



Instruction, Maintenance and Parts Manual

Series 670 (Heavyweight) Electric Chain Hoist

CAPACITIES: 2 THROUGH 6 TONS

CAUTION-IMPORTANT

If not properly installed, operated and maintained, the use of all mechanical equipment presents the possibility of personal injury or property damage. Before hoist use, all persons who will install, operate or maintain should read this manual thoroughly. For safe, dependable and economical performance, follow all instructions and recommendations contained herein. It is also important to retain this manual for future use.

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SAFETY PRECAUTIONS

"Each hoist is built in accordance with the specifications contained herein and at the time of manufacture complies with our interpretation of applicable sections of the American National Standard Institute Code B30.16-1981 'Overhead Hoists,' The National Electrical Code (NFPA70-1981) and the Occupational Safety and Health Act-1970. **Since OSHA** states that the National Electrical Code applies to all electrical hoists, installers are required to provide current overload protection and grounding in keeping with the code. Users should check installation for compliance with the application, operation and maintenance requirements of this law."

"The safety laws for elevators, lifting of people and for dumbwaiters specify construction details that are not incorporated in CM Industrial Hoists. For such applications, refer to requirements that meet state and local codes and the American National Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks (ANSI A17.1-1978).

NOTE: Columbus McKinnon Corporation should be consulted on any usage of the Hoists that would not involve lifting of the load on the lower hook.

WARNING: TO AVOID INJURY

1. DO read ANSI B30.16 Safety Standard for Overhead Hoists and Hoist Manufacturer's Operating and Maintenance Instructions.
2. DO be familiar with hoist operating controls, procedures and warnings.
3. DO make sure hook travel is in the same direction as shown on controls.
4. DO make sure hoist limit switches function properly.
5. DO maintain firm footing when operating hoist.
6. DO make sure that load slings or other approved single attachments are properly sized and seated in the hook saddle.
7. DO make sure that the hook latch, if Used, is closed and not supporting any part of the load.
8. DO make sure that load is free to move and will clear all obstructions.
9. DO take up slack carefully, check load balance, lift a few inches and check load holding action before continuing.
10. DO avoid swinging of load or load hook.
11. DO make sure that all persons stay clear of the suspended load.
12. DO warn personnel of an approaching load.
13. DO protect wire rope and load chain from weld splatter or other damaging contaminants.
14. DO promptly report any malfunction, unusual performance, or damage of the hoist.
15. DO inspect hoist regularly, replace damaged or worn parts, and keep appropriate records of maintenance.
16. DO use the hoist manufacturer's recommended parts when repairing a hoist.
17. DO use hook latches wherever possible.
18. DO apply lubricant to the wire rope or load chain as recommended by the hoist manufacturer.
19. DO NOT lift more than rated load.
20. DO NOT use the hoist load limiting device to measure the load.
21. DO NOT use damaged hoist or hoist that is not working correctly.
22. DO NOT use the hoist with twisted, kinked, damaged or worn wire rope or chain.
23. DO NOT lift a load unless wire rope is properly seated in its groove(s) or unless chain is properly seated in chain wheel(s) or sprocket(s).
24. DO NOT use load rope or load chain as a sling or wrap rope or chain around the load.
25. DO NOT lift a load if any binding prevents equal loading on all supporting ropes or chains.
26. DO NOT apply the load to the tip of the hook.
27. DO NOT operate unless load is centered under hoist.
28. DO NOT allow your attention to be diverted from operating the hoist.
29. DO NOT operate the hoist beyond limits of load rope or load chain travel.
30. DO NOT use limit switches as routine operating stops unless recommended. They are emergency devices only.
31. DO NOT use hoist to lift, support or transport people.
32. DO NOT lift loads over people.
33. DO NOT leave a suspended load unattended unless specific precautions have been taken.
34. DO NOT allow sharp contact between two hoists or between hoist and obstructions.
35. DO NOT allow the rope, chain or hook to be used as a ground for welding.
36. DO NOT allow the rope, chain or hook to be touched by a live welding electrode.
37. DO NOT remove or obscure the warnings on the hoist.
38. DO NOT adjust or repair a hoist unless qualified to perform hoist maintenance.
39. DO NOT attempt to lengthen the load rope or chain or repair damaged load rope or chain.

FOREWORD

This manual contains important information to help you properly install, operate and maintain your hoist for maximum performance, economy and safety. Please study its contents thoroughly before putting your hoist into operation. By practicing correct operation procedures and by carrying out the recommended preventive maintenance suggestions or requirements, you will experience long, dependable and safe service. After you have completely familiarized yourself with the contents of this manual, we recommend that you carefully file it for future reference.

The information herein is directed to the proper use, care and maintenance of the CM Series 670 Hoist and does not comprise a handbook on the broad subject of rigging.

A word about rigging. Rigging can be defined as the process of lifting and moving heavy loads using hoists and other mechanical equipment. Skill acquired through specialized experience and study is essential to safe rigging operations. For rigging information, we recommend consulting a standard textbook on the subject.

OPERATING AND SAFETY PROCEDURES

Operating the Hoist

1. Before picking up a load, check to see that the hoist is directly overhead.

IMPORTANT: *When applying a load, it should be directly under hoist or trolley. Avoid off center loading of any kind.*

2. Take up a slack load chain carefully and start load easily to avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower the load and remove the excess load.
3. Do not allow the load to swing or twist while hoisting.

Hoist with Plain Trolley

This unit should be moved by pushing on the suspended load or pulling on the empty hook. The pendant chain supporting control station should not be used for this purpose.

Hoist with Geared Trolley

This unit should be moved by means of the trolley hand chain. Pull on the chain farthest from end toward which the unit is to travel.

Hoist with Motor Driven Trolley

This unit should be moved by operating the controls marked 4n FORWARD and o REVERSE in control station. Anticipate the stopping point and allow trolley to coast to a smooth stop. Reversing or "plugging" to stop trolley causes overheating of motor and swaying of load.

Safety

1. When preparing to lift a load, be sure that the attachments to the hook are firmly seated in hook saddle. Avoid off center loading of any kind, especially loading on the tip of the hook.

2. When lifting, raise the load only enough to clear the floor or support and check to be sure that the attachments to hook and load are firmly seated. Continue lift only after you are assured the load is free of all obstructions.
3. Do not load hoist beyond the rated capacity shown on hoist identification plate. Overloading can cause immediate failure of some load carrying part or create a defect causing subsequent failure at less than rated capacity. When in doubt, use the next larger capacity CM Series 670 Hoist.
4. Do not use this or any other overhead materials handling equipment for lifting people.
5. Stand clear of all loads and do not move or locate a load over the heads of other people. Warn people of your intention to move a load in their area.
6. Do not leave the load suspended in the air unattended.
7. Let only qualified people operate unit.
8. Do not wrap the load chain around the load and hook onto itself as a choker chain. Doing this will result in the following:
 - a. The upper limit is not effective and the load could hit the hoist.
 - b. The swivel effect of the hook could be lost and result in a twisted chain and a jammed liftwheel.
 - c. The chain could be damaged at the hook.

INSPECTION

To maintain continuous and satisfactory operation, a regular inspection procedure must be initiated to replace worn or damaged parts before they become unsafe. Inspection intervals must be determined by the individual application and are based on the type of service to which your hoist will be subjected and the degree of exposure to wear, deterioration or malfunction of the critical components.

The type of service to which the hoist is subjected can be classified as "Normal", "Heavy" and "Severe".

Normal Service: Involves operation with randomly distributed loads within the rated load limit, or uniform loads less than 65 percent of rated load for not more than 25 percent of the time.

Heavy Service: Involves operating the hoist within the rated load limit which exceeds normal service.

Severe Service: Is normal or heavy service with abnormal operating conditions. Two classes of inspection-frequent and periodic-must be performed.

Frequent Inspections: These inspections are visual examinations by the operator or other designated personnel. Records of such inspections are not required. The frequent inspections are to be performed monthly for normal service, weekly to monthly for heavy service, and daily to weekly for severe service and they should include those items listed in Table 1.

Periodic Inspections: These inspections are visual inspections of external conditions by an appointed person. Records of periodic inspections are to be kept for continuing evaluation of the condition of the hoist. Periodic inspections are to be performed yearly for normal service, semi-annually for heavy service and quarterly for severe service and they are to include those items listed in Table 2.

WARNING: Any deficiencies are to be corrected before the hoist is returned to service. Also, the external conditions may show the need for disassembly to permit a more detailed inspection

which, in turn, may require the use of non-destructive type testing.

PREVENTIVE MAINTENANCE

In addition to the above inspection procedure, a preventive maintenance program should be established to prolong the useful life of the hoist and maintain its reliability and continued safe use. The program should include the following periodic and frequent inspections with particular attention being paid to the lubrication of the various components using the recommended lubricants (see page 10).

Table 1. Minimum Frequent Inspections

TYPE OF SERVICE			ITEM
Normal	Heavy	Severe	
Monthly ↑ ↓	Weekly ↑ to ↓ Monthly	Daily ↑ to ↓ Weekly	a) Brake for evidence of slippage. b) Control functions for proper operation. c) Limit switches for proper operation—see page 7. d) Hooks for damage, cracks, twists, excessive throat opening, latch engagement and latch operation—see page 9. e) Load chain for lubricant, wear, damaged links or foreign matter—see page 8.

Table 2. Minimum Periodic Inspections

TYPE OF SERVICE			ITEM
Normal	Heavy	Severe	
Yearly ↑ ↓	Twice a Year ↑ ↓	Every Three Months ↑ ↓	a) Frequent inspections per Table 1. b) External evidence of loose bolts or nuts. c) External evidence of worn, corroded, cracked or distorted hook blocks, suspension bolts, gears, pins, bearings, hand chain wheel, levers and frames. d) External evidence of damage or excessive wear to the hook collar and retaining pin. e) Trolley wheels for external wear on the tread and flange, and for wear on the internal bearing surfaces as evidenced by looseness on the stud. f) External evidence of excessive wear of the electric brake—see page 9. g) Contactors and relays for signs of pitting or any deterioration of the visible contacts. h) Electrical cords and cables for damaged insulation. i) Oil level in gear housing—see page 6. j) Liftwheel pockets for wear as evidenced by a widening and deepening of the load end of pocket. This will cause the chain to lift up in pocket and result in binding between liftwheel and chain guides. Severely worn liftwheel should be replaced. k) Chain guides for wear or burring where chain enters hoist. Severely worn guides should be replaced. l) Load chain, chain guides and liftwheel pockets for clogging with foreign matter which causes the chain to bind. Clean parts with solvent and wipe chain down with Lubriplate, Bar and Chain Oil 10-R (Fiske Bros. Refining Co.) or equal lubricant. m) Collector shoes for wear. Badly worn parts should be replaced. n) Gasket between gear cover and main frame for signs of leaks. Tighten the screws holding gear cover to main frame. If leakage persists, install a new gasket. o) Supporting structure and trolley, if used, for external evidence of damage. p) Warning label or tag and hoist identification plate for existence and legibility. q) Gear cover breather vent for free passage of air. Clean if necessary. r) Fans* for proper operation by placing a temporary jumper across thermostat terminals S1 and S2. Replace the fans if they fail to operate. s) Fan* control thermostat by manipulating the thermostat setting. After completing check, reset thermostat at 130°F.

*Applies to hoists with 7.5/2.5 horsepower, 2 speed motors

CAUTION: The outboard bearings supporting the intermediate gears are located in gear housing cover. Therefore, it should be carefully removed. It is suggested, in order to retain the gears in gear housing, that the hoist be tipped slightly upward or positioned on end, then carefully lift cover.

GENERAL INFORMATION

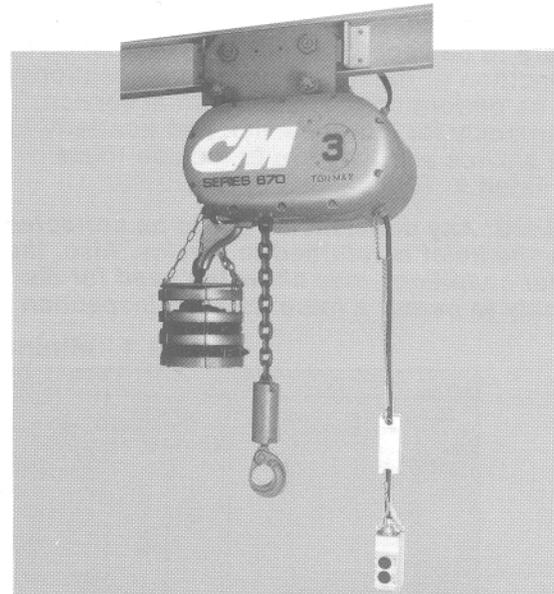
SPECIFICATIONS

The CM Series 670 Electric Chain Hoist (Figure 1) is a materials handling device that can be used to lift and lower loads within its rated capacity. It is available in capacities of 2, 3, 4, 5, 6, *7 1/2, *9, *10, *12 and *15 tons with close headroom type construction. A wide variety of lifting speeds and lift ranges are available as well as single and two-speed operation. The hoist can be supplied with lug suspension, plain trolley, geared trolley or motor driven trolley.

The mechanical features of the hoist include a rugged aluminum alloy frame, CM Hoistalloy™ load chain, 3 gear reduction helical gearing system, alloy steel liftwheel, ductile iron chain guide, forged steel Latchlok™ hook on 2 through 6 ton units, forged steel latch type hook on *7 1/2 through *15 ton units, a friction clutch-Protector TV-designed to prevent dangerous overloading, and a chain container.

The electrical features include D.C. rectified, triple disc hoist brake, magnetic reversing contactors, isolating transformer, adjustable upper and lower limit switches, heavy duty thermally protected hoist and trolley motors and a rugged pushbutton station.

*This manual applies to the 2 through 6 ton units. For the 7 1/2 through 15 ton units, a supplement to the manual is provided.



STANDARD/CLOSE HEADROOM MODELS		
Capacity (Tons)	Hoist Speeds Ft./Min.	Lift Range
2	20, 24, 32, 40, 48	Up to 254 Ft.
3	20, 24, 32, 40	Up to 254 Ft.
4	10, 12, 16, 20, 24	Up to 127 Ft.
5	10, 12, 16, 20, 24	Up to 127 Ft.
6	10, 12, 16, 20	Up to 127 Ft.
*7 1/2	7, 8, 11, 14, 16	Up to 84 Ft.
*9	7, 8, 11, 13	Up to 84 Ft.
*10	7, 8, 11, 13	Up to 84 Ft.
*12	5, 6, 8, 10	Up to 63 Ft.
*15	8, 6, 5, 4	Up to 50 Ft.

Figure 1. Series 670 Electric Chain Hoist

ACCESSORIES

Lug Suspension. The lug suspension consists of heat-treated bolts, spacer washers, nuts and cotter pins, and it is used to suspend the hoist from a trolley or a permanent structure.

Plain Trolley. The manual push type trolley is designed for use with the Series 670 Electric Hoists. The trolley is adjustable to operate on a range of American Standard beams and flat flange beams.

Geared Trolley. The geared trolley is similar to the plain trolley except it is moved by the means of a hand chain. The hand chain rotates a pinion that drives gears attached to the trolley wheels and moves the trolley along the beam.

Motor Driven Trolley. The motor driven trolley is similar to the geared trolley except the hand chain is replaced by an electric motor. The motor is energized by a reversing contactor mounted in the control enclosure, and it is controlled by pushbuttons located in the pendant control station.

CM GUARANTEE

If any properly maintained CM part, within 1 year of shipment, proves to have been originally defective in materials or workmanship, and is returned to us, transportation prepaid, we will replace or repair the part, no charge, f.o.b. our factory.

We reserve the right to change materials or design if, in our opinion, such changes will improve our product. Abuse, repair by an unauthorized person, or use of non-CM replacement parts voids the guarantee and could lead to dangerous operation. For full Terms of Sale, see Sales Order Acknowledgment.

The postage paid guarantee card included in the envelope with this manual should be filled in and mailed to the factory at once for recording and validating.

INSTALLATION AND OPERATION

INSTALLATION

When received, the hoist should be carefully inspected for damage which may have occurred during shipment or handling. Check the frame for oil leaks, the external wiring for broken leads or damaged connectors and inspect the load chain for nicks and gouges.

Before installing the hoist, make sure that the power supply to which it will be connected is the same as that shown on the hoist nameplate.

The hoist should be connected to a branch circuit which complies with the requirements of the National Electrical Code and applicable local codes. For grounding the hoist, the power cord includes a grounding conductor (green wire). In addition, the beam or other suspension system from which the unit is to be suspended should be permanently grounded.

