OPERATION AND MAINTENANCE MANUAL

for

PALAIR AIR CHAIN HOISTS

MODEL 3 CP 1500
(1.5 metric tons)

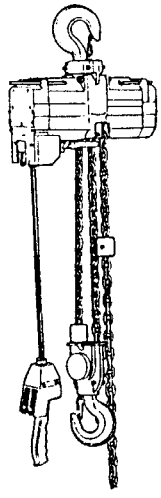
MODEL 6 CP 3000
(3 metric tons)

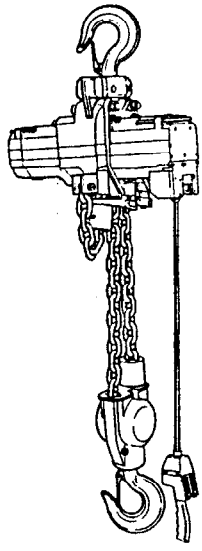
MODEL 12 CP 6000
(6 metric tons)

MODEL 3 CP 3000
(3 metric tons)

MODEL 6 CP 6000
(6 metric tons)

MODEL 12 CP 12000
(12 metric tons)





(1 metric ton = 2200 lbs)

READ THIS MANUAL BEFORE USING THESE PRODUCTS. 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 Office or Distributor.

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Edition 2
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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 must 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 a hazard. 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*** personal 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*** personal 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*** personal 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 or attached equipment for lifting, supporting, or transporting people or lifting or supporting loads over people.
• The supporting structures and load-attaching devices used in conjunction with this hoist must provide an adequate safety factor to handle the rated load, plus the weight of the hoist and attached equipment. This is the customer's responsibility. If in doubt, consult a qualified structural engineer.

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 or pulling 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.

To the best of our knowledge, INGERSOLL-RAND Material Handling hoists are manufactured in accordance with the latest standards in effect at time of manufacture.

However, contrary to common belief, the Occupational Safety and Health Act of 1970, as we understand it, generally places the burden of compliance with the user, 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. Check all applicable industry, trade association, federal, state and local regulations. 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 ANSI/ASME B30.9 for rigging information, American National Standards Institute, 1430 Broadway, New York, NY 10018.

NOTICE

• Using other than genuine INGERSOLL-RAND Material Handling parts will result in the void of warranty.

SAFE OPERATING INSTRUCTIONS

The following warnings and operating instructions have been adapted in part from American National (Safety) Standard ANSI B30.16 and are intended to avoid unsafe operating practices which might lead to personal injury or property damage.
These recommendations apply to hoists used for material handling of freely suspended unguided loads.

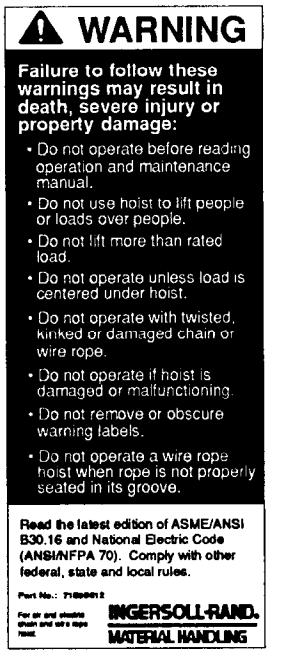
INGERSOLL-RAND recognizes that most companies who use hoists have a safety program in force in their plants. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

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 qualified people (trained in safety and operation) to operate the hoist.
2. Only operate a hoist if you are physically fit to do so.
3. Only allow qualified people (trained in safety, maintenance and troubleshooting) to perform service on hoists.
4. 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.
5. Never use a hoist which inspection indicates is defective.
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 or failure of one hoist.
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

Each hoist is supplied from the factory with the safety label shown. If the label is not attached to your unit, order a new label and install it. See the parts list for the part number. Read and obey all warnings and other safety information attached to this hoist. Label may not be shown actual size.



SPECIFICATIONS

General

The Palair hoist is an air powered hoist designed to lift and lower loads. The Palair hoist hook mounts to the suspension shaft of a trolley or a permanent mounting structure. The air supply line can be strung to the hoist using either cable hangers or cable trolleys.

Specifications

Pressure: 90 psi (6.2 bar)

Model No.	Air Flow (cu ft/min)	(cu m/min)
3 CP 1500	78	2.2
3 CP 3000	78	2.2
6 CP 3000	120	3.4
6 CP 6000	120	3.4
12 CP 6000	120	3.4
12 CP 12000	120	3.4

Model No.	Capacity (metric tons)	Max Lifting Speed With Rated Load (ft/min)	(m/min)
3 CP 1500	1.5	13	4.0
3 CP 3000	3	6	1.8
6 CP 3000	3	10	3.0
6 CP 6000	6	5	1.5
12 CP 6000	6	5	1.5
12 CP 12000	12	2.5	0.8

Model No.	Unit Net Wt. without chain (lb)	(kg)	Wt. of Chain (per ft) (lb)	(per meter) (kg)
3 CP 1500	84	38	3.3	1.5
3 CP 3000	84	38	3.3	1.5
6 CP 3000	130	59	8.5	3.85
6 CP 6000	130	59	8.5	3.85
12 CP 6000	213	97	12.6	5.75
12 CP 12000	213	97	12.6	5.75

(1 metric ton = 2200 lbs)

Prior to installing the hoist, carefully inspect it for possible shipping damage.
Hoists are supplied fully lubricated from the factory.

⚠ 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.

⚠ WARNING

• A falling load can cause injury or death. Before installing, read "SAFETY INFORMATION".

Hook Mounted Hoist Installation

Place hook over mounting structure. Make sure hook latch is engaged.

Trolley Mounted Hoist Installation

Preadjust trolley width for the beam flange measurement. Remove the rail stop and slide trolley onto the end of the beam. If trolley cannot be installed onto the end of the beam due to insufficient space or fixed limit stops, the trolley may need to be partially disassembled and installed from underneath the beam.

⚠ CAUTION

• To avoid an unbalanced load which may damage the trolley, the hoist must be centered under the trolley.

NOTICE

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

When a trolley is used, check that the trolley side plates are parallel and vertical. Raise a load equal to the rated capacity of the hoist a few inches off the floor and operate the trolley along the entire length of the beam.

Air Supply

The air supply must be clean and free from moisture.

Air Lines

The inside diameter of the hoist air supply lines must not be smaller than 1/2 in. (13 mm) and 3/8 in. (10 mm) for fittings on hoist models 3 CP 1500 and 3 CP 3000 or 3/4 in. (19 mm) and 5/8 in. (16 mm) for fittings on all other size hoists. Before making final connections, all air supply lines should be purged before connecting to system 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.

Air Line Lubricator

The air lubricator is built into the air motor. The lubricator has a capacity of 0.44 pints (0.21 lts). When correctly adjusted no oil mist should be visible from the air exhaust. The air line lubricator should be replenished daily with SAE 30W oil (minimum viscosity 135 Cst at 104° F (40°C)).

⚠ CAUTION

• Shut off air supply before filling air line lubricator.

Air Line Filter

When a hoist is to be used in corrosive or moist atmospheres it is recommended that an air line strainer/filter be installed within 3 feet (1 meter) of the motor to prevent dirt from entering the motor. The strainer/filter should provide 20 micron filtration and include a moisture trap. Clean 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 reciever 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

For optimum performance and maximum durability of parts, operate air motor within the operating specifications provided in the "SPECIFICATIONS" section. The air motor should be installed as near as possible to the compressor or air receiver.

Chain Container

⚠ 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.

To attach the chain container: run lower block to lowest point, attach chain container to hoist and run hoist in up direction to feed the chain back into the container.

1. Check the chain bucket label to make sure the length

of load chain is within the capacity of the chain bucket. Replace with a larger chain bucket, if required.
2. Attach stopper to the third link from the end of the chain.
3. Attach the chain bucket to the hoist.

NOTICE

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

Attaching Free End of Load Chain

If chain bucket is not used:
1. Install stopper on the end of the load chain.
2. Attach stopper to the ninth link from the end of the load chain.
3. Attach the free end of the load chain to the hoist.

Hoist Pendant

Check all hose connections are tight and that hoses are not twisted or crimped.

⚠ WARNING

• Disconnect air supply before performing any maintenance.

