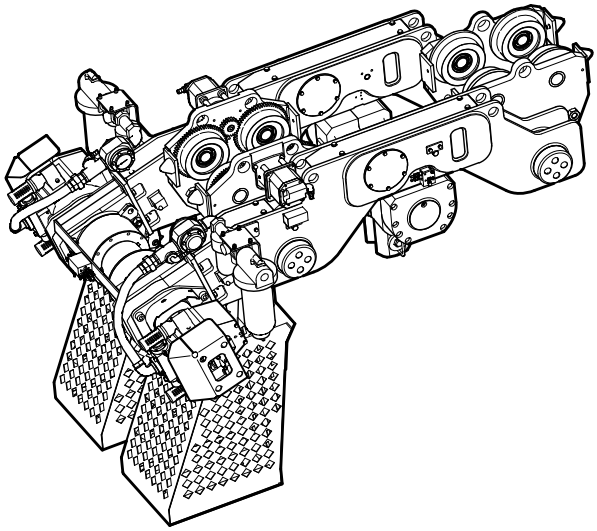
Product Maintenance Information

Ultra-Lo BOP SYSTEM
AIR CHAIN HOIST
Models
ULBS100LCA4 and ULBS150LCA6



(Dwg. MHP2865)

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Ingersoll Rand
Industrial Technologies

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Only allow **Ingersoll Rand** trained technicians to perform maintenance on this product. For additional information contact **Ingersoll Rand** factory or nearest Distributor.

For additional supporting documentation refer to Table 1 'Product Information Manuals' on page 2.
Manuals can be downloaded from www.ingersollrandproducts.com.
The use of other than genuine **Ingersoll Rand** replacement parts may result in safety hazards, decreased performance and increased maintenance and will invalidate all warranties.
Original instructions are in English. Other languages are a translation of the original instructions.
Refer all communications to the nearest **Ingersoll Rand** Office or Distributor.

Table 1: Product Information Manuals

Publication	Part/Document Number	Publication	Part/Document Number
Product Safety Information Manual	MHD56295	Product Information Manual	MHD56366
Product Parts Information Manual	MHD56367		

INSPECTION

Perform frequent inspections on equipment in regular service. Refer to Product Information Manual.

■ Periodic Inspection

Refer to Table 2 'Inspection Classifications' on page 2 for suggested inspection classifications for Periodic Inspection Intervals. Select conditions most appropriate to application.

Table 2: Inspection Classifications

Conditions	Normal	Heavy	Severe
Typical Use (operating time)	Infrequent	Regular	Continual/Constant
Load Range	Usually light loads, occasional max. loads	Usually medium loads, frequent max. loads	Usually max. loads or almost max. loads
Installation	Protected/Enclosed/Dry	Not Sheltered/Exterior	Full Exposure
Atmosphere	Clean/Non-Corrosive	Dirty/Non-Corrosive/Freshwater Marine	Dirty/Corrosive/Saltwater Marine
Climate	Dry/Stable Temperature	Wet/Moderate Temperature Fluctuations	Wet/Severe Temperature Fluctuations

Maintain written records of periodic inspections to provide an accumulative basis for continuing evaluation. Inspect all items listed in "Frequent Inspection" in the Product Information Manual. Also inspect the following at the suggested intervals recommended in Table 5, 'Maintenance Interval Chart' on page 3.

1. **Fasteners.** Check all rivets, split pins, capscrews and nuts. Replace if missing or tighten if loose.
2. **All Components.** Inspect for wear, damage, distortion, deformations and cleanliness. If external evidence indicates damage, disassemble as required to conduct a detailed inspection. Check gears, shafts, bearings, sheaves, chain guides, springs and covers. Replace worn or damaged parts. Clean, lubricate and reassemble.
3. **Hooks.** Inspect hooks carefully for cracks using magnetic particle or other suitable non-destructive method. Inspect hook retaining parts. Tighten or repair if necessary.

Table 3: Hook Throat Normal and Discarded Width

Hoist Model	Capacity metric tons	Throat Width		Discard Width	
		in.	mm	in.	mm
ULBS100LCA4	2 x 50	4.64	118	5.34	135
ULBS150LCA6	2 x 75	5.98	152	6.85	174

4. **Load Chain Sprockets.** Check for damage or excessive wear. Replace if necessary. Observe the action of load chain feeding through hoist. Do not operate a hoist unless load chain feeds through hoist and hook block smoothly and without audible clicking or other evidence of binding or malfunctioning.
5. **Motors.** If performance is poor, disassemble motor and check for wear or damage to bearings and shafts. Parts should be cleaned, lubricated and reassembled. Replace worn or damaged parts.
6. **Hoist Brake.** Raise a load equal to rated capacity of hoist a few inches (cms) off the floor. Verify hoist holds the load without drift. If drift occurs, disassemble. Remove brake discs as described in "MAINTENANCE" on page 6. Check and clean brake parts each time hoist is disassembled. Replace brake discs if grooves are no longer visible.

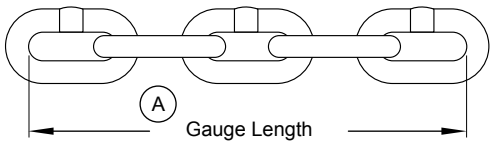
⚠ WARNING

- **Worn or improperly functioning brakes may cause excessive heat build up and sparks.**

7. **Supporting Structure System.** Check for distortion, wear and continued ability to support the system.
8. **Trolley.** Check that the trolley wheels track beam properly and trolley is correctly adjusted. Refer to Product Information Manual. Check that wheels and beam are not excessively worn and inspect side plates for spreading due to bending. Do not operate hoist until problem has been determined and corrected.
9. **Load Chain End Anchors.** Ensure both ends of load chain are securely attached. Secure if loose, repair if damaged, replace if missing. Check chain stoppers are correctly installed and functional.
10. **Load Chain.** Check the chain for stretching. Measure the load chain over five link sections all along chain, paying particular attention to the most frequently reeved links. Refer to Dwg. MHP0041 on page 2, **A.** Gauge Length. When any five links in the working length reaches or exceeds the discard length, replace entire chain. Refer to Table 4, 'Load Chain Normal and Discard Length' on page 2. Always use genuine **Ingersoll Rand** replacement chain. Zinc plated load chain is standard on Liftchain hoists.

Table 4: Load Chain Normal and Discard Length

Hoist Model	Chain Size	Normal Length		Discard Length	
	mm	in.	mm	in.	mm
ULBS100LCA4	22 x 66	12.99	330	13.23	336
ULBS150LCA6					



(Dwg. MHP0041)

11. **Chain Container.** Check for damage or excessive wear and that chain container is securely attached to the hoist. Secure or replace if necessary.
12. **Limit Switch.** Check limit switches function correctly.
13. **Emergency Stop.** During hoist operation verify emergency shut-off by activating button. All operation must stop quickly. Stop button must reset properly.
14. **Labels and Tags.** Check for presence and legibility. Replace if necessary.

■ Records and Reports

Inspection records, listing all points requiring periodic inspection should be maintained for all load bearing equipment. Written reports based on severity of service, should be made of the condition of critical parts as a method of documenting periodic inspection. These reports should be updated, signed by the person who performed the inspection, and kept on file where they are readily available for review.

■ Maintenance Intervals

Refer to 'Periodic Maintenance' and Table 5 on page 3 for maintenance interval guidance.

