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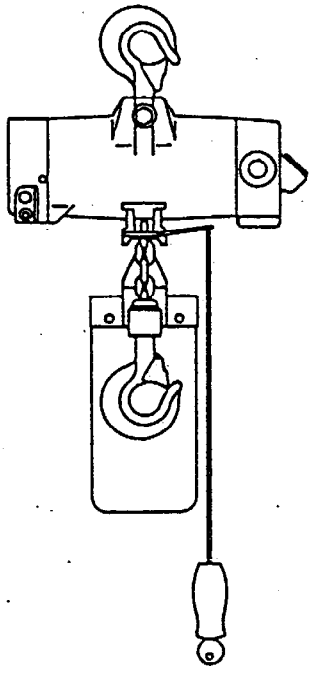
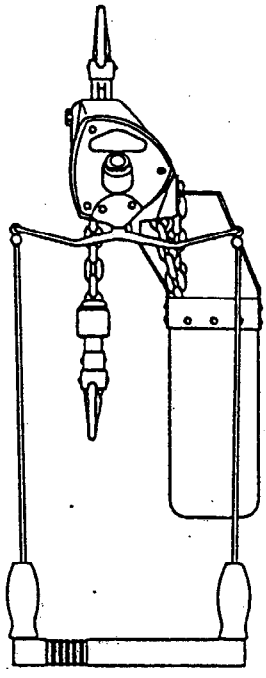
OPERATION AND MAINTENANCE MANUAL
for

MODEL ACHM030
3 TON AIR CHAIN HOIST

MODEL ACHM060
6 TON AIR CHAIN HOIST





FOR TOP PERFORMANCE AND MAXIMUM DURABILITY OF PARTS, OPERATE THE HOIST AT 90 psig (6.2 bar/620 kPa) with 3/4" (19 mm) MINIMUM AIR SUPPLY HOSE.

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 unit for lifting, supporting, or transporting people or lifting or supporting loads over people.

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

Refer All Communications to the Nearest Ingersoll-Rand Material Handling Products Office or Distributor.

INGERSOLL-RAND®
MATERIAL HANDLING

SAFETY SUMMARY

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

WARNING: 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. 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 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 Products 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 Products parts will result in the void of warranty.

Hoist returned with opened, bent or twisted hooks, or without chain and hooks, will not be repaired or replaced under warranty.

PARTS ORDERING INFORMATION

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

1. Complete model number and serial number as it appears on the nameplate.
2. Part number and part name as shown in manual.
3. Quantity required.

NOTE: ACHM air chain hoists have cast iron bodies. ACH air chain hoists have aluminum bodies.

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.

INGERSOLL-RAND Material Handling Division
2724 Sixth Avenue South, Seattle, Washington, USA 98134-2102
P.O. Box 24046, Seattle, Washington, USA 98124-0046
Phone (206) 624-0466, Telex: 3723554
Fax (206) 447-0715

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Ⅳ. Installation

1. Accessories

■ In case of using contror handle (pull rope) (Fig. 1); Referring to the drawing, attach the S hook to the control lever. Close the S hook to prevent the disengagement of the control chain.

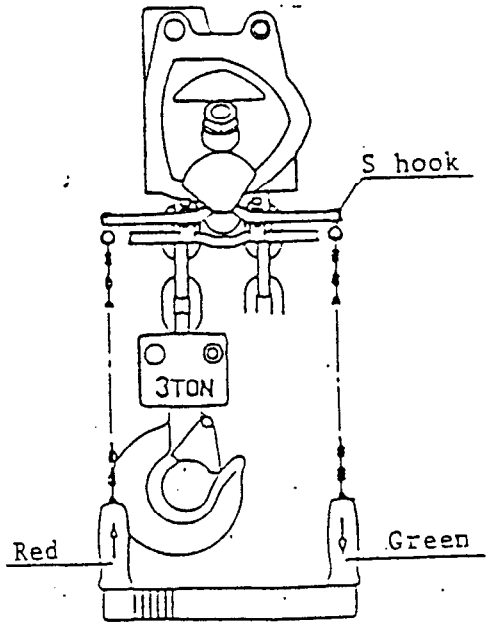

Fig. 1

■ In case of using special accessories; Before installing the hoist, special accessories, such as pendant control or overload protector, should be attached to the hoist according to the Instruction Manual.

2. Installation

Be sure that the I-beam or other supporting structure can safely support the gross weight of the material to be lifted, the trolley and the hoist itself at the rated capacity of the hoist.

The supporting structure for the hoist should have successfully passed an inspection for the applicable safety standard.

Check that the top hook is correctly latched onto the supporting device and that the hook latch is correctly closed.

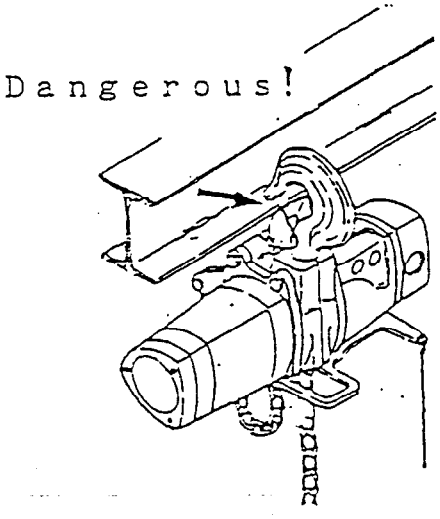

Fig. 2

Caution

Do not use the hoist with a lifting method as shown above (top hook on beam flange).

This type of use poses serious danger. (Fig. 2)

If a trolley is used, after installation, check that the trolley side plates are parallel and vertical. Operate the trolley over the entire length of the beam with a capacity load suspended a few inches off the floor.

Chain Container

WARNING: Do not pile chain in the chain container. Piling the chain 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.

Air Supply

Always use an air filter and lubricator with the hoist. Install the lubricator as close to the hoist inlet as practical. Operate the hoist at 57 to 90 psig (4 to 6.2 bar/400 to 620 kPa). Do not exceed 120 psig (8.2 bar/820 kPa). The diameter of the air supply hose and the filter and lubricator must be at least 3/4" (19 mm). When the air supply hose is connected to the hoist, drip about 10 drops of nondetergent SAE 10 or 20W oil into the hoist inlet port.

SAFETY INSTRUCTIONS
WARNING -- READ THESE INSTRUCTIONS

1. Only allow qualified people (trained in safety and operation) to operate the hoist.
2. Only operate a hoist if you are physically fit.
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 inspect the hoist for wear or damage.
5. Never use a hoist which inspection indicates is defective.
6. Periodically, inspect the hoist thoroughly and replace worn or damaged parts.
7. Lubricate the hoist regularly.
8. Do not use hoist if safety latch on a hook has been sprung or broken.
9. Check that the safety latches are engaged before using.
10. Never splice a hoist chain by inserting a bolt between links.
11. Only lift loads less than or equal to the rated capacity of the hoist. See warning labels attached to the hoist.
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. When using two hoists to suspend one load, select two hoists both having rated capacities equal to or more than the load to be lifted. This provides adequate safety in the event of a sudden load shift or failure of one hoist.
21. Pay attention to the load at all times when operating the hoist.
22. Make sure all people are clear of the load path. Do not lift a load over people.
23. Never use the hoist for lifting or lowering people, and never allow anyone to stand on a suspended load.
24. Ease the slack out of the chain and sling when starting a lift. Do not jerk the load.
25. Do not swing a suspended load.
26. Never suspend a load for an extended period of time.
27. Never leave a suspended load unattended.
28. Never weld or cut a load suspended by the hoist.
29. Never use the hoist chain as a welding electrode.
30. Do not operate hoist if chain jumping, excessive noise, jamming, overloading, or binding occurs.
31. Keep the load from hitting the load chain.
32. Do not use the up and down emergency stop limit switches as a means of stopping the hoist.
33. Always keep hands and clothing free from the controls.
34. Always rig the hoist properly and carefully.
35. Turn off, depressurize and disconnect the air lines before performing any maintenance.
36. Avoid collision or bumping of hoist.
37. After use, properly secure hoist and loads.

OPERATION

The three most important aspects of hoist operation are: (1) Follow all safety instructions when operating hoist, (2) Allow only qualified people to operate a hoist and (3) Subject each hoist to a regular inspection and maintenance procedure.

Hoist Movement

Lifting and lowering a load is controlled by the pendant or rope control. For rope control, pull down on:

Green end of the handle to lower.
Red end of the handle to raise.

4. Troubleshooting

Troubles	Major causes	Troublesshooting
Motor does not operate. Slow rotation or no rotation of motor.	• Insufficient air pressure. • Supplied air volum is insufficient.	• Increase air pressure. • Increase compressor output.
	• Inner diameter of piping is too small.	• Enlarge inner diameter.
	• Strainer in the adapter at air inlet port is clogged.	• Clean.
	• Silencer is clogged.	• Replace with new silencer.
	• Powder or dust in the motor.	• Clean motor and lubricate. Clean air filter and replace filter element.
	• Vane is enlarged because of wet atmosphere or long term of maintenance.	• Replace vane. Discharge drain water from air filter. Or clean and replace filter element.
	• Vane is burnt owing to the dry operation.	• Clean the motor and polish the vane and replace if required. Supply oil to lubricator or clean the lubricator.
	• Vane is worn or damaged.	• Replace the vane.
	• Main valve does not open.	• Tighten the connecting bolt on the respective part or disassemble and check.
	• Control lever is bent or damaged.	• Replace the control lever.
	• Brake does not open.	• Clean air circuit of the brake. Thereafter, perform leakage test.
	• Reduction gear: Wrong assembly or gear, bearing, etc. are worn or broken.	• Disassembly and check are required. Replace the worn or broken parts.
Brake does not work.	• Lining is worn.	• Replace with new brake disc.
	• Oil on the lining.	• Clean. Replace oil-seal if required.
	• Air exhaust hole of the brake cover is clogged.	• Clean.(See the section "Inspection of Brake".)
	• Main valve does not return to the neutral position.	• Chekc the operation system, e.g., bending of control lever. Disassemble and inspect the valve housing if required.

When hoist is malfunctioning, stop operation immediately and perform suitable troubleshooting.

Careless repair causes damage to the hoist. Therefore, be careful when repairing.

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INSPECTION

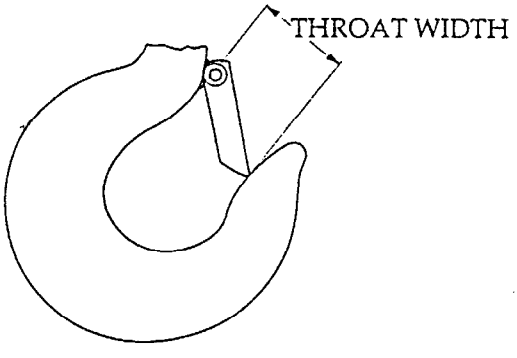
There are two types of inspection, the frequent inspection performed by the operator and periodic inspections performed by qualified personnel.

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 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, or 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 SWITCH. Test operation at slow speed with empty hook. If the hook does not stop in its normal position for either upper or lower limit, adjust or repair.
3. PNEUMATIC SYSTEM. Check air lines, valves and other components for leakage. Repair if necessary.
4. HOOK. Check for wear or damage, increase throat width, bent shank or bending of hook. Replace hooks with 15% increase in throat width or 10% bend. If the hook latch snaps past the tip of the hook, the hook is sprung and must be replaced.

Model No.:	Throat Width: in.	(mm)
ACHM030	1.56	39.5
ACHM060	2.07	52.5



Check hook support bearings for lubrication and damage. Make sure they swivel easily and smoothly. Repair and lubricate as necessary.

5. HOOK LATCH. Make sure the hook latch is present and operating. Replace if necessary.
6. 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. Replace a chain that fails any of the inspections. Check chain lubrication and lubricate if necessary. See "Load Chain" under "LUBRICATION."

NOTE: 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."

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

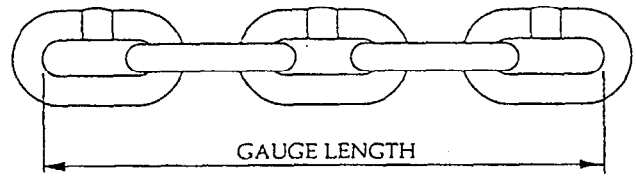
7. CHAIN REEVING. Ensure welds on standing links are away from load sheave. Reinstall chain if necessary. Make sure chain is not capsized, twisted or kinked. Adjust as required.
8. LUBRICATOR AND FILTER. If plastic bowls are used on the filter or lubricator, check for cracks, clouding or other damage. Replace if cracked or damaged.

Periodic Inspection

According to ANSI/ASME B30.16-1987, 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 a frequent inspection. Also inspect the following:

1. FASTENERS. Check rivets, cotter pins, cap screws and nuts on hook, chain bucket and hoist body. Replace if missing and 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. HOOK. Inspect hook for cracks using magnetic particle or other suitable method. Remove cover and inspect hook retaining nut and key or other hook retaining parts. Tighten or repair, if necessary.
4. CHAIN SHEAVES. Check for damage or excessive wear. Replace if necessary.
5. MOTORS. Check for satisfactory performance. If performance is poor, disassembly the components and check for worn vanes, gearing, bearings and shafts. The parts should be cleaned, lubricated and reassembled. Replace worn parts.
6. BRAKES. Ensure proper operation. Lift a capacity or near capacity load a few inches off the floor and check ability of braking system to stop and hold the load without excessive drift. If external inspection indicates the need, disassemble. Brake discs must be uniform and at least .22 in. (5.5 mm) thick. Check friction surface of brake plates for wear, deformation or foreign deposits. Clean or replace if necessary.
7. SUPPORTING STRUCTURE. Check for distortion, wear and continued ability to support load.
8. TROLLEY. If a trolley is used, check that the trolley wheels track the beam properly and that clearance between wheels and beam is correct. Check trolley for smoothness of operation. Adjust or repair as necessary.
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. See "MAINTENANCE" for proper means of chain attachment.
11. LOAD CHAIN. Measure the chain for stretching by suspending a light load (50 to 100 pounds) from the hoist and measuring across five links sections all along the chain. When any five links in the working length reaches or exceeds the discard length, replace the entire chain. Always use a genuine INGERSOLL-RAND Material Handling Products replacement chain. For regular and nickle-diffused load chains:

Model:	Size:	Normal Length:		Discard Length:	
No.:	(mm)	in.	(mm)	in.	(mm)
ACHM030	13	7.087	180.0	7.228	183.6
ACHM060	13	7.087	180.0	7.228	183.6



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

LUBRICATION

Load Chain

WARNING: Failure to maintain clean and well lubricated load chain will void the manufacturer's warranty.

