

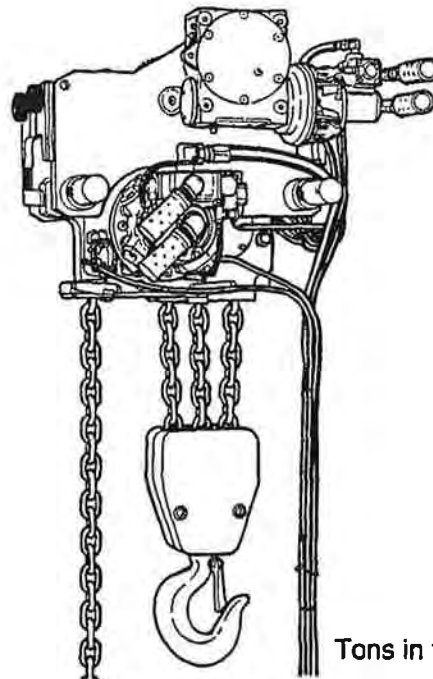
PARTS, OPERATION AND MAINTENANCE MANUAL for **Hercu-Link™ AIR HOIST** MODELS

HA1-005
5 ton

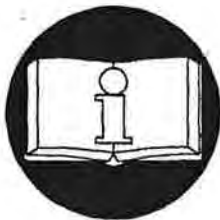
HA1-010
10 ton

HA1-015
15 ton

HA1-020
20 ton



Tons in this manual are metric tons (2,200 lbs.)



READ THIS MANUAL BEFORE USING THESE HOISTS. This manual contains important safety, installation, operation and maintenance information. Make this manual available to all persons responsible for the operation, installation and maintenance of these products.

⚠ WARNING

Do not use this hoist for lifting, supporting or transporting people or lifting or supporting loads over people.

Always operate, inspect and maintain this hoist in accordance with American National Standards Institute Safety Code (ASME B30.16) and any other applicable safety codes and regulations.

Refer all communications to the nearest Ingersoll-Rand Material Handling Products Office or Distributor.

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INGERSOLL-RAND®
MATERIAL HANDLING

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SAFETY INFORMATION

This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read and understand this manual before operating the product.

Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures which, if not followed, may result in an injury. The following signal words are used to identify the level of potential hazard.

⚠ DANGER Danger is used to indicate the presence of a hazard which *will* cause *severe* injury, death, or substantial property damage if the warning is ignored.

⚠ WARNING Warning is used to indicate the presence of a hazard which *can* cause *severe* injury, death, or substantial property damage if the warning is ignored.

⚠ CAUTION Caution is used to indicate the presence of a hazard which *will* or *can* cause *minor* injury or property damage if the warning is ignored.

NOTICE Notice is used to notify people of installation, operation, or maintenance information which is important but not hazard-related.

Safety Summary

⚠ WARNING

- Do not use this hoist for lifting, supporting, or transporting people or lifting or supporting loads over people.
- Air powered hoists are designed to provide a 5 to 1 safety factor and are factory tested to 125% of the rated load. The supporting structures and load-attaching devices used in conjunction with this hoist must provide adequate support to handle all hoist operations plus the weight of the hoist and attached equipment. This is the customer's responsibility. If in doubt, consult a registered structural engineer.

NOTICE

- Lifting equipment is subject to different regulations in each country. These regulations may not be specified in this manual.

The National Safety Council, Accident Prevention Manual for Industrial Operations, Eighth Edition and other recognized safety sources make a common point: Employees who work near cranes or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount: conduct all lifting operations in such a manner that if there were an equipment failure, no personnel would be injured. This means keep out from under a raised load and keep out of the line of force of any load.

Ingersoll-Rand Material Handling hoists are manufactured in accordance with the latest ASME B30.16 standards.

The Occupational Safety and Health Act of 1970 generally places the burden of compliance with the owner/employer, not the manufacturer. Many OSHA requirements are not concerned or connected with the manufactured product but are, rather, connected with the final installation. It is the owner's responsibility and user's responsibility to determine the suitability of a product for any particular use. It is recommended that all applicable industry, trade association, federal, state and local regulations be checked. Read all operating instructions and warnings before operation.

Rigging: It is the responsibility of the operator to exercise caution, use common sense and be familiar with proper rigging techniques. See ASME B30.9 for rigging information, American National Standards Institute, 1430 Broadway, New York, NY 10018.

This manual has been produced by **Ingersoll-Rand** to provide dealers, mechanics, operators and company personnel with the information required to install, operate, maintain and repair the products described herein.

It is extremely important that mechanics and operators be familiar with the servicing procedures of these products, or like 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 can not know of, nor 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.

SAFE OPERATING INSTRUCTIONS

The following warnings and operating instructions have been adapted in part from American National (Safety) Standard ASME B30.16 and are intended to avoid unsafe operating practices which might lead to injury or property damage.

An operator should be physically competent. The operator should have no health condition which might affect his ability to react, and he should understand the operation of the hoist, including reading the manufacturer's literature. The operator should have a working knowledge of hitching loads. The operator should have a good attitude regarding safety and should refuse to operate the hoist under unsafe conditions.

Ingersoll-Rand recognizes that most companies who use hoists have a safety program in force at their facility. If you are aware that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

Safe Operating Instructions are provided to make an operator aware of dangerous practices to avoid and are not necessarily limited to the following list. Refer to specific sections in the manual for additional safety information.

1. Only allow personnel trained in, safety and operation on this product to operate and maintain the hoist.
2. Only operate a hoist if you are physically fit to do so.
3. When a "DO NOT OPERATE" sign is placed on the hoist controls, do not operate the hoist until the sign has been removed by designated personnel.
4. Before each shift, the operator should check the hoist for wear or damage.
5. Never use a hoist which inspection indicates is worn or damaged.
6. Do not use hoist if hook latch on a hook has been sprung or broken.
7. Check that the hook latches are engaged before using.
8. Never splice a hoist chain by inserting a bolt between links.
9. Only lift loads less than or equal to the rated capacity of the hoist. See warning labels attached to the hoist.
10. When using two hoists to suspend one load, select two hoists each having a rated capacity equal to or more than the load. This provides adequate safety in the event of a sudden load shift.
11. Never place your hand inside the throat area of a hook.
12. Never use the hoist chain as a sling.
13. Only operate a hoist when the load chain is centered over the hook. Do not "side pull" or "yard".
14. Never operate a hoist with twisted, kinked, "capsized" or damaged load chain.
15. Do not force a chain or hook into place by hammering.
16. Never insert the point of the hook into a chain link.
17. Be certain the load is properly seated in the saddle of the hook.
18. Do not support the load on the tip of the hook.
19. Never run the load chain over a sharp edge. Use a sheave.
20. Pay attention to the load at all times when operating the hoist.
21. Make sure all people are clear of the load path. Do not lift a load over people.
22. Never use the hoist for lifting or lowering people, and never allow anyone to stand on a suspended load.
23. Ease the slack out of the chain and sling when starting a lift. Do not jerk the load.
24. Do not swing a suspended load.
25. Never suspend a load for an extended period of time.
26. Never leave a suspended load unattended.
27. Never weld or cut a load suspended by the hoist.
28. Never use the hoist chain as a welding electrode.
29. Do not operate hoist if chain jumping, excessive noise, jamming, overloading, or binding occurs.
30. Keep the load from hitting the load chain.
31. Do not use the up and down emergency stop limit protection as a normal means of stopping the hoist.
32. Avoid unnecessary jogging of hoist and/or trolley controls.
33. Always rig the hoist properly and carefully.
34. Shut off air supply before performing any maintenance.
35. Avoid collision or bumping of hoist.
36. After use, properly secure hoist and all loads.

WARNING LABELS AND TAGS

Each hoist is supplied from the factory with the warning tags and labels shown. If the tags or labels are not attached to your hoist, order new tags or labels and install them. See Labels and Tags parts list in parts section. Read and obey all warnings and other safety information attached to this hoist. Tags and labels may not be shown actual size.



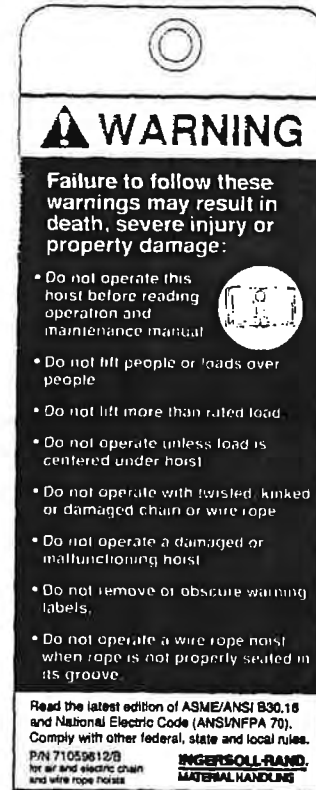
Tag part number 71042121/B is attached to the inlet air supply components.



Tag part number 71042147/A is attached to the lubricator in the inlet air supply line.



Tag part number 71107155 is attached to the power head reduction gear assembly fill plug.



Tag part number 71059612/B is attached to the pendant assembly.



Tag part number 71107148 is attached to the power head reduction gear assembly.



Label part number 71107130/A is attached to the inlet air supply components.

SPECIFICATIONS

Description of Hoist Operation

The HA1 air powered hoist primarily consists of a power head assembly which acts as the control for the lower hook block movement. The power head assembly is made up of three main sections. They are the motor and first gear reducer section, the brake and second gear reducer section and the sheave section.

The output shaft from the piston motor is connected to the first planetary reducer assembly. The output from the first planetary reducer assembly is connected to the brake by the input shaft which passes through the center of the sheave section. The input shaft also acts as the sun gear for the second stage planetary reducer. The output from the secondary planetary reduction assembly is transmitted directly to the load chain sheave.

The input shaft cannot rotate in either direction until the brake has been released. The brake is released by air pressure applied to the annular brake piston. The piston compresses the brake springs, releasing the brake discs. There are five sintered bronze type brake friction discs and six stationary brake discs.

The brake piston is actuated by air from the main control valve. When the control pendant "UP" or "DOWN" button is pushed it moves the main control valve spool. The spool is designed to send air to the brake.

When the pendant "UP" or "DOWN" button is released, quick exhaust valves allow the brake to set quickly and avoid downward load drift.

Table 1

Model No.	Capacity (metric tons)	Std. Lift		Speed				HP	Air Supply	
		ft	m	Lift (fpm)	Lift (m/min)	Lower (fpm)	Lower (m/min)		cfm	cu.m/min
HA1-005	5	10	3	10	3	15	4.6	3.8	165	4.67
HA1-010	10	10	3	5	1.5	7-1/2	2.3	3.8	165	4.67
HA1-015	15	10	3	3-1/4	1	5	1.5	3.8	165	4.67
HA1-020	20	10	3	2-1/2	0.76	3-3/4	1.14	3.8	165	4.67

Table 2

Model No.	Capacity (metric tons)	Load Chain Size (mm)	Head Room*				Unit Weight Hook Mount		Unit Weight with Trolley (Piston Motor)	
			Hook Mount		Trolley Mount		lbs	kg	lbs	kg
			in	mm	in	mm				
HA1-005	5	16	27-5/8	702	23-9/16	598	685	311	905	411
HA1-010	10	16	35-1/2	902	30-1/2	775	765	348	1105	502
HA1-015	15	16	41-7/8	1064	35-1/4	895	875	398	1315	590
HA1-020	20	16	42-1/2	1080	34-9/16	878	975	443	1425	640

* Head room dimensions are for hoists without limit switches. Refer to sales brochure for head room dimensions of hoists with limit switches.

Model Code Explanation

Model Code Example

HA1 - 010M - A3 - 30 - 27FLM

Series	HA = Hercu-Link Air Powered Hoist	
Frame Size	1 = 16 mm Load chain	
Capacity	005 = 5 metric ton (11,000 lbs) 010 = 10 metric ton (22,000 lbs) 015 = 15 metric ton (33,000 lbs) 020 = 20 metric ton (44,000 lbs)	
Suspension	H = Hook mount C = Clevis mount* D = Deck Mount* P = Plain trolley G = Geared trolley V = Vane motor driven trolley M = Piston motor driven trolley	
Trolley Flange Adjustment	M = No trolley used with hook A = Standard B = 2 in. (51 mm) extension C = 4 in. (102 mm) extension D = 6 in. (152 mm) extension	
Control	1 = Pull rope 2 = 1 motor pendant (2 button) 3 = 2 motor pendant (4 button) 4 = 3 motor pendant (6 button)	5 = 1 motor with emergency stop 6 = 2 motor with emergency stop 7 = 3 motor with emergency stop
Lift	XX = Length of lift. (XX = Specify length (ft). Max. 60 ft. (18 m))	
Control Drop	XX = Control Drop Pendant or Hand chain length	
Options	C = Corrosion resistant coating (SBCZ and Marine 812 top coat) L = Upper and lower limit switch N = Corrosion resistant load chain (zinc plated) M = Marine protection package T = Galvanized chain container (not available on 5 ton hook mounted models) Y = Hull bumper (for hook mounted shipyard hoists only) R = Copper plate S•COR•E package S = Solid bronze S•COR•E package (12-1/2 ton models only) Q = 60 psi application package	
Trolley	B = Trolley bumper G = Trolley guide rollers	
Control	F = Push button main air shutoff A = Accu-Trol® pendant	

* Features not covered in this manual. For additional information contact your nearest **Ingersoll-Rand** Material Handling office or distributor.

INSTALLATION

Prior to installing the hoist, carefully inspect it for possible shipping damage.

⚠ WARNING

- Before installing hoist read "SAFETY INFORMATION" section.

Hoists are supplied from the factory with the correct grade and quantity of lubricating oil. Before operation all oil levels must be checked and/or topped off with the proper type of oil recommended in the "LUBRICATION" section. Lubricate load chain before operating hoist.

⚠ CAUTION

- Owners and users are advised to examine specific, local or other regulations, including American National Standards Institute and/or OSHA Regulations which may apply to a particular type of use of this product before installing or putting hoist to use.

Remove cover from the shipping crate. Carefully remove steel straps. On units equipped with a trolley, carefully position wire rope sling around the hoist trolley side plates and slowly lift hoist assembly. Constantly monitor the position of the hoist and trolley to ensure the load is balanced and secure. On hook mounted units lift into position by using top hook of the hoist. Attach chain container to hoist with chain container pin and connect the container suspension hook as required.

Hook Mounted Hoist Installation

Place hook over mounting structure. Make sure hook latch is engaged. Ensure the supporting member rests completely within the saddle of the hook and is centered directly above the hook shank.

⚠ CAUTION

- Do not use a supporting member that tilts to one side or the other.

Trolley and Hoist Installation

⚠ WARNING

- A falling load can cause injury or death. Before installing trolley and hoist, read "SAFETY INFORMATION".
- Depending on the size of hoist selected it could weigh as much as 1425 lbs. (640 kg). If parts of the trolley or hoist are dropped, they could cause injury or damage property. Adequately support the hoist and trolley when lifting them into place on the beam.

Installing Over the End of the Beam

Preadjust trolley width for the beam flange measurement. Refer to "Installing from Underneath the Beam." Remove the rail stop and slide trolley on end of the beam. Reinstall rail stop. If this procedure cannot be used, due to insufficient space or fixed limit stops, the trolley must be installed from underneath the beam using the procedure which follows.

