

FOREWORD

This manual has been prepared to acquaint you with the general aspects of the installation, operation, and maintenance of the Robbins & Myers equipment you have purchased. It is our earnest desire to express our appreciation for the privilege of serving you.

We feel that the advantage of advanced engineering, based on more than 50 years' experience in designing hoists and cranes for all types of industrial service — plus superior workmanship and the highest quality materials available — will provide you the utmost satisfaction through the years.

Proper installation is important to the ultimate performance of this equipment. Careful study of the instructions will assure safe, dependable operation. It is also recommended that you keep this manual readily accessible in case of an emergency.

Standard Guarantee and Warranty

The Company will repair or replace, at its option, defects in material or workmanship developing within one year from date of shipment from the factory, providing the Company receives immediate written notice of such defects upon their discovery and such claims are substantiated by the Company's inspection department. Correction of such defects by repair or replacement, FOB the Company's factory, shall constitute fulfillment of this guarantee. The return of all parts submitted for inspection under this guarantee must be authorized by the Company and transportation prepaid by the shipper. The guarantee will not be applicable unless the apparatus has been properly cared for and operated under normal conditions. The Company will not be responsible for damage resulting from improper storage or handling prior to placing the apparatus in service. The Company has no liability for any repairs made outside the Company's factory unless with the prior written consent of the Company.

Guarantee on Purchased Items. The guarantee of the Company on purchased items, assemblies, or accessories which are installed as a separate unit shall not extend beyond the guarantee made by the manufacturer of the item, assembly, or accessory.

How to Order Repair Parts Correctly

The Parts Catalog section of this manual covers replacement parts required for your Robbins & Myers hoist and/or crane. To assure prompt service, each repair parts order must contain the following information:

- 1) Hoist and/or crane serial number (see cover).
- 2) Capacity.
- 3) Reference number from applicable bulletin.
- 4) Quantity.
- 5) Description.
- 6) Voltage, phase, cycles.
- 7) Correct shipping destination.

On the brass nameplate will be found the Serial Number of your hoist or crane — i.e., Serial No. H ---, J ---, or C ---, or as in the case of the most recently built units, it may show a five-digit number followed by two letters and another number. An example of this type serial number would be 37885PP1. Without this serial number we cannot be sure of sending you correct parts, so *always mention serial number for prompt service.*

Minimum Charges

All orders for repair parts are subject to a minimum charge.

Return of Parts

Robbins & Myers, Inc., will not accept return of any parts unless accompanied by a claim tag. These claim tags are issued at the time authorization of such return is made. Tags must be attached to the outside of the package.

Claims

All shipments are carefully inspected and are delivered to the carrier in good order. Upon receipt of shipment caution should be exercised that there is no loss or damage. If damage has occurred, refuse to accept the

shipment until the carrier makes the proper notation to that effect. In the event of concealed loss or damage, notify the carrier immediately. By following these suggestions you will encounter less difficulty collecting your claim.

Orders telephoned or telegraphed to us must immediately be confirmed by letter since we cannot assume responsibility for the correctness of the phone or telegraphed message.

Robbins & Myers spare parts are available locally in major industrial areas. Should it be necessary to order parts direct, they should be addressed as follows:

MATERIAL HANDLING DIVISION
CUSTOMER SERVICE DEPARTMENT
ROBBINS & MYERS, INC.
1345 LAGONDA AVENUE
SPRINGFIELD, OH 45501

**IT IS IMPORTANT THAT THE PERSONS
OPERATING OR SERVICING THE HOIST BE
FAMILIAR WITH THE PRACTICES CON-
TAINED IN THIS MANUAL, FOR THEIR OWN
PROTECTION AND FOR THE PROTECTION OF
OTHER WORKMEN AND EQUIPMENT.**

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**SECTION 1
INSTALLATION**

IMPORTANT

Hoists/trolleys are designed for lifting and transporting of materials only. Under no conditions, either during initial installation or in regular use, are hoists to be used for lifting or transporting of personnel.

General

Each complete Robbins & Myers hoist is load tested at the factory at 125% of rated capacity, and shipped assembled. Units purchased and shipped without motors and/or bottom blocks are bench run only and require load testing at the job site by the user after installation.

All hoists/trolleys are designed for the type of mounting specified by the purchaser. The adequacy of the supporting members (monorail beams, hangers, supports, framing, etc.) is the responsibility of the user.

Prior to installation, unit should be checked over for damage during shipment or handling at the job site. Particular attention should be taken to make sure that the hoisting cable and limit switch mechanism has not been damaged by improper use of fork lifts or sling chains.

Read the instructions contained in this manual and observe the warning tags attached before installation is started.

Mounting

Before installing trolley mounted hoists, make certain that the trolley wheel contour is correct for the type of monorail beam the trolley is to run on. WF beams and patented monorail tracks should have flat flanged wheels, while standard I-beams should have contoured tapered tread.

On rolled I-beams or WF sections wheel clearance must be such that there is approximately $\frac{1}{8}$ " clearance between wheel flange and rail with hoist/trolley centered on the beam. See Figure 1-1.

Trolleys designed to run on patented type rails should have $\frac{1}{16}$ " clearance. See Figure 1-2. Type MSM trolleys (J and F series hoists) are preset at the factory and are

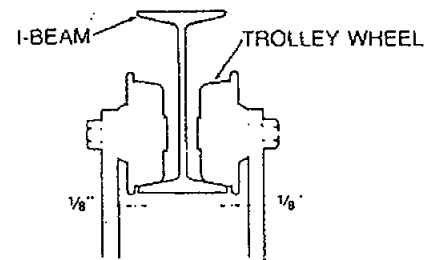


Figure 1-1

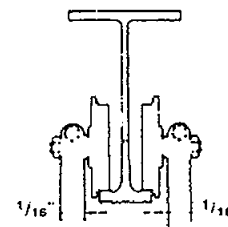


Figure 1-2

non-adjustable. Type "M" trolleys with flat tread wheels (straight track only) are adjustable and should be checked for proper clearance.

See Section 6 on Trolley Spare Parts Identification Sheet for wheel adjustment instructions.

After trolley hoists have been hung on the beam, check for balance. All Robbins & Myers' hoists are balanced at the factory for the "as shipped" condition. Any auxiliary devices (control boxes, cable reels, etc.) furnished and mounted by customer may require the addition of counter-weight. Hoists must hang straight without a load or there will be a noticeable kick when a load is applied to the hook.

Reeving

Bottom block must hang straight, and cables must be free of kinks or twists. Make sure limit switch weight is not hung up, and hangs freely suspended from its supporting cable/chain. Bottom block may rotate during

initial lifts due to new cables not having taken a permanent "set", causing the cable falls to twist, or wrap around each other. See Section 4 Operation Maintenance, Wire Rope for corrective action.

See Section 6 on Bottom Block Spare Parts Identification Sheet for proper reeving.

Lubrication

All Robbins & Myers' hoists are shipped completely lubricated, including gear cases filled with oil; however, to avoid potential damage from low oil levels resulting from leakage during handling/shipping, all levels must be checked, and oil added where necessary.

If hoist gearcase has been shipped with solid oil filler plug, replace with attached breather plug to prevent oil leakage due to pressure build up.

Make sure cables and any open gearing are adequately greased and free from any contamination or dirt.

Refer to Section 5 Lubrication Schedule for type of lubrication.

Power Connections

Make sure that power supply voltage is the same as that shown on the hoist nameplate. The power source/

conductors must be sized sufficiently to maintain the voltage at the hoist at $\pm 10\%$ of the nominal voltage under all operating conditions. Standard nominal voltages are 230/460/575. Improper voltage maintenance can cause motor overheating or sluggishness, and chattering or inoperative motor brakes and controls.

A wiring diagram is included in this manual showing the identification of the power lead connections.

CAUTION

Make sure power source disconnect is off and locked in open position while making connections.

Make sure all collectors, if furnished, are compatible and properly lined up and make good contact with conductor bars on rail.

Note: All standard Robbins & Myers hoists are furnished with motor and control circuit protection which in their interpretation meet the requirements of the National Electrical Code, 1978. The protective devices required for the power feed are outlined in Article 610 of the NEC, and are the responsibility of the user. It is recommended that this article be reviewed by the user for compliance requirements.

SECTION 2 INITIAL START-UP

Once power has been supplied to the hoist, several important checks *must* be made.

Proper Hook Motion (Hoist Motor Rotation)

Since direction of rotation of any three-phase A.C. motor can be reversed by reversing any two of the three lines feeding the motor, it is important that the motion travel is in correct relationship with the button being depressed.

CAUTION

Do *not* attempt to reverse hoist motion by changing control leads in the push button or at the contactor, or change the nameplate on the P/B. The pilot circuit limit switch is in series with the "up" control circuit wiring as furnished from the factory. Changing these leads will not only void the stop limit, but will also cause the down/reverse circuit of the limit to power the bottom block in the hoisting direction.

To check/correct hook motion (motor rotation), *carefully* inch the up button and observe hook motion. If block does *not* travel up, stop and open the power source disconnect.

IMPORTANT

Do not run bottom block into limit switch with down button if direction is reversed. To correct the direction of the hook block, reverse any two leads supplying power to the hoist. This can be done at the main power source, or at the lead in connections to the hoist.

Proper Trolley Motion

If necessary to change trolley motion to orient direction with P/B markings, change any two power leads at the load side of the contactor only.

CAUTION

Do not reverse main power leads. This will cause a reversal also of hoist motion, with resulting hazards at limit switch as described under "CAUTION — Proper Hook Motion."

The optional ballast resistors may be adjusted to provide optimum starting acceleration for normal load conditions as described in Section 6 on the Trolley Motor Sheet.

The optional trolley brake may be adjusted to provide the optimum stopping deceleration for normal load conditions as described in Section 6 on the Trolley Brake Spare Parts Identification Sheet.

