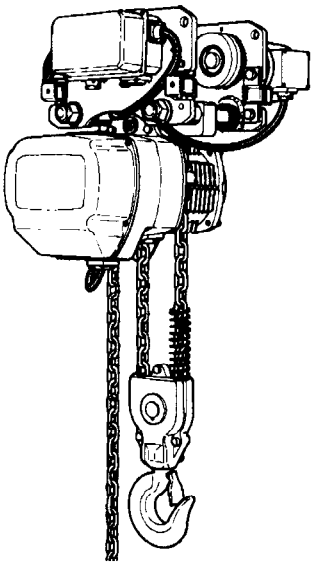
TROUBLESHOOTING MANUAL
for
"LECTRA LINK" LE SERIES
ELECTRIC CHAIN HOISTS



This document is a supplement to and should be used in conjunction with the Lectra-Link LE Hoist, Operation and Maintenance manual form number MHD56022.

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

TROUBLESHOOTING INGERSOLL-RAND "LECTRA-LINK" ELECTRIC HOIST POWER AND CONTROL SYSTEMS

TABLE OF CONTENTS

INTRODUCTION

Ingersoll-Rand Electric chain hoists have two major electrical systems. These are the:

a. Power system
b. Control system

Some basic knowledge of how these systems work is necessary for troubleshooting hoists that are not operating as they should. Electrical power with voltage and phase matching the hoist being tested and certain basic tools and measuring equipment are also required. It is recommended that shielded tools always be used when working on the hoist electrical components. It is recommended that persons working on Lectra-Link hoists know the hoist and trolley (when used) electrical specifications.
Refer to the Lectra-Link Motor Data section in this manual for the electrical specifications for the various models.

If specified at the time of order hoists can be wired for either 230 or 460 volt prior to shipment. The operating voltage is provided on a tag attached to the power supply cord. If the tag has been removed or is missing check the hoist wiring to determine voltage prior to completing electrical connections.

⚠WARNING

• Do not use 230 volt supply on 460 volt hoist or vise-versa.
• Electrical installation should be performed by licensed electricians in accordance with the latest edition of the National Electrical Code (ANSI/NFPA 70) and any applicable local, state and national electrical codes and ordinances.

Electrical Connection
The hoist should be installed and connected by a licensed electrician who is knowledgeable with the NEC article 430 and local regulations. He should make sure that the voltage and frequency of the electrical supply correspond with the data stamped on the hoist nameplate before connecting the hoist.
In addition the following points are of primary importance when installing and connecting the hoist:

Restricted Ventilation will cause a hoist motor to operate at a higher than desired temperature. Dirt, dust, chemicals, snow, oil etc. all can cause a problem. Avoid installing hoists where air flow will be restricted or excessive ambient temperatures may be encountered.

Voltage Unbalance can cause excess temperature rise resulting in premature hoist motor failure. Periodically check voltage.

Electrical Connections if not tight and secure, will be an endless cause of trouble. During installation the electrician must make sure that all electrical connections including the ground connection are secure.

Moisture resulting from condensation or the elements may affect the operation of the hoist and appropriate precautions should be taken. When using hoists outdoors or in washdown applications the electrical cable entries into the terminal box must be directed downward to prevent water from entering the conduit box. Any unused cable entries must be closed off properly. Ensure all joints are sealed and openings are plugged.

POWER SYSTEM

General
The power system for **Ingersoll Rand** Lectra-Link electric chain hoists consists of the hoist motor and, when used, the trolley motor plus all components that route or interrupt the flow of power from the power source to the motor or motors. An additional component that monitors the power on three phase hoists is the non-reverse relay. Refer to the Wiring Diagram Chart for the appropriate wiring diagram.

Motors
The Lectra-Link hoist and trolley motors are induction motors which means that the rotors are not wound with wire. The wire wound part of the motor, the stationary part, is called the stator. The cylindrical rotors have longitudinal bars of metal embedded in them. Currents are induced (set up) in these bars by the magnetic field created by the stator windings. It is the interaction of the two magnetic fields that cause the rotor to rotate.

Connections from the stator to the rest of the power system are different depending on the hoist model. Existing **Ingersoll-Rand** three phase hoists are equipped with motor winding over temperature protective devices called microthermostats. These are explained in the "Control System" section.

Non-reverse Relay
Refer to item 2 on Electrical Parts Dwg. MHTPA0538.
The non-reverse relay module is only used on three phase hoists. The non-reversing relay protects the hoist from damage due to incorrect connections of the power supply. If the three power wires are connected incorrectly or if the motor is wired single phase (only two power wires are connected), the motor will not start. Make sure all three wires are connected. If the hoist still does not start, reverse any of the three power wires for a correct three phase connection. It is located under the terminal block. It is a small circuit board containing resistors, a capacitor and a clear plastic enclosed relay. On LE Series hoists the plugging relay is located under the terminal block. It is part of the control system.

The non-reverse relay is connected to each of the three incoming power lines. It is connected so that when the hoist is connected to the user's power source and the phasing of the three power lines is correct the hoist lifts when the "UP" button on the pendant is pushed.

Without the non-reverse relay, it would be possible for the hoist to lower when the "UP" button is pushed. If the power connections are incorrect, the non-reverse relay contacts open and there is no control power to the hoist control circuit. (Refer to the normally closed LX contacts towards the upper right corner of schematic drawing MHTPA0537). The trolley, however, will operate since the LX contacts do not effect the trolley control circuit.

Electromagnetic Contactors
Refer to items 8 and 12 on Electrical Parts Dwg. MHTPA0538.
The electromagnetic contactors are relays whose contacts are rated for motor starting current which is typically five times the motor full load current. Their contacts are shown on the lower left side of schematic drawing MHTPA0537.

When the contactor coils in the control circuit are energized, the contacts are closed, the motor windings are powered, the brake releases and the motor runs. The use of contactors also permits the use of 110 volt control circuitry which is safer and more economical than operating control components at the line voltage of 230 volts or more. The 120 volt SP (single phase) hoists do not use contactors.

Limit Switch (Used only on three phase models)
Refer to item 9 on Electrical Parts Dwg. MHTPA0538.
The limit switch is actuated by the limit paddle on the bottom of the hoist. At the upper limit of hoist travel the power portion of the up limit switch opens and the hoist stops its upward travel. (Refer to the limit switch LSU, LSD to the left of the hoist motor on schematic MHTPA0537). The hoist also reverses direction on models with a plugging relay.
This is explained in the "Control System" section. Hoist downward motion is stopped by the down limit switch to prevent the chain from reeving it's way out of the hoist. The plugging relay does not operate at the down limit.