Table 5: Maintenance Interval Chart

Normal Application

The following work can be completed by owner maintenance personnel							
System Air Filter	Inspect system air filter every 45 days or 125 hours.						
Grease Fittings	Lubricate grease fittings every 180 days or 500 hours.						
Gearbox Oil Level	Check oil level in gearbox every 120 days or 340 hours. Replace oil yearly.						
It is recommended that the following work be completed by an Ingersoll Rand trained technician.							
Standard Components	**1 year or 1,000 hrs**	**2 years or 2,000 hrs**	**3 years or 3,000 hrs**	**4 years or 4,000 hrs**	**5 years or 5,000 hrs**	**6 years or 6,000 hrs**	**8 years or 8,000 hrs**
Inspect Motor			X		X	X	X
Inspect Disc Brake					X		X
Inspect Gearbox					X		X
Inspect Controls			X		X	X	X
Inspect Housings and Main Frames			X		X	X	X
Inspect Trolley Motor				X	X	X	X
Inspect Trolley Wheel Assembly				X	X	X	X
Inspect Trolley Gearbox				X	X	X	X
Chain Container			X		X	X	X

Heavy Application

The following work can be completed by owner maintenance personnel							
System Air Filter	Inspect system air filter every 30 days or 100 hours.						
Grease Fittings	Lubricate grease fittings every 90 days or 250 hours.						
Gearbox Oil Level	Check oil level in gearbox every 90 days or 250 hours. Replace oil yearly.						
It is recommended that the following work be completed by an Ingersoll Rand trained technician.							
Standard Components	**1 year or 1,000 hrs**	**2 years or 2,000 hrs**	**3 years or 3,000 hrs**	**4 years or 4,000 hrs**	**5 years or 5,000 hrs**	**6 years or 6,000 hrs**	**8 years or 8,000 hrs**
Inspect Motor		X		X		X	X
Inspect Disc Brake				X		X	X
Inspect Gearbox				X		X	X
Inspect Controls		X		X		X	X
Inspect Housings and Main Frames		X		X		X	X
Inspect Trolley Motor				X		X	X
Inspect Trolley Wheel Assembly				X		X	X
Inspect Trolley Gearbox				X		X	X
Chain Container		X		X		X	X

Severe Application

The following work can be completed by owner maintenance personnel							
System Air Filter	Inspect system air filter every 30 days or 100 hours.						
Grease Fittings	Lubricate grease fittings every 90 days or 250 hours.						
Gearbox Oil Level	Check oil level in gearbox every 90 days or 250 hours. Replace oil yearly.						
It is recommended that the following work be completed by an Ingersoll Rand trained technician.							
Standard Components	**1 year or 1,000 hrs**	**2 years or 2,000 hrs**	**3 years or 3,000 hrs**	**4 years or 4,000 hrs**	**5 years or 5,000 hrs**	**6 years or 6,000 hrs**	**7 years or 7,000 hrs**
Inspect Motor		X	X	X	X	X	X
Inspect Disc Brake			X	X	X	X	X
Inspect Gearbox			X		X		X
Inspect Controls		X	X	X	X	X	X
Inspect Housings and Main Frames		X	X	X	X	X	X
Inspect Trolley Motor		X	X	X	X	X	X
Inspect Trolley Wheel Assembly			X		X		X
Inspect Trolley Gearbox			X		X		X
Chain Container		X	X	X	X	X	X

Note 1: Hours are for actual system operation. Perform an annual hoist load test for all applications.

Recommend complete general overhaul.

INSPECTION REPORT

Ingersoll Rand Ultra-Lo BOP SYSTEM

Model Number:					**Date:**
Serial Number:					**Inspected by:**
Reason for Inspection: (Check Applicable Box)					
	1. Scheduled Periodic Inspection (___ Quarterly ___ Semiannually ___ Yearly)				**Operating Environment:**
	2. Discrepancy(s) noted during Frequent Inspection				
	3. Discrepancy(s) noted during maintenance				Normal ___ Heavy ___ Severe ___
	4. Other: _____				

Refer to the Product Information and Parts Information Manuals and "INSPECTION" section for the general inspection criteria. Also, refer to appropriate National Standards and Codes of Practice. If in doubt about an existing condition contact the nearest **Ingersoll Rand** distributor or the factory for technical assistance.

COMPONENT	**CONDITION**		**CORRECTIVE ACTION**		**NOTES**
	Pass	**Fail**	**Repair**	**Replace**	
Fasteners					
Gears					
Shafts					
Bearings			---		
Load Bearing Sheave					
Chain Guides					
Springs			---		
Covers, Housings					
Hook	Actual Hook Throat Width: _____ inches / _____ mm (Refer to Table 3 'Hook Throat Normal and Discarded Width' on page 2 for minimum/maximum acceptable widths.)				
	Hook Twist		---		(maximum 10%)
	Hook Crack Test Method Used: Dye Penetrant _____ Magnetic Particle _____ Other: _____				
Hook Latch			---		
Hoist Brake (100% Load Test)			---		
Brake (Visual Inspection)					
Tail Pin (End Anchor)					
Load Chain:			---		
Working length(s) maximum wear: _____ inches / _____ mm (Refer to Table 4 'Load Chain Normal and Discard Length' on page 2)					
Supporting Structure					
Labels and Tags			---		
Other Components (List in NOTES section)					

TESTING:	**Pass**	**Fail**	**NOTES**
Operational (No Load)			
Operational (100% Load)			
Operational (Maximum Test Load*)			

* Testing to more than 100% of rated capacity may be required to set overload device.

This form may be photocopied and used as an inspection record.

TROUBLESHOOTING

This section provides basic troubleshooting information. Determination of specific causes to problems are best identified by thorough inspections performed by **Ingersoll Rand** trained technicians. The chart below provides a brief guide to common hoist and trolley symptoms, probable causes and remedies.

Symptom	Cause	Remedy
Hoist will not operate.	No air supply to hoist, or too little CFM or psi.	Check psi (bar) at hoist inlet. Refer to “SPECIFICATIONS” section in Product Information Manual for correct CFM (cu.m/min) and psi (bar).
	Pendant lever sticking.	Check pendant lever and restore free movement.
	Pendant malfunction.	Check psi (bar) at pendant. Minimum operating pressure in pendant line is 60 psi (4 bar).
	Hoist is overloaded.	Reduce load to within rated capacity.
	Motor is damaged.	Repair or replace. Refer to “MAINTENANCE” section on page 6.
	Limit switch sticking.	Check limit switch button moves freely. Clean and lubricate if sticking.
	Brake is not releasing.	Check brake release circuit and psi (bar) at brake inlet (60 psi (4 bar) minimum).
Load continues to move when hoist is stopped. "UP" direction.	Pendant lever sticking.	Check lever and restore free movement.
Load continues to move when hoist is stopped. "DOWN" direction.	Pendant lever sticking.	Check lever and restore free movement.
	Hoist is overloaded.	Reduce load to within rated capacity.
	Brake is slipping.	Check brake springs and brake disc linings for wear. Refer to “MAINTENANCE” section on page 6.
Hoist will not lift rated capacity.	Hoist is overloaded.	Reduce load to within rated capacity.
	No air supply to hoist or too little CFM or psi (cu. m/min or bar).	Check psi (bar) at hoist inlet. Refer to “SPECIFICATIONS” section in Product Information Manual for correct CFM (cu.m/min) and psi (bar).
	Brake is not releasing.	Check brake release circuit and psi (bar) at brake inlet (60 psi (4 bar) minimum).
	Exhaust is restricted.	Inspect vents and clean or replace muffler.
	Motor is damaged.	Check for worn motor bearings.
Hook lowers but will not raise.	Hoist is overloaded.	Reduce load to within rated capacity.
	No air supply to hoist or too little CFM or psi (cu. m/min or bar).	Check at hoist power supply connection with hoist under load. Raise pressure to rated capacity.
	Pendant malfunction.	Check psi (bar) at air inlet connection on pendant.
Load chain jumps on sprocket or is making a snapping sound.	Worn or rusted chain.	Refer to “INSPECTION” section on page 2 to determine wear limit. Replace if necessary.
	Incorrect chain.	Replace with correct chain.
	Worn sprocket or chain guide.	Replace worn parts.
	Capsized hook.	Correct as described in “MAINTENANCE” section on page 6.
	Hoist not in line with load.	Align hoist with load. Do not "yard" or "side pull".
	Incorrectly reeved load chain.	Check load chain is correctly reeved.
	No oil on load chain.	Lubricate load chain.
Trolley will not stop or trolley wheels slip.	Damaged beam.	Repair or replace beam.
	Excessive oil, grease or paint on track of beam.	Clean off oil, grease or paint.
	Trolley not spaced for beam clearance.	Check trolley spacing. Refer to Product Information Manual.
Air-powered trolley does not operate.	Pendant lever sticking.	Check lever and restore free movement.
	No air supply to trolley or too little CFM or psi (cu. m/min or bar).	Check psi (bar) at trolley inlet. Refer to Product Information Manual.

⚠ WARNING

- **Never perform maintenance on the hoist while it is supporting a load.**
- **Before performing maintenance, tag controls:**

WARNING - DO NOT OPERATE EQUIPMENT BEING REPAIRED.

