



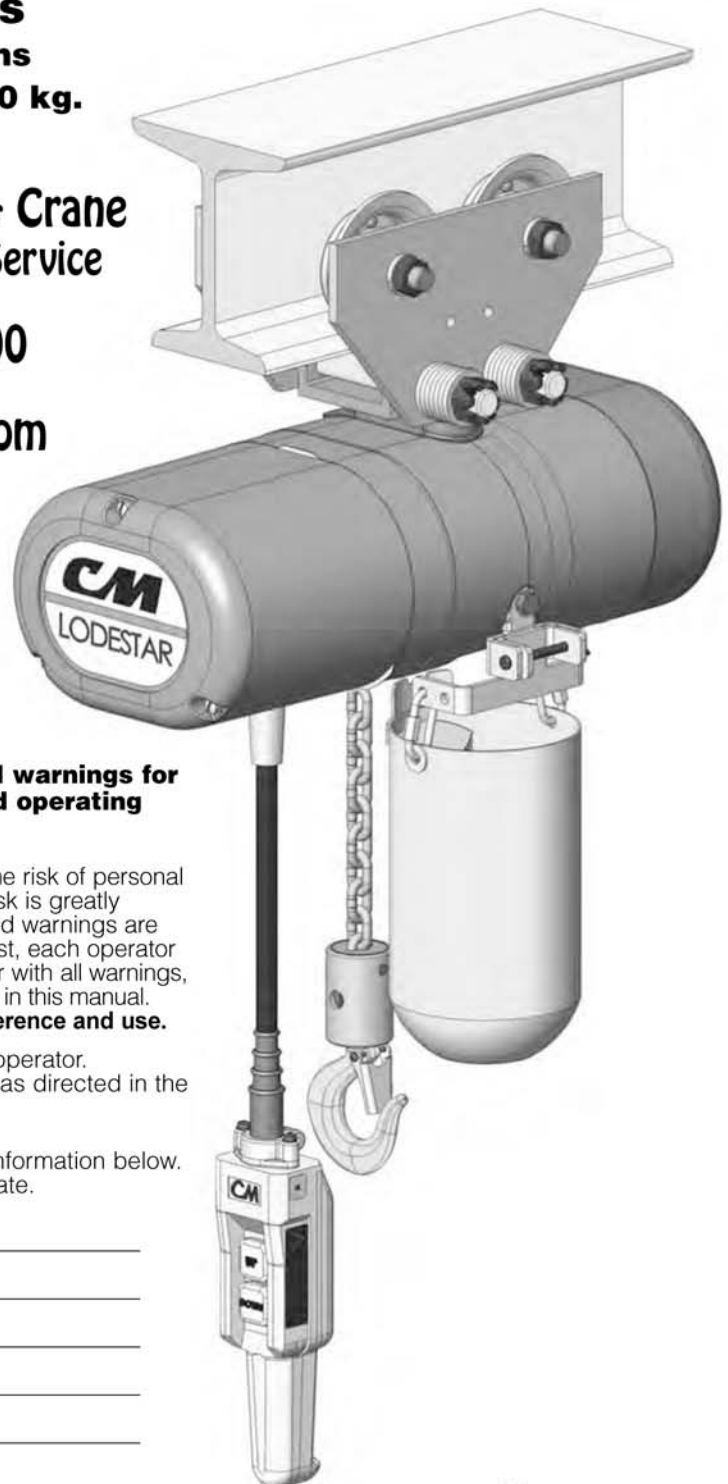
LODESTAR[®]

Rated Loads
1/8 through 3-Tons
125 kg through 3000 kg.

McLaughlin Hoist & Crane
Authorized Sales & Service

(636) 343-9700

www.stlcrane.com



Follow all instructions and warnings for inspecting, maintaining and operating this hoist.

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

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

Before using the hoist, fill in the information below. Refer to the hoist identification plate.

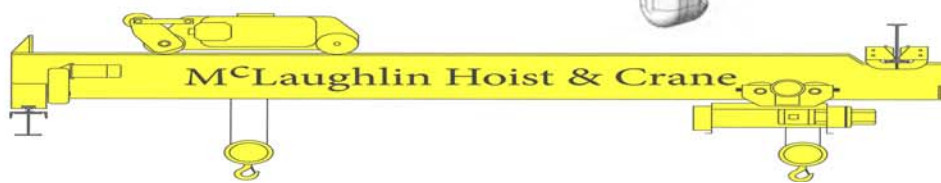
Model Number _____

Serial Number _____

Purchase Date _____

Voltage _____

Rated Load _____



SAFETY PRECAUTIONS

Each Lodestar Electric Hoist is built in accordance with the specifications contained herein and at the time of manufacture complied with our interpretation of applicable sections of the "American Society of Mechanical Engineers Code B30.16 "Overhead Hoists," the National Electrical Code (ANSI/NFPA 70) and the Occupational Safety and Health Act. Since OSHA states the National Electrical Code applies to all electric hoists, installers are required to provide current overload protection and grounding [on the branch circuit section] in keeping with the code. Check each installation for compliance with the application, operation and maintenance sections of these articles.

The safety laws for elevators, lifting of people and for dumbwaiters specify construction details that are not incorporated into the hoists. For such applications, refer to the requirements of applicable state and local codes, and the American National Safety Code for elevators, dumbwaiters, escalators and moving walks (ASME A17.1). Columbus McKinnon Corporation cannot be responsible for applications other than those for which CM equipment is intended.

*Copies of this standard can be obtained from ASME Order Department, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300, U.S.A.



THIS SYMBOL POINTS OUT IMPORTANT SAFETY INSTRUCTIONS WHICH IF NOT FOLLOWED COULD ENDANGER THE PERSONAL SAFETY AND/OR PROPERTY OF YOURSELF AND OTHERS. READ AND FOLLOW ALL INSTRUCTIONS IN THIS MANUAL AND ANY PROVIDED WITH THE EQUIPMENT BEFORE ATTEMPTING TO OPERATE YOUR LODESTAR HOIST.



WARNING

Usage of hoists that do not involve lifting of the load on the lower hook or using hoists in the inverted position without special precaution may cause an accident resulting in injury and/or property damage.

TO AVOID INJURY:

Consult Columbus McKinnon for information concerning using hoists in these applications.



WARNING

Improper operation of a hoist can create a potentially hazardous situation which, if not avoided, could result in death or serious injury. To avoid such a potentially hazardous situation, the operator shall:

1. **NOT** operate a damaged, malfunctioning or unusually performing hoist.
2. **NOT** operate the hoist until you have thoroughly read and understood this Operating, Maintenance and Parts Manual.
3. **NOT** operate a hoist which has been modified.
4. **NOT** lift more than rated load for the hoist.
5. **NOT** use hoist with twisted, kinked, damaged, or worn load chain.
6. **NOT** use the hoist to lift, support, or transport people.
7. **NOT** lift loads over people.
8. **NOT** operate a hoist unless all persons are and remain clear of the supported load.
9. **NOT** operate unless load is centered under hoist.
10. **NOT** attempt to lengthen the load chain or repair damaged load chain.
11. Protect the hoist's load chain from weld splatter or other damaging contaminants.
12. **NOT** operate hoist when it is restricted from forming a straight line from hook to hook in the direction of loading.
13. **NOT** use load chain as a sling, or wrap load chain around load.
14. **NOT** apply the load to the tip of the hook or to the hook latch.
15. **NOT** apply the load unless load chain is properly seated in the chain wheel(s) or sprocket(s).
16. **NOT** apply load if bearing prevents equal loading on all load supporting chains.
17. **NOT** operate beyond the limits of the load chain travel.
18. **NOT** leave load supported by the hoist unattended unless specific precautions have been taken.
19. **NOT** allow the load chain or hook to be used as an electrical or welding ground.

20. **NOT** allow the load chain or hook to be touched by a live welding electrode.
21. **NOT** remove or obscure the warnings on the hoist.
22. **NOT** operate a hoist on which the safety placards or decals are missing or illegible.
23. **NOT** operate a hoist unless it has been securely attached to a suitable support.
24. **NOT** operate a hoist unless load slings or other approved single attachments are properly sized and seated in the hook saddle.
25. Take up slack carefully - make sure load is balanced and load holding action is secure before continuing.
26. Shut down a hoist that malfunctions or performs unusually and report such malfunction.
27. Make sure hoist limit switches function properly.
28. Warn personnel of an approaching load.



CAUTION

Improper operation of a hoist can create a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. To avoid such a potentially hazardous situation, the operator shall:

1. Maintain a firm footing or be otherwise secured when operating the hoist.
2. Check brake function by tensioning the hoist prior to each lift operation.
3. Use hook latches. Latches are to retain slings, chains, etc. under slack conditions only.
4. Make sure the hook latches are closed and not supporting any parts of the load.
5. Make sure the load is free to move and will clear all obstructions.
6. Avoid swinging the load or hook.
7. Make sure hook travel is in the same direction as shown on the controls.
8. Inspect the hoist regularly, replace damaged or worn parts, and keep appropriate records of maintenance.
9. Use the hoist manufacturer's recommended parts when repairing the unit.
10. Lubricate load chain per hoist manufacturer's recommendations.
11. **NOT** use the hoist load limiting or warning device to measure load.
12. **NOT** use limit switches as routine operating stops unless allowed by manufacturer. They are emergency devices only.
13. **NOT** allow your attention to be diverted from operating the hoist.
14. **NOT** allow the hoist to be subjected to sharp contact with other hoists, structures, or objects through misuse.
15. **NOT** adjust or repair the hoist unless qualified to perform such adjustments or repairs.

HOIST SAFETY IS UP TO YOU...

WARNING

—DO NOT LIFT MORE THAN RATED LOAD.

1

CHOOSE THE RIGHT HOIST FOR THE JOB...

Choose a hoist with a capacity for the job. Know the capacities of your hoists and the weight of your loads. Then match them. The application, the size and type of load,

the attachments to be used and the period of use must also be taken into consideration in selecting the right hoist for the job. Remember the hoist was designed to ease

our burden and carelessness not only endangers the operator, but in many cases, a valuable load.



WARNING

—DO NOT OPERATE DAMAGED OR MALFUNCTIONING HOIST.
—DO NOT OPERATE WITH TWISTED, KINKED OR DAMAGED CHAIN.

2

INSPECT

All hoists should be visually inspected before use, in addition to regular, periodic maintenance inspections.

Inspect hoists for operational warning notices and legibility.

Deficiencies should be noted and brought to the attention of supervisors. Be sure defective hoists are tagged and taken out of



service until repairs are made.

Under no circumstances should you operate a malfunctioning hoist.

Check chain for gouged, twisted, distorted links and foreign material. Do not operate hoists with twisted, kinked or damaged chain.

Load chain should be properly lubricated.

Hooks that are bent, worn or whose open-

ings are enlarged beyond normal throat opening should not be used. If latch does not engage throat opening of hook, hoist should be taken out of service.

Check for misphasing — hook travel should correspond to control direction.



WARNING

—DO NOT PULL AT AN ANGLE. BE SURE HOIST AND LOAD ARE IN A STRAIGHT LINE.

3

USE HOIST PROPERLY



Be sure hoist is solidly held in the uppermost part of the support hook arc.



Be sure hoist and load are in a straight line. Do not pull at an angle.



Be sure load is hooked securely. Do not tip load the hook. Do not load hook latch. Hook latch is to prevent detachment of load under slack chain conditions only.



Do not use load chain as a sling. Such usage damages the chain and lower hook.



Do not operate with hoist head resting against any object. Lift the load gently. Do not jerk it.

WARNING

—DO NOT LIFT PEOPLE OR LOADS OVER PEOPLE.

4

LIFT PROPERLY

Do not lift co-workers with a hoist. Make sure everyone is clear of the load when you lift. Do not remove or obscure operational warning notices.



5

MAINTAIN PROPERLY

CLEANING: Hoists should be kept clean and free of dust, dirt, moisture, etc., which will in any way affect the operation or safety of the equipment.

LUBRICATION: Chain should be properly lubricated.

AFTER REPAIRS: Carefully operate the hoist before returning it to full service.



VIOLATION OF ANY OF THESE WARNINGS LISTED MAY RESULT IN SERIOUS PERSONAL INJURY TO THE OPERATOR OR NEARBY PERSONNEL BY RELEASED LOAD OR BROKEN HOIST COMPONENTS.

FOREWORD

This manual contains important information to help you properly install, operate and maintain your hoist for maximum performance, economy and safety.

Please study its contents thoroughly before putting your hoist into operation. By practicing correct operating procedures and by carrying out the recommended preventive maintenance suggestions, you will experience long, dependable and safe service.

After you have completely familiarized yourself with the contents of this manual, we recommend that you carefully file it for future reference.

The information herein is directed to the proper use, care and maintenance of the hoist and does not comprise a handbook on the broad subject of rigging. Rigging can be defined as the process of lifting and moving heavy loads using hoists and other information, we recommended consulting a standard textbook on the subject.

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GENERAL INFORMATION

SPECIFICATIONS

The Lodestar Electric Chain Hoist is a highly versatile materials handling device that can be used to lift loads that are within rated capacity. The mechanical features of these hoists include an alloy steel lift wheel, Load Protector, hardened steel chain guides, hardened steel gear train, life-time lubrication, forged steel hooks and lightweight aluminum frame. The electrical features include hoist-duty motor, rugged hoist brake, magnetic reversing contactor and voltage conversion board (dual voltage units). The hoist is available with hook or lug suspensions that are supplied separately. Table 1 summarizes the Lodestar Electric Chain Hoist models and the Series 635 Trolleys available. It should be noted that standard single speed hoists are available with 10 (3M), 15 (4.6M) and 20 (6.1M) foot lifts and the standard lift for two speeds hoists is 10 feet. However, hoists with longer lifts are available on a special, per order basis.

CM REPAIR/REPLACEMENT POLICY

All Columbus McKinnon (CM®) Lodestar Electric Chain Hoists are inspected and performance tested prior to shipment. If any properly maintained hoist develops a performance problem due to a material or workmanship defect, as verified by CM®, repair or replacement of the unit will be made to the original purchaser without charge. This repair/replacement policy applies only to Lodestar Hoists installed, maintained and operated as outlined in this manual, and specifically excludes parts subject to normal wear, abuse, improper installation, improper or inadequate maintenance, hostile environmental effects and unauthorized repairs/modifications.

We reserve the right to change materials or design if, in our opinion, such changes will improve our product. Abuse, repair by an unauthorized person, or use of non-CM replacement parts voids the guarantee and could lead to dangerous operation. For full Terms of Sale, see Sales Order Acknowledgement. Also, refer to the back cover for Limitations of Warranties, Remedies and Damages, and Indemnification and Safe Operation.

Table 1. Specifications

A. Lodestar Electric Chain Hoists					
Maximum Capacity Tons (kg)	Model	Lifting Speed Per Min. Feet (m)	Motor H.P. (kW)	Shortest Distance Between Hooks Inches (mm)	Net Weight Lbs. (kg)
<i>Single Speed 115-1-60</i>					
1/8 (125)	A	32 (9.8)	1/4 (.19)	14 1/4 (362)	53 (24)
1/8 (125)	AA	60 (18.4)	1/2 (.37)	14 1/4 (362)	64 (29)
1/4 (250)	B	16 (4.9)	1/4 (.19)	14 1/4 (362)	57 (26)
1/4 ((250g)	C	32 (9.8)	1/2 (.37)	14 1/4 (362)	65 (29.5)
1/2 (500)	E	8 (2.4)	1/4 (.19)	17 1/8 (454)	68 (31)
1/2 (500)	F	16 (4.9)	1/2 (.37)	14 1/4 (362)	64 (29)
1/2 (500)	J	32 (9.8)	1 (.75)	15 9/16 (395)	115 (52.3)
1 (1000)	H	8 (2.4)	1/2 (.37)	17 7/8 (454)	75 (34)
1 (1000)	L	16 (4.9)	1 (.75)	15 9/16 (395)	117 (53.2)
2 (2000)	R	8 (2.4)	1 (.75)	22 1/2 (572)	136 (61.8)
3 (3000)	RT	5.5 (1.9)	1 (.75)	25 (635)	161 (73.2)
<i>Single Speed 230/460-3-60 or 220/380-3-50 or 220/415-3-50</i>					
1/8 (125)	A	32 (9.8)	1/4 (.19)	14 1/4	67 (30.5)
1/8 (125)	AA	60 (18.4)	1/2 (.37)	14 1/4	74 (33.6)
1/4 (250)	B	16 (4.9)	1/4 (.19)	14 1/4	68 (31)
1/4 (250)	C	32 (9.8)	1/2 (.37)	14 1/4	74 (33.6)
1/2 (500)	E	8 (2.4)	1/4 (.19)	17 7/8	79 (36)
1/2 (500)	F	16 (4.9)	1/2 (.37)	14 1/4	74 (33.6)
1/2 (500)	J	32 (9.8)	1 (.75)	15 9/16	113 (51.4)
1/2 (500)	JJ	64 (19.6)	2 (1.50)	15 9/16	120 (54.5)
1 (1000)	H	8 (2.4)	1/2 (.37)	17 7/8	85 (38.6)
1 (1000)	L	16 (4.9)	1 (.75)	15 9/16	114 (51.8)
1 (1000)	LL	32 (9.8)	2 (1.50)	15 9/16	121 (55)
2 (2000)	R	8 (2.4)	1 (.75)	22 1/2	134 (61)
2 (2000)	RR	16 (4.9)	2 (1.50)	22 13/16	136 (61.8)
3 (3000)	RT	5.5 (1.9)	1 (.75)	25	161 (73.2)
3 (3000)	RRT	11 (3.8)	2 (1.50)	25	161 (73.2)

*Lifting and travel speed listed are for 60 Hertz units. For 50 Hertz units, these speeds will be 5/6 of those listed.

** A 1/2 H.P. (.37 kW) motor furnished on 380-3-50, 415-3-50 and 460-3-60 volt units.

Maximum Capacity Tons (kg)	Model	*Lifting Speed Per Min. Feet (m)	Motor H.P. (kW)	Shortest Distance Between Hooks Inches (mm)	Net Weight Lbs. (kg)
<i>Two Speed 230-3-60 or 460-3-60 or 220-3-50 or 380-3-50 or 415-3-50</i>					
1/8 (125)	A-2	10/32 (3.1/9.8)	1/4 (.19)	14 1/4 (362)	69 (31.3)
1/8 (125)	AA-2	20/60 (6.1/18.3)	1/2 (.37)	14 1/4 (362)	76 (34.5)
**1/4 (250)	B-2	5/16 (1.5/4.9)	1/4 (.19)	14 1/4 (362)	70 (31.8)
1/4 (250)	C-2	10/32 (3.1/9.8)	1/2 (.37)	14 1/4 (362)	76 (34.5)
**1/2 (500)	E-2	2.5/8 (.76/2.4)	1/4 (.19)	17 7/8 (454)	81 (36.8)
1/2 (500)	F-2	5/16 (1.5/4.9)	1/2 (.37)	14 1/4 (362)	76 (34.5)
1/2 (500)	J-2	10/32 (3.1/9.8)	1 (.75)	15 9/16 (395)	115 (52.3)
1/2 (500)	JJ-2	21/64 (6.4/19.5)	2 (1.50)	15 9/16 (395)	125 (56.3)
1 (1000)	H-2	2.5/8 (.76/2.4)	1/2 (.37)	17 7/8 (454)	87 (39.5)
1 (1000)	L-2	5/16 (1.5/4.9)	1 (.75)	15 9/16 (395)	116 (52.7)
1 (1000)	LL-2	10/32 (3.1/9.8)	2 (1.50)	15 9/16 (395)	126 (57.3)
2 (2000)	R-2	2.5/8 (.76/2.4)	1 (.75)	22 1/2 (572)	136 (61.8)
2 (2000)	RR-2	5/16 (1.5/4.9)	2 (1.50)	22 13/16 (579)	143 (65)
3 (3000)	RT-2	1.75/5.5 (.53/1.68)	1 (.75)	25 (635)	175 (79.5)
3 (3000)	RRT-2	3.5/11 (1.1/3.4)	2 (1.50)	25 (635)	177 (80.5)

B. Series 635 Low Headroom Trolleys

Capacity Tons (kg)	For Use With Models	Adj. For STD S-Beams Depth In. (mm)	Tread Dia. of Wheels In. (mm)	Min. Rad. Curve In. (mm)
1/8 to 1 (125 to 1000)	A thru LL-2	4 thru 15 (102 thru 381)	3 1/8 (79.4)	24 (609)
2 (2000)	R thru RR-2	6 thru 18 (152 thru 457)	4 3/4 (120.6)	24 (609)
3 (3000)	RT thru RRT-2	8 thru 15 (203 thru 381)	4 (101.6)	30 (762)

C. Series 635 Motor Driven Trolleys

Capacity Tons (kg)	For Use With Models	*Travel Speed FPM (MPM)	Motor H.P. (kW)	Adj. For STD S-Beams Depth In. (mm)	Min. Rad. Curve In. (mm)
1/8 to 2 (125 to 2000)	A thru RR-2	75 (23)	1/4 (.19)	6 thru 15 (152 thru 381)	30 (762)
3 (3000)	RT thru RRT-2	75 (23)	1/4 (.19)	6 thru 15 (152 thru 381)	30 (762)

ACCESSORIES

HOOK SUSPENSIONS

Swivel and rigid type hook suspensions (see Figure 1) are available for all Lodestar Electric Hoists. However, rigid type hook suspensions are normally recommended for most application. The hook suspensions are intended for suspending the hoist from a trolley which has a single load bar (such as CM's® Series 632 and 633 Trolleys) or for suspending the hoist from a fixed structure.