NOTICE

• Three phase motors will not operate with only one phase connected. This is why it is not necessary to open all three lines to stop the motor.

CONTROL SYSTEM

General

The control system is shown in the center of schematic MHTPA0537. The control system is powered from a transformer which converts the line voltage to 110/120 volts. The transformer power is routed to the common connection in the pendant where it is connected to the selected contactor via the operator selected push-button. If there is a closed circuit between the depressed button and the other side of the transformer (top of the transformer), the contactor corresponding to the button pushed is energized and power is routed to the motor. The motor selected will not run, however, if certain protective devices in the control circuit and/or the power circuit are open. These devices are the limit switch, non-reverse relay, plugging relay or microthermostats (sometimes referred to as klixons which is a trade name).

Transformer

Refer to item 6 on Electrical Parts Dwg. MHTPA0538.
A transformer in its most basic form consists of two windings on the same metallic core. When alternating current is applied to one winding it causes the other winding to be energized. By controlling the number of turns on each winding it is possible to step up or step down the voltage level from one winding to the other.
The control power transformer, in the hoist electrical compartment steps down the users line voltage to 110 volts. Transformers used in **Ingersoll-Rand** electric three phase chain hoists have dual voltage selectability as do the motors so that the same hoist can be operated at either 230 or 460 volts.

Pendant

All pendants used on Lectra Link hoists use momentary contact push-buttons which means that the contacts are only closed when depressed by the operator. Most pendants use pairs of buttons that are mechanically interlocked so that only one of the pair can be closed at one time. For certain applications, a second source pendant (Ductowire) which is not available with mechanically interlocked push-buttons is used. These pendants, however, can be electrically interlocked.

Electrical interlocking is accomplished with push-buttons that each have two sets of contacts, one normally open and one normally closed set. The control power for each push-button is then routed through the normally closed contact of the other push-button of the interlocked pair (up-down, forward-reverse, etc.) so that pushing one button cuts off the power to the other.

Electromagnetic Contactors

Refer to circles with UP, DOWN, FWD, and REV on schematic MHTPA0537.
The coils of the contactors are in the control circuit and are designed to operate at the voltage provided by the control side of the control power transformer. If all the devices in line with the contactor are closed between the top and bottom terminals of the transformer, the contactor coil is energized, the contacts in the power circuit close and the motor runs in the direction matching the push-button pressed.

Microthermostats (Klixons®)

Refer to schematic MHTPA0537.
The microthermostat for the hoist is in line with the up contactor coil of the hoist. If the hoist motor is overloaded for a period of time long enough for the motor windings to overheat, the microthermostat opens the contactor circuit and the hoist stops. Since the microthermostat does not affect the down circuit the hoist can be lowered and the overload removed.

The microthermostat for the trolley works in the same way as the one for the hoist except that it is in the path between both the forward and reverse trolley contactors.
If the trolley motor overheats and the trolley must be moved to lower the load, the operator has to wait until the trolley motor cools down.

Limit Switch

Refer to item 9 on Electrical Parts Dwg. MHTPA0538.
The control section of the limit switch and the power section of the limit switch are part of the same physical unit. The up contacts of both the power and control circuits operate together when the hoist reaches its upper limit of travel. The control section of the limit switch operates in conjunction with the plugging module to reverse the hoist direction when the upper limit is reached.

Plugging Module

Refer to item 2 on Electrical Parts Dwg. MHTPA0538 and the two locations noted as PLUG on schematic MHTPA0537.

The plugging module is the clear plastic enclosed relay mounted in the terminal block. It looks similar to the non-reverse relay, but is not mounted on a circuit board and does not contain resistors and a capacitor. In addition it has some wires with colored stripes connected to it. All the leads connected to the non-reverse relay are solid colored.

When the hoist reaches the upper limit and the operator is still pushing on the "UP" button, limit switch contacts M/N and L/K close. Contacts M/N in conjunction with the "UP" push-button connect the plugging relay coil to the control circuit power and PLUG is energized. The PLUG contacts in series with the up contactor coil open and the hoist stops its upward motion. At the same time the L/K contacts on the limit switch, which are now closed, complete the circuit to the down contactor coil through the "UP" push-button, the down power contacts close and the hoist reverses direction almost instantaneously (known as plugging). The hoist will continue to move down until the operator stops pushing the "UP" button.

TROUBLESHOOTING

General

An understanding of this section will be a lot easier after reading the sections on how the power and control systems work. For instance, if it is known that the non-reverse relay only affects the hoist controls on a hoist and trolley system, then the customer, who may have just installed a hoist, should be asked if he has tried reversing two of the power leads if the reported problem is that the trolley runs but the hoist does not. This may not be the problem, but it's a good place to start.

Hoist Only System

Refer to Chart 1.

The hoist control circuitry is more complex than the trolley control circuitry because it depends on the non-reverse relay and the plugging module. The trouble-shooting chart starts with the case of a hoist that does not run at all. A specific hoist only problem may be:

Hoist only goes up or hoist only goes down.

> Since the transformer and non-reverse relay are okay (If either is bad, hoist will not go in either direction), enter the troubleshooting chart at the block that starts "CHECK FOR 110V AT LEAD IB...." if hoist will not go up. If hoist does not go down, then check for 110V at point where WH and WH/BK leads connect to down contactor while "DOWN" button is pushed. If not hot, replace push-button....if hot, replace contactor. DO NOT FORGET TO CHECK ALL RELATED CONNECTIONS FIRST.

Hoist and Trolley System

Refer to Chart 2.

