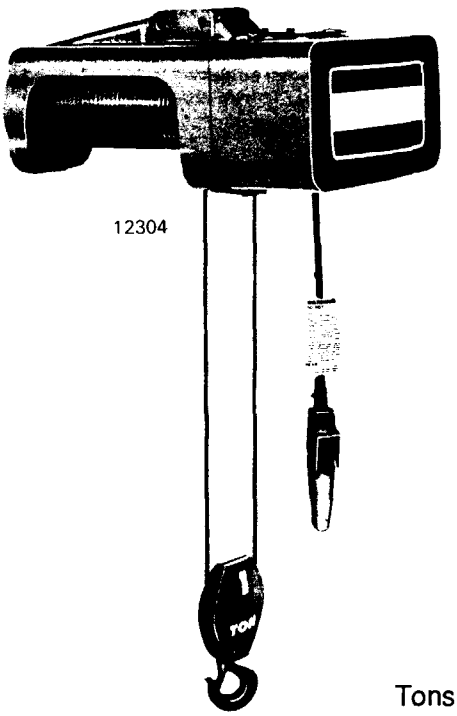
PARTS, OPERATION AND MAINTENANCE MANUAL
for
WIRE ROPE ELECTRIC HOISTS
SERIES E1
RATED LOADS 1/2 AND 1 METRIC TON



Tons in this manual are metric tons (2,200 lbs.)

READ THIS MANUAL BEFORE USING THESE HOISTS. This manual contains important safety, installation, operation and maintenance information. Make this manual available to all persons responsible for the operation, installation and maintenance of these products.

⚠WARNING

Do not use this hoist for lifting, supporting, or transporting people or lifting or supporting loads over people.

Always operate, inspect and maintain this hoist in accordance with American National Standards Institute Safety Code (ASME B30.16) and any other applicable safety codes and regulations.

Refer all communications to the nearest Ingersoll-Rand Material Handling Products Office or Distributor.

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INGERSOLL-RAND®
MATERIAL HANDLING

FOREWORD

This manual contains important information to help you install, operate, maintain and service your new Series E1 INGERSOLL-RAND electric hoist. We recommend that you study its contents thoroughly before putting the hoist into use. Read ANSI B30.16 safety standard for overhead hoists. Then, with proper installation, application of correct operating procedures, and by practicing the recommended maintenance suggestions you can expect maximum lifting service from the hoist.

It will likely be a long time before the parts information found in Section IX is needed; therefore, after the hoist is installed and operators are completely familiar with operation and preventive maintenance procedures, we suggest that this manual be carefully filed for future reference.

When ordering replacement parts from this manual it will be necessary that you include, in addition to key numbers listed for required parts, the Hoist Serial Number, Catalog Number and Model Number which are found on the nameplate attached to motor side of hoist frame. For your convenience, a space has been provided on the front cover of this manual to record nameplate information. We recommend that you fill it in immediately. If applicable also record the customer hoist identity number and/or location of hoist in your plant, providing a tie between the hoist and this manual. Customer hoist identity numbers can also be useful for identifying future inspection records.

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 facility at Seattle, Washington 98124.

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

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

INDEX

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SECTION 1–GENERAL DESCRIPTION

1-1. **GENERAL.** SERIES E1 **INGERSOLL-RAND** electric hoists are precision built wire rope and drum type hoists which are made in two load ratings, 1/2 and 1 metric tons, having various lifting speeds, and electrical service. Equipped with an integral suspension lug, they are designed to be rigidly attached to an overhead structure or mounted on **INGERSOLL-RAND** rigid mount trolleys for operation on runway beams.

NOTICE

SERIES E1 INGERSOLL-RAND hoists are available with an optional built-in mechanical overload clutch.

The overload clutch permits operation of your hoist within its rated load and helps prevent lifting of excessive overloads which could cause permanent deformation of a properly maintained hoist or trolley.

1-2. BASIC CONSTRUCTION. All sizes and models of Series E1 hoists are of the same basic construction, having an alloy aluminum frame which houses a rope drum, three-reduction gear train and automatic load brake. An alloy aluminum gearcase cover encloses gearing and load brake within the frame. An electric driving motor with multiple disc-type motor brake mounts on back of gearcase beside drum. Electrical components, mounted on gearcase cover, control operation and direction of driving motor. A gasketed, removable, cover protects electrical units. An integral suspension lug is cast into top of frame. Hoisting rope wrapped around a grooved drum and a lower block assembly are used for lifting loads. An upper limit stop is used to limit travel of the lower block in the raising direction. A push button control station, for operating hoist, is suspended from the electrical compartment.

1-3. OVERLOAD CLUTCH. This optional clutch is built into the load brake gear. It is a cone-friction clutch that connects the first reduction gear (load brake gear) to the load brake output pinion shaft. A belleville disc spring provides clutch pressure between the gear and its cone shaped gear center. An excessive overload causes the load brake gear to rotate without turning the gear center and the output pinion shaft. The clutch is located between the load brake and the motor, thus allowing both load brake and motor to function in their normal manner. See paragraph 3-3 for operation.

SECTION II - INSTALLATION

2-1. GENERAL INGERSOLL-RAND electric hoists are lubricated and tested before being shipped from the factory. To place hoist in service, attach to a suitable suspension (par. 2-2), connect to electrical service (par. 2-3) and perform pre-operation tests and checks (par. 2-4).

WARNING

Before attempting installation of hoist or trolley, the main power switch must be locked in the open position.

2-2. SUSPENDING HOIST. Hoist may be suspended in a fixed location servicing only the area directly below the hoist (Lug Mounted). Hoist may be attached to a moveable trolley which in turn may be mounted on an I-beam attached to a building or crane, servicing a larger area (Trolley Mounted).

a. Lug Mounted hoists attach to adequate supports welded or bolted to a building or other structure. The supporting structure must have sufficient strength with adequate margin to support the weight of the hoist and rated load as well as other loads to which the supporting structure may be subjected.

WARNING

Design and installation of hoist support shall be done only by qualified persons.

Steel angles or plates used to suspend hoist should be spaced as close to the hoist suspension lug as possible. Mounting bolts or threaded studs, attaching hoist to mounting structure, must be 5/8" diameter and high strength material such as ASTM-A325 or equivalent is recommended. Make certain that mounting bolts or studs are long enough so that the threads do not engage the mounting support and that mounting bolts or studs are secured with nuts and lockwashers, self-locking nuts or cross bolting, if unthreaded.

b. Trolley Mounted hoists are attached to moveable trolleys. If hoist is mounted on an existing trolley, a qualified person shall determine that the trolley and its supporting structure will support the rated load and weight of the hoist with adequate margin. Hoist/trolley units are shipped from the factory with trolley packaged separately. If the trolley can be installed directly over the end of the supporting beam, assemble trolley to hoist. Be certain that the spacing between wheel flanges, after assembly, is 1/4" greater than exact width of beam flange. (See Figure 2-1 below and instruction sheet furnished with trolley.) Using proper equipment, carefully lift trolley and hoist and install on end of beam.

For trolleys which are to be mounted along the span of a beam not having open ends, measure exact width of beam flange and assemble trolley to hoist so that spacing between wheel flanges is 1/4" (see Figure 2-1) greater than beam width (3/8" if beam has curves). This is accomplished by rearranging the spacer washers on the bolts connecting trolley side plates to hoist mounting lug. If trolley is shipped separate from hoist, see instruction sheets furnished with trolley for orientation and installation.

When proper spacing has been determined, loosen mounting nuts (item 1, Figure 2-1) to allow trolley wheels to spread far enough to pass over edges of beam flange. (Some installations may require complete removal of one trolley side plate.) Using adequate equipment carefully lift the hoist and trolley so the wheel treads will rest on the lower beam flange. Replace side plate and washers if removed for installation. Replace suspension stud nuts.

CAUTION

Recheck spacer washers to make certain that the number of washers between the side plate and hoist suspension lug are equal, and also the number on the outside of each side plate are equal. The suspension stud nuts should only be snugged up on the lockwashers until a load has been applied on the hook. A partial load (approx. 25% rated hoist load) placed on the hook will properly seat hoist in the trolley. Tighten suspension stud nuts only after hoist has been properly seated in the trolley.

WARNING

Mounting of the hoist-trolley unit on the monorail and final preoperation inspection shall be performed only by qualified persons properly supervised.

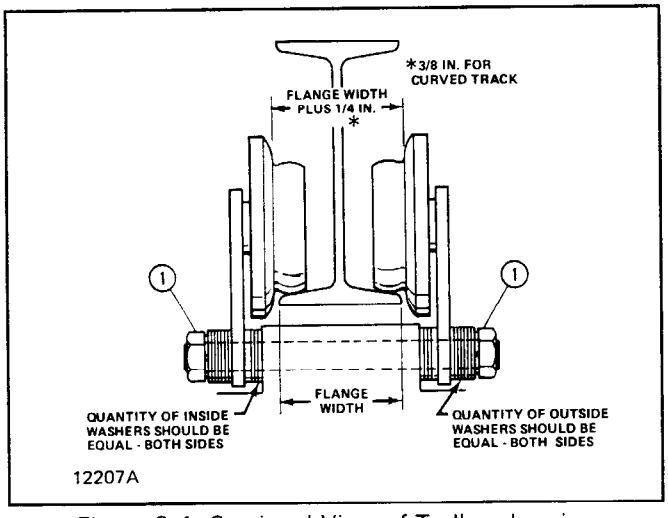


Figure 2-1. Sectional View of Trolley showing proper wheel and washer spacing.

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.

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, or other applicable codes. If the grounding method used is through the trolley wheels, then each section of track must be grounded by metal-to-metal connection to the building ground. Certain environments may prevent proper grounding by this means. In this case a separate grounding conductor should be provided.

a. Follow National, State and Local Electrical Codes when providing electrical service to the hoist.

CAUTION

Verify that the hoist and/or trolley is the same voltage, frequency and phase as the power supply. 460V./230V. and 230V./115V. dual voltage hoists are reconnectable for use on either voltage. Check terminal board connections with wiring diagram to make certain that the motor and transformer leads are located on proper terminals.

b. Make electrical connections using the apporpriate diagrams shown in Section VIII. All electrical connections, including connections to collectors or power cord, shall be made only by qualified journeyman electricians.

WARNING

The green wire provided in the power supply cable (when furnished) is a grounding wire and must be connected to a proper ground.

2-4. PRE-OPERATION CHECKS.

a. Check Oil Level and Grease Fittings. The gearcase has been filled with oil to proper level and the lower block sheave bearing has been lubricated at the factory. However, this should be checked before operating hoist. Remove and discard felt shipping plug from oil filler at top of hoist. Refer to Figure 4-1. Check oil level by removing oil plug at side of hoist. With hoist in level position, level of oil should be even with bottom of tapped hole. If not, add oil as specified in Section IV. Grease fitting in lower block sheave pin should show evidence of grease.

b. Check Push Button Operation and Phasing.

WARNING

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

To properly check the phase of the hoist, follow the steps below:

(1) With "POWER OFF" operate the "START" (if furnished), "STOP" (if furnished), and "UP" push buttons and determine that they do not bind or stick in any position. DO NOT REMOVE WARNING TAG or test "DOWN" push button at this time.

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) Temporarily connect hoist to power source.

(3) Operate "UP" button briefly to determine direction of hook travel.

(4) If hook raises, phase is correct. Turn power off and make temporary connections permanent.

(5) If hook lowers, hoist is "Reversed Phased". TURN POWER OFF and correct by interchanging any two leads at power source connection. Do not change internal wiring of hoist.

(6) The WARNING TAG should be removed from the "DOWN" push button after it has been determined that hoist is correctly phased.

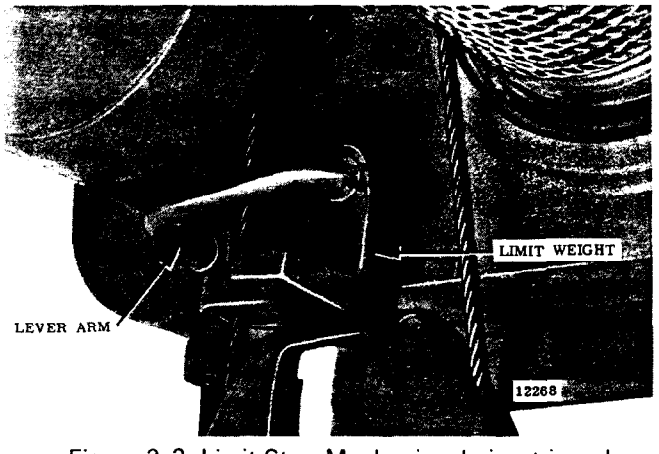


Figure 2-2. Limit Stop Mechanism being tripped by lower block.

c. Check Limit Switch Operation. A block operated upper limit stop (Fig. 2-2) is furnished as standard equipment. This limit stop is factory set to stop lower block in its high position and guard against over-travel and possible damage to hoist. No adjustment can be made. Limit switch operation should be tested when hoist is installed. Move hook to a low position by depressing push button marked "DOWN". Now depress button marked "UP" to raise hook. While hook is traveling upward, manually (or with an extension pole) actuate limit stop mechanism (Fig. 2-2). When limit stop weight is raised, "stop" switch is actuated first and then the "reversing" switch is actuated (Fig. 2-3). Stop switch stops hoists. Reversing switch lowers hook block in case of over-travel. If limit switch does not function in this manner, refer to trouble shooting chart Section VI for possible remedy.

WARNING

Do not attempt to make above test with hook in a high position near hoist.

d. Check Lower Block and Hoisting Cable. Depress "DOWN" push button and run lower block to its lower position. No less than two wraps shall remain on the drum with the loaded hook in its lowest position, unless hoist is equipped with a lower limit switch in which case no less than one and one half wraps shall remain on the drum. Also check to see that lower block and rope do not twist

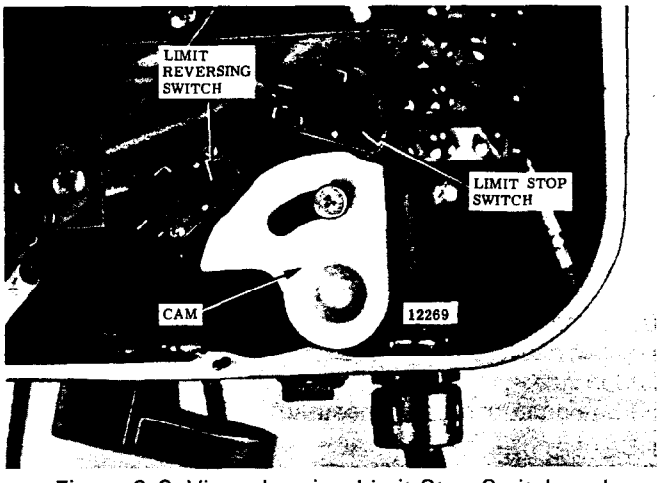


Figure 2-3. View showing Limit Stop Switch and Reversing Switch arrangement.

excessively. If they twist to the extent that two ropes rub against each other, disengage rope from the frame anchor and twist rope four or five turns in a direction opposite to that which the block turns. Reconnect rope to anchor (Fig. 2-4), holding firmly to eliminate rope twisting back to its original position. Operate hoist up and down a few times. If lower block still rotates, repeat process until twisting is corrected.

NOTICE

Under certain conditions, when removing the rope anchor keeper plate at top of hoist, it will be impossible to take out one of the keeper plate bolts due to interference by spacer washers and hex nut on end of suspension cross pin.

To facilitate removal of the keeper plate, when there is this interference and without removing interferring parts, one bolt hole in keeper plate is slotted. This slot allows the plate to be pulled from under the loosened bolt. It will be necessary to back the bolt out as far as it will go against the interferring parts to remove plate. **Keeper plate bolts must be tightened securely after reinstalling keeper plate.**

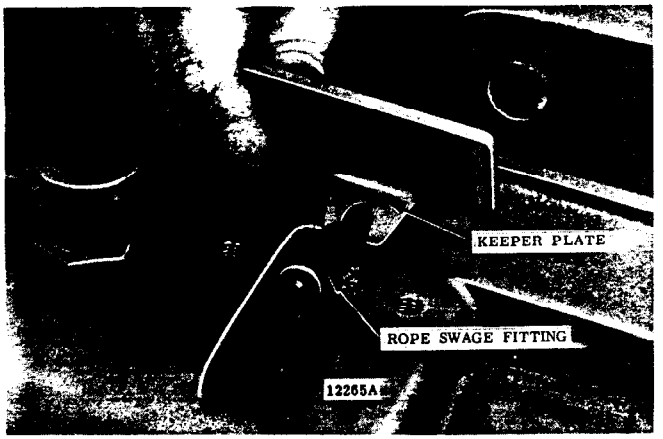


Figure 2-4.
View showing Rope End Anchor arrangement.

e. Lubricate Hoist Cable. For longer cable life, it is recommended that the cable be lubricated at time of installation by applying Chain and Cable fluid as outlined in Section IV, paragraph 4-3.

SECTION III - OPERATION

3-1. GENERAL. Operation of Series E1 INGERSOLL-RAND electric 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 load in small increments, providing accurate spotting. The push button station has a built-in interlock to prevent depressing opposing buttons simultaneously.

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

3-2. PUSH BUTTON OPERATION.

a. Depress push button marked "UP" to raise load.

b. Depress push button marked "DOWN" to lower load.

c. Jogging the push buttons will give "hairline" load movement. The quickness of the depressing motion will determine the amount of movement. Excessive use of this "Jogging" feature will cause premature burning of contact tips and motor overheating.

d. On two-speed hoists, partial depression of button operates hoist at slow speed; depressing button completely operates hoist at fast speed.

3-3. OVERLOAD CLUTCH OPERATION (Optional). The overload clutch, when furnished with the hoist, is factory preset and tested so that the hoist will lift its full rated load but will refuse to lift overloads which could cause deformation or weakening of your hoist. If the load to be lifted exceeds the clutch setting, the hoist motor will continue to run when the "UP" button is depressed and rotate the load brake gear without lifting the load. Whenever this slipping occurs, immediately release the "UP" push button to prevent overheating of the clutch friction surfaces and the hoist motor.

NOTICE

Always know load to be lifted. INGERSOLL-RAND does not recommend lifting loads greater than the rated capacity of your hoist.

3-4. OPERATING PRECAUTIONS.

WARNING

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

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 save injury to personnel and damage to equipment.

1. DO read ANSI B30.16 Safety Standard for Overhead Hoists and the Operation, Service and Parts Manual.

2. DO be familiar with hoist operating controls, procedures and warnings.

3. DO make sure hook travel is in the same direction as shown on controls.

4. DO make sure hoist limit switches function properly.

5. DO maintain firm footing when operating hoist.

6. DO make sure that load slings or other approved single attachments are properly sized and seated in the hook saddle.

7. DO make sure that the hook latch, if used, is closed and not supporting any part of the load.

8. DO make sure that load is free to move and will clear all obstructions.

9. DO take up slack carefully, check load balance, lift a few inches and check load holding action before continuing.

10. DO avoid swinging of load or load hook.

11. DO make sure that all persons stay clear of the suspended load.

12. DO warn personnel of an approaching load.

13. DO protect wire rope from weld splatter or other damaging contaminants.

14. DO promptly report any malfunction, unusual performance, or damage of the hoist.

15. DO inspect hoist regularly, replace damaged or worn parts, and keep appropriate records of maintenance.

16. DO use the hoist manufacturer's recommended parts when repairing a hoist.

17. DO use hook latches wherever possible.

18. DO apply lubricant to the wire rope as recommended.

19. DO NOT lift more than rated load.

20. DO NOT use the hoist load limiting device to measure the load.

21. DO NOT use damaged hoist or hoist that is not working correctly.

22. DO NOT use the hoist with twisted, kinked, damaged or worn wire rope.

23. DO NOT lift a load unless wire rope is properly seated in its groove(s).

24. DO NOT use load rope as a sling or wrap rope around the load.

25. DO NOT lift a load if any binding prevents equal loading on all supporting ropes.

26. DO NOT apply the load to the tip of the hook.

27. DO NOT operate unless load is centered under hoist.

28. DO NOT allow your attention to be diverted from operating the hoist.

29. DO NOT operate the hoist beyond limits of load rope travel.

30. DO NOT use limit switches as routine operating stops unless recommended. They are emergency devices only.

31. DO NOT use hoist to lift, support or transport people.

32. DO NOT lift loads over people.

33. DO NOT leave a suspended load unattended unless specific precautions have been taken.

34. DO NOT allow sharp contact between two hoists or between hoist and obstructions.

35. DO NOT allow the rope or hook to be used as a ground for welding.

36. DO NOT allow the rope or hook to be touched by a live welding electrode.

37. DO NOT remove or obscure the warnings on the hoist.

38. DO NOT adjust or repair a hoist unless qualified to perform hoist maintenance.

39. DO NOT attempt to lengthen the load rope or repair damaged load rope.

40. Personnel not physically fit or properly qualified, shall not operate hoist.

41. Do not operate hoist unless limit stop switch is operating properly.

42. Center hoist over load before operating. Avoid side pulls and swinging of load or load hook when traveling hoist.

WARNING

Do not operate the hoist with the hoisting rope out of the drum grooves. Such operation may result in the rope breaking and dropping the load which can cause damage to equipment and injury to operatoror other personnel. Hoist rope will remain in the drum grooves during proper operation under normal operating conditions, however, slack or kinked rope, excessive side pulls, swinging or jerking of load, or similar abuse, may cause the rope to leave the grooves.

