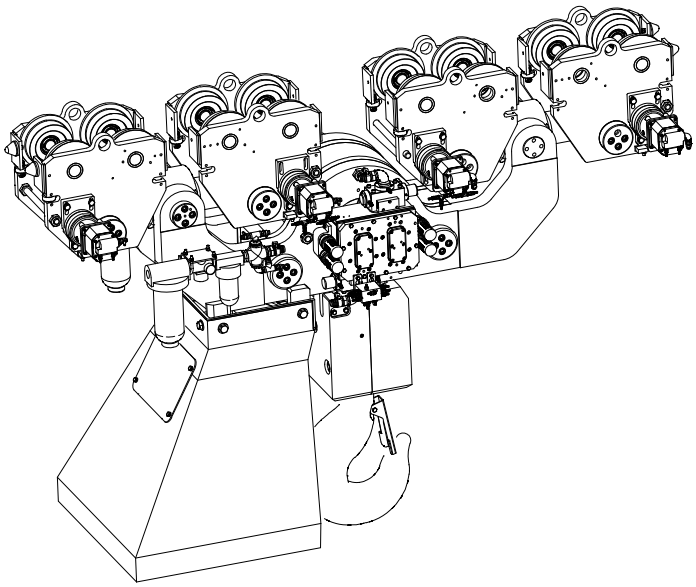
Product Maintenance Information

Air Chain Hoist
Model
LCA750T



(Dwg. MHP2986)

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Ingersoll Rand
Industrial Technologies

Form MHD56416
Edition 2
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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.irtools.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.
The original language of this manual is English.
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	MHD56414
Product Parts Information Manual	MHD56415		

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	60% of Capacity 75% of Times Used	80% of Capacity 75% of Times Used	100% of Capacity 75% of Times Used
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 a basis for continuing evaluation. Inspect all items listed in "Frequent Inspection". Refer to 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 the need, disassemble. 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.

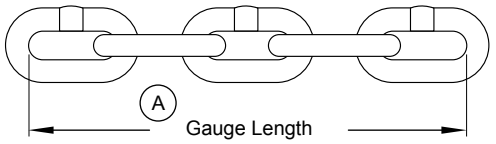
Table 3: Hook Throat Normal and Discarded Width

Hoist Model	Capacity metric tons	Throat Width		Discard Width	
		in.	mm	in.	mm
LCA750T	7.5	5.98	152	6.85	174

4. **Load Chain Sprocket.** 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. **Motor.** 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. **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 5. Check and clean brake parts each time hoist is disassembled. Replace brake discs if grooves are no longer visible.
7. **Supporting Structure.** Check for distortion, wear and continued ability to support a load.
8. **Trolley**. Check that the trolley wheels track beam properly and trolley is correctly adjusted in accordance with manufacturer's literature. 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. **Labels and Tags.** Check for presence and legibility. Replace if necessary.
10. **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.
11. **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 reach or exceed 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
LCA750T	32 x 90	17.72	450	18.03	458



(Dwg. MHP0041)

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

■ 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.

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 service 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 System, 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

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 service 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 System, 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

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 service 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 System, 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

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

Recommend complete general overhaul.

INSPECTION REPORT

Ingersoll Rand LCA750T Liftchain Air Hoist

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 Manual for frequent "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 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					
Hooks			---		
Bottom	Actual Hook Throat Width: _____ inches / _____ mm (Refer to Table 3 for minimum/maximum acceptable widths.)				
	Hook Twist		---		(maximum 10%)
	Hook Crack Test Method Used: Dye Penetrant _____ Magnetic Particle _____ Other: _____				
Hook Latch			---		
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" on page 5.
	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" on page 5.
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" 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" on page 5.
	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 the manufacturer's literature.
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 manufacturer's specifications.

MAINTENANCE

⚠ 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 replacement parts may result in safety hazards, decreased performance and increased maintenance and may invalidate all warranties.**

■ Maintenance

Personnel trained and certified by the owner/user are the only personnel authorized to do repair or maintenance on a hoist. 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 mechanics' and operators be familiar with the servicing procedures of these hoists or similar products, and are physically capable of conducting the procedures. These personnel shall have a general working knowledge that includes:

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 the 'Maintenance Interval Chart' on page 3 for recommended maintenance schedule.