⚠ CAUTION

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

Initial Operating Checks

1. After installation, make sure the chain is not twisted or kinked. Fix before using. On the Palair, for a capsized bottom hook, pass the hook between the two chain falls until the chain is untwisted.
2. If a trolley is used, check that the hoist is centered below the trolley. Raise a load equal to the rated capacity of the hoist a few inches off the floor and operate the trolley along the entire length of the beam.
3. Run hoist slowly in both directions with no load with a good supply of lubricating oil.

Storing the Hoist

1. Always store the hoist in a no load condition.
2. Wipe off all dirt and water.
3. Oil the chain, hook pins and hook latch.
4. Place in a dry location.
5. Plug hoist air inlet port.
6. Before returning hoist to service follow instructions for Hoists not in Regular Service in the "INSPECTION" section

OPERATION

The four most important aspects of hoist operation are:
1. Follow all safety instructions when operating hoist.
2. Allow only qualified people to operate a hoist.
3. Subject each hoist to a regular inspection and maintenance.
4. Be aware of the hoist capacity and weight of load at all times.

Hoist Movement

Lifting and lowering a load is controlled by the pendant push buttons.

TROUBLE SHOOTING

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

SYMPTOM	TROUBLE	REMEDY
Hoist will not operate.	No air supply to hoist.	Check power supply and connections, in power supply line.
	Hoist is overloaded.	Reduce load to within rated capacity.
	Motor is damaged.	Repair or replace. See "MAINTENANCE" section.
	Brake is not releasing.	Remove end cover and inspect brake. Check brake release circuit.
Load continues to move when hoist is stopped.	Brake is slipping.	Check brake spring and brake disc lining. See "MAINTENANCE" section.
	Hoist is overloaded.	Reduce load to within rated capacity.
Hoist will not lift rated capacity.	Hoist is overloaded.	Reduce load to within rated capacity.
	Motor is damaged.	Check for worn motor bearings.
	Brake is not releasing.	Remove end cover and inspect brake. Check brake release circuit.
Hook lowers, but will not raise.	Hoist is overloaded.	Reduce load to within rated capacity.
	Low air pressure.	Check at hoist power supply connection with hoist under load. Raise pressure to rated capacity.
Load chain jumps on sheave or is making a snapping sound.	Worn or rusted chain.	See "INSPECTION" to determine wear limit. Replace if necessary.
	Incorrect chain.	Replace with correct chain.
	Worn sheave or chain guide.	Replace worn parts.
	No oil on load chain.	Lubricate load chain.
Trolley		
Trolley won't stop or trolley wheels slip.	Damaged beam.	Repair or replace beam.
	Too much oil or grease on track of beam.	Clean off oil or grease.

INSPECTION

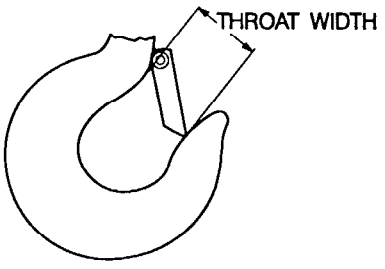
There are two types of inspection, the frequent inspection performed by the operator and periodic inspections performed by qualified personnel.
Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.
Any deficiency revealed through inspection must be reported to an appointed person. A determination must be made as to whether a deficiency constitutes a safety hazard before resuming operation of the hoist.

Records and Reports
Some form of inspection record should be maintained for each hoist, listing all points requiring periodic inspection. A written report should be made monthly on the condition of the critical parts of each hoist. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available to authorized personnel.

Frequent Inspection

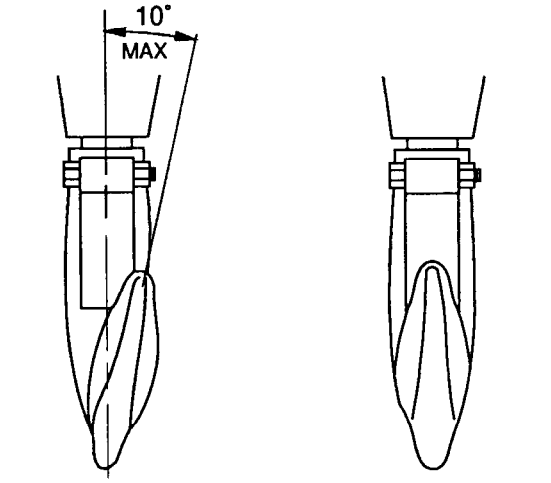
On hoists in continuous service, frequent inspection should be made at the beginning of each shift. In addition, visual inspections should be conducted during regular service for any damage or evidence of malfunction.

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. UPPER AND LOWER LIMIT DEVICE. Test operation with no load. Upward travel must stop when the bottom block or stopper on chain hits hoist directly.
3. HOOKS. Check for wear or damage, increased throat width, bent shank or twisting of hook. Replace hooks with 15% increase in throat width (see Dwg. MHTPA0040) or 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/ANSI B30.10 "HOOKS" for additional information.
4. HOOK LATCH. Make sure the hook latch is present and operating. Replace if necessary.
5. CHAIN. Examine each of the links for bending, cracks in weld areas or shoulders, traverse nicks and gouges, weld splatter, corrosion pits, straition (minute parallel lines) and chain wear, including bearing surfaces between chain links. Replace a chain that fails any of the inspections. Check chain lubrication and lubricate if necessary. See "Load Chain" under "LUBRICATION".



(Dwg. MHTPA0040)

Model	Throat Width		Discard Width	
	in.	mm	in.	mm
3 CP 1500	1.18	30	1.36	34.5
3 CP 3000	1.18	30	1.36	34.5
6 CP 3000	1.18	30	1.36	34.5
6 CP 6000	1.61	40	1.81	46.0
12 CP 6000	1.61	40	1.81	46.0
12 CP 12000	2.24	57	2.28	65.5



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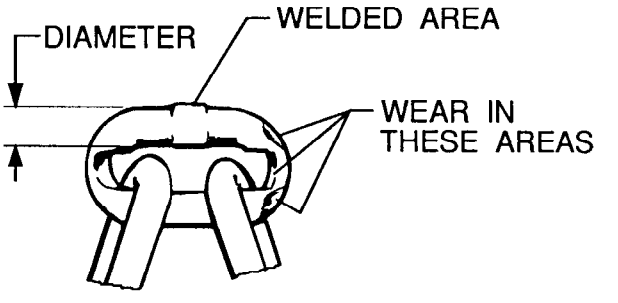


(Dwg. MHTPA0102)

NOTICE

• Excessive wear or stretching may not be apparent from visual observation. Also, inspect chain by measuring five links in accordance with instructions under "Periodic Inspection". A worn load chain may cause the load sheave to wear rapidly. Inspect the load sheave and replace if damaged or worn.

6. 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

According to ANSI/ASME B30.16, frequency of periodic inspection depends on the severity of usage: NORMAL, yearly; HEAVY, semiannually; SEVERE, quarterly. Disassembly may be required for HEAVY or SEVERE usage. Keep accumulative written records of periodic inspections to provide a basis for continuing evaluation.

Inspect all the items in "Frequent Inspection". Also inspect the following:

1. FASTENERS. Check rivets, split pins, capscrews and nuts on hook, chain bucket and hoist body. 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. If performance is poor, disassemble the motor and check for worn gearing, bearings and shafts. The parts should be cleaned, lubricated and reassembled. Replace worn or damaged parts.

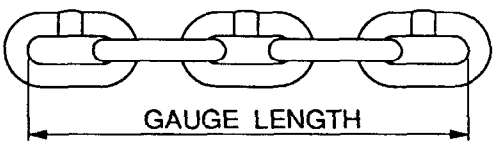
⚠ WARNING

• A falling load can cause injury or death. To keep the brake from slipping, do not get lubricant on the brake lining.

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 excessive drift. If excessive drift occurs, disassemble. Check brake disc lining thickness per "Hoist Brake Lining Measurement" under "MAINTENANCE".
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 wheels and beam is correct, 3/32 to 5/32 in. (2 to 4 mm). Check side plates for spreading due to bending.
9. LABELS. Check for presence and legibility. Replace if necessary.
10. LOAD CHAIN END ANCHORS. Ensure both ends of load chain are securely attached. Secure if loose, repair if damaged, replace if missing.
11. LOAD CHAIN. Measure the chain for stretching 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 nickle-diffused load chains.