Limit Switch Action

After proper direction has been established, run bottom block down several feet from upper limit and stop. Check upper limit action by slowly lifting weight or paddle manually while operating hoist in the hoisting direction. Block should stop after lifting weight no more than two inches. If block does not stop, immediately release the up button, shut off power to the hoist and check out control circuit wiring, switches, or possible binding of limit switch levers/shafts.

Next, check reverse element of limit switch action. Slowly lift the limit weight manually beyond the stop position with bottom block stationary and lowered several feet below limit. Lifting limit weight beyond stop position should automatically cause bottom block to lower. If block fails to lower, check out circuit as above.

IMPORTANT

On some model hoists, additional lifting of limit weight will cause lowering motion to stop.

CAUTION

Under no conditions should any lifting of limit weight cause the hook block to raise. If this happens, hoist motor is not properly phased. Do not proceed further with installation until proper motor rotation is established. See previous instructions — "Proper Hook Motion." Contact your factory service representative for additional information if necessary.

Note: If hoist is furnished with optional upper and lower screw limits, or lower paddle limit, check for proper

setting. Unless otherwise specified, upper screw limits are set at the factory to trip approximately 3" below contact of bottom block with the upper weight type limit. Lower limits are set to trip with two wraps of cable remaining on drum. For adjustment of trip location, refer to separate sheets in Section 6.

No Load Operational Checks.

Check motor brake adjustment. Block should stop without load on hook with maximum 1" to 3" of hook drift, depending on hoisting speed. See Section 6, Spare Parts Identification Sheet "Brakes" for adjustment instructions.

Run bottom block to within 6" of upper limit switch, then slowly inch button until block makes contact with limit weight and block motion is stopped.

Next, lower block out of limit 1 to 1½ feet and stop. Run bottom block into upper limit at maximum hoist speed. Block motion should be stopped by limit switch action.

Note: At most fast hoisting speeds, generally 30-40 FPM or faster, bottom block may be plugged down by reverse action of limit switch.

Lower bottom block to the lowest required position. There must be at least two wraps of cable remaining on drum.

CAUTION

No hoist should be installed where the potential of winding the cable backwards on the drum can be foreseen. All Robbins & Myers F and C series hoists are available with an optional lower limit which should be specified where the inherent dangers of cable breakage exist if cable is wound on backwards.

Load/Run Test

While all Robbins & Myers hoists are load tested at the factory, full load testing should be performed after installation by the user.

Attach a near-capacity load and lift/lower several feet. The mechanical load brake, when operating correctly, will maintain proper lowering speed when lowering button is depressed. If motor brake or controls chatter under full load, check voltage at motor.

Run trolley full length of monorail and check for binding of trolley wheels on rail and/or interference at splice joints, hanger connections/bolts, etc. Check contact with rail end stops. Contact should be made with trolley side plates or bumpers. Rail stops designed to make contact with wheels are to be avoided.

Note: Trolley wheels may be adjusted to provide 1/16" maximum additional clearance between wheel and beam flanges if binding occurs while negotiating curves in tracks.

SECTION 3 SAFE OPERATING PRACTICES

General

There is no one single factor that is more important for minimizing the possibility of personal injury to the operator and those working in the area, or damage to property, equipment, or material, than being familiar with the equipment and using *Safe Operating Practices*.

Hoists/trolleys are designed for lifting and transporting of material only. Under no circumstances, either during initial installation or in regular use, are hoists to be used for lifting or transporting of personnel.

No operator should be permitted to use the equipment who is not familiar with its operation, is not physically or mentally fit, or has not been schooled in safe operating practices. The misuse of hoists can lead to certain hazards which cannot be protected against by mechanical means; hazards which can only be avoided by the exercise of intelligence, care, and common sense.

Safe Operating Practices also involves a program of periodic inspection and preventative maintenance (covered in separate section). Part of the operator's training should be an awareness of potential malfunctions/hazards requiring adjustments or repairs, and bringing these to the attention of supervision for corrective action.

Supervision and management also have an important role to play in any safety program by assuring that a maintenance schedule is adhered to, and that the equipment provided for the operators is suitable for the job intended without violation of one or more of the rules covering safe operating practices and good common sense.

The Safe Operating Practices shown are taken in part from the following publications:

American National Standards Institute (ANSI)
Safety Standards for Cranes, Derricks, Hoists
ANSI B30.2 — Overhead and Gantry Cranes
ANSI B30.16 — Overhead Hoist

Do's and Don'ts (Safe Operation of Hoists)

The following are Do's and Don'ts for safe operation of overhead hoists. Taking precedence over any specific rule listed here, however, is the most important rule of all, **USE COMMON SENSE**. A few minutes spent reading these rules can make an operator aware of dangerous practices to avoid and precautions to take for his own safety and the safety of others. Frequent examinations and periodic inspections of the equipment as well as a conscientious observance of safety rules may save lives as well as time and money.

DON'TS — HOISTS

1. Never lift or transport a load until all personnel are clear.
2. **DO NOT** allow any unqualified personnel to operate hoist.
3. **NEVER** pick up a load beyond the capacity appearing on the hoist. Overloading can be caused by jerking as well as by static overload.
4. **NEVER** carry personnel on the hook or the load
5. **DO NOT** operate hoist if you are not physically fit.
6. **DO NOT** operate hoist to extreme limits of chain or rope.
7. **AVOID** sharp contact between two hoists, between hoist and end post, and hooks and hoist body
8. **DO NOT** tamper with any parts of the hoist.
9. **NEVER** use the hoist rope or chain as a sling.
10. **DO NOT** divert attention from load while operating hoist.
11. **NEVER** leave a suspended load unattended

12. DO NOT use chain or rope as ground for welding. NEVER touch a live welding electrode to the chain or rope.
13. DO NOT jog controls unnecessarily. Hoist motors are generally high torque, high slip types. Each start causes an inrush of current greater than the running current and leads to over-heating and heat failure, or burn-out, if continued to excess.

DO'S — HOISTS

1. READ and follow manufacturer's instruction, installation, and maintenance manuals. When repairing or maintaining a hoist, use only manufacturer's recommended parts and materials.
2. READ and follow all instruction and warning information on or attached to a hoist.
3. REMOVE the hoist from service and thoroughly inspect and repair as necessary if unusual performance or visual defects (such as peculiar noise, jerky operations, or travel in improper direction or obviously damaged parts) are noticed.
4. ESTABLISH a regular schedule of inspection and maintain records for all hoists with special attention given to hooks, ropes, chains, brakes, and limit switches.
5. CHECK operation of brakes for excessive drift.
6. CHECK operation of limit switches.
7. CHECK for damaged hooks, ropes, or chain.
8. KEEP load chain or rope clean and well lubricated.
9. CHECK the wire rope or chain for improper seating, twisting, kinking, wear, or other defects before operating the hoists.
10. CHECK for broken wires in wire rope. Twelve randomly distributed broken wires in one rope lay or four broken wires in one strand in one rope lay are sufficient cause for replacement.
11. MAKE SURE a load clears neighboring stock piles, machinery, or other obstructions when raising, lowering, or traveling the load.
12. CENTER hoist over the load before operating.
13. AVOID swinging of load or load hook when traveling the hoist.
14. BE SURE the load attachment is properly seated in the saddle of the hook. Balance load properly before handling. Avoid tip loading.
15. PULL in a straight line, so that neither hoist body nor load chain or rope are angled around an object.
16. MAKE SURE you take up slack slowly.
17. KNOW the hand signals for hoisting, cross travel, and crane travel if working with cab operated hoists or cranes. Operators should accept the signals of only those persons authorized to give them.

**SECTION 4
OPERATION/MAINTENANCE**

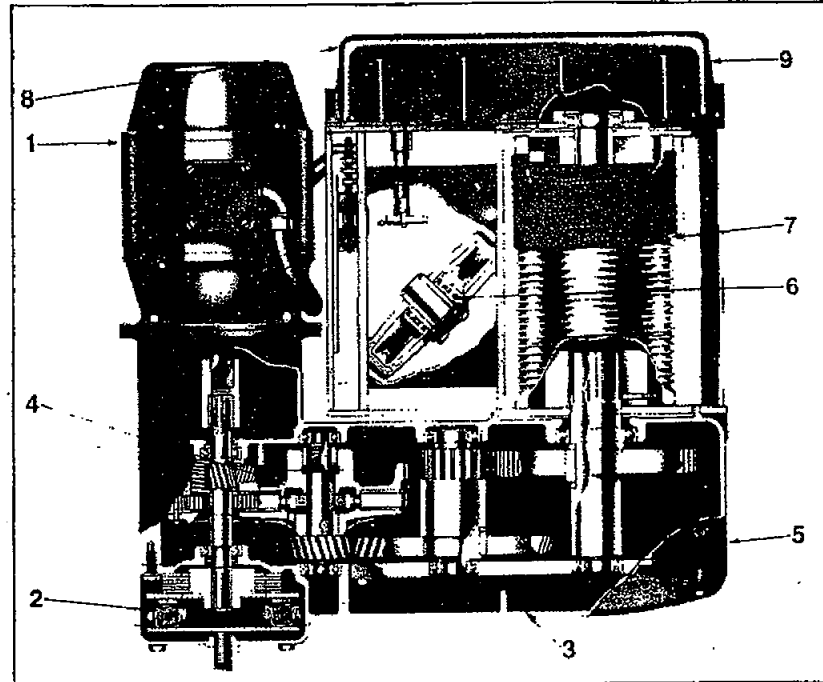


Figure 4-1

Typical Construction

Figure 4-1 represents a typical hoist cross section. While each model may have some slight variation in design/arrangement, all models have the same basic elements.

1. *Motor/Coupling* — basic drive package.
2. *Hoist Motor Brake* — brings motor to quick stop, and part of the braking system that enables a load to be suspended from the hook with power off.
3. *Gearcase Assembly* — three reduction gear reducer coupling the motor to the drum. Also houses the mechanical load brake.
4. *Mechanical Load Brake* — Weston-type friction brake which controls the lowering speed, and, in conjunction with motor brake, provides a double braking system for holding suspended loads.

Note: If optional electric braking systems are provided, mechanical brake may not be included.

