
REPAIR MANUAL

ELECTRIC CHAIN HOIST ER and NER SERIES

1/8 Ton through 20 Ton Capacity

⚠ WARNING

This equipment should not be installed, operated or maintained by any person who has not read and understood all the contents of this manual. Failure to read and comply with the contents of this manual can result in serious bodily injury or death, and/or property damage.

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1.0 Important Information and Warnings

1.1 Terms and Summary

This manual provides important information for personnel involved with the repair of this product. Although you may be familiar with this or similar equipment, it is strongly recommended that you read this manual before repairing or operating the product.

Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures that can present hazardous situations. The following signal words are used to identify the degree or level of hazard seriousness.

▲ DANGER Danger indicates an imminently hazardous situation which, if not avoided, **will** result in **death or serious injury**, and property damage.

▲ WARNING Warning indicates an imminently hazardous situation which, if not avoided, **could** result in **death or serious injury**, and property damage.

▲ CAUTION Caution indicates a potentially hazardous situation which, if not avoided, **may** result **minor or moderate injury** or property damage.

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

▲ CAUTION

These general instructions deal with the normal repair, operation, and maintenance situations encountered with the equipment described herein. The instructions should not be interpreted to anticipate every possible contingency or to anticipate the final system, crane, or configuration that uses this equipment. For systems using the equipment covered by this manual, the supplier and owner of the system are responsible for the system's compliance with all applicable industry standards, and with all applicable federal, state and local regulations/codes.

This manual includes instructions and parts information for a variety of hoist types. Therefore, all instructions and parts information may not apply to any one type or size of specific hoist. Disregard those portions of the instructions that do not apply.

Use only Harrington authorized replacement parts in the service and maintenance of this hoist.

WARNING

Equipment described herein is not designed for and **MUST NOT** be used for lifting, supporting, or transporting people, or for lifting or supporting loads over people.

Equipment described herein should not be used in conjunction with other equipment unless necessary and/or required safety devices applicable to the system, crane, or application are installed by the system designer, system manufacturer, crane manufacturer, installer, or user.

Modifications to upgrade, rerate, or otherwise alter this equipment shall be authorized only by the original equipment manufacturer.

Equipment described herein may be used in the design and manufacture of cranes or monorails. Additional equipment or devices may be required for the crane and monorail to comply with applicable crane design and safety standards. The crane designer, crane manufacturer, or user is responsible to furnish these additional items for compliance. Refer to ANSI/ASME B30.17, "Safety Standard for Top-Running Single Girder Cranes"; ANSI/ASME B30.2 "Safety Standard for Top-Running Double-Girder Cranes"; and ANSI/ASME B30.11 "Safety Standard for Underhung Cranes and Monorails".

If a below-the-hook lifting device or sling is used with a hoist, refer to ANSI/ASME B30.9, "Safety Standard for Slings" or ANSI/ASME B30.20, "Safety Standard for Below-the-Hook Lifting Devices".

Hoists and cranes, used to handle hot molten material may require additional equipment or devices. Refer to ANSI Z241.2, "Safety Requirements for Melting and Pouring of Metals in the Metalcasting Industry".

Electrical equipment described herein is designed and built in compliance with Harrington's interpretation of ANSI/NFPA 70, "National Electrical Code". The system designer, system manufacturer, crane designer, crane manufacturer, installer, or user is responsible to assure that the installation and associated wiring of these electrical components is in compliance with ANSI/NFPA 70, and all applicable Federal, State and Local Codes.

Failure to read and comply with any one of the limitations noted herein can result in serious bodily injury or death, and/or property damage.

DANGER

HAZARDOUS VOLTAGES ARE PRESENT IN THE CONTROL BOX, OTHER ELECTRICAL COMPONENTS, AND CONNECTIONS BETWEEN THESE COMPONENTS.

Before performing ANY mechanical or electrical maintenance on the equipment, de-energize (disconnect) the main switch supplying power to the equipment; and lock and tag the main switch in the de-energized position. Refer to ANSI Z244.1, "Personnel Protection – Lockout/Tagout of Energy Sources".

Only trained and competent personnel should inspect and repair this equipment.

NOTICE

It is the responsibility of the owner/user to install, inspect, test, maintain, and operate a hoist in accordance with ANSI/ASME B30.16, "Safety Standard for Overhead Hoists", OSHA Regulations and ANSI/NFPA 70, National Electric Code. If the hoist is installed as part of a total lifting system, such as an overhead crane or monorail, it is also the responsibility of the owner/user to comply with the applicable ANSI/ASME B30 volume that addresses that type of equipment.

It is the responsibility of the owner/user to have all personnel that will install, inspect, test, maintain, and operate a hoist read the contents of this manual and applicable portions of ANSI/ASME B30.16, "Safety Standard for Overhead Hoists", OSHA Regulations and ANSI/NFPA 70, "National Electric Code". If the hoist is installed as part of a total lifting system, such as an overhead crane, the applicable ANSI/ASME B30 volume that addresses that type of equipment must also be read by all personnel.

If the hoist owner/user requires additional information, or if any information in the manual is not clear, contact Harrington or the distributor of the hoist. Do not install, inspect, test, maintain, or operate this hoist unless this information is fully understood.

A regular schedule of inspection of the hoist in accordance with the requirements of ANSI/ASME B30.16 should be established and records maintained.

1.2 Warning Tags and Labels

The warning tag illustrated below in Figure 1-1 is supplied with each hoist shipped from the factory. If the tag is not attached to your hoist's pendant cord, order a tag from your dealer and install it. Read and obey all warnings attached to this hoist. Tag is not shown actual size.

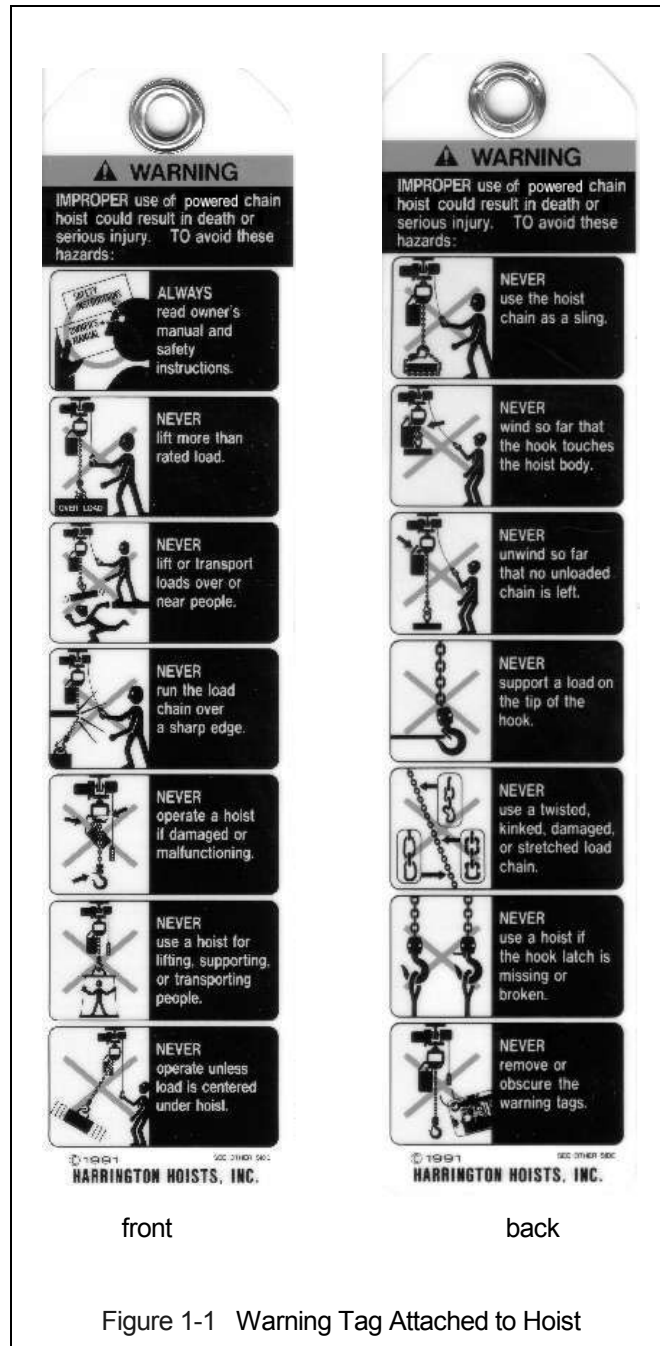


Figure 1-1 Warning Tag Attached to Hoist

2.0 ER and NER Repair Manual Information

2.1 Purpose

The purpose of this manual is to provide disassembly and assembly instructions for the ER/NER family of hoists 1/8 through 20 Ton. It is also intended to act as a diagnostic guide for troubleshooting various hoist problems and provide applicable solutions. Instructions provided are generic and intended to apply to all sizes of hoists covered by this document.

2.2 Difference between the ER and NER

The NER has a friction clutch mechanism that provides over winding protection. The ER has a mechanical load brake/friction clutch combination and an electronic count/hour meter in the control circuit. The ER has a vented oil plug where as the NER has a solid vent plug. Finally, a brake label is placed on the ER.

2.3 Design Concept

The ER/NER hoist is a modular design consisting of four primary parts.

1. **Controls Section**- This section houses the electrical components such as the transformer, limit switch(s) and motor contactors.
2. **Gear Case** - This section consists of the gear system. A mechanical brake with friction clutch (ER only).
3. **Body** - This section consists of the chain guide, load chain, load sheave and suspension hooks.
4. **Motor and Fan Cover** - This section consists of the motor frame with stator, motor shaft with rotor, pull rotor, rotor, thrust disc, motor brake spring, brake drum, and fan.

This concept allows any ER/NER model to be disassembled and repaired according to specific requirements of the repair job. For a complete list of parts and an exploded view- see the ER/NER owners manuals.

2.4 Tools Required

- 1/4" and 3/8" drive metric socket sets
- metric Allen wrenches
- metric Hex bit sockets
- #1, 2, & 3 Philips screwdrivers
- Medium and Large Flat blade screwdrivers
- Needle nose pliers
- Small snap ring pliers internal/external
- 6" adjustable wrench
- Feeler Gages (0.010-0.080" range)
- Sm. Plastic or Rubber Mallet
- Small 2 arm wheel/pulley remover
- Bearing puller
- Electrical tape
- Safety glasses
- Vise or 2 clamps
- Ball bearing and oil seal drivers (to install seals/bearings)

2.5 Instructional Sequence

3.0 Hoist Disassembly

- 3.1 Removal of outer parts.
- 3.2 Disassembly, Controls unit.
- 3.3 Disassembly, Gear Case and Gear Parts.
- 3.4 Disassembly, Chain Guide and Load Chain.
- 3.5 Disassembly, Motor.
- 3.6 Disassembly, Body.
- 3.7 Disassembly, Motor Brake.

4.0 Hoist Reassembly

- 4.1 Reassembly, Motor Brake
- 4.2 Reassembly, Partial Chain Guide.
- 4.3 Reassembly, Body.

- 4.4 Reassembly, Motor.
- 4.5 Reassembly, Load Chain.
- 4.6 Reassembly, Gear Case and Gear Parts.
- 4.7 Reassembly, Controls Unit.
- 4.8 Checking Operation.

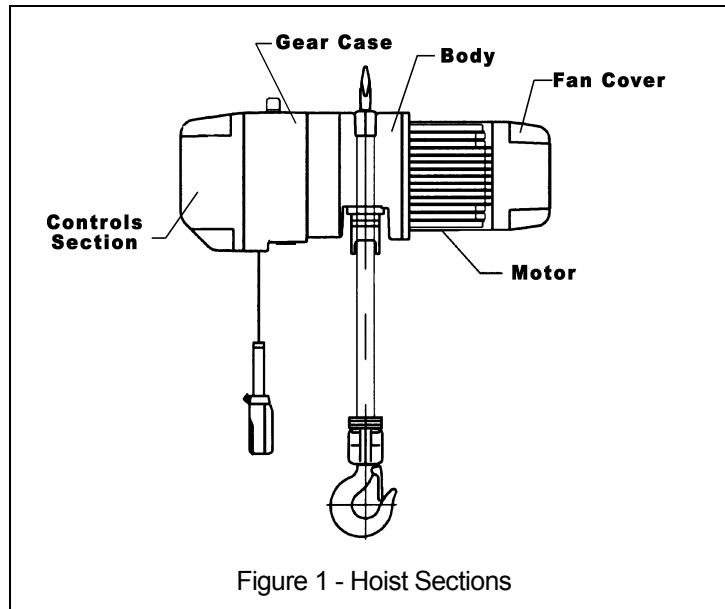
5.0 Electrical Troubleshooting

Appendix A- Inspection Methods, Criteria, and Wear Measurements.

Appendix B- Inspection Methods, Criteria, and Wear Measurements for Large Capacity.

Appendix C- Electrical Criteria and Wiring Diagram

Appendix D- Harrington Hoists, Inc. Contact Information



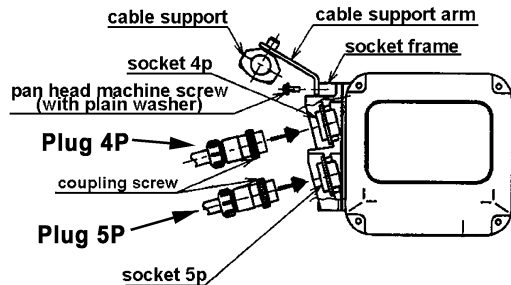
⚠ DANGER Improper disassembly/assembly may cause a serious accident. Disassembly/ assembly should be conducted by a qualified and well-experienced service technician, otherwise please contact a Harrington Authorized Repair Center. (You can contact Harrington for a list of official repair centers. See **Appendix D** to this manual to find a repair center nearest you.)

NOTICE

- Perform disassembly and assembly procedures in accordance with this manual.
- **Never** connect additional links to the load chain.
- Remove dirt and contamination from disassembled parts such as gears.
- When reassembling the hoist, the following parts **must** be replaced with new:
 - GEAR OIL - PACKING - OIL SEALS
 - SNAP RINGS - SPLIT PINS - O-RINGS
- Use thread-locking adhesive when re-installing bolts where indicated.
- Always use Harrington genuine parts for replacement.

3.0 Hoist Disassembly

3.1 Outer Part Removal



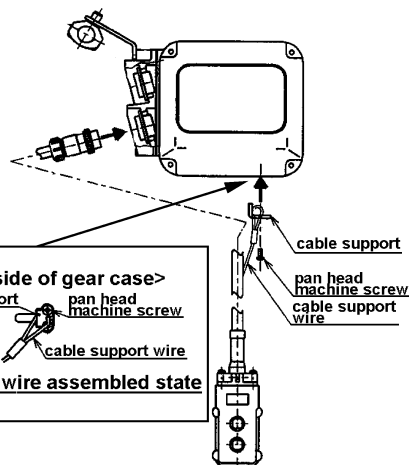
⚠ DANGER Hazardous voltages are present in the control box, other electrical components, and connections between these components.

Only trained and competent personnel should inspect and repair this equipment.

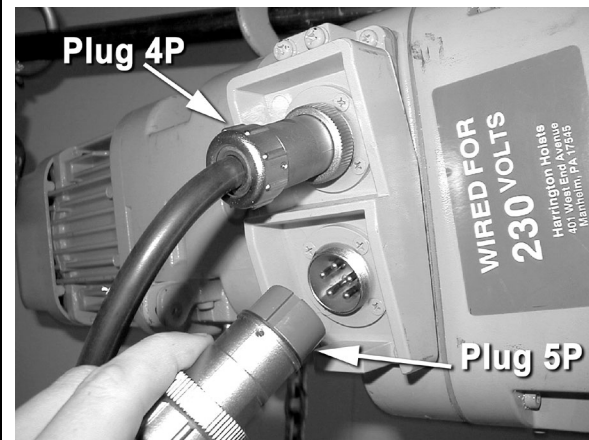
A) De-energize (disconnect) the main switch supplying power to the equipment, and lock and tag the main switch in the de-energized position.

B) Remove plug 4P (4 pin Connector) of the power supply cable complete set.

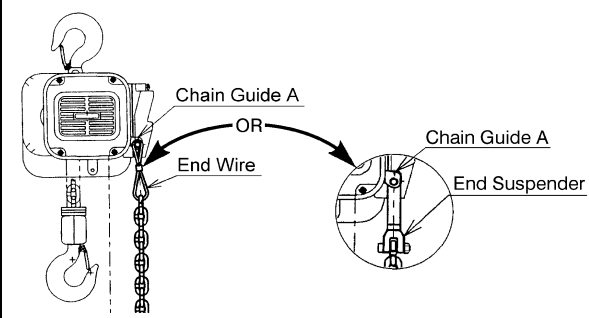
NOTICE The 4P and 5P plugs are quick disconnects; therefore, just loosen the threaded nut on the connector and pull connector from hoist.



C) Remove the cable support wire from the body by removing the machine screw attaching the cable support to the hoist.



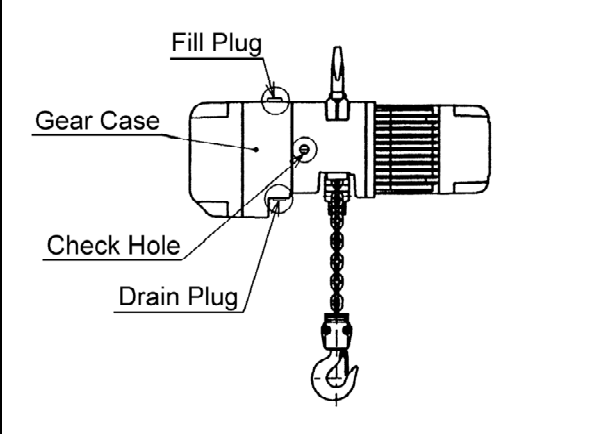
D) Remove plug 5P (5 pin connector) of the push button cable assembly.



