

OPERATION, SERVICE & PARTS MANUAL



Before installing hoist, fill in the information below. Refer to the Hoist and Motor data plates.

Model No. _____

Serial No. _____

Purchase Date _____

Voltage _____

Rated Load _____

Yale®

GLOBAL KING™

WIRE ROPE HOISTS

RATED LOADS THRU 3.2 METRIC TONNE

Follow all instructions and warnings for inspecting, maintaining, and operating this hoist. The use of any hoist presents some risk of personal injury or property damage. That risk is greatly increased if proper instructions and warnings are not followed. Before using this hoist, each operator should become thoroughly familiar with all warnings, instructions, and recommendations in this manual. **Retain this manual for future reference and use.**

Forward this manual to operator. Failure to operate equipment as directed in manual may cause injury.



YALE • LIFT-TECH™
division of Columbus McKinnon Corporation

Yale® HOISTS

FOREWORD

This manual contains important information to help you install, operate, maintain and service your new YALE electric hoist. We recommend that you study its contents thoroughly before putting the hoist into use. We also recommend that you read Section IX - Series Lifting Equipment of the European Federation of Materials Handling and Storage Equipment (FEM) and the applicable performance and safety standards referenced therein. Then, through proper installation, application of correct operating procedures, and by practicing the recommended maintenance procedures, you can expect maximum lifting service from the hoist.

It will likely be a long time before parts information found in the Parts List is needed. Therefore, after the hoist is installed and you have completely familiarized yourself with operation and preventative maintenance procedures, we suggest that this book be carefully filed for future reference.

When ordering replacement parts from this book, it will be necessary that you include with your order: the Hoist Serial Number and Model

Number that are found on the nameplate attached to the hoist as shown in Figure 4-1. For your convenience, a space has been provided on the front cover of this Manual for entering this information. We recommend that you fill it out immediately so it is readily at hand when needed.

The contents of this manual are of necessity, general in nature and may cover features not incorporated on your hoist; or, you may have ordered features not covered by this manual. Therefore, the user must exercise care in applying instructions given in this manual. If specific information not in this manual is required, contact the factory.

THE INFORMATION CONTAINED IN THIS MANUAL IS FOR INFORMATIONAL PURPOSES ONLY AND YALE-LIFT-TECH DOES NOT WARRANT OR OTHERWISE GUARANTEE (IMPLIEDLY OR EXPRESSLY) ANYTHING OTHER THAN THE COMPONENTS THAT YALE-LIFT-TECH MANUFACTURES AND ASSUMES NO LEGAL RESPONSIBILITY (INCLUDING, BUT NOT LIMITED TO CONSEQUENTIAL DAMAGES) FOR INFORMATION CONTAINED IN THIS MANUAL.

NOTICE: Information contained in this book is subject to change without notice.

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SECTION I - GENERAL DESCRIPTION

1-1. GENERAL. YALE "Global King" electric hoists are wire rope and drum type hoists that are manufactured with an integral trolley. These hoists are all low headroom models with the rope drum and upper block supported on opposite sides of the beam, by the trolley frame. There is one basic frame configuration for both the two and four part single reeved hoists. Both reeving configurations are referred to as "A" Frame hoists with the distinction made between reeving styles. The S4 designation refers to the 3.2 tonne (3200 kg) capacity with a four parts of rope single reeving configuration. The S2 designation refers to the 1.6 tonne (1600 kg) capacity with a two part of rope single reeving configuration. Both hoists feature an integral trolley and are offered with two different flange width ranges; 4-5/8" through 8-1/2" and 8-5/8" through 14" on a maximum flange thickness of 1-1/8". The smaller flange range also accommodates patented track beams using an optional trolley wheel arrangement. The hoist motor is 2-speed with a 4:1 ratio between high and low speeds, as standard. The motor driven trolley has two available speeds with 1, 2 speed, or variable frequency control.

Throughout this manual, you will see references to the "S2" and "S4" Frame hoists. If you are unsure about which frame you have, count the number of rope falls that are supporting the lower block and/or see Section IV, Paragraph 4-2 for a simple gearcase measurement to determine the configuration of your hoist.

1-2. BASIC CONSTRUCTION. YALE "Global King" hoists consist of a rugged steel frame, made from structural steel and assembled using high strength structural bolts. The frame houses a lifting drum and serves as the suspension means for the rated hoist load. An aluminum gearcase, attached to one end of the drum frame, houses a triple-reduction, helical gear train. Applying power to the gearcase is a 2-speed, AC hoisting motor with a 4:1 speed ratio coupled with a 250% torque DC brake. High strength wire rope and a covered lower sheave block act as the load carrying means. Standard equipment includes a rope guide, a rotary-gear limit switch to limit hook travel in both up and down directions and an overload capacity limit switch. An optional block operated limit switch can be used to limit the upward travel of the lower block. An integral trolley, consisting of a 2-speed AC motor and a sealed worm reducer, applies torque to the trolley wheels through a cross-shaft and pinion arrangement, which provides traverse motion to the hoist. A single NEMA 4/12 control enclosure houses both the hoist and trolley electrical system controls. A push button control station (purchased separately) for operating the hoist is suspended on a wire strain cable attached to the hoist.

1-3. SELECTION & APPLICATION GUIDE.

Hoist Duty Classification

Your YALE "Global King" hoist was designed to meet a specific duty classification as described by the FEM "Rules for the Design of Serial Lifting Equipment". The methodology used to determine the duty class requirements of your specific application is shown below.

YALE "Global King" hoists are defined as "mechanisms" by the FEM and are classified as such by the following factors: **Class of Operating Time** and **Load Spectrum**. Your application must be definable by these two factors in order to determine duty classification.

Class of Operating Time

Class of Operating Time indicates the average period per day during which the mechanism is in operation, which is anytime the equipment is in motion. The Class of Operating Time is determined by calculation of the average daily operating time (average daily use):

Where:

t = Average Daily Operating Time (hr/day)

H = Average Hoist Height (ft)

N = Number of Cycles Per Hour (cycles/hr)

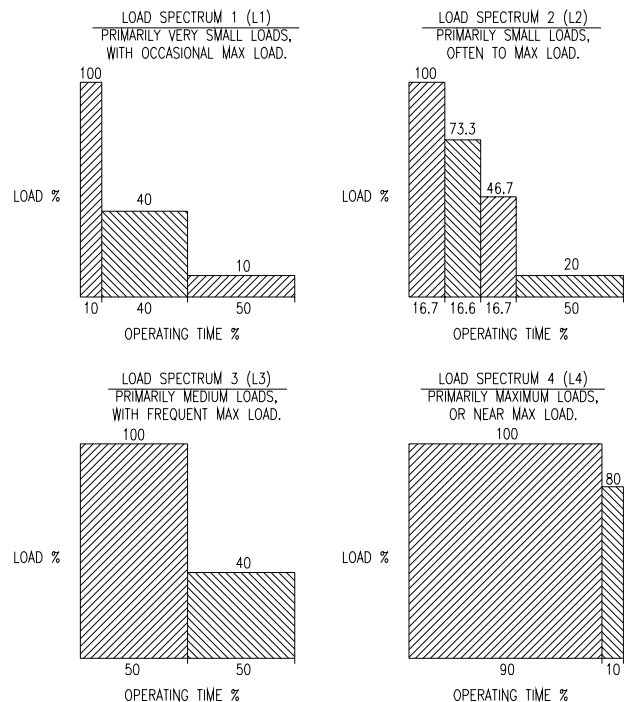
T = Daily Working Time (hr/day)

V = Hoisting Speed (ft/min)

$$t = \frac{2 \times H \times N \times T}{V \times 60}$$

Load Spectrum

Load Spectrum indicates the extent of which the mechanism is subjected to maximum stresses (full capacity lifts) or whether it is subject to smaller loads only. Use the charts below to estimate your load spectrum. For an exact means of calculating your load spectrum, refer to FEM 9.511 "Classification of Mechanisms".



Once the average daily operating time, "t", is calculated for a specific application, the Class of Operating Time can be identified. Using the Class of Operating Time along with the Load Spectrum, one can determine the duty classification requirement of the application. Defining the proposed equipment usage in this manner is critical to selecting the correct hoist for the application.

Classification of Mechanisms

Load Spectrum	Class of Operating Time				
	T2	T3	T4	T5	T6
	Average Daily Operating Time (hr/day)				
	1/4- 1/2	1/2-1	1-2	2-4	4-8
L1	1Dm	1Cm	1Bm	1Am	2m
L2	1Cm	1Bm	1Am	2m	3m
L3	1Bm	1Am	2m	3m	4m
L4	1Am	2m	3m	4m	5m

Example:

An application requires that a hoist be used to repeatedly lift and move small to medium size loads, but occasionally will be required to lift heavy loads equal to 3.2 metric tonne. This hoist will be operated daily for a single 8-hour shift and will be required to perform 15 lifting cycles per hour. The average height, which the load is lifted, is 18 ft. at a desired speed of 20ft/min.

The average daily operating time can be calculated from the above information:

$$t = \frac{2 \times 18 \times 15 \times 8}{20 \times 60} = 3.6 \text{ hr/day}$$

The description of the example application implies that the load spectrum is likely an L1 or L2. Choosing an L2 load spectrum factor and using the calculated average daily operating time, one can determine from the "Classification of Mechanisms" table above, the duty classification for this application is 2m for a 3.2 metric ton rated hoist.

For a more thorough explanation of the determination of mechanism classification, refer to FEM 9.511 "Classification of Mechanisms".

Your YALE "Global King" hoist was designed to meet the duty classifications as described above. The standard 3.2 tonne and 1.6 tonne capacity models are rated at 2m duty classification. A 3m duty classification is available at a derated capacity.

SECTION II - INSTALLATION

2-1. GENERAL. YALE "Global King" electric hoists are lubricated and tested before being shipped from the factory. To place a hoist in service, install onto beam by adjusting appropriately for the flange width, connect to electrical service and perform pre-operation tests and checks.

2-2. INSTALLING HOIST

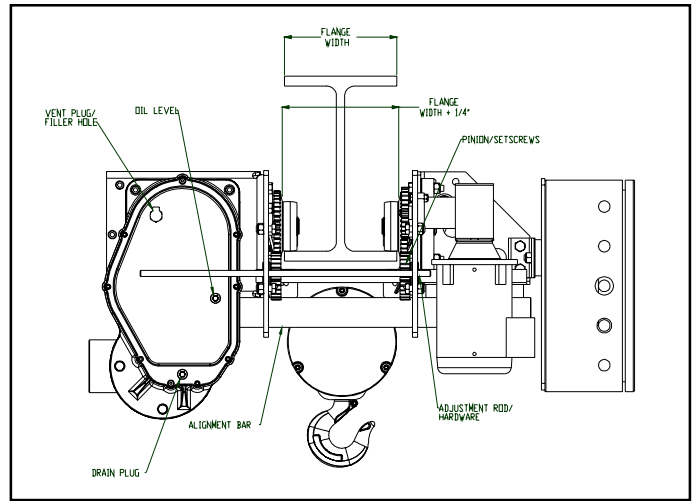


Figure 2-1. Trolley Wheel Spacing

OPEN-END BEAM: If the trolley can be installed directly from the end of the supporting beam, adjust the spacing between the trolley wheel flanges to be 3/16"-1/4" greater than the exact width of the beam flange (See Figure 2-1). Before adjusting the width of the trolley frame, make sure to loosen the pinion set screws on the keyed cross shaft nearest the traverse drive reducer. Do not lose the keys for the pinion during adjustment. Also, the electrical conduit/cable must not be constrained when attempting to adjust the trolley sides, in or out. The trolley width is adjusted by loosening the jam nuts on the traverse drive side of the threaded rods at each end of the hoist. If necessary, lubricate the frame alignment bars with penetrating oil before attempting to adjust trolley width. The trolley side may then be pushed or driven into position by turning the adjusting nuts on the threaded rods. Adjust nuts on each side of the hoist simultaneously, to avoid binding. After adjusting the trolley to the proper width, tighten all adjusting nuts and setscrews, and re-secure the electrical conduit/cable. Verify that the geared wheels mesh properly with the traverse drive pinions. Using proper equipment, carefully lift the hoist and install on the end of the beam. Lubricate the wheel gear and all pinions (WG, Section IV, Paragraph 4-5).

▲WARNING
Only qualified personnel with proper supervision shall install the hoist on the monorail and perform the final pre-operation inspection.

▲WARNING
Working in or near exposed energized electrical equipment presents the danger of electric shock.
TO AVOID INJURY: DISCONNECT POWER AND IMPLEMENT LOCKOUT/ TAGOUT PROCEDURE BEFORE REMOVING COVER OR SERVICING THIS EQUIPMENT.

NOTICE
Loosen all electrical cable or conduit attached to the frame and alignment bars before adjusting trolley width. Ensure that the electrical cable is not stretched, pinched, twisted or otherwise damaged when adjusting trolley width.

CLOSE-END BEAM: For trolleys which are to be mounted along the span of a beam not having open ends, the trolley must be adjusted in the same manner as described above to a width that allows clearance between the axle ends and the beam flange. Using proper lifting equipment, the trolley and hoist must then be lifted to the beam where it is to be installed. Once in position, adjust the spacing between the trolley wheel flanges to be 3/16"-1/4" greater than the exact width of the beam flange (See Figure 2-1). After tightening all adjusting bolts, set screws, and all electrical conduit/cable clamps, carefully set the trolley on the beam. Lubricate the wheel gear and all pinions (WG, Section IV, Paragraph 4-5).

2-3. CONNECTING HOIST TO ELECTRICAL SERVICE.

Electrical service to the hoist may be power cable or a guarded system having sliding shoe or wheel type collectors.

Follow ANSI/NFPA 70, state, and local electrical codes including the grounding provisions thereof when providing electrical service to the hoist.

Make electrical connections using the appropriate wiring diagrams furnished with the hoist. Only qualified journeyman electricians shall make any electrical connections, including connections to collectors or power cord.

⚠WARNING

Be certain that electrical power supply is OFF and locked in the open position before attempting any electrical connections to the hoist. This equipment must be effectively grounded according to the National Electric Code ANSI/NFPA 70, or other applicable codes.

⚠CAUTION

Power supply to hoist and trolley must be the same voltage, frequency, and phase that are specified on the hoist and trolley nameplate.

2-4. PRE-OPERATIONAL CHECKS

- a) Check Oil Level. (Figure 2-1) The gearcase has been filled with oil to the proper level. However, this should be rechecked before operating the hoist.

Check oil level by removing the plug indicated in Figure 2-1. When properly filled, oil should be level with the bottom of the tapped hole. Fill to this level with oil as specified in Paragraph 4-2.e.

- b) Check Push Button Operation and Phasing. To properly check the phase of the hoist, follow these steps:

- (1) With "POWER OFF", operate all the push buttons and determine that they do not bind or stick in any position.

⚠WARNING

If any push button binds or sticks in any position - DO NOT TURN POWER ON - determine the cause and correct the malfunction before operating.

- (2) Connect hoist to power source.
- (3) Operate "UP" button briefly to determine direction of hook travel.
- (4) If hook raises when "UP" button is depressed, phasing is correct.
- (5) If hook lowers when "UP" button is depressed, hoist is "Reverse Phased." TURN AND LOCK POWER OFF and check the pushbutton wiring. If the pushbutton was wired properly, correct the problem by interchanging any two leads at power source connection. Do not change internal wiring of hoist.

⚠WARNING

On three phase hoists, it is possible to have "Reverse Phasing" causing the block to lower when the "UP" button is depressed. When this condition exists, the automatic limit switch is inoperative and hoist operation will be dangerous.

- c) Check Lower Block and Hoisting Cable. Depress "DN" push button and run lower block to its lowest position. No less than two wraps shall remain on the drum with the loaded hook in its lowest position. Also check to see that the lower block and rope do not twist excessively. If it does twist to the extent that two ropes rub against each other, disengage the swaged rope end from the frame anchor and twist the rope four or five turns in a direction opposite to that which the block turns. Reconnect rope to the frame anchor, holding firmly to eliminate rope twisting back to its original position. Operate hoist up and down a few times. If lower block still rotates excessively, repeat process until twisting is corrected.
- d) Lubricate Hoisting Cable. For longer cable life, it is recommended that the cable be lubricated at time of installation by applying a heavy coating of lubricant **CL** (Para. 4-7) as outlined in SECTION IV, Paragraph 4-3.
- e) Check Limit Switch Operation.
- (1) A geared rotary type upper and lower limit switch is provided as standard equipment on YALE "World Series" hoists. This switch is adjustable and although preset by the factory, it should be adjusted at time of installation to the desired high and low limits of lower block travel. Refer to SECTION VII, Paragraph 7-3.
- (2) A block operated upper limit switch can be furnished as optional equipment on YALE "Global King" hoists. This limit stop is factory set to stop the lower block at the safest high position, guarding against over travel and possible damage to hoist. Minimal adjustments can be made. When equipped with this option, the hoist should be tested by jogging the lower block against the limit switch actuator arm to assure the switch is functioning properly. When the lower block lifts the actuator, the hoist will automatically stop. If the lower block coasts through the limit switch when lifting, a reversing switch will automatically close and reverse direction of motion to lowering.
- f) An overcapacity limit switch is provided as standard equipment on YALE "Global King" hoists. This switch is adjustable and although preset by the factory, it should be adjusted at the time of installation to the desired setting. Refer to SECTION VII, Paragraph 7-4.
- g) When first using the hoist and trolley, operate with lighter loads through full travel before applying maximum load.

⚠WARNING

Damage to the hoist, a dropped load, and injury may result if limit switches fail due to improper use.

TO AVOID INJURY:

UNDER NORMAL OPERATING CONDITIONS, STOP HOIST TRAVEL BEFORE ENGAGING LIMIT SWITCHES. LIMIT SWITCHES ARE SAFETY DEVICES AND SHOULD NOT BE USED AS NORMAL OPERATING CONTROL.

⚠WARNING

Some hoists may be shipped with the electrical controls loose (disconnected) and will not have the upper and lower limit switches connected. DO NOT OPERATE HOIST UNTIL LIMIT SWITCHES ARE PROPERLY CONNECTED AND ADJUSTED. Failure to do so may allow hoist to be operated beyond proper travel limits, which can cause load to drop, resulting in damage to equipment or injury.

SECTION III - OPERATION

3-1. GENERAL. Operation of YALE "Global King" hoists is controlled by a convenient pendant push button station. With it, the hoist can be controlled to give fast lifting and lowering; or controlled to lift or lower the load in small increments, providing accurate positioning capability. The push button station has a built-in interlock to prevent depressing opposing buttons simultaneously.

When first using the hoist, break in by operating under lighter loads to full travel before applying maximum load.

3-2. PUSH BUTTON OPERATION

- a.) For the hoist motion depress push button marked "UP" to raise load.
- b.) For the hoist motion depress push button marked "DN" to lower load.
- c.) For the trolley traverse motion:

With two speed control depress buttons marked "<<" , ">>" or "N", "S" to activate the trolley traverse motion

With one speed control depress buttons marked "<" , ">" or "N", "S" to activate the trolley traverse motion.

- d.) On two-speed hoist or trolley motions, partial depression of a button operates hoist or trolley at slow speed; depressing button completely operates hoist or trolley at full speed.

NOTICE

Excessive "jogging" will cause premature burning of contact tips, motor overheating and premature brake wear.

3-3. OPERATING PRECAUTIONS. Safe operation of an overhead hoist is the operator's responsibility. Listed below are some basic rules that can make an operator aware of dangerous practices to avoid and precautions to take for his own safety and the safety of others. Observance of these rules, in addition to frequent examinations and periodic inspection of the equipment, may prevent injury to personnel and damage to equipment.

⚠WARNING

Equipment covered herein is not designed or suitable as a power source for lifting or lowering persons.

- a) **DO** read applicable sections of FEM Section IX, Series Lifting Equipment and the Operation, Service and Parts Manual.
- b) **DO** be familiar with hoist operating controls, procedures, and warnings.
- c) **DO** make sure hook travel is in the same direction as shown on the controls. If opposite direction occurs, see Pre-Operation Checks, Section II, Paragraph 2-4.b.
- d) **DO** make sure hoist limit switches function properly.
- e) **DO** maintain firm footing when operating hoist.
- f) **DO** make sure that the load slings or other approved attachments are properly sized and seated in the hook saddle.
- g) **DO** make sure that the hook latch is closed and not supporting the load.
- h) **DO** make sure that load is free to move and will clear all obstructions.
- i) **DO** take up slack carefully, check load balance, lift a few inches and check load's holding action before continuing.
- j) **DO** avoid swinging of load or load hook.
- k) **DO** make sure that all persons stay clear of the suspended load.
- l) **DO** warn personnel of an approaching load.
- m) **DO** protect wire rope from weld splatter or other damaging contaminants.
- n) **DO** promptly report any malfunction, unusual performance, or damage of the hoist.
- o) **DO** inspect hoist regularly, replace damaged or worn parts, and keep appropriate records of maintenance.
- p) **DO** use the hoist manufacturer's recommended parts when repairing a hoist.
- q) **DO** use hook latches.
- r) **DO** apply lubricant to the wire rope as recommended.
- s) **DO NOT** lift more than rated load.
- t) **DO NOT** use the hoist load-limiting device to measure the load.
- u) **DO NOT** use damaged hoist or hoist that is not working properly.
- v) **DO NOT** use the hoist with twisted, kinked, damaged, or worn wire rope.
- w) **DO NOT** lift a load unless wire rope is properly seated in its groove(s).
- x) **DO NOT** use wire rope as a sling or wrap rope around the load.

- y) **DO NOT** lift a load if any binding prevents equal loading on all supporting ropes.
- z) **DO NOT apply** the load to the tip of the hook.
- aa) **DO NOT** operate unless load is centered under hoist.
- bb) **DO NOT** allow your attention to be diverted from operating the hoist.
- cc) **DO NOT** operate the hoist beyond limits of wire rope travel.
- dd) **DO NOT** use limit switches as routine operating stops unless recommended. They are emergency devices only.
- ee) **DO NOT** use hoist to lift, support, or transport people.
- ff) **DO NOT** lift loads over people.
- gg) **DO NOT** leave a suspended load unattended unless specific precautions have been taken.
- hh) **DO NOT** allow sharp contact between two hoists or between hoist and obstructions.
- ii) **DO NOT** allow the rope or hook to be used as a ground for welding.
- jj) **DO NOT** allow the rope or hook to be touched by a live welding electrode.
- kk) **DO NOT** remove or obscure the warnings on the hoist.
- ll) **DO NOT** adjust or repair a hoist unless qualified to perform hoist maintenance.
- mm) **DO NOT** attempt to lengthen the wire rope or repair damaged wire rope.
- nn) **DO NOT** allow personnel not physically fit or properly qualified, to operate hoist.
- oo) **DO NOT** operate hoists unless hook moves in the same direction as indicated on the push button. If opposite direction occurs, see pre-operation checks, Section II Paragraph 2-4.b.
- pp) **DO NOT operate** hoist unless limit switches are operating properly.
- qq) **DO** avoid operating hoist when hook is not centered under hoist. Avoid side pulls and swinging of load or load hook when traveling hoist.
- rr) **DO** operate hoist within recommended duty cycle and **DO NOT** "jog" unnecessarily.
- ss) **DO** conduct regular visual inspections for signs of damage and wear.
- tt) **DO NOT** operate hoist with hooks that have opened up. See Section V, Paragraph 5-2.f.
- uu) **DO** provide supporting structure that has an appropriate design factor based on the load rating and dead weight of the hoist. If in doubt of the supporting structure's strength, consult a structural engineer.
- vv) **DO NOT** use hoist in location that will not allow operator movement to be free of the load.
- ww) **DO**, when starting to lift, move the load a few inches at which time the hoist should be checked for proper load holding action. The operation shall be continued only after the operator is assured that the hoist is operating properly and that the load is supported in the center of the base/bowl/saddle of the hook.
- xx) **DO** observe recommended inspection and maintenance procedures.
- yy) **DO** use common sense and best judgment whenever operating a hoist.
- zz) **DO NOT** remove drop lugs. Removal will create an unsafe operating condition.

SECTION IV - LUBRICATION

4-1. GENERAL. The lubrication services outlined in Paragraphs 4-3 thru 4-6 should be performed before initial operation of the hoist. The lubrication services outlined in Paragraphs 4-2 thru 4-6 should be performed at regular intervals at least every six (6) months, coinciding with spring and fall seasons is recommended. The reason for this is that on hoists installed outside or in unheated areas a "cold test" oil is required in such (below freezing) climates making seasonal changes necessary.

