjustable flow control valve is used in the swing brake circuit. It controls the setting time for both brakes.

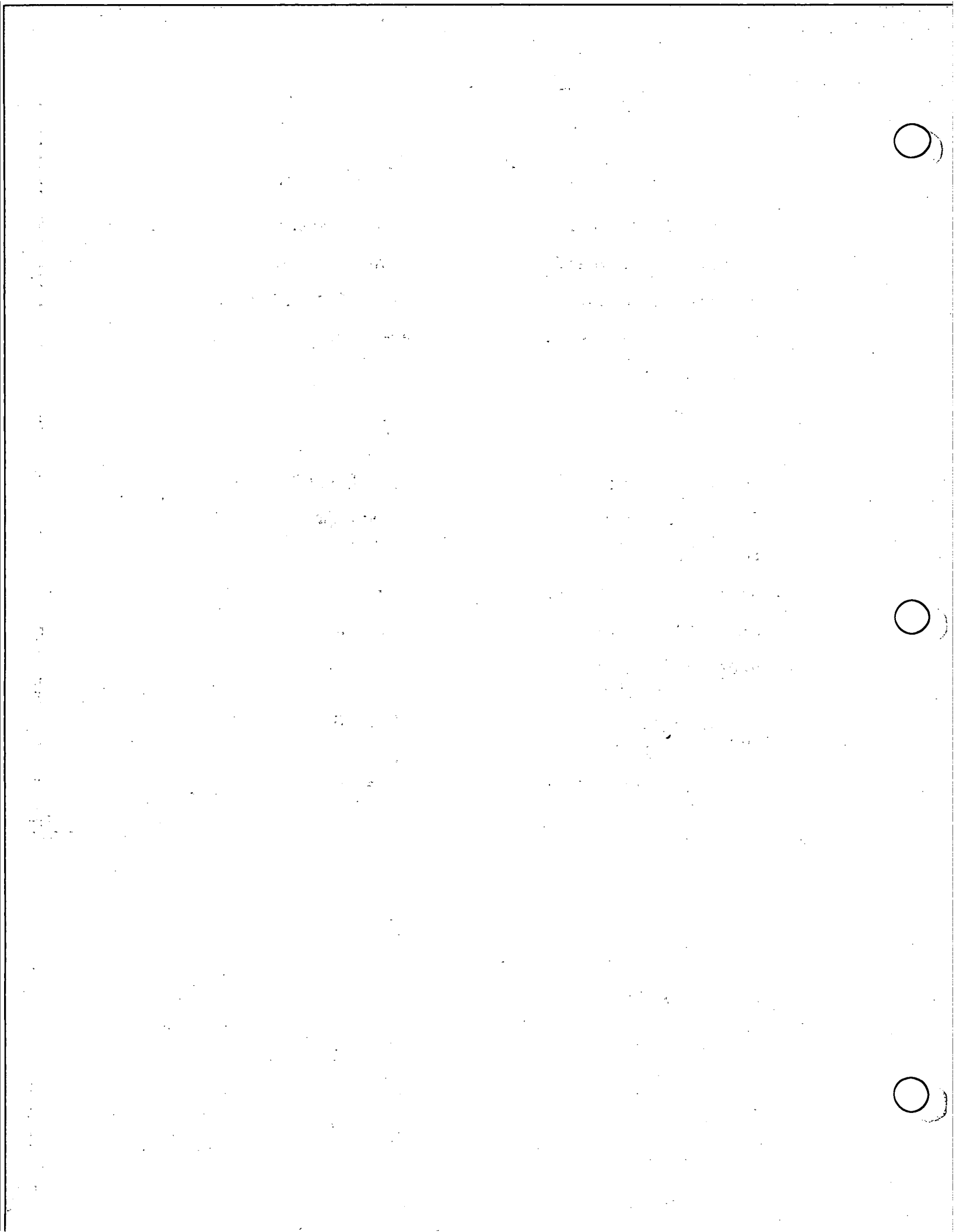


v_fl1144

Flow Rate Control Valve



Turn the adjustment screw counterclockwise (CCW) to restrict air flow more back through the valve (opposite direction to free flow). Turn it clockwise (CW) to increase air flow (decrease restriction) back through valve. The internal parts of this valve are easily accessible if maintenance is required.



4. MAINTENANCE SCHEDULE

a. Daily

1. Clean the compressor thoroughly
2. Check the oil level in the crankcase., Replenish with the correct grade it required.
3. Check compressor belt tension
4. Drain water from the air receiver.

b. Every 125 hours of operation

Dismantle the drain valve from the air receiver and clean. Run the compressor for some time without the drain valve, to blow out all the moisture and dirt from the receiver. Reassemble the drain valve.

c. Every 250 hours of operation

1. Check the compressor for satisfactory operation which include:
Operational noise and vibration
Tightness of mounting bolts and other fasteners.
Air leaks at the pressure line, inter-cooler, safety valves, after-cooler, non-return valve, drain valve etc.
Cutting off and cutting on pressures.
2. Suction filter: Dismantle the suction filter and clean it with compressed air. After thorough cleaning, reassemble on the compressor.

d. Every 500 hours of operation

1. Breather: the breather valve should be dismantled, cleaned and checked for perfect seating of the valve.
2. Lubricating oil : Examine the lubricating oil the crankcase. drain the oil if necessary and renew
Note that the compressor should be run for a short while and draining of the oil should be done when the oil is warm.