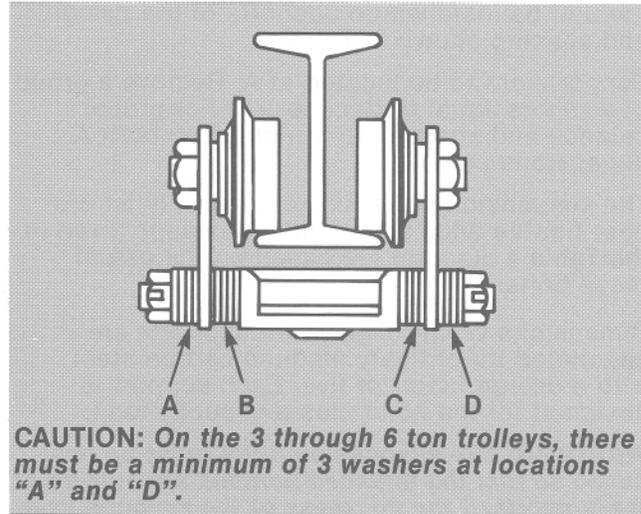
Trolley Suspended Hoists

For all trolley suspended hoists, rail stops must be installed. These stops must be positioned to contact the trolley side frames and not exert impact force on the hoist. If the trolleys are mounted on the hoist lugs at the factory, the side frames are normally positioned so that the wheels will operate on the beam flange that was specified on the order. However, it is recommended that the actual beam flange width be measured before installation to determine the exact spacing of the side frames. The distance between the trolley wheel flanges should be 1/8 to 3/16 inch greater than the beam flange width for straight runway beams, and 3/16 to 1/4 inch if the runway includes sharp curves. Table 3 shows the number of spacer washers to be installed between the trolley side frames and the hoist suspension lug for the beam flange widths indicated. The number of washers shown in Table 3 is nominally correct. Due to variations in size encountered on structural steel sections, it will be necessary in some cases to vary the numbers used. When used on monorail with curves, lightly lubricate edges of beam at curve section with grease.

WARNING: Special trolleys in chart require special side frames and suspension bolts.

On geared trolleys, the bottom of the hand chain loop is normally located two feet above the floor. If it is desired to change this, find the unwelded link and open it by spreading with a chisel or twist one end with a wrench while holding the other end in a vise or another wrench. Remove an even number of links (2, 4, 6, etc.) as necessary to shorten the chain or add an even number of links to lengthen the chain (when lengthening the chain, another open link will be required and this can be made from a welded link by cutting through the weld with a hacksaw). Make certain that the chain is not twisted-then re-install and close open link(s).

Table 3. Trolley Spacer Washer Arrangement



	Amer. Std. Flange Width	1/2 Thru 2 Ton				3 Thru 6 Ton			
		No. of Washers				No. of Washers			
		A	B	C	D	A	B	C	D
Standard Trolleys	3-3/8	13	0	0	13				
	3-5/8	11	2	2	11				
	3-7/8	10	3	4	9	Special Trolleys			
	4	9	4	4	9	11	0	0	11
	4-1/8	8	5	5	8	10	1	0	11
	4-5/8	5	8	8	5	7	4	4	7
	5	3	10	10	3	11	0	0	11
	5-1/8	3	10	11	2	11	0	1	10
	5-1/4	2	11	12	1	10	1	1	10
	5-1/2	0	13	13	0	8	3	3	8
Special Trolleys	5-5/8	12	1	1	12	7	4	4	7
	6	10	3	3	10	3	8	7	4
	6-1/4	9	4	5	8	3	8	8	3
	6-3/8	8	5	6	7	11	0	0	11
	7	4	9	9	4	6	5	5	6
	7-1/8	3	10	10	3	6	5	4	7
	7-1/4	3	10	11	2	6	5	5	6
	7-3/8	2	11	12	1	5	6	6	5
	7-1/2	1	12	12	1	4	7	7	4
7-5/8	0	13	13	0	3	8	8	3	
*Minimum Beam Radius		4'0"				5'6"			

*Dimension applies to minimum I-beam and will vary with larger I-beams.

On Motor Driven Trolleys, it is necessary to lubricate the trolley wheel gears and the driving pinion with Texaco Novatex #2 or an equivalent heavy cup grease or graphite grease prior to installing trolley on the beam. The motor driven trolley is wired in such a way that when the hoist motor is operating correctly, as described on page 6, the trolley will move toward the left when the FORWARD (0) control is depressed, when facing the trolley motor by standing at the capacity end of the hoist.

For Separate Motor Driven Trolley (trolley shipped separately from hoist), refer to the instructions packed with unit and the information **given on page 5.**

Lug Suspended Hoists

For lug suspended hoists, it is suggested that the unit be installed on supports of the design and spacing shown in Table 4.

Supports are to be located at A. Remove a group of washers equal to thickness T. For proper balance and stress distribution, keep both A dimensions equal.

The suspension bolts furnished with hoist are heat treated alloy steel and dimensions given in the Table 4 diagram are based on the use of these bolts.

Dimensions W and T given for supports are calculated for ordinary medium carbon steel with a design factor of five. Each support is designed for the hoist plus a capacity load.

WARNING: The suspension bolts must be positioned so that the threaded portions are outside of the supports. If the thickness of the supports used is such that the threaded portions of the suspension bolts will be inside the supports, order longer suspension bolts from the factory. When ordering longer suspension bolts, specify the thickness of the distance between the supports.

Hoist Lubrication

After hoist is mounted on its suspension system, remove pipe plug in top of gear cover and install breather plug furnished with hoist. Check oil level by removing small plug in the side of the gear cover. Oil level should be in line with bottom of hole. See that the breather plug in top, the drain plug in bottom and the level plug in cover are tight.

NOTE: A pint can of chain lubricant is packed loose with the hoist. The load chain was initially lubricated at the factory and this pint of lubricant should be used to renew the lubricant in accordance with the instructions on page 10. The lubricant should only be applied to the load chain. DO NOT pour this lubricant into the gear housing of the hoist.

Power Supply and Electrical Connections

To insure proper operation and avoid damage to hoist and electrical system observe the following before connecting power cord to the appropriate power supply:

The hoist should be connected to a branch circuit of ample size to prevent excess voltage drop (see Table 5 for minimum operating voltages) and also comply with the requirements of the National Electrical Code and applicable local codes. The length of the branch circuit conductors and the starting current amperage of the various horsepower hoists should be given special consideration in determining the size of the branch circuit to which the hoist is connected to prevent excess voltage drop during the starting of the hoist.

It is recommended that the branch circuit protective device protecting the hoist and electrical circuit to the hoist have sufficient time delay to permit the motor to start and accelerate its load.

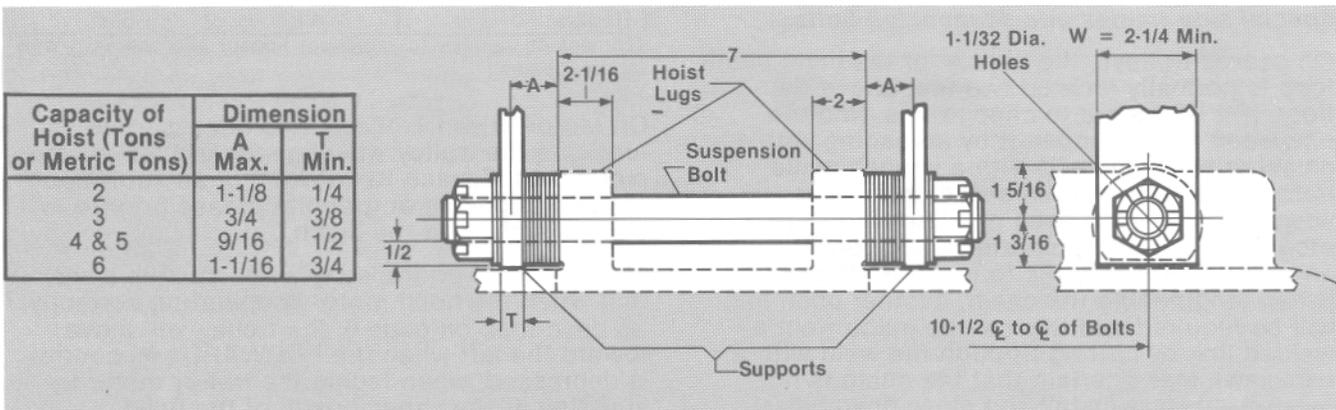
Since the motor in a three phase hoist can rotate in either direction, depending on the manner in which it is connected to the power supply, the direction of hook movement must be checked during the original installation and each time hoist is moved to a new location.

WARNING: Serious damage to the hoist can result if the hook is run to the upper or lower limit of travel with the hook operating in a direction opposite to that indicated by the control station.

Therefore, proceed as follows:

1. Make temporary connections at the power supply.
2. Operate UP (*) control in control station momentarily. If hook rises, connections are correct and can be made permanent.
3. If hook lowers, it is necessary to change direction by interchanging the Red lead (marked L2) and the Black lead (marked L3) of hoist power cord at power supply. Under no circumstances should the internal wiring of control station or hoist be changed to reverse hook direction. The wiring is inspected and tested before leaving the factory.

Table 4. Hoist Support Plate Dimensions



Checking for Adequate Voltage at Hoist

Take voltage readings at the hoist reversing contactor with hoist operating in the UP (*) direction with full load. Voltage readings that are below the minimums listed in Table 5 indicate that the circuit supplying power to the unit is undersized.

Table 5. Minimum Operating Voltages

Nominal Current	*Min. Voltage at Instant of Start	Minimum Operating Voltage
230-3-60	190	207
460-3-60	380	414

*The drop in voltage upon energizing the hoist should not be below the value listed.

Checking for Twist in Load Chain 4, 5, and 6 Ton Double Reeved Units

The best way to check for this condition is to run the lower hook, without a load, up to within about 2 feet of hoist. If the dead end of the chain has been properly installed, a twist can occur only if the lower hook block has been capsized between the strands of chain. Reverse capsize to remove twist.

Checking Limit Switch Operation

Operate hoist over the entire length of its rated lift, checking upper and lower limit switches for correct operation as follows:

1. Press UP (*) control and raise the lower hook until top of hook is about one foot below the hoist.
2. Cautiously continue raising the hook until the upper limit switch stops the upward motion. The upper limit switch is set at the factory to stop the hook block 3 inches from bottom of hoist.
3. If adjustment is necessary, see page 11.

CAUTION: As with any power hoist, the hook block must not be allowed to run into the bottom of hoist or allow the chain to become taut between loose end screw and frame or serious damage will result.

4. Press DOWN (i) control and cautiously lower hook until lower limit switch stops the downward motion. From 11 to 15 chain links should be between the loose end link and the hoist entry.
5. If adjustment is necessary, see page 11.

Chain Container

All hoists are supplied with a chain container. The chain container is packed loose and it should be attached to the hoist as follows.

Remove loose end screw (A), lockwasher (B) and plain washer (C) from hoist. These items are not required for installation of chain container. See Figure 2. Insert loose end of chain through channel in chain container chute (D) and into chain container (N). (Parts D through N are included with chain container.) Place washer (E) on the longest 3/8 inch screw (F). Now place the end links (G) of the two

longer chains on this same screw and then washer (H). Insert screw (F) through chain chute (D) into the loose end screw hole and tighten. Place washer (J) on the remaining 3/8 inch screw (K), insert screw through slot in chain chute (D) into the hole in the stripper and tighten. Place the end link (L) between the ears on the chain chute (D) and secure with the bolt and nut (M).

NOTE: The above applies to installing the chain container on single reeved (2 and 3 ton) hoists -with up to 100 feet of lift and double reeved (4, 5 and 6 ton) hoists with up to 50 feet of lift. For the chain container for lifts greater than these, auxiliary supports are provided and a separate installation instruction sheet is packed with the chain container.

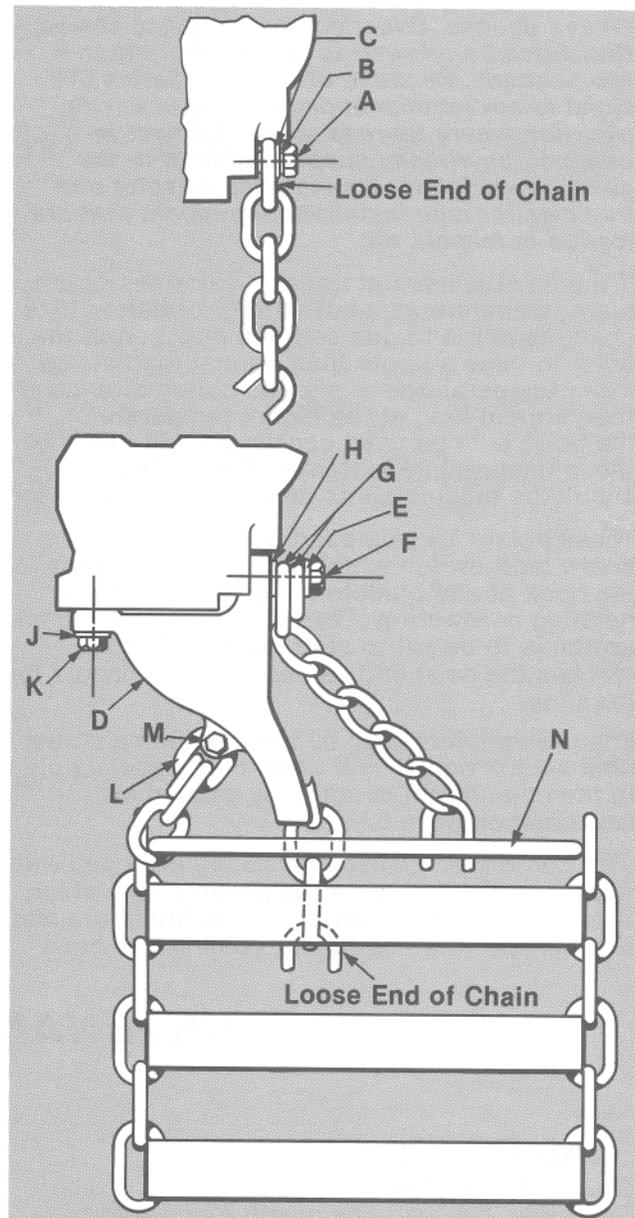


Figure 2. Chain Container Installation

CAUTION: The Chain Container furnished by CM is engineered and designed for use with a Series 670 hoist of specific size and lift. Hoist malfunction and damage to the unit can occur if other than properly engineered Chain Container is used.

OPERATION

1. The CM Series 670 Protector is designed to allow the second reduction gear to slip on an excessive overload. An overload is indicated when the hoist will not raise the load. Should this occur, immediately release the UP (*) control to stop the operation of the hoist. At this point, the load should be reduced to the rated hoist capacity or the hoist should be replaced with one of the proper capacity. When the excessive load is removed, normal hoist operation is automatically restored.

CAUTION: The Protector is susceptible to overheating and wear when slipped for extended periods. Under no circumstance should the clutch be allowed to slip for more than a few seconds. Because of this, the Series 670 Hoist is not recommended for use in any application where there is a possibility of increasing an already suspended load to the point of overload. This includes elevator and dumbwaiter type installation, hoppers that are loaded in mid-air, etc.

If the hoist is used at unusual extremes of ambient temperatures, above 150°F or below 15°F, changes to the torque settings may permit the hoist to raise a larger than normal load at the lower temperatures or slip the clutch at a lower than normal load at the higher temperatures. If the hoist is to be used consistently at either of these temperature extremes, the Protector should be readjusted as described on page 11.

2. These hoists are equipped with an adjustable screw limit switch which automatically stops the hook at any predetermined point in either hoisting or lowering. The adjustable screw limit switch is to be set to stop the hook before it reaches the hoist and as described on page 7 for lowering.
The protection offered by the adjustable screw limit switch only exists when the power supply to the hoist motor is correctly phased as described on page 6.
3. The 7.512.5 H.P., 2 speed hoists are **equipped with thermostatically controlled cooling fans which energize at a preset shroud air temperature and de-energize when sufficient cooling has been**

achieved. Since the cooling fans are controlled by the thermostat, they may not run when the hoist is operating or they may continue to run after hoist operation has stopped.

4. The hoist and trolley motors are equipped with thermal switches that interrupt the "up" side of the control circuit when either motor exceeds its safe operating temperature. If one of these switches should open while a load is suspended from the hoist, the hook may be lowered and the trolley may be moved in either direction to remove the load. Further hoisting is prevented until the switch automatically resets when the overheated motor has cooled sufficiently to resume operation. This takes approximately one hour under normal conditions.

Since the trolley motor thermal switch is in the hoist control circuit, the trolley can be operated while its motor is overheated. Therefore, to reduce the possibility of trolley motor burn-out, only move the trolley enough to allow the load to be removed from the hoist.