5. *Frame/Drum* — basic structural components which support the load to be handled.
6. *Bottom Block and Sheaves* — includes bottom block and equalizer sheaves.
7. *Wire Rope* — hoisting rope and end connections for picking up the load.
8. *Controls/Enclosures* — electromechanical devices for supplying power to, and reversing direction of, the motor(s).
9. *Limit Switch* — emergency shut-off switch to stop hook motion at maximum elevation of bottom block.

CAUTION

Do not perform any service operation when load is suspended from hook.

The following details the operation/maintenance instructions for each basic element.

Motors/Couplings

Robbins & Myers hoist motors are designed to provide the utmost in dependable hoisting service. Standard motors are enclosed for protection against normal hazards of dust and moisture. All bearings are sealed and lifetime lubricated and do not require greasing.

Standard motors are furnished with thermal protection in the form of normally closed, automatic reset control circuit thermostats. These are pilot circuit devices which open the control circuit if the motor overheats. The hoist motor protector opens only the "up" circuit.

Couplings may be either sleeve type (head mounted motors) or flexible (foot mounted motor). Couplings are press fit and keyed to motor shaft, with slip fit onto spline of gearcase shaft. Splined half of couplings are coated with grease at the factory and must be regreased if coupling or gearcase extension shaft are disassembled.

Note: Foot-mounted motors are shimmed between motor feet and motor shelf to provide the necessary accuracy of alignment between motor and gearcase shafts. If motor is removed and reassembled to hoist, the shimming must be retained. If new motor is installed, reshimming may be necessary. Maximum allowable misalignment of shafts using flexible coupling is 1° on angular alignment and 0.020" on parallel. See Figure 4-2.

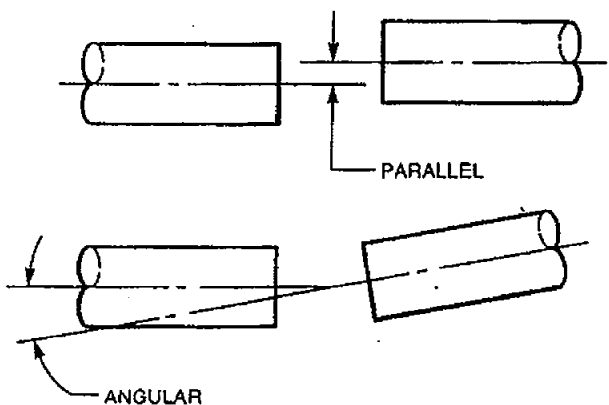


Figure 4-2

Hoist Motor Brake

Standard Robbins & Myers' hoists are furnished with electro-magnetic disc type brakes with minimum torque rating equal to 100% full load torque of the motor. The purpose of the motor brake is twofold:

- 1) To minimize hook drift by bringing the motor to a quick and smooth stop.
- 2) To help hold loads suspended from the hook with power off.

When the hoist motor is energized, the magnet brake coils are also energized, pulling the armature plate against the brake pole plate, thereby releasing the pressure on the friction discs, this permits the discs to turn freely with motor rotation. When the motor is de-energized, the brake coils are simultaneously de-energized, releasing the armature plate which applies pressure to the friction discs and motor is brought to a stop. The kinetic energy of the motor is dissipated as heat on the friction surfaces.

Proper maintenance and adjustment of the motor brake is essential to the reliable operation of the hoist. Heat is generated and wear occurs each time the motor is stopped and the work done by the brake is not reduced with light load or empty hook operation. The brake life and serviceability will be greatly extended by adequate maintenance. The practice of excessive and unnecessary inching of pushbutton by an operator causes unnecessary brake heating and wear. The frequency of brake wear adjustment depends on the duty cycle. To adjust brake, follow instruction on nameplate secured to brake cover.

The brake adjustment is for taking up disc wear and not for torque adjustment. Brake discs must be replaced when wear reaches 1/8" total per disc (1/16" per side).

Gearcase Assembly

Drive train consists of three reductions of precision cut gears/pinions, keyed or splined to steel shafts, supported on ball bearings. First two reductions are helical gears, last reduction spur gears. All gears and bearings operate in an oil bath and do not require additional lubrication.

Gearcases normally require a minimum of maintenance. On some models, the motor brake is built into the gearcase cover. On these models, the brake parts must be removed and the brake coils disconnected prior to removing the cover. Care should be used to prevent damaging the oil seal around the brake shaft when the cover is removed and replaced.

It is recommended that both the oil seal and gearcase cover gasket be replaced whenever inspection or servicing of the gearcase requires cover removal.

CAUTION

Fill gearcase to oil level with lubrication as recommended in lubrication schedule prior to putting hoist back in service.

Mechanical Load Brake

Robbins & Myers' hoists, except those equipped with an optional electric braking system, are furnished with a Weston-type mechanical load brake inside the hoist gearcase, which serves three purposes:

- 1) To suspend the load without power to the hoist and independent of the motor brake.
- 2) Controls the lowering speed by dissipating the energy from the overhauling load off the drum as heat in the sliding friction surfaces.
- 3) Reduces motor heating and motor brake wear by absorbing the potential and kinetic energy of a lowering load rather than dissipating this energy in these elements.

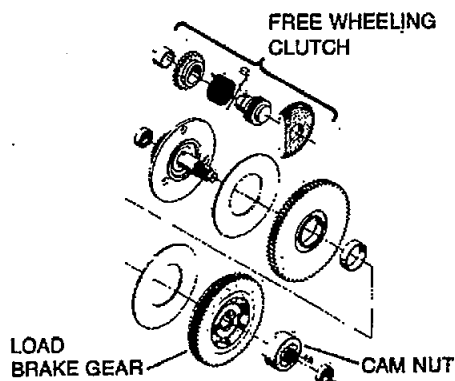


Figure 4-3

Operation of Load Brake

In the hoisting direction, the load brake gear, which is free to turn on the load brake shaft, rotates with respect to the cam nut. See Figure 4-3. The thrust generated from the matching include surfaces on the cam nut and load brake gear compresses and locks the load brake. The freewheeling clutch assembly is free to rotate in the hoisting direction, and the load brake rotates as a unit and simply becomes part of the gear train.

In the down direction, the free-wheeling clutch is locked, preventing rotation of the ratchet gear. Motor rotation causes load brake gear to back off the include surface of the cam nut. Pressure on friction discs is relieved allowing the overhauling load off drum to rotate the load brake against the friction surfaces, dissipating energy in the form of heat.

Load brake adjustment instructions are shown in Section 6 on the Gearcase Parts Identification Sheet.

Frame and Drum

The frame and drum are both constructed of steel, and unless damaged from abuse (impact with another hoist or building structure) require no maintenance. A frame or drum that is no longer serviceable for any reason should be referred to the factory for replacement/repair.

Wire Rope

CAUTION

A hoist should never be used if the wire rope shows any evidence of mechanical damage or excessive wear.

Replacement must be made using cable of exact size and quality with which your hoist, was originally equipped from the factory.

Improper wire rope storage or installation procedure can render the cable unusable prior to the first lift.

Wire rope inspection should be conducted by a designated person using good judgment in evaluating the remaining service life. Any deterioration of the cable resulting in appreciable loss of the original strength such as situations described below should be noted and evaluated.

- 1) Improper lubrication of cable.
- 2) Worn outside wires.
- 3) Broken or corroded wires at the end connections.
- 4) Crushing, slicing, unstranding, or kinking.
- 5) Internal wear caused by grit penetrating the strands.
- 6) Broken outside wires and the concentration of such wires.
- 7) Reduction of original rope diameter.
- 8) Damaged, worn, or improperly applied end connections.

Note: Also evaluate these sections which are normally hidden during inspections, such as sections which pass over equalizer sheaves.

CAUTION

Wear gloves whenever handling wire rope.

The wear life of the wire rope depends mainly upon the frequency and severity of service and its maintenance. All wire rope will eventually deteriorate to a point where it is no longer serviceable.

The precise rules can be given for determination of the exact time for replacement of wire rope because of the many factors involved. The following conditions should be sufficient reason for consideration of replacement.

- 1) Twelve randomly distributed broken wires in any one rope lay, or four broken wires in any one strand in one rope lay.
- 2) Wear of one-third of the original diameter of individual outside wires.
- 3) Kinking, crushing, birdcaging, or any damage resulting in distortion of the rope structure.
- 4) Evidence of any heat damage from any cause.
- 5) Reductions from nominal diameter of more than:
 - a) $\frac{1}{16}$ " for diameters up to and including $\frac{5}{16}$ ".
 - b) $\frac{1}{32}$ " for diameters $\frac{3}{8}$ " to $\frac{1}{2}$ " inclusive.
 - c) $\frac{3}{64}$ " for diameters $\frac{9}{16}$ " to $\frac{3}{4}$ " inclusive.

The correct diameter of a wire rope is the diameter of a circumscribed circle which will enclose all the strands. It is the largest cross-sectional measurement as illustrated in Figure 4-4. The measurement should be made carefully with calipers. The illustrations show the correct and incorrect methods of measuring the diameter of wire rope.

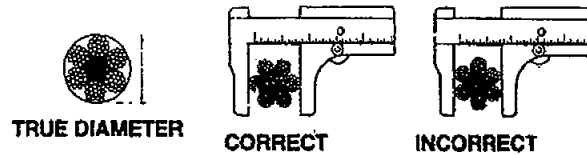
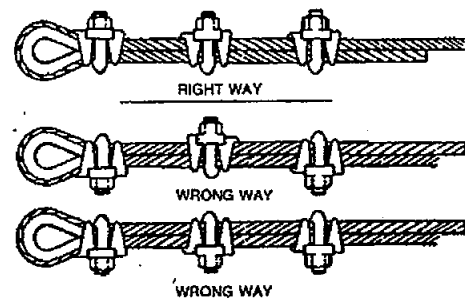
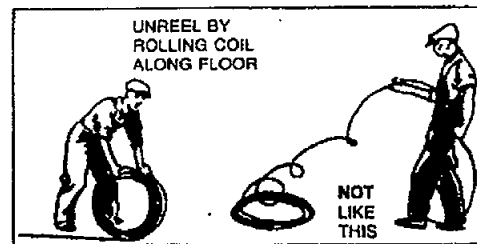


Figure 4-4

Generalized instructions for inspection/servicing of wire rope follow. Specific reeving instructions are shown in Section 6 on the Bottom Block Spare Parts Identification Sheet.