4-2. CHANGING GEARCASE OIL

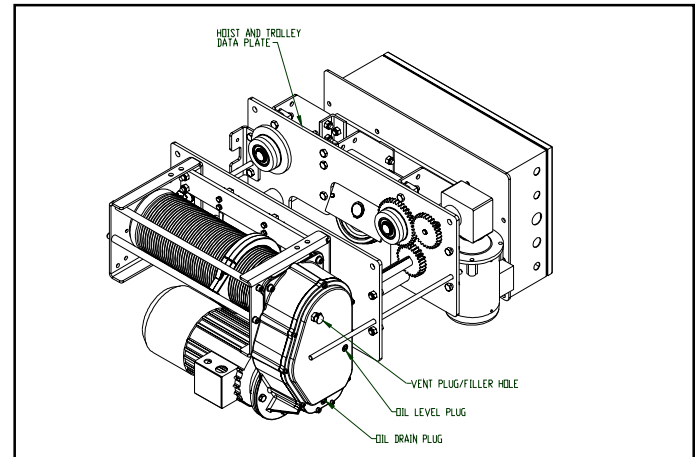


Figure 4-1. View of Hoist Showing Location of Name Plates and Oil Plugs

- a) Add 5% solution of Mobilsol A (or equivalent) to the oil and run for a short time. This will clean components and hold particles in suspension for draining.
- b) Remove oil drain plug from bottom of gearcase and drain oil out. Dispose of oil in accordance with local environmental codes.

▲WARNING

DO NOT operate hoist with the hoisting rope out of the drum grooves. Such operation may result in damage to the rope guide and rope and could result in the rope breaking. This may result in dropping the load that can cause damage to equipment and injury to operator or other personnel. Hoist rope will remain in the drum grooves during operation under normal operating conditions, however, slack or kinked rope, excessive side pulls, swinging or jerking of load, or similar abuse, may cause damage to the rope guide causing the rope to leave the grooves.

▲CAUTION

Avoid skin contact with Mobilsol A. In case of skin contact: dry wipe the skin, cleanse the area with a waterless hand cleaner and follow by washing thoroughly with soap and water.

- c) Reinstall drain plug.
- d) Remove oil level plug from front of gearcase cover.

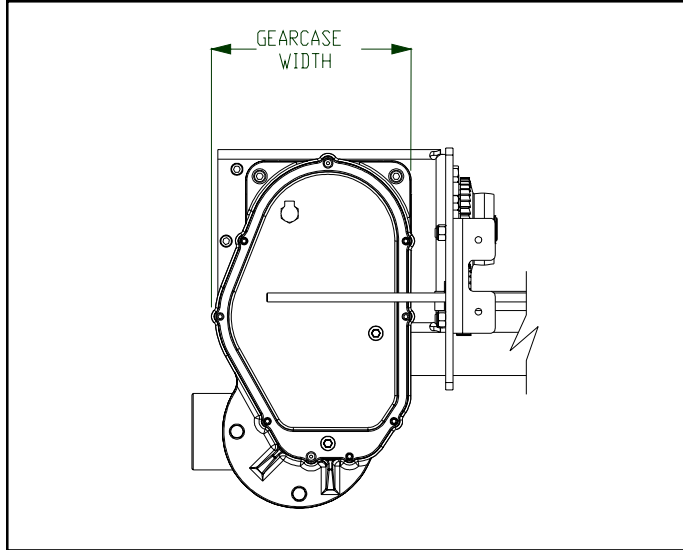


Figure 4-2. Gearcase Width Illustration

- e) Refill through filler hole to proper level (bottom of oil level plug hole) using **GCOH** (Paragraph 4-7). The amount of oil required depends on the overall size of the gearcase. Both versions of the "A" Frame hoist utilize the same size gearcase, although their contents differ. To confirm the version of your gearcase refer to Figure 4-2. Your gearcase should have a similar shape to that shown and will measure 10 in width and requires approximately 3 quarts of oil.

4-3. LUBRICATION OF HOISTING CABLE. Hoists are shipped from the factory without an exterior coating of grease on hoisting cable. It is recommended that the cable be thoroughly coated at installation and kept well lubricated with **CL** (Paragraph 4-7).

4-4. LUBRICATION OF LIMIT SWITCH. Provide a light film of grease **MPG** (Paragraph 4-7) on bevel gear of rotary geared limit switch.

4-5. LUBRICATION OF GEARED TROLLEY WHEELS AND PINIONS. At installation and periodically, apply grease **WG** (Paragraph 4-7) to the traverse drive pinions and the gears of the trolley wheels.

4-6. LUBRICATION OF ROPE GUIDE

- a) Maintenance. The rope guide is made of a molded self-lubricated reinforced nylon material. It is lubricated prior to installation at the factory and requires only periodic inspection.

- (1) Periodically re-grease with **MPG** (Paragraph 4-7) by applying grease to the leading edge of the guide and rope drum.
- (2) Every 6 months, the rope guide should be removed per Section V, Paragraph 5-5, cleaned and inspected. When reassembled, the rope guide should be thoroughly greased with **MPG** (Paragraph 4-7) and the hoist run up and down to lubricate both the drum and the wire rope.

Notes

4.7. LUBRICANT SPECIFICATIONS

		AMBIENT TEMPERATURE		
		-20° to +50° F (-29° to +10°C)	50° to 125° F (10° to 52°C)	125° to 250° F (52° to 121°C)
GCOH	AGMA Lubricant	No. 6	No. 7 EP	No. 7
Gear Case Oil Hoist Gearcase	Viscosity @ 100° F	1335 - 1632 SUS	1919 - 2346 SUS	1919 - 2346 SUS
	Viscosity Index	154	95	158
	Pour Point	-40°F	20°F	-37°F
	Mobil ® Oil Corp.	Mobil ® SHC 632	Mobilgear ® 634	Mobil ® SHC 634
	Shell ® Oil Co.	Omala ® RL 320	Omala ® 460	Omala ® RL 460
	Texaco ® Inc.	Pinnacle ® 320	Meropa ® 460	Pinnacle ® 460
SG	NLGI Grease	No. 1		
Spline Grease	ASTM D217 Worked Penetration	310 - 340		
	Dropping Point	320°F (160°C)		
	Base	Lithium		
	Mobil ® Oil Corp.	----- Mobilux ® EP 111 -----		
WG	Viscosity @ 100° F	25,000 SUS (contains diluent)		
Wheel Gear and Pinion Grease	Mobil ® Oil Corp.	----- Mobiltac ® 375 NC -----		
	Texaco ® Inc.	----- Crater H ® -----		
CL	No Specification			
Cable Lubricant	Amoco ® Oil Co.	----- Amovis ® 5-X -----		
	Mobil ® Oil Corp.	----- Mobilarma ® 798 -----		
Wire Rope Lubricant	Sun ® Oil Co.	----- Sunoco ® Wire Rope Lubricant -----		
	Texaco ® Inc.	Crater A	Texclad ® 2	
GO	AGMA Lubricant	No. 1	No. 2	
General Oil General Oiling to Prevent Rusting and Provide Limited Lubrication for Points Not Considered Normal Wear Points	Viscosity @ 100° F	193 - 235 SUS	284 - 347 SUS	
	Viscosity Index	60 Min.	60 Min.	
	Pour Point	-20°F (-29°C)	10°F (-12°C)	
	Amoco ® Oil Co.	Rykon ® Oil 46	American Industrial Oil ® 68	
	Mobil ® Oil Corp.	----- Mobil ® DTE Oil Heavy -----		
	Shell ® Oil Co.	Rotella ® 10W	Rotella ® 10W-30	
	Sun ® Oil Co.	Sunvis ® 932	Sunvis ® 968	
	Texaco ® Inc.	Rando ® Oil 46	Rando ® Oil 68	
MPG	NLGI Grease	No. 1	No. 2	
Multipurpose Grease Grease Lubricated Wear Points Provided with Fittings and Grid or Gear Type Flexible Couplings	6ASTM Worked Penetration	310 - 340	265 - 295	
	Dropping Point	360°F (182°C)	360°F (182°C)	
	Base	Lithium	Lithium	
	Amoco Oil ® Co.	Amolith ® Grease 1 EP	Amolith ® Grease No. 2 EP	
	Mobil Oil ® Corp.	Mobilith ® AW 1	Mobilith ® AW 2	
	Shell ® Oil Co.	----- Retinax LC -----		
	Sun ® Oil Co.	Prestige ® 741 EP	Sunoco ® Multipurpose 2 EP	
	Texaco ® Inc.	Multifak ® EP 1	Multifak ® EP 2	
GCOT	AGMA Lubricant	No. 7 or 7C (Compounded)	No. 8 or 8C (Compounded)	Refer to YALE Hoist Field Service Department for Gearcase Operating Temperatures above 125° F
Gear Case Oil Traverse Gear Case	ISO Viscosity Grade	460	680	
	Amoco ® Oil Corp.	Worm Gear Oil	Cylinder Oil #680	
	Mobil ® Oil Corp.	Mobil ® SHC 634 Synthetic, Mobil ® 600W	Mobil ® SHC 634 Synthetic, Extra Hecla Super	
	Shell ® Oil Co.	Valvata ® J460	Valvata ® J680	
	Texaco ® Inc.	Meropa ® 460	Meropa ® 680	

SECTION V - INSPECTION AND PREVENTIVE MAINTENANCE

5-1. GENERAL. All YALE "Global King" hoists are inspected and tested at the factory. Regular in-service inspection and preventative maintenance programs not only help reduce overall maintenance costs but may also prevent service shutdowns by forewarning of problems that could cause these shutdowns. Regular inspections, periodic minor adjustments, regular cleaning and lubrication and replacement of worn parts can help preserve good performance and operation of your hoist.

Many factors influence the inspection and preventative maintenance program required for your hoist. Frequency and severity of service and material handled, local environmental conditions and various applicable codes are some of the factors that the user must consider to adjust inspection and maintenance program outlined in this section to meet his specific conditions.

The inspection and maintenance intervals outlined in this section are considered a minimum. Recommended in the schedule are minimum inspection and maintenance intervals based on average daily use in a normal environment. Your YALE "Global King" hoist was designed to meet a specific duty classification as described by the FEM "Rules for the Design of Serial Lifting Equipment" and is to be used in accordance with the duty rating identified on the equipment nameplate. For more details regarding hoist duty cycles and average daily use, please reference FEM Section IX, Series Lifting Equipment or the Hoist Duty Classification page in this manual.

Environmental conditions in which the hoist operates are also important considerations for the user, when adjusting hoist inspection and maintenance programs to local conditions. Frequency of inspection and maintenance must be increased if hoist is subjected to severe atmospheric environmental conditions, such as corrosive vapors, extreme heat or cold, cement or dust and other airborne contaminants. The user should carefully consider all environmental conditions and adjust frequency and degree of maintenance for his local conditions. Consult the factory's Field Service Department for advice regarding unusual environmental conditions.

Various codes also regulate inspection and maintenance programs. Attention must be given to applicable federal standards, OSHA regulations, national standards, state and local codes which may include mandatory rules relating to hoist inspection and maintenance. The user should become familiar with all applicable codes for his area and be guided accordingly.

Listed on the Recommended Inspection and Maintenance Schedule are inspection frequencies and requirements. Perform these inspections regularly as scheduled and additional inspections as may be required for activity, service, and environment of your hoist. The hoist operator must be responsible for determining the operating conditions and severity of service.


Inspection Schedule and Maintenance Report Form.

Shown on page 12 of this manual is a recommended Inspection Schedule and Maintenance Report form that lists various components of the hoist. The form also includes trolley components, runway components, and miscellaneous items. This form is suggested as a guide for written inspection reports. Inspections are recommended each month and should be performed thoroughly enough to inform the hoist user of deficiencies for any item listed. This form does not supersede

the Inspection and Maintenance Schedule listed on page 11 of this manual but may be used to record scheduled inspection and maintenance services required.

The user should revise the inspection interval, add additional units or provide a similar form to suit particular conditions that may exist. However, written, dated and signed inspection reports should be maintained particularly on critical items such as hoist hooks, hoisting rope, sheaves, drums and brakes. Periodic review of old inspection reports can point out service life of hoist components, forecasting need for adjustment, repair or replacement of these components.

As a matter of expedience, appointed maintenance personnel inspecting hoist can also take care of minor adjustments, repairs and cleaning, where required. Note column on Inspection Schedule and Maintenance Report form headed Corrective Action and Notes. When corrective action is made during inspection, note condition of part or unit as inspected in appropriate Condition column with a check mark (✓). Note "during inspection" corrective action taken and date in space provided. In this manner, items requiring further attention will be checked (✓) without showing corrective action. This will advise the person responsible for hoist operation and safety, or whoever reviews the inspection reports, that deficiencies exist. The designated person will check all deficiencies as listed and re-examine or otherwise determine whether they constitute a safety hazard.

 WARNING
Deficiencies may be hazardous to personnel and equipment. Do not operate a hoist having deficiencies unless a designated qualified person has determined that these deficiencies DO NOT constitute a safety hazard.

Written, dated and signed inspection reports for many items are mandatory under OSHA regulations, and many state safety codes.

It is strongly recommended that the Inspection Schedule and Maintenance Report, shown herein, be completed by a qualified person designated with the responsibility for hoist operation and safety or an inspector appointed by this person.

Inspection records can point out the service life of hoist components and help forecast the need for adjustments, repairs, and ordering of replacement parts. File and review these reports after each inspection.

All YALE "Global King" hoists are equipped with a Pulse™ monitor, which is wired into the control circuit in the control enclosure. This equipment consists of a circuit board, a serial communications port, and onboard memory, which will retain data even when the hoist is removed from power. The Pulse monitor takes the "pulse" of the equipment by recording the most recent hoist activities including all normal operation events, motor starts, overcapacity lifts and thermal overload events. In addition, the monitor records the total cumulative operating time and motor starts for the life of the equipment. Each Pulse monitor is programmed with the equipment serial number at the factory.

Data may be downloaded from the monitor, via the serial communications link, by a certified technician. Pulse monitor data may be used to determine equipment usage and to verify that the application does not exceed the hoist duty rating as identified on the equipment nameplate. The data can also be

helpful in establishing and scheduling preventative maintenance as well as an aid in troubleshooting the equipment. For additional information refer to the Pulse monitor manual (P/N 11817503) sent with this manual.

RECOMMENDED INSPECTION AND MAINTENANCE SCHEDULE	
TIME INTERVAL	INSPECTION OR MAINTENANCE
Daily or start of each shift (visual)	* Check operation of all functional mechanisms including limit switch operation, brakes and control. Check hoist cable for kinks, abrasions, corrosion or broken wires or evidence of improper spooling on drum. Inspect hooks, upper and lower blocks, and all load bearing components for damage.
1 Month	* HOIST CABLE - Inspect per Paragraph 5-6 and lubricate per Paragraph 4-3.
1-3 Months	* ELECTRICAL CONTROLS - Inspect per Paragraph 5-4. Check hoist gearcase oil level - add oil as required per Paragraph 4-2.e.
6 Months	* LOWER BLOCK -Inspect per Paragraph 5-2. * UPPER BLOCK -Inspect per Paragraph 5-3. * ROPE GUIDE-Inspect per Paragraph 5-5. * OVER-CAPACITY LIMIT SWITCH-Inspect per Paragraph 5-13. * BLOCK OPERATED LIMIT SWITCH (if equipped)-Inspect per Paragraph 5-12. * Lubricate hoist cable per Paragraph 4-3. Lubricate upper and lower hook block, Lubricate outboard bearing cartridge at grease fitting, Add a light film of MPG grease to the bevel gear in the screw type limit switch per Paragraph 4-7.
Annually	* Complete inspection. Motor brake and actuating mechanisms inspected and adjusted per Paragraph 5-10. Inspect hooks with crack detecting procedures per Paragraph 5-2.

Hours of "On" time		
Load Spectrum	Hoist Duty	
	2m	3m
L1	12500	25000
L2	6300	12500
L3	3200	6300
L4	1600	3200

* Complete inspection, disassembly and maintenance required. It is recommended that your YALE repair Station be contacted for this service.

Notes

INSPECTION SCHEDULE AND MAINTENANCE REPORT

HOIST SERIAL NO. (MFGRS) _____
 RATED LOAD _____
 TYPE _____
 VOLTAGE _____

CUSTOMER CRANE IDENTITY NO. _____
 LOCATION IN PLANT _____
 THIS INSPECTION IS MONTHLY ANNUAL
 SEMI-ANNUAL

INSPECTED BY: _____ DATE _____

COMPONENT, UNIT OR PART and location		* Recommended Inspection Interval			CONDITION (Check column best indicating condition when part or unit is inspected. Use note column to the right if condition is not listed below.)							CORRECTIVE ACTION NOTES
		MONTHLY	SEMI-ANNUAL	ANNUAL	GOOD	ADJUSTMENT REQUIRED	REPAIR REQUIRED (Loose Parts or Wires)	REPLACEMENT REQUIRED (Worn or Damaged)	LUBRICATION REQUIRED (Low Oil or Grease, Rust or Corrosion)	CLEANING OR PAINTING REQUIRED		
HOIST	Motor	<input type="radio"/>										
	Motor Brake	<input type="radio"/>										
	Mechanical Load Brake	<input type="radio"/>										
	Overload Clutch	<input type="radio"/>										
	Couplings	<input type="radio"/>										
	Gears, Shafts & Bearings	<input type="radio"/>										
	Upper Block	<input type="radio"/>										
	Lower Block	<input type="radio"/>										
	Hook & Throat Opening	<input checked="" type="radio"/>		X							Record Hook Throat Opening	
	Hoist Rope	<input checked="" type="radio"/>										
	Rope Drum	<input type="radio"/>										
	Rope Guide	<input type="radio"/>										
	Guards	<input type="radio"/>										
	Limit Switches	<input type="radio"/>										
CONTROL STATION OR PUSHBUTTON	Pushbutton	<input type="radio"/>										
	Wiring	<input type="radio"/>										
TROLLEY	Motor	<input type="radio"/>										
	Brake (when so equipped)	<input type="radio"/>										
	Couplings	<input type="radio"/>										
	Gears, Shafts & Bearings	<input type="radio"/>										
	Frame			<input type="radio"/>								
	Wheels	<input type="radio"/>										
	Bumpers	<input type="radio"/>										
	Guards	<input type="radio"/>										
	Conductors	<input type="radio"/>										
	Collectors	<input type="radio"/>										
RESISTORS	Hoist	<input type="radio"/>										
	Trolley	<input type="radio"/>										
RUNWAYS	Monorail Joints	<input type="radio"/>										
	Monorail	<input type="radio"/>										
	Main Conductors	<input type="radio"/>										
	Main Collectors	<input type="radio"/>										
MISC.	General Condition	<input type="radio"/>										
	Load Attachment Chains	<input checked="" type="radio"/>										
	Rope Slings & Connections	<input checked="" type="radio"/>										
	Change Gearcase Lub.			<input type="radio"/>								
	Grounding Faults	<input type="radio"/>										

* See text for DAILY & WEEKLY REQUIREMENTS.

● SIGNED & DATED REPORT REQUIRED – OSHA.

○ INSPECTION INTERVAL.

X MAGNETIC PARTICLE OR EQUIVALENT EXAMINATION REQUIRED.

Typical Inspection Schedule and Maintenance Report form.

User must adjust inspection interval and components to suit his individual conditions and usage.

12375gwr

▲WARNING

Do not operate a hoist having unusual vibrations, sounds, or with anything visibly or otherwise wrong. Danger may be present that the hoist operator cannot see. Determine and correct the cause of unusual conditions and make certain hoist can be operated safely.

5-2. INSPECTION OF LOWER BLOCK

Refer to the Section IX, Figure 9-4.
Lower Block Assembly.

- a) Check lubrication of all parts. Also lubricate the shank of the hook that passes through the crosshead. If the thrust bearing is removed, apply **MPG** grease (Section IV, Paragraph 4-7).
- b) Check each sheave to insure rope groove is smooth and free from burrs, or other surface defects.
- c) Check each sheave for freedom of rotation; replace bearings if defective.
- d) Make certain that the spring pin holding the hook nut to the hook is securely in position.
- e) If hook is equipped with a hook latch or rotational lock, check to determine that they are in good operating condition.
- f) Check throat opening of the hook. (Refer to Figure 5-2.) It is recommended that upon receipt of the hoist, a measurement be made and recorded of the hook throat opening. OSHA regulations require that the hook be replaced if the throat opening exceeds 15 percent of the original opening, or if the hook is twisted more than 10 degrees from the unbent plane. We suggest that a gage block properly identified to the hoist, similar to the one shown in Figure 5-2, be made for each hook for use in these measurements.

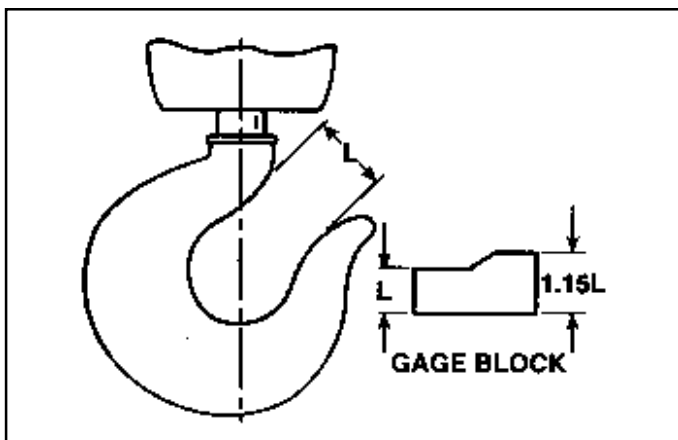


Figure 5-2. Gage Block

- g) Hooks showing signs of cracks must be replaced. Hooks should be inspected at least once per year using dye penetrants, magnetic particle, or other suitable non-destructive test methods.
- h) Check wear of the hook, especially at the saddle and replace if worn more than 10% of original dimensions.

5-3. INSPECTION OF UPPER BLOCK

Refer to the Section IX, Figure 9-5.
Upper Block Assembly.

- a) Check upper block sheaves for wear, damage and freedom of rotation. If sheaves do not rotate freely, disassemble block and inspect bearings. Replace worn or damaged bearings, washers, pins, or sheaves.
- b) Make certain that all sheaves, bearing and hanger pins are free of foreign material. Bearings without grease fittings are lubricated for the life of the bearing and require no further lubrication.
- c) Make certain that the rope retention bolts are not bent, loose or otherwise distorted; bolts must have close clearance to sheave flange to keep rope in sheave grooves.

5-4. INSPECTION OF ELECTRICAL CONTROLS

Arrangement of electrical control equipment varies with the type of control, physical space and the optional control features ordered with the hoist.

Note the location in the electrical enclosure of the control circuit fuse, transformer, limit stop switches and the hoist contactors. Trolley contactors and optional hoist and trolley fuses are also located in this enclosure.

Use wiring diagrams furnished with hoist to determine electrical components on your hoist; then determine component location and identity on your hoist.

▲WARNING

Be certain that main power switch is locked in open position (OFF) before opening hinged control enclosure cover mounted to the counterweight.

- a) Open hinged control panel enclosure cover mounted to the counterweight and inspect wiring and terminals. Terminals should be securely crimped to wires and insulation sound. Terminal screws should be tight.
- b) Check condition of contactor assembly, transformer, and upper limit switches.

5-5. INSPECTION OF ROPE GUIDE

- a) General. The rope guide is intended to help prevent the rope from "back-winding" and to hold the rope in the proper groove. Side pulling and excessive load swing will severely damage the rope guide and must be avoided.

▲WARNING

Side pulling and excessive load swing will severely damage the rope and rope guide. Failure of these components may result in injury.

