EFFECTIVE: August 27, 2003

OWNER'S MANUAL

ELECTRIC CHAIN HOIST ES3 and NES SERIES

1/4 Ton through 5 Ton Capacity

Model, Lot, and Serial Number

⚠ 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.

HARRINGTON
HOISTS AND CRANES

TABLE OF CONTENTS

1.0 Important Information and Warnings

⚠ CAUTION

These general instructions deal with the normal installation, 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.

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.

Record hoist serial number on the front cover of this manual for identification and future reference to avoid referring to the wrong manual for information or instructions on installation, operation, inspection, maintenance, or parts.

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 humans.

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 ASME B30.17, Safety Standard for Top-Running Single Girder Cranes; ASME B30.2 Safety Standard for Top-Running Double-Girder Cranes; and 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 ASME B30.9, Safety Standard for Slings, or 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 ASME B30.16, Safety Standard for Overhead Hoists, OSHA Regulations, and ANSI/NFPA 70, National Electrical 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 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 ASME B30.16, Safety Standard for Overhead Hoists, OSHA Regulations, and ANSI/NFPA 70, National Electrical Code. If the hoist is installed as part of a total lifting system, such as an overhead crane, the applicable 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 ASME B30.16 should be established and records maintained.

2.0 Preoperational Procedures

2.1 Fill Gear Box With Oil

For a new hoist the correct quantity and type of oil is supplied in separate container(s). Remove the oil plug from the top of the hoist and pour in all of the oil from the separate container(s). Then replace the plug.

Table 2-1
Amount of gear oil

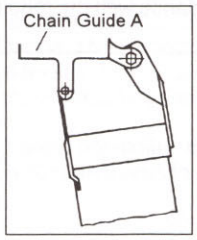
Capacity (ton)	With Mechanical Brake (ES Model)		Without Mechanical Brake (NES Model)	
	quarts	liters	quarts	liters
1/4, 1/2L, 1/2S, 1L	0.64	0.6	0.42	0.4
1S, 2L	1.06	1.0	0.64	0.6
1 1/2, 2S, 2 1/2, 3, 5	2.12	2.0	1.06	1.0

The oil supplied with the hoist is Nippon Antoil B (see section 6 for Material Safety Data Sheet). Use only this oil, or Texaco Meropa No. 68, in the hoist's gear box; DO NOT use any other oil or any other quantities other than that specified in Table 2-1.

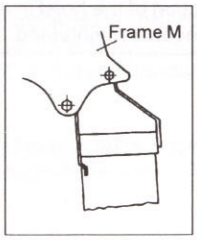
2.2 Chain

2.2.1 With Chain Container

When the standard canvas chain container is used, unfold it fully and install it on the hoist body as shown in Fig. 2-1. 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. A chain spring is to be on the chain between the chain stopper and the hoist body. 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.



1/4 ton to 2 ton L
(except 1 1/2 ton)



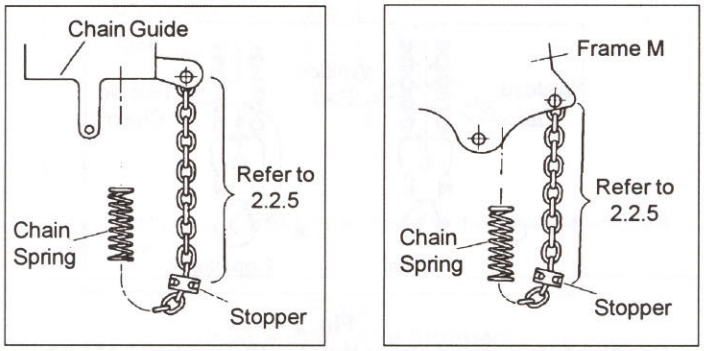
1 1/2 ton to 5 ton S
(except 2 ton L)

Fig. 2-1
Attachment of Chain Container to Hoist Body

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

2.2.2 Without Chain Container

When the hoist is used without a chain container, the free end of the chain is attached to the hoist body as shown in Fig. 2-2 and in Fig. 2-3. In connecting the free end of the chain to the hoist body, ensure that the chain remains free of twists. Refer to section 2.2.5 and Table 2-2 for proper placement of stopper.



1/4 ton through 2 ton L (except 1 1/2 ton)

1 1/2 ton through 5 ton S (except 2 ton L)

Fig. 2-2
Attachment of Chain to Hoist Body - No Chain Container

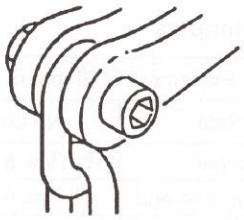
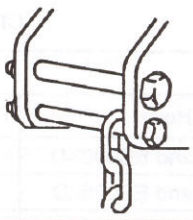
1/4 ton through 2 ton L (except 1-1/2 ton)	1-1/2 ton through 5 ton S (except 2 ton L)
	

Fig. 2-3
Detail of Chain Free End Attachment

2.2.3 Lubrication

For longer life, lightly coat the chain with machine or gear oil. Ensure that the oil is applied to the bearing surfaces of the chain links. For applications in dusty environments it is acceptable to substitute a dry lube. In any case, the load chain must be inspected and maintained at regular intervals (see Section 4.0).

2.2.4 Prevent Twist in Double Fall Hoists

If your hoist is 1/2 ton L, 1 ton L, 2 ton L, 3 ton, or 5 ton capacity, the bottom hook is suspended by two falls of load chain. Check to be sure the bottom hook has not capsized, giving a twist in the load chain as shown in Fig. 2-4. If the bottom hook has capsized, restore it to normal. Never try to suspend a load on a unit with twisted chain. If the load chain is not twisted, the welded part of the chain links are in alignment. See Fig. 2-4.

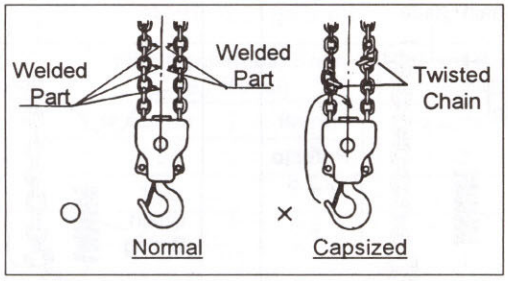


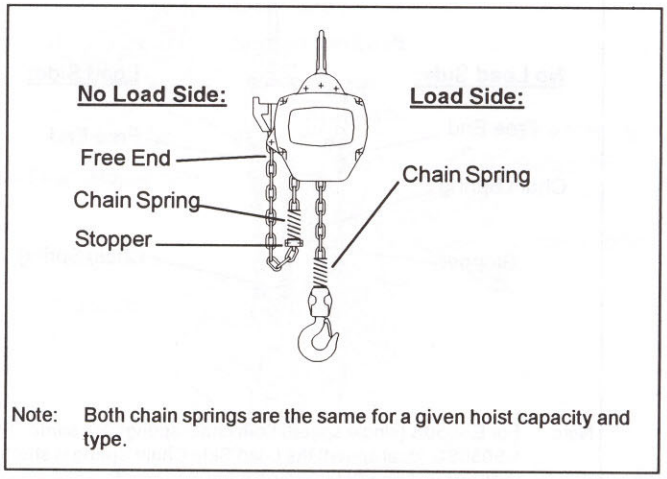
Fig. 2-4
Capsized Bottom Hook on Hoist with Two Falls of Load Chain

2.2.5 Springs and Stoppers

Ensure that chain springs and stoppers are installed properly according to Table 2-2 and Figures 2-5, 2-6, and 2-7. The chain springs and stoppers are important for proper operation of the hoist. Never operate the hoist without chain springs or with incorrect or deformed chain springs.

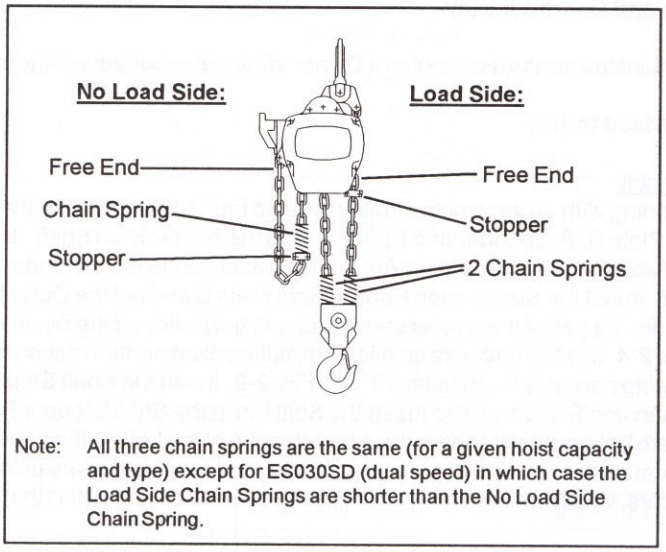
Table 2-2
Chain Springs and Stoppers

		Placement of Stoppers	
Hoist	Fig. No.	Load Side	No Load Side
ES003S and ES003SD	2-5	no stopper	15th link from free end
ES005L and ES005LD	2-6	14th link from free end	15th link from free end
ES005S and ES005SD	2-5	no stopper	15th link from free end
ES010S and ES010SD	2-5	no stopper	15th link from free end
ES010L and ES010LD	2-6	10th link from free end	15th link from free end
ES015S and ES015SD	2-5	no stopper	13th link from free end
ES020L and ES020LD	2-6	11th link from free end	15th link from free end
ES020S and ES020SD	2-5	no stopper	13th link from free end
ES025S and ES025SD	2-5	no stopper	13th link from free end
ES030S and ES030SD	2-6	10th link from free end	13th link from free end
ES050S and ES050SD	2-7	no stopper	13th link from free end



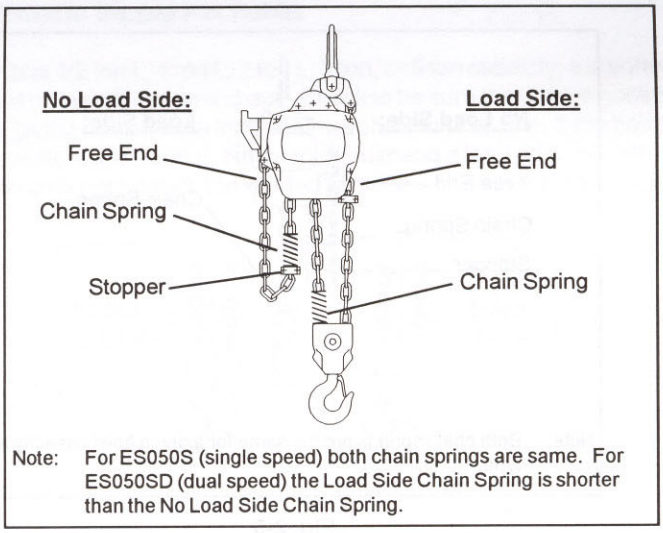
Note: Both chain springs are the same for a given hoist capacity and type.