E) When the hoist is used without a chain container, the free end of the chain is attached to the hoist body as shown in Figure to the right. Remove the no load end of the chain from Chain Guide A by detaching the End Wire or End Suspender installed on the hoist. For 5 ton hoist, remove the no load end of the chain directly from Chain Guide A if Chain Guide A is notched to accept the chain.

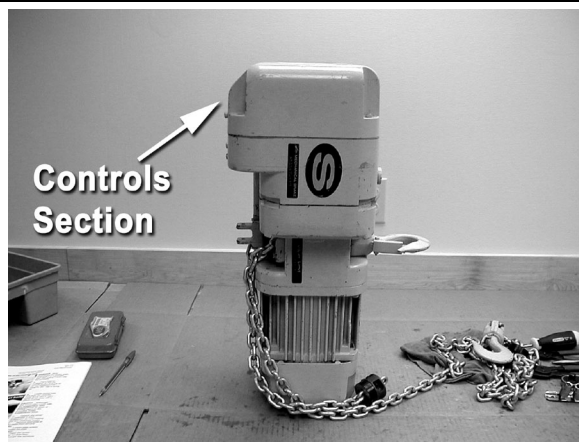


F) If a chain container is installed, remove the chain container from the body.



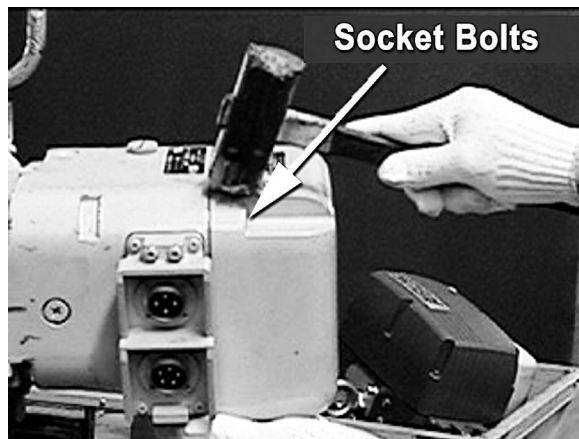
G) Drain the gear oil by removing the oil plug and plug packing from the bottom of the gear case.

3.2 Disassembly of the Controls Unit



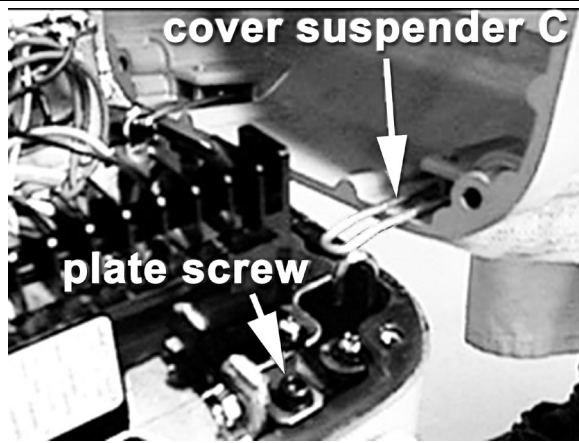
⚠ CAUTION Never disassemble the electric chain hoist while it is suspended. Only perform disassembly and assembly repair work while the hoist is supported on a stable and level work surface.

A) PLACE HOIST ON WORKBENCH SO THAT THE CONTROLS SECTION IS ON TOP.



B) Loosen and remove socket bolts and open the controller cover. If necessary, loosen the cover by tapping it lightly with a plastic or rubber mallet.

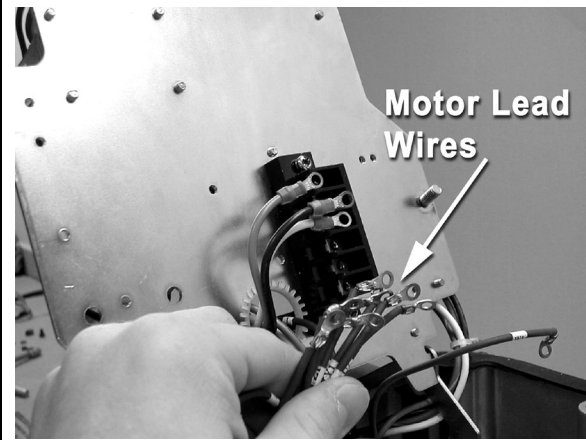
⚠ CAUTION Although the controller cover can be suspended, the cover may fall off of the hoist if there is a loose suspension hook.



C) Detach the cover suspender C from suspender by unscrewing the two retaining hooks.

D) Remove lead-wires of the motor from terminal plate.

E) Loosen and remove plate screws and to enable plate to swing out on hinge.

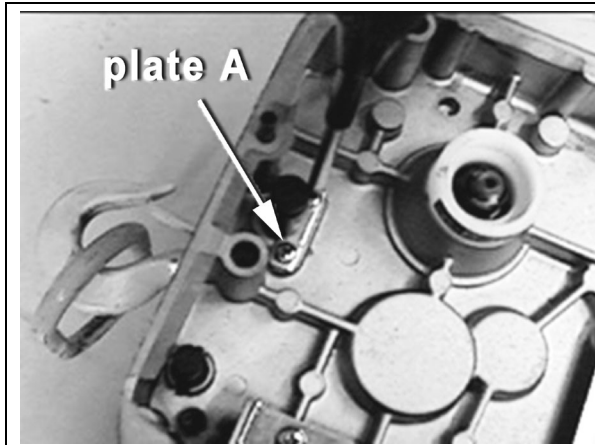


F) On the under side of the controls plate, remove lead-wires of the motor from the terminal strip. For convenience, group wires removed from each terminal together and mark with the terminal strip identification to prevent misconnecting wiring during reassembly. Several models will have wiring passing through to the front side of the plate. Disconnect and mark these wires, too.

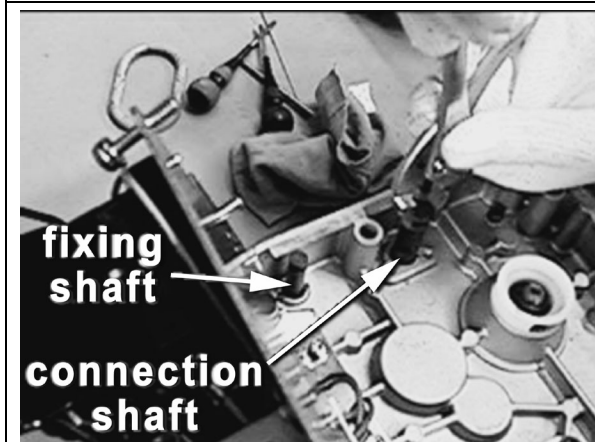


G) Make sure all motor leads are clear of the plate and tape the wires together so that they pass through the body sections without chaffing or scraping the wires.

3.3 Disassembly of the Gear Case and Gear Parts

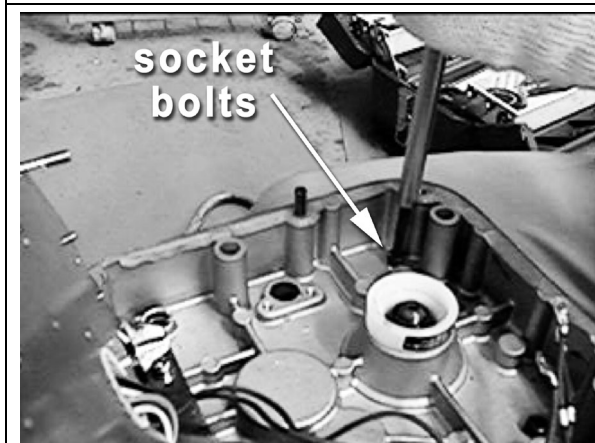


A) Swing the electrical controls plate open, remove the two screws retaining plate A.



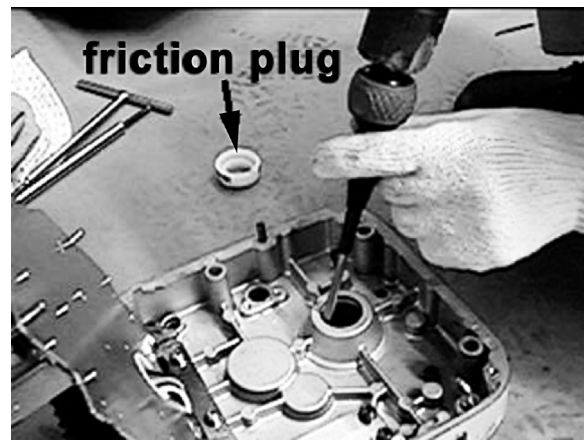
B) Using pliers, pull out the connection shaft and the fixing shaft to disconnect the top hook assembly or connection yoke from the hoist.

CAUTION Once the Shafts are removed the hook and yokes will fall from the hoist.



C) For the ER - Remove the socket bolts and tap the controls case lightly with a plastic or rubber mallet to remove the body section.

NOTICE Take precautions to prevent damage to the gasket during removal of the controls section. If damaged, the gasket must be replaced with a new gasket during reassembly. Also, lift off the controls section carefully to prevent damaging motor wiring.



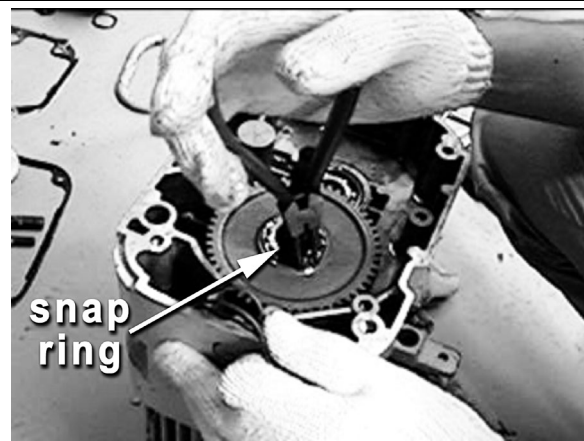
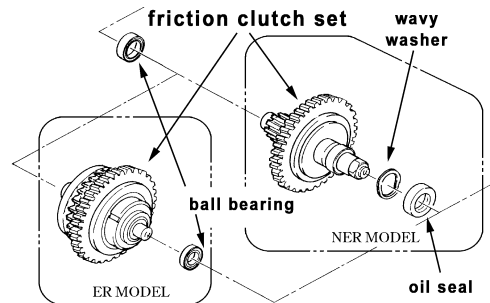
D) For **NER**, remove the friction plug, oil seal and nut cover from the gear case. (Do not remove oil seal, unless it is to be replaced.) Remove the socket bolts connecting the gear case to the body. Tap the controls section lightly with a plastic or rubber mallet to release it from the body section.

NOTICE Take precautions to prevent damage to the gasket during removal of the controls section. If damaged, the gasket must be replaced with a new gasket during reassembly. Also, lift off the controls section carefully to prevent damaging motor wiring.



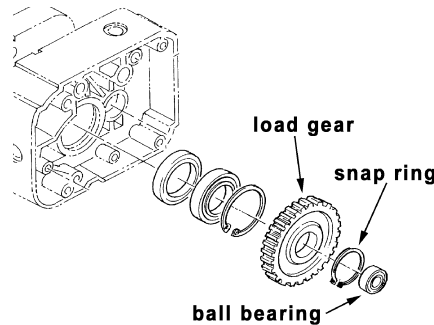
E)

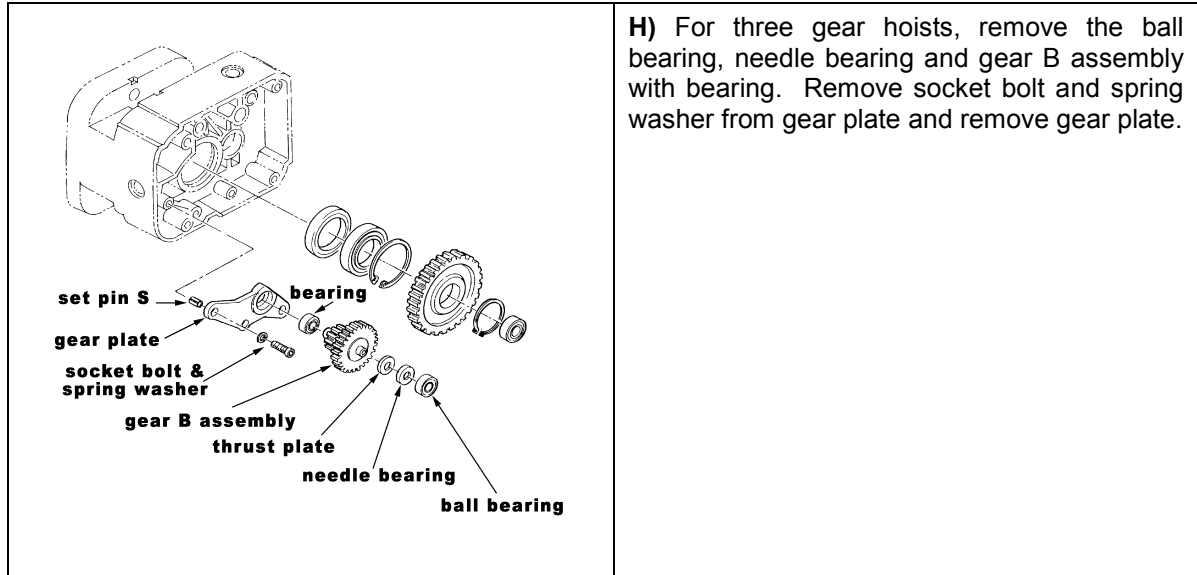
- For **ER** -Lift out the complete friction clutch set
- For **NER** -Remove the wavy washer, then pull out the complete friction clutch set.



F) Pull out the load gear bearing from the gear case using a bearing remover.

G) Remove the snap ring to pull out the load gear.



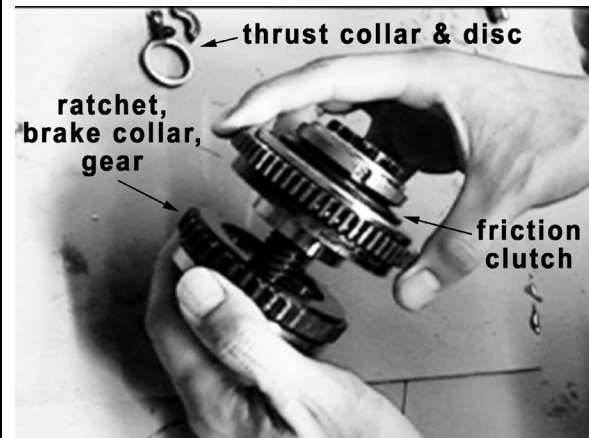


FOR ER ONLY – MECHANICAL BRAKE WITH FRICTION CLUTCH DISASSEMBLY



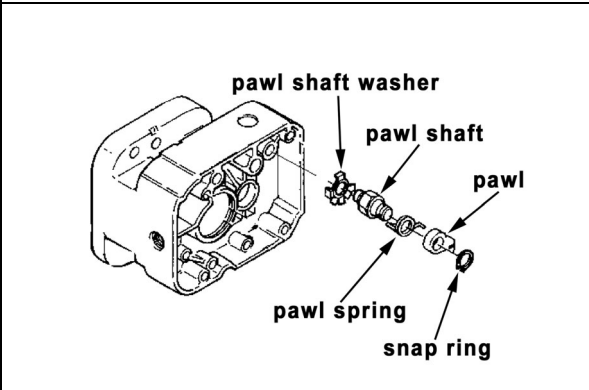
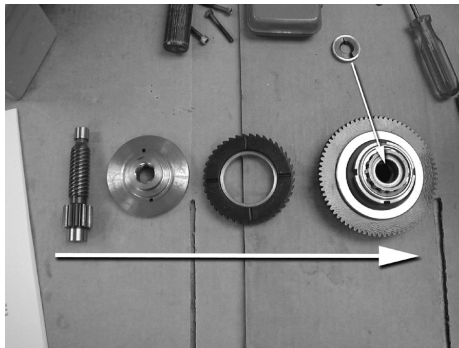
I) Remove the thrust disc and the thrust collar from the mechanical brake with friction clutch complete set. To pull out the friction clutch assembly rotate it.

NOTICE Thrust disc can be removed with needle nose pliers.



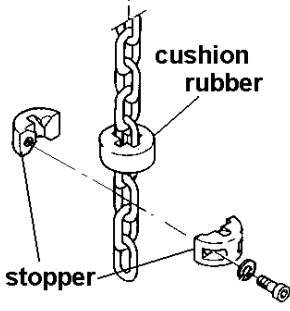
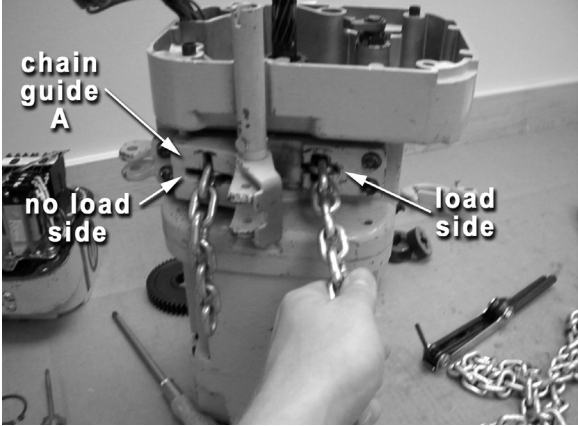
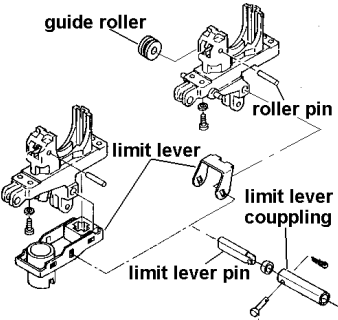
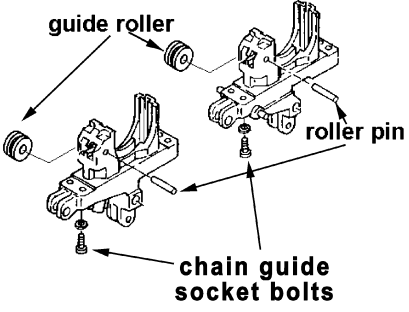
J) Remove the ratchet, the brake collar, and the gear by rotating the assembly.