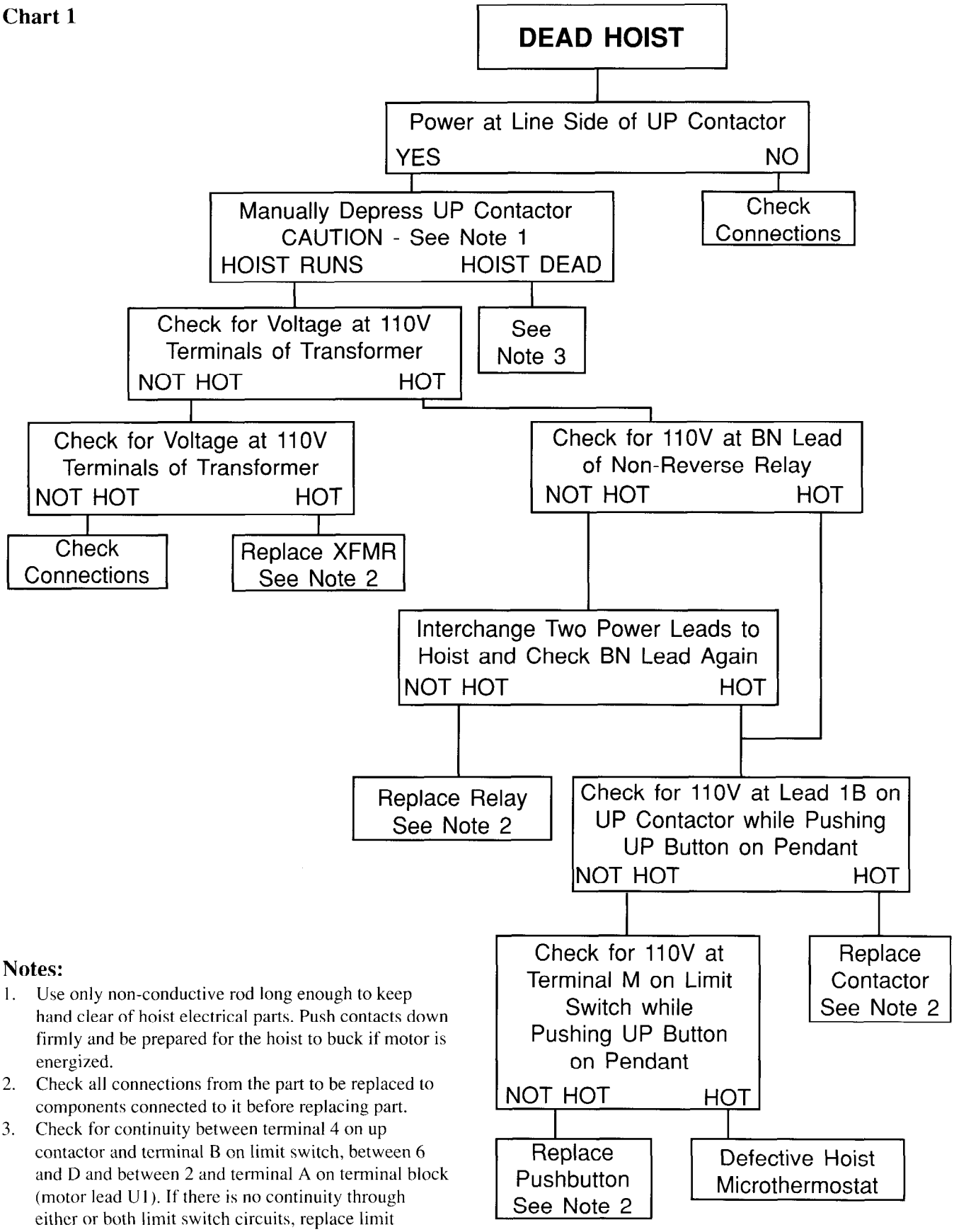
If trolley and hoist are still dead with 110 volts present at transformer low voltage terminals, most likely cause is lack of control voltage at pendant. The point that is common to all push-buttons in pendant (all the terminals connected together by black wires inside the pendant) is connected to the transformer by the black wire in the pendant cable.

Check for pendant problem as follows:

> Set meter for measuring 110V AC. Put one lead on transformer terminal that does not have black wire to pendant connected to it. Put other lead on terminal M of limit switch. Push "UP" button. If there is no voltage at terminal M then there is a high probability that there is no voltage at common side of the push-buttons. (If only the "UP" push-button were defective, the other motion controls would work.) Check for bad connections in pendant.

TROUBLESHOOTING CHART

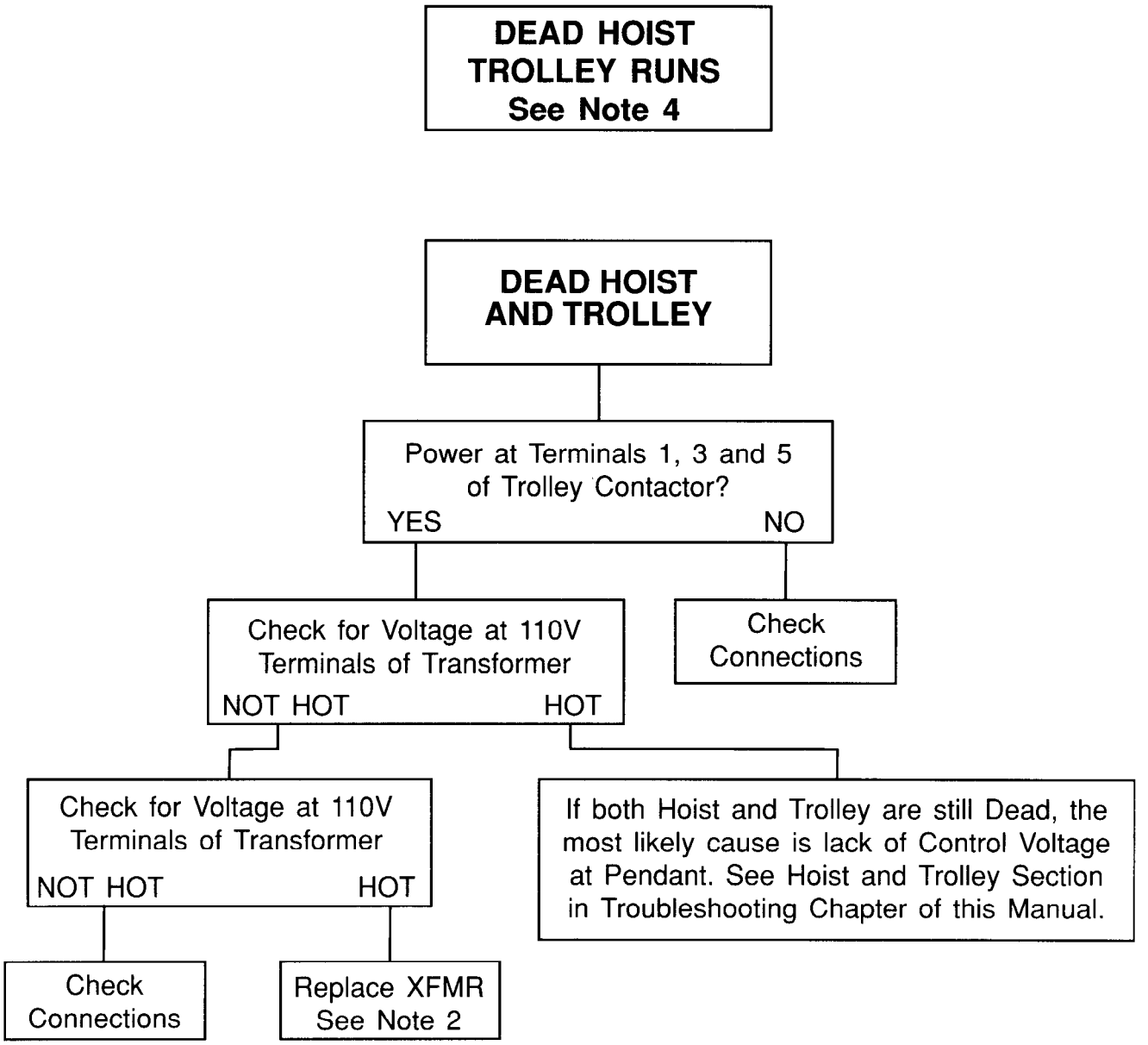
Chart 1



Notes:

1. Use only non-conductive rod long enough to keep hand clear of hoist electrical parts. Push contacts down firmly and be prepared for the hoist to buck if motor is energized.
2. Check all connections from the part to be replaced to components connected to it before replacing part.
3. Check for continuity between terminal 4 on up contactor and terminal B on limit switch, between 6 and D and between 2 and terminal A on terminal block (motor lead U1). If there is no continuity through either or both limit switch circuits, replace limit switch. If there is continuity between all three pairs of points, refer to section on motor testing.

Chart 2



Notes:

1. Use only non-conductive rod long enough to keep hand clear of hoist electrical parts. Push contacts down firmly and be prepared for the hoist to buck if motor is energized.
2. Check all connections from the part to be replaced to components connected to it before replacing part.
3. Check for continuity between terminal 4 on up contactor and terminal B on limit switch, between 6 and D and between 2 and terminal A on terminal block (motor lead U1). If there is no continuity through either or both limit switch circuits, replace limit switch. If there is continuity between all three pairs of points, refer to section on motor testing.
4. Interchange any two power supply leads. If hoist still does not run refer to troubleshooting procedure for hoist only system. If hoist runs when contactor is manually depressed, skip to voltage check at lead 1B on up contactor.

TROUBLESHOOTING

This section provides the information necessary for troubleshooting this hoist. The troubleshooting guide provides a general outline of problems which could be experienced with normal use of this hoist. It lists the symptom, the possible cause, and the possible remedy for the trouble being experienced.

SYMPTOM	CAUSE	REMEDY
Hoist will not operate.	No power to hoist.	Check connections, circuit breaker switches in power supply lines.
	Hoist is wired wrong or phasing is reversed causing nonreversing relay to stop hoist.	Interchange any two power supply leads to change phasing of hoist.
	Blown fuse.	Install regular fuse (never use ordinary wire or oversized fuse.)
	Incorrect voltage or frequency.	Check voltage and frequency rating on hoist nameplate against power supply. Also check wiring. Check for voltage drop at hoist power supply connection while hoist is operating under load.
	Loose or broken connections in hoist, power supply or push button.	Disconnect hoist from power source. Remove control cover and push-button cover. Check all connections and check continuity of each wire.
	Contactor failure.	Check contactors for wear or burn marks.
	Defective transformer.	Check for open or shorted coil winding.
	Hoist is overloaded.	Check weight of load.
	Motor is burned out.	Replace motor.
	Motor brake is not releasing. (Motor will hum but not rotate.)	Motor brake lining is "frozen" in drum. Remove motor end cover and remove rust, etc., from brake.
Load does not stop when hoist is stopped.	Motor brake is slipping.	See instructions 5.8 in Operation and Maintenance Manual Form MHD56022.
	Hoist is overloaded.	Reduce load to within rated capacity.
Hoist will not lift load, is over heating, and/or does not lift at rated speed.	Hoist is overloaded.	Reduce load to within rated capacity.
	Rotor is dragging in stator.	Check for worn motor bearings.
	Motor brake is too tight.	See adjustment instructions 5.8 in Operation and Maintenance Manual Form MHD56022.
	Low voltage.	Check voltage at hoist power source connections with hoist under load. Raise voltage to within 10% of specified hoist voltage.
	Excessive jogging.	Reduce frequency of jogging.
	Motor brake is not releasing.	See Instructions 5.8 in Operation and Maintenance Manual Form MHD56022.
Hook raises but will not lower.	Down circuit is open.	Check circuit for loose connections. Check down limit switch for proper operation.
	Broken or loose conductor in push-button cable or control.	Disconnect power supply. Check each conductor in cable. If loose, tighten. If broken, replace cable.
	Faulty hoist control switch.	If controller contactor does not activate after steps 1 and 2 above, then check for open or short in controller coil winding. If controller contactor does not activate, then check connection and wiring to motor for discontinuity. Check for open or short in motor winding.

SYMPTOM	CAUSE	REMEDY
Hook lowers but will not raise.	Hoist is overloaded.	Reduce load to within rated capacity.
	Low voltage.	Check voltage at hoist power source connection with hoist under load. Raise voltage to within 10% of specified hoist voltage.
	Up circuit open.	Check circuit for loose connections. Check upper limit switch for proper operation.
	Broken or loose conductor in push-button cable or control.	Disconnect power supply. Check each conductor in cable. If loose, tighten. If broken, replace cable.
	Faulty hoist control switch.	Refer to "Hook raises but will not lower" #3 above.
Motor brake noise.	Motor brake needs adjustment.	See instructions 5.8 in Operation and Maintenance Manual Form MHD56022.
	Broken brake lining.	Replace with new lining.
Load chain jumps on sheave or is making a snapping sound.	Worn or rusted chain. See instructions 5.6 in Operation and Maintenance Manual Form MHD56022 to determine allowable wear.	Replace only with Ingersoll-Rand load chain.
	Incorrect chain.	Replace with correct Ingersoll-Rand chain.
	Worn sheave or chain guide.	Replace with genuine Ingersoll-Rand parts.
	No oil on load chain.	Lubricate with "LUBRI-LINK" chain lube.
Trolley won't stop or trolley wheels slip.	Poor braking (motorized only.)	Repair and adjust brake.
	Angulation of beam.	Check and correct beam angulation.
	Oil or grease on track of beam.	Clean oil or grease from beam.
	Load off center.	Center load under beam.
Electrical leak.	Poor grounding.	Correct grounding.
	Track of beam is painted causing poor grounding.	Remove paint.
	Foreign matter or moisture is deposited on electrical parts.	Remove foreign material and/or dry electrical parts.
	Leak on power supply system.	Check all switches, connections, and circuit breakers in power supply line for damaged insulation or open contact with hoist frame part.
Oil leak.	Improper oil plug.	Install proper oil plug with gasket.
	Oil plug is loosened.	Tighten plug.
	No oil plug gasket.	Install new gasket.
	If leak occurs at place other than oil plug.	a. Check for loose bolts and tighten. b. Disassemble hoist and check thoroughly for cause. Repair or replace with new gaskets and seals and reassemble.