- **Only allow Ingersoll Rand trained technicians to perform maintenance.**
- **After performing any maintenance on the hoist dynamically test the hoist to 100% of its rated capacity, in accordance with ASME B30.16 standards, before returning hoist to service. Testing to more than 100% of rated capacity is required to set overload device and may be required to comply with standards and regulations set forth in areas outside the USA.**
- **Shut off air system and depressurize air lines before performing any maintenance.**
- **Use of other than genuine Ingersoll Rand parts may result in safety hazards, decreased performance and increased maintenance and may invalidate all warranties.**

■ Maintenance

Correct disassembly (to prevent loss or damage of good parts), repair, assembly, testing and adjusting are critical to proper hoist operation. Maintenance procedures are technical in nature and require training and experience to accomplish correctly. In addition, repair and testing require specialized equipment that is not typically found at the hoist-mounting site.

Proper use, inspections and maintenance increase the life and usefulness of your **Ingersoll Rand** equipment. During assembly, lubricate gears, nuts, capscrews and all machined threads with applicable lubricants. Use of antiseize compound and/or thread lubricant on capscrew and nut threaded areas prevents corrosion and allows for easy disassembly of components.

It is extremely important that anyone involved with maintaining the hoist be familiar with the servicing procedures of these products, and are physically capable of conducting the procedures. These personnel shall have skills that include:

1. Proper and safe use and application of mechanics' common hand tools as well as special **Ingersoll Rand** or recommended tools.
2. Safety procedures, precautions and work habits established by accepted industry standards.

Ingersoll Rand cannot know of, or provide all the procedures by which product operations or repairs may be conducted and the hazards and/or results of each method. If operation or maintenance procedures not specifically recommended by the manufacturer are conducted, it must be ensured that product safety is not endangered by the actions taken. If unsure of an operation or maintenance procedure or step, personnel should place the product in a safe condition and contact supervisors and/or the factory for technical assistance.

■ *Maintenance Intervals*

Refer to Table 5 'Maintenance Interval Chart' on page 3 for recommended maintenance schedule.

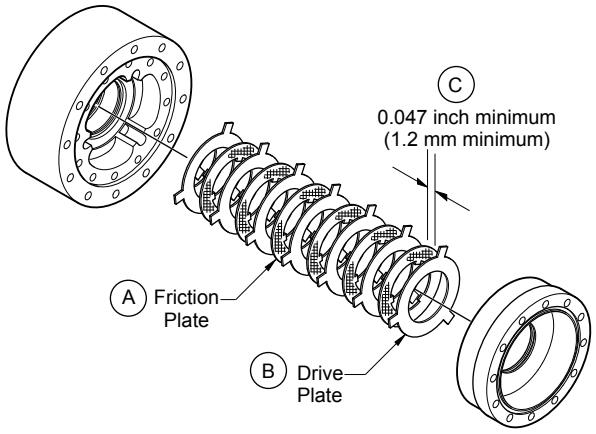
■ Adjustments

■ *Disc Brake*

No brake adjustment is required.
Refer to Dwg. MHP2979 on page 6, **A.** Friction Plate; **B.** Drive Plate; **C.** 0.047 inch minimum (1.2 mm minimum).
Use the following procedure to remove the brake.

1. Remove the motor as described in 'Hoist Motor Disassembly' on page 8.
2. Remove the brake spacer ring (323), brake friction plate (320), steel disc (319) and brake housing (325).
3. Inspect the brake friction plate (320) for wear. If brake friction plate thickness is uneven or is less than 0.047 in (1.2 mm) replace brake friction plate.
4. Remove, discard and replace 'O' rings on piston (327).

No further disassembly is required, if only the brake is to be serviced.



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NOTICE

- **Original brake friction plate thickness is 0.059 in (1.5 mm).**

■ *Overload Device*

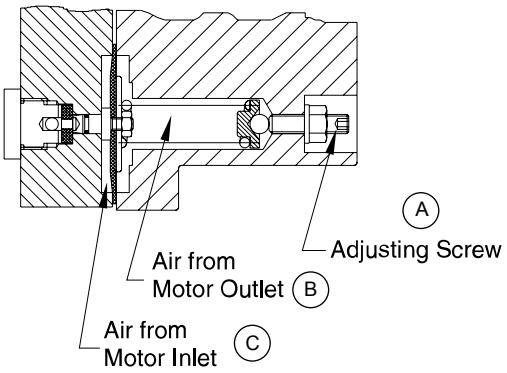
⚠ CAUTION

- **Overload is factory set and should not be adjusted without consulting an Ingersoll Rand trained technician.**

1. Connect hoist to an air supply.
2. Loosen locknut and turn adjusting screw in order to increase or decrease the SWL (increase SWL by tightening the adjusting screw). Adjustment must be made for an overload of 20% maximum of SWL. Refer to Dwg. MHP1302 on page 6, **A.** Adjusting Screw; **B.** Air from Motor Outlet; **C.** Air from Motor Inlet.
3. Tighten locknut securing adjusting screw.
4. Check hoist operation at rated load. If necessary repeat adjustment.

NOTICE

- **Do not change factory settings unless hoist is tested and recertified at an Ingersoll Rand authorized service center.**



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■ *Load Chain Replacement*

⚠ WARNING

- **NEVER splice a load chain except when installing a new load chain by the following method. Always discard link used to connect old chain with new.**

Excessive chain wear cannot be detected by casual observation. Chain is case hardened and once the case hardening is worn through, wear will progress rapidly and the strength of the chain will be considerably reduced. Further, the chain will no longer fit the chain sprocket properly, greatly increasing the chance of malfunction and chain breakage.
One chain sprocket will outlast several chains if chain is replaced as recommended. The use of a worn chain will cause the chain sprocket to wear rapidly.
If the chain is visibly damaged, examine chain sprocket and chain guide. Install a new chain sprocket if the old one is visibly worn. Install a new guide if old one is broken or distorted.

It is suggested that a short length of load chain be available when replacing hoist load chain. Feeding a short length of load chain through bottom block assembly or power head assembly prior to installing new load chain may simplify installation. Weld on perpendicular load chain must always face away from chain sprocket. Refer to Dwg. MHP0472 on page 7, **A.** Load Chain; **B.** Chain Wheel; **C.** Chain Weld To Outside On Powered Chain Wheels; **D.** Standing Link.

NOTICE

- **For ease of installation, do not remove old chain from hoist. Use the old chain to feed new chain through hoist.**

⚠ WARNING

- **Replacement of the load chain must be made on the two chains at the same time to ensure synchronization.**

NOTICE

- **The two hoist load chains are synchronized at the factory.**

1. System must be hung and connected to air supply. Reduce air pressure to 60 psi (4 bar).
2. Remove chain container.
3. Support the bottom hook block assembly 6 to 10 ft. (2 to 3 meter) below the hoist support frame (23).
4. For 50 ton hoists remove capscrews (35), lockwashers (34) and plates (44) from hoist support frame (23).
5. For 75 ton hoists remove capscrews (35), lockwashers (34) and locking plates (259) from bottom hook block assembly. Extract chain anchor pins (260).
6. Check the old chains are not twisted.
7. Check weld of the first chain link of each old chain. The weld must be in the same position as on the other standing links.
8. Using an abrasive wheel, create two 'C' Links. Cut a section from the last link as shown in Dwg. MHP0817 on page 7, **A.** 'A' Dimension; **B.** 'C' Link. The 'C' Link must be the same size as the load chain. Refer to Table 6 "C' Link Dimension' on page 7.