Note : On installing a new compressor, the oil change should be carried out after 150 hours operation. The subsequent oil changes should be done after 500 hours of operation.

e. Every 1000 hours of operation

1. Remove the cylinder head and inspect the disc valves Replace worn out parts with spares.
2. All the pipe lines should be checked for leaks at joints and packings renewed if necessary
3. Dismantle the non-return valve. Examine the spring for stiffness and check its valve seat. Renew the spring and valve seat if required.
4. Decarbonize the after-cooler and inter-cooler assembly.

f. Every 2500 hours of operation

General overhaul

The compressor should be completely stripped by and experienced staff.
All parts have to be thoroughly cleaned, examined and repaired in a clean surrounding.
Renew suction air filter element.

g. Every 2 years

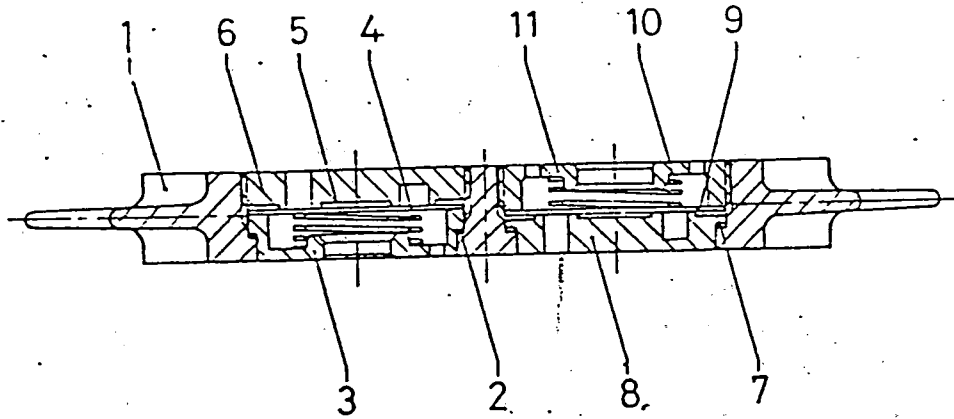
Open the hand hole on the air receiver and examine the internal condition of the receiver clean chemically.

Examine the hand hole packing and renew if required.

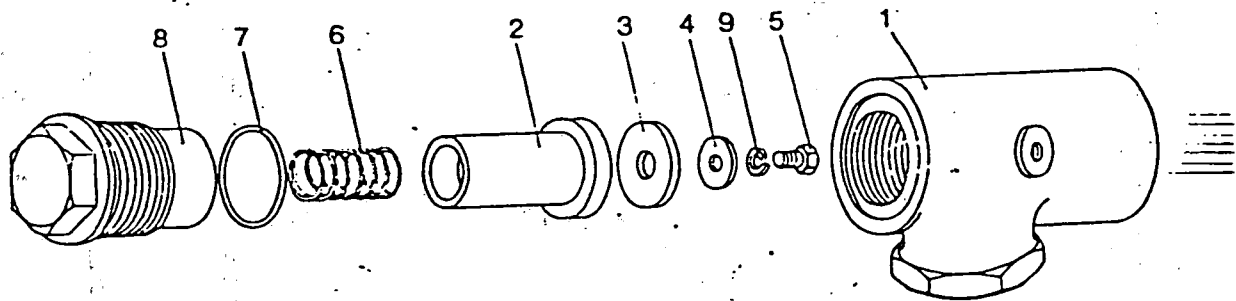
Hydraulically test receiver to the specified pressure in the technical data.

NOTE: Users are advised to adhere to the requirements of inspection pressure test of government, safety agencies in respect of air receivers as applicable.





VALVE HOUSING COMPLETE
 PART No. 03 2373 A
 PLATE No. IV - 1



NON-RETURN VALVE ASSEMBLY 1 1/2" BSP
 PART No. 03 1471 2
 PLATE No. IV - 2



SECTION III REGULATION

TYPES OF REGULATION

(See Wiring Diagrams on page 29)

The Model 2540 Electric package Compressor may be supplied with Dual Control Regulation. The Bare Compressor is supplied with Constant Speed Control Regulation.

Dual Control is accomplished by a combination of Auto-Start- And-Stop Control Regulation which consists of a pressure switch that makes or breaks the electrical contacts to the motor at a predetermined pressure setting, and Constant Speed Control Regulation which unloads the compressor at a predetermined pressure setting while the motor continues to run.

AUTOMATIC START AND STOP CONTROL

This type of regulation is used when the demand for air is small or intermittent, but where pressure must be continuously maintained.

Automatic Start and Stop Control is obtained by means of a pressure switch which makes or breaks an electrical circuit, starting and stopping the driving motor, thereby maintaining the air receiver pressure within definite limits. The pressure switch is piped to the receiver and is actuated by changes in air receiver pressure.

Automatic Start and Stop should only be used when motor starts not more than 6-8 times per hour.

CONSTANT SPEED CONTROL

This type of regulation is used when the demand for air is practically constant at the capacity of the compressor.

Constant Speed Control is obtained by means of an auxiliary valve that controls the operation of the Inlet Unloaders, thereby loading and unloading the compressor in accordance with air receiver pressure. This action maintains receiver pressure within definite limits while the compressor continues to operate.