LECTRA-LINK HOIST AND TROLLEY MOTOR DATA

Hoist Motor

FRAME SIZE SPEED	HP	MOTOR OUTPUT (KW)	IP	INSUL CLASS	DUTY RATING (MIN)	POLE	VOLTAGE	Hz	CURRENT (Amps)	MOTOR RPM
1 Single	0.6	0.45	54	B	50	4	440 220	60	1.8 3.6	1680
1 Dual	0.6	0.45	54	B	40	2	440 220	60	2.0 3.9	3290
		0.15				6	440 220		1.2 2.4	1100
2 Single	1.0	0.08	54	B	50	4	440 220	60	1.2 2.4	1680
2 Dual	1.0	0.08	54	B	40	2	440 220	60	2.7 5.3	3350
		0.27				6	440 220		1.4 2.8	1120
3 Single	2.0	1.5	54	B	50	4	440 220	60	4.1 8.2	1680
3 Dual	2.0	1.5	54	B	40	2	440 220	60	4.3 8.5	3350
		0.05				6	440 220		2.3 4.6	1120
4 & 5 Single	4.0	3.0	54	B	50	4	440 220	60	7.8 15.6	1710
4 & 5 Dual	4.0	3.0	54	B	40	2	440 220	60	8.2 16.3	3300
		1.0				6	440 220		5.3 10.6	1100

Trolley Motor

FRAME SIZE SPEED	HP	MOTOR OUTPUT (KW)	IP	INSUL CLASS	DUTY RATING (MIN)	POLE	VOLTAGE	Hz	CURRENT	MOTOR RPM
1 to 2 tons	0.5	0.4	54	B	30	4	440 220	60	1.5 3.0	1680
3 to 15 tons	1.0	0.75	54	B	30	4	440 220	60	2.4 4.8	1700

WIRING DIAGRAM CHART

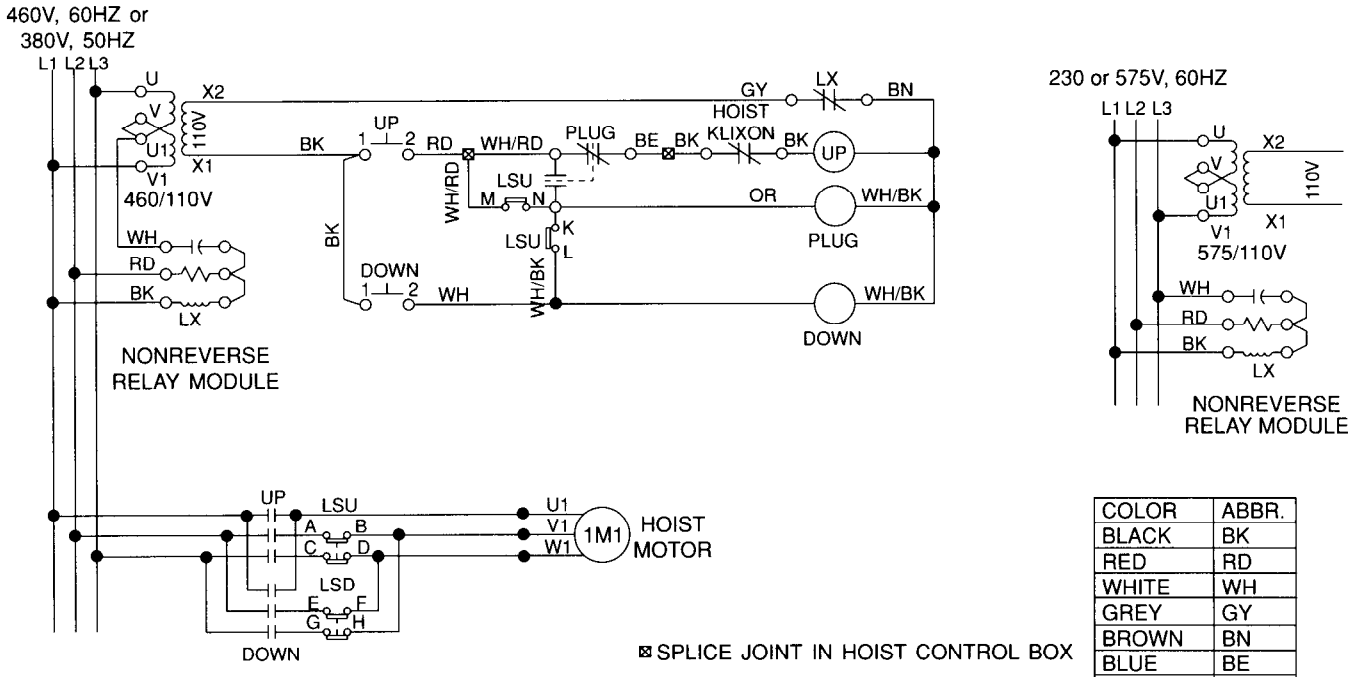
Model		Wiring Diagram Drawing Numbers					
LE Series Hoist Description	Volt	Basic	Main Line Disconnect	On/Off Push Button	Extra Function	Main Line Disconnect with On/Off Push Button	On/Off Push Button with Extra Function
LE1-5SH Frame Size 1 thru 5 Single Speed No Electric Trolley	380	20830 (2)				23065 (2)	
	460	18188 (2)		20614 (2)	20560 (4)	18659 (2)	19827 (4)
	575	*20207 (2)			22049 (4)	23066 (2)	
	575	21386 (2)					
LE1-5ST Frame Size 1 thru 5 Single Speed Electric Trolley	208					22241 (6)	
	380	19356 (4)		21385 (4)		23062 (4)	
	380	19739 (4)		23064 (4)			
	460	17610 (4)		19404 (6)	18230 (6)	18286 (4)	
	460			20786 (4)		18487 (6)	
	460					19698 (6)	
	575	18901 (4)		23059 (4)		23063 (4)	20017 (6)
LE1-3DH Frame Size 1 thru 3 Dual Speed No Electric Trolley	380	22131 (2)					
	460	13195 (2)				20611 (4)	22741 (4)
	460					22127 (2)	
	575	22132 (2)					
LE1-3DT Frame Size 1 thru 3 Dual Speed Electric Trolley	208						
	380	22133 (4)					
	460	18192 (4)				22128 (4)	
	575	22135 (4)					
LE4-5DH Frame Size 4 thru 5 Dual Speed No Electric Trolley	380	20841 (2)					
	380	22134 (2)					
	460	18190 (2)		20697 (2)		22129 (2)	19581 (4)
	460						22743 (4)
	575	22136 (2)				**20149 (2)	20191 (4)
	575						22066 (4)
LE4-5DT Frame Size 4 thru 5 Dual Speed Electric Trolley	208	21267 (4)					
	380	22137 (4)		20230 (6)			
	460	12565 (4)		17071 (6)		20726 (4)	
	460	***20839 (4)				21109 (4)	
	460					21388 (4)	
	575	22138 (4)					
LE1-3DTD Frame Size 1 thru 3 Dual Speed Hoist Dual Speed Trolley	208						
	380						
	460	22579 (4)					
	575						
LE4-5DTD Frame Size 4 thru 5 Dual Speed Hoist Dual Speed Trolley	380						
	460	22505 (4)	23051 (4)				
	460	22620 (4)					
	575	11536 (4)					