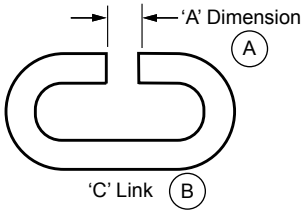

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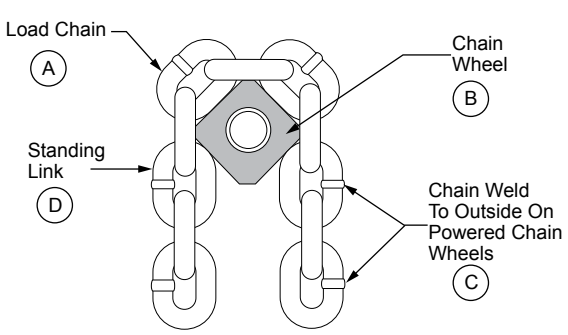
Table 6: 'C' Link Dimension

Hoist Model	Chain Size	'A' Dimension	
	mm	in.	mm
ULBS100LCA4	22 x 66	0.945	24
ULBS150LCA6			

⚠ CAUTION

- **Do not distort link in any manner. Link must be able to pass over the chain sprocket and idler wheels without binding.**
- **Ensure chain does NOT become twisted during reeving. All chain welds must align while chain is hanging free.**

9. Install the 'C' links in last link of each old chain.
10. Connect the new chains to the old chains by hooking end of new chain onto 'C' links.
11. Check the weld of the standing and horizontal links of the new chains. The welds must be in the same positions as on the old chains.
12. Slowly run the hoist in the raise direction, running off old chain and reeving new chain over the chain wheels and guide rollers. The first link of new chain over the load chain wheel must be a standing link. Refer to Dwg. MHP0472 on page 7, **A.** Load Chain; **B.** Chain Wheel; **C.** Chain Weld To Outside On Powered Chain Wheels; **D.** Standing Link.



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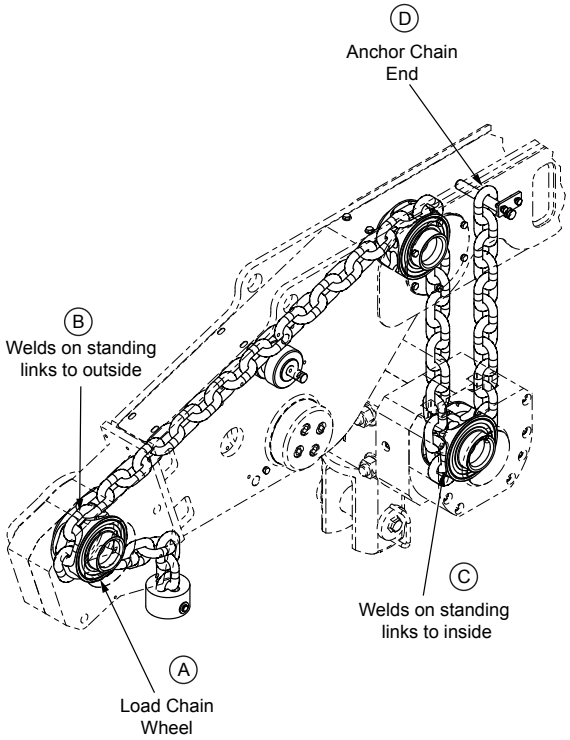
13. On 75 ton hoists pass the new chains through all of the chain stoppers (250).
14. After the new chains are installed secure the unloaded ends (chain container side) with the buffers.
15. Check that the first links (bottom block side) are standing links.
16. For 50 ton hoists attach the free end of the load chains to the hoist support frames (23) with capscrews (35), lockwashers (34) and plates (44).
17. For 75 ton hoists attach the free end of the load chains (bottom block side) using the anchor pins (260), capscrews (35), lockwashers (34) and locking plates (259).
18. Check that the new chains are not twisted or 'capsized' during installation.
19. Operate hoists slowly to verify the hook block assembly remains level through raise and lower cycle.

Chain Reeving

Refer to Dwgs. MHP3184 and MHP3185 on page 7, **A.** Load Chain Wheel; **B.** Welds on standing links to outside; **C.** Welds on standing links to inside; **D.** Anchor Chain End; **E.** Guide Roller.



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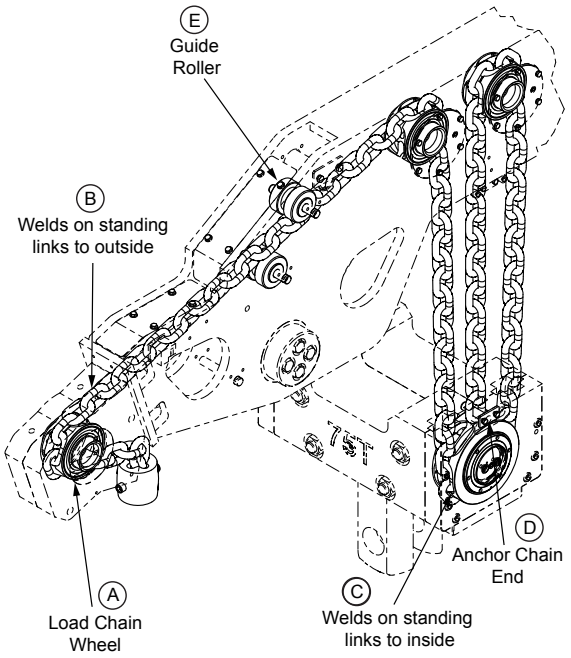

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■ Disassembly

■ *General Disassembly Instructions*

Refer to the Product Parts Information Manual for drawings and item numbers referenced in the "MAINTENANCE" section, unless otherwise noted.

The following instructions provide the necessary information to disassemble, inspect, repair, and assemble the hoist. Parts drawings are provided in the Product Parts Information Manual.
If a system is being completely disassembled for any reason, follow the order of the topics as they are presented.
It is recommended that all maintenance work on the system be performed in a clean dust free work area.
In the process of disassembling the system, observe the following:

1. Never disassemble the system any further than is necessary to accomplish the needed repair. A good part can be damaged during the course of disassembly.
2. Never use excessive force when removing parts. Tapping gently around the perimeter of a cover or housing with a soft hammer, for example, is sufficient to break the seal.
3. Do not heat a part with a flame to free it for removal, unless the part being heated is already worn or damaged beyond repair and no additional damage will occur to other parts.

   In general, the system is designed to permit easy disassembly and assembly. The use of heat or excessive force should not be required.

4. Keep the work area as clean as practical, to prevent dirt and other foreign matter from getting into bearings or other moving parts.
5. All seals, gaskets and 'O' rings should be discarded once they have been removed. New seals, gaskets and 'O' rings should be used when assembling the system.
6. When grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members, machined surfaces and housings.
7. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.
8. When removing ball bearings from shafts, it is best to use a bearing puller. When removing bearings from housings, drive out the bearing with a sleeve slightly smaller than the outside diameter of the bearing. The end of the sleeve or pipe which contacts the bearing must be square. Protect bearings from dirt by keeping them wrapped in clean cloths.

■ System Removal

1. Shut off, bleed down air supply then disconnect and tag air lines.
2. Remove chain bucket assembly.
3. Remove beam rail stops.
4. Support hoist and trolley system with adequate lifting system and remove.
5. Position several blocks of wood on the work bench to support the hoist system.

■ *Hoist Removal*

Refer to Dwg. MHP2868.

1. Remove hooks and load chains from hoists.
2. Shut off, bleed down air supply then disconnect and tag air lines.
3. Remove capscrews (35), lockwashers (34) and frame (30) from suspension assembly.
4. Remove capscrews (244), washers (245) and guards (243).
5. Support one hoist and remove capscrews (220) and lockwashers (72).
6. Carefully slide hoist sideways to separate output shaft (242) from coupler assembly (236).
7. Set hoist assembly to one side for later disassembly.
8. Repeat process to remove second hoist from suspension frame.

■ *Hoist Reduction Gear Disassembly*

Refer to Dwgs. MHP2950, MHP2905 and MHP2868.

1. Remove covers (118), (233) and (234) piping and motor assembly from motor flange (231).
2. Remove capscrews (232), nuts (212) and lockwashers (211).
3. Pry reducer assembly (210) from chain guide (213).
4. Remove capscrews (354).
5. Remove gear cover (352) and 'O' ring.
6. Remove bearing (241) from gear cover (352).
7. Extract ring gear (342) and keys (343).
8. Remove planet gear assembly with pinion shaft (337).

NOTICE

- **If pinion shaft is difficult to move, gently tap it to loosen.**

9. Remove bearings (344) from both ends of planet assembly.
10. Remove planet axles (349).
11. Remove planet gears (348).
12. Remove needle bearings (350), spacer rings (351) and thrust needle bearings (347).
13. Remove ring gear (341) and retainer ring (340).
14. Remove ring gear flange (339).

■ *Hoist Brake Disassembly*

Refer to Dwg. MHP2929.