DANGER Do not attempt to adjust the friction clutch assembly or mechanical friction assembly. If you think an adjustment is needed, contact Harrington.



K) Remove the snap ring from the body and remove the pawl and the pawl spring.

3.4 Disassembly of the Chain Guide and Load Chain

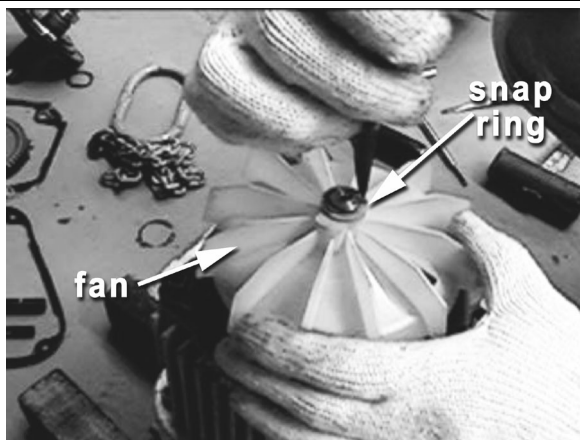
 <p>Diagram illustrating the removal of the stopper and cushion rubber from the load chain. The stopper is shown being removed from the no-load side of the chain. The cushion rubber is also shown being removed from the no-load side.</p>	<p>A) Remove the stopper, and the cushion rubber or the chain spring from the no load side of the load chain.</p>
 <p>Photograph showing the disassembly of the chain guide A. The chain is being pulled out from the body. The no-load side and load side are labeled. A hand is shown pulling the chain out from the load side.</p>	<p>B) Pull out the load chain from the body. Pulling the chain out of the body from the load side.</p>
 <p>Diagram illustrating the removal of the limit lever pin, lever coupling, and limit lever S from the chain guide A. The limit lever pin, limit lever coupling, and limit lever S are shown being removed from the chain guide A.</p>	<p>C) If hoist is equipped with upper limit or an upper/ lower limit switch remove the split pin and pull out the limit lever pin from the lever coupling. D) Remove the limit lever pin, the lever coupling, and the limit lever collar from the limit lever S (an upper limit switch type) or the limit lever assembly (an upper/ lower limit switch type). E) Remove the limit lever S (an upper limit switch type) or the limit lever assembly (an upper/ lower limit type) from the chain guide A (AL).</p>
 <p>Diagram illustrating the removal of the guide roller and roller pin from the chain guide A. The guide roller and roller pin are shown being removed from the chain guide A.</p>	<p>F) Remove the socket bolts to detach the chain guide A from the body. G) Remove the guide roller and the roller pin from the chain guide.</p>

3.5 Disassembly of the Motor



A) Turn the hoist over so that fan cover is facing up. Remove the socket bolts to detach the fan cover from the motor frame.

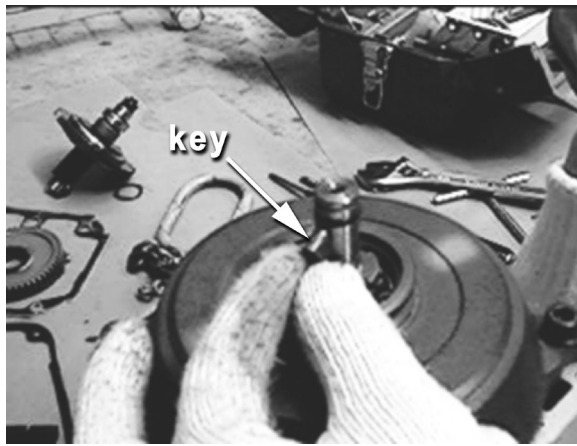
NOTICE Setting the hoist up on wooden blocks will accommodate the gear shaft, which extends out past the body.



B) Remove the snap ring and fan washer.



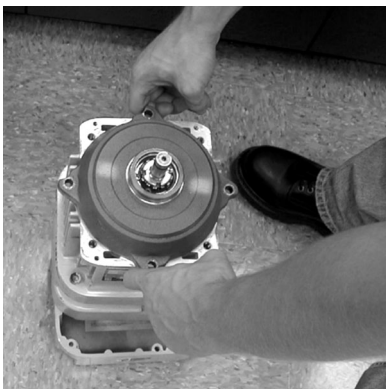
C) Remove fan. If fan does not come off easily, use a pulley remover. Insert the "arms" of the pulley-remover into the holes in the fan to remove it.



D) Remove the key (small square metal insert that keeps the fan in line with the motor) and the "O" ring.



E) Remove the socket bolts on the motor cover assembly.
F) Using a plastic or rubber mallet and a screwdriver tap the cover evenly on each side to release the motor brake assembly from the motor frame. Pry gently under the recesses the tabs to free the cover assembly.

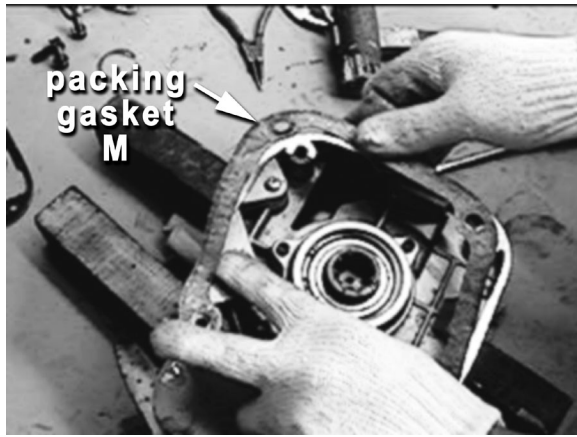


G) Remove rotor and brake assembly.
NOTICE For convenient removal, rotate the motor cover tabs so that they extend beyond the body as pictured to the left and lift firmly upward on the tabs.
CAUTION Carefully remove motor cover with brake drum, motor shaft and rotor. Damage to stator windings may result if rotor is allowed to fall or drop against motor frame.



H) Remove the socket bolts and loosen the motor frame/stator assembly by lightly tapping the base of the assembly with a plastic or rubber mallet. To separate, pry gently at the square notch on the side of the body. Pull off the motor frame/stator assembly from the body.

⚠ CAUTION Take precautions to prevent damaging the lead-wires of the motor/stator while pulling the unit off of the body section. Wiring must slide through the body section during removal.



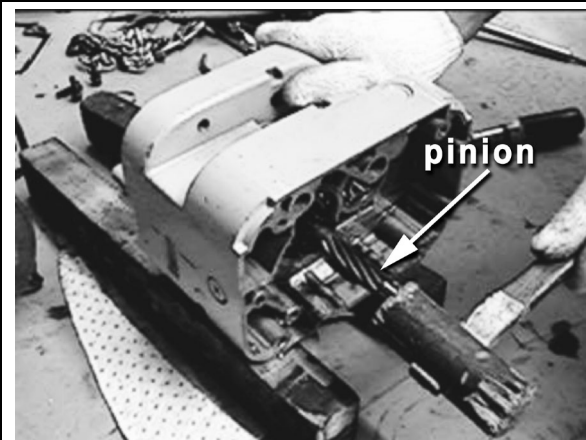
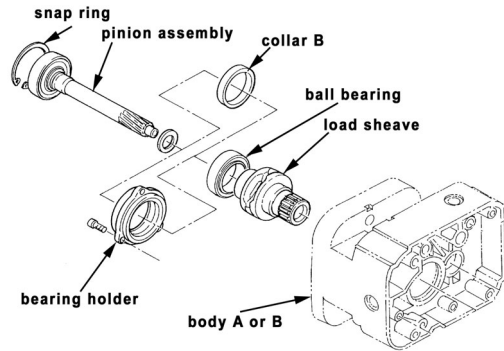
I) Remove the packing gasket M.

NOTICE If damaged, the packing gasket M will have to be replaced with a new gasket during reassembly.

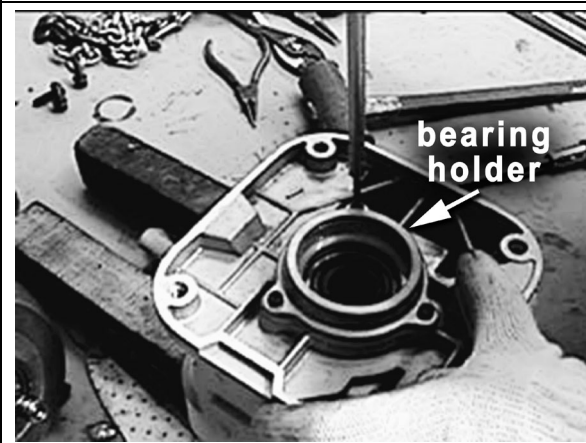
3.6 Disassembly of the Body



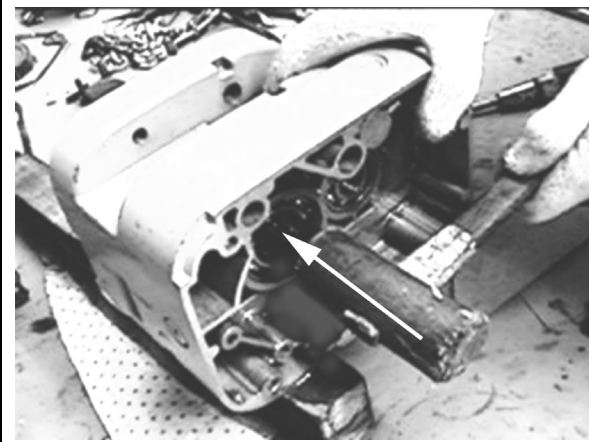
A) Remove the snap ring retaining the pinion to the body.



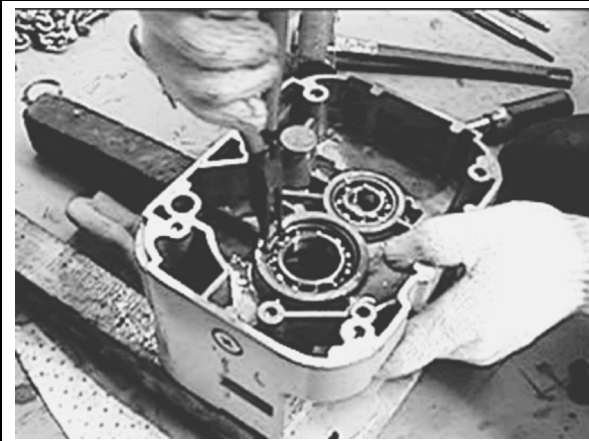
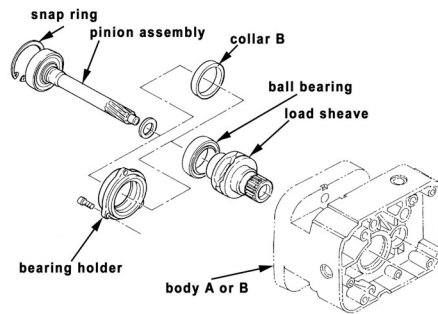
B) Pull out the pinion together with the bearing by lightly tapping the pinion from the direction of the gear case with a plastic or rubber mallet.



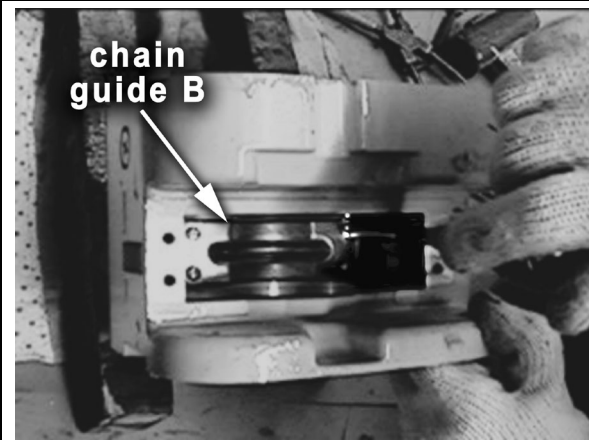
C) Remove the socket bolts to detach the bearing holder from the body.



D) Remove the load sheave together with the bearing and the oil seal by lightly tapping in the same direction as the pinion.

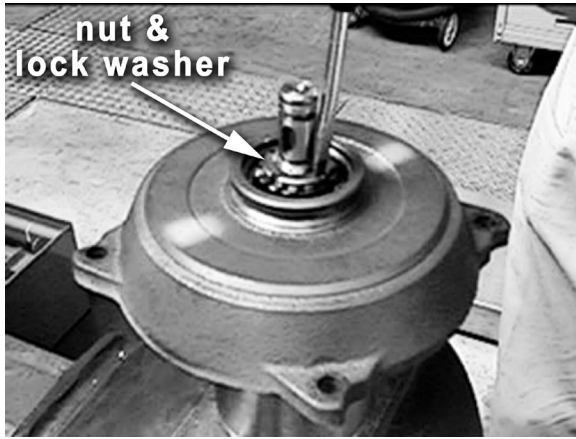


E) Remove the snap ring and take out all bearings and oil seals from the body.



F) Remove the screws to take out chain guide B.

3.7 Disassembly of the Motor Brake

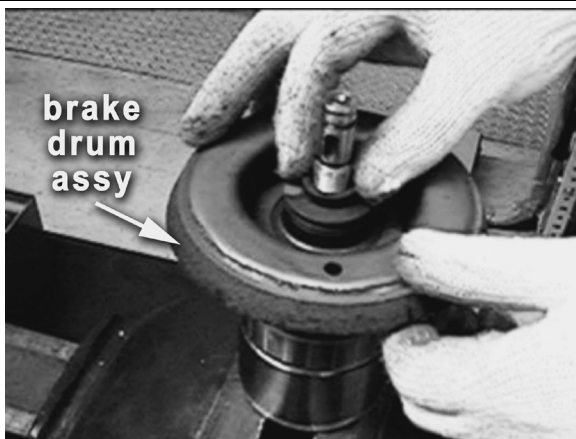


A) Flatten the claw of the lock washer using a small screwdriver.

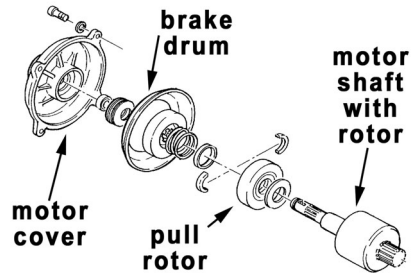


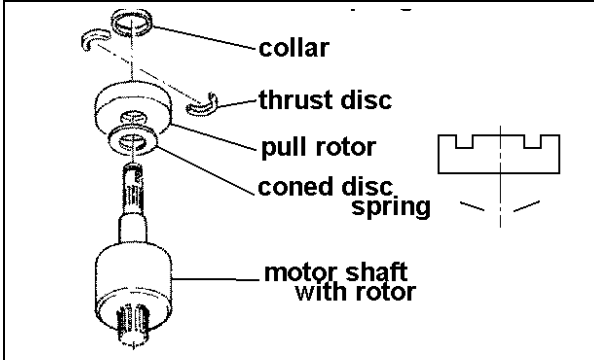
B) Loosen nut by lightly tapping a notch on the nut with a screwdriver and mallet. Remove the nut by turning.

NOTICE Pushing down on the motor brake cover releases the spring tension making the nut easier to remove. Then remove the lock washer; spacer and motor cover assembly in this order.

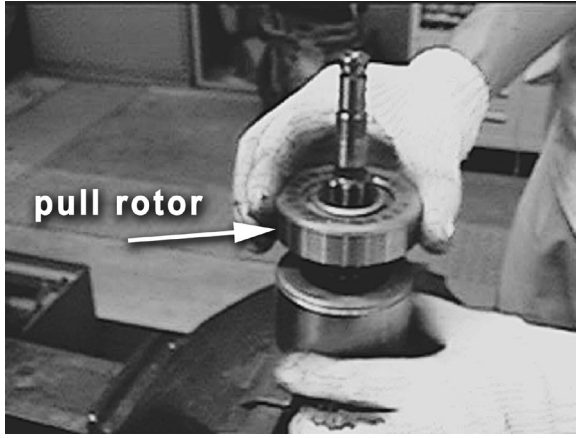


C) Remove the collar M, coned disc spring, brake drum assembly, brake spring, and thrust collar.





D) Clamp the pull-rotor and the rotor together with two vises to remove the thrust disc.



E) Remove the pull rotor and the coned disc spring

⚠ CAUTION Inspect all parts referring to Appendix A for wear measurements and criteria before reassembly. Replace all parts that do not meet Appendix A criteria.

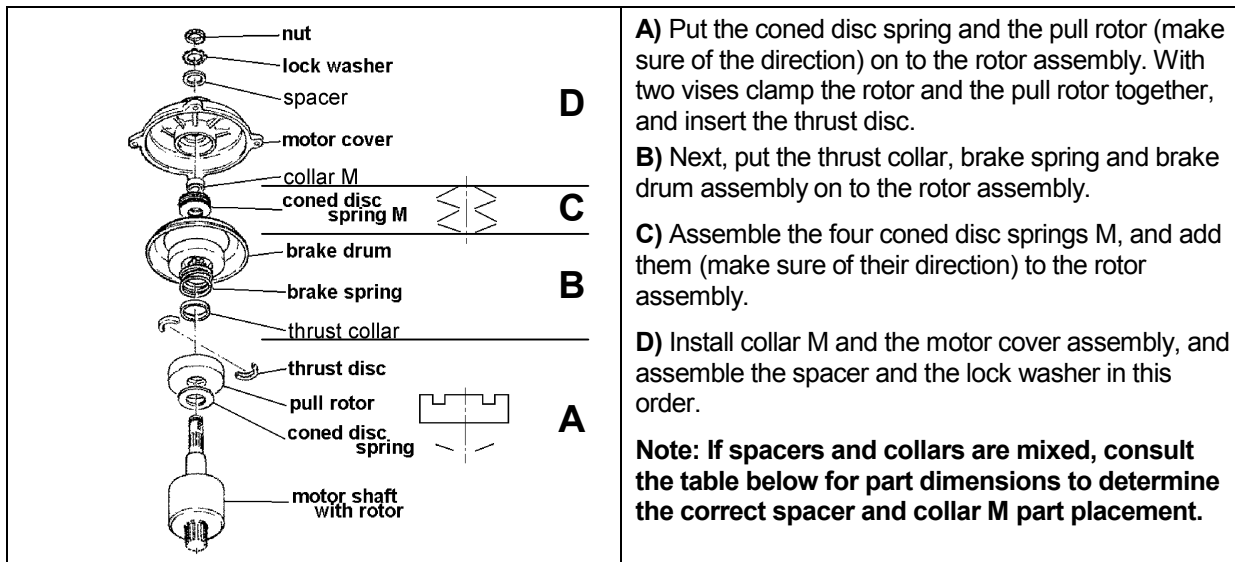
4.0 Hoist Reassembly

4.1 Reassembly of the Motor Brake

⚠ DANGER If any part is judged to be outside of discard criteria during the check, do not use it for reassembly.