Figure 1. Hook Suspensions

LUG SUSPENSION

Lug suspensions (see Figure 2) are available for all Lodestar Electric Hoists. These are rigid type suspensions wherein the lug shown replaces the hook (Figure 1) in the suspension adapter. The Lug suspensions are required for suspending the hoist from the Series 635 Low Headroom and Motor Driven Trolleys described next.



Figure 2. Lug Suspensions



Figure 3. Series 635 Low Headroom Trolley

Series 635 Low Headroom Trolley

These are manual push type trolleys (see Figure 3) designed for use with the Lodestar Electric Chain Hoists. A rigid lug suspension (see Figure 2) is required to suspend the hoist from the trolley. The trolley is adjustable for operation on a range of American Standard "S" beams as indicated in Table 1, and it will also operate on flat flanged beams.



Figure 4. Series 635 Motor Driven Trolley

Series 635 Motor Driven Trolley

The motor driven trolleys (see Figure 4) are self-contained and supplied complete with independent controls and wiring, including a four directional control station. A rigid lug suspension (see Figure 2) is required to suspend the hoist from the Motor Driven Trolley. The hoist and trolley are joined electrically by connecting the hoist control and power cords (supplied) into the hoist or trolley. The trolley is adjustable for operation on a range of American Standard "S" beams as indicated in Table 1, and it will also operate on flat flanged beams.

LATCHLOK® HOOKS

CM's Latchlok hooks (see Figure 5) are available to replace the standard upper and lower hooks used on the Lodestar Electric Hoists.



Figure 5. Upper or Lower Latchlok® Hook

CHAIN CONTAINER

This accessory (see Figure 6) is used to hold slack chain and it is supplied complete with mounting hardware and instructions. The chain container is recommended for those applications where the slack chain would interfere with the load or drag on the floor as may be the case with double or triple reeved units. Chain containers can be furnished for units already in use.



Figure 6. Chain Container

INSTALLATION

UNPACKING INFORMATION

When received, the hoist should be carefully inspected for damage which may have occurred during shipment or handling. Check the hoist frame for dents or cracks, the external cords for damaged or cut insulation, the control station for cut or damaged enclosure, and inspect the load chain for nicks and gouges. If shipping damaged has occurred, refer to the packing list envelope on the carton for claim procedure.

Before installing the hoist, make sure that the power supply to which it will be connected is the same as that shown on the nameplate located on the side of the hoist.

NOTE: To assure long life and top performance, be sure to follow the load chain lubricating instructions on page 15.

INSTALLING THE SUSPENSION

A. Single Reeved Units.

Remove the hook or lug suspension from its carton and the two suspension screws. Place the suspension assembly into the recess on top of the hoist so that the adapter body follows the contour of the hoist. Insert the suspension screws through the holes in the adapter and hand thread these into the self locking nuts enclosed in the hoist. The screws will turn freely into the nuts until the last 1/4" (6.35mm) of travel, during which the resistance of the nut locking collar will be encountered. Securely tighten the screws to the recommended seating torque (see Table 2) using a 12 point socket which fits the head of the screw.

B. Double Reeved Units:

Remove the hook or lug suspension from its carton and the two suspension screws, dead end pin, washer and cotter pin. It should be noted that a Double Reeved suspension includes a dead end bolt and block for supporting the dead end of the chain as shown in Figure 7.

Place the suspension assembly into the recess on top of the hoist. The dead end block should project through the bottom of the hoist with the pin hole and slot aligned to the underside of the hoist as shown in Figure 7. If these are not aligned as shown, lift the head of the bolt and block assembly and reseal the bolt head to obtain the proper alignment. Do not change the position of the dead end block on the bolt to attain this alignment.

Check the position of the pin hole in the dead end block to make sure it has not been disturbed from its factory setting. The distance from the top of the pin hole to the bottom of the hoist should not exceed 1/4" (6.35 mm) for Models E, E-2, H and H-2 and 7/16" for the Models R, R-2, RR and RR-2. If the distance is not correct, adjust the position of the dead end block to obtain the proper distance (see Page 48).

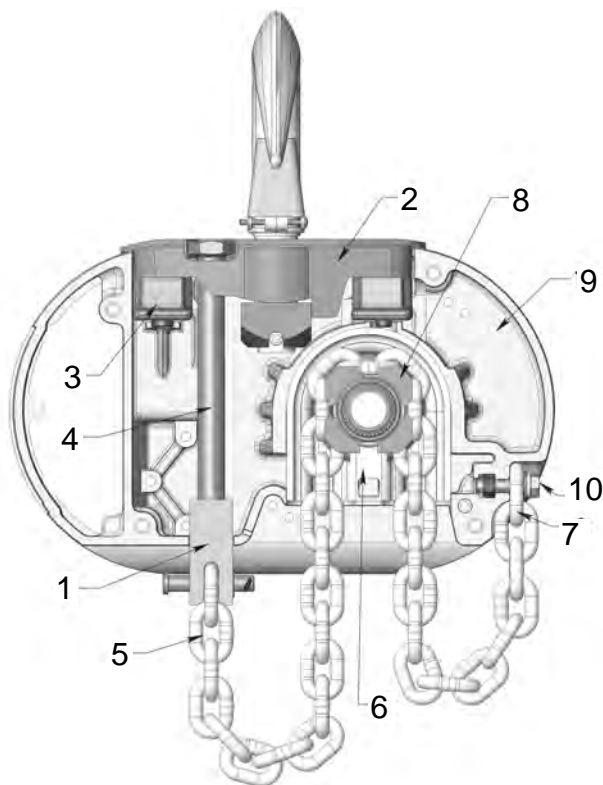


Figure 7. Attaching Load Chain
(Models E, H, E-2 and H-2 illustrated)
(Models R, RR, R-2 and RR-2 similar)

- | | |
|--------------------------------|------------------------------------|
| 1. Dead End Block | 7. Loose End Link |
| 2. Suspension Assembly | 8. Liftwheel |
| 3. Suspension Self-Locking Nut | 9. Gear Housing |
| 4. Dead End Bolt | 10. Loose End Screw and Lockwasher |
| 5. Load Chain | |
| 6. Chain Guide | |

(Do not order parts by these numbers. See parts list.)

Now, insert the suspension screws through the holes in the adapter and hand thread these into the self-locking nuts enclosed in the hoist frame. These screws will turn freely into the nut until the last 1/4" (6.35 mm) of travel during which the resistance of the nut locking collar will be encountered. Securely tighten the screws to the recommended seating torque (see Table 2) using a 12 point socket which fits the head of the screw.

To rotate the hook 90°, proceed as follows:
NOTE: On the rigid hook suspensions for Models A through RR-2, if it is necessary to rotate the hook 90°, from its factory set position, one of the suspension screws becomes captive and a socket cannot be used to tighten this screw.

- Using a hammer and drift, drive the pin out of the square hook collar.
- Remove the square collar from the hook shank.
- Place a hi-collar type lockwasher (this lockwasher is not supplied with the suspension assembly) under the head of one of the suspension screws. Insert this assembly into the hole in the suspension adapter and rotate the hook 90° to make this screw captive.

- Re-assemble the square collar to the hook shank using the drive pin previously removed.
- Follow the instructions above, except tighten the captive screw to the recommended seating torque (see Table 2) using a 12 point box type wrench.

C. Triple Reeved Units:

These hoists have a sheave hanger which is loosely connected to the top of the frame by a thin metal plate for shipping purposes. To attach the suspension, support the sheave hanger from the underside of the hoist and remove the nut and seat from the sheave stud. Remove and discard the shipping plate and retain the sheave stud nut and seat since they will be reused later.

Remove the suspension assembly from the carton and the two suspension screws. Place the suspension assembly over the sheave stud and into the recess on top of the hoist.

Insert the suspension screws through the holes in the suspension adapter and hand thread these into the self-locking nut enclosed in the hoist. The screws will turn freely into the nuts until the last 1/4" (6.35 mm) of travel, during which the resistance of the nut locking collar will be encountered. Securely tighten the screws to the recommended seating torque (see Table 2) using a 12 point socket which fits the head of the screw.

After the suspension assembly is installed, secure the sheave stud to the suspension adapter using the round slotted nut and seat that were formerly used to attach the shipping plate to top of the hoist frame. Place the seat over the stud with the flat side down and then rotate the seat so that there is clearance between the seat and the suspension lug or hook. Assemble the nut to the stud and turn the nut by hand until the nut seats in the seat and the sheave hanger is snug in the frame. Then back off the nut until the hole in the stud is in line with one of the slots in the nut. Using a hammer, drive the retaining pin (packed with the suspension assembly) into the hole in the sheave stud until the end of the pin is flush with the edge of the nut.

Table 2. Recommended Seating Torques For Suspension Adapter Screws

MODEL NO'S	SCREW SIZE	RECOMMENDED SEATING TORQUE
A thru H-2	3/8"-16 UNC-2A	30 to 45 lb. ft.
J thru RRT-2	1/2"-20 UNF-2A	40 to 80 lb. ft.

! WARNING

Using other than CM supplied high strength suspension screws to attach the suspension adapter to the hoist may cause the screws to break and allow the hoist and load to fall.

TO AVOID INJURY:

Use only the CM supplied suspension screws to attach the suspension to the hoist and torque these screws to the recommended seating torque as specified above.

CAUTION:

Also, do not apply any type of lubricant to the threads of these screws. Lubricating the threads will reduce the effort to seat the screws and as a result, tightening the screws to the (Table 2) recommended torque may break the screw, damage the suspension adapter, strip the nuts and/or damage the hoist frame.

ATTACHING LOAD CHAIN

To attach the chain to the dead end block on Models E, E-2, H, H-2, R, R-2 and RR-2, proceed as follows:

1. Suspend the hoist from an adequate support.
2. On Models E, E-2, H and H-2, insert the last link of the load chain into the dead end block (2) and secure it with the dead end pin, washer and cotter pin furnished with the suspension.
3. On Models R, R-2, RR and RR-2, slide the contact block up the chain until it is against the bottom of the hoist and the dead end block is projecting through the square opening in the bottom of the block. Insert the last link of the load chain, making sure there are no twists between the hook block and the dead end block, into the dead end block. Push the contact block up slightly and secure the load chain to the dead end block using the dead end pin, washer and cotter pin furnished with the suspension. The dead end pin also supports the contact block (See Figure 8)

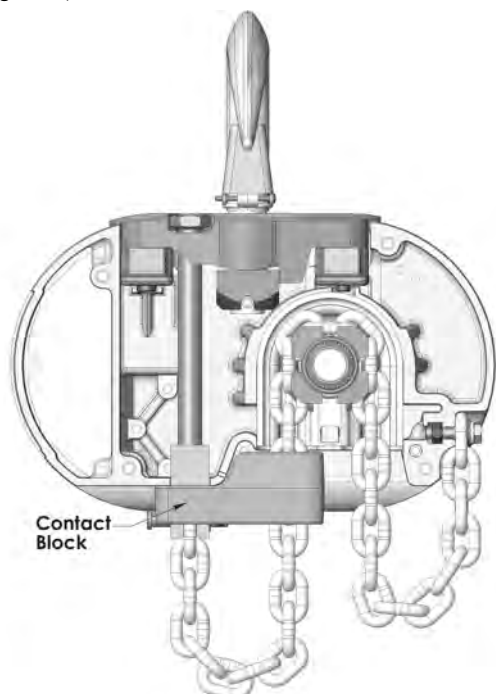


Figure 8. Contact Block Used on Models R, R-2, RR and RR-2

4. Do not remove the plastic ties from the load chain at this time.

After the suspension is installed, hoists with a hook suspension can be suspended from its permanent support and then connected to the power supply system (refer to page 8). For hoists with a lug suspension that are to be suspended from a Series 635 Low Headroom Trolley, attach the hoist to the trolley per the following instructions.

INSTALLING THE SERIES 635 LOW HEADROOM TROLLEY (See Figure 9)

WARNING

Operating the trolley on a beam that has no rail stops may allow the trolley to fall off the end of beam.

TO AVOID INJURY:

Install rail stops at each end of the beam on which the trolley is to operate.

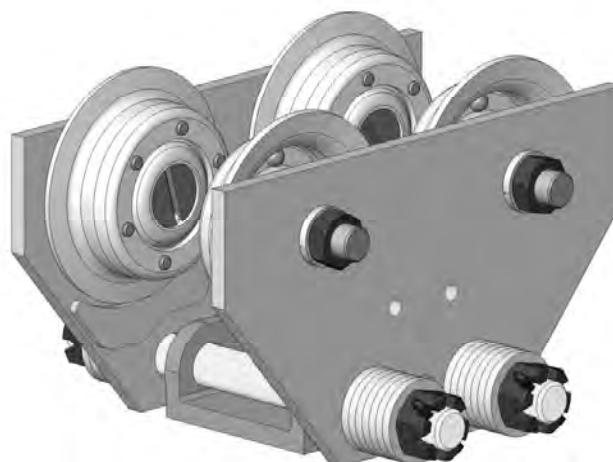


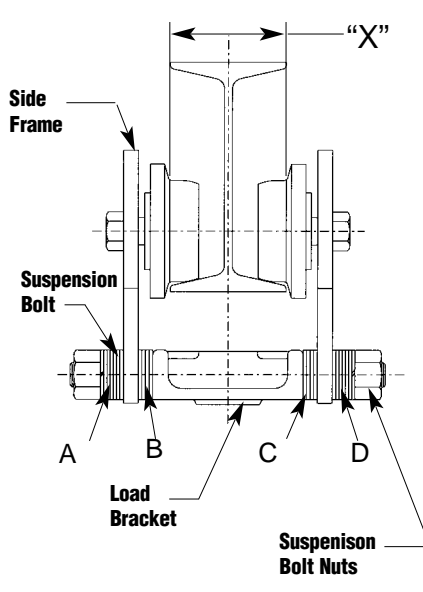
Figure 9. Series 635 Low Headroom Trolley: 1 and 2 Ton (1000 and 2000 kg) Trolley Shown- 3 Ton (3000 kg) Similar.

For hoists with a lug suspension that are to be suspended from a Series 635 Motor Driven Trolley, attach the hoist to the trolley, wire the hoist and trolley together and connect the trolley to the power supply system per the instructions supplied with the trolley.

The stops must be positioned so as to not exert impact force on the hoist frame or trolley wheels. They must contact the ends of the trolley side frames.

It is recommended that the trolley be mounted on the beam prior to attaching the hoist to the trolley. Before attempting to mount the trolley on the beam, measure the actual width of the beam flange on which the trolley is to operate. Using the measurement and Table 3, determine the arrangement of the spacer washers. Loosely assemble the side frames, load bracket, spacer washers and nuts on the suspension bolts as shown in Table 3.

Table 3. Series 635 Low Headroom Trolley Side Frame Spacing



Flange Width	No. of Spacers			
	A	B	C	D
2 5/8	10	0	0	10
3	9	1	1	9
3 3/8	8	2	2	8
3 5/8	7	3	3	7
4	6	4	4	6
4 5/8	4	6	6	4
5	3	7	7	3
5 1/4	2	8	8	2
5 5/8	1	9	9	1

Flange Width	No. of Spacers			
	A	B	C	D
3 3/8	8	0	0	8
3 5/8	7	1	1	7
4	6	2	2	6
4 5/8	4	4	4	4
5	3	5	5	3
5 1/4	3	5	6	2
5 5/8	2	6	7	1
6	0	8	8	0

Flange Width	No. of Spacers			
	A	B	C	D
4	6	1	1	7
4 5/8	5	3	3	4
5	4	4	4	3
5 1/4	3	5	5	2
5 5/8	3	5	6	1

Flange Width	No. of Spacers			
	A	B	C	D
6	6	5	5	5
6 1/4	5	6	6	4
7	2	9	9	1

Flange Width	No. of Spacers			
	A	B	C	D
6 1/4	8	2	1	8
7	5	5	4	5
7 1/8	5	5	5	4
7 1/4	4	6	5	5
7 7/8	2	8	8	1
8	1	9	8	1

Flange Width	No. of Spacers			
	A	B	C	D
6	7	2	2	6
6 1/4	6	3	2	6
7	4	5	5	3
7 1/8	3	6	5	3

*Dimension applies to minimum S-Beam and will vary with larger S-Beams..



WARNING

If CM's washer spacing recommendations are not followed, trolley may fall from beam.

TO AVOID INJURY:

Measure the actual beam flange on which the trolley is to operate and use Table 3 to determine the arrangement of the spacer washers for that flange width.

Note: Due to the variations in beam flange widths, it is suggested that the beam flange width be measured to determine the exact distribution of spacer washers. The distance between trackwheel flanges (dimension "X") should be 1/8 to 3/16 inch (3.18 to 4.77 mm) greater than the beam flange width for straight runway beams, and 3/16 to 1/4 inch (4.77 to 6.35 mm) greater than the beam flange width if runway system includes sharp curves. Also, the use of other than CM supplied washers may result in trackwheel to beam flange variations and thus Table 3 will not apply.

On the 1/8 to 2-ton (125 to 2000 kg) trolleys, assemble the suspension lug on hoist to the trolley on beam as shown in Figure 10. The lug is inserted in the trolley load bracket and retained by the vertical load bar pin. A socket head cap screw and lockwasher are used to keep the in in place.

For the 3-ton (3000 kg) trolley, a shackle and pin assembly consisting of a pin retained in a central position by retainers is packed loose with the suspension. Insert this assembly into the opening in the top of the load bracket with the legs of the shackle down. Position the shackle pin in the groove provided for the same in the load bracket making sure it is centered between the suspension bolts.

Now install the trolley on the beam by sliding one side frame out far enough to allow all the trackwheels to clear the beam flange. Lift the trolley up so that the trackwheels are riding on the beam, draw the side frames together and tighten the nuts snugly. Insert the cotter pins through the slotted nuts and holes in the suspension bolts and spread the legs of the cotter pins to secure.

On the 3 ton (3000 kg) trolley (refer to Figure 11), drive one retaining pin into the hole on one end of the lug pin. Raise the hoist into position so that the lug is between the legs of the shackle. Align the holes in the shackle and lug. Insert the lug pin in the aligned holes and secure the lug pin by driving the remaining retaining pin into the hole in the lug pin. Make certain that the shackle pin is properly seating in the load bracket by manipulating the hoist and checking for freedom of movement (swinging) in both planes and all four directions.

Note that the shackle pin should be retained and centered in the shackle by the retainers.

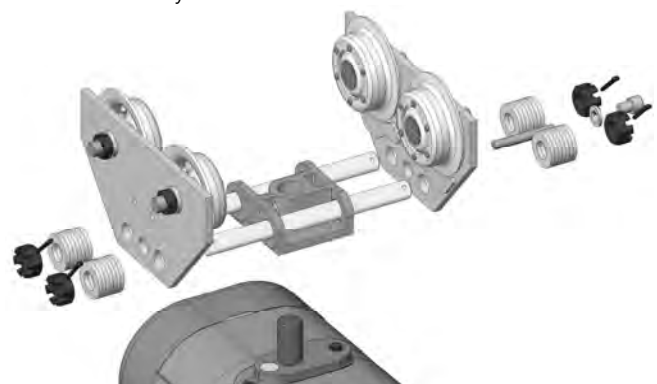


Figure 10. 1/8 to 2 Ton (125 to 2000 kg) Hoist to Trolley Assembly



Figure 11. 3 Ton (3000 kg) Hoist to Trolley Assembly

NOTE: After the unit is connected to the power supply system (see below), suspend a capacity load from the hoist and operate the trolley over the entire length of the runway or monorail system to be sure that the adjustments and operation is satisfactory. On systems with curves, the edges of the rail at the curved sections should be kept lightly lubricated with grease.



WARNING

An excessively worn beam flange may fail and allow the trolley to fall from the beam.

TO AVOID INJURY:

Periodically inspect the beam flange for wear. Replace beam if flange is worn.

POWER SUPPLY AND ELECTRICAL CONNECTIONS

The hoist should be connected to a branch circuit which complies with the requirements of the National Electrical Code and applicable local codes.

It is recommended, especially for a single phase hoist with a one horsepower (.75 kW) motor, that a line of adequate capacity be run directly from the power supply to the hoist to prevent having problems with low voltage and circuit overloads.

For grounding of the hoist, the power cord includes a grounding conductor (green wire). Furthermore, the suspension system on which the hoist is mounted must also be permanently grounded.

Before connecting the hoist to the power supply, check that the power to be used agrees with that shown on the hoist identification plate. In addition, for a three phase, dual voltage unit, check the voltage shown on the tag attached to the power cord.

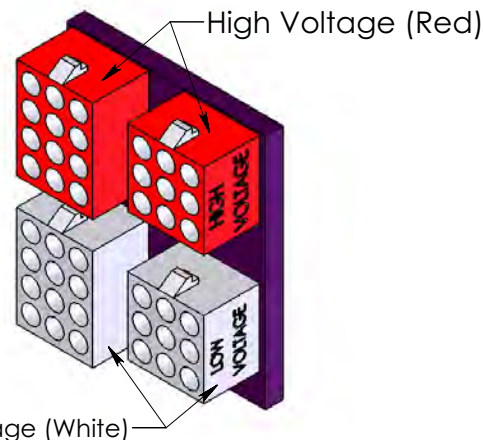


Figure 12. Voltage Conversion Board

NOTE: Before connecting the hoist to the power supply, check that the power to be used agrees with the position of voltage change plug on the voltage change board.