43. Observe recommended inspection and maintenance procedures.

44. Use common sense and best judgement whenever operating a hoist.

SECTION IV — LUBRICATION

4-1. GENERAL. The lubrication services outlined in paragraphs 4-2 thru 4-6 should be performed at regular intervals to maintain top hoist performance and help insure long life.

4-2. CHANGE GEARCASE OIL. (Figure 4-1, Page 7)

a. Remove oil drain plug from bottom of gearcase and drain out oil.

b. Remove oil level plug from side of gearcase and then flush housing, thru oil filler, using petroleum solvent. Reinstall drain plug.

c. Refill thru oil filler to proper level (bottom of oil level plug hole) using 32 ounces of Automatic Transmission Fluid, DEXRON II Type, suitable for all temperature ranges. Reinstall oil level plug.

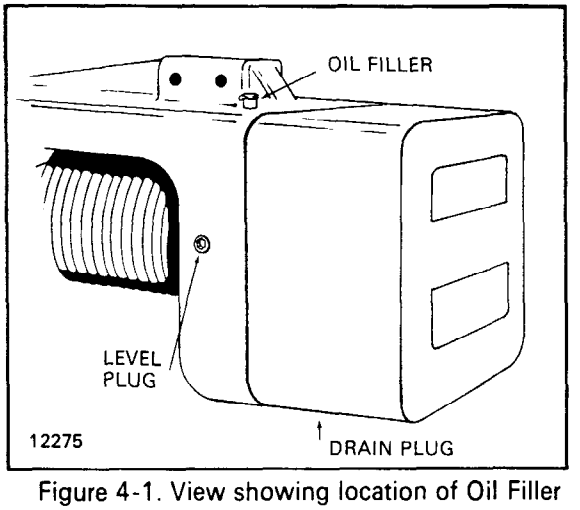


Figure 4-1. View showing location of Oil Filler Oil Level Plug and Oil Drain Plug.

4-3. LUBRICATE HOISTING CABLE. Hoists are shipped from the factory without an exterior coating on hoisting cable. It is recommended, where conditions permit, that the cable be thoroughly coated at installation and kept well coated with INGERSOLL-RAND Lubri-Link® or equal.

4-4. LUBRICATE LOWER BLOCK ASSEMBLY.

a. Lubricate lower block sheave thru grease fitting located in end of sheave pin. Apply (*) NLGI No. 2 grease, for operating temperatures from +50°F to +125°F. For colder temperatures, (-20°F to + 50°F) use NLGI No. 1 grease.

b. Apply a few drops of S.A.E. No. 50 oil to hook thrust bearings and shank of hook.

(*) National Lubricating Grease Institute.

4-5. LUBRICATE LIMIT STOP LEVER.

a. Apply a few drops of S.A.E. No. 50 oil to pivot points of limit lever arm.

b. Apply a few drops of S.A.E. No. 50 oil to shaft bearing at rear of electrical compartment.

SECTION V — INSPECTION AND PREVENTIVE MAINTENANCE

5-1. GENERAL. All INGERSOLL-RAND, Series E1, hoists are inspected and tested at the factory. Regular in service inspection and preventive maintenance programs not only help reduce overall maintenance costs but may also prevent serious 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 preventive 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 the inspection and maintenance program outlined in this section to meet his specific conditions.

The inspection and maintenance services outlined in this section are considered minimum. Recommended in the schedule are minimum inspection and maintenance intervals based on average daily use in a normal environment. Average daily use is based on 1000 operational hours per year maximum and intermittent operation of the hoist eight hours per day, five days per week with maximum 50% "on" time, a maximum of 300 starts per hour of elapsed time, and the effective load not to exceed 65% of rated load.

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 air borne contaminates. The user should carefully consider all enviormental conditions and adjust frequency and degree of maintenance for his local conditions. Consult INGERSOLL-RAND Field Service Department for advice for 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 in this manual is a recommended Inspection Schedule and Maintenance Report form which 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 below 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 which may exist. However, written, dated and signed inspection reports should be maintained particularly on critical items, such as hoist hooks, hoisting ropes, sheaves, drums and brakes. Periodic review of old inspection reports can indicate 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 designated person responsible for hoist operation and safety, who reviews the 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 show the service life of hoist components and help forecast the need for adjustments, repairs and ordering or replacement parts. File and review these reports after each inspection.

WARNING

Do not operate a hoist having unusual vibrations, sounds or other conditions. Danger may be present that the hoist operator cannot see. Determine and correct cause of unusual conditions and make certain hoist can be operated safely. Be certain to disconnect power to the hoist whenever electrical cover is removed.

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 hook and lower block and all load bearing components for damage.
1 Month	* HOIST CABLE — Inspect and lubricate per paragraph 5-8.
1—3 Months	* ELECTRICAL CONTROLS — Inspect per paragraph 5-4. Check hoist gearcase oil level - add oil as required per paragraph 4-2c.
6 Months	* LOWER BLOCK — Inspect per paragraph 5-2.
Annually	* Motor brake and actuating mechanisms. Inspect per paragraph 5-5. Inspect hooks with suitable crack detecting procedures per paragraph 5-2. Drain and refill hoist gearcase per paragraph 4-2c.
6 Months or 500 — 750 hours "on" time	* Inspect electrical controls per paragraph 5-4. Lubricate hoist cable per paragraph 4-3. Lubricate lower hook block per paragraph 4-4. Lubricate limit stop level per paragraph 4-5.

* Perform services described by paragraph indicated.

INSPECTION SCHEDULE AND MAINTENANCE REPORT

HOIST SERIAL NO. (MFGRS) _____ CUSTOMER HOIST IDENTITY NO. _____

RATED LOAD _____ LOCATION IN PLANT _____

TYPE _____ THIS INSPECTION IS MONTHLY ☐ ANNUAL ☐

VOLTAGE _____ SEMI-ANNUAL ☐

INSPECTED BY _____ DATE _____

COMPONENT, UNIT OR PART and location on hoist		* 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	
LOCATION	COMPONENT, UNIT OR PART	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	(Indicate corrective action taken during inspection and note date. For corrective action to be done after inspection, a designated person must determine that the existing deficiency does not constitute a safety hazard before allowing unit to operate. When corrective action is completed, describe and note date in this column.)	DATE
HOIST	Motor	○										
	Motor Brake	○										
	Mechanical Load Brake	○										
	Overload Clutch	○										
	Couplings	○										
	Gears, Shafts & Bearings	○										
	Upper Block	○										
	Lower Block	○										
	Hook & Throat Opening	●		X							Record Hook Throat Opening	
	Hoist Rope	●										
	Rope Drum		○									
	Guards		○									
	Limit Switch	○										
CONTROL STATION OR PUSHBUTTON												
	Pushbutton		○									
	Wiring		○									
TROLLEY	Motor	○										
	Brake (when so equipped)	○										
	Couplings	○										
	Gears, Shafts & Bearings	○										
	Frame			○								
	Wheels		○									
	Bumpers		○									
	Guards		○									
	Conductors	○										
	Collectors	○										
RESISTORS	Hoist		○									
	Trolley		○									
RUNWAYS	Monorail Joints		○									
	Monorail		○									
	Main Conductors	○										
	Main Collectors	○										
MISC.	General Condition		○									
	Load Attachment Chains	●										
	RopeSlings & Connections	●										
	Change Gearcase Lub.			○								
	Grounding Faults		○									

* See text for DAILY & WEEKLY REQUIREMENTS.

○ INSPECTION INTERVAL. – should not exceed schedule on page 9.

● SIGNED & DATED REPORT REQUIRED - OSHA.

X MAGNETIC PARTICLE OR EQUIVALENT EXAMINATION REQUIRED.

12375A

5-2. INSPECT LOWER BLOCK.

a. Check lubrication of sheave, hook, thrust washer and shank of the hook which passes through the lower block body.

b. Check sheave to insure rope groove is smooth and free from burrs, or other surface defects.

c. Check sheave for freedom of rotation; replace bearing if defective.

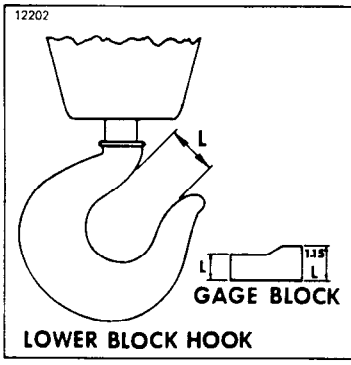
d. Make certain that grooved pin, holding the hook nut to the hook, is securely in position.

e. Check to determine that the hook latch is in good operating condition.

f. Check throat opening of hook. (Refer to Figure 5-1.) It is recommended that upon receipt of the hoist a measurement be made and recorded of the hook throat opening. OSHA Standards 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. A gage block, properly identified to the hoist, similar to the one shown in Figure 5-1, is suggested to be made for each hook for use in these measurements.

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 crack detecting methods.

h. Check wear of the hook, especially at the saddle and replace if badly worn.



HOIST RATED LOAD (IN TONS)	HOOK SIZE (STANDARD)	CORRECT 'L' DIMENSION (NEW HOOK)
1/2	G	1-1/8"
1	G	1-1/8"

Figure 5-1. Proper Hook Opening.

NOTE: Hooks and hook openings shown are based on hooks normally furnished with standard hoists. For dimensions of hooks having a special size, shape or material, consult the Seattle, Washington facility. For hooks with certain kinds of safety latches it may be necessary to temporarily remove latch to measure hook opening.

5-3. INSPECT ROPE END ANCHOR AND HOIST SUSPENSION.

a. Check rope end anchor at top of frame (Fig. 2-4). Be certain keeper plate bolts are tight and rope swage fitting is securely anchored.

b. Check suspension bolts attaching hoist to overhead structure or trolley. Be certain bolts are secure, properly tightened and free from damage.

WARNING

Do not Operate Hoists Having Worn or Damaged Suspension Bolts.

c. Check suspension lug at top of hoist frame for damage, cracks, or other signs of wear. Lugs with above deficiencies require frame replacement.

5-4. INSPECT ELECTRICAL CONTROLS.

WARNING

Before performing any internal work on hoist, be certain power is shut off. Lock main service switch in the open position.

a. Disconnect electrical power to hoist, remove electrical compartment cover and inspect wiring and terminals. Terminals should be securely crimped to wires and electrical insulation should be sound. Terminal screws should be tight.

b. Check condition of contactor assembly, transformer, and limit stop and reverse switches.

5-5. INSPECT MOTOR AND MOTOR BRAKE. These are mounted on the back of the gearcase, adjacent to the rope drum. To remove and inspect, proceed as follows:

a. Disconnect electrical power to hoist. Remove electrical compartment cover and disconnect all motor leads, limit switch leads, push button leads, and power supply leads.

b. Remove acorn nuts holding brake cover and remove brake cover (Fig. 9-6).

c. Disconnect wire nuts on brake rectifier leads.

d. Remove brake mounting plate screws (Fig. 9-6) and lift brake assembly off to gain access to the motor mounting bolts.

e. Remove four thru bolts securing motor assembly and pull motor from gearcase. Inspect helical gear teeth on end of motor shaft for wear or damage. Check interior of motor for evidence of overheating.

f. Check braking surfaces for wear and scoring. Replace badly worn or scored parts.

g. Reinstall parts following procedure in reverse of disassembly.

h. Instructions for adjusting the hoist motor brake are inside the brake cover and are repeated below. Check brake adjustment after first 30 days of service and regularly thereafter during the annual inspection procedure recommended.

(1) Examine position of indicating tang located below the solenoid coil.

(2) If the tang is below the midway position of the two adjustment points shown on the brake, the brake should be adjusted to bring the tang back up along-side the NORMAL position on the brake.

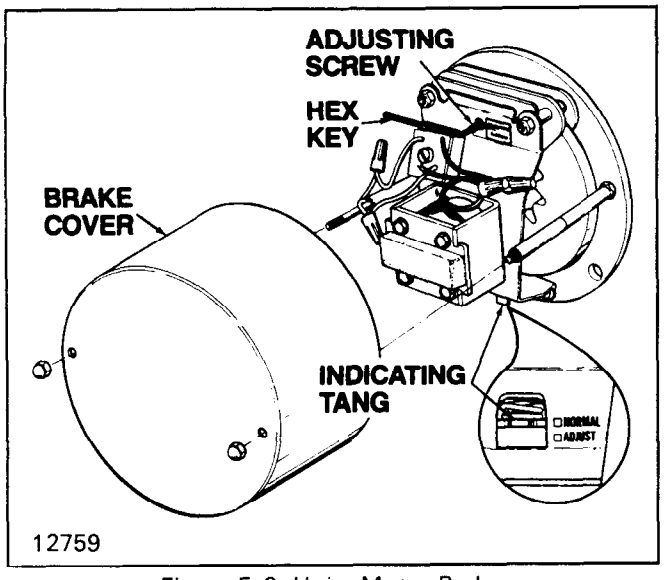


Figure 5-2. Hoist Motor Brake.

(3) Remove the hex key (1/8" size) from the holster on the cover mounting stud and carefully turn the ADJUSTING SCREW (located above the solenoid coil) clockwise. The indicating tang will move a large distance for a small turn of the adjusting screw, therefore turn the screw no more than one quarter turn before checking adjustment.

(4) After adjustment operate the brake by hand to assure brake disc running clearance. The outboard brake pad should separate from the brake disc by approximately .010".

(5) Replace hex key in holster.

(6) Replace brake cover.

5-6. INSPECT MECHANICAL LOAD BRAKE AND GEARING.

a. The mechanical load brake and gearing may be inspected and serviced with hoist suspended. To do so, remove lower block and wire rope, electrical compartment cover, electrical panel assembly and limit switch assembly.

> NOTE: To remove limit switch assembly, it will be necessary to disengage limit lever arm from limit shaft by driving roll pin from coupling. Refer to Figure 5-3.

b. Drain oil from gearcase; then, remove eight (8) socket head cap screws and lockwashers securing cover to gearcase. Carefully pry off cover.

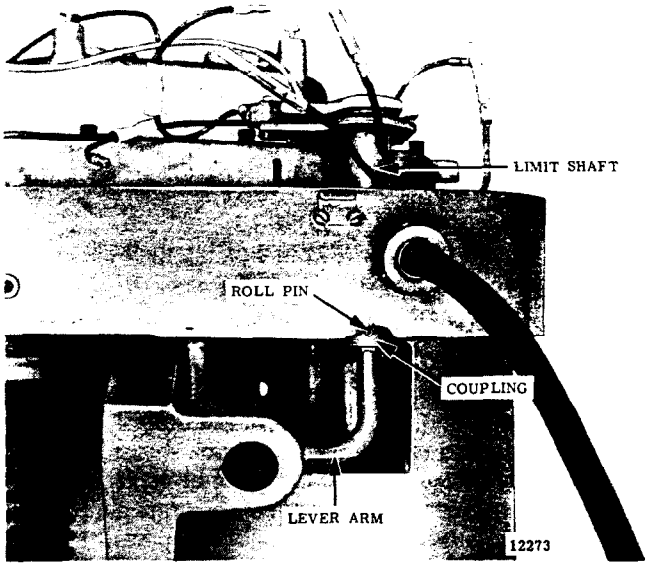


Figure 5-3. View showing Pinned Coupling between Limit Shaft and Lever Arm.

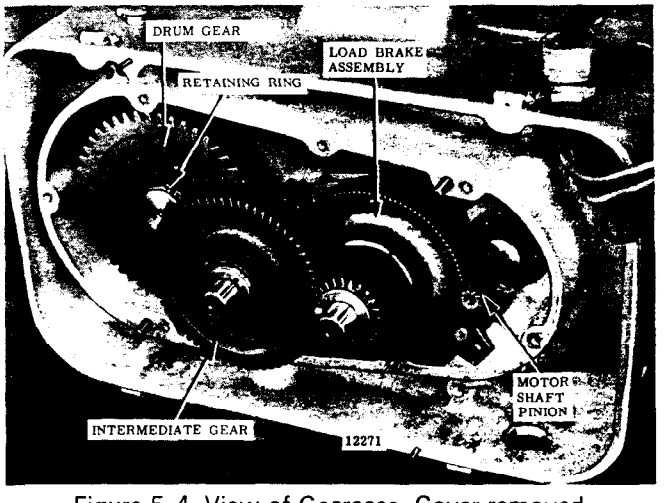


Figure 5-4. View of Gearcase. Cover removed.

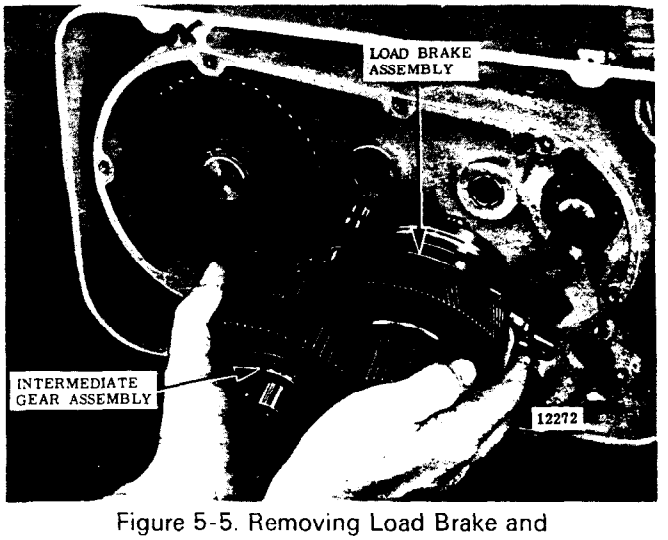


Figure 5-5. Removing Load Brake and Intermediate Gear Assemblies.

c. To inspect gearing, pull out intermediate gear and pinion assembly, and load brake assembly (Fig. 5-5). Do not remove drum gear unless visual inspect indicates replacement is necessary.

d. Inspect gears and pinions for signs of tooth wear and damage. Inspect needle bearings in frame and cover for signs of wear or damage. If replacement of parts appears necessary, disassemble drum gear, intermediate gear and pinion assembly, and load brake assembly as directed below.

e. To disassemble drum gear, remove external retaining ring from shaft, using special pliers, and pull off gear.

f. To disassemble intermediate gear and pinion, press pinion shaft from gear using an arbor press.

g. It is recommended that load brake assembly be returned to an Authorized Repair Station for inspection and repair. If it is necessary that you make your own inspection and repair, instructions below must be followed:

(1) Place load brake assembly, flange up, in a vise equipped with brass or copper jaw plates to protect pinion gear teeth. Remove snap ring from end of load brake shaft (Fig. 5-6).