Model No.	Size (mm)	Normal Length in.	(mm)
3 CP 1500 and 3 CP 3000	8.0	4.72	120
6 CP 3000 and 6 CP 6000	13.0	7.09	180
12 CP 6000 and 12 CP 12000	16.0	8.85	225

Model No.	Size (mm)	Discard Length in.	(mm)
3 CP 1500 and 3 CP 3000	8.0	4.80	122
6 CP 3000 and 6 CP 6000	13.0	7.24	184
12 CP 6000 and 12 CP 12000	16.0	9.02	229



(Dwg. MHTPA0041)

12. CHAIN CONTAINER. Check for excessive wear. Replace if necessary.

Hoists Not in Regular Use

A hoist which has 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.

A hoist which has been idle for a period of over six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection". Standby hoists shall be inspected at least semiannually in accordance with the requirements of "Frequent Inspection". If adnormal operating conditions apply hoists may require a more frequent inspection.

LUBRICATION

Lubrication Schedule

The time intervals listed below are for service in a normal environment. Units operating in a harsh environment (excessively hot or cold, marine, hazardous gases or abrasive dust) may require more frequent lubrication.

Usage:

Heavy	Continual daily usage.
Normal	Subject to daily use, but not continually.
Occasional	Average use of once a week or less.

Component:	Lubrication Frequency by Usage Level		
	Heavy	Normal	Occasional
Geared Trolley Wheels	Monthly	Quarterly	Yearly
Load Chain	Daily	Weekly	At Usage
Hook and Hook Latch	Daily	Weekly	At Usage
Gear Case	Yearly	Every 3 Years	Unnecessary

Load Chain

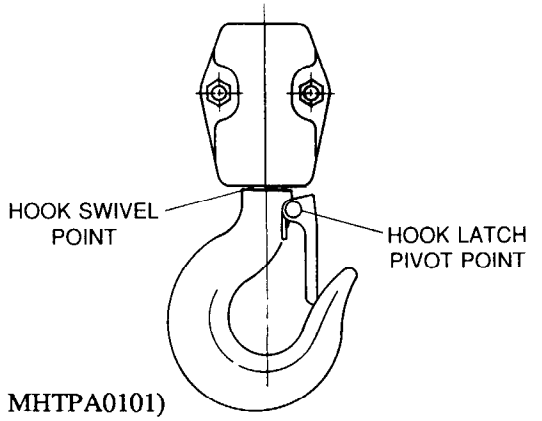
⚠ CAUTION

• Failure to maintain clean and well lubricated load chain will affect the life of the chain resulting in premature wear.

1. Lubricate each link of the chain and apply new lubricant over existing layer.
2. Coat entire link surfaces, including bearing surfaces between links.
3. Clean chain to remove rust or abrasive dust build-up. After cleaning, lubricate the chain using SAE 50 to 90W EP oil.

Hook and Hook Latch

Lubricate the hook and hook latch pivot points. Hook should swivel freely. Hook latch should pivot freely. Use SAE 30 oil or SAE 50 to 90W EP oil.



(Dwg. MHTPA0101)

Gear Case

The gear case is packed with grease on assembly.

Air Line Lubricator

To adjust. Remove plug then rotate screw to limit oil flow. The air line lubricator should be replenished daily with SAE 30W oil (minimum viscosity 135 Cst at 104° F (40°C)).

⚠ 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 qualified service personnel to perform maintenance.
• After performing any maintenance on the hoist, test hoist to 125% of its rated capacity before returning to service.
• Turn off air system and depressurize air lines before performing any maintenence.

INTERVAL	MAINTENANCE CHECKS
Start of each shift	Make a thorough visual inspection of the hoist for damage. Do not operate the hoist if damage is found. Check the operation of the brake.
3 Months	Inspect the drum brake friction linings. Clean or replace parts as required.
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

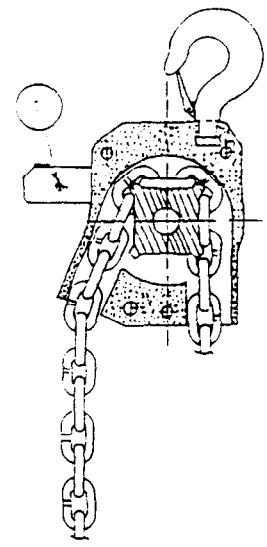
• When any part of the brake lining measures .062 in. (1.6 mm) or less, lining must be replaced.

To check or replace the brake disc use the following procedure.

1. Loosen capscrews one turn at a time progressively round the housing until brake spring load is relaxed. Remove capscrews holding brake assembly to the hoist frame.
2. Pull brake disc from keyed shaft.

Chain Replacement

1. The hoist must be hung and connected to the air supply. Reduce air pressure to 30 psi (2 bar).
2. Remove chain bucket, if used.
3. Remove free end of chain from hoist body, if attached. Remove chain stopper.
4. Run hoist slowly in the lifting direction until the chain free end is approximately 2 ft (60 cm) from the hoist.
5. Using a 'C' link which is the same size as the chain join the new chain to the old taking care that the "standing" links on the new chain are facing away from the hoist load sheave.



(Dwg. MHTPA0172)

6. Run the hoist slowly until the new chain has passed 24 to 36 in. (60 to 90 cm) through the hoist.

General Disassembly

The following instructions provide the necessary information to disassemble, inspect, repair, and assemble the hoist. A parts drawing of the hoist assembly is 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 the process of disassembling the hoist, observe the following:

1. Never disassemble the hoist any further than is necessary to accomplish the needed repair. A good part can be damaged during the course of disassembly.
2. Never use excessive force when removing parts. Tapping gently around the perimeter of a cover or housing with a soft hammer, for example, is sufficient to break the seal.
3. Do not heat a part with a torch to free it for removal,

unless the part being heated is already worn or damaged beyond repair.

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

4. Keep the work area as clean as practical, to prevent dirt and other foreign matter from getting into bearings or other moving parts.
5. All seals and 'O' rings should be discarded once they have been removed. New seals and 'O' rings should be used when assembling the hoist.
6. When grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
7. Do not remove any part which is press fit in or on a subassembly unless the removal of that part is necessay for repairs or replacement.

Cleaning, Inspection and Repair

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

Cleaning

⚠ CAUTION

• Bushings that are loose, worn or rotate in the frame must be replaced. Failure to observe this precaution will result in additional component damage.

Clean all hoist component parts in solvent (except for the brake disc). 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 maybe necessary to carefully scrape old Loctite from the bushing bores. Dry each part using low pressure, filtered compressed air. If the brake disc is oil soaked, it must be replaced.