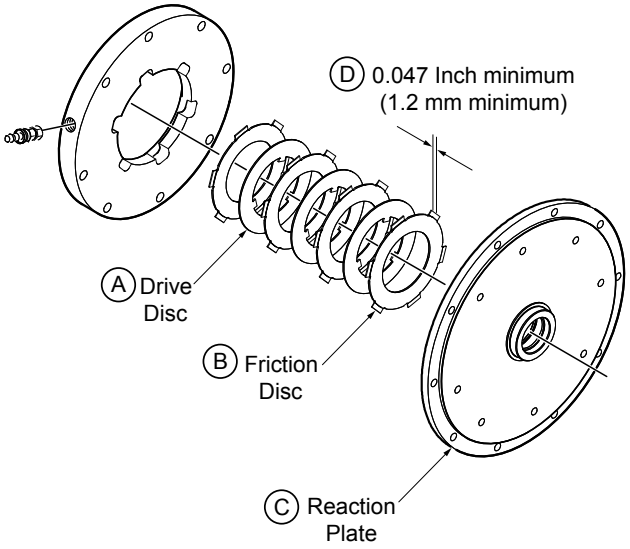
■ Adjustments

■ *Disc Brake*

No brake adjustment is required.
Refer to Dwg. MHP3045 on page 6, **A**. Drive Plate; **B**. Friction Plate; **C**. Reaction Plate; **D**. 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 Removal' on page 7.
2. Remove the brake reaction plate (68), brake friction plate (66), drive plate (67) and brake piston (63).
3. Inspect the brake friction disc (212) for wear. Friction discs (212) have 0.008 in (0.2 mm) deep grooves on each side. Replace the friction discs (212) if grooves are no longer visible.
4. Measure total friction disc (212) and steel disc (213) stack up. Check that measurement is not less than 0.374 in (9.5 mm).
5. Remove, discard and replace 'O' rings (205) and (206) on piston (204).

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).**

■ Disassembly

■ *General Disassembly Instructions*

Refer to the Product Parts Information Manual for item numbers referenced in the "MAINTENANCE" section.

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 hoist 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 hoist be performed in a clean dust free work area.
In the process of disassembling the hoist, observe the following:

1. Never disassemble the hoist 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 hoist is designed to permit easy disassembly and assembly. The use of heat or excessive force should not be required.

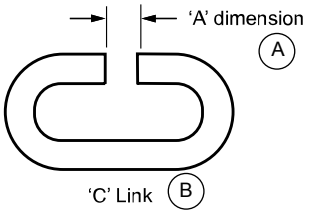
4. Keep the work area as clean as practical, to prevent dirt and other foreign matter from getting into bearings or other moving parts.
5. All seals, gaskets and 'O' rings should be discarded once they have been removed. New seals, gaskets and 'O' rings should be used when assembling the hoist.
6. When 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.

■ *Load Chain Replacement*

Ingersoll Rand chain is chosen according to DIN norm 5684-Grade 80 with the correct dimensions and tolerance to suit the load sprocket.

Table 6: 'C' Link Dimension

Hoist Model	Chain Size	'A' Dimension	
	mm	in.	mm
LCA750T	32 x 90	1.38	35



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■ *Removing Load Chain*

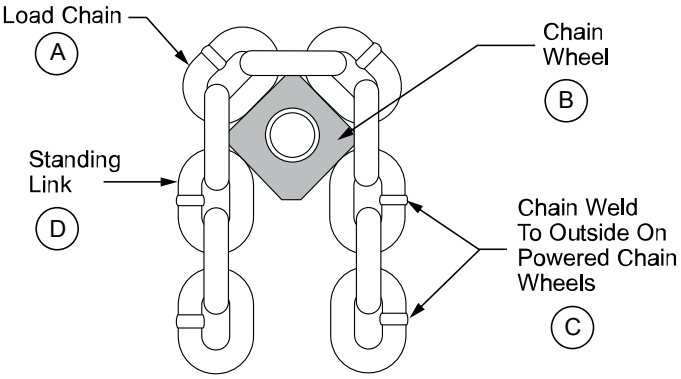
1. Support the hook assembly.
2. Disconnect the load chain end from the hook assembly.
3. Remove nuts (115), lockwashers (154), stop chain axle (491), stop chain (492) and chain stop (490) on load chain (493).
4. Run the hoist in the lifting direction of the free chain fall until the last link is 10 inches (25 cm) from the hoist.

■ *Installing Load Chain*

To feed load chain through bottom hook assembly:
1. Install the 'C' link in the last link of the load chain extending from the hoist (A). Connect the new load chain to the 'C' link. The end link must be a standing link (perpendicular to the axle of hoist sprocket wheels).
2. Run the hoist to feed the chain through the hoist body and down to (B) on the hook block.
3. The rotation axle of the sprocket (376) in hook block assembly must be perpendicular to the rotation axle of hoist sprockets (152) and (157) of the hoist.
4. Introduce the last link of the load chain in the opening to hook block (C). The first link must be put in parallel to the axle. The sprocket of bottom hook assembly and the following standing links must have the welds turned to the outside position with the sprocket. Refer to Dwg. MHP0472 on page 6, **A**. Load Chain; **B**. Chain Wheel; **C**. Chain Weld to Outside on Powered Chain Wheels; **D**. Standing Link.
5. After exiting the hook block at (D), feed the last link of the load chain into opening (E) of the sprocket (152) of the hoist.
6. After exiting the hoist at (F), position the last link of the load chain in the slot (G) in the hook block assembly and attach it with axle (374), plate (263), lockwashers (119) and capscrews (133).