The auxiliary valve is piped directly to the receiver (See Figure 3-4.) When receiver pressure reaches the pre-set unload pressure the auxiliary valve actuates and compressed air from the receiver activates the inlet unloader piston. This compressed air forces the unloader piston against the intake air seat in the unloader which blocks the flow of intake air, through the filter/silencer. When receiver pressure falls to the pre-set load pressure the auxiliary valve closes, shutting off pressure to the unloader. With receiver pressure removed from the

unloader, vacuum within the inlet port retracts the piston. The air inlet opens and the compressor reloads.

DUAL CONTROL

Dual Control is accomplished by adjusting the locking knob on the top of the auxiliary valve. See Figure 3-3. For constant speed operation turn the knob counterclockwise until fully open. This adjustment will allow the valve to function. Turning the knob clockwise locks-out operation of the auxiliary valve. Note the pressure gauge reading at which the compressor cuts-out and re-establish this point if necessary.

For proper dual control operation, the cut-out setting of the pressure switch must be at least 5 PSIG (.35 kg/cm²) greater than the cut-out pressure of the auxiliary valve.

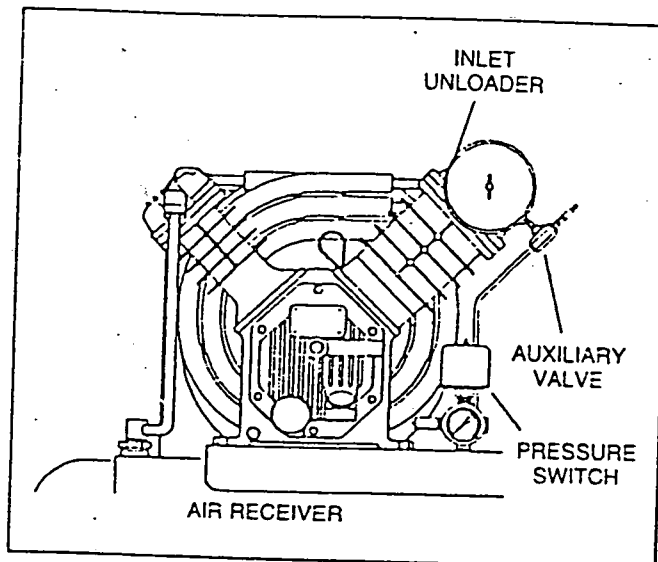


Figure 3-1. Typical Dual Control arrangement.

PRESSURE SWITCH ADJUSTMENT

The pressure switch has a Range Adjustment and a Differential Adjustment. See Figure 3-2. The Cut-out (Compressor Shut-down) is the pressure at which the switch contacts open, and the Cut-in (Compressor Restart) is the pressure at which the switch contacts close.

The cut-out point may be increased by screwing the range adjustment clockwise. Screwing the range adjustment counterclockwise decreased the cut-out point. Note the pressure gauge reading at which the compressor cuts-in and out and re-establish pressure setting if necessary.

The differential pressure may be increased by screwing the differential adjustment clockwise. Backing off the

BELT INSTALLATION AND ADJUSTMENT

When installing new belts, do not pry the belts over the pulley grooves. The proper method of removing and installing new belts is to loosen the anchor screws and the belt tightener screw Figure 6-1, and push the motor toward the compressor. Use the tightener screw to adjust belt tension on new belts.

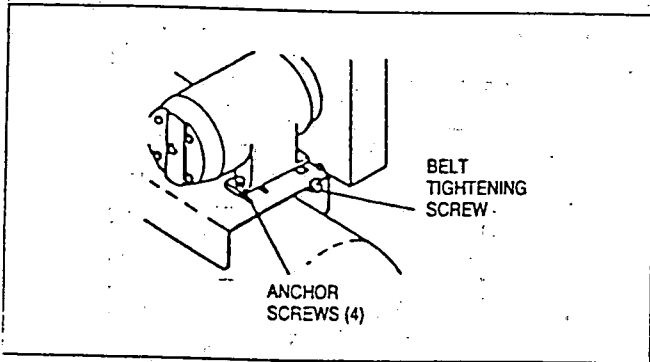


Figure 6.1. Belt Adjustments.

It is important that the belts be properly adjusted. A belt that is too loose will slip and cause heating and wear, and a belt that is too tight may overload the bearings. A quick check to determine if belt adjustment is proper may be made by observing the slack side of the belt for a slight bow when the unit is in operation. See Figure 6-2. If a slight bow is evident, belts are usually adjusted satisfactorily. However, the recommended method of checking belt tension is by the more accurate spring scale measurement method that follows:

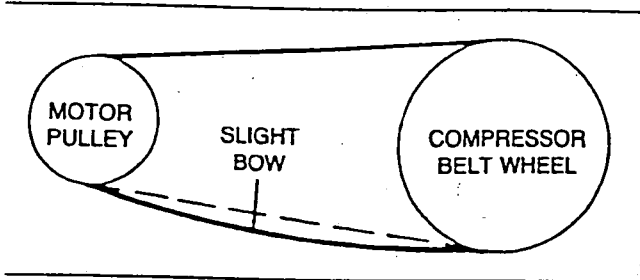


Figure 6.2. Visual Method.

- A. Measure the belt span (t) as shown in Figure 6.3.
- B. At the center of the span (t), apply a force (perpendicular to the span, by attaching a spring scale to the two outside belts. The force applied to the spring scale should be sufficient to deflect the belts $1/64"$ (.396 mm). thus, the force applied to the spring scale should deflect the belts to $1.9/16"$ (39.6 mm).