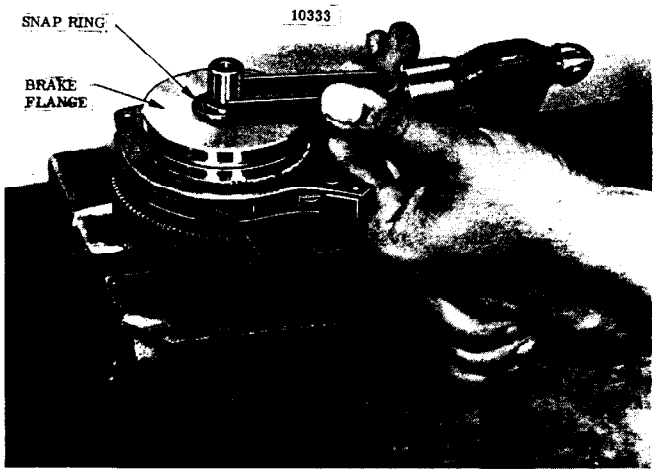


Figure 5-6. Removing Snap Ring from Load Brake Shaft.

(2) Using a puller tool, remove brake flange from shaft. A groove is provided around outer diameter for this purpose. See Figure 5-7. Remove key from shaft and lift off 2 friction discs, and the pawl and ratchet assembly (Fig. 5-8).

(3) Remove load brake gear. If replacement of spring, spring retainer or cam is necessary, press off shaft (Fig. 5-9).

(4) The load brake pawl and ratchet is a riveted assembly and is not to be disassembled.

(5) Clean all parts throughly and inspect for wear and damage. Replace all parts that are excessively worn or damaged. Hard surfaced or glazed friction discs should be replaced.

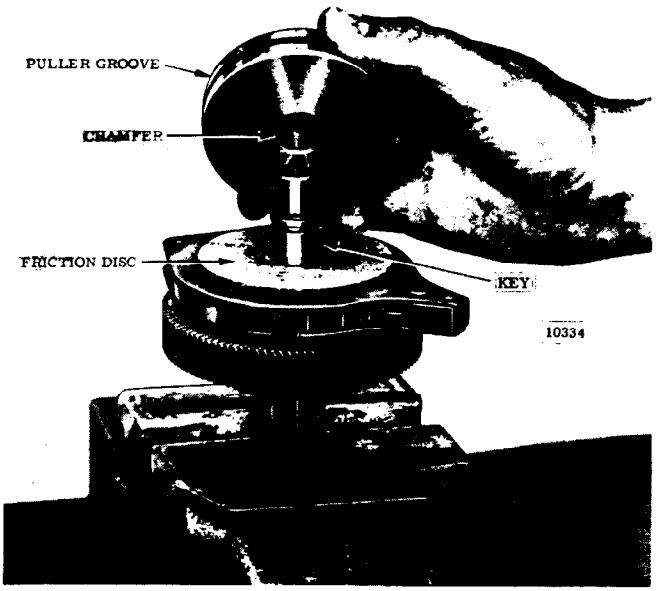


Figure 5-7. View showing Load brake Flange removed.

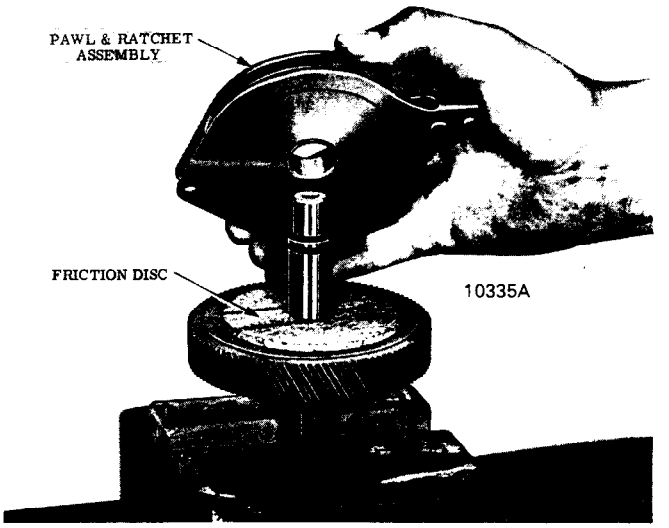
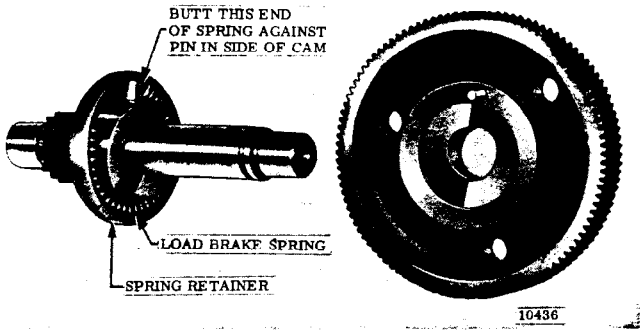


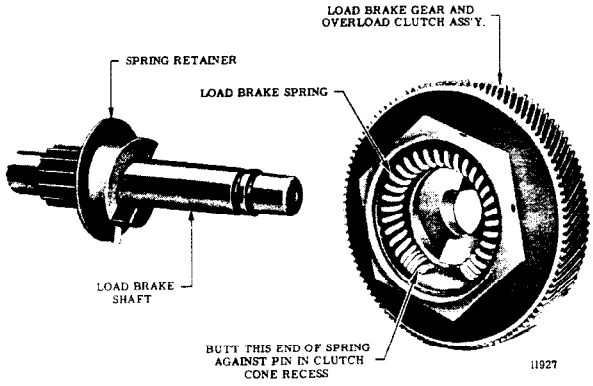
Figure 5-8. Removing Pawl and Ratchet Assembly from Load Brake Shaft.

h. Reassemble gearing and load brake parts following reverse procedure of disassembly. In assembling load brake, observe assembly steps (1) through (4) below:

(1) Before installing spring in its retainer (Fig. 5-9), apply a good grade of ball bearing grease to inside of retainer. Spring must be positioned exactly as illustrated, butted against pin at side of cam.



(without OVERLOAD CLUTCH)



(with OVERLOAD CLUTCH)

Figure 5-9. Load Brake Gear removed from Load Brake showing Load Brake Spring.

(2) When installing pawl and ratchet assembly on load brake shaft, be certain that teeth on ratchet face are in the same direction as shown in Figure 5-8. The ratchet assembly should rotate freely when turned counter-clockwise and the pawl should engage ratchet teeth when unit is turned clockwise.

(3) When installing brake flange, position it with chamfer facing friction disc (Fig. 5-7).

(4) The brake spring must be pre-loaded at assembly to a torque of from 10 to 14 lb-ft. This is accomplished using a plumber's strap wrench to wind (rotate) load brake gear to set up spring (Fig. 5-10) while pressing brake flange into place using an arbor press. Clamp pinion end of shaft into a portable vise to keep brake from rotating in press. Use brass or copper jaw plates on vise to protect pinion gear teeth. Wind gear counter-clockwise (viewing brake from flange end) with strap wrench and press down on flange until snap ring groove in shaft is exposed allowing snap ring to be installed. Use extreme care not to over wind spring as yield will result and final spring torque will be reduced. Do not wind gear beyond point necessary to install snap ring in groove.

j. Install gearing and load brake assembly in gearcase in reverse order of disassembly. Be certain that thrust washers are properly installed at both ends of intermediate gear shaft and load brake shaft as noted below.

(1) A steel thrust washer with 5/8" I.D. must be installed on the brake flange end (end opposite pinion) of load brake and the gear cover end of the intermediate gear shaft.

(2) A steel thrust washer with 11/16" I.D. must be installed on the pinion gear end of the intermediate gear shaft.

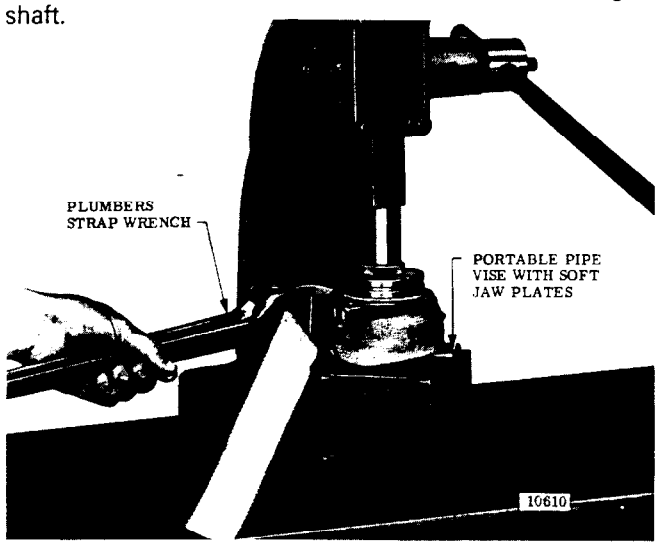


Figure 5-10. Winding Load Brake Gear using Strap Wrench to set up Brake Spring.

(3) A bronze thrust washer with a lug on one side goes on pinion end of load brake shaft and it must be installed so that its lug engages the special slot located on the spot face surrounding the load brake bearing bore inside gearcase cover. Use heavy grease to hold it in place on cover as cover is installed.

On hoists with 14 tooth load brake pinion, an 11/16" I.D. steel thrust washer is installed between pinion and bronze thrust washer.

k. At completion of reassembly of gearing and load brake in gearcase, refill gearcase to proper level using correct grade of oil, as outline in Section IV — LUBRICATION.

l. For hoists equipped with an overload clutch (optional) which has been functioning properly, visually inspect clutch adjusting nut and spring washer for signs of damage or looseness. With a small hex allen wrench, make certain two set screws in adjusting nut are tight. DO NOT TURN ADJUSTING NUT OR DISASSEMBLE CLUTCH. If spring washer, adjusting nut or gear is loose or damaged, or the clutch did not function properly before disassembly of hoist for inspection, consult the nearest INGERSOLL-RAND Authorized Repair Station for repair or adjustment.

5-7. INSPECT ROPE DRUM AND SHAFT.

a. To remove drum, remove wire rope, electrical compartment cover (par. 5-5) and electrical panel assembly, gearing and load brake assembly (par. 5-6). Remove woodruff key and spacer from end of drum shaft.

b. Remove four button head cap screws securing drum access plate to hoist frame. Pull assembled access plate, drum and shaft from frame. Tap on end of drum shaft (inside gearcase), using a soft faced hammer, to loosen for removal.

c. Check parts for wear and damage. Replace drum if there are any signs of cracks or other damage.

d. Reinstall parts following a procedure in reverse of disassembly.

5-8. 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:

(1) Twelve randomly distributed broken wires in one rope lay or four broken wires in one strand.

(2) Wear of one-third of the original diameter of outside individual wires.

(3) Kinking, crushing or bird caging.

(4) Heat damage from any cause.

(5) Reductions from nominal diameter of more than 1/64" on 1/4" diameter rope.

(6) Rope corrosion, internal or external.

(7) Effects from improper lubrication.

(8) Rope idle for month or more due to shutdown. Special attention should be exercised when inspecting rope normally hidden during inspecting procedures.

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 which will scrape, nick, crush or induce sharp bends in the rope.

c. Replacement. When recommended by an authorized inspector, the rope should be replaced. Replacement rope assemblies are shipped from the factory carefull coiled to prevent damage by kinking. Care must be taken to avoid twisting or kinking when uncoiled and handling during reeving. Before replacing rope, check condition of grooves in sheaves and drums to determine if they are excessively worn.

WARNING

Use only factory approved rope with swaged wire rope sockets.

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

5-9. ROPE REEVING.

a. General. Before unreeling rope from a coil or reel be sure floor is clean. Dirt picked up by the rope can cause excessive wear and abrasion. Uncoil the rope by rolling the coil or reel along the floor; or, place reel on stand with shaft thru center of reel so rope can be pulled straight out with reel rotating.

CAUTION

It is imperative that rope reel or coil rotate 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 may be unsafe for service.

b. Removing old rope.

(1) Lower the bottom block to a scaffold located 6 to 7 feet below hoist to relieve tension on wire rope. (Bottom block may be lowered to floor if desired; however, to handle less weight and for ease of rereeving adequate scaffold below the hoist is recommended.)

(2) Remove side covers from lower block and remove retaining rings from ends of sheave pin. Press out sheave pin and separate rope and sheave from lower block body.

(3) Make certain all personnel are clear of hoist and operate hoist "DOWN" to completely unwind all wire rope from drum. Stop hoist so drum anchor slot is accessible. Remove live rope end swage fitting from drum.

(4) TURN OFF POWER TO HOIST.

(5) Remove two hex head bolts and lockwashers, securing rope end anchor keeper plate at top of hoist frame. (Refer to Figure 2-4 and Notice under paragraph 2-4, d.) Remove rope end from slot in frame and pull from hoist.

c. Installing new rope.

WARNING

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

(1) Stretch new cable on floor in one continuous length. Make certain there is no twist in rope.

(2) Place one end of rope in drum anchor slot. Be sure end fitting is properly seated.

(3) With all personnel clear of hoist, TURN ON POWER.

(4) Operate hoist in "UP" direction, guiding rope into drum grooves with gloved hand, until about 14' of rope remains unwound.

(5) Pass free end of rope thru hole in limit stop weight, up into bottom of hoist, over partial sheave cast into frame,

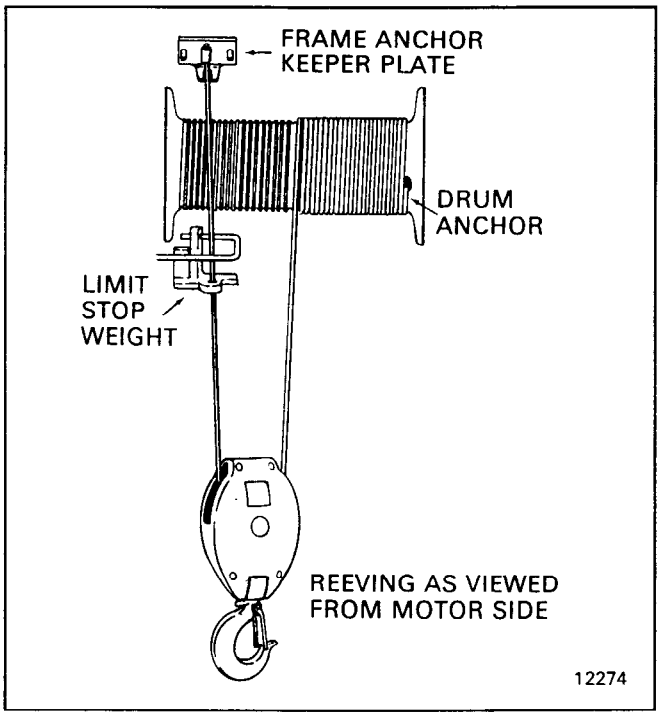


Figure 5-11. Hoist Reeving - 2 part single.

and into end anchor slot at top of frame. Secure rope end fitting with keeper plate, hex head bolts and lockwashers. Figure 5-11 illustrates proper reeving for hoist.

(6) Grasp loop, formed after installing end anchor, and place lower block sheave in loop. Install sheave with rope into lower block body and insert sheave pin thru body and sheave. Replace external retaining rings at each end of pin.

(7) Replace covers. Make certain rope is not twisted. Should the two parts of rope tend to wind around each other, remove rope from anchor slot and untwist rope. Reattach the rope anchor.

(8) Lubricate rope per paragraph 4-3.

d. Checking for and removal of rope twisting. Although rereeving of hoist may have been done carefully, sometimes after a new rope has been installed twisting may occur. With new rope installed, the hoist block should be raised and lowered several times with gradually increasing loads through full lift. If the block still rotates excessively at no load, the rope may have twists which should be removed.

(1) Observe direction block tends to rotate.

(2) Lower the block to a low position and turn off power.

(3) Loosen end anchor keeper plate at top of hoist.

(4) Rotate rope near the anchor end several turns in a direction tending to correct block rotation. This rotates rope end fitting in the anchor.

(5) Turn on power; raise and lower the block several times to feed the correcting twist in the rope through the reeving.

(6) If block still tends to twist, repeat the above procedure until block rotation is corrected.

(7) Retighten end anchor keeper plate securely.

5-10. TESTING HOIST.

a. General. Before placing hoist in service or after disassembly and reassembly, hoist should be tested. To test, suspend hoist from an overhead supporting member of sufficient strength to safely support the weight of the hoist and the rated load. Hoists having overload clutches require an overhead supporting structure capable of supporting, with adequate margin, a load equal to 200 percent rated load plus the weight of the hoist. Connect hoist to power supply 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 capacity load.

(1) Attach rated load to lower hook.

(2) Depress "UP" push button and raise load. When push button is released, hoist should immediately stop and hold load at that level.

(3) Depress "DOWN" 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 inspection — see paragraph 5-5.

d. Overload Clutch. The overload clutch (optional) must be tested for proper operation before placing hoist in service or after disassembly and reassembly of hoist. For test procedure follow instructions listed below.

WARNING

BEFORE ATTEMPTING TO TEST THE OVERLOAD CLUTCH, MAKE CERTAIN THE FOLLOWING PREREQUISITES ARE STRICTLY OBSERVED:

a. An appointed person must determine, before starting, that all structures supporting the hoist are adequately strong to safely withstand the test load of 200% of the rated load, plus the weight of the hoist, whether hoist is tested in installed position or moved to a designated test facility.

b. Loads used for testing must be accurately known.

c. Test must be made ONLY by a qualified operator, thoroughly familiar with the

hoist and the purpose of the test.

d. Adequate and proper rigging must be provided to insure that test loads are securely attached, properly balanced, and lifted level. Failure to provide adequate support could cause injury to personnel and/or damage to equipment.

(1) Using a known load, equal to the hoist rated load, energize hoist to lift the load. Raise the load just high enough to be certain hoist is lifting the entire load. Clutch should not slip with the rated load. Lower load to rest position. If clutch slips with rated load, adjustment is required. (See paragraph 7-4. — "OVERLOAD CLUTCH".) If hoist will lift rated load, proceed to step (2).

(2) Increase load in steps from rated load, TO A MAXIMUM OF 200% of the rated load, attempting to lift with each increase in weight. Hoist Overload Clutch should slip and refuse to lift load before 200% of the rated load is reached. Should hoist lift 200% of the rated load — STOP TEST — A CLUTCH ADJUSTMENT IS REQUIRED. (See paragraph 7-4 — "OVERLOAD CLUTCH".)

(3) Run hoist with load causing clutch to slip (hoist refusing load) five cycles of approximately 1 second each.

CAUTION

To prevent overheating, do not operate hoist for longer than one second intervals with the hoist refusing to lift the load.

(4) Removes weights added in step (2) and return to hoist rated load. Lift rated load one final time. Clutch should not slip.

WARNING

Do not lift more than rated load except for test purposes.

NOTICE– ALWAYS KNOW LOAD TO BE LIFTED. INGERSOLL-RAND DOES NOT RECOMMEND LIFTING LOADS GREATER THAN THE RATED CAPACITY OF YOUR HOIST.

SECTION VI - TROUBLE SHOOTING

Trouble	Probable Cause	Possible Remedy
6-1. Hoist Will Not Operate.	a. No power to hoist.	a. Check switches, circuit breakers or fuses, and connections in power supply lines. Check for power collectors.
	b. Wrong voltage.	b. Check voltage required on motor data plate against power supply.
	c. Loose or broken wire connections in hoist electrical system.	c. Shut off power supply, remove electrical cover on hoist and check wiring connections. Also check connections in push button station and limit switches. Check control circuit fuse.
	d. Contactor assembly not functioning.	d. Check contact points. Replace if excessively burned or pitted. Check for burned out contactor coils. See that necessary jumper wires are properly installed.
	e. Defective control transformer.	e. Check transformer coil for signs of overheating. Replace if burned out.
	f. Motor burned out.	f. Replace motor. Check input power supply.
	g. Brake does not release.	g. Check for defective transformer fuse.