- Fasten bolts and nuts properly.
- Ensure that all split pins are installed properly.

⚠ CAUTION Make sure that the brake gap is inspected and adjusted.



SPACER/COLLAR M – PARTS DIFFERENTIATION				
HOIST TYPE	SPACER		COLLAR M	
	PART NUMBER	OUTSIDE DIAMETER IN (mm)	PART NUMBER	OUTSIDE DIAMETER IN (mm)
001H, 003S, 005L, 003H, 005S, 010L, 010M	ES216S005	1.10 (28)	ES192005S	1.00 (25.4)
010S, 15S, 020L, 020M, 030C	ES216S010	1.18 (30)	ES192010S	1.07 (27)
020S, 025S, 030L, 030S, 050L	ES216S015	1.575 (40)	ES192015	1.49 (38)

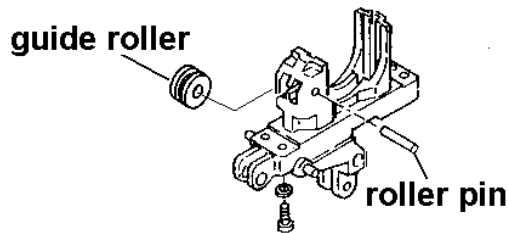


E) Tighten the nut until the break gap (a gap between the pull rotor and the brake drum) becomes the equal to the value specified in the Appendix A, Table 6-3. Confirm the gap with a feeler gauge.

F) After confirmed, bend up the claw of the lock washer into the notch of the nut. (If the notch of the adjusting nut and the claw of the nut washer do not meet, turn the nut slightly in tightening direction so that the claw gets into the nearest notch.)

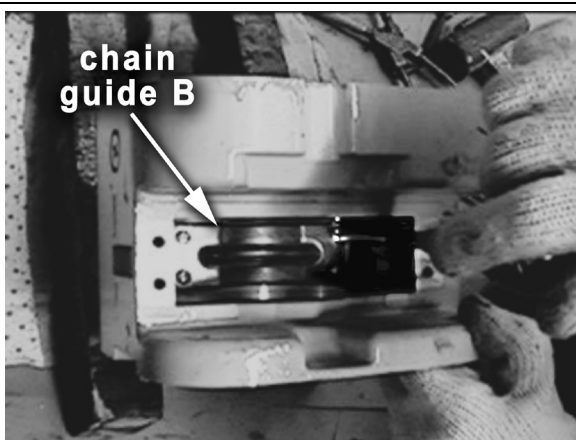
⚠ CAUTION If the gap becomes 0.047”(1.2mm) or larger for those models with a proper gap of 0.020”(0.5 mm) and 0.059”(1.5 mm) for those models with a proper gap of 0.032”(0.8 mm) respectively, the brake may drag or function improperly when the hoist is operated.

4.2 Partial Assembly of the Chain Guide

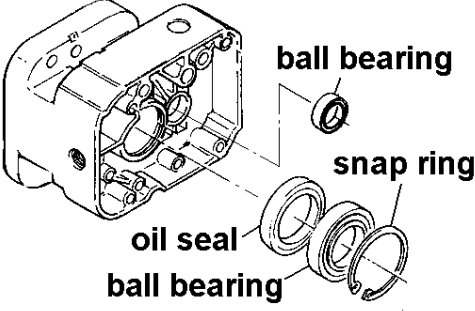
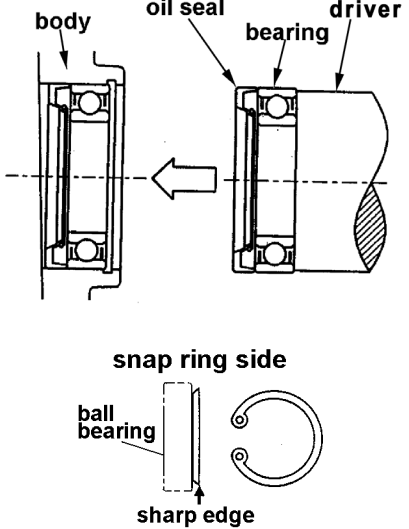
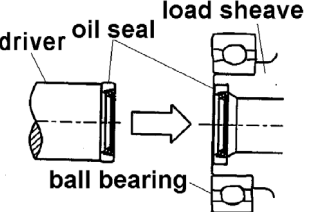
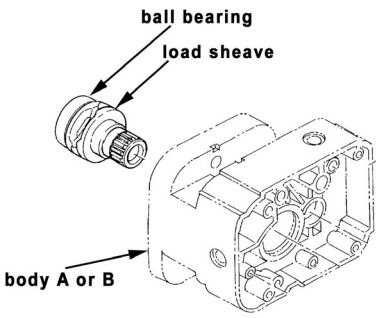


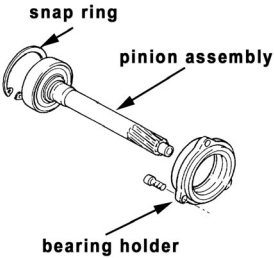
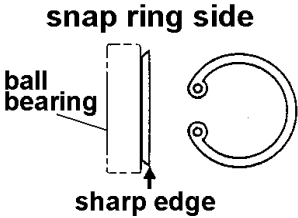
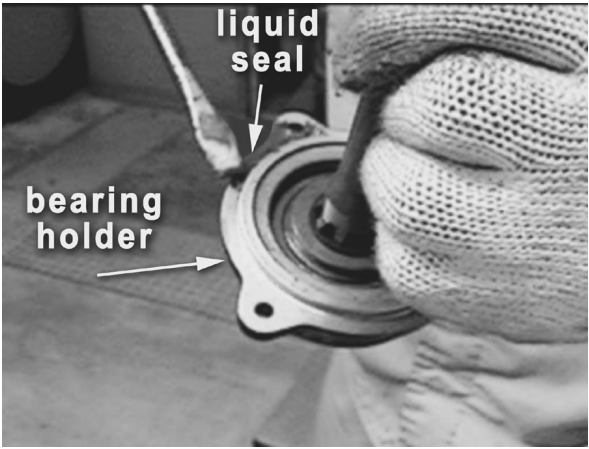
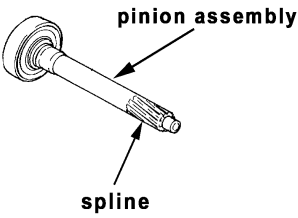
A) Install the guide roller and the roller pin.

4.3 Reassembly of the Body

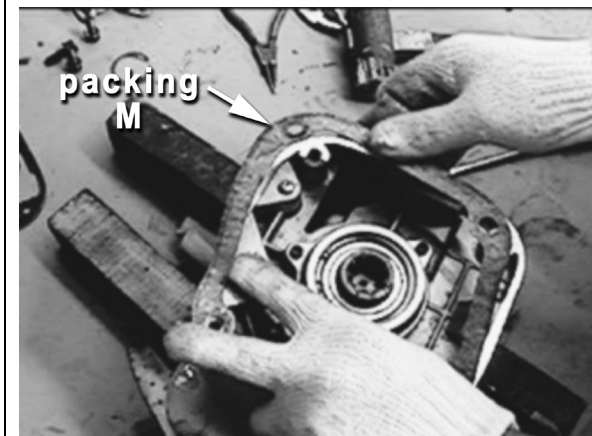


A) Mount the chain guide B to the body (“A” NER or “B” ER) with machine screws. Ensure that screws are adequately tightened.

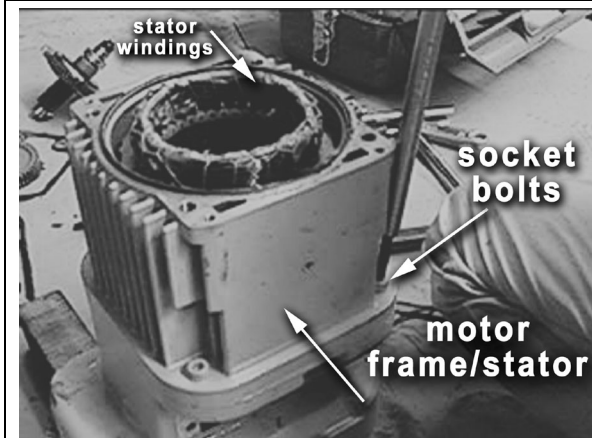
	<p>B) Prepare the bearing for the mechanical brake gear set or friction clutch set into the body section.</p>
	<p>C) Put a new oil seal on the bearing, and insert them into the body section from the gear-case side using a properly sized ball bearing or oil seal driver. Use care while installing to prevent damaging them.</p> <p>After assembly, apply machine oil onto the entire circumference of the lip. Using snap ring pliers insert a new snap ring with its sharp edge up (away from bearing). Check the snap ring fit. Make sure that the snap ring is properly seated in the groove.</p>
	<p>D) Put an oil seal on to the load sheave. Use a properly sized ball bearing or oil seal driver to prevent damage to the seal. After assembly, apply machine oil onto the entire circumference of the lip.</p>
	<p>E) Put the body section on wooden blocks and insert the load sheave by using a ball bearing or oil seal driver and lightly tapping with a plastic or rubber mallet.</p>

	<p>F) Put the pinion assembly (includes bearing) on the bearing holder and insert by lightly tapping with a plastic or rubber mallet.</p>
	<p>G) Using a snap ring pliers, install a new snap ring with its sharp edge up (away from bearing). Check the snap ring fit. Make sure that the snap ring is properly seated in the groove.</p>
	<p>H) Apply a thin and uniform layer of liquid sealant on the surface of the bearing holder that contacts the body. Install the bearing holder and pinion assembly in the body. Apply thread-locking adhesive to the socket bolts prior to installing.</p>
	<p>I) Apply a thin and uniform layer of high temperature grease to the internal spline on the end of the pinion.</p>

4.4 Reassembly of the Motor



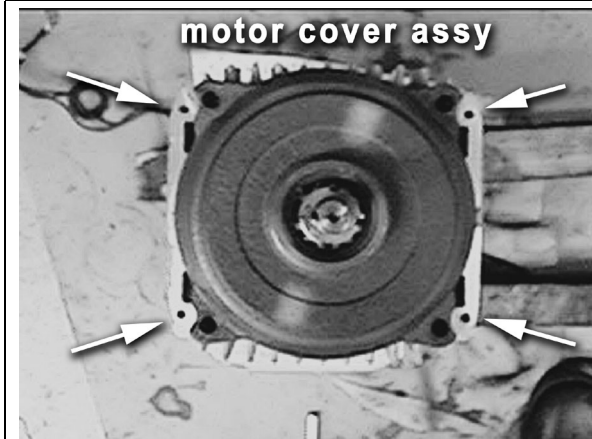
A) Place a new packing M on the surface of the body section where the motor frame/stator assembly is to be mounted, then bundle the lead-wires of the motor with a electrical tape and pass them through the body section. Make sure lead-wires are not pinched between the body and the stator assembly. Mount the motor frame/stator assembly on to the body section such that the Harrington nameplate is located on the top hook side. Make sure the set pin is already installed.



B) Apply thread-locking adhesive to the socket bolts that connect the motor frame/stator assembly to the body section and tighten the socket bolts.

C) Apply liquid sealant to edge of motor cover where it mates to the motor frame. Insert the motor brake assembly into the motor frame/stator assembly.

⚠ CAUTION Guard against bumping or scraping the stator windings while installing the motor brake and rotor.



D) Apply thread-locking adhesive to the socket bolts, and fasten the motor brake assembly and the motor frame/stator assembly together. Check that the orientation of the motor cover leaves space for the fan cover bolts.



E) Slide the key into the motor shaft of the motor brake assembly.

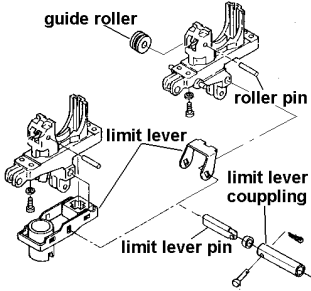

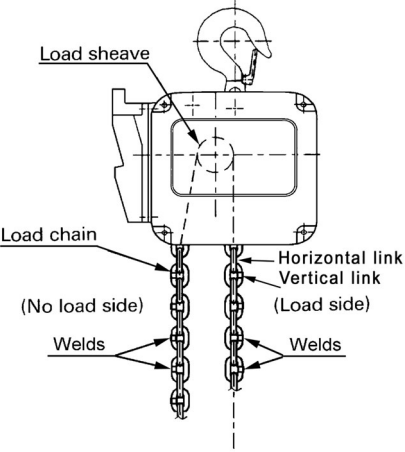
F) Align the notch in the fan with the key on the motor shaft and press the fan onto the shaft. If the fit is too tight, lightly tap the place indicated in the figure with a plastic or rubber mallet to install the fan.



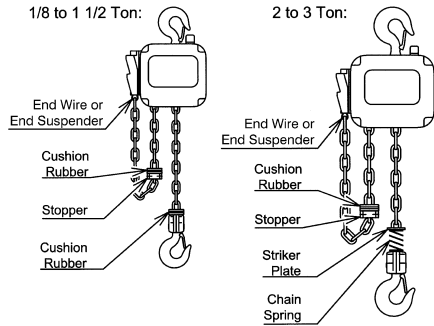
G) Insert the fan washer and using snap ring pliers, install a new snap ring with its sharp edge up. Check the snap ring fit. Make sure that the snap ring is properly seated in the groove.

H) Using socket bolts with star lock washers, connect the fan cover and the motor frame/stator assembly together. Make sure that the fan cover drain hole is facing down towards the chain guide.

4.5 Reassembly of the Load Chain

	<p>A) Reinstall the guide roller and the roller pin on the chain guide A.</p> <p>B) Reinstall the limit lever S (an upper limit switch type) or the limit lever assembly (an upper/ lower limit type) on the chain guide A (AL).</p>
	<p>C) Install the socket bolts to connect the chain guide A to the body.</p> <p>D) Reinstall the limit lever pin, the lever coupling, and the limit lever collar on the limit lever S (an upper limit switch type) or the limit lever assembly (an upper/ lower limit switch type).</p> <p>E) If hoist is equipped with upper limit or an upper/ lower limit switch reinstall the split pin and reinsert the limit lever pin in the lever coupling.</p>
	<p>F) Set up the load chain for installation such that the welded side of the chain link runs on the outside of the load sheave. In addition, start by inserting a horizontal link first (a vertical link for the capacity of 5 tons or larger).</p> <p>G) With the chain guide facing up, insert the load chain into the chain guide from the load side. Wind up the chain by turning the load sheave gear (not the spline) with your hand to pass it through to the other load chain exit. Turn the hoist over to allow the load chain to pass through the no load side exit.</p> <p>H) Double-check the direction of the load chain. There should be no twisting of the load chain.</p>

1/8 to 3 Ton Upper Limit Switch Only

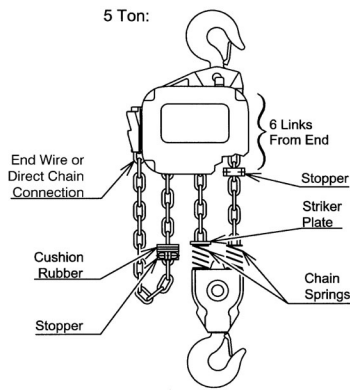


I) The quantity and location of the chain components including cushion rubbers, chain springs and striker plates depend on the hoist model, capacity and limits switches. Never operate the hoist with incorrect, missing or damaged chain components.

J) For hoists with an Upper Limit Switch only, refer to the hoist's nameplate, Chain Stopper Placement Table, and Figures to the left and ensure that all chain components are in the correct location and properly installed.

K) For further information on installing the stopper, and cushion rubber or chain spring refer to section 3.2 in the Owner's Manual for specific instructions applicable to your hoist.

5 Ton Upper Limit Switch Only



Chain Stopper Placement Table

Capacity Code

Without Chain Container

With Chain Container

001HD, dual speed with optional upper/lower limit switch

25th link from the free end

3rd link from the free end

001H, 003S, 003H, 005L, 005S, 010L, 010S, 015S, 020L

15th link from the free end

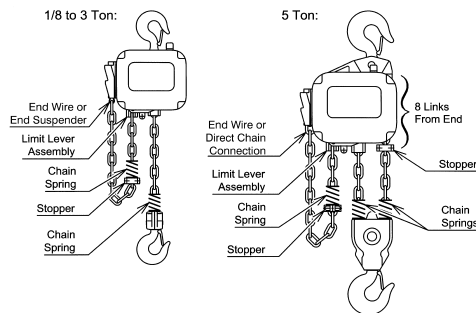
3rd link from the free end

020S, 025S, 030L, 030S, 050L

13th link from the free end

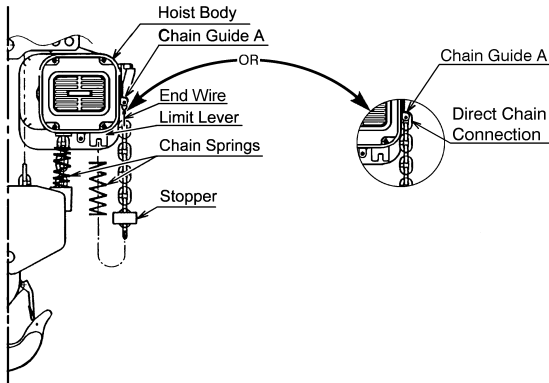
3rd link from the free end

1/8 to 5 Ton Upper/Lower Limit Switch



L) For hoists with Upper and Lower Limit Switches, refer to the illustrations at the left...