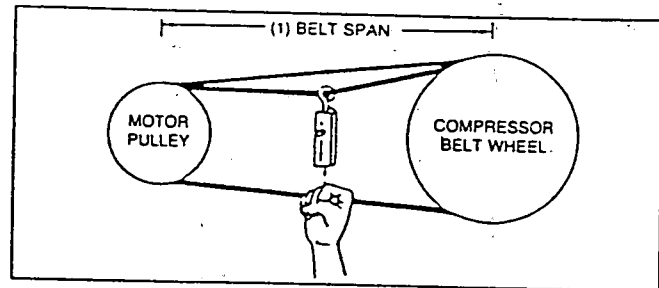


Figure 6.3. Spring Scale Method.

- C. When the belts are deflected the necessary distance, compare the spring scale reading (in lbs. force) with the value given in the following table.

STANDARD BELT TENSION

Belt Type	Normal Tension	150% Normal Tension
A	$1\frac{1}{4}$ lbs. (.565 kg)	$1\frac{1}{2}$ lbs. (.85 kg)

If the reading is between the value for normal tension and 150% normal tension, the belt tension, the belt tension should be considered satisfactory. A reading below the value for normal tension indicates the belt slack should be reduced, and conversely, a reading exceeding the value for 150% normal tension indicates the belt slack should be increased. Experienced has shown that a new drive can be tightened initially to two times normal tension to allow for any drop in tension during run in.

INGERSOLL-RAND BRANCHES

PLACE	ADDRESS	TEL/FAX NO.	TELEX
AHMEDABAD	GIDC ESTATE NARODA AHMEDABAD 382 330	0272 810223 810323 FAX 811003	0121 6464
BANGALORE	PEENYA INDL. AREA PEENYA BANGALORE 560 058	0812 395791 FAX 394651	0845 5020
BOMBAY	RHONE-POULENCE HOUSE S.K. AHIRE MARG P. BOX NO. 9138 BOMBAY 400 025	022 4936765 FAX 4949416	011 71395 011 71674
CALCUTTA	1 TARATALA ROAD CALCUTTA 700 088	033 714257 714258 714259 714260 714608	021 5024
JAMSHEDPUR	7 CIRCUIT HOUSE AREA (EAST) JAMSHEDPUR 831 001	0657 310123 310387	
MADRAS	8 WHITES ROAD ROYAPETTAH MADRAS 600 014	044 860200 8257362 869862	041 7403
NAGPUR	POONAM PLAZA PALAM ROAD CIVIL LINES NAGPUR 440 001	0712 533697 533386 537716	0715 418
NEW DELHI	301 'KAILASH' KASTURBA GANDHI MARG NEW DELHI 110 001	011 3313551 FAX 3712822	031 66135
PUNE	2164 SADASHIVPETH OPP. MUN. SPORTS GRD. PARVATI RASTA PUNE 411 030	0212 434687 435308	0145 7760
SECUNDERABAD	ABDULLA MANSION 66 RASHTRAPATI ROAD SECUNDERABAD 500 003	0842 833710	0425 6299
VISHAKAPATNAM	NO. 4, 1ST FLOOR OCEAN VIEW LAYOUT VISHAKAPATNAM 530 003	0891-64006	0495 434