Trouble	Probable Cause	Possible Remedy
6-2 Hook Moves in Wrong Direction.	a. Reverse phasing on three-phase hoists.	a. Interchange any two power supply line leads. Refer to Section II, 2-4. b.
	b. Hoist wired wrong.	b. Check wiring connections with appropriate wiring diagram.
6-3. Hook Will Raise But Not Lower.	a. Lower electrical circuit open.	a. Check for loose connections. See that necessary jumper wires are properly installed on contactor.
	b. Contractor not functioning.	b. Check for burned or pitted contact points or burned out contactor coil.
	c. Down, push button inoperative.	c. Check push button contacts and wires.
6-4 Hook Will Lower But Not Raise.	a. Excessive load.	a. Reduce loading to rated load of hoist, as shown on nameplate.
	b. Hoist electrical circuit open.	b. Check for loose connections. See that necessary jumper wires are properly installed on contactor. Check limit switch mounting and connections.
	c. Contactor not functioning.	c. Check for burned or pitted contact points or burned out solenoid coil.
	d. Up, push button inoperative.	d. Check push button contacts and wires.
6-5. Hoist Will Not Lift Rated Load.	a. Low voltage.	a. See that power supply current is same voltage listed on motor data plate. Check size of power supply lines.
	b. Overload Clutch not properly adjusted.	b. See Section VII, par. 7-5.
6-6. Hoist Motor Overheats.	a. Excessive load.	a. Reduce loading to rated load of hoist, as shown on nameplate.
	b. Excessive duty-cycle.	b. Reduce frequency of lifts or amount of jogging.
	c. Wrong voltage or frequency.	c. Check current rating on motor data plate against power supply.
	d. Defective motor or worn bearings in hoist frame.	d. Disassemble hoist and inspect for defective, worn or damaged parts.
	e. Overload Clutch slipping without lifting load.	e. See Section VII, par. 7-5.

Trouble	Probable Cause	Possible Remedy
6-7. Load Drifts Excessively When Hoist is Stopped.	a. Excessive load.	a. Reduce loading to rated load of hoist, as shown on nameplate.
	b. Motor brake not holding.	b. With No Load, check hoist for drift. If drifting is excessive, remove motor and clean and inspect motor brake linings.
	c. Load brake not holding.	c. After determining that the motor brake is working properly, attach rated load to hook and operate hoist. If the load accelerates during lowering, the load brake is not functioning properly. See section V, par. 5-6 for replacing worn or damaged parts.
6-8. Hoist Operates Intermittently.	a. Collectors make poor contact.	a. Check collectors for free movement of spring arm, weak spring or electrical connections.
	b. Loose connections.	b. Check all wiring for loose connections.
	c. Temperature activated switch in motor.	c. Check for defective contact or excessive motor heat.

SECTION VII – ADJUSTMENTS

7-1. MECHANICAL LOAD BRAKE. The mechanical load brake on Series E1 INGERSOLL-RAND hoists is a pawl and ratchet "Weston" type automatic brake. The brake is not adjustable and requires only periodic inspection and occasional replacement of the friction washers.

7-2. MOTOR BRAKE. The hoist motor brake adjustment should be checked after the first 30 days of service and annually thereafter. Instructions are inside the brake cover and also in paragraph 5-5.h.

7-3. BLOCK OPERATED LIMIT SWITCH. The block operated upper limit stop, furnished as standard equipment, is non-adjustable and designed to stop lower block at its high point of travel to eliminate any possibility of double blocking. When high point is reached, limit stop switch automatically stops hook travel. If hook drifts upward slightly after stop switch is actuated, a reversing switch will close and automatically reverse direction of hook travel.

7-4. GEARED ROTARY LIMIT SWITCH. The geared rotary type limit switch is optional equipment. Instructions for adjusting the limit switch are inside the switch cover.

7-5. OVERLOAD CLUTCH. When properly adjusted, the overload device is designed so that the hoist will lift its full rated load but will refuse to lift an excessive overload. The overload clutch is not externally adjustable. It is necessary to remove the overload clutch assembly from the hoist for proper adjustment. Therefore, it is strongly recommended that when adjustment and/or replacement parts are required, a INGERSOLL-RAND Authorized repair Station be contacted. Consult your INGERSOLL-RAND Distributor for nearest Repair Station.

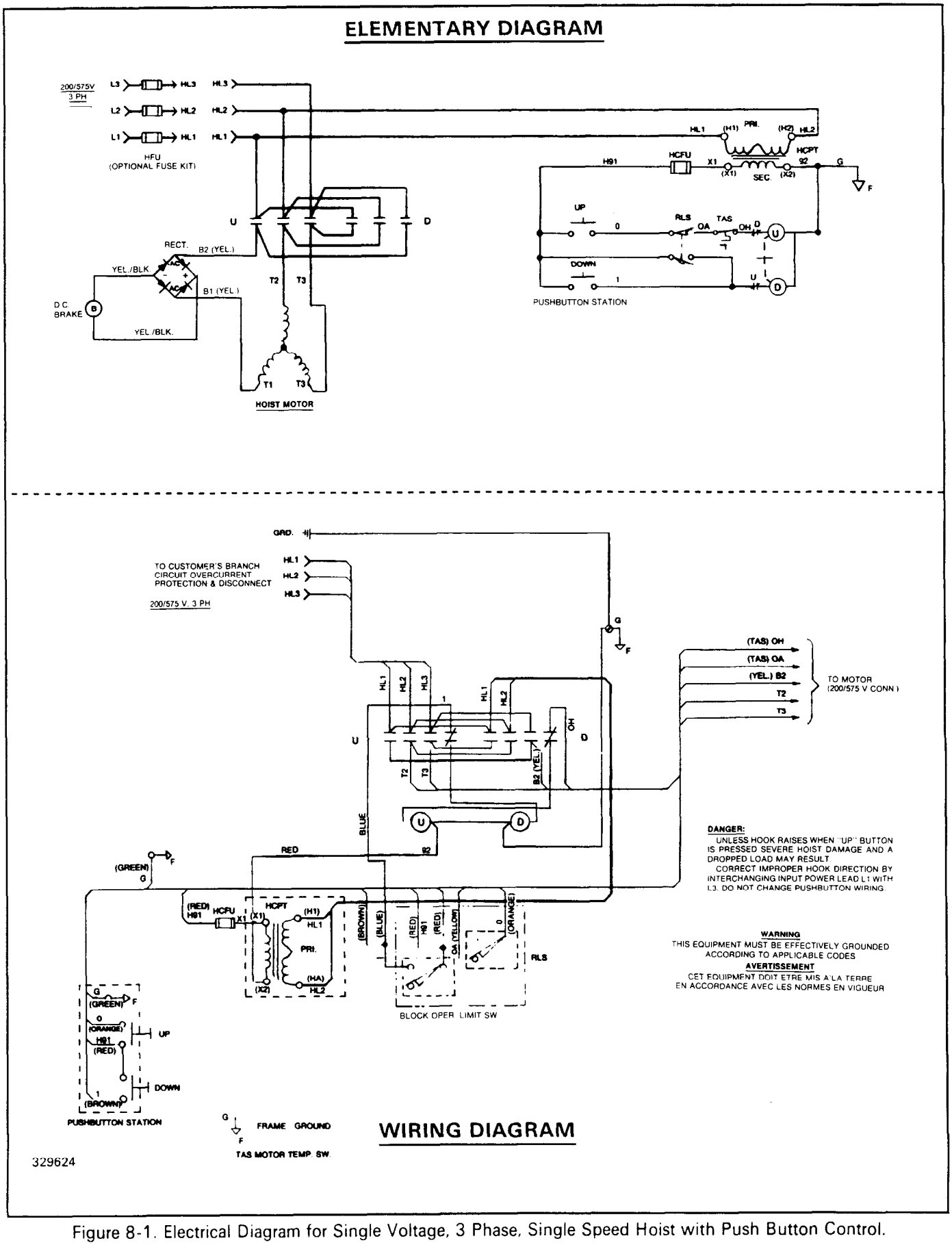


Figure 8-1. Electrical Diagram for Single Voltage, 3 Phase, Single Speed Hoist with Push Button Control.

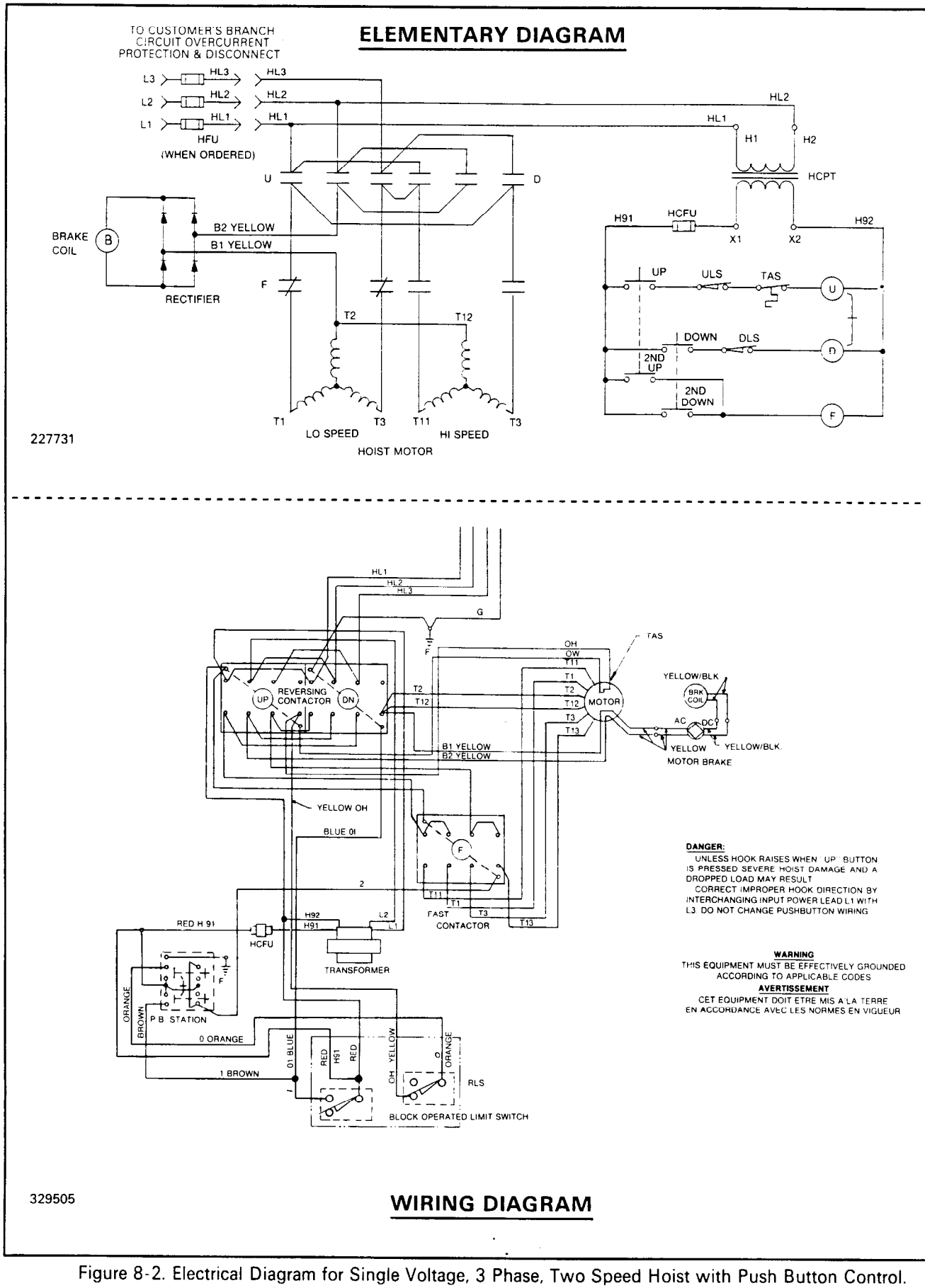
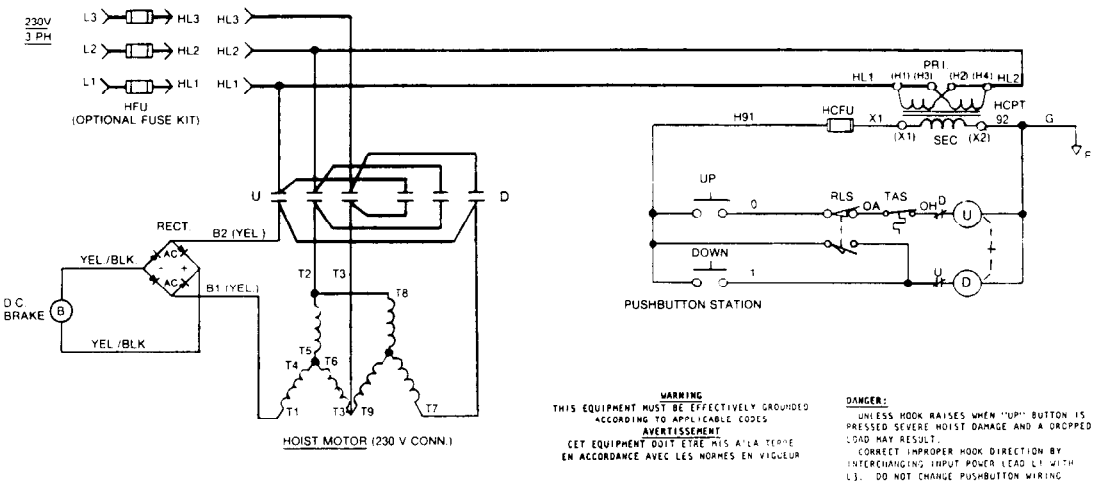
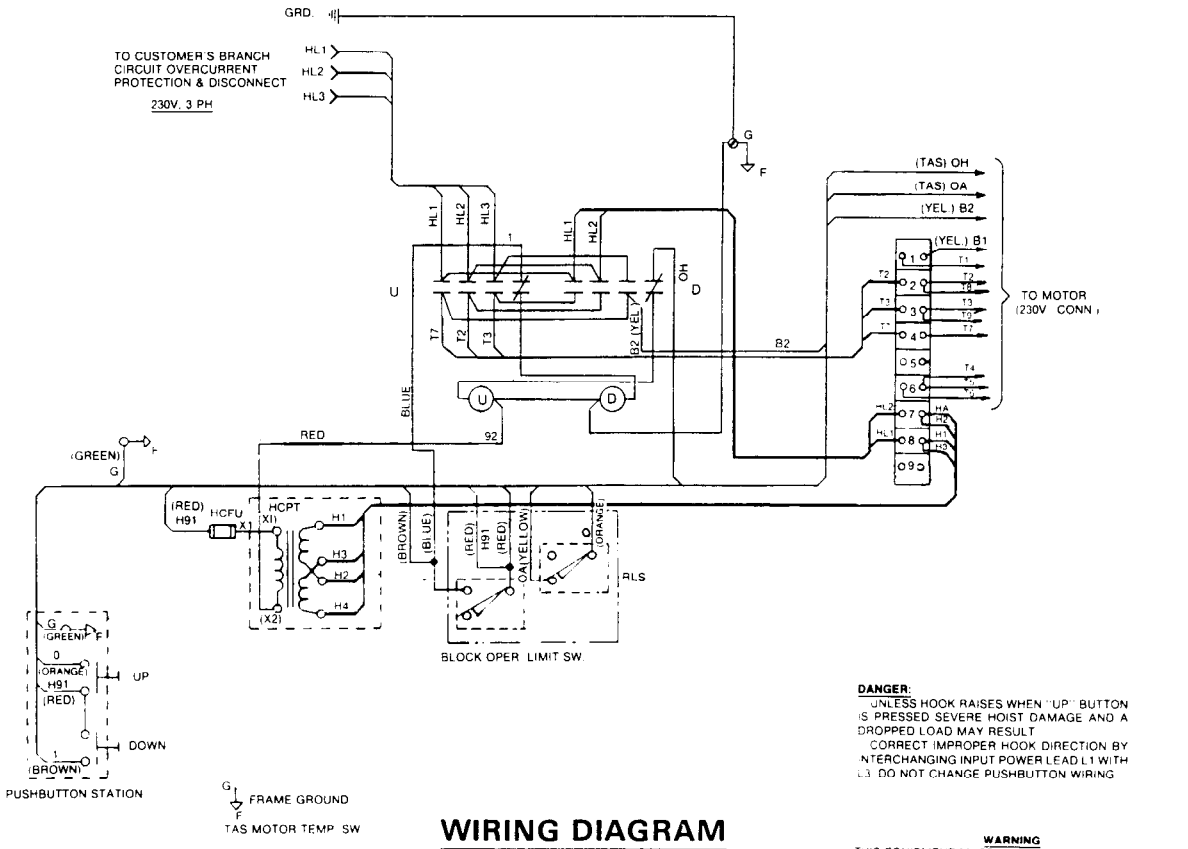


Figure 8-2. Electrical Diagram for Single Voltage, 3 Phase, Two Speed Hoist with Push Button Control.

ELEMENTARY DIAGRAM





WIRING DIAGRAM

230 V CONNECTIONS

329625 SHT. 1 REV. 1

Figure 8-3. Electrical Diagram for 230/460 Volt Reconnectable, 3 Phase, Single Speed Hoist with Push Button Control.

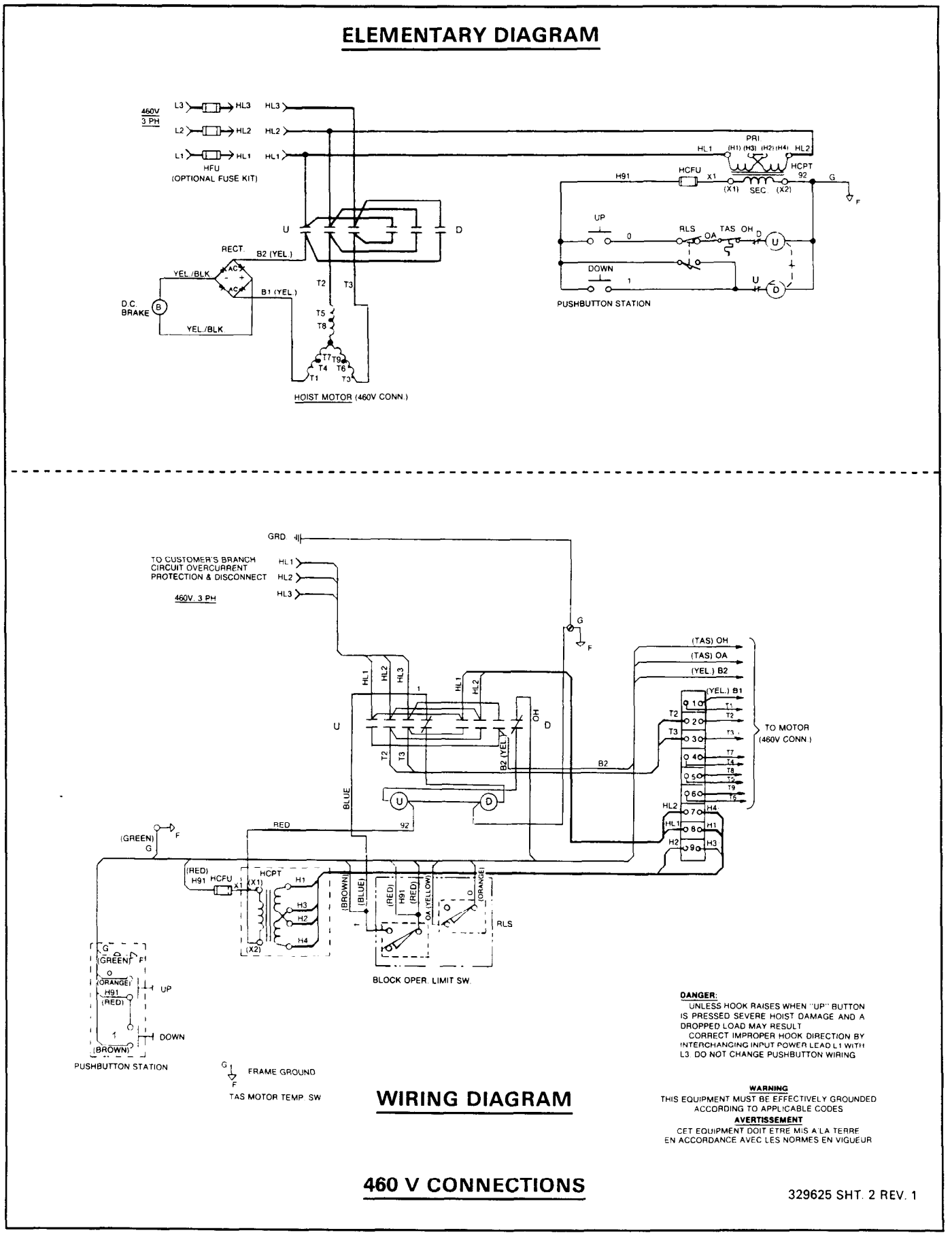
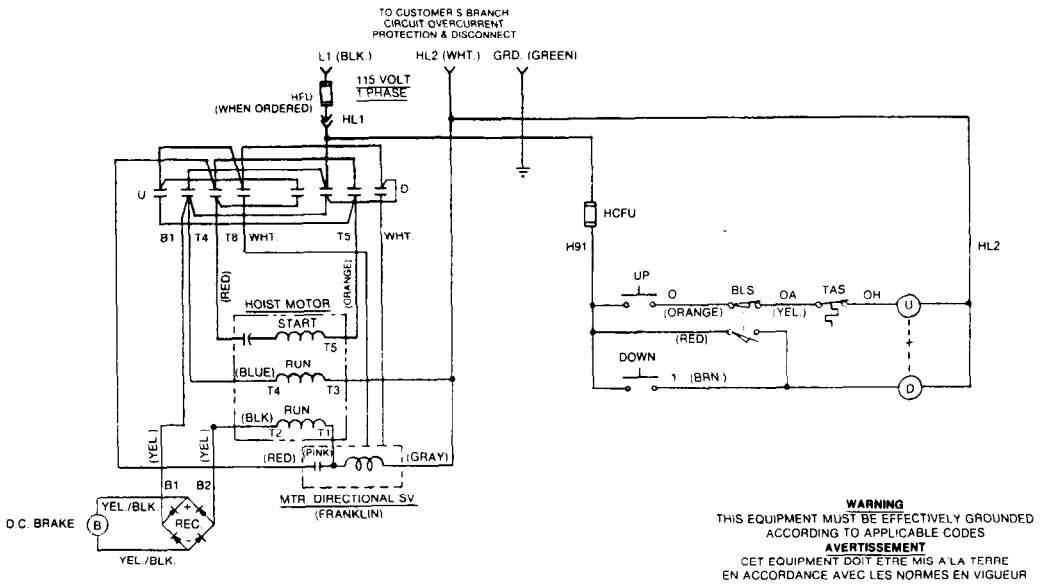
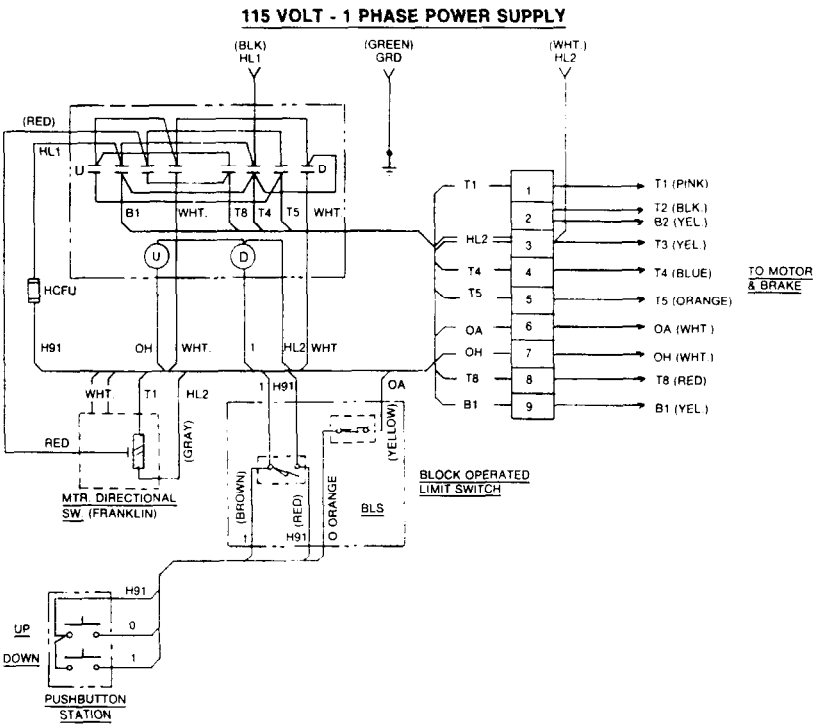