Inspection

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

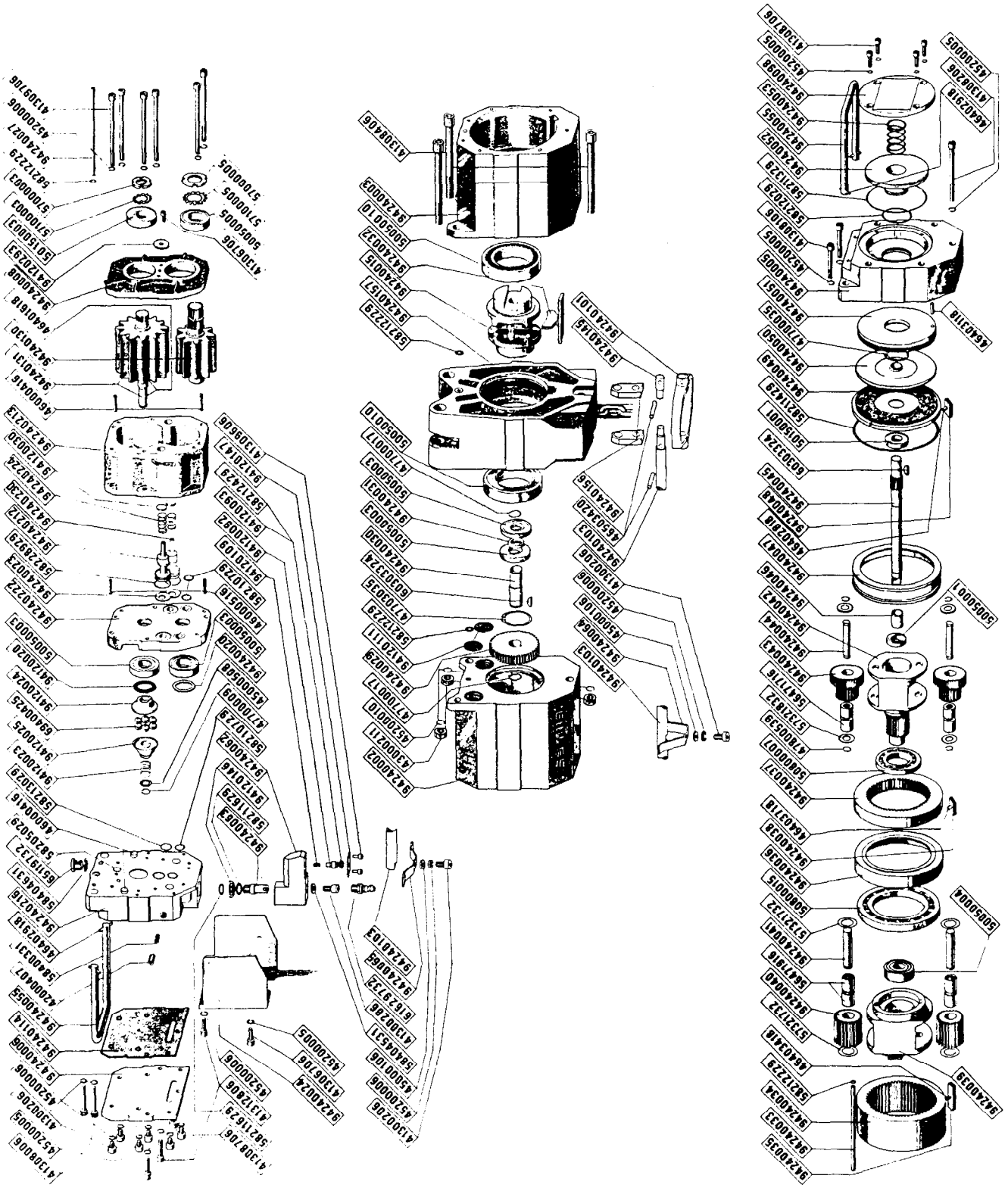
1. Inspect all gears for worn, cracked, or broken teeth.
2. Inspect all bushings for wear, scoring, or galling.
3. Inspect shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace the shaft.
4. Inspect all threaded items and replace those having damaged threads.
5. Inspect the brake disc lining for oil. If the brake disc lining is oil-soaked, replace the brake shoe. If the brake shoe is glazed, sand it lightly using fine emery cloth.
6. Measure the thickness of the brake disc lining. If the brake disc lining is less than .062 in. (2 mm) replace the brake disc (15).

Repair

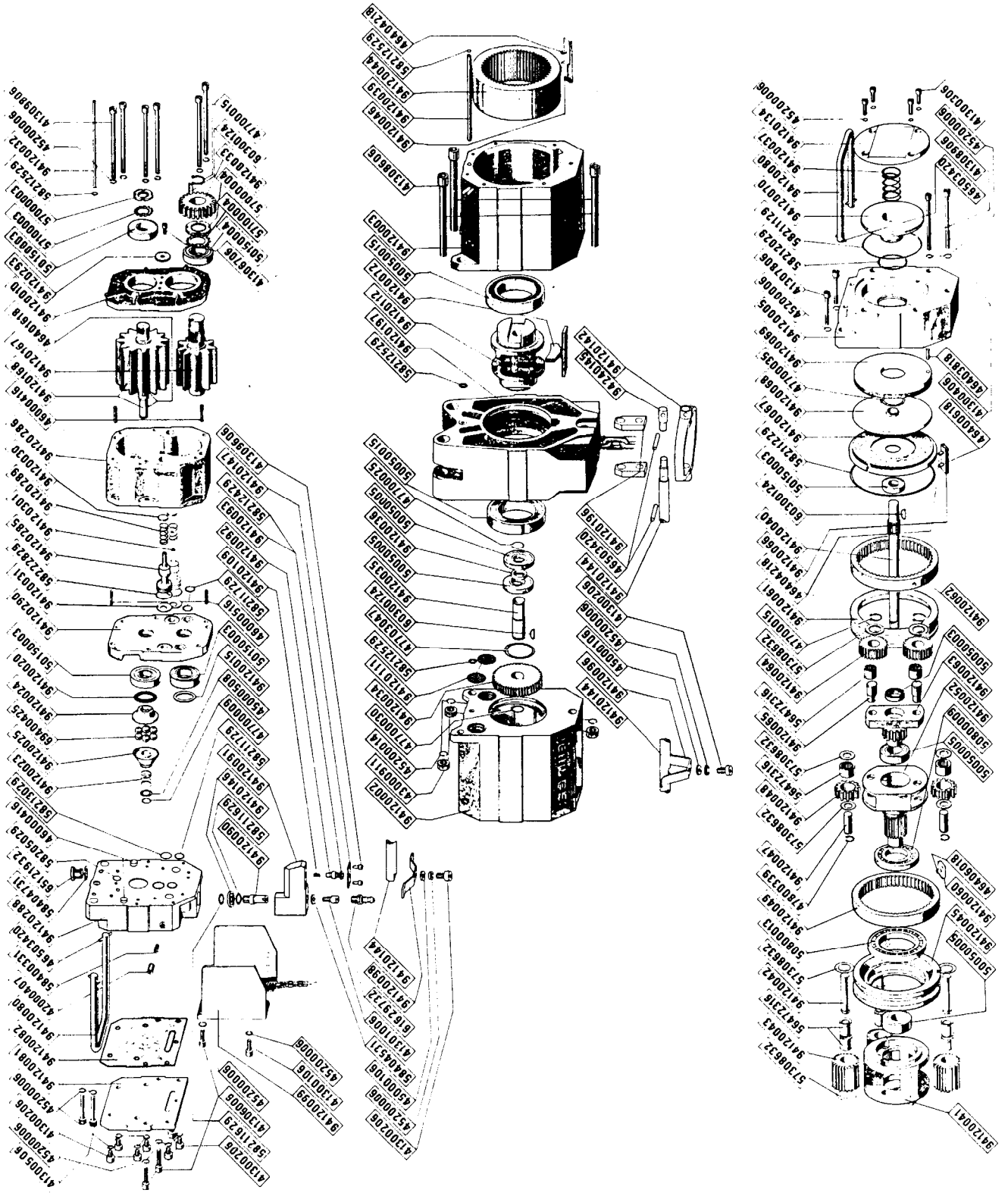
Actual repairs are limited to the removal of small burrs and other minor surface imperfections from gears and shafts. Use a fine stone or emery cloth for this work.

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.