The nominal hoist voltage rating corresponding to the voltage range given on the hoist identification plate is:

SINGLE SPEED UNITS		TWO SPEED UNITS	
Range	Nominal Volts	Range	Nominal Volts
110-120	115	208-230	230
208-240	230	440-460	460
440-480	460		

THREE PHASE HOIST

Unless ordered on a special basis, all single speed dual voltage (230/460-3-60, 220/230-3-50 and 220/415-3-50) hoists are factory set to operate on 460-3-60 (380-3-50 or 415-3-50). However, a voltage conversion board is provided to easily and quickly change from 460 to 230 (or 380 to 220 or 415 to 220) volt operation. The voltage conversion board shown in Figure 12 is located in the hoist as shown in Figure 13.

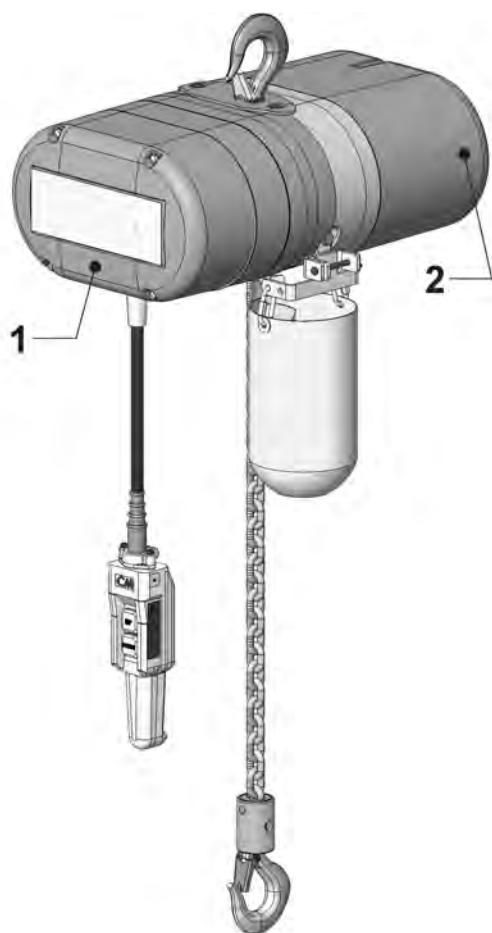


Figure 13. Location of Components

Voltage conversion board is located under frame cover (1) for Models A thru H and under motor housing cover (2) for Models J thru RRT.

Limit switches and electric brake are located under frame cover (1) for all hoists.

PROPER PHASING

Since the motor in a three phase hoist can rotate in either direction, depending on the manner in which it is connected to the power supply, the direction of hook movement must be checked during the original installation and each time hoist is moved to a new location.

Note: Serious damage can result if the hook is run to the upper or lower limit of travel with the hook operating in a direction opposite to that indicated by the control station. Therefore, proceed as follows:

1. Make temporary connections at the power supply.
2. Operate **↑**(UP) control in control station momentarily. If hook raises, connections are correct and can be made permanent.
3. If hook lowers, it is necessary to change direction by interchanging the Red lead and the Black lead of hoist power cord at power supply. Under no circumstances should the internal wiring of control station or hoist be changed to reverse hook direction. The wiring is inspected and tested before leaving the factory.

! WARNING

Allowing the hook block to run into the bottom of the hoist when raising a load or allowing the chain to become taut between the loose end screw and the frame when lowering a load may break the chain and allow the load to drop.

TO AVOID INJURY:

Do not allow the hook block to contact the bottom of the hoist or the loose end chain to become taut.

Also, do not force the Lodestar Protector to compensate for improperly adjusted limit switches or reverse voltage phasing.

CHECKING FOR TWIST IN LOAD CHAIN Models E, H, E-2, H-2, R, RR, R-2 and RR-2

The best way to check for this condition is to run the lower hook, without a load, up to within 24 inches (609 mm) of hoist. If the dead end of the chain has been properly installed, a twist can occur only if the lower hook block has been capsized between the strands of chain. Reverse capsize to remove twist.

Models RT, RT-2, RRT and RRT-2

On these models, the load chain is dead ended on top of the lower hook block. If the chain has been properly installed, the only way a twist can occur is if the lower hook block has been capsized between the strands of chain. If this has occurred, two strands of chain will be wrapped around each other and to remove this, reverse the capsize.

CHECKING FOR ADEQUATE VOLTAGE AT HOIST

The hoist must be supplied with adequate electrical power in order to operate properly. For proper operation, the voltage, (measured at the end of the standard 15 foot (4.6 m) power cord with the hoist operating in the **↑**, up direction with full load) must be as indicated in the table below.

NOMINAL CURRENT	MINIMUM RUNNING VOLTAGE	MINIMUM STARTING VOLTAGE
115-1-60	104	98
230-1-60	207	196
230-3-60	187	-
460-3-60	396	-
220-3-50	198	-
380-3-50	365	-
415-3-50	399	-

SIGNS OF INADEQUATE ELECTRICAL POWER (LOW VOLTAGE) ARE:

- Noisy hoist operations due to brake and/or contactor chattering.
- Dimming of lights or slowing of motors connected to the same circuit.
- Heating of the hoist motor and other internal components as well as heating of the wires and connectors in the circuit feeding the hoists.
- Failure of the hoist to lift the load due to motor stalling.
- Blowing of fuses or tripping of circuit breakers.

To avoid these low voltage problems, the hoist must be connected to an electrical power supply system that complies with the National Electrical Code and applicable local codes. This system must also be rated for a minimum of 20 amps and it must have #14 AWG (2.0 mm) or larger wiring, a disconnecting means, overcurrent protection (slow blow fuses or inverse-time circuit breakers) and provisions for grounding the hoist.

WARNING

Failure to properly ground the hoist presents the danger of electric shock.

TO AVOID INJURY:

Permanently ground the hoist as instructed in this Manual.

Low voltage can also be caused by using an undersize extension cord to supply power to the hoist. The following chart should be used to determine the size wires in the extension cord in order to minimize the voltage drop between the power source and the hoist.

LENGTH OF EXTENSION CORD	SINGLE PHASE HOISTS	THREE PHASE HOISTS
	MINIMUM WIRE SIZE	MINIMUM WIRE SIZE
UP TO 50 FEET (15.2 M)	#14 AWG (1.6 mm)	#16 AWG (1.3 mm)
80 FEET (24.1 M)	#12 AWG (2.0 mm)	#16 AWG (1.3 mm)
120 FEET (36.7 M)	#10 AWG (2.6 mm)	#14 AWG (1.6 mm)

WARNING

Failure to provide a proper supply system for the hoist may cause hoist damage and offers the potential for a fire.

TO AVOID INJURY:

Provide the hoist with a 20 amp, minimum, overcurrent protected power supply system per the national Electrical Code and applicable local codes as instructed in this Manual.

Remember, operation with low voltage can void the CM repair/replacement policy. When in doubt about any of the electrical requirements, consult a qualified electrician.

Always disconnect the power from the power supply system and lockout/tagout disconnecting means before servicing the hoist.



WARNING


Working in or near exposed energized electrical equipment presents the danger of electric shock.

TO AVOID INJURY:

DISCONNECT POWER AND LOCKOUT/TAGOUT DISCONNECTING MEANS BEFORE REMOVING COVER OR SERVICING THIS EQUIPMENT.

CHECKING LIMIT SWITCH OPERATION

Operate hoist over the entire length of its rated lift, checking upper and lower limit switches for correct operation as follows:

1. Press  (UP) control and raise the lower hook until top of hook block is about one foot below the hoist.
2. Cautiously continue raising the hook until the upper limit switch stops the upward motion. The upper limit switch is set at the factory to stop the hook block 3 inches (76.2 mm) from bottom of the hoist on all units with standard 10 foot (3 M) lift except Models AA and AA-2. Factory setting is 6 inches (152.4 mm) for these models and for all other models equipped with chain for lifts longer than 10 feet (3 M).
3. If adjustment is necessary, see page 17.




WARNING

Allowing the hook block to run into the bottom of the hoist when raising a load or allowing the chain to become taut between the loose end screw and the frame when lowering the load may break the chain and allow the load to drop.

TO AVOID INJURY:

Do not allow the hook block to contact the bottom of the hoist or the loose end chain to become taut.

4. Press  (DOWN) control and cautiously lower hook until lower limit switch stops the downward motion. From 7 to 11 chain links (depending on hoist model) should be between the loose end link and the hoist entry. See Figures 7 and 8.
5. If adjustment is necessary, see pages 16-17.
NOTE: If the hoist is equipped with a chain container reset the upper and lower limit switches as indicated on page 17. Set the upper limit switch so that the uppermost point of hook travel is just below the bottom of the chain container. Set the lower limit switch so that there is a minimum of ten links showing below the bottom if the hoist when the hook is at its lowest position.

Under no condition should the hook block or load be permitted to come in contact with the chain container. If contact is made, the function of the chain container can be interfered with and its fasteners imperiled.

CONTROL CORD

Unless ordered on a special basis, the hoist is supplied with a control cord that will position the control station approximately 4 feet above the lower hook when it is at the lower limit of the lift. If this places the control station too close to the floor, a "control cord alteration kit" (Key No. 627-474, Part Number 28642) can be obtained from CM for shortening the length of the control cord.



WARNING


Tying knots or loops to shorten the drop of the control station will make the strain relief ineffective and the internal conductors of the cord may break.

TO AVOID INJURY:

Shorten the control cord using the control cord alteration kit and the instructions provided with the kit.

OPERATING INSTRUCTIONS

GENERAL

1. The Protector™ is designed to allow the intermediate gear to slip on an excessive overload. An overload is indicated when the hoist will not raise the load. Also, some clutching noise may be heard if the hoist is loaded beyond rated capacity. Should this occur, immediately release the up  control to stop the operation of the hoist. At this point, the load should be reduced to the rated hoist capacity or the hoist should be replaced with one of the proper capacity. When the excessive load is removed, normal hoist operation is automatically restored.

CAUTION: The Protector™ is susceptible to overheating and wear when slipped for extended periods. Under no circumstance should the clutch be allowed to slip for more than a few seconds.

Due to the above, a hoist equipped with a Protector™ is not recommended for use in any application where there is a possibility of adding to an already suspended load to the point of overload. This includes dumbwaiter (*see below) installations, containers that are loaded in mid-air, etc.

(*)Refer to limitations on Page i concerning dumbwaiter applications.

Also, if a Lodestar Hoist with a Protector™ is used at unusual extremes of ambient temperatures, above 150°F. (106° C.) or below 15°F. (-0° C.), changes in lubricant properties may permit the hoist to raise larger loads than under normal operating conditions and present possibility of damage or injury.

2. All hoists are equipped with an adjustable screw limit switch, which automatically stops the hook at any pre-determined point when either hoisting or lowering.
3. The control station used on two speed hoists is similar to single speed unit, except that either of two definite speeds may be selected by the operator in both hoisting and lowering. Each control when partially depressed provides SLOW speed and when fully depressed gives FAST speed. Partial release of control returns hoist to slow speed, while complete release allows hoist to stop. Rated lifting speeds are shown on hoist identification plate. SLOW speed is intended as a means of carefully controlling or "spotting" the load, although the hoist may be operated solely at this speed if desired. It is not necessary to operate in the SLOW speed position as the hoist will pick up a capacity load at FAST speed from a standing start. In other words, it is not necessary to hesitate at the slow position when moving control from STOP to FAST position or vice versa.
4. If material being handled must be immersed in water, pickling baths, any liquid, dusty or loose solids, use a sling chain of ample length so that the hook is always above the surface. Bearings in the hook block are shielded only against ordinary atmospheric conditions.

HOIST




1. Before picking up a load, check to see that the hoist is directly overhead.
2. **WHEN APPLYING A LOAD, IT SHOULD BE DIRECTLY UNDER HOIST OR TROLLEY. AVOID OFF CENTER LOADING OF ANY KIND.**

3. Take up a slack load chain carefully and start load easily to avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower the load and remove the excess load.
4. **DO NOT** allow the load to swing or twist while hoisting.
5. **DO NOT** allow the load to bear against the hook latch.

HOIST WITH LOW HEADROOM TROLLEY

This unit should be moved by pushing on the suspended load or by pulling the empty hook. However, the unit can also be moved by pulling on the control station since an internal steel cable extends the length of the control cord and is anchored to the hoist and to the control station.

HOIST WITH MOTOR DRIVEN TROLLEY

This unit should be moved by operating the controls marked  (Forward) and  (Reverse) in control station. Unless altered by the erector, depressing  (Forward) control will move the hoist toward motor housing end. Anticipate the stopping point and allow trolley to coast to a smooth stop. Reversing or "plugging" to stop trolley causes overheating of motor and swaying of load.

SAFETY PROCEDURES

For safety precautions and a list of **DO'S** and **DO NOT'S** for safe operation of hoists, refer to **page ii**.

1. When preparing to lift a load, be sure that the attachments to the hook are firmly seated in hook saddle. Avoid off center loading of any kind, especially loading on the point of hook.
2. When lifting, raise the load only enough to clear the floor or support and check to be sure that the attachments to the hook and load are firmly seated. Continue to lift only after you are assured the load is free of all obstructions.
3. **DO NOT** load hoist beyond the rated capacity shown on hoist identification plate or on the hoist motor housing cover or hoist back frame cover. Overload can cause immediate failure of some load-carrying part or create a defect causing subsequent failure at less than rated capacity. When in doubt, use the next larger capacity of CM Lodestar Hoist.
4. **DO NOT** use this or any other overhead materials handling equipment for lifting persons.
5. Stand clear of all loads and avoid moving a load over the heads of other personnel. Warn personnel of your intention to move a load in their area.
6. **DO NOT** leave the load suspended in the air unattended.
7. Permit only qualified personnel to operate unit.
8. **DO NOT** wrap the load chain around the load and hook onto itself as a choker chain.
Doing this will result in:
 - a. The loss of the swivel effect of the hook which could mean a twisted chain and a jammed lift wheel.
 - b. The upper limit switch is by-passed and the load could hit the hoist
 - c. The chain could be damaged at the hook.
9. On two and three part reeved hoists, check for twists in the load chain. A twist can occur if the lower hook block has been capsized between the strands of chain. Reverse the capsize to remove twist.

10. **DO NOT** allow the load to bear against the hook latch. The latch is to help maintain the hook in position while the chain is slack before taking up slack chain.



WARNING

Allowing the load to bear against the hook latch and/or hook tip can result in loss of load.

TO AVOID INJURY:

Do not allow the load to bear against the hook latch and/or hook tip. Apply load to hook bowl or saddle only.

11. Take up a slack load chain carefully and start load easily to avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower the load and remove the excess load.
12. **Do not** allow the load to swing or twist while hoisting.
13. Never operate the hoist when flammable materials or vapors are present. Electrical devices produce arcs or sparks that can cause a fire or explosion.
14. **STAY ALERT!** Watch what you are doing and use common sense. Do not use the hoist when you are tired, distracted or under the influence of drugs, alcohol or medication causing diminished control.

INSPECTION

PROCEDURES

To maintain continuous and satisfactory operation, a regular inspection procedure must be initiated to replace worn or damaged parts before they become unsafe. Inspection intervals must be determined by the individual application and are based on the type of service to which the hoist will be subjected and the degree of exposure to wear, deterioration or malfunction of the critical components.

The type of service which the hoist is subjected can be classified as "**NORMAL**," "**HEAVY**," "**SEVERE**."

NORMAL SERVICE: Involves operation with randomly distributed loads within the rated load limit, or uniform loads less than 65 percent of rated load for not more than 25 percent of the time.

HEAVY SERVICE: Involves operating the hoist within the rated load limit which exceeds normal service.

SEVERE SERVICE: Is normal or heavy service with abnormal operating conditions.

Two classes of inspection, **FREQUENT** and **PERIODIC**, must be performed.

FREQUENT INSPECTIONS: These inspections are visual examinations by the operator or other designated personnel. Records of such inspections are not required. The frequent inspections are to be performed monthly for normal service, weekly to monthly for heavy service, and daily to weekly for severe service, and they should include those items listed in Table 4.

PERIODIC INSPECTIONS: These inspections are visual inspections of external conditions by an appointed person. Records of periodic inspections are to be kept for continuing evaluation of the condition of the hoist. Periodic inspections are to be performed yearly for normal service, semi-annually for heavy service and quarterly for severe service, and they are to include those items listed in Table 5.

CAUTION: Any deficiencies are to be corrected before the hoist is returned to service. Also, the external conditions may show the need for disassembly to permit a more detailed inspection, which, in turn, may require the use of non-destructive type testing.

Preventive Maintenance

In addition to the above inspection procedure, a preventive maintenance program should be established to prolong the useful life of the hoist and maintain its reliability and continued safe use. The program should include periodic and frequent inspections with particular attention being paid to the lubrication of the various components using the recommended lubricants (see page 15).

Hook Inspection

Hooks damaged from chemicals, deformations or cracks, or that have more than a 10° twist from the hook's unbent plane or excessive opening or seat wear must be replaced. Also, hooks that are opened and allow the latch to not engage the tip, must be replaced. Any hook that is twisted or has excessive throat opening indicates abuse or overloading of the unit. Inspect other load sustaining parts for damage.

On latch type hooks, check to make sure that the latch is not damaged or bent and that it operates properly with sufficient spring pressure to keep the latch tightly against the tip of the hook and allow the latch to spring back to the tip when released. If the latch does not operate properly, it should be replaced. See Figure 14 to determine when the hook must be replaced.

Table 4**Minimum Frequent Inspections**




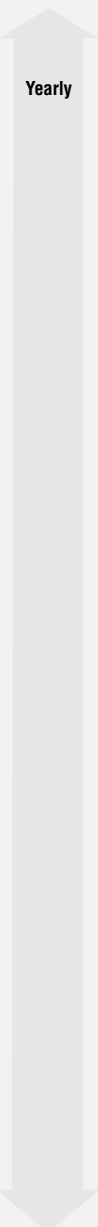

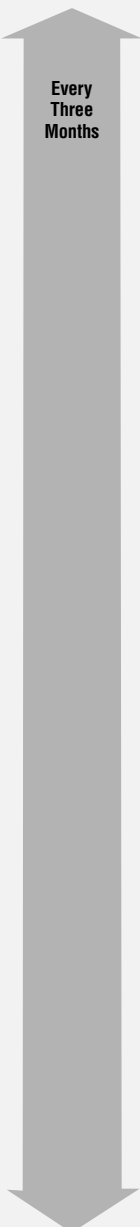
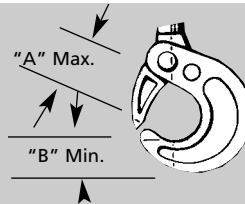
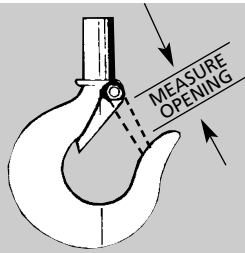
Type of Service			Item
Normal	Heavy	Severe	
 <p>Monthly</p>	 <p>Weekly to Monthly</p>	 <p>Daily to Weekly</p>	<ul style="list-style-type: none"> a) Brake for evidence of slippage. b) Control functions for proper operation. c) Hooks for damage, cracks, twists, excessive throat opening, latch engagement and latch operation – see page 12. d) Load chain for adequate lubrication, as well as for signs of wear, damaged links or foreign matter – see page 14. e) Load chain for proper reeving and twists.

Table 5**Minimum Periodic Inspections**

Type of Service			Item
Normal	Heavy	Severe	
 <p>Yearly</p>	 <p>Every Six Months</p>	 <p>Every Three Months</p>	<ul style="list-style-type: none"> a) All items listed in Table 4 for frequent inspections. b) External evidence of loose screws, bolts or nuts. c) External evidence of worn, corroded, cracked or distorted hook block, suspension screws, gears, bearings and dead end block and chain pin. d) External evidence of damage to hook retaining nut and pin. Also check the upper suspension adapter making sure it is fully seated in the hoist frame and that both screws are tight. e) External evidence of damage or excessive wear of the liftwheel and hook block sheave chain pockets. Widening and deepening of the pockets may cause the chain to lift-up in the pocket and result in binding between liftwheel and chain guides or between the sheave and hook block. Also, check the chain guides for wear or burring where the chain enters the hoist. Severely worn or damaged parts should be replaced. f) External evidence of excessive wear or brake parts and brake adjustment – see page 16. g) External evidence of pitting or any deterioration of contactor contacts. Check the operation of the control station making sure the buttons operate freely and do not stick in either position. h) Inspect the electrical cords and cables and control station enclosure for damaged insulation. i) Inspect trolley trackwheels for external wear on tread and flange, and for wear on internal bearings surfaces as evidenced by a looseness on the stud. Suspension components for damage, cracks, wear and operation. Also check suspension adapter screws for proper tightness-(see page 5). j) Inspect the loose end link, loose end screw and dead end block on double reeved units. Replace worn or distorted parts. k) Inspect the suspension lug or hook for excess free play or rotation. Replace worn parts as evidenced by excess free play or rotation. l) Inspect for signs of lubricant leaks at the gasket between the gear housing and back frame. Tighten screws holding back frame to gear housing. If leak persists, repack housing and gears with grease and install a new gasket. m) On the Models RT, RT-2, RRT and RRT-2: <ul style="list-style-type: none"> 1. Inspect shackle and lug pins for wear. Replace if worn. 2. Check dead end screw in lower hook block for wear and tightness*. Replace if worn. 3. Check shackle pin for proper seating in groove of load bracket. 4. Inspect cloverleaf plate on bottom of sheave hanger for wear or burring. Replace if worn. 5. Inspect sheave stud nut and seat for wear. Replace if worn or damaged.