Fig. 2-5
Chain Springs and Stoppers



Note: All three chain springs are the same (for a given hoist capacity and type) except for ES030SD (dual speed) in which case the Load Side Chain Springs are shorter than the No Load Side Chain Spring.

Fig. 2-6
Chain Springs and Stoppers



Note: For ES050S (single speed) both chain springs are same. For ES050SD (dual speed) the Load Side Chain Spring is shorter than the No Load Side Chain Spring.

Fig. 2-7
Chain Springs and Stoppers

2.3 Installing Trolleys

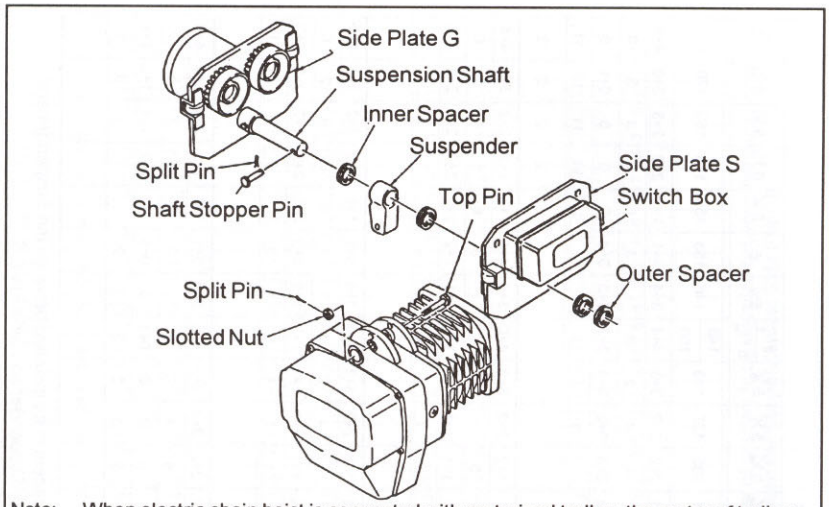
2.3.1 Plain and Geared trolley

Follow instructions in Harrington's Owner's Manual provided with the manual trolley.

2.3.2 Motorized trolley

Assembly

Beginning with an assembled trolley, refer to Fig. 2-8 and remove the Shaft Stopper Pin, Side Plate S, Suspender and Spacers from the Suspension Shaft. Referring to Fig. 2-8 and Table 2-4, install the Inner Adjusting Spacers and the Suspender on the Suspension Shaft. Insert the Suspension Shaft in Side Plate S and put the Outer Spacers to the outside. Use all of the spacers provided with the trolley. If the beam width is not listed in Table 2-4, use the next size smaller and make adjustments in accordance with the following paragraph "Adjustment" and Fig. 2-9. Insert the Shaft Stopper Pin in the Suspension Shaft and also insert the Split Pin in the Shaft Stopper Pin. For wide beams that are beyond the standard adjustment range of the trolley, the trolley must be set up for an extended range. Trolleys requiring extended range setup are provided with Fixing Spacers, which are special spacers that are even thicker (wider) than the Thick Spacer.



Note: When electric chain hoist is connected with motorized trolley, the motor of trolley should be on the left side of the name plate of electric chain hoist as shown above.

Fig. 2-8
Motorized Trolley Assembly

The Suspension Shaft has four (4) holes. To assemble the trolley correctly ensure that these holes are used properly per Fig. 2-9 and Table 2-3.

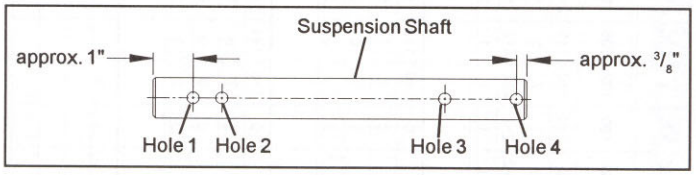


Fig. 2-9
Suspension Shaft for Motorized Trolley

Table 2-3
Use of Holes in Motorized Trolley Suspension Shaft

Flange Range	Hole Usage (Refer to Fig. 2-9)	
Standard Range	Hole 1	Not used
	Hole 2	Used to bolt Suspensoin Shaft to Side Plate G
	Hole 3	Used for the Shaft Stopper Pin
Extended Range	Hole 1	Used to bolt Suspension Shaft to Side Plate G
	Hole 2	Not used
	Hole 3	Used for the Shaft Stopper Pin
Hole 4: Used only for assisting in mounting trolley to beam when trolley can not be mounted from the end of beam. Never use Hole 4 for Shaft Stopper Pin or to bolt the Suspension Shaft to Side Plate G.		

Table 2-4
Spacers for Motorized Trolley (Model MS3F)

Number of Adjusting Spacers																																
Beam Width		(in.)	2 5/16	2 1/2	2 7/8	3	3 1/4	3 5/16	3 7/8	3 15/16	4	4 3/16	4 5/16	4 7/16	4 11/16	4 15/16	5	5 3/16	5 5/16	5 3/8	5 5/8	5 7/8	5	6	6 1/8	6 5/16	6 7/16	6 11/16	6 7/8
				2 5/8	2 15/16										4 3/4							5 15/16	5 3/4								
Cap.	Parts	(mm)	58	64	73	75	82	90	98	100	102	106	110	113	119	125	127	131	135	137	143	149	146	153	155	160	163	170	175
				66	74	76		91							120							150							
1	Thin Spacer	Inner	1+2	2+3	4+4	1+0	1+2	2+3	0	1+0	1+0	1+1	2+2	2+3	3+4	4+4	4+1	5+1	2+2	2+2	3+3	4+4	3+4	4+1	1+1	2+2	2+3	3+0	4+4
		Outer	5	3	0	7	5	3	8	7	7	5	4	3	1	0	3	2	4	4	2	0	1	3	6	4	3	5	0
	Thick Spacer	Inner	0	0	0	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+3	2+3	3+3	3+3	3+3	3+3	3+3	3+4	0	0	0	0+1	0
		Outer	5	5	5	3	3	3	1	1	1	1	1	1	1	1	0	2	1	1	1	1	1	1	11	11	11	10	11
	Fixing Spacer	Inner																							2	2	2	2	2
2	Thin Spacer	Inner								0	1+0	1+1	1+2	2+2	3+3	4+4	1+0	1+1	1+2	2+2	3+3	4+0	3+4	4+1	1+1	1+2	2+2	3+3	4+4
		Outer								8	7	6	5	4	2	0	7	6	5	4	2	4	1	3	6	5	4	2	0
	Thick Spacer	Inner								0	0	0	0	0	0	0	1+1	1+1	1+1	1+1	1+1	1+2	1+1	1+2	2+2	2+2	2+2	2+2	2+2
		Outer								3	3	3	3	3	3	3	1	1	1	1	1	0	1	0	1	1	1	1	1
	Fixing Spacer	Inner																											
3	Thin Spacer	Inner								0	1+0	1+1	1+2	2+2	3+3	4+4	1+0	1+1	1+2	2+2	3+3	4+0	3+4	4+1	1+1	1+2	6+2	3+3	4+4
		Outer								8	7	6	5	4	2	0	7	6	5	4	2	4	1	3	6	5	0	2	0
	Thick Spacer	Inner								0	0	0	0	0	0	0	1+1	1+1	1+1	1+1	1+1	1+2	1+1	1+2	2+2	2+2	1+2	2+2	2+2
		Outer								3	3	3	3	3	3	3	1	1	1	1	1	0	1	0	1	1	2	1	1
	Fixing Spacer	Inner																											
5	Thin Spacer	Inner														0	1+0	1+1	2+2	2+2	3+3	4+0	3+4	5+1	1+1	2+2	2+3	3+0	4+4
		Outer														8	7	6	4	4	2	4	1	3	6	4	3	5	0
	Thick Spacer	Inner														0	0	0	0	0	0	0+1	0	0+1	1+1	1+1	1+1	1+2	1+1
		Outer														3	3	3	3	3	3	2	3	2	1	1	1	0	1
	Fixing Spacer	Inner																											

Note: Take note the number of spacers on Inner side. The left-hand number is the number of spacers to be installed between the Suspender and Side Plate G. The right-hand number is the number of spacers to be installed between the Suspender and Side Plate S.