* CSA Version Hoist ** With Thermal Disconnect *** With Hoist Overload Relays

( ) Figures in parenthesis indicate the number of Pendant Buttons excluding ON/OFF buttons

Contact the factory for copies of wiring diagrams or configurations not listed

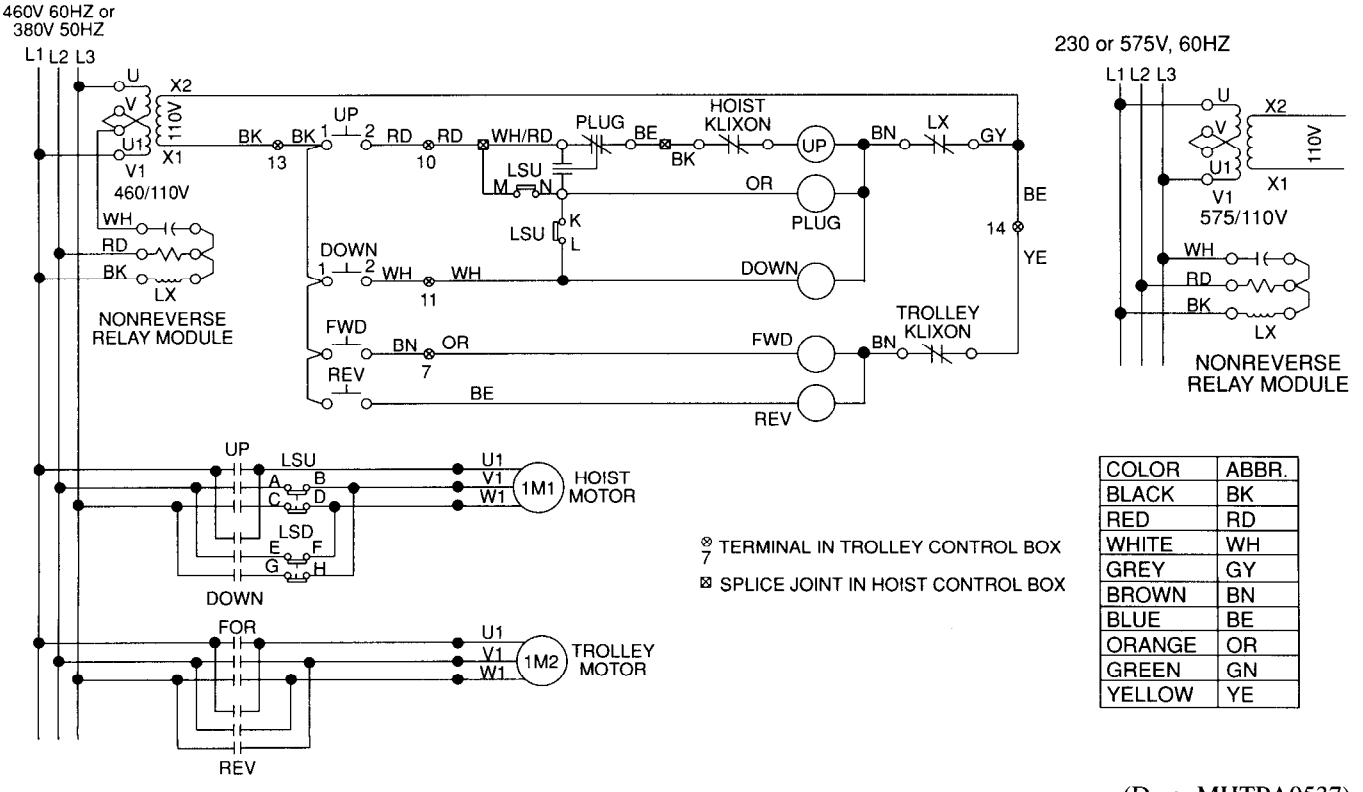
LE1S-LE5S Electric Hoist without Trolley
230-575V, 50-60HZ, 3 Phase



COLOR	ABBR.
BLACK	BK
RED	RD
WHITE	WH
GREY	GY
BROWN	BN
BLUE	BE
ORANGE	OR
GREEN	GN
YELLOW	YE

(Dwg. MHTPA0536)