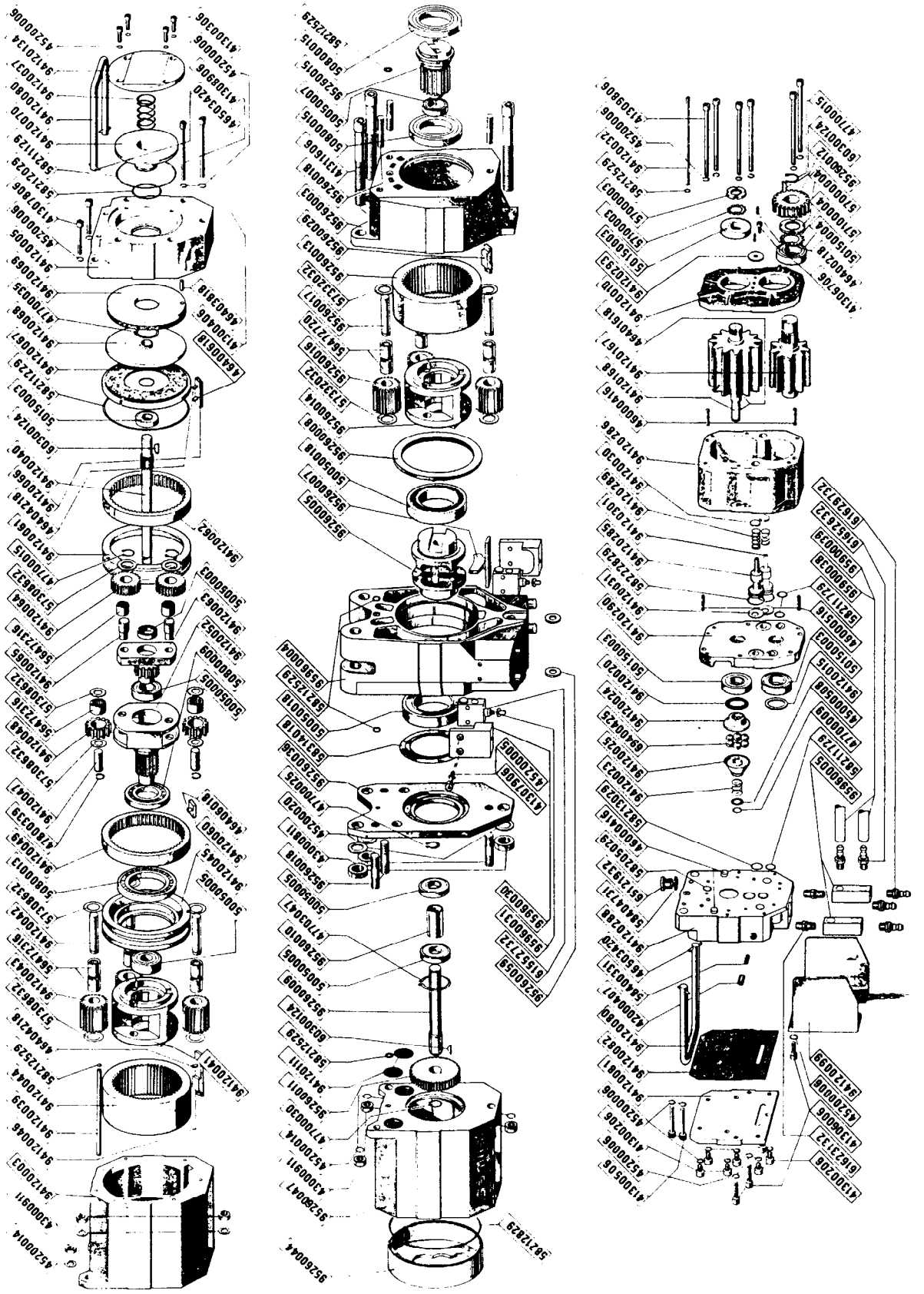
3 CP HOIST ASSEMBLY DRAWING



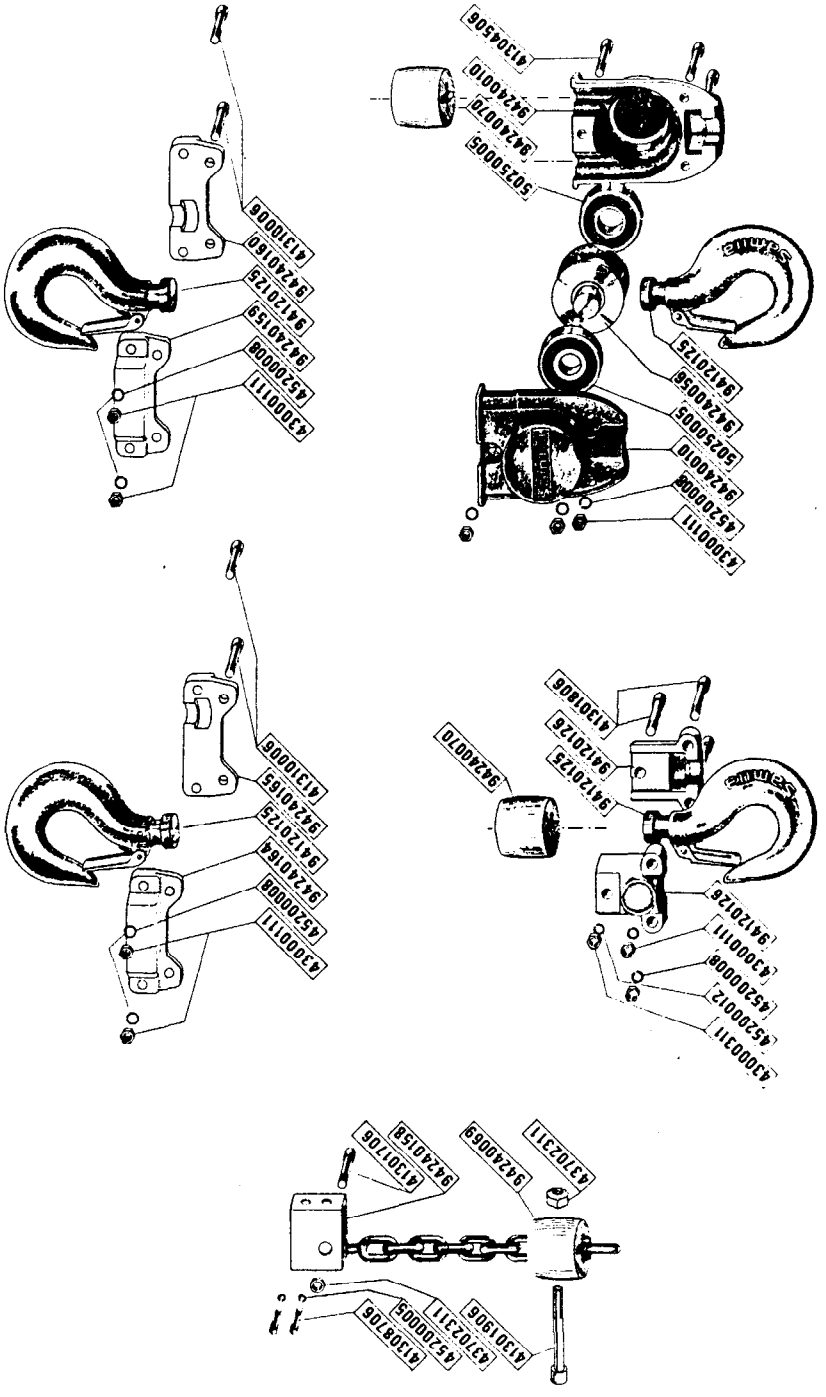
6 CP HOIST ASSEMBLY DRAWING



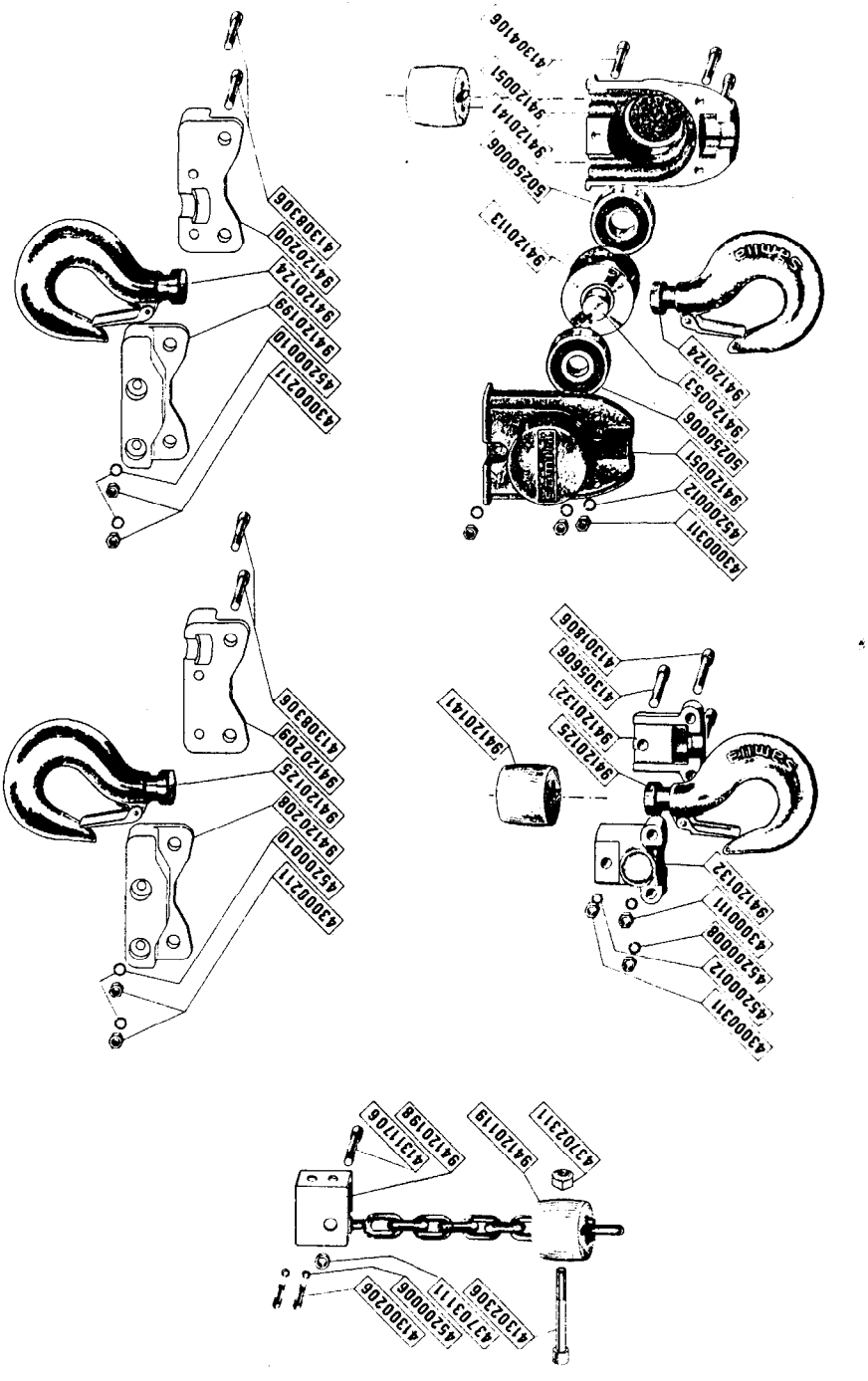
12 CP HOIST ASSEMBLY DRAWING



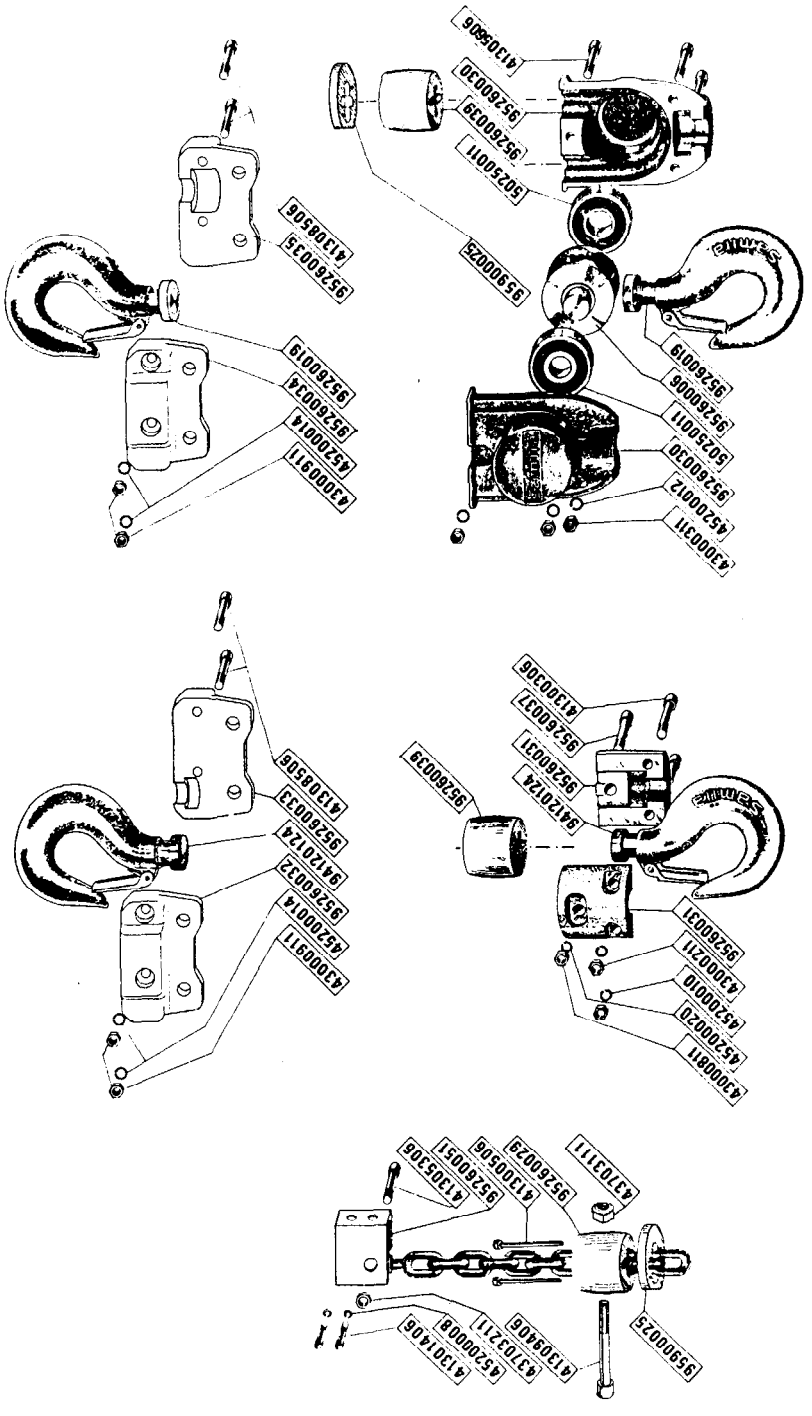
3 CP HOOK ASSEMBLY DRAWING



6 CP HOOK ASSEMBLY DRAWING



12 CP HOOK ASSEMBLY DRAWING



HOIST ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.		
			3 CP	6 CP	12 CP
8	Gear Casing	1	9424-0003	9412-0003	9412-0003
9	Gear Cover	1	9424-0005	9412-0005	9412-0005
10	Brake Spring	1	9424-0053	9412-0037	9412-0037
11	Tube	1	9424-0033	9412-0039	9412-0039
12	Shaft	1	9424-0045	9412-0040	9412-0040
13	Satellite Support	1	9424-0039	9412-0041	9412-0041
14	Satellite Axle	see ( )	9424-0041 (2)	9412-0042 (3)	9412-0042 (3)
15	Satellite Gear	see ( )	9424-0040 (2)	9412-0043 (3)	9412-0043 (3)
16	Ring Gear	1	9424-0034	9412-0044	9412-0044
17	Bearing Support Ring	1	---	9412-0045	9412-0045
18	Key	1	9424-0035	9412-0046	9412-0046
19	Satellite Axle	2	9424-0044	9412-0047	9412-0047
20	Satellite	2	9424-0043	9412-0048	9412-0048
21	Ring Gear	1	9424-0037	9412-0049	9412-0049
22	Satellite Support	1	9424-0042	9412-0052	9412-0052
23	Key	1	9424-0038	9412-0060	9412-0060
24	Spacer	1	9424-0047	9412-0061	9412-0061
25	Ring Gear	1	---	9412-0062	9412-0062
26	Satellite Support	1	---	9412-0063	9412-0063
27	Satellite Gear	2	---	9412-0064	9412-0064