Example 1 + 2

- 2 — Number on Side Plate S
- 1 — Number on Side Plate G

Table 2-4 (continued)
Spacers for Motorized Trolley (Model MS3F)

Number of Adjusting Spacers																											
Beam Width		(in.)	7	7 1/16	7 1/4	7 1/8	8	8 3/16	8 1/16	9	9 1/8	9 3/8	10	10 1/8	10 1/4	10 3/8	10 1/2	11	11 1/8	11 1/4	11 3/8	11 3/8	11 3/4	11 13/16	11 7/8	12
				7 1/8	7 5/16																					
Cap.	Parts	(mm)	178	180	184	200	203	215	220	229	232	250	254	257	260	264	267	279	283	286	289	295	298	300	302	305
				181	185																					
1	Thin Spacer	Inner	4+1	1+1	1+2	4+4	5+0	2+3	3+4	1+1	1+2	4+0	1+1	1+2	2+2	2+3	3+3	1+1	1+2	2+2	2+3	3+0	4+0	4+1	4+1	4+2
		Outer	3	6	5	0	3	3	1	6	5	4	6	5	4	3	2	6	5	4	3	5	4	3	3	2
	Thick Spacer	Inner	0+1	1+1	1+1	1+1	1+2	2+2	2+2	3+3	3+3	3+4	4+4	4+4	4+4	4+4	4+4	5+5	5+5	5+5	5+5	5+6	5+6	5+6	5+6	5+6
		Outer	10	9	9	9	8	7	7	5	5	4	3	3	3	3	3	1	1	1	1	0	0	0	0	0
	Fixing Spacer	Inner	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2	Thin Spacer	Inner	1+4	1+1	1+2	4+4	1+0	2+3	3+3	4+1	1+1	4+4	4+1	5+1	4+3	2+3	3+3	4+1	1+2	2+2	2+3	3+3	3+4	4+4	4+1	5+1
		Outer	3	6	5	0	7	3	2	3	6	0	3	2	1	3	2	3	5	4	3	2	1	0	4	2
	Thick Spacer	Inner	3+2	0	0	0	1+1	1+1	1+1	1+2	2+2	2+2	2+3	2+3	2+3	3+3	3+3	3+4	4+4	4+4	4+4	4+4	4+4	4+4	4+5	4+5
		Outer	0	9	9	9	7	7	7	6	5	5	4	4	4	3	3	2	1	1	1	1	1	1	0	0
	Fixing Spacer	Inner		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	Thin Spacer	Inner	4+1	1+1	1+2	4+4	1+0	2+3	3+3	4+1	1+1	4+4	4+1	5+1	4+3	2+3	3+3	4+1	1+2	2+2	2+3	3+3	3+4	4+4	4+1	5+1
		Outer	3	6	5	0	7	3	2	3	6	0	3	2	1	3	2	3	5	4	3	2	1	0	3	2
	Thick Spacer	Inner	2+3	0	0	0	1+1	1+1	1+1	1+2	2+2	2+2	2+3	2+3	2+3	3+3	3+3	3+4	4+4	4+4	4+4	4+4	4+4	4+4	4+5	4+5
		Outer	0	9	9	9	7	7	7	6	5	5	4	4	4	3	3	2	1	1	1	1	1	1	0	0
	Fixing Spacer	Inner		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
5	Thin Spacer	Inner	4+1	5+1	4+3	4+4	1+0	2+3	3+4	1+1	1+2	4+4	1+1	1+2	2+2	2+3	3+3	5+1	1+2	2+2	2+3	4+3	4+4	4+0	4+1	5+1
		Outer	3	2	1	0	7	3	1	6	5	0	6	5	4	3	2	2	5	4	1	1	0	4	3	2
	Thick Spacer	Inner	1+2	1+2	1+2	2+2	3+3	3+3	3+3	4+4	4+4	4+4	5+5	5+5	5+5	5+5	5+5	5+6	6+6	6+6	6+6	6+6	6+6	6+7	6+7	6+7
		Outer	0	10	10	9	7	7	7	5	5	5	3	3	3	3	3	2	1	1	1	1	0	1	0	0
	Fixing Spacer	Inner																								

Note: Take note the number of spacers on Inner side. The left-hand number is the number of spacers to be installed between the Suspender and Side Plate G. The right-hand number is the number of spacers to be installed between the Suspender and Side Plate S.

Example 1 + 2

- 2 — Number on Side Plate S
- 1 — Number on Side Plate G

Adjustment

After assembling trolley per the preceding paragraph, check the adjustment as follows:

- Refer to Fig. 2-10 below. With the trolley Side Plates spread apart, measure dimensions "A" and "B". Dimension "A" should be $^{3}/_{32}$" to $^{5}/_{32}$" greater than Dimension B. If not then move spacers from inner to outer or from outer to inner as necessary to obtain the proper "A" dimension.

- After the proper "A" dimension is obtained, re-assemble the trolley remembering to insert the Split Pin into the Shaft Stopper Pin.

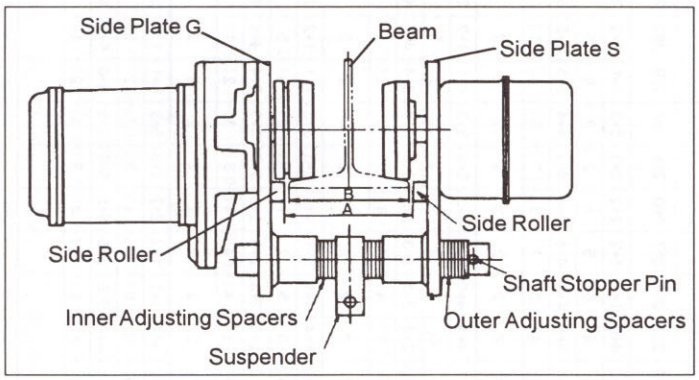


Fig. 2-10
Motorized Trolley

Mounting

If the trolley can be mounted from the end of the beam then:

- Remove the trolley end stop from the beam and set the trolley on the beam from the end.
- Securely re-install the trolley end stop on the beam.

If the trolley can not be mounted from the end of the beam, then:

- Move the Shaft Stopper Pin to Hole 4 (see Fig. 2-9).
- Spread the trolley side plates apart.
- Lift the trolley on to the beam so that the geared wheels (motor side of trolley) rest on the beam's flange.
- Push the trolley side plates together so that all four wheels rest on the beam's flange.
- Remove the Shaft Stopper Pin from Hole 4 and re-install in Hole 2 (or Hole 3 - see Fig. 2-9 and Table 2-3). Never use trolley with Shaft Stopper Pin in Hole 4.
- Bend the Split Pin open.

2.4 Hoist Mounting

2.4.1 Manual Trolley

Follow instructions in Harrington's Owner's Manual provided with the manual trolley.

2.4.2 Motorized trolley

- Remove Top Pin or Top Pin L and Hook (if provided).
- Mount hoist to the Trolley Suspender using Top Pin, Nut, and Split Pin. Make sure the hoist-to-trolley orientation is per Fig. 2-8.

2.4.3 Hook Mounted to Fixed Point

Prior to hook mounting the hoist to a fixed suspension point ensure that the suspension point and its supporting structure are adequate for the load. If necessary consult a professional that is qualified to evaluate the adequacy of the suspension point and its supporting structure.

Next, attach the hoist's top hook to the fixed suspension point. Ensure that the fixed suspension point rests on the center of the hook's saddle and that the hook's latch is closed.

2.5 Electrical

2.5.1 Precautions

⚠ CAUTION

Ensure that the voltage of the electric power supply is proper for the hoist or trolley.

⚠ CAUTION

Do not apply variable speed control to the NES model hoist. Use the ES model for applications of variable speed control for hoists.

⚠ DANGER

Before proceeding, ensure that the electrical supply for the hoist or trolley has been de-energized (disconnected) and locked and tagged. Refer to ANSI Z244.1, Personnel Protection - Lockout/Tagout of Energy Sources

2.5.2 Pendant With 2 Button Control

This instruction applies to installations where the hoist is installed hook mounted to a fixed suspension point or installed on a manual trolley. In this case the hoist is controlled by a pendant with two pushbuttons - one for raising and one for lowering. See Section 2.5.3 if the hoist is installed on a motorized trolley.

Pendant Cord

The Pendant Cord connects to the hoist via a 5 pin plug and socket. Make this connection as follows:

For 1/4 ton through 2 ton L (except 1-1/2 ton)

- Refer to Fig. 2-11.
- Insert the 5P plug into the 5P socket and hand tighten the screw coupling.
- Install the Cord Strain Relief Cable into Socket Holder B using the Cord Strain Relief Cable Pin.
- Insert the Split Pin into the hole of the Cord Strain Relief Cable Pin and bend it open.

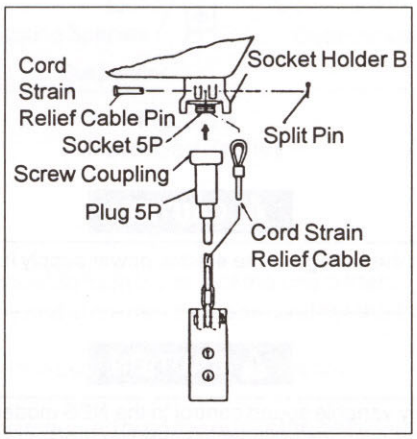


Fig. 2-11
Installation of Pendant Cord
1/4 ton through 2 ton L (except 1-1/2 ton)

For 1-1/2 ton through 5 ton (except 2 ton L)

- Refer to Fig. 2-12.
- Insert the 5P plug into the 5P Socket and hand tighten the Screw Coupling.
- Install the Cord Strain Relief Cable Stopper through the loop of the Cord Strain Relief Cable.
- Fasten the Cord Strain Relief Cable Stopper to the Socket Holder Support using Machine Screws.