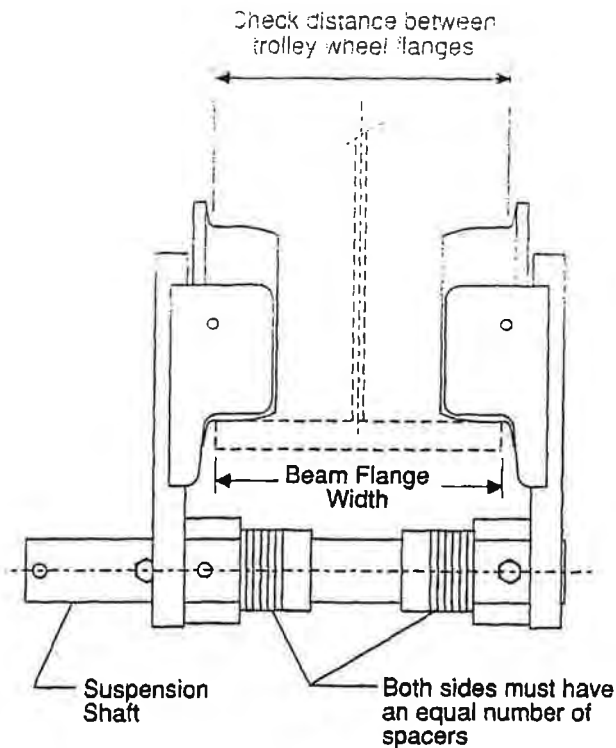
Installing from Underneath the Beam

(Ref. Dwgs. MHTPA0511 and MHTPC0532)

1. Measure beam flange width and compare with measurement between trolley wheel flanges. The correct total clearance between the beam and the trolley wheel flanges is 1/16 to 3/16 in. (2 to 5 mm). To adjust trolley wheel spacing remove cotter pins (178) and pins (177) at side plate. Remove adjusting spacers (157) and side plate and add or subtract an equal number of adjusting spacers (157) on suspension shafts (174) between top frame and side plates. Longer spacers (175) and (176) are used on trolleys which will be mounted to wider beam flange widths. Ensure that the same spacer configuration is used on either side of the hoist top frame.
2. When desired trolley wheel spacing measurement is achieved, carefully position wire rope sling around the hoist trolley side plates and slowly lift hoist and trolley assembly into place beneath the beam flange. Press side plates together on beam. Trolley wheels must rest on top of the beam flange.

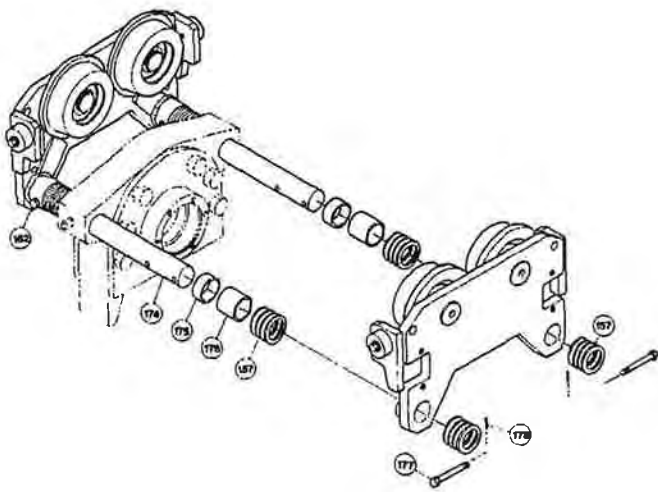
⚠ CAUTION

- To avoid an unbalanced load which may damage the trolley, the hoist must be centered under the trolley by the spacers (157).
3. Slide remaining adjusting spacers (157) over the free end of the suspension shafts (174). Insert pins (177) into the holes in the suspension shafts (174). Secure by installing cotter pins (178) and bending ends apart.
 4. The pin (177) and outside spacers (157) must hold the trolley to the adjustment in step 1. If the side plates can be spread farther apart, install more outside spacers (157) between side plate and the pin (177).



(Dwg. MHTPA0511)

Trolley Installation



(Dwg. MHTPC0532)

NOTICE

• Trolley wheels ride on the top of the lower flange of the beam.

5. If trolley is equipped with guide rollers measure beam flange width and compare with measurement between guide rollers. Side roller spacing measurement should be 1/16 to 3/16 in. (2 to 5 mm) greater than beam flange width.
6. Ensure beam stops are installed prior to operating hoist and trolley.
7. Prior to placing into service test the trolley. Check that the trolley side plates are vertical. Raise a load equal to the rated capacity of the hoist 6 to 7 ins. (130 to 180 mm) off the floor and operate the trolley along the entire length of the beam.

Chain Container (optional feature)

CAUTION

• Do not pile chain carelessly in the chain container. Piling the chain carelessly into the container by hand may lead to kinking or twisting that will jam the hoist.

1. Check the chain container size to make sure the length of load chain is within the capacity of the chain container. Replace with a larger chain container, if required.
2. Attach chain stopper (241) to the last link of the load chain free end.
3. Attach the chain container to the hoist.
4. Run bottom block to lowest point and run hoist in up direction to feed the chain back into the container.

NOTICE

• When feeding chain into the chain container begin with the chain stopper end of the chain so that it piles naturally.

Attaching Free End of Load Chain

1. Install chain stopper (241) on the end of the load chain.
2. Attach the free end of the load chain to the hoist or bottom hook assembly. See Chaining Drawings in the "MAINTENANCE" section.

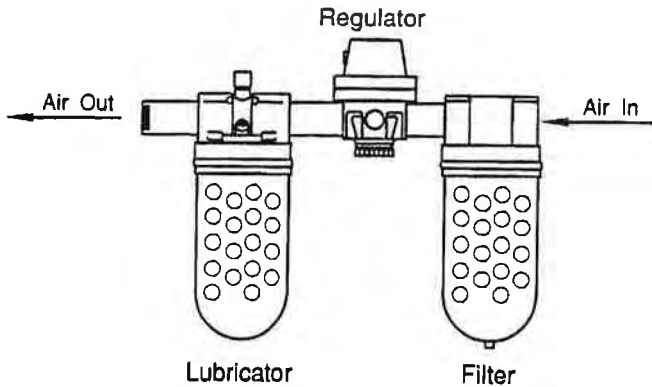
After installing load chain, make sure it is not twisted or kinked. Fix before using hoist.

Air Supply

The air supply must be clean and free from moisture. Due to efficiency losses in the air lines and air line components, air pressures should be checked at the hoist motor. A minimum of 105 psi (7.2 bar/724 Kpa) at the hoist motor is required to provide rated hoist capacity. Due to efficiency losses in air lines, pressures of up to 130 psi (8.9 bar/896 Kpa) at the air supply may be required to achieve the required operating pressure. (Contact the Technical Support Department for operating requirements with optional 60 psi system).

Air Lines

The inside diameter of the hoist air supply lines must not be smaller than 1 in. (25 mm) based on a maximum of 50 ft. (15 m) between the air supply and the hoist. Contact the factory for recommended air line sizes for distances greater than 50 ft. (15 m). Before making final connections, all air supply lines should be purged before connecting to unit inlet. Supply lines should be as short and straight as installation conditions will permit. Long transmission lines and excessive use of fittings, elbows, tees, globe valves etc. cause a reduction in pressure due to restrictions and surface friction in the lines.



(Dwg. MHTPA0191)

Air Line Lubricator

(Ref. Dwg. MHTPA0191)

Always use an air line lubricator with these motors. Use a lubricator having an inlet and outlet at least as large as the inlet on the motor. Install the air line lubricator as close to the air inlet on the motor as possible.

CAUTION

- Lubricator must be located no more than 10 ft. (3 m) from the motor.

The air line lubricator should be replenished daily and set to provide 4 to 6 drops per minute of SAE 10W oil. A fine mist will be exhausted from the throttle control valve when the air line lubricator is functioning properly.

Air Line Filter

(Ref. Dwg. MHTPA0191)

It is recommended that an air line strainer/filter be installed as close as practical to the motor air inlet port to prevent dirt from entering the motor. The strainer/filter should provide 20 micron filtration and include a moisture trap. Clean the strainer/filter periodically to maintain its operating efficiency.

Moisture in Air Lines

Moisture that reaches the air motor through the supply lines is the chief factor in determining the length of time between service overhauls. Moisture traps can help to eliminate moisture and other methods, such as an air receiver which collects moisture before it reaches the

motor or an aftercooler at the compressor that cools the air prior to distribution through the supply lines, are also helpful.

Motor and Reducer Assemblies

Remove shipping 'O' Ring (360) from breather on hoist motor and trolley motor if equipped.

WARNING

- Failure to remove shipping 'O' Ring(s) on the motor breather(s) may result in premature failure of the motor seals.

Hoist and Trolley Motors

For optimum performance and maximum durability of parts, provide an air supply to operate hoist and trolley motors with 105 psig at 165 scfm (7.2 bar/724 kpa at 4.67 cu.m/m). The air motor should be installed as near as possible to the compressor or air receiver. (Contact the Technical Support Department for operating requirements with optional 60 psi system)

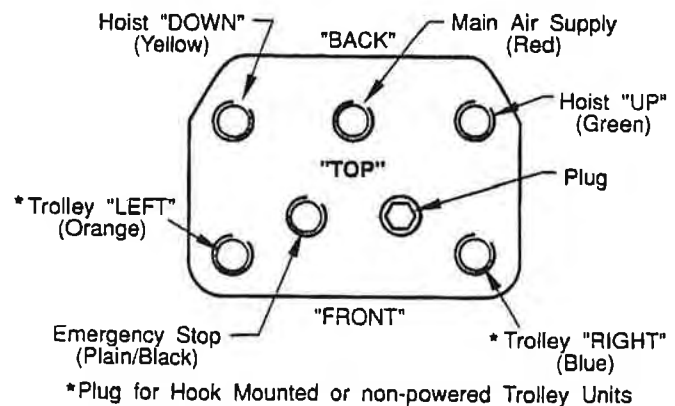
Hoist Pendant

The pendant control is installed at the factory. Hose fittings on the pendant are color coded to ensure correct assembly. Check all hose connections are tight and that hoses are not twisted or crimped. Refer to Dwg. MHTPA0095 and MHTPA0510 for correct pendant hose connections. If the optional Accu-trol® pendant is used refer to Accu-trol pendant manual form number MHD56014 for correct pendant hose connections.

WARNING

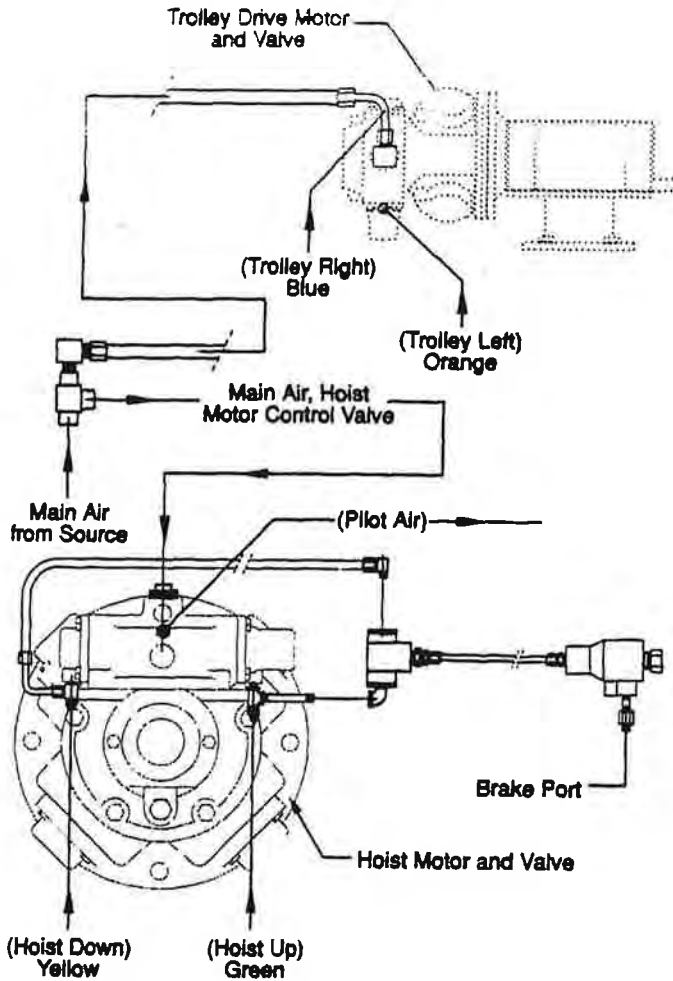
- Disconnect air supply before performing any maintenance.
- Do not attempt to reverse air lines either at the pendant station or hoist. This will give a false indication of operation which may result in serious damage to the hoist.

PENDANT CONTROL BLOCK (Looking Down On Top of Block)



(Dwg. MHTPA0095)

Check strain relief chain (188) is properly connected to the hoist and pendant body. The chain is connected to the hoist at the piston motor assembly with capscrew (631). Ensure pendant is supported by the chain and not hose assemblies.



(Dwg. MHTPA0510)

⚠ CAUTION

• To avoid damaging the pendant hose, make sure the strain relief chain, not the pendant hoses, is supporting the weight of the pendant.

Emergency Air Shutoff (optional feature)

If supply air is wet and unfiltered, and/or the hoist is operated in a dirty environment, the hoist or trolley control valves may malfunction and become stuck "on". As a safeguard, an emergency main line shutoff valve is provided at the pendant. The emergency valve shuts off the air supply to the entire unit when the red pull/push button is depressed (pushed in).

If it is necessary to use the emergency air shut off valve, then the malfunctioning control valve should be disassembled, cleaned, and/or repaired as required to clear the malfunction before resuming operation.

Initial Operating Checks

Hoists are tested for proper operation prior to leaving the factory. Before the hoist is placed into service the following initial operating checks should be performed.

1. After installation of trolley mounted hoists, check to ensure the hoist is centered below the trolley.
2. Check for air leaks in the supply hose and fittings to pendant, and from pendant to manifold.
3. When first running the hoist or trolley motors some light oil should be injected into the inlet connection to allow good lubrication.
4. When first operating the hoist and trolley it is recommended that the motors be driven slowly in both directions for a few minutes.
5. Operate the trolley along the entire length of the beam.
6. Inspect hoist and trolley performance when raising, moving and lowering test load(s). Hoist and trolley must operate smoothly and at rated specifications prior to being placed in service.
7. Check that trolley (if equipped) and hook movement is the same direction as arrows or information on the pendant control.
8. Raise and lower a light load to check operation of the hoist brake.
9. Check hoist operation by raising and lowering a load equal to the rated capacity of the hoist a few inches (cm) off the floor.
10. Check operation of limit devices.
11. On trolley units check 'O' ring (360) on breather plug (362) in trolley drive piston motor has been removed.

Storing the Hoist

For hoists that have been in storage for a period of more than one month the following start-up procedure is required.

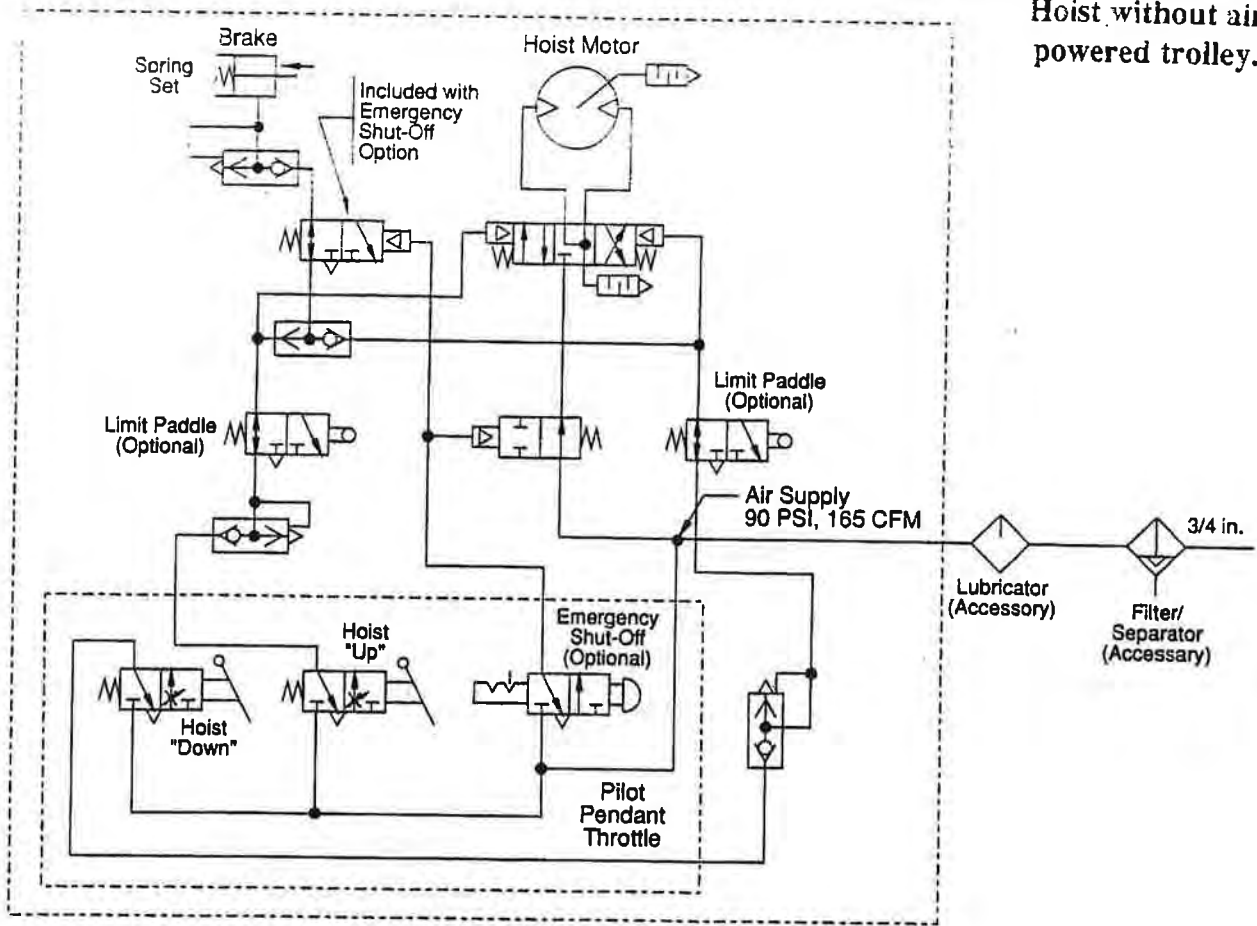
1. Give the hoist an inspection conforming to the requirements of "Hoists Not in Regular Use" in the "INSPECTION" section.
2. Pour a small amount of 10W oil in the motor inlet port(s).
3. Operate the motor for 10 seconds to flush out any impurities.
4. The hoist is now ready to work.