1. Remove covers (118), (233) and (234) piping and motor assembly from motor flange (231).
2. Remove capscrews (302) from brake housing (314). Separate brake assembly from motor flange (231).
3. Remove ring gear (304) and planet assembly. Do not disassemble planet assembly unless repairs are required.
4. Remove retainer ring (312) and pinion (313) from drive shaft (315).
5. Remove capscrews (321). Separate brake housing (325) from brake housing (314).
6. Remove spacer ring (323) and coupling (322).
7. Remove friction discs (320) and steel discs (319) from brake housing (314).
8. Remove retainer ring (312) and gear wheel (318) from drive shaft (315).
9. Remove retainer ring (317). Tap drive shaft (315) and bearing (316) from brake housing.
10. Press spacer ring (330), springs (329) and piston (327) from brake housing (325).
11. Remove 'O' rings (326) and (328) from piston (327).

■ *Hoist Motor Disassembly*

Refer to Dwg. MHP2928.

1. Remove capscrews (133) and (134), lockwashers (34), muffler brackets (131) and mufflers (138) from motor housing (130).
2. Extract tubes (141) and 'O' rings (516) from motor housing (130).
3. Remove capscrews (518) and lockwashers (34) from rear end cover (501).
4. Carefully remove the gear motor assembly from motor housing (130).
5. Remove the capscrews (524) from rear end cover (501).
6. Carefully remove the gear unit by prying rear end cover assembly from motor housing (502).
7. Remove capscrew (524) on front end cover (504).
8. Remove front end cover (504) from motor housing (502).
9. Remove retainer ring (526).
10. Remove assembled oil seal support (507) and ball bearing (511) from front end cover.
11. Remove capscrew (521) and washer (522).
12. Remove ball bearing (511).
13. Remove capscrews (200) and separate cover (503) from rear end cover (501).
14. Remove nuts (527) and 'O' rings (514). Extract drive gear (508) and idle gear (509).
15. Remove bearings (510).

■ *Bottom Block Disassembly (50 ton)*

Refer to Dwg. MHP2863.

1. Remove capscrews (15) and lockwashers (14) from covers (1).
2. Carefully pry covers (1) from lower block halves (5).
3. Remove sprockets (4) with bearings (2) and 'O' rings (3).
4. Remove nuts (17) and lockwashers (18) from studs (19).
5. Tap out studs (19) and separate lower block halves (5).
6. Remove clevis (10), bearing (9) and split ring (8).
7. Remove bearings (2) and 'O' rings (3) from sprockets only if they require replacement or cleaning.

■ *Bottom Block Disassembly (75 ton)*

Refer to Dwg. MHP2902.

1. Remove capscrews (35), washers (34), locking plates (259) and pins (260) from covers (1).
2. Remove load chain from bottom block assembly.
3. Remove capscrews (35), lockwashers (67) and covers (258) from lower block halves (5).
4. Remove capscrews (15) and lockwashers (14) from covers (1).
5. Carefully pry covers (1) from lower block halves (5).
6. Remove capscrews (256), lockwashers (67) and stop rings (255) from axles (254).
7. Remove sprockets (4) with bearings (2), oil seal supports (252) and oil seals (253).
8. Remove nuts (17) and lockwashers (18) from studs (19).
9. Tap out studs (19) and separate lower block halves (5).
10. Remove axles (254), clevis (10), bearing (9) and split ring (8).
11. Remove capscrews (257), oil seals (253) and bearings (2) from sprockets only if they require replacement or cleaning.

■ *Hoist Suspension Disassembly (50 and 75 ton)*

Refer to Dwgs. MHP2864 and MHP2901.

1. Remove load chain and hoists from hoist suspension assembly. Refer to 'Hoist Removal' on page 8.
2. Remove capscrews (42), washers (41) and guards (21) and (45) from support frames (23).
3. Remove capscrews (35) and lockwashers (34) from covers (20).
4. Pry covers (20) from hoist support frame (23).
5. Remove sprocket(s) (4) with bearings (2).
6. Remove capscrews (35) and lockwashers (34) from hose support plate (28).
7. Remove hose support plate (28), pin(s) (27) and guide roller(s) (22).

■ *Trolley Disassembly (50 and 75 ton)*

Refer to Dwgs. MHP2862, MHP2864, MHP2901 and MHP2906.

1. Remove complete ULBS hoist from the end of support beams and carefully lower to the floor.
2. Remove capscrews (71), lockwashers (72) and suspension shaft caps (73) from one side of hoist support frame (23).
3. Note position and quantity of spacers then remove spacers (76), (81) and (77).
4. Remove remaining capscrews (71), lockwashers (72) and suspension shaft caps (73) from outside of second hoist support frame (23).
5. Note position and quantity of spacers then remove spacers (76), (81) and (77).
6. Carefully support trolleys and push out suspension shafts (83). Note position and quantity of spacers then remove spacers (81) and (82).
7. Separate hoist support frames (23) and trolley assemblies.
8. Remove capscrew (200), washer (201) and gear (205) from geared trolley motor.
9. Remove capscrews and trolley drive assemblies from side plate.
10. Remove nuts (17) from shafts (79) on outside of one trolley side plate (80).
11. Remove the other outside nuts (17) from shafts (79).
12. Remove second side plate (80) and spacers from suspension shaft (83).

Trolley Wheel Disassembly (50 and 75 ton)

1. Remove retainer ring (88) and pull wheel assembly from trolley side plate axle.
2. Remove spacer (87).
3. Remove retainer ring (90) and spacer (89).
4. Remove front seal (85) and discard. Pull bearings (86) from wheel (84) or (92). Remove rear seal (85) and discard.

Trolley Motor Disassembly

Refer to Dwg. MHP1651.
1. Remove capscrews (328) in motor cover (325) and separate from motor housing (331).

NOTICE

- **Pins (309) do not have to be removed.**

2. Remove and discard '0' ring (336).
3. Remove capscrews (303) and separate motor housing (308) and motor cover.
4. Discard '0' rings (307) and (311).
5. Remove retainer rings (315) and bearings (314).
6. Remove stop (322), slide valve (318), quad rings (319) and (321), springs (317) and slide valve (316). Discard quad rings.
7. Immobilize the motor gears with a rod between the teeth and remove locknuts (304).
8. Slide gears out of housing.
9. Remove screw (301) and washer (302). Press bearings (305) out of motor flange (306).

Motor Emergency Stop Valve Disassembly

Refer to Dwg. MHP1651.
1. Remove capscrews securing cover (363) to motor cover (325). Remove cover.
2. Remove diaphragm (364).
3. Remove capscrews (355) securing cover (352). Remove cover and discard '0' ring (353).
4. Remove spring (354).
5. Secure valve cone (365) and remove screw (358).
6. Remove valve cone (356), valve cone (365), seals (357) and washers (361). Push spacer (359) out of motor cover.

Trolley Reduction Gear Disassembly

Refer to Dwg. MHP1543.
1. Remove plugs (407) from gear casing (406). Drain oil into a suitable container and dispose of it in an environmentally friendly manner.
2. Remove four capscrews (444) and flange (443) from gear casing (406). Flange was assembled with Loctite® and may be difficult to remove.
3. Remove two '0' rings (441) and discard.
4. Remove two mufflers (445) in flange (443).
5. Lift out springs (439).
6. Remove coupling (431) from shaft and '0' ring (432) from groove in coupling bore.
7. Remove brake disc (437), piston (435), '0' rings (436) and (434) from piston (435).
8. Remove retainer ring (429) and friction disc (428) from shaft (418) spline.
9. Remove brake body (427) and gasket (408).
10. Remove planet support (416), bearing (423) and ring gear (424).
11. Remove retainer ring (421) and bearing (419) from sun gear shaft (418).
12. Remove ring gear (411) from gear case.
13. Remove retainer ring (403). Tap drive shaft (402) from bearing (404). Remove bearing (404) from gear case (406). Tap out bearing (409).
14. Remove bearing (423). Remove planet pins (413). Remove two bearings (414) and single spacer (415) from each planet gear (417).
15. Remove retainer ring (401).
16. Tap shaft (402) out of bearing (404).