- 1) Hoisting ropes are of special construction, designed specifically for hoist applications. It is recommended that replacement cables with sockets swaged on the end when required be obtained from an authorized Robbins & Myers service station or the factory. Use of non-authorized cable may seriously shorten the life of the cable.
- 2) When unreeling a new replacement cable, follow procedure sketched below to avoid developing kinks or twists.
- 3) Maintain rope in a well-lubricated condition. See lubrication chart.
- 4) Rope clips, when used, must be assembled with the rope saddle on the load side of the cable. See sketch below.



- 5) Make sure replacement cables are properly reeved through sheaves and bottom block. See reeving diagram.
- 6) Any new or replacement cable when first installed may cause the bottom block to turn or twist when a load is applied, resulting in the hoist cables twisting around each other. To correct, run bottom block to the floor and disconnect the cable at the end anchor on the hoist frame. Turn the end of the cable several revolutions in the direction opposite of block twist and reconnect. Run empty bottom block up and down a few times to stabilize cable twist. It may be necessary to repeat more than once during the first few days of hoist operation with new cables.

Bottom Block/Sheaves

Sheaves showing evidence of scored grooves or broken/cracked flanges or sharp edges generated from wear, should be replaced. Worn sheaves can greatly reduce the life of the hoisting rope. Check hooks for deformation or cracks. Hooks having a throat opening more than 15% of normal, or more than a 10 degree twist from the plane of the unbent hook, must be replaced. See Figure 4-5.

Due to the many types and sizes of hooks which can be furnished and specified by the user, it is recommended that the user measure the actual throat opening of the hook as furnished and record on the sketch below and retain for a permanent record. This record can then be used for determining when hook must be replaced due to deformation/excessive throat opening.

Note: Any hook that is twisted or has throat opening in excess of normal indicates abuse or overloading of the unit. Other load bearing components should be checked for damage.

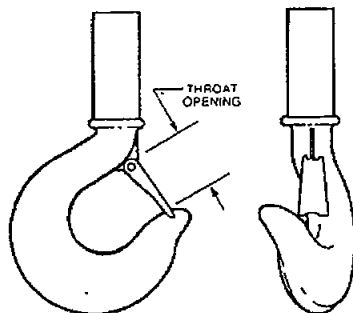


Figure 4-5

Safety latches, when furnished, should be replaced if bent or broken to the extent that they no longer provide proper closure of throat opening of hook.

CAUTION

Repairs by welding or reshaping of hooks are to be avoided.

Controls/Enclosure

WARNING

Before removing or checking any electrical component, be sure the power supply is shut off, and disconnect locked in the open position.

Standard basic control components consist of the following:

- 1) Motor Contactor — three pole reversing contactor which closes the power leads to the motor when actuated by the push button.
- 2) Push Button Station
- 3) Control Circuit Transformer — reduces the incoming power supply voltage to 115 volts for control circuit operation
- 4) Limit Switch (see separate section)
- 5) Motor Thermal Protection — pilot circuit contact which opens the hoisting circuit if motor overheats.

Note: The number, size, and quantity of control devices vary considerably, depending on the number and types of motors and the many control options that are available. Refer to wiring diagram for specific details on power/control devices.

No specific rules can be given as to the frequency of replacement of electrical devices. Deterioration of electrical components is directly related to the heat generated (on time) in contactor coils and transformers, and the arcing of contactors when motor circuit is opened (starts/stops). Electrical malfunctions can be minimized by a monthly to quarterly inspection for loose connections/broken or frayed wiring, and replacement of contacts on starters/relays when severely pitted.

Limit Switch

Standard upper weight type limit switch consists of a weight or paddle suspended from a chain or cable, which, when lifted by upward motion of the bottom block, opens the hoist control circuit and stops further block travel. A second position, should bottom block coast upwards due to improperly adjusted motor brake, closes the lowering circuit and results in bottom block being driven downward by the motor. Downward motion stops after 2"-3" of block travel.

CAUTION

Standard upper weight limit is an emergency device only and is not to be used as an automatic stop. Hoist motor must also be properly phased for limit to function

as intended. See warnings/instructions under "Installation — Initial Start Up."

Since good hoisting practice dictates the use of the upper limit as an emergency device only, and in many installations is seldom used, limit switch parts do not normally need replacement due to wear. Maintenance consists of making sure that the limit remains functional and does not become inoperative due to dirt, dust, corrosion, or physical damage.

IMPORTANT

When checking manually, make sure bottom block is lowered several feet below upper limit.

SECTION 5 PREVENTATIVE MAINTENANCE

Inspection/Preventative Maintenance Schedule

The intervals between inspections will vary due to the wide range of applications, duty cycles, and environmental conditions encountered by hoisting equipment. The following schedule lists minimum requirements, based on intermittent operation of the hoist on an 8-hour/day, 5-day/week work schedule, under normal environmental conditions (free from excessive dust,

moisture, and corrosive fumes). If duty is heavier, or the environment severe, inspections should be more frequent.

The operator should also bring to the attention of maintenance personnel any unusual operation conditions that occur between inspection periods, and not operate hoist until unit has been repaired and is functioning properly.

INSPECTION/PREVENTATIVE MAINTENANCE SCHEDULE

Time Interval	Inspection Function
Start of each shift	<p><i>Upper limit switch</i> — check by operating empty hook into limit.</p> <p><i>Hoist/trolley brakes</i> — excessive coast without load.</p> <p><i>Reeving</i> — twisted or kinked cables.</p> <p><i>Controls</i> — proper operation from pushbutton.</p>
Weekly	<p><i>Reeving</i> — check for kinks, unstranding, broken wires, corrosion, etc.</p> <p><i>Bottom Block</i> — check for bent or twisted hook and/or safety latches.</p> <p>For complete instructions on cable/bottom block, refer to Operation/Maintenance section under Reeving System.</p>
Monthly to Quarterly	<p><i>Motor Brakes</i> — remove, inspect, clean magnetic disc plate and linings. Replace as required. Adjust brake to proper setting. See Operation/Maintenance section — Hoist Motor Brakes.</p> <p><i>Lubrication</i> — refer to Lubrication Sheet. Regrease lubrication points and check oil level in gearcases.</p> <p><i>Controls</i> — inspect contacts of motor starters. <i>Note:</i> discoloration and slight pitting are normal. Replace only if silver is worn thin or is severely pitted. Check for loose or broken connections.</p> <p><i>Limit Switch</i> — remove any accumulated dirt/dust on exposed shafts/levers. Lift the limit weight manually through the down/reverse position to make sure that shaft/bearings rotate freely. (IMPORTANT: When checking manually, make sure bottom block is lowered several feet below upper limit.)</p>

Time Interval	Inspection Function
Semi Annually to Annual	<p>Drain and replace oil in hoist gearcase. Check for loose bolts and/or connections on both hoist/trolley and suspension system.</p> <p>Check all load carrying parts, such as sheaves, drums, bottom blocks, wheel pins, frames, suspension bolts for wear, cracks, distortion or signs of overload. Replace/tighten secure as required.</p> <p>Lubricate all flexible couplings. Check mechanical load brake for holding action. See Operation/Maintenance Section under Load Brake.</p> <p>If noise level of hoist gearcase has increased, remove cover and inspect for damaged/worn gears, bearings, and shafts.</p>

IMPORTANT

After any major tear down, repair, or alteration, unit should be functionally load tested as described in section "Installation — Initial Start Up." Also, any hoist which has been out of service one month or more should have a complete maintenance/inspection, followed by a functional load test.

TROUBLESHOOTING

While the chart below can be used for diagnosing typical equipemental functions, the basic underlying cause in many cases is insufficient voltage maintenance at motor and control terminals. Not only must the equipment be connected to the proper nominal voltage source, the power supply leads must be of sufficient size to maintain rated voltage during starting and full load operation. Excessive voltage drop during starting or under load can cause:

- 1) Sluggish starting and overheating of motors.
- 2) Chattering and overheating of contactor and brake coils.
- 3) Overheating and possible burn out of transformers.
- 4) Non-release of motor brakes.
- 5) Excessive arcing of electrical contacts.
- 6) Erratic performance of optional electronic O.L. devices.

PROBLEM	DIAGNOSIS	POTENTIAL SOLUTION
Hook moves in wrong direction	Phase reversal of three-phase power supply.	Interchange any two of the three power lead connections either at the power source or at the lead in connections to the hoist. (See Caution — Initial Start Up.)
	Hoist cable wound on wrong side of drum.	Rewind and check hoist cable for damage. Check operation of lower limit switch.
CAUTION		
Hoist operation must immediately cease and corrective action taken before hoist is put back in service.		
Hook doesn't stop at extreme of up travel.	Limit Switch(es) are not opening circuit.	Check operation and setting of limit switch(es).
		CAUTION
Hoist operation must immediately cease and corrective action taken before hoist is put back in service.		