Trolley Drive Assembly Run In Period

Maximum efficiency of the trolley drive worm gear is obtained after a "run-in" period. The length of time required will depend on the load applied and will be two to four hours at rated load and considerably longer at lighter loads. (Overloading will not decrease the "run-in" time and it may damage the worm gear.)

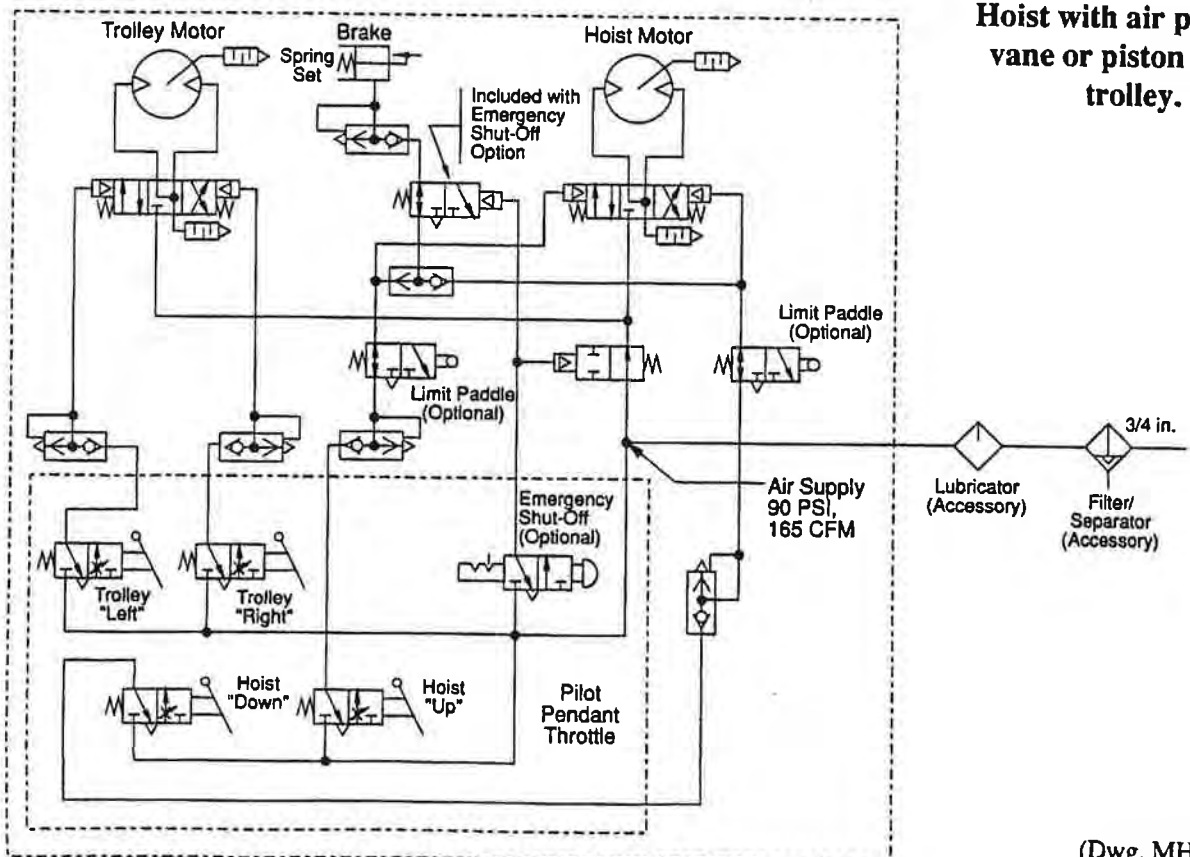
During "run-in" higher than normal temperature rise, and lower efficiency and output torque can be expected.

AIR SCHEMATICS



Hoist without air powered trolley.

(Dwg. MHTPA0534)



Hoist with air powered vane or piston motor trolley.

(Dwg. MHTPA0535)

OPERATION

The four most important aspects of hoist operation are:

1. Follow all safety instructions when operating the hoist and trolley.
2. Allow only people instructed in safety and operation of this product to operate the hoist and trolley.
3. Subject each hoist to a regular inspection and maintenance procedure.
4. Be aware of the hoist capacity and weight of load at all times.

⚠ WARNING

- Only allow personnel instructed in safety and operation of this product to operate the hoist and trolley.
- The hoist is not designed or suitable for lifting, lowering or moving persons. Never lift loads over people.

Operators must be physically competent. Operators must have no health condition which might affect their ability to act, and they must have good hearing, vision and depth perception. The hoist operator must be carefully instructed in his duties and must understand the operation of the hoist, including a study of the manufacturer's literature. The operator must thoroughly understand proper methods of hitching loads and should have a good attitude regarding safety. It is the operator's responsibility to refuse to operate the hoist under unsafe conditions.

Initial Operating Checks

Hoists are tested for proper operation prior to leaving the factory. Before the hoist is placed into service perform the initial operating checks described in the "INSTALLATION" section.

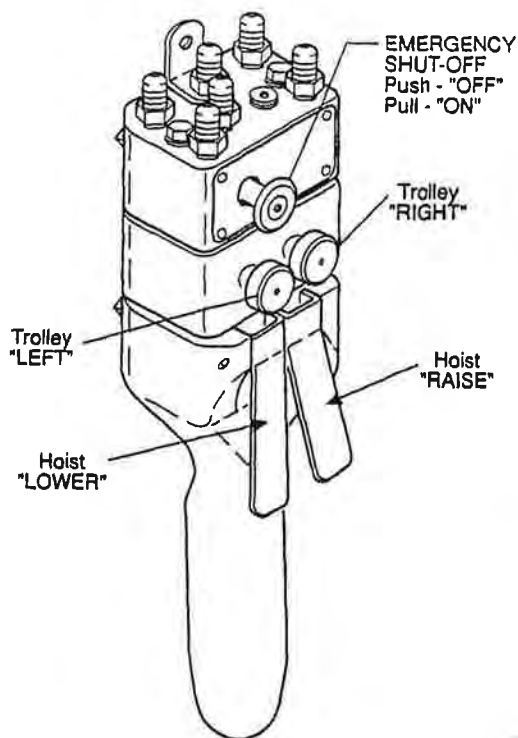
Hoist Controls

Refer to Dwg. MHTPA0094 and MHTPA0095 in the "INSTALLATION" section for correct pendant hose connections.

Pilot Pendant Throttle with Emergency Stop

(Ref. Dwg. MHTPA0395)

The pendant control throttle is equipped with two separate levers for hoist operation. Pilot pressure from the pendant throttle activates the hoist control valve. Direction of hook travel is controlled by whichever lever is depressed.

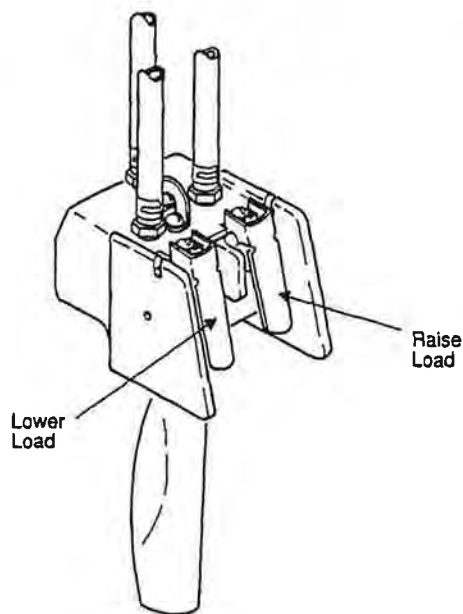


(Dwg. MHTPA0395)

Pilot Two Lever Pendant

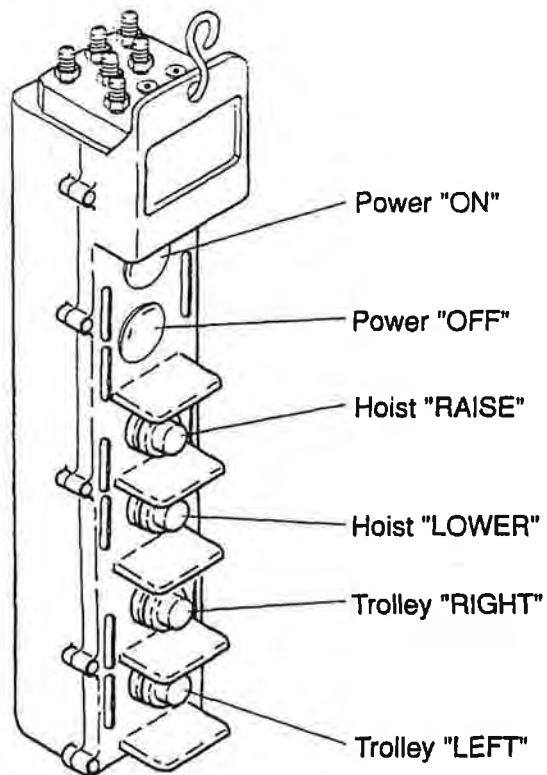
(Ref. Dwg. MHTPA0396)

The pilot two lever pendant is standard on hook mounted hoists without the emergency stop option.



(Dwg. MHTPA0427)

Accu-Trol® Pendant (Push Button Type): Optional
The Accu-Trol® pendant is available with 2, 4 or 6 buttons. Refer to Accu-Trol® Pendant manual form number MHD56014 for additional information. (4 button pendant shown).



(Dwg. MHTPB0434)

Attaching the Load

⚠ WARNING

• The hook latch is intended to retain loose slings or devices under slack conditions. Hook latches are not intended to be an anti-fouling device, so caution must be used to prevent the latch from supporting any of the load.

⚠ WARNING

• All new, altered or modified equipment should be inspected and tested by personnel trained in safety, operation and maintenance of this equipment to ensure safe operation at rated specifications before placing equipment in service.

Frequent and periodic inspections should be performed on equipment in regular service. Frequent inspections are visual examinations performed by operators or personnel trained in safety and operation of this equipment and include observations made during routine equipment operation. Periodic inspections are thorough inspections conducted by personnel trained in the safety, operation and maintenance of this equipment. ASME B30.16 states inspection intervals depend upon the nature of the critical components of the equipment and the severity of usage. Frequent and periodic inspection intervals for equipment use under various operating conditions are listed below:

1. Frequent Inspection:

NORMAL	HEAVY	SEVERE
monthly	weekly	daily

2. Periodic Inspection:

NORMAL	HEAVY	SEVERE
yearly	semi-annually	quarterly

Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.

Deficiencies revealed through inspection, or noted during operation, must be reported to designated personnel trained in safety, operation and maintenance of this equipment. A determination as to whether a condition constitutes a safety hazard must be decided, and the correction of noted safety hazards accomplished and documented by written report before placing the equipment in service.

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 on the condition of critical parts as a method of documenting **periodic** inspections. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available for review.

NOTICE

• The external placement of coded marks on equipment identifying completed inspections and operationally certified equipment is an acceptable method of documenting periodic inspections in place of written records.

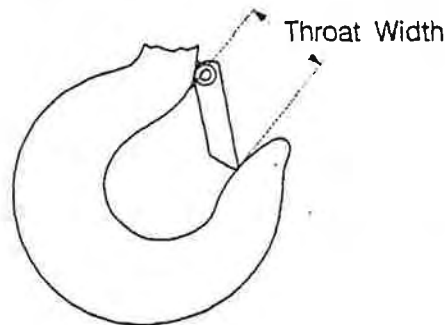
Load Chain Reports

Records should be maintained documenting the condition of load chain removed from service as part of a long-range load chain inspection program. Accurate records will establish a relationship between visual observations noted during frequent inspections and the actual condition of the load chain as determined by periodic inspection methods.

Frequent Inspection

On hoists in continuous service, frequent inspection should be made at the beginning of each shift. In addition, visual inspections should be conducted during regular service for any damage or evidence of malfunction.

1. **OPERATION.** Check for visual signs or abnormal noises (grinding etc.) which could indicate a defect. Make sure all controls function properly and return to neutral when released. Check chain feed through the hoist and bottom block. If chain binds, jumps, is excessively noisy or "clicks", clean and lubricate the chain. If problem persists, replace the chain. Do not operate the hoist until all defects have been corrected.
2. **HOOKS.** Check for wear or damage, increased throat width, bent shank or twisting of hook. Replace hooks which exceed the throat opening discard width specified in Table 3 (see Dwg. MHTPA0040) or exceed a 10° twist (see Dwg. MHTPA0111). If the hook latch snaps past the tip of the hook, the hook is sprung and must be replaced. Refer to the latest edition of ASME B30.10 "HOOKS" for additional information.

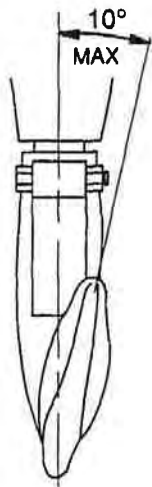


(Dwg. MHTPA0040)

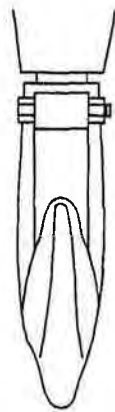
Table 3

Hoist Model	Hook Throat Opening			
	New Hook		Discard Hook	
	in.	mm	in.	mm
HA1-005 (Steel)	1.87	47.6	2.15	54.6
HA1-005 (Bronze)	2.25	57.2	2.58	65.5
HA1-010 (Steel)	2.50	63.5	2.87	73.0
HA1-010 (Bronze)	3.37	85.7	3.88	98.5
HA1-015 (Steel)	3.37	85.7	3.88	98.5
HA1-015 (Bronze)	4.15	105.4	4.77	121.1
HA1-020 (Steel)	4.00	101.6	4.60	116.8
HA1-020 (Bronze)	4.50	114.3	5.17	131.3

3. **UPPER AND LOWER LIMIT DEVICE.** Test operation with no load. Upward travel must stop when the bottom block or stop buffer on chain hits hoist limit arm.
4. **AIR SYSTEM.** Visually inspect all connections, fittings, hoses and components for indication of air leaks. Repair any leaks found.
5. **CONTROLS.** During operation of hoist, verify response to pendant is quick and smooth. If hoist responds slowly or movement is unsatisfactory, do not operate hoist until all defects have been corrected.



Twisted
DO NOT USE

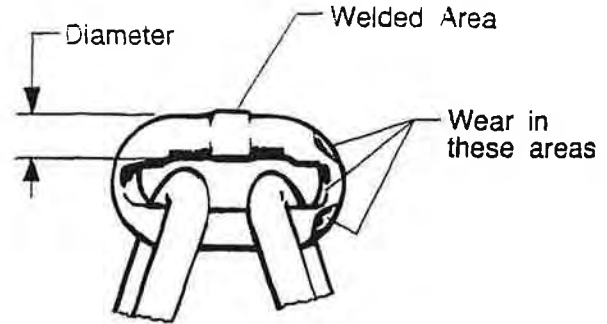


Normal
Can Be Used

(Dwg. MHTPA0111)

6. **HOOK LATCH.** Make sure the hook latch is present and operating. Replace if necessary.