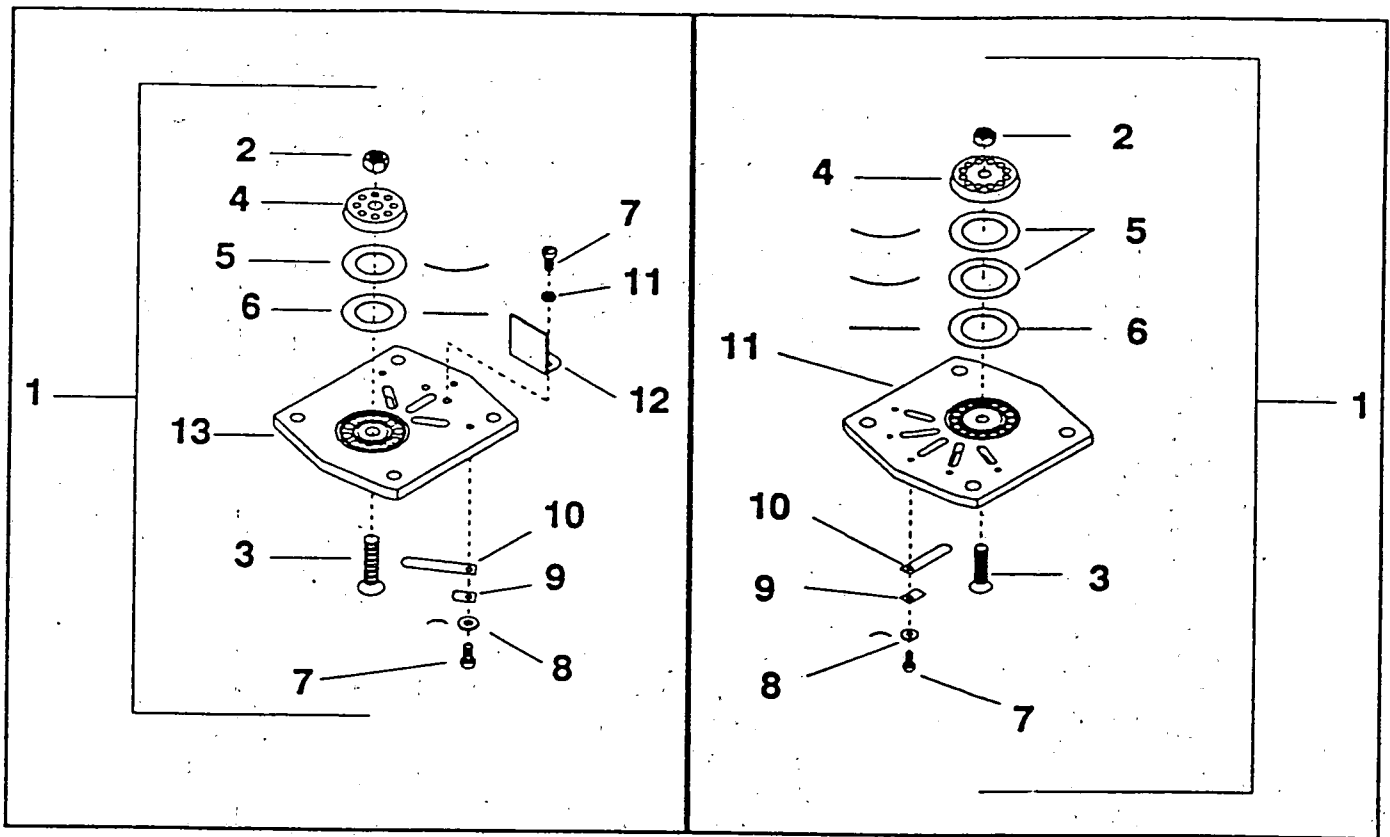


FIGURE 3 HIGH PRESSURE VALVE ASSEMBLY FIGURE 4 LOW PRESSURE VALVE ASSEMBLY

REF. NBR.	PART NUMBERS	DESCRIPTION	UNITS PER ASSY.	REC. SPARES		
				1	2	3
FIGURE 3. HIGH PRESSURE VALVE ASSEMBLY						
3-1	32229817	ASSEMBLY, VALVE HIGH PRESSURE	1			
3-2	97166946	• NUT WHIZ LOCK 7/16-14 HEX	1	1	1	1
3-3	32223927	• BOLT, DISCHARGE VALVE	1	1	1	1
3-4	32176703	• PLATE, STOP	1			
3-5	30221576	• SPRING, DISCHARGE VALVE	1	1	1	1
3-6	30215941	• PLATE, DISCHARGE VALVE	1	1	1	1
3-7	32035511	• SCREW, FILLISTER HEAD - 1/4-20 X 3/8"	5	3	3	3
3-8	32217382	• WASHER, BELLEVILLE - 1/4"	3	3	3	3
3-9	32228306	• RETAINER, FINGER VALVE	3	3	3	3
3-10	30220115	• VALVE FINGER	3	3	3	3
3-11	32035479	• LOCKWASHER - SPRING 1/4"	2			
3-12	32224156	• DIFFUSER	1			
3-13	32228363	• PLATE, SEAT - HIGH PRESSURE	1			
FIGURE 4. LOW PRESSURE VALVE ASSEMBLY						
4-1	32228389	ASSEMBLY, VALVE - LOW PRESSURE	1			
4-2	97166946	• NUT, WHIZ-LOCK - 7/16-14 HEX	1	1	1	1
4-3	32223927	• BOLT, DISCHARGE VALVE	1	1	1	1
4-4	32228264	• PLATE, STOP	1			
4-5	30221394	• SPRING, DISCHARGE VALVE	2	2	2	2
4-6	30215917	• PLATE, DISCHARGE VALVE	1	1	1	1
4-7	32035511	• SCREW, FILLISTER HEAD 1/4-20 X 3/8"	5	5	5	5
4-8	32217382	• WASHER, BELLEVILLE - 1/4"	5	5	5	5
4-9	32228306	• RETAINER, FINGER VALVE	5	5	5	5
4-10	30220115	• VALVE, FINGER	5	5	5	5
4-11	3222835	• PLATE, SEAT - LOW PRESSURE	1			



INADEQUATE COOLING

System may not be performing as well as it should be.

- Check pressures. A system would normally operate between 125-200 PSI on the high side and 25-45 PSI on the low side.

High pressure could indicate air in the system, dirty condenser, overcharge. Low high side pressure could indicate broken valves or low charge.

If the low side has a much higher than 45 PSI pressure it could indicate broken valves, liquid floodback, and/or poor TX valve adjustment.

- Check refrigerant charge in sight glass. It should be full at all times when compressor is running.
- Check for restriction in the system. This can be done by feeling the plumbing before and after a "device". If it is noticeably cooler, expansion has taken place from a drop in pressure. There is restriction, and steps should be taken to clear it. Check for a:
 - Blocked return air filter.
 - An open lid admitting outside air.
 - Coil for cleanliness.
 - TX valve for superheat adjustment.

INADEQUATE HEATING

- Check for power to 910 (first stage) and 913 (second stage) with the thermostat set to maximum.
- Check the fuses.
- Check the heater elements.
- Check that the contactors are closing.
- Check for air flow. Low air flow will cause the high temperature thermostat to trip heaters.
- Check the 5 amp fuses on the thermostat board.