28	Satellite Axle	2	---	9412-0065	9412-0065
29	Key	1	9424-0048	9412-0066	9412-0066
30	Gear Cover	1	9424-0049	9412-0067	9412-0067
31	Brake Disc	1	9424-0050	9412-0068	9412-0068
32	Brake Disc Lining	1	9424-0051	9412-0069	9412-0069
33	Cylinder Piston	1	9424-0052	9412-0070	9412-0070
34	Lifting Handle	1	9424-0055	9412-0080	9412-0080
35	Cylinder Cover	1	9424-0098	9412-0134	9412-0134
36	Key	1	6030-3324	6030-0124	6030-0124
37	Bearing	1	5005-0001	5005-0003	5005-0003
38	Bearing	see ( )	5005-0004 (1)	5005-0005 (2)	5005-0005 (2)
39	Bearing	see ( )	5005-0010 (1)	5005-0015 (1)	5080-0015 (2)
40	Bearing	1	5015-0001	5015-0003	5015-0003
41	Bearing	1	5080-0007	5080-0009	5080-0009
42	Bearing	1	5080-0015	5080-0013	5080-0013
43	Bearing	see ( )	5647-1916 (4)	5647-2316 (10)	5647-2316 (10)
44	Thrust Washer	see ( )	5732-1832 (4)	5730-8632 (14)	5730-8632 (14)
45	'O' ring	1	5821-1329	5821-1129	5821-1129
46	'O' ring	1	5821-1429	5821-1229	5821-1229
47	'O' ring	1	5821-2029	5821-2029	5821-2029
48	'O' ring	2	5821-2229	5821-2529	5821-2529
49	Screw	4	4130-8706	4130-0306	4130-0306
50	Screw	see ( )	4130-8206 (5)	4130-0406 (1)	4130-0406 (1)
51	Screw	2	4130-8106	4130-7806	4130-7806
52	Screw	4	---	4130-8906	4130-8906
53	Washer	11	4520-0005	4520-0006	4520-0006
54	Pin	1	4640-3718	4640-0618	4640-0618
55	Pin	see ( )	4640-2818 (1)	4640-4218 (2)	4640-4218 (2)
56	Pin	1	4640-3418	4640-6018	4640-6018