CHAIN. Examine each of the links for bending, cracks in weld areas or shoulders, transverse nicks and gouges, weld splatter, corrosion pits, striation (minute parallel lines) and chain wear, including bearing surfaces between chain links (see Dwg. MHTPA0102). Replace a chain that fails any of the inspections. Check chain lubrication and lubricate if necessary. Refer to "Load Chain" in "LUBRICATION" section.



(Dwg. MHTPA0102)

NOTICE

• It may not be possible to determine the full extent of chain wear or stretching by visual observation. At any indication of wear or stretching inspect the chain in accordance with instructions in "Periodic Inspection".

8. **CHAIN REEVING.** Ensure welds on standing links are away from load sheave. Reinstall chain if necessary. Make sure chain is not capsized, twisted or kinked. Adjust as required.

Periodic Inspection

NOTICE

• Refer to "INSPECTION AND MAINTENANCE REPORT" for guidance on documenting periodic inspection items.

Disassembly may be required as a result of initial indications of inspections or in order to properly inspect the individual components. Disassembly steps are described in the "MAINTENANCE" section. Maintain written records of periodic inspections to provide an accumulative basis for continuing evaluation. Inspect all items listed in "Frequent Inspection." Also inspect the following:

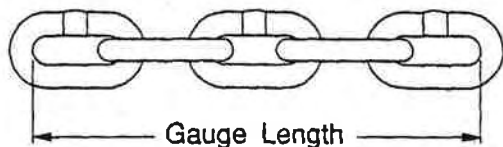
1. **FASTENERS.** Check all rivets, split pins, capscrews and nuts. Replace if missing or tighten if loose.
2. **ALL COMPONENTS.** Inspect for wear, damage, distortion, deformation and cleanliness. If external evidence indicates the need, disassemble. Check gears, shafts, bearings, sheaves, chain guides, 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.
4. **CHAIN SHEAVES.** Check for damage or excessive wear. Replace if necessary.
5. **MOTOR (Hoist and Trolley).** If performance is poor, disassemble the motor and check for wear or damage to bearings and shafts. The parts should be cleaned, lubricated and reassembled. Replace worn or damaged parts.
6. **BRAKE.** Raise a load equal to the rated capacity of the hoist a few inches off the floor and check ability of hoist to hold the load without drift. If drift occurs, disassemble. Check rotating disc lining thickness as noted in the "MAINTENANCE" section.
7. **SUPPORTING STRUCTURE.** Check for distortion, wear and continued ability to support load.
8. **TROLLEY.** Check that the trolley wheels track the beam properly and clearance between side rollers and beam is correct, 1/16 to 3/16 in. (2 to 5 mm). Check side plates for spreading due to bending.
9. **LABELS AND TAGS.** Check for presence and legibility. Replace if necessary.
10. **LOAD CHAIN END ANCHORS.** Ensure end of load chain is securely attached to the hoist or bottom block. Secure if loose, repair if damaged, replace if missing. Check chain stopper is correctly installed and functional.
11. **LOAD CHAIN.** Measure the chain for stretching and wear by measuring across five link sections all along the chain paying particular attention to the most frequently reeved links. When any five links in the working length reaches or exceeds the discard length, replace the entire chain (see Dwg. MHTPA0041). Always use a genuine **Ingersoll-Rand Material Handling** replacement chain for regular and nickel-diffused load chains.
12. **CHAIN CONTAINER.** Check for damage or excessive wear and that chain container is securely attached to the hoist. Secure or replace if necessary.
13. **LIMIT ASSEMBLY.** Check limit arm moves freely and activates limit switches for maximum upper and lower hook travel.

Hoists Not in Regular Use

1. Hoists which have been idle for a period of one month or more, but less than six months shall be given an inspection conforming with the requirements of "Frequent Inspection" before being placed into service.
2. Hoists which have been idle for a period of over six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection" before being placed into service.
3. Standby hoists shall be inspected at least semi-annually in accordance with the requirements of "Frequent Inspection". If abnormal operating conditions apply hoists may require a more frequent inspection.

Size (mm)	Normal Length		Discard Length	
	in.	(mm)	in.	(mm)
16.0	8.86	225	9.02	229



(Dwg. MHTPA0041)

NOTICE

• A worn load chain may cause the load sheave to wear rapidly. Inspect the load sheave and replace if damaged or worn.

INSPECTION AND MAINTENANCE REPORT

MODEL HA1 AIR CHAIN HOIST

Model Number: _____ Date: _____

Serial Number: _____ Inspected by: _____

Reason for Inspection: (Check Applicable Box)

1. Scheduled Periodic Inspection (___ Monthly ___ Quarterly ___ Yearly).
2. Discrepancy(s) noted during Frequent Inspection.
3. Discrepancy(s) noted during maintenance.
4. Other: _____

Refer to the Parts, Operation and Maintenance Manual "INSPECTION" section for 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 Sheaves			---		
Chain Guides			---		
Springs			---		
Covers					
Hooks:					
Top	Actual Hook Throat Width: _____ inches / _____ mm (reference Table 3 for minimum/maximum acceptable widths).				
	Hook Twist		---		(maximum 10%)
	Hook Crack Test Method Used: ___ Dye Penetrant ___ Magnetic Particle ___ Other: _____				
Bottom	Actual Hook Throat Width: _____ inches / _____ mm (reference Table 3 for minimum/maximum acceptable widths).				
	Hook Twist		---		(maximum 10%)
	Hook Crack Test Method Used: ___ Dye Penetrant ___ Magnetic Particle ___ Other: _____				
Hook Latch			---		
Brake (10% Load Test)					
Brake (Visual Inspection)					
Tail Pin (Chain End Anchor)					
Load Chain			---		
Working length(s) maximum wear/stretch: _____ inches / _____ mm (ref. load chain dimensions for maximum acceptable wear/stretch).					
Supporting Structure					
Labels and Tags			---		
Other Components (list in NOTES section)					

Testing:	Pass	Fail
Operational (No Load)		
Operational (10% Load)		
Operational (Maximum Test Load *)		

* Refer to the Parts, Operation and Maintenance manual "Testing" in the "MAINTENANCE" section to determine Maximum Test Load.

LUBRICATION

To ensure continued satisfactory operation of the hoist, all points requiring lubrication must be serviced with the correct lubricant at the proper time interval as indicated for each assembly. Correct lubrication is one of the most important factors in maintaining efficient operation.

The lubrication intervals recommended in this manual are based on intermittent operation of the hoist eight hours each day, five days per week. If the hoist is operated almost continuously or more than the eight hours each day, more frequent lubrication will be required. Also, the lubricant types and change intervals are based on operation in an environment relatively free of dust, moisture, and corrosive fumes. Use only those lubricants recommended. Other lubricants may affect the performance of the hoist. Approval for the use of other lubricants must be obtained from your **Ingersoll-Rand** Technical Support Department or distributor. Failure to observe this precaution may result in damage to the hoist and/or its associated components.

INTERVAL	LUBRICATION CHECKS
Start of each shift	<p>Check flow and level of air line lubricator (approximately 4 to 6 drops per minutes required at maximum motor speed).</p> <p>Check oil levels in the hoist and trolley piston motors.</p>
Monthly	<p>Lubricate all grease fittings.</p> <p>Clean air line filter.</p> <p>Check oil level in the brake and reduction gear assembly.</p>
6 Monthly	Drain and replace oil in trolley and hoist piston drive motors.
Yearly	Drain and refill oil in the hoist brake and reduction gear assembly.

Pivot Points and Bushings

Lubricate grease fittings monthly with 2 or 3 pumps from a grease gun or more frequently, depending on severity of service. For temperatures -20° to 50° F (-29° to 10° C) use a multipurpose lithium-based EP 1 grease. For temperatures 30° to 120° F (-1° to 49° C) use a multipurpose lithium-based EP 2 grease.

Hoist Motor

The motor is splash lubricated by the oil in the motor housing and has no other means of lubrication. It is therefore important to use only high quality, non-detergent hydraulic oil to insure maximum performance and minimum down time for repairs. Allow oil to settle prior to topping off. Oil capacity for the HA1 hoist motor is 0.1 gals. (0.38 ltrs.).

Below 32° F (0° C)	SAE 10W Hydraulic Oil
32° to 80° F (0° to 27° C)	SAE 20W Hydraulic Oil*
Above 80° F (27° C)	SAE 30W Hydraulic Oil

* Hoists are shipped from the factory with this oil

Trolley Drive Motor (piston)

The motor is splash lubricated by the oil in the motor housing and has no other means of lubrication. It is therefore important to use only high quality, non-detergent hydraulic oil to insure maximum performance and minimum down time for repairs. Allow oil to settle prior to topping off. Oil capacity for the HA1 trolley drive motor is 0.1 pints (65 ml).

Below 32° F (0° C)	SAE 20W Hydraulic Oil
32° to 80° F (0° to 27° C)	SAE 30W Hydraulic Oil*
Above 80° F (27° C)	SAE 40W Hydraulic Oil

* Hoists are shipped from the factory with this oil

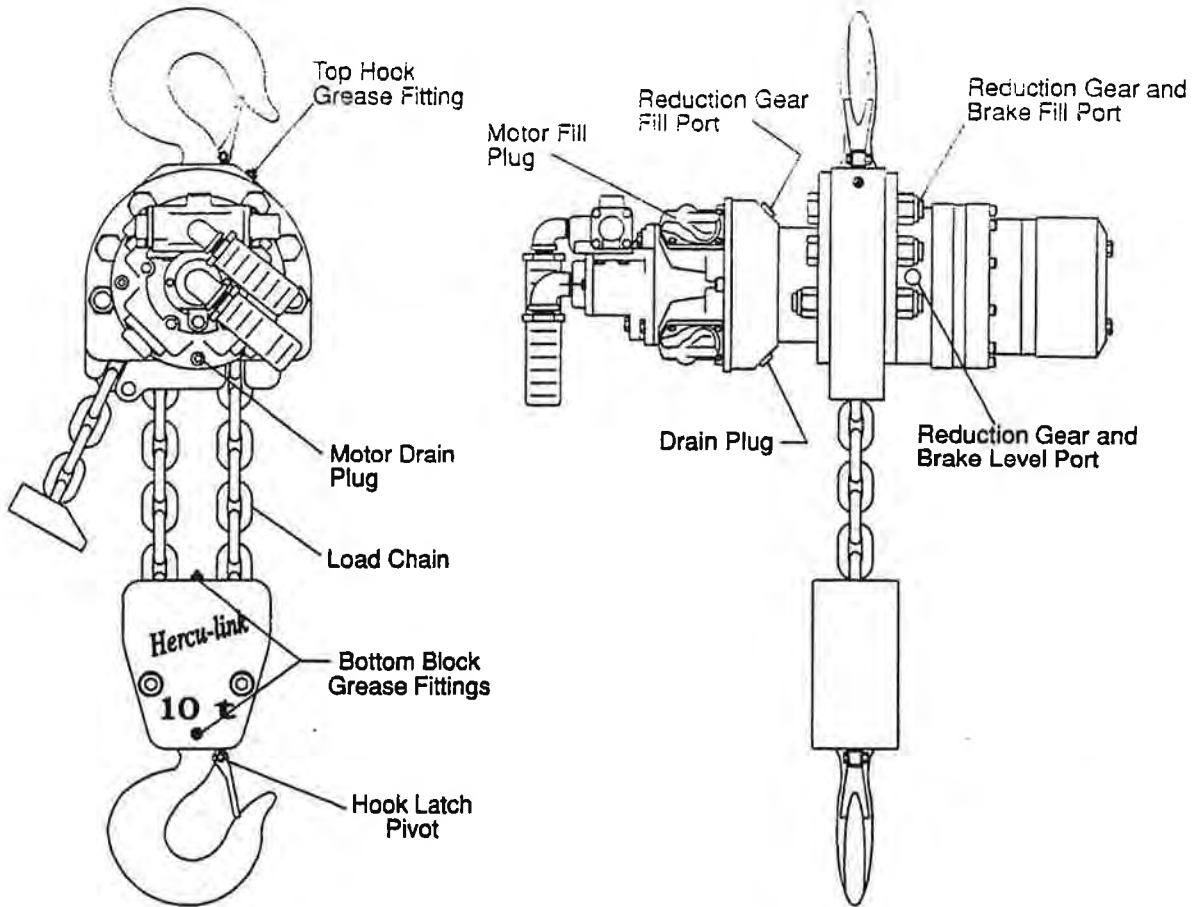
Bottom Hook Block Assembly

To prevent moisture entering the bottom block assemblies they should periodically be disassembled and repacked with grease. For temperatures -20° to 50° F (-29° to 10° C) use a multipurpose lithium-based EP 1 grease. For temperatures 30° to 120° F (-1° to 49° C) use a multipurpose lithium-based EP 2 grease. Add grease to bottom hook assemblies through grease fittings (39).

Hoist Capacity	Grease Required to Pack Hook Assembly	
	ozs.	grams
HA1-005 (5 ton)	0.33	31
HA1-010 (10 ton)	1.1	204
HA1-015 (15 ton)	1.1	468
HA1-020 (20 ton)	7.2	873

Hoist Lubrication Points

Hook Mounted Hoist



(Dwg. MHTPA0509)

Load Chain

⚠ WARNING

• Failure to maintain clean and well lubricated load chain will result in rapid load chain wear that can lead to chain failure which can cause severe injury, death or substantial property damage.

1. Lubricate load chain weekly, or more frequently, depending on severity of service.
2. In a corrosive environment, lubricate more frequently than normal.
3. Lubricate each link of the load chain and apply new lubricant over existing layer.
4. Lubricate hook and hook latch pivot points.
5. If required, clean chain with acid free solvent to remove rust or abrasive dust build-up and lubricate the chain.
6. Use Ingersoll-Rand LUBRI-LINK® or a SAE 50 to 90 EP oil.

Trolley Drive Assembly

The gear housing is filled at the factory and shipped with the proper amount of oil, a non-toxic, rust inhibiting worm gear oil AGMA #7 compound that is suitable for an ambient temperature of 50° F to 125° F (10° C to 52° C). Before placing the hoist in operation, make certain that the breather (237) in the gear housing (212) is clean and unrestricted.

Lubricant Chart

Temperature Range	Recommended Lubricant
50° to 125° F (10° to 52° C)	AGMA #7 (EP 7)
-10° to 50° F (-23° to 10° C)	AGMA #5 (EP 5)

Fill gear housing (212) through port with breather (237) to the height of level plug (201) hole located in the cover (202). The gear housing oil capacity is approximately 0.4 gals. (1.5 lts.)

After the first 10 hours of operation, the oil should be changed. Thereafter it should be changed every 100 hours of service or every 6 months whichever occurs first. The oil is drained by removing pipe plug (213) located underneath the gear housing (212). The oil should be replaced using one of the recommended lubricants or its equivalent.

Reduction Gear Assemblies

The reduction gear assemblies are filled and shipped with oil from the factory. There are two reduction gear assemblies, check oil level on both sides before initial hoist operation. If the hoist is used at a normal frequency replace the oil in the reduction housing once every year. To ensure correct performance, highest efficiency and long life, it is essential that the lubricating oil be maintained at the correct level. Brake side oil capacity for the reduction gear assembly is 0.3 gals (1.1 lts). Motor side oil capacity for the reduction gear assembly is 0.3 gals (1.1 lts). Refer to Dwg. MHTPA0509 for fill, level and drain port locations.

CAUTION

- Do not over fill. Excess oil will reduce operating efficiency and increase oil temperature.

Use only high quality lubricants in the reduction gear assembly such as SAE 90 EP motor oil or high grade EP4 gear oil.

The recommended grade of oil must be used at all times since the use of unsuitable oil may result in excessive temperature rise, loss of efficiency and possible damage to the gears. Check breathers (24) are clean and unrestricted.

Brake Assembly

The brake assembly is lubricated from oil in the reduction gear assembly on the brake side of the hoist. If oil has been drained or hoist has been disassembled check oil level in reduction gear assembly prior to operating hoist.

CAUTION

- Do not over fill. Excess oil will reduce operating efficiency and increase oil temperature.

Use only high quality lubricants in the disc brake housing assembly such as SAE 90 EP motor oil or high grade EP4 type gear oil.