⚠ WARNING

- **The chain must not be twisted.**



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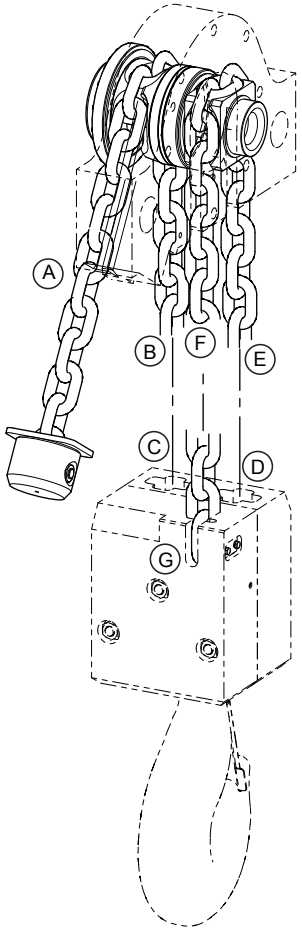

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7. On the free end of the load chain, install the chain stop (490) and stop chain (492) with the stop chain axle (491), lockwashers (154) and nuts (this buffer activates the bottom switch limit).
8. As a minimum attach the buffer to the 9th link from the load chain end.

System Removal

1. Shut off, bleed down air supply then disconnect and tag air lines.
2. Remove beam rail stops.
3. Support hoist and trolley system with adequate lifting system and remove.
4. Remove capscrews (482) and washers (481) securing chain bucket to central chain guides (141) and (142). Refer to Dwg. MHP2977. Remove chain bucket assembly.
5. Prior to removing hoist brake, reduction gear or motor assemblies, remove hook and load chain from hoist.

Hoist Brake and Reduction Gear Removal

Refer to Dwgs. MHP2971 and MHP2972.
1. Remove nuts (115), lockwashers (154) from screw rods (153).
2. Support brake and reduction gear assembly, and carefully pull assembly from central chain guide (141).
3. Set brake and reduction gear assembly to one side for later disassembly.
4. Remove 'O' rings (261) and (262).

Hoist Motor Removal

Refer to Dwgs. MHP2971 and MHP2973.
1. Remove capscrews (406) from motor flange (403).
2. Support motor assembly (400), and carefully pull assembly from central chain guide (142).
3. Set motor assembly to one side for later disassembly.

Hoist Brake Removal

Refer to Dwg. MHP2972.
1. Remove capscrews (201) from cover (202).
2. Carefully pull brake assembly (199) from brake cover (219).
3. Set brake assembly (199) to one side for later disassembly.

Hoist Reduction Gear Disassembly

Refer to Dwg. MHP2972.
1. Remove retainer ring (214) from pinion shaft (237) and pull out disc hub (211).
2. Remove retainer ring (216) from brake side.
3. Carefully tap on motor end of pinion shaft (237) until it can be removed from brake cover (219).
4. Remove the ten capscrews (218) and carefully remove brake cover (219).
5. Remove ring gear (225) from reduction gear housing (241) and keys (224).
6. Using the two puller screw holes M8 provided in the planetary gear support (236), pull planetary support assembly from reduction gear housing (241).
7. To disassemble planetary assembly, remove bearings (221), push out planet axles (235) and remove planet gears (234), thrust rings (230), spacers (233) and bearings (229) and (232).
8. Remove ring gear (228).
9. Remove capscrews (242).
10. Separate gear flange (260) and reduction gear housing (241) from ring gear (254).
11. Pull planetary support assembly from sun gear (238).

NOTICE

- **If sun gear is difficult to move, gently tap it to loosen.**

12. To disassemble planetary assembly, remove bearing (253), drive pins (243) completely through to the inside of the planetary support (249). Push out planet axles (244) and remove planet gears (247), thrust rings (245) and bearings (246).
13. Tap pins (243) out of planet axles (244).
14. Remove spacer (252) and retainer rings (240) and (251).
15. Tap sun gear (238) from reduction gear housing (241) and extract bearing (239).

Hoist Brake Disassembly

Refer to Dwg. MHP2972.
1. Remove capscrews (201) from cover (202). Separate brake assembly from brake cover (219).
2. Remove friction disc housing (208), friction discs (212) and steel discs (213).
3. Remove brake housing (207) and brake springs (203) from cover (202).
4. Tap piston (204) from brake housing (207).
5. Remove 'O' rings (205) and (206) from piston (204).