PROBLEM	DIAGNOSIS	POTENTIAL SOLUTION
Hook doesn't raise or lower	No power	Check switches, breakers, fuses, and power line connections for open circuit, grounded or faulty connections.
	Contactor not operating.	Check connections in control circuit. Check contactor coils and pushbutton control cable for open or short circuit. Reset overload relay if used. Defective transformer.
	Limit switch open circuit.	Check limit switch contacts.
	Magnetic brake not releasing.	Check adjustment. Check for loose connections. Check auxiliary contacts and brake coil.
	Excessive load.	Check weight of load and rated capacity.
Hook up motion stops after heavy use.	Thermal detectors sense overheated motor.	Avoid concentrating many lifts in short time period.
Motor overheats.	Excessive load.	Check weight of load. Do not exceed hoist capacity.
	Excessive duty cycle.	Avoid concentrating many lifts in short time period.
	Incorrect voltage or frequency.	Check for correct power supply. Voltage should be within $\pm 10\%$ of nameplate rating.
	Three-phase power supply phase failure or unbalanced current.	Check motor windings for open or short circuits. Check supply lines for balanced voltages.
	Brake does not release completely.	Check brake adjustment. Check brake control circuit and brake coil.
Hoist lifts lighter loads but not heavy loads.	Hoist overloaded.	Reduce load.
	Optional overload device set too low.	Adjust overload device.
<div style="border: 1px dashed black; padding: 2px; display: inline-block;">CAUTION</div> Do not set overload device above rated load.		
Bottom block fails to stop quickly.	Magnetic brake slips.	Check brake adjustment. Check brake linings, clean, or replace as necessary. Check load brake operation, refer to Section 4 Operation/Maintenance.
Load lowers when hoist not being operated.	Both the magnetic brake and the load brake are inoperative.	Refer to Section 4 Operation/Maintenance.

PROBLEM	DIAGNOSIS	POTENTIAL SOLUTION
Hoist operates intermittently.	Collectors making poor contact.	Check collectors for free movement of spring loaded arm, weak spring, connections, and free movement of shoe or roller.
	Defective pushbutton.	Check pushbutton inserts.
Excessive cable wear.	Lack of lubrication.	Lubricate cable.
	Hoist being used for side pulling.	Hoist cable should be vertical before starting lift so that cable wraps smoothly on drum.
Magnetic brake does not release.	Low voltage.	Check voltage.
	Magnetic coil is open or shorted. Open brake circuit.	Check connection. Check magnetic coil for open or short circuit.
Oil leaks	Vent plug clogged.	Check to be sure vent plug is open.
	Oil seals worn or damaged. Gasket leaking between gearcase and cover.	Replace oil seals. Tighten any loose bolts. Replace gasket if necessary.



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SPACEMASTER Hoist & Crane Products
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Springfield, Ohio 45502

Spare Parts Identification

SECTION 6 SPARE PARTS IDENTIFICATION/ADJUSTMENT AND REPLACEMENT INSTRUCTIONS

General

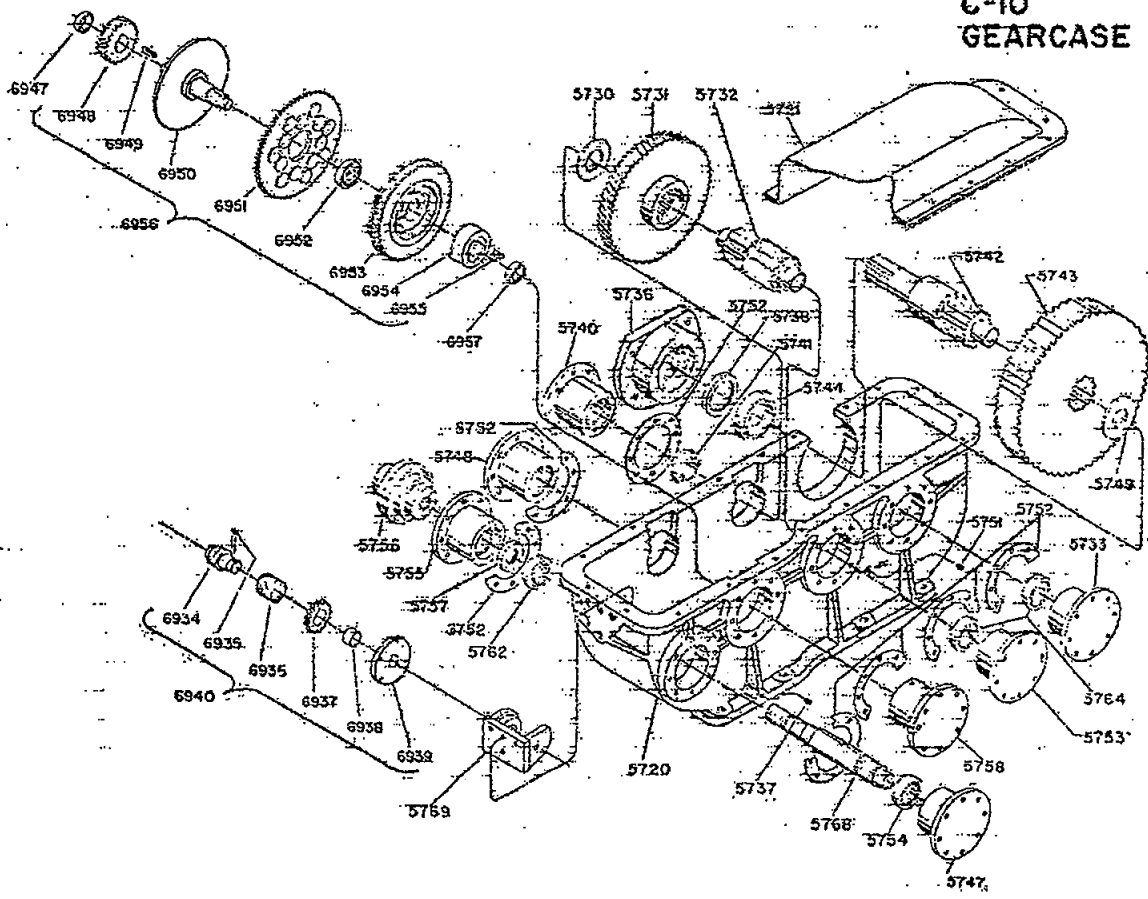
The pages in this section all refer to the specific Robbins & Myers hoist whose serial number matches that on the front page of this book.

Also included are specific operation and adjustment instructions applying to components and assemblies in the hoist.

IMPORTANT

Both the reference number and the hoist serial number must be provided to ensure the proper ordering of parts.

C-10
GEARCASE

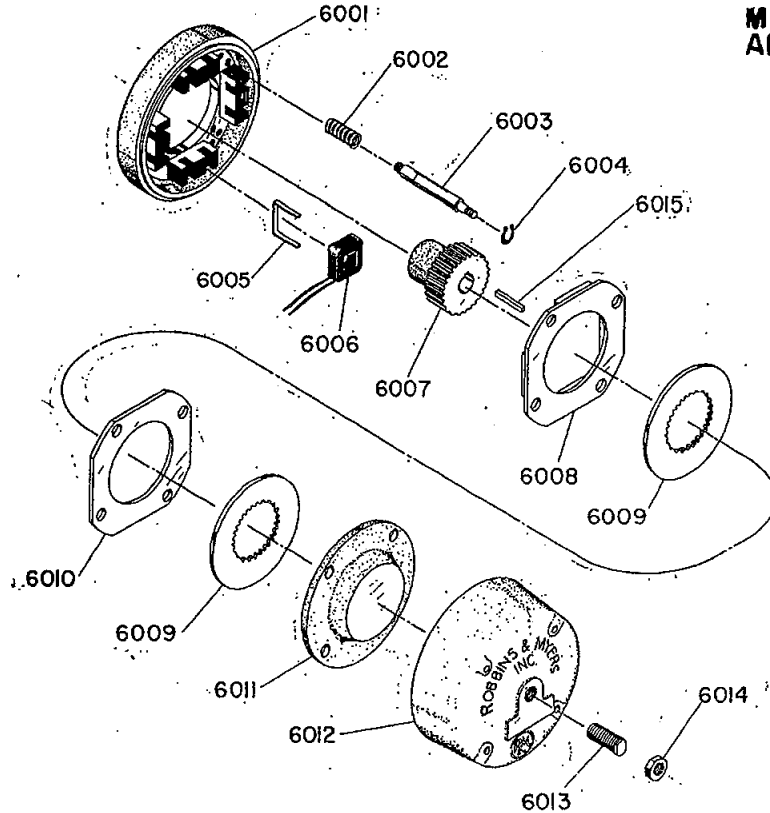


C-10 GEARCASE ASSEMBLY-PARTS LIST

*Indicates Assembly

- | | |
|---------------------------------------|-------------------------------------|
| 5720 Gearcase | 5762 Roller Bearing |
| 5721 Gearcase Cover | |
| 5730 Thrust Washer | 5764 Roller Bearing |
| 5731 Intermediate Gear | |
| 5732 Intermediate Shaft & Drum Pinion | 5768 Motor Ext. Shaft & Pinion |
| 5736 Bearing Support | 5769 Backstop Bracket |
| 5737 Drain Plug | 6934 Spring Clutch Shaft |
| 5738 Oil Seal | 6935 Clutch Shaft Key |
| 5740 Bearing Support | 6936 Clutch Spring |
| 5741 Roller Bearing | 6937 Clutch Gear |
| 5742 Output Extension Shaft | 6938 Bushing |
| 5743 Drum Gear | 6939 Spring Clutch Cover |
| 5744 Roller Bearing | 6940 Spring Clutch Assembly |
| 5747 Bearing Support | 6947 Load Brake Shaft Bearing |
| 5748 Bearing Support | 6948 Intermediate Pinion |
| 5749 Thrust Washer | 6949 Pinion Key |
| 5751 Oil Level Plug | 6950 Thrust Disc & Load Brake Shaft |
| 5752 Shims | 6951 Free Wheeling Gear Assembly |
| 5753 Bearing Support | 6952 Bearing |
| 5754 Roller Bearing | 6953 Motor Gear & Spider |
| 5755 Bearing Support | 6954 Load Brake Cam Nut |
| 5756 Motor Coupling | 6955 Cam Nut Key |
| 5757 Oil Seal | 6956 Load Brake Assembly |
| 5758 Bearing Support | 6957 Load Brake Shaft Bearing |

M-7,10 BRAKE
ADJUSTING / PARTS



IMPORTANT

When ordering parts for this brake be sure to give part number, name of part, quantity, and SERIAL NUMBER OF HOIST found on a large plate attached to the Main Frame of hoist.