The recommended grade of oil must be used at all times since the use of unsuitable oil may result in excessive temperature rise, loss of efficiency and possible damage to the brake discs.

Seals and Bearings

If hoist is disassembled, clean all parts thoroughly and coat bearings and seals with clean grease. Use sufficient grease to provide a good protective coat. Lubricate grease fittings monthly with 2 or 3 squirts from a grease gun. For temperatures -20° to 50° F (-30° to 10° C) use a multipurpose lithium-based EP 1 grease. For temperatures 30° to 120° F (-1° to 49° C) use a multipurpose lithium-based EP 2 grease.

Trolley

Lubricate grease fittings monthly with 2 to 3 squirts from a grease gun. Grease fittings are located on trolley side plates at each trolley wheel location. Use grease as recommended for seals and bearings.

TROUBLESHOOTING

This section provides the information necessary for troubleshooting this hoist. The troubleshooting guide provides a general outline of problems which could be experienced with normal use of this hoist. It lists the symptom, the possible cause, and the possible remedy for the trouble being experienced.

SYMPTOM	CAUSE	REMEDY
Hoist will not operate.	No air supply to hoist, or too little CFM or PSI.	Check PSI (bar) at valve inlet. Refer to "SPECIFICATIONS" section for correct CFM (cu.m/min) and PSI (bar).
	Valve or limit arm sticking.	Check limit arm for free movement.
	Emergency valve "OFF".	Turn air "ON".
	Pendant malfunction.	Check PSI (bar) at pendant. Minimum operating pressure in pendant line is 55 PSI (3.8 bar).
	Hoist is overloaded.	Reduce load to within rated capacity.
	Motor is damaged.	Repair or replace. See "MAINTENANCE" section. Check oil level in motor and gearbox.
	Lubricator is low on oil.	Fill lubricator.
Hoist will not lift load.	Brake is not releasing.	Check brake release circuit and PSI (bar) at the brake inlet. (55 PSI (3.8 bar) minimum)
Load continues to move when hoist is stopped. "UP" direction.	Valve sticking.	Check limit arm for free movement.
	Dump valves not releasing.	Check pendant dump valves.
	Pendant lever sticking.	Check lever and restore free movement.
Load continues to move when hoist is stopped. "DOWN" direction.	Valve sticking.	Check limit arm for free movement.
	Dump valves not releasing.	Check pendant dump valves.
	Brake is slipping.	Check brake springs and rotating disc linings. See "MAINTENANCE" section.
	Hoist is overloaded.	Reduce load to within rated capacity.
	Pendant lever sticking.	Check lever and restore free movement.
Hoist will not lift load.	Hoist is overloaded.	Reduce load to within rated capacity.
	No air supply to hoist, or too little CFM or PSI.	Check PSI (bar) at valve inlet. Refer to "SPECIFICATIONS" section for correct CFM (cu.m/min) and PSI (bar).
	Main air valve travel is restricted.	Check limit arm and linkage for free movement.
	Exhaust restricted.	Inspect vents and replace mufflers.
	Motor is damaged.	Check for worn motor bearings.
	Motor or gearbox out of oil.	Check oil levels in motor and gearbox and fill to required level. Check oil level in lubricator.

SYMPTOM	CAUSE	REMEDY
Hook lowers, but will not raise.	No air supply to hoist, or too little CFM (cu.m/min). Hoist is overloaded. Pendant malfunction.	Check power supply and connections, in power supply line. Reduce load to within rated capacity. Check PSI (bar) at green colored fitting connection on pendant.
Hook can be raised but not lowered.	Pendant malfunction.	Check PSI (bar) at yellow colored fitting connection on pendant.
Load chain jumps on sheave or is making a snapping sound.	No oil on load chain. Worn or rusted chain. Worn load sheave. Hoist not in-line with load. Incorrectly reeved load chain.	Lubricate load chain. See "LUBRICATION" section. See "INSPECTION" to determine wear limit. Replace if necessary. Replace worn parts. Align hoist with load. Do not "yard" or side pull. Check load chain is correctly reeved.
Trolley Trolley won't stop or trolley wheels slip.	Damaged beam. Too much oil, grease or paint on track of beam. Trolley not spaced for beam clearance.	Repair or replace beam. Clean off oil, grease or paint. Check trolley spacing. Refer to "INSTALLATION" section.
Trolley won't run.	Pendant lever sticking. Emergency valve "OFF". No air supply to trolley, or too little CFM (cu.m/min) or PSI (bar). Control valve is sticking. No oil in trolley motor or gearbox. Wheels may be obstructed. Motor is damaged.	Check lever and restore free movement. Turn air "ON". Check PSI (bar) at trolley valve. See "MAINTENANCE" section. Check oil levels in trolley motor and gearbox and fill to required level. Remove obstruction. Repair or replace. See "MAINTENANCE" section.

MAINTENANCE

⚠ WARNING

- Never perform maintenance on the hoist while it is supporting a load.
- Before performing maintenance, tag controls:
DANGER - DO NOT OPERATE - EQUIPMENT BEING REPAIRED.
- Only allow personnel trained in service and repair on this hoist to perform maintenance.
- After performing any maintenance on the hoist, dynamically test hoist to 100% of its rated capacity, in accordance with ASME B30.16 standards, before returning hoist to service.
- Turn off air system and depressurize air lines before performing any maintenance.

INTERVAL	MAINTENANCE CHECKS
Start of each shift	Lubricate as recommended in "LUBRICATION" section. Make a thorough visual inspection of the hoist for damage. Do not operate the hoist if damage is found. Check the operation of the pendant control and brake.
See "INSPECTION" section for recommended intervals	Conduct maintenance as needed to correct problems noted during inspection.
Annually	Inspect the gearing, shafts, and bearings for damage or wear. Check all of the supporting members, including the trolley if used.

Disc Brake Adjustment

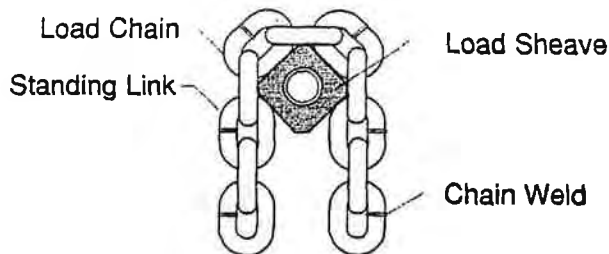
No brake adjustment is required.

NOTICE

- When any part of the friction disc thickness measures 0.200 in. (5.08 mm) or less, or if oil groove pattern is not clearly visible, the friction discs must be replaced.

Load Chain Replacement

It is suggested that a short length of 16 mm load chain be available when replacing the hoist load chain. Feeding a short length of load chain through the bottom block assembly or power head assembly prior to installing the new load chain may simplify installation.



(Dwg. MHTPA0042)

Weld on perpendicular load chain must always face away from sheaves. See Dwg. MHTPA0042.

HA1-005 Hoist (Ref. Dwg. MHTPA0428)

1. The hoist should be hung and connected to the air supply. Reduce hoist air pressure to 60 psi (4 bar).
2. Remove chain bucket, if used.
3. Remove capscrew (242) and load chain stopper (241).
4. Remove bottom block assembly (400).
5. Cut new load chain to length. Load chain must have an even number of links (first and last links must be at 90° to each other).
6. Run hoist slowly in the lifting direction until the load chain free end is approximately 2 ft (60 cm) from the hoist.
7. Using a "C" link (Ref. Dwg. MHTPA0016) which is the same size as the load chain join the new load chain to the old taking care that the weld on the perpendicular "standing" links on the new load chain are facing away from the hoist load sheave. Feed new load chain alphabetically as indicated on Dwg. MHTPA0428.

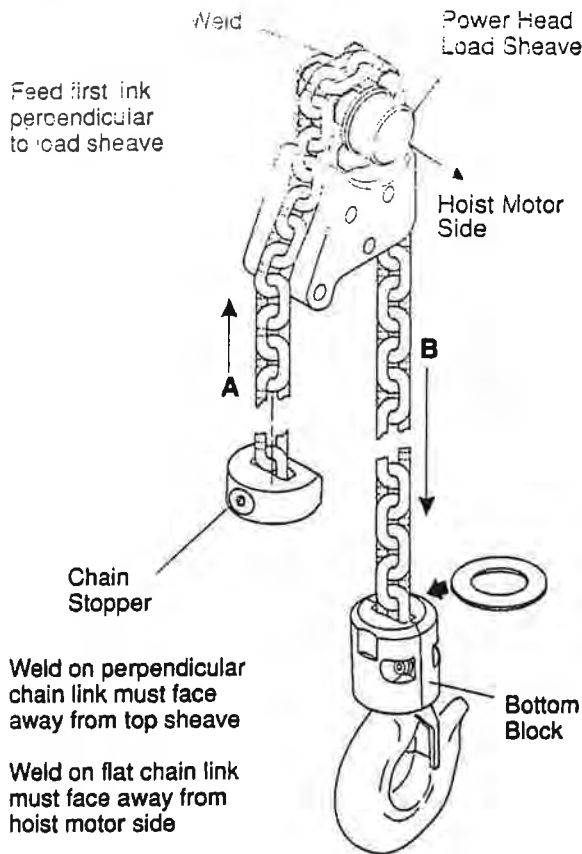


"C" Link

(Dwg. MHTPA0016)

8. Run the hoist slowly until the new load chain has passed 2 to 3 feet (60 to 90 cm) through the hoist. Remove the "C" link and old chain.
9. Install chain stopper (241) in last link of the load chain free end and secure with capscrew (242).
10. Install bottom block assembly (400).
 - a. Install washer on load chain for hoists equipped with limit switches.

1. Lubricate entire length of load chain before operating hoist. Refer to "LUBRICATION" section.



(Dwg. MHTPA0428)

Chain Replacement

HA1-010 Hoist (Ref. Dwg. MHTPA0337)

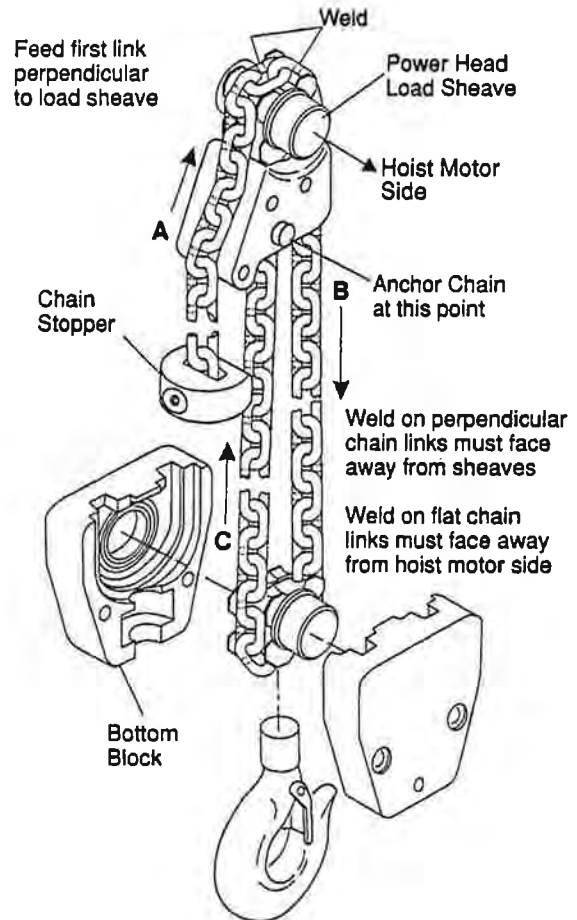
1. The hoist should be hung and connected to the air supply. Reduce hoist air pressure to 60 psi (4 bar).
2. Remove chain bucket, if used.
3. Remove capscrew (242) and load chain stopper (241).
4. Run hoist slowly in the lifting direction until the bottom block assembly (400) is approximately 3 ft (1 m) from the hoist power head. Firmly support and secure the bottom block assembly (400) in this position.



• Do not begin chain replacement until bottom block assembly is fully secured and supported. If the bottom block assembly or chain are dropped, they could cause injury or damage property.

5. Cut new load chain to length. Load chain must have an even number of links (first and last links must be at 90° to each other).
6. Remove capscrew (48) and nut (46) which anchor the load chain to the chain stripper (45) on the power head assembly.

7. Using a "C" link (Ref. Dwg. MHTPA0016) which is the same size as the load chain join the new load chain to the free end on the old chain taking care that the weld on the perpendicular "standing" links on the new chain are facing away from the hoist load sheave.
3. Run the hoist slowly until the new load chain has passed through the hoist. Continue running hoist and pull chain by hand through bottom block assembly (400). Begin feeding chain at position 'A' and work alphabetically. Remove the "C" link and old chain.
9. Anchor the end of the load chain to the power head assembly with capscrew (48) and nut (46). Install chain stopper (241) in last link of load chain free end and secure with capscrew (242).
10. Lubricate entire length of load chain before operating hoist. Refer to "LUBRICATION" section.



(Dwg. MHTPA0337)

Chain Replacement

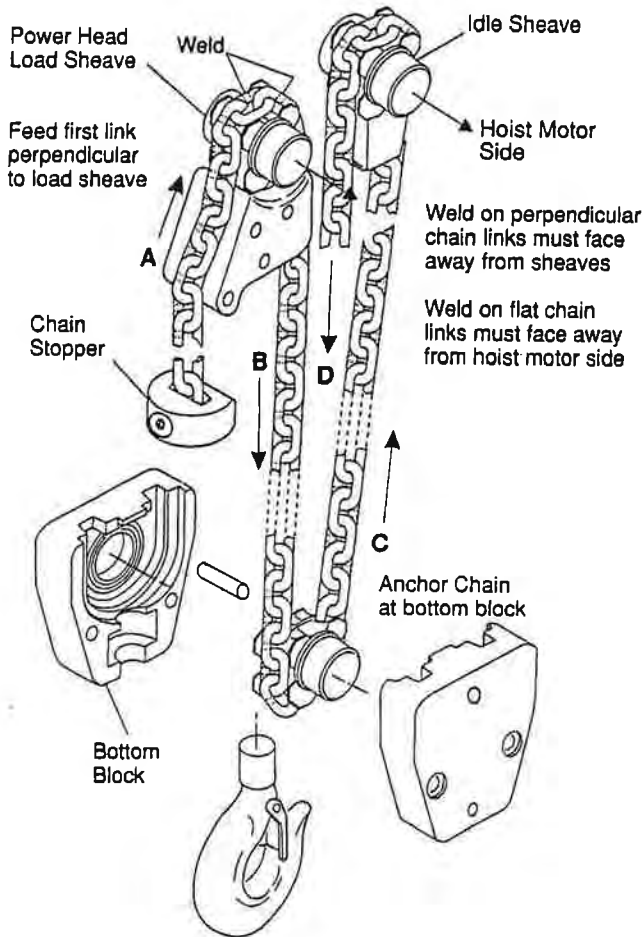
HA1-015 Hoist (Ref. Dwg. MHTPA0516)

1. The hoist must be hung and connected to the air supply. Reduce hoist air pressure to 60 psi (4 bar).
2. Remove chain bucket, if used.
3. Remove capscrew (242) and load chain stopper (241).
4. Run hoist slowly in the lifting direction until the bottom block assembly (400) is approximately 3 ft (1 m) from the hoist power head. Firmly support and secure the bottom block assembly (400) in this position.

⚠ WARNING

• Do not begin chain replacement until bottom block assembly is fully secured and supported. If the bottom block assembly or chain are dropped, they could cause injury or damage property.

5. Cut new load chain to length. Load chain must have an odd number of links (first and last links must be in the same plane/parallel to each other).
6. Remove plug (408) and pin (402) which anchor load chain to bottom block assembly.
7. Using a "C" link (Ref. Dwg. MHTPA0016) which is the same size as the load chain join the new load chain to the free end on the old chain taking care that the weld on the perpendicular "standing" links on the new chain are facing away from the hoist load sheave.



(Dwg. MHTPA0516)

8. Run the hoist slowly until the new load chain has passed through the hoist. Continue running hoist and pull chain by hand through the bottom block assembly (400). Begin feeding chain at position 'A' and work alphabetically. Remove the "C" link and old chain.

9. Attach the end of the load chain to the bottom block assembly with pin (402) and plug (408). Install chain stopper (241) in last link of load chain free end and secure with capscrew (242).
10. Lubricate entire length of load chain before operating hoist. Refer to "LUBRICATION" section.