*When tightening the special, dead end socket head screw, it should be held firmly in place and torqued from the nut end only to avoid damage to the screw and/or dead end chain link (Refer to step J on page 49).

LATCH TYPE HOOK
(Upper and Lower)
TO MEASURE OPENING,
DEPRESS LATCH AGAINST
HOOK BODY AS SHOWN.



LATCHLOCK® TYPE HOOK
(UPPER AND LOWER)

Models	Replace Hooks When Opening is Greater Than
A, A-2, AA, AA-2, B, B-2, C, C-2, F AND F-2	1 3/16 (30.2 mm)
E, E-2, H, H-2, J, J-2, JJ, JJ-2, L, L-2, LL AND LL-2	1 5/16 (33.3mm)
R, R-2, RR AND RR-2, RT, RT-2, RRT AND RRT-2	1 1/2 (38.1 mm)

Models	Replace Hook When Opening or Seat are:	
	"A" Max.	"B" Min.
A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H, H-2, J, J-2, JJ, JJ-2, L, L-2, LL, LL-2	1 31/64 in.	21/32 in.
R, R-2, RR, RR-2	1 59/64 in.	27/32 in.
RT, RT-2, RRT AND RRT-2	2 1/2 in	1 1/8 in

Figure 14. Hook Inspection

LOAD CHAIN

Clean and Inspection

First clean the load chain with a non-acid or non-caustic type solvent. Then slack the chain and make a link-by-link inspection for nicks, gouges, twisted links and excessive wear or stretching. Chain should be gaged throughout its entire length and replaced if worn beyond serviceable limits.

Gaging Load Chain Wear

To determine if load chain should be continued in service, check gage lengths as indicated in Figure 15. Chain worn beyond length indicated, nicked, gouged or twisted should be replaced before returning hoist to service. Chain should be clean, free of twists and pulled taut before measuring.

Note that worn chain can be an indication of worn hoist components. For this reason, the hoist's chain guides, hook blocks and liftwheel should be examined for wear and replaced as necessary when replacing worn chain.

Also, these chains are specially heat treated and hardened and should never be repaired.

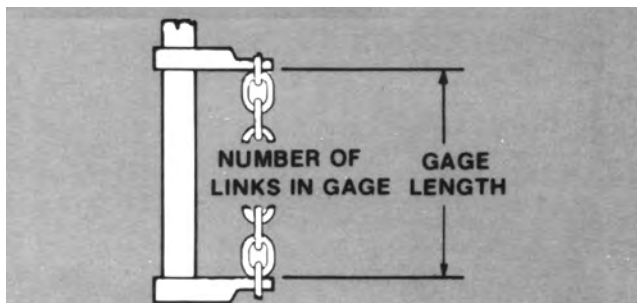


Figure 15. Gaging Load Chain Wear

Models	Dia. of Chain Stock	No. of Links to Gage	Max. Gage Length Allowable Used Chain
A thru H A-2 thru H-2	0.250" (6.35mm)	19	14 13/16 (376 mm)
J thru RRT J-2 thru RRT-2	0.312 (7.9mm)	21	18 7/8 (479 mm)



WARNING

Using other than CM supplied load chain may cause the chain to jam in the hoist and/or allow the chain to break and the load to drop.

TO AVOID INJURY:

Due to size requirements and physical properties, use only CM HoistAloy load chain in the Lodestar Hoists.

IMPORTANT: Do not use replaced chain for other purposes such as lifting or pulling. Load chain may break suddenly without visual deformation. For this reason, cut worn chain into short lengths to prevent use after disposal.

PROTECTOR

The Protector should operate for the normal life of the hoist without service. The device has been lubricated and calibrated at the factory for a specific model of Lodestar Hoist and is not to adjustable or interchangeable with other models. For proper overload protection, be sure before installing a Protector that it is correct for the unit. The edge of the spring washer of the Protector has been color coded at the factory as follows:

Models	Protector Color Code
A, A-2	White
AA, AA-2	Light Blue
B, B-2, E, E-2	White
C, C-2	Orange
F, F-2, H, H-2	Orange
J, J-2	Red
JJ, JJ-2	White-Green
L, L-2, RT, RT-2	Green
LL, LL-2	Yellow
R, R-2	Green
RR, RR-2, RRT, RRT-2	Yellow



WARNING

Removing the snap ring on the Protector assembly will allow the parts to spring apart.

TO AVOID INJURY:

Do not attempt to disassemble the Protector.

MAINTENANCE



WARNING

The lubricants used in and recommended for the Lodestar Hoist may contain hazardous materials that mandate specific handling and disposal procedures.

TO AVOID CONTACT AND CONTAMINATION:

Handle and dispose of lubricants only as directed in applicable material safety data sheets and in accordance with applicable local, state and federal regulations.

HOIST LUBRICATION

NOTE: To assure extra long life and top performance, be sure to lubricate the various parts of the Lodestar Hoist using the lubricants specified below. If desired, these lubricants may be purchased from CM. Refer to page 52 for information on ordering the lubricants.

- The Protector™ should operate for the normal life of the hoist without service. The device has been lubricated and calibrated at the factory for a specific model of Lodestar Hoist and is not adjustable or interchangeable with other models.

CAUTION: The Protector™ is to be used with Century Lubricants HB-11, #3 grease. Use of any other grease will damage Protector™ parts or cause improper operation.

The gears and Protector™ (627-327 and 627-328) are packed at assembly with grease and should not need to be renewed unless the gears have been removed from the housing and degreased.

CAUTION: Never degrease or attempt to disassemble the Protector™. Degreasing may damage parts or cause erratic, inconsistent operation. If the Protector™ has been degreased, it must be replaced by a factory calibrated device.

If the gears are removed from the housing, wipe the excess grease off the outside Protector™ surfaces with a soft cloth and degrease the remaining gears and housings. Upon reassembly, add 7 oz. of above grease to gears and housing. Also, coat the spline on the end of the drive shaft (627-311) with a molydisulphide lubricant such as "Super Herculon."

For Models JJ, LL, RR, RRT, JJ-2, LL-2, RR-2 and RRT-2, see page 48 for special gearing alignment instructions.

- The limit switch gears are of molded nylon and require no lubrication.
- Apply a light film of machine oil to the limit switch shaft threads (627-220 pages 64 and 65) at least once a year.
- On Models RT, RT-2, RRT and RRT-2 suspended from trolleys, the upper sheave, shackle pin and lug pin must be periodically lubricated with Lubriplate Bar and Chain Oil 10-R (Fiske Bros. Refining Co.). Also, apply a light film of EP Grease (Acheson Colloids Co. Molydag #204, or equal) to the spherical surfaces of the sheave stud nut and the sheave stud nut seat.

Bearings

- All bearings and bushings except the lower hook thrust bearing are prelubricated and require no lubrication. Lubricate the lower hook thrust bearing at least once a month, using a heavy cup grease.

Chain Guides, Liftwheel & Lower Sheave Wheel

- When the hoist is disassembled for inspection and/or repair, the chain guides, lower sheave wheel (on double chain units) and liftwheel must be lubricated with Lubriplate, Bar and Chain Oil 10-R (Fiske Bros. Refining Co.) prior to reassembly. Apply sufficient lubricant to obtain run-off and full coverage.

Load Chain

A small amount of lubricant will greatly increase the life of load chain. Do not allow the chain to run dry.

Keep it clean and lubricate at regular intervals with Lubriplate, Bar and Chain Oil 10-R (Fiske Bros. Refining Co.) or equal lubricant. Normally, weekly lubrication and cleaning is satisfactory, but under hot and dirty conditions, it may be necessary to clean the chain at least once a day and lubricate it several times between cleanings.

When lubricating the chain, apply sufficient lubricant to obtain natural run-off and full coverage.



WARNING

Used motor oils contain known carcinogenic materials.

TO AVOID INJURY:

Never use motor oils as a chain lubricant. Only use Lubriplate Bar and Chain Oil 10-R as a lubricant for the load chain.

TROLLEY LUBRICATION

Low Headroom Trolley

- CM trackwheel bearings are pre-lubricated and require no lubrication.

EXTERIOR FINISH

The exterior surfaces of the hoist and trolleys have a durable, scratch resistant baked powder coating. Normally, the exterior surfaces can be cleaned by wiping with a cloth. However, if the finish is damaged, compatible touch-up paint can be purchased from CM. Refer to page 52 for information on ordering the paint.

SOLID STATE REVERSE SWITCH (115-1-60/230-1-60 Units Only)

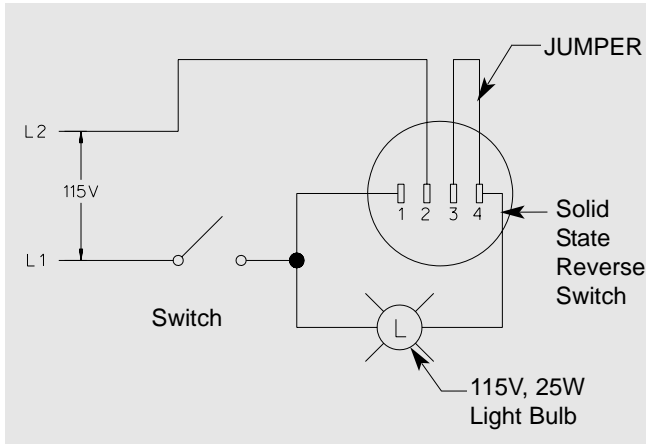
Above an ambient temperature of 104°F. (40° C.), the frequency of hoist operation should be limited to avoid overheating the solid state reverse switch. Even at temperatures less than 104° F. (40° C.), high duty cycle, frequent starting or reversing, excessive inching, jogging or plugging may overheat the solid state reverse switch. Overheating the switch will cause it to malfunction, and this in turn will overheat the motor and/or damage the solid state reverse switch.

If allowed to cool, the solid state will return to normal operation. However, before returning the hoist to service, the following procedure should be used to determine if the switch has been damaged.

1. De-energize the power system supplying the hoist and remove the solid state reverse switch.
2. Connect the solid state reverse switch to a 115-1-60/230-1-60 light circuit as shown below.

3. Close the switch to energize the 115-1-60/230-1-60 power supply. The light bulb will illuminate if the solid state reverse switch is not damaged. If the bulb fails to illuminate, the switch is damaged and must be replaced.
4. Turn the 115-1-60/230-1-60 power off and remove the solid state reverse switch from the test circuit.

Reinstall the solid state reverse switch in the hoist and re-connect it using the wiring diagram supplied with the hoist. Re-energize the power system supplying the hoist and test for proper operation. Also, ventilate the space around the hoist and/or reduced duty cycle, excessive starting, excessive plugging to reduce future malfunctions of the solid state reverse due to overheating.



ADJUSTMENTS

ELECTRIC BRAKE ASSEMBLY

The correct air gap between armature and field, when brake is not energized, is 0.025 inch (.635 mm) and need not be adjusted until the gap reaches 0.045 inches (1.14 mm). When checking brake gap, always reset to 0.025 inch (.0635 mm).

To adjust the brake, proceed as follows:

1. Disconnect hoist from power supply.
2. Remove back frame cover, see Figure 13.
3. Before adjusting the gap:
 - a) back off the stud nuts and examine friction linings and friction surfaces for excessive wear, (min. thickness .188 inches (4.78 mm)), scoring or warpage.
 - b) Check shading coils to be sure they are in place and not broken. A missing or broken shading coil will cause the brake to be noisy when hoist is operated. Any of these symptoms indicate the need for replacement of parts.
4. Turn adjusting nuts clockwise gaging the air gap at both ends.
5. Replace cover, reconnect the power and check operation.

LIMIT SWITCHES

If limit switch operation has been checked as described on page 10 and is not operating correctly or is not automatically stopping the hook at a desired position, proceed as follows:

1. Disconnect hoist from power supply.
2. Remove back cover, see Figure 13.
3. The position of upper and lower limit switches are indicated on the fiber insulator.
4. Loosen the screws to permit guide plate to be moved out of engagement with the traveling nuts, refer to Figures 16 and 17. For Rotatable Limit Switch, slightly pull out on the guide spring, disengaging the the travel nut, refer to figure 16A and 17A.

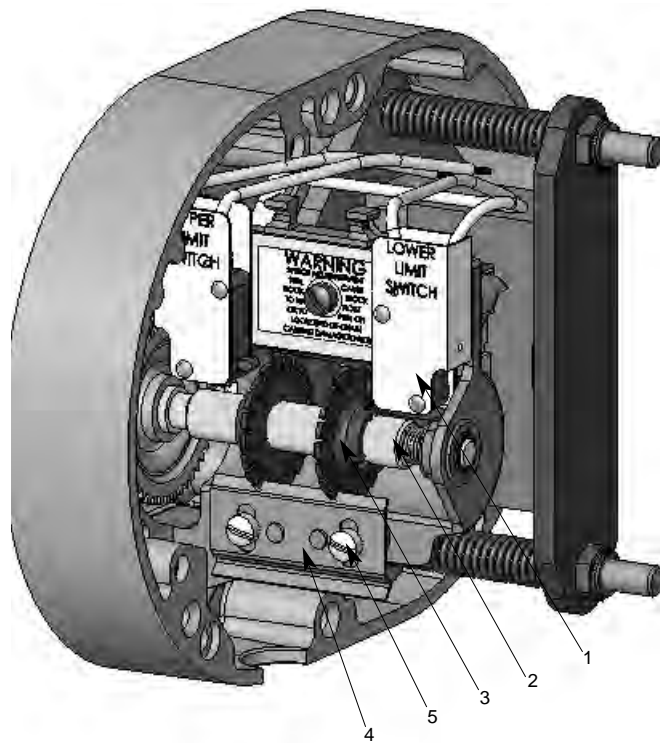


Figure 16. Limit Switches, Models A thru H-2

1. Limit Switch Sub-Assembly
2. Limit Switch Shaft
3. Traveling Nuts
4. Guide Plate
5. Screws

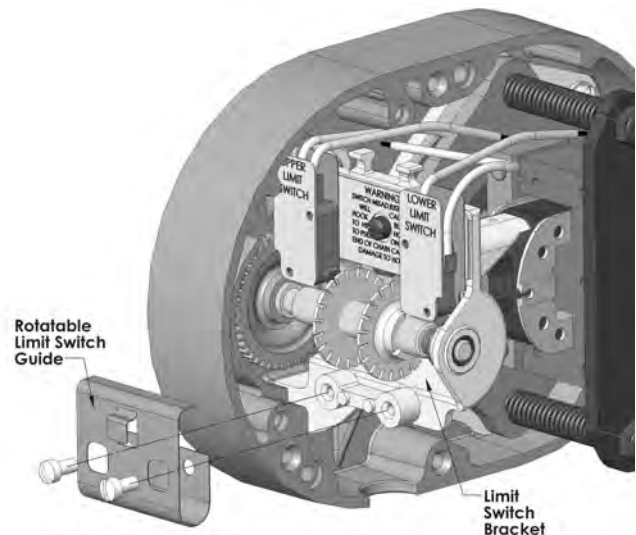


Figure 16a. Rotatable Limit Switch, Models A thru H-2

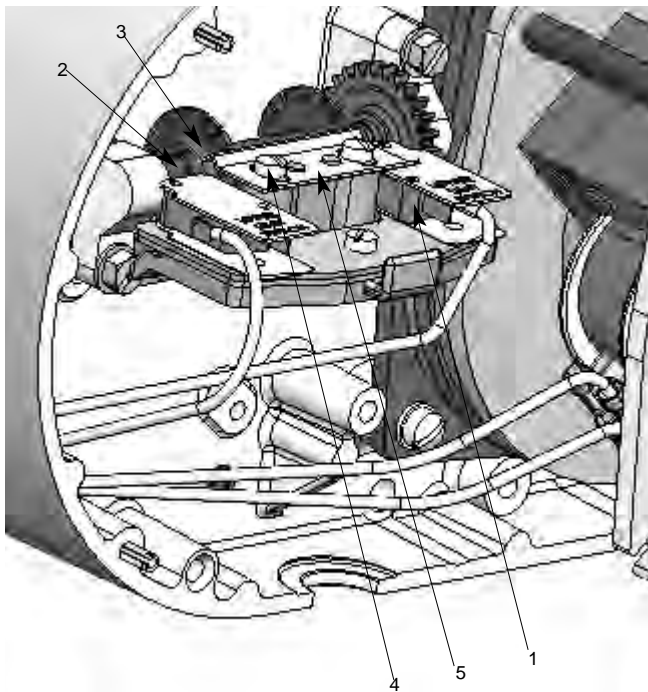


Figure 17. Limit Switches, Models J thru RRT-2

- | | |
|------------------------------|----------------|
| 1. Limit Switch Sub-Assembly | 4. Guide Plate |
| 2. Limit Switch Shaft | 5. Screws |
| 3. Traveling Nuts | |

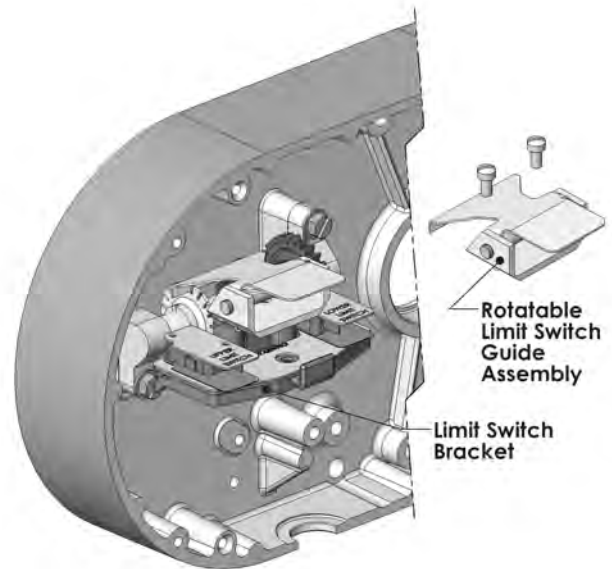
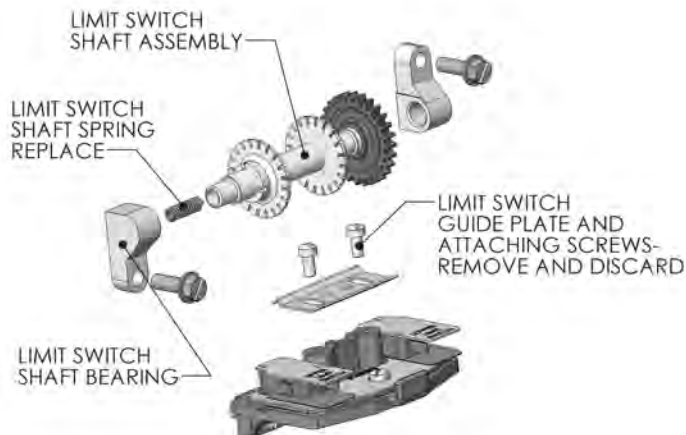


Figure 17a. Rotatable Limit Switch, Models J thru RRT-2

SETTING UPPER LIMIT SWITCH

- Refer to Table 6-The "A" dimensions given are the minimum distances that should be set between top of hook block and bottom of hoist. In other words, the highest allowable hook position.

CAUTION: THE "A" DIMENSIONS SHOWN IN THE TABLE ARE THE MINIMUM ALLOWED FOR SAFE OPERATION AND SHOULD NOT BE REDUCED.

- Reconnect hoist to power supply.
- Run hook to the desired upper position, cautiously operating the hoist without a load.
- Disconnect hoist from power supply.
- Moving one traveling nut toward the other increasing hook travel and away from the other decreases the travel. Now, turn the nut nearest the switch indicated as the "UPPER LIMIT SWITCH" until it just breaks the limit switch contacts. An audible click will be heard as the switch opens. Continue to rotate the nut toward the switch an additional one full tooth.
- Reposition the guide plate in the next slot and securely tighten screws.
- Reconnect hoist to power supply and check the stopping point of hook by first lowering the hook about 10 inches, then raise the hook by jogging cautiously until the upper limit switch stops upward motion. The stopping point of hook should be the desired upper position. If not, repeat the above instructions.
- Double check the setting by lowering the hook about 24 inches (609 mm) and then run the hook into the upper limit with \uparrow (UP) control held depressed.
- Fine adjustment of the upper limit setting may be obtained by inverting the guide plate in Step 10. The offset on the plate gives adjustments equivalent to 1/2 notch, see Table 6 for the Hook Travel Per Notch of Limit Switch Nut." When inverting the plate, it may be necessary to use the notch adjacent to the one used in the preliminary setting.

SETTING LOWER LIMIT SWITCH

- Refer to Table 6-The "B" dimensions given are the minimum number of load chain links that should be set between the loose end link and the hoist frame on the loose end side of the chain. In other words, the lowest allowable hook position.

CAUTION: THE "B" DIMENSIONS SHOWN IN THE TABLE ARE THE MINIMUM ALLOWED FOR SAFE OPERATION AND SHOULD NOT BE REDUCED.


- Reconnect hoist to power supply.
- Run the hook to the desired lower position, cautiously operating the hoist without a load.
- Disconnect hoist from power supply.
- Moving one traveling nut toward the other increases hook travel and away from the other decreases the travel. Now, turn the nut nearest the switch indicated as the "LOWER LIMIT SWITCH" until it just breaks the limit switch contacts. An audible click will be heard as the switch opens. Continue to rotate the nut toward the switch an additional one full tooth.
- Reposition the guide plate in the next slot and securely tighten screws.
- Reconnect hoist to power supply, and check the stopping point of the hook by first raising the hook about 10 inches, then lower the hook by jogging cautiously until the lower limit switch stops the downward motion. The stopping point of hook should be the desired lower position. If not, repeat the above instructions.
- Double check setting by raising the hook about 24 inches (609.6 mm) and then run the hook into the lower limit with the  (DOWN) control held depressed.
- Fine adjustment of the lower limit setting may be obtained by inverting the guide plate in Step 10. The offset on the plate gives adjustments equivalent to 1/2 notch, see Table 6 for the "Hook Travel Per Notch of Limit Switch Nut". When inverting the plate, it may be necessary to use the notch adjacent to the one used in the preliminary setting.