5. The control station used on the two speed hoist is similar to the single speed unit, except that either of two definite speeds may be selected by the operator in both hoisting and lowering. Each control, when partially depressed, provides slow speed and when fully depressed, gives fast speed, while full release allows hoist to stop. Rated lifting speeds are shown on hoist identification plate. Slow speed is intended as a means of carefully controlling or "spotting" the load, although the hoist may be operated solely at this speed for a short period of time if desired. It is not necessary to operate in the slow speed position as the hoist will pick up a capacity load at fast speed from a standing start. It is not necessary to hesitate at the slow position when moving control from Stop to Fast position or vice versa.
6. If material being handled must be immersed in water, pickling baths, any liquid or dusty or loose solids, use a sling chain of ample length so that the hook is always above the surface. Bearings in the hook block are shielded only against ordinary atmospheric conditions.

MAINTENANCE AND CARE

LOAD CHAIN

Cleaning and Inspection

First clean the load chain with a non-acid or non-caustic type solvent. Then slack the chain and make a link-by-link inspection for nicks, gouges, twisted links and excessive wear or stretching. Chain should be gaged throughout its entire length and replaced if beyond serviceable limits.

CAUTION: There is no safe substitute for CM Hoistaloy load chain because of size requirements and physical properties. These chains are specially heat treated and hardened and should always be returned to the factory for repair. Before returning a chain to service, lubricate liberally with Lubriplate, Bar and Chain Oil 10-R (Fiske Bros. Refining Co.) or equal lubricant. Remove excess lubricant from the chain by wiping with a cloth.

Gaging Load Chain Wear

To determine if load chain should be continued in service, check gage lengths as indicated in Figure 3. Chain worn beyond length indicated, nicked, gouged or twisted should be replaced before returning hoist to service. Chain should be clean, free of twists and pulled taut before measuring.

Note that worn chain can be an indication of worn hoist components. For this reason, the hoist's chain guides, hook blocks and liftwheel should be examined for wear and replaced as necessary when replacing worn chain.

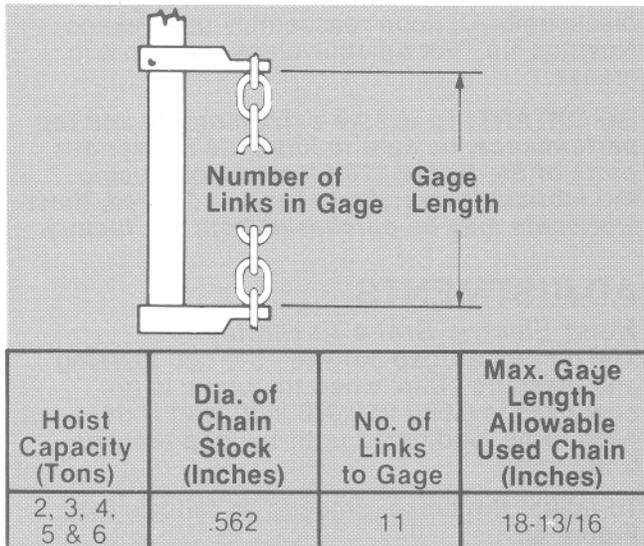


Figure 3. Gaging Load Chain

Cutting Chains CM Hoistalloy load chain is hardened and is difficult to cut. However, the following methods are recommended when cutting a length of new chain from stock or cutting off a length of worn chain.

1. Use a 7 inch minimum diameter by 1/8 inch thick abrasive wheel (of type recommended by wheel supplier) that will clear adjacent links.
2. Use a grinder and nick the link on both sides (Figure 4). Then secure the link in a vise and break off with a hammer.

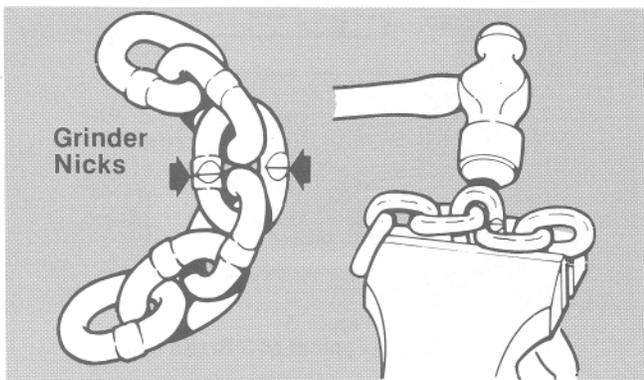


Figure 4. Cutting Chain by Nicking

3. An acetylene cutting torch can be used. The flame must clear adjacent links so as not to destroy the hardness properties.

HOOKS

Hooks damaged from chemicals, deformations or cracks, or that have more than a 10 degree twist from the plane of the unbent hook or excessive throat opening or seat wear must be replaced. See Figure 5 for hook inspection.

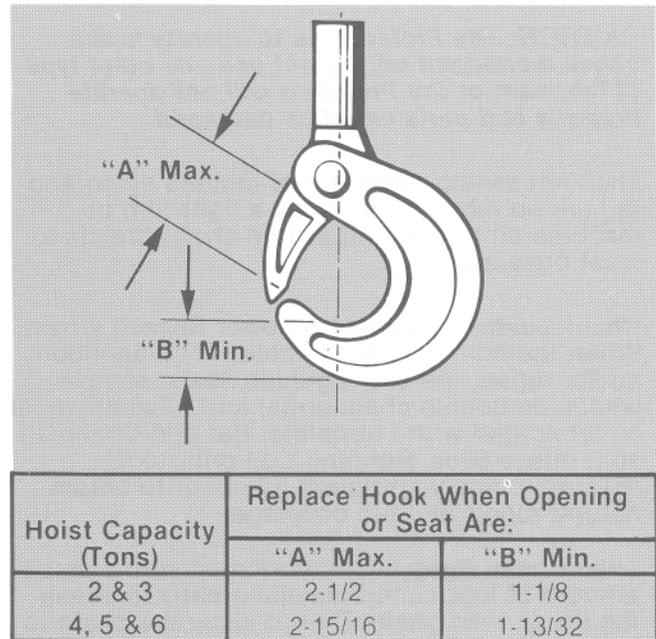


Figure 5. Hook Inspection

A twisted hook or one with excessive throat opening is an indication of abuse or overloading of the unit. Other load sustaining components of the hoist should be inspected for damage.

HOIST ELECTRIC BRAKE

It is recommended that the brake be periodically disassembled to check the friction lining and friction surfaces for wear, scoring and warpage. To do this, disconnect the hoist from the power supply and remove the motor cover and shroud. Disconnect the brake coil (670-226) leads from the rectifier and reversing contactor. Back-off brake nuts and remove the coil housing (670-212). Remove the brake springs (670-19) and the pressure plate (670-155). Remove the brake discs (670-17) and the intermediate plates (670-16). Examine the friction surfaces of the pressure plate, intermediate plates and friction discs for wear, scoring or warpage. Replace any parts that are worn or damaged from excessive scoring or warpage. Also, check the teeth on the brake hub (670-43) and brake discs (670-17) for wear and replace parts that are worn. Reassemble the brake components and then adjust the air gap per the instructions on page 10.

LUBRICATION

Hoist Lubrication

Gears. Check oil level in gear housing at least once a month, maintaining it at the bottom of oil level hole in gear cover.

Drain housing every 2-3 years and refill with two gallons of hydraulic and transmission oil which conforms to John Deere Specification J14 B dated July, 1970, available from various oil companies (Kendall, Texaco, Quaker State, BP).

CAUTION: The Protector is to operate in the above mentioned oil. Do not use any other type of lubricant or the Protector will not operate properly and parts could be damaged.

The limit switch gears are of molded nylon and require no lubrication. Apply a light film of machine oil to the limit switch shaft threads at least once a year.

Chain Guides, Liftwheel & Lower Sheave Wheel.

When the hoist is disassembled for inspection and/or repair, the chain guides, lower sheave wheel (on double chain units) and liftwheel must be lubricated with Lubricate, Bar and Chain Oil 10-R (Fiske Bros. Refining Co.) prior to reassembly. Apply sufficient lubricant to obtain natural runoff and full coverage.

Load Chain. Keep chain lubricated with a small amount of lubricant. This will greatly increase the life of load chain. Do not allow the chain to run dry.

Keep it clean and lubricate at regular intervals with Lubricate, Bar and Chain Oil 10-R (Fiske Bros. Refining Co.) or equal lubricant. Normally, weekly lubrication and cleaning is satisfactory, but under hot and dirty conditions, it may be necessary to clean the chain at least once a day and lubricate it several times between cleanings. When lubricating the chain, apply sufficient lubricant to coverage.

Bearings. All bearings except the lower hook thrust bearings are pre-lubricated or are in an oil bath and need no lubrication. The lower hook thrust bearing should be lubricated at least once a month with heavy-duty machine oil.

Miscellaneous. If the liftwheel is removed from the unit, the spline should be coated with an EP type grease (such as Evans Products Co. AntiScoring Extreme Pressure Lub. No. 3) before it is reassembled into the unit. If the lower hook block or energy absorption system is disassembled, coat the disc springs with extreme pressure molybdenum disulfide paste (Dow Corning Molykote Gn or equal) before it is reassembled.

Trolley Lubrication

Trackwheel bearings are pre-lubricated and require no lubrication.

Geared Trolley. Once a month lubricate trackwheel gears with Texaco Novatex No. 2 or an equivalent heavy cup grease or graphite grease.

Every six months lubricate handwheel shaft bearings with 3-in-1 or light machine oil.

Motor Driven Trolley. Once a month lubricate trackwheel gears with Texaco Novatex No. 2 or an equivalent heavy cup grease or graphite grease.

The motor bearings and reduction gears require no additional lubrication. However, if gears are disassembled, upon reassembly use Texaco Novatex No. 1 or an equivalent medium cup grease.

IMPORTANT: To assure extra long life and top performance, be sure to lubricate the various parts of the Series 670 Electric Hoist using the lubricants specified above. If desired, these lubricants may be purchased from the factory.

ADJUSTMENTS

Hoist Electric Brake Assembly

The correct air gap between the coil housing and pressure plate, when the brake is not energized is 0.060 to 0.070 inch, and it does not need to be readjusted until the gap reaches 0.187 inch.

To adjust the brake, proceed as follows (see Figure 6):

1. Remove any load from the lower hook of the hoist and disconnect the hoist from the power supply.
2. Remove motor cover.
3. Adjust the air gap by turning the brake nut clockwise until there is a uniform gap of 0.060 to 0.070 inch between the coil housing and pressure plate. The air gap should be gaged at three locations near the brake studs.

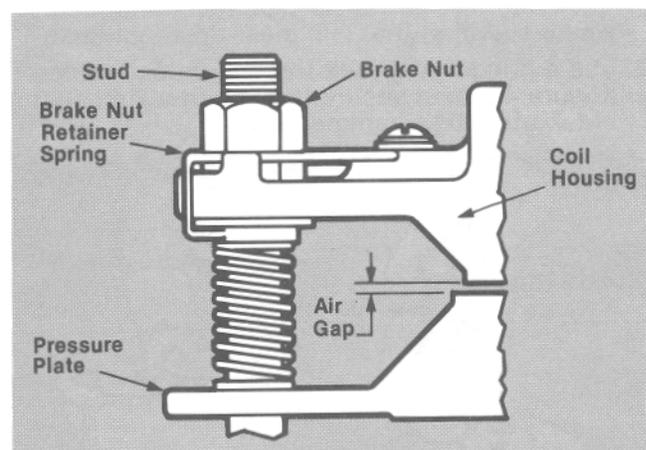


Figure 6
Brake Air Gap—Typical at 3 Brake Studs

NOTE: It is not necessary to remove the brake nut retainer springs to adjust the air gap. After the correct air gap is obtained, it may be necessary to rotate the brake nut so that the sides of the retainer spring engage the flats on the nut.

- After the correct air gap is obtained, the space between the button of the cutout switch (670-247) and the head of the cutout actuator screw must be checked. To do this, measure the air gap between the pressure plate and coil housing at the brake stud nearest the cutout switch (Figure 7). Subtract 0.030 inch from the measured air gap, and this should be the space between the button of the cutout switch and the head of the screw. If the cutout switch space is other than the measured air gap less 0.030 inch, loosen the locknut on the pressure plate and rotate the screw until the proper space is obtained. Lock the screw in this position by tightening the locknut against the pressure plate (Figure 7).
- Replace the motor cover, reconnect the hoist to the power supply and check operation,

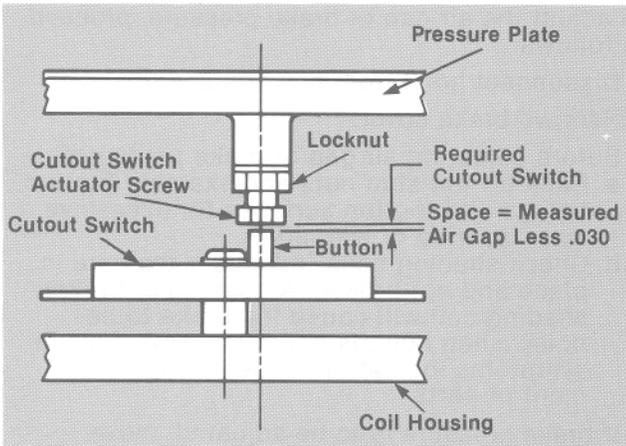


Figure 7
Cutout Switch Actuator Screw Adjustment

Protector

The Protector is adjusted at the factory so that the hoist will refuse to lift approximately 140% of its rated capacity. If the periodic inspections indicate that the Protector is slipping at other than 140% of rated hoist capacity, the device can be adjusted as follows:

- Attach the lower hook to a load of 140% of rated hoist capacity or a dynamometer (scale) attached to a "dead load" (Table 6).

Table 6. Protector Slip Point

Hoist Capacity (Tons)	Slip Point of Protector (Pounds)
2	5,600
3	8,400
4	11,200
5	14,000
6	16,800

- Energize hoist *in tire JP* (4) direction anti determine if setting is greater or less than 140% of rated capacity.
- Remove adjusting access cover and install adjusting tool (furnished with hoist). The shaft portion of the adjusting tool engages a hole in the main frame, and the teeth of the adjusting tool must engage the teeth of the Protector.

- Adjust slip point of the clutch by turning the nut portion of the adjusting tool. If slip point is greater than 140% of rated hoist capacity, turn adjusting tool clockwise to decrease. If slip point is less than 140% of rated hoist capacity, turn adjusting tool counterclockwise.
- Remove the adjusting tool, re-install access cover and operate hoist in UP (*) direction to check the slip point of the Protector. If necessary, repeat step 4 until the proper slip point is reached.

NOTE: The adjusting tool must be removed while the hoist is in operation or serious damage to the hoist gears and/or Protector could result.

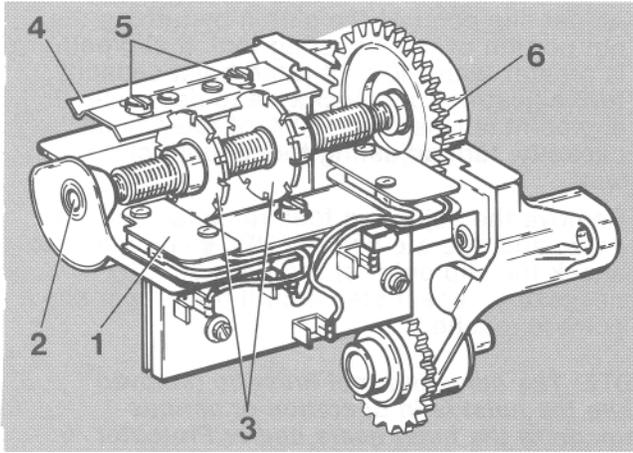
CAUTION: Under no circumstances should the slip point of the Protector be adjusted to exceed 140% of rated hoist capacity. Doing so would allow an excessive overload to be applied to the hoist that may cause immediate failure of some load carrying part or create a defect causing subsequent failure at less than rated capacity.

Adjusting Fan Thermostat (2 Speed Hoists with 7.5/2.5 HP Motors) Cooling fans are controlled by a thermostat which energizes at a preset shroud air temperature and de-energizes when cooling has been completed. The thermostat should be adjusted to energize fans at 130°F.

Adjustable Screw Limit Switch Setting Adjustable Screw Limit Switch: For safe operation, the upper screw limit switch should be adjusted to stop the hoist when the hook block is three inches below the bottom of the hoist on units without energy absorption system or 16 1/2 inches on units with energy absorption system. The lower screw limit switch should be adjusted to stop the hoist when from 11 to 15 chain links are remaining between the loose end link and the hoist entry.