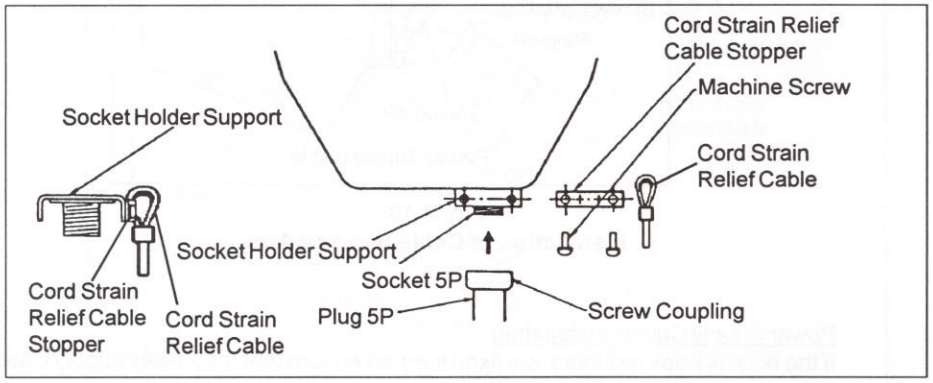


Fig. 2-12
Installation of Pendant Cord
1-1/2 ton through 5 ton (except 2 ton L)

Power Supply Cable - Connection

The Power Supply Cable connects to the hoist via a 4 pin plug and socket. Make this connection as follows:

- Refer to Fig. 2-13.
- Insert the 4P plug of the Power Supply Cable into the 4P Socket on the hoist and hand tighten the screw coupling.
- Install the Cable Support Arm on to the Socket Holder A using the pre-installed Bolts and Spring Washers.
- Use care to avoid twisting or kinking the Power Supply Cable.

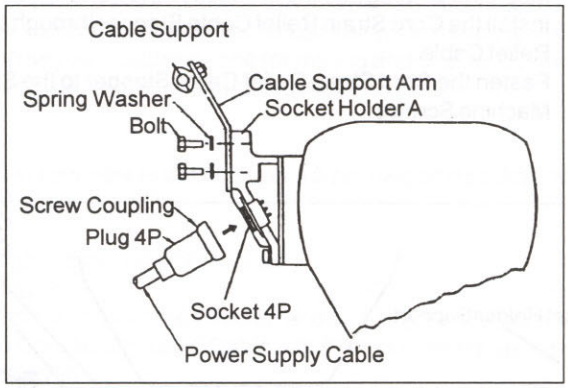


Fig. 2-13
Installation of Cable Support Arm

Power Supply Cable - Installation

If the hoist is hook mounted to a fixed support ensure that the Power Supply Cable is properly installed and supported between the hoist and the electrical power supply.

If the host is installed on a manual trolley, then the Power Supply Cable must be installed along the beam that the trolley runs on. For curved beams a special cable suspension system will be needed, and this instruction does not apply. For straight beams install the Power Supply Cable as follows:

- Install a guide wire system parallel to the beam.
- For a manual trolley the guide wire should be positioned slightly outside the hoist's Cable Support (refer to Fig. 2-13).
- Use the Cable Trolleys to suspend the Power Supply Cable from the guide wire.

2.5.3 Pendant With 4 Button Control

This instruction applies to installations where the hoist is installed on a motorized trolley. In this case the hoist and trolley are controlled by a pendant with 4 push buttons - one for raising, one for lowering, one for trolley left, and one for trolley right.

The electrical interconnections for a hoist installed on a motorized trolley involves four cables as listed below and as shown by Fig. 2-14.

- Pendant to Trolley Control Box
- Trolley Control Box to Hoist 5P Socket
- Trolley Control Box to Hoist 4P Socket
- Power Supply Cable to Trolley Control Box

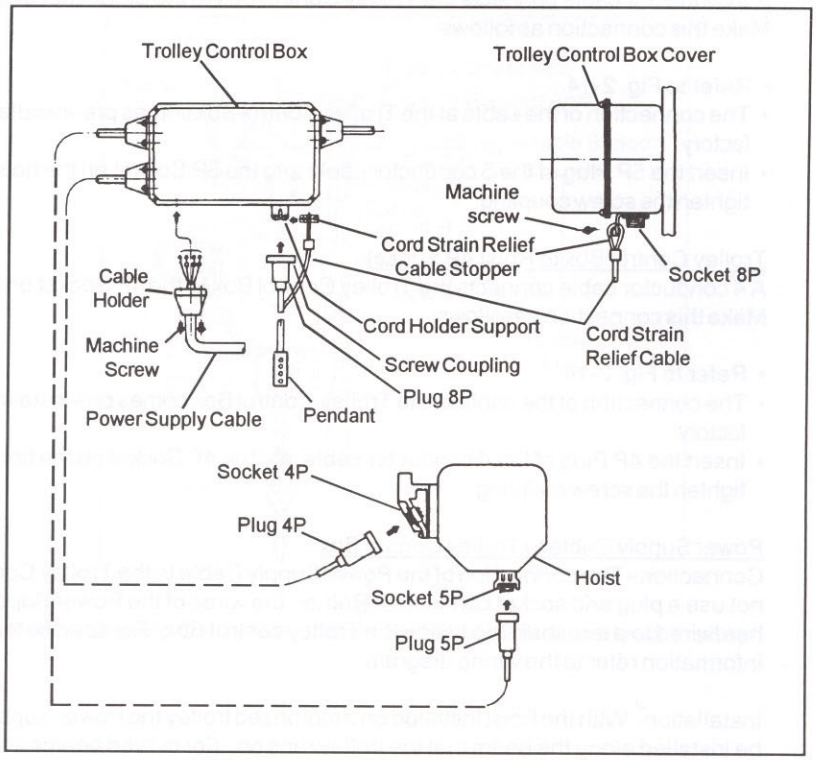


Fig. 2-14
Installation of Pendant Cord With 8P Connector

Pendant to Trolley Control Box

The Pendant Cord connects to the Trolley Control Box via an 8 pin plug and socket. Make this connection as follows:

- Refer to Fig. 2-14.
- Insert the 8P plug of the Pendant Cord into the 8P Socket on the Trolley Control Box and hand tighten the screw coupling.
- Install the Cord Strain Relief Cable Stopper through the loop of the cord Strain Relief Cable.
- Fasten the Cord Strain Relief Cable Stopper to the Cord Holder Support using Machine Screws.

Trolley Control Box to Hoist 5P Socket

A 5 conductor cable connects the Trolley Control Box to the 5P Socket on the hoist. Make this connection as follows:

- Refer to Fig. 2-14.
- The connection of the cable at the Trolley Control Box comes pre-installed from the factory.
- Insert the 5P Plug of the 5 conductor cable into the 5P Socket on the hoist and hand tighten the screw coupling.

Trolley Control Box to Hoist 4P Socket

A 4 conductor cable connects the Trolley Control Box to the 4P Socket on the hoist. Make this connection as follows:

- Refer to Fig. 2-14.
- The connection of the cable at the Trolley Control Box comes pre-installed from the factory.
- Insert the 4P Plug of the 4 conductor cable into the 4P Socket on the hoist and hand tighten the screw coupling.

Power Supply Cable to Trolley Control Box

Connection - The connection of the Power Supply Cable to the Trolley Control Box does not use a plug and socket connector. Rather, the wires of the Power Supply Cable are hardwired to a terminal strip inside the Trolley control Box. For specific termination information refer to the wiring diagram.

Installation - With the hoist installed on a motorized trolley the Power Supply Cable must be installed along the beam that the trolley runs on. For curved beams a special cable suspension system will be needed, and this instruction does not apply. For straight beams install the Power Supply Cable as follows:

- Install a guide wire system parallel to the beam.
- For a motorized trolley refer to Fig. 2-15 and first afix the guide wire to the Wire Guide. Then attach the Cable Support to the Cable Support Arm.

If a longer Power Supply Cable is required, the cable used must be selected and sized properly to ensure that the motor terminal voltage remains within $\pm$ 5% of the motor's namplate data.

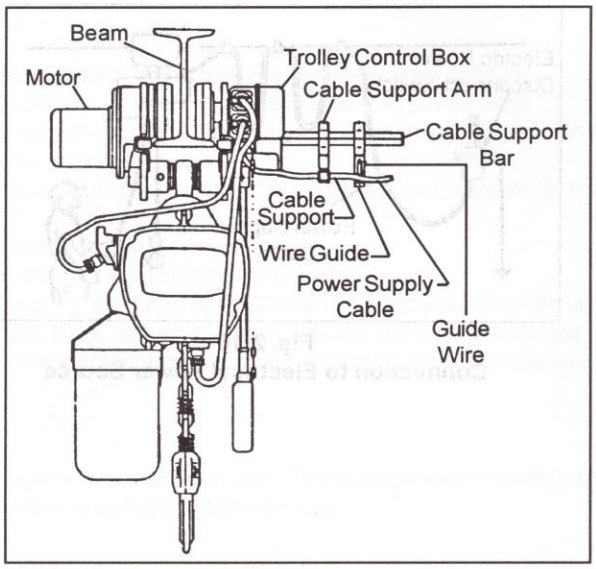


Fig. 2-15
Power Supply Cable Installation for Hoist With Motorized Trolley

2.5.4 Connection to Electrical Power Source

This instruction applies to the connection of the Power Supply Cable to the Electrical Power Source.

Wiring

The red, white, and black wires of the Power Supply Cable should be connected to the Electric Power Disconnect Switch as shown in Fig. 2-16. This connection should be made so that the hoist is phased properly. **If the phasing of the power to the hoist is not correct, the hoist will not operate. If this happens, disconnect and swap any two of the three wires, then re-connect.**

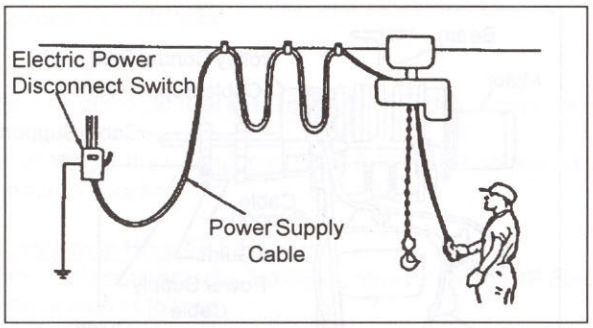


Fig. 2-16
Connection to Electrical Power Source

Fuse Capacity

The hoist's (trolley'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 nameplates for the hoist and trolley for the full load amperage draw.

Grounding

⚠ DANGER

An improper or insufficient ground connection creates an electrical shock hazard when touching any part of the hoist or trolley.