PHYSICAL DATA

Bolling Point	-26.2°C (-15.2°F) at 736 mm Hg.
Vapor Pressure	96 psia at 25 deg C (77 deg F)
Vapor Density	3.60 (Air = 1.0) at 25 deg C (77 deg F)
% Volatiles	100 WT %
Water Solubility	0.15 WT % at 25°C (77°F) and 14.7 psia
Odor	Slight ethereal
Form	Liquefied gas
Color	Clear, colorless
Density	1.21 g/cc at 25 deg C (77 deg F) - Liquid

HAZARDOUS REACTIVITY

Instability	Material is stable. However, avoid open flames and high temperatures.
Incompatibility	Incompatible with alkali or alkaline earth metals- powdered Al, Zn, Be, etc.
Polymerization	Polymerization will not occur.
Decomposition	: Decomposition products are hazardous. "SUVA" Cold-MP can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride.

FIRE AND EXPLOSION DATA

Flash Point	Will not burn
Method	TOC
Flammable Limits in Air, % by Volume	LEL Not applicable UEL Not applicable
Autoignition	>750°C (>1,382°F)
<p>"SUVA" Cold-MP is not flammable at ambient temperatures and atmospheric pressure. However, "SUVA" Cold-MP has been shown in tests to be combustible at pressures as low as 5.5 psig at 177 deg C (351 deg F) when mixed with air at concentrations of generally more than 60 volume % air. At lower temperatures, higher pressures are required for combustibility. Experimental data have also been reported which indicate combustibility of HFC-134a in the presence of certain concentrations of chlorine.</p>	
Fire and Exploslon Hazards	Cylinders may rupture under fire conditions. Decomposition may occur.
Extngulshing Media	As appropriate for combustibles in area.
Special Fire Fighting Instructlons	Cool cylinders with water spray. Self-contained breathing apparatus (SCBA) may be required if cylinders rupture or release under fire conditions.

(continued)

acdata_2



POSSIBLE CAUSE	SYMPTOMS	RECOMMENDED ACTION
Expansion valve stuck in open position	Abnormally cold suction line	Repair or replace valve
Broken suction valve in compressor	Noisy compressor	Overhaul compressor
SUCTION PRESSURE TOO LOW		
Light load on evaporator	Compressor short cycles	Plant should not be running under these conditions
Flash gas in liquid line	Expansion valve hisses	Provide sub-cooling
Clogged strainer	Liquid line cold beyond	Clean or replace strainer
Obstructed expansion valve	Loss of capacity	Repair or replace valve
Expansion valve too small	Lack of capacity	Replace with larger valve
Expansion valve lost charge	Erratic valve response	Repair or replace
Expansion valve	Erratic valve	Refix bulb
Lack of refrigerant	Low suction pressure	Repair leak and charge
Evaporator fan stopped	Low suction pressure	Check fan motor and circuits ~ensure fan blades secure on motor shaft
Dirty filters	Lack of air flow through evaporators	Replace or clean filters

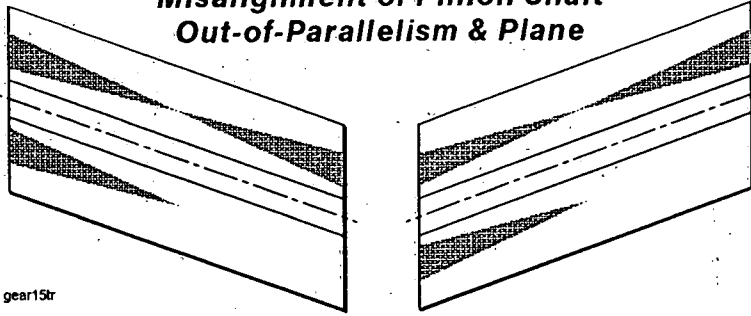


RUNNING CLEARANCES for BRONZE BUSHINGS
Inches (Millimeters)