If limit switch operation has been checked as described on page 7 and is not operating correctly or is not automatically stopping the hook at a desired position, proceed as follows:

- Disconnect hoist from power supply.
- Remove shroud access cover.
- Upper and lower limit switches are identified on the fiber insulator.
- Loosen the screws to permit guide plate to be moved out of engagement with the traveling nuts (Figure 8).
- Reconnect hoist to power supply.
- Run hook to the desired upper or lower position, cautiously operating the hoist without load.
- Disconnect hoist from power supply.
- Moving one travel nut toward the other increases hook travel and away from the other decreases the travel. To adjust the upper limit, turn the nut nearest the switch in-



1. Limit switch sub-assy
2. Limit switch shaft
3. Traveling nuts
4. Guide plate
5. Screws
6. Gear Train

Figure 8. Adjustable Screw Limit Switch

- icated as "Upper Limit Switch". To adjust the lower limit, turn the nut nearest the switch marked "Lower Limit Switch". Turn the desired nut until it just breaks the limit switch contacts. An audible click will be heard as the switch opens. Continue to rotate the nut toward the switch an additional two full teeth.
9. Reposition the guide plate in the next slot and securely tighten screws.
 10. Reconnect hoist to power supply and check the stopping point of the hook by first moving the hook about 10 inches away from the desired stopping point. Then move the hook towards the desired stopping point by jogging cautiously until the limit switch stops the motion. If the stopping point is not the desired position, repeat the above instructions.
 11. Double check the adjustment by moving the hook about 2 feet from the desired stopping point and then run the hook into the limit with the control held in the fully depressed position.
 12. Fine adjustment of the screw limits setting may be obtained by inverting the guide plate. The offset on the plate gives adjustments equivalent to 1/2 notch (see Table 7). When inverting the plate, it may be necessary to use the notch adjacent to the one used in the preliminary setting.

**Table 7.
Hook Travel Per Notch of Limit Switch Nut**

Hoist Capacity (Tons)	Single Reduction Unit		Double Reduction Unit	
	Length of Max. Lift (Ft.)	Hook Travel per Notch (In.)	Length of Max. Lift (Ft.)	Hook Travel per Notch (In.)
2 & 3	47'0"	3/4	127'	2
4, 5 & 6	23'6"	3/8	63'	1

Trolley Electric Brake Assembly (Optional Accessory)

The stopping distance of the Motor Driven Trolley equipped with an electric brake can be increased or decreased by adjusting the brake pressure. To increase brake pressure, and thereby decrease stopping distance, move the brake spacer washers progressively from the nut side of the brake field plate to the spring side. To decrease brake pressure, and thereby increase the stopping distance, move the washers in an opposite manner. Both studs must have the same number of washers on the spring side of the brake field plate, and the air gap between the field and armature must set at 0.025 inch.

The correct air gap between armature and field, when the brake is not energized, is 0.025 inch and need not be adjusted until the gap reaches 0.045 inch.

To adjust the air gap or brake pressure, proceed as follows:

1. Disconnect hoist from power supply.
2. Remove brake cover.
3. Before adjusting air gap or brake pressure: a. Back off the stud nuts and examine friction linings and friction surfaces for excessive wear, scoring or warpage. b. Check shading coils to be sure they are in place and not broken. A missing or broken shading coil will cause the brake to be noisy when hoist is operated. Any of these symptoms indicate the need for replacement of parts.
4. If brake pressure is to be adjusted, move brake spacer washer to the desired side of the brake field plate to increase or decrease pressure as indicated above.
5. After spacer washers are positioned, turn adjusting nuts clockwise gaging the air gap at both ends.
6. Replace brake cover, reconnect the power and check operation. If the stopping distance of the trolley is not as desired, repeat the above.

ELECTRICAL DATA

Open circuits in the coils of electrical components may be detected by isolating the coil and checking for continuity with an ohmmeter or with the component in series with a light or bell circuit. Shorted turns are indicated by a current draw substantially above normal (connect ammeter in series with suspected element and impose normal voltage) or DC resistance substantially below normal. The current method is recommended for coils with very low DC resistance. Motor current draw in the stator should be measured with the motor running. Brake and contractor coil current should be measured with the core iron in operating position.

Table 8 provides the electrical data for the motors, transformer and coils. Typical wiring diagrams are shown in Figures 9-12.

Table 8. Electrical Resistance Data

TRANSFORMER		
Voltage	Leads	*D.C. Resistance (Ohms)
230/460 to 115	16-17	40
	18-19	40
	R-R	30
440/380/220 to 48	BR-BR	30
	R-R	1.5
	BR-BR	18
	16-17	8.1
380 to 230	16-18	33
	16-19	41
	B-B	50
575 to 230	R-R	30
	B-B	50
	R-R	30

CONTACTOR COIL			
Type Contactor	Voltage	Normal Current (Amps)	*D.C. Resistance (Ohms)
Hoist Reversing	115	0.12	123
Hoist Speed Selecting	115	0.12	61
Trolley Reversing (Type SD)	115	0.12	132
Trolley Reversing (Type D)	120	0.23	81
Hoist Reversing (Type D)**	48	0.051	19
Hoist Speed Selecting	48	0.051	20
Trolley Reversing (Type SD)	48	0.051	15

FAN MOTOR		
Voltage-Phase Hertz	Full Load Current (Amps)	*D.C. Resistance (Ohms)
230-3-60	.12	595

BRAKE COIL		
Voltage	Normal Current (Amps)	*D.C. Resistance (Ohms)
115, D.C.	0.29	12.2

TROLLEY MOTORS						
Volts-Phase Hertz	H.P.	R.P.M. (Syn.)	Current (Amps)		Lead No.	*D.C. Resistance (Ohms)
			Start	Full Load		
230/460-3-60 and 220/380-3-50	1/2	1200 at 60 Hz.	7.3/3.7	2.0/1.0	<i>New</i> T1-T4 T2-T5 T3-T6 T7-T8 T7-T9 T8-T9	15.5
						15.5
						15.5
						31.0
						31.0
						31.0
230/460-3-60 and 220/380-3-50	1/2	600 at 60 Hz.	7.2/3.6	3.0/2.0	T1-T4 T2-T5 T3-T6 T7-T8 T7-T9 T8-T9	16.3
						16.3
						16.3
						32.6
						32.6
						32.6
575-3-60	1/2	1200	2.9	0.8	T1-T2 T1-T3 T2-T3	102.2
						102.2
						102.2
575-3-60	1/2	600	2.9	1.6	T1-T2 T1-T3 T2-T3	86.3
						86.3
						86.3

HOIST MOTORS						
Volts-Phase Hertz	H.P.	R.P.M. (Syn.)	Current (Amps)		Lead No.	*D.C. Resistance (Ohms)
			Start	Full Load		
230/460-3-60 and 220/380-3-50	3	1800 at 60 Hz.	57.2/28.6	15.6/7.8	T1-T4 T2-T5 T3-T6 T7-T8 T7-T9 T8-T9	0.8
						0.8
						0.8
						1.5
						1.5
						1.5
230/460-3-60 and 220/380-3-50	3	3600 at 60 Hz.	94/47	12/6	T1-T4 T2-T5 T3-T6 T7-T8 T7-T9 T8-T9	0.7
						0.7
						0.7
						1.4
						1.4
						1.4
575-3-60	3	1800	22.9	6.3	T1-T2 T1-T3 T2-T3	4.8
						4.8
						4.8
575-3-60	3	3600	35.6	5.1	T1-T2 T1-T3 T2-T3	4.2
						4.2
						4.2

*Resistance values listed are nominal and they may vary slightly from motor to motor or component to component. -Supplied on separate motor driven trolley.

†With motor running at full load and hoist operating in the up direction.

HOIST MOTORS (CONT.)

Volts-Phase Hertz	H.P.	R.P.M. (Syn.)	†Current (Amps)		Lead No.	*D.C. Resistance (Ohms)	
			Start	Full Load			
230/460-3-60 and 220/380-3-50	5	1800 at 60 Hz	82/41	19/9.5	<i>NEW</i> T1-T4	0.5	
						T2-T5	0.5
						T3-T6	0.5
						T7-T8	0.9
						T7-T9	0.9
230/460-3-60 and 220/280-3-50	5	3600 at 60 Hz	92/46	18/9	T1-T4	0.5	
						T2-T5	0.5
						T3-T6	0.5
						T7-T8	1.0
						T7-T9	1.0
575-3-60	5	1800	34.3	7.6	T1-T2	2.8	
						T1-T3	2.8
						T2-T3	2.8
575-3-60	5	3600	47.5	7.1	T1-T2	3.2	
						T1-T3	3.2
						T2-T3	3.2
230/460-3-60 and 220/380-3-50	7.5	1800 at 60 Hz	115/57.5	24/12	T1-T4	0.3	
						T2-T5	0.3
						T3-T6	0.3
						T7-T8	0.7
						T7-T9	0.7
230/460-3-60 and 220/380-3-50	7.5	3600 at 60 Hz	120/60	22/11	T1-T4	0.4	
						T2-T5	0.4
						T3-T6	0.4
						T7-T8	0.8
						T7-T9	0.8
575-3-60	7.5	1800	43.4	10	T1-T2	2.2	
						T1-T3	2.2
						T2-T3	2.2
575-3-60	7.5	3600	60.4	8.8	T1-T2	2.4	
						T1-T3	2.4
						T2-T3	2.4
230-3-60 and 220-3-50	3/1	1800/600 at 60 Hz	53/14	15/9	T1-T2	4.4	
						T1-T3	4.4
						T2-T3	4.4
						T11-T12	1.3
						T11-T13	1.3
230-3-60 and 220-3-50	3/.375	3600/450 at 60 Hz	14.4/6.6	96/9.6	T1-T2	5.9	
						T1-T3	5.9
						T2-T3	5.9
						T11-T12	0.7
						T11-T13	0.7
460-3-60 and 380-3-50	3/1	1800/600 at 60 Hz	27/6.7	7.5/4.2	T1-T2	18.7	
						T1-T3	18.7
						T2-T3	18.7
						T11-T12	4.9
						T11-T13	4.9
460-3-60 and 380-3-50	3/.375	3600/450 at 60 Hz	48/4.8	7.2/3.3	T1-T2	23.8	
						T1-T3	23.8
						T2-T3	23.8
						T11-T12	2.6
						T11-T13	2.6
575-3-60	3/1	1800/600	21.4/5.5	6/3.5	T1-T2	28.1	
						T1-T3	28.1
						T2-T3	28.1
						T11-T12	8.0
						T11-T13	8.0
575-3-60	3/.375	3600/450	36.7/3.7	5.5/2.5	T1-T2	36.4	
						T1-T3	36.4
						T2-T3	36.4
						T11-T12	3.7
						T11-T13	3.7
					T12-T13	3.7	

HOIST MOTORS (CONT.)

Volts-Phase Hertz	H.P.	R.P.M. (Syn.)	†Current (Amps)		Lead No.	*D.C. Resistance (Ohms)
			Start	Full Load		
230-3-60 and 220-3-50	5/1.67	1800/600 at 60 Hz	69/21	19.5/11.5	T1-T2	3.0
					T1-T3	3.0
					T2-T3	3.0
					T11-T12	0.7
					T11-T13	0.7
					T12-T13	0.7
230-3-60 and 220-3-50	5/1.625	3600/450 at 60 Hz	94/10	18/6.4	T1-T2	5.3
					T1-T3	5.3
					T2-T3	5.3
					T11-T12	0.7
					T11-T13	0.7
					T12-T13	0.7
460-3-60 and 380-3-50	5/1.67	1800/600 at 60 Hz	37/12.5	9.7/5.7	T1-T2	10.2
					T1-T3	10.2
					T2-T3	10.2
					T11-T12	3.0
					T11-T13	3.0
					T12-T13	3.0
460-3-60 and 380-3-50	5/1.625	3600/450 at 60 Hz	47/5.0	9/3.2	T1-T2	22.7
					T1-T3	22.7
					T2-T3	22.7
					T11-T12	2.7
					T11-T13	2.7
					T12-T13	2.7
575-3-60	5/1.67	1800/600	26.3/8.6	7.7/5.0	T1-T2	18.2
					T1-T3	18.2
					T2-T3	18.2
					T11-T12	4.8
					T11-T13	4.8
					T12-T13	4.8
575-3-60	5/1.625	3600/450	35.7/3.9	6.9/2.4	T1-T2	32.9
					T1-T3	32.9
					T2-T3	32.9
					T11-T12	4.0
					T11-T13	4.0
					T12-T13	4.0
230-3-60 and 220-3-50	7.5/2.5	1800/600 at 60 Hz	106/32	23.3/16.9	T1-T2	2.1
					T1-T3	2.1
					T2-T3	2.1
					T11-T12	0.6
					T11-T13	0.6
					T12-T13	0.6
230-3-60 and 220-3-50	7.5/1.94	3600/450 at 60 Hz	124/13.4	24/8.2	T1-T2	4.3
					T1-T3	4.3
					T2-T3	4.3
					T11-T12	0.5
					T11-T13	0.5
					T12-T13	0.5
460-3-60 and 380-3-50	7.5/2.5	1800/600 at 60 Hz	53/14	12.5/7.5	T1-T2	9.7
					T1-T3	9.7
					T2-T3	9.7
					T11-T12	1.8
					T11-T13	1.8
					T12-T13	1.8
460-3-60 and 380-3-50	7.5/1.94	3600/450 at 60 Hz	62/6.7	12/4.1	T1-T2	17.3
					T1-T3	17.3
					T2-T3	17.3
					T11-T12	1.9
					T11-T13	1.9
					T12-T13	1.9
575-3-60	7.5/2.5	1800/600	48/12	10/6.4	T1-T2	12.4
					T1-T3	12.4
					T2-T3	12.4
					T11-T12	3.2
					T11-T13	3.2
					T12-T13	3.2
575-3-60	7.5/1.94	3600/450	49/5.1	9.2/3.1	T1-T2	25.8
					T1-T3	25.8
					T2-T3	25.8
					T11-T12	2.9
					T11-T13	2.9
					T12-T13	2.9

TESTING

Prior to initial use, all hoists in which the load sustaining parts have been altered, replaced or repaired, or hoists that have not been used within the preceding 12 months should be tested by or under the direction of an appointed person and a record of the test should be made. The test should consist of operating the hoist in the hoisting and lowering directions to check the operation of the unit, that the brake holds when the control is released and the upper limit switch stops the operation at the upper limit of the lift. On two speed units, the tests are to be conducted in slow and fast speed. If practical, the trip setting of the upper limit switch should be conducted by hand.

Test the unit first in the unloaded state and then with a light load of 50 pounds times the number of parts of load chain. After it is assured that the unit is operating properly, test the hoist with a rated capacity load. After the rated load test, the function of the overload device is to be tested. The overload device should allow lifting a rated capacity load, reversing a descending rated capacity load, and it should prohibit the lifting of a load 140% of rated load capacity. If the overload device is not functioning properly, it should be adjusted as described on page 11.

NOTE: For additional information on inspection and testing, refer to the current issue of ANSI B30.16 "Overhead Hoists" obtainable from American National Standards Institute, 1430 Broadway, New York, N.Y. 10018, U.S.A.

NOTE: Wiring diagrams shown are representative.

Consult diagram in hoist or furnished with unit.