1. Lubricate load chain weekly, or more frequently, depending on severity of service.
2. In an corrosive environment, lubricate more frequently than normal.
3. Lubricate each link of the chain and apply new lubricant over existing layer.
4. Also lubricate hook and safety latch pivot points.
5. Use BEEBE Lubri-Link or a SAE 50 to 90W EP oil.
6. Clean chain to remove rust or abrasive dust build-up. After cleaning, lubricate the chain.

CAUTION: Do not use an acid-based solvent to clean the chain.

Lubricator

Check fluid level daily, add nondetergent SAE 10 or 20W motor oil as necessary. Adjust lubricator drip rate to 19 to 26 drops per minute. To adjust the optional INGERSOLL-RAND lubricator, turn the adjustment screw on top of lubricator counterclockwise to increase drip rate, clockwise to decrease drip rate. Annually, disassemble and clean lubricator bowl of dirt and other foreign material. Blow out internal passages.

Filter

Check filter with manual petcock daily and drain when necessary. Replace filter element when it becomes dirty or plugged. Annually, disassembly and clean filter bowl, also blow out filter element in reverse direction of normal air flow.

Disassembly

1. Coat all motor parts with a light film of SAE 10 or 20W nondetergent motor oil before assembling.
2. Clean and lubricate with new grease the chain wheel bearing and hook thrust bearing on the bottom hook block.
3. Repack gear reducers (two large and one small) and fill the space between the small internal gear and the housing with grease.
4. Clean the inner mechanism of the brake and lubricate with lithium safonified silicon grease, NLGI Class No. 2, like Molykote Grease 33.

Recommended Lubricant Chart

Mfg.:	Air Motor: (Lubricator)	Gear Reducer: (Including Reducer Bearing)	Other Bearings:
Esso	Arox 22 Teresso 32	Lithtan EP 0	Beacon EP 2
Mobil	Almo Oil No. 525	Mobilux EP 0	Mobilux EP 0
Shell	Tellus Oil C32 Torcula Oil 32	Alvania Grease EPR0	Alvania Grease EP 2

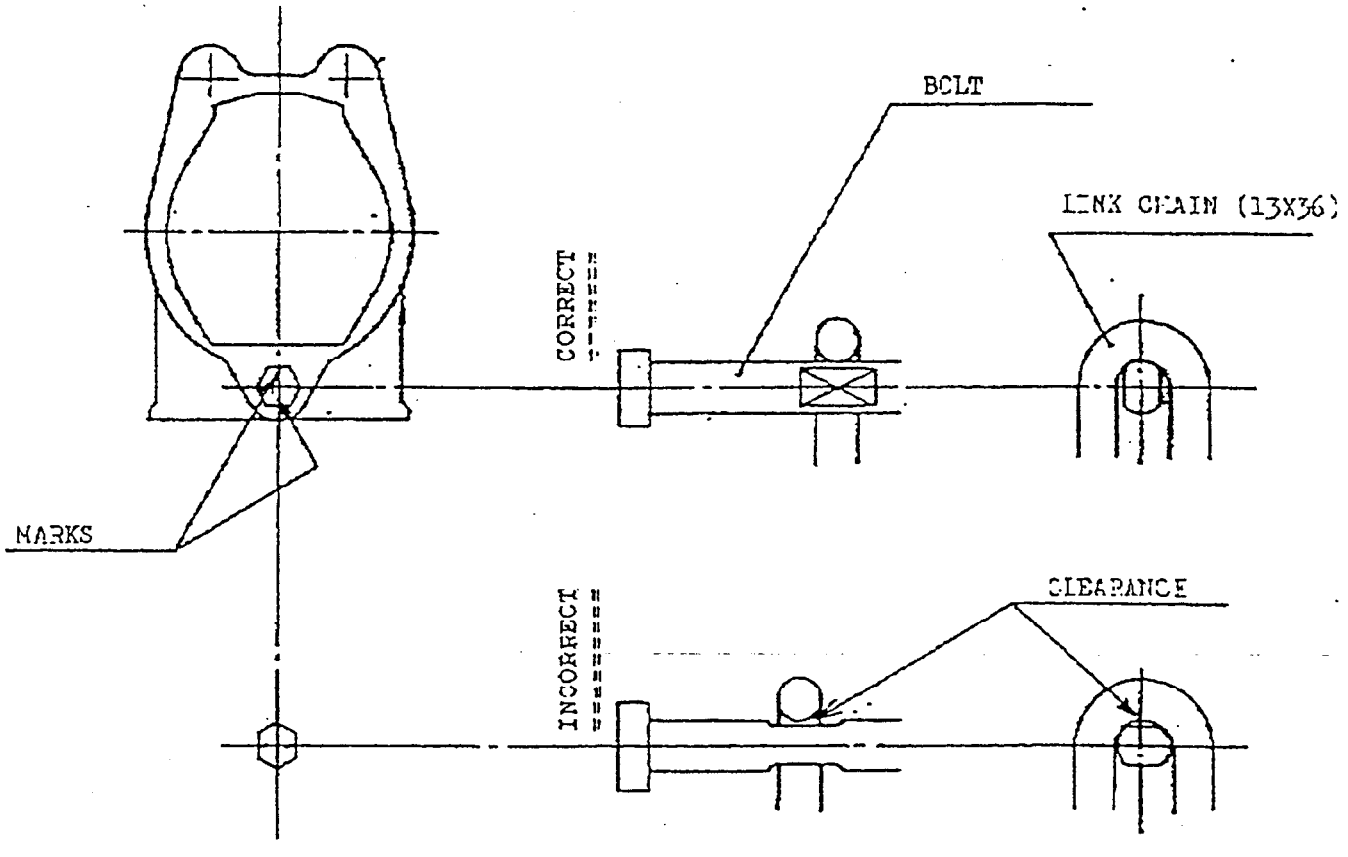
MAINTENANCE

WARNING: Never perform maintenance on the hoist while it is supporting a load.
WARNING: Before performing maintenance, tag controls: DANGER - DO NOT OPERATE - EQUIPMENT BEING REPAIRED.
WARNING: Turn off, depressurize and disconnect the air lines before performing any maintenance.
WARNING: Only allow qualified service personnel to perform maintenance.
WARNING: Test hoist to 125% of its rated capacity before returning to service.

Correct Installation of Anchor Bolt

When attaching the end link of the load chain on the six ton side, position the anchor bolt so that the marks on the head of the bolt are perpendicular to the hoist body as shown in the figure.

If the bolt is installed with the marks horizontal or otherwise tilted from vertical, there will be a clearance between the bolt and the inside of the link chain and the end link may wear out prematurely.



3. Installation of Load Chain

① Before installing the link chain, pass steel wire through casing (1) and (15) and hook case (200) of the 6 ton model.

② Suspend the hoist at the height about 1.5 m using a crane, etc. and perform temporary piping. Air pressure is 2.5 ~ 3.5 kgf/cm²G (2.5 ~ 3.5 bar gauge, 35.5~49.5 p.s.i.g.).

■ 3 Ton Model (Fig. 16)

① Install the end link of the link chain to the steel wire A on the hoisting side.

② Pull the link chain into the casing by pulling the steel wire.
The first link is pulled across the longitudinal direction of the hoist.
(Vertical link)

Note: The welded part faces away from the center of the chain wheel (6). Check the next vertical link so that the welded part is also facing outward.

③ Carefully and very slowly operate the hoist in the lowering direction until the end link enters the chain wheel (can be felt with the steel wire).
Do not drive in the hoisting direction at this stage.

④ Next, slowly drive the hoist in the hoisting direction while continuously pulling the steel wire.

⑤ When the end link comes out, pass through the space between control lever (143) and fix with hex. head bolt (156) and U-nut (157) without twisting.

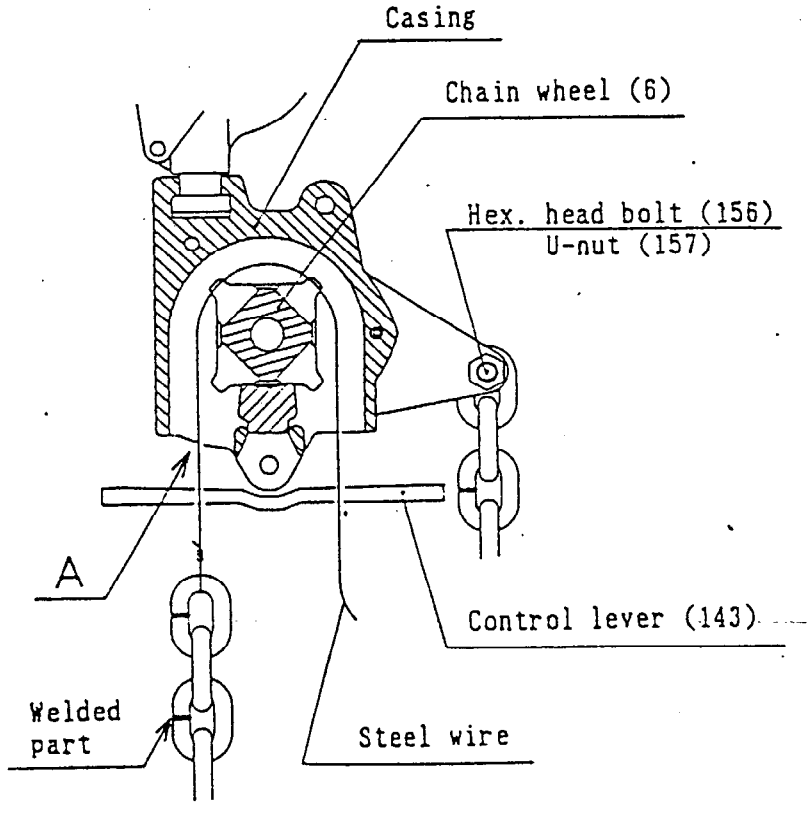


Fig. 16

■ 6 Ton Model (Fig. 17)

① Install the end kink of the link chain to the steel wire B on the lowering side.

② Pull the link chain into the casing by pulling the steel wire. The first link is pulled across the longitudinal direction of the hoist. (Vertical link)

Note: The welded part faces away from the center of the chain wheel (6). Check the next vertical link so that the welded part is also facing outward.

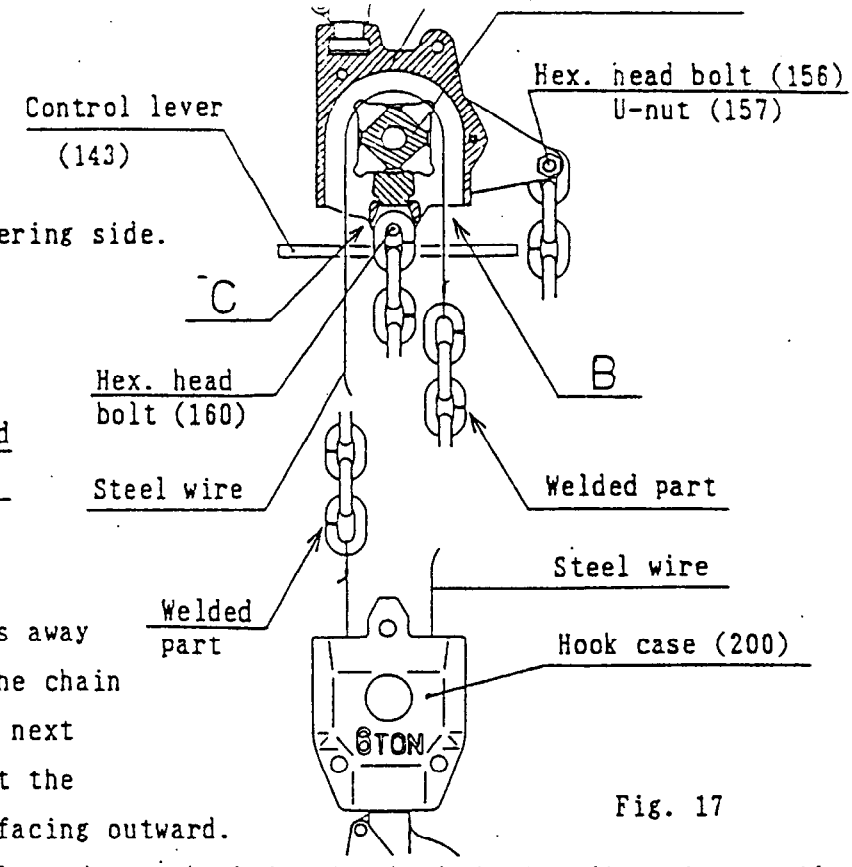


Fig. 17

③ Carefully and very slowly operate the hoist in the hoisting direction until the end link enters the chain wheel (can be felt with the steel wire.) Do not drive in the lowering direction at this stage.

④ Next, slowly drive the hoist in the lowering direction while continuously pulling the steel wire.

⑤ Install the pulled out end link to the steel wire passed through hook case (200) and pass the link chain.

Note: Pass the hook case while standing the end link. (The first link is a vertical link.) All welded parts of standing link should face away from the center of the chain wheel (202).

⑥ Check that both link chains on hoisting side are not twisted and fix at the C part on the casing using bolt (160).

Note: Be sure to shut off the air supply before loosening/tightening bolt (160).
Tightening torque for bolt (160) is 16.7 ~ 18.4 kgf·m.
Bolt (160) should be adjusted to the link chain. Using those marks which is stamped at the head of the bolt (160), adjust positions of the bolt to the link chain as shown in Fig. 18.

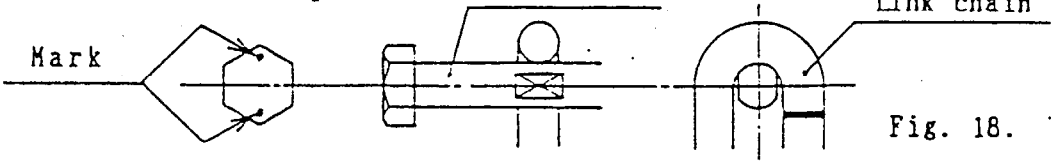


Fig. 18.

⑦ Pass the end link at lowering side through the space between control lever (143) and fix with hex. head bolt (156) and U-nut (157) without twisting.

X. Adjustment for Speed and Operating Limit of Control Lever (Fig. 7)

Prior to being shipped, the hoist is adjusted so that the control lever (143) or (144) mechanically stops against motor housing (84) before main valve reaches the operating limit position.

This method prevents the main valve from overloading.

■ For readjustment, individually set hoisting and lowering directions following the procedure shown below.