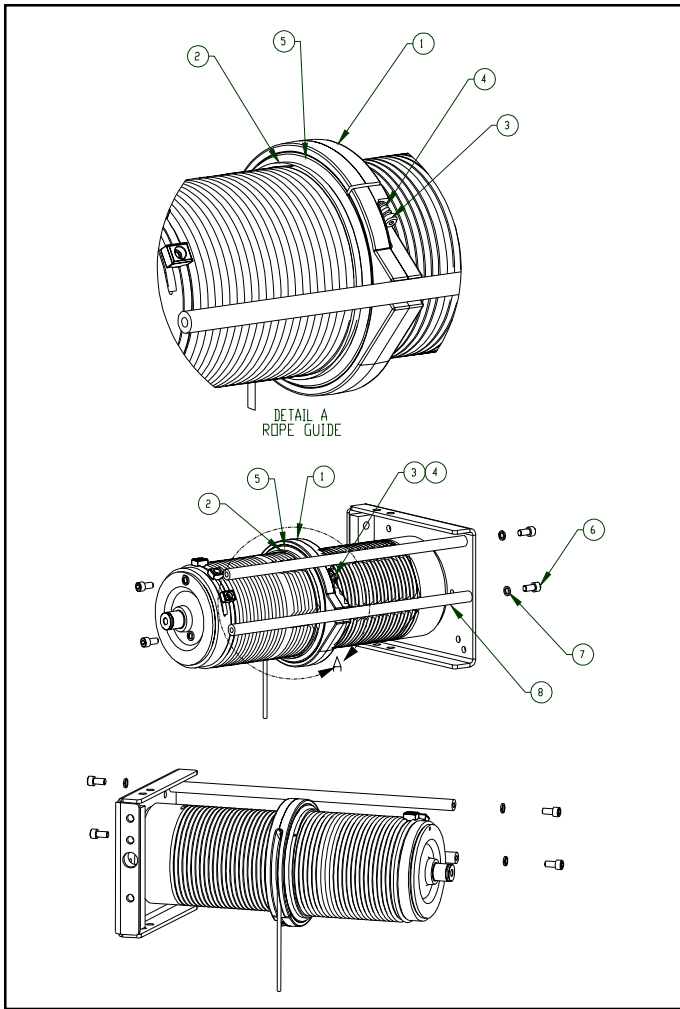


Figure 5-3 Rope Guide Assembly

- (4) Remove the split plastic shroud (Item 2) from the drum. When reassembling the rope guide, be sure the plastic shroud (Item 2) fits snugly in the rope guide body groove.
- (5) Thoroughly clean and inspect all components.
- (6) Follow steps in reverse to reassemble. Be sure to re-grease the rope guide with **MPG** (Paragraph 4-7), after assembling.

5-6. ROPE INSPECTION, MAINTENANCE AND REPLACEMENT

⚠WARNING

Wire Rope improperly handled or abused can create a SAFETY HAZARD. Read and comply with inspection, maintenance and replacement information given herein.

a) Inspection. Wire rope on your hoist is one of the most important components requiring frequent inspection and maintenance. All wire ropes will eventually deteriorate to a point where they are not safe and will require replacement. Wire rope should be thoroughly inspected at regular monthly intervals by an authorized person and a determination made when further use of the rope would constitute a safety hazard. Each inspection should include a written dated and signed report of rope condition. Reports should be filed and reviewed each month and any rope deterioration carefully noted. Inspections revealing, but not limited to the following conditions, should cause inspector to question remaining strength of rope and consider replacement. Inspections should take place at the most active sections of the rope, which may be identifiable through visual inspection of rope color. Ropes will wear more quickly in areas that are more frequently in contact with the running sheaves and drum.

- (1) Replace wire rope if the number of visible broken wires exceeds 13 over a length of 6 times the nominal diameter (6d) or exceeds 26 wires over a length of 30d.
- (2) Replace wire rope, if a complete strand has broken.
- (3) Replace wire rope, if rope exhibits swelling, bruises, permanent bends, kinks, crushing, bird-caging or especially heavy wear.
- (4) Replace wire rope, if rope has suffered heat damage from any cause.

b) Disassembly of "A" Frame Rope Guide. Refer to Fig. 5-3. For further assistance in locating components, refer to the parts list in Section IX.

- (1) Remove socket head cap screws and lock washers (Items 6 and 7). Remove drum frame rod (Item 8).
- (2) Remove shoulder bolts (Item 3) and compression springs (Item 4). The two halves of the rope guide body (Item 1) can now be pulled off the drum separately. When reassembling be sure that the half with the rope slot is on the top half of the drum.

⚠WARNING

Once shoulder bolts are removed, the halves will separate and, if not properly supported, the halves could fall.

- (3) Carefully unhook the rope tensioning spring (Item 5), which is under tension.

⚠WARNING

The rope tensioning spring is under considerable tension; use caution when unhooking to avoid injury.

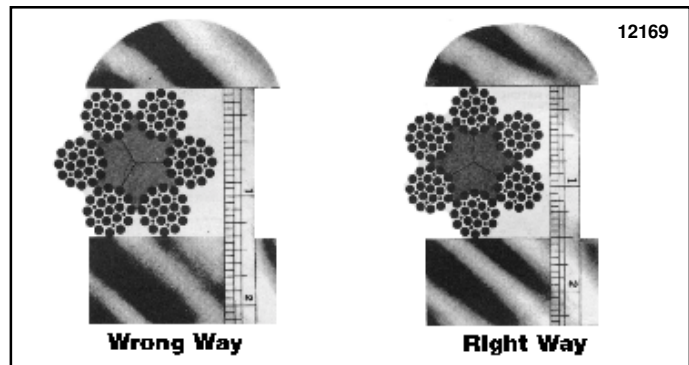


Figure 5-4. Correct Method of Measuring Rope

- (5) Rope corrosion and/or rust formation, internal or external.
- (6) Effects from improper lubrication.
- (7) Rope being idle for one month or more due to shutdown or inactivity.

Special attention should be exercised when inspecting rope normally hidden during inspecting procedures.

Please refer to FEM Section IX, Series Lifting Equipment, namely Section 9.661, "Dimensions and Design of Rope Reeving Components" and ISO 4309, "Wire Ropes - Care, Maintenance, Installation, Examination and Discard", for illustrations and definitions when following the above guidelines for rope inspection.

- b) Maintenance. Keep rope well lubricated to help reduce internal friction and prevent corrosion. Lubricant, as described in Paragraph 4-3, should be applied as a part of the regular maintenance program. Special attention is required to lubricate sections of rope over equalizing sheaves and other hidden areas.

Avoid dragging ropes in dirt or around sharp objects that will scrape, nick, crush, or induce sharp bends in the rope.

▲WARNING
Use only factory-approved rope with swaged wire rope socket.

- c) Replacement. When recommended by an authorized inspector, the rope should be replaced. Replacement rope assemblies are shipped from the factory carefully coiled to prevent damage by kinking. Care must be taken to avoid twisting or kinking when uncoiling and handling during reeving.

Before replacing rope, check condition of grooves in sheaves and drums to determine if they are excessively worn.

When first using hoist after rope replacement, break in rope by operating under lighter loads to full travel before applying maximum load.

5-7. ROPE REEVING

- a) General. Place reel on stand with shaft through the center of reel so rope can be pulled straight out with reel rotating.

▲WARNING
It is imperative that rope reel or coil rotates as rope unwinds. If coil or reel does not rotate the wire will be twisted as it is uncoiled and kinking will result. A kinked rope is unsafe and must be removed from service.

- b) Before removing the old rope, refer to reeving diagram, Figure 5-5. To assist with re-reeving your hoist, refer to the reeving diagram and corresponding paragraph that describes the reeving procedure.

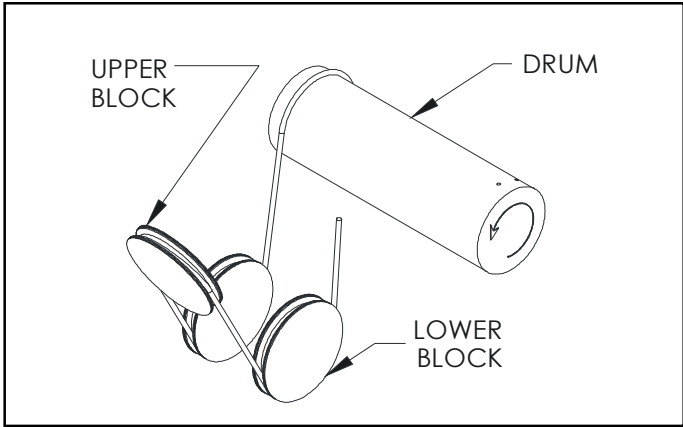


Figure 5-5a. Reeving Diagram - 4 Part Single Reeved. (Note: Arrow on Drum Indicates Direction of Drum when Lowering.)

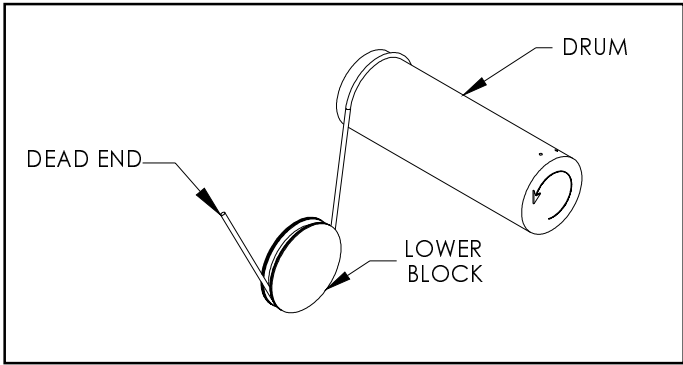


Figure 5-5b. Reeving Diagram 2 Part Single Reeved

- c) Removing old rope. Please refer to Section IX to assist in locating components referred to in the following paragraphs.
 - (1) Lower the lower block to a scaffold 6 to 7 feet below hoist to relieve tension on wire rope. (Lower block may be lowered to the floor if desired; however, to handle less weight and for ease of reeving, adequate scaffold below the hoist is recommended.)

▲CAUTION
Be certain all personnel are clear of hoist as components, hardware, and wire rope are removed from hoist.

- (2) Remove the cap screws and hex nuts that retain the lower block sheave covers. Remove covers.
- (3) Remove retaining rings from lower block sheave pin.
- (4) Slide out lower block sheave(s) and remove wire rope.
- (5) Remove two (2) rope retention bolts and nuts from the upper block yoke, as needed.

- (6) Remove one retaining ring on upper block to allow removal of upper block sheave pin.
- (7) Securely grasp the upper block sheave before carefully sliding the sheave pin out. Note that two spacers will Also be released as the pin is removed.
- (8) Remove wire rope from sheave.
- (9) Remove retaining ring(s) and washer from dead end anchor pin. Securely grasp the swaged wire rope before removing the anchor pin.
- (10) Remove rope guide per Section V, Paragraph 5-5.
- (11) Make certain all personnel are clear of hoist and operate hoist "DN" to completely unwind all wire rope from drum. Stop hoist so all (3) rope clamps are accessible. Remove rope clamps and wire rope from drum.

▲WARNING

Winding rope on rope drums with power can be hazardous. Keep hands safe distance from drum; wear gloves and use extreme care when winding rope.

d) Installing new rope.

- (1) Thread rope to drum from trolley frame side then secure with rope clamps as follows:
 - (a) Make sure that the rope clamp is orientated such that the clamp grooves capture and fully seat the rope in the drum grooves. The clamps are designed for use specifically with the 6.4mm wire rope that was supplied with your "A" Frame hoist.
 - (b) With the rope lying in the bottom of the drum groove, begin by tightening the rope clamp at the tail end of the rope. Torque the "A" Frame clamps to 12-15 ft.-lbs. (16-20 N-m).
 - (c) Applying tension to the rope and keeping it properly seated in the drum groove, install the remaining two clamps to the specified torque above.
- (2) With all personnel clear of hoist - TURN ON POWER.
- (3) Operate hoist "UP" guiding six (6) wraps of new rope into drum grooves with gloved hand.
- (4) Reinstall rope guide over rope in rope drum grooves as shown in Figure 5-3a. & 5-3b. and outlined in Section V, Paragraph 5-5. Continue lubricating as rope is spooled onto the drum until about 24'-0" remain unwound.
- (5) With outer lower block covers removed, thread the wire rope through the sheaves of the upper and lower block as shown in Figures 5-5a and 5-5b.
- (6) Attach swaged rope end to the dead end anchor pin and fasten with the retainer rings provided with the hoist.
- (7) Replace the lower block sheave covers.

- (8) Lubricate cable per Paragraph 4-3.

e) Checking for and removal of rope twisting.

- (1) To remove rope twist in "A" Frame single reeved hoists:
 - (a) Observe direction block tends to rotate.
 - (b) Lower the block to a low position and TURN OFF (lock out) POWER.
 - (c) Remove swaged fitting from anchor pin and rotate rope several turns in a direction tending to correct block rotation.
 - (d) TURN ON POWER; raise and lower the block several times to feed the correcting twist in the rope through the reeving.

▲WARNING

The hoist must be removed from service and placed on the ground for any maintenance that requires removal of the output shaft assembly or drum.

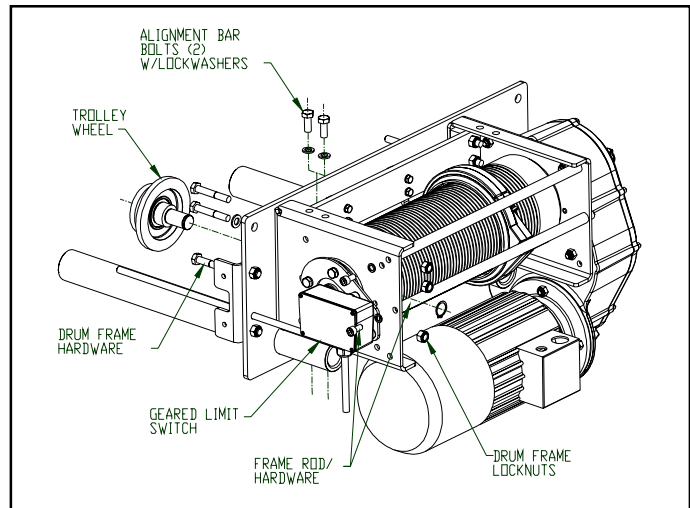


Figure 5-6. Drum Frame & Geared Limit Switch

5-8. INSPECTION OF ROPE DRUM AND SHAFT

- a) To remove the rope drum, remove the rope guide and hoisting cable, as outlined in Section V, Paragraphs 5-5. and 5-7.c., respectively.
- b) Remove the geared limit switch or disconnect the wires so that the electrical cable will not inhibit removal of the drum. (see Figure 5-6).
- c) Remove the hoist from the beam, place it on the ground and provide adequate means to support the drum before removing the frame rod cap screws and rods at the outboard end drum frame (see Figure 5-6).
- e) The hardware attaching the drum frame to the hoist and trolley frame may then be removed.
- f) Keeping the drum level, remove the drum from the splined output shaft at the gear case end.

- g) Inspect the gearcase output shaft and drum splines for wear.
- h) Before re-assembling, by reversing above instructions, make sure to apply a liberal amount of **SG** (Paragraph 4-7) spline grease to both the output shaft and drum splines. Torque "A" Frame drum mounting bolts to 60-80 ft.-lbs. (81-108 N-m).

5-9. INSPECTION OF HOIST GEARING

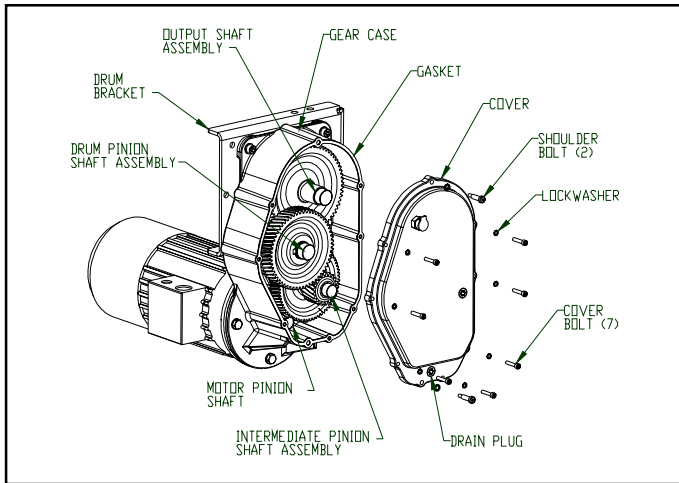


Figure 5-7. Hoist Gear Case Assembly

a) **General.** The hoist gear case is a triple-reduction, splash lubricated, vertically split, cast aluminum case and cover. A helical gear train provides smooth and quiet hoisting operation. The gear shafts are supported with ball and roller bearings housed in the back of the case and in the cover. The input pinion is integrated onto the motor shaft. An oil seal housed in the gear case at the motor input seals the motor shaft as it passes into the gear case. Since the entire motor shaft is submerged in oil, anytime the motor is removed, the oil must be drained from the gear case. All pinions are integral with their shafts while the gears are keyed and pressed onto their shafts, with exception of the integral output shaft. The output shaft passes through an oil seal in the back of the gear case and drives the drum by means of a crowned spline. One end of the rope drum is supported on this output shaft.

b) **Inspection and Disassembly.**

Gearcase. (See Figure 5-7.)

- (1) Lower hook block to the floor and relieve all load from ropes.
- (2) Make sure power to hoist is off and locked out.

▲WARNING
Before disassembly, prevent rope drum from free spinning by wedging drum in place with a block of wood, and resting lower block on work surface so all weight is off rope drum. Rope may also be removed from hoist drum.

- (3) Drain the oil from the gear case per Section IV, Paragraph 4-2.

- (4) On the "A" Frame hoist, the bolts supporting the gearcase are installed through tabs on the outside of the housing and do not pass through the gearcase cover. These bolts are not to be removed, unless the entire gearcase assembly is being removed from the hoist.
- (5) Provide adequate means to support the gearcase cover. Remove the smaller socket head cap screws and lockwashers holding the cover to the gearcase. Carefully draw the cover directly away from the gearcase, as damage to this surface will prevent the gasket from sealing properly. If needed, lightly tap on the top and bottom cover tabs to release. As the cover is removed, ensure that all gear and shaft assemblies remain in the case and are fully supported by the gearcase bearings.

▲WARNING
If output shaft assembly is pulled out of the gear case with the cover, it will disengage from the drum allowing the drum to drop. Be certain all shaft assemblies stay in the case.

- (6) If it is necessary to remove the output shaft assembly from the gear case, the rope drum must first be removed from the hoist. See Section V, Paragraph 5-8.

▲WARNING
The hoist must be removed from service and repaired on the ground for any maintenance that requires removal of the output shaft assembly or drum.

Only once the output shaft is free of the rope drum, can the output shaft assembly be safely removed from the gearcase. Provide an adequate means to support this shaft and gear assembly before removing, as it is heavy. The "A" Frame gear assembly weighs 14 lbs.

- (7) The pinion shaft and gear assemblies may be removed as necessary.
- (8) Inspect all gears, pinions, bearings, and the output shaft spline for wear, pitting, or mechanical damage. Replace the gearcase assembly, as necessary. Thoroughly clean the output shaft external spline teeth before reassembly.
- (9) Assembly is opposite of removal. Use a new gasket. Do not attempt to assemble the cover to the gear case without a gasket, as the spacing between bearings will be reduced. Severe damage to the hoist will occur if no gasket or the wrong gasket is used. Refill gear case with new lubricant per Section IV, Paragraph 4-2 before use. Using **SG** (Paragraph 4-7), grease the spline teeth on the output shaft before reinstalling rope drum.
- (10) Test hoist per Section V, Paragraph 5-14 to ensure proper lubrication.

Hoist Motor.

- (1) Lower hook block to the floor and relieve all load from ropes.
- (2) Make sure power to hoist is off and locked out.
- (3) Drain the oil from the gear case per Section IV, Paragraph 4-2.
- (4) Disconnect the wiring and conduit from the motor junction box.
- (5) Provide a means to support the hoist motor. The "A" Frame S4 hoist motor weighs approximately 70 lbs. and the S2 hoist motor weighs approximately 50 lbs. The motor must be adequately supported and held horizontally while removing and installing, to avoid input seal damage.
- (6) Once the motor is properly supported, remove the hardware fastening it to the gear case. Carefully withdraw the motor horizontally straight out from the gear case. Do not tip or move the motor from side to side.
- (7) Replace the motor shaft seal using an appropriate seal driver. It is recommended that a new seal be installed each time the motor is removed from the case.

IMPORTANT!

- (8) Before reinstalling the motor, pack the gear teeth with **MPG** grease (Paragraph 4-7) and wrap the gear teeth with a number of layers of Teflon tape to protect the seal lip from being damaged by the gear teeth. Coat the seal lip and the motor shaft with **MPG** grease.

NOTICE

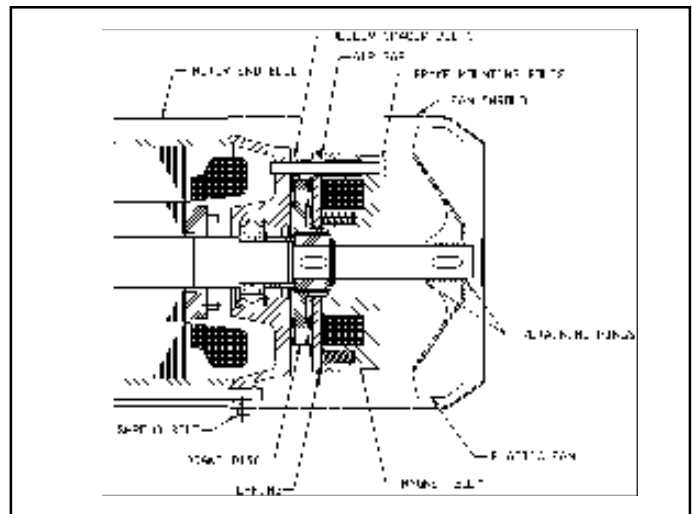
Failure to use a factory replacement seal will cause premature seal failure due to specific lip material requirements that must be met.

- (9) Install the motor to the gear case. The motor shaft must be in line with the seal bore and perpendicular to the mounting surface before attempting to insert the shaft through the seal. The motor shaft must remain horizontal and not rock up and down or side-to-side while installing the motor or seal damage will occur. It may be necessary to rotate the rope drum slightly to align the gear teeth to mesh with the teeth on the motor shaft. Ensure that the motor seats properly into the rabbet fit machined in the gear case. Fasten the motor to the gear case.
- (10) Reconnect the conduit and power leads to the motor. See Section VIII and refer to the specific wiring diagrams shipped with your hoist.
- (11) Refill gear case with lubricant per Section IV, Paragraph 4-2.
- (12) Test hoist to ensure proper operation per Section V, Paragraph 5-14.

5-10. INSPECTION OF MOTOR BRAKE AND ACTUATING MECHANISM

- a) General Operation. The hoist brake is an electro-magnetically released, spring set non-adjustable brake. Torque is generated by compressing a friction disk between the stationary motor end bell and the spring loaded brake armature. The friction disk is fixed to and rotates with the motor shaft. When the magnet coil is energized, the armature plate is pulled across the air gap. The friction disk is carried by a splined hub that permits axial movement when the brake is released. This axial movement releases both sides of the friction disk from their mating stationary surfaces and allows the friction disk to rotate freely when the brake is energized. When power is removed from the magnetic coil, the compression springs push the armature against the friction disk and the other side of the friction disk against the motor end bell generating the torque necessary to stop the hoist machinery and hold the load.

It will be necessary to compensate for the friction disk wear when a greater amount of hook movement (drift) is noticed when stopping. There is no torque adjustment of the brake. Friction disk wear can only be compensated for by resetting air gap.

**Figure 5-8. Motor Brake**

- b) Friction Disk Inspection and Air Gap Adjustment.

- (1) Lower hook block to the floor and relieve all load from ropes.
- (2) Make sure power to the hoist is off and locked out.

WARNING

Check to be certain main power switch is locked in open position (OFF), before removing fan shroud.

- (3) Remove the four (4) bolts attaching the fan shroud to the motor and remove the fan shroud. See Figure 5-8.
- (4) Carefully roll the large O-ring from the groove over the air gap back toward the magnet body. Do not excessively stretch this O-ring.

- (5) Measure the air gap using feeler gages. If the air gap exceeds the maximum value shown in Table 5-1, the air gap must be reset.
- (6) To measure the thickness of the friction disk, it is necessary to remove the brake body from the motor end bell. Remove the three (3) brake mounting bolts and draw the brake body away from the friction disk. Carefully set the brake body down on the motor shaft directly in front of the fan. Draw the friction disk away from the end bell and measure the thickness across the friction surfaces. If the friction disk thickness is less than the minimum shown in Table 1, it must be replaced. See Section IX, Figure 9-8. If the friction disk thickness is within the allowable, reassemble the brake body to the motor end bell and torque the mounting bolts to the value shown in Table 5-1. Whenever the friction disk is replaced, it is necessary to reset the air gap.