Figure 9.
Wiring Diagram,
Single Speed Hoist

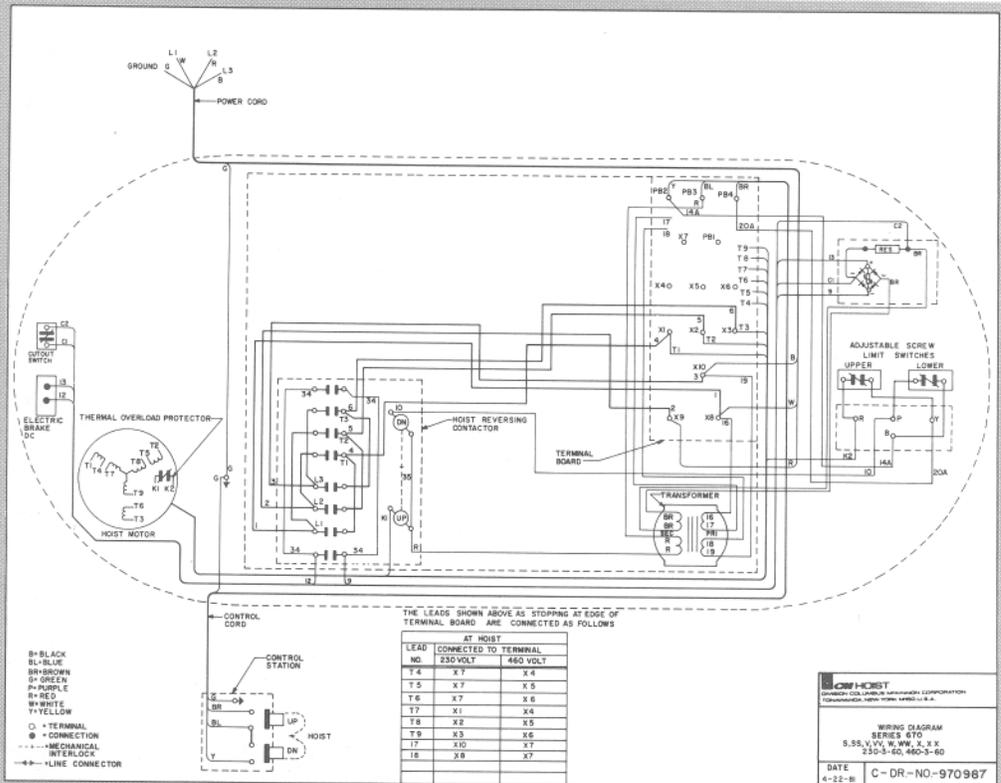
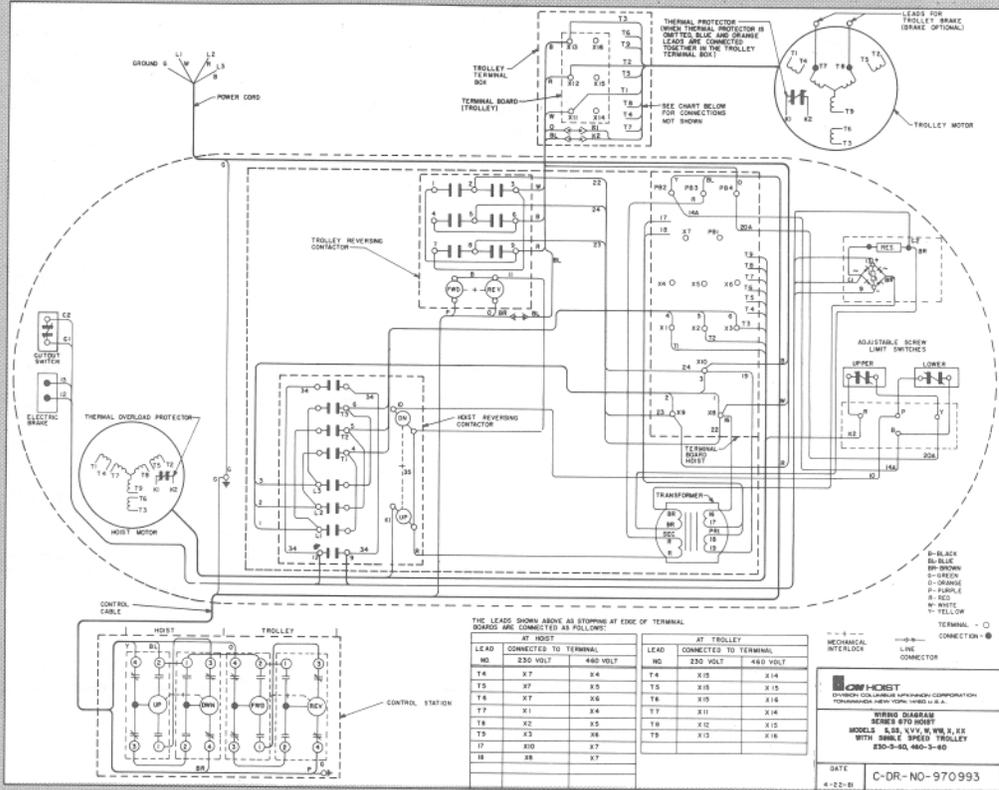


Figure 10.
Wiring Diagram, Single Speed
Hoist with Motor Driven Trolley



NOTE: Wiring diagrams shown are representative. Consult diagram in hoist or furnished with unit.

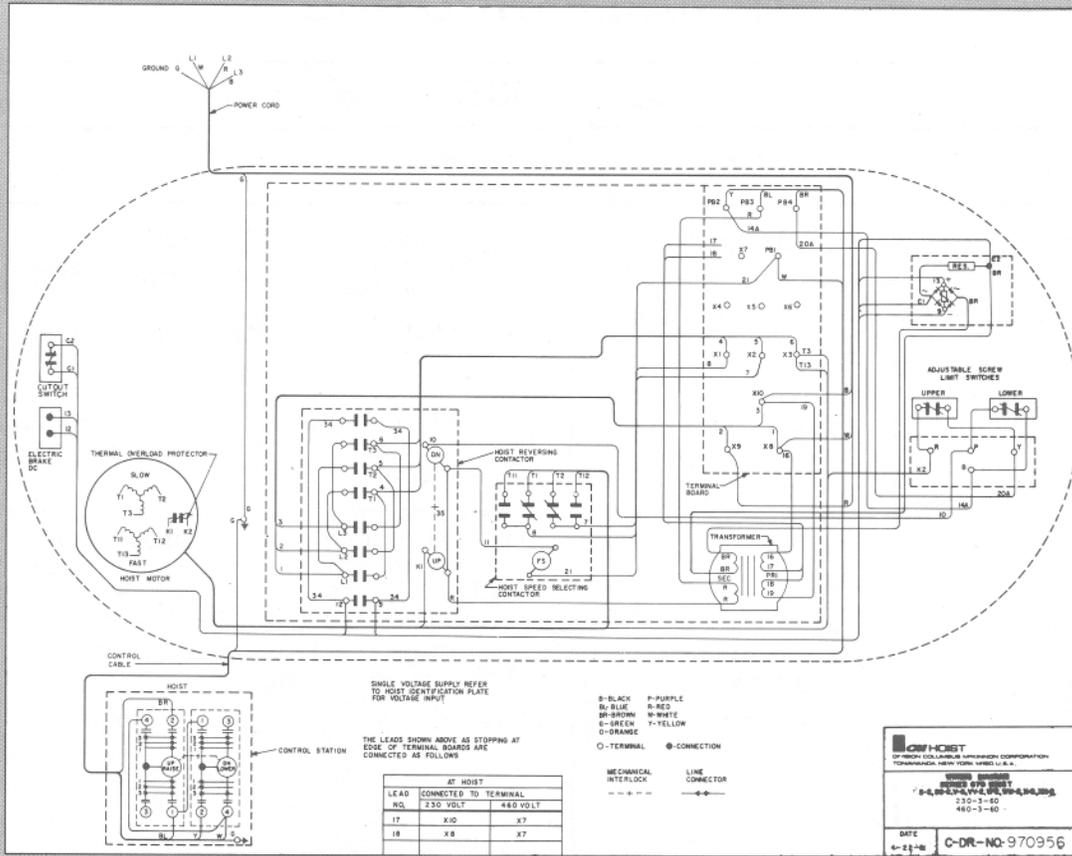


Figure 11. Wiring Diagram, Two Speed Hoist

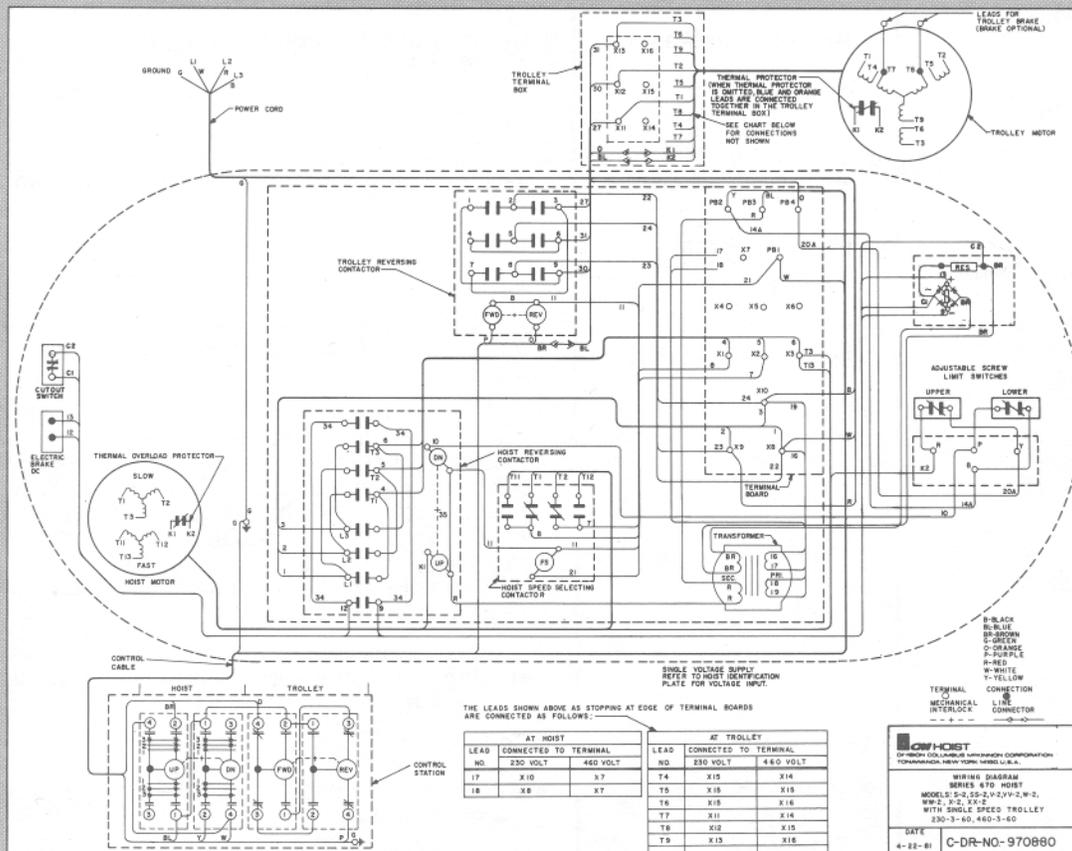


Figure 12. Wiring Diagram, Two Speed Hoist with Motor Driven Trolley

TROUBLESHOOTING

ALL HOISTS								
PROBLEM	CAUSE MAY BE	REMEDY						
1) Hook does not raise or lower	a) No voltage at hoist b) Phase failure (Single phasing) c) Open control circuit d) Wrong voltage or frequency e) Low voltage	a) Main line or branch circuit switch open; branch line fuse blown or circuit breaker tripped. Close, replace or reset. Grounded or faulty connection in supply lines or current collectors. b) Open circuit, grounded or faulty connection in one line of supply system, collectors, hoist wiring, reversing contactor, motor leads or windings. Check for electrical continuity. c) Open or shorted winding in transformer or reversing contactor coil; loose connection or broken wire in circuit; mechanical binding in contactor; control station contacts not making. Check continuity and repair or replace malfunctioning parts. d) The voltage and frequency must be the same as shown on hoist identification plate. e) Read voltage at the hoist terminal board while operating hoist in UP (▲) direction with full load. Reading should be as follows: <table style="margin-left: auto; margin-right: auto; border: none;"> <thead> <tr> <th style="text-align: center; padding: 2px;">UNIT RATING</th> <th style="text-align: center; padding: 2px;">MINIMUM VOLTAGE</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;">230-3-60</td> <td style="text-align: center; padding: 2px;">207</td> </tr> <tr> <td style="text-align: center; padding: 2px;">460-3-60</td> <td style="text-align: center; padding: 2px;">414</td> </tr> </tbody> </table> Branch line overloaded. Install separate line to hoist or use proper wire size for branch line.	UNIT RATING	MINIMUM VOLTAGE	230-3-60	207	460-3-60	414
UNIT RATING	MINIMUM VOLTAGE							
230-3-60	207							
460-3-60	414							
2) Hook moves in wrong direction	f) Brake not releasing	f) Open or shorted coil winding; open wiring harness circuit. Check continuity and repair or replace defective part. Brake not properly adjusted. See page 10.						
3) Hook lowers but will not raise	g) Excessive load/ Protector slipping a) Phase reversal a) Excessive load/ Protector slipping b) Open hoisting circuit c) Phase failure d) Motor (hoist or trolley) overheated.	g) Reduce loading to the capacity limit of the hoist as indicated on the identification plate and capacity insert. a) See page 6. a) Reduce loading to the capacity limit of hoist as indicated on the identification plate and capacity insert. b) Open or malfunctioning parts in motor thermal switch. Switch automatically resets when motor has cooled sufficiently to resume operation (approximately one hour). Check continuity in the switch after motor has cooled and replace if it shows an open circuit. Open or shorted winding in reversing contactor coil; loose connection or broken wire in hoisting circuit; control station contacts not making. Check continuity and repair or replace malfunctioning part. Check operation of adjustable screw limit switch (page 7). c) See Item 1b. d) Allow motor to cool for approximately one hour, then retest. See Item 8.						

TROUBLESHOOTING (Cont.)

PROBLEM	CAUSE MAY BE	REMEDY
4) Hook raises but will not lower	a) Open lowering circuit	a) Open or shorted winding in reversing contactor coil; loose connection or broken wire in lowering circuit; control station contacts not making. Check continuity and repair or replace malfunctioning part. Check operation of adjustable screw limit switch (page 7).
5) Hook lowers when hoisting control is operated	a) Phase failure	a) See Item 1b.
6) Hook does not stop promptly	a) Brake slipping b) Excessive load	a) See page 10. b) Reduce loading to the capacity limit of hoist as indicated on the identification plate and capacity insert.
7) Hoist operates sluggishly	a) Excessive load b) Low voltage c) Phase failure or unbalanced current in the phases d) Brake dragging	a) See Item 6b. b) See Item 1e. c) See Item 1b. d) See page 10.
8) Motor overheats	a) Excessive load b) Low voltage c) Extreme external heating d) Frequent starting or reversing e) Phase failure f) Brake dragging	a) See Item 6b. b) See Item 1e. c) Above an ambient temperature of 104°F., the frequency of hoist operation must be limited to avoid overheating of motor. Special provisions should be made to ventilate the space or shield the hoist from radiation. d) Excessive inching, jogging or plugging should be avoided since this type of operation will drastically shorten the life of motor and contactor and cause excessive wear on the brake. e) See Item 1b. f) See page 10.
9) Hook fails to stop at either or both ends of travel	a) Limit switch shaft not rotating b) Traveling nuts not moving along shaft—guide plate loose; shaft or nut threads damaged c) Limit switches not opening circuit	a) Check for damaged limit switch gears and replace if damaged. b) Tighten guide plate screws. Replace malfunctioning part. c) Check switch connections, electrical continuity and mechanical operation. Check the switch adjustment as described on page 11. Check for a pinched wire.
10) Hook stopping point varies	a) Limit switch not holding adjustment b) Brake not holding	a) See Item 9b. b) See page 10.
11) Hoist will not operate at slow speed in either direction	a) Open circuit b) Phase failure	a) Open or shorted motor winding, loose or broken wire in circuit. Speed selecting contactor stuck in opposite speed mode. Replace motor, repair wire and/or repair speed selecting contactor. b) See Item 1b.

TROUBLESHOOTING (Cont.)

TWO SPEED HOIST		
PROBLEM	CAUSE MAY BE	REMEDY
12) Hoist will not operate at fast speed in either direction	<ul style="list-style-type: none"> a) Open circuit b) Open speed selecting—control circuit c) Phase failure 	<ul style="list-style-type: none"> a) See Item 11a. b) Open or shorted winding in speed selecting contactor coil. Loose connection or broken wire in circuit. Mechanical binding in contactor. Control station contacts not making or opening. c) See Item 1b.
13) Hook will not raise at slow speed	<ul style="list-style-type: none"> a) Excessive load/ Protector slipping b) Phase failure c) Open speed selecting—control circuit d) Brake not releasing e) Open hoisting circuit 	<ul style="list-style-type: none"> a) See Item 6b. b) See Item 1b. c) See Item 11a. d) See page 10. e) Open or defective motor thermal switch. Replace switch.
14) Hook will not lower at slow speed	<ul style="list-style-type: none"> a) Phase failure b) Open circuit c) Brake not releasing 	<ul style="list-style-type: none"> a) See Item 1b. b) See Item 11a. c) See page 10.
15) Hook will not raise at fast speed		<ul style="list-style-type: none"> a) See Items 13a, b, d, e & 11a.
16) Hook will not lower at fast speed		<ul style="list-style-type: none"> a) See Items 14a, c & 11a.
17) Hook moves in proper direction at one speed—wrong direction at other speed	<ul style="list-style-type: none"> a) Phase reversal 	<ul style="list-style-type: none"> a) Wiring reconnected improperly. Interchange two leads of motor windings that are out of phase at the speed selecting contactor.
18)*Motor overheats	<ul style="list-style-type: none"> a) Fan failure b) Fan thermostat failure c) Blocked fan inlet or outlet 	<ul style="list-style-type: none"> a) Check the operation of the fans and replace them if necessary b) Check the thermostat setting and operation. Lower the setting or replace if necessary. c) Remove or clean foreign material from openings.
MOTOR DRIVEN TROLLEY		
19) Trolley does not operate in either direction	<ul style="list-style-type: none"> a) No voltage at motor b) Phase failure c) Open control circuit d) Low voltage e) Wrong voltage or frequency 	<ul style="list-style-type: none"> a) Open circuit; grounded or faulty connection in hoist wiring. b) See Item 1b. c) See Item 1c. d) See Item 1e. e) See Item 1d.
20) Trolley operates in one direction only	<ul style="list-style-type: none"> a) Open control circuit 	<ul style="list-style-type: none"> a) See Item 1c.
21) Trolley operates sluggishly	<ul style="list-style-type: none"> a) Excessive load b) Low voltage c) Unbalanced current in the phases d) Brake dragging 	<ul style="list-style-type: none"> a) See Item 1g. b) See Item 1e. c) See Item 1b. d) See page 12.
22) Trolley motor overheats		<ul style="list-style-type: none"> a) See Item 8.