In the Power Supply Cable the ground wire will be either Green and Yellow striped or solid Green. It should always be connected to a suitable ground connection. Do not paint the trolley wheel running surfaces of the beam as this can affect grounding.

2.6 Trial operation

Before proceeding:

- Measure and record the uncompressed height of all chain springs.
- Measure and record the "k" dimension (see Table 4-4) of all hooks.
- Record the hoist's model, lot, and serial number (from the nameplate on the hoist) in the space provided on the cover of this manual.
- Ensure that the hoist is properly installed to either (a) fixed point, or (b) trolley, whichever applies.
- If hoist is installed on a trolley, ensure that
  (a) trolley is properly installed on the beam, and
  (b) stops for the trolley are correctly positioned and securely installed on the beam.
- Ensure that all nuts, bolts, and split (cotter) pins are sufficiently fastened.
- Pull down on the Pendant and ensure that the Cord Strain Relief Cable takes the force, not the Pendant Cord.

Check voltage

Check supply voltage before everyday use. If the voltage varies more than 5% of the rated value, electrical devices may not function normally.

Confirm Proper Operation

- Before operating read and become familiar with Section 3 - Operation.
- Before operating ensure that the hoist (and trolley) meets the Inspection, Testing, and Maintenance requirements of ANSI/ASME B30.16.
- Before operating ensure that nothing will interfere with the full range of the hoist's (and trolley's) operation.
- Proceed with trial operation to confirm proper operation.

Make sure that depression of up button lifts the load chain and depression of down button lowers the load chain hook. **If the load chain does not move when the push buttons are pushed, the NR relay (Non-reverse relay), in the chain hoist is operating and breaks the control circuit. In this case, reverse any two of the three wires at the power source.** The hook will then move in accordance with the directions of the push button. The NR relay also breaks the control circuit in the case of a single-phased condition of the power source. If it does not operate correctly even after the above changes of the connection, check for a single-phased condition.

3.0 Operation

⚠ DANGER

DO NOT WALK UNDER A SUSPENDER LOAD.

⚠ WARNING

HOIST OPERATORS SHALL BE REQUIRED TO READ THE OPERATIONS SECTION OF THIS MANUAL, THE WARNINGS CONTAINED IN THIS MANUAL, INSTRUCTION AND WARNING LABELS ON THE HOIST OR LIFTING SYSTEM, AND THE OPERATION SECTIONS OF ASME B30.16 AND ASME B30.10; AND TO BE FAMILIAR WITH THE HOIST AND HOIST CONTROLS BEFORE BEING AUTHORIZED TO OPERATE THE HOIST OR LIFTING SYSTEM.

HOIST OPERATORS SHOULD BE TRAINED IN PROPER RIGGING PROCEDURES TO BE FOLLOWED IN THE ATTACHMENT OF LOADS TO THE HOIST HOOK.

HOIST OPERATORS SHOULD BE TRAINED TO BE AWARE OF POTENTIAL MALFUNCTIONS OF THE EQUIPMENT THAT REQUIRE ADJUSTMENT OR REPAIR, AND TO BE INSTRUCTED TO STOP OPERATION IS SUCH MALFUNCTIONS OCCUR, AND TO IMMEDIATELY ADVISE THEIR SUPERVISOR SO CORRECTIVE ACTION CAN BE TAKEN.

HOIST OPERATORS SHOULD HAVE NORMAL DEPTH PERCEPTION, FIELD OF VISION, REACTION TIME, MANUAL DEXTERITY, AND COORDINATION.

HOIST OPERATORS SHOULD NOT BE SUBJECT TO SEIZURES, LOSS OF PHYSICAL CONTROL, PHYSICAL DEFECTS, OR EMOTIONAL INSTABILITY THAT COULD RESULT IN ACTIONS OF THE OPERATOR BEING A HAZARD TO THE OPERATOR OR OTHERS.

HOIST OPERATORS SHOULD NOT OPERATE A HOIST OR LIFTING SYSTEM WHEN UNDER THE INFLUENCE OF ALCOHOL, DRUGS, OR MEDICATION.

OVERHEAD HOISTS ARE INTENDED ONLY FOR VERTICAL LIFTING SERVICE OF FREELY SUSPENDED UNGUIDED LOADS. DO NOT USE HOIST FOR LOADS THAT ARE NOT LIFTED VERTICALLY, LOADS THAT ARE NOT FREELY SUSPENDED, OR LOADS THAT ARE GUIDED.

NOTICE

- Read ANSI/ASME B30.16 and ANSI/ASME B30.10.
- Read the hoist manufacturer's Operating and Maintenance Instructions.
- Read all labels attached to equipment.

The operation of an overhead hoist involves more than activating the hoist's controls. Per the ASME B30 standards, the use of an overhead hoist is subject to certain hazards that cannot be mitigated by engineered features, but only by the exercise of intelligence, care, commons sense, and experience in anticipating the effects and results of activating the hoist's controls. Use this guidance in conjunction with other warnings, cautions, and notices in this manual to govern the operation and use of your overhead hoist.

⚠ WARNING

Improper operation of a hoist can create a potentially hazardous situation which, if not avoided, could result in death or serious injury. To avoid such a potentially hazardous situation **THE OPERATOR SHALL:**

- **NOT** lift more than rated load for the hoisting equipment.
- **NOT** operate unless load is centered under hoist.
- **NOT** use damaged hoist or hoist that is not working properly.
- **NOT** use hoist with twisted, kinked, damaged, stretched, or worn chain.
- **NOT** use the hoist if the bottom hook is capsized (double fall hoists - see Section 2.2.4).
- **NOT** use the hoist to lift, support, or transport people.
- **NOT** lift loads over people.
- **NOT** apply load unless load chain is properly seated in the load sheave (and idle sheave for double fall hoists).
- **NOT** use the hoist in a way that could result in shock or impact loads being applied to the hoist.
- **NOT** attempt to lengthen the load chain or repair damaged load chain.
- **NOT** operate hoist when it is restricted from forming a straight line from hook to hook in the direction of loading.
- **NOT** use load chain as a sling or wrap load chain around load.
- **NOT** apply the load to the tip of the hook or to the hook latch.
- **NOT** operate beyond the limits of the load chain travel.
- **NOT** operate hoist with missing or damaged chain spring(s).
- **NOT** leave load supported by the hoist unattended unless specific precautions have been taken.
- **NOT** allow the chain, or hook to be used as an electrical or welding ground.
- **NOT** allow the chain, or hook to be touched by a live welding electrode.
- **NOT** remove or obscure the warnings on the hoist.
- Be familiar with operating controls, procedures, and warnings.
- Make sure the hoist (and trolley) is securely attached to a suitable support before applying load.
- Make sure load slings or other approved single attachments are properly sized , rigged, and seated in the hook saddle.
- Take up slack carefully - make sure load is balanced and load holding action is secure before continuing.
- Make sure all persons stay clear of the supported load.
- Protect the hoist's load chain from weld splatter or other damaging contaminants.

- Malfunctions or unusual performances (including unusual noises) of the hoist should be reported and the hoist should be removed from service until the malfunction of unusual performance is resolved.
- Make sure hoist limit switches function properly.
- Warn personnel before lifting or moving a load.
- Warn personnel of an approaching load.

⚠ CAUTION

Improper operation of a hoist can create a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. To avoid such a potentially hazardous situation **THE OPERATOR SHALL:**

- Maintain a firm footing or be otherwise secured when operating the hoist.
- Check brake function by tensioning the hoist prior to each lift operation.
- Use hook latches. Latches are to retain slings, chains, etc. under slack conditions only.
- Make sure the hook latches are closed and not supporting any parts of the load.
- Make sure the load is free to move and will clear all obstructions.
- Avoid swinging the load or hook.
- Make sure hook travel is in the same direction as shown on the controls.
- Allow motors to stop completely before changing direction.
- Inspect the hoist regularly, replace damaged or worn parts, and keep appropriate records of inspection and maintenance.
- Use the hoist manufacturer's recommended parts when repairing the unit.
- Lubricate load chain per hoist manufacturer's recommendations.
- **NOT** use the hoist load limiting or warning device to measure the weight of the load.
- **NOT** use limit switches as routine operating stops They are emergency devices only.
- **NOT** allow your attention to be diverted from operating the hoisting equipment.
- **NOT** allow the hoist to be subjected to sharp contact with other hoists, structures, or objects through misuse.

4.0 Inspection and Maintenance

4.1 Inspection

4.1.1 General

The inspection information provided herein is based on ASME B30.16. The following definitions are from ASME B30.16 and pertain to the inspection information that follows.

- Designated Person - a person selected or assigned as being competent to perform the specific duties to which he/she is assigned.
- Qualified Person - a person who, by possession of a recognized degree or certificate of professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.
- Normal Service - that distributed service which involves operation with randomly distributed loads within the rated load limit, or uniform loads less than 65% of rated load for not more than 25% of the time.
- Heavy Service - that service which involves operation within the rated load limit which exceeds normal service.
- Severe Service - that service which involves normal or heavy service with abnormal operating conditions.

4.1.2 Inspection Classification

Initial Inspection - prior to initial use, all new, altered, or modified hoists shall be inspected by a designated person to ensure compliance with the applicable provisions of this manual.

Inspection Classification - the inspection procedure for hoists in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the hoist and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are herein designated as FREQUENT and PERIODIC, with respective intervals between inspections as defined below.

FREQUENT Inspection - visual examinations by the operator or other designated personnel with intervals per the following criteria:

- Normal service - monthly
- Heavy service - weekly to monthly
- Severe service - daily to weekly
- Special or infrequent service - as recommended by a qualified person before and after each occurrence.

PERIODIC Inspection - visual inspection by a designated person with intervals per the following criteria:

- Normal service - yearly
- Heavy service - semiannually
- Severe service - quarterly
- Special or infrequent service - as recommended by a qualified person before the first such occurrence and as directed by the qualified person for any subsequent occurrences.