Hoist Motor Disassembly

Refer to Dwg. MHP2973.
1. Remove capscrews (427), muffler brackets (428), reducer fittings (432) and mufflers (431) from motor housing (429).
2. Remove capscrews (555) and lockwashers (440) from control valve assembles (450). Remove control valve assemblies (450), tubes (425) and 'O' rings (426).
3. Remove capscrews (266) and covers (446) from motor flange (439).
4. Remove capscrews (441) and lockwashers (440) from motor flange (439).
5. Carefully remove the gear motor assembly from motor housing (429).
6. Remove capscrews (406) from inside of motor housing (429).
7. Carefully remove the gear unit by prying motor flange assembly from motor housing (429).
8. Remove capscrews (421) on front end covers (422).
9. Remove front end covers (422) and motor housings (424) from motor flange (439).
10. Remove retainer rings (412).
11. Remove assembled oil seal supports (417) from motor housing (429).
12. Remove capscrews (415) and washers (178).
13. Remove bearings (419).
14. Remove nuts (443) and 'O' rings (444). Extract motor drive gears (436) and motor idle gears (435).
15. Remove bearings (442).
16. Remove motor shaft (407) from motor flange (403).
17. Remove external gears (411).
18. Remove retainer ring (409) and bearing (408) from motor shaft (407).

Bottom Hook Disassembly

Refer to Dwg. MHP2975.
1. Remove capscrews (133), lockwashers (119), locking plate (263) and axle (374) from hook block (380).
2. Remove nuts (115) and lockwashers (154) from threaded rods (375).
3. Carefully pry hook block halves (380) and (381) apart.
4. Remove sprocket (376) with bearings (149) and seal rings (150).
5. Remove hook (382) or clevis (385), thrust bearing (378) and split ring (377).
6. Remove bearings (149) and seal rings (150) from sprockets only if they require replacement or cleaning.

Hoist Suspension Disassembly

Refer to Dwgs. MHP2970 and MHP2971.
1. Remove load chain, limit switch assemblies (168), hoist brake and reduction assembly and motor assembly.
2. Remove capscrews (106), lockwashers (105) and caps (113) from shafts (139).
3. Tap out shafts (139) and remove suspension assembly and spacers (137) from trolley assemblies.
4. Remove nuts (115) and lockwashers (154) from screw rods (153).
5. Pry reduction gear flange (260) from central chain guide (141).
6. Remove capscrews (106), lockwashers (105) and caps (156) from the central chain guide (141).
7. Remove central chain guide (141), chain guide (143) and chain guide stop (146).
8. Remove sprocket (157) with bearings (158) and (161).
9. Remove screw rods (153).
10. Remove chain guide housing (151), chain guide (144) and sprocket (152) with bearings (149).

Trolley Disassembly

Refer to Dwg. MHP2970.
1. Remove capscrew (133), lockwasher (119), washer (135) and drive gear (136) from trolley drive assembly.
2. Remove trolley drive assembly from side plates (102) and (103).
3. Remove capscrews (106), lockwashers (105) and suspension shaft caps (123) from side plates (102) and (103).
4. Remove nuts (115) from screw rods (116). Remove screw rods (116).
5. Remove side plates (102) and (103) from supports (111).
6. Remove remaining capscrews (106), lockwashers (105) and suspension shaft caps (123) from outside of side plates (101) and (104).
7. Note position and quantity of spacers then remove spacers (137).
8. Remove side plates (101) and (104) from supports (111).
9. Remove capscrews (114), lockwashers (105) and caps (113) from trolley axle (107).

10. Remove supports (111) from trolley axle (107).
11. Remove sleeves (109) from trolley axle (107).
12. Do not remove bushings (110) from trolley axle (107) or support (111) unless replacement is required.

Trolley Wheel Disassembly

1. Remove retainer ring (126) and pull wheel assembly from trolley side plate axle.
2. Remove retainer ring (125).
3. Remove spacer (127), seal ring (128) and spacer (129).
4. Remove roller bearings (130) and seal ring (128).

Trolley Motor Disassembly

Refer to Dwg. MHP1651.
1. Remove capscrews (333) and washers (332) to separate motor from trolley reduction gear assembly.
2. Remove capscrews (328) in motor cover (325) and separate from motor housing (331).