HOIST ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.		
			3 CP	6 CP	12 CP
57	Pin	2	4640-2918	4650-3420	4650-3420
58	Retainer Ring	2	---	4770-0015	4770-0015
59	Retainer Ring	1	4770-0035	4770-0035	4770-0035
60	Retainer Ring	see ( )	4780-0539 (4)	4780-0339	4780-0339
61	Pin	1	4640-3118	4640-3818	4640-3818
63	Bearing	4	5647-1716	---	---
64	Thrust Washer	4	5732-1732	---	---
65	Spacer	1	9424-0046	---	---
66	Spacer	1	9424-0036	---	---
70	Pinion	1	9424-0029	9412-0034	9526-0011
71	Pinion Shaft	1	9424-0030	9412-0035	9526-0009
72	Spacer	1	9424-0031	9412-0036	9526-0010
73	Chain Guide	1	9424-0032	9412-0072	9526-0007
74	Chain Sprocket Wheel	1	9424-0015	9412-0112	9526-0005
75	Chain Guide Housing	1	9424-0157	9412-0197	9596-0004
76	Spacer	2	9424-0168	9412-0216	9526-0059
77	Key	1	6030-3324	6030-0124	6030-0124
78	Bearing	2	5005-0003	5005-0005	5005-0005
79	Bearing	see ( )	5005-0010 (1)	5005-0015 (1)	5005-0018 (2)
80	Screw	3	4130-8406	4130-8606	4131-1606
81	Nut	3	4300-0211	4300-0911	4300-0911
82	Washer	3	4520-0010	4520-0014	4520-0014
83	Retainer Ring	1	4770-0017	4770-0025	4770-0025
84	Retainer Ring	1	4770-0017	4770-0030	4770-0030
85	Retainer Ring	1	4770-3035	4770-3047	4770-3047
86	Stud	3	---	---	9526-0018
87	Flange	1	---	---	9526-0036
88	'O' ring	see ( )	5821-2229 (1)	5821-2529 (1)	5821-2529 (2)
89	Joint	1	---	---	5831-4018
90	Nut	3	---	---	4300-0811
91	Washer	3	---	---	4520-0020
100	Motor Housing	1	9424-0002	9412-0002	9526-0047
101	Front End Cover	1	9424-0008	9412-0010	9412-0010
102	Spacer	1	9424-0020	9412-0015	9412-0015
103	'O' ring	1	9412-0020	9412-0020	9412-0020
104	Regulator Spring	1	9412-0023	9412-0023	9412-0023
105	Fixed End Cover	1	9412-0024	9412-0024	9412-0024
106	Flange	1	9412-0025	9412-0025	9412-0025
107	Rear Stop	2	9412-0030	9412-0030	9412-0030
108	Front Stop	2	9424-0023	9412-0031	9412-0031
109	Tube	1	9424-0027	9412-0032	9412-0032
110	Pinion	1	---	9412-0033	9526-0012
111	Handle	1	9424-0055	9412-0080	9412-0080
112	Flange Cover	1	9424-0006	9412-0081	9412-0081
113	Gasket	1	9424-0114	9412-0082	9412-0082
114	Protective Casing	1	9424-0024	9412-0099	9412-0099
115	Grid	2	9412-0111	9412-0111	9412-0111
116	Rotor and Axle	1	9424-0130	9412-0167	9412-0167
117	Repulsion Rotor and Axle	1	9424-0131	9412-0168	9412-0168

HOIST ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.		
			3 CP	6 CP	12 CP
118	Slide Valve	1	9424-0212	9412-0285	9412-0285
119	Motor Block	1	9424-0213	9412-0286	9412-0286
120	Cover	1	9424-0216	9412-0288	9412-0288
121	Spring	2	9424-0224	9412-0289	9412-0289
122	Rear Cover Assembly	1	9424-0222	9412-0290	9412-0290
123	Washer	see ( )	9412-0293 (1)	9412-0293 (1)	9412-0293 (2)
124	Slide Valve	1	9424-0230	9412-0301	9412-0301
125	Key	1	---	6030-0124	6030-0124
126	End	3	6162-9732	6162-9732	6162-9732
127	Plug	1	6511-9732	6512-1932	6512-1932
128	Steel Ball	6	6940-0425	6940-0425	6940-0425
129	Bearing	1	5005-0005	5015-0004	5015-0004
130	Bearing	see ( )	5015-0003 (1)	5015-0003 (3)	5015-0003 (3)
131	Locknut	1	5700-0003	5700-0003	5700-0003
132	Locknut	1	5700-0005	5700-0004	5700-0004
133	Lockwasher	1	5710-0003	5710-0003	5710-0003
134	Lockwasher	1	5710-0005	5710-0004	5710-0004
135	'O' ring	1	5820-5029	5820-5029	5820-5029
136	'O' ring	4	5821-0729	5821-1729	5821-1729
137	'O' ring	2	5821-2229	5821-2529	5821-2529
139	'O' ring	2	5821-3029	5821-3029	5821-3029
140	'O' ring	2	5822-8929	5822-2829	5822-2829
141	Felt	1	5840-0331	5840-0331	5840-0331
142	'O' ring	1	5840-4631	5840-4731	5840-4731
143	Screw	see ( )	4130-0206 (4)	4130-0206 (6)	4130-0206 (6)
144	Screw	2	4130-8006	4130-0506	4130-0506
145	Screw	4	4131-2806	4130-6006	4130-6006
146	Screw	see ( )	4130-6706 (2)	4130-6706 (1)	4130-6706 (1)
147	Screw	6	4130-9706	4130-9806	4130-9806
148	Screw	1	4200-0407	4200-0407	4200-0407
149	Washer	1	4500-0508	4500-0508	4500-0508
150	Washer	see ( )	4520-0006 (13)	4520-0006 (18)	4520-0006 (18)
151	Pin	4	4600-0416	4600-0416	4600-0416
152	Pin	2	4600-0516	4600-0516	4600-0516
153	Pin	2	4640-1618	4640-1618	4640-1618
154	Pin	2	4640-2918	4650-3420	4650-3420
155	Retainer Ring	1	4770-0009	4770-0009	4770-0009
156	Retainer Ring	1	---	4770-0015	4770-0015
157	Washer	4	4520-0005		
158	Bearing	2	5005-0003	---	---
159	Screw	2	4130-8706	---	---
160	'O' ring	2	5822-2329		
161	Housing	1	---	---	9526-0047
162	Pin	2	---	---	4640-0218
163	'O' ring	1	---	---	5821-2829
165	Sleeve	1	9424-0069	9412-0119	9526-0029
166	Sleeve	1	9424-0070	9412-0141	9596-0039
167	Chain Support	1	9424-0158	9412-0198	9526-0051
168	Screw	1	4130-1706	4131-1706	4130-5306