Figure 8-3. Electrical Diagram for 230/460 Volt Reconnectable, 3 Phase, Single Speed Hoist with Push Button Control (Continued).

ELEMENTARY DIAGRAM





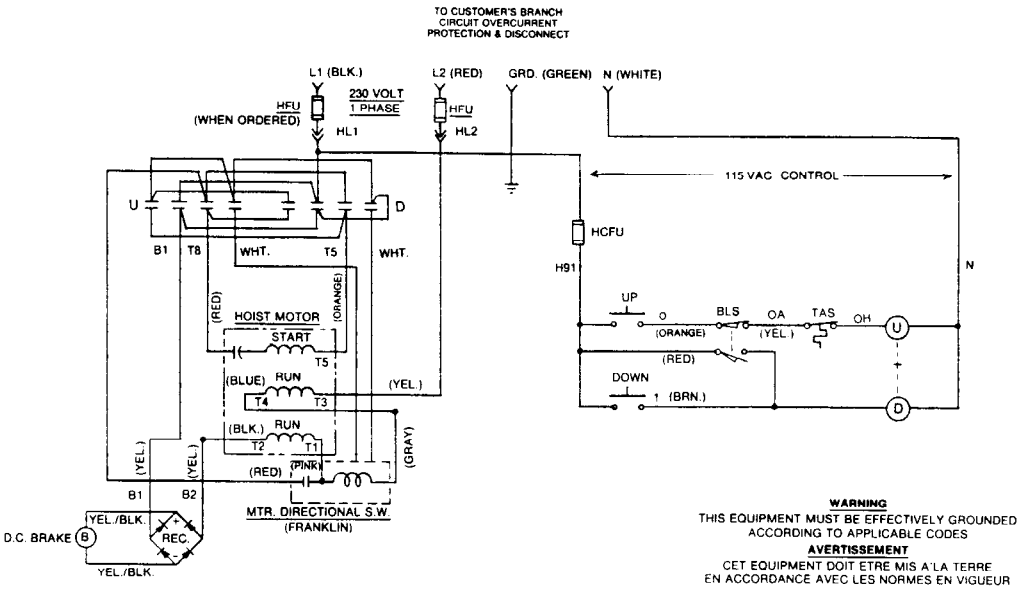
WIRING DIAGRAM

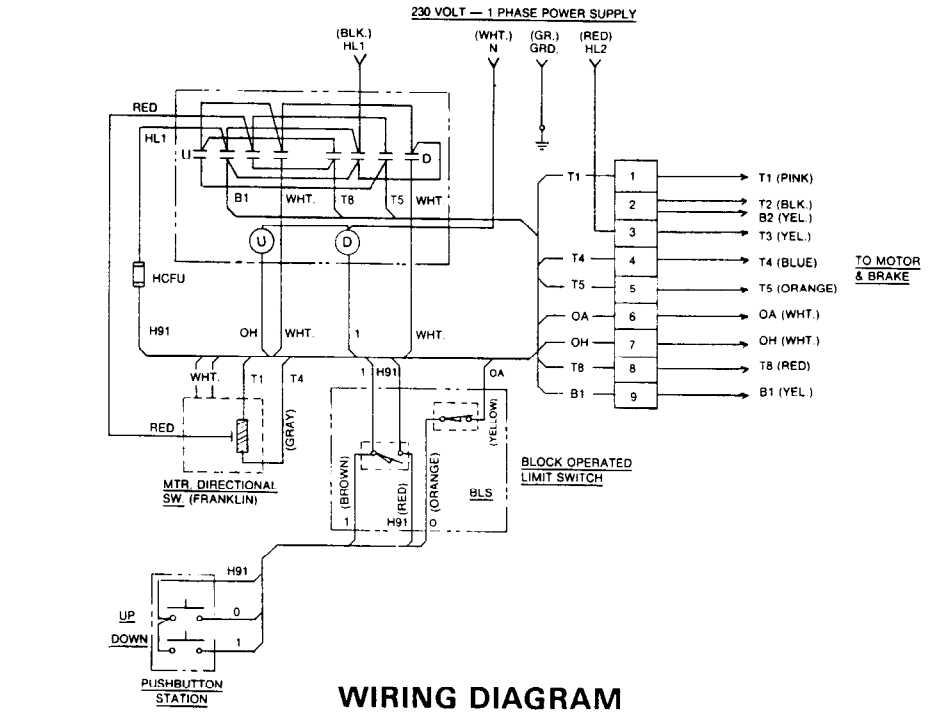
115 V CONNECTIONS

329616 SHT. 1 REV. 1

Figure 8-4. Electrical Diagram for 115/230 Volt Reconnectable, 1 Phase, Single Speed Hoist with Push Button Control and Starting Switch.

ELEMENTARY DIAGRAM





WIRING DIAGRAM

230 V CONNECTIONS

329616 SHT. 2 REV. 1

Figure 8-4. Electrical Diagram for 115/230 Volt Reconnectable, 1 Phase, Single Speed Hoist with Push Button Control and Starting Switch (Continued).

SECTION IX – PARTS LIST

GENERAL. The parts listed and illustrations in this section of the manual, cover parts of all standard Series E1 INGERSOLL-RAND 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, Model Number, Motor Horsepower, Voltage, Phase, Frequency, and Rated Load of Hoist when ordering parts.

The numbers assigned to the parts of our various assemblies in our parts list are not the part numbers used in manufacturing the part. They are identifcation numbers, that when given with the model number, permit us to identify, select or manufacture, and ship the correct part needed.

INDEX OF EXPLODED VIEW PARTS ILLUSTRATIONS

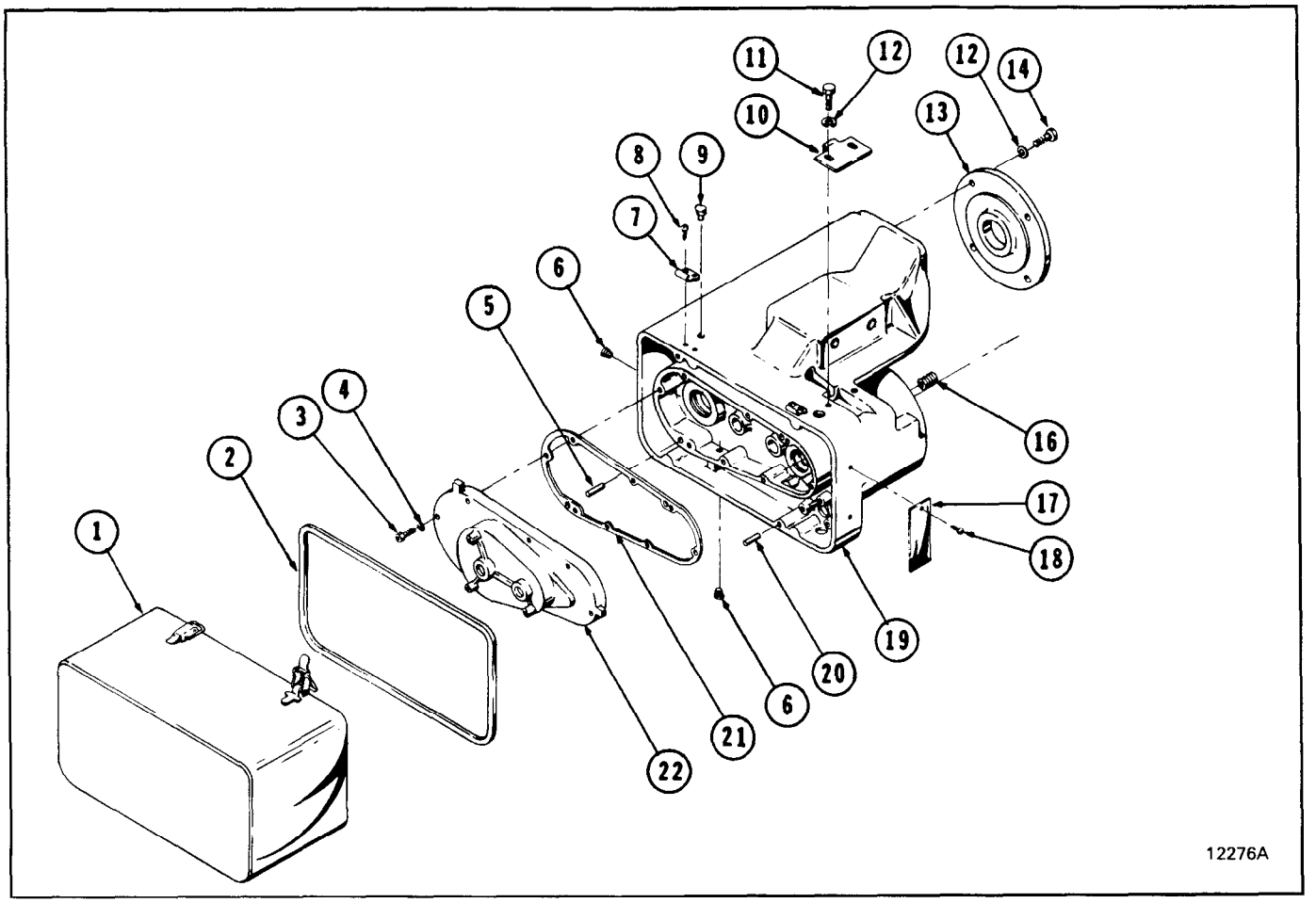


Figure 9-1. Frame, Covers and External Parts.

Ref. No.	Part Number	Description	Qty. Req'd.
1	900-101	Cover Assembly — Electrical Compartment	1
2	900-102	Gasket — Electrical Compartment Cover	1
3	900-103	Screw-Cap, Hex socket head	8
4	900-104	Lockwasher — Spring	8
5	900-105	Pin — Dowel	2
6	900-106	Plug — Pipe (Dry Seal)	2
7	900-107	Strike — Cover Latch	4
8	900-108	Screw — Drive, round head	8
9	900-109	Filler — Oil	1
10	900-110	Plate — Keeper, rope anchor	1
11	900-111	Screw — Cap, hex head	2
12	900-112	Lockwasher — Spring	6
13	900-113	Plate — Access, rope drum	1
14	900-114	Screw - Cap, button head	4
16	900-115	Insert — Heli-Coil	2
17	900-116	Plate — Hoist Data	1
18	900-117	Screw — Drive	2
19	900-122	Frame Assembly (with needle bearings)	1
20	900-119	Pin — Dowel	2
21	900-120	Gasket — Gear Case Cover	1
22	200-121	Cover Assembly — Gear Case (with needle bearings)	1

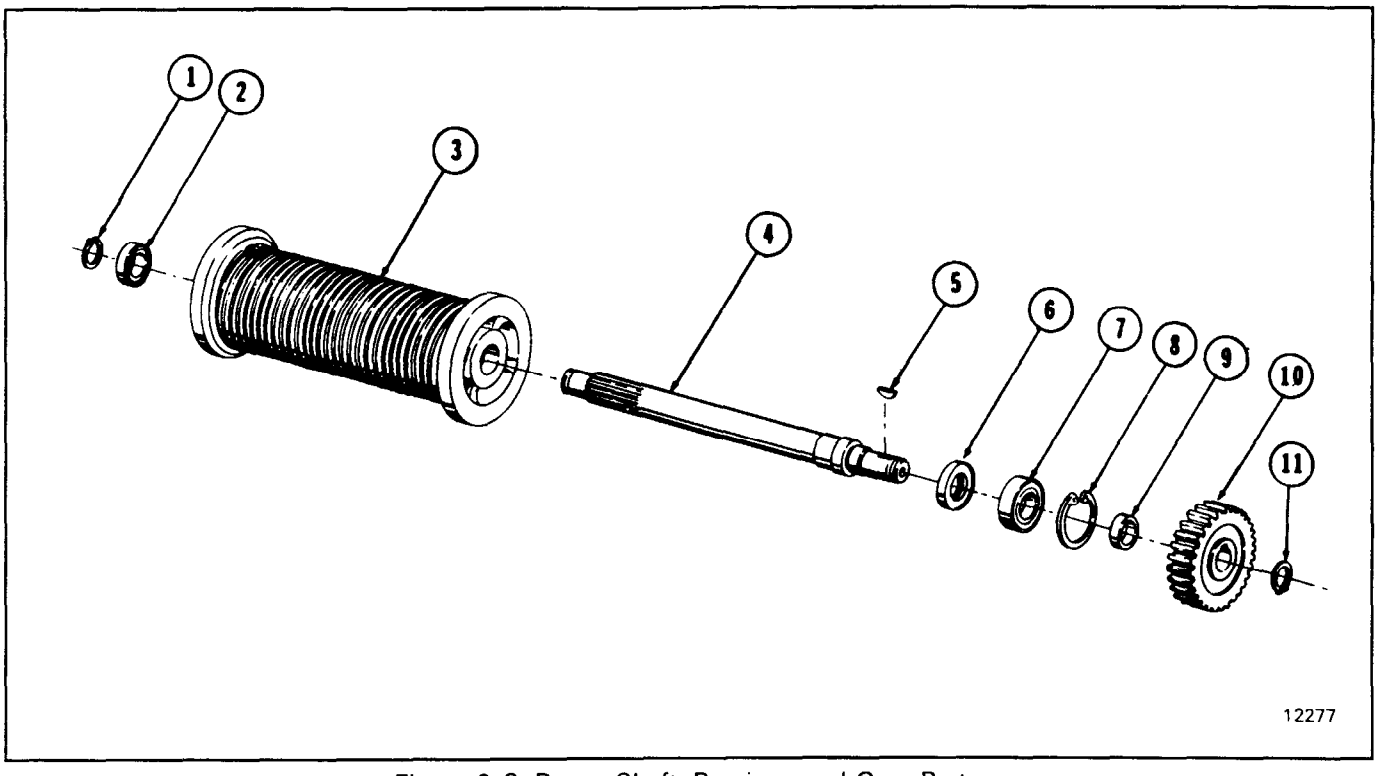


Figure 9-2. Drum, Shaft, Bearings and Gear Parts.

Ref. No.	Part Number	Description	Qty. Req'd.
1	900-201	Ring — Retaining, external	1
2	900-202	Bearing Assembly — Ball, drum shaft	1
3	900-203	Drum — Rope	1
4	900-204	Shaft — Drum	1
5	900-205	Key — Woodruff	1
6	900-206	Seal —Oil	1
7	900-207	Bearing Assembly — Ball, drum shaft	1
8	900-208	Ring — Retaining, internal	1
9	900-209	Spacer — Drum Gear	1
10	900-210	Gear — Drum (47 tooth)	1
11	900-211	Ring — Retaining, external	1

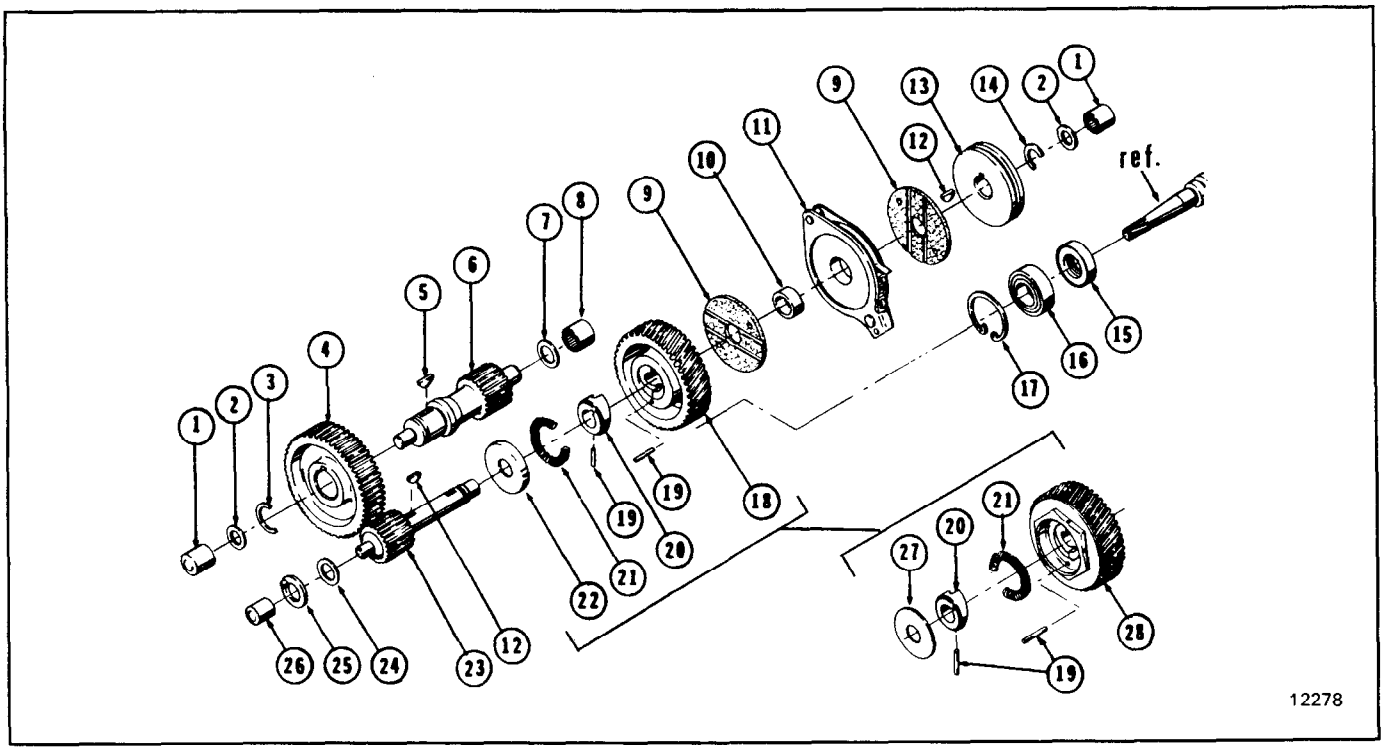


Figure 9-3. Gearing and Load Brake Parts (Including Overload Clutch).