TABLE 6. LIMIT SWITCHES

Hook Travel Per Notch of Limit Switch Nut (44TPI)				
	MAX. LENGTH OF LIFT	HOOK TRAVEL Per Notch	A in. (mm)	B (links)
MODEL	ft. (M)	in. (mm)	Min.	Min.
A, A-2, C, C-2	204 (62.2)	1-5/16 (33.3)	1-1/2 (38.1)	6
AA, AA-2	385 (117.3)	2-1/2 (63.5)	2 (30.8)	6
B, B-2, F, F-2	102 (31.1)	11/16 (17.5)	1-1/2 (38.1)	6
E, E-2, H, H-2	47 (14.3)	11/32 (93.1)	1-3/4 (44.5)	6
J, J-2, L, L-2	125 (38.1)	3/4 (19.0)	1-1/2 (38.1)	8
JJ, JJ-2	254 (77.4)	1-15/32 (37.3)	2-1/2 (63.5)	8
LL, LL-2	254 (77.4)	1-15/32 (37.3)	1-1/2 (38.1)	8
R, R-2	66 (20.1)	3/8 (9.5)	2-1/2 (63.5)	8
RR, RR-2	125 (38.1)	3/4 (19.0)	2-1/2 (63.5)	8
RT, RT-2	44 (13.4)	1/4 (6.35)	2-1/2 (63.5)	8
RRT, RRT-2	83 (25.3)	15/32 (11.9)	2-1/2 (63.5)	8

RECOMMENDED SPARE PARTS

To insure continued service of the Lodestar Hoist, the following is a list of parts that are recommended to be kept on hand at all times to replace parts that have worn or failed:

Key No.	Part Name	Qty. for each Hoist in Service
627-222	Limit Switch Kit	1
627-259	Brake Coil	1
627-261	Brake Friction Disc Models A,B, & E All other models	1 2
627-439	Solid State Reverse Switch (115/230-1-60 units only)	1
627-418	Capacitor (115-1-60, 230-1-60 units only)	1
627-530	Transformer and Bracket Assembly	1
627-563	Control Station Parts Kit	1
627-565	Control Station Switch Kit	1
627-650	Contactors	1
627-800	Selector Relay (Two Speed units only)	1
627-1063	CM Terminal Pin-Extraction Tool (Dual Voltage Only)	1

Refer to Pages 51 through 85 for ordering information and parts list for the part numbers.

Table 7

TROUBLE SHOOTING All Hoists

TROUBLE	PROBABLE CAUSE	CHECK AND REMEDY
1. Hook does not respond to the control station	A.) No voltage at hoist-main line or branch circuit switch open; branch line fuse blown or circuit breaker tripped.	A.) Close switch, replace fuse or reset breaker.
	B.) Phase failure (single phasing, three phase unit only)-open circuit, grounded or faulty connection in one line of supply system, hoist wiring, reversing contactor, motor leads or windings.	B.) Check for electrical continuity and repair or replace defective part.
	C.) Upper or lower limit switch has opened the motor circuit.	C.) Press the "other" control and the hook should respond. Adjust limit switches as described on pages 17-18.
	D.) Open control circuit-open or shorted winding in transformer, reversing contactor coil or speed selecting relay coil; loose connection or broken wire in circuit; mechanical binding in contactor or relay; control station contacts not closing or opening.	D.) Check electrical continuity and repair or replace defective part.
	E.) Wrong voltage or frequency..	E.) Use the voltage and frequency indicated on hoist identification plate. For three phase dual voltage unit, make sure the connections at the voltage conversion board are the proper voltage as described on page 8.
	F.) Low Voltage.	F.) Correct low voltage condition as described on page 9.
	G.) Brake not releasing-open or shorted coil winding; armature binding.	G.) Check electrical continuity and connections. Check that correct coil has been installed. The coil for three phase dual voltage unit operates at 230 volts when the hoist is connected for either 230 volt or 460 volt operation. Check brake adjustment as described on page 16.
	H.) Excessive load.	H.) Reduce loading to the capacity limit of hoist as indicated on the identification plate.
2.) Hook moves in the wrong direction.	A.) Wiring connections reversed at either the control station or terminal board (single phase unit only).	A.) Check connections with the wiring diagram.
	B.) Failure of the motor reversing switch to effect dynamic braking at time of reversal (single phase unit only).	B.) Check connections to switch. Replace a damaged switch or a faulty capacitor.
	C.) Phase reversal (three phase unit only).	C.) Refer to installation instruction on page 8.
3.) Hook lowers but will not raise.	A.) Excessive load.	A.) See item 1H.
	B.) Open hoisting circuit-open or shorted winding in reversing contactor coil or speed selecting relay coil; loose connection or broken wire in circuit; control station contacts not making; upper limit switch contacts open.	B.) Check electrical continuity and repair or replace defective part. Check operation of limit switch as described on page 10.
	C.) Phase failure (three phase unit only).	C.) See item 1B.

Table 7. (con't)

TROUBLE	PROBABLE CAUSE	CHECK AND REMEDY
4.) Hook raises but will not lower.	A.) Open lowering circuit-open or shorted winding in reversing contactor coil or speed selecting relay coil; loose connection or broken wire in circuit; control station contacts not making; lower limit switch contacts open.	A.) Check electrical continuity and repair or replace defective part. Check operation of limit switch as described on page 10.
	B.) Motor reversing switch not operating (single phase unit only).	B.) See items 2B and 3C.
5.) Hook lowers when hoisting control is operated.	A.) Phase failure (three phase unit only).	A.) See item 1B.
6.) Hook does not stop promptly.	A.) Brake slipping.	A.) Check brake adjustment as described on page 16.
	B.) Excessive load.	B.) See item 1H.
7.) Hoist operates sluggishly.	A.) Excessive load.	A.) See item 1H.
	B.) Low voltage.	B.) Correct low voltage condition as described on page 9.
	C.) Phase failure or unbalanced current in the phases (three phase unit only).	C.) See item 1B.
	D.) Brake dragging.	D.) Check brake adjustment as described on page 16.
8.) Motor overheats.	A.) Excessive load.	A.) See item 1H.
	B.) Low voltage.	B.) Correct low voltage condition as described on page 9.
	C.) Extreme external heating.	C.) Above an ambient temperature of 40°C. (104°F.), the frequency of hoist operation must be limited to avoid overheating of motor. Special provisions should be made to ventilate the space or shield the hoist from radiation.
	D.) Frequent starting or reversing.	D.) Avoid excessive inching, jogging or plugging. This type of operation drastically shortens the motor and contactor life and causes excessive brake wear.
	E.) Phase failure or unbalanced current in the phase (three phase unit only).	E.) See item 1B.
	F.) Brake dragging.	F.) Check brake adjustment as described on page 16.
	G.) 115-1-60 Units: Solid state reverse switch exposed to excessive temperature or the switch is damaged.	G.) See page 15.
9.) Hook fails to stop at either or both ends of travel.	A.) Limit switches not opening circuits.	A.) Check switch connections, electrical continuity and mechanical operation. Check the switch adjustment as described on pages 16 & 17. Check for a pinched wire.
	B.) Shaft not rotating.	B.) Check for damaged gears.
	C.) Traveling nuts not moving along shaft-guide plate loose; shaft or nut threads damaged.	C.) Tighten guide plate screws. Replace damaged part.
10.) Hook stopping point varies.	A.) Limit switch not holding adjustment.	A.) See item 9.
	B.) Brake not holding.	B.) Check the brake adjustment as described on page 16.

Table 7 (con't)		
Two Speed Hoist		
TROUBLE	PROBABLE CAUSE	CHECK AND REMEDY
11.) Hoist will not operate at slow speed in either direction.	A.) Open Circuit.	A.) Open or shorted motor winding, loose or broken wire in circuit, speed selecting contactor stuck in opposite speed mode. Replace motor, repair wire and/or replace speed selecting contactor.
	B.) Phase Failure.	B.) See item 1B.
12.) Hoist will not operate at fast speed in either direction.	A.) Open Circuit.	A.) See Item 11A.
	B.) Open speed selecting circuit.	B.) Open or shorted winding in speed selecting contactor coil. Loose connection or broken wire in circuit. Mechanical binding in contactor. Control station contacts not making or opening. Replace speed selector; repair connection, replace contactor or control station.
	C.) Phase Failure.	C.) See Item 1B.
13.) Hook will not raise at slow speed.	A.) Excessive load.	A.) See item 1H.
	B.) Phase Failure.	B.) See Item 1B.
	C.) Open Circuit.	C.) See item 11A.
	D.) Brake not releasing.	D.) See Item 1G.
14.) Hook will not lower at slow speed.	A.) Phase Failure.	A.) See item 1B.
	B.) Open Circuit.	B.) See item 11A.
	C.) Brake not releasing.	C.) See Item 1G.
15.) Hook will not raise at fast speed.	A.) Excessive load.	A.) See item 1H.
	B.) Phase Failure.	B.) See Item 1B.
	C.) Brake not releasing.	C.) See Item 1G.
16.) Hook will not lower at fast speed.	A.) Phase Failure.	A.) See Item 1B.
	B.) Brake not releasing.	B.) See Item 1G.
17.) Hook moves in proper direction at one speed-wrong direction at other speed.	A.) Phase reversal.	A.) Wiring reconnected improperly. Interchange two leads of motor winding that is out of phase at the speed selecting relay.

ELECTRICAL DATA**TO DETECT OPEN AND SHORT CIRCUITS IN ELECTRICAL COMPONENTS.**

Open circuits in the coils of electrical components may be detected by isolating the coil and checking for continuity with an ohmmeter or with the unit in series with a light or bell circuit.

Shorted turns are indicated by a current draw substantially above normal (connect ammeter in series with suspected element and impose normal voltage) or D.C. resistance substantially below normal. The current method is recommended for coils with very low D.C. resistance.

Motor current draw in the stator should be measured with the rotor in place and running. Brake, relay and contactor coil current should be measured with the core iron in operating position.

Table 8. Electrical Data for Hoist Components

TRANSFORMER VOLTAGE	LEADS	*D.C. RESISTANCE (OHMS)
230/460 to 115	X2 to X1	27.9
	H2 to H1	99.0
	H3 to H4	111.8
230/380 to 48	X2 to X1	5.2
	H2 to H1	99.0
	H3 to H4	112.6
220/415 to 24	X2 to X1	1.3
	H2 to H1	100.4
	H3 to H4	114.9
575 to 115	X2 to X1	28.4
	H4 to H1	329.1

MODELS	CONTACTOR OR SPEED SELECTOR COIL VOLTAGE	NOMINAL CURRENT (AMPS)	*D.C. RESISTANCE (OHMS)
A thru H-2	115	0.04	297.5
	48	0.09	56.3
	24	0.19	14.9
JJ thru RRT-2	115	0.07	126.6
	48	0.17	25.1
	24	0.33	6.4

MODELS	BRAKE COIL VOLTAGE	NOMINAL CURRENT (AMPS)	*D.C. RESISTANCE (OHMS)
A, AA, B, C, E F and H	115	.51	5.8
A thru H-2	**230	.17	23.1
A-2 thru H-2	460	.20	92.3
A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H, H-2	575	.14	140.0
J, L, R, RT	115	1.25	1.1
J, J-2, L, L-2, LL-2, R, R-2, RT, RT-2	**230	.46	4.6
JJ, JJ-2, LL, LL-2, RR, RR-2, RRT, RRT-2	**230	1.7	2.2
J-2, L-2, R-2, RT-2	460	.25	18.7
JJ-2, LL-2, RR-2, RRT-2	460	1.5	8.9
J, J-2, L, L-2, LL-2, R, R-2, RT, RT-2	575	.50	38.5
JJ, JJ-2, LL, LL-2, RR, RR-2, RRT, RRT-2	575	1.70	14.2

*Resistance values listed are nominal and they may vary slightly from component to component.

**On dual voltage units (230/460-3-60, 220/380-3-50 and 220/415-3-50), brake coils operate on 230 (220) volts.

Table 8. (con't)

Models	Volts-Phase-Hertz	H.P. (kW)	Full Load Current (Amps)	Leads	*D.C. Resistance (Ohms)	Models	Volts-Phase-Hertz	H.P. (kW)	Full Load Current (Amps)	Leads	*D.C. Resistance (Ohms)				
A,B,E	115-1-60	1/4 (.19)	4.6	T1 to T2 (run)	1.9	J,L,R,RT	115-1-60	1 (.75)	9.8	T1 to T2 (run)	1.1				
				T3 to T4 (run)						T3 to T4 (run)					
				T5 to T8 (start)						T5 to T8 (start)					
A,B,E	230-1-60	1/4 (.19)	2.3	T1 to T2 (run)	4.3	J,L,R,RT	230-1-60	1 (.75)	4.9	T1 to T2 (run)	1.1				
				T3 to T4 (run)						T3 to T4 (run)					
				T5 to T8 (start)						T5 to T8 (start)					
A,B,E	230/460-3-60	1/4 (.19)	1.4/.7	W-B to O-BL	14.8	J,L,R,RT	230/460-3-60	1 (.75)	3.0/1.5	W-B to W-BL	4.7				
	W-B to O-B			W-BL to W-B											
	220/380-3-50		1.4/.7	W to O-G	29.5		220/380-3-50		3.6/1.8	W to W-B	9.4				
	Y-B to Y-BL			Y-G to Y-BL											
	220/415-3-50		1.4/.7	Y-B to Y-G	98.2		220/415-3-50		3.6/1.8	Y-G to Y-B	29.6				
	575-3-60			.5			W-BL to W-B			W to W-B					
550-3-50	.6	W-B to P	W-B to W-BL												
A-2, B-2, E-2	230-3-60	.08/.25 (.06/.19)	1.7/1.8	W-B to W	17.5	J-2, L-2, R-2, RT-2	230-3-60	.33/1 (.25/.75)	3.4/5.0	Y-B to Y-BL	19.4				
	W-B to W-BL			Y-B to Y-G											
	W to W-BL			Y-BL to Y-B			3.2/4.7			W-B to W-BL		7.7			
	220-3-50		1.9/2.0	Y-G to Y-BL	W-B to W										
	Y-G to Y-B			W-BL to W											
A-2, AA-2, B, C, C-2, E-2, F-2, H-2	230-3-60	.15/.5 (.12/.37)	1.8/2.0	W-B to W	13.5	J-2, L-2, R-2, RT-2	460-3-60	.33/1 (.25/.75)	1.5/2.4	Y-B to Y-BL	80.8				
	W-B to W-BL			380-3-50			1.6/2.4			Y-B to Y-G					
	W to W-BL			415-3-50						1.6/2.4		W-B to W-BL			
	220-3-50		2.1/2.4	Y-BL to Y-B	25.0				W-B to W		29.4				
	Y-G to Y-BL			Y-BL to Y-G											
	Y-G to Y-B			W-BL to W											
	460-3-60		1.0/1.0	W-B to W	63.0	J-2, L-2, R-2, RT-2	575-3-60	.33/1 (.25/.75)	1.1/1.9	Y-B to Y-BL	125.6				
	380-3-50			1.2/1.2			W-B to W-BL			1.3/2.1		Y-B to Y-G	45.4		
	415-3-50						1.2/1.2					Y-BL to Y-B		104	W-B to W-BL
	575-3-60		.8/.85		Y-G to Y-BL				99.1		W-B to W				
	550-3-50			.8/.90	Y-G to Y-B					156.0	W-BL to W				
AA, C, F, H	115-1-60	1/2 (.37)	7.2		T1 to T2 (run)	1.9	JJ, LL, RR, RRT	230/460-3-60	2 (1.50)		5.8/2.9	W-B to W-BL	2.2		
				T3 to T4 (run)	220/380-3-50			3.4/3.3		W to W-B					
				T5 to T8 (start)	220/415-3-50					3.4/3.3		Y-BL to Y-B		9.4	
AA, C, F, H	230-1-60	1/2 (.37)	3.6	T1 to T2 (run)	1.9	JJ-2, LL-2, RR-2, RRT-2					575-3-60	.33/1 (.25/.75)	3.2		Y-G to Y-BL
				T3 to T4 (run)				Y-BL to Y-B			W to W-B				
				T5 to T8 (start)				Y-G to Y-B		W to W-BL					
AA, C, F, H	230/460-3-60	1/2 (.37)	1.8/.09	W-B to O-BL	7.8		JJ-2, LL-2, RR-2, RRT-2	230-3-60	.67/2 (.50/1.50)	5.8/8.8	Y-B to Y-BL		14.1		
	W-B to O-B			Y-B to Y-G											
	230/380-3-50		2.1/1.0	W to O-G	15.6			220-3-50			6.6/9.5			Y-B to Y-G	3.2
	Y-B to Y-BL			W-B to W-BL											
	220/415-3-50		2.1/1.0	Y-B to Y-G	48.3	460-3-60		.67/2 (.50/1.50)		Y-BL to Y-G		11.3			
	575-3-60			.8		W-BL to W-B				Y-B to Y-BL	83.9				
575-3-50	.91	W-B to P	Y-BL to Y-G												
							550-3-50			W-B to W-BL		17.1			
										W-B to W					
										W-BL to W					