Chain Replacement

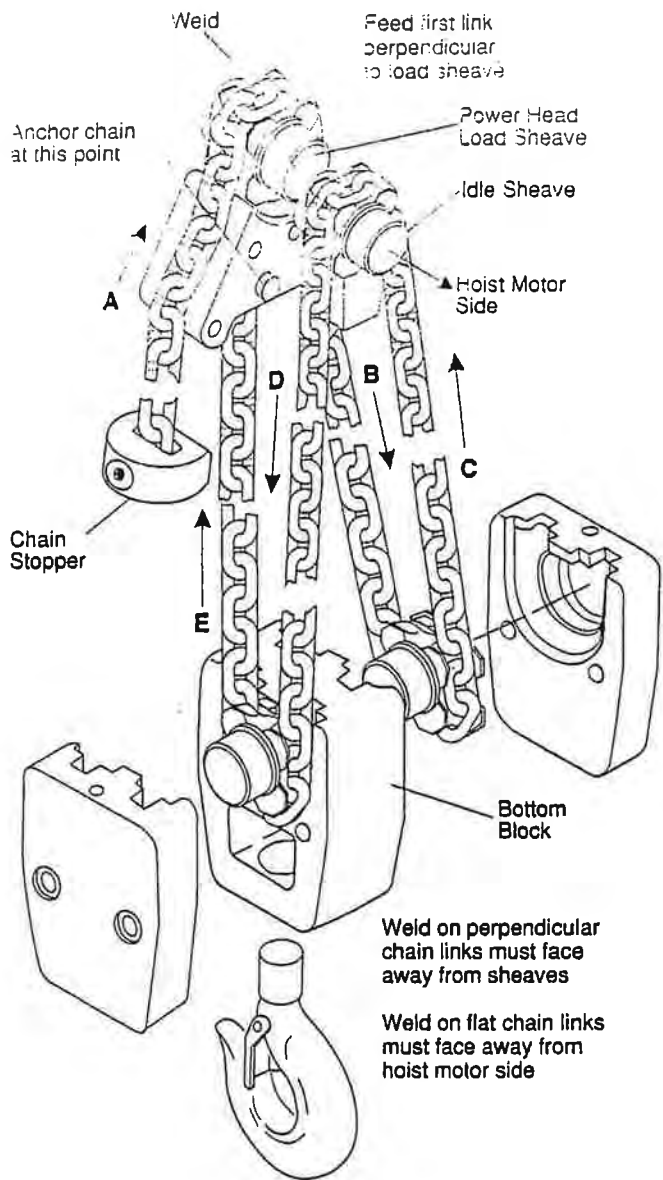
HA1-020 Hoist (Ref. Dwg. MHTPA0331)

1. The hoist must be hung and connected to the air supply. Reduce hoist air pressure to 60 psi (4 bar).
2. Remove chain bucket, if used.
3. Remove capscrew (242) and load chain stopper (241).
4. Run hoist slowly in the lifting direction until the bottom block assembly (400) is approximately 3 ft (1 m) from the hoist power head. Firmly support and secure the bottom block assembly (400) in this position.

⚠ WARNING

• Do not begin chain replacement until bottom block assembly is fully secured and supported. If the bottom block assembly or chain are dropped, they could cause injury or damage property.

5. Cut new load chain to length. Load chain must have an even number of links (first and last links must be at 90° to each other).
6. Remove retainer ring (79) and pin (78) which anchor load chain to the chain stripper on the power head assembly.
7. Using a "C" (Ref. Dwg. MHTPA0016) link which is the same size as the load chain join the new load chain to the free end on the old load chain taking care that the weld on the perpendicular "standing" links on the new load chain are facing away from the hoist load sheave.
8. Run the hoist slowly until the new load chain has passed through the hoist. Continue running hoist and pull chain through the bottom block assembly (400). Begin feeding chain at position 'A' and work alphabetically. Remove the "C" link and old chain.
9. Anchor the end of the load chain to the power head assembly with pin (78) and retainer rings (79). Install chain stopper (241) in last link of load chain free end and secure with capscrew (242).
10. Lubricate entire length of load chain before operating hoist. Refer to "LUBRICATION" section.



(Dwg. MHTPA0331)

General Disassembly

The following instructions provide the necessary information to disassemble, inspect, repair, and assemble the hoist. Parts drawings of the hoist assembly are provided in the Parts Section.

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

1. Turn off air system and depressurize air lines before performing any maintenance. Disconnect hoses from hoist and trolley. Plug or cap openings to keep out dirt and contaminants.

2. 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.
3. 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.
4. 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.

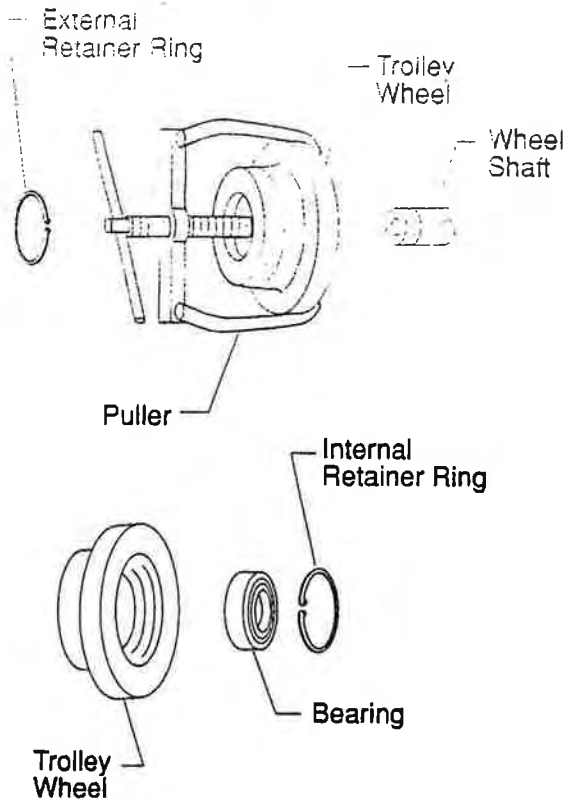
In general, the hoist is designed to permit easy disassembly and assembly. The use of heat or excessive force should not be required.

5. Keep the work area clean to prevent dirt and other foreign matter from getting into bearings and other moving parts.
6. All seals, 'O' rings and back-up rings should be discarded once they have been removed. New seals, 'O' rings and back-up rings should be used when assembling the hoist.
7. When grasping a part in a vise, always use leather or copper covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and machined surfaces.
8. Do not remove any part which is press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.
9. To avoid damaging bearings during hoist assembly or disassembly always tap or press on the bearing inner race for shaft fit bearings or the outer race for bore fit bearings.

Trolley Disassembly

(Ref. Dwg. MHTPC0530)

1. On motorized trolley's remove capscrews (236) and lockwashers (235) then separate trolley drive assembly from side plate (173).
2. Remove cotter pin (178) and pin (177) from suspension shaft (174).
3. Remove side plate (150) or (173) and spacers (157) from suspension shafts (174). Record the position of spacers (157) for later reassembly.
4. Remove hoist assembly from suspension shafts (174) with remaining spacers (157), (175) and (176).
5. Remove capscrews (162) and nuts (164) from side plate (150) and pull out suspension shafts (174).
6. Remove retainer ring (156) and spacer (155) and pull wheels (153) or (172) from side plates.



(Dwg. MHTPA0414)

7. Remove oil seal (151) and retainer ring (152) from wheels (153) or (172). Press bearing (154) out of wheels (153) or (172). Refer to Dwg. MHTPA0414.

Hand Chain Trolleys

(Ref. Dwg. MHTPA0528)

- a. Remove split pin (294), nut (293) and washer (292) from pinion extension (287).
- b. Remove handwheel (290) and washer (288).
- c. Remove retainer rings (289) and bushings (295).
- d. Pull pinion extension (282) from trolley side plate.

Power Head Disassembly

(Ref. Dwg. MHTPD0506, MHTPC0519 and MHTPC0520)

1. Disconnect all hoses from hoist motor. On trolley mounted hoists remove hoist assembly from trolley. Drain oil from reduction gear assemblies, brake and motor assembly. Position power head assembly vertically so brake end is up.
2. Remove four capscrews (86) and lockwashers (235) and pry motor assembly (328) from adapter (67). Check location of pinion (64) it may remain attached to the motor crank shaft assembly. Remove gasket (68). Set motor assembly to one side. Refer to piston motor disassembly if motor repairs are required.
3. Remove capscrews (70) and lockwashers (69). Pry motor adapter (67) from ring gear (56) and reducer adapter (50).
4. Remove planet gear assembly and ring gear (56).

5. Position power head assembly so motor end is down. Remove four capscrews (113) and lockwashers (235) which secure brake assembly (1) to brake adapter (5). Remove brake cover (116) and gasket (115). Pull brake assembly (1) and gasket (115) from brake adapter.
6. Remove capscrews (3) and lockwashers (4). Pry brake adapter (5) from ring gear (7). Carefully pull out input shaft (53).
7. Remove planet gear assembly, ring gear (7) and thrust washers (8) from internal gear (17).
8. Remove capscrews (18), (19) and nuts (22) from large gear housing (26).
9. Pry large gear housing (26) from top frame (38). On 20 ton hoists also remove frame drive side (82).

15 ton Hoist Only

Remove capscrews (76) and retainer plates (75) from large gear housing (26) and reducer adapter (50).

10. Remove stud (33), chain stripper (45) and pins (49). Tap out load sheave (44) with bearings (28).

15 and 20 ton Hoists

Remove idle stripper (73) and idle sheave (74).

11. Pull bearings from load sheave (44) and remove 'O' ring retainers (32), 'O' rings (30) and quad rings (29). On 15 and 20 ton hoists also pull bearings from idle sheave (74).
12. Pry reducer adapter from top frame (38). On 20 ton hoists also remove frame idle side (83).
13. Drive out pin (43) and unscrew nut (42) from threaded hook section. Remove bearing (40).
14. Pull hook (36) from top frame (38).
15. Remove screws (34) and inserts (35).

If planet gear assemblies require disassembly proceed as follows:

16. Using a punch with a diameter slightly smaller than the spring pin hole in the planet carrier tap pins (11) or (60) completely into the center of planet gear pins (14) or (62).
17. Tap planet gear pins (14) or (62) out of planet carrier (9) or (63). Remove planet gears (16) or (59), thrust washers (10) or (52) and needle rollers (12) or (58). Avoid dropping or loosing needle rollers as they are removed from planet gears.

Brake Disassembly

(Ref. Dwg. MHTPB0527)

1. Position brake assembly with shaft protrusion downward. Capscrews (118), lockwashers (117), brake cover (116) and gasket (115) should have been removed during disassembly of brake from the power head assembly.
2. Alternately and evenly loosen capscrews (114) until brake spring compression is relaxed. Remove capscrews (114), washers (113) and housing (93).

3. The following parts can now be removed: spring retainer (95), primary disc (99), rotating discs (100), springs (96), stationary discs (102) and pins (98).
4. Further disassembly is not recommended and should not be attempted unless necessary for the replacement of specific parts, i.e., seal (90), retainer ring (91), bearing (92), and shaft (97) from housing (93). If necessary proceed as follows:
 - a. Remove seal (90). The seal will be damaged in the process and must be replaced. Be extra careful not to damage the adjacent bearing seal.
 - b. Remove retainer ring (91), then shaft (97) with bearing (92) by lightly tapping the shaft with a plastic mallet.
 - c. Remove shaft from bearing by supporting the inner race of the bearing and applying pressure to the shaft.
5. Remove the piston (103) from the power plate (109) by introducing low pressure air 15 psi (1 bar) into the air inlet port. Make sure piston is directed away from the operator.
6. Remove O-rings (105 and 107) and back-up rings (104 and 106) from the grooves in the piston bore and on the outside diameter. Back-up rings will be damaged and should not be removed if replacement is not planned. Remove retainer ring (91) from power plate (109). Bearing (92) may be removed by tapping it lightly with a plastic mallet.

Top Hook Disassembly

Hook Mount Hoist

(Ref. Dwg. MHTPD0506)

1. Remove hoist from mounting structure.
2. The top hook can only be removed after partial disassembly of the power head assembly. Refer to power head disassembly for instructions.

Bottom Block Disassembly

HA1-005 Hoist

(Ref. Dwg. MHTPA0503)

1. Remove capscrews (405), lockwashers (403) and nuts (404) securing side blocks (401). Pry side blocks (401) apart.
2. Remove pin (402).
3. Drive out pin (43) and remove nut (42) on threaded hook section. Remove bearing (40).

HA1-010 Hoist

(Ref. Dwg. MHTPA0512)

1. Always make sure load chain is removed before disassembly.
2. Remove capscrews (405), lockwashers (403) and nuts (404) securing side blocks (401). Pry side blocks (401) apart.
3. Drive out pin (43) and unscrew nut (42) from threaded hook section. Remove bearing (40).
4. Remove sheave assembly and pull bearings (406) from sheave (407).

HA1-015 Hoist

(Ref. Dwg. MHTPA0513)

1. Always make sure load chain is removed before disassembly.
2. Remove plug (408) and pin (402) if not already done for load chain removal.
3. Remove capscrews (405), lockwashers (403) and nuts (404) securing side blocks (401). Pry side blocks (401) apart.
4. Drive out pin (43) and unscrew nut (42) from threaded hook section. Remove bearing (40).
5. Remove sheave assembly and pull bearings (406) from sheave (407).

HA1-020 Hoist

(Ref. Dwg. MHTPB0514)

1. Always make sure load chain is removed before disassembly.
2. Remove capscrews (405), lockwashers (403) and nuts (404) securing side blocks (401) to hook center block (409) and pry side blocks (401) from both sides of hook center block (409).
3. Drive out pin (43) and unscrew nut (42) from threaded hook section. Pull hook (36) from hook center block (409) and remove bearing (40).
4. Remove sheave assemblies and pull bearings (406) from sheaves (407). Remove retainer ring (410) from hook center block (409).

Trolley Drive Disassembly

(Ref. Dwg. MHTPC0306)

1. Remove capscrews (236) and lockwashers (235) then pull trolley drive assembly from trolley side plate (173).
2. Remove retainer ring (180) and drive gear (182) from shaft (208).
3. Remove capscrews (234) and lockwashers (233) from reducer adapter (232). Carefully pry reducer adapter (232) from housing (212).
4. Remove spacer (230) and sleeve (229) from shaft (208). Remove oil seal (228) from reducer adapter (232). Pull shaft (208) with worm gear (226) and bearing (cones) (205) from housing (212).
5. Remove motor adapter (220) from housing (212) with bearing cup (218).
6. Remove four screws (200), cover (225) and cover shims.
7. Pull worm (214) from housing (212).
8. Carefully pull bearing cones (217) from worm (214).
9. Remove oil seal (219) from motor adapter (220).
10. Pull bearing cup (218) out of cover (225).
11. Remove screws (200), cover (202) and gaskets (203) from housing (212).
12. Remove worm gear (226) from shaft (208).
13. Remove bearing cone (205) and spacer (206).

Piston Motor Disassembly

(Power Head and Trolley Drive)

(Ref. Dwg's. MHTPC0380 and MHTPC0381)

Remove the motor assembly (328 or 329) from the power head or trolley drive assembly and move to a clean work area.

Drain the oil from the motor housing (369) into a suitable container by removing pipe plug (379).

Disassembly and re-assembly will be simplified if the crankshaft (354) is held vertically in a soft-jawed vice or supported vertically on suitable packing, to raise the shaft clear of the work surface.

1. Remove capscrews (334) and valve assembly (625).
2. Remove capscrews (340) and cover (339).
3. Remove capscrews (334) and rotary valve housing (332).
4. Support the rotary valve housing evenly on the flange face. Tap rotary valve (337) out of rotary valve housing (332) from inside outwards. The normal clearance between the rotary valve (337) and rotary valve housing (332) is 0.002 - 0.003 in. (0.05 - 0.075 mm). Replace parts if wear is excessive.
5. Remove the retaining ring (335) and bearing (336) from rotary valve housing (332).
6. Remove setscrew (346) and balance weight (345). Remove spacer washers (347) and note the thickness for subsequent re-assembly.

Instructions 7 through 9 apply to the Trolley Motor Only.