Be sure to remove the air supply before adjustment.

(1) Screw all hex. head bolts (146) to control lever.

(2) Loosen hex. head bolts until they touch the motor housing with the control lever pulled down.

(3) Release the control lever, reloosen hex, head bolts by 1 turn and thereafter, lock the hex. head bolts with hex. nuts.

■ Adjustment for Speed

Hoisting and lowering speed can be reduced by readjusting the operating limit of the control lever if required.

Turn hex. head bolts (146) counterclockwise for speed reduction.

We would recommend removing the air supply while turning the hex. head bolts. If removing is impossible, there is danger that the hoist will move during the adjustment of hex. head bolts. So carefully adjust.

When returning to regular speed, perform the adjustment in the same manner previously described for the adjusting method to prevent overload of the main valve.

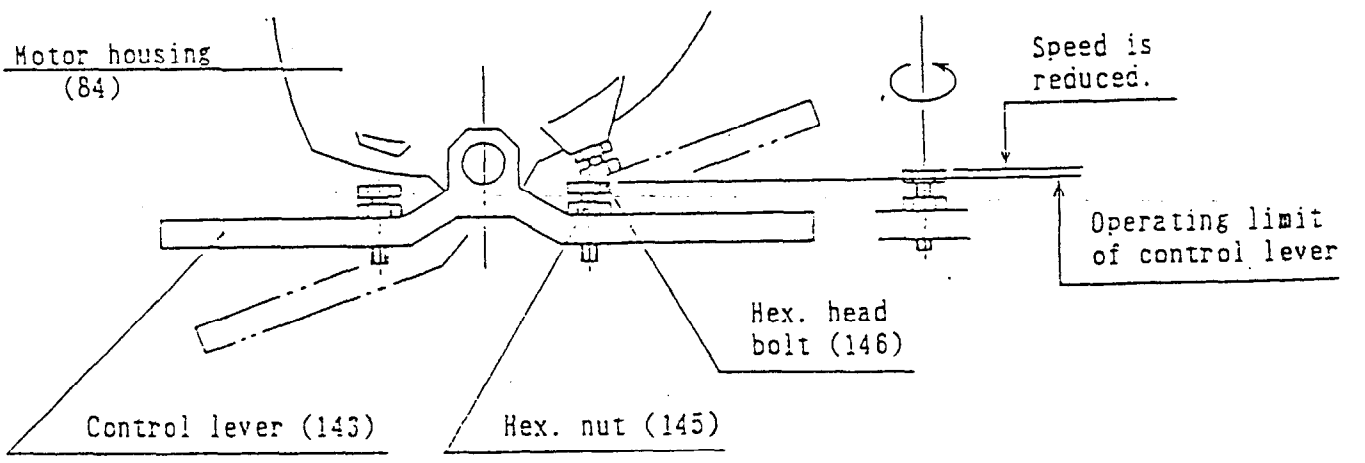


Fig. 7

Inspection of Brake and Limit of Use

Disassemble the brake and inspect the lining and component parts.

■ Disassembly of Brake

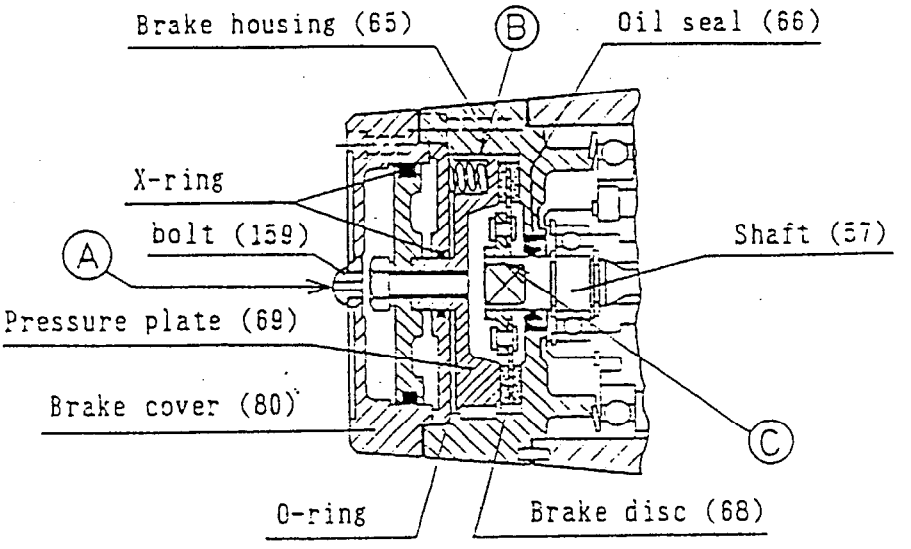
For details, see Ⅺ-1 "Disassembly Procedures".

a) Remove the brake cover (80) by sequentially loosening cap screw by 1/6 turn each.

b) Check that grease does not leak from reduction gear part when removing brake disc (68) from brake housing (65).

c) If grease leakage is found, remove the brake housing.
Loosen cap screw by 1/6 turn each sequentially.

d) Clean each part.



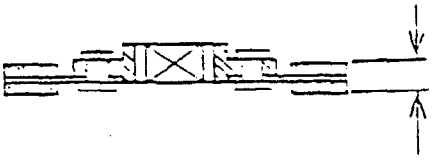
NOte:

- Do not use solvent when cleaning oil seal, O-ring or X-ring.
- Qhickly clean up lining if solvent is used.
- Carefully check air circuit of the brake to prevent the entry of solvent or foreign matter.

■ Inspections should be performed to all parts, checking cracks, flaws, deformation and wear.

- Does wear rate of lining exceed the limit of use?
- Is brake spring decayed, cracked or flawed?
- Are there any marks or cracks at engaged part Ⓒ between brake disc and shaft (57)?
- Is air exhaust hole Ⓐ on bolt (159) open?
- Are there flaws, deformation or worn on oil seal and X-ring?
  Are there any flaws on the shaft surface where oil seal touches?

■ Wearing Limit of Lining



(mm)

Standard dimension	Limit of use
8	5.5

■ Solution

- Replace parts with cracks, flaws, deformation or excessive wear.
- Replace the oil seal if grease leaks from the reduction gear.
  Clean the lining using solvent.
  If shaft is worn or flawed, simultaneously replace.
- Be sure to replace lining if the wear exceeds the limit of use.
  If wear is nearly exceeding the limit of use, we recommend to replace.
- Replace brake spring at the same time the brake disc is changed.
- Replace all brake springs at the same time.

■ Assembling Method

- See XI-2 "Reassembly" for assembling method.
- Apply Molykote Grease 33 to the sliding surface of X-ring, sliding surface Ⓑ of pressure plate (69) and brake housing , and engaged part Ⓒ between brake disc and shaft before assembly. (See IX-1 Lubrication)
- Thinly coat sliding surface Ⓑ of pressure plate and engaged part Ⓒ of shaft.
- Brake is self-adjust system. Therefore adjustment is not required.

XI. Disassembly and Reassembly

Caution

- Remove the air supply before disassembly or reassembly.
- Lower hoist to the ground before disassembly or reassembly.
- Careless mistakes in working may cause excessive damage to the hoist and may be a cause of injury. Therefore, perform the suitable work.
- Qualified persons should perform the work.

1. Procedures of Disassembly

Work as shown in the following procedure referring to the disassembly DWG (Page 42)

-1) Remove hoist from support device.

Caution: Release load, remove piping after removing the air supply and remove the hoist. If neglecting, serious danger shall occur.

-2) Remove link chain (171) or (172).

① Remove hex. head bolt (156) or (223) and remove the dead end of link chain from hoist or chain bucket.

② Suspend the hoist for temporary piping at height about 1.5 m using a crane, etc. Air supply pressure is 4～6 kgf/cm²G (4～6 bar gauge, 57～85 p.s.i.g.).

③ Slowly operate the hoist in the lowering direction and draw the link chain from the hoist.

Caution: The link chain drops down at same time it is disengaged from the chain wheel. So be careful.

④ Remove piping after removing the air supply and lower the hoist to the ground.

-3) If pendant control is attached, remove the pendant control device at this time. Remove cylinder holder cover, then remove cap screw.

-4) Remove cap screw (183 or 197) and uniformly remove hook (175 or 191) and hook holdre (180&181 or 195&196).

-5) Sequentially loosen hex. head bolts (44),(48),(160) by 1/6 turn. Uniformly remove motor housing (84) and valve housing (115) and also remove coupling (83).

-6) Remove cover (148). Remove cap screw (13) from shaft (140), then remove valve housing (115).

-7) Valve housing portion (115～137)

① Remove retaining ring C-type (130) and withdraw lever (127).

② Remove retaining ring C-type (10) and withdraw valve cone (117).

Note: Do not disassemble liner (116) except when replacing O-rings (119) and (120) or replacing with new part.

-8) Remove cap screw (147) and withdraw shaft (140) toward the valve housing side.

-9) Remove motor cover (103) and withdraw air motor.

Note: Sequentially loosen cap screws (113) by 1/6 turn.
Do not loosen cap screw (13) of cover (91) until cap screw (113) are removed.

-10) Motor cover portion (103～112)

Note: Insert (111) and plug (108) are treated by sealant.
Do not disassemble if not required.
If plug (108) is disassembled, replace shuttle valve (107) and plug with new ones.

① Remove plug (112) and check that orifice (inner dia. 1.2 mm) mounted on insert (111) is not clogged.
If disassembly of insert is required, first heat the insert to about 200°C using a burner, etc. and remove before the insert is cooled.
The outer periphery of the insert is a screw type.

② When disassembling shuttle valve (107), first remove spring pin (109), screw bolt (M4 p=0.7) into plug (108),heat the plug to about 200°C using a burner, etc. and withdraw before being cooled.

-11) Air motor portino (93～101)

① Withdraw end plate (101) from rotor (97).
Remove retaining ring (96) and ball bearing (95).

Note: Keep the parts from the disassembled end plate (101), retaining ring, ball bearing and spacer (94) all together in one set until they are assembled.

② Remove cylinder (99) and withdraw vane (98).

③ Ball bearing (95) of end plate (93) and rotor are interference fit.
Therefore, when disassembling, use jig and withdraw using hand press.

Note: Keep the parts from the disassembled end plate (93), retaining ring, ball bearing and spacer all together in one set until they are assembled. Do not mix with the parts of end plate (101).

-12) Do not disassemble nylon tube (85) in motor housing (84) if air leak is not found.
When the nylon tube is disassembled, replace the nylon tube and nipple (41) with new ones.

-13) Stand hoist with the mounting face of the motor housing downward and brake cover (80) upward. At that time, be careful not to separate casing (1) , (15) and gear housing (39).

-14) Brake portion (65～81)

① Sequentially loosen cap screws (81) by 1/6 turn and remove brake cover (80).

② Remove bolt (78), brake piston (75) and cylinder cover (72).

③ Withdraw pressure plate (69) and brake disc (68).

Note: When the brake disc is withdrawn, check that grease does not leak from the reduction gear portion.

④ Sequentially loosen cap screws (67) by 1/6 turn and remove brake housing (65).

-15) Uniformly withdraw planet shaft (51), double gear wheel (52), ball bearing (56) and shaft (57).

-16) Planet shaft portion (51～62)

Note: The engaging position of teeth of shaft (57) and double gear wheel (52) is specified.

Do not disassemble if not required.

① Remove retaining ring C-type (55), withdraw shaft (54) and remove double gear wheel.

② Remove retaining ring C-type (61) and uniformly withdraw shaft (57) and ball bearing (60).

-17) Withdraw internal gear (49).

-18) Remove gear housing (39) (Lift up).

-19) Do not disassemble nylon tube (40) in the gear housing if air leak is not found.

When the nylon tube is disassembled, replace the nylon tube and nipple (41) with new ones.

-20) Remove internal gear (37), gear wheel (33) and shaft (36), and withdraw planet shaft (31).

-21) Remove ball bearing (30) and internal gear (28).

-22) Remove planet shaft (22), withdraw shaft (26) to chain wheel (6) side and remove gear wheel (24).

-23) Remove cap screw (18), separate casing (1) and casing (15) and remove chain wheel (6).

2. Reassembly

Note

- Before the reassembly, completely clean all disaseembled parts and check for cracks, flaws, deformation and wear.
- Do not use acidic solvent.
- Replace every broken parts and excessively worn parts.
  Also replace burred or damaged screws.
- Do not use solvent when cleaning the rubber parts such as O-rimg, X-ring, oil seal,. etc. and the plastic parts.
- Do not clean shielded bearings (5), (7) and (95). If they are cleaned or particles enter, replace them.

For assembly, see the disassembly DWG (page 42) and follow the procedure shown below.

-1) Assembly directions for retaining ring (Fig. 8)

Set up the retaining ring so that the sharp surface of the edge is loaded.

Note: Only retaining ring (96) has a different assembly directions.
See "Air motor portion".

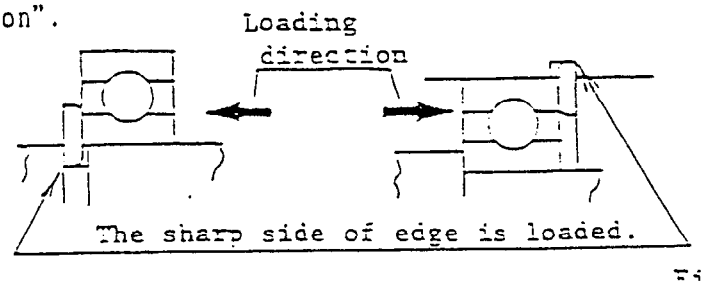


Fig. 8

-2) Aseembly procedures for nylon tubes (40) and (85)

① Insert nipple (41) to the nylon tube. Keep clearance between the end face of the nylon tube and the flange of the nipple at 0~1 mm.

② Use a jig of which outerdiameter is 11.5 mm and strike into the gear housing or the motor housing.

③ As shown with Ⓐ in Fig. 9, pull out the opposite side of the nylon tube from the end face of each housing, insert the nipple and strike with a jig. (Similarly to ①, keep the clearance at 0~1 mm.)