WIRING HARNESS

POWER CORD

CONTROL CORD

TERMINAL STRIPS

CONTROL STATION

UP

DN

Y

BR

BL

W

B

G

R1

R2

R3

R4

R5

R6

R7

R8

W1

W2

B1

B2

B3

B4

B5

B6

B7

B8

B9

B10

B11

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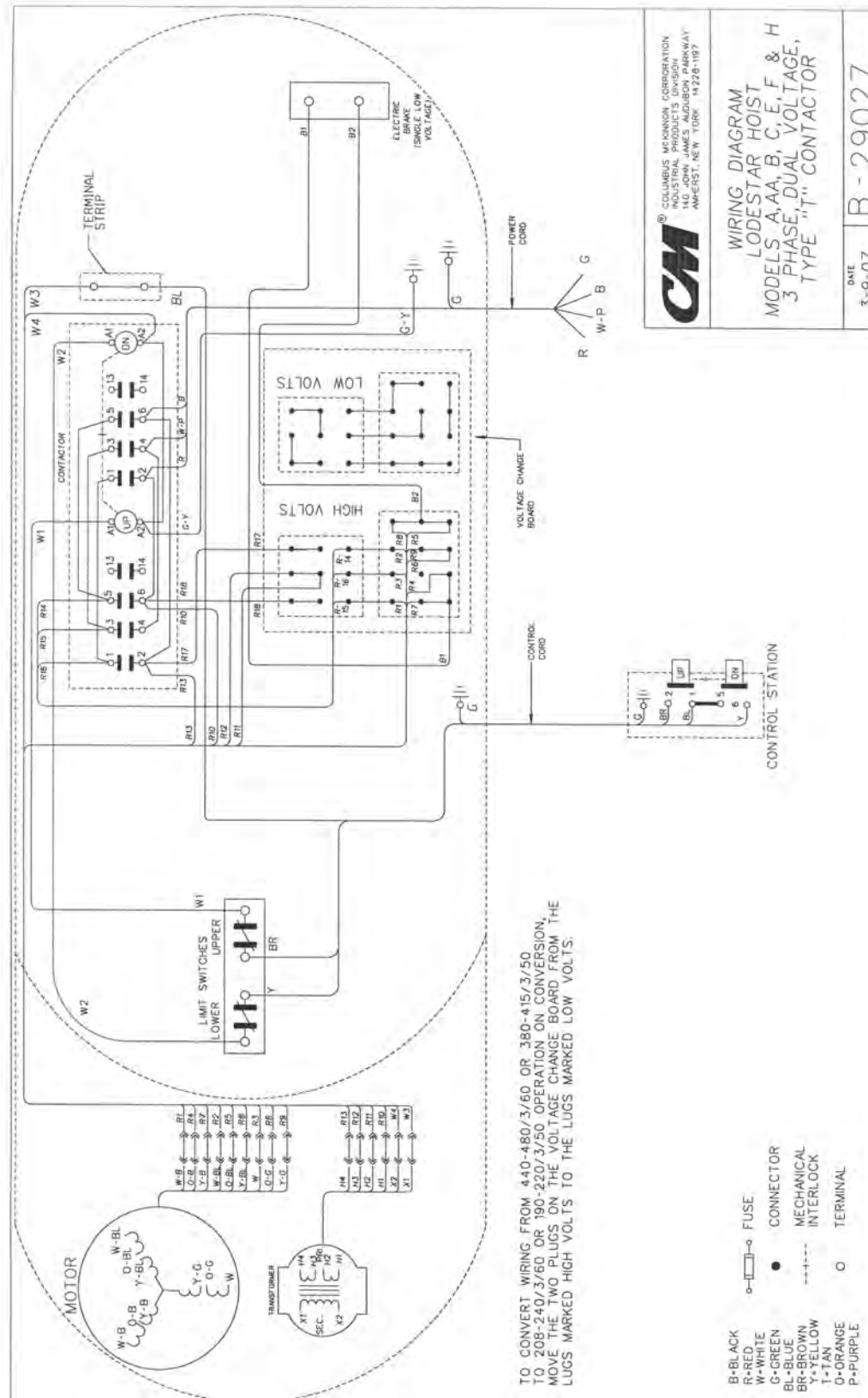
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The diagram illustrates the electrical wiring for a hoist system. It includes a motor with 'RUN' and 'START' windings, a transformer with primary (X1, X2) and secondary (H1, H2, H3, H4) terminals, and a control station with 'UP' and 'DN' buttons. The control station is connected to a solid state reverse switch (R5, R6, R7, R8) and a steel core (R7, R8). The motor is connected to a capacitor (R7, R8) and limit switches (W1, W2). The control station is connected to a power cord (W, B, G) and a terminal strip (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100, R101, R102, R103, R104, R105, R106, R107, R108, R109, R110, R111, R112, R113, R114, R115, R116, R117, R118, R119, R120, R121, R122, R123, R124, R125, R126, R127, R128, R129, R130, R131, R132, R133, R134, R135, R136, R137, R138, R139, R140, R141, R142, R143, R144, R145, R146, R147, R148, R149, R150, R151, R152, R153, R154, R155, R156, R157, R158, R159, R160, R161, R162, R163, R164, R165, R166, R167, R168, R169, R170, R171, R172, R173, R174, R175, R176, R177, R178, R179, R180, R181, R182, R183, R184, R185, R186, R187, R188, R189, R190, R191, R192, R193, R194, R195, R196, R197, R198, R199, R200, R201, R202, R203, R204, R205, R206, R207, R208, R209, R210, R211, R212, R213, R214, R215, R216, R217, R218, R219, R220, R221, R222, R223, R224, R225, R226, R227, R228, R229, R230, R231, R232, R233, R234, R235, R236, R237, R238, R239, R240, R241, R242, R243, R244, R245, R246, R247, R248, R249, R250, R251, R252, R253, R254, R255, R256, R257, R258, R259, R260, R261, R262, R263, R264, R265, R266, R267, R268, R269, R270, R271, R272, R273, R274, R275, R276, R277, R278, R279, R280, R281, R282, R283, R284, R285, R286, R287, R288, R289, R290, R291, R292, R293, R294, R295, R296, R297, R298, R299, R300, R301, R302, R303, R304, R305, R306, R307, R308, R309, R310, R311, R312, R313, R314, R315, R316, R317, R318, R319, R320, R321, R322, R323, R324, R325, R326, R327, R328, R329, R330, R331, R332, R333, R334, R335, R336, R337, R338, R339, R340, R341, R342, R343, R344, R345, R346, R347, R348, R349, R350, R351, R352, R353, R354, R355, R356, R357, R358, R359, R360, R361, R362, R363, R364, R365, R366, R367, R368, R369, R370, R371, R372, R373, R374, R375, R376, R377, R378, R379, R380, R381, R382, R383, R384, R385, R386, R387, R388, R389, R390, R391, R392, R393, R394, R395, R396, R397, R398, R399, R400, R401, R402, R403, R404, R405, R406, R407, R408, R409, R410, R411, R412, R413, R414, R415, R416, R417, R418, R419, R420, R421, R422, R423, R424, R425, R426, R427, R428, R429, R430, R431, R432, R433, R434, R435, R436, R437, R438, R439, R440, R441, R442, R443, R444, R445, R446, R447, R448, R449, R450, R451, R452, R453, R454, R455, R456, R457, R458, R459, R460, R461, R462, R463, R464, R465, R466, R467, R468, R469, R470, R471, R472, R473, R474, R475, R476, R477, R478, R479, R480, R481, R482, R483, R484, R485, R486, R487, R488, R489, R490, R491, R492, R493, R494, R495, R496, R497, R498, R499, R500, R501, R502, R503, R504, R505, R506, R507, R508, R509, R510, R511, R512, R513, R514, R515, R516, R517, R518, R519, R520, R521, R522, R523, R524, R525, R526, R527, R528, R529, R530, R531, R532, R533, R534, R535, R536, R537, R538, R539, R540, R541, R542, R543, R544, R545, R546, R547, R548, R549, R550, R551, R552, R553, R554, R555, R556, R557, R558, R559, R560, R561, R562, R563, R564, R565, R566, R567, R568, R569, R570, R571, R572, R573, R574, R575, R576, R577, R578, R579, R580, R581, R582, R583, R584, R585, R586, R587, R588, R589, R590, R591, R592, R593, R594, R595, R596, R597, R598, R599, R600, R601, R602, R603, R604, R605, R606, R607, R608, R609, R610, R611, R612, R613, R614, R615, R616, R617, R618, R619, R620, R621, R622, R623, R624, R625, R626, R627, R628, R629, R630, R631, R632, R633, R634, R635, R636, R637, R638, R639, R640, R641, R642, R643, R644, R645, R646, R647, R648, R649, R650, R651, R652, R653, R654, R655, R656, R657, R658, R659, R660, R661, R662, R663, R664, R665, R666, R667, R668, R669, R670, R671, R672, R673, R674, R675, R676, R677, R678, R679, R680, R681, R682, R683, R684, R685, R686, R687, R688, R689, R690, R691, R692, R693, R694, R695, R696, R697, R698, R699, R700, R701, R702, R703, R704, R705, R706, R707, R708, R709, R710, R711, R712, R713, R714, R715, R716, R717, R718, R719, R720, R721, R722, R723, R724, R725, R726, R727, R728, R729, R730, R731, R732, R733, R734, R735, R736, R737, R738, R739, R740, R741, R742, R743, R744, R745, R746, R747, R748, R749, R750, R751, R752, R753, R754, R755, R756, R757, R758, R759, R760, R761, R762, R763, R764, R765, R766, R767, R768, R769, R770, R771, R772, R773, R774, R775, R776, R777, R778, R779, R780, R781, R782, R783, R784, R785, R786, R787, R788, R789, R790, R791, R792, R793, R794, R795, R796, R797, R798, R7

WIRING DIAGRAMS **MODELS A, AA, B, C, E, F, & H** **220/230-3-50/60 OR 380/415/460-3-50/60 VOLT**

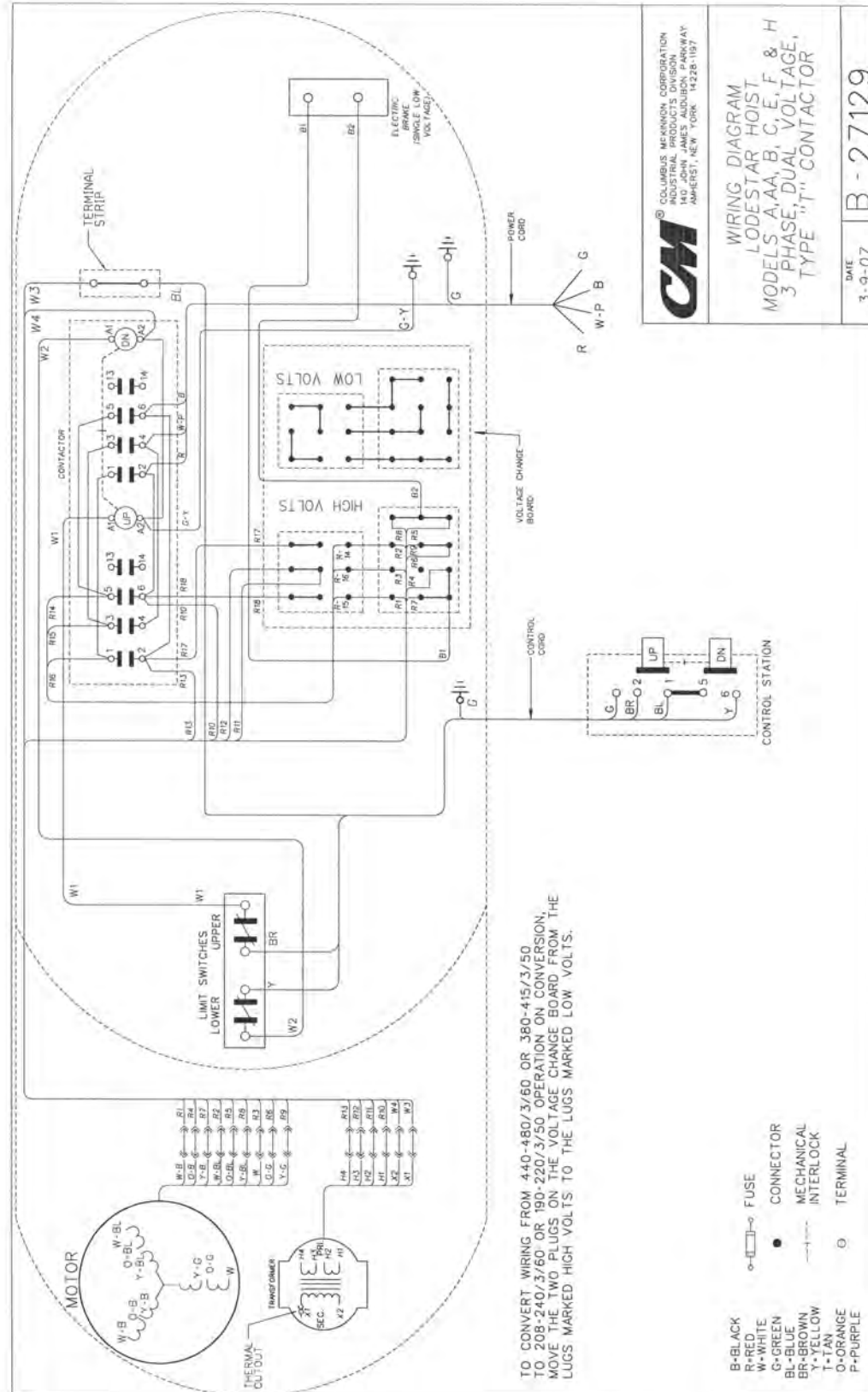


CM COLUMBIA MC CONNOR CORPORATION
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 140 JOHN JAMES AUDUBON PARKWAY
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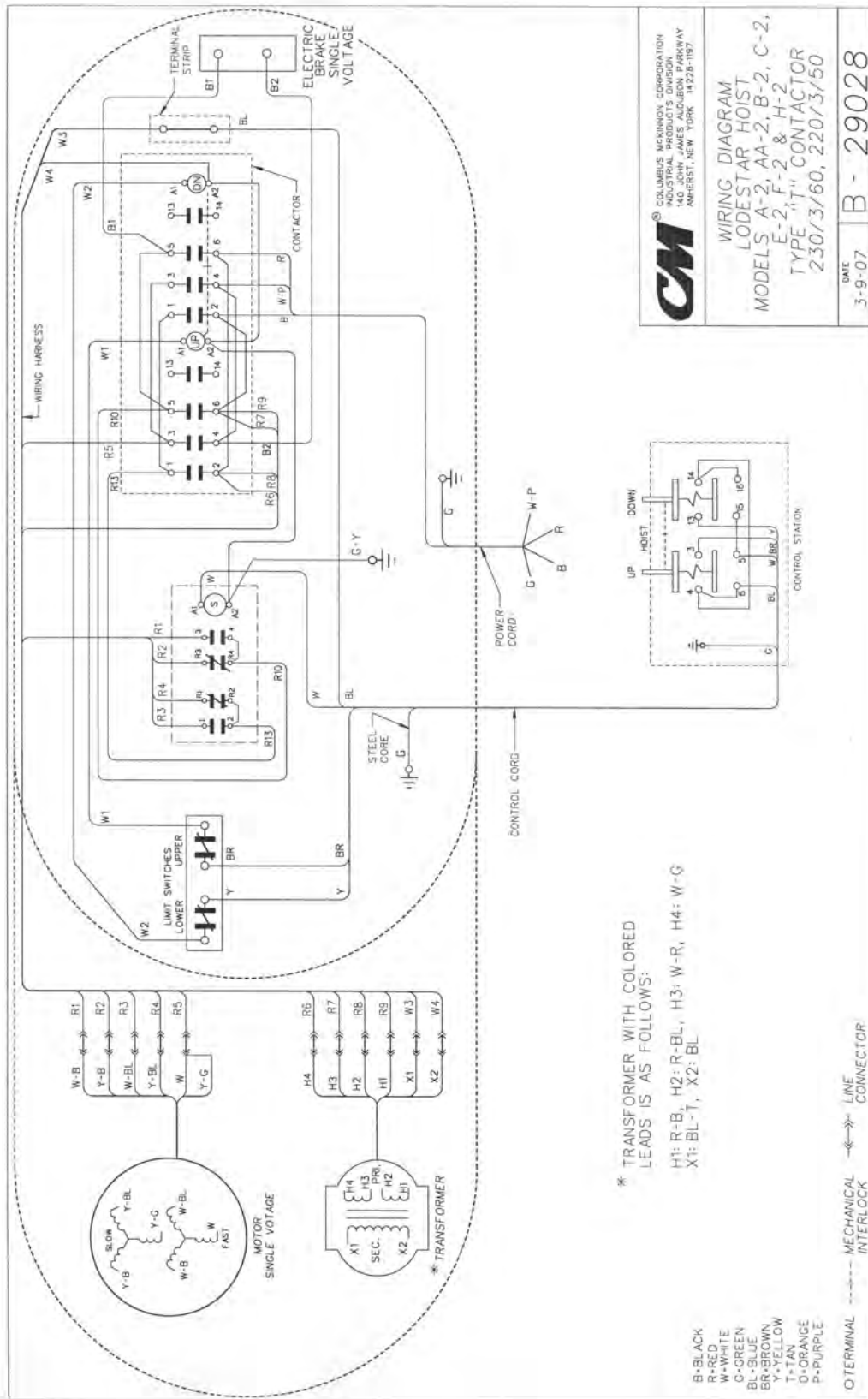
WIRING DIAGRAM
LODESTAR HOIST
MODELS A, AA, B, C, E, F & H
3 PHASE, DUAL VOLTAGE,
TYPE "T" CONTACTOR

DATE 3-9-07 **B-29027**

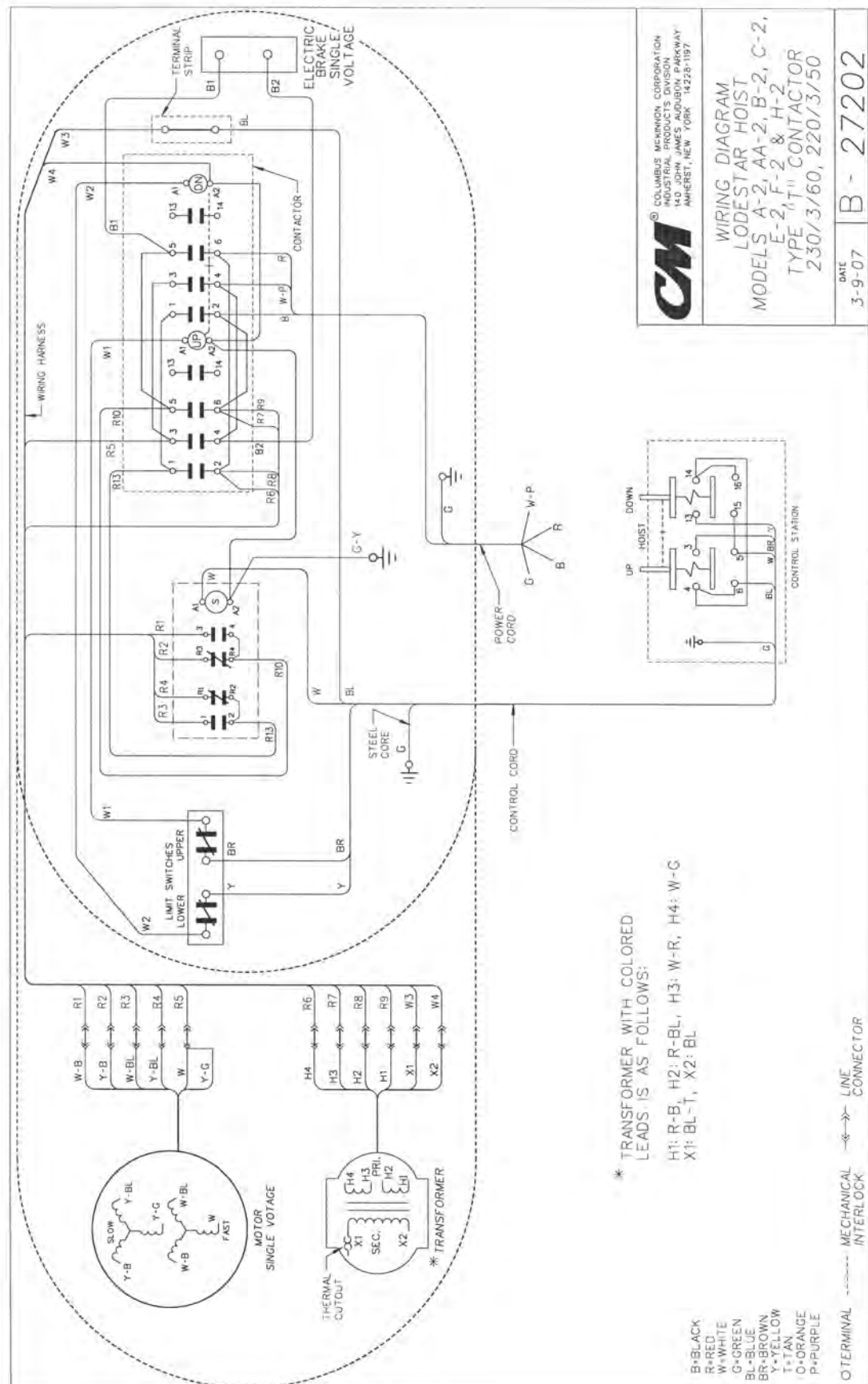
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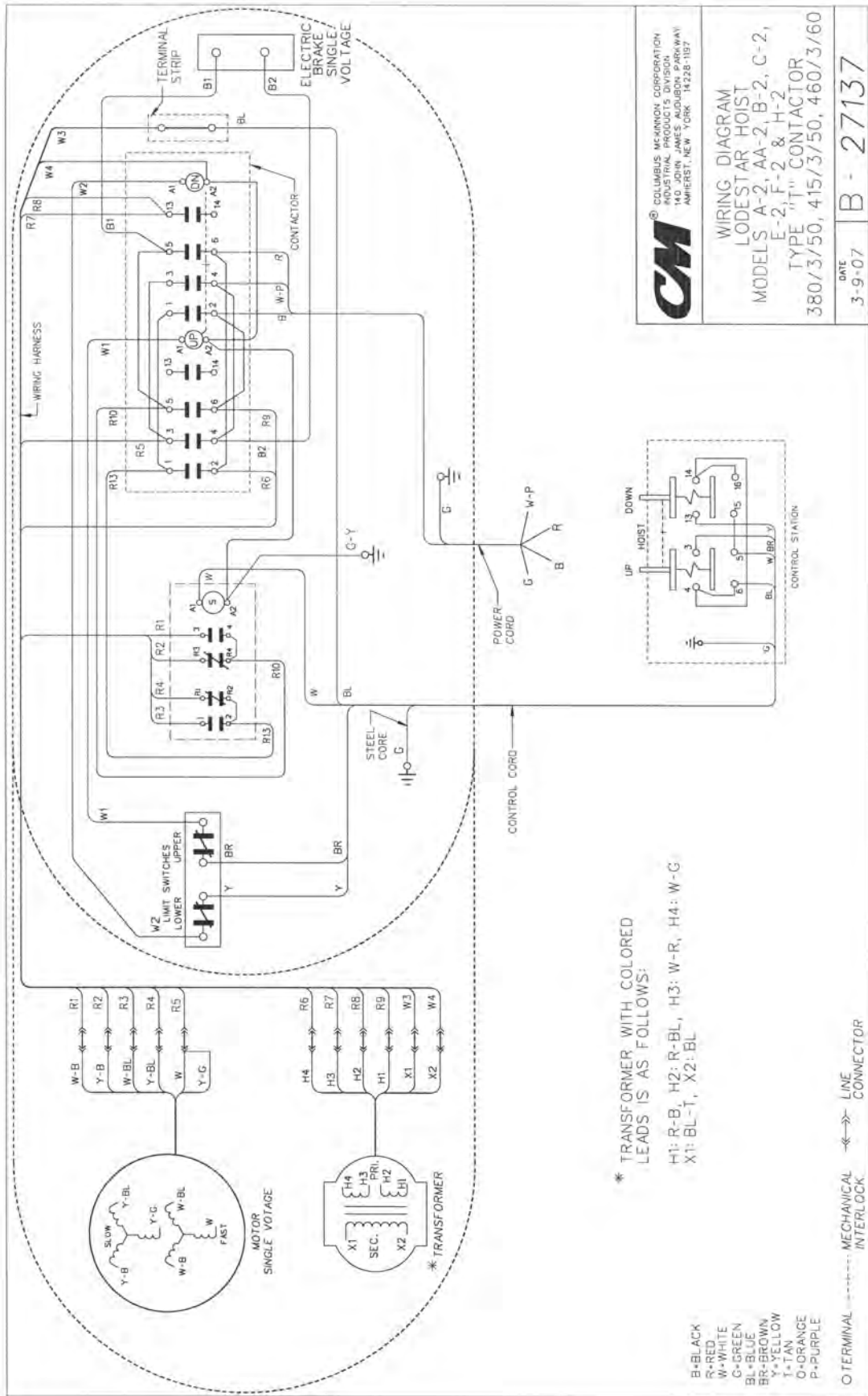
WIRING DIAGRAMS