7. Remove the ring (351) now exposed.
8. Remove capscrews (334) and cylinders (375) from motor housing (369). Slide connecting rod (349) along the bearing (352) towards the open end of the motor housing (369), until the connecting rod slipper end is clear of the ring (351). Push out the complete piston assembly, from inside the motor housing (369).
9. When all four piston assemblies (373) have been removed, remove the bearing (352), ring (351) and spacer (353).

Instructions 7A through 9A apply to the Power Head Motor Only.

- 7A. Remove pins (348). This procedure can be accomplished with a bent rod to apply pressure from inside outwards.
- 8A. Remove capscrews (334) and cylinders (375) from motor housing (369). Push out the complete piston assembly, from inside the motor housing (369).
- 9A. When all four piston assemblies (373) have been removed, remove the bearings (352), crank (350) and spacer (353).

Instructions 10 through 12 apply to both the Power Head and Trolley Motors.

10. Remove the retainer ring (366) and spacer (367) and shims (365).

11. Press out crankshaft (354), aligning oil thrower with opening in motor housing (369).
12. Clean off jointing compound from rotary valve housing bore (332) and the outside of the valve bush (336) with "Hermetite" 1325B solvent or similar.

Vane Motor Disassembly (Trolley Drive)

Optional Feature

(Ref. Dwg. MHTPB0379)

1. Remove capscrews (262) from cover (260) and pull vane motor assembly from trolley drive assembly.
2. Remove capscrews (273) and (274). Pull pilot control valve (270) from valve manifold (267).

Pilot control valve (270) repair should be limited to the removal of the end caps, bushings and plunger to replace the 'O' rings. See Dwg. MHTPB0407.

3. Remove capscrews (268) and valve manifold (267) from cylinder (256).
4. Remove capscrews (265) and pry cover (260) from cylinder (256).
5. Remove cover (253) from cylinder (256).
6. Slide shaft and rotor (259) from cylinder (256). Be careful not to drop or damage vanes (258) during removal.
7. Remove capscrews (264) and cap (263) from cover (260).
8. Tap bearings (251) from motor adapter (220) and cover (260).

Cleaning, Inspection and Repair

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

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.
- Do not use trichloroethylene to clean parts.

Clean all hoist component parts in solvent (except for the friction discs). The use of a stiff bristle brush will facilitate the removal of accumulated dirt and sediments on the gears and frames. If bushings have been removed it may be necessary to carefully scrape old Loctite® or gasket material from the bearing bores and gasket surfaces. 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 shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace the shaft.
4. Inspect all threaded items and replace those having damaged threads.
5. Measure the thickness of the friction rotating discs (100). If the friction rotating discs are less than 0.200 in. (5.08 mm), if oil groove pattern is not clearly visible or surfaces are heavily scored replace the friction rotating discs (100). Thickness of a new friction rotating disc is 0.226 in. (5.74 mm).
6. Check mufflers (266), (144) and (145) for damage or excessive dirt.
8. Check bearings for freeness of rotation and wear. Replace bearings if rotation is rough or bearings are excessively worn.

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.

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 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 seals, 'O' rings and gaskets.

Assembly Instructions

Trolley Assembly

(Ref. Dwg. MHTPC0530)

Preassemble side plate on Hand Chain Trolleys. Skip to instruction 1 for Plain and Motorized Trolleys.

- a. Lubricate and install bushings (286) and pinion extension (287) in side plate (173). Install spacer (285) and retainer ring (179).
- b. Install washer (288) and handwheel (290) on pinion extension. Ensure splines in handwheel align with splines on pinion extension.
- c. Install bushings (295) in side frame (173) and secure with retainer rings (289).
- d. Install washer (292) and nut (293). Tighten nut until snug and back off approximately one quarter turn until cotter pin hole is aligned. Install cotter pin (294) and bend ends apart.
1. Press bearings (154) into wheels (153) or (172). Install retainer rings (152) and oil seals (151) in wheels (153) or (172).

2. Lubricate oil seal lips with grease then install wheels (153) or (172) on side plates. Install spacers (155) and retainer rings (156).
3. Coat suspension shaft (174) ends with grease then install in side plate (150). Install capscrews (162) and nuts (164).
4. Install spacers (157), (175) and (176) in same location as noted during disassembly. Slide assembled side plate and suspension shafts through holes in hoist frame. Install remaining spacers.
5. Install side plate (173). Install pins (177). Secure pins (177) with cotter pins (178) and bend ends apart.
6. Install beam roller guides and bumpers if used.
7. Install trolley drive assembly on side plate (184). Refer to "INSTALLATION" section for trolley adjustment procedure.

Power Head Assembly

(Ref. Dwg. MHTPD0506, MHTPC0519 and MHTPC0520)

Preassemble planet gear assemblies:

- a. Use a liberal amount of grease on each needle roller (12) or (58). Position needle rollers in bore of planet gears (16) or (59). Use sufficient grease to hold needle rollers in position.
- b. Install planet gear in planet carrier and carefully slide or tap planet shaft (14) through planet carrier and gear. Align pin holes.
- c. Install pins (11) or (60).

NOTICE

- Never use pins that are longer than the diameter of planet shaft or later removal will not be possible.

Assemble brake and planet gear assemblies prior to beginning assembly of power head.

1. Ensure flanged sleeve is tight in reducer adapter (50) and that flange side of sleeve is toward chain sheave.
2. Lubricate and install 'O' rings (30) and quad rings (29) in grooves provided in 'O' ring retainers (32). Install assembled 'O' ring retainers on sheave(s) with seal side facing away from the sheave. Use a small amount of Loctite® 609 on bearing bores and press a bearing (28) onto each side of the sheave(s). Press needle bearing (54) into bore of sheave (44).
3. Install chain stripper (45) on reducer adapter (50) and locate with two pins (49) or one pin (49) and one pin (77) on 20 ton hoists. Install a short length of 16 mm starter chain around sheave(s).

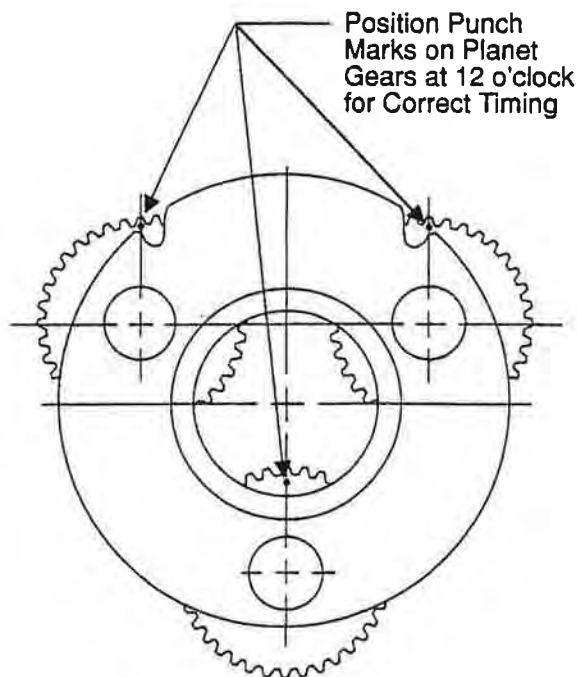
On 15 ton hoists install retainer plate (75) on reducer adapter (50) with four capscrews (76).

On 15 and 20 ton hoists install idle sheave (74) and idle stripper (73). Position idle stripper with pins (49) and (77) on 15 ton hoists and pins (77) and (85) on 20 ton hoists.

4. Install inserts (35) in top frame (38). On 20 ton hoists install one insert on frame drive side (82). Apply Loctite® 242 to flat head screws (34) and secure inserts on each side.
5. Install top frame (38) so it fits over 16 mm starter chain(s). Install capscrews (18) and (19). On 20 ton hoists also install frame idle side (83).
6. Position bearing (40) and nut (42) in top frame (38) and install hook (36) through top frame and bearing. Tighten nut until parts clamp top frame. Back nut off until first dowel pin hole is lined up. Install pin (43). Do not attempt to drive dowel pin (43) into nut until holes are aligned or threads on hook (36) will be damaged. Pack cavity with grease.
7. Ensure flanged sleeve is tight in large gear housing (26) and that flange side of sleeve is toward chain sheave.
8. Apply Loctite® 609 to the bearing outside diameter and sleeve inside diameter in large gear housing (26). Install large gear housing on top frame (38) install studs (33) with nuts (22). On 20 ton hoists also install frame drive side (82). Install remaining nuts (22) and (52). Torque capscrews or nuts to 500-550 lbs. ft. (675-745 N.m). On 15 ton hoists install retainer plate (75) on large gear housing (26) with capscrews (76).

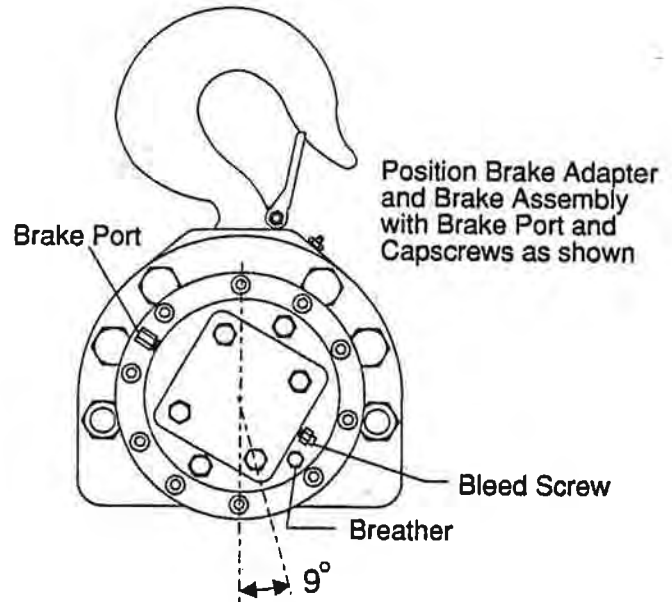
Position Power Head assembly on bench with splined end of load sheave up.

9. Install thrust washer (27) on load sheave (44) spline. Install internal gear (17) on spline of load sheave. Install thrust washer (8).
10. Set timing marks on planet gears and install planet gear assembly in internal gear. (Ref. Dwg. MHTPA0508).



(Dwg. MHTPA0508)

11. Lubricate and install 'O' ring (6) in bore of large gear housing (26). Install ring gear (7). Ring gear may be installed either way. Align capscrew holes.
12. Lube and install 'O' ring (5) in bore of brake adapter (5).
13. Grease thrust washer (8) and place on boss in brake adapter (5) to keep in place as it is assembled.
14. Install brake adapter (5). Position brake adapter so capscrew holes for brake assembly match drawing MHTPA0543.



Viewed from Brake Side

(Dwg. MHTPA0543)

15. Install ten capscrews (3) and lockwashers (4) to secure brake adapter (5) to ring gear (7) and large gear housing (26). Torque to 45 lbs. ft dry or 36 lbs. ft. lubricated (61 N.m dry or 50 N.m lubricated).
16. Install drain plugs (23) in large gear housing (26).
17. Install input shaft (53) so gear meshes with planet gears (16). On 20 ton hoists install spacers (78) in the end of input shaft (53) to establish 0.12 in. (3 mm) end play.
18. Install gasket (115) on brake assembly and install brake assembly on brake adapter (5) so brake release port is in line with brake tube hole through top frame (38). When viewed from brake end, it must be located in the 10 o'clock position. Ref. Dwg. MHTPA0543.
19. Position gasket (115) and brake cover (116) on brake assembly. Secure brake assembly in position with capscrews (118) and lockwashers (235). Torque to 63 lb.ft. (85 N.m).

20. Turn power head over so motor end is up. Install spacer (55) on input shaft (53). Install planet gear assembly to spline fits over input shaft. Install plug (66) in motor adapter (67). Apply Loctite® 515 sealant to ring gear (56) face and install ring gear on reducer adapter (50) so it fits over planet gear assembly. Planet gears do not require to be timed. Align capscrew holes.
21. Apply Loctite® 515 to outer face of ring gear (56) and install motor adapter (67) on ring gear. Position motor adapter so plug is located at the bottom (6 o'clock position). Install capscrews (70) and lockwashers (69) to secure motor adapter and torque to 65 to 70 lb. ft. (88 to 95 N.m).
22. Install key (355) and pinion gear (64) on motor crank shaft assembly (354). (refer to instructions for motor assembly.) Install gasket (68) on motor mounting face.
23. Install motor assembly (328) on motor adapter so motor oil filler and valve are to the top. Apply a small amount of Loctite® 242 on capscrew (86) threads and install with lockwashers (235). Torque to 110 lb.ft. (150 N.m).
24. Install valve assembly (625) on motor assembly (238). Ensure gasket (330) is in place. Secure with four capscrews (334). Install piping fittings in valve assembly. Ref. Piping Dwg. MHTPB0552.
25. Install elbow fittings (142) and (143) and mufflers (144) and (145) in valve and motor assembly exhaust ports. Ref. Muffler Dwg. MHTPA0540.
26. Install dump valve (676), brake tube (674) and fittings between valve and brake release port. To prevent brake tube rubbing in the bore of the top frame, install a 5 in. (130 mm) length of 1/4 in. hose material on the outside diameter of brake tube (674). Position brake tube and hose so that it passes through the hole provided in the top frame.
27. Connect pendant hoses. If hoist is equipped with limit switches, pendant hoses connect to the limit switches. If hoist does not have limit switches, pendant hoses connect to the fittings on the valve assembly.

Brake Assembly

(Ref. Dwg. MHTPB0527)

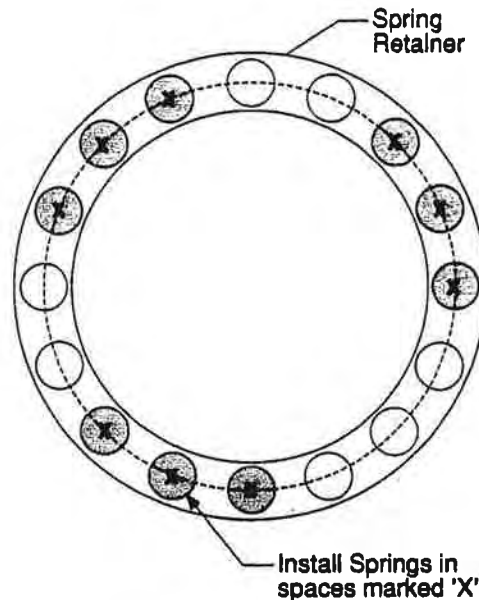
NOTICE

• All parts must be thoroughly clean prior to reassembly.

1. Install retainer ring (91) and bearing (92) in power plate if previously removed.
2. Lubricate and install 'O' Rings (105 and 107) and back-up rings (104 and 106) on piston (103).
3. Assemble piston (103) into power plate (109) using a shop press, being careful not to damage the 'O' rings or the Teflon back-up rings. Visually align the center of the cutouts in the piston (103) with the torque pin (98) holes in the power plate (109).

If the shaft and housing were disassembled follow instructions 4 through 6 otherwise skip to instruction 7.

4. Install bearing on shaft (97) by supporting the inner race of the bearing (92) and applying pressure to the shaft.
5. Insert the shaft and bearing in housing (93) and push into position. Secure with retainer ring (91).
6. Install new seal (90).
7. Install spring retainer (95) and springs (96). Position springs as shown in Dwg. MHTPA0525.



(Dwg. MHTPA0525)

8. Install pins (98) in housing (93). Install primary disc (99) so that the outside slots locate with the pins.
9. Alternately install the rotating discs (100) and stationary discs (102) in housing (93).
10. Alternately tighten capscrews (119) to prevent binding, until snug. Then torque the capscrew to 75 to 85 lb. ft. (100 to 115 N.m) Note: Both shafts must slide together freely. **DO NOT** use capscrews to force the brake assembly together.
11. Install gasket (115) and brake cover (116). Secure in position with capscrews (118) and lockwashers (117).
12. Install gasket (115) on the mounting face of the brake.
13. Place the brake shaft into the gear reducer with the brake fitting (108) in the vertical position.
14. Re-connect air line to the brake port fitting (108).

Trolley Drive Assembly

(Ref. Dwg. MHTPC0306)

1. Press or tap bearing cup (218) into housing (212) on cover (225) side.
2. Place shims (222, 223 and 224) on shoulder of cover (225).
3. Install cover (225) and gaskets on housing (212). Secure with four screws (200).
4. Press bearing cones (217) onto worm (214). Ensure bearings are fully seated against worm shoulder. Install worm and bearings in housing (212). Tap or press second bearing cup (218) into housing bore.