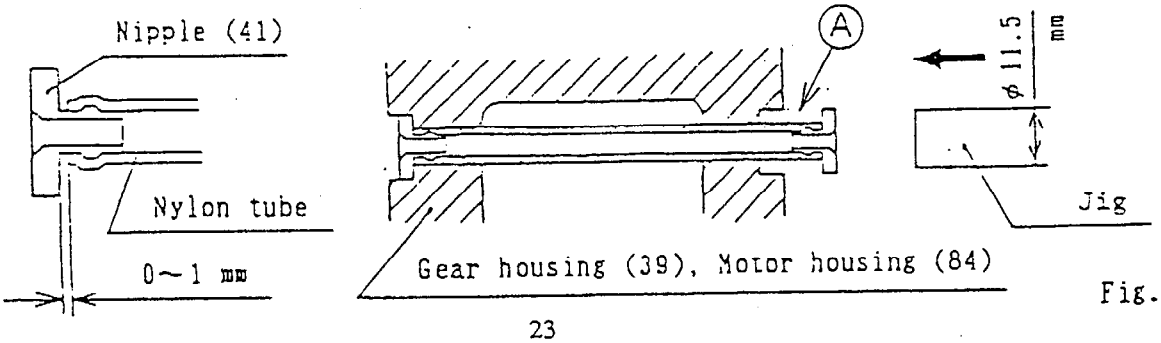


Fig. 9

-3) Hook portion (175～179), (191～194)

① Degrease tapping holes of hook pins (178) and (194) and screw (179) using solvent such as trichloroethylene, etc.

② Coat the tapping hole of the hook pin with adhesive and tighten with screw (179). For the adhesive, use Loctite 262 or equivalent.

-4) Casing portion (1～18)

① Set up chain guide (2) and (16) to casing (1) and (15).

② Set up ball bearing (7), rotary shaft seal (8), washer (9),retaining ring C-type (10) and O-ring (11) to chain wheel (6).

③ Sequentially set up ball bearing (5), chain wheel, and chain guide (12) to casing (1). Use the pocket of the chain wheel for setting up the chain guide.

④ Set up O-ring (14) and mate casing (1) and (15). Next, set up ball bearing (5) to casing (15).

⑤ Tighten cap screw (18) with the torque of 6.2 ～ 6.7 kgf·m.

-5) Horizontally set up placing casing (15) lower and casing (1) upper.

-6) Reduction gear portion (19～64)

① For lubrication volume and types of grease, see IX-1 "Lubrication".

② Lubricate with grease individually needle cages (25), (34) and (53), ball bearings (23), (27), (30), (32), (56) and (60) when assembling.

③ Set up O-rings (20) and (21) to spacer (19) and mount on casing (1).

④ Set up ball bearings (23) and (27) and gear wheel (24) to planet shaft (22) and mount into casing (1).

⑤ Sequentially assemble internal gear (28), key (29) and ball bearing (30) and lubricate with grease.

⑥ Set up ball bearing (32) to planet shaft (31) and mount into planet shaft (22).

⑦ Set up shaft (36) and gear wheel (33).
For setting direction, see Fig.10.

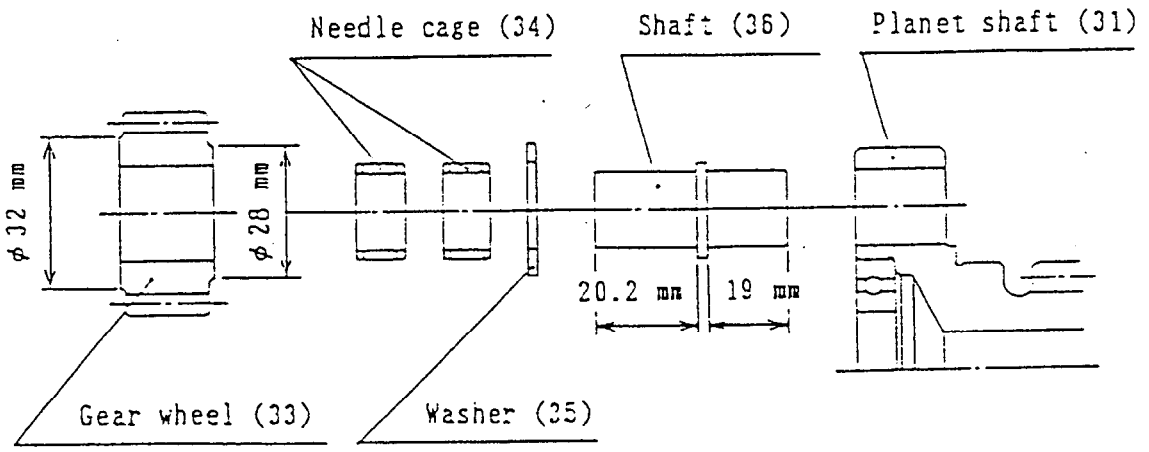


Fig. 10

⑧ Set up internal gear (37) and key (38) and lubricate with grease.

⑨ After mounting O-ring (42) to gear housing (39), set up the gear housing from the upper portion.

At that time, be careful not to drop keys (29) and (38) and O-ring (42).

⑩ Set up internal gear (49) and lubricate with grease.

⑪ Uniformly assemble planet shaft (51), double gear wheel (52), shaft (57), and ball bearing (56) and thereafter, mount into the gear housing.

Note: Teeth of double gear wheel (52) and shaft (57) should be mated. As shown in Fig. 11, on the large gear of the double gear wheel, 1 dot mark is chiseled at a tooth top and 2 dot marks at a tooth bottom. Using those marks, adjust teeth positions as shown in Fig.11.

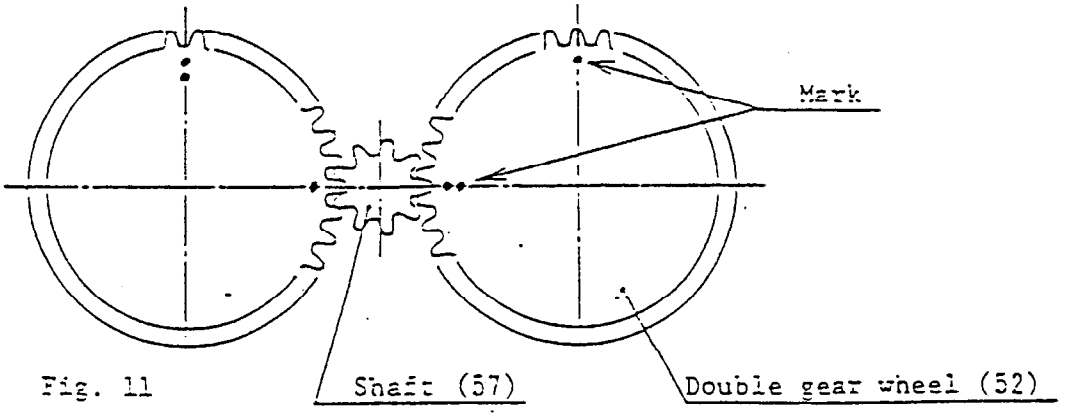


Fig. 11

-a) Mount spacer (58) and retaining ring C-type (59) on shaft (57) and insert to planet shaft (51)

-b) After adjusting teeth positions as shown in Fig. 11, set up shaft (54).

-c) After setting up retaining ring C-type (55), recheck that teeth positions are correctly adjusted and set up ball bearing (60).

-7) Brake portion (65～81)

① When assembling, coat sliding surfaces and engaged parts of each part using Molykote grease 33.

For coating positions, see IX-2 "Inspection of Brake and Limit of Use".

For details of grease, see IX-1 "Lubrication".

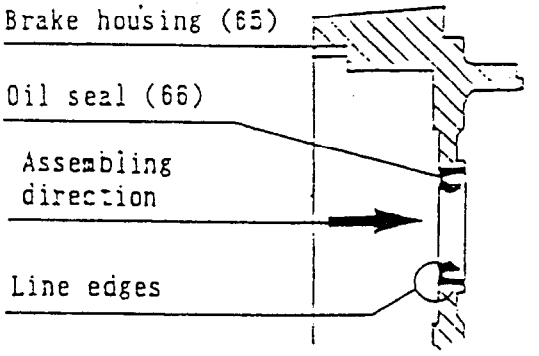


Fig. 12

② Be careful not to put oil, etc. on the lining portion of brake disc (68).

③ Forcibly insert oil seal (66) and line edges of oil seal and brake housing (65). (see Fig. 12)

④ Carefully mount the brake housing without flawing the oil seal and sequentially tighten cap screws (67) by 1/6 turn.

⑤ Set up X-rings (73) and (76) to the corresponding part, respectively.

⑥ Insert pressure plate (69) and cylinder cover (72) to the brake housing and tighten bolt (78) through brake piston (75) at 8.5 ~ 9.3 kgf·m torque.

⑦ Uniformly withdraw the pressure plate and the brake piston.

⑧ Insert the brake piston to brake cover (80).
At that time be careful not to flaw X-ring (76).

⑨ Uniformly mount the pressure plate and the brake cover on the brake housing. Sequentially tighten cap screws (81) by 1/6 turn.

-8) Reversely turn the hoist so that the brake cover faces downward and the motor housing mounting surface upward.
At that time, be careful not to separate casing (1), (15) and gear housing.

-9) Air motor portion

① Assemble end plates (93) and (101), retaining rings (96), ball bearings (95) and spacers (94) without mixing, which was separately maintained when being disassembled.

② Set up the retaining ring to be loaded on the sloped surface.
The sloped surface is place at the opposite side of the ball bearing.
(See Fig. 13)

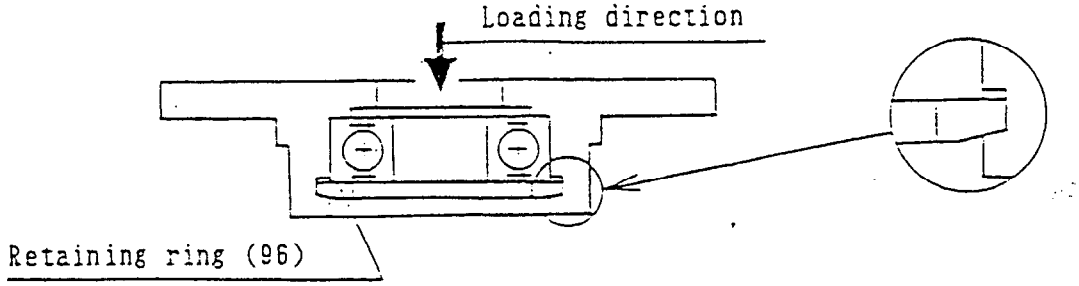


Fig. 13

③ Set up spacer (94) such that the largely chamfered edge surface of internal periphery contacts with rotor (97).

④ When ball bearing (95) or retaining ring (96) is replaced, the step difference between the end plate and the spacer should be measured after setting up the ball bearing and the retaining ring on the end plate.

First, apply load of about 5 kgf on the spacer and keep loading for about 10 seconds, next, remove the load and measure the dimension.
The allowable range for the dimension is 0.08～0.11 mm (Fig. 14).
When measured value is larger than allowable value, scrape (grind) the spacer. When it is smaller, replace the ball bearing or the retaining ring. Do not scrape (grind) the end plate.

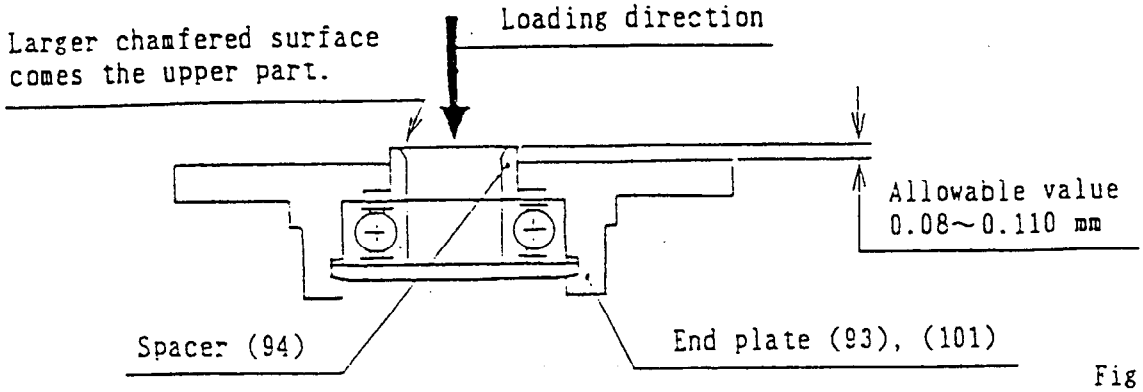


Fig. 14

We would recommend to order end plate, ball bearing, retaining ring and spacer together in a set.
Order the part No. of a set of end plat.
Thereby, the checked end plate set shall be shipped.

⑤ Ball bearing (95) of end plate (93) and rotor (97) are interference fit. Therefor, when assembling, use jig and insert using hand press.
When inserting rotor to the ball bearing, support load with inner ring of the ball bearing.
Keep forcibly inserting until the rotor is in complete contact with the spacer.

⑥ Slightly lubricate the part between the end plate and the rotor and also vane (98) portion. (Use the same oil used for the lubricator.)

-10) Set up cover (91) on motor housing (84), then mount coned disc spring (92) and the air motor.

-11) Motor cover portion (103～112)

① Using solvent such as trichloroethylene, etc. degrease plug (108), set screw (110), insert (111) and their mounting positions on motor cover (103).

② Coat the set screw and outer periphery of the insert with sealant and screw.
Screw the insert until the tip touches the air circuit wall. (Fig. 15)
Use Loctite 510 or equivalent for sealant.

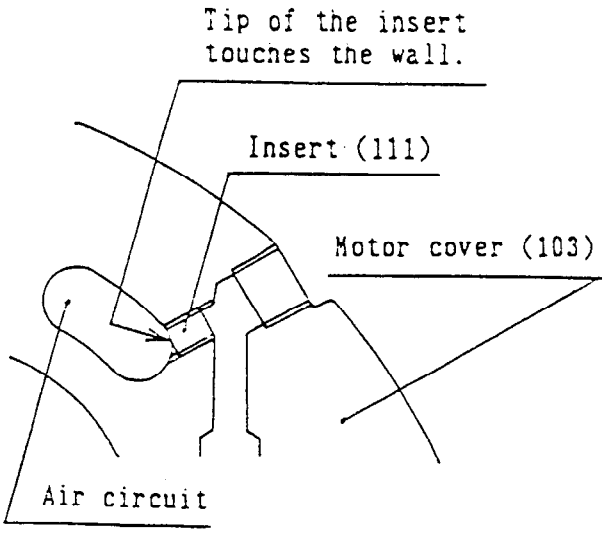


Fig. 15

③ Apply sealant to plug (108), i.e., thinly coat the part of which diameter is 9 mm and little bit thickly coat the stepped part of 9 mm and 12 mm in diameter and the part of which diameter is 12 mm. Then insert the plug. Set up spring pin (109).

④ Project needle bearing (86) about 3 mm from the surface of the motor cover to valve housing (115) side.