8 to 20 Ton Stopper and End Connections



M) For 8 to 20 Ton hoists without a chain container, the free end of the chain is attached to the hoist body as shown in Figure at right. Connect the “no load” end of the chain to Chain Guide A with an End Wire or End Suspenders and the pre-installed socket bolt and lock nut. Make sure the chain remains free of twists and the chain Stopper is installed on the correct link. Refer to table below for proper placement of Stopper.

Chain Stopper Placement

Capacity Code

Without Chain Container

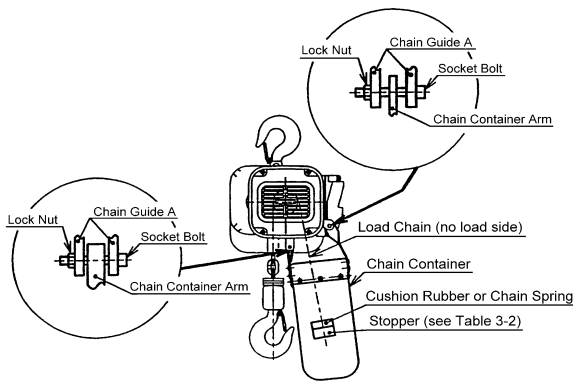
With Chain Container

080S, 100L, 100S, 150S, 200S

9th link from the free end

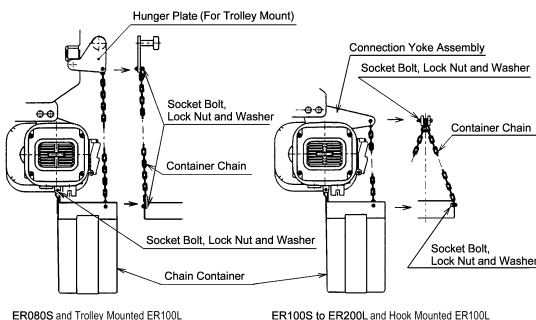
3rd link from the free end

1/8 to 5 Ton Chain Container Installation



N) For hoist on which the optional canvas chain container is used, install it on the hoist body as shown in the figures to the right. In this case the free end of the chain is not attached to the hoist body and the chain stopper is installed on the third link from the free end. To place the chain into the chain container, feed the chain into the chain container beginning with the free end. Take care to avoid twisting or tangling the chain.

8 to 20 Ton Chain Container Installation



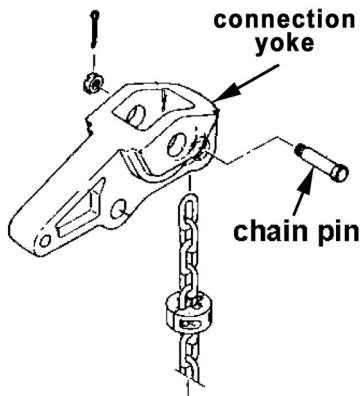
O) NEVER put all the chain into the container at once. Lumped or twisted chain may:

Upper Limit Switch Only - jam against the hoist body activating the friction clutch and potentially damaging the chain.

Upper and Lower Limit Switch (Optional) - activate the down limit switch and stop the hoist during lowering.

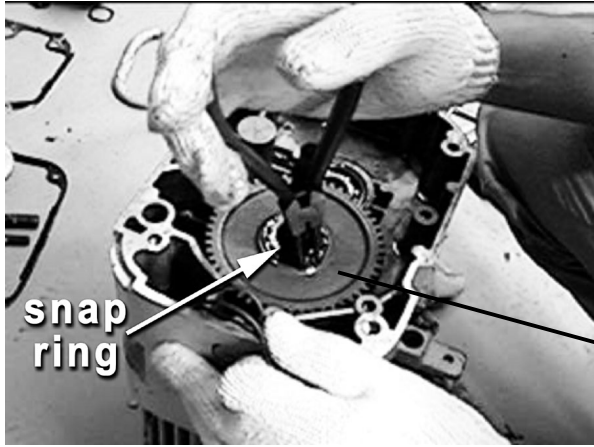
P) When using an optional steel chain container, refer to the assembly drawing provided with the container for correct assembly and attachment.

- **PRECAUTIONS FOR ASSEMBLING DOUBLE FALL TYPE LOAD CHAIN (5 – 20 TON)**

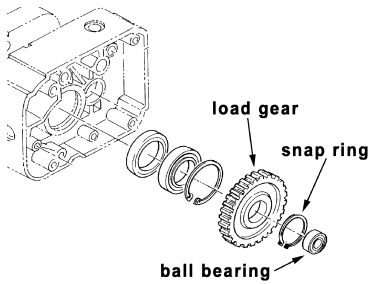
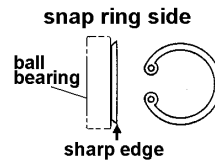


- A)** For hoist capacities 5-20 Ton, insert the load chain from the no load side. Also, insert a vertical link first into the chain guide.
- B)** For placement of the chain spring, stopper, and cushion rubber or chain spring see Owner's Manual 1/8 – 5 Ton & 8-20 Ton, Section 3.2.
- C)** Pass the chain spring to the top of the bottom hook.
- D)** Connect the load side chain end to the connection yoke using the chain pin, slotted nut and split pin. Make sure the load chain is not twisted.
- E)** For installation instructions for the stopper on the load chain see Owner's Manual 1/8 – 5 Ton & 8-20 Ton, Section 3.2.

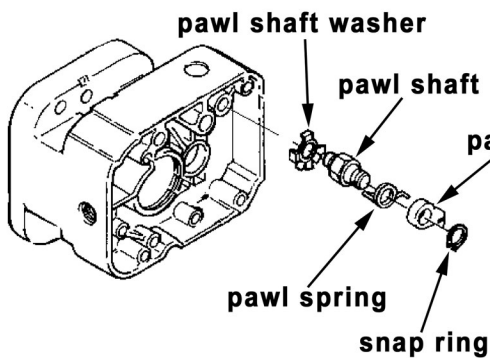
4.6 Reassembly of the Gear Case and Gear Parts



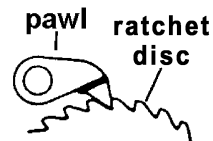
A) Flip the hoist body such that the fan side is down. Insert the load gear on to the load sheave and attach with a new snap ring with its sharp edge up. **B)** Ensure that the snap ring is properly seated in the groove.

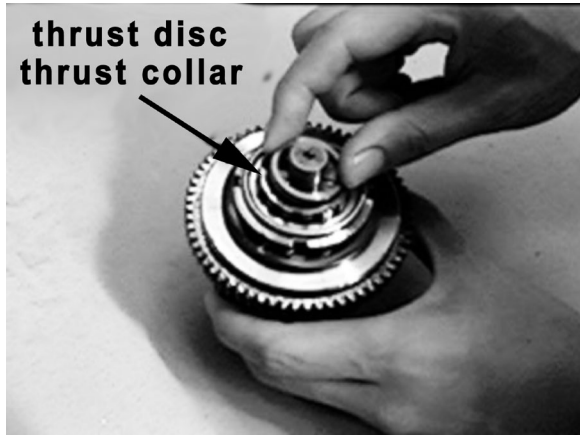


- **FOR ER ONLY**

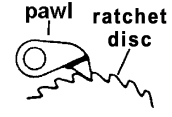


A) Insert the pawl spring and pawl onto the pawl shaft. Make sure that the pawl spring is inserted into the restraining hole in the body and clips to the top of the pawl. Fasten with a new snap ring. Make sure of the direction so that the pawl properly engages the ratchet (see illustration below).

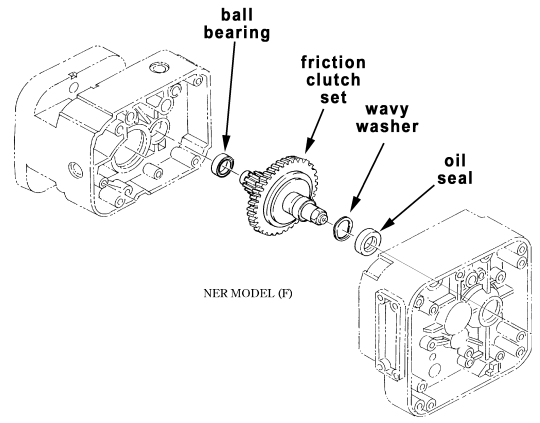




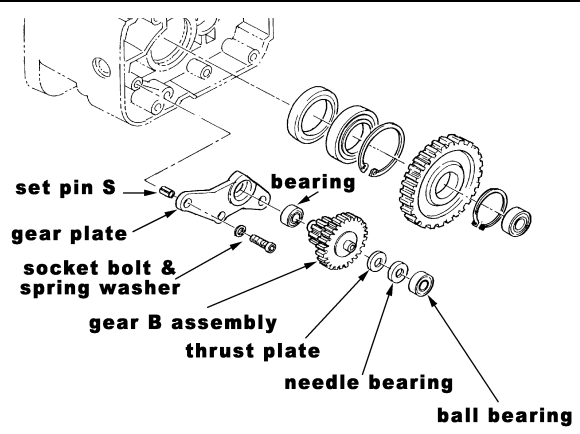
B) Pre-assemble the mechanical brake with friction clutch complete set (composed of the gear, brake holder, ratchet, friction clutch assembly, thrust disc, and thrust collar). After confirming the engagement of the ratchet wheel and pawl, connect them together.



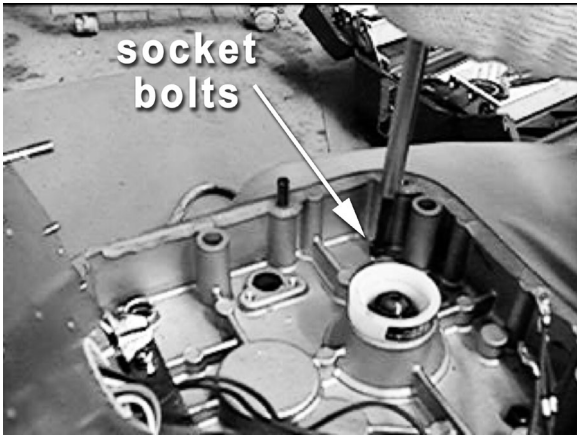
C) Install the friction clutch assembly and attach the set spring (This step is not necessary for mechanical brake with friction clutch type)



D) For NER, insert new oil seal into the gear case and press it into the gear case. After assembly, apply machine oil on the entire circumference of the lip. (This step is not necessary for mechanical brake with friction clutch type)



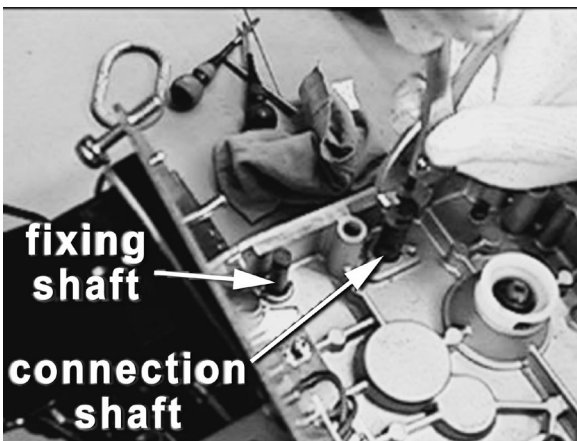
E) For three gear hoists, reinstall the gear plate socket bolt and spring washer checking the position of set pin S. Place bearing on gear plate, and then the gear B assembly, thrust plate, needle bearing and ball bearing.



F) Place a new gear case packing and assemble the gear case by lightly tapping with a plastic or rubber mallet. Make sure that the set pin is already installed.

⚠ CAUTION Prevent pinching lead-wires while connecting the gear case to the body.

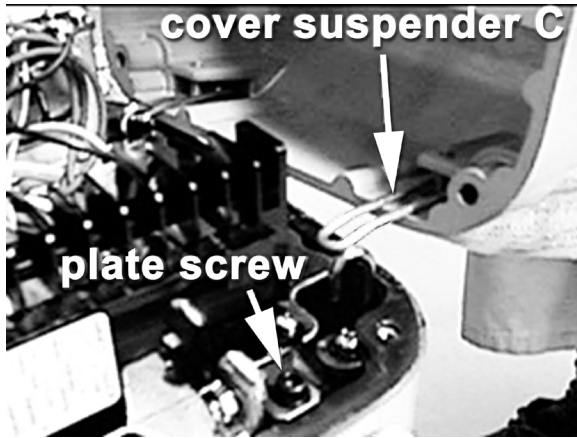
G) Hand tighten socket bolts to connect the gear case to the body section, and then tighten bolts in a diagonal sequential manner.



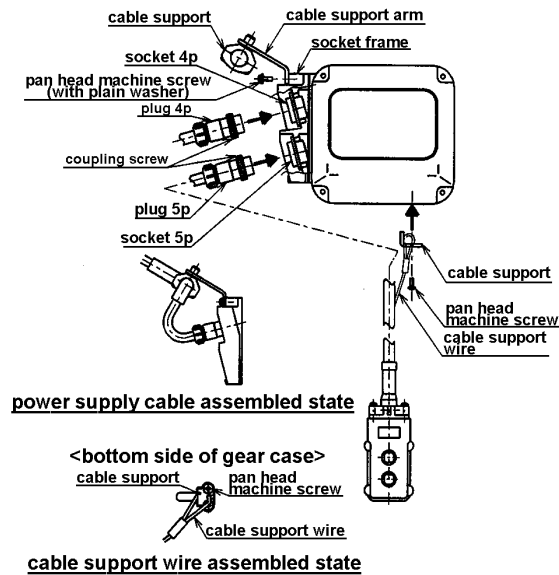
H) Insert the connection shaft and the fixing shaft through the top hook (connection yoke).

I) Retain the connection shaft with plate A.

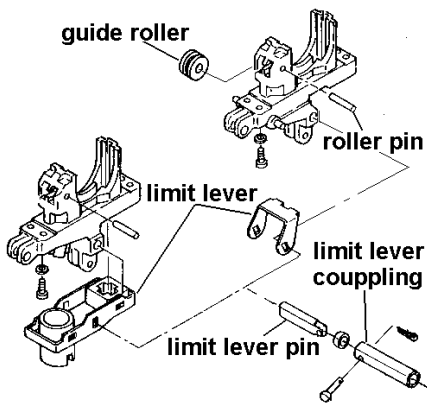
4.7 Reassembly of the Controls Unit



- A) Reconnect lead-wires of the motor.
- B) Check the wiring using the wiring diagram listed in Appendices or Owner' Manual.
- C) Close the plate and secure the plate screws.
- D) Hook the cover sponder C connected to the controller cover onto the cover sponder A and B connected to the gear case.



- E) If damaged, replace the controller cover packing with a new one and connect the controller cover with socket bolts.
- F) Insert the plug 5P of the push button cord into the socket 5P and connect the cord support wire to the gear case.
- G) Insert the plug 4P of the power supply cable to the socket 4P and connect the power supply cable to the cable holder.
- H) Reinstall the chain container on to the body, if the hoist was equipped with one. Or, install load chain end wire or end sponder (Refer to the Owner's Manual 1/8 – 5 Ton & 8-20 Ton, Section 3.2 for installing the container, end wire or end sponder).



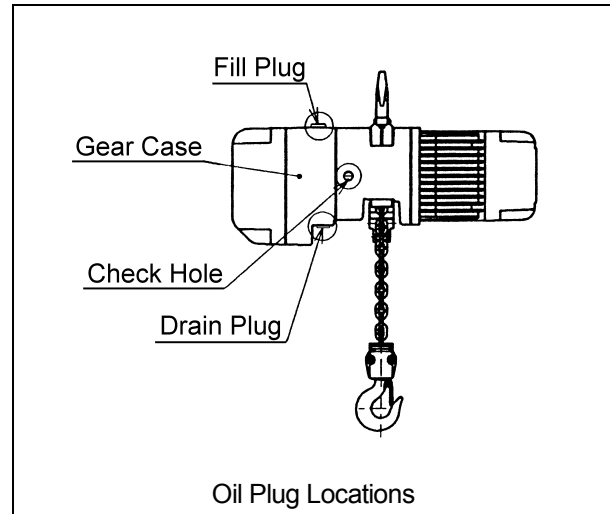
- I) Install the limit lever S (an upper limit switch type) or the limit lever assembly (an upper/ lower limit type) on to the chain guide A (AL).
- J) Install the limit lever pin, the lever coupling, and the limit lever collar on to the limit lever S (an upper limit switch type) or the limit lever assembly (an upper/ lower limit switch type).
- K) If hoist is equipped with upper limit or an upper/ lower limit switch install the split pin and re-insert the limit lever pin on to the lever coupling.

4.8 Checking Hoist Operation

⚠ CAUTION Refer to applicable paragraphs of Owner's Manual, Electric Chain Hoist, ER and NER SERIES 1/8 Ton through 5 Ton Capacity, and Owner's Manual Supplement, Electric Chain Hoist, ER and NER SERIES 8 Ton through 20 Ton Capacity of sections 3.0 and 6.0 prior to operating the hoist.

A. Fill gear oil through the fill plug before starting operational checks.

Amount of Gear Oil		
Capacity Code	Quarts	Liters
001H, 003S, 005L	0.74	0.7
003H, 005S, 010L	1.06	1.0
010S, 015S, 020L	1.80	1.7
020S, 025S, 030L, 030S, 050L	3.17	3.0



NER Gear Oil:

- Harrington standard: Bonnoc M260 (NIPPON OIL)
- Acceptable equivalent: Meropa 320 (TEXACO)
- Acceptable equivalent: Meropa 320 (CALTEX)

ER Gear Oil:

- Harrington standard: Antoil super B (NIPPON OIL)
- Acceptable equivalent: Meropa No.68 (TEXACO)

⚠ CAUTION The ER (with mechanical load brake/friction clutch) uses different gear oil than the NER (with friction clutch). DO NOT use any oil or quantity other than that specified.