LE1S-LE5S Electric Hoist with Trolley
230-575V, 50-60HZ, 3 Phase



COLOR	ABBR.
BLACK	BK
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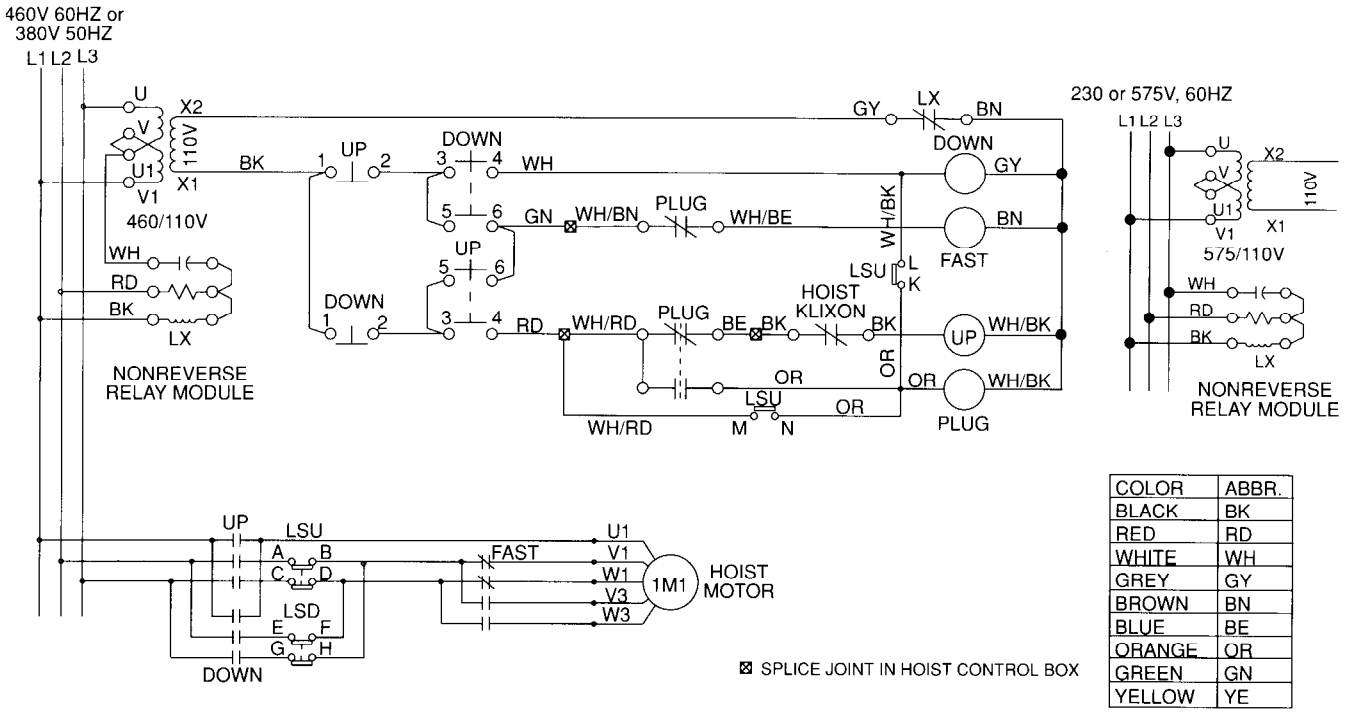
WHITE	WH
GREY	GY
BROWN	BN
BLUE	BE
ORANGE	OR
GREEN	GN
YELLOW	YE

(Dwg. MHTPA0537)

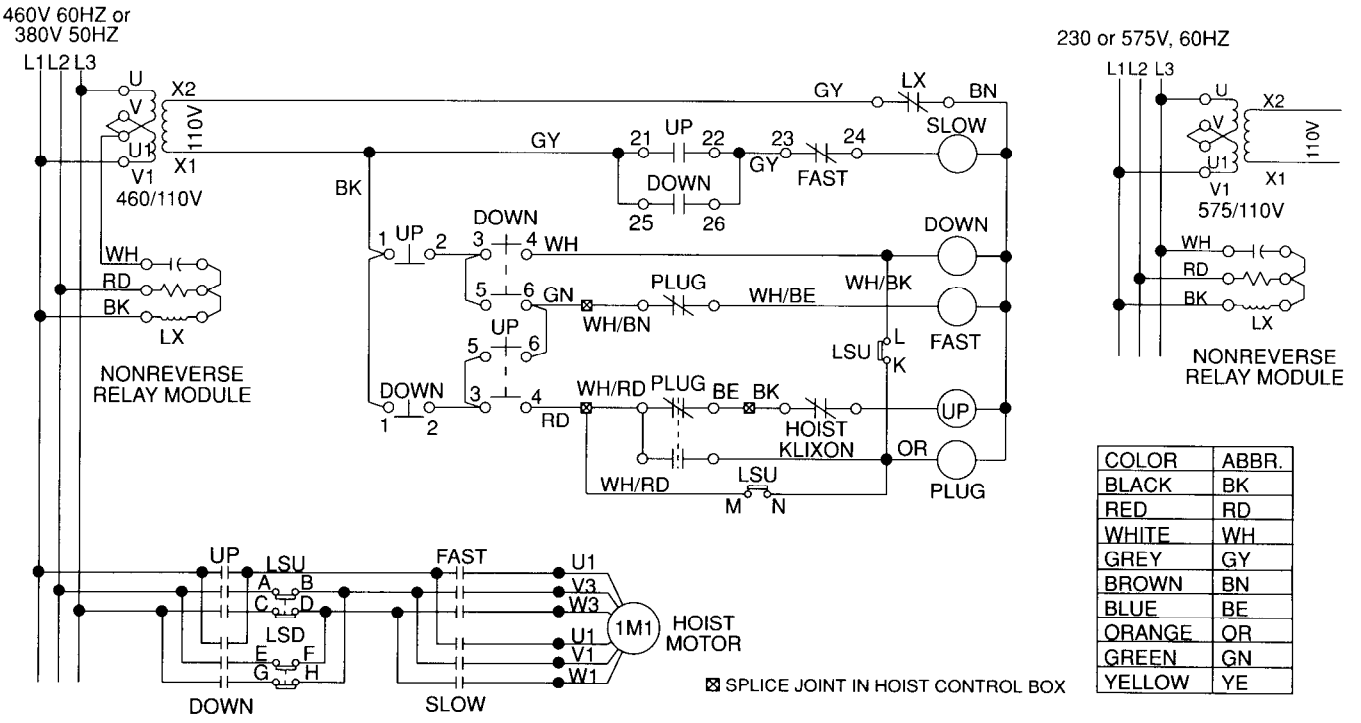
LE1D-LE3D Electric Hoist without Trolley
230-575V, 50-60HZ, 3 Phase



COLOR	ABBR.
BLACK	BK
RED	RD
WHITE	WH
GREY	GY
BROWN	BN
BLUE	BE
ORANGE	OR
GREEN	GN
YELLOW	YE

(Dwg. MHTPA0541)

LE4D-LE5D Electric Hoist without Trolley
230-575V, 50-60HZ, 3 Phase

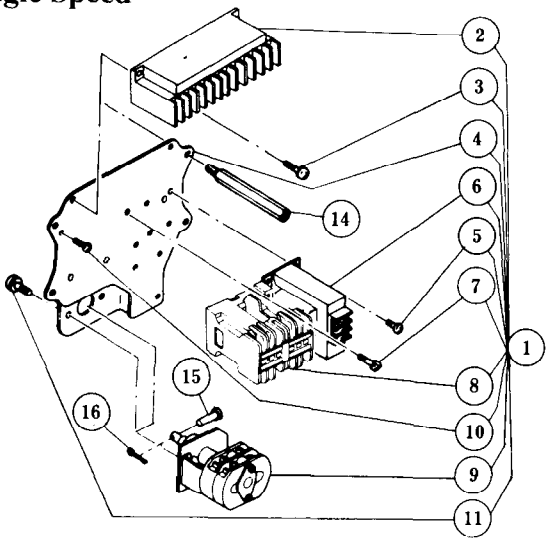


COLOR	ABBR.
BLACK	BK
RED	RD
WHITE	WH
GREY	GY
BROWN	BN
BLUE	BE
ORANGE	OR
GREEN	GN
YELLOW	YE

(Dwg. MHTPA0542)