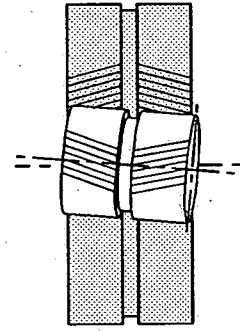
Nominal Diameter	Shaft		Running Clearance	Shaft		Running Clearance
	Nominal Diameter	Outside Diameter		Nominal Diameter	Outside Diameter	
18.00 (457.2)	18.000-17.996 (457.200-457.098)	.028-.042 (.071-1.066)	22.25 (565.15)	22.250-22.246 (565.150-565.048)	.033-.047 (.838-1.194)	
18.25 (463.55)	18.250-18.246 (463.550-463.448)	.028-.042 (.071-1.066)	22.50 (571.5)	22.500-22.496 (571.500-571.398)	.033-.047 (.838-1.194)	
18.50 (469.9)	18.500-18.496 (469.900-469.798)	.028-.042 (.071-1.066)	22.75 (577.85)	22.750-22.746 (577.850-577.748)	.033-.047 (.838-1.194)	
18.75 (476.25)	18.750-18.746 (476.250-476.148)	.028-.042 (.071-1.066)	23.00 (584.2)	23.000-22.996 (584.200-584.318)	.034-.048 (.863-1.219)	
19.00 (482.6)	19.000-18.996 (482.600-482.498)	.028-.042 (.071-1.066)	23.25 (590.55)	23.250-23.246 (590.550-590.448)	.034-.048 (.863-1.219)	
19.25 (488.95)	19.250-19.246 (488.950-488.848)	.028-.042 (.071-1.066)	23.50 (596.9)	23.500-23.496 (596.900-596.798)	.034-.049 (.863-1.244)	
19.50 (495.3)	19.500-19.496 (495.300-495.198)	.028-.042 (.071-1.066)	23.75 (603.25)	23.750-23.746 (603.250-603.148)	.034-.049 (.863-1.244)	
19.75 (501.65)	19.750-19.746 (501.650-501.548)	.028-.042 (.071-1.066)	24.00 (609.6)	24.000-23.996 (609.600-609.498)	.034-.049 (.863-1.244)	
20.00 (508.0)	20.000-19.996 (508.000-507.898)	.030-.044 (.762-1.117)	24.25 (615.95)	24.250-24.245 (615.950-615.823)	.034-.050 (.863-1.270)	
20.25 (514.35)	20.250-20.246 (514.350-514.248)	.030-.044 (.762-1.117)	24.50 (622.3)	24.500-24.495 (622.300-622.173)	.034-.050 (.863-1.270)	
20.50 (520.7)	20.500-20.496 (520.700-520.598)	.030-.044 (.762-1.117)	24.75 (628.65)	24.750-24.745 (628.650-628.665)	.035-.052 (.889-1.320)	
20.75 (527.05)	20.750-20.746 (527.050-526.948)	.030-.044 (.762-1.117)	25.00 (635.0)	25.000-24.995 (635.000-634.873)	.034-.052 (.863-1.320)	
21.00 (533.4)	21.000-20.996 (533.400-533.298)	.031-.045 (.787-1.143)	25.25 (641.35)	25.250-25.245 (641.350-641.223)	.034-.052 (.863-1.320)	
21.25 (539.75)	21.250-21.246 (539.750-539.648)	.031-.045 (.787-1.143)	25.50 (647.7)	25.500-25.495 (647.700-647.573)	.034-.052 (.863-1.320)	
21.50 (546.1)	21.500-21.496 (546.100-546.998)	.031-.045 (.787-1.143)	25.75 (654.05)	25.750-25.745 (654.050-653.923)	.037-.055 (.939-1.397)	
21.75 (552.45)	21.750-21.746 (552.450-552.348)	.031-.045 (.787-1.143)	26.00 (660.4)	26.000-25.995 (660.400-660.273)	.037-.055 (.939-1.397)	
22.00 (558.8)	22.000-21.996 (558.800-558.698)	.033-.047 (.838-1.194)	26.25 (666.75)	26.250-26.245 (666.750-666.623)	.037-.055 (.939-1.397)	

rc_31144

**Misalignment of Pinion Shaft
Out-of-Parallelism & Plane**



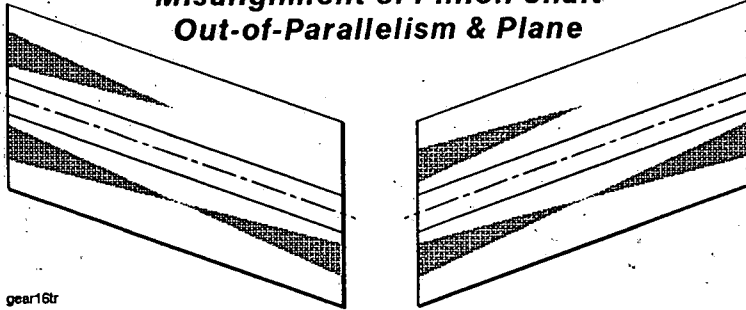
gear15r



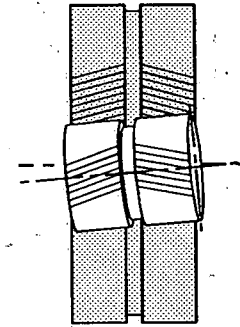
Corrective Adjustment:

Move the left hand drum shaft bearing housing to the rear and remove shims to lower.

**Misalignment of Pinion Shaft
Out-of-Parallelism & Plane**



gear16r



Corrective Adjustment:

Move the left hand drum shaft bearing housing to the rear and add shims to raise.

MAINTENANCE WELDING

These recommendations for repair welding apply to the major structural members of the machine. The high cyclic loading characteristics of the machine are considered in the design and material selected for the construction of the machine. However, due to unusual operational conditions that may be encountered and to the great number of cyclic loadings that may be applied to the machine, fatigue cracks or other abnormalities may occur. Early detection of these conditions through regular machine inspection helps to avoid problems or emergency breakdowns.

Maintenance welding is applied to the repair of cracked or broken structural components. Reconditioning of broken parts by the application of heating, cutting and welding processes requires attention to a number of details, careful adherence to the repair procedure and observance of federal, state and local safety regulations.



CAUTION: WELDING AND THERMAL-CUTTING OF METALS INVOLVE THE GENERATION OF TEMPERATURES UP TO THOUSANDS OF DEGREES AT WHICH METALS MELT AND VAPORIZE. When proper precautions are taken to protect personnel and property against the heat, evolved gases and fumes, electric shock and radiation, no harm will result either to personnel or property. In gas heating and cutting, the handling and storage of compressed gases present other hazards that also must be protected against to provide a safe working environment.

Safety precautions should conform to the latest edition of ANSI standard Z49.1, Safety in Welding and Cutting, published by the American Welding Society.