Four Function Pendant Disassembly

Refer to Dwgs. MHP1577 without emergency stop or MHP1545 with emergency stop.
1. Remove fittings (327) and lifting eye (501).
2. Unscrew plugs (518). Remove springs (517) and balls (516).
3. Remove capscrews (527) and (525) and washers (526) from attachment (left) (523). Remove attachment (left) taking care not to damage pin (529). Separate pin (529), lever (522) and '0' rings (528) from attachment (left). Discard '0' rings.
4. Repeat step 3 for attachment (right) (524).
5. Remove screw (504) from levers (503).
6. Tap out pin (502) and remove levers (503).
7. Remove valve assemblies (509). Remove '0' rings (511) and (505) and protector (506) from valve assemblies. Discard '0' rings.
8. Remove plug (507) or emergency stop valve (508) from pendant handle (514).
9. Remove retainer ring (512) and exhaust washer (513).

Cleaning, Inspection and Repair

Use the following procedures to clean, inspect and repair the components of the hoist and trolley system.

Cleaning

⚠ CAUTION

- **Bearings that are loose, worn or rotate in the housing must be replaced. Failure to observe this precaution will result in additional component damage.**

Clean all hoist component parts in solvent. The use of a stiff bristle brush will facilitate the removal of accumulated dirt and sediments on the gears and frames. Dry each part using low pressure, filtered compressed air.

Inspection

All disassembled parts should be inspected to determine their fitness for continued use. pay particular attention to the following:

1. Inspect all gears for worn, cracked or broken teeth.
2. Inspect all bushings for wear, scoring or galling.
3. Inspect all bearings for play, distorted races, pitting and roller or ball wear or damage. Inspect bearings for freedom of rotation. Replace bearings if rotation is rough or bearings are excessively worn.
4. Inspect shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace the shaft. Inspect all surfaces on which oil seal lips seat. These surfaces must be very smooth to prevent damage to the seal lip.
5. Inspect all threaded items and replace those having damaged threads.
6. Inspect the brake drive plates and friction discs for oil. If the friction discs have become oil-soaked, replace them. If the drive plates have become glazed, sand them lightly using fine emery cloth and a flat surface as backing. Inspect the remaining brake parts for warpage or other damage, and replace damaged parts as necessary.
7. Measure the thickness of the brake friction disc. The brake friction disc must show and even wear pattern. If the brake friction disc is 0.047 inches (1.2 mm) or less, replace discs.
8. Check mufflers for damage or excessive dirt.
9. Check side plates for cracks or bending, replace if one of these conditions is found.

Repair

Actual repairs are limited to the removal of small burrs and other minor surface imperfections from gears and shafts. Use a fine stone or emery cloth for this work. Do not use steel wool.

1. Worn or damaged parts must be replaced. Refer to the Product Parts Information Manual for specific replacement parts information.
2. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition. The cost of the part is often minor in comparison with the cost of redoing the job.
3. Smooth out all nicks, burrs or galled spots on the shafts, bores, pins, or bushings.
4. Examine all gear teeth carefully, and remove nicks or burrs.
5. Polish the edges of all shaft shoulders to remove small nicks which may have been caused during handling.
6. Remove all nicks and burrs caused by lockwashers.
7. Replace all gaskets, oil seals and '0' rings removed during hoist disassembly.

Assembly Instructions

Hoist Motor Assembly

Refer to Dwg. MHP2928.
1. Install '0' rings (514) and bearings (510) in rear end cover (501).
2. Install drive gear (508) and idle gear (509). Immobilize the motor gears with a rod between the teeth and tighten nuts (527).
3. Install and secure cover (503) with capscrews (200).
4. Install bearing (511) in front end cover (504).
5. Clamp bearing (511) with washer (522) and capscrew (521).
6. Install oil seal support (507) with oil seal (512) and '0' ring (515) in front end cover (504). Install ball bearing (511).
7. Secure with retainer ring (526).
8. Align dowel pins (128) and install front end cover (504) on gear housing (502). Secure with capscrews (524).
9. Carefully install assembled gear unit by pushing from the front end cover side. Ensure dowels (128) are aligned.
10. Secure rear end cover (501) to gear housing (502) with capscrews (524). Refer to "TORQUE CHART" on page 15 for torque requirements.
11. Install gear motor assembly in motor housing (130).
12. Secure with lockwashers (34) and capscrews (518).
13. Install '0' rings (516) and tubes (141).
14. Install cover (503) with capscrews (200).
15. Install muffler brackets (131) and manifold (132) on motor housing (130). Secure with lockwashers (34) and capscrews (133) and (134).
16. Install fittings (530) and mufflers (138).

Hoist Brake Assembly

Refer to Dwg. MHP2929.
1. Lubricate and install '0' ring (328) on piston (327).
2. Lubricate and install '0' ring (326).
3. Press piston assembly into brake housing (325).
4. Install bearing (316) on drive shaft (315) and insert in brake housing (314).
5. Install retainer ring (317).
6. Install gear wheel (318) on drive shaft (315) and secure with retainer ring (312).
7. Install six friction discs (320) and seven steel discs (319) in brake housing (314). Begin with a steel disc (319) then alternate friction and steel discs finishing with a steel disc.
8. Install spacer ring (323) and coupling (322).
9. Lubricate and install '0' ring (324) on brake housing (314).
10. Align bolt holes and install brake housing (325) on brake housing (314). Install capscrews (321). Refer to"TORQUE CHART" on page 15 for torque requirements.
11. Ensure pin (303) is installed in ring gear (304).
12. Install pinion (313) and retainer ring (312) on drive shaft (315).
13. Align pin (303) and install ring gear (304) in brake housing (314).
14. Install planet assembly, rotate drive shaft to align gear teeth.
15. Align bolt holes and install brake housing assembly on motor flange (231).
16. Install capscrews (302) to secure brake housing (314). Refer to "TORQUE CHART" on page 15 for torque requirements.
17. Install springs (329) and spacer ring (330) on piston (327).

Hoist Reduction Gear Assembly

Refer to Dwg. MHP2950.
1. Install ring gear flange (339) and retainer ring (340) in ring gear (341).
2. Install ring gear assembly (341) in gear housing (338).
3. Install needle bearings (350), spacer rings (351), thrust needle bearings (347) in planet gears (348).
4. Install planet gear assemblies in planet gear support (345).
5. Install planet axles (349).
6. Install one bearing (344) on each side of planet gear support (345).
7. Install pinion shaft (337) in sub-assembly planetary support.

8. Install ring gear (342) and keys (343) in gear housing (338).
9. Install planet gear assembly in gear housing.
10. Install gear cover (352) and '0' ring.
11. Secure cover with capscrews (354).
12. Install bearing (241) in cover (352).
13. Install motor assembly.

Bottom Block Assembly (50 ton)

Refer to Dwg. MHP2863.
1. Assemble split ring (8) and bearing (9) on clevis (10).
2. Install assembled pieces between lower block halves (5).
3. Ensure split ring and bearing are correctly located in recess of lower block halves and do not restrict halves coming together. Pack cavity with grease. Tap lower block halves together and install studs (19).
4. Install nuts (17) and lockwashers (18) on studs (19). Ensure all nuts have an equal amount of engagement. Refer to "TORQUE CHART" on page 15 for torque requirements.
5. Lubricate and install '0' rings (3) in sprocket (4) '0' ring grooves.
6. Press a bearing (2) onto each end of sprockets (4). Ensure '0' rings (3) remain in place.
7. Install sprocket assemblies in lower block halves (5).
8. Install covers (1) on lower block halves (5).
9. Secure covers with capscrews (15) and lockwashers (14). Refer to "TORQUE CHART" on page 15 for torque requirements.

Bottom Block Assembly (75 ton)

Refer to Dwg. MHP2902.
1. Assemble split ring (8) and bearing (9) on clevis (10).
2. Install assembled pieces between lower block halves (5).
3. Ensure split ring and bearing are correctly located in recess of lower block halves and do not restrict halves coming together. Pack cavity with grease. Tap lower block halves together.
4. Install axles (254). Position locating groove at the top and align with holes for studs. Tap studs (19) through lower block halves.
5. Install nuts (17) and lockwashers (18) on studs (19). Ensure all nuts have an equal amount of engagement. Refer to "TORQUE CHART" on page 15 for torque requirements.
6. Press a bearing (2) into each side of sprockets (4).
7. Install an oil seal (253) in each side of sprockets (4). Position seal lip nearest the bearing.
8. Secure with oil seal supports (252) and capscrews (257).
9. Install sprocket assemblies in lower block halves and secure with stop rings (255), lockwashers (67) and capscrews (256).
10. Install roll pins (251) in covers (1).
11. Install covers (1) on lower block halves (5).
12. Secure covers with capscrews (15) and lockwashers (14). Refer to "TORQUE CHART" on page 15 for torque requirements.
13. Install covers (258) on lower block halves with capscrews (35) and lockwashers (67). Refer to "TORQUE CHART" on page 15 for torque requirements.