.:APPres to t.5I2.5 motor and/or units with fans.

DISASSEMBLY AND ASSEMBLY INSTRUCTIONS

WARNING: *The components (motor, gear housing, frame, etc.) are heavy and an overhead lifting device and slings will be required to support, lift and lower the components during disassembly and reassembly. Remove any load and disconnect the hoist from the power supply before attempting to disassemble the unit.*

CAUTION: *The outboard bearings supporting the intermediate gears are located in gear housing cover, therefore, it should be carefully removed. It is suggested, in order to retain the gears in gear housing, that the hoist be tipped slightly upward or positioned on end. Then carefully lift cover.*

REMOVAL AND INSTALLATION OF LOAD CHAIN

Hoist load chain can be installed by one of the following methods. The first two methods do not require extensive hoist disassembly. The third method is recommended when replacing severely worn chain, and inspection and/or replacement of the liftwheel and chain guides are required.

Method 1

- A. Disconnect hoist from power supply.
- B. Remove shroud access cover and disengage the limit switch guide plate from the traveling nuts. On double chain units without energy absorption system, motor end cover must also be removed.
- C. On double chain units, without energy absorption system, remove chain anchor from main frame by removing (from motor side) the chain anchor screw and drawing out chain anchor pin. Remove chain anchor from chain. On double chain units with energy absorption system, remove chain hanger pin located at base of energy absorption system. Remove hook block.
- D. Using the procedures described on page 9 for cutting chains, cut a portion out of the second to last loose end link (upstanding) to form a coupling link. The portion removed should be centered on the weld and be 518" long. Remove any burrs from the cut edges of the coupling link. Discard last link.
- E. Coupling link should be an upstanding link. Attach new chain to the old chain using the coupling link. First link of new chain should be a flat link. Be sure that upstanding links have welds away from liftwheel.
- F. Re-energize power supply and then carefully operate hoist in **DOWN (*)** direction until approximately ²¹/₂ feet of the new chain is hanging free on the loose end side. Make

- sure that the last chain link is a flat link. On double chain models the new chain must have an ODD number of links. Remove coupling link and old chain.
- G. On single chain models, attach lower hook block. For double chain models operate hoist in the UP (*) direction until approximately 6 to 8 feet of chain remains on the dead end side. Allow chain to hang free to remove twists. Using a wire as a starter, insert the chain into the hook block. The flat link enters the block first. The upstanding links should have the weld toward the hook sheave. On units without energy absorption system, insert anchor link (half link) in last link of chain and attach chain anchor. Position chain anchor in hoist frame and secure with anchor pin. **BE SURE THERE IS NO TWIST BETWEEN HOOK BLOCK AND CHAIN ANCHOR.** Lock anchor pin in position using screw and lockwasher. Be sure grounding wires are also re-attached under this locking screw. On units with energy absorption system, insert last link of chain into chain hanger. **BE SURE THERE IS NO TWIST BETWEEN HOOK BLOCK AND CHAIN HANGER.** Reassemble chain hanger pin.

- H. Adjust limit switches as described on page 11.

Method 2

- A. Follow steps A, B, C of Method 1. Also re move motor end cover on single chain units.
- B. Re-energize power supply and carefully run the chain out of the hoist.
- C. Disconnect hoist from power supply and disassemble electric brake from motor end bell (removal of studs is not necessary).
- D. Feed a length of soft wire into loose end side of chain guide and push wire until it comes out the load side. Attach end of new chain to the wire (loose end side) so that welds on upstanding links are away from liftwheel. First link into hoist should be a flat link.
- E. Rotate brake hub by hand and at the same time pull on wire to pull chain up into hoist and onto the liftwheel. Insert rods through the links just below the chain guide (both strands) to prevent chain from running out of hoist while brake is reassembled.
- F. Reassemble electric brake to motor end bell. Adjust brake as outlined on page 10.
- G. Remove rods from chain links and complete installation of chain by following steps F, G, and H of Method 1.

Method 3

- A. Follow steps A, B, and C of Method 1. Also remove motor end cover and shroud.

- B. Re-energize power supply and carefully run the chain out of the hoist.
- C. Disconnect hoist **from power supply and continue the disassembly of liftwheel** chain guides as outlined below. Inspect **liftwheel and chain guides for wear**. If these **parts are worn or damaged they could cause** premature wear of the new chain. If the liftwheel pockets, particularly the ends, are worn or scored excessively, replace the liftwheel. If the chain guides are worn or badly scored or cracked, they should also be replaced. The stripper should also be inspected and replaced if necessary.
- D. Reassemble the hoist, reversing the disassembly procedure outlined below.
- E. Install new chain and complete installation by following steps C, D, E, F and G of Method 2.

REPLACING MOTOR

The motor can be removed without completely disassembling the hoist by using the following procedure:

1. Disconnect hoist from power supply.
2. Insert rods or bolts in the load chain on both sides where it enters the chain guides. This will prevent movement of the chain when the motor is removed.
3. Drain approximately 3 quarts of gear oil and remove access cover (capacity insert) from gear cover.
4. Through the opening in the gear cover, remove the pinion retaining ring and motor pinion.

CAUTION: Do not allow parts to fall into gear case or complete disassembly of gear cover will be necessary to retrieve dropped parts.

5. Remove motor cover and shroud, and disconnect motor and brake leads from contactors.
6. Disassemble and remove the electric brake assembly. Then remove the motor bolts and withdraw the motor.

NOTE: The motor pinion end of the rotor shaft has an oil seal surface that must not be damaged or nicked during the removal of the motor. Damaging the oil seal surface will allow the gear lubricant to seep into the motor.

7. Remove and discard oil seal. If only motor is to be replaced, remove electric brake from

old motor and install same (using studs supplied with new motor) on replacement motor. Install new motor. Bolt motor into position. Apply a thin film of lubricant from the gear housing to the new oil seal and then install the new oil seal. When installing the new oil seal, it must be positioned to a depth of 1/8 inch as measured from the face of the gear housing to the face of the oil seal. Make certain that the back or open side of the seal faces the gears (oil reservoir). Complete the installation by assembling motor pinion and pinion retaining ring to rotor shaft. Make certain that retaining ring is properly and thoroughly seated in rotor shaft groove. Install access cover and pour the drained oil back into gear cover to bring oil to proper level. Remove rods or bolts holding the chain and adjust brake as described on page 10.

REPLACING LIFTWHEEL AND/OR CHAIN GUIDES

The liftwheel and chain guides of the hoist can be replaced or removed for inspection without complete disassembly of the unit by using the following procedure.

1. Remove load chain as described on page 21 (Method 3).
2. Disconnect hoist from power supply.
3. Remove motor cover and shroud. Remove control panel.
4. Remove adjustable screw limit switch assembly.
5. Remove liftwheel bearing retainer. Loosen bolts attaching chain guide to frame.
6. Remove stripper screw. Insert this screw in the hole in the bottom of the stripper and withdraw stripper using the screw.
7. Insert a 1/2-13 UNC-2A bolt at least 2 inches long in the end of the liftwheel and using this bolt, withdraw the liftwheel and bearings. It may be necessary to use a puller to remove the liftwheel.
8. If chain guides are to be removed, remove bolts attaching chain guides to frame. To re-install chain guides and/or liftwheel, reverse the above procedure. Be sure to coat the spline of the liftwheel with an EP grease such as Evans Products Co. Anti-Scoring, Extreme Pressure Lub. No. 3. The load chain can be installed by using Method 2 as described on page 21.

PARTS LIST

ORDERING INSTRUCTIONS

The following information must accompany all correspondence or repair parts orders:

1. Hoist model number.
2. Serial number of hoist and/or motor driven trolley.
3. Voltage, phase, hertz. This information is stamped on the hoist nameplate. The motor driven trolley serial number is stamped on end of motor side frame.

When ordering hoist and/or trolley parts, give the motor nameplate data in addition to the above.

For parts orders specify:

1. Quantity desired.
2. Key number of part.
3. Part name.

NOTE: When ordering replacement parts, consider the need for such items as gaskets, oil seals, fasteners, etc. These items may be damaged or lost during the disassembly or may be unfit for future service because of deterioration from age or service conditions.

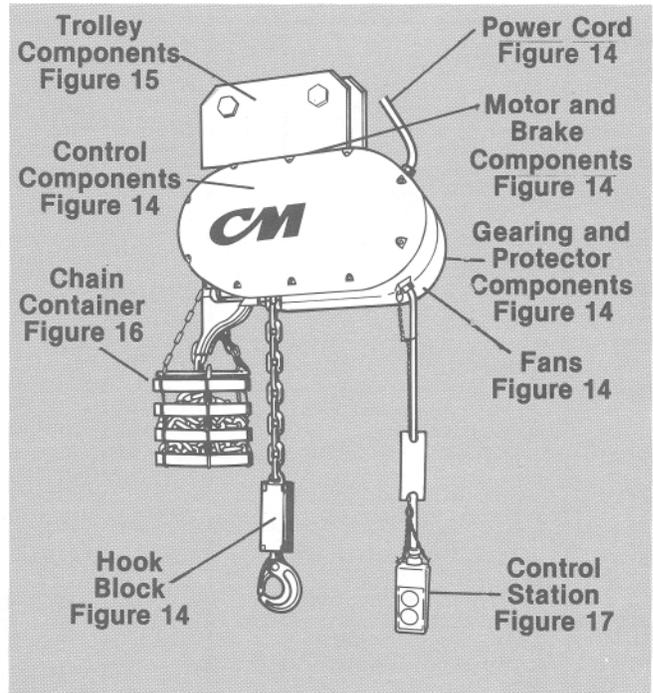


Figure 13. Parts Illustration Key

Table 9. Parts List-Series 670 Electric Chain Hoist-2 thru 6 ton

NOTE: NOT EVERY PART LISTED BELOW IS USED ON EVERY MODEL

Key No.	Part Name	No. Req'd.	Key No.	Part Name	No. Req'd.	Key No.	Part Name	No. Req'd.
670-8	Warning Tag	1	670-44	Intermediate Gear Retainer Ring	1	670-67	Bearing Retainer Screw—Control Side	4
670-10	Access Cover	1	670-45	Intermediate Gear	1	670-68	Adjusting Access Cover Screw With Seal Washer	1
670-11	Access Cover Gasket	1	670-46	Second Reduction Pinion	1	670-69	Adjusting Access Cover Gasket	1
670-12	Access Cover Screw	4	670-47	Second Reduction Pinion Bearing—Main Frame Side	1	670-70	Adjusting Access Cover Gasket	1
670-16	Brake Intermediate Plate	2	670-48	Second Reduction Pinion Bearing—Cover Side	1	670-71	Protector Adjusting Tool	1
670-17	Brake Friction Disc	3	670-49	Chain Anchor Pin Screw, Washer and Lockwasher	1	670-72	Liftwheel Pinion	1
670-19	Brake Spring	3	670-50	Gear Cover	1	670-73	Liftwheel Pinion Bearing—Cover Side	1
670-23	Motor (Includes Items 670-24, 670-25, 670-26, 670-28, 670-29, 670-31, 670-32, and 670-198)	1	670-51	Motor Cover	1	670-74	Shaft Adapter	1
670-24	Motor Stator (Includes Item 670-32)	1	670-52	Liftwheel Gear	1	670-75	Clutch Disc	2
670-25	Motor Rotor and Shaft Assembly (Includes Items 670-28 and 670-29)	1	670-53	Bearing Retainer Screw—Gear Side	4	670-76	Disc Spring	2
670-26	Motor End Bell with Brake Studs	1	670-54	Bearing Retainer—Gear Side	1	670-77	Second Reduction Gear Bushing	1
670-28	Motor Bearing—Brake End	1	670-55	Liftwheel Gear Retainer Ring	1	670-78	Second Reduction Gear Adjusting Sprocket (Includes Pins)	1
670-29	Motor Bearing—Main Frame End	1	670-56	Liftwheel Gear Bearing	1	670-79	Protector (Includes Items 670-74 thru 670-79)	1
670-31	Motor Thru Bolt and Lockwasher	4	670-57	Bearing Oil Seal Retainer Gasket	1	670-80	Protector Retainer Ring	1
670-32	Motor Thermal Switch	1	670-58	Bearing Oil Seal Retainer	1	670-81	Liftwheel Pinion Bearing—Main Frame Side	1
670-33	Motor Shaft Oil Seal	1	670-59	Bearing Oil Seal Retainer Screw	4	670-82	Main Frame Assembly (Caution: Frame Components are assembled and then machined as a unit. DO NOT attempt to disassemble components.)	1
670-34	Load Chain (Specify Length Required)	1	670-60	Liftwheel Gear Oil Seal	1	670-83	Gear Cover Gasket	1
670-35	Control Cable (Specify Length Required)	1	670-61	Liftwheel Gear Expansion Plug	1	670-84	Shroud Gasket	2
670-37	Chain Guide Threaded	1	670-63	Liftwheel	1	670-85	Shroud Assembly (Includes Access Door and Screws)	1
670-38	Chain Guide—Plain	1	670-64	Liftwheel Bearing	1			
670-41	Stripper	1	670-65	Liftwheel Bearing Retainer Ring	1			
670-42	Brake Hub Retainer Ring	1	670-66	Bearing Retainer—Control Side	1			
670-43	Brake Hub	1						

(Continued on page 24)

PARTS LIST (Continued)