Hoist	"A" S2	"A" S4
Mounting Bolt Torque	7.5 ft-lbs. (10 Nm)	7.5 ft-lbs. (10 Nm)
Nominal Air Gap	0.012 in. (0.3 mm)	0.016 in. (0.4 mm)
Maximum Air Gap	0.024 in. (0.6 mm)	0.028 in. (0.7 mm)
Minimum Brake Disk Thickness	0.335 in. (8.5 mm)	0.374 in. (9.5 mm)

Table 5-1. Motor Brake Data

- (7) To reset the air gap, begin by releasing the (3) mounting bolts 1/2 turn. Turn the hollow spacer bolts into the magnet body approximately 1/4 turn. Retighten all three mounting screws. Measure the air gap at a minimum of three places around the circumference. Threading the hollow spacer bolts into the magnet body will decrease the air gap, while backing these spacer bolts out of the magnet body will increase the air gap. Repeat this step, as necessary, until the required air gap is achieved. The air gap must be the same all the way around the brake. Once the air gap is correct, torque the mounting bolts to the value shown in Table 5-1.
- (8) Replace the large O-ring over the air gap and reassemble the fan shroud to the motor.
- (9) Test hoist per Section V, Paragraph 5-14 to ensure proper brake operation.

c) Brake Disassembly.

- (1) Lower hook block to the floor and relieve all load from ropes.
- (2) Make sure power to the hoist is off and locked out.
- (3) Remove the four (4) bolts attaching the fan shroud to the motor and remove the fan shroud. See Figure 5-8.
- (4) Remove the snap ring behind the plastic fan. Carefully remove the fan and key from the motor shaft. Remove the snap ring in front of where the fan was mounted.
- (5) Disconnect the two wires from the terminal block on the magnetic body.

- (6) Remove the three mounting bolts that attach the brake body to the motor end bell and remove the brake body from the motor. Remove the friction disk from the motor shaft.
- (7) Clean and inspect all components and working surfaces. Replace all damaged or worn components as necessary. Measure friction disk thickness and replace if less than the minimum thickness shown in Table 5-1.

d) Brake Re-assembly.

- (1) Install the friction disk on the splined hub. The friction disk must slide on the splined hub and seat against the end bell of the motor.
- (2) Install the brake body to the motor end bell using the three (3) mounting bolts. The air gap must be reset as described in Section V, Paragraph 5-10.b. Torque the mounting bolts to the values shown in Table 5-1. Install the large O-ring in the groove over the air gap. Ensure this O-ring is not pinched in the air gap.
- (3) Connect the brake leads to the terminal block on the brake body.
- (4) Install the forward fan mounting retaining ring and install the fan. Install the rear retaining ring. Install the fan shroud and bolts.
- (5) Test hoist per Section V, Paragraph 5-14.

5-11. INSPECTION OF HOIST TRAVERSE DRIVE

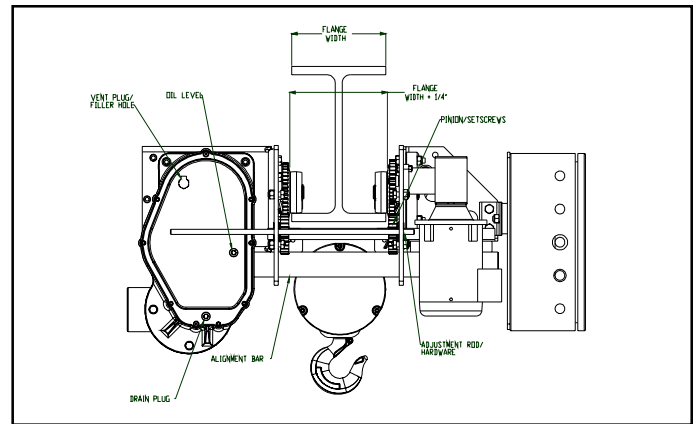


Figure 5-9. Traverse Drive Arrangement

- a) **General.** The traverse drive consists of four single flange wheels, two on each side of the beam, carried directly by the hoist frame. These wheels rotate on sealed ball bearings supported by fixed pins. Pinions drive two opposing wheels with gear teeth cut into the flange. Both pinions are mounted on a keyed drive shaft supported by sealed ball bearings at each hoist side. The pinions are held in place by means of locking setscrews. The drive shaft is driven by a single geared trolley wheel, which is in turn driven by a pinion mounted to a single reduction worm gear reducer.
- b) Ensure that the hoist is properly fitted to the beam. The hoist must be centered on the beam with clearance between the sides of the bottom of the beam flange and the inside faces of the wheel flanges. Proper clearance must exist along the entire length of beam that the hoist can traverse. An amount of 3/32 to 1/8 inch clearance per

side is recommended for a total of 3/16 to 1/4 inch wider than the beam flange. If too little or too much clearance is determined, adjust trolley per Section II, Paragraph 2-2.

- c) Inspect wheel treads, flanges, and gear teeth for wear. Check for adequate lubrication (**WG**, Section IV, Paragraph 4-7) on the wheel gear and pinion mesh. Check wheel bearings for any signs of wear, including rough rotation and signs of lubricant leakage. Replace all damaged or missing items. Wheels must always be changed in opposing pairs and drive wheels should be changed when the drive pinions are replaced.

NOTICE

Ensure that the cross shaft is properly positioned and locked into place by means of the setscrews. Failure to do so may allow the drive shaft to contact the hoist gearcase.

- d) Examine the drive pinions, cross shaft, and cross shaft bearings. Check pinions for gear tooth wear and proper alignment with wheel gear. A spacer washer between the cross shaft bearings and the pinion aligns the gear mesh. Setscrews hold the pinions and spacer washers tight against the bearings. Verify that the setscrews are tight on the cross shaft. If it is necessary to adjust or reset the pinions, verify that the cross shaft surface is free of mechanical damage and oil before tightening the setscrews. Drive pinions must be replaced as sets and should be replaced along with the drive wheels. The cross shaft bearings are sealed for life and should be replaced at any sign of mechanical wear or lubricant leakage.
- e) Inspect the traverse gearbox and motor. Look for signs of rough operation, mechanical damage or lubricant leaks. Inspect the reducer and driving pinion for wear. Verify that all hardware that mounts the reducer to the trolley frame and the motor to the gear reducer are all present and tight. Replace and tighten as necessary. The factory recommends complete replacement of the traverse gearbox. However, gearbox service may be available from your local authorized YALE repair center.

5-12. TESTING BLOCK OPERATED LIMIT SWITCH

- a) **General.** The optional block operated limit switch is a secondary upper limit switch actuated when the lower block contacts the actuator rod. The rotary-gear limit switch (screw type limit switch) is the primary upper limit switch and must be temporarily bypassed to allow the block operated limit switch to be tested.
- b) **Procedure.** Remove load from the hook. To disconnect the geared limit switch, refer to Figure 7-2. Remove the limit switch cover then loosen the two (2) screws holding the locking plate in place. Allow the locking plate to slide down and disengage from the adjustment discs. Do not rotate the adjustment discs.

CAUTION

Damage to the hoist may occur if the block operated limit switch fails during testing.

Damage can be avoided by immediately releasing the pushbutton once the lower block has traveled through the limit switch weight.

The block operated limit switch may now be tested by slowly and carefully raising the hook until the limit switch rod contacts the lower block. If the hook does not stop when the limit switch rod is lifted, immediately release the pushbutton before damage to your hoist occurs. If the block operated switch functions properly, proceed by testing in the same manner with rated load on the hook. Once it has been determined that the block operated limit switch is functioning properly, the geared limit switch must be reconnected and tested.

Position the lower block three inches (3") below the point where the block operated limit switch is activated. The geared limit switch shall be reconnected by sliding the locking plate back into position ensuring slots on adjustment discs are fully engaged and tightening locking plate screws to 4 in-lbs. (See Figure 7-2). The geared limit switch must then be tested.

Test the geared limit switch by raising the lower block until it stops. Ensure that the geared limit switch stopped the hoist before the block operated limit switch was activated. If this is not the case, see Section VII, Paragraph 7-3 for adjusting the geared limit switch. Replace geared limit switch cover when testing and adjusting is complete.

WARNING

Check limit switch operation carefully, without load, before placing hoist in service. If misadjusted, SEVERE DAMAGE AND/OR A DROPPED LOAD COULD RESULT. Allow 3" for hook drift in both directions. Never allow less than two (2) complete wraps of rope on drum with hook in lowest position.

5-13. TESTING OVER-CAPACITY LIMIT SWITCH

The over-capacity limit switch is provided as standard equipment on YALE "Global King" hoists. This switch is integral to the wire rope dead end assembly and is factory preset to prevent over-capacity lifts. This device is preset at the time of hoist inspection to prevent the lifting of loads weighing 125-150% of rated capacity.

To test the function of the over-capacity limit switch, apply 125% of the rated capacity to load hook. If hoist is capable of lifting the load, then actual switch setting may be higher

than necessary and needs to be adjusted. If hoist cannot lift load, then the switch setting is correct. Refer to SECTION VII, Paragraph 7-4 for information regarding the adjustment of the limit switch setting

- (3) Depress "DN" push button, lower load a short distance and release button. Hoist should stop immediately and hold load at that level.

NOTE:

If load drifts downward slowly in step 2 or 3 above, motor brake requires adjustment - see Motor Brake Adjustment - SECTION VII, Paragraph 7-1.

5-14. TESTING HOIST

- a) General. Testing shall be performed in accordance with FEM Section IX, Series Lifting Equipment, namely Section 9.811 "Specification for rope and chain hoists", and this manual. Before placing hoist in service, hoist should be tested to insure safe operation, when hoist has been disassembled and reassembled. To test, suspend hoist from an overhead supporting member of sufficient strength to support the weight of the hoist and the rated load. Connect hoist to power supply as shown on hoist nameplate and perform the checks listed in b) and c) below.
- b) Check hoist as outlined in PRE-OPERATION CHECKS, SECTION II, Paragraph 2-4.
- c) Check hoist with rated load.
 - (1) Attach rated load to lower hook.
 - (2) Depress "UP" push button and raise load. When push button is released, hoist should stop immediately and hold load at that level.

SECTION VI - TROUBLESHOOTING

6-1. GENERAL. This section contains possible causes and solutions to common hoist problems. Please attempt to remedy your hoist problems by following these steps, before contacting the factory.

Whenever servicing electrical components, be sure to shut off and lock out power following proper lockout/tagout procedures.

 WARNING
Working in or near exposed energized electrical equipment presents the danger of electric shock.
TO AVOID INJURY: DISCONNECT POWER AND IMPLEMENT LOCKOUT/ TAGOUT PROCEDURE BEFORE REMOVING COVER OR SERVICING THIS EQUIPMENT.

SECTION VI - TROUBLESHOOTING

Trouble	Probable Cause	Remedy
6-1. Hoist Will Not Operate	<ul style="list-style-type: none"> a. No power to hoist b. Wrong voltage c. Loose or broken wire connections in hoist electrical system d. Contactor assembly not functioning e. No control voltage f. Motor burned out g. Reverse phasing on three-phase hoists 	<ul style="list-style-type: none"> a. Check switches, circuit breakers or fuses and connections in power supply lines. Check power collectors. b. Check voltage required on motor data plate against power supply. c. Shut off and lock out power supply; remove electrical cover on hoist and check wiring connections. Also check connections in push button station and limit switches. d. See that necessary jumper wires are properly installed. Verify that the contactor armatures are free to move. If binding occurs, replace contactor. Check for burned out contactor coils. e. Check transformer fuse. If blown, check for grounding and/or shorts in the push button station. Check the transformer coil for signs of overheating. Replace transformer if burned out. Verify the transformer secondary is the same voltage as the coils to which it is connected. f. Replace motor. Check input power supply. Check hoist motor connections. g. Check phase protection device (PPD), if amber LED is steady; interchange any two power supply line leads per Section II, Paragraph 2-4.b.

SECTION VI - TROUBLESHOOTING

Trouble	Probable Cause	Remedy
6-2. Hook Moves in Wrong Direction	<ul style="list-style-type: none"> a. Reverse phasing on three-phase hoists b. Hoist wired incorrectly 	<ul style="list-style-type: none"> a. Check PPD, if green LED is steady; interchange any two sets (each winding) of motor power leads. b. Check wiring connections with appropriate wiring diagram.
6-3. Hook Will Raise But Not Lower	<ul style="list-style-type: none"> a. Lower electrical circuit open b. Contactor assembly not functioning c. Down, push button inoperative 	<ul style="list-style-type: none"> a. Check for loose connections. See that necessary jumper wires are properly installed on contactor. b. See that necessary jumper wires are properly installed. Verify that the contactor armatures are free to move. If binding occurs, replace contactor. Check for burned out contactor coils. c. Check push button contacts and wires.
6-4. Hook Will Lower But Not Raise	<ul style="list-style-type: none"> a. Excessive load b. Hoist electrical circuit open c. Contactor assembly not functioning d. Up, down button inoperative 	<ul style="list-style-type: none"> a. Reduce loading to rated load of hoist, as shown on nameplate. b. Check for loose connections. See that necessary jumper wires are properly installed on contactor. c. See that necessary jumper wires are properly installed. Verify that the contactor armatures are free to move. If binding occurs, replace contactor. Check for burned out contactor coils. d. Check push button contacts and wires.
6-5. Hoist Will Not Lift Rated Load	<ul style="list-style-type: none"> a. Low voltage 	<ul style="list-style-type: none"> a. See that power supply current is the same voltage listed on motor data plate. Check hoist motor connections. Check size of power supply lines.
6-6. Hoist Motor Overheats	<ul style="list-style-type: none"> a. Excessive load b. Excessive duty-cycle c. Wrong voltage or frequency d. Defective motor or worn bearings in hoist frame e. Brake not adjusted properly 	<ul style="list-style-type: none"> a. Reduce loading to rated load as shown on nameplate. b. Reduce frequency of lifts or amount of jogging. c. Check current rating on motor data plate against power supply. Check hoist and inspect for defective, worn or damaged parts. d. Disassemble hoist and inspect for defective, worn or damaged parts. e. Adjust brake per Section VII, Paragraph 7-1.
6-7. Load Drifts Excessively When Hoist Is Stopped	<ul style="list-style-type: none"> a. Excessive load b. Motor brake not holding 	<ul style="list-style-type: none"> a. Reduce loading to rated load, as shown on nameplate. b. With No Load, check hoist for drift. If drifting is excessive, inspect motor brake (Section V, paragraph 5-10) and adjust as outlined in Section VII, paragraph 7-1.
6-8. Hoist Operates Intermittently	<ul style="list-style-type: none"> a. Collectors make poor contact b. Loose connections 	<ul style="list-style-type: none"> a. Check collectors for free movement of spring arm, weak spring or electrical connections. b. Check all wiring for loose connections.

SECTION VII - ADJUSTMENTS

7-1. MOTOR BRAKE ADJUSTMENT. These brakes are designed so that adjustment is seldom required. If, after a period of service, the load hook "drifts" downward more than usual for your hoist before coming to a stop, the motor brake may require adjustment to compensate for brake disc wear.

▲WARNING
Check to be certain main power switch is locked in open position (OFF) before removing brake cover.

Refer to Figure 5-9 and proceed as outlined in Section V, Paragraph 5-10.

7-2. BLOCK OPERATED LIMIT SWITCH ADJUSTMENT. The block operated limit stop, furnished as optional equipment, is minimally adjustable and designed to stop the lower block at the safest high point of travel to eliminate any possibility of double-blocking. When the safest high point is reached, the limit switch automatically stops hook travel. If the block switch is not tripping after contact with the lower block body, loosen the limit switch hub retaining screw and rotate the hub and rod downward to ensure earlier contact. Retighten and test, repeat as needed until switch functions properly.

7-3. GEARED ROTARY LIMIT SWITCH ADJUSTMENT. The geared rotary type limit switch is standard equipment and is located on the drum end opposite the gearcase end.

This limit switch has a rotary screw driven by a gear reduction that is coupled to the end of the drum shaft. Adjustment discs operate the contacts of separate switches, one for the hoisting circuit and one for the lowering circuit. The switch assembly must be wired in accordance with the appropriate wiring diagram, which is shipped with the hoist. Instructions for adjusting limit switch are inside cover and are repeated below (see Figure 7-2).

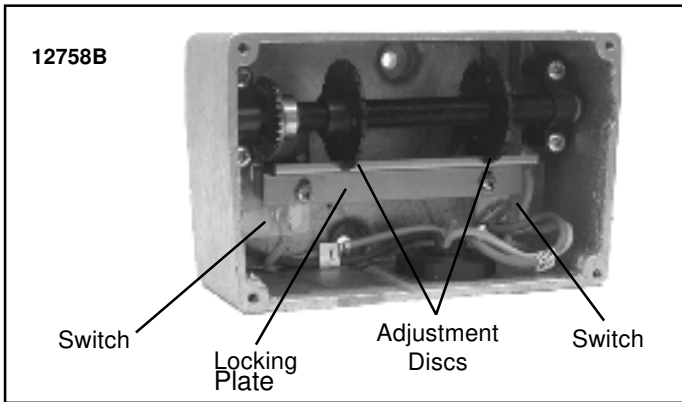


Figure 7-2. Screw-Type Limit Switch Adjustment (Wires Not Shown for Clarity.)

- a) Remove four screws and lift off switch cover.

▲WARNING
Be certain that electrical power supply is OFF and locked in the open position before removing limit switch cover.

- b) Loosen locking plate screws. Slide locking plate away from adjustment disc.
- c) Turn proper adjustment disc (right for up, left for down) toward switch to reduce hook travel or away from switch to increase hook travel.
- d) Slide locking plate back into position ensuring slots on adjustment discs are fully engaged, tighten locking plate screws to 4 in-lbs.
- e) Replace cover.
- f) Carefully check limit switch operation without load before placing hoist in service. If misadjusted, repeat steps above. Allow 3" for hook drift in both directions. Never allow less than two (2) complete wraps of rope on drum with hook in lowest position.

▲WARNING
Check limit switch operation carefully, without load, before placing hoist in service. If misadjusted, SEVERE DAMAGE AND/OR A DROPPED LOAD COULD RESULT. Allow 3" for hook drift in both directions. Never allow less than two (2) complete wraps of rope on drum with hook in lowest position.

Provide a light film of **MPG** grease (Paragraph 4-7) on gear of both limit switches.

7-4. OVER-CAPACITY LIMIT SWITCH ADJUSTMENT. The over-capacity limit switch is standard equipment and is integrated into the wire rope dead end assembly (see Figure 7-3). The device is designed to prevent overloading of the equipment, but is not intended to be used as a load-measuring device.

The limit switch is factory preset to prevent the lifting of loads weighing 125-150% of rated capacity. At times, it may be necessary to adjust the limit switch setting.

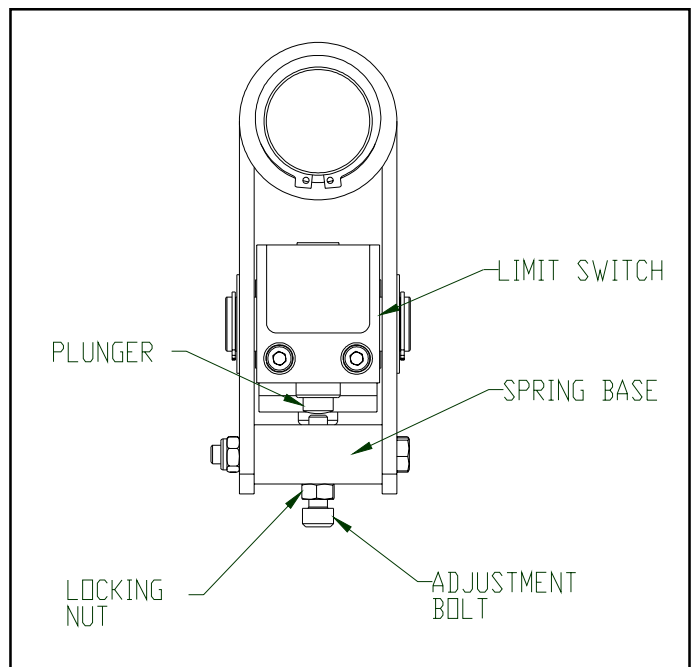


Figure 7-3. Over-Capacity Limit Switch

To adjust the limit switch setting, simply loosen the locking nut (see Figure 7-3) and then either loosen or tighten the adjustment bolt into the overload base to achieve the desired setting. Loosening the adjustment bolt will increase the load required to trip the limit switch plunger while tightening will reduce this setting. Only very small adjustment is required. Adjusting the limit switch setting to increase the capacity limit beyond 125% is not permitted.

- c) Loosen upper cable grip and pull excess cable into connection box at hoist.
- d) Tighten cable grip and cut off excess cable.
- e) Strip cable sheath and connect wires with the same type of terminals previously furnished (care must be taken to match previous wire color coding with wire markers in accordance with the wiring diagram furnished with the hoist).

7-5. SHORTENING OF PUSHBUTTON CABLE

▲WARNING

Be certain that electrical power supply is OFF and locked in the open position before attempting shortening of push button cable.

- a) Loosen screws at cable connectors and clamps at top of cable.
- b) Adjust steel support cable to proper length and tighten screws.

SECTION VIII - WIRING DIAGRAMS

8-1. GENERAL. Comprehensive wiring diagrams for YALE electric hoists have been omitted from this book because of the many possible variations. This is due to different currents and types of electrical components used in their construction. Figures 8-1 and 8-2 are examples of typical two-speed hoist and trolley wiring diagrams respectively. However, please consult the exact wiring diagrams for your hoist. A print of the correct wiring diagram for each hoist is furnished as a separate insert and shipped with the hoist. We suggest you carefully file the wiring diagram with this book for future reference.