NOTICE

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

3. Remove and discard '0' ring (336).
4. Remove capscrews (303) and separate motor housing (308) and motor cover (325).
5. Discard '0' rings (307) and (311).
6. Remove retainer rings (315) and bearings (314).
7. Remove stop (322), slide valve (318), quad rings (319) and (321), springs (317) and slide valve (316). Discard quad rings.
8. Immobilize the motor gears with a rod between the teeth and remove locknuts (304).
9. Slide gears out of motor housing (308).
10. 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. MHP2978.
1. Remove capscrew (133) washer (119) and washer (135) from planet support (655).
2. Remove gear (136) and key (656).
3. Remove capscrews (270) and washers (271) from flange (651).
4. Remove plugs (176) from gear housing (668). Drain oil into a suitable container and dispose of it in an environmentally friendly manner.
5. Carefully remove four capscrews (682) and motor flange (681) from gear housing (668). Loosen capscrews (682) half a turn at a time until spring compression is released. Flange was assembled with Loctite® and may be difficult to remove.
6. Remove '0' ring (690) and discard.
7. Remove two mufflers (680) from flange (681).
8. Remove springs (701).
9. Remove coupling (699) and sleeve (700) from shaft spindle (678) and '0' ring (698) from groove in coupling bore.
10. Remove brake discs (695) and (694).
11. Apply low pressure air to brake port in brake housing (689) to remove piston (692).
12. Remove '0' rings (691) and (693) from piston (692).
13. Remove brake housing (689) and gasket (667) from gear housing (668).
14. Remove planet support (673), bearing (685) and ring gear (686).
15. Remove retainer ring (683) and bearing (679) from shaft spindle (678).
16. Remove ring gear (670) from gear housing (668).
17. Remove retainer ring (672). Tap drive shaft (663) from bearing (671). Remove bearing (405) from gear housing (668). Tap out bearing (665).
18. Remove bearing (685). Tap out planet pins (677). Remove two bearings (674) and single spacer (675) from each planet gear (676).
19. Remove retainer ring (664).
20. Tap shaft (663) out of bearing (665).
21. Remove capscrews (650) and separate flange (651), ring gear (654) from gear housing (668).
22. Tap planet support (655) from flange (651).
23. Remove bearing (130).
24. Drive pins (662) completely into planet pins (657) then tap planet pins out of planet support (655).
25. Remove planet gears (661), thrust bearings (659) and washers (658).
26. Remove bearing (130) and oil seal (652) from flange (651).

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.**

Inspection

All disassembled parts should be inspected to determine their fitness for continued use. Pay particular attention to the following:
1. Check mufflers for damage or excessive dirt.
2. Check side plates for cracks or bending, replace if one of these conditions is found.
3. Inspect all gears for worn, cracked or broken teeth.
4. Inspect all bushings for wear, scoring or galling.
5. 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.
6. 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.
7. Inspect all threaded items and replace those having damaged threads.
8. 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.
9. 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.

Repair

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.
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 applicable Parts Listing 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. MHP2973.
1. Install bearing (408) and retainer ring (409) on motor shaft (407).
2. Install assembled motor shaft in motor flange (403) and secure with retainer ring (410).
3. Install bearings (405) and external gears (411) in motor flange (403).
4. Install '0' rings (444) and bearings (442) in motor flange (439).
5. Install motor drive gears (436) and motor idle gears (435) in motor flange (439). Secure with nuts (443).
6. Install pins (404) in motor housings (424) if removed during disassembly.
7. Align pin holes and install motor housings (424) on motor flange (439). Secure with capscrews (421).
8. Install bearings (419) in front end covers (422).
9. Clamp bearings (419) with washers (178) and capscrews (415).
10. Install oil seals (220) and '0' rings (416) in oil seal supports (417).
11. Install assembled oil seal supports (417) in motor housing (429).
12. Align dowel pins (404) and install front end covers (422) on gear housings (424). Secure with capscrews (421).
13. Carefully install assembled gear unit in motor housing (429) by pushing from the motor flange side.
14. Secure gear unit to motor housing (429) with lockwashers (440) and capscrews (441). Refer to 'Torque Chart' on page 12 for torque requirements.
15. Install '0' rings (426), tubes (425) and control valve assemblies (450) on motor housing (429) with lockwashers (440) and capscrews (555).
16. Install covers (446) with capscrews (266).
17. Install muffler brackets (428) on motor housing (429). Secure with capscrews (427).
18. Install reducer fittings (432) and mufflers (431) in muffler brackets (428).

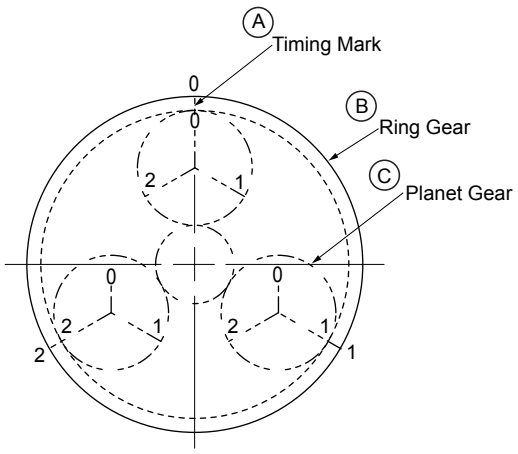
Hoist Brake Assembly

Refer to Dwg. MHP2972.
1. Lubricate and install '0' rings (205) and (206) on piston (204).