Ref. No.	Part Number	Description	Qty. Req'd.
1	900-301	Bearing Assembly — Needle, 5/8" I.D.	2
2	900-302	Washer — Thrust, 5/8" I.D. (steel)	2
3	900-303	Ring — Retaining	1
4	900-304	Gear — Intermediate (65 teeth)	1
	900-305	Gear — Intermediate (74 teeth)	1
5	900-306	Key — Woodruff	1
6	900-307	Shaft & Integral Pinion — Intermediate (15 teeth)	1
7	900-308	Washer — Thrust, 11/16" I.D. (Steel)	1
8	900-309	Bearing Assembly — Needle, 11/16" I.D. (36 rollers, grease retained)	1
9	900-310	Disc — Friction, load brake	2
10	900-311	Bushing — Ratchet, load brake	1
11	900-312	Pawl & Ratchet Assembly — load brake (includes bushing 10)	1
12	900-313	Key — Woodruff (special)	2
13	900-314	Flange — Load Brake	1
14	900-315	Ring — Retaining, load brake flange	1
15	900-316	Seal — Oil, motor shaft	1
16	900-317	Bearing Assembly — Ball, motor shaft	1
17	900-318	Ring — Retaining, internal	1
18	900-319	Gear & Center Assembly (106 teeth)	1
19	900-320	Pin — Grooved	2
20	900-321	Cam — Load Brake	1
21	900-322	Spring — Load Brake (plain — no color code)	1
	900-323	Spring — Load Brake (yellow color code)	1
22	900-324	Retainer — Spring	1
23		Shaft & Integral Pinion — Load Brake	1
	900-325	(14 teeth)	
	900-326	(23 teeth)	
24	900-327	Washer — Thrust, 11/16" I.D. (steel, used on 14 tooth pinion only)	1
25	900-328	Washer — Thrust, bronze	1
26	900-329	Bearing Assembly — Needle, 11/16" I.D.	1
27	900-330	Retainer — Spring (used with item 28 only)	1
28		Gear & Clutch Assembly — Load Brake	1
	900-331	(1/2 ton, 14 fpm hoists)	
	900-332	(1 ton, 14 fpm hoists)	

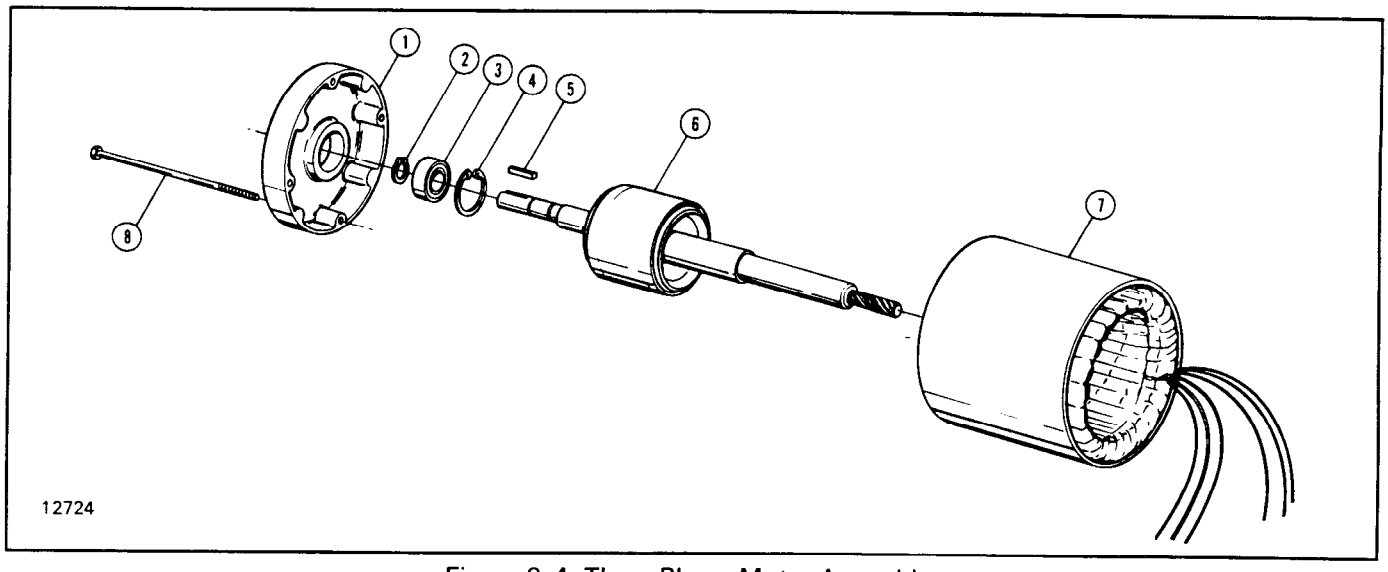


Figure 9-4. Three Phase Motor Assembly.

Ref. No.	Part Number	Description	Qty. Req'd.
		Motor Assembly (Includes Ref. Nos. 1 thru 8)	1
		1/2 Horsepower (1 Speed)	
	900-1401	200 Volt	
	900-1402	230/460 Volt	
	900-1403	575 Volt	
		1 Horsepower (1 Speed)	
	900-1404	200 Volt	
	900-1405	230/460 Volt	
	900-1406	575 Volt	
		2-1/2 Horsepower (1 Speed)	
	900-1407	200 Volt	
	900-1408	230/460 Volt	
	900-1409	575 Volt	
		1/2 - 1/6 Horsepower (2 Speed)	
	900-1410	200 Volt	
	900-1411	230 Volt	
	900-1412	460 Volt	
	900-1413	575 Volt	
		1 - 1/3 Horsepower (2 Speed)	
	900-1414	200 Volt	
	900-1415	230 Volt	
	900-1416	460 Volt	
	900-1417	575 Volt	
		2-1/4 - 3/4 Horsepower (2 Speed)	
	900-1418	200 Volt	
	900-1419	230 Volt	
	900-1420	460 Volt	
	900-1421	575 Volt	
1	*	Bell — End	1
2	*	Ring — Retaining	1
3	*	Bearing — Ball	1
4	*	Ring — Retaining	1
5	*	Key — Brake	1
6	*	Rotor and Shaft Assembly	1
7	*	Stator Assembly	1
8	*	Bolt — Motor Mounting	4

* Furnished only as part of motor assembly.

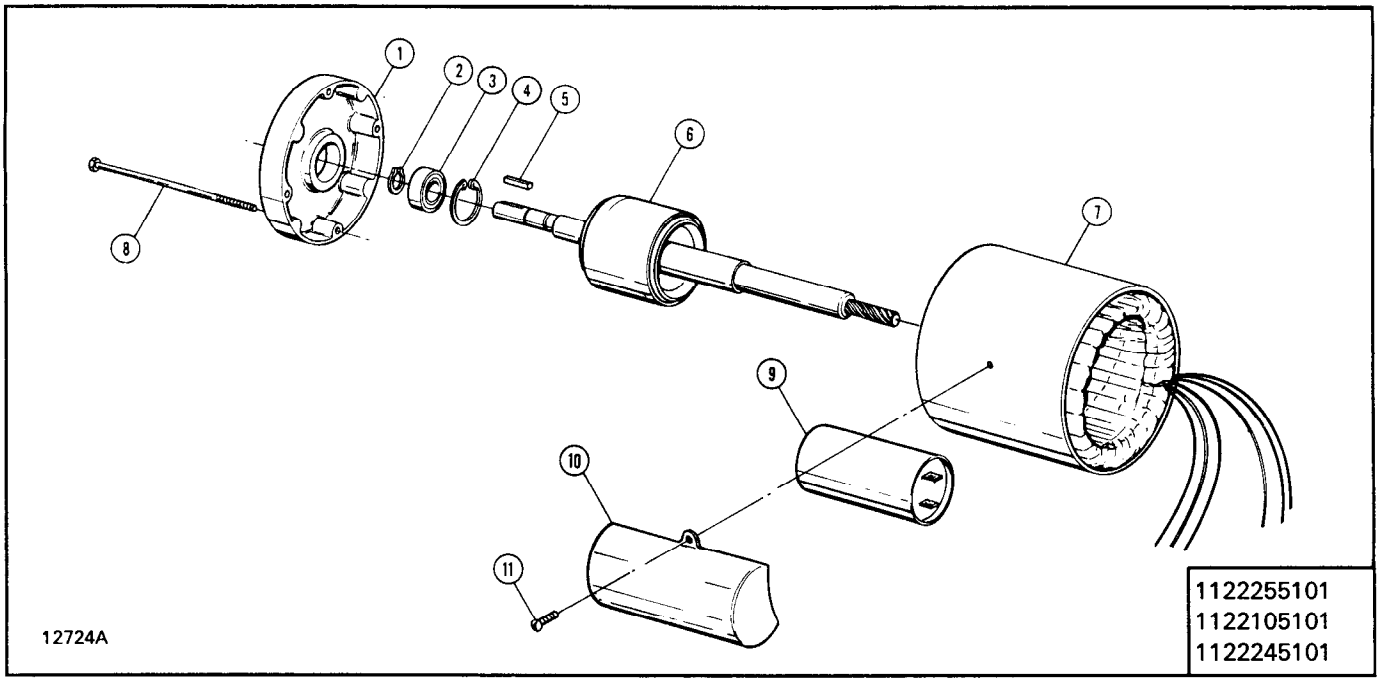


Figure 9-5. Single Phase Motor Assembly.

Ref. No.	Part Number	Description	Qty. Req'd.
		Motor Assembly (Includes Ref. Nos. 1 thru 11)	1
	900-1501	1/2 Horsepower	
	900-1502	1 Horsepower	
1	*	Bell — End	1
2	*	Ring — Retaining	1
3	*	Bearing — Ball	1
4	*	Ring — Retaining	1
5	*	Key — Brake	1
6	*	Rotor and Shaft Assembly	1
7	*	Stator Assembly	1
8	*	Bolt — Motor Mounting	4
9		Capacitor Assembly	1
	900-1503	1/2 Horsepower	
	900-1504	1 Horsepower	
10	*	Capacitor Cover	1
11	*	Screw	2

* Furnished only as part of motor assembly.

NOTES

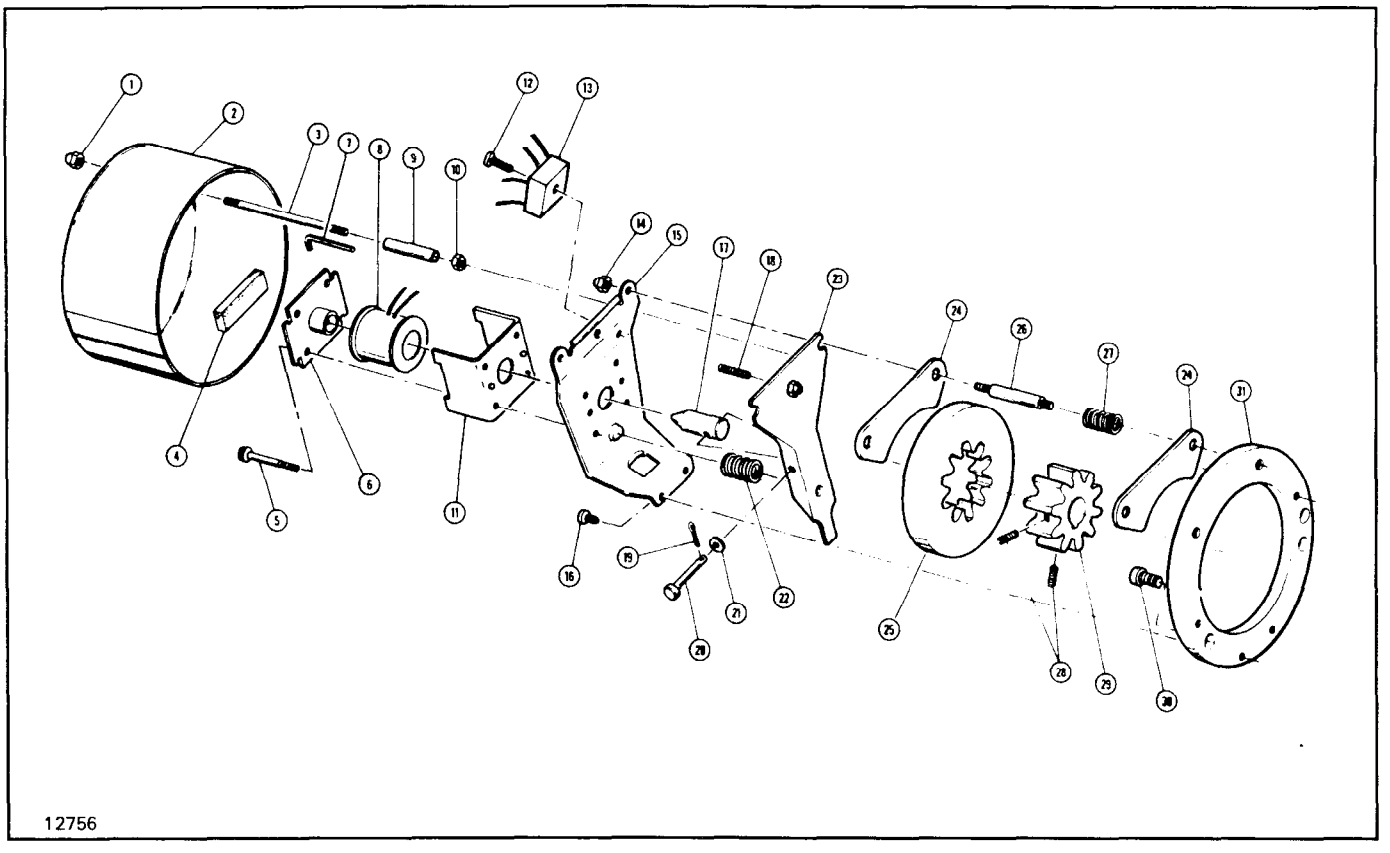


Figure 9-6. Hoist Motor Brake.

Ref. No.	Part Number	Description			Qty. Req'd.
		Motor Brake Assembly (Includes Ref. Nos. 1 thru 32)			1
		Hst. Spds.	**Mtr. HP**	**Voltage**	
	900-1601	1	½ & 1	115/230	
		1	2½	575	
		2	1 / ⅓	200 & 230	
		2	2¼ / ¾	230 & 460	
	900-1602	1	½	200 & 230/460	
		1	1	200, 230/460 & 575	
		2	½ / ⅙	200 & 230	
		2	1 / ⅓	460	
		2	2¼ / ¾	575	
	900-1603	1	½	575	
		2	½ / ⅙	460 & 575	
		2	1 / ⅓	575	
	900-1604	1	2½	200 & 230/460	
		2	2¼ / ¾	200	
1	*	Acorn Nut (# 10-32)			2
2	900-1605	Brake Cover Assembly (Includes Brake Cover and Label Inside Cover)			1
3	*	Cover Stud			2
4	*	Gasket			1
5	*	Hex Washer Head Thread Forming Screw (#10-32 x 1¾)			4
6	*	Solenoid Frame Cover Assembly			1
7	*	Hex Key (⅛ — ¾ x 2¼)			1
8	*	Solenoid Coil Assembly			1
9	*	Tubing			3

Figure 9-6. Hoist Motor Brake — Continued.

Ref. No.	Part Number	Description	Qty. Req'd.
10	*	Hex Nut (# 10-32 Pltd.)	2
11	*	Solenoid Frame	1
12	*	Hex Washer Head Thread Forming Screw (#10-32 x 3/4)	1
13	*	Rectifier Assembly	1
14	*	Hex Head Self-locking Nut (#10-24)	2
15	900-1606	Solenoid Support	1
16	*	Hex Washer Head Thread Forming Screw (#10-32 x 1/4)	2
17	*	Solenoid Plunger	1
18	900-1607	Hex Socket Head Self-locking Set Screw - Oval Point (1/4 - 28 x 1)	1
19	*	Cotter Pin (3/32 x 1/2 Pltd.)	1
20	*	Clevis Pin (3/16 x 1 1/4)	1
21	*	Flat Washer	2
22	*	Brake Spring	1
23	*	Brake Lever Assembly	1
24	*	Pressure Pad	2
25	*	Brake Disc (Nonasbestos)	1
26	*	Brake Support Stud	2
27	*	Separating Spring	2
28	*	Hex Socket Head Self-locking Set Screw - Cup Point (1/4 - 20 x 3/8)	2
29	*	Brake Hub	1
30	*	Hex Socket Head Screw (3/8 - 16 x 3/4)	2
31	900-1608	Brake Mounting Plate	1
32	*	Wire Nuts — Not Shown (No. 22 thru 16 AWG)	4

* Not available as individual parts. See replacement kits listed below. Kits include quantities shown above.