4.1.3 Frequent Inspection

Inspections shall be made on a FREQUENT basis in accordance with Table 4-1, "Frequent Inspection." Included in these FREQUENT Inspections are observations made during operation for any defects or damage that might appear between Periodic Inspections. Evaluation and resolution of the results of FREQUENT Inspections shall be made by a designated person such that the hoist is maintained in safe working condition.

Table 4-1
Frequent Inspection

Item	Normal Service		Heavy Service		Severe Service	
	Visual Monthly	Record Yearly	Visual Weekly	Record Semi-anually	Visual Daily	Record Quarterly
All functional operating mechanisms for maladjustment and unusual sounds.	X	_	X	_	X	_
Operation of limit switch and chain spring(s).	X	_	X	_	X	_
Hoist braking system for proper operation.	X	_	X	_	X	_
Hooks in accordance with ASME B30.10.	X	_	X	_	X	_
Hook latch operation.	X	_	X	_	X	
Load chain in accordance with Section 4.1.7.	X	_	X	_	X	_
Load chain reeving for compliance with Section 2.2 and Section 4.2.3.	X	_	X	_	X	_

4.1.4 Periodic Inspection

Inspections shall be made on a PERIODIC basis in accordance with Table 4-2, "Periodic Inspection". Evaluation and resolution of the results of PERIODIC Inspections shall be made by a designated person such that the hoist is maintained in safe working condition.

Table 4-2
Periodic Inspection

Item	Normal Service		Heavy Service		Severe Service	
	Visual Monthly	Record Yearly	Visual Weekly	Record Semi-anually	Visual Daily	Record Quarterly
Requirements of frequent inspection	_	X	_	X	_	X
Evidence of loose bolts, nuts, or rivets	_	X	_	X	_	X
Evidence of worn, corroded, cracked, or distorted parts such as load blocks, suspension housing, chain, attachments, clevises, yokes, suspension bolts, shafts, gears, bearings and pins	_	X	_	X	_	X
Evidence of damage to hook retaining nuts or collars and pins, and welds or rivets used to secure the retaining members	_	X	_	X	_	X
Imperfect insulation of cables, cords, and control station	_	X	_	X	_	X
Evidence of damage or excessive wear of load and idler sheaves	_	X	_	X	_	X
Evidence of excessive wear on motor or load brake.	_	X	_	X	_	X
Electrical apparatus for signs of pitting or any deterioration of visible controller contacts	_	X	_	X	_	X
Evidence of damage of supporting structure or trolley, if used	_	X	_	X	_	X
Function labels on pendant control stations for legibility	_	X	_	X	_	X
Warning label	_	X	_	X	_	X
End connections of load chain	_	X	_	X	_	X

For inspections where load suspension parts of the hoist are disassembled, a load test per ASME B30.16 must be performed on the hoist after it is re-assembled.

4.1.5 Occasionally Used Hoists

Hoists that are used infrequently shall be inspected as follows prior to placing in service:

- Hoist Idle More Than 1 Month, Less Than 1 Year: Inspect per FREQUENT Inspection criteria of paragraph 4.1.3 above.
- Hoist Idle More Than 1 Year: Inspect per PERIODIC Inspection criteria of paragraph 4.1.4 above.

4.1.6 Inspection Records

Dated inspection reports and records should be maintained at time intervals corresponding to those that apply for the hoist's PERIODIC interval per paragraph 4.1.4 above. These records should be stored where they are available to personnel involved with the inspection, maintenance, or operation of the hoist.

A long range chain inspection program should be established and should include records of examination of chains removed from service so a relationship can be established between visual observation and actual condition of the chain.

4.1.7 Inspection Methods and Criteria

This section covers the inspection of specific items. The list of items in this section is based on those listed in ASME B30.16 for Frequent and Periodic Inspection. In accordance with ASME B30.16, these inspections are not intended to involve disassembly of the hoist. Rather, disassembly for further inspection would be required if inspections of this section so indicate. Such disassembly and further inspection should be performed only by a qualified person trained in the disassembly and reassembly of the hoist.

Table 4-3
Inspection of Specific Items

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 lever should stop hoist.	Repair or replace as required.
Braking System	Function	Braking distance should not exceed approximately five chain links.	Repair, replace, or adjust 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" dimension should not be less than minimum value listed in Table 4-4.	Replace.
Hooks - Stretch	Measure	The "g" dimension should not be greater than maximum value listed in Table 4-4, OR "k" dimension should not be greater than 1.15 times that measured and recorded at time of purchase as new (see Section 2.6).	Replace.
Hooks - Bent Shank or Neck	Visual	Shank and neck portions of hook should be free of deformations.	Replace.

Table 4-3 (continued)
Inspection of Specific Items

Item	Method	Criteria	Action
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.
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.	Adjust or replace as required.
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	Measure	The "A" dimension should not be greater than maximum value listed in Table 4-5.	Replace, inspect Load Sheave (and Idle Sheave for double fall hoist).
Load Chain - Lubrication	Visual, Auditory	Entire surface of each link of chain 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 Sections 2.2.3 and 4.2.3).
Chain Container (optional)	Visual	Container should not be damaged. Brackets should not be deformed or missing.	Replace

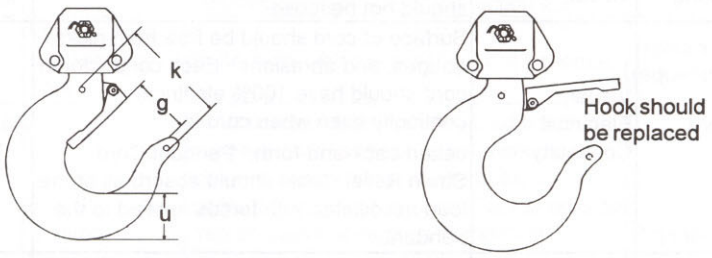
Table 4-3 (continued)
Inspection of Specific Items

Item	Method	Criteria	Action
Load Chain - Reeving	Visual	Chain should be reeved properly through Load Sheave (and Idle Sheave for double fall hoist) - refer to Section 4.2.3. Chain, chain springs, and stoppers should be installed properly - refer to Section 2.2.	Reeve/install chain properly.
Bolts, Nuts, and Rivets	Visual, Check with Proper Tool	Bolts, nuts, and rivets should not be loose.	Tighten or replace as required.
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
Motor Brake	Measure, Visual	Motor brake lining dimension should be within the allowable limits of Table 4-6. See Section 4.2.2 for gaining access to motor brake. Braking surfaces should be clean, free of grease/oil, and should not be glazed.	Replace, inspect Mechanical Brake (requires disassembly by qualified person trained in disassembly and reassembly of hoist).
Contactor Contacts	Visual	Contacts should be free of significant pitting or deterioration.	Replace.
Load Sheave	Visual	Pockets of Load Sheave should be free of significant wear.	Replace.
Chain Springs	Measure	Free height of chain springs should be no less than 0.85 times its free height when new (see Section 2.6).	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 energization of circuits for opposing motions (e.g. up and down).	Repair or replace as required.

Table 4-3 (continued)
Inspection of Specific Items

Item	Method	Criteria	Action
Pendant - Housing	Visual	Pendant housing should be free of cracks and mating surfaces of housing parts should seal without gaps.	Replace.
Pendant - Wiring	Visual	Wire connections to switches in pendant should not be loose.	Tighten.
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 and they should be legible.	Replace.
Gear Box Oil Level	Visual	With the hoist in the level position the level of the oil in the hoist should be approximately even with the lower edge of the side oil plug hole. The hoist should be free of oil leaks.	Change the oil (see Section 2.1) and repair leaks.
Label - Capacity	Visual	The label that indicates the capacity of the hoist should be legible and securely attached to the hoist.	Replace.
Limit Lever Assembly	Visual, Function	Lever should not be bent or significantly worn.	Replace.

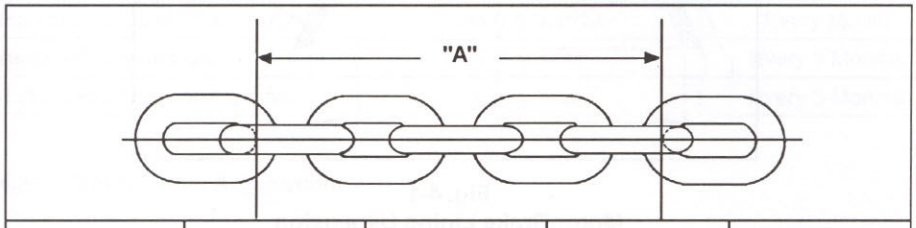
Table 4-4
Hook Dimensions



Capacity (Tons)	Maximum Allowable "g" dim. mm (in.)		Minimum Allowable "u" dim. mm (in.)		Nominal* "k" dim. mm (in.)	
1/4, 1/2 Top	32	(1.27)	21	(0.83)	45.9	(1.81)
1/4, 1/2 Bottom	28	(1.09)			42.0	(1.65)
1	36	(1.40)	28	(1.10)	49.8	(1.96)
1 1/2 Top	43	(1.68)	36	(1.42)	62.5	(2.46)
1 1/2 Bottom	39	(1.54)	33	(1.30)	59.8	(2.35)
2	43	(1.68)	36	(1.42)	62.5	(2.46)
2 1/2 Top	51	(1.99)	43	(1.69)	93.9	(3.70)
2 1/2 Bottom	46	(1.81)	39	(1.54)	88.1	(3.47)
3	51	(1.99)	43	(1.69)	93.9	(3.70)
5	53	(2.08)	50	(1.97)	78.2	(3.08)

* These values are nominal since the dimension is not controlled to a tolerance. The "k" dimension should be measured when the hook is nes - this becomes a reference measurement. Subsequent measurements are compared to this reference to make determinations about hook deformation/stretch. See Section 2.6.