Notes

Figure 8-1. Elementary Wiring Diagram for a Two-Speed Hoist and Trolley with Standard Features

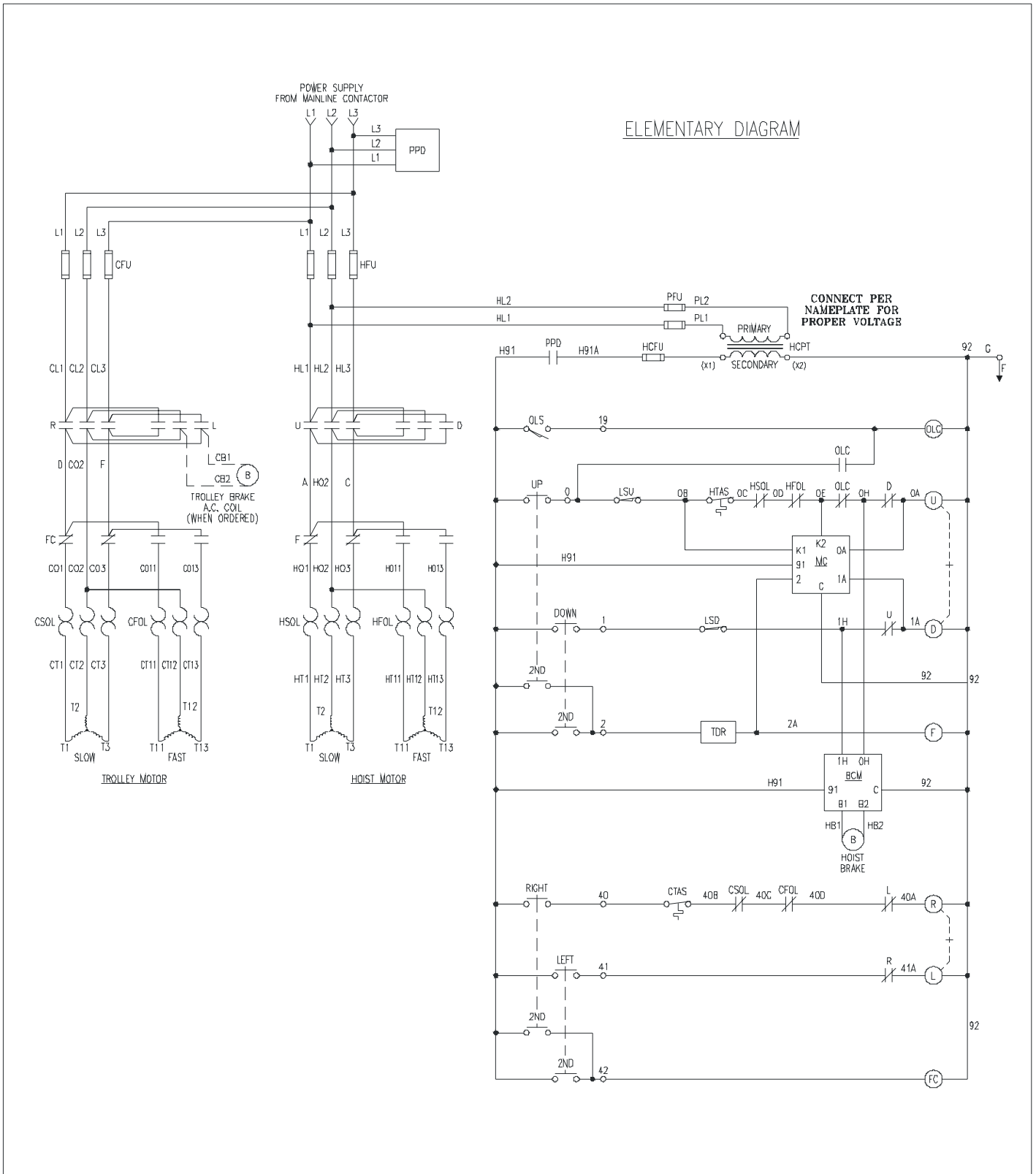
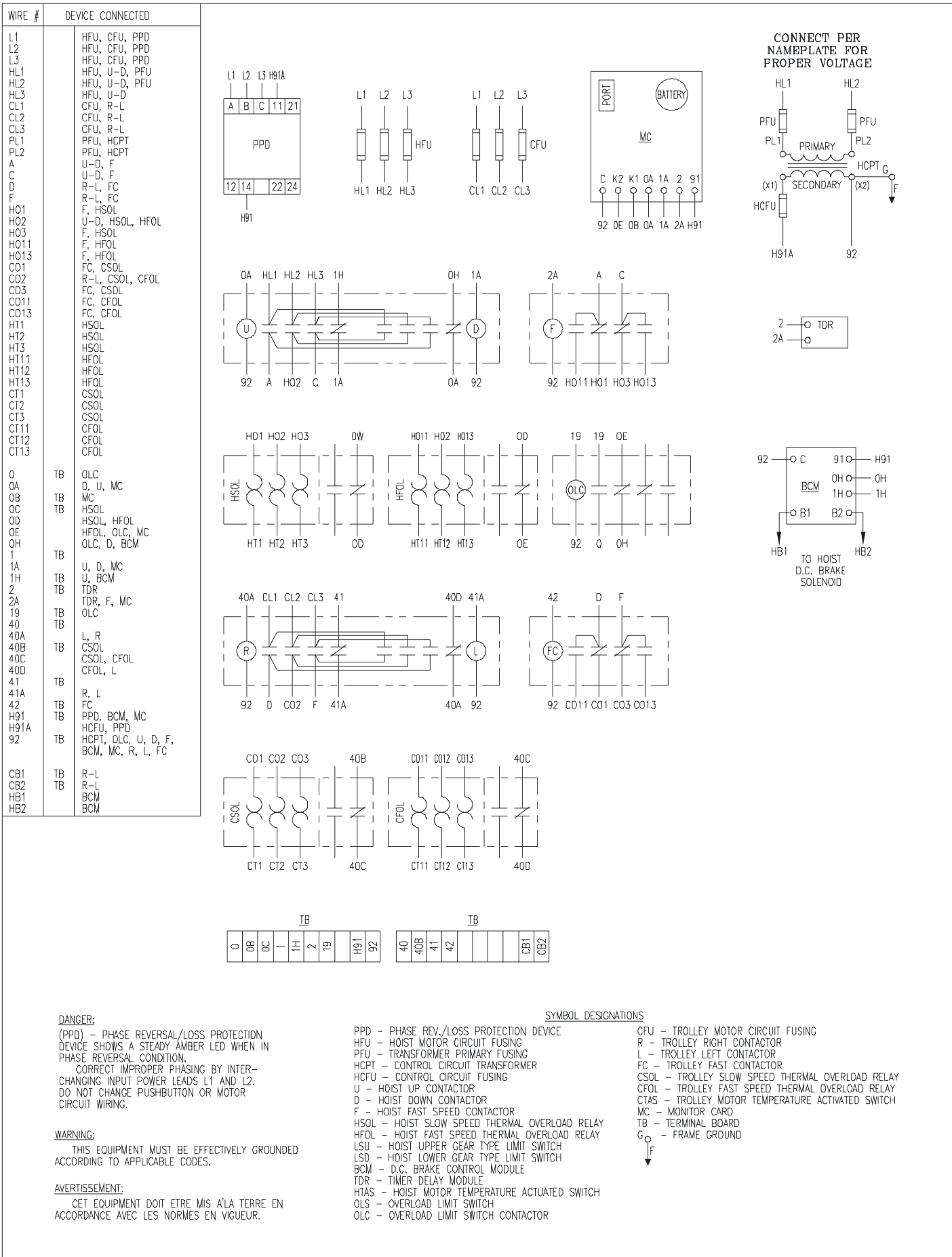


Figure 8-2. Component Diagram for a Two-Speed Hoist and Trolley with Standard Features



SECTION IX - PARTS LIST

9-1. GENERAL. The parts lists and illustrations in this section of the manual cover parts for models of YALE "Global King" Electric hoists. A typical hoist is shown as the basis for the exploded parts illustrations; therefore, certain variations may occur from the information given. For this reason, always give the Hoist Serial Number, Catalog Number, Motor Horsepower, Voltage, Phase, Frequency and Capacity of Hoist when ordering parts.

Throughout this manual, you will see references to the "S2" and "S4" Frame hoists. If you are unsure about which frame you have, count the number of rope falls that are supporting the lower block and/or see Section IV, Paragraph 4-2 for a simple gearcase measurement to determine the configuration of your hoist. Your gearcase should have a similar shape to that shown and will measure 10 in width and requires approximately 3 quarts of oil.

Certain parts of your hoist will, in time, require replacement under normal wear conditions. It is suggested that these parts be purchased for your hoist as spares for future use. These parts are listed at the end of this manual.

The numbers assigned to parts of our various assemblies in our Parts List are the part numbers used in manufacturing. Some of these itemized parts are not for individual sale, but must be grouped with other related replacement items.

WHEN ORDERING PARTS OR INFORMATION ON THIS EQUIPMENT, ALWAYS INCLUDE MODEL AND SERIAL NUMBER ON ORDER.

⚠ WARNING

Using "Commercial" or other manufacturer's parts to repair Global King Hoists may cause load loss.

TO AVOID INJURY:

Use only YALE Hoist supplied parts. Parts may look alike but YALE Hoist parts are made of specific materials or processed to achieve specific properties.

LIST OF PART ILLUSTRATIONS		
TITLE	FIGURE No.	PAGE No.
Hoist Drum, Drum Frame, Gearcase, Motor, Rope Guide, and Limit Switch	9-1	28
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Notes

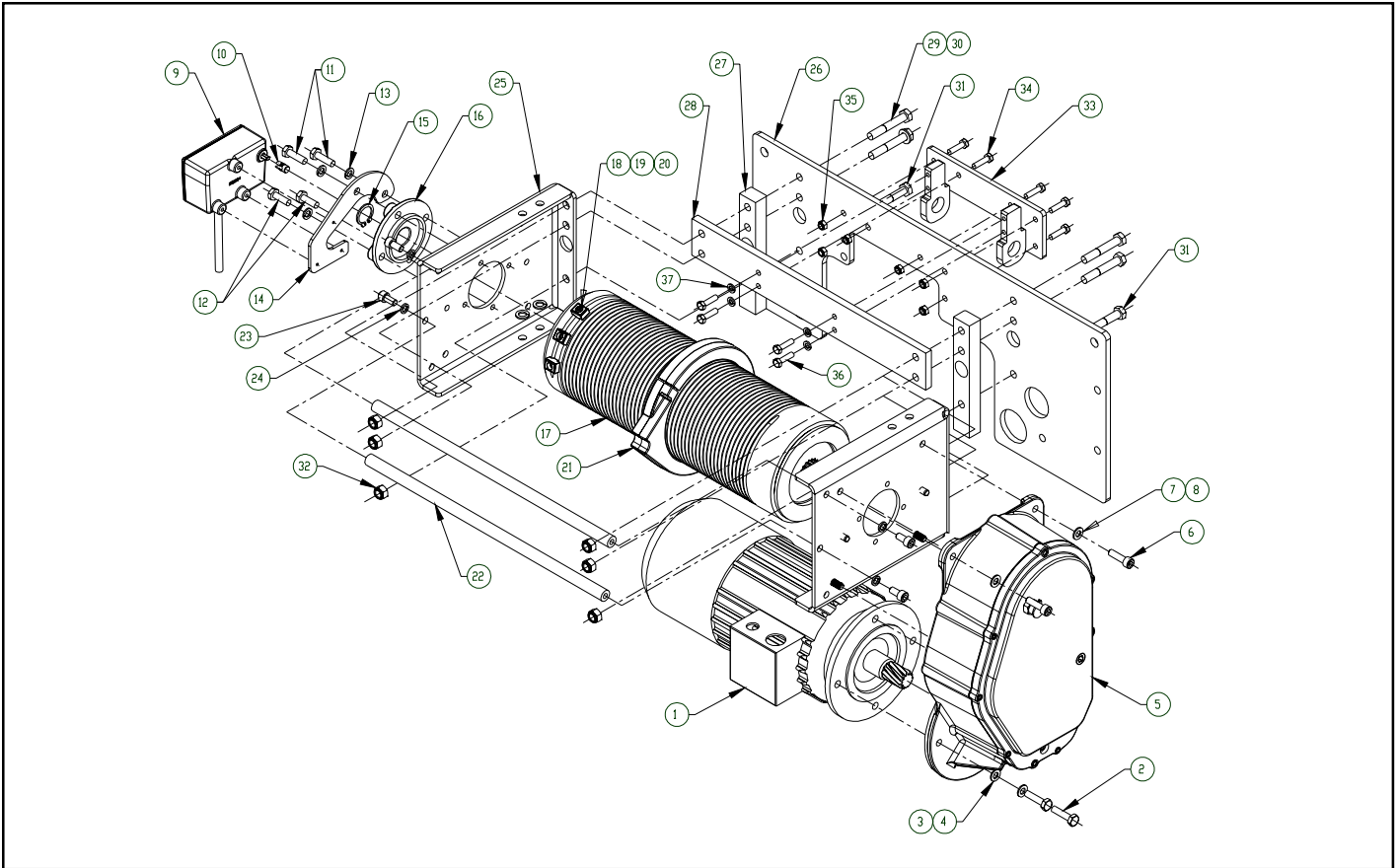


Figure 9-1. Hoist Drum, Drum Frame, Gearcase, Motor, Rope Guide and Screw Type Limit Switch

"A" Frame S4 Reeved: Hoist Components for Figure 9-1.			
Ref. No.	Part Number	Description	Qty. Req'd
1	-	5 HP Hoist Motor, 2-Speed with Brake and Fan (See Figure 9-8 for Parts)	1
	33295001	208 Volt, 3-Phase, 60 Hertz	
	33295002	230 Volt, 3-Phase, 60 Hertz	
	33295003	460 Volt, 3-Phase, 60 Hertz	
	33295004	575 Volt, 3-Phase, 60 Hertz	
2	N/A	Hex Head Cap Screw, M10	2
3	N/A	Flat Washer, M10	2
4	N/A	Locknut, M10 (Not Shown)	4
5	44943501	Hoist Gearcase (See Figure 9-2 for Parts)	1
6	N/A	Socket Head Cap Screw, M10	2
7	N/A	Flat Washer, M10	2
8	N/A	Locknut, M10 (Not Shown)	4
9	43981305	Geared Limit Switch	1
10	11593901	Drum Shaft Insert for Geared Limit Switch	1
11	N/A	Hex Head Cap Screw (Long), M10	2
12	N/A	Hex Head Cap Screw (Short), M10	2
13	N/A	Lock Washer, M10	4
14	N/A	Limit Switch Bracket	1
15	N/A	Heavy Duty External Retaining Ring	1
16	N/A	Flanged Cartridge Ball Bearing	1
17	-	Rope Drum	1
	44943901	Rope Drum, 20' Lift Model	
	44943902	Rope Drum, 40' Lift Model	
18	23397701	Rope Clamp	3

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"A" Frame S4 Reeved: Hoist Components for Figure 9-1. (continued)			
Ref. No.	Part Number	Description	Qty. Req'd
19	N/A	Socket Head Cap Screw, M6	3
20	N/A	Lock Washer, M6	3
21	44943801C	Rope Guide (See Figure 9-7 for Parts)	1
22	-	Frame Rod	2
	23385903	Frame Rod, 20' Lift Model	
	23385904	Frame Rod, 40' Lift Model	
23	N/A	Socket Head Cap Screw, M10	4
24	N/A	Hi-Collar Lock Washer, M10	4
25	N/A	Drum Frame Bracket	2
26	-	Trolley Frame Side Plate (Drum)	1
	N/A	Frame Side Plate, 20' Lift Model	
	N/A	Frame Side Plate, 40' Lift Model	
27	N/A	Stiffener Bar	2
28	N/A	Dead End Support Bar	1
29	N/A	Hex Head Cap Screw, M12 (Long)	4
30	N/A	Flat Washer, M12	1
31	N/A	Hex Head Cap Screw, M12 (Short)	2
32	N/A	Locknut, M12	6
33	N/A	Dead End Support Weldment	1
34	N/A	Hex Head Cap Screw, M8	6
35	N/A	Locknut, M8	6
36	N/A	Hex Head Cap Screw, M8	4
37	N/A	Lock Washer, M8	4
38	44944702	YALE Brand Label for Gearcase (Not Shown)	1

Notes

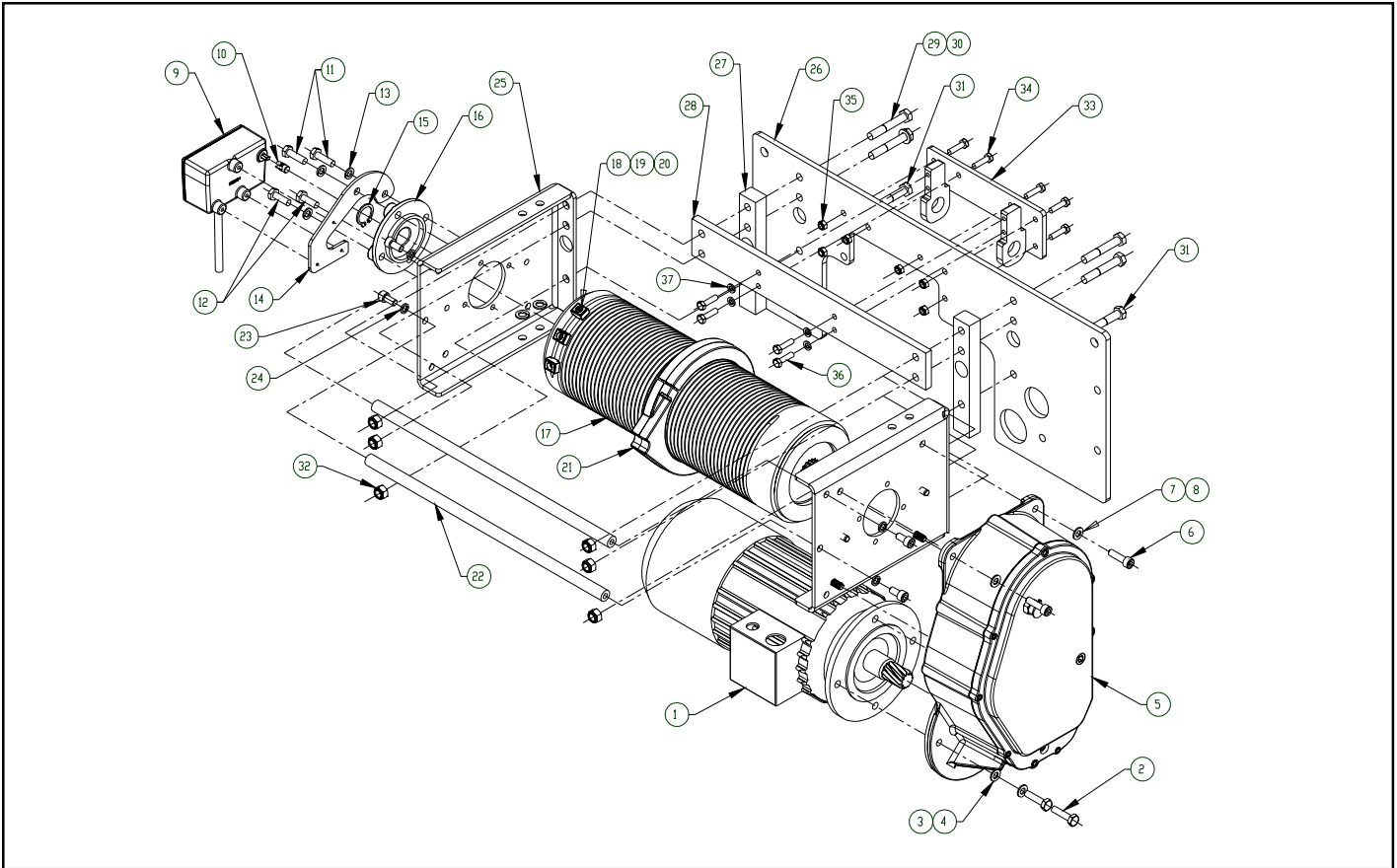


Figure 9-1. Hoist Drum, Drum Frame, Gearcase, Motor, Rope Guide and Screw Type Limit Switch

"A" Frame S2 Reeved: Hoist Components for Figure 9-1.			
Ref. No.	Part Number	Description	Qty. Req'd
1	-	3 HP Hoist Motor, 2-Speed with Brake and Fan (See Figure 9-8 for Parts)	1
	33295501	208 Volt, 3-Phase, 60 Hertz	
	33295502	230 Volt, 3-Phase, 60 Hertz	
	33295503	460 Volt, 3-Phase, 60 Hertz	
	33295504	575 Volt, 3-Phase, 60 Hertz	
2	N/A	Hex Head Cap Screw, M10	2
3	N/A	Flat Washer, M10	2
4	N/A	Locknut, M10 (Not Shown)	4
5	44943502	Hoist Gearcase (See Figure 9-2 for Parts)	1
6	N/A	Socket Head Cap Screw, M10	2
7	N/A	Flat Washer, M10	2
8	N/A	Locknut, M10 (Not Shown)	4
9	43981305	Geared Limit Switch	1
10	11593901	Drum Shaft Insert for Geared Limit Switch	1
11	N/A	Hex Head Cap Screw (Long), M10	2
12	N/A	Hex Head Cap Screw (Short), M10	2
13	N/A	Lock Washer, M10	4
14	N/A	Limit Switch Bracket	1
15	N/A	Heavy Duty External Retaining Ring	1
16	N/A	Flanged Cartridge Ball Bearing	1
17	44943901	Rope Drum, 40' Lift Model	1
18	23397701	Rope Clamp	3
19	N/A	Socket Head Cap Screw, M6	3
20	N/A	Lock Washer, M6	3

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"A" Frame S2 Reeved: Hoist Components for Figure 9-1. (continued)			
Ref. No.	Part Number	Description	Qty. Req'd
21	44943801C	Rope Guide (See Figure 9-7 for Parts)	1
22	23385903	Frame Rod, 40' Lift Model	2
23	N/A	Socket Head Cap Screw, M10	4
24	N/A	Hi-Collar Lock Washer, M10	4
25	N/A	Drum Frame Bracket	2
26	N/A	Trolley Frame Side Plate (Drum), 40' Lift Model	1
27	N/A	Stiffener Bar	2
28	N/A	N/A	-
29	N/A	Hex Head Cap Screw, M12	6
30	N/A	Flat Washer, M12	1
31	N/A	N/A	-
32	N/A	Locknut, M12	6
33	N/A	N/A	-
34	N/A	N/A	-
35	N/A	N/A	-
36	N/A	N/A	-
37	N/A	N/A	-
38	44944702	YALE Brand label for Gearcase (Not Shown)	1

Notes

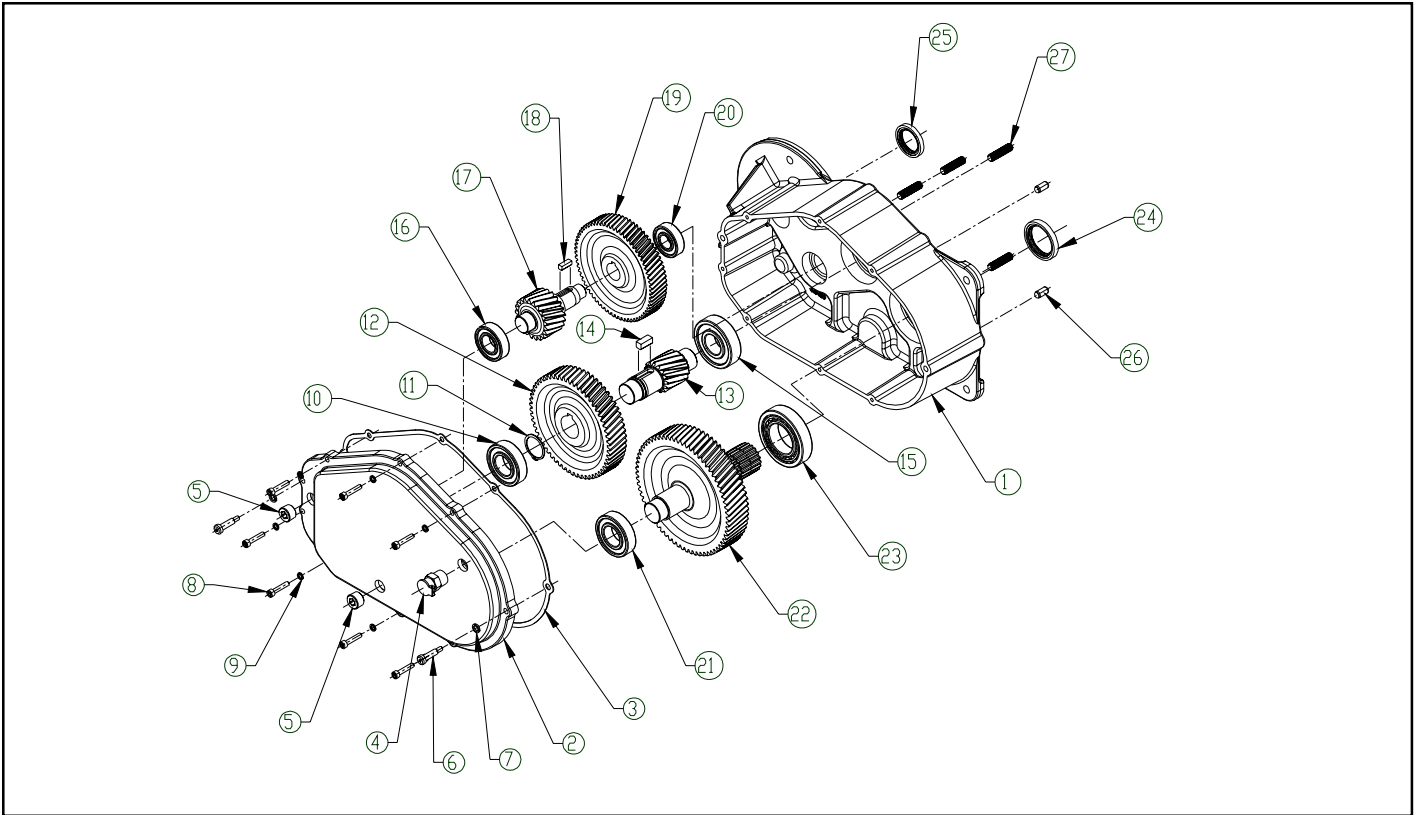


Figure 9-2. Hoist Gearing

"A" Frame S4 Reeved: Hoist Gearing for Figure 9-2.			
Ref. No.	Part Number	Description	Qty. Req'd
	44943501C	Complete 3200kg Hoist Gearcase Ass'y. - 75.14:1 Ratio	1
	44943590	Gearcase Gasket/Seal Kit (Incl. Ref. Nos. 3, 24, 25)	
	44943591	Gearcase Gasket/Bearings Kit (Incl. Ref. Nos. 3, 10, 15, 16, 20, 21, 23, 24, 25)	
1	N/A	Gearcase	1
2	N/A	Cover	1
3	N/A	Gasket	1
4	-	Vent Plug	1
5	-	Drain/Fill Level Plug	2
6	N/A	Socket Head Shoulder Screw, M6	2
7	N/A	Hi-Collar Lockwasher, M8	2
8	N/A	Socket Head Cap Screw, M6	7
9	N/A	Hi-Collar Lockwasher, M6	7
10	N/A	Ball Bearing	1
11	N/A	External Retaining Ring	1
12	N/A	Intermediate Gear	1
13	N/A	Drum Pinion Shaft	1
14	N/A	Key	1
15	N/A	Ball Bearing	1
16	N/A	Ball Bearing	1
17	N/A	Intermediate Pinion Shaft	1
18	N/A	Key	1
19	N/A	Motor Gear	1
20	N/A	Ball Bearing	1
21	N/A	Ball Bearing	1
22	N/A	Output Shaft	1
23	N/A	Roller Bearing	1
24	N/A	Output Shaft Oil Seal	1
25	N/A	Motor Shaft Oil Seal	1
26	N/A	Torque Pin	2
27	N/A	Threaded Stud, M10	4