Key No.	Part Name	No. Req'd	Key No.	Part Name	No. Req'd	Key No.	Part Name	No. Req'd
670-87	Shroud Stud	6	670-143	Control Panel Mounting Screw	1	670-204	Thermostat Wiring Harness	1
670-88	Breather Vent	1	670-144	Control Panel Mounting Screw Nut	1	670-205	Terminal Board with Mounting Hardware	1
670-89	Identification Plate and Attaching Screws	1	670-145	Plug—Main Frame (not shown)	1	670-206	Fan Screen	1
670-90	Warning Label	1	670-146	Control Cable Connector	1	670-207	Fan with Mounting Hardware	2
670-91	Protector Label (not shown)	1	670-147	Spring Container	1	670-208	Transformer with Spacer and Mounting Hardware (575-3-60 and 380-3-50 units only)	1
670-92	Gear Cover Screw and Seal	10	670-148	Spring Container Screw (5/16 Dia.) and Nut	2	670-209	Fan Power Wiring Harness	1
670-93	Motor Cover Nut and Seal	6	670-149	Spring Container Screw (3/8 Dia.) and Nut	2	670-211	Air Baffle & Mtg. Screws	1
670-94	Locator Dowel	2	670-150	Chain Hanger Nut	1	670-212	Coil Housing Assembly (Contains Housing 670-194, 670-214, 670-215, 670-216, 670-217, 670-218, 670-226, 670-246 and 670-247)	1
670-95	Cover Plate	1	670-151	Pin—Chain Hanger Nut	1	670-213	Components Board Assembly (Contains 670-219, 670-220, 670-221, 670-222, 670-224 and 670-225)	1
670-96	Cover Plate Screw	2	670-152	Chain Hanger	1	670-214	Coil Retainer	1
670-98	Access Door With Gasket Screws	1	670-153	Pin—Chain Hanger with Cotter Pins (2)	1	670-215	Coil Retainer Screw	1
670-100	Loose End Attachment (Includes Screw, Washer and Lockwasher)	1	670-154	Guide Seat	1	670-216	Brake Nut Retainer Spring and Mounting Hardware (Includes Spring, Screw, Washer and Lockwasher)	3
670-101	Stripper Mounting Screw and Lockwasher	1	670-155	Pressure Plate	1	670-217	Brake Nut Spring	3
670-102	Chain Guide Mounting Screw and Lockwasher	5	670-157	Spacer—Double Reduction Gearing (not shown)	1	670-218	Brake Nut Retaining Ring	3
670-103	Oil Drain Plug	1	670-158	Intermediate Gear Bushing—Double Reduction Gearing	1	670-219	Components Board Resistor	1
670-104	Oil Level Plug	1	670-159	Idler Gear—Double Reduction Gearing	1	670-220	Resistor	1
670-105	Control Cable Clip (Specify number required)	1	670-160	Adjustable Screw Limit Switch Assembly Complete, Specify single or double reduction—See Page 13.	1	670-221	Resistor Insulator	2
670-106	Control Station Chain (Specify length required)	1	670-162	Limit Switch Bracket Kit (Includes bracket and shaft bushing)	1	670-222	Resistor Mounting Hardware (Includes Screw, Lockwasher and Nut)	1
670-107	Motor Pinion Retainer Ring	1	670-163	Limit Switch Kit (Includes Switch Assembly and Mounting Screw)	1	670-223	Cutout Switch Actuator Screw, Nut and Lockwasher	1
670-109	Motor Pinion	1	670-167	Jumper	4	670-224	Rectifier/Varistor and Mounting Hardware (Includes Rectifier, Screw, Lockwasher and Nut)	1
670-110	Hook Nut Pin	1	670-168	Terminal Board	1	670-225	Jumper Kit (Includes 3 Jumpers, 2 Screws, 2 Lockwashers and 2 Nuts)	1
670-111	Hook Nut	1	670-169	Gear Train Bracket	1	670-226	Brake Coil	1
670-112	Hook Washer	1	670-170	Drive Gear	1	670-246	Coil Retainer Wave Spring	1
670-113	Limit Ring	2	670-171	Limit Switch Drive Shaft and Snap Ring	1	670-247	Cutout Switch and Mounting Hardware (Includes Switch, 2 Spacers, 2 Screws, 2 Lockwashers and Insulator)	1
670-114	Hook Block Disc Spring	33	670-172	Limit Switch Shaft and Gear Kit (Includes Shaft, 2 Traveling Nuts, Gear Shaft, Spring, Shaft Washer, Guide Plate, 2 Screws and Single Reduction Idler Gear or Double Reduction Intermediate Gear)	1	670-256	Control Station (See Page 32)	1
670-115	Hook Bearing	1	670-173	Jumper (14A)	1	670-258	Coil Insulating Washer	1
670-116	Latchlok Hook	1	670-174	Jumper (20A)	1	670-259	Coil Retainer Cushion Cover	1
670-117	Hook Block Screw (5/16 Dia.) and Nut	2	670-175	Gear Bushing	1	670-270	Enclosure with screws	1
670-118	Hook Block Screw (3/8 Dia.) and Nut	2	670-176	Drive Shaft Bushing	1	670-271	Switch Insert (Specify number required)	1
670-119	Half Link	1	670-177	Idler Gear Bushing	1	670-275	Push Button Chain Clip	1
670-120	Hook Block	2	670-178	Idler Gear Pin	1	670-282	Push Button Connector	1
670-121	Chain Anchor	2	670-181	Terminal Board Screw	2	670-283	Terminal Base (Specify number required)	1
670-122	Chain Anchor Pin	1	670-182	Idler Gear Washer	1	670-284	Reducer	1
670-123	Chain Anchor Screw	4	670-183	Drive Shaft Pin	1			
670-124	Hook Block Sheave	1	670-184	Drive Gear Pin	1			
670-125	Hook Block Sheave Bearing	2	670-185	Limit Switch Bracket Screw	2			
670-126	Hook Sleeve	1	670-187	Limit Switch Locator Bushing	2			
670-127	Hook Block Screw and Nut	3	670-188	Limit Switch Assembly Mounting Screw and Washer	2			
670-128	Control Cable Chain Clip	1	670-194	Hex Adjusting Nut	3			
670-129	Control Cable Chain Attaching Link (Specify number required)	1	670-195	Cap Plug—Main Frame	1			
670-130	Control Panel	1	670-196	Brake Hub Spacer	1			
670-131	Hoist Reversing Contactor Mounting Screw	2	670-197	Brake Instruction Label (not shown)	1			
670-132	Terminal Board	1	670-198	Wave Type Loading Spring	1			
670-133	Terminal Board Mounting Screw	4	670-201	Frame Screen with Mounting Screws	1			
670-134	Transformer	1	670-202	Thermostat with Spacers and Mounting Hardware	1			
670-135	Transformer Mounting Screw	4	670-203	Fan Wiring Harness	1			
670-136	Hoist Speed Selecting Contactor Mounting Screw	2						
670-137	Trolley Reversing Contactor Mounting Screws	2						
670-138	Jumper (Specify number required and Identification Number stamped on wire insulation or from wiring diagram)	1						
670-139	Line Connector	1						
670-140	Power Cable (Specify length required)	1						
670-141	Power Cable Connector	1						
670-142	Control Panel Mounting Screw	2						

NOTE: The Terminal Box and associated parts shown as mounting on side of motor, plus the additional control parts shown mounting on Control Panel (670-130) are for a Hoist with Single Speed Trolley.

Continued on Page 25

Table 10. Parts List-Plain, Geared & Motor Driven Trolley

Key No.	Part Name	No. Req'd	Key No.	Part Name	No. Req'd.	Key No.	Part Name	No. Req'd.
670-300	Control Station Chain Attaching Link (Specify number required).	—	670-338	Trackwheel Pinion Shaft	1	670-387	Contacting Attaching Screw	3
670-301	Control Station Chain (Specify length required).	—	670-339	Trackwheel Pinion Spacer	1	670-388	Contacting Attaching Screw Lockwasher	3
670-302	Control Station Cord Clip (Specify No. Req'd.)	—	670-340	Pinion Bearing Sleeve	1	670-390	Transformer	1
670-303	Contacting Jumper	3	670-341	Pinion Shaft Ball Bearing	2	670-391	Transformer Attaching Screw	2
670-304	Hoist Suspension Bolt	2	670-342	Intermediate Shaft Ball Bearing (Side Frame End)	1	670-392	Transformer Attaching Screw Lockwasher	2
670-305	Hoist Suspension Bolt Nut	4	670-343	Intermediate Shaft Ball Bearing (Motor End)	1	670-393	Transformer Attaching Screw Nut	2
670-306	Hoist Suspension Bolt Nut Cotter Pin	4	670-344	Driven Gear	1	670-395	Control Station Cord Connector, "O" Ring and Locknut	1
670-307	Spacer Washer (Specify number required)	—	670-345	Intermediate Pinion	1	670-396	Combination Power and Control Cord Connector, "O" Ring and Locknut	1
670-308	Trackwheel with Bearing Cups	4	670-346	Intermediate Gear	1	670-397	Control Station Cable Connector	4
670-309	Trackwheel Bearing Cup	8	670-347	Motor Pinion	1	670-398	Transformer Lead Connector (460 Volt Unit only)	1
670-310	Trackwheel Bearing Cone	8	670-348	Motor Pinion Pin	1	670-399	Control Station Chain Eyebolt	1
670-311	Trackwheel Bearing Seal Washer	8	670-349	Driven Gear Key	1	670-400	Control Station Chain Eyebolt Washer	2
670-312	Trackwheel Stud	4	670-350	Pinion Bearing Spacer	1	670-401	Control Station Chain Eyebolt Nut	2
670-313	Trackwheel Stud Collar	4	670-351	Intermediate Bearing Spacer	1	670-402	Ground Screw	2
670-314	Trackwheel Stud Nut	4	670-352	Intermediate Pinion Nut	1	670-403	Ground Screw Lockwasher	1
670-315	Trackwheel Gear	2	670-353	Intermediate Pinion Nut Lockwasher	1	670-405	Motor Lead Connector 1 Req'd for 230V Unit; 3 Req'd for 460V Unit	1
670-316	Trackwheel Gear Pin	4	670-354	Gear Housing	1	670-406	Trolley Reversing Contactor (See Page 33)	1
670-317	Trackwheel Gear Pinion	1	670-355	Gear Housing Gasket	1	670-407	Trolley Motor	1
670-318	Trackwheel Pinion Key	1	670-356	Gear Housing Screw	4	670-419	Trolley Motor Brake (Items 670-359 through 670-366 and 670-420)	1
670-319	Geared Side Frame (Does not include wheels)	1	670-357	Gear Housing Screw Lockwasher	4	670-420	Electric Brake (Items 670-421 through 670-423 and 670-425 through 670-431)	1
670-320	Plain Side Frame (Does not include wheels) 1 Req'd for Geared & Motor Driven Trolleys; 2 Req'd for Plain Trolley	1	670-358	Motor End Bell Gasket	1	670-421	Brake Base Plate with Studs	1
670-321	Handwheel Bracket with Bushings	1	670-359	Brake Hub	1	670-422	Brake Friction Disc	1
670-322	Handwheel Bushing	2	670-360	Brake Hub Snap Ring	1	670-423	Brake Armature with Plate	1
670-323	Handwheel Bracket Screw Lockwasher	3	670-361	Brake Attaching Screw	2	670-424	Brake Coil Jumper	2
670-324	Handwheel Bracket Screw	3	670-362	Brake Attaching Screw Lockwasher	2	670-425	Brake Coil	1
670-325	Handwheel Shaft	1	670-363	Motor End Cover and Brake Cover Gasket	2	670-426	Brake Coil Retainer Strap	1
670-326	Hand Chain Wheel Key	1	670-364	Brake Cover	1	670-427	Brake Field with Plate and Shading Coils	1
670-327	Hand Chain Wheel	1	670-365	Brake Cover Screw	3	670-428	Brake Spring	2
670-328	Trackwheel Pinion or Handwheel Shaft Nut Lockwasher	1 or 2	670-366	Brake Cover Screw Lockwasher	3	670-429	Brake Spacer Washer	10
670-329	Trackwheel Pinion or Handwheel Shaft Nut	1 or 2	670-367	Motor End Cover	1	670-430	Brake Stud Nut	2
670-330	Hand Chain Guide	1	670-368	Motor End Cover Screw	3	670-431	Shading Coil	2
670-331	Chain Guide Screw	1	670-369	Motor End Cover Screw Lockwasher	3	670-433	Brake Lead Wire Nut	2
670-332	Chain Guide Screw Washer	1	670-370	Terminal Box, Cover and Gasket	1			
670-333	Chain Guide Screw Nut Lockwasher	1	670-371	Terminal Board	1			
670-334	Chain Guide Screw Nut	1	670-372	Terminal Board	1			
670-335	Hand Chain and Connecting Link (Specify length required)	1	670-373	Terminal Box Attaching Screw	1			
670-336	Hand Chain Connecting Link	1	670-374	Terminal Box Attaching Screw Lockwasher	1			
670-337	Trackwheel Pinion Spacer Washer (3 Ton Only—specify number required) (not shown)	—	670-375	Terminal Board Spacer	2			
			670-376	Terminal Box and Board Attaching Screw	2			
			670-377	Terminal Box and Board Attaching Screw Lockwasher	2			
			670-378	Power Cable Connector	1			
			670-379	Power Cable	1			
			670-380	Junction Box Gasket	1			
			670-381	Contacting Box, Cover with Gasket & Screws	1			
			670-382	Contacting Box Attaching Screw	3			
			670-383	Contacting Box Attaching Screw Lockwasher	3			
			670-384	Contacting Box Cover Attaching Screw	2			
			670-385A	Combination Power and Control Cord	1			

NOTE: Hoists that are supplied with the Trolley contacting mounted on the control panel inside hoist use a type SD contacting. Individual components are not available for the repair of this contacting. (Key No. 670-502).

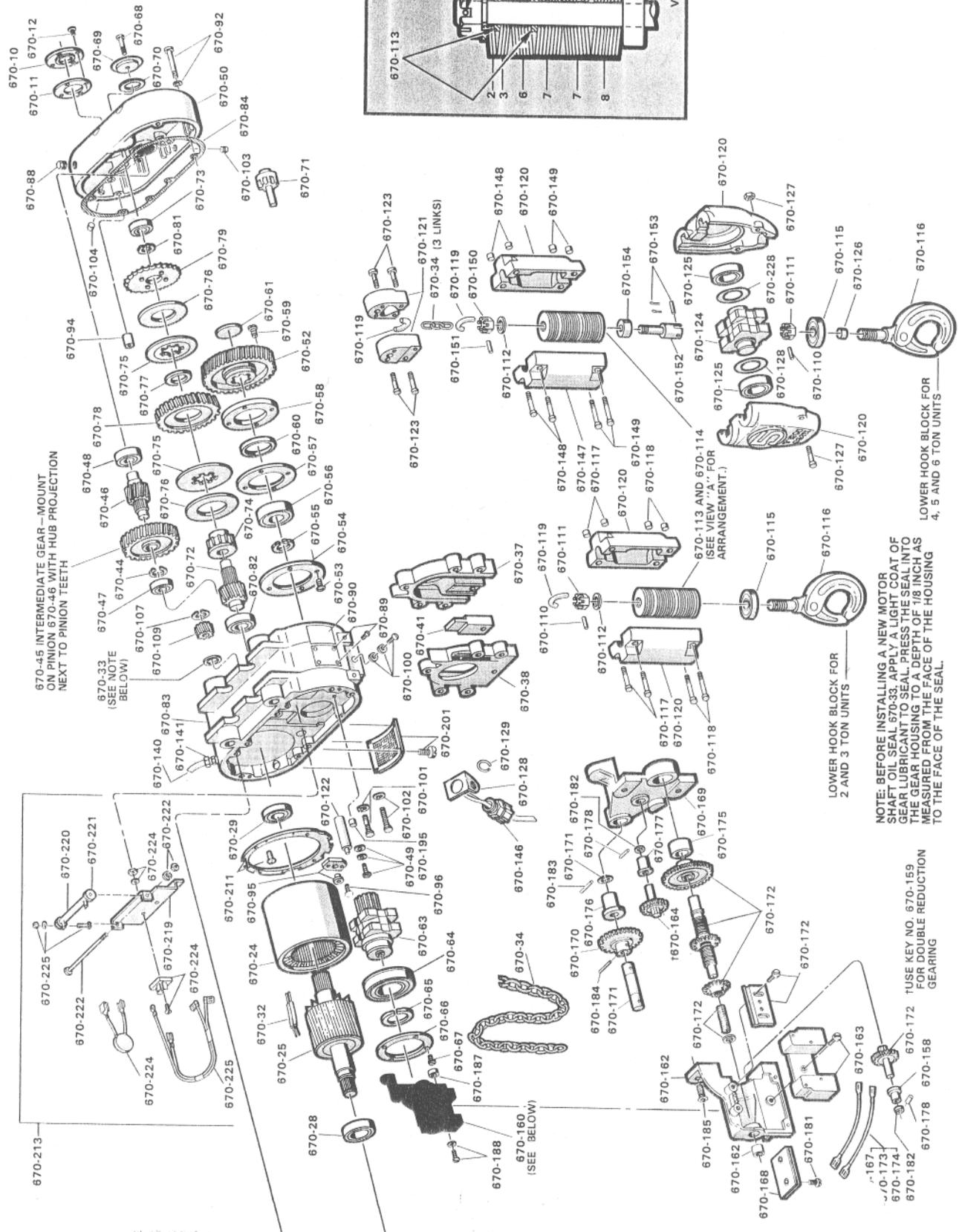
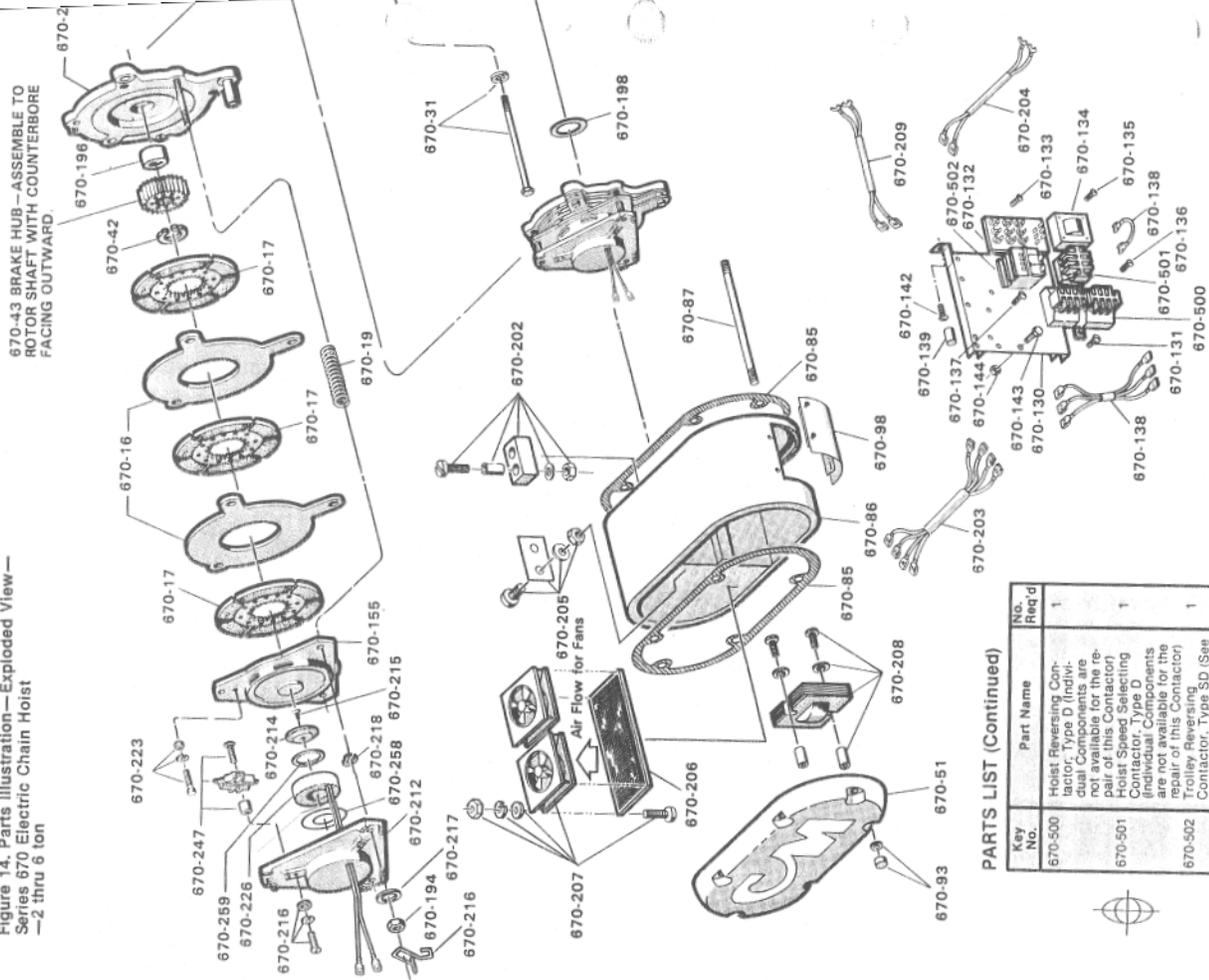