⚠ WARNING Using an incorrect type/grade of gearbox oil or the wrong quantity of oil may prevent the friction clutch from working properly and may affect the ability of the hoist to hold the load. Refer to table above for the correct oil and quantity.

B. Power ON: Conduct lifting and lowering operations with no load, and check if:

- The hoist lifts or lowers as intended.
- The motor rotates properly.
- The gear rotates properly.
- The brake engages when stopped and the motor stops immediately.
- The upper/ lower limit switch works properly (only for a model equipped with a limit switch).

If proper operations are confirmed without load, set a rated load and repeat the operational test.

C. Dynamic Load Test

- A dynamic load test must be performed on the hoist in accordance with ANSI B30.16.

5.0 Electrical Troubleshooting Procedure

WARNING

HAZARDOUS VOLTAGES ARE PRESENT IN THE HOIST AND IN CONNECTIONS BETWEEN COMPONENTS.

Before performing ANY troubleshooting on the equipment, de-energize the supply of electricity to the equipment, and lock and tag the supply device in the de-energized position. Refer to ANSI Z244.1, "Personnel Protection - Lockout/Tagout of Energy Sources."

Only Trained and competent personnel should inspect and repair this equipment.

The following operations provide guidance in the electrical troubleshooting and repair of the ER/NER electric chain hoist. These operations are best performed prior to hoist disassembly.

5.1 Principle of Operation

The electrical components of the hoist are connected in a series circuit configuration. In a series circuit all of the components are connected together one after another. The series circuit is completed when all of the switches and components in the circuit are closed and energized. If there is a disconnect or a component is not energized in the series circuit the hoist will not operate.

Three-phase power is introduced into the hoist through the power supply cord to the contactor and the transformer. The contactors are used to control the hoist and/or trolley operation. The transformer lowers and converts the voltage to 110-volt single phase. The single-phase power is used in the pendant control circuit. The lower control voltage meets the requirements of ASME and OSHA. Once the contactor is energized, the three-phase power flows to the hoist motor allowing hoist operation.

5.2 Design Concept

The hoist electrical circuit is divided into a power circuit and a control circuit. The electrical components are arranged on a hinged plate for repair and maintenance convenience.

5.3 Count/Hour Meter (C/H)

The optional C/H Meter provides the means to compile a maintenance record. Using it with the following tables also provides an indicator of when to replace components.

The C/H Meter located on the electrical control panel records the hoist's on time and the number of starts. To view the two values press the button on the C/H Meter one time. The display will first show an "H" and a 4-digit number, which is the hoist's total on time (lifting/lowering) in hours. After 3 seconds, the display will automatically change to a 6-digit number indicating the number of hoist starts based on the Down contactor activity. Refer to **Figure 5-1**.

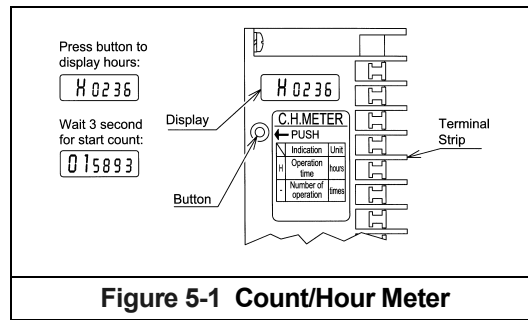


Figure 5-1 Count/Hour Meter

5.3.1 Contactor Use

The C/H Meter can be used in conjunction with the amount of hoist “jogging” to estimate when the contactor(s) should be replaced. “Jogging” is defined as short or quick hoist operations required to position the load hook. It is accomplished by repetitively pressing the pendant hoist control buttons to move the load hook in small increments. Refer to **Table 5-1**.

Table 5-1 Criteria for Recommended Contactor Replacement		
Jogging During Normal Operation		Change Contactor After: (Starts)
Rating	Approximate Jogging Frequency	
Low	Jogging is rare.	1,000,000
Medium	During 25% of operations/lifts.	500,000
High	During 50% or more of operations/lifts.	200,000

5.3.2 Gear Oil Changing

The C/H Meter can be used in conjunction with the average load lifted by the hoist to estimate when the gear oil should be changed. Refer to **Table 5-2**.

Table 5-2 Criteria for Recommended Gear Oil Replacement		
Loading During Normal Operation		Change Gear Oil After: (Hours)
Rating	Average % of Rated Capacity	
Light	0 to 33%	360
Medium	33 to 67%	240
Heavy	67 to 100%	120

5.4 Additional Tools Required

- Volt-Ohm-Meter (VOM)
- Clamp type Ammeter (Amp Clamp)

5.5 Troubleshooting/Repair

5.5.1 Lower/Lift Direction Notice

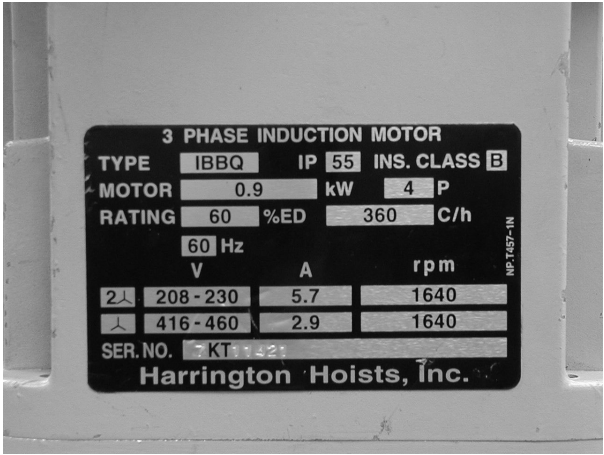
- 1) **⚠ WARNING** The hoist must be connected to the power source so that its direction of operation corresponds to the up-and-down commands issued from the pendant control; i.e. pushing the up button must cause the hoist to lift the load. If the hoist does not operate correctly, shut off and before proceeding, ensure that the electrical supply for the hoist or trolley has been de-energized (disconnected). Lock out and tag out in accordance with ANSI Z244.1 "Personnel Protection - Lockout/Tagout of Energy Sources".
- 2) Disconnect and switch any two of the three input power leads at the power source to correct the hoist's motor phasing. **Do not change any of the power connections inside the hoist body.**

5.5.2 Hoist Motor Phasing/Single Phasing

- 1) A hoist will not function normally if the incoming power is not on all three (3) conductors, which is a condition called "single-phasing". "Single-phasing" will cause damage to the hoist.

5.5.3 Hoist Fails To Operate

- 1) Check Incoming Power

	<p>Use data that pertains to your particular hoist installation; motor wiring can be connected for a variety of voltages.</p>
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Hoist Data Plate

Voltage Measurement

A) ⚠ DANGER Hazardous voltages are present in the control box, other electrical components, and connections between these components. Only trained and competent personnel should inspect and repair this equipment.

B) Before proceeding, ensure proper lock out and tag out procedures in accordance with ANSI Z244.1 "Personnel Protection -Lockout/Tagout of Energy Sources" are followed.

C) Check the incoming power source to ensure that each phase measures within 10% of the voltage listed on the data plate on the outside of the hoist. Refer to paragraph 5.5.3 1).

C) If the voltage varies more than 10% of the rated value, the hoist may not function normally. A hoist will not function normally if the incoming power is not present on all three (3) conductors, which is a condition called "single-phasing".

2) Check Power Supply Cord

Continuity Measurement

A) Check the power supply (SO) cord continuity. Continuity failures may occur in the power supply cord because of the amount of motion that the conductors encounter. Over time the conductors become brittle and break.

B) On one end of the power supply cord is a four (4) pin connector that connects to the hoist. The other end of the power supply cord connects to an outside power source. Check the power supply conductors by pulling the 4 pin disconnect plug out of the hoist and disconnecting the other end from the hard-wired source. Using a VOM test the continuity of each conductor.

B) Also, test the continuity with the other conductors to ensure that the reading is correct and that the wire is not "shorted" to another conductor.

3) Check Contactor(s)



Contactor Voltage Measurement

A) NOTICE Taking a reading from line to ground will not yield the proper voltage reading due to the use of phase converters or deltas. Only measure line to line.

B) Power On – High Voltage. With the hoist powered ON check the voltage on the contactor. Test the voltage line to line. Ensure that the voltage measurements match the voltage listed on the data plate, which is on the outside of the hoist. Refer to paragraph 5.5.3 1).

C) Contactor Coil –Verify that the contactor coil is not damaged or open by measuring the resistance between A1 and A2 on both coils. It should not be an “open” circuit.



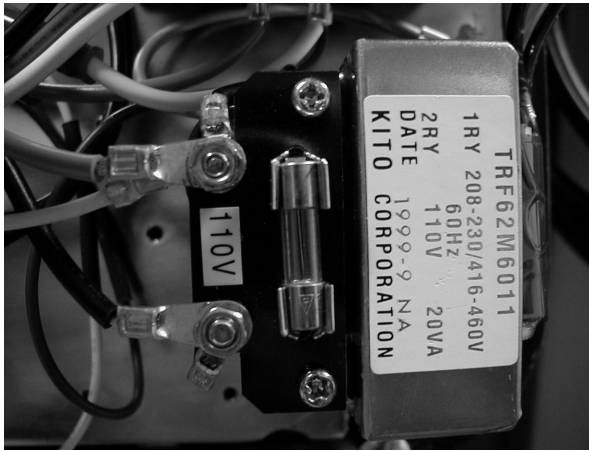
Contactor

A) Power Off – Make sure that there are no cracks or other damage to the contactor. Make sure that the contactor operates smoothly by pushing the test button with a screwdriver.

B) Check each contact point for continuity while mechanically operating the contactor. Observe the contact points “making” and “breaking”.

C) Make sure that no contact is burned and damaged. This is exhibited by blackening or pitting. If this or any results of “arcing” are observed, replace the contactor.

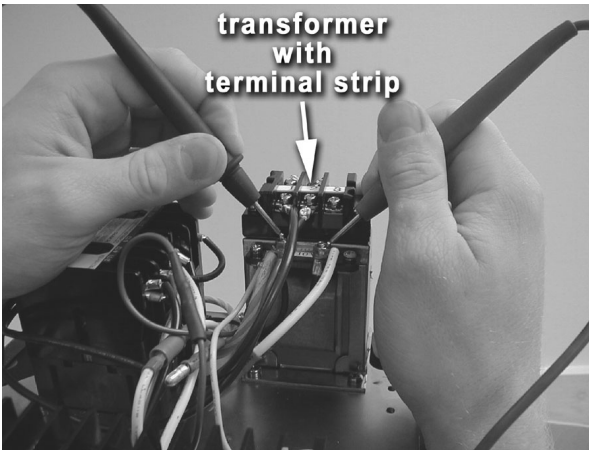
4) Check Transformer



Transformer

A) De-energize (disconnect) the main switch supplying power to the equipment, and lock and tag the main switch in the de-energized position.

B) Verify that the transformer fuse is not open.



Transformer Continuity Test

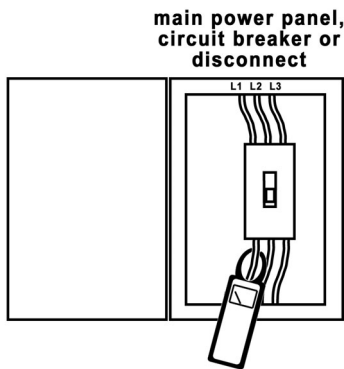
A) Isolate or disconnect the transformer. Using the VOM verify the continuity of the primary and the secondary transformer windings. The resistance value should be small. If very large, indicating an open circuit, replace transformer.

B) Next, reconnect all wiring, reenergize all circuits and check the voltage on the secondary (low voltage) side of the transformer. It should measure +/- 10% of rated voltage.

C) Check for improper electrical connections by referring to the wire diagram (Appendix C).

D) Check for loose or broken connections.

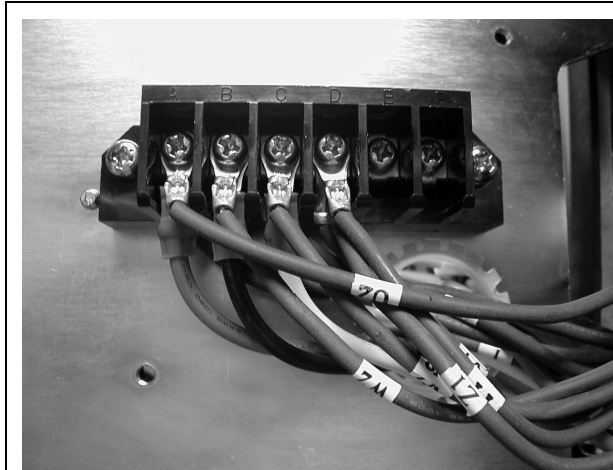
5) Check Incoming Current.



Current Measurement

Using a clamp type ammeter (amp clamp) check each of the three-phase lines at the main disconnect or switch, one at a time. The amperage should be approximately equal for each phase and the same for values listed on the data plate. It will be a little under the rating on the plate if it is cold and close to or a little over to the data on the plate if it is hot.

6) Check the Motor Windings (Current Draw).



Hoist Motor Connections

With the hoist powered ON measure the current draw at the motor connections on the terminal strip using the clamp type ammeter (amp clamp). Ensure that the current measurements match those listed on the data plate, which is on the outside of the hoist.

7) Check Pendant Cable (SO Cord)

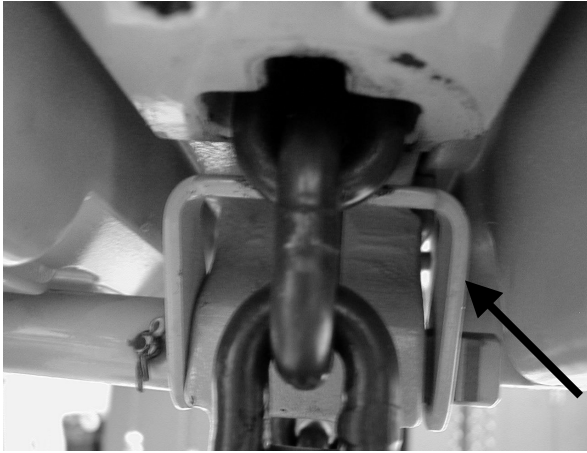


Continuity Check

A) Check the pendant (SO) cord continuity. Continuity failures may occur in the pendant cable because of the amount of motion that the conductors within the SO Cord encounter. Over time the conductors may become brittle and break. Using the VOM, check the continuity of the pendant cable conductors. Remove the pendant cable plug from the hoist.

B) At the pendant plug, test for continuity between the common conductor, pin 4 and the UP (pin 2) and DOWN (pin 1) conductors. A “short” or low resistance measurement should be observed when depressing the pendant button and an “open” or high resistance measurement when the button is released. Also, test the continuity with the other conductors to ensure that the reading is correct and that there is not a “short” to another conductor.

8) Check Limit Switch(es)



Limit Switch

A) Power On Method – While operating the hoist in the lifting direction, push up on the load side of the limit switch. The hoist should stop lifting.

B) If there is an optional lower limit switch, operate the hoist in the lowering direction, push up on the no-load side the limit switch. The hoist should stop lowering. Malfunctioning limit switch(es) should be replaced.



Limit Switch

A) Power Off Method – For the Up direction, place the VOM probes across limit switch terminals A and B. Push the limit lever UP, the VOM should measure an “open” circuit and in the DOWN direction a “closed” circuit.

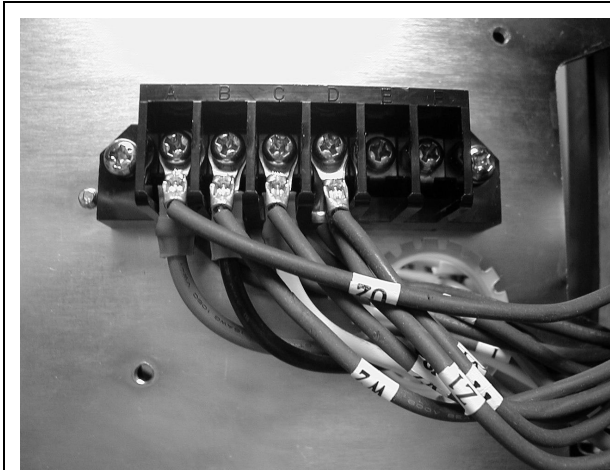
B) If there is an optional lower limit switch, place the VOM probes across limit switch terminals D and C. Push the limit lever UP, the VOM should measure an “open” and in the DOWN direction a “closed” circuit.

C) Refer to the appropriate wiring diagram in Appendix C.

9) Check Count Hour (C/H) Meter

If the C/H Meter is not operating and there is power to the hoist, using the VOM measure the voltage across the C/H Meter. If single-phase voltage is measured and the C/H Meter is not functioning, the C/H Meter is defective and should be replaced. Refer to paragraph 5.3.

10) Check Hoist Motor

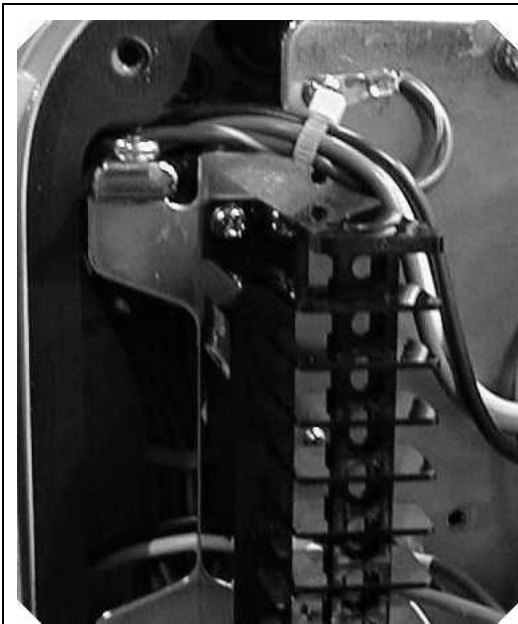


Motor Terminals U1, V1 and W1

A) Motor Winding Resistance Value. Using the VOM, the resistance measurement between terminals U1, V1 and W1 should be the equal.