INSTRUCTIONS

To adjust brake, back off the jam nut and draw up center screw until firm (6 to 8 lbs. force on a 10" wrench.) Then back off 3/4 turn. Relock in place with the jam nut. No other adjustment needed.

As the brake discs wear the brake will gradually lose its torque. For maximum life, the brake should be adjusted within a few weeks after the unit has been installed or as soon as the friction discs have been well seated. After this, only a periodic adjustment is required. It is not recommended to wait until the brake has lost all its torque before adjusting.

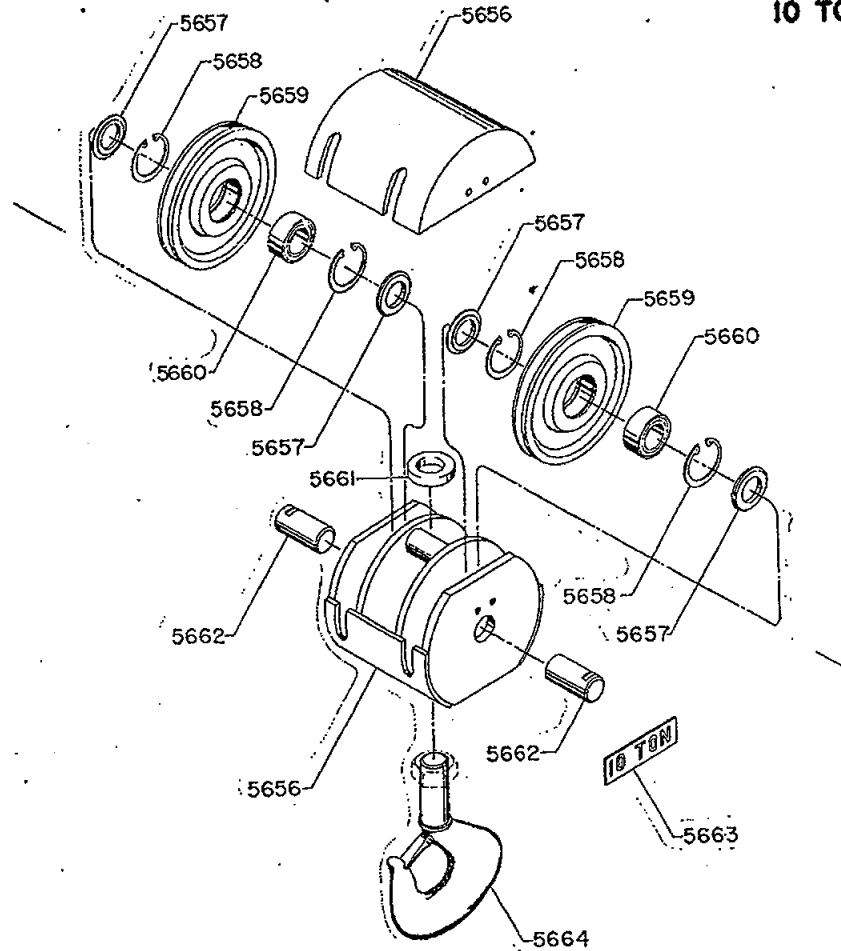
RAN 11/28/73 SHEET NO. 502

REFERENCE NUMBER	PART DESCRIPTION	REFERENCE NUMBER	PART DESCRIPTION
* 6000	Brake Assembly Complete	6008	Armature Plate Assembly
6001	Brake Head	6009	Friction Disc
6002	Spring	6010	Intermediate Thrust Plate
6003	Brake Stud	6011	End Thrust Disc
6004	Snap Ring	6012	Brake Cover
6005	Coil Support	6013	Adjustment Screw
6006	Magnet Coil	6014	Jam Nut
6007	Brake Hub	6015	Key

* Use this reference number when ordering the complete assembly.

TROLLEY
 HOIST

Robbins & Myers
 C-10
 BOTTOM BLOCK
 10 TON



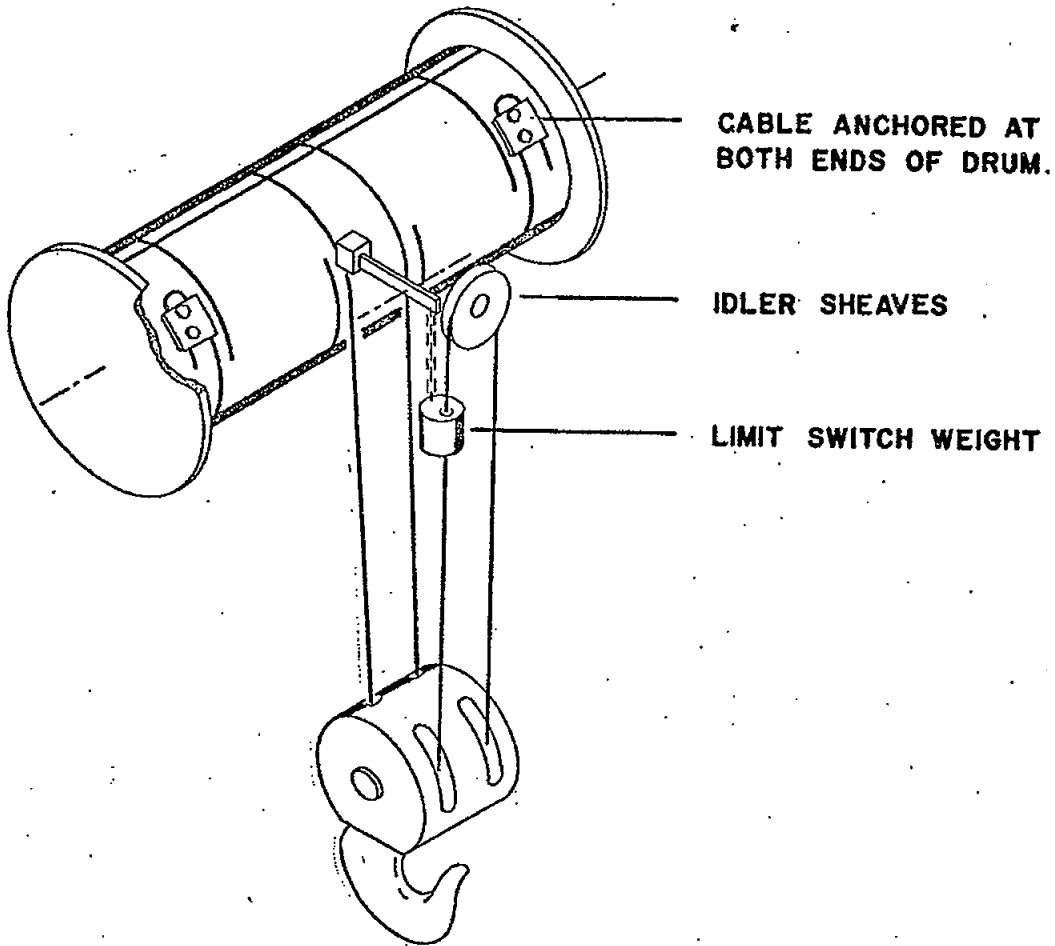
- + 5655 10 TON BOTTOM BLOCK ASSEMBLY
- 5656 BOTTOM BLOCK FRAME
- 5657 THRUST WASHER
- 5658 RETAINING RING
- 5659 ROPE SHEAVE
- 5660 BALL BEARING
- 5661 THRUST BEARING
- 5662 SHEAVE PIN
- 5663 CAPACITY PLATE
- 5664 HOOK AND NUT (W/SAFETY LATCH)

+ INDICATES ASSEMBLY

DRWN BY RAM DATE 5-14-75 SHEET NO. 205

HOIST

Robbins & Myers
REEVING
4 PART BOTTOM BLOCK - 2 LINES OFF DRUM

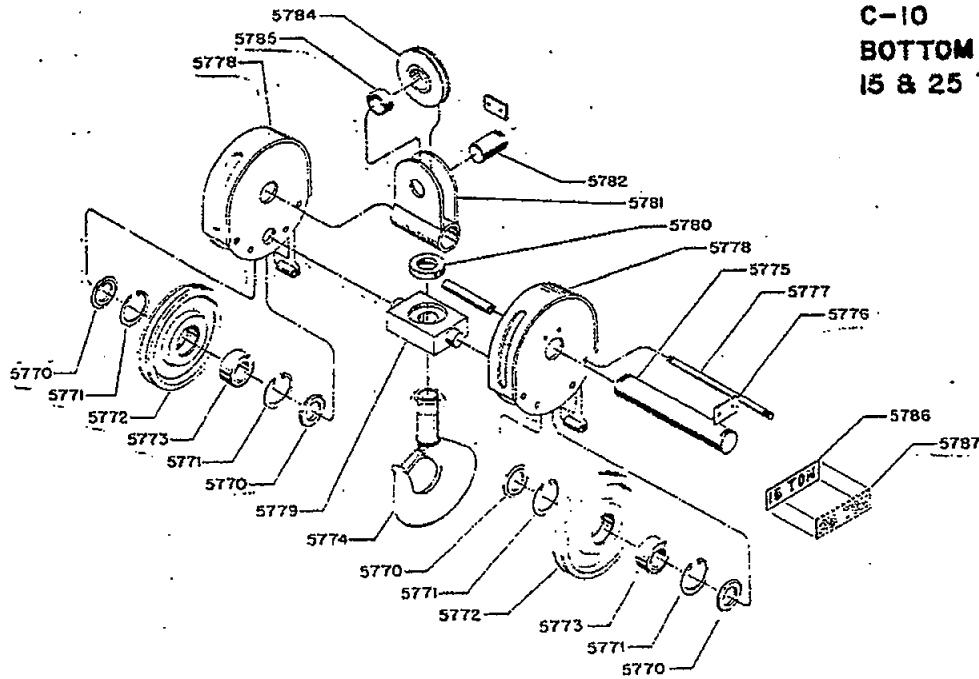


HOIST

DRWN BY RAN DATE 5/14/75 SHEET NO. 205

HC6332-

Robbins & Myers
C-10
BOTTOM BLOCK
15 & 25 TON



		15 TON	25 TON
5770	THRUST WASHER	4	8
5771	RETAINING RING	4	8
5772	ROPE SHEAVE	2	4
5773	BALL BEARING	2	4
5774	LOAD HOOK (W/SAFETY LATCH)	1	1
5775	SHEAVE PIN	1	1
5776	KEEPER PLATE	1	2
5777	PIN	1	1
5778	BLOCK HOUSING	2	4
5779	HOOK TRUNNION	1	1
5780	THRUST BEARING	1	1
5781	EQUALIZER SUPPORT	1	1
5782	SHEAVE PIN	1	1
5784	EQUALIZER SHEAVE	1	1
5785	BUSHING	1	1
5786	CAPACITY PLATE	2	0
5787	CAPACITY PLATE	0	2