2. Press piston assembly into brake housing (207).
3. Install capscrews (201) in cover (202) and set on workbench with capscrew heads down.
4. Grease and insert springs (203) in piston (204).
5. Install brake housing (207) assembly on cover (202) and capscrews (201).
6. Install friction disc housing (208) on capscrews (201).
7. Install bearing (217) and retainer ring (216) in brake cover (219).
8. Install oil seal (220) in brake cover (219) with lip toward the reduction gear end.
9. Install pinion shaft (237) through brake cover (219).
10. Install disc hub (211) on pinion shaft (237) and secure with retainer ring (214).
11. Install four friction discs (212) and three steel discs (213) on disc hub (211). Alternate friction and steel discs beginning and ending with a friction disc.
12. Carefully install assembled brake cover (219) on friction disc housing (208). Ensure tabs on friction discs (212) align with slots in disc housing (208).
13. Align capscrews (201) with capscrews holes in brake cover (219). Alternating on a crossing pattern, tighten capscrews (201) half a turn at a time until tight. Refer to "TORQUE CHART" on page 12 for torque requirements.

Hoist Reduction Gear Assembly

Refer to Dwg. MHP2972.
1. Install bearing (239) on sun gear (238) and secure with retainer ring (251).
2. Install retainer ring (240) and sun gear assembly in reduction gear housing (241).
3. Assemble planetary assembly if previously disassembled.
   a. Install retainer ring (248) in planet gear (247).
   b. Press a bearing (246) into each side of the planet gear (247).
   c. Install a thrust ring (245) on each side of the planet gear (247).
   d. Position assembled planet gear in planetary gear support (249) and install planet axle (244). Align pin hole in planet axle (244) with hole in planetary gear support (249).
   e. Tap pin (243) into planetary gear support (249) to anchor planet axle (244).
4. Install planetary gear support assembly on sun gear (238).
5. Install oil seal (259) in gear flange (260). Seal lip toward ring gear (254).
6. Install ring gear (254) and gear flange (260) on reduction gear housing (241). Apply Loctite® 586 between contact surfaces.
7. Install capscrews (242) and tighten. Apply Loctite® 243 to capscrew threads. Refer to "TORQUE CHART" on page 12 for torque requirements.
8. Assemble planetary assembly if previously disassembled.
   a. Install spacer (233), bearings (232), thrust rings (230) and bearings (229) in planet gear (234).
   b. Position assembled planet gear in planetary support (236) and install planet axle (235). Align flats on planet axles (235) toward center of planetary support (236).
   c. Install bearings (221).
9. Install retainer ring (227) in ring gear (228).
10. Install ring gear (228) and planetary assembly in reduction gear housing (241). Time planetary gears with ring gear, as shown in Dwg. MHP3020 on page 9, **A**. Timing Mark; **B**. Ring Gear; **C**. Planet Gear. Using a separate ring gear tool to maintain gear position during installation of planetary assembly is helpful.



(Dwg. MHP3020)

11. Install keys (224) in ring gear (225) and install in reduction gear housing (241).
12. Install oil seal (220) in brake cover (219).
13. Install brake cover (219) on reduction gear housing (241) using Loctite® 586 between contact surfaces. Secure with capscrews (218). Apply Loctite® 243 to capscrew threads. Refer to "TORQUE CHART" on page 12 for torque requirements.
14. Install plugs (222) and washers (223).
15. Carefully install pinion shaft (237) through brake cover (219).

Bottom Hook Assembly

Refer to Dwg. MHP2975.
1. Install rings (150) on sprocket (376).
2. Press a bearing (149) onto each end of sprocket (376).
3. Install sprocket assembly between hook block halves (380) and (381).
4. Assemble split ring (377) and thrust bearing (378) on hook (382) or clevis (385).
5. Install assembled pieces between hook block halves (380) and (381).
6. Ensure split ring and bearing are correctly located in recess of hook block halves and do not restrict halves coming together. Pack cavity with grease. Tap hook block halves together and install threaded rods (375).
7. Install nuts (115) and lockwashers (154) on threaded rods (375). Ensure all nuts have an equal amount of engagement. Refer to "TORQUE CHART" on page 12 for torque requirements.
8. Install axle (374) in hook block half (380).
9. Install plate (263) with capscrews (133) and lockwashers (119). Refer to "TORQUE CHART" on page 12 for torque requirements.
10. Check hook or clevis swivels freely in hook assembly (370).

Trolley Assembly

Refer to Dwgs. MHP2970 and MHP2978.

Trolley Wheels
1. Install seal ring (128) in trolley wheel (124) bore.
2. Press two bearings (130) into each wheel. The shoulders on the bearings inner races must face each other.
3. Install spacer (129) followed by seal ring (128) on the outside of bearings. Install retainer ring (125) to secure parts.
4. Press wheel assemblies onto side plate axles.
5. Secure trolley wheels on side plate axles with spacers (127) and retainer rings (126).