WIRING DIAGRAMS

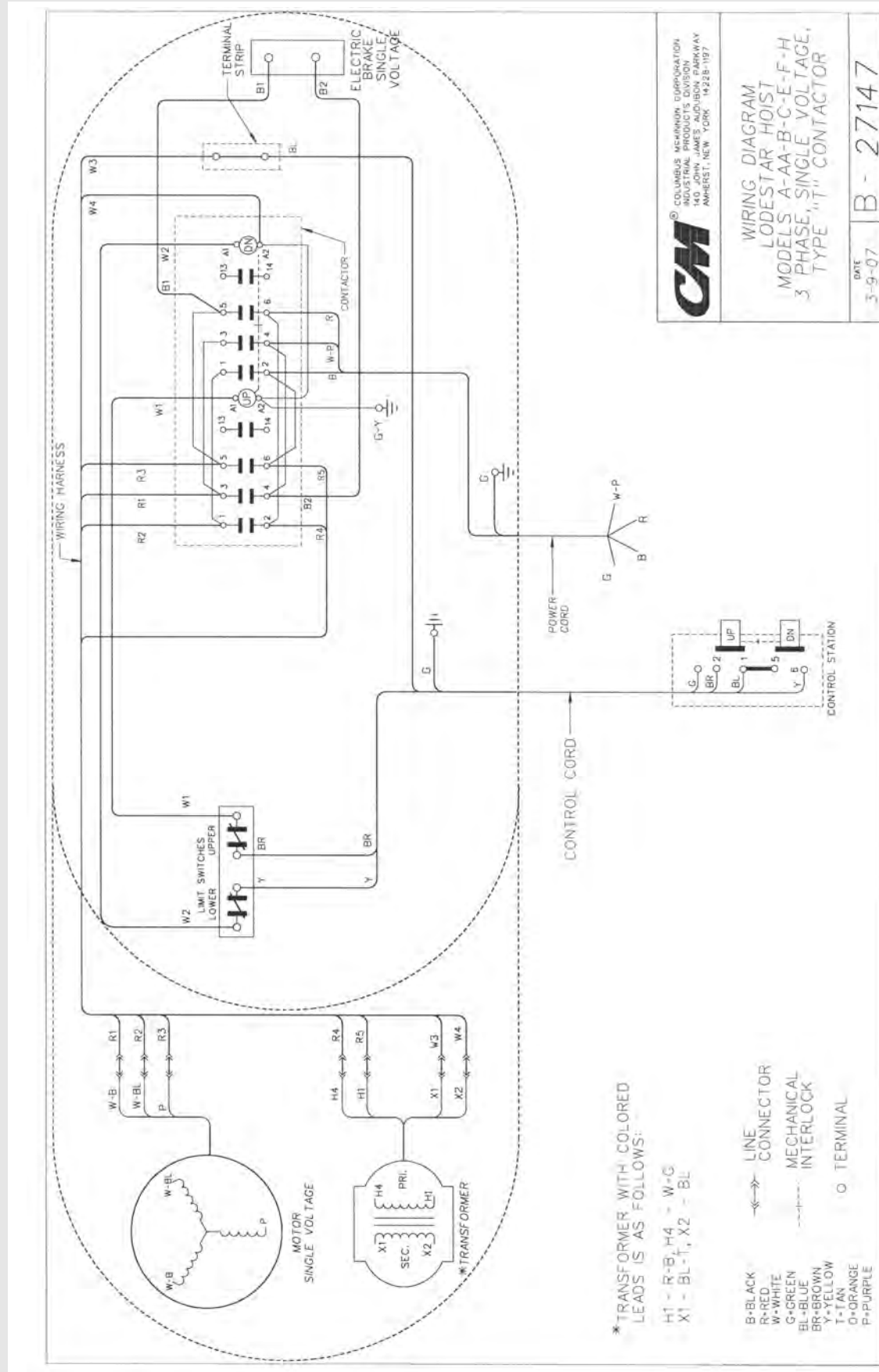


WIRING DIAGRAMS
MODELS A-2, AA-2, B-2, C-2, E-2, F-2, & H-2
380/415/460-3-50/60 VOLT



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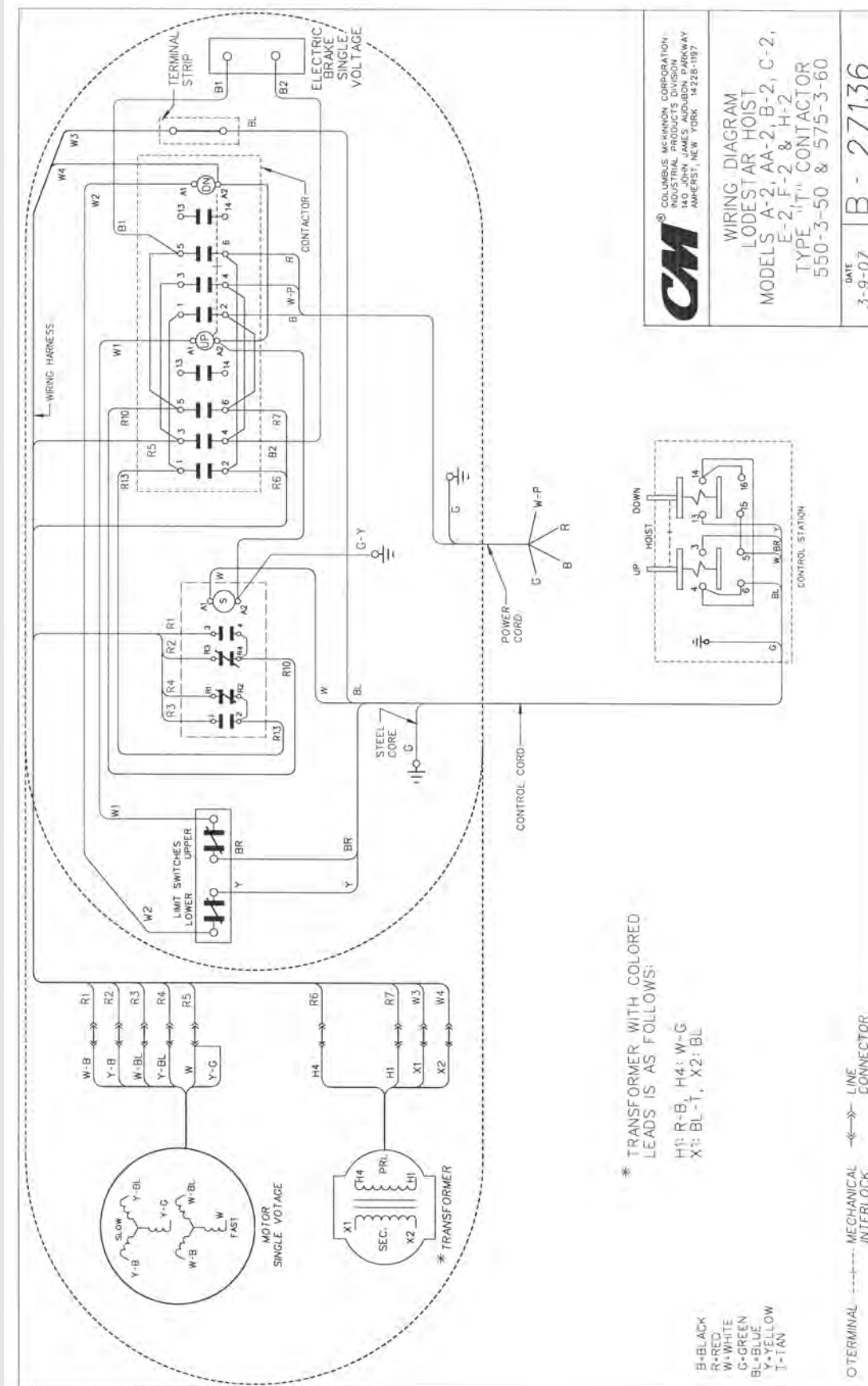
WIRING DIAGRAMS
MODELS A-, AA, B, C, E, F & H
550/575-3-50/60 VOLT



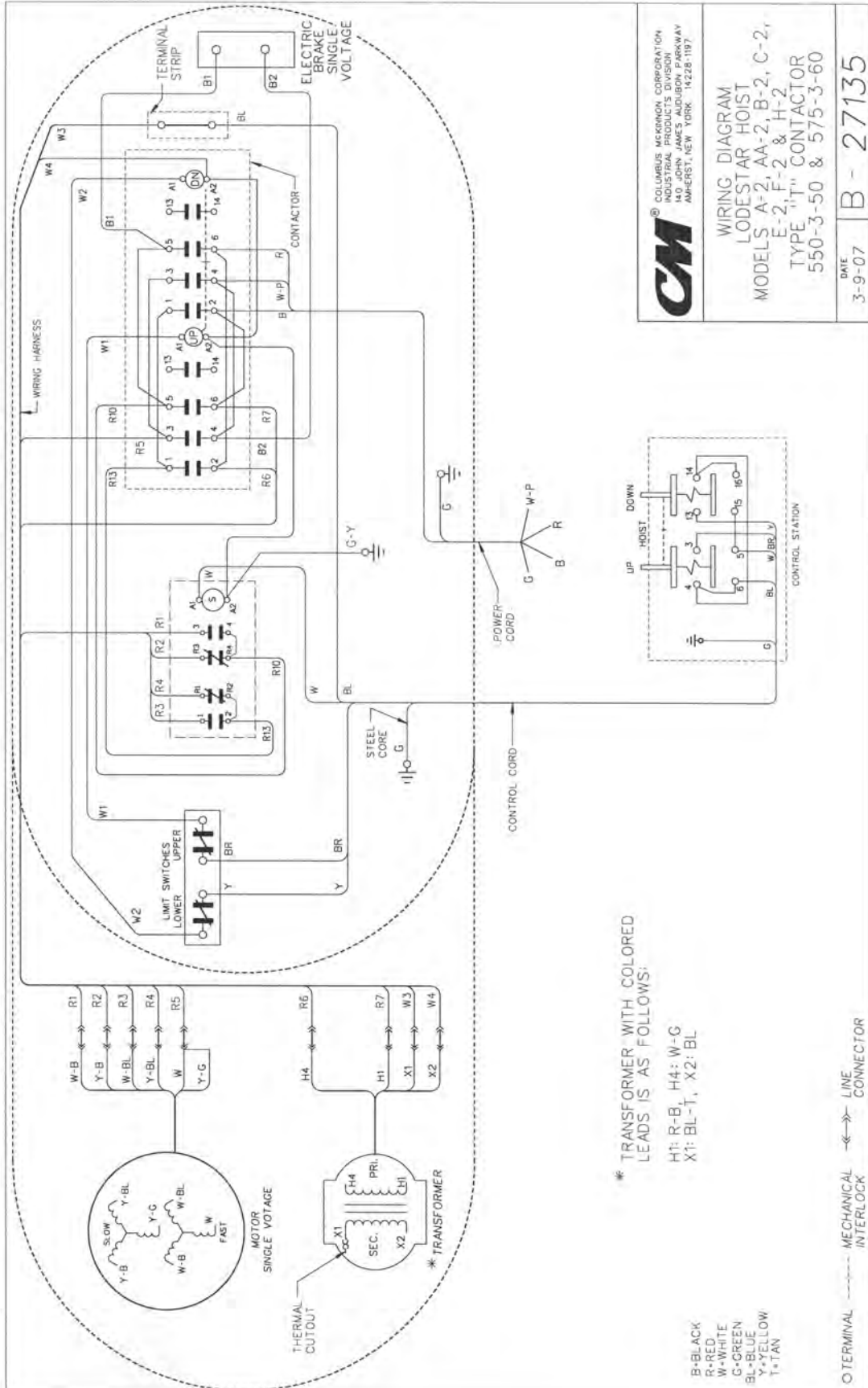
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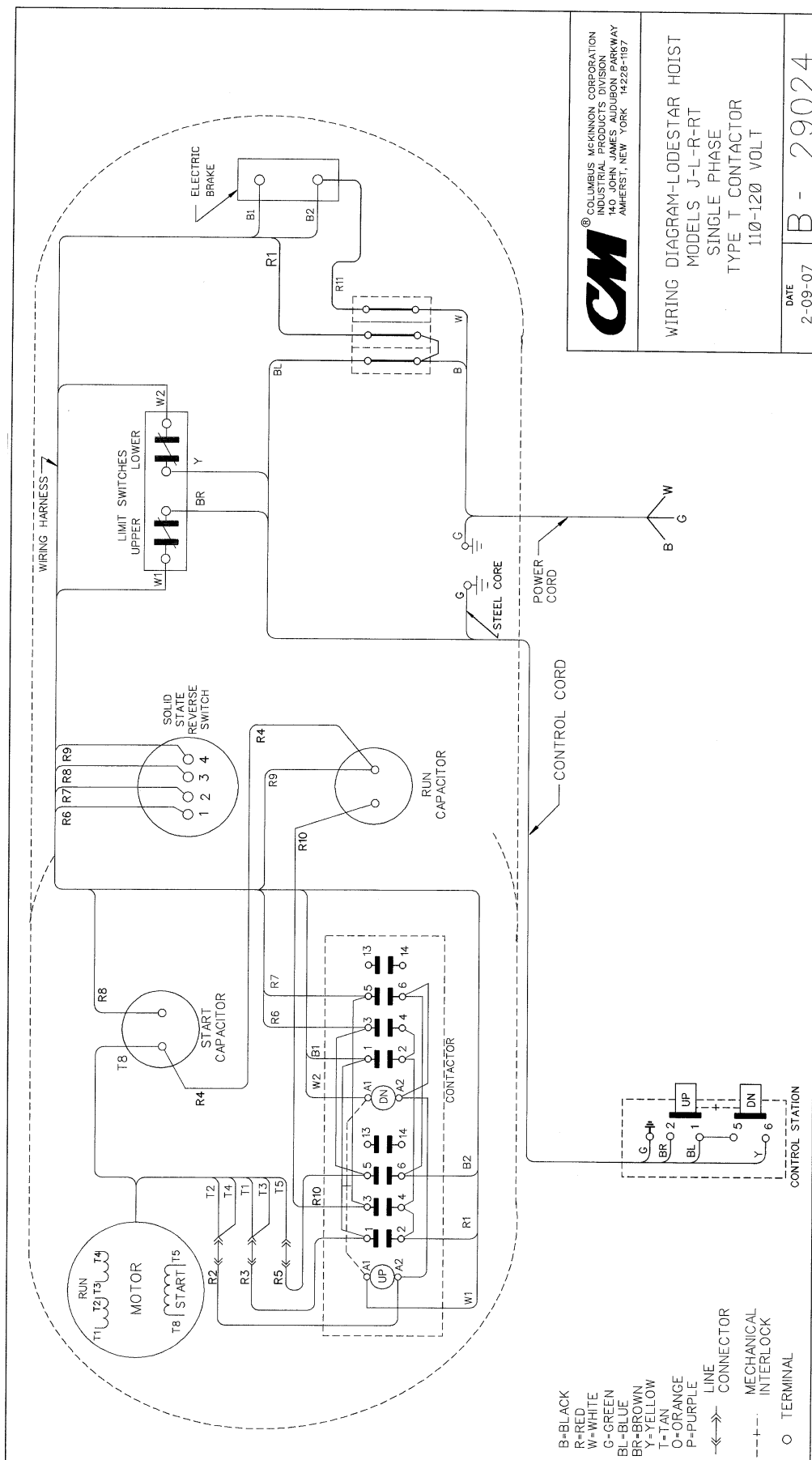
WIRING DIAGRAMS
MODELS A-2, AA-2, B-2, C-2, E-2, F-2, & H-2
550/575-3-50/60 VOLT



WIRING DIAGRAMS



WIRING DIAGRAMS **MODELS J, L, R, & RT** **110/115-1-50/60 VOLT**

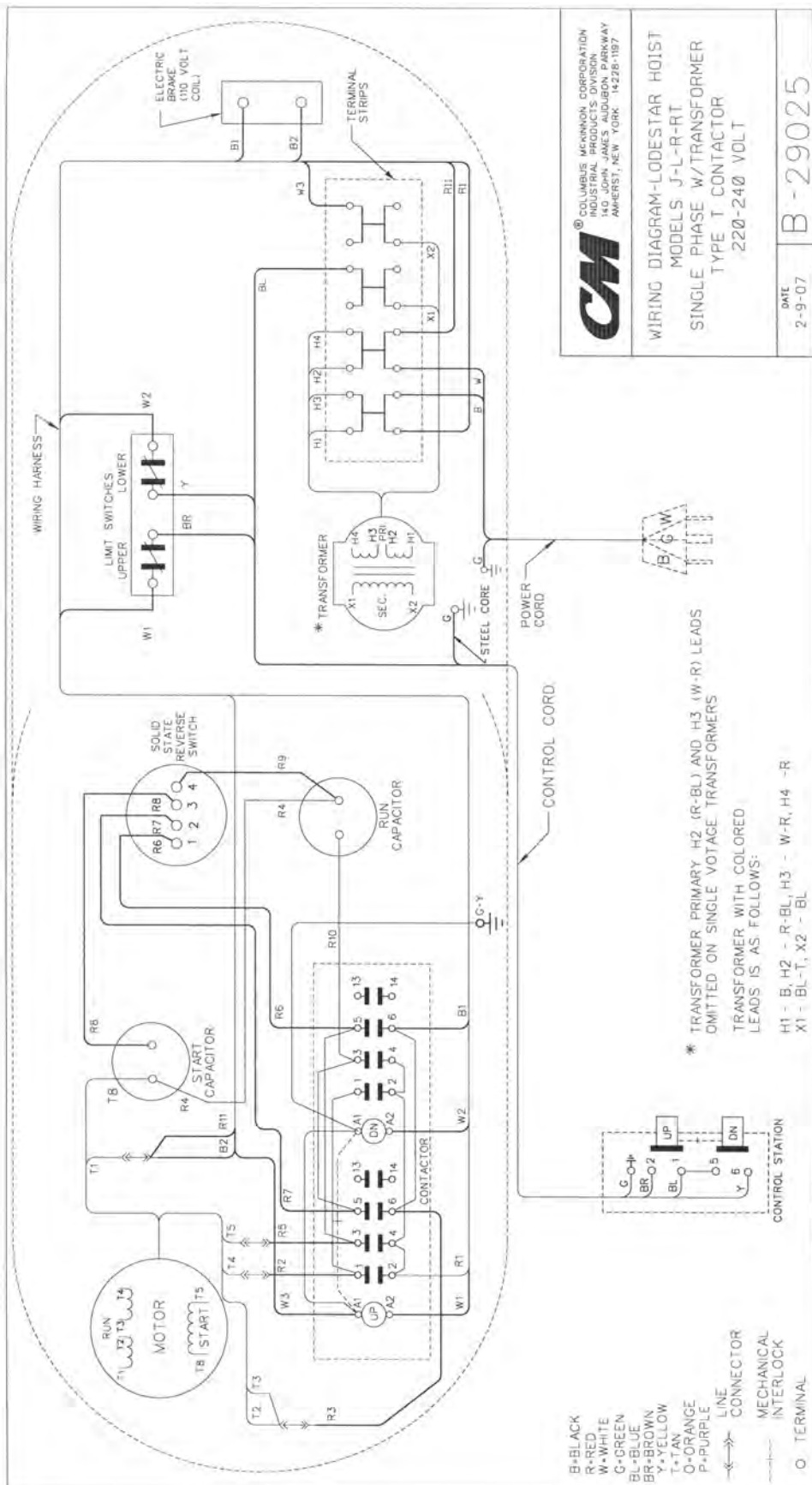


CM
 COLUMBUS MCKINNON CORPORATION
 INDUSTRIAL PRODUCTS DIVISION
 140 JOHN JAMES AUDUBON PARKWAY
 AMPERST, NEW YORK 14228-1197

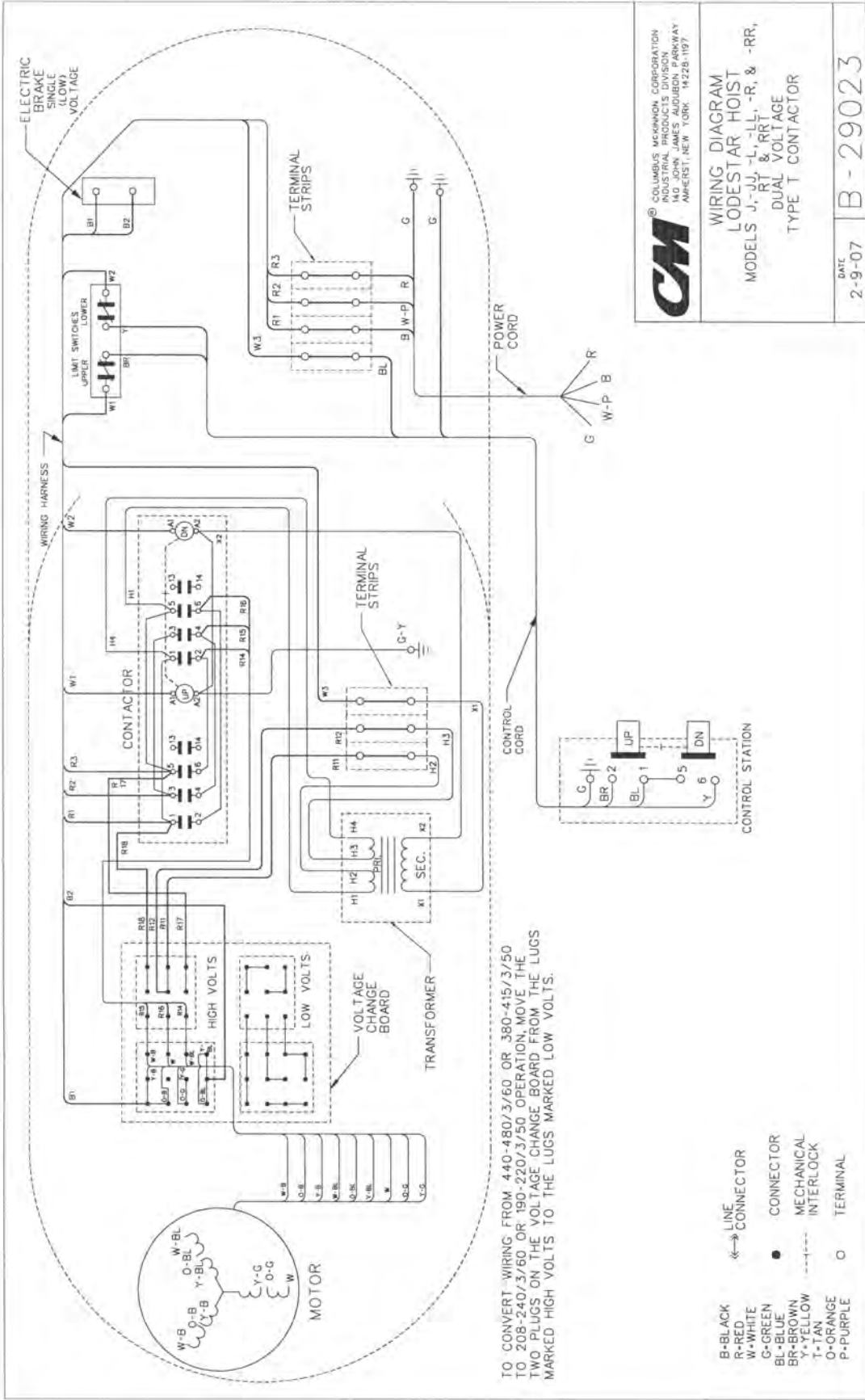
WIRING DIAGRAM-LODESTAR HOIST
 MODELS J-L-R-RT
 SINGLE PHASE
 TYPE T CONTACTOR
 110-120 VOLT