Trolley Assembly (50 and 75 ton)

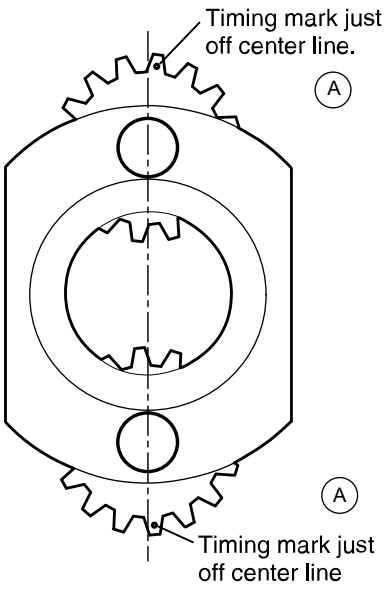
Refer to Dwgs. MHP2862 and MHP2906.

Trolley Wheels
1. Install washers (85) on outside of bearings. Press two bearings (86) into each wheel.
2. Install spacer (89) and secure with retainer ring (90).
3. Press wheel assemblies onto side plate axles.
4. Place spacers (87) on side plate axles and secure with retainer rings (88).
5. Install suspension shaft (83) with spacers and caps (73). Position spacers as noted during disassembly.
6. Secure caps (73) with washers (72) and capscrews (71).

Trolley
1. Insert shafts (79) through one side plate (80) and loosely secure with one nut (17) on the inside and one on the outside.
2. Install one nut on the other end of each shaft (79).
3. Install second side plate and remaining nuts (17).
4. Secure motor assemblies to side plates (80) using capscrews and lockwashers.
5. Install drive gear (205), washer (201) and capscrew (200) on trolley drive shaft (402).

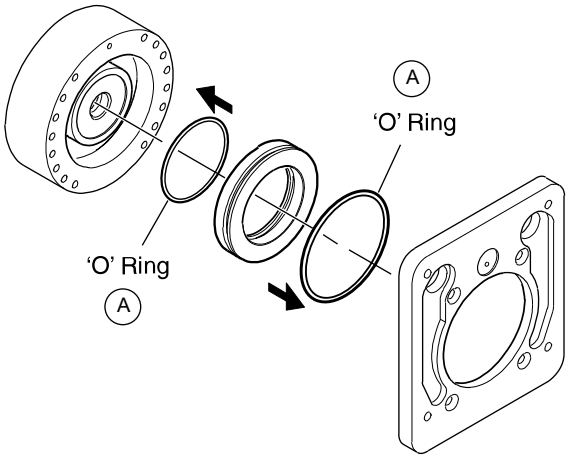
Trolley Reduction Gear Assembly

Refer to Dwg. MHP1543.
1. Install retainer ring (401) on drive shaft (402).
2. Install oil seal (425) in small bore of brake body (427). Lip of seal must be toward pin side of brake body. Install two pins (426) in brake body. Position pins in holes at top and bottom toward the end of the eight drilled port holes.
3. Install bearing (419) in planet support (416) and secure with retainer (421).
4. Install shaft (418) through bearing and tap until seated. Install retainer ring (422).
5. Install two bearings (414) in each planet gear (417) with a spacer (415) between the bearings. Install gears in planet support and locate with planet pins (413). The flats on the planet pins must be located nearest bearing (419).
6. Install oil seal (405) in gear case (406) with lip toward inside of gear case.
7. Install bearing (404) in gear case (406). Install drive shaft (402) through bearing and tap until seated. Turn assembly over and install bearing (409) in gear case.
8. Install ring gear (411) in gear case. Locate ring gear splines on drive shaft.
9. Install planet support assembly in ring gear (411). Position planet gears to obtain correct timing. Refer to Dwg. MHP1560 on page 10.



(Dwg. MHP1560)

10. Install ring gear (424) and verify timing position has been maintained.
11. Install bearing (423) on planet support (416).
12. Install gasket (408), check holes are correctly aligned.
13. Install brake housing (427). Use two loosely installed capscrews (444) to align parts while tapping into position.
14. Install friction disc (428) on splines of shaft (418). Install retainer ring (429).
15. Install '0' ring (432) in bore of coupling (431) in center groove.
16. Lubricate and install '0' rings (434) and (436) on piston (435). Clean excess silicone from the bore of flange and brake housing. Area must be clean prior to installing piston.
17. Install piston. Ensure '0' ring (434) in bore of piston is located toward brake housing. Refer to Dwg. MHP1627 on page 10.



(Dwg. MHP1627)

18. Install pin (438) in brake disc (437) and position brake disc on friction disc (428).
19. Install '0' ring (442) in recess on flange and install bearing (433) in motor housing (331).
20. Place brake springs (439) in motor housing (331) using silicone to hold them in place. DO NOT USE GREASE.
21. Install coupling (431) on shaft.
22. Install '0' ring (441) on mounting flange (443). Apply Silicone AS310 (Silicomet) or equivalent to brake housing face. Install four capscrews (444) using Loctite® 243 on the threads. Refer to "TORQUE CHART" on page 15 for torque requirements.
23. Ensure springs stay in place and pin (438) in brake disc (437) locates in hole in motor housing.
24. Install two mufflers (445) in mounting flange (443).
25. Ensure two '0' rings (442) are installed in motor housing prior to installing motor assembly.
26. Install plugs (407) in gear case (406).

Motor Emergency Stop Valve Assembly

Refer to Dwg. MHP1651.
1. Push spacer (359) into motor cover (325).
2. Install valve cones (356) and (365), seals (357) and washers (361) on both sides of motor cover.
3. Install screw (358) to locate parts installed in step 2 and secure in valve cone (365).
4. Install spring (354).
5. Install '0' ring (353) on cover (352). Assemble cover on motor cover and secure with capscrews (355).
6. Install diaphragm (364). Seat lip in recess.
7. Install cover (363) and secure with capscrews.

Trolley Motor Assembly

Refer to Dwg. MHP1651.
1. Press bearings (305) into motor flange (306).
2. Insert screw (301) through washer (302) and secure bearings.
3. Insert motor gears (312 and 313) into motor flange. Ensure drive gear (313) is in lower position.
4. Immobilize the motor gears with a rod between the teeth and install locknuts (304).
5. Insert 'O' rings (307) into recess in motor flange.
6. Slide motor housing (308) over motor gears, with large slide valve port facing away from motor flange. Press pins (309) into motor housing.
7. Insert slide valves (316) into valve ports followed by springs (317). Slide quad rings (319 and 321) onto slide valve (318), lubricate and insert into valve ports.
8. Press bearings (314) onto motor gears and secure with retainer rings (315).
9. Insert 'O' rings (311) into recesses in motor housing (308).
10. Lubricate stops (322) and insert into recesses in motor cover (325).
11. Place motor cover over motor housing, align pins and press together.
12. Apply Loctite® 243 to screws (328) holding motor cover, insert through cover and secure cover.

Hoist Suspension Assembly (50 and 75 ton)

Refer to Dwgs. MHP2864 and MHP2901.
1. Position trolley assemblies between hoist support frames (23).
2. Position spacers as noted during disassembly.
3. Insert suspension shafts (83) through hoist support frames (23) and trolley side plates (80) and (91). On 75 ton models also install trolley hanger bracket (261).
4. Install spacers (77) and (81) with caps (73) and loosely secure with capscrews (71) and lockwashers (72).
5. Ensure trolley wheel spacing is correctly adjusted. Follow the steps in mounting the trolley in the "INSTALLATION" section in Product Information Manual.
6. Install hose support plate (28), pin(s) (27) and guide roller(s) (22).
7. Secure hose support plate (28) with capscrews (35) and lockwashers (34).
8. Install 'O' rings (13), then press bearings (2) onto sprocket(s) (4) and install assemblies in hoist support frames (23).
9. Install covers (20) on hoist support frames (23) and secure with capscrews (35) and lockwashers (34).
10. Install capscrews (42), washers (41) and guards (21) and (45) on support frames (23).