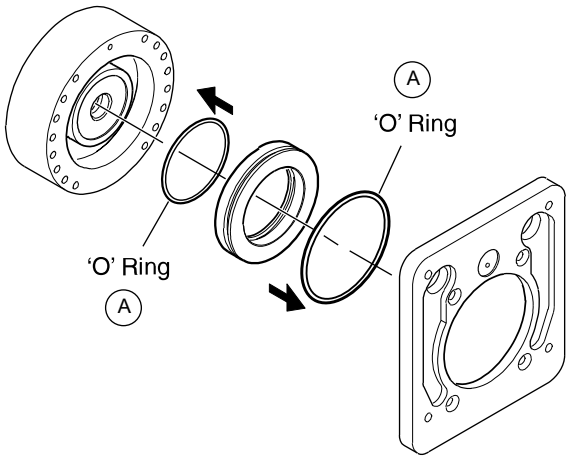
Trolley
1. Ensure bushings (110) are installed in support (111) and trolley axle (107).
2. Install sleeves (109) on trolley axle (107).
3. Install supports (111) on trolley axles (107).
4. Install caps (113) on ends of trolley axle (107). Secure caps in place with capscrews (114) and lockwashers (105).
5. Install spacers (112) on supports (111). Spacers must be equally distributed on both sides. Ensure trolley wheel spacing is correctly adjusted. Follow the steps in mounting the trolley in the "INSTALLATION" section in Product Information Manual.
6. Install side plates (101) and (104) on the same side.
7. Loosely install spacers (112), caps (123), lockwashers (105) and capscrews (106) on the ends of supports (111).
8. Insert screw rods (116) through one side plate and loosely secure with one nut (115) on the inside and one on the outside.
9. Install one nut (115) on the other end of each screw rod (116).
10. Repeat steps 6 and 7 for remaining side plates (102) and (103) on opposite side.
11. Install remaining nuts (115) on screw rods (116). Tighten nuts (115) and capscrews (106). Refer to "TORQUE CHART" on page 12 for torque requirements.
12. If removed, install roller axles (122) and rollers (120) on side plates with capscrews (121).
13. Mount trolley reduction gear assembly to side plates (102) and (103).
14. Secure trolley reduction gear assemblies to side plates using capscrews (270) and lockwashers (271).
15. Install pinion (136), key (656), washer (135), lockwasher (119) and capscrew (133) on planet support (655).

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. Install and tighten locknuts (304).
5. Insert 'O' rings (307) into recess in motor flange (306).
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.

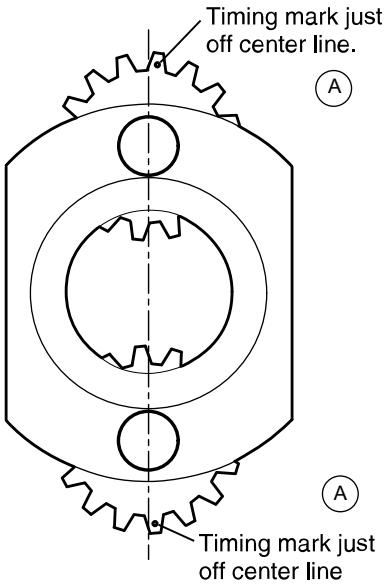
Trolley Reduction Gear Assembly

Refer to Dwg. MHP2978.
1. Install oil seal (652) and bearing (130) in flange (651). Lip of seal must be toward planetary gear side.
2. Assemble planetary assembly if previously disassembled.
   a. Install bearing (660) in planet gear (661).
   b. Install a thrust bearing (659) and washer (658) on either side of planet gear (661).
   c. Install assembled planet gear in planet support (655).
   d. Install planet pin (657) in planet support (655). Align pin hole with hole in planet support.
   e. Tap pin (662) into planet support to secure planet pin.
3. Install bearing (130) on planet support (655).
4. Install planet support (655) in flange (651).
5. Install bearings (665) and (405) in gear housing (668).
6. Install drive shaft (663) and retainer ring (664).
7. Install ring gear (654) and gear housing (668) on flange (651) and secure with capscrews (650). Apply Loctite® 243 to capscrew threads. Refer to'Torque Chart' on page 12 for torque requirements.
8. Assemble planetary assembly if previously disassembled.
   a. Install spacer (675) with a bearing (674) on either side into planet gear (676).
   b. Install assembled planet gear in planet carrier (673).
   c. Install planet pin (677).
9. Install planet support assembly in ring gear (670). Position planet gears to obtain correct timing. Refer to Dwg. MHP1560 on page 10, **A**. Timing mark just off center line; **B**. Timing mark just off center line.
10. Install ring gear (670) assembly in gear housing (668). Verify timing position has been maintained.
11. Install bearing (679) and retainer ring (683) on sun gear shaft (678).
12. Install ring gear (686), bearing (685) and planet support (673).
13. Install gasket (667) and brake housing (689) on gear housing (668). Check holes are correctly aligned.
14. Lubricate and install 'O' rings (691) and (693) on piston (692). Clean excess silicone from piston (692) and bore of brake housing (689). Area must be clean prior to installing piston (692).
15. Install piston (692) in brake housing (689). Ensure 'O' ring in bore of piston is located toward brake housing. Refer to Dwg. MHP1627 on page 10, **A**. 'O' Ring.