Kit Description	Part Number	Ref. Nos. Included
Brake Disc	900-1609	24, 25, 27
Solenoid	900-1610 (For 900-1601) 900-1611 (For 900-1602) 900-1612 (For 900-1603) 900-1613 (For 900-1604)	5, 6, 8, 11, 17
Rectifier	900-1614	12, 13, 32
Brake Lever	900-1615	18, 19, 20, 21, 22, 23
Brake Hub	900-1616	28, 29, Hub Drive Key (Shown Elsewhere)
Special Hardware	900-1617	3, 4, 9, 26, Instruction Label inside cover, Adjust Label, Adjusting Screw Label on brake lever assembly, Power Warning Label on cover
Hardware	900-1618	1, 5, 7, 10, 12, 14, 16, 18, 19, 20, 21, 28, 30

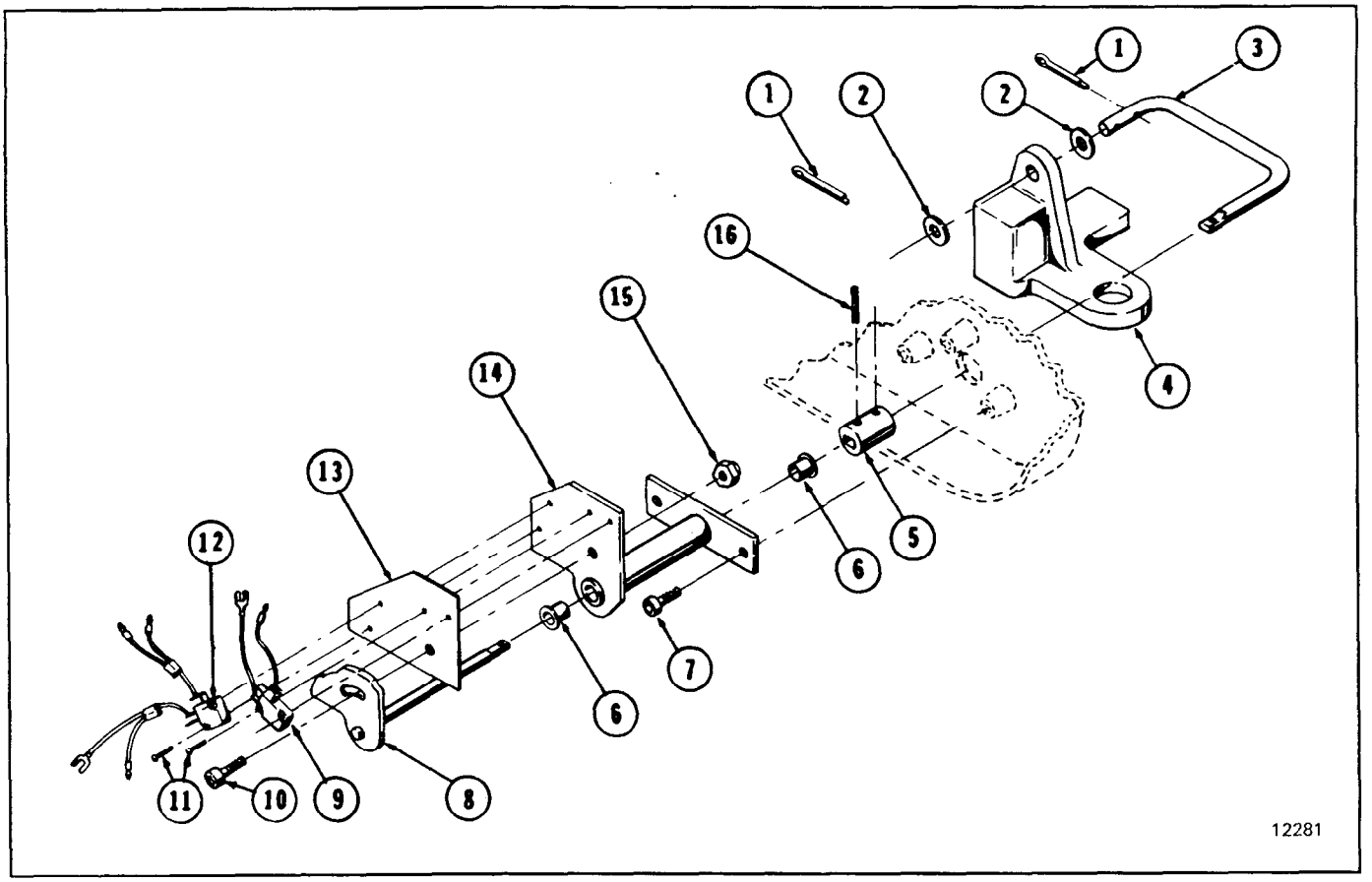


Figure 9-7. Upper Limit Switch Parts.

Ref. No.	Part Number	Description	Qty. Req'd.
1	900-701	Pin — Cotter	2
2	900-702	Washer — Flat	2
3	900-703	Arm — Lever	1
4	900-704	Weight — Limit Switch Actuator	1
	900-705	Switch Assembly — Upper limit (Complete, includes items 5 thru 16)	1
5	900-706	Coupling — Shaft	1
6	900-707	Bearing — Nylon	2
7	900-708	Screw — Cap, hex socket head	2
8	900-709	Shaft and cam assembly	1
9	900-710	Switch Assembly — Limit stop (includes wire leads)	1
10	900-711	Screw — Shoulder, hex socket head	1
11	900-712	Screw — Round head	4
12	900-713	Switch Assembly — Limit Reversing (includes wire leads)	1
13	900-714	Insulator — Limit Switch	1
14	900-715	Bracket Assembly — Mounting	1
15	900-716	Nut — Self Locking	1
16	900-717	Pin — Roll	2

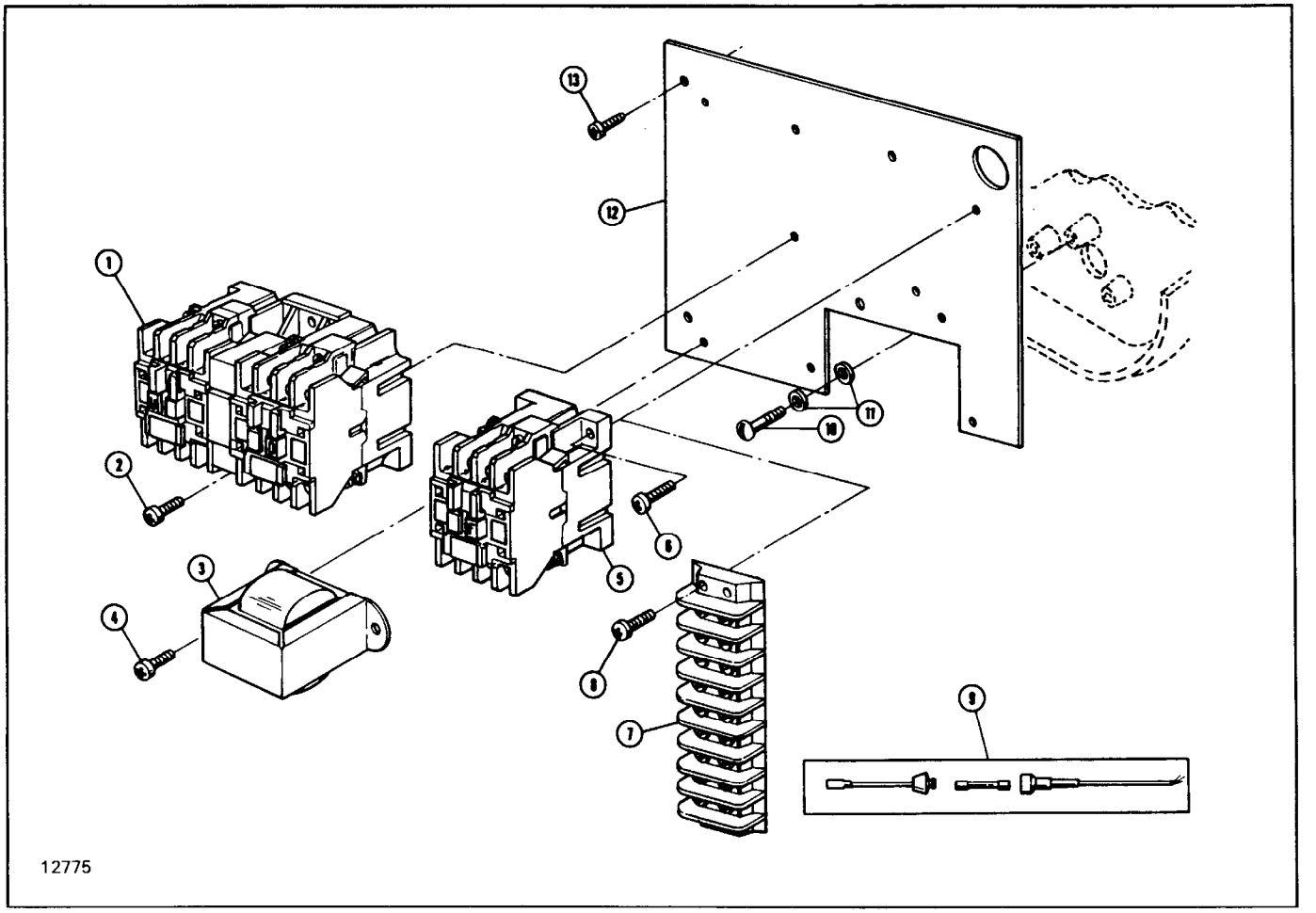


Figure 9-8. Electrical Control Equipment.
Three Phase Hoists.

Ref. No.	Part Number	Description	Qty. Req'd.
1	900-820	Contactor Assembly	1
2	*	Pan Head Self-Tapping Screws (#8-32 x ½ Pltd.)	2
3		Transformer	1
	900-815	200V/115V	
	900-813	230V-460V/115V	
	900-821	230V/115V	
	900-822	460V/115V	
	900-814	575V/115V	
4	*	Pan Head Self-Tapping Screws (#10-24 x ¼ Pltd.)	2
5	900-824	Contactor Assembly (Two Speed Hoists Only)	1
6	*	Pan Head Self-Tapping Screws (#8-32 x ½ Pltd.) (Two Speed Hoists Only)	2
7	900-823	Terminal Block (Reconnectable Hoists Only)	1
8	*	Pan Head Self-Tapping Screws (#8-32 x ½ Pltd.) (Reconnectable Hoists Only)	4
9	900-811	Fuse, Fuse Holder and Wire Assembly (½A/250V)	1
	*	Fuse Only (½A/250V)	1
10	*	Phillips Round Head Machine Screw (¼-20 x ⅝)	1
11	*	Flat Washers (¼ Type N)	2
12	900-808	Mounting Plate	1
13	*	Pan Head Self-Tapping Screws (#10-24 x ⅜ Pltd.)	2
	*	Pan Head Self-Tapping Grounding Screw — Not Shown (#10-24 x ¼ Pltd.)	1

* Not available as individual parts.

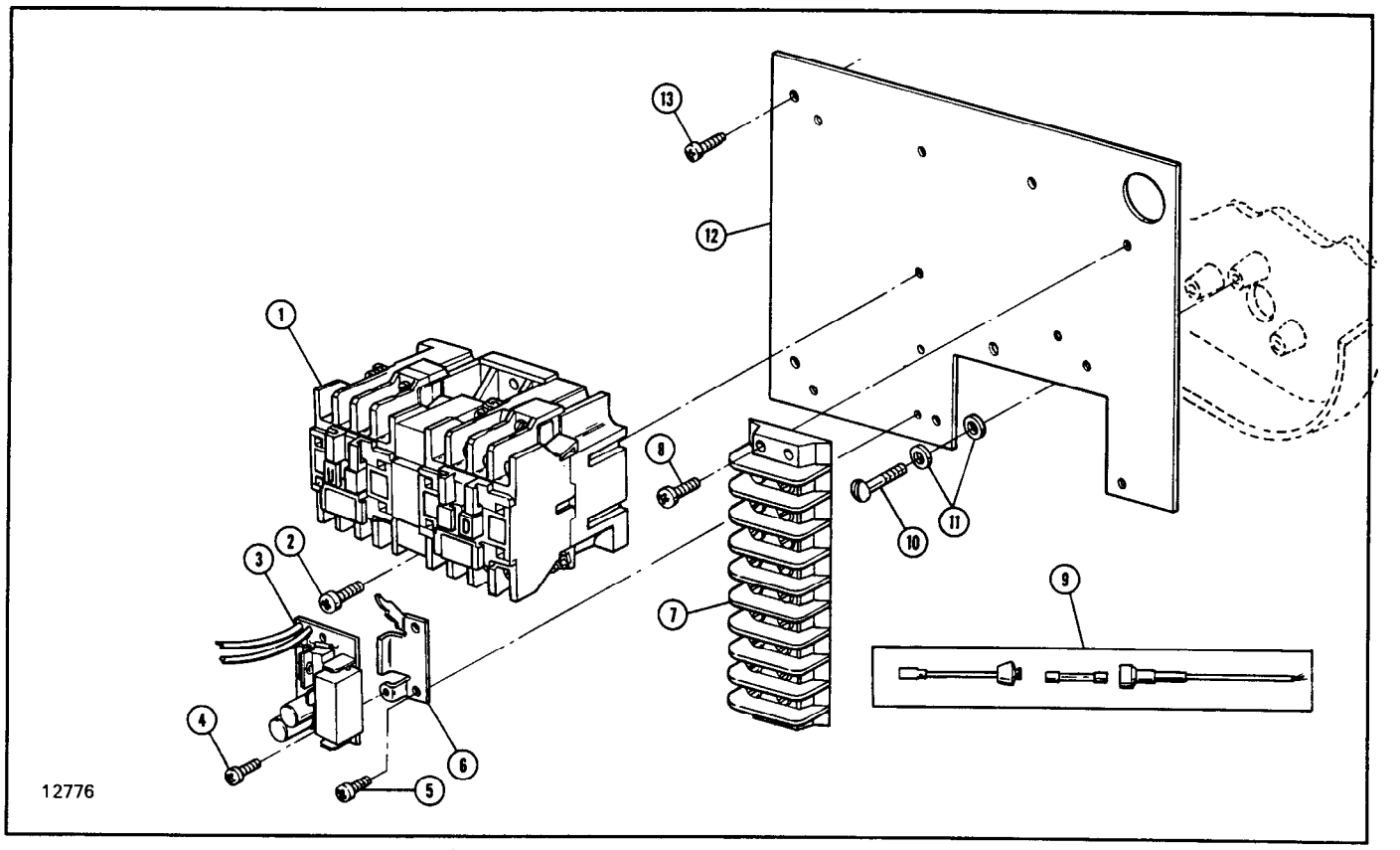


Figure 9-9. Electrical Control Equipment.
Single Phase Hoists.

Ref. No.	Part Number	Description	Qty. Req'd.
1	900-851	Contactor Assembly	1
2	*	Pan Head Self-Tapping Screws (#8-32 x ½ Pltd.)	2
3		Starting Switch	1
	900-852	½ Horsepower	
	900-853	1 Horsepower	
4	*	Phillips Head Machine Screw (#6-32 x 5/16 Pltd.)	1
5	*	Pan Head Self-Tapping Screw (#6-32 x 3/8 Pltd.)	2
6	900-854	Starting Switch Mounting Bracket	1
7	900-823	Terminal Block	1
8	*	Pan Head Self-Tapping Screws (#8-32 x ½ Pltd.)	4
9	900-811	Fuse, Fuse Holder and Wire Assembly (½A/250V)	1
	*	Fuse Only (½A/250V)	1
10	*	Phillips Round Head Machine Screw (¼-20 x 5/8)	1
11	*	Flat Washers (¼ Type N)	2
12	900-808	Mounting Plate	1
13	*	Pan Head Self-Tapping Screws (#10-24 x 3/8 Pltd.)	2
	*	Pan Head Self-Tapping Grounding Screw — Not Shown (#10-24 x ¼ Pltd.)	1

* Not available as individual parts.

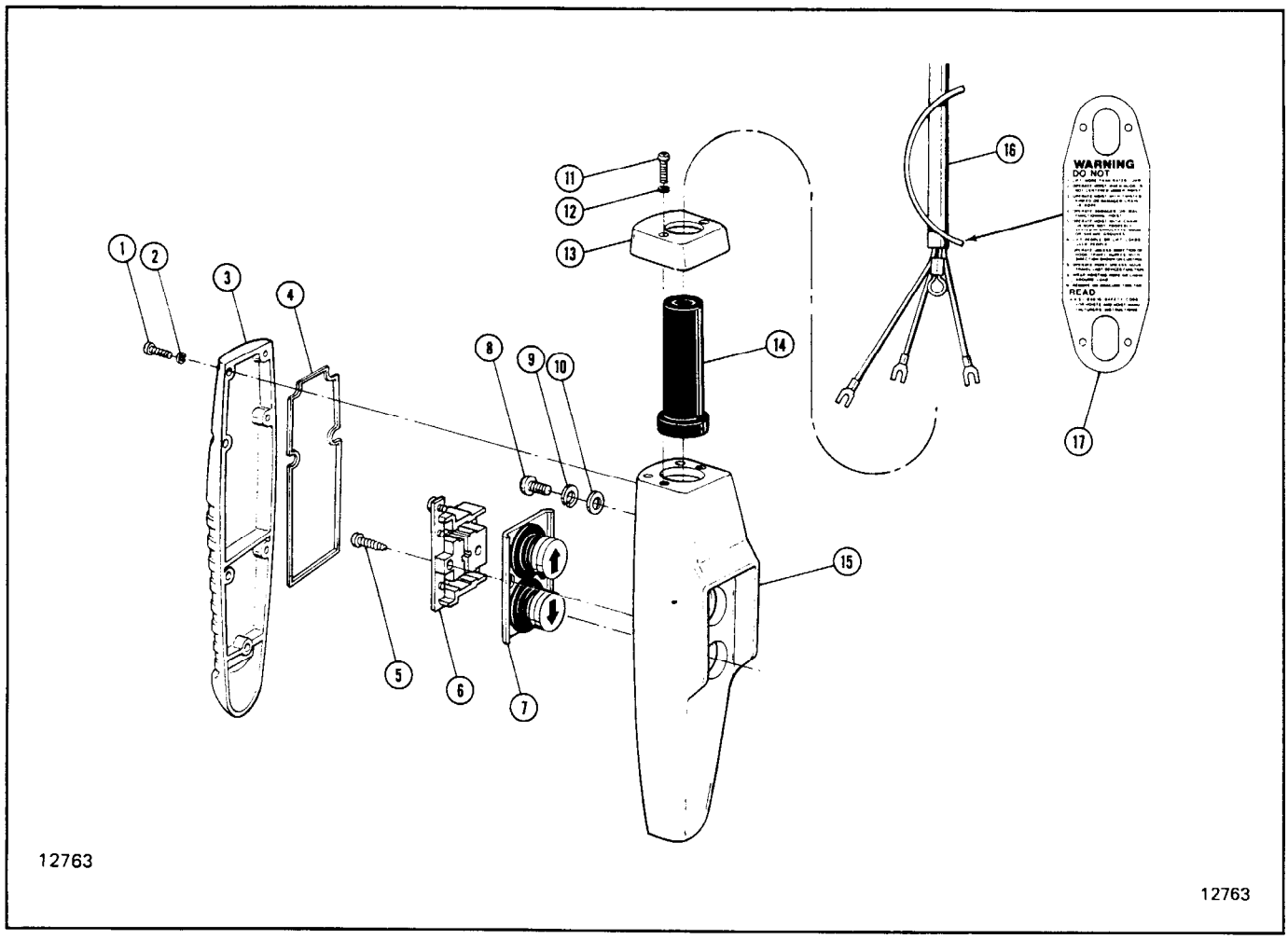


Figure 9-10. Push Button Station and Conductor Cable Assembly.
Single Speed Hoists.

Ref. No.	Part Number	Description	Qty. Req'd.
	900-1051	Push Button Station and Conductor Cable Assembly (Includes Ref. Nos. 1 thru 17)	1
	900-1052	Push Button Station (Includes Ref. Nos. 1 thru 15)	1
1	*	Type 1 Pan Head Machine Screw (M 3.5 x 0.6 x 12 Pltd.)	7
2	*	Lockwasher (M 3.5 Pltd.)	7
3	*	Rear Cover	1
4	900-1053	Gasket	1
5	*	Type 1 Pan Head Thread Cutting Screw (M 4 x 15 Pltd.)	2
6	900-1054	Contact Assembly	1
7	900-1055	Button Assembly	1
8	*	Type 1 Pan Head Machine Screw (M 6 x 1 x 12 Pltd.)	1
9	*	Lockwasher (M 6 Pltd.)	1
10	*	Plain Washer (M 6 Pltd.)	1
11	*	Type 1 Pan Head Machine Screw (M 3.5 x 1 x 14 Pltd.)	2
12	*	Lockwasher (M 3.5 Pltd.)	2
13	*	Housing Cap	1
14	900-1056	Grommet	1
15	*	Housing	1
16	900-1057	Conductor Cable Assembly	1
17	900-1058	Plastic Warning Tag	1

* Not available separately. Order Push Button Station.