HOIST ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.		
			3 CP	6 CP	12 CP
169	Screw	2	4130-8706	4130-0206	4130-1406
170	Screw	1	4130-1906	4130-2306	4130-9406
171	Nut	1	4370-2311	4370-2311	4370-3111
172	Locknut	1	4370-2311	4370-3111	4370-3211
173	Washer	2	4520-0005	4520-0006	4520-0008
175	Plate	1	---	---	9590-0025
176	Screw	2	---	---	4130-0506
180	Gear Casing	1	---	---	9526-0003
181	Spacer	1	---	---	9526-0008
182	Ring Gear	1	---	---	9526-0013
183	Satellite Support	1	---	---	9526-0014
184	Pinion	1	---	---	9526-0015
185	Satellite Gear	3	---	---	9526-0016
186	Satellite Axle	3	---	---	9526-0017
187	Stud	3	---	---	9526-0018
188	Key	1	---	---	9526-0029
189	Washer	3	---	---	4520-0014
190	Nut	3	---	---	4300-0911
191	Bearing Plate	6	---	---	5733-2032
192	Bearing	1	---	---	5005-0007
194	Bearing	6	---	---	5647-2720
200	Hook	1	9412-0125	9412-0124	9526-0019
201	Suspension Block	1	9424-0159	9412-0199	9526-0034
202	Support	1	9424-0160	9412-0200	9526-0035
203	Screw	2	4131-0006	4130-8306	4130-8506
204	Nut	2	4300-0111	4300-0211	4300-0911
205	Washer	2	4520-0008	4520-0010	4520-0014
210	Sprocket Wheel	1	9424-0056	9412-0053	9526-0006
211	Hook	1	9412-0125	9412-0124	9526-0019
212	Flange	2	9412-0126	9412-0132	9526-0031
213	Bearing	2	5025-0005	5025-0006	5025-0011
214	Screw	1	4130-1806	4130-5606	9526-0037
215	Nut	1	4300-0311	4300-0311	4300-0811
216	Washer	1	4520-0012	4520-0012	4520-0020
217	Screw	2	4130-1806	4130-1806	4130-0306
218	Nut	2	4300-0111	4300-0111	4300-0211
219	Washer	2	4520-0008	4520-0008	4520-0010
220	Catch	2	9412-0126	9412-0132	
221	Hook	1	9412-0125	9412-0125	9412-0124
222	Flange	2	9424-0010	9412-0051	9526-0030
223	Screw	3	4130-4506	4130-4106	4130-5606
224	Nut	3	4300-0111	4300-0311	4300-0311
225	Washer	3	4520-0008	4520-0012	4520-0012
226	Flange	1	9424-0164	9412-0208	9526-0032
227	Flange	1	9424-0165	9412-0209	9526-0033
228	Fitting	2	9424-0063	9412-0090	
229	Control Valve Housing	2	9424-0062	9412-0091	
230	Valve Cone	2	9412-0092	9412-0092	
231	Control Valve Ring	2	9412-0093	9412-0093	

HOIST ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.		
			3 CP	6 CP	12 CP
232	Drawback Spring	1	9424-0064	9412-0096	---
233	Spring	2	9412-0109	9412-0109	---
234	Limit Switch Strap	1	9424-0101	9412-0142	---
235	Driving Axle	1	9424-0103	9412-0144	---
236	Axle	1	9424-0145	9424-0145	---
237	Spacer	2	9412-0146	9412-0146	---
238	Stop Plate	2	9412-0147	9412-0147	---
239	Strap Support	2	9424-0156	9412-0196	---
240	'O' ring	4	5821-1629	5821-1629	---
241	'O' ring	2	5821-2429	5821-2429	---
242	Gasket	2	5840-4531	5840-4531	---
243	Screw	2	4130-6706	4130-0106	---
245	Screw	see ( )	4130-0206 (4)	4130-0206 (2)	---
246	Screw	2	---	4130-1006	---
247	Screw	4	4130-9606	4130-9606	---
248	Washer	2	4500-0106	4500-0106	---
249	Washer	see ( )	4520-0006 (2)	4520-0006 (6)	---
250	Pin	2	4650-3420	4650-3420	---
251	Spring Plate	1	9424-0065	9412-0098	---
252	Washer	2	4520-0005	4520-0006	---
253		2	9424-0103	9412-0144	---
254	Fitting	3	6162-9732	6162-9732	6162-9732
255	Fitting	2	---	---	6165-2632
256	Washer	2	---	---	9526-0059
257	Adapter	2	---	---	9596-0005
258	Screw	2	---	---	4130-7906
259	Hose	1	---	---	9590-0038
260	Hose	1	---	---	9590-0039
261		1	---	---	4520-0005
262		1	---	---	9596-0030
263		1	---	---	9526-0044
*264	Hook Latch Assembly	1	9412-0186	9412-0186	9526-0061
*265	Chain Bucket (20 m)	1	3850-2340	3850-2357	3850-2365
*266	Chain Bucket (12 m)	1	3850-2332	---	---

* Not Shown

SERVICE NOTES

PARTS ORDERING INFORMATION

The use of replacement parts other than INGERSOLL-RAND Material Handling will invalidate the Company's warranty. For prompt service and genuine INGERSOLL-RAND Material Handling parts, provide your nearest Distributor with the following:

1. Complete hoist model number and serial number as it appears on the nameplate. For: Palair air chain hoist 3CP 1500, 3 CP 3000, 6 CP 3000, 6 CP 6000, 12 CP 6000 or 12 CP 12000.
2. Part number and part description as shown in this manual.
3. Quantity required.

The model and serial number tag is located on the brake end housing.

Return Goods Policy

Ingersoll-Rand will not accept any returned goods for warranty or service work unless prior arrangements have been made and written authorization has been provided from the location where the goods were purchased. Hoists returned with opened, bent or twisted hooks, or without chain and hooks, will not be repaired or replaced under warranty.

NOTICE

• Continuing improvement and advancement of design may cause changes to this hoist which are not included in this manual. Manuals are periodically revised to incorporate changes. Always check the manual edition number on the front cover for the latest issue.

HOIST AND WINCH LIMITED WARRANTY

Ingersoll-Rand Company (I-R) warrants to the original user its Hoists and Winches (Products) to be free of defects in material and workmanship for a period of one year from the date of purchase. I-R will repair, without cost, any Product found to be defective, including parts and labor charges, or at its option, will replace such Products or refund the purchase price less a reasonable allowance for depreciation, in exchange for the Product. Repairs or replacements are warranted for the remainder of the original warranty period.

If any Product proves defective within its original one year warranty period, it should be returned to any Authorized Hoist and Winch Service Distributor, transportation prepaid with proof of purchase or warranty card.

This warranty does not apply to Products which I-R has determined to have been misused or abused, improperly maintained by the user, or where the malfunction or defect can be attributed to the use of non-genuine I-R parts.

I-R makes no other warranty, and all implied warranties including any warranty of merchantability or fitness for a particular purpose are limited to the duration of the expressed warranty period as set forth above. I-R's maximum liability is limited to the purchase price of the Product and in no event shall I-R be liable for any consequential, indirect, incidental, or special damages of any nature rising from the sale or use of the Product, whether based on contract, tort, or otherwise.

Note: Some states do not allow limitations on incidental or consequential damages or how long an implied warranty lasts so that the above limitations may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

IMPORTANT NOTICE

It is our policy to promote safe delivery of all orders.
This shipment has been thoroughly checked, packed and inspected before leaving our plant and receipt for it in good condition has been received from the carrier. Any loss or damage which occurs to this shipment while enroute is not due to any action or conduct of the manufacturer.

VISIBLE LOSS OR DAMAGE
If any of the goods called for on the bill of lading or express receipt are damaged or the quantity is short, do not accept them until the freight or express agent makes an appropriate notation on your freight bill or express receipt.

CONCEALED LOSS OR DAMAGE
When a shipment has been delivered to you in apparent good condition, but upon opening the crate or container, loss or damage has taken place while in transit, notify the carrier's agent immediately.

DAMAGE CLAIMS
You must file claims for damage with the carrier. It is the transportation company's responsibility to reimburse you for repair or replacement of goods damaged in shipment. Claims for loss or damage in shipment must not be deducted from the Ingersoll-Rand invoice, nor should payment of Ingersoll-Rand invoice be withheld awaiting adjustment of such claims as the carrier guarantees safe delivery.
You may return products damaged in shipment to us for repair, which services will be for your account and form your basis for claim against the carrier.

United States Office Locations

For Order Entry and Order Status:

Ingersoll-Rand Distribution Center
510 Hester Drive
P.O. Box 618
White House, TN 37188
Phone: (615) 672-0321
Telex: 786573
Fax: (615) 672-0801

Ingersoll-Rand Material Handling Technical Support
2724 Sixth Avenue South
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Detroit, MI
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Los Angeles, CA
5533 East Olympic Blvd.
Los Angeles, CA 90022
Phone: (213) 725-2826

Milwaukee, WI
12311 W. Silver Spring Dr.
Milwaukee, WI 53225
Phone: (414) 461-0973

Philadelphia, PA
900 E. 8th Ave., Suite 103
P.O. Box 425
King of Prussia, PA 19406
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International

Offices and distributors in principal cities throughout the world. Contact the nearest Ingersoll-Rand office for the name and address of the distributor in your country or write/fax to:
Ingersoll-Rand Material Handling
P.O. Box 24046 Seattle, WA 98124-0046 USA
Phone: (206) 624-0466
Telex: 328795
Fax: (206) 624-6265

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National Sales Office
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