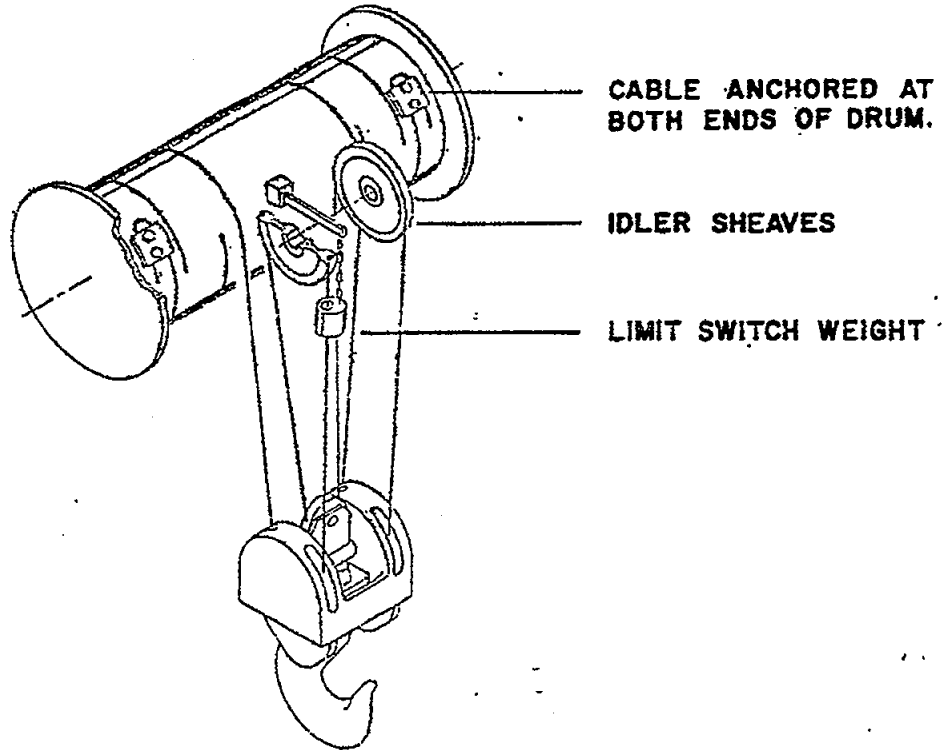
DRWN BY RAW DATE 5-14-75 SHEET NO 206

HOIST

Robbins & Myers

REEVING - 15 TON

6 PART BOTTOM BLOCK - 2 LINES OFF DRUM



DRAWN BY RAN DATE 5/16/75 SHEET NO. 228

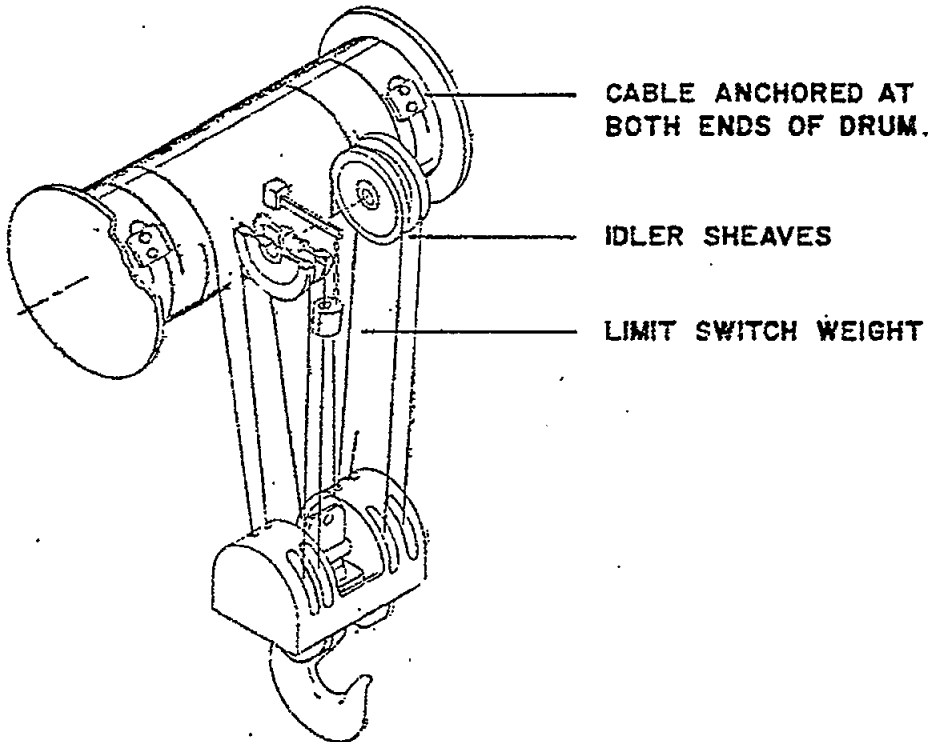
204

SHEET NO. 228

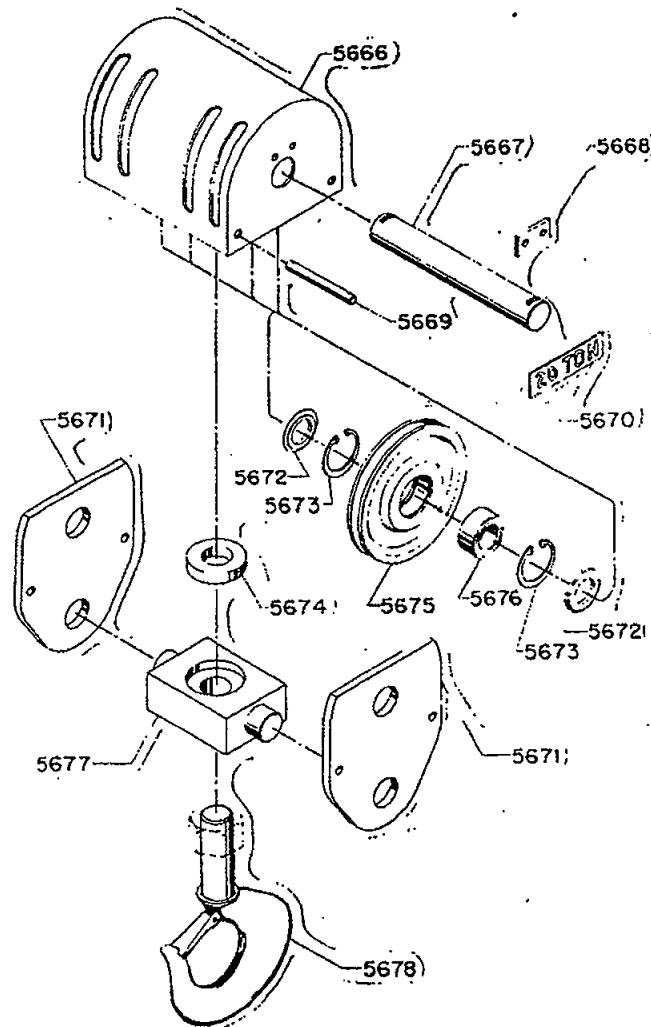
Robbins & Myers

REEVING - 25 TON

10 PART BOTTOM BLOCK - 2 LINES OFF DRUM



**C-10
BOTTOM BLOCK
20 & 30 TON**



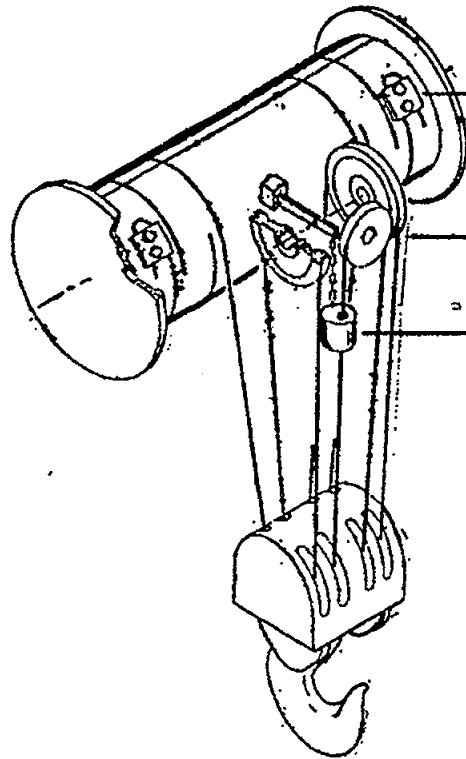
- * 5665 BOTTOM BLOCK ASSEMBLY
- 5666 BOTTOM BLOCK COVER
- 5667 SHEAVE PIN
- 5668 KEEPER PLATE
- 5669 GUARD PIN
- 5670 CAPACITY PLATE
- 5671 LOAD PLATE
- 5672 THRUST WASHER
- 5673 RETAINING RING
- 5674 THRUST BEARING
- 5675 SHEAVE
- 5676 BALL BEARING
- 5677 HOOK TRUNION
- 5678 LOAD HOOK (W/SAFETY LATCH)

* INDICATES ASSEMBLY

DRWN BY RAW DATE 5/19/75 SHEET NO. 207

HOIST

**REEVING-20 TON
8 PART BOTTOM BLOCK-2 LINES OFF DRUM**



CABLE ANCHORED AT BOTH ENDS OF DRUM.