Reconditioning of failed members requires attention to a number of details and careful application of the repair procedure. Only in certain cases is it necessary to strengthen members by added reinforcement.



WARNING: REINFORCING STRUCTURAL MEMBERS SHOULD BE MADE ONLY UPON RECOMMENDATION BY BUCYRUS INTERNATIONAL, INC. IMPROPERLY APPLIED REINFORCEMENTS CAN HAVE AN ADVERSE EFFECT ON THE PERFORMANCE AND LIFE OF THE STRUCTURE.

A broken member is best repaired by making a complete penetration weld, preferably by welding from both sides, using the correct welding electrode and observing all precautions such as preheat, back-gouging, etc. The complete penetration groove weld should be ground flush with the base metal on both sides to remove all surface irregularities. An alternate procedure incorporates backup bars to ensure sound, complete penetration welds in the repair area. Be sure to follow all applicable safety measures and federal, state and local regulations.

A complete penetration weld repair conditioned by grinding instead of adding reinforcement is favored to maintain the original pattern of stress flow designed into the structural members. Addition of reinforcement which is not part of the design can reduce fatigue strength because of the change in geometry from the original structure.



DUPLEX WIRES - Chromel-Alumel - Type K - 16 AWG Stranded

LENGTH - Total External Resistance for both Wires including Thermocouple not to exceed 2500 Ohms or 410 Feet.

WIRE RESISTANCE - Nominal Resistance, Ohm per Foot at 20°C (66°F) - Chromel - Ohms - Alumel - .0683 Ohms.

WIRE INSULATION - each Conductor Enamel; Asbestos (Twisted Pair) Overall Asbestos Braid

WIRE CODE -Alumel, Negative Wire (Red); Chromel, Positive Wire (Yellow)

OVERALL COLOR - Yellow

CATALOG No. 16-59-17

POLARITY DISCONNECT

CHROMEL-ALUMEL COMPENSATED CONNECTION

JACK Color Code (Yellow) - Catalog No. 040419

PLUG Color Code (Yellow) - Catalog No. 040434

CABLE CLAMP - Catalog No. 072513

ADAPTER - Catalog No. 076794

THERMOCOUPLE ELEMENT

CHROMEL-ALUMEL - Type K - Swagged One (1) Inch Stripped

CHROMEL POSITIVE WIRE Color Code (None)

ALUMEL NEGATIVE WIRE Color Code (Red)

CATALOG No. 8784-K-1-3-12"-D

1. 588003 Kaopak Flex Heaters
2. 588004 Kaopak Collector Streamer Type
3. Kaopak Blankets 3, 5, or 6 Pocket Size as needed for Size Pipe being Stressed Relieved

Thermocouple Assembly, Complete

Catalog No. 8784-K-1-3-12"-Q

Temperature Heating Pellets

Range: 1050°F 1100°F - 1200°F 1250°F

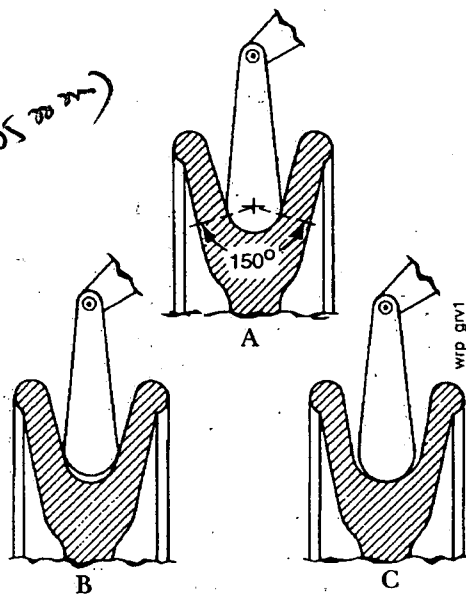
Mean Accuracy: +/-1%

These Tempil Pellets will begin to melt at the temperature specified.

For new or re-machined grooves, the groove gauge is nominal plus the full oversize percentage. The gauge carried by most wire rope representatives today is used for worn grooves and is made nominal plus 1/2 the oversize percentage.

This latter gauge is intended to act as a sort of "no-go" gauge. Any sheave with a groove smaller than this must be re-grooved or, in all likelihood, the existing rope will be damaged.

*DRAG & HOIST
ROPE of 1075214 & 11"
2.75" φ (69.905 mm)*



Cross-sections illustrating three sheave-groove conditions. "A" is correct, "B" is too tight, and "C" is too loose.

Inspecting for Worn Sheave

These sheave-groove cross-sections represent three wire rope seating conditions: "A" - a new rope in a new groove; "B" - a new rope in a worn groove; and "C" - a worn rope in a worn groove.

BREAKING IN A NEW WIRE ROPE

A new wire rope requires careful installation. Adherence to the previously covered procedures is highly recommended. After the rope has been installed, and the ends secured in the applicable manner, the mechanisms should be started carefully and then permitted to run through a complete cycle of operation at greatly reduced speed. During this trial operation, a very close watch should be kept on all working parts such as sheaves, drums and rollers to ensure the rope runs freely. Be vigilant to ensure there are no obstructions as it makes its way through the system. If no problems are apparent, the next step should include several run-throughs of the normal operational cycle under light load conditions at a reduced speed. This procedure allows the component parts of the new rope to gradually adjust to the actual operating conditions.

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