B) Motor Voltage (+/-10% Range). Check the motor voltage across terminals U1, V1 and W1 to ensure that each phase measures within 10% of the voltage listed on the data plate on the outside of the hoist. If the voltage varies more than 10% of the rated value, the hoist may not function normally. A hoist will not function normally if the incoming power is not present on all three (3) conductors, which is a condition called "single-phasing".

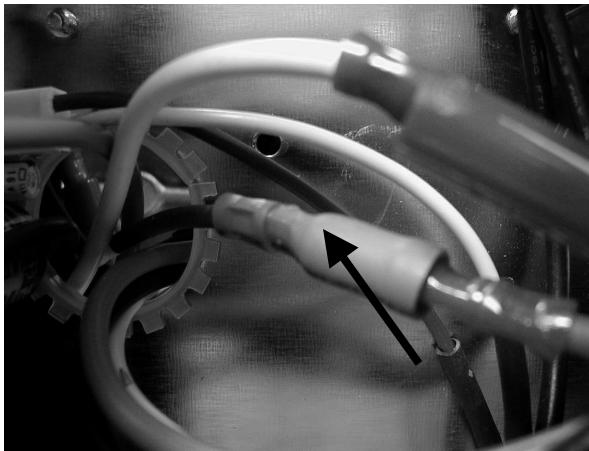
11) Check for Pinched Motor Leads



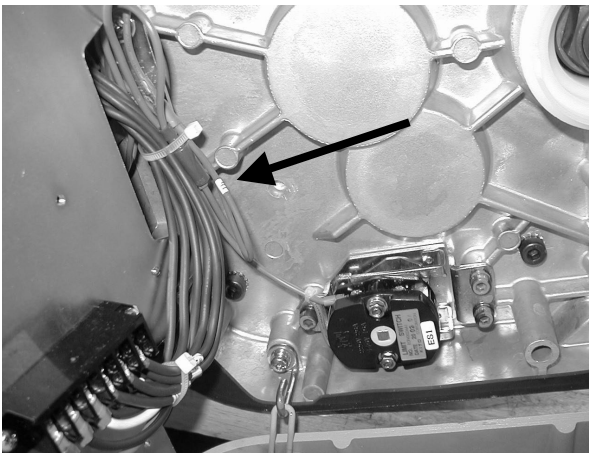
Wires at Hinged Panel

Although a rare occurrence, the motor leads may become pinched somewhere within the hoist. This may cause a wire breakage or a "short".

12) Check Hoist Motor Thermal Overload



Thermal Overload Continuity Test



A) The thermal overload is a normally closed switch. The switch opens when there is an overload condition.

B) With the hoist power OFF measure the continuity between plug terminals 1 and 1B.

C) Plug terminal 1 is located at the hinged panel by the hoist contactors. Plug terminal 1B is located on the other side of the hinged panel near the hoist limit switch. A closed circuit measurement, a “short” or low resistance measurement, indicates that the thermal switch has not been activated. An open circuit measurement, an “open” or high resistance measurement, indicates that the thermal overload switch has been activated by a thermal overload condition or it is defective.

D) If a thermal overload exists it must be corrected and the continuity test performed. If there is no thermal overload and the thermal overload switch measures “open”, the switch should be replaced.

E) Perform the continuity test and corrections until the thermal switch performs correctly.

13) Check Hoist Motor Brake

Refer to Section 6.3 of the Electric Chain Hoist ER and NER Series Owner's Manual.

14) Check Hoist Fusing

Time Delay Fuse – The hoist's power supply should be equipped with overcurrent protection such as fuses, which should be selected for 110% to 120% of total listed full load amperage, and should be dual element time-delay fuses. Refer to the motor nameplate for the full load amperage draw. Dual element time-delay fuses are recommended because of the large “in-rush” currents encountered with motors.

Large Amperage Fuse – If dual element time-delay fuses are not available, a large amperage fuse may be used but must be sized higher than the in-rush current. In-rush currents may be as high as three (3) times the operating current.

5.5.4 Wiring Diagram – Select the appropriate wiring diagram in Appendix C

5.5.5 Troubleshooting Guide – See Appendix C

Appendix A

- Inspection Methods, Criteria and Wear Measurements
- For 1/8 Ton through 5 Ton Capacity
- Section references are to the Owner's Manual, Electric Chain Hoist, ER and NER Series

Table 5-3 Hoist Inspection Methods and Criteria

Item	Method	Criteria	Action
Functional operating mechanisms.	Visual, Auditory	Mechanisms should be properly adjusted and should not produce unusual sounds when operated.	Repair or replace as required.
Limit Switch	Function	Proper operation. Actuation of limit switch should stop hoist.	Repair or replace as required.
Limit Lever Assembly	Visual, Function	Lever should not be bent or significantly worn and should be able to move freely.	Replace.
Braking System Operation	Function	Braking distance with rated capacity should not exceed 3% of the lifting speed (approximately two chain links).	Repair or replace as required.
Hooks - Surface Condition	Visual	Should be free of significant rust, weld splatter, deep nicks, or gouges.	Replace.
Hooks - Fretting wear	Measure	The "u" and "t" dimensions should not be less than discard value listed in Table 5-4	Replace.
Hooks - Stretch	Measure	The "k" dimension should not be greater than 1.15 times that measured and recorded at the time of purchase (See Section 3.6). If recorded "k" values are not available for hooks when new, use nominal "k" values from Table 5-4 .	Replace.
Hooks - Bent Shank or Neck	Visual	Shank and neck portions of hook should be free of deformations.	Replace.
Hooks - Yoke Assembly	Visual	Should be free of significant rust, weld splatter, nicks, gouges. Holes should not be elongated, fasteners should not be loose, and there should be no gap between mating parts.	Tighten or replace as required.
Hooks - Swivel Bearing	Visual, Function	Bearing parts and surfaces should not show significant wear, and should be free of dirt, grime and deformations. Hook should rotate freely with no roughness.	Clean/lubricate, or replace as required.
Hooks - Idle Sheave and Axle (Bottom Hook on Double Fall Hoist)	Visual, Function	Pockets of Idle Sheave should be free of significant wear. Idle Sheave surfaces should be free of nicks, gouges, dirt and grime. Bearing parts and surfaces of Idle Sheave and Axle should not show significant wear. Idle Sheave should rotate freely with no roughness or significant free play.	Clean/lubricate, or replace as required.

Table 5-3 Hoist Inspection Methods and Criteria

Item	Method	Criteria	Action
Hooks - Hook Latches	Visual, Function	Latch should not be deformed. Attachment of latch to hook should not be loose. Latch spring should not be missing and should not be weak. Latch movement should not be stiff - when depressed and released latch should snap smartly to its closed position.	Replace.
Load Chain - Surface Condition	Visual	Should be free of rust, nicks, gouges, dents and weld splatter. Links should not be deformed, and should not show signs of abrasion. Surfaces where links bear on one another should be free of significant wear.	Replace.
Load Chain - Pitch and Wire Diameter	Measure	The "P" dimension should not be greater than maximum value listed in Table 5-5 . The "d" dimension should not be less than minimum value listed in Table 5-5 .	Replace. Inspect Load Sheave (and Idle Sheave for double fall hoist).
Load Chain - Lubrication	Visual, Auditory	Entire surface of each chain link should be coated with lubricant and should be free of dirt and grime. Chain should not emit cracking noise when hoisting a load.	Clean/lubricate (see Section 6.0).
Load Chain - Reeving	Visual	Chain should be reeved properly through Load Sheave (and Idle Sheave for double fall hoist) - refer to Section 6.4 . Chain, Chain Springs, Cushion Rubbers, Striker Plates, and Stoppers should be installed properly - refer to Section 3.2 .	Reeve/Install chain properly.
Housing and Mechanical Components	Visual, Auditory, Vibration, Function	Hoist components including load blocks, suspension housing, chain attachments, clevises, yokes, suspension bolts, shafts, gears, bearings, pins and rollers should be free of cracks, distortion, significant wear and corrosion. Evidence of same can be detected visually or via detection of unusual sounds or vibration during operation.	Replace.
Bolts, Nuts and Rivets	Visual, Check with Proper Tool	Bolts, nuts and rivets should not be loose.	Tighten or replace as required.
Motor Brake	Measure, Visual	Motor brake gap should be adjusted to the distance shown in Table 6-3 before measuring the brake wear. Brake lining dimension "A" should not be less than discard value listed in Table 5-6 . Refer to Section 6.3 for gaining access to motor brake and for adjustment and inspection procedures. Braking surfaces should be clean, free of grease/oil and should not be glazed.	Adjust, Repair or Replace as required.
Contactors Contacts	Visual	Contacts should be free of significant pitting or deterioration. On hoists equipped with Count/Hour Meter check the contactor cycles – refer to Section 6.1 .	Replace.

Table 5-3 Hoist Inspection Methods and Criteria

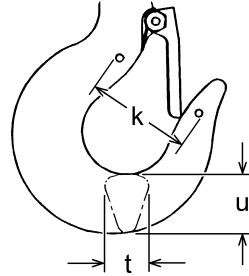
Item	Method	Criteria	Action
Load Sheave	Visual	Pockets of Load Sheave should be free of significant wear.	Replace.
Cushion Rubber	Visual	Should be free of significant deformation.	Replace.
Chain Springs	Visual	Chain springs should not be deformed or compressed. Refer to Chain Spring Dimensions chart on page 60.	Replace.
Pendant - Switches	Function	Depressing and releasing push-buttons should make and break contacts in switch contact block and result in corresponding electrical continuity or open circuit. Push-buttons should be interlocked either mechanically or electrically to prevent simultaneous energizing of circuits for opposing motions (e.g. up and down).	Repair or replace as necessary.
Pendant - Housing	Visual	Pendant housing should be free of cracks and mating surfaces of parts should seal without gaps.	Replace.
Pendant - Wiring	Visual	Wire connections to switches in pendant should not be loose or damaged.	Tighten or repair
Pendant - Cord	Visual, Electrical Continuity	Surface of cord should be free from nicks, gouges, and abrasions. Each conductor in cord should have 100% electrical continuity even when cord is flexed back-and-forth. Pendant Cord Strain Relief Cable should absorb all of the load associated with forces applied to the pendant.	Replace.
Pendant - Labels	Visual	Labels denoting functions should be legible.	Replace.
Warning Labels	Visual	Warning Labels should be affixed to the hoist (see Section 1.2) and they should be legible.	Replace.
Hoist Capacity Label	Visual	The label that indicates the capacity of the hoist should be legible and securely attached to the hoist.	Replace.

Table 5-4 Top Hook & Bottom Hook Dimensions

"k" Measured When New:

Top: _____

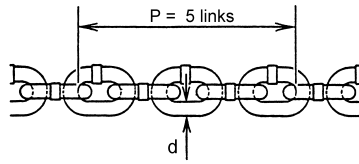
Bottom: _____



Capacity Code	*Nominal "k" Dimension inch (mm)	"u" Dimension inch (mm)		"t" Dimension inch (mm)	
		Standard	Discard	Standard	Discard
001H, 003S, 003H, 005L, 005S	1.65 (42)	0.93 (23.5)	0.83 (21)	0.69 (17.5)	0.63 (16)
010L, 010S	1.97 (50)	1.22 (31)	1.10 (28)	0.89 (22.5)	0.79 (20)
015S	2.36 (60)	1.44 (36.5)	1.30 (33)	1.04 (26.5)	0.94 (24)
020L, 020S	2.46 (62.5)	1.57 (40)	1.42 (36)	1.14 (29)	1.02 (26)
025S	2.72 (69)	1.87 (47.5)	1.54 (39)	1.24 (31.5)	1.10 (28)
030L, 030S	2.95 (75)	2.20 (56)	1.97 (50)	1.36 (34.5)	1.22 (31)
050L	3.27 (83)	2.20 (56)	1.97 (50)	1.67 (42.5)	1.50 (38)

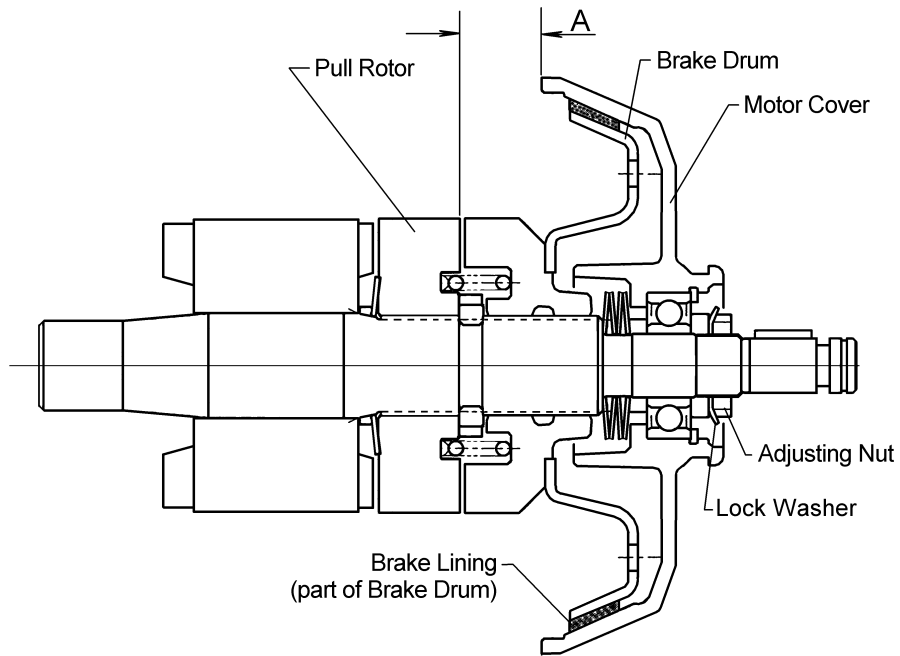
* These values are nominal since the dimension is not controlled to a tolerance. The "k" dimension should be measured when the hook is new - this becomes a reference measurement. Subsequent measurements are compared to this reference to make determinations about hook deformation/stretch. See Section 5.7, "Hooks – Stretch."

Table 5-5 Chain Wear Dimensions



Capacity Code	"P" Dimension inch (mm)		"d" Dimension inch (mm)	
	Standard	Discard	Standard	Discard
001H, 003S,	2.97 (75.5)	3.02 (76.6)	0.22 (5.0)	0.18 (4.5)
003H, 005L, 005S	3.76 (95.5)	3.82 (96.9)	0.25 (6.3)	0.22 (5.7)
010L, 010S	4.76 (121.0)	4.91 (124.6)	0.31 (8.0)	0.28 (7.2)
015S, 020L, 020S	5.96 (151.5)	6.05 (153.8)	0.39 (10.0)	0.35 (9.0)
025S, 050L	6.75 (171.5)	6.85 (174.1)	0.44 (11.2)	0.40 (10.1)
030L, 030S	7.52 (191)	7.74 (196.7)	0.49 (12.5)	0.44 (11.3)

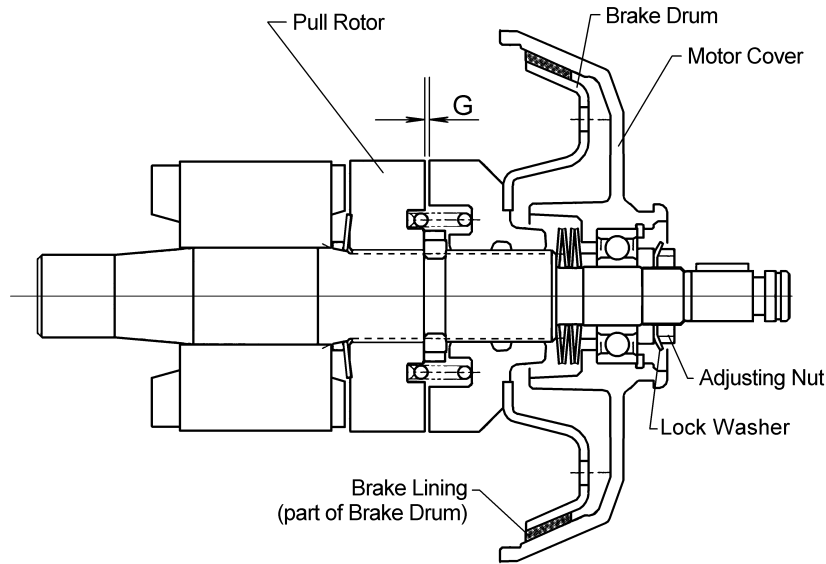
Table 5-6 Motor Brake Wear Dimensions



NOTICE Brake must be properly adjusted before measuring "A". See Section 6.3

Capacity Code	"A" Dimension - inch (mm)			
	Single Speed		Dual Speed	
	Standard	Discard	Standard	Discard
001H, 003S, 005L	0.67 (17)	0.61 (15.5)	0.67 (17)	0.61 (15.5)
003H, 005S, 010L	0.85 (21.5)	0.79 (20)	0.85 (21.5)	0.79 (20)
010S, 015S, 020L	0.89 (22.5)	0.83 (21)	1.06 (27)	1.00 (25.5)
020S, 025S, 030L, 030S, 050L	0.83 (21)	0.77 (19.5)	1.54 (39)	1.48 (37.5)

Table 6-3 Motor Brake Gap



Capacity Code	Brake Gap (G) inch (mm)
001H, 003S, 005L, 003H, 005S, 010L, 010S, 015S, 020L	0.020 (0.5)
020S, 025S, 030L, 030S, 050L	0.032 (0.8)

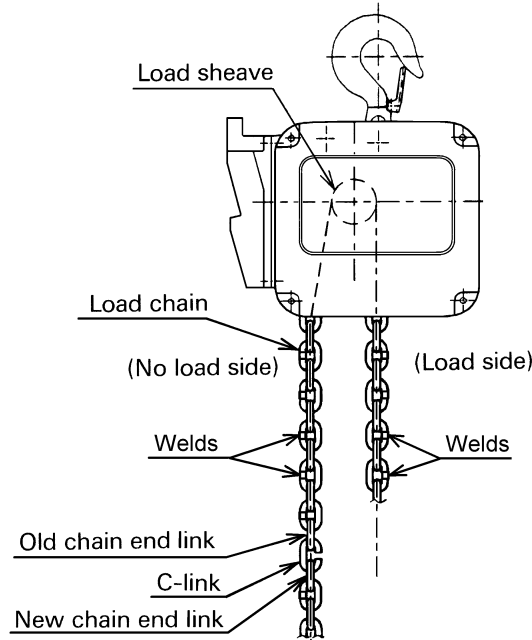


Figure 6-3 Chain Replacement

Chain Spring Measurements

⚠ WARNING The chain spring gets compressed over time and if not replaced will result in damage to the hoist body form motor drift.