Hoist Installation

Refer to Dwg. MHP2868.
1. Remove hooks and load chains from hoists.
2. Tag and remove hoses and fittings.
3. Remove capscrews (35), lockwashers (34) and frame (30) from suspension assembly.
4. Remove capscrews (244), washers (245) and guards (243).
5. Support one hoist and remove capscrews (220) and lockwashers (72).
6. Carefully slide hoist sideways to separate output shaft (242) from coupler assembly (236).
7. Set hoist assembly to one side for later disassembly.
8. Repeat process to remove second hoist from suspension frame.

Four Function Pendant Assembly

Refer to Dwgs. MHP1545 with emergency stop or MHP1577 without emergency top.
1. Assemble protectors (506) and 'O' rings (511) and (505) on valves (509).
2. Insert valve (509) assemblies into pendant handle (514) and attachments (right) (524) and (left) (523).
3. Install screws (515) in pendant handle and attachments (right) and (left).
4. Install balls (516), springs (517) and plugs (518) into pendant handle and attachments (right) and (left).
5. Install plug (507) or emergency stop valve (508) into pendant handle.
6. Install fittings (327) into top of pendant handle and attachments (right) and (left). Install lifting eye (501) into top of pendant handle.
7. Facing pendant handle operation side, place levers (503) such that lever direction indicates 'UP' on left hand side and 'DOWN' on right hand side. Install pin (502) ensuring pin inserts through levers and locates on opposite side of pendant handle.
8. Install screw (504) in levers.
9. Lubricate and install 'O' rings (528) in recesses on sides of pendant handle (514).
10. Install attachment (right) (524) and (left) (523) to pendant handle (514) and secure with washers (526) and capscrews (527) and (525). Install shorter screws in back, longer screws in front.
11. Facing pendant handle operation side, place levers (522) such that lever direction indicates 'LEFT' on left hand side and 'RIGHT' on right hand side. Install pins (529) ensuring pins insert through levers and locate on side of pendant handle.
12. Install screw (504) in levers.
13. Install exhaust washer (513) in pendant handle and secure with retainer ring (512).
14. Attach hoses to fittings located on top of pendant handle. Locate hoses to fittings as shown in the "INSTALLATION" section of Product Parts Information Manual.

Testing

Prior to initial use, all extensively repaired hoists shall be load tested by or under the direction of an **Ingersoll Rand** trained technician and a written report furnished confirming the rating of the tested equipment.

Trolley Operational Test

To ensure proper operation of the trolley, mount the system and conduct the following:
1. Verify that pendant to trolley hoses are properly attached and that trolley movement agrees with the pendant lever arrows.
2. Operate trolley **without** a load on the system. Verify trolley operates smoothly along entire length of the beam.
3. Operate trolley **with** a load on the system. Verify trolley operates smoothly along entire length of the beam.

Limit Switches

Operate hoist through three complete cycles to ensure consistent limit switch operation within +/- 2 feet (0.6 m) of set points. Refer to "Limit Switch Adjustment" procedure in Product Information Manual to establish set points.

System Load Test

NOTICE

- **Refer to "SPECIFICATIONS" section in Product Information manual for applicable maximum system load capacity.**

Conduct a load test to 125% of the **rated system capacity**.
Testing to more than 125% may be necessary to comply with standards and regulations set forth in areas outside of the USA.

SERVICE NOTES

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TORQUE CHART

Standard Coarse Thread Torque

Size	SAE Grade 5			SAE Grade 8		
	Dry	Lubricated	PTFE	Dry	Lubricated	PTFE
1/4-20	8-10	6-7	4	12-14	9-10	5-6
5/16-18	17-20	13-15	8-9	25-28	18-21	11-13
3/8-16	31-35	23-26	14-16	44-49	33-37	20-22
7/16-14	49-56	37-42	22-25	70-79	52-59	31-36
1/2-13	75-85	57-64	34-38	106-121	80-90	48-54
9/16-12	109-123	82-92	49-55	154-174	115-130	69-78
5/8-11	150-170	113-128	68-77	212-240	159-180	95-108
3/4-10	267-302	200-227	120-136	376-426	282-320	169-192
7/8-9	429-487	322-365	193-219	606-687	455-515	273-309
1-8	644-729	483-547	290-328	909-1030	681-772	409-463
1 1/8-7	794-900	596-675	357-405	1288-1460	966-1095	580-657
1 1/4-7	1121-1270	840-952	504-571	1817-2059	1363-1545	818-927

Standard Fine Thread Torque

Size	SAE Grade 5			SAE Grade 8		
	Dry	Lubricated	PTFE	Dry	Lubricated	PTFE
1/4-20	10-11	7-8	4-5	14-15	10-12	6-7
5/16-24	19-22	14-16	9-10	27-31	20-23	12-14
3/8-24	35-40	26-30	16-18	49-56	37-42	22-25
7/16-20	55-63	41-47	25-28	78-88	58-66	35-40
1/2-20	85-96	64-72	38-43	120-136	90-102	54-61
9/16-18	121-137	91-103	55-62	171-194	128-146	77-87
5/8-18	170-193	127-144	76-87	240-272	180-204	108-122
3/4-16	297-337	223-253	134-152	420-476	315-357	189-214
7/8-14	474-537	355-403	213-242	669-758	502-568	301-341
1-12	704-798	528-599	317-359	995-1127	746-845	448-507
1 1/8-12	1023-1159	767-869	460-572	1444-1637	1083-1227	650-736
1 1/4-12	1425-1615	1069-1211	641-727	2012-2280	1509-1710	905-1026

Metric Coarse Thread Torque

Size	Class 8.8 / 9.8			Class 10.9		
	Dry	Lubricated	PTFE	Dry	Lubricated	PTFE
M6x1	9-10	6-7	4	11-12	8-9	5-6
M8x1.25	21-23	16-18	9-11	26-30	20-22	12-13
M10x1.5	41-47	31-35	19-21	53-60	39-45	24-27
M12x1.75	71-81	54-61	32-36	91-103	68-77	41-46
M14x2	115-130	86-98	52-59	147-166	110-125	66-75
M16x2	165-187	124-140	74-84	227-257	170-193	102-116
M20x2.5	321-364	241-273	144-164	443-502	332-376	199-226
M22x2.5	439-497	329-373	197-224	605-686	454-514	272-309
M24x3	556-630	417-473	250-284	767-869	575-652	345-391
M30x3.5	1103-1250	827-938	496-563	1521-1724	1141-1293	685-776

Metric Fine Thread Torque

Size	Class 8.8 / 9.8			Class 10.9		
	Dry	Lubricated	PTFE	Dry	Lubricated	PTFE
M8x1	22-25	17-19	10-11	28-32	21-24	13-14
M10x1.25	44-49	33-37	20-22	56-63	42-47	25-28
M12x1.25	78-89	59-67	35-40	100-113	75-85	45-51
M14x1.5	125-141	93-106	56-64	159-180	119-135	72-81
M16x1.5	176-200	132-150	79-90	243-276	183-207	110-124
M18x1.5	257-291	193-219	116-131	355-402	266-302	160-181
M20x1.5	358-406	268-304	161-183	494-559	370-420	222-252
M22x1.5	484-548	363-411	218-247	667-756	500-567	300-340
M24x2	609-690	456-517	274-310	839-951	630-713	378-428
M30x2	1227-1390	920-1043	552-626	1692-1918	1269-1438	761-863

Notes:

1. Definitions:
   DRY: Cadmium plate, zinc plate, and oiled fasteners.
   LUBRICATED: Molysulfide paste, carnaba wax, molysulfide grease and copper-based anti-seize coated fasteners.
   PTFE: 2% minimum PTFE (teflon) coated fasteners.
2. All torque values foot-pounds unless noted.
3. SAE grade 5 equivalent to ASTM A325 Type 2 and ASTM A449.
4. SAE grade 8 equivalent to ASTM A354 Grade BD, ASTM A490 Type 1.
5. If mixing fasteners use lowest torque value.
6. Torque values 75 to 85% of fastener proof load ref.

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