Table 4-5
Load Chain Dimensions



Capacity (Tons)	Wire Size mm (in.)	Code	Nominal "A" mm (in.)	Maximum Allowable "A" mm (in.)
1/4, 1/2L	5.0(.20)	LCES003	75.5(2.97)	76.6(3.02)
1/2S, 1L	6.3(.25)	LCES005	95.5(3.76)	96.9(3.82)
1S, 2L	7.1(.28)	LCES010	106.2(4.18)	107.8(4.25)
1 1/2, 2S, 3	10.1(.40)	LCES020	151.5(5.96)	153.8(6.05)
2 1/2, 5	11.2(.44)	LCES025	171.5(6.75)	174.1(6.85)

Table 4-6
Motor Brake Lining Dimensions

Hoist(s)	Speed	Refer to Figure Number:	Replace if "A" Dimension is:
1/4 ton, 1/2 ton L	Single	4-1	Greater than 123.3 mm
	Dual	4-1	Greater than 132.3 mm
1/2 ton S, 1 ton L	Single	4-3	Less than 41 mm
	Dual	4-2	Less than 157 mm
1 ton S, 2 ton L	Single	4-3	Less than 46 mm
	Dual	4-2	Less than 176 mm
1-1/2 ton S, 2 ton S, 2-1/2 ton, 3 ton, 5 ton	Single	4-3	Less than 49.5 mm
	Dual	4-2	Less than 228 mm

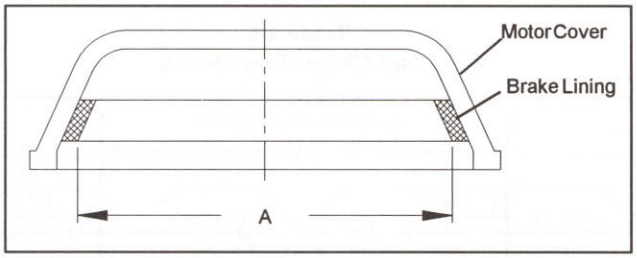


Fig. 4-1
Motor Brake Lining Dimension

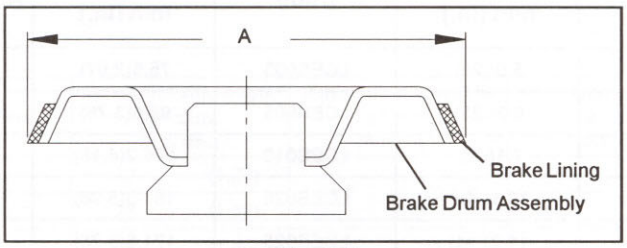


Fig. 4-2
Motor Brake Lining Dimension

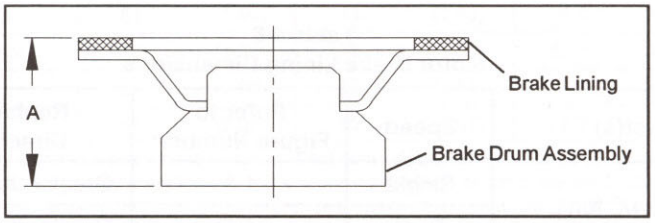


Fig. 4-3
Motor Brake Lining Dimension

4.2 Maintenance and Handling

4.2.1 Lubrication

Whenever the hoist shows evidence of an oil leak, the oil level must be checked and brought to the proper level. See paragraph 2.1 for the proper oil type and amount. The cause of the leak should also be investigated and resolved.

Table 4-7
Lubrication

LUBRICATION	NORMAL USAGE	HIGH USAGE
Change Hoist Gear Box Oil	Not Necessary	Every Year
Clean and Oil Load Chain	Every 6 Months	Every Month
Grease all Exposed Gears	Every Year	Every 3 Months
Oil all External Pins and Shafts	Every Year	Every 3 Months

4.2.2 Motor Brake Adjustment

To keep your hoist working in optimum condition and prevent possible down time, it is recommended to check your motor brake adjustment at regular intervals.

Inspection and adjustment of the motor brake requires removal of the motor brake unit from the hoist as an assembly. But first, be sure the power is off, the hoist is unloaded and the load chain is secured. By removing the four motor cover bolts you can carefully pull the motor brake unit out of the hoist as shown in Fig. 4-4.

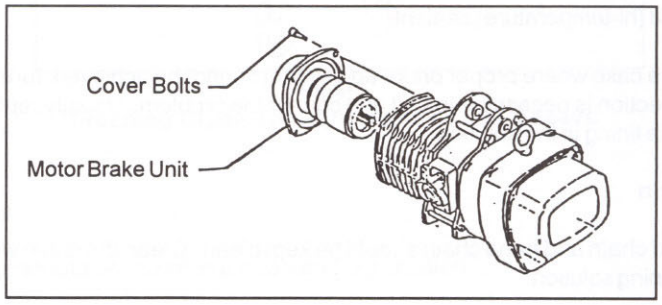


Fig. 4-4
Motor Brake

The brake gap should be measured between the brake drum and pull rotor. Adjustment of the brake gap is accomplished by turning the adjustment nut in the center of the motor cover as shown in Fig. 4-5. Do this as follows:

- Bend the tab of the Lock Washer away from the Adjusting Nut so that the Adjusting Nut can be rotated.
- Using a spanner wrench and a feeler gauge, rotate the Adjusting Nut to attain the proper brake gap per Table 4-8.
- After the brake gap is set in accordance with Table 4-8, secure the Adjusting Nut by bending one of the tabs of the Lock Washer into a slot in the Adjusting Nut.

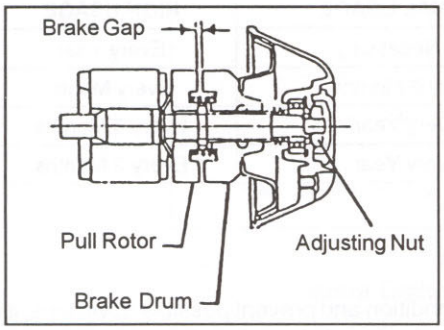


Fig. 4-5
Brake Gap

Table 4-8
Brake Gap

Hoist Capacity (Tons)	Brake Gap inches (mm)
1/4, 1/2L, 1/2S, 1L, 1S, 2L	.020 - .032 (0.5 - 0.8)
1 1/2, 2S, 2 1/2, 3, 5 and above	.032 - .043 (0.8 - 1.1)

After the brake gap is properly adjusted, carefully replace the motor brake unit back into the hoist. Be sure to reseal the motor cover to motor frame surface using a small bead of liquid (hi-temperature) sealant.

In the case where proper brake adjustment cannot be achieved, further disassembly and inspection is necessary to find and correct the problem. Usually replacement of the brake lining is the solution.

4.2.3 Chain

Load chain and hand chain should be kept clean. Clean the chain with an acid-free cleaning solution.

Lubrication - for normal use coat load chain lightly with machine oil or gear oil. Under dusty or abrasive conditions, use a dry lubricant.

Be certain that the replacement chain is obtained from Harrington and is the exact same size, grade, and construction as the original chain.

When replacing load chain, check for wear on mating parts, i.e. Load Sheave, Chain Guides, and Idler Wheels, and replace if necessary. Ensure that the chain fits properly in the Load Sheave and chain guide. Destroy old load chain. Also, ensure that the all required chain springs and stoppers are installed properly on the replacement chain - refer to Section 2.2.5.

Threading the load chain on to the hoist's load sheave is made easier by using a short length of chain with an open link on one end. This short length of chain (pilot chain) is first placed on the hoist's load sheave during reassembly of the hoist. It must be oriented so that the open link is not a standing link (figure 4-6 illustrates a standing link). The load chain must have an odd number of links so that both its end links have the same orientation. After the hoist reassembly is complete the pilot chain can be used to thread the load chain on to the load sheave. The end link of the load chain is connected to the open link of the pilot chain so that the welded portions of the load chain's standing link are oriented to the outside as they pass over the sheave - refer to Fig. 4-6. The pilot chain is then used to pull the load chain through the hoist and on to the hoist's load sheave. The pilot chain is then disconnected from the load chain and discarded.

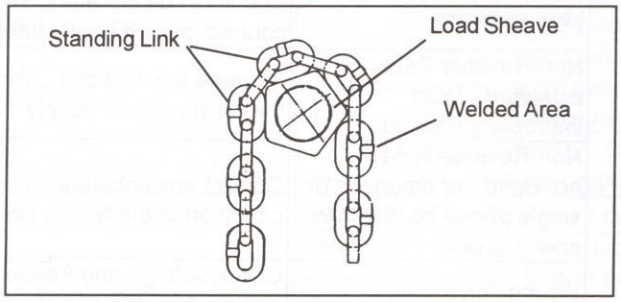


Fig. 4-6
Threading Chain Through Hoist's Load Sheave

4.2.4 Storage

The unit should be stored in a clean and dry location.

4.2.5 Outdoor Installation

When the unit is installed outdoors, extra care should be used. Be sure to cover the unit *to protect it from bad weather conditions and make regular inspections of the unit's* condition and operation.

5.0 Troubleshooting

⚠ DANGER

Before proceeding, ensure that the electrical supply for the hoist or trolley has been de-energized (disconnected) and locked and tagged. Refer to ANSI Z244.1, Personnel Protection - Lockout/Tagout of Energy Sources. Only a qualified electrician should perform these steps.

Table 5-1
Troubleshooting

Problem	Cause	Solution
Hoist will not operate	Loss of power	Check circuit breakers, switches, fuses and connections on power lines/cable.
	Non-Reverse Relay activated - hoist improperly phased	Reverse any two of the three connections in the hoist's power supply.
	Non-Reverse Relay activated - unbalanced or single phase condition in power supply	Correct any unbalanced or single phase condition in the hoist's power supply.
	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 (if provided) has tripped	See Trouble Shooting Problem "Motor or brake overheating".
	Improper, loose, or broken wire in hoist electrical system	Shut off power supply, remove control box cover end cover from hoist (and trolley) and check wiring connections on push-button station.
	Brake does not release	Check motor brake adjustment for proper clearance.
	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.