IDLER SHEAVES

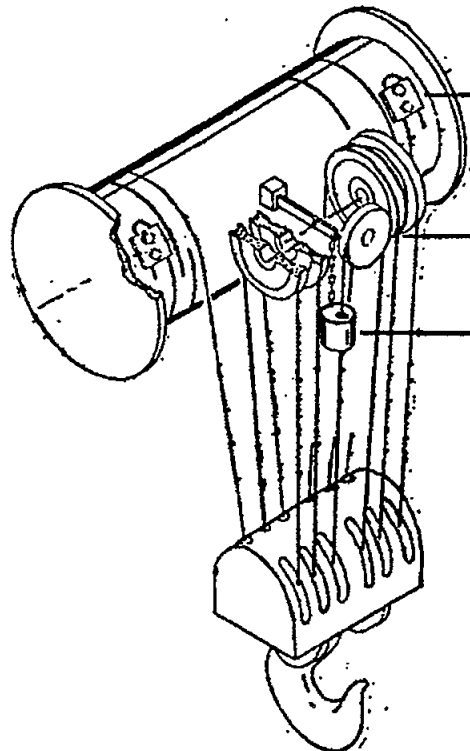
LIMIT SWITCH WEIGHT ON STATIONARY CABLE.

DRAWN BY: RAN DATE: 5-19-75 SHEET NO. 230 JGT

SHEET NO. 230

HOIST

**REEVING-30 TON
12 PART BOTTOM BLOCK-2 LINES OFF DRUM**



CABLE ANCHORED AT BOTH ENDS OF DRUM.

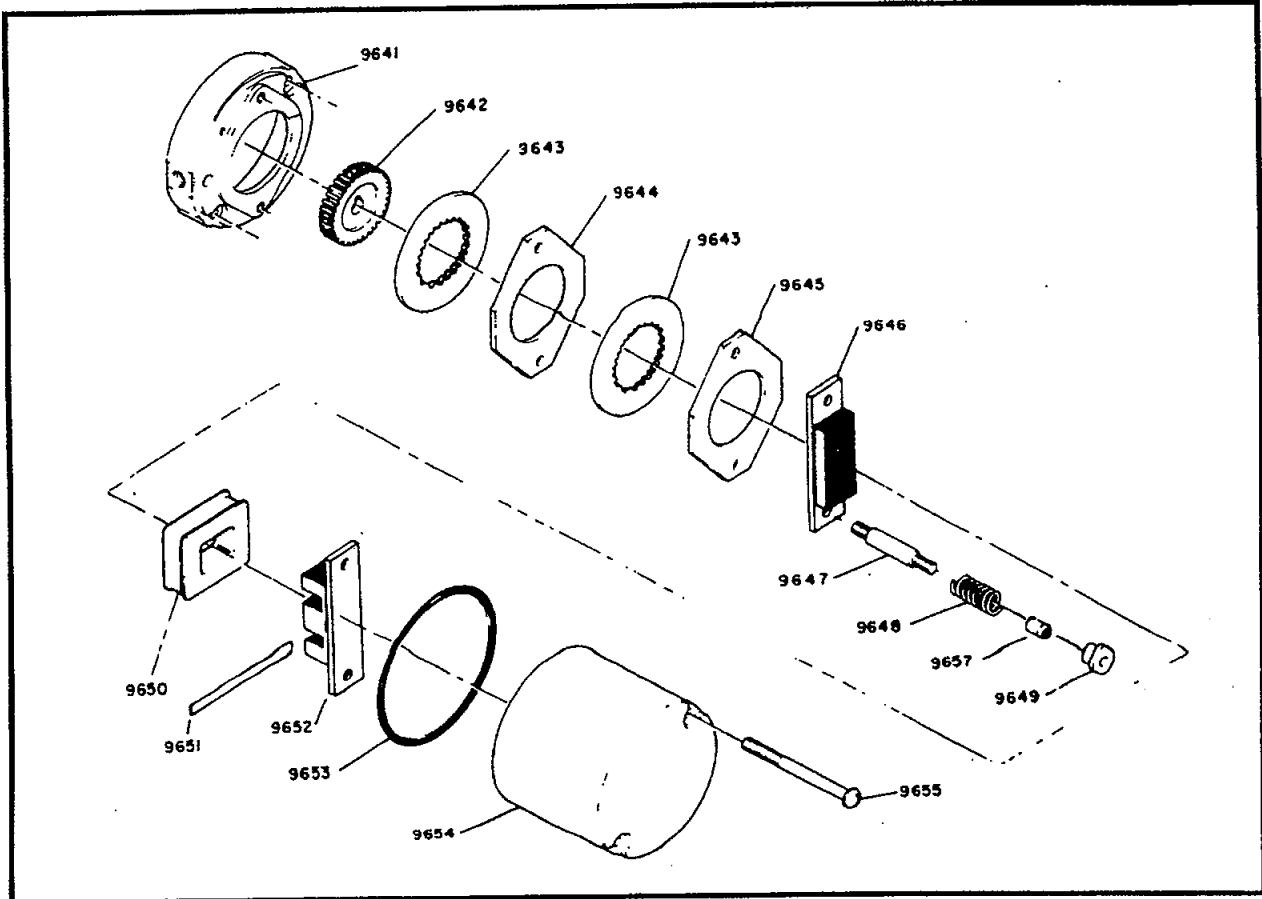
IDLER SHEAVES

LIMIT SWITCH WEIGHT ON STATIONARY CABLE.



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Spare Parts Identification
550



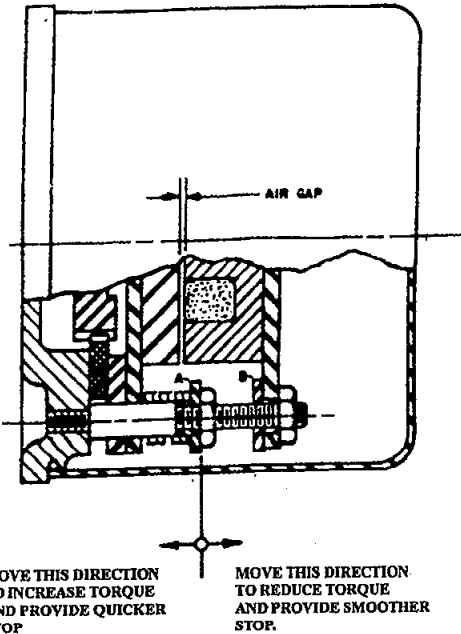
R4A MOTOR BRAKE

REFERENCE NUMBER	PART DESCRIPTION
9641 •	Brake Adapter
9642 •	Brake Hub
9643 •	Friction Discs (1 Req'd R4A-4.0, 2 Req'd R4A-8.0)
9644 •	Intermediate Disc (R4A-8.0 only)
9645 •	Thrust Disc
9646 •	Armature Plate Assembly
9647 •	Brake Stud
9648 •	Spring
9649 •	Adjusting Nut
9650 •	Coil (Specify voltage stamped on coil)
9651 •	Wedge
9652 •	Pole Plate Assembly
9653 •	Gasket
9654 •	Brake Cover
9655 •	Bolt
9656 •	Brake Assembly
9657 •	Spacer (2 Req'd R4A-8.0 only)

***USE THIS NUMBER WHEN ORDERING COMPLETE ASSEMBLY**
UNIT SERIAL NUMBER MUST BE FURNISHED IN ADDITION TO PART REFERENCE NUMBER.



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TORQUE ADJUSTMENT:

Brakes used on hoist motion drives are to be adjusted for maximum torque.

Brakes used on trolley and crane motion drives can be adjusted to provide stopping action to suit operations.

To adjust, loosen jam nuts as adjusting nuts "A" and adjust both sides equally as indicated by direction of arrows. Relock jam nuts after proper setting is determined.

WEAR ADJUSTMENT:

Loosen jam nuts at adjusting nuts "B" and adjust both sides to get uniform 1/32" (.031") air gap in magnet assembly. Relock jam nuts securely and recheck to insure proper gap. Adjustment for wear is indicated when air gap exceeds 1/16". Friction disc should be replaced when worn to 1/8" thickness.

ELECTRICAL CONNECTIONS

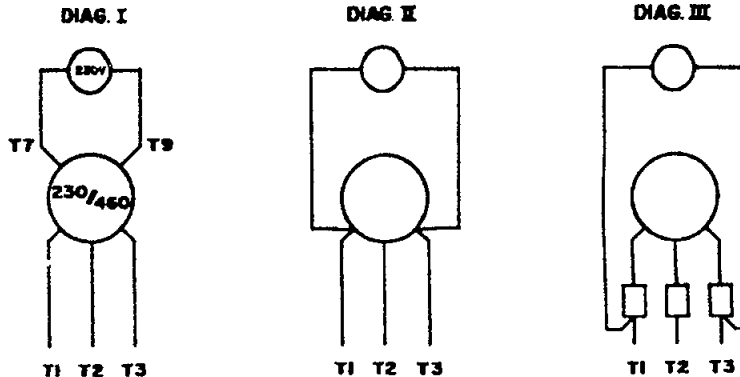
When used as a replacement brake, the coil voltage should be the same as that of the old brake for proper operation.

When used as an add-on brake kit, connections may allow latitude in selection of brake coil voltage.

DIAGRAM I: Allows usage with dual voltage (230/460) motors and permits use of 230 volt brake coil for either line voltage. Brake coil lead connections are to be completed in the motor terminal box.

DIAGRAM II: Allows usage with dual voltage (230/460) motors, and must be used with single voltage motors. Brake coil voltage must equal line voltage. Brake coil lead connections are to be completed in the motor terminal box.

DIAGRAM III: Must be used on any installation where control system uses a startmaster or ballast resistor to cushion motor start. Brake coil voltage must equal line voltage. Wiring must be run to the control system such that the brake coil will receive full voltage.



For additional information, consult W.D. furnished with original equipment when applicable.