⑤ Sequentially tighten cap screws (113) by 1/6 turn.
Be sure to tighten cap csrew (13) of cover (91) before tightening the ca screw (113).

-12) Valve housing portion (115～137)

① Carefully handle liner (116) and valve cone (117), because every flaw even a small one is rejected.

② Degrease adapter (137) and its mounting surface on valve housing (115) using solvent such as trichloroethylene, etc.

③ Apply sealant (Loctite 510) to the seat of the adapter and screw.

④ Apply oil to O-rings (119) and (120) mounted on the liner.
Check that longer hole of the liner mates with the set hole of lever (127) before setting them up. (Use the same oil used for lubricator.)

-13) Assemble the valve housing to the motor housing and thereafter mount on the casing.
Sequentially tighten hex. head bolts (44), (48) and (160) by 1/6 turn.
The tightening torque for hex. head bolt (44) is 15 ～ 16.5 kgf·m and the torque for hex. head bolts (48) and (160) is 16.7 ～ 18.4 kgf·m.

-14) Top hook portion (175～183), (191～197)

① Set up hook (175 or 191) and mate hook holders (180 or 195) and (181 or 196),and mount on the casing.

Gently tighten cap screw (18). Do not tighten strongly at this stage.

② Tighten cap screw (183 or 197) with 40 ～ 43 kgf·m torque, and tighten cap screw (18) with 6.2 ～ 6.7 kgf·m torque.

-15) Insert shaft (140) from the valve housing side.

When inserting, sequentially mount angle piece (141), washer (142) and control lever (143 or 144).

Tighten cap screws (13) and (147) with 1.4 ～ 1.55 kgf·m torque.

-16) Adjust operating limit of control lever.

The adjustment is necessary to prevent overloading to the parts of the main valve.

See X "Adjustment for Speed and Operating Limit of Control Lever".

-17) Bottom hook portion (175～188), 3 Ton

① Assembly directions for thrust bearing (184)

The inner ring (ring with small ID) is engaged with hook ring (185).

② Assemble hex. nut (187) into the hole (not spot-faced) of hook holder (186) facing the chamfered edge surface of outer periphery inside.

③ Tighten cap screw (188) with 10.5 ～ 11.8 kgf·m torque.

-18) Bottom hook block portion (191～203), 6 Ton

① Assembly directions for thrust bearing (198)

The inner ring (ring with small ID) is engaged with hook ring (199).

② Tighten cap screw (203) with 10.5 ～ 11.8 kgf·m torque.

PENDANT CONTROL SWITCH FOR AIR HOIST

HANDLING MANUAL

Model	PCS-2
Applicable air pressure (kgf/cm²G)	4 ~ 6
Applicable models of air hoist	ACHM030 ACHM060
Weight (kgw)	About 2.7

Ⅱ. Construction

1. Control Valve

Comprising a built-in spring-return type poppet valve of direct drive, 3-positions and 3-ports, it is designed to adjust the flow of compresse air by means of an exhaust orifice inside the cylinder and control valv Inside air pressure of cylinder can be adjusted according to the operation of push button.

2. Cylinder

A balance type cylinder is adopted to adjust the stroke by means of the air pressure inside the cylinder.
The cylinder piston is connected to the main valve of air hoist, therefore, enabling operator to adjust the lifting/lowering speed easily by means of control of push buttons.

Ⅲ. Operating Procedure (Refer to Fig.1)

1. Installation

Install the pendant control switch onto the hoist according to the following instructions.
The pendant control switch is supplied detached from the hoist.
Before installing the hoist, install the pendant control switch to the hoist

-1) Remove cover (B) and screw (C) from valve housing (A).
-2) Fix seal (13) and nipple (43) to be supplied with the pendant control switch into the part, which is fixed the screw (C).
-3) Remove cover (54) from cylinder holder (19).
-4) Uniformly fix cylinder (10) and cylinder holder (19) together with cover (28) to valve housing (A).
-5) Fix wire rope (45) by the screw (52) to cylinder holder.
-6) Connect nylon tubes to the correct parts according to indentification colors.
-7) Fix cover (54).

2. Adjustment of Pendant Control Switch

The operating speed of the pendant control type hoist may be changed as required flom slow to high by adjusting the pressure on the push button (39).

with the buffer spool (41).
In this position, the hoist is operated at the slowest speed. Further pressing of the push button will accordingly increase the operating speed from slow to high.

By gradually restoring the push button from its fully-pressed position the operating speed may be reduced to the slow.
Prior to being shipped, the position of buffer spool is adjusted to operate the hoist at slowest speed, where the hoist is to be operated under the rated load (PCS-1····500kgs or 1000kgs, PCS-2····3tons or 6tons) at the intake air pressure of 4kgf/cm²G.
If the intake air pressure from the shop supply is different from the above value, or if a different speed setting is desired, make the readjustment a position of buffer spool by control of set bolt (42).
If increase in speed is required, turn set bolt in counter-clockwise direction.
If decrease in speed is required, turn set bolt in clockwise direction.

3. Operational Cares

Do not ever pull on pendant control switch in operation and non-operation.

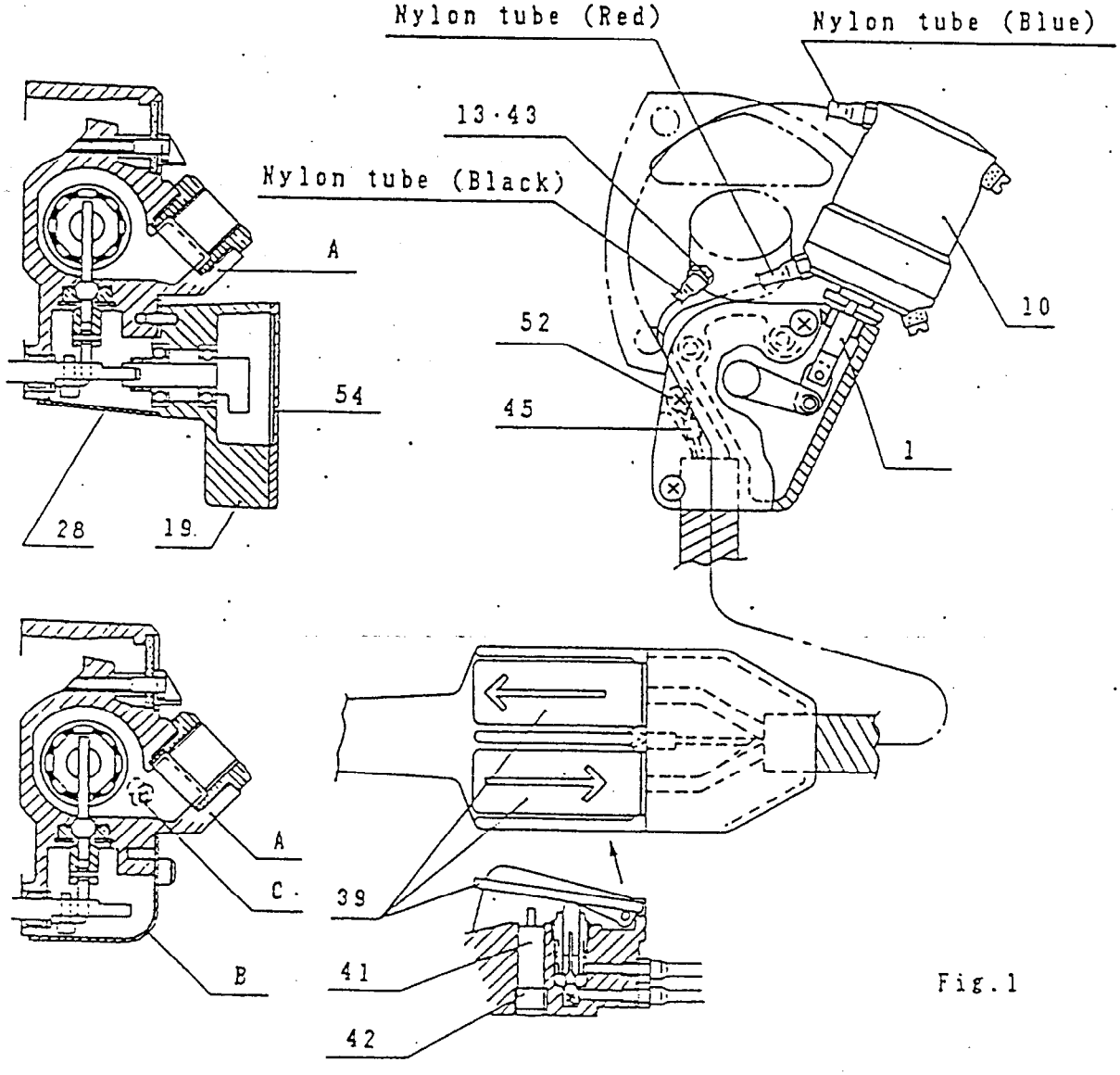


Fig.1

1. The piston rod (1) and cylinder bore are lubricated with molybdenum disulphide grease NO.2 of NLGI (National Lubrication Grease Institute) e.g. Molykote BR2-S.
2. The other moving parts of pendant control are lubricated with grease of EP type.
(Recommended lubricants, Refer to operation manual of the hoist.)

V. Disassembly and Reassembly

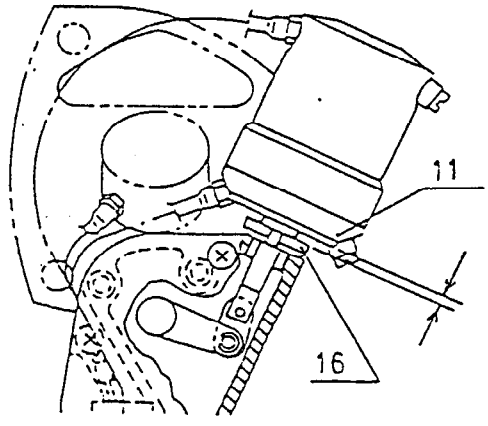
Caution

- Remove the air supply before disassembly or reassembly.
- Lower the hoist to the floor before disassembly or reassembly.
- Careless mistakes in working may cause excessive damage to the hoist and may be s cause of injury.
  Therefore, perform the suitable work.
- Qualified or well-trained persons should perform the work.

1. Procedure of Disassembly

When the pendant control switch is to be disassembled, refer to the disassembly DWG (page-6) and follow the procedure shown below.

-1) Remove cover (54), then remove piping of nylon tubes (47.48.49) from the cylinder (10) and the valve housing.
-2) Remove wire rope (45) from cylinder holder (19).
-3) Uniformly remove cylinder holder and cylinder.
-4) Remove retaining ring E-type (27) and withdraw pin (26) toward the reverse side of cylinder holder.
-5) Measure the dimension of clearance between bearing nut (16) and cylinder cover (11).
Refer to the sketch at right.
Note : Make sure to measure the dimension of clearance, as it is required when assembling.



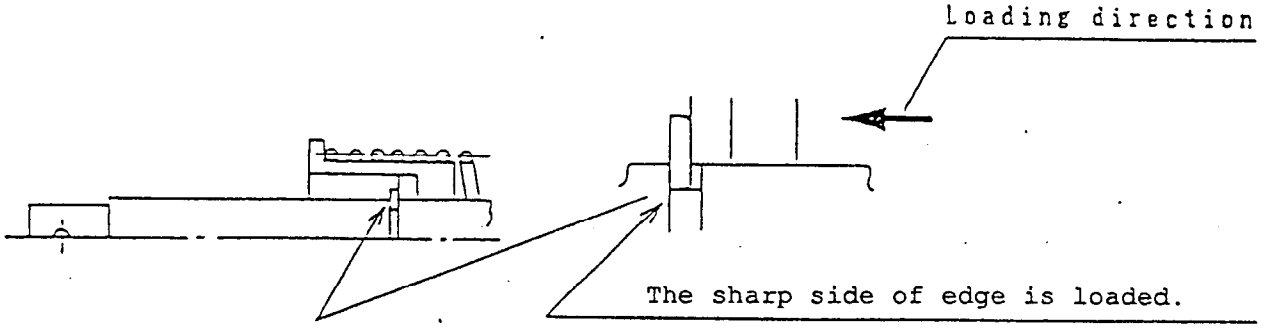
-6) Loosen bearing nut.
Remove cylinder from cylinder holder.
-7) Cylinder portion (1 ~ 12)
① Remove cap screw (12).
② Remove nylon lock nut (9) and withdraw piston (7), spacers (4, 6), spring (5) and ring (3).
③ Remove retaining ring C-type (2) and remove cylinder cover (11)
-8) Cylinder holder portion (19 ~ 25)
① Check that the spindle (21) rotates smoothly and that the joint part of spindle is worn or cracked.
If not troubled, do not disassemble spindle.
② In case it necessitates disassembling, drive out spindle from the side of sleeve (25).
-9) Valve housing portion (30 ~ 42)
① Remove valve cover (50), and remove nylon tubes and wire rope.
② Remove pin (40) and push button (39).
③ Withdraw valve knob (38) and valve pin (37).
④ Remove liner (36), and withdraw seat (35), steel ball (33) an valve spling (32).

Note

- Before the reassembly, completely clean all disassembled parts and chec for cracks, flaws, deformation and wear.
- Do not use acidic solvent.
- Replace every broken part and excessively worn part.
- Do not cleanser on the rubber parts such as O-ring, etc. and the ; ti parts.

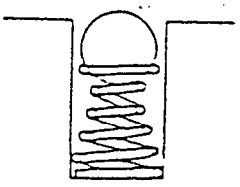
Assemble the pendant control switch in reverse order of disassembly whil taking the fllowing cares.