Figure 14. Parts Illustration—Exploded View—
Series 670 Electric Chain Hoist
—2 thru 6 ton



PARTS LIST (Continued)

Key No.	Part Name	No. Req'd
670-500	Hoist Reversing Con- tactor, Type D (Indivi- dual Components are not available for the re- pair of this Contactor) Hoist Reversing Con- tactor, Type D (Individual Components are not available for the repair of this Contactor)	1
670-501	Contactor, Type SD (See Note Page 25) Complete with Terminal and Coil Jumpers	1
670-502	Contactor, Type SD (See Note Page 25) Complete with Terminal and Coil Jumpers	1

Figure 15. Parts Illustration—Exploded View—
Series 670 Plain, Geared and Motor Driven Trolleys

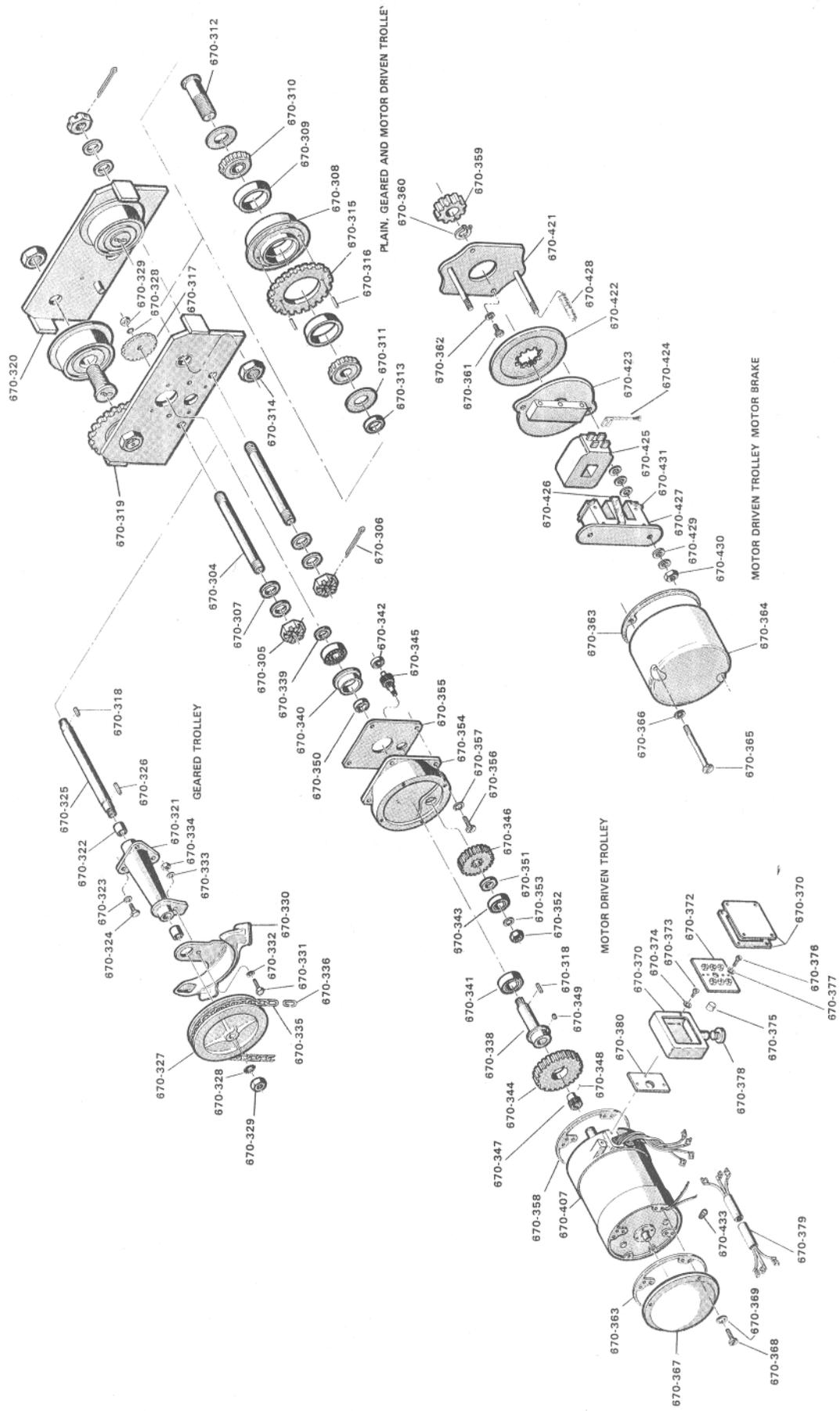
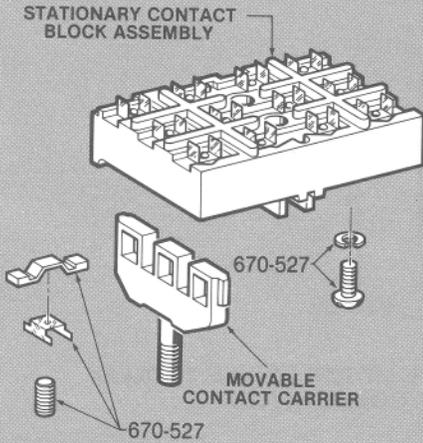


Figure 16. Parts List and Exploded View, Separate M.D.T. Contactor, Chain Container and Lug Suspension

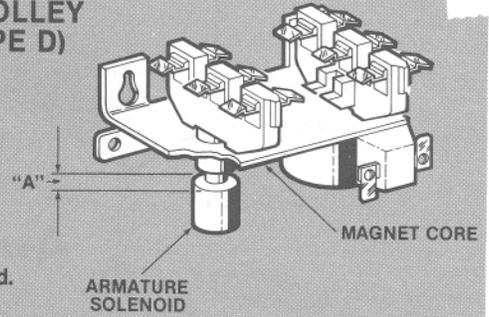
SEPARATE MOTOR DRIVEN TROLLEY REVERSING CONTACTOR (TYPE D)



PARTS LIST

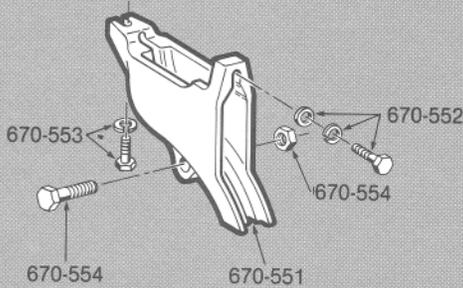
Key No.	Part Name	No. Req'd.
670-406*	Reversing Contactor (Complete)	1
670-527	Contact Kit (includes 12 Stationary Contact Screws, 12 Lockwashers, 6 Retainer Clips, 6 Springs and 6 Movable Contacts)	1

*Other than for 670-527, individual components are not available for the repair of this contactor.



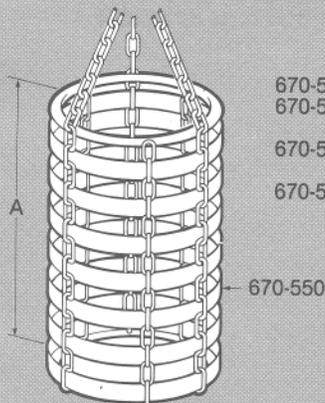
ADJUSTMENT: IF THE CONTACTOR IS DISASSEMBLED TO REMOVE THE MOVABLE CONTACT CARRIER, THE ARMATURE SOLENOID MAY BE ADJUSTED BY SCREWING THE ARMATURE WITHIN "A" DIMENSION OF THE MAGNET CORE AND LOCKING WITH SLOTTED NUT TO 20 LB.-IN. TORQUE. "A" DIMENSION DEPENDS UPON THE SERIES STAMPED ON THE CONTACTOR NAMEPLATE. FOR SERIES "C" CONTACTORS "A" = 15/64". FOR SERIES "D" CONTACTORS "A" = 19/64".

CHAIN CONTAINER PARTS LIST

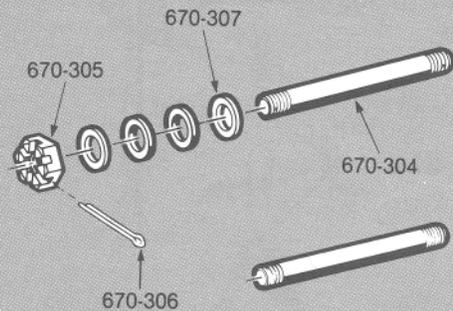


NOTE: THE CHAIN CONTAINER FURNISHED BY CM IS ENGINEERED AND DESIGNED FOR USE WITH A SERIES 670 HOIST OF SPECIFIC SIZE AND LIFT. HOIST MALFUNCTION AND DAMAGE TO THE UNIT CAN OCCUR IF OTHER THAN PROPERLY ENGINEERED CHAIN CONTAINER IS USED.

Key No.	Part Name	No. Req'd.
670-550	Chain Container A = 10-7/16 for single reeved units with 20 ft. lift A = 18-9/16 for double reeved with 20 ft. lift and single reeved units with 40 ft. lift	1
670-551	Chain Chute	1
670-552	Chute and Container Screw and Washer (2)	1
670-553	Chute Mounting Screw and Washer	1
670-554	Container Mounting Screw and Nut	1

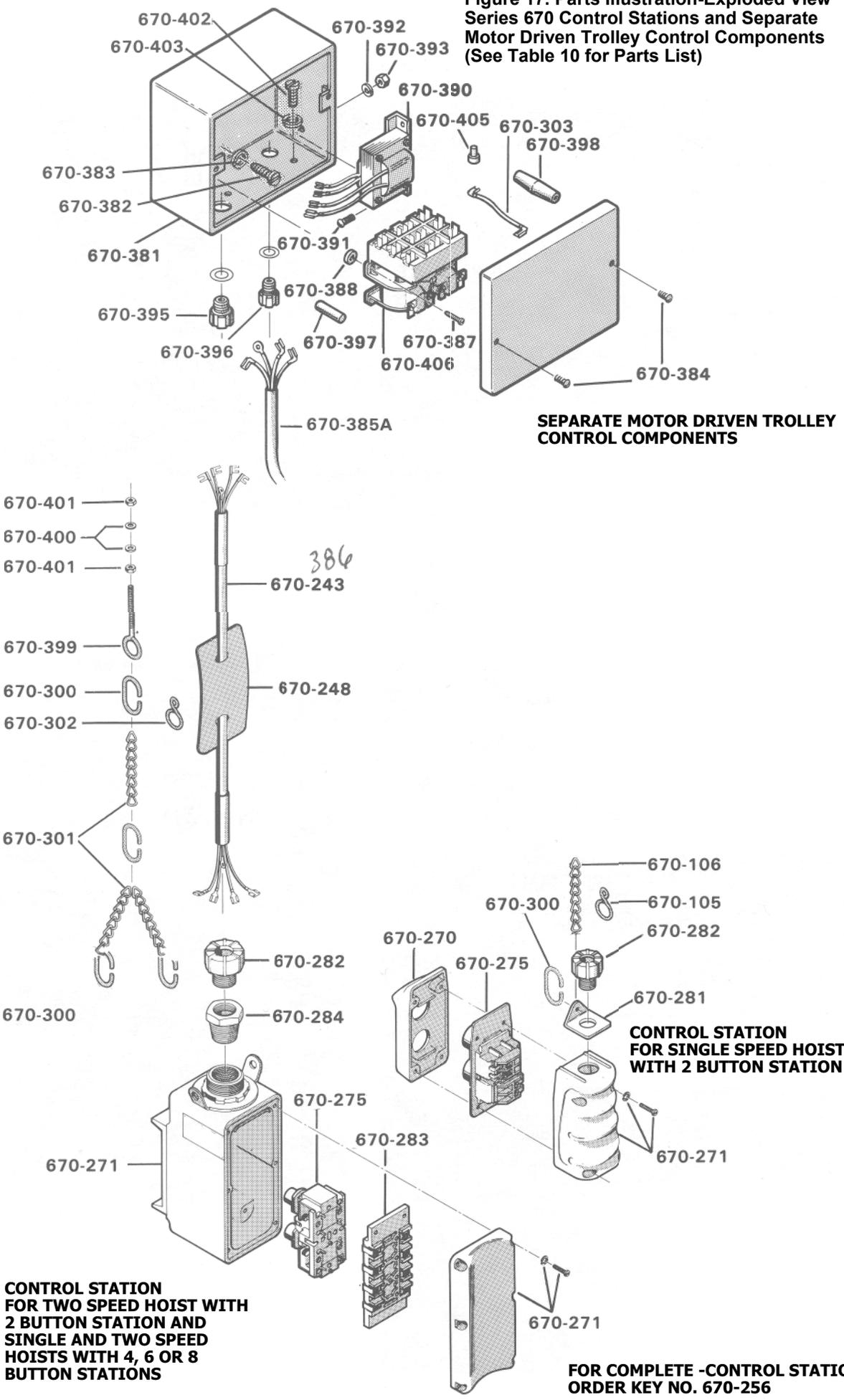


LUG SUSPENSION PARTS LIST



Key No.	Part Name	No. Req'd.
670-432	Lug Suspension (Items 670-304 thru 670-307)	1
670-304	Hoist Suspension Bolt (Specify length of bolt)	2
670-305	Hoist Suspension Bolt Nut	4
670-306	Hoist Suspension Bolt Nut Cotter Pin	4
670-307	Spacer Washer (Specify No. Req'd.)	—

Figure 17. Parts Illustration-Exploded View Series 670 Control Stations and Separate Motor Driven Trolley Control Components (See Table 10 for Parts List)



SEPARATE MOTOR DRIVEN TROLLEY CONTROL COMPONENTS

CONTROL STATION FOR SINGLE SPEED HOIST WITH 2 BUTTON STATION

CONTROL STATION FOR TWO SPEED HOIST WITH 2 BUTTON STATION AND SINGLE AND TWO SPEED HOISTS WITH 4, 6 OR 8 BUTTON STATIONS

FOR COMPLETE -CONTROL STATION ORDER KEY NO. 670-256