5. Tap or press bearing cup (204) into cover (202). Place gaskets (203) on shoulder of cover (202).
6. Install cover (202) and gaskets on housing (212). Secure with six screws (200).

NOTICE

• Rotate cover (202) so oil level hole is in the 3 o'clock position.

7. Install keys (207) in shaft (208) and press worm gear (226) onto shaft making sure it aligns with and fits over the keys (207).
8. Install spacers (206) and (227) on shaft. Press bearing cones (205) on shaft (208) until they contact the spacers.
9. Install shaft and worm gear assembly in gear housing (212) so worm gear teeth mesh with worm.
10. Tap or press bearing cup (204) into reducer adapter (232).
11. Install reducer adapter (232) and gaskets (203) on housing (212). Secure with capscrews (234) and lockwashers (233). Check to see if shaft (208) turns freely without binding or moving from side to side.

NOTICE

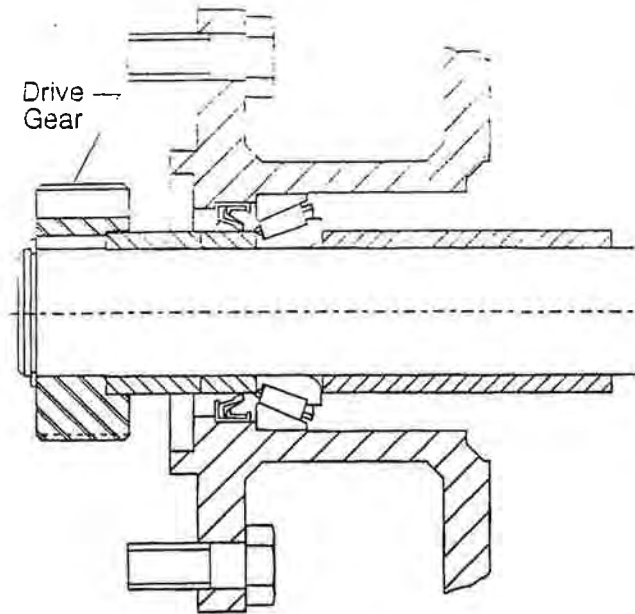
• Adjust gasket (203) quantity to provide zero side to side motion of the worm gear assembly.

12. Install oil seal (219) in motor adapter (220) so oil seal lip faces into the housing.
13. Install oil seal (228) in reducer adapter (232) so lip faces into the housing.
14. Install motor adapter (220) on housing (212) and secure with screws (200) (piston motor) or screws (234) (vane motor).
15. Install spacer (230) on shaft (208). Take care not to damage the lip of oil seal (228).
16. Install key (183) in shaft (208). Slide drive gear (182) onto shaft (208) so it aligns with and fits over key (183). Install retainer ring (180). Ensure drive gear (182) is installed with recessed side correctly positioned. Ref. Dwg. MHTPA0504.

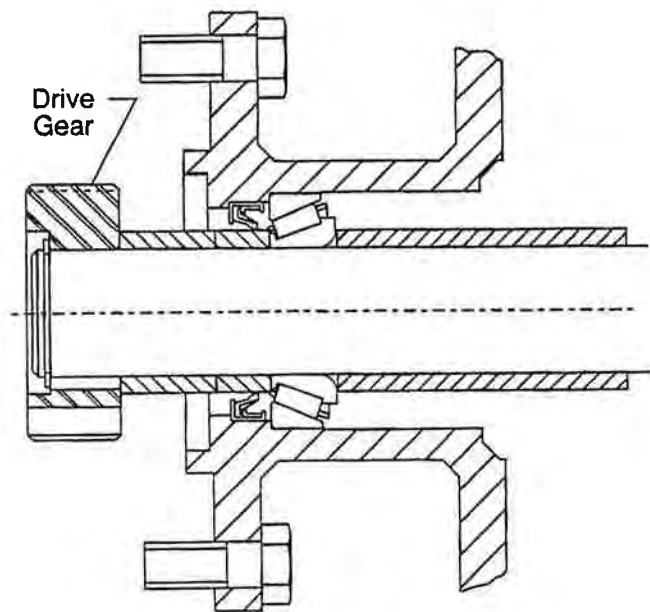
NOTICE

• The first bearing cup (218) must be flush against cover (225) for accurate backlash reading.

17. Rotate worm to check for tight spots and to see if backlash is between 0.004 - 0.008 in. (0.10 - 0.20 mm). Adjust shims (222, 223 or 224) until correct backlash is achieved.



HA1-005, HA1-010 and HA1-015 Hoists
Install Drive Gear with recess on Retainer Ring side



HA1-020 Hoist
Install Drive Gear with recess on Bushing side

(Dwg. MHTPA0504)

Piston Motor Assembly (Power Head and Trolley Drive) (Ref. Dwg. MHTPC0381)

1. Install oil seal (358) and bearings (356) on crankshaft (354). Lip of oil seal (358) must face into motor housing (369). Tap assembled parts into position in flange plate (363).
2. Install shims (365), spacer (367) and retainer ring (366) on the end of crankshaft (354).

3. Lubricate and install 'O' ring (368) on flange plate (363). Align oil-thrower on crankshaft (354) with opening in motor housing (369) and assemble flange plate to motor housing (369) with screws (364).
4. Clamp the crankshaft vertically in a soft-jawed vice. (shaft down)
5. Install spacer (353) so radius on inside bore of spacer is toward the crank pin shoulder.
6. Install ring (351) and bearing (352). Radius on inside bore of ring (351) must face outward.
7. Assemble the connecting rods (349) to the pistons (373). Ensure retainer rings (378) are fully seated in the grooves on wrist pins (377). Install the oil rings (370) and compression rings (372) on the pistons (373). Check gap on rings is 0.003 to 0.004 ins. (0.076 to 0.1 mm). **Note:** The upper compression ring (372) is plain and the lower oil ring (370) acts as an oil control.
8. Carefully install the cylinders (375) on pistons. Do not use force during this procedure and avoid damaging oil rings (370) and compression rings (372).
9. Install a gaskets (374) on each cylinder. Insert the piston assemblies into the motor housing (369) bores, with the connecting rod (349) positioned correctly to seat on the needle bearing (352). When the slipper end is seated on the bearing (352), slide the connecting rod (349) inward to enter the ring (351). Install capscrews (334) so they are finger tight. When all cylinders have been installed tighten capscrews (334) evenly.
10. Install second ring (351) with the radius of the bore innermost. Install spacer (347). Rotate crankshaft 360° to ensure parts are correctly fitted.
11. Install rotary valve (337) in rotary valve housing (332). Press bearings (336) and (338) into rotary valve housing (332). Install retainer ring (335).
12. Install balance weight (345). Secure balance weight with setscrew (346).
13. Rotate the crankshaft (354) until the balance weight is at the bottom dead center position, rotate the rotary valve (337) until the balance weight is at the bottom position.
14. Install gasket (331) on rotary valve housing then assembly to motor housing and secure with capscrews (334). Rotate the output shaft in both directions and viewing the rotary valve (337) through the exhaust cover (339) opening ensure that the valve is correctly following the output shaft direction. This checks that both crank and valve slot are correctly engaged.
15. Install cover (339) and secure with capscrews (340).
4. Install cap (263) on cover (260) with capscrews (264).
5. Apply gasket sealant to the motor cylinder (256) surface for cover (253). Use a minimal amount but enough to create a total seal. Install cover (253) to motor cylinder (256).
6. Install dowels (255) to align cover (253) with motor cylinder (256).

NOTICE

• **Replacement rotors and cylinders must be supplied as matched sets in order to maintain the proper end running clearance of 0.002 to 0.004 in. (0.05 to 0.1 mm).**

7. Apply a film of 10W oil to the cylinder wall. Install shaft and rotor (259) in cylinder (256). Place one vane (258) in each rotor slot so that the long straight vane edge is towards the cylinder wall.
8. Apply gasket sealant to the motor cylinder (256) surface for cover (260). Use a minimal amount but enough to create a total seal. Install motor cover (260) to motor cylinder (256). Align cover with dowel pin (255) holes and carefully tap cover (260) into position until flush with the cylinder (256).
9. Install dowel pins (255) in cover (260) and cylinder (256). The relationship of the motor end covers (253) and (260) with motor cylinder (256) is very critical. In order to provide proper running clearance for the rotor, the rotor has to run exactly parallel with the cylinder (256) and perpendicular to the covers. Dowel pins (255) are used to locate these parts within 0.007 in. (0.18 mm) of correct alignment.
10. Install capscrews (256). The correct alignment is established by snugging down the capscrews (265) which retain the covers to the cylinder and checking the motor for free turning. If any drag is noted, tap around the edges of the motor covers until the shaft turns freely. Tighten capscrews to 30 in. lbs. (3.3 N.m).
11. Tap shaft key (257) into the keyway on shaft and motor (259).
12. Install valve manifold (267) on cylinder (256) with capscrews (268).
13. Lubricate and install 'O' rings (269) in recesses in pilot control valve (270). Install pilot control valve (270) on valve manifold (267) secure with capscrews (273) and (274).

Vane Motor Assembly (Trolley)

(Ref. Dwg. MHTPB0379)

1. Install seal (252) in cover (253) so seal (252) is flush with cover face. Seal lip must face towards motor.
2. Install seal (254) in cover (253) so seal lip faces towards the motor.
3. Install bearings (251) in covers (253) and (260) using a small amount of Loctite® 609 on the outside bearing diameter. Pack grease between seal (252) and bearing (251) in cover (253) filling the cavity.

Top Hook Assembly Hook Mounted Hoists

(Ref. Dwg. MHTPD0506)

1. The top hook assembly can only be assembled after partial disassembly of the power head assembly. Refer to the assembly instructions for the power head assembly.

Bottom Block Assembly

HA1-005 Hoist

(Ref. Dwg. MHTPA0503)

1. Pack bearing (40) with grease and install bearing (40) on hook (36) swivel face of bearing (40) should be located nearest the nut (42). Screw nut (42) onto threaded shank of hook (36).
2. Place hook with bearing and nut in one half of side block (401) and tighten nut until parts clamp side block. Back nut off until first dowel pin hole is lined up. Install pin (43). Do not attempt to drive dowel pin (43) into nut until holes are aligned or threads on hook (36) will be damaged.
3. Install pin (402).
4. Pack cavities in side blocks (401) with grease and place side blocks (401) together. Apply a small amount of Loctite ® 242 to capscrews threads and install capscrews (405), lockwashers (403) and nuts (404) to clamp parts. Torque capscrews to 85 lb. ft (115 N.m). Check that hook swivels freely.
5. Install grease fitting (39) and fill block with grease. Refer to "LUBRICATION" section.
6. Check latch is installed and functional.

On 10, 15 and 20 ton hoists it is suggested that a short length of 16 mm chain be available when assembling the bottom block assembly. The chain should be installed around the sheave prior to final assembly of the block sections. If this procedure is followed it will simplify the installation of the load chain later.

HA1-010 Hoist

(Ref. Dwg. MHTPA0512)

1. Pack bearing (40) with grease and install bearing (40) on hook (36) swivel face of bearing (40) should be located nearest the nut (42). Screw nut (42) onto threaded shank of hook (36).
2. Place hook with bearing and nut in one half of side block (401) and tighten nut until parts clamp side block. Back nut off until first dowel pin hole is lined up. Install pin (43). Do not attempt to drive dowel pin (43) into nut until holes are aligned or threads on hook (36) will be damaged.
3. Using a press against the inner race of bearing (406) press the bearing (406) onto the sheave (407). Install bearing so shielded side is toward sheave. Repeat the process for the opposite side.
4. Install the assembled sheave in the bottom block. Pack cavities in side blocks (401) with grease and place side blocks (401) together.

5. Secure side blocks (401) with capscrews (405), lockwashers (403) and nuts (404). Use Loctite® 242 on capscrew threads and torque to 360 lb. ft. (488 N.m).
6. Install grease fitting (39) and fill block with grease. Refer to "LUBRICATION" section.
7. Check latch is installed and functional.

HA1-015 Hoist

(Ref. Dwg. MHTPA0513)

1. Pack bearing (40) with grease and install bearing (40) on hook (36) swivel face of bearing (40) should be located nearest the nut (42). Screw nut (42) onto threaded shank of hook (36).
2. Place hook with bearing and nut in one half of side block (401) and tighten nut until parts clamp side block. Back nut off until first dowel pin hole is lined up. Install pin (43). Do not attempt to drive dowel pin (43) into nut until holes are aligned or threads on hook (36) will be damaged.
3. Using a press against the inner race of bearing (406) press the bearing (406) onto the sheave (407). Install bearing so shielded side is toward sheave. Repeat the process for the opposite side.
4. Install the assembled sheave in the bottom block. Pack cavities in side blocks (401) with grease and place side blocks (401) together.
5. Secure side blocks (401) with capscrews (405), lockwashers (403) and nuts (404). Use Loctite® 242 on capscrew threads and torque to 360 lb. ft. (488 N.m).
6. Install grease fitting (39) and fill block with grease. Refer to "LUBRICATION" section.
7. Install pin (402) and plug (408) when anchoring load chain to bottom block assembly.
8. Check latch is installed and functional.

HA1-020 Hoist

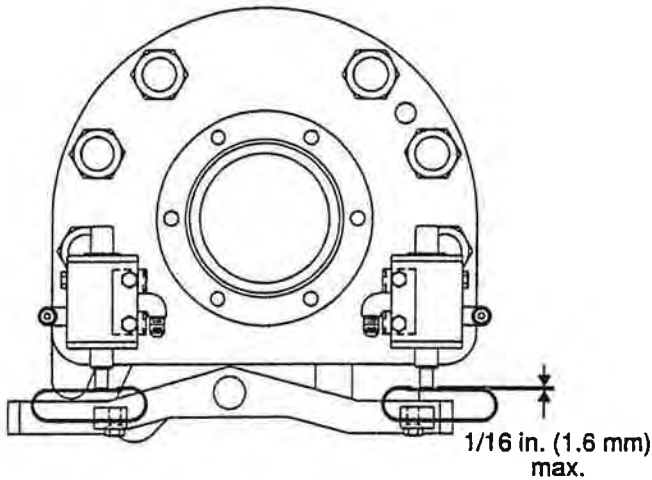
(Ref. Dwg. MHTPB0514)

1. Pack bearing (40) with grease and position bearing (40) in hook center block (409) cavity. Swivel face of bearing (40) should be located nearest the nut (42).
2. Install threaded hook end into hook center block (409) and through bearing (40).
3. Install nut (42) being careful that threads are not crossed. Tighten nut (42) until snug then back nut (42) off until first dowel pin hole is lined up. Install dowel pin (43) until flush with nut (42) diameter. Do not attempt to drive dowel pin (43) into nut until holes are aligned or threads on hook (36) will be damaged.
4. Using a press against the inner race of bearing (406) press the bearings (406) onto both sides of sheaves (407). Install bearings so shielded sides are toward sheaves.
5. Install retainer ring (410) in bore of center block (409).
6. Install the assembled sheaves in the hook center block (409). Pack cavities in hook center block (409) and side blocks (401) with grease.

7. Install side plates (401) over bearings (406) and sheaves (407). Secure side plates (401) with capscrews (405), lockwashers (403) and nuts (404). Use Loctite® 242 on capscrew threads and torque to 525 lb. ft. (712 N.m).
8. Install grease fitting (39) and fill block with grease. Refer to "LUBRICATION" section.
9. Check latch is installed and functional.

Limit Switch (optional feature)

1. Mount limit switches (454) to spacers (450) with capscrews (458), nuts (453) and lockwashers (451). Do not use the slotted holes in spacers for attaching limit switches.
2. Install spacers with limit switches on reducer adapter (50) with capscrews (452) and lockwashers (451).
3. Adjust the position of the limit switch plunger to ensure a maximum of 1/16 in. (1.6 mm) clearance between limit switch plunger and spring (460). Ref. Dwg. MHTPA0544.



(Dwg. MHTPA0544)

Load Test

Prior to initial use, all new, extensively repaired, or altered hoists shall be load tested by or under the direction of a qualified person, and a written report furnished confirming the rating of the hoist. Dynamically load test hoist to 100% of its rated capacity in accordance with ASME B30.16 standards. Testing to more than 100% may be necessary to comply with standards and regulations set forth in areas outside of the USA.

SERVICE NOTES