(Dwg. MHP1627)

16. Install brake disc (694) on shaft spindle (678).
17. Install pin (696) in brake disc (695) and position brake disc (695) on brake disc (694).
18. Install 'O' ring (698) in bore of coupling (699) in center groove.
19. Install coupling (699) and sleeve (700) on shaft spindle (678).
20. Install two mufflers (680) in motor flange (681).
21. Place four brake springs (701) in motor housing (331) using silicone to hold them in place. DO NOT USE GREASE.
22. Lubricate and install 'O' ring (690) in recess on brake housing (689). Apply Silicone AS310 (Silicomet) or equivalent to brake housing face.
23. Install motor flange (681) on gear housing (668) and secure with capscrews (682) using Loctite® 243 on the threads. Refer to "TORQUE CHART" on page 12 for torque requirements.
24. Apply Loctite® 574 to surface between motor flange (681) and motor housing (331).
25. Ensure 'O' ring is installed in motor flange (681) prior to installing motor assembly (300).
26. Install motor assembly (300) on motor flange ensuring springs stay in place and pin (696), in brake disc (695), locates in hole in motor housing. Secure motor assembly with four lockwashers (332) and capscrews (333). Tighten capscrews (333) half a turn at a time to evenly compress brake springs (701). Refer to "TORQUE CHART" on page 12 for torque requirements.
27. Install plugs (176) in gear housing (668).
28. Install reduction gear assembly on trolley side plate with capscrews (270) and washers (271).
29. Install drive gear (136) with key (656) on planet support (655).
30. Install washer (135), washer (119) and capscrew (133) to secure drive gear (136).



(Dwg. MHP1560)

Hoist Suspension Assembly

Refer to Dwgs. MHP2970 and MHP2971.
1. Install a seal ring (150) and bearing (149) on each end of sprocket (152).
2. Position sprocket assembly in chain guide housing (151).
3. Install chain guide stop (146). Align pin holes and tap pins (147) into position until flush with chain guide stop (146).
4. Install chain guides (143) and (144) on either side of chain guide housing using connecting pins (145) for alignment.
5. Install seal rings (159) and (160), and bearings (158) and (161) on driving sprocket (157).
6. Install central chain guide (141), seal bearing (162) and assembled driving sprocket to chain guide (143) and chain guide stop (146).
7. Install caps (156), lockwashers (105) and capscrews (106) on connecting pins (145).
8. Install cover (260) on central chain guide (141).
9. Install central chain guide (142) and seal bearing (162) on chain guide (144).
10. Install remaining caps (156), lockwashers (105) and capscrews (106) on connecting pins (145).
11. Install screw rods (153), lockwashers (154) and nuts (115).
12. Insert suspension shafts (139) through central chain guides (141) and (142) and trolley assemblies.
13. Install caps (113) and loosely secure with capscrews (106) and lockwashers (105) on shafts (139).
14. Install limit switch assemblies (168).

Hoist Brake Installation

Refer to Dwg. MHP2972.
1. Position brake assembly (199) on brake cover (219).
2. Secure brake assembly with capscrews (201). Refer to 'Torque Chart' on page 12 for torque requirements.

Hoist Motor Installation

Refer to Dwgs. MHP2971 and MHP2973.
1. Carefully support motor assembly and position on central chain guide (142). Align capscrew holes.
2. Secure motor with capscrews (406). Refer to "TORQUE CHART" on page 12 for torque requirements.

Hoist Brake and Reduction Gear Installation

Refer to Dwgs. MHP2971 and MHP2972.
1. Lubricate and install 'O' rings (261) and (262).
2. Carefully support brake and reduction gear assembly and locate on screw rods (153).
3. Secure brake and reduction gear assembly with lockwashers (154) and nuts (115). Refer to "TORQUE CHART" on page 12 for torque requirements.

System Installation

1. Install hook and load chain on hoist.
2. Connect air lines, hoses and fittings.
3. Support hoist and trolley system with an adequate lifting system and install on the end of support beam.
4. Carefully roll system onto beam and install beam rail stops.
5. Install chain bucket assembly on central chain guides (141) and (142). Refer to Dwg. MHP2977. Secure with washers (481) and capscrews (482).
6. Repeat process to install second system.

Four Function Pendant Assembly

Refer to Dwg. MHP1545 with emergency stop or MHP1577 without emergency stop.
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 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.

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.

SERVICE NOTES

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