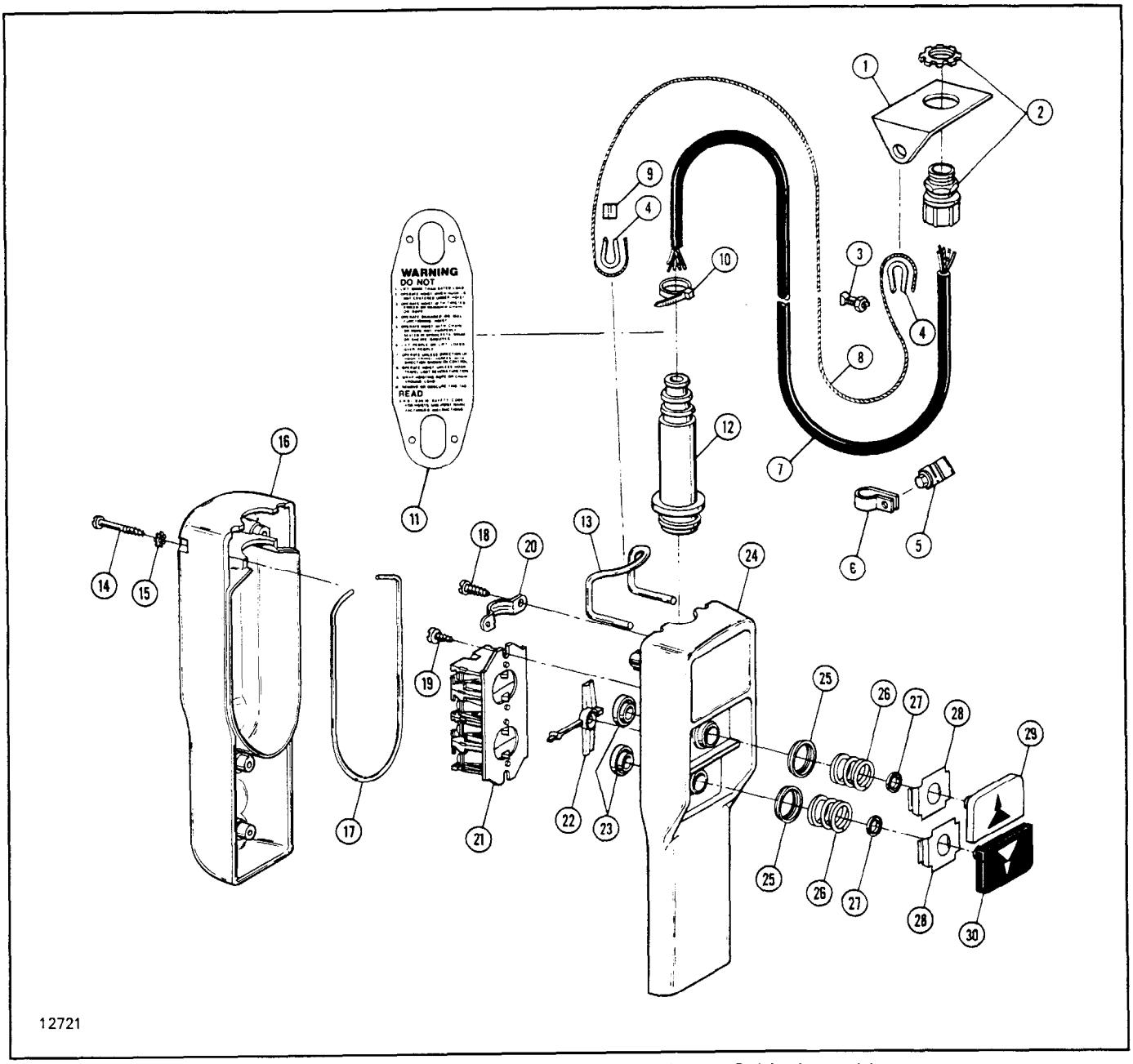


Figure 9-11. Push Button Station and Conductor Cable Assembly.
Two Speed Hoists Only.

Ref. No.	Part Number	Description	Qty. Req'd.
	900-2101	Push Button Station and Conductor Cable Assembly (Includes Ref. Nos. 1 thru 30)	1
1	900-2102	Anchor Bracket—Strain Cable	1
2	900-2103	Grip Assembly—Conductor	1
3	900-2104	Connector—Strain Cable	1
4	900-2105	Thimble—Strain Cable	2
5	900-2106	Connector—Conductor to Strain Cable	1
6	900-2107	Clamp—Conductor	1
7	900-2108	Conductor Cable	1
8	900-2109	Strain Cable	1
9	900-2110	Sleeve—Pressure	1
10	900-2111	Tie—Conductor	As Req'd.
11	900-2112	Operator Warning Label	1
	900-2113	Push Button Station (Includes Ref. Nos. 12 thru 30)	1

(Continued on following page.)

Figure 9-11. Push Button Station and Conductor Cable Assembly - Continued.

Ref. No.	Part Number	Description	Qty. Req'd.
12	900-2114	Sleeve—Conductor	1
13	*	Support—Strain Cable	1
14	*	Screw—Slotted Head	4
15	*	Lockwasher	4
16	*	Enclosure—Rear	1
17	*	Gasket	1
18	*	Screw—Slotted Head	2
19	*	Screw—Slotted Head	2
20	*	Clamp—Conductor	1
21	*	Contact Block Assembly	1
	900-2115	Contact Block (ZB2-BE101)	2
	900-2116	Contact Block (ZB2-BE201)	2
22	*	Interlock—Mechanical	1
	900-2117	Up Push Button Assembly (Includes 1 Each of Ref. Nos. 23 and 25 thru 29)	1
	900-2118	Down Push Button Assembly (Includes 1 Each of Ref. Nos. 23, 25 thru 28 and 30)	1
23	**	Ring—Retaining	2
24	*	Enclosure—Front	1
25	**	Seat—Spring	2
26	**	Spring	2
27	**	Seal	2
28	**	Plate—Push Button	2
29	**	Push Button—Up	1
30	**	Push Button—Down	1

* Not available separately. Order Push Button Station.
** Not available separately. Order Push Button Assembly.

NOTES

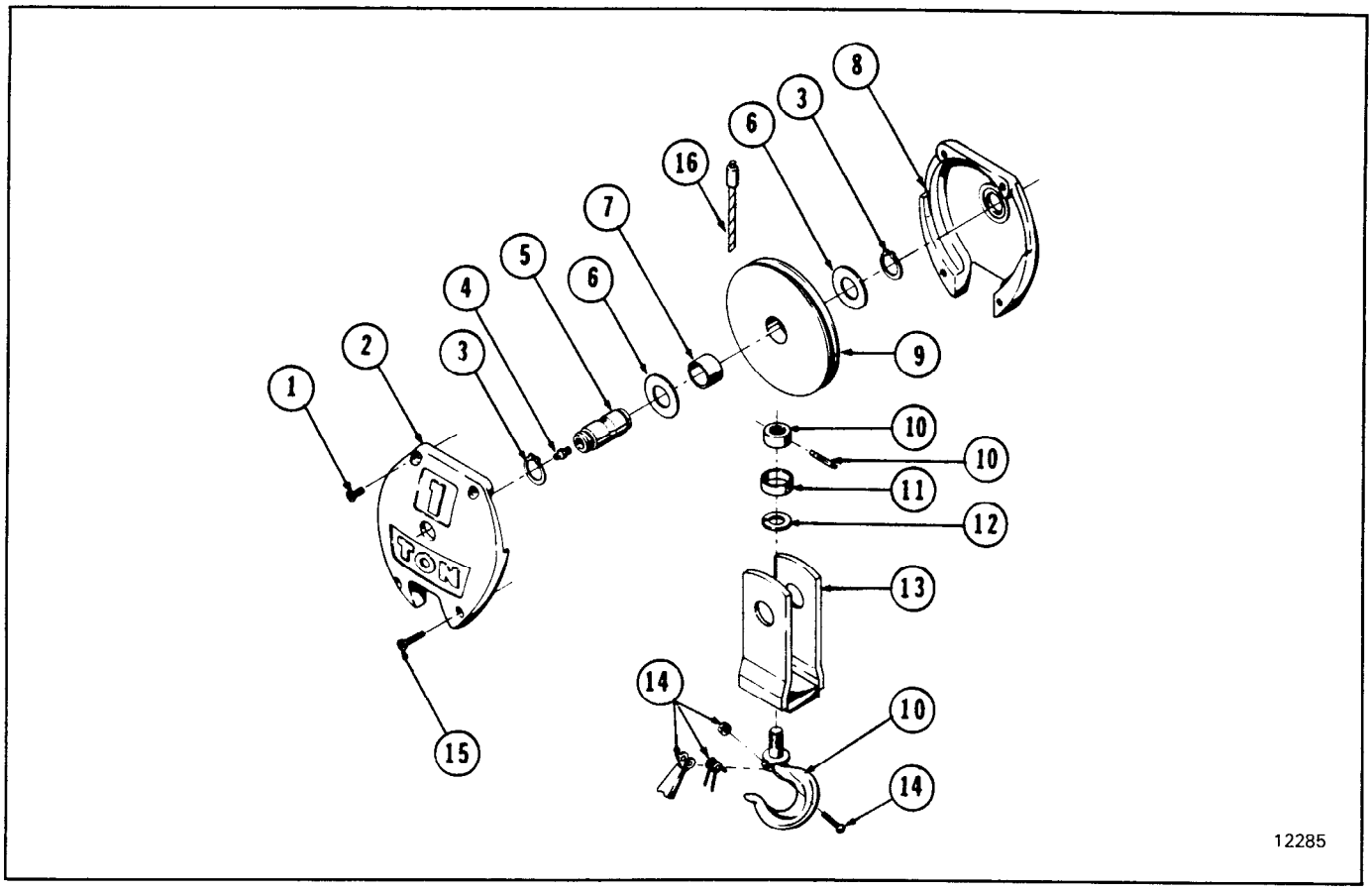


Figure 9-12. Lower Block Assembly and Wire Rope Parts.

Ref. No.	Part Number	Description	Qty. Req'd.
	900-1101	Block Assembly — Lower, complete (1/2 ton)	1
	900-1102	Block Assembly — Lower, complete (1 ton)	1
1	900-1103	Screw — Self-Tapping, flat head	2
2	900-1104	Cover — 1/2 ton (with c'sunk holes)	1
	900-1105	Cover — 1 ton (with c'sunk holes)	1
3	900-1106	Ring — Retaining, external	2
4	900-1107	Lube Fitting	1
5	900-1108	Pin — Sheave	1
6	900-1109	Spacer	2
7	900-1110	Bearing — Sheave	1
8	900-1111	Cover — 1/2 Ton (with threaded bolt holes)	1
	900-1112	Cover — 1 Ton (with threaded bolt holes)	1
9	900-1113	Sheave Assembly (includes bearing 7)	1
10	900-1114	Hook Assembly (includes nut and groove pin)	1
11	900-1115	Shroud — Thrust Bearing	1
12	900-1116	Bearing Washer — Thrust	1
13	900-1117	Body Assembly — Lower Block	1
14	900-1118	Latch Kit — Lower Hook	1
15	900-1119	Screw — Self-tapping, flat head	2
16	900-1120	Rope Assembly — Wire (20' lift)	1

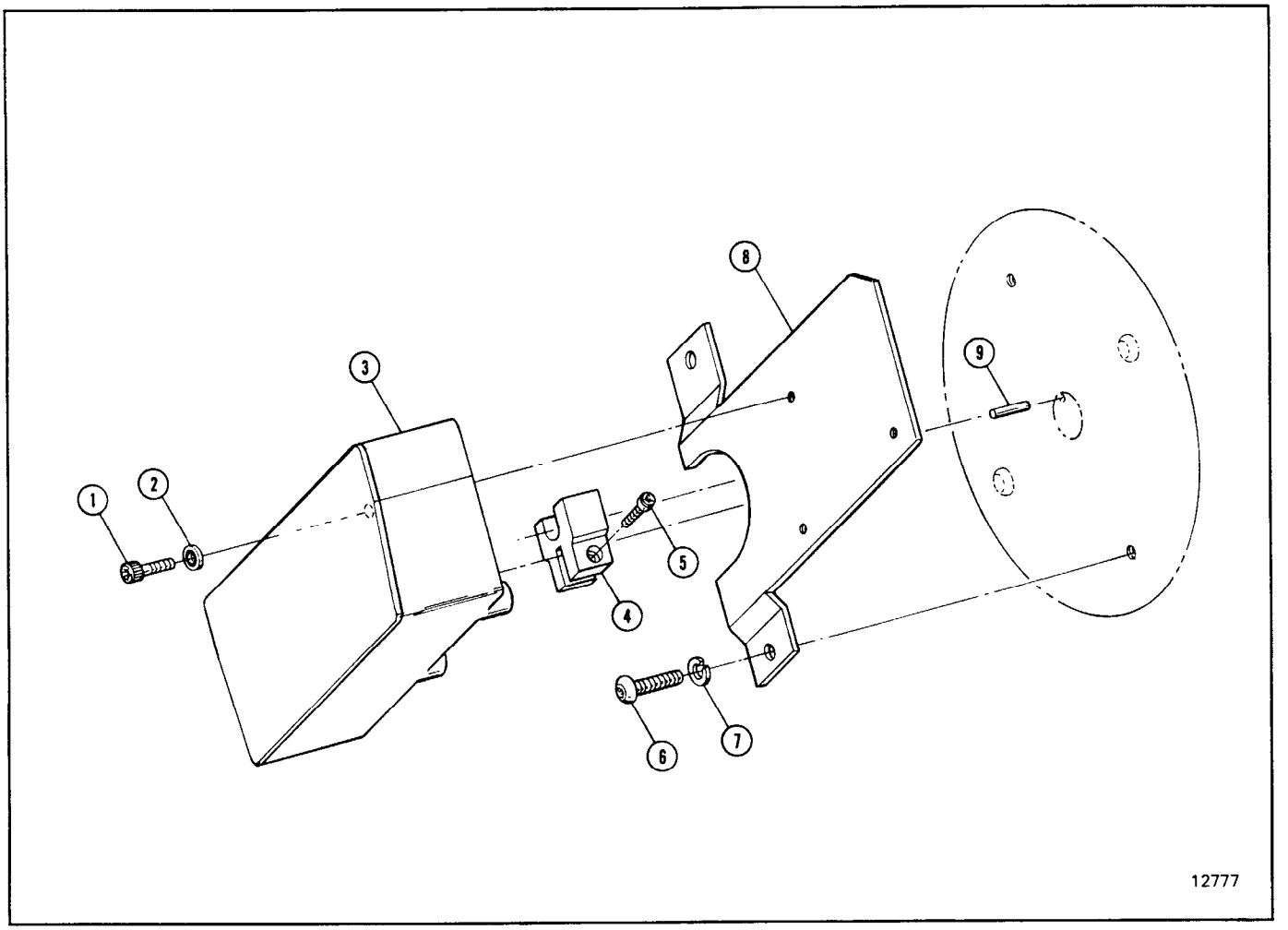


Figure 9-13. Screw Type Limit Switch.

Ref. No.	Part Number	Description	Qty. Req'd.
1	*	Hex Socket Head Cap Screws (#10-24 x ¾ Pltd.)	3
2	*	O Ring with Washer (#10 Sealing Washer)	3
3	900-1301	Screw Type Limit Switch	1
4	900-1302	Yoke	1
5	*	Hex Socket Head Cap Screw (#10-24 x ¾)	1
6	*	Hex Socket Round Head Cap Screws (5/16 - 18 x ¾)	2
7	*	Regular Spring Lock Washers (5/16 Pltd.)	2
8	900-1303	Mounting Plate	1
9	*	Spring Roll Pin (⅛ x 1 Pltd.)	1

* Not available as individual parts.

PARTS ORDERING INFORMATION

The use of replacement parts other than INGERSOLL-RAND Material Handling will invalidate the Company's warranty. For prompt service and genuine INGERSOLL-RAND Material Handling parts, provide your nearest Distributor with the following:

1. Complete hoist model number, serial number motor horsepower, voltage, phase, frequency and capacity of hoist on which the parts are to be used.
2. Part number and part description as shown in this manual.
3. Quantity required.

For your convenience and future reference it is recommended that the following information be recorded.

Hoist Model Number.....

Hoist Serial Number.....

Date Purchased.....

Return Goods Policy

Ingersoll-Rand will not accept any returned goods for warranty or service work unless prior arrangements have been made and written authorization has been provided from the location where the goods were purchased.

Hoists returned with opened, bent or twisted hooks, or without wire rope and hooks, will not be repaired or replaced under warranty.

NOTICE

• Continuing improvement and advancement of design may cause changes to this hoist which are not included in this manual. Manuals are periodically revised to incorporate changes. Always check the manual edition number on the front cover for the latest issue.

When the life of the hoist has expired, it is recommended that the hoist be disassembled, degreased and parts separated as to materials so that they may be recycled. For additional information contact:

Ingersoll-Rand Material Handling
2724 Sixth Avenue South
Seattle, Wa 98124 USA
Phone: (206) 624-0466
Fax: (206) 624-6265
or
Ingersoll-Rand Material Handling
Samiia, Douai Operations
111, avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 27-93-08-08
Fax: (33) 27-93-08-00

NOTICE

• Mineral based oils are recyclable, however, some oils such as glycols may be extremely toxic and must be identified and disposed of at an approved waste or disposal site in accordance with all local, state and federal laws and regulations.

Recommended Spare Parts for your Ingersoll-Rand Hoist

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 set of load brake friction washers
Brake discs
One motor brake solenoid
One contactor
Five control circuit fuses
One transformer
One wire rope assembly

When ordering parts always furnish complete hoist model number, serial number, motor horsepower, voltage, phase, frequency and capacity of hoist on which the parts are to be used.

HOIST AND WINCH LIMITED WARRANTY

Ingersoll-Rand Company (I-R) warrants to the original user its Hoists and Winches (Products) to be free of defects in material and workmanship for a period of one year from the date of purchase.
I-R will repair, without cost, any Product found to be defective, including parts and labor charges, or at its option, will replace such Products or refund the purchase price less a reasonable allowance for depreciation, in exchange for the Product. Repairs or replacements are warranted for the remainder of the original warranty period.

If any Product proves defective within its original one year warranty period, it should be returned to any Authorized Hoist and Winch Service Distributor, transportation prepaid with proof of purchase or warranty card.

This warranty does not apply to Products which I-R has determined to have been misused or abused, improperly maintained by the user, or where the malfunction or defect can be attributed to the use of non-genuine I-R parts.

I-R makes no other warranty, and all implied warranties including any warranty of merchantability or fitness for a particular purpose are limited to the duration of the expressed warranty period as set forth above.
I-R's maximum liability is limited to the purchase price of the Product and in no event shall I-R be liable for any consequential, indirect, incidental, or special damages of any nature rising from the sale or use of the Product, whether based on contract, tort, or otherwise.

Note: Some states do not allow limitations on incidental or consequential damages or how long an implied warranty lasts so that the above limitations may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

IMPORTANT NOTICE

It is our policy to promote safe delivery of all orders.
This shipment has been thoroughly checked, packed and inspected before leaving our plant and receipt for it in good condition has been received from the carrier. Any loss or damage which occurs to this shipment while enroute is not due to any action or conduct of the manufacturer.

VISIBLE LOSS OR DAMAGE

If any of the goods called for on the bill of lading or express receipt are damaged or the quantity is short, do not accept them until the freight or express agent makes an appropriate notation on your freight bill or express receipt.

CONCEALED LOSS OR DAMAGE

When a shipment has been delivered to you in apparent good condition, but upon opening the crate or container, loss or damage has taken place while in transit, notify the carrier's agent immediately.

DAMAGE CLAIMS

You must file claims for damage with the carrier. It is the transportation company's responsibility to reimburse you for repair or replacement of goods damaged in shipment. Claims for loss or damage in shipment must not be deducted from the Ingersoll-Rand invoice, nor should payment of Ingersoll-Rand invoice be withheld awaiting adjustment of such claims as the carrier guarantees safe delivery.
You may return products damaged in shipment to us for repair, which services will be for your account and form your basis for claim against the carrier.

United States Office Locations

For Order Entry and Order Status:

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Distribution Center
510 Hester Drive
P.O. Box 618
White House, TN 37188
Phone: (615) 672-0321
Telex: 786573
Fax: (615) 672-0801

For Technical Support:

Ingersoll-Rand
Material Handling
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Seattle, WA
98124-0046
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Telex: 328795
Fax: (206) 624-6265

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Farmington Hills, MI 48335
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Fax: (313) 476-6670

Houston, TX
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Houston, TX 77008
Phone: (713) 864-3700

Los Angeles, CA
5533 East Olympic Blvd.
Los Angeles, CA 90022
Phone: (213) 725-2826

Milwaukee, WI
12311 W. Silver Spring Dr.
Milwaukee, WI 53225
Phone: (414) 461-0973

Philadelphia, PA
900 E. 8th Ave., Suite 103
P.O. Box 425
King of Prussia, PA 19406
Phone: (215) 337-5930

International

Offices and distributors in principal cities throughout the world. Contact the nearest Ingersoll-Rand office for the name and address of the distributor in your country or write/fax to:
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Material Handling
P.O. Box 24046 Seattle, WA 98124-0046 USA
Phone: (206) 624-0466
Telex: 328795
Fax: (206) 624-6265

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Rexdale, Ontario
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Fax: (416) 675-6920

Regional Sales Offices

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T2R 0C7
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British Columbia
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V7C 5C7
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