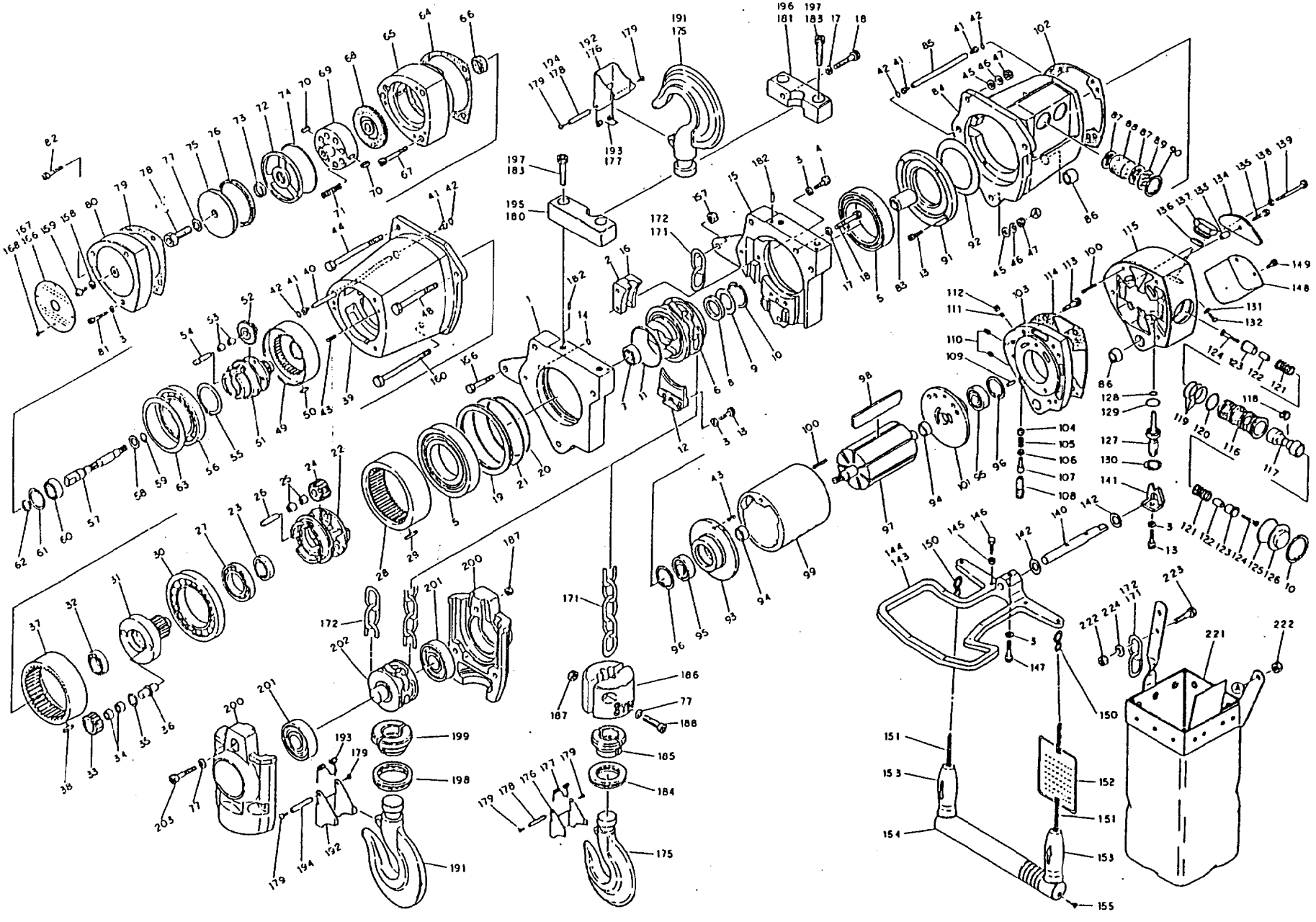
-1) Retaining ring C-type (2) must be replaced always by new one. Set up the retaining ring so that the sharp surface of the edge is loaded.

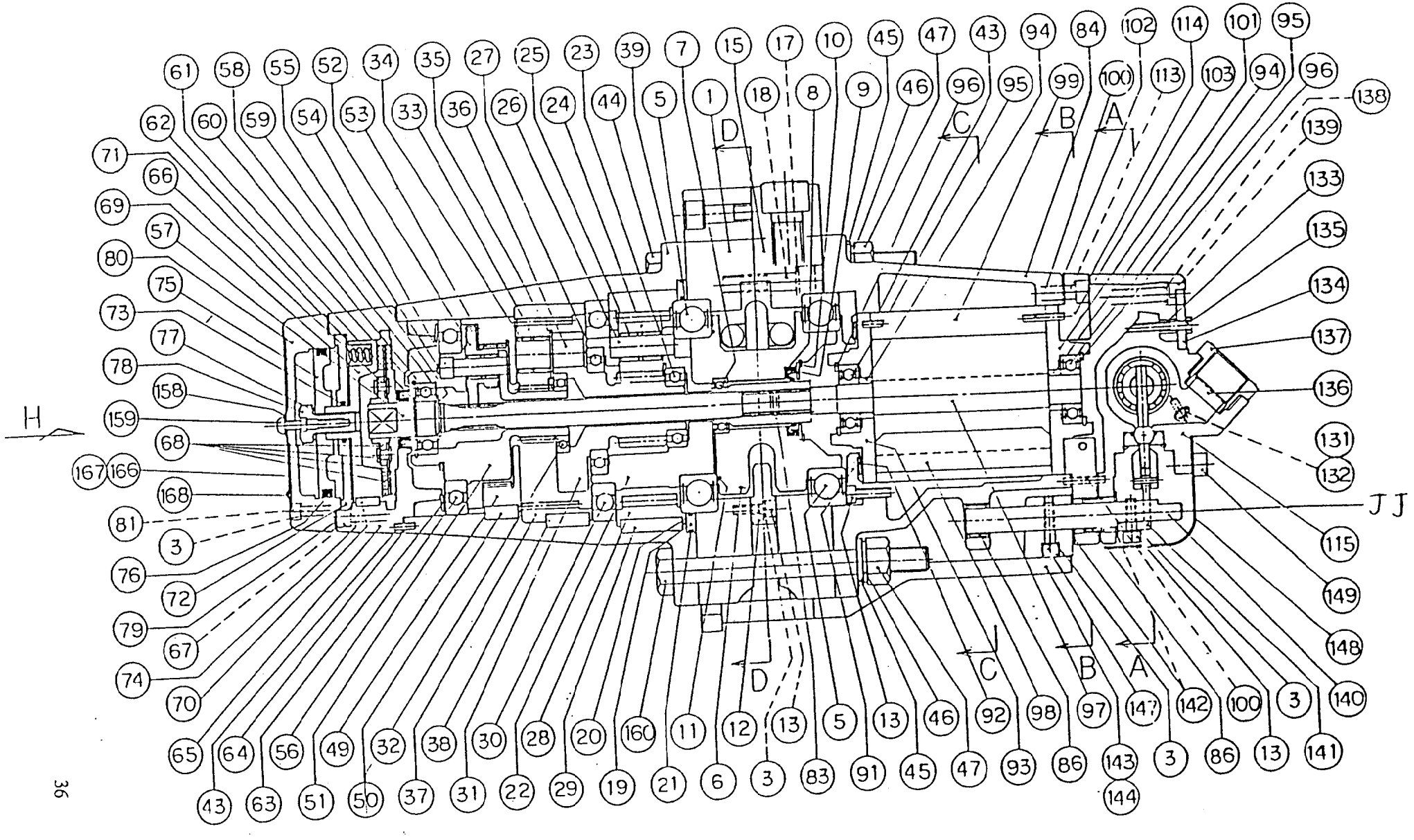


-2) Cylinder (10) and cylinder holder (19) must be assembled to the exact same dimension as clearance that was measured prior to disassembling.

-3) Valve spring must be assembled as shown in the following sketch, and assemble steel ball (33) and seat (35).
At that time, be careful not to drop steel ball from the end turn part of valve spring (32).



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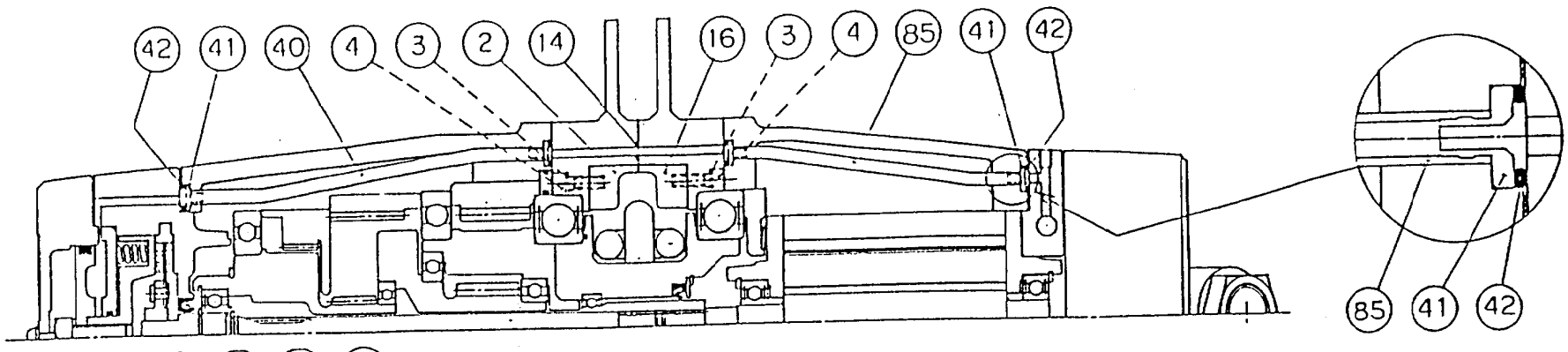

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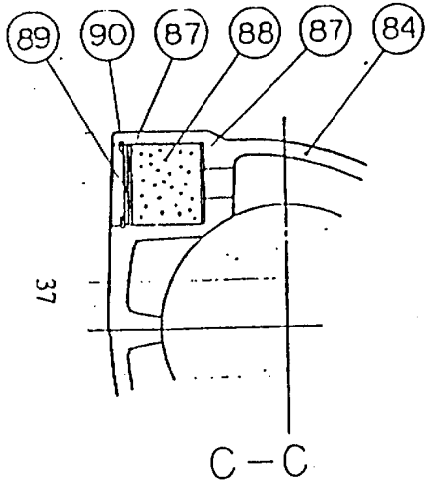

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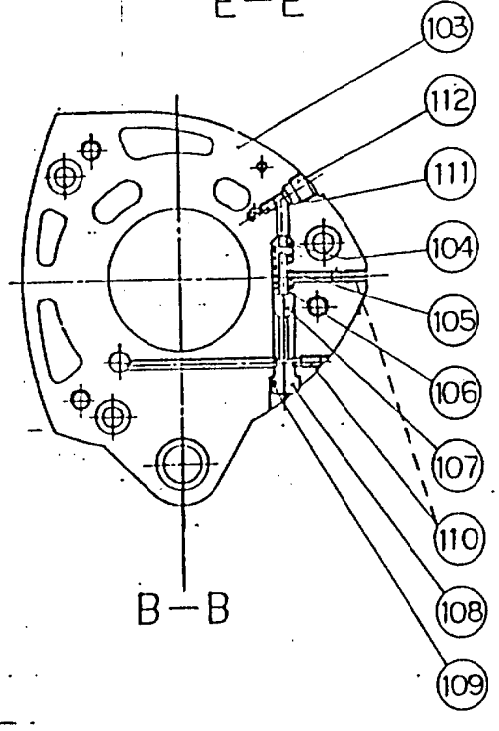

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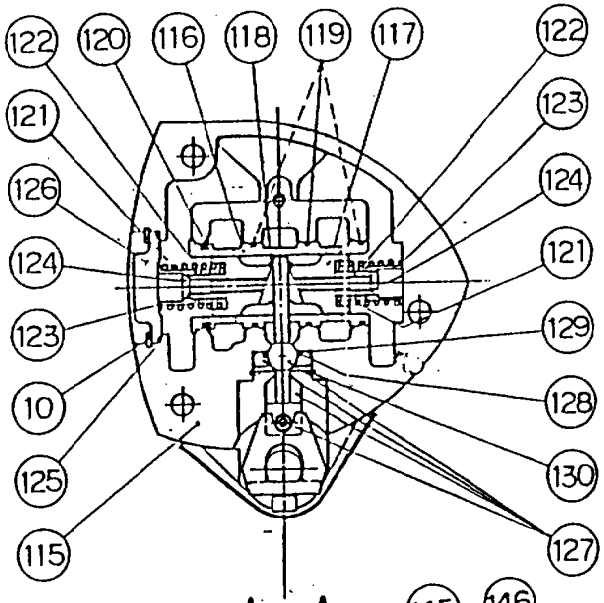

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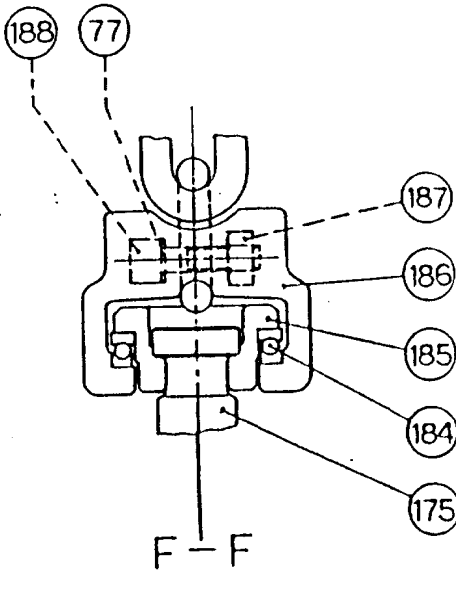

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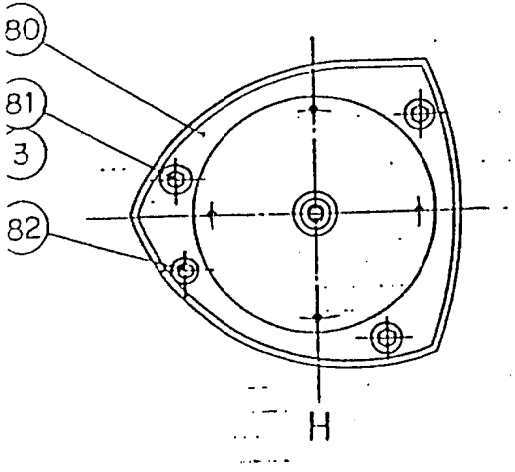

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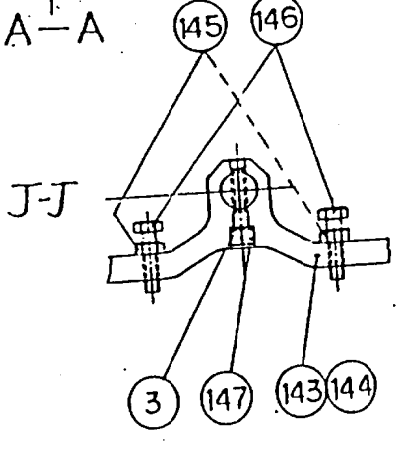