Table 5-1 (continued)
Troubleshooting

Problem	Cause	Solution
Hoist moving in wrong direction	Improper electrical connections	Check all connections with Wiring Diagram.
	Non-reverse relay circuit has been altered	Do not operate hoist until non-reverse relay circuit has been properly restored.
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.
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	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.

Table 5-1 (continued)
Troubleshooting

Problem	Cause	Solution
Bottom hook doesn't stop at ends of travel	Faulty limit switch	Check for burned contacts and replace as needed.
	Limit lever not activating limit switch	Determine cause and replace as needed.
Load drifts excessively when hoist is stopped	Motor brake not holding	Remove cover, clean and inspect brake lining. Check brake adjustment for proper clearance.
	Load brake not holding (ES only)	Remove load brake and inspect parts. (ES only, NES has no load brake.)
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 102° 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.
	Contactor 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.

6.0 Material Safety Data Sheets

6.1 Gear Box Oil

The ES and NES hoist is shipped new with the oil for the gear box in a separate container. In compliance with OSHA regulations, a Material Safety Data Sheet has been provided for the gear box oil that is provided in this separate container. This MSDS is provided in Table 6-1.

Table 6-1
Material Safety Data Sheet
Gear Box Oil for ES and NES Electric Chain Hoist

SECTION I. GENERAL INFORMATION		
MANUFACTURER'S NAME	EMERGENCY TELEPHONE NUMBER	TELEPHONE NUMBER FOR INFORMATION
Nippon Oil Co., Ltd.	03-3502-9161	03-3502-1111
ADDRESS		
3-12, Nishi Shimbashi 1-chome, Minato-ku, Tokyo 105 Japan		
DATE PREPARED	SIGNATURE OF PREPARER	
July 30, 1992	Signature on file at Harrington Hoists, Inc.	
TRADE NAME AND SYNONYMS	CHEMICAL NAME AND SYNONYMS	
Antoil B	Tractor Hydraulic Fluid	
WARNING STATEMENT		
CAUTION: Prolonged or repeated contact with skin may cause irritation in some cases.		

SECTION II.	TYPICAL COMPOSITION	
Base Oil	(highly refined mineral oil)	>91%
Additives	(Oxidation inhibitor, Friction modifier, Anti wear agent, Antifoamer, Pour point depressants, etc.)	<9%

SECTION III. EXPOSURE STANDARD
No OSHA exposure or ACGIH Threshold Limit Value (TLV) has been established for this material. The suggested TLV is 5mg/m^3 for a daily 8-hour exposure. This is the OSHA exposure standard and the ACGIH-TLV (1990-1991) for mineral oil mists.

Table 6-1 (continued)
Material Safety Data Sheet
Gear Box Oil for ES and NES Electric Chain Hoist

SECTION IV.	OCCUPATIONAL CONTROL PROCEDURES
Eye protection:	Chemical type goggles or face shield optional.
Skin protection:	Avoid prolonged or frequently repeated skin contact by wearing impervious protective clothing including gloves.
Respiratory protection:	No special respiratory protection is normally required.
Ventilation:	No special ventilation is usually necessary. However, if operating conditions create high airborne concentrations of this material, special ventilation may be needed.

Other clothing and equipment: No special clothing or equipment is usually necessary.
Work practices, hygienic practices: No information is available.
Other handling and storage requirements: No information is available.
Protective measures during maintenance of contaminated equipment: No information is available.

SECTION V.	HEALTH HAZARD INFORMATION

SYMPTOMS OF OVEREXPOSURE FOR EACH POTENTIAL ROUTE OF EXPOSURE

Inhalation:	Not expected to be acutely toxic by inhalation.
Skin:	Expected to cause no more than minor skin irritation, but prolonged or frequently repeated skin contact may be harmful.
Eyes:	Expected to cause no more than minor irritation.
Absorption through skin:	No information is available.
Ingestion:	Not expected to be acutely toxic by ingestion.

HEALTH EFFECTS OR RISK FROM EXPOSURE

Acute:	No information is available.
Chronic:	No information is available.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

No information is available.

Table 6-1 (continued)
Material Safety Data Sheet
Gear Box Oil for ES and NES Electric Chain Hoist

SECTION VI.	EMERGENCY & FIRST AID PROCEDURES
Eyes:	Wash eyes with fresh water for at least 15 minutes. If irritation continues, see a doctor.
Skin:	Wash skin thoroughly with soap and water. Launder contaminated clothing.
Inhalation:	None considered necessary.
Ingestion:	If swallowed, give a large amount of water to drink, make person vomit and call a doctor.
Sensitization property:	unknown

SECTION VII.		MEDIAN LETHAL DOSE (LD_{50})
Oral:	N.D.:	believed to be greater than 5g/kg
	(rat):	practically nontoxic
Dermal:	N.D.:	believed to be greater than 3g/kg
	(rabbit):	practically nontoxic

SECTION VIII. FIRE PROTECTION INFORMATION	
Flash Point °C	214
AutoIgnition Temp. °C	N.D.
Flammability limits	N.D.

Extinguishing Media: CO_2, Dry chemical foam, Water fog or spray.

SECTION IX.	REACTIVITY DATA	
Stability	___X_ Stable	_____ Unstable
Conditions to avoid	Do not store at high temperature.	
Incompatibility (materials to avoid;):	May react with strong oxidizing materials.	
Hazardous polymerization:	_____ May occur	___X__ Will not occur

SECTION X.	REQUIREMENTS FOR TRANSPORTATION, HANDLING & STORAGE

Minimum feasible handling temperatures should be maintained.
Periods of exposure to high temperatures should be minimized.
Water contamination should be avoided.

SECTION XI.	SPILL, LEAK AND DISPOSAL PROCEDURES

PROCEDURES IN CASE OF BREAKAGE OR LEAKAGE
Wipe up, or absorb on suitable material and shovel up.

WASTE DISPOSAL METHOD
Place contaminated materials in disposable containers and bury in an approved dumping area.

Table 6-1 (continued)
Material Safety Data Sheet
Gear Box Oil for ES and NES Electric Chain Hoist

SECTION XII.	CHEMICAL AND PHYSICAL PROPERTIES	
Density	g/cm³@15°C	0.885
Color	ASTM	L2.5
Viscosity	cSt @40°C	57.56
	@100°C	8.14
Solubility		N.D.
Boiling point		N.D.
Evaporation rate		N.D.
Vapor pressure	mmHg	N.D.
Vapor Density		N.D.
PH of undiluted product		N.D.
Percent Volatile by volume		N.D.
Appearance		Light Yellow color
Odor		Little odor

N.D. - Not Determined

7.0 Warranty

All products sold by Harrington Hoists, Inc. are warranted to be free from defects in material and workmanship from date of shipment by Harrington for the following periods:

Manual Hoists & Trolleys - 2 years
Electric Hoists & Trolleys, Crane Components - 1 year
Spare / Replacement Parts - 1 year

The product must be used in accordance with manufacturer's recommendations and must not have been subject to abuse, lack of maintenance, misuse, negligence, or unauthorized repairs or alterations.

Should any defect in material or workmanship occur during the above time period in any product, as determined by Harrington Hoist's inspection of the product, Harrington Hoists, Inc. agrees, at its discretion, either to replace (not including installation) or repair the part or product free of charge and deliver said item F.O.B. Harrington Hoists, Inc. place of business to customer. Customer must obtain a Return Goods Authorization as directed by Harrington or Harrington's published repair center prior to shipping product for warranty evaluation. An explanation of the complaint must accompany the product. Product must be returned freight prepaid. Upon repair, the product will be covered for the remainder of the original warranty period. If it is determined there is no defect, or that the defect resulted from causes not within the scope of Harrington's warranty, the customer will be responsible for the costs of returning the product.

Harrington Hoists, Inc. disclaims any and all other warranties of any kind expressed or implied as to the product's merchantability or fitness for a particular application. Harrington will not be liable for death, injuries to persons or property or for incidental, contingent, special or consequential damages, loss or expense arising in connection with the use or inability whatever, regardless of whether damage, loss or expense results from any act or failure to act by Harrington, whether negligent or willful, or from any other reason.

8.0 Parts List

Parts list for the ES/NES hoist follows in sections 8.1 through 8.7.

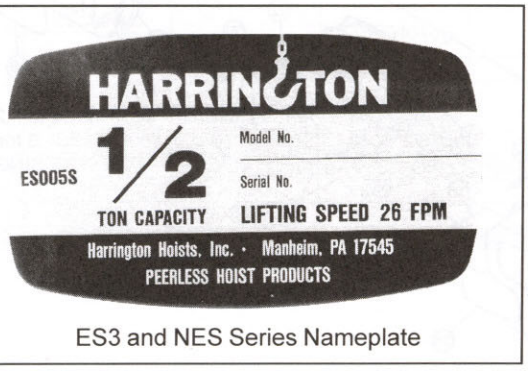
The letters S and L in the hoist capacity designation (e.g. 1-S, 2-L) indicate Standard or Low lifting speed. Standard speed hoists will be single fall hoists and Low speed hoists will be double fall hoists, except for the 3 ton and 5 ton, which are Standard speed hoists that are double fall.

In the case of dual speed hoists, the letter D will follow the S (or L). For example ES010S (or NES010S) is a standard lifting speed, single speed hoist and ES010SD (or NES010SD) is a standard lifting speed hoist, with a dual speed motor (high speed will be the standard lifting speed, and low speed wil be a much slower lifting speed). A variation to the meaning of S is used in the Parts Listings. In the column "Parts per Hoist" S means Single speed, and D means Dual speed.

Ordering Parts

1. To aid in ordering Parts and Product Support, record the Hoist model and serial numbers in the space provided on the cover of this manual.

2. When ordering Parts, please provide the Hoist code number and model number located on the Hoist nameplate (see Fig. below).



ES3 and NES Series Nameplate

HARRINGTON
HOISTS AND CRANES

www.harringtonhoists.com

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401 West End Avenue
Manheim, PA 17545
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Toll Free: 800-233-3010
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ESOM