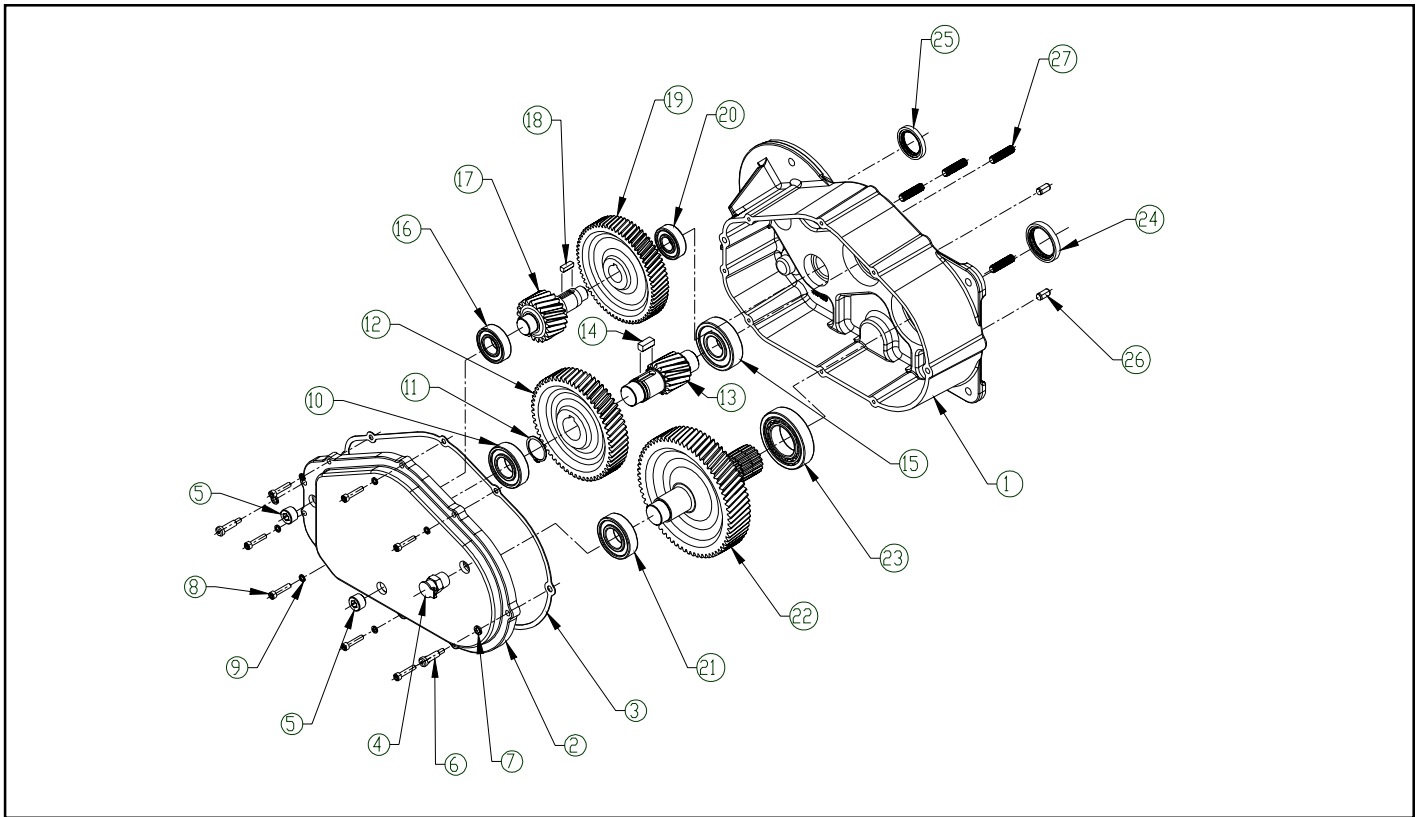


Figure 9-2. Hoist Gearing

"A" Frame S2 Reeved: Hoist Gearing for Figure 9-2			
Ref. No.	Part Number	Description	Qty. Req'd
	44943502C	Complete 1600kg Hoist Gearcase Ass'y. - 126.3:1 Ratio	1
	44943590	Gearcase Gasket/Seal Kit (Incl. Ref. Nos. 3, 24, 25)	
	44943591	Gearcase Gasket/Bearings Kit (Incl. Ref. Nos. 3, 10, 15, 16, 20, 21, 23, 24, 25)	
1	N/A	Gearcase	1
2	N/A	Cover	1
3	N/A	Gasket	1
4	-	Vent Plug	1
5	-	Drain/Fill Level Plug	2
6	N/A	Socket Head Shoulder Screw, M6	2
7	N/A	Hi-Collar Lockwasher, M8	2
8	N/A	Socket Head Cap Screw, M6	7
9	N/A	Hi-Collar Lockwasher, M6	7
10	N/A	Ball Bearing	1
11	N/A	External Retaining Ring	1
12	N/A	Intermediate Gear	1
13	N/A	Drum Pinion Shaft	1
14	N/A	Key	1
15	N/A	Ball Bearing	1
16	N/A	Ball Bearing	1
17	N/A	Intermediate Pinion Shaft	1
18	N/A	Key	1
19	N/A	Motor Gear	1
20	N/A	Ball Bearing	1
21	N/A	Ball Bearing	1
22	N/A	Output Shaft	1
23	N/A	Roller Bearing	1
24	N/A	Output Shaft Oil Seal	1
25	N/A	Motor Shaft Oil Seal	1
26	N/A	Torque Pin	2
27	N/A	Threaded Stud, M10	4

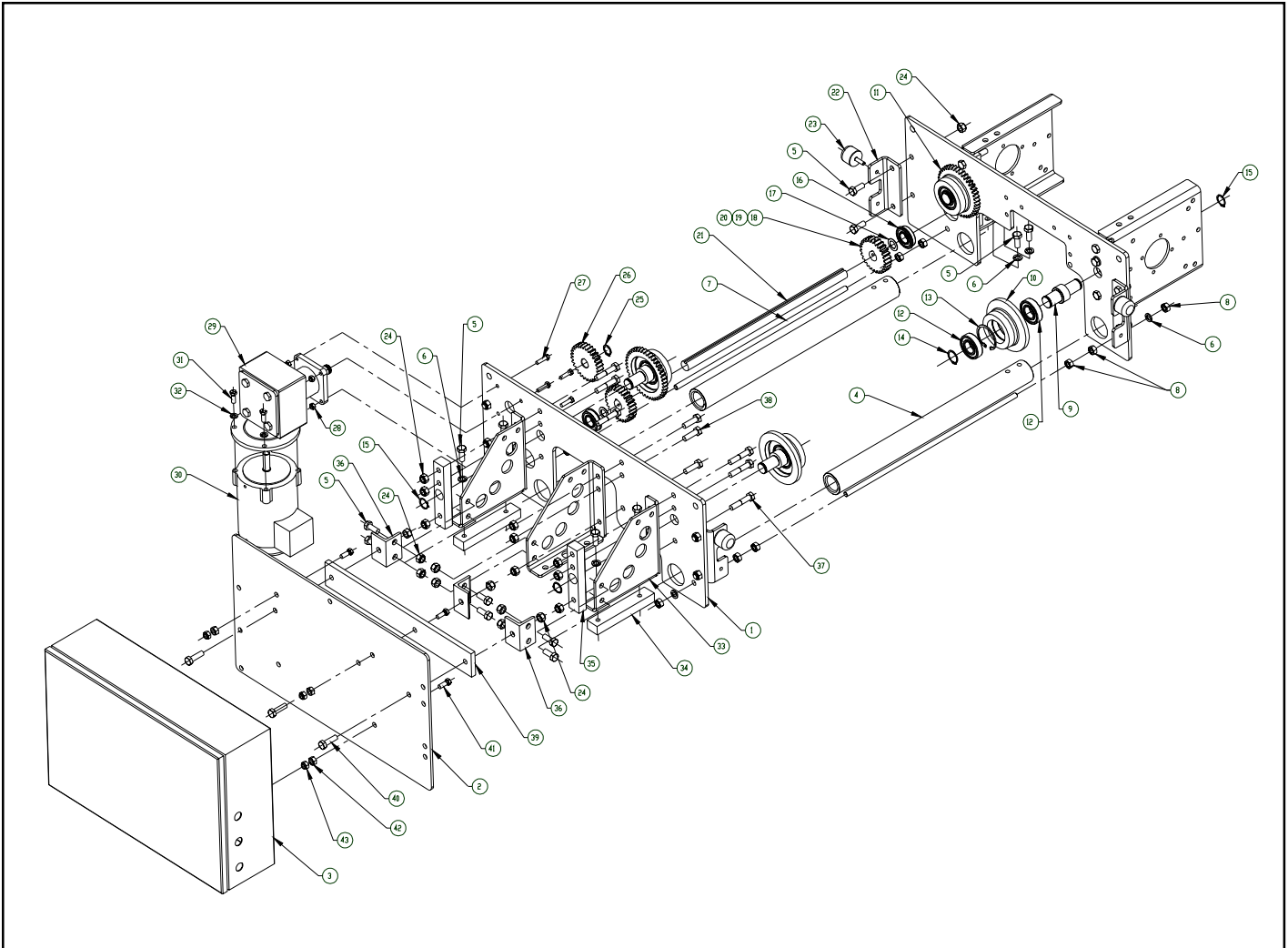


Figure 9-3. Motor Driven Trolley Frame and Drive

"A" Frame S4 Reeved: Trolley Frame and Drive Components for Figure 9-3.			
Ref. No.	Part Number	Description	Qty. Req'd
1	33295921	Geared Wheel Assembly Pair (Incl. Ref. Nos. 9, 11, 12, 13, 14, 15)	1
	33295922	Plain Wheel Assembly Pair (Incl. Ref. Nos. 9, 10, 12, 13, 14, 15)	
2	-	Trolley Frame Side Plate (Drum)	1
	N/A	Frame Side Plate, 20' Lift Model	
	N/A	Frame Side Plate, 40' Lift Model	
3	-	Counterweight Plate	1
	N/A	Counterweight, 20' Lift Model	
	N/A	Counterweight, 40' Lift Model	
4	-	Hoist/Trolley Controls (Specify HP, Voltage, Frequency, No. of Speeds, Options)	1
5	-	Alignment Bar	2
	23400201	Alignment Bar, 4" Thru 8-1/2" Trolley Beam Flange Width	
6	23400202	Alignment Bar, 8-5/8" Thru 14" Trolley Beam Flange Width	22
	N/A	Hex Head Cap Screw, M12	
7	N/A	Lockwasher, M12	12
	-	Threaded Rod, M12	
8	-	Threaded Rod, 4" Thru 8-1/2" Trolley Beam Flange Width	2
	N/A	Threaded Rod, 8-5/8" Thru 14" Trolley Beam Flange Width	
	N/A	Plain Hex Nut, M12	

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"A" Frame S4 Reeved: Trolley Frame and Drive Components for Figure 9-3. (continued)			
Ref. No.	Part Number	Description	Qty. Req'd
9	N/A	Wheel Axle	4
10	N/A	Plain Trolley Wheel	2
11	N/A	Geared Trolley Wheel	2
12	N/A	Ball Bearing	8
13	N/A	Internal Retaining Ring	4
14	N/A	External Retaining Ring	4
15	N/A	External Retaining Ring	4
16	N/A	Ball Bearing w/Retaining Ring	2
17	N/A	Flat Washer	2
18	N/A	Traverse Pinion	2
19	N/A	Key	2
20	N/A	Set Screw, M6	6
21	-	Traverse Cross Shaft	1
	N/A	Cross Shaft, 4" Thru 8-1/2" Trolley Beam Flange Width	
	N/A	Cross Shaft, 8-5/8" Thru 14" Trolley Beam Flange Width	
22	N/A	Drop Lug/Bumper Stop	4
23	11680704	Bumper (Optional)	4
24	N/A	Locknut, M12	26
25	N/A	External Retaining Ring	1
26	N/A	Output Pinion	1
27	N/A	Hex Head Cap Screw, M8	4
28	N/A	Locknut, M8	4
29	-	Traverse Reducer	1
	43907725	Traverse Reducer, 50 FPM	
	43907715	Traverse Reducer, 80 FPM	
30	N/A	Traverse Motor (Specify HP, Voltage, Frequency, No. of Speeds, Options)	1
31	N/A	Hex Head Cap Screw, 3/8	4
32	N/A	Lock Washer, 3/8	4
33	N/A	Gusset Bracket	3
34	N/A	Gusset Shoe	2
35	N/A	Gusset Stiffener	2
36	N/A	Angle Bracket	3
37	N/A	Hex Head Cap Screw (Long), M12	6
38	N/A	Hex Head Cap Screw (Short), M12	3
39	N/A	Traverse Stiffener Plate	1
40	N/A	Hex Head Cap Screw, M12	3
41	N/A	Hex Head Cap Screw, 3/8	4
42	N/A	Plain Hex Nut, 3/8	4
43	N/A	Locknut, 3/8	4

Notes

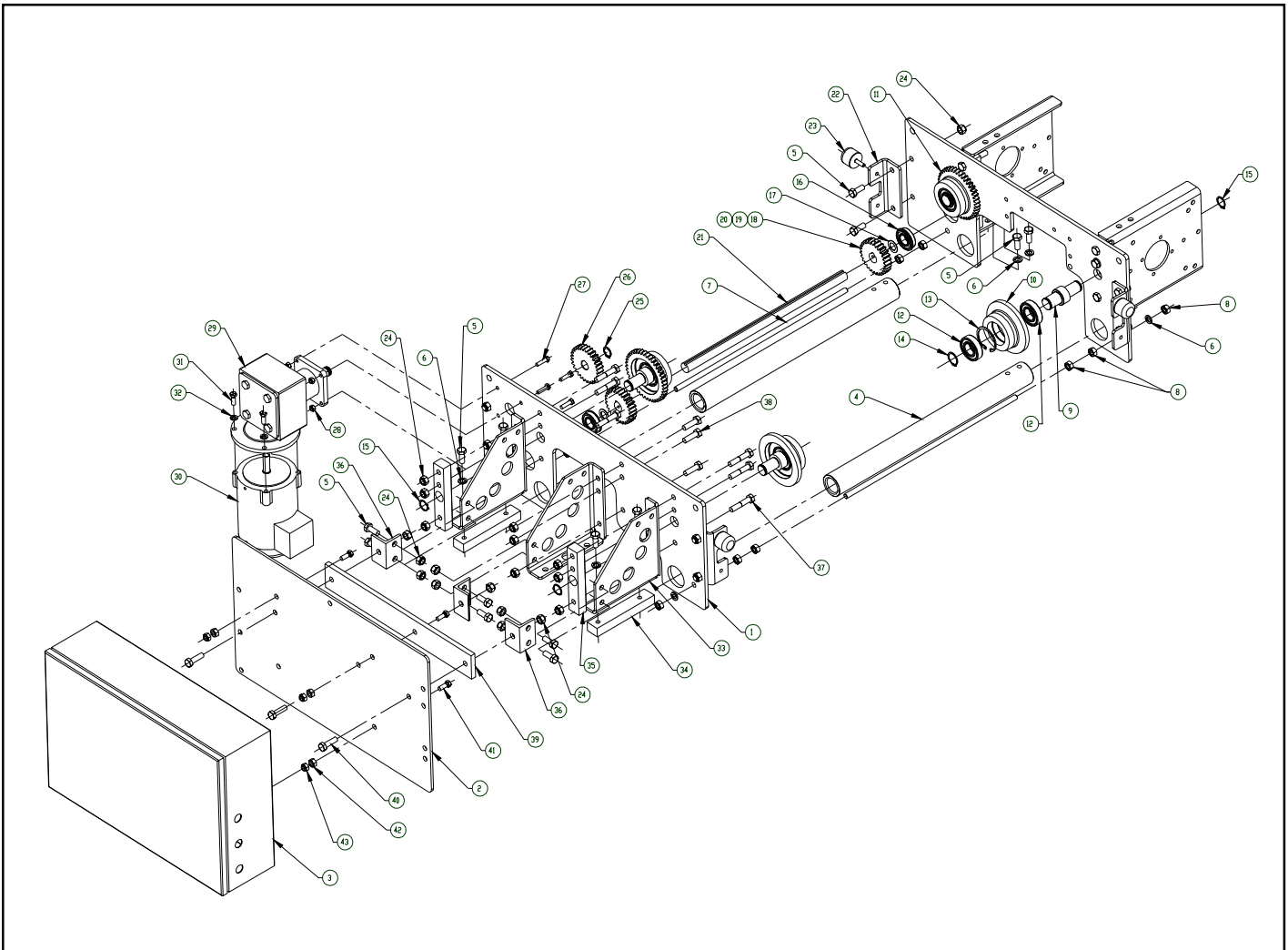


Figure 9-3. Motor Driven Trolley Frame and Drive

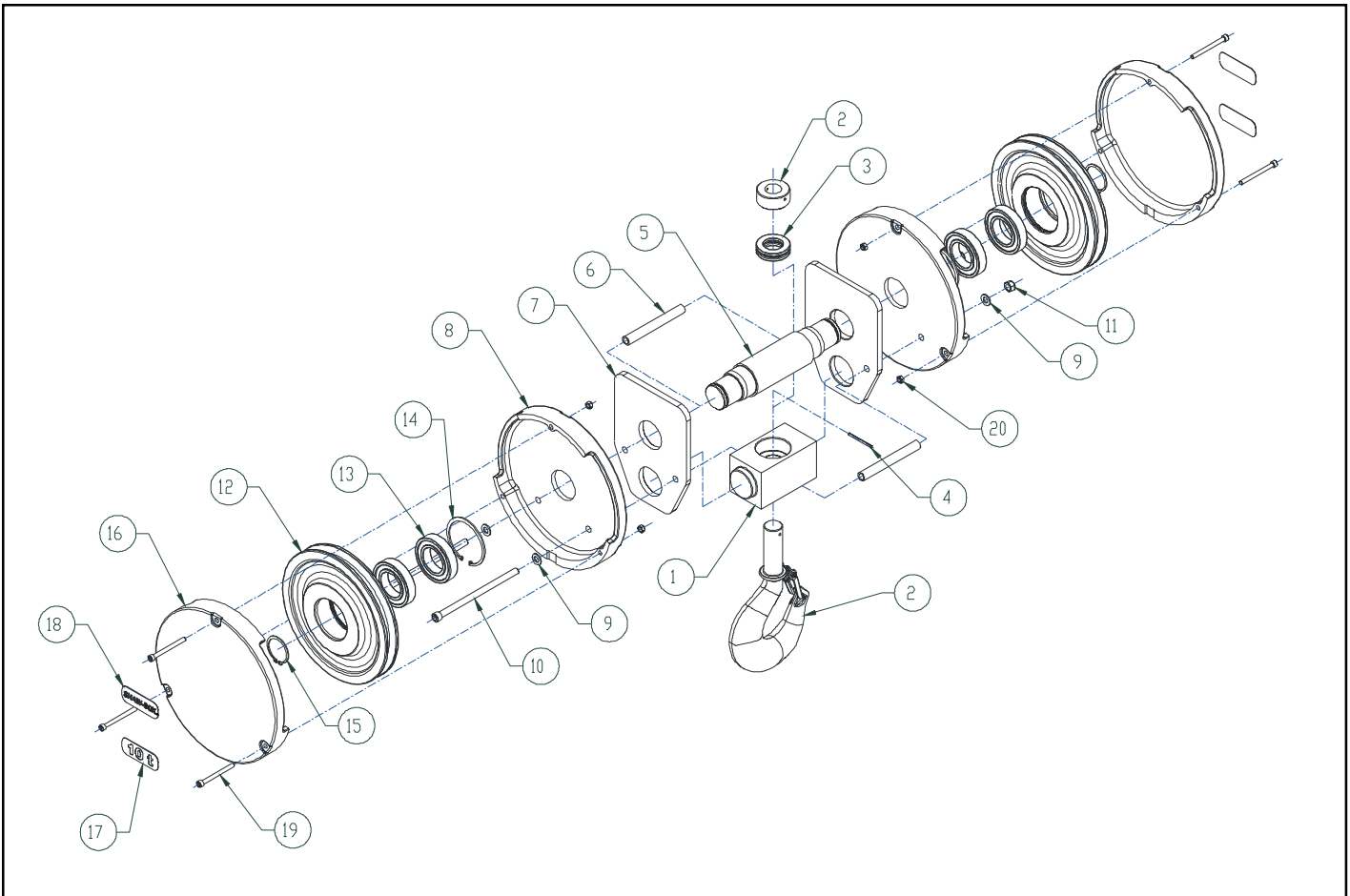
"A" Frame S2 Reeved: Trolley Frame and Drive Components for Figure 9-3.