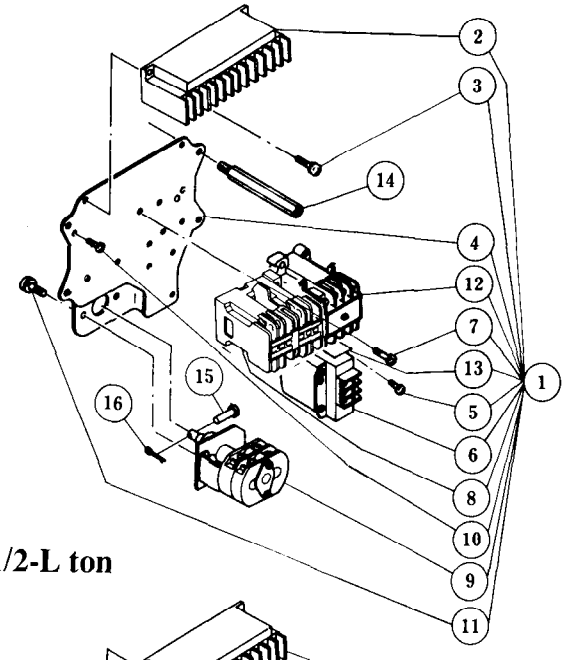
ELECTRICAL PARTS DRAWING

Single Speed

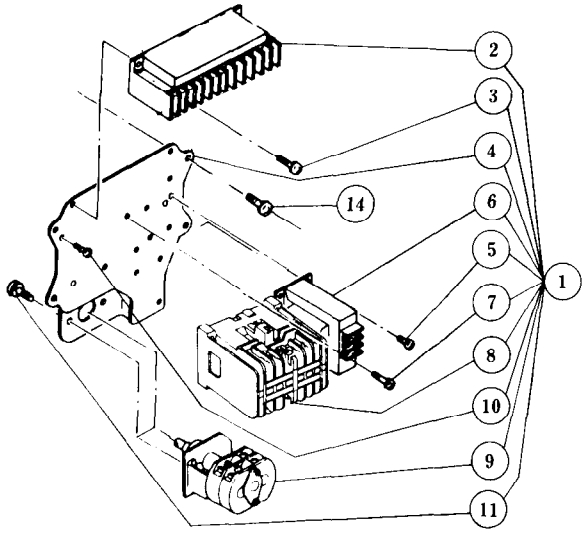


1/4 and 1/2-L ton

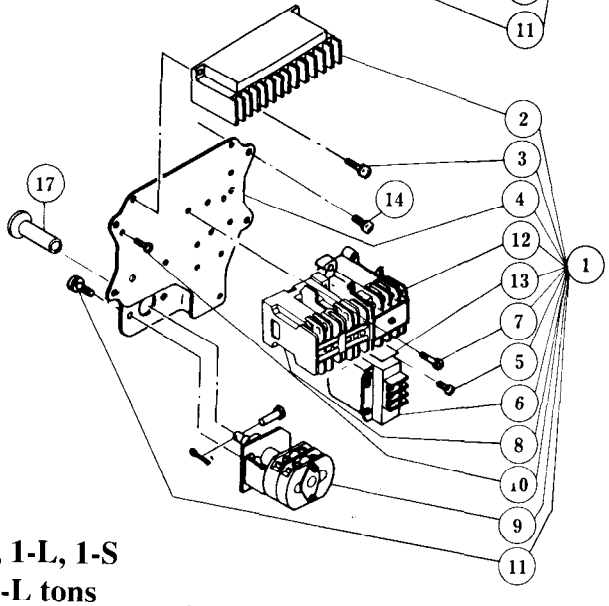
Dual Speed



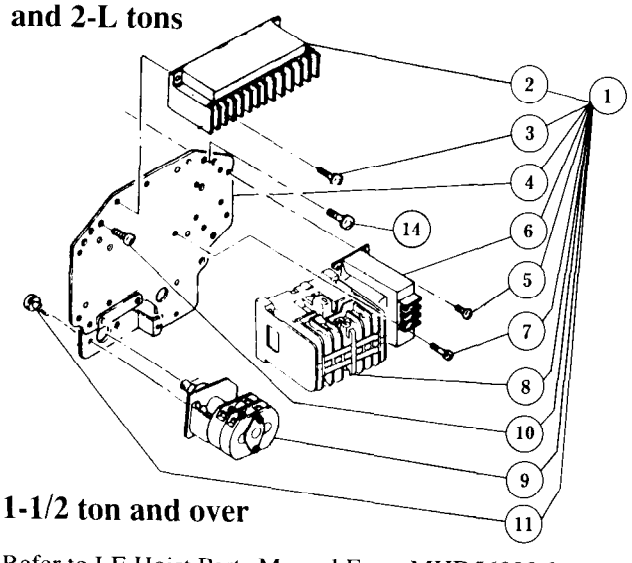
1/4 and 1/2-L ton



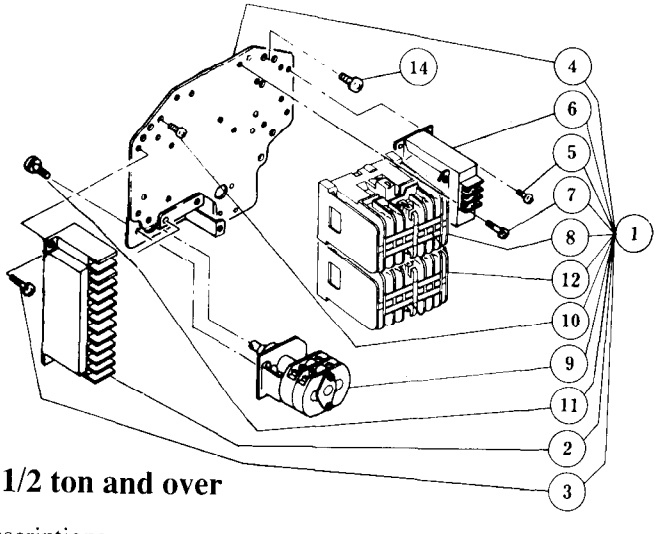
1/2-S, 1-L, 1-S and 2-L tons



1/2-S, 1-L, 1-S and 2-L tons



1-1/2 ton and over



1-1/2 ton and over

Refer to LE Hoist Parts Manual Form MHD56023 for parts descriptions.

(Dwg. MHTPA0538)

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