NOTICE For the 001H, 003S, 005L 003H, 010L, 015S -single and dual speed hoists with just the upper limit switch there are **No Springs**.

Chain Spring Dimensions					
<p style="text-align: center;"> a b c -# of turns d -Effective # of turns </p>					
Capacity Code	Chain Diameter Inch (mm)	a inch (mm)	b inch (mm)	c inch (mm)	d inch (mm)
Single Speed with Upper/Lower Limit Switch (standard)					
001H, 003S	0.20 (5)	0.87 (22)	4.72 (120)	0.63 (16)	0.55 (14)
003H, 005L, 005S	0.25 (6.3)	1.06 (27)	5 (127)	0.51 (13)	0.43 (11)
010L, 010S	0.31 (8)	1.30 (33)	3.94 (100)	0.35 (9)	0.28 (7)
015S	0.39 (10)	1.59 (40.5)	3.35 (85)	2.95 (7.5)	0.22 (5.5)
020L	0.39 (10)	1.59 (40.5)	2.76 (70)	0.26 (6.5)	0.18 (4.5)
020S	0.39 (10)	1.59 (40.5)	3.35 (85)	2.95 (7.5)	0.22 (5.5)
025S	0.44 (11.2)	1.77 (45)	2.95 (75)	0.26 (6.5)	0.18 (4.5)
030L, 030S	0.49 (12.5)	1.95 (49.5)	3.15 (80)	0.26 (6.5)	0.18(4.5)
050L	0.44 (11.2)	1.77 (45)	2.95 (75)	0.26 (6.5)	0.18 (4.5)
Dual Speed with Upper/Lower Limit Switch (standard)					
001H, 003S	0.20 (5)	0.87 (22)	4.72 (120)	0.63 (16)	0.55 (14)
003H, 005L, 005S	0.25 (6.3)	1.06 (27)	5 (127)	0.51 (13)	0.43 (11)
010L, 010S	0.31 (8)	1.30 (33)	3.94 (100)	0.35 (9)	0.28 (7)
015S	0.39 (10)	1.59 (40.5)	2.76 (70)	0.26 (6.5)	0.18 (4.5)
020L	0.39 (10)	1.59 (40.5)	3.35 (85)	2.95 (7.5)	0.22 (5.5)
020S	0.39 (10)	1.59 (40.5)	6.30(160)	0.43 (11)	0.35 (9)
025S	0.44 (11.2)	1.77 (45)	5.31 (135)	0.35 (9)	0.28 (7)
030L, 030S	0.49(12.5)	1.95 (49.5)	5.71 (145)	0.33 (8.5)	0.26 (6.5)
050L	0.44 (11.2)	1.77 (45)	5.31 (135)	0.35 (9)	0.28 (7)

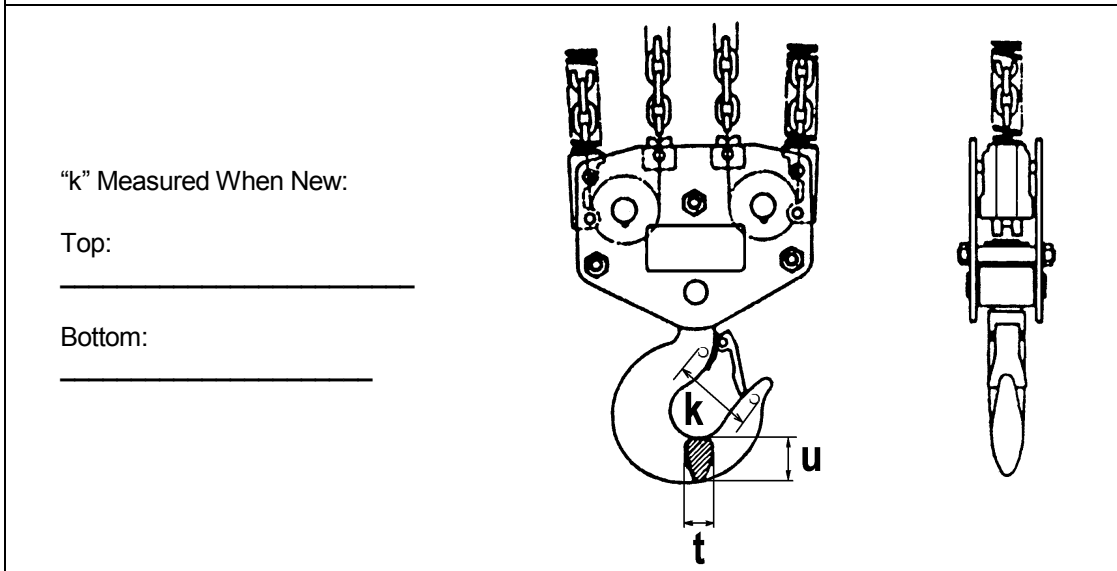
Appendix B

- Inspection Methods, Criteria and Wear Measurements
- For 8 Ton through 20 Ton Capacity

NOTICE The information listed in this section is intended to supplement Appendix A. Section references are made to the Owner's Manual, Electric Chain Hoist ER and NER Series

Table 5-3 Hoist Inspection Methods and Criteria			
Use this table in conjunction with Table 5-3 of the EROM. The entries in this table replace in their entirety the corresponding entries in Table 5-3 of the EROM.			
Item	Method	Criteria	Action
Hooks - Fretting wear	Measure	The "u" and "t" dimensions should not be less than discard value listed in Table 5-4	Replace.
Hooks - Stretch	Measure	The "k" dimension should not be greater than 1.15 times that measured and recorded at the time of purchase (See Section 3.6). If recorded "k" values are not available for hooks when new, use nominal "k" values from Table 5-4 .	Replace.
Load Chain - Pitch and Wire Diameter	Measure	The "P" dimension should not be greater than maximum value listed in Table 5-5 . The "d" dimension should not be less than minimum value listed in Table 5-5 .	Replace. Inspect Load and Idle Sheaves.
Load Chain – Reeving and Evening	Visual	Chain should be reeved properly through Load and Idle Sheaves - refer to Section 6.4 . Chain, Chain Springs, Stoppers, and Chain Pin should be installed properly - refer to Section 3.2 . For double body hoists, chain should be evenly distributed – equal lengths of chain in each chain container or equal lengths of chain on no-load side of each hoist body.	Reeve/Install chain properly. Lower hook until lower limit switch is activated on both hoist bodies.
Motor Brake	Measure, Visual	Motor brake gap should be adjusted to the distance shown in Table 6-3 of the EROM before measuring the brake wear. Brake lining dimension "A" should not be less than discard value listed in Table 5-6 . Refer to Section 6.3 of the EROM for gaining access to motor brake and for adjustment and inspection procedures. Braking surfaces should be clean, free of grease/oil and should not be glazed.	Adjust, Repair or Replace as required.

Table 5-4 Top Hook & Bottom Hook Dimensions



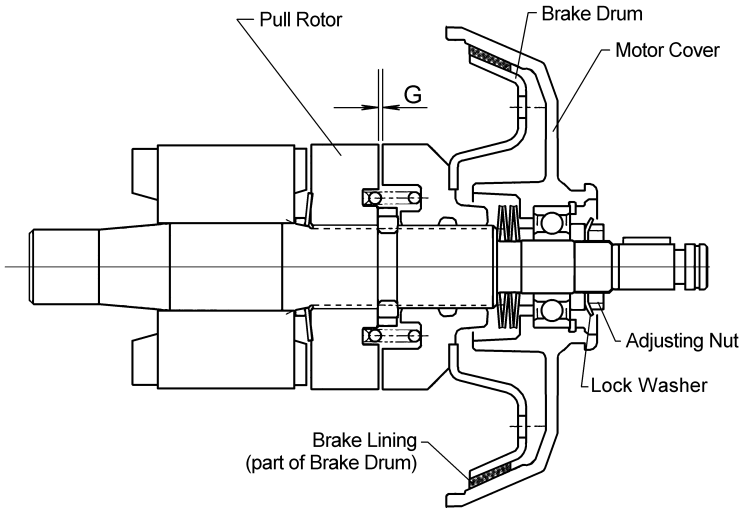
Capacity Code	*Nominal "k" Dimension inch (mm)	"u" Dimension inch (mm)		"t" Dimension inch (mm)	
		Standard	Discard	Standard	Discard
080S, 100L, 100S	4.72(120)	2.87(73)	2.60(66)	1.89(48)	1.69(43)
150S	5.04(128)	3.43(87)	3.07(78)	2.36(60)	2.13(54)
200S	5.57(141.5)	3.92(99.5)	3.54(90)	2.76(70)	2.48(63)

* These values are nominal since the dimension is not controlled to a tolerance. The "k" dimension should be measured when the hook is new - this becomes a reference measurement. Subsequent measurements are compared to this reference to make determinations about hook deformation/stretch. See Section 5.7, "Hooks - Stretch".

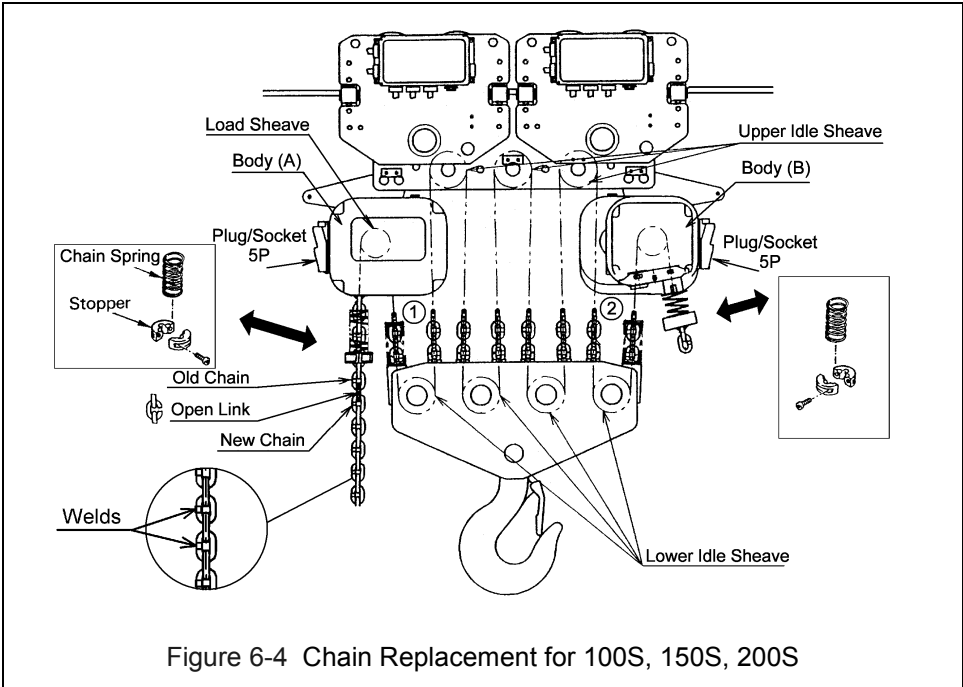
Table 5-5 Chain Wear Dimensions				
Capacity Code	"P" Dimension inch (mm)		"d" Dimension inch (mm)	
	Standard	Discard	Standard	Discard
080S, 100L, 100S, 150S, 200S	6.75 (171.5)	6.85 (174.1)	0.44 (11.2)	0.40 (10.1)

Table 5-6 Motor Brake Wear Dimensions				
<p>NOTICE Brake must be properly adjusted before measuring "A". See Section 6.3 of EROM</p>				
Capacity Code	"A" Dimension - inch (mm)			
	Single Speed		Dual Speed	
	Standard	Discard	Standard	Discard
080S, 100L, 100S, 150S, 200S	0.83 (21)	0.77 (19.5)	1.54 (39)	1.48 (37.5)

Table 6-3 Motor Brake Gap



Capacity Code	Brake Gap (G) inch (mm)
080S, 100L, 100S, 150S, 200S	0.032 (0.8)



Chain Spring Measurements



WARNING The chain spring gets compressed over time and if not replaced will result in damage to the hoist body from motor drift.

Chain Spring Dimensions					
<p style="text-align: center;"> a b c - # of turns d - Effective # of turns </p>					
Capacity Code	Chain Diameter Inch (mm)	a inch (mm)	b inch (mm)	c inch (mm)	d inch (mm)
Single Speed with Upper/Lower Limit Switch (standard)					
080S, 100L, 100S, 150S, 200S	0.44 (11.2)	1.77 (45)	6.30 (160)	0.47 (12)	0.39 (10)
Dual Speed with Upper/Lower Limit Switch (standard)					
080S, 100L, 100S, 150S, 200S	0.44 (11.2)	1.77 (45)	6.30 (160)	0.47 (12)	0.39 (10)

Appendix C

- **Electrical Trouble shooting Guide and Wiring Diagram.**

Table 7-1 Troubleshooting Guide			
Symptom	Cause	Remedy	
Hoist moving in wrong direction	Power supply reversed phased	Switch 2 of the 3 power supply cord wires at the power source.	
	Improper electrical connections	Refer to wiring diagram and check all connections.	
Hoist will not operate	Loss of power	Check circuit breakers, switches, fuses and connections on power lines/cable.	
	Wrong voltage or frequency	Check voltage and frequency of power supply against the rating on the nameplate of the motor.	
	Hoist overload	Reduce load to within rated capacity of hoist.	
	Motor overheated and thermal overload protector has tripped	See Trouble Shooting Problem "Motor or brake overheating".	
	Improper, loose, or broken wire in hoist electrical system	Shut off power supply, check wiring connections on hoist control panel and inside push-button pendant.	
	Brake does not release		Check motor brake adjustment for proper clearance.
			Check voltage and frequency of power supply against the rating on the nameplate of the motor.
	Faulty magnetic contactor	Check coil for open or short circuit. Check all connections in the control circuit. Check for open contactors. Replace as needed.	
	Defect in control transformer	Check transformer coil for signs of overheating. Disconnect transformer and check for open winding.	
Motor burned out	Replace motor frame/stator, shaft/rotor, and any other damaged parts.		
Hoist lifts but will not lower	Down circuit open	Check circuit for loose connections. Check down side of limit switch for malfunction.	
	Broken conductor in pendant cord	Check the continuity for each conductor in the cable. If one is broken, replace entire cable.	
	Faulty magnetic contactors	Check coils for open or short circuit. Check all connections on motor circuit. Check for burned contacts. Replace as needed.	
	Faulty switch in pendant	Check electrical continuity. Check electrical connections. Replace or repair as needed.	

Table 7-1 Troubleshooting Guide

Symptom	Cause	Remedy
Hoist lowers but will not lift	Hoist overloaded	Reduce load to within rated capacity of hoist.
	Low voltage in hoist's power supply	Determine cause of low voltage and bring to within plus or minus 10% of the voltage specified on the motor nameplate. The voltage should be measure at the hoist contactor.
	Up circuit open	Check circuit for loose connections. Check up side of limit switch for malfunction.
	Broken conductor in pendant cord	Check the continuity of each conductor in the cable. If one is broken, replace entire cable.
	Faulty magnetic contactor	Check coils for open or short circuit. Check all connections on motor circuit. Check for burned contacts. Replace as needed.
	Faulty switch in pendant	Check electrical continuity. Check electrical connections. Replace or repair as needed.
Hoist will not lift rated load or does not have the proper lifting speed	Faulty friction clutch	Repair by a qualified person trained in the repair of hoists and proper friction clutch adjustment procedures. Replace as needed.
	Hoist overloaded	Reduce load to within rated capacity.
	Low voltage in hoist's power supply	Determine cause of low voltage and bring to within plus or minus 10% of voltage specified on the motor nameplate. The voltage should be measured at the hoist contactor.
	Brake drags	Check motor brake adjustment for proper clearance.
	Faulty friction clutch	Repair by a qualified person trained in the repair of hoists and proper friction clutch adjustment procedures. Replace as needed.
Load drifts excessively when hoist is stopped	Motor brake not holding	Clean and inspect brake lining. Check brake adjustment for proper clearance.
	Mechanical Load brake not holding (ER only)	Replace as needed. (ER only, NER has no load brake.)

Table 7-1 Troubleshooting Guide

Symptom	Cause	Remedy
Motor or brake overheating	Excessive load	Reduce load to within rated capacity of hoist.
	Excessive duty cycle	Reduce frequency of lifts.
	Wrong voltage or frequency	Check voltage and frequency of power supply against the rating on the nameplate on the motor.
	Brake drags	Check brake adjustment for proper clearance.
	Extreme external heating	Above an ambient temperature of 140°F, the frequency of hoist operation must be reduced to avoid overheating of the motor. Special provisions should be made to ventilate the hoist or otherwise shield it from the heat.
Hoist operates intermittently	Collectors making poor contact	Check movement of spring loaded arm, weak spring, connections, and shoe. Replace as needed.
	Contactors contacts arcing	Check for burned contacts. Replace as needed.
	Loose connection in circuit	Check all wires and terminals for bad connections. Replace as needed.
	Broken conductor in Pendant Cord	Check for intermittent continuity in each conductor the Pendant Cord. Replace entire Pendant Cord if continuity is not constant.



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