Ref. No.	Part Number	Description	Qty. Req'd
	33295921	Geared Wheel Assembly Pair (Incl. Ref. Nos. 9, 11, 12, 13, 14, 15)	
	33295922	Plain Wheel Assembly Pair (Incl. Ref. Nos. 9, 10, 12, 13, 14, 15)	
1	N/A	Trolley Frame Side Plate (Drum), 40' Lift Model	1
2	N/A	Counterweight Plate, 40' Lift Model	1
3	-	Hoist/Trolley Controls (Specify HP, Voltage, Frequency, No. of Speeds, Options)	1
4	-	Alignment Bar	2
	23400201	Alignment Bar, 4" Thru 8-1/2" Trolley Beam Flange Width	
	23400202	Alignment Bar, 8-5/8" Thru 14" Trolley Beam Flange Width	
5	N/A	Hex Head Cap Screw, M12	22
6	N/A	Lockwasher, M12	12
7	-	Threaded Rod, M12	2
	N/A	Threaded Rod, 4" Thru 8-1/2" Trolley Beam Flange Width	
	N/A	Threaded Rod, 8-5/8" Thru 14" Trolley Beam Flange Width	
8	N/A	Plain Hex Nut, M12	12
9	N/A	Wheel Axle	4
10	N/A	Plain Trolley Wheel	2
11	N/A	Geared Trolley Wheel	2
12	N/A	Ball Bearing	8
13	N/A	Internal Retaining Ring	4

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"A" Frame S2 Reeved: Trolley Frame and Drive Components for Figure 9-3. (continued)			
Ref. No.	Part Number	Description	Qty. Req'd
14	N/A	External Retaining Ring	4
15	N/A	External Retaining Ring	4
16	N/A	Ball Bearing w/Retaining Ring	2
17	N/A	Flat Washer	2
18	N/A	Traverse Pinion	2
19	N/A	Key	2
20	N/A	Set Screw, M6	6
21	-	Traverse Cross Shaft	1
	N/A	Cross Shaft, 4" Thru 8-1/2" Trolley Beam Flange Width	
	N/A	Cross Shaft, 8-5/8" Thru 14" Trolley Beam Flange Width	
22	N/A	Drop Lug/Bumper Stop	4
23	11680704	Bumper (Optional)	4
24	N/A	Locknut, M12	26
25	N/A	External Retaining Ring	1
26	N/A	Output Pinion	1
27	N/A	Hex Head Cap Screw, M8	4
28	N/A	Locknut, M8	4
29	-	Traverse Reducer	1
	43907725	Traverse Reducer, 50 FPM	
	43907715	Traverse Reducer, 80 FPM	
30	N/A	Traverse Motor (Specify HP, Voltage, Frequency, No. of Speeds, Options)	1
31	N/A	Hex Head Cap Screw, 3/8	4
32	N/A	Lock Washer, 3/8	4
33	N/A	Gusset Bracket	3
34	N/A	Gusset Shoe	2
35	N/A	Gusset Stiffener	2
36	N/A	Angle Bracket	3
37	N/A	Hex Head Cap Screw (Long), M12	6
38	N/A	Hex Head Cap Screw (Short), M12	3
39	N/A	Traverse Stiffener Plate	1
40	N/A	Hex Head Cap Screw, M12	3
41	N/A	Hex Head Cap Screw, 3/8	4
42	N/A	Plain Hex Nut, 3/8	4
43	N/A	Locknut, 3/8	4

Notes



**Figure 9-4a. Lower Block Assembly
(S4 Reeved)**

"A" Frame S4 Reeved: Lower Block Components for Figure 9-4a.			
Ref. No.	Part Number	Description	Qty. Req'd
	44943601C	Lower Block Assembly (Excludes Ref. Nos. 17 & 18)	1
	33296201	Sheave Assembly (Incl. Ref. Nos. 12, 13, 14)	
	4X1307	Hook Latch Kit (Not shown)	
	23398091	Hook Assembly (Incl. Ref. Nos. 2, 3, 4)	
1	N/A	Trunnion Crosshead	1
2	N/A	Hook & Nut Assembly	1
3	N/A	Thrust Bearing	1
4	N/A	Roll Pin	1
5	N/A	Sheave Pin	1
6	N/A	Spacer Tube	2
7	N/A	Lower Block Strap	2
8	33296501	Inner Sheave Cover	2
9	N/A	Flat Washer, M8	4
10	N/A	Socket Head Cap Screw, M8	2
11	N/A	Locknut, M8	2
12	N/A	Rope Sheave	2
13	N/A	Ball Bearing	4
14	N/A	Internal Retaining Ring	2
15	N/A	External Retaining Ring	2
16	33296511	Outer Sheave Cover	2
17	23382880	3200 kg Capacity Label	2
18	23382802	YALE Brand Label	2
19	N/A	Socket Head Cap Screw, M6	6
20	N/A	Locknut, M6	6

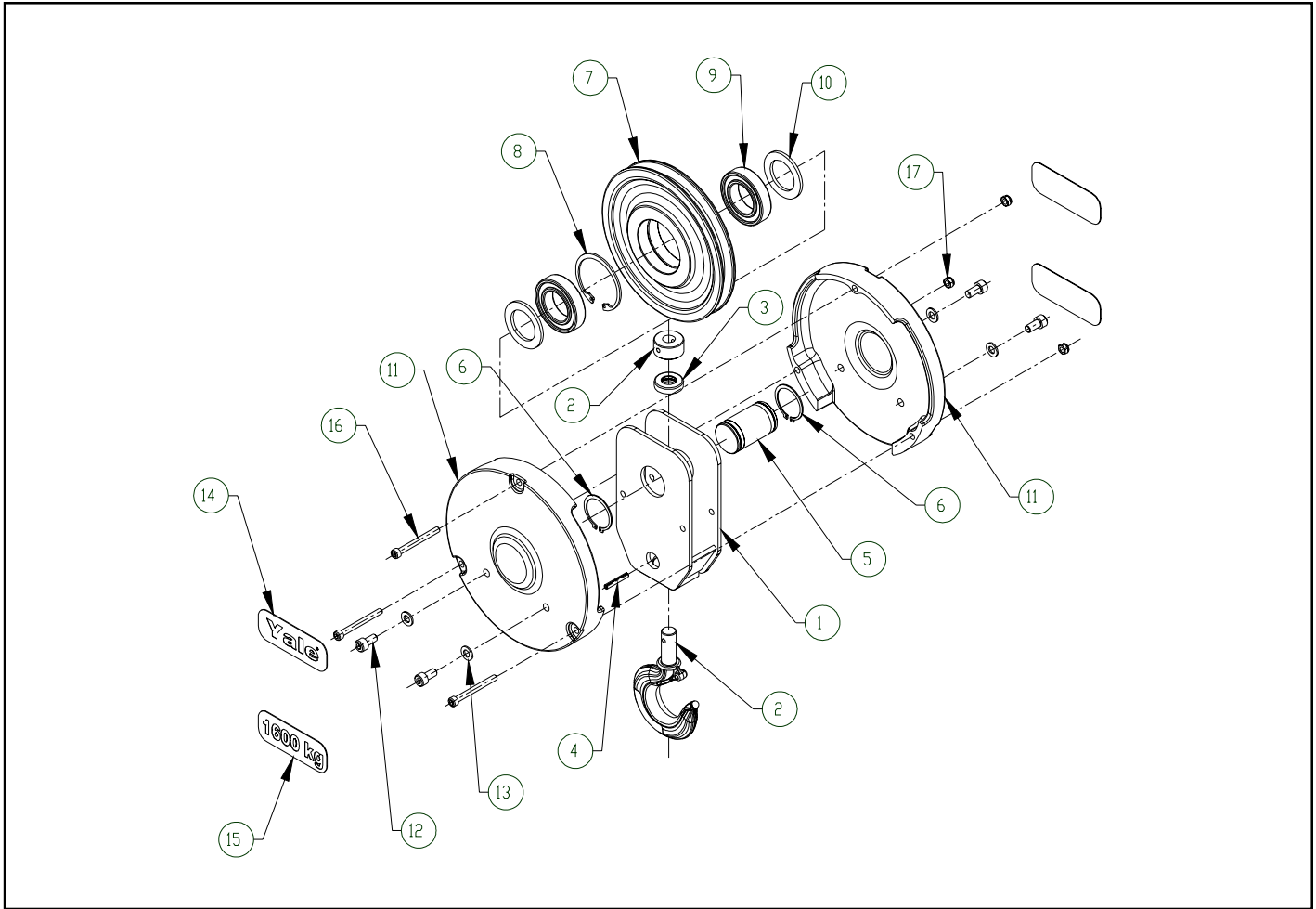
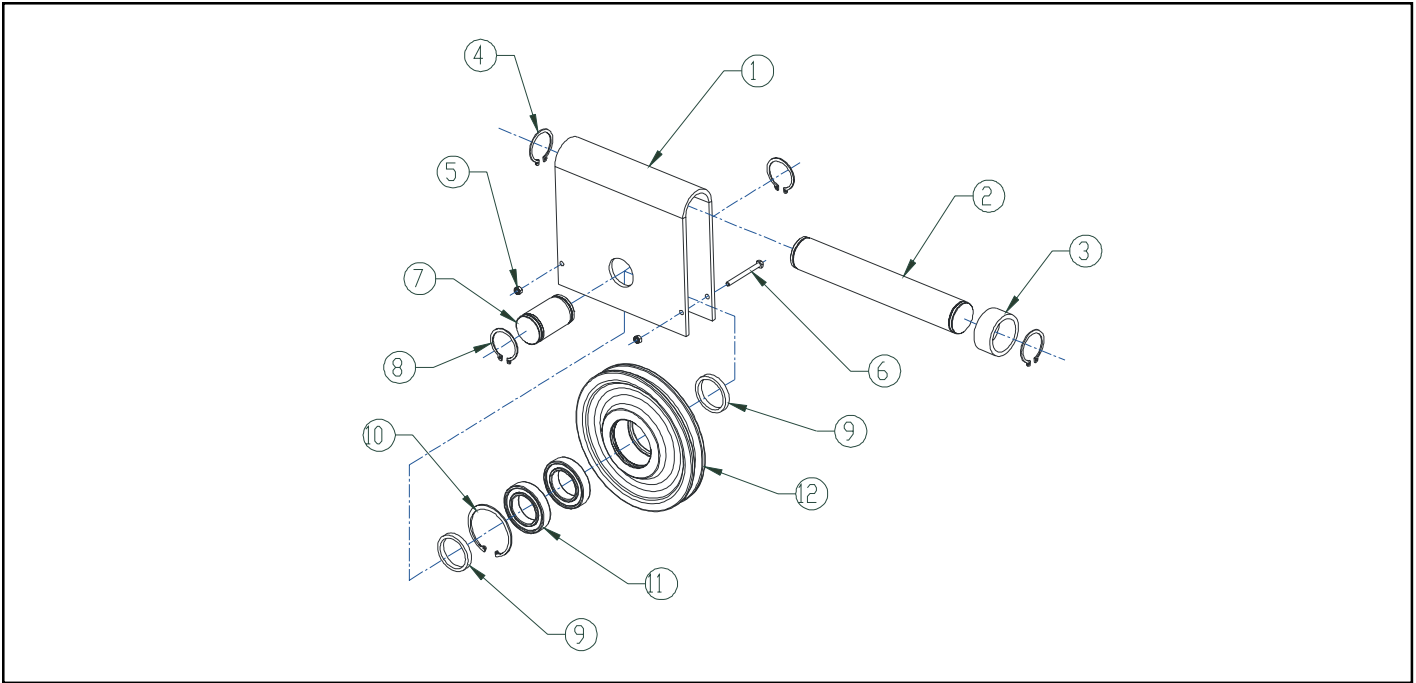


Figure 9-4b. Lower Block Assembly
(S2 Reeved)

"A" Frame S2 Reeved: Lower Block for Figure 9-4b.			
Ref. No.	Part Number	Description	Qty. Req'd
	44944101C	Lower Block Assembly (Excludes Ref. Nos. 14 & 15)	1
	33296201	Sheave Assembly (Incl. Ref. Nos. 7, 8, 9)	
	4X1304	Hook Latch Kit (Not Shown)	
	23398691	Hook Assembly (Incl. Ref. Nos. 2, 3, 4)	
1	N/A	Crosshead Weldment	1
2	N/A	Hook & Nut Assembly	1
3	N/A	Thrust Bearing	1
4	N/A	Roll Pin	1
5	N/A	Sheave Pin	1
6	N/A	External Retaining Ring	2
7	N/A	Rope Sheave	1
8	N/A	Internal Retaining Ring	1
9	N/A	Ball Bearing	2
10	N/A	Spacer Washer	2
11	33296701	Outer Sheave Cover	2
12	N/A	Socket Head Cap Screw, M8	4
13	N/A	Flat Washer, M8	4
14	23382802	YALE Brand Label	2
15	23382881	1600 kg Capacity Label	2
16	N/A	Socket Head Cap Screw, M6	3
17	N/A	Locknut, M6	3



**Figure 9-5. Upper Block Assembly
(S4 Reeved)**

"A" Frame: Upper Block Components for Figure 9-5.			
Ref. No.	Part Number	Description	Qty. Req'd
	44944001	"A" Frame Hoist Upper Block Assembly	1
	33296201	Sheave Assembly (Incl. Ref. Nos. 10, 11, 12)	
1	N/A	Upper Block Yoke	1
2	N/A	Yoke Pin	1
4	N/A	External Retaining Ring	2
5	N/A	Locknut, M6	2
6	N/A	Hex Head Bolt, M6	2
7	N/A	Sheave Pin	1
8	N/A	External Retaining Ring	2
9	N/A	Spacer Washer	2
10	N/A	Internal Retaining Ring	1
11	N/A	Sealed Ball Bearing	2
12	N/A	Rope Sheave	1

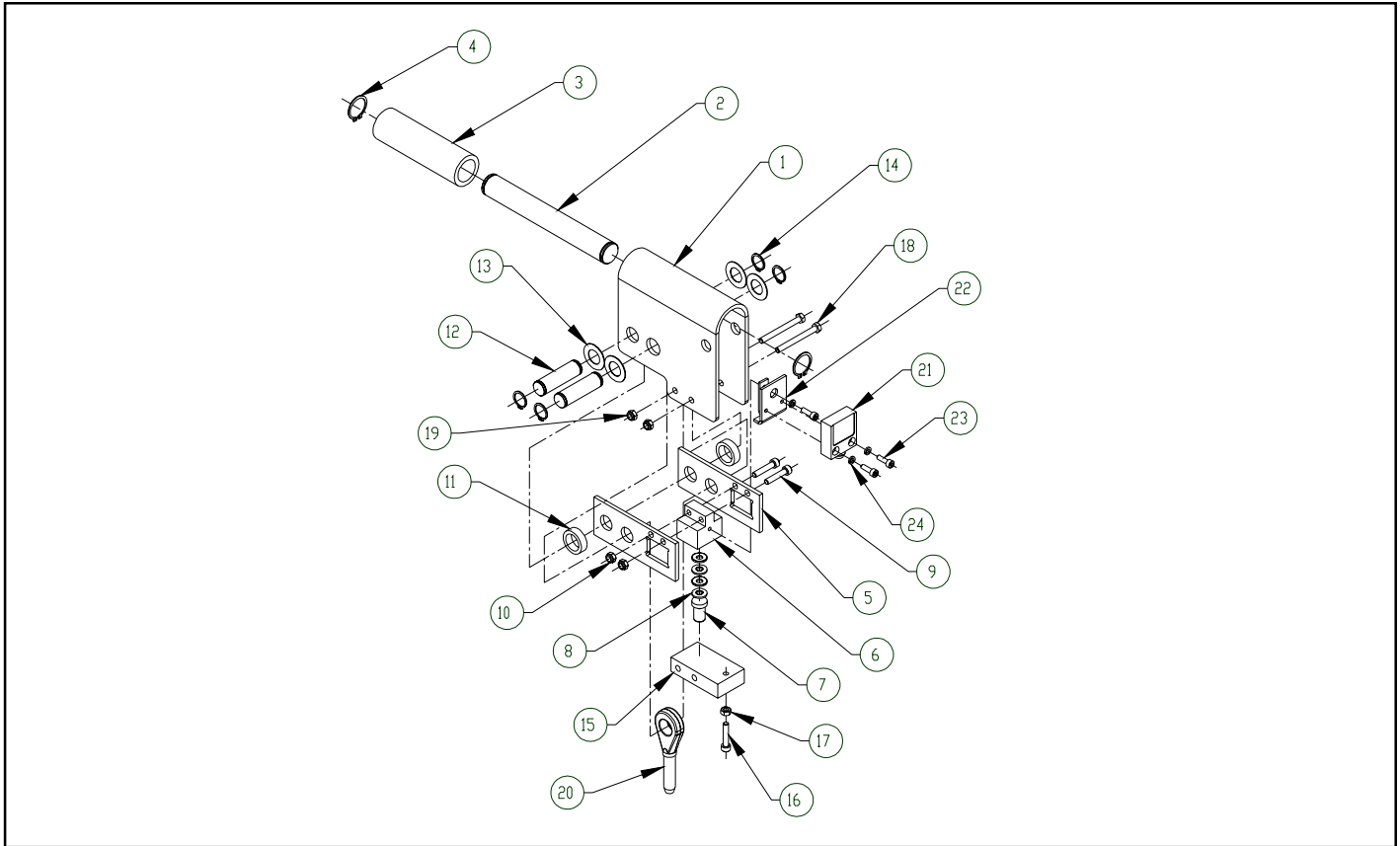


Figure 9-6. Wire Rope Dead End Assembly

"A" Frame S4 Reeved: Dead End for Figure 9-6.			
Ref. No.	Part Number	Description	Qty. Req'd
	44944201C	"A" Frame S4 Reeved Rope and Dead end Assembly (Excl. Ref. No. 20)	1
1	N/A	Dead End Yoke	1
2	N/A	Yoke Pin	1
3	N/A	Yoke Sleeve	1
4	N/A	External Retaining Ring	2
5	N/A	Overload Beam Plate	2
6	N/A	Overload Spring Retainer	1
7	N/A	Detent	1
8	N/A	Belleville Spring Washer	4
9	N/A	Socket Head Cap Screw, M6	2
10	N/A	Locknut, M6	2
11	N/A	Spacer	2
12	N/A	Dead End Pin	2
13	N/A	Washer	4
14	N/A	External Retaining Ring	4
15	N/A	Overload Spring Base	1
16	N/A	Socket Head Cap Screw, M6	1
17	N/A	Hex Nut, M6	1
18	N/A	Hex Head Cap Screw, M6	2
19	N/A	Locknut, M6	2
20	-	Wire Rope and Swaged End Assembly	1
	23397901	Rope Assembly, 20' Lift Model, 6.4mm	
	23397902	Rope Assembly, 40' Lift Model, 6.4mm	
21	N/A	Limit Switch	1
22	N/A	Limit Switch Bracket	1
23	N/A	Socket Head Cap Screw, M5	3
24	N/A	Lockwasher, M5	3
25	33290505C	"A" Frame Block Operated Limit Switch - Optional Equipment (not shown)	1

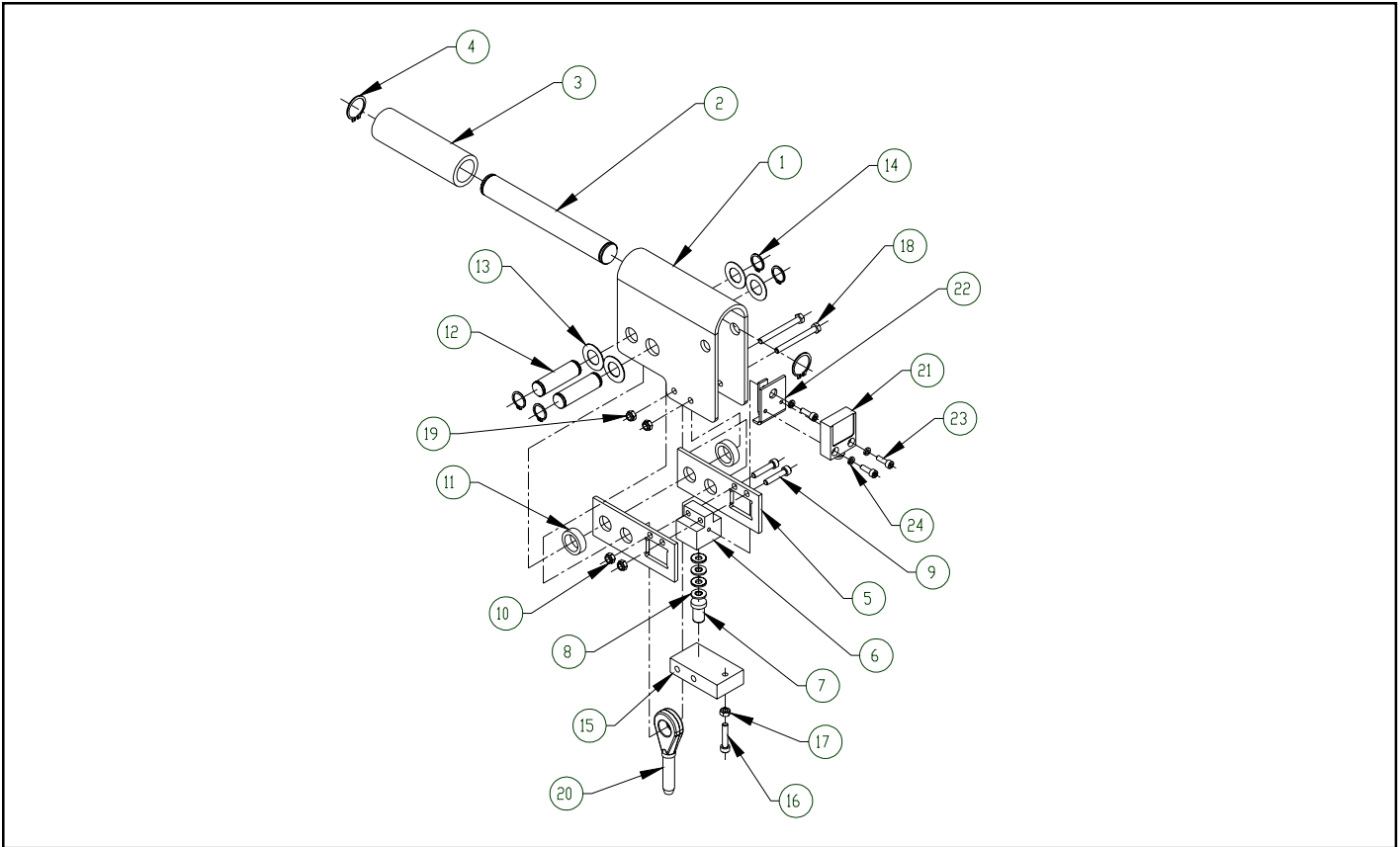


Figure 9-6. Wire Rope Dead End Assembly

"A" Frame S2 Reeved: Dead End for Figure 9-6.			
Ref. No.	Part Number	Description	Qty. Req'd
	44944202C	"A" Frame S2 Reeved Rope and Dead end Assembly (Excl. Ref. No. 20)	1
1	N/A	Dead End Yoke	1
2	N/A	Yoke Pin	1
3	N/A	Yoke Spacer	1
4	N/A	External Retaining Ring	2
5	N/A	Overload Beam Plate	2
6	N/A	Overload Spring Retainer	1
7	N/A	Detent	1
8	N/A	Belleville Spring Washer	4
9	N/A	Socket Head Cap Screw, M6	2
10	N/A	Locknut, M6	2
11	N/A	Spacer	2
12	N/A	Dead End Pin	2
13	N/A	Washer	4
14	N/A	External Retaining Ring	4
15	N/A	Overload Spring Base	1
16	N/A	Socket Head Cap Screw, M6	1
17	N/A	Hex Nut, M6	1
18	N/A	Hex Head Cap Screw, M6	2
19	N/A	Locknut, M6	2
20	-	Wire Rope and Swaged End Assembly	1
	23397903	Rope Assembly, 40' Lift Model, 6.4mm	
21	N/A	Limit Switch	1
22	N/A	Limit Switch Bracket	1
23	N/A	Socket Head Cap Screw, M5	3
24	N/A	Lockwasher, M5	3
25	33290505C	"A" Frame Block Operated Limit Switch - Optional Equipment (not shown)	1

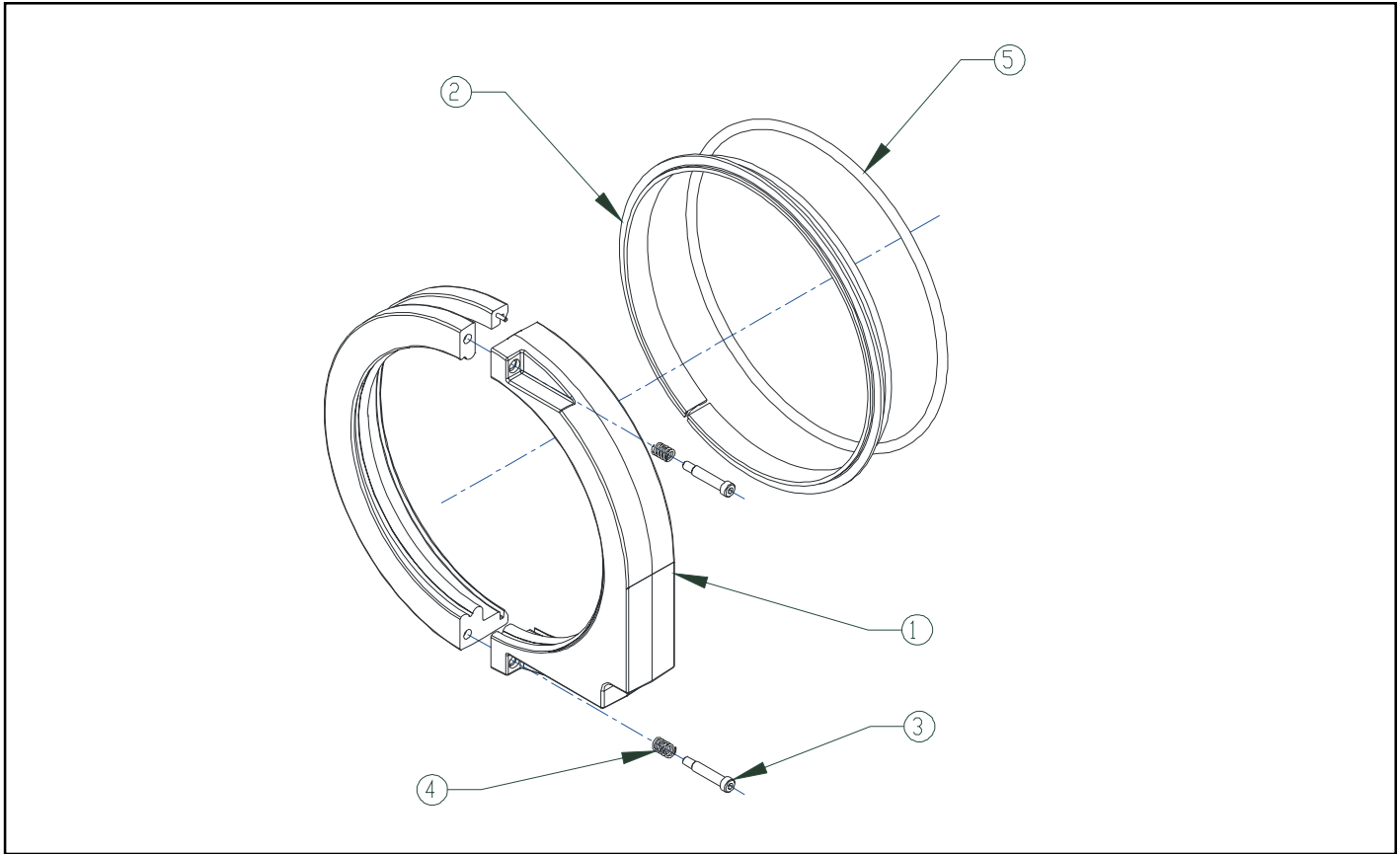


Figure 9-7. Rope Guide Assembly

"A" Frame: Rope Guide Components for Figure 9-7.			
Ref. No.	Part Number	Description	Qty. Req'd
	44943801C	"A" Frame Rope Guide Assembly	1
1	N/A	Rope Guide Body	1
2	N/A	Plastic Shroud	1
3	N/A	Socket Head Shoulder Bolt, M6 Thread	2
4	N/A	Compression Spring	2
5	N/A	Extension Spring	1