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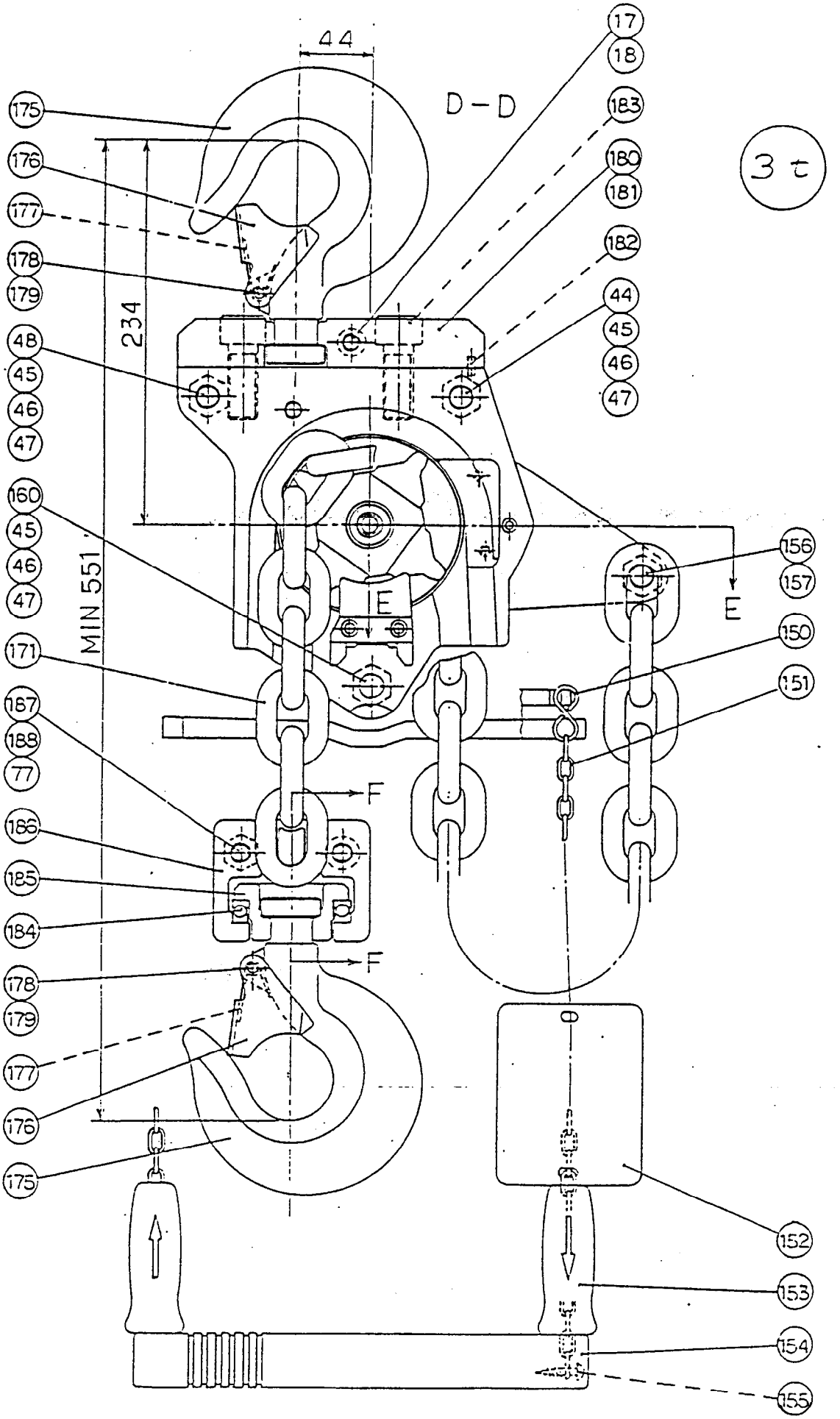
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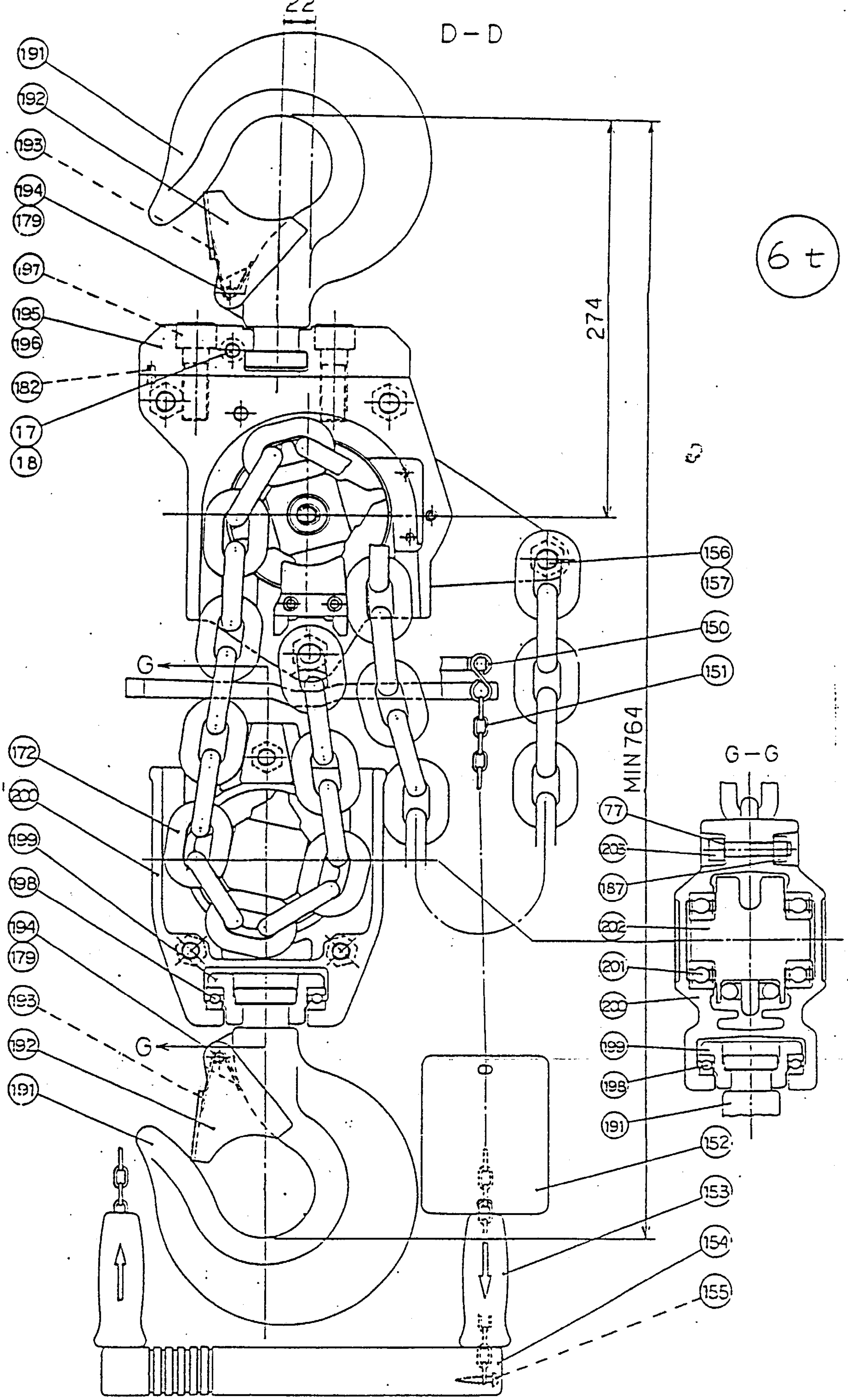

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ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
	Casing Set (Includes Pc's 1 & 15)	1	5373357
1	Casing, Gear Side	1	Not Sold Separately
15	Casing, Motor Side	1	Not Sold Separately
2	Chain Guide, Gear Side	1	5373358
3	C.D. Washer	11	5373560
4	Cap Screw	4	5373394
5	Ball Bearing	2	5373581
	Chain Wheel Set (Includes Pc's 6,8,9 & 10)	1	5373359
6	Chain Wheel	1	Not Sold Separately
8	Rotary Shaft Seal	1	5373547
9	Washer	1	5373548
10	Retainer Ring C-Type	1	5373569
7	Ball Bearing	1	5373578
11	O-Ring	1	5373575
12	Chain Guide	1	5373361
13	Cap Screw	7	5373552
14	O-Ring	1	5373573
16	Chain Guide, Motor Side	1	5373362
17	C.D. Washer	1	5373562
18	Cap Screw	1	5373555
19	Spacer	1	5373549
20	O-Ring	1	5373576
21	O-Ring	1	5373577
22	Planet Shaft	1	5373313
23	Ball Bearing	1	5373580
24	Gear Wheel	Set of 3	5373527
25	Needle Cage	6	5373491
26	Shaft	3	5373528
27	Ball Bearing	1	5373584
28	Internal Gear	1	5373550
29	Key	1	5373530
30	Ball Bearing	1	5373586
31	Planet Shaft	1	5373531
32	Ball Bearing	1	5373583
33	Gear Wheel	Set of 2	5373532
34	Needle Cage	4	5373492
35	Washer	2	5373533
36	Shaft	2	5373534
37	Internal Gear	1	5373535
38	Key	1	5373536
	Gear Housing Complete (Includes Pc's 39,40,41,42 & 43)	1	5373363

ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
39	Gear Housing	1	Not Sold Separately
	Nylon Tube Set (Includes Pc's 40,41 & 42)	1	5373314
40	Nylon Tube	1	Not Sold Separately
41	Nipple	2	Not Sold Separately
42	O-Ring	2	5373574
43	Spring Pin	2	5373570
44	Hex Head Bolt	1	5373519
45	Plain Washer	3	5373559
46	C.D. Nut	3	5373564
47	Hex Nut	3	5373558
48	Hex Head Bolt	1	5373520
49	Internal Gear	1	5373537
50	Key	1	5373538
51	Planet Shaft	1	5373539
52	Double Gear Wheel	Set of 2	5373540
53	Needle Cage	4	5373494
54	Shaft	2	5373541
55	Retainer Ring C-Type	1	5373567
56	Ball Bearing	1	5373585
57	Shaft	1	5373315
58	Spacer	1	5373542
59	Retainer Ring C-Type	1	5373565
60	Ball Bearing	1	5373579
61	Retainer Ring C-Type	1	5373568
62	Retainer Ring C-Type	1	5373566
63	Coned Disc Spring	1	5373543
64	Gasket	1	5373316
65	Brake Housing	1	5373364
66	Oil Seal	1	5373521
67	Cap Screw	3	5373400
68	Brake Disc	1	5373317
69	Pressure Plate	1	5373365
70	Key	2	5373318
71	Brake Spring	Set of 9	5373319
72	Cylinder Cover	1	5373320
73	X-Ring	1	5373321
74	O-Ring	1	5373436
75	Brake Piston	1	5373366
76	X-Ring	1	5373322
77	C.D. Washer	1	5373563
78	Bolt	1	5373367
79	Gasket	1	5373368
80	Brake Cover	1	5373369
81	Cap Screw	3	5373553
82	Cap Screw	1	5373391
83	Coupling	1	5373370

ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
	Motor Housing Complete (Includes Pc's 84,85,41,42,86, 87,88,89 & 90)	1	5373486
84	Motor Housing	1	Not Sold Separately
	Nylon Tube Set (Includes Pc's 85, 41 & 42)	1	5373323
85	Nylon Tube	1	Not Sold Separately
41	Nipple	2	Not Sold Separately
42	O-Ring	2	5373574
86	Needle Bearing	1	5373591
87	Support	4	5373324
88	Silencer	2	5373325
89	Support	2	5373326
90	Retainer Ring C-Type	2	5373421
91	Cover	1	5373327
92	Coned Disc Spring	1	5373328
	Air Motor Complete (Includes Pc's 93,94,95,96,97, 98,99,43,100,101,94,95 & 96)	1	5373329
	End Plate Set, Gear Side (Includes Pc's 93,94,95 & 96)	1	5373330
93	End Plate	1	Not Sold Separately
94	Spacer	1	Not Sold Separately
95	Ball Bearing	1	5373582
96	Retainer Ring	1	5373331
97	Rotor	1	5373332
98	Vane	Set of 7	5373333
99	Cylinder	1	5373334
43	Spring Pin	1	5373570
100	Spring Pin	1	5373571
	End Plate Set, Valve Side (Includes Pc's 101,94,95 & 96)	1	5373335
101	End Plate	1	Not Sold Separately
94	Spacer	1	Not Sold Separately
95	Ball Bearing	1	5373582
96	Retainer Ring	1	5373331
102	Gasket	1	5373336
	Motor Cover Complete (Includes Pc's 103,104,105,106,107, 108,109,110,111,112,86 &100)	1	5373488
103	Motor Cover	1	Not Sold Separately
	Shuttle Valve Set (Includes Pc's 105,106,107,108 & 109)	1	5373356
105	Spring	1	Not Sold Separately
106	Washer	1	Not Sold Separately
107	Shuttle Valve	1	Not Sold Separately
108	Plug	1	Not Sold Separately

ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
109	Spring Pin	1	Not Sold Separately
110	Set Screw	2	5373413
111	Insert	1	5373337
112	Plug	1	5373588
86	Needle Bearing	1	5373591
100	Spring Pin	1	5373571
113	Cap Screw	3	5373554
114	Gasket	1	5373338
	Valve Housing Assembly (Including Pc's 115,116,117,118,119, 120,121,122,123,124,125,126,10, 127,128,129,130,131,132,133,134, 135,136 & 137)	1	5373487
115	Valve Housing	1	5373453
	Valve Set (Includes Pc's 116,117,118,119 & 120)	1	5373339
116	Liner	1	Not Sold Separately
117	Valve Cone	1	Not Sold Separately
118	Spring	1	5373340
119	O-Ring	3	5373434
120	O-Ring	1	5373429
121	Spring	2	5373341
122	Spacer	2	5373342
123	Sleeve	2	5373343
124	Cap Screw	2	5373408
125	O-Ring	1	5373435
126	Cover	1	5373344
10	Retainer Ring C-Type	1	5373569
127	Lever	1	5373345
128	O-Ring	1	5373427
129	O-Ring	1	5373433
130	Retainer Ring C-Type	1	5373420
131	Seal	2	5373378
132	Machine Screw	1	5373409
133	Spacer	1	5373379
134	Cover	1	5373346
135	Hex Head Bolt	1	5373387
136	Strainer	1	5373347
137	Adapter	1	5373348
138	C.D. Washer	3	5373561
139	Cap Screw	3	5373401
140	Shaft	1	5373349
141	Angle Piece	1	5373350
142	Washer	2	5373351
143	Control Lever	1	5373352
144	Control Lever, For Bucket	1	5373353
145	Hex Nut	2	5373414

ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
146	Hex Head Bolt	2	5373388
147	Cap Screw	1	5373396
148	Cover	1	5373354
149	Cap Screw	2	5373398
150	S-Hook	2	5373355
151	Control Chain	2	5373380
152	Caution Plate	1	5373310
153	Handle Set	1	5373381
154	Handle	1	5373382
155	Screw	2	5373411
156	Hex Head Bolt	1	5373389
157	U-Nut	1	5373417
158	Washer	1	5373377
159	Bolt	1	5373372
160	Bolt	1	5373485
166	Name Plate		5373311
167	Name Plate	1	5373312
168	Drive Screw	4	5373412
171	Link Chain (Specify length)	1	LCAH030P
172	Link Chain (Specify length)	1	LCAH030P
173 +	Filter	1	50225
174 +	Lubricator	1	52176

+ Not Illustrated

3 Ton, Top Hook

ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
	Hook Holder Assembly (Includes Pc's 175,176,177,178,179, 180,181,17,18,182 & 183)	1	5373373
	Hook Complete (Includes Pc's 175, 176,177,178 & 179)	1	5373545
175	Hook		Not Sold Separately
	Hook Latch Set (Includes Pc's 176,177,178 & 179)	1	5373546
	Hook Latch Set Copper Plated (Includes Pc's 176,177,178 & 179)	1	5373546CP
176	Hook Latch	1	Not Sold Separately
177	Hook Spring	1	Not Sold Separately
178	Hook Pin	1	Not Sold Separately
179	Screw	2	Not Sold Separately
	Hook Holder Set (Includes Pc's 180 & 181)	1	5373374
180	Hook Holder, Gear Side	1	Not Sold Separately
181	Hook Holder, Motor Side	1	Not Sold Separately
17	C.D. Washer	1	5373562
18	Cap Screw	1	5373402
182	Parallel Pin	4	5373572
183	Cap Screw	4	5373405

3 Ton, Bottom Hook

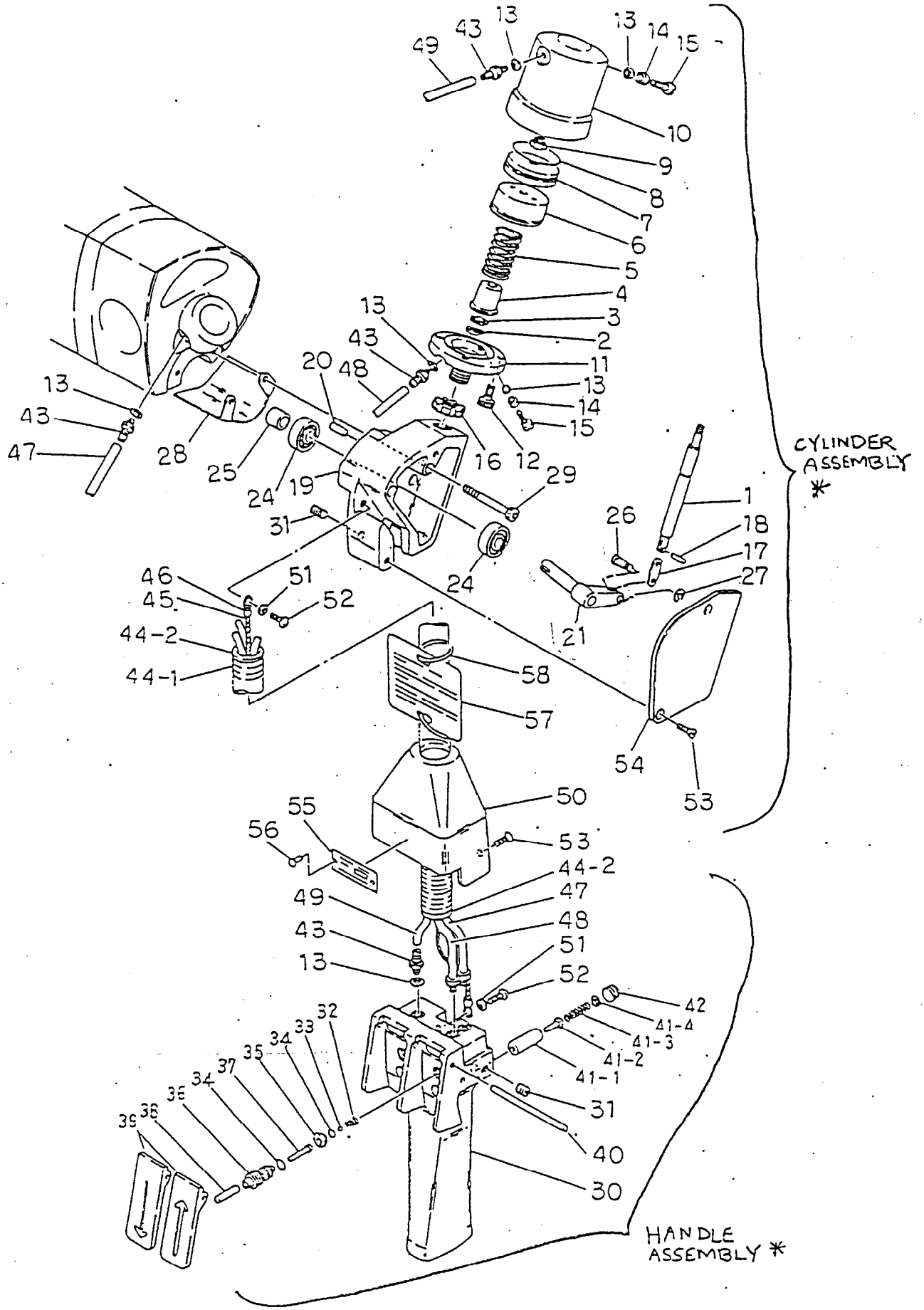
ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
	Hook Holder Assembly (Includes Pc's 175,176,177,178,179, 184,185,186,187,77 & 188)	1	5373375
	Hook Complete	1	5373545
175	Hook	1	Not Sold Separately
	Hook Latch Set (Includes Pc's 176,177,178 & 179)	1	5373546
	Hook Latch Set Copper Plated (Includes Pc's 176,177,178 & 179)	1	5373546CP
176	Hook Latch	1	Not Sold Separately
177	Hook Spring	1	Not Sold Separately
178	Hook Pin	1	Not Sold Separately
179	Screw	1	Not Sold Separately
184	Thrust Ball Bearing	1	5373438
185	Hook Ring Half	Set of 2	5373376
186	Hook Holder Half	2	Not Sold Separately
187	Hex Nut	2	5373557
77	C.D. Washer	2	5373563
188	Cap Screw	2	5373403

6 Ton, Top Hook

ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
	Hook Holder Assembly	1	5373383
	Hook Complete (Includes Pc's 191,192,193,194 & 179)	1	5373525
191	Hook	1	Not Sold Separately
	Hook Latch Set (Includes Pc's 192,193,194 & 179)	1	5373526
	Hook Latch Set Copper Plated (Includes Pc's 192,193,194 & 179)	1	5373526 CP
192	Hook Latch	1	Not Sold Separately
193	Hook Spring	1	Not Sold Separately
194	Hook Pin	1	Not Sold Separately
179	Screw	2	Not Sold Separately
	Hook Holder Set (Includes Pc's 195 & 196)	1	5373384
195	Hook Holder, Gear Side	1	Not Sold Separately
196	Hook Holder, Motor Side	1	Not Sold Separately
17	C.D. Washer	1	5373562
18	Cap Screw	1	5373555
182	Parallel Pin	4	5373572
197	Cap Screw	4	5373406

6 Ton, Bottom Hook Block

ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
	Bottom Block Assembly (Includes Pc's 191,192,193,194,179, 198,199,200,201,202,187,77 & 203)	1	5373385
	Hook Complete (Includes Pc's 191,192,193,194 & 179)	1	5373525
191	Hook	1	Not Sold Separately
	Hook Latch Set (Includes Pc's 192,193,194 & 179)	1	5373526
	Hook Latch Set Copper Plated (Includes Pc's 192,193,194 & 179)	1	5373526 CP
192	Hook Latch	1	Not Sold Separately
193	Hook Spring	1	Not Sold Separately
194	Hook Pin	1	Not Sold Separately
179	Screw	2	Not Sold Separately
198	Thrust Ball Bearing	1	5373439
199	Hook Ring Half	Set of 2	5373386
200	Hook Case Half	2	Not Sold Separately
201	Ball Bearing	2	5373590
202	Chain Wheel	1	5373551
187	Hex Nut	3	5373557
77	C.D. Washer	3	5373563
203	Cap Screw	3	5373556



* SEE THE PENDANT PARTS LIST FOR A LIST OF COMPONENTS IN EACH ASSEMBLY.

Pendant (PCS-2)

ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
	Cylinder Assembly (Includes Pc's 1,2,3,4,5,6,7,8,9,10,11, 12,13,14,15,16,17,18,19,20,21,24, 25,26,27,28,29,43,51,52,53 &54)	1	5373616
	Handle Assy (Includes Pc's 13,30,31,32,33,34,35 36,37,38,39,40,41,42,43,50,51,52 & 53)	1	5373617
1	Piston Rod	1	5372734
2	Retainer Ring C-Type	1	5372735
3	Ring	1	5372736
4	Spacer	1	5372737
5	Spring	1	5372738
6	Spacer	1	5372739
7	Piston	1	5372740
8	O-Ring	1	5372741
9	Nylon Lock Nut	1	5372742
10	Cylinder	1	5372743
11	Cylinder Cover	1	5372744
12	Cap Screw	4	5373592
13	Seal	10	5373593
14	Silencer	2	5372745
15	Silencer Bolt	2	5372746
16	Bearing Nut	1	5372748
17	Link	1	5373594
18	Parallel Pin	1	5372750
19	Cylinder Holder	1	5373595
20	Parallel Pin	1	5372752
21	Spindle	1	5373596
24	Ball Bearing	2	5373597
25	Sleeve	1	5373598
26	Pin	1	5372758
27	Retainer Ring E-Type	1	5372759
28	Cover	1	5373599
29	Cap Screw	2	5373600
30	Valve Housing	1	5372762
31	Set Screw	1	5373601
32	Valve Spring	2	5372764
33	Steel Ball	2	5372765
34	O-Ring	4	5373602
35	Seat	2	5372766
36	Liner	2	5372767
37	Valve Pin	2	5372768
38	Valve Knob	2	5372769
39	Pushbutton Set	1	5372770

ITEM NO.	DESCRIPTION OF PART	QTY. TOTAL	PART NO.
40	Pin	1	5372771
41	Buffer Spool Complete (Includes Pc's 41-1,41-2,41-3 & 41-4)	2	5372772
41-1	Spring Case	2	5373603
41-2	Spool	2	5373604
41-3	Buffer Spring	2	5373605
41-4	Retainer Ring	2	5373606
42	Set Bolt	2	5372773
43	Nipple	6	5372774
	Control Tube Complete (Includes Pc's 44-1,44-2,45,46,47,48 & 49)	1	5372775
44-1	Flexible Tube	1	Not Sold Separately
44-2	Inner Rim	2	Not Sold Separately
45	Wire Rope With Wire Lock	1	Not Sold Separately
46	Wire Lock	2	Not Sold Separately
47	Nylon Tube (Black)	1	Not Sold Separately
48	Nylon Tube (Red)	1	Not Sold Separately
49	Nylon Tube (Blue)	1	Not Sold Separately
50	Valve Cover	1	5372776
51	Plain Washer	2	5372777
52	Machine Screw	2	5373607
53	Machine Screw	4	5372778
54	Cover	1	5373609
55	Name Plate	1	5373611
56	Drive Screw	2	5373612
57	Caution Plate	1	5373613
58	Convex Belt	2	5373614

United States Office Locations

For Order Entry and Order Status

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

For Technical Support

Ingersoll-Rand Material Handling
P.O. Box 24046
2724 Sixth Avenue South
Seattle, WA 98124-0046
Phone: (206) 624-0466
Fax: (206) 624-6265

Regional Sales Offices

Chicago
888 Industrial Drive
Elmhurst, IL 60126
Phone: (708) 530-3800
Fax: (708) 530-3891

Detroit, MI
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Farmington Hills, MI 48335
Phone: (810) 476-6677
Fax: (810) 476-6670

Houston, TX
Suite 150
2500 East T.C. Jester
Houston, TX 77008
Phone: (713) 864-3700
Fax: (713) 864-2244

Los Angeles, CA
11909 E. Telegraph Road
Santa Fe Springs, CA 90670
Phone: (310) 948-4189
Fax: (310) 948-1828

Philadelphia, PA
P.O. Box 425
900 E. 8th Ave., Suite 103
King of Prussia, PA 19406
Phone: (610) 337-5930
Fax: (610) 337-5912

International Office Locations

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
2724 Sixth Avenue South
Seattle, WA 98124-0046
USA
Phone: (206) 624-0466
Fax: (206) 624-6265

Canada
National Sales Office
Regional Warehouse
Toronto, Ontario
51 Worcester Road
Rexdale, Ontario
M9W 4K2
Phone: (416) 675-5611
Fax: (416) 213-4510
Order Desk
Fax: (416) 213-4605

Regional Sales Offices

Calgary, Alberta
44 Harley Road S.E.
Calgary, Alberta
T2V 3K3
Phone: (403) 252-4180
Fax: (403) 252-4462

Edmonton, Alberta
1430 Weber Center
5555 Calgary Trail N.W.
Edmonton, Alberta
T6H 5G8
Phone: (403) 438-5039
Fax: (403) 437-3145

Montreal, Quebec
3501 St. Charles Blvd.
Kirkland, Quebec
H9H 4S3
Phone: (514) 695-9040
Fax: (514) 695-0963

British Columbia
201-6351 Westminster Hwy
Richmond, B. C.
V7C 5C7
Phone: (604) 278-0459
Fax: (604) 278-1254

Latin America Operations
Ingersoll-Rand Production Equipment Group
730 N.W. 107 Avenue
Suite 300, Miami, FL
33172-3107
Phone: (305) 559-0500
Fax: (305) 559-7505

Europe, Middle East and Africa
Ingersoll-Rand Material Handling Douai Operations
111, avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 27-93-08-08
Fax: (33) 27-93-08-00

Asia Pacific Operations
Ingersoll-Rand (Japan) Ltd.
Shin-Yokohama Square Bldg.
(5TH Floor)
2-3-12 Shin-Yokohama,
Kouhoku-Ku, Yokohama-shi,
Kanagawa Pref. 222 Japan
Phone: 81-45-476-7800
Fax: 81-45-476-7806

Russia
Ingersoll-Rand Company
World Trade Center
Office 1101
Krasnopresnenskaya Nab. 12
Moscow, Russia 123610

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