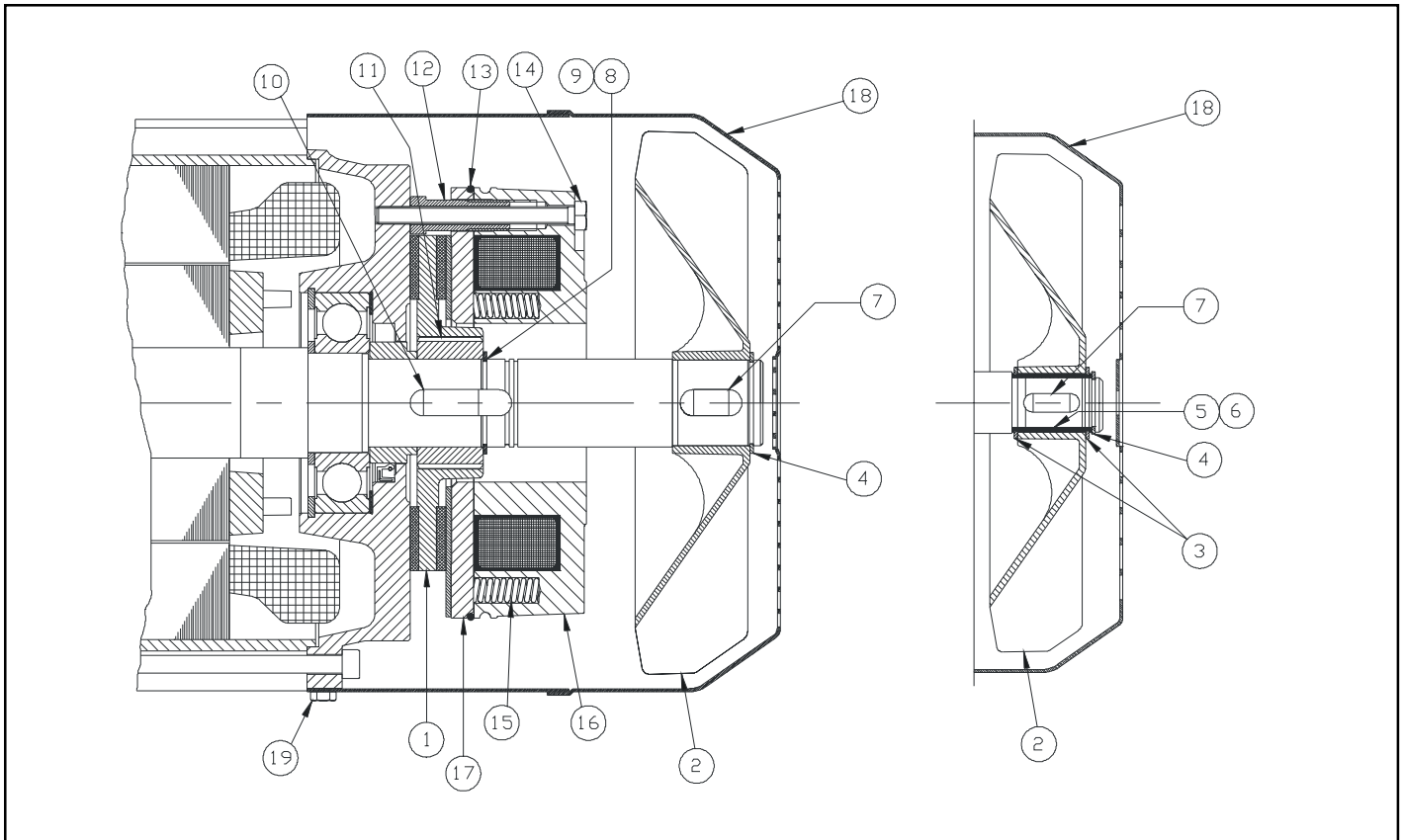


Figure 9-8. Standard Hoist Motor Brake

"A" S4 Frame: Hoist Brake Components for Figure 9-8.			
Ref. No.	Part Number	Description	Qty. Req'd
	33295049	Complete Brake Assembly (Includes Ref. Nos. 1,11,16,17 & P/N 33313853)	1
1	33313850	Brake Friction Disc	1
2		Fan	1
3	33295051	External Retaining Rings (Fan Hub)	-
4	BRAKE	External Retaining Ring (Fan)	1
5	FAN	Fan Hub	-
6	KIT	Key (Fan Hub)	-
7		Key (Fan)	1
8	33313852	External Retaining Ring (Brake Hub)	1
9	BRAKE	Spacer (Brake Hub)	1
10	HUB	Key (Brake Hub)	1
11	KIT	Brake Hub	1
12	33313853	Hollow Core Bolts	3
13	HARD-	O-Ring	1
14	WARE	Bolts (Brake Mounting)	3
15	KIT	Compression Springs	5*
16	N/A	Magnet Body - Order Complete Brake	1
17	N/A	Armature Plate - Order Complete Brake	1
18	33295055	Fan Shroud	1
19	SHROUD KIT	Bolts (Fan Shroud)	4

* Kit comes with (7) springs, but only (5) are utilized in this assembly.

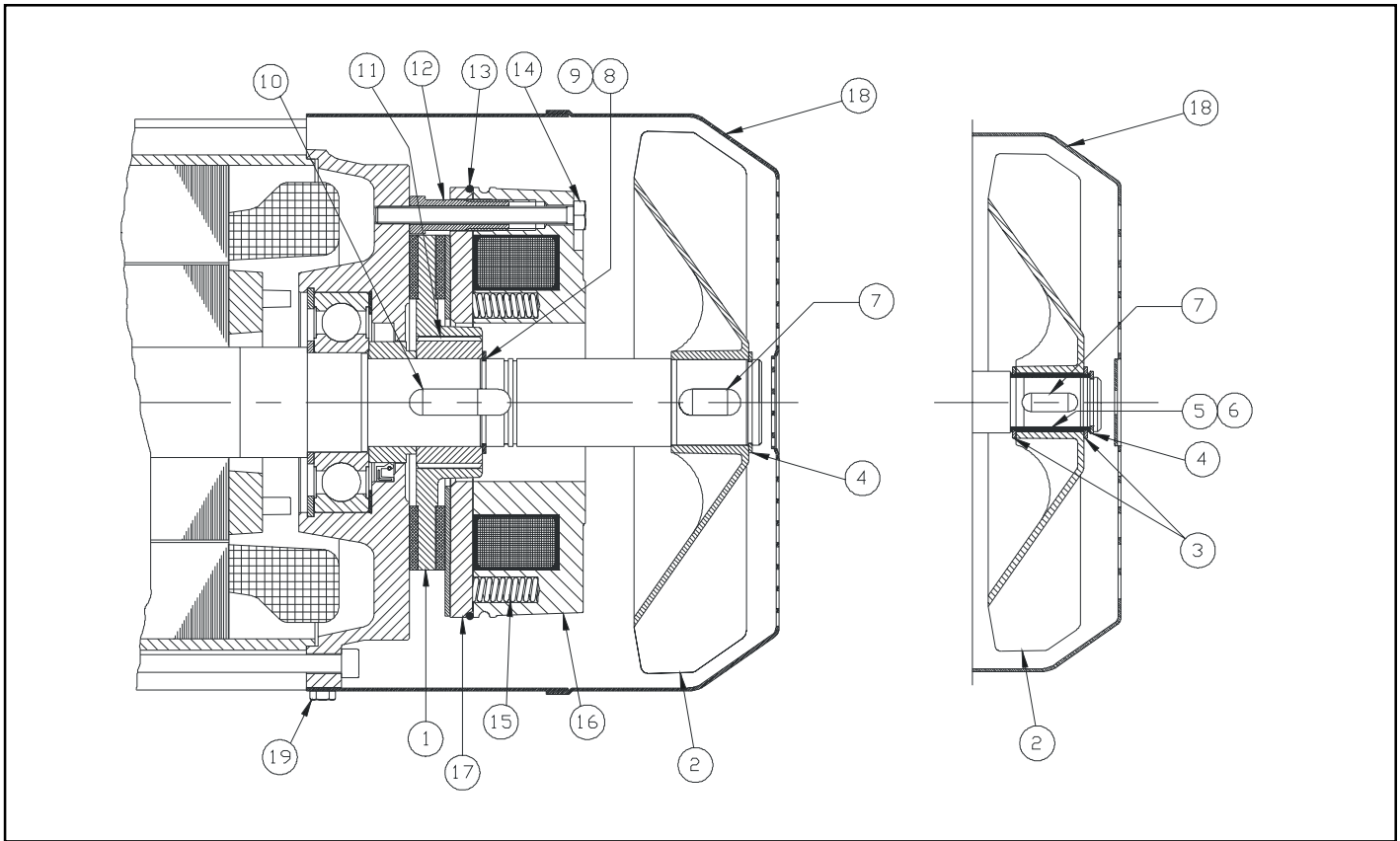


Figure 9-8. Standard Hoist Motor Brake

"A" S2 Frame: Hoist Brake Components for Figure 9-8.			
Ref. No.	Part Number	Description	Qty. Req'd
	33295549	Complete Brake Assembly (Includes Ref. Nos. 1,11,16,17 & P/N 33295553)	1
1	33295550	Brake Friction Disc	1
2	33295551 BRAKE FAN KIT	Fan	1
3		External Retaining Rings (Fan Hub)	-
4		External Retaining Ring (Fan)	1
5		Fan Hub	-
6	KIT	Key (Fan Hub)	-
7		Key (Fan)	1
8	33295552	External Retaining Ring (Brake Hub)	1
9	BRAKE	Spacer (Brake Hub)	1
10	HUB	Key (Brake Hub)	1
11	KIT	Brake Hub	1
12	33295553	Hollow Core Bolts	3
13	HARD- WARE KIT	O-Ring	1
14		Bolts (Brake Mounting)	3
15		Compression Springs	7
16	N/A	Magnet Body - Order Complete Brake	1
17	N/A	Armature Plate - Order Complete Brake	1
18	33295555	Fan Shroud	1
19	SHROUD KIT	Bolts (Fan Shroud)	4

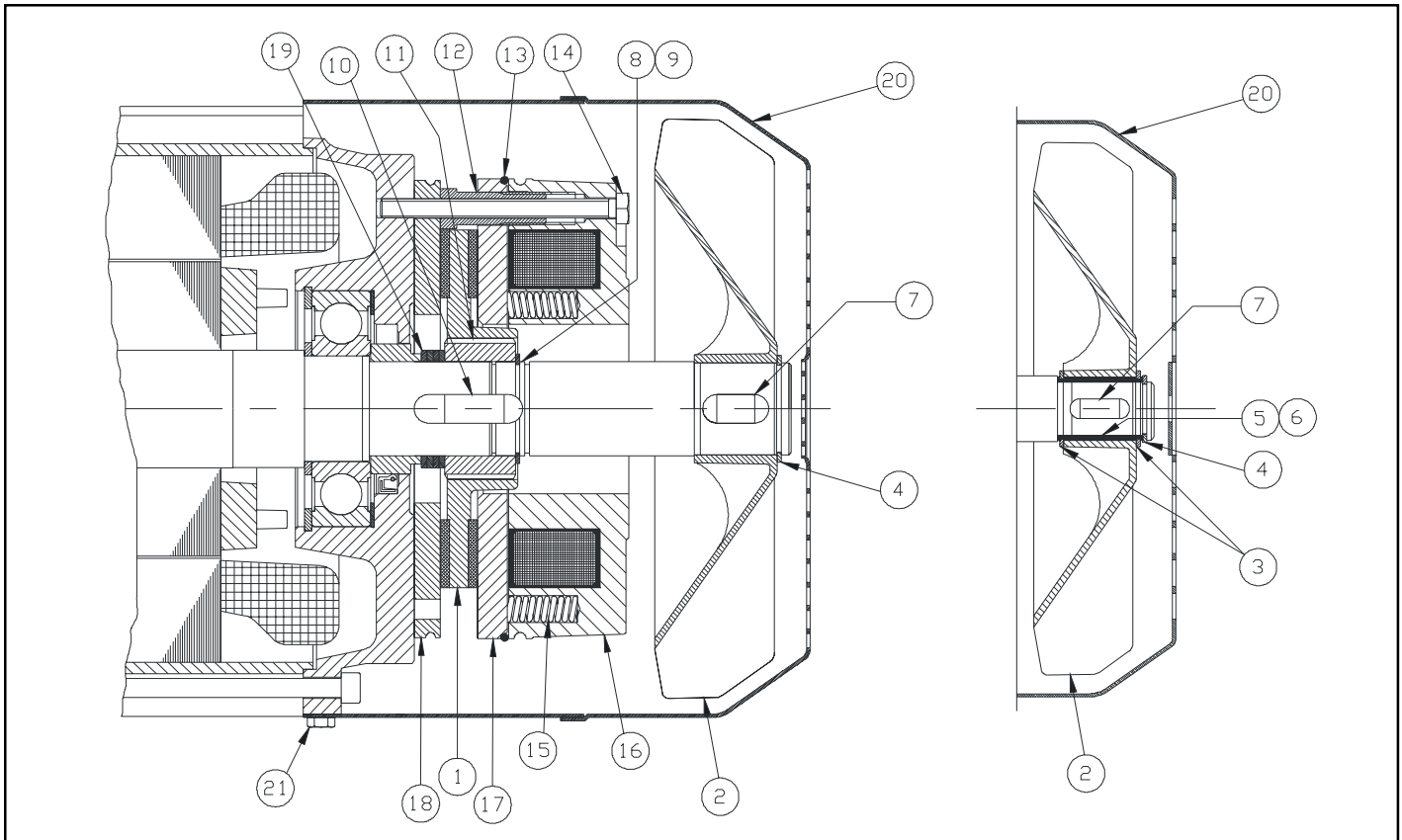


Figure 9-9. Outdoor Service Hoist Motor Brake

"A" S4 Frame: Hoist Brake Components for Figure 9-9.			
Ref. No.	Part Number	Description	Qty. Req'd
	33297049	Complete Brake Assembly (Includes Ref. Nos. 1,11,16,17, 18 & P/N 33294053)	1
1	33313850	Brake Friction Disc	1
2		Fan	1
3	33295051	External Retaining Rings (Fan Hub)	-
4	BRAKE	External Retaining Ring (Fan)	1
5	FAN	Fan Hub	-
6	KIT	Key (Fan Hub)	-
7		Key (Fan)	1
8	33294052	External Retaining Ring (Brake Hub)	1
9	BRAKE	Spacer (Brake Hub)	1
10	HUB	Key (Brake Hub)	1
11	KIT	Stainless Steel Brake Hub	1
12	33294053	Hollow Core Bolts	3
13	HARD-	O-Ring	1
14	WARE	Bolts (Brake Mounting)	3
15	KIT	Compression Springs	5*
16	N/A	Magnet Body - Order Complete Brake	1
17	N/A	Stainless Steel Armature Plate - Order Complete Brake	1
18	N/A	Stainless Steel Friction Disc - Order Complete Brake	1
19	11803105	Spacer Washers	4
20	33295055	Fan Shroud	1
21	SHROUD KIT	Bolts (Fan Shroud)	4

* Kit comes with (7) springs, but only (5) are utilized in this assembly.

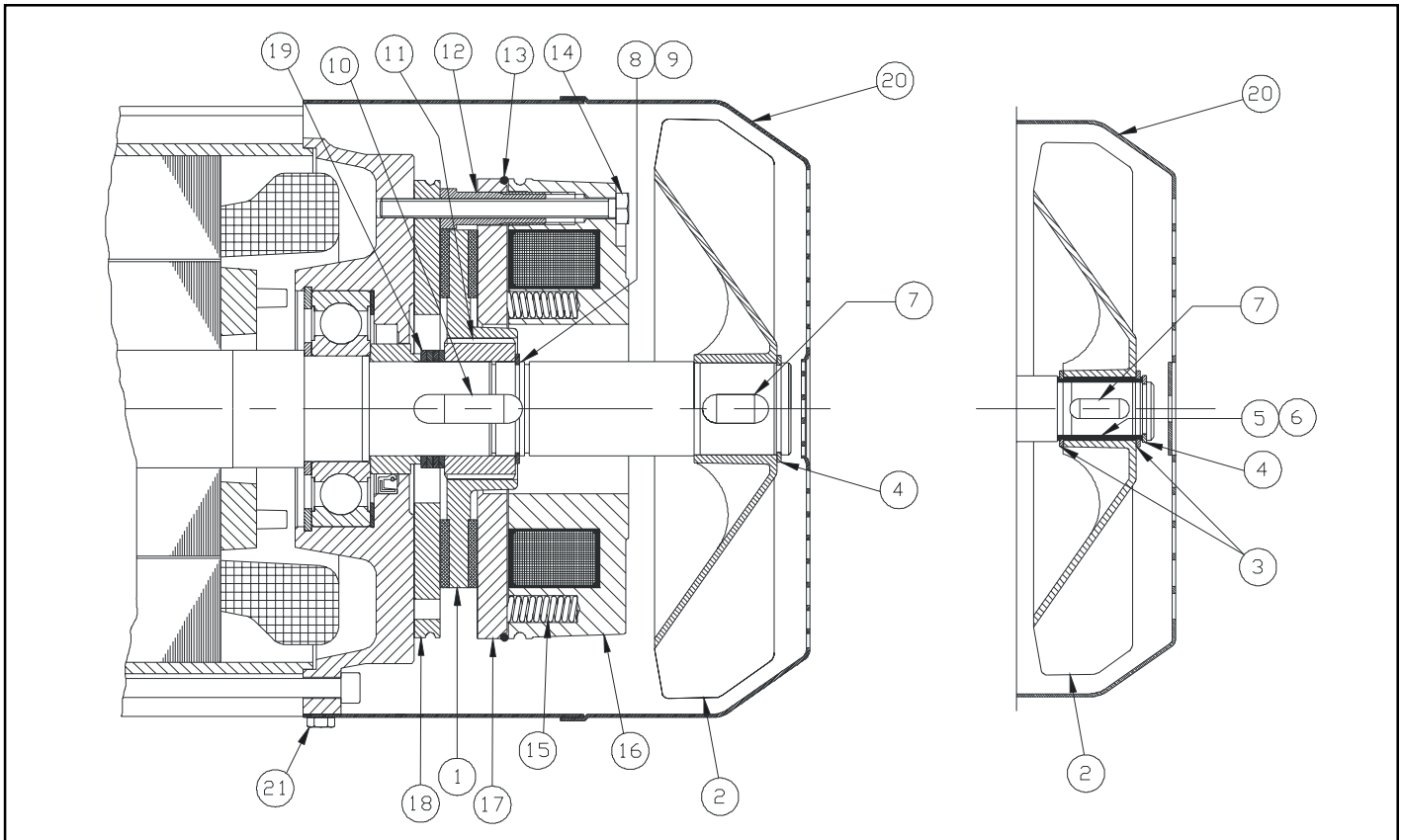


Figure 9-9. Outdoor Service Hoist Motor Brake

"A" S2 Frame: Hoist Brake Components for Figure 9-9.			
Ref. No.	Part Number	Description	Qty. Req'd
	33297149	Complete Brake Assembly (Includes Ref. Nos. 1,11,16,17, 18 & P/N 33297153)	1
1	33295550	Brake Friction Disc	1
2		Fan	1
3	33295551	External Retaining Rings (Fan Hub)	-
4	BRAKE	External Retaining Ring (Fan)	1
5	FAN	Fan Hub	-
6	KIT	Key (Fan Hub)	-
7		Key (Fan)	1
8	33297152	External Retaining Ring (Brake Hub)	1
9	BRAKE	Spacer (Brake Hub)	-
10	HUB	Key (Brake Hub)	1
11	KIT	Stainless Steel Brake Hub	1
12	33297153	Hollow Core Bolts	3
13	HARD-	O-Ring	1
14	WARE	Bolts (Brake Mounting)	3
15	KIT	Compression Springs	7
16	N/A	Magnet Body - Order Complete Brake	1
17	N/A	Stainless Steel Armature Plate - Order Complete Brake	1
18	N/A	Stainless Steel Friction Disc - Order Complete Brake	1
19	11803107	Spacer Washers	4
20	33295555	Fan Shroud	1
21	SHROUD KIT	Bolts (Fan Shroud)	4

Recommended Spare Parts

Certain parts of your hoist will, in time, require replacement under normal wear conditions. It is suggested that the following parts be purchased for your hoist as spares for future use.

One Brake Friction Disc
 One Brake Control Module
 One Brake Hardware Kit
 One Set of Contactors
 One Transformer
 One Wire Rope Assembly

Note: When ordering parts always furnish Hoist Serial Number, Catalog Number, Motor Horsepower, Voltage, Phase, Frequency and Rated Load of Hoist on which the parts are to be used.

Parts for your hoist are available from your local authorized **YALE** repair station. For the location of your nearest repair station, write:

Yale•Lift-Tech
 414 West Broadway Avenue
 P.O. Box 769
 Muskegon, MI 49443-0769

Phone: **800 742-9269**
 Fax: **800 742-9270**

WARRANTY

WARRANTY AND LIMITATION OF REMEDY AND LIABILITY

A. Seller warrants that its products and parts, when shipped, and its work (including installation, construction and start-up), when performed, will meet applicable specifications, will be of good quality and will be free from defects in material and workmanship. All claims for defective products or parts under this warranty must be made in writing immediately upon discovery and in any event, within one (1) year from shipment of the applicable item unless Seller specifically assumes installation, construction or start-up responsibility. All claims for defective products or parts when Seller specifically assumes installation, construction or start-up responsibility and all claims for defective work must be made in writing immediately upon discovery and in any event, within one (1) year from completion of the applicable work by Seller, provided; however, all claims for defective products and parts made in writing no later than eighteen (18) months after shipment. Defective items must be held for Seller's inspection and returned to the original f.o.b. point upon request. THE 'FOREGOING IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESS, IMPLIED AND STATUTORY, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS.

B. Upon Buyer's submission of a claim as provided above and its substantiation, Seller shall at its option either (i) repair or replace its product, part or work at either the original f.o.b. point of delivery or at Seller's authorized service station nearest Buyer or (ii) refund an equitable portion of the purchase price.

C. This warranty is contingent upon Buyer's proper maintenance and care of Seller's products, and does not extend to normal wear and tear. Seller reserves the right to void warranty in event of Buyer's use of inappropriate materials in the course of repair or maintenance, or if Seller's products have been dismantled prior to submission to Seller for warranty inspection.

D. The foregoing is Seller's only obligation and Buyer's exclusive remedy for breach of warranty and is Buyer's exclusive remedy hereunder by way of breach of contract, tort, strict liability or otherwise. In no event shall Buyer be entitled to or Seller liable for incidental or consequential damages. Any action for breach of this agreement must be commenced within one (1) year after the cause of action has accrued.