DATE 2-09-07
 B - 29024

WIRING DIAGRAMS



WIRING DIAGRAMS
MODELS J, JJ, L, LL, R, RR, RT & RRT
220/230-3-50 OR 380/415/460-3-50/60 VOLT

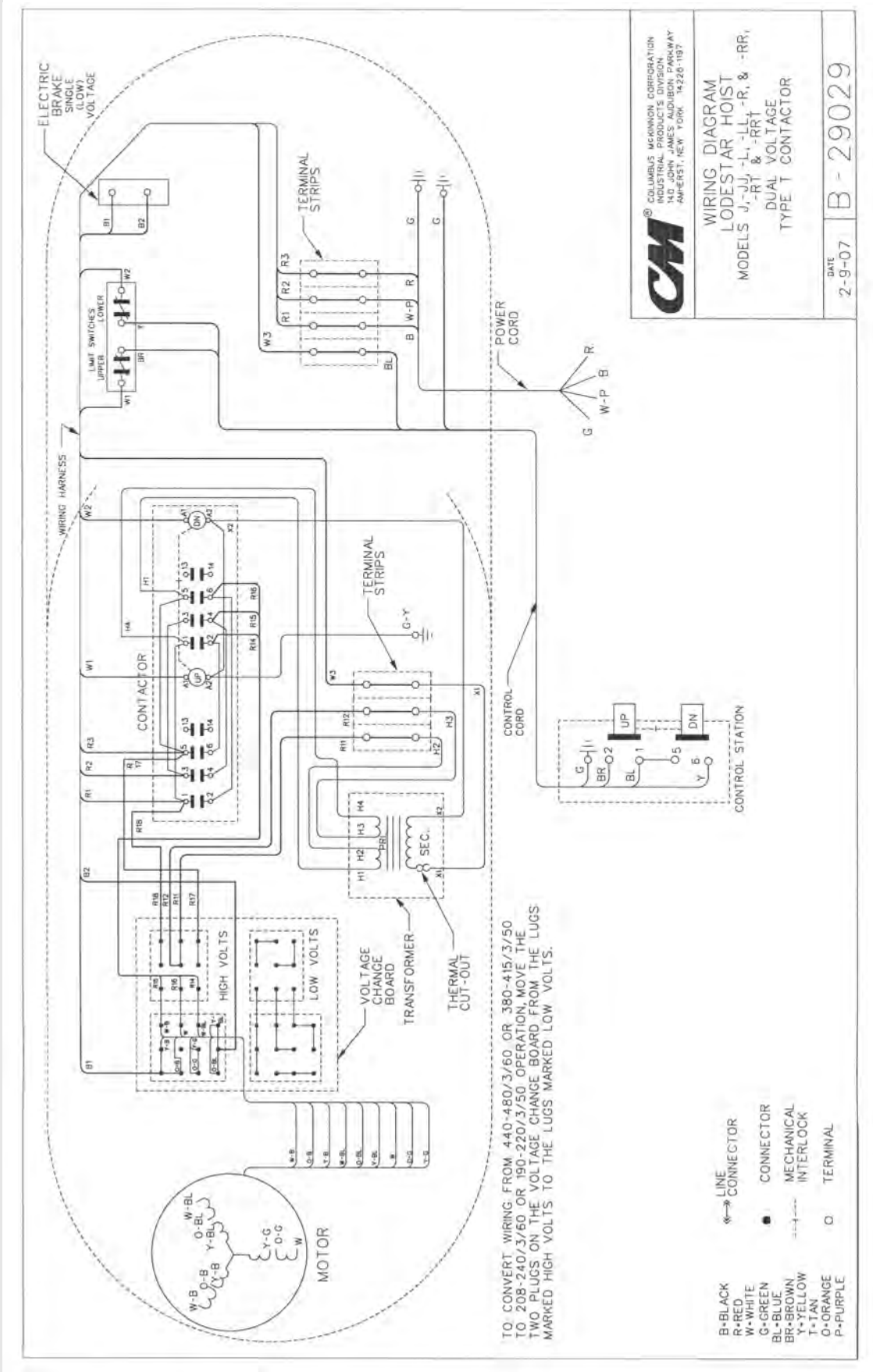


CM COLUMBUS MCKINNON CORPORATION
INDUSTRIAL PRODUCTS DIVISION
100 EAST JAMES STREET, 5TH FLOOR
AMHERST, NEW YORK 14228-1197

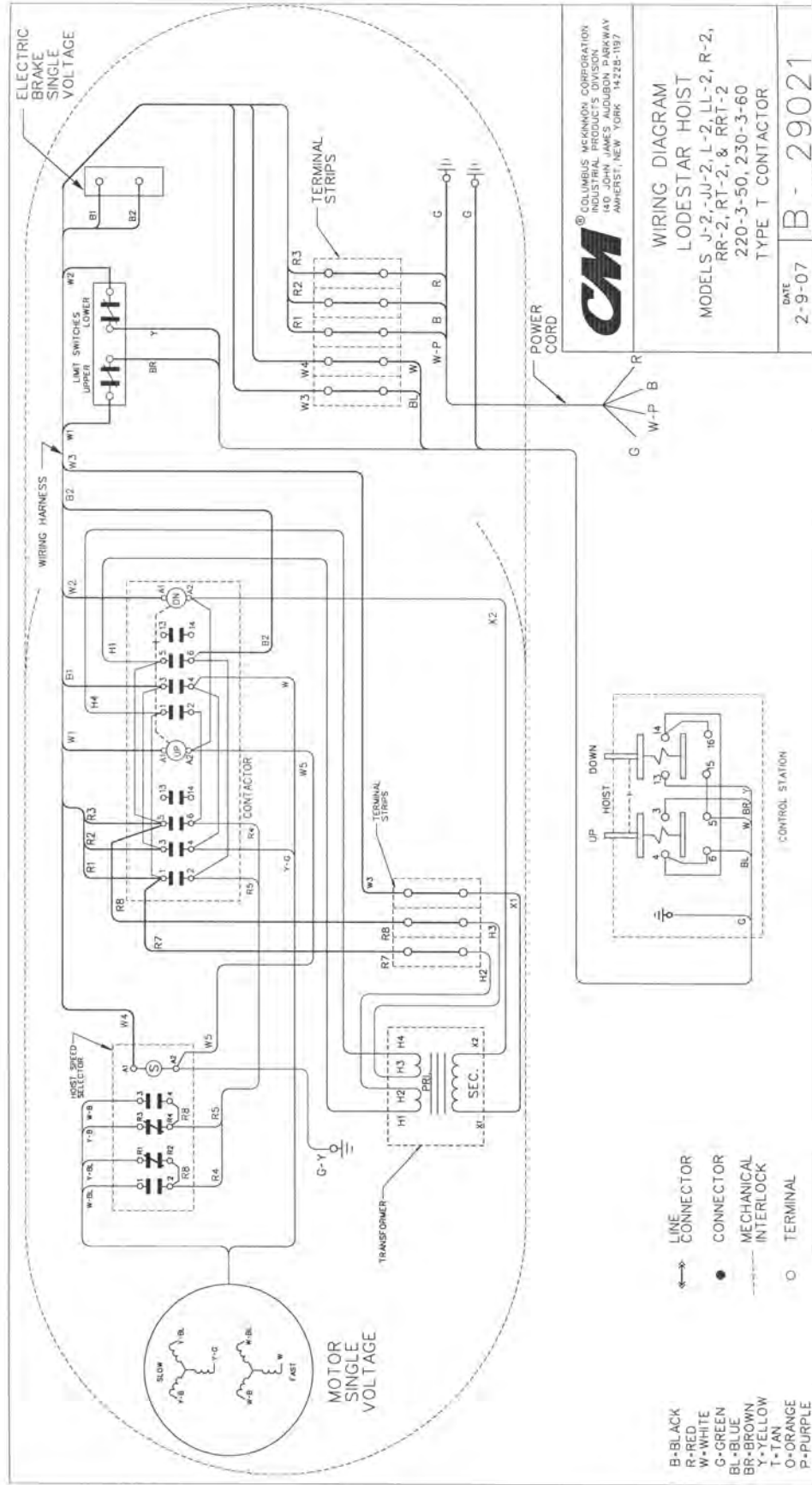
WIRING DIAGRAM
LODESTAR HOIST
MODELS J, JJ, L, LL, R, & -RR,
RT & RRT.
DUAL VOLTAGE
TYPE T CONTACTOR

DATE 2-9-07 B-29023

WIRING DIAGRAMS
MODELS J, JJ, L, LL, R, RR, RT & RRT
220/230-3-50/60 OR 380/415/460-3-50/60 VOLT
CSA UNITS



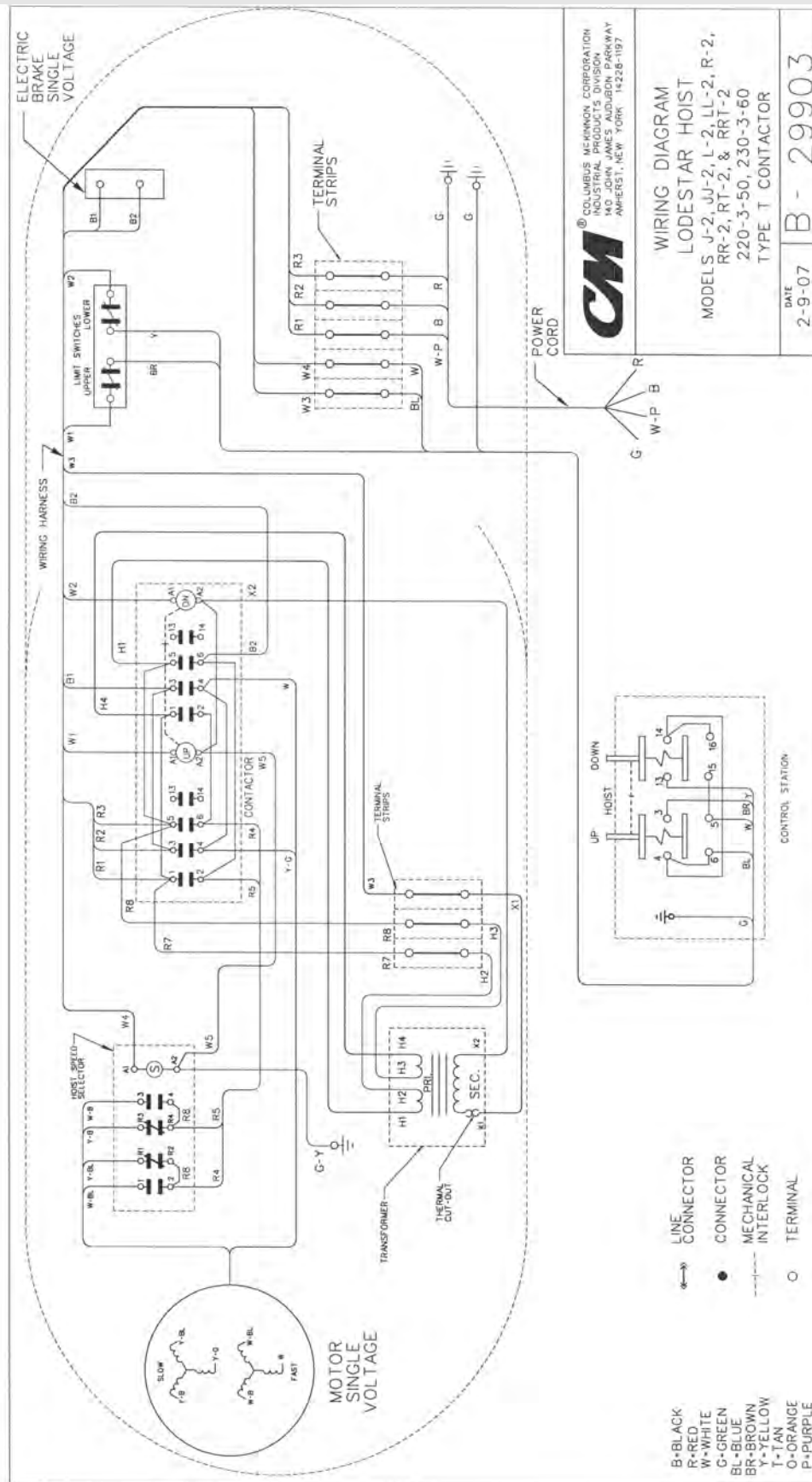
WIRING DIAGRAMS
MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2 & RRT-2
220/230-3-50/60 VOLT



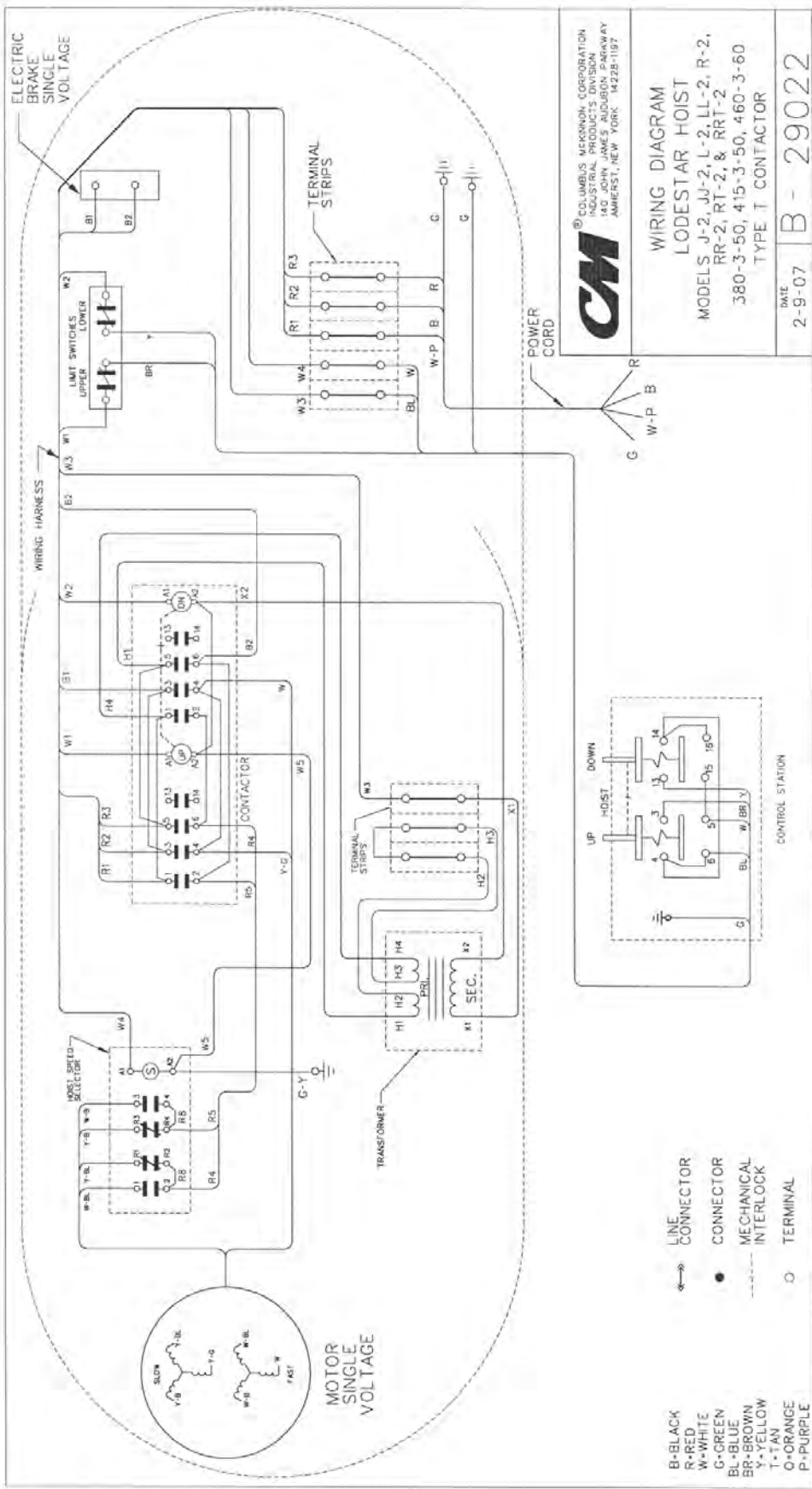
WIRING DIAGRAMS

**MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2 & RRT-2
220/230-3-50/50 VOLT**

CSA UNITS



WIRING DIAGRAMS
MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2 & RRT-2
380/415/460-3-50/60 VOLT



WIRING DIAGRAMS



The diagram illustrates the electrical system for a Lodestar Hoist. It includes a motor with windings W-B, W-BL, and W. A transformer with primary H1-H4 and secondary X1-X2 is connected to the motor. A contactor with terminals A1-A4, A5-A8, and A9-A12 is shown, along with limit switches (UPPER and LOWER) and terminal strips (R1-R3, W1-W3, B1-B3). The diagram also shows a power cord with ground (G), line (L), and neutral (N) connections, and a control station with terminals for UP and DOWN directions. A legend at the bottom identifies the symbols used: a double arrow for line connector, a solid dot for connector, a dashed line for mechanical interlock, and a circle with a dot for terminal.

B-BLACK
 R-RED
 W-WHITE
 G-GREEN
 BL-BLUE
 BR-BROWN
 Y-YELLOW
 T-TAN
 O-ORANGE
 P-PURPLE

WIRING HARNESS
 ELECTRIC
 BRAKE
 SINGLE
 VOLTAGE

MOTOR
 SINGLE
 VOLTAGE

TRANSFORMER
 H1
 H4
 X1
 X2

CONTACTOR
 W
 W-B
 W-BL
 W
 W1
 W2
 W3
 B1
 B2
 B3

LIMIT SWITCHES
 UPPER
 LOWER
 Y
 BR

TERMINAL STRIPS
 R1
 R2
 R3
 W1
 W2
 W3
 B1
 B2
 B3

POWER CORD
 G
 L
 N

WIRING HARNESS
 ELECTRIC
 BRAKE
 SINGLE
 VOLTAGE

MOTOR
 SINGLE
 VOLTAGE

TRANSFORMER
 H1
 H4
 X1
 X2

CONTACTOR
 W
 W-B
 W-BL
 W
 W1
 W2
 W3
 B1
 B2
 B3

LIMIT SWITCHES
 UPPER
 LOWER
 Y
 BR

TERMINAL STRIPS
 R1
 R2
 R3
 W1
 W2
 W3
 B1
 B2
 B3

POWER CORD
 G
 L
 N

WIRING HARNESS
 ELECTRIC
 BRAKE
 SINGLE
 VOLTAGE

MOTOR
 SINGLE
 VOLTAGE

TRANSFORMER
 H1
 H4
 X1
 X2

CONTACTOR
 W
 W-B
 W-BL
 W
 W1
 W2
 W3
 B1
 B2
 B3

LIMIT SWITCHES
 UPPER
 LOWER
 Y
 BR

TERMINAL STRIPS
 R1
 R2
 R3
 W1
 W2
 W3
 B1
 B2
 B3

POWER CORD
 G
 L
 N

WIRING HARNESS
 ELECTRIC
 BRAKE
 SINGLE
 VOLTAGE

MOTOR
 SINGLE
 VOLTAGE

TRANSFORMER
 H1
 H4
 X1
 X2

CONTACTOR
 W
 W-B
 W-BL
 W
 W1
 W2
 W3
 B1
 B2
 B3

LIMIT SWITCHES
 UPPER
 LOWER
 Y
 BR

TERMINAL STRIPS
 R1
 R2
 R3
 W1
 W2
 W3
 B1
 B2
 B3

POWER CORD
 G
 L
 N

WIRING HARNESS
 ELECTRIC
 BRAKE
 SINGLE
 VOLTAGE

MOTOR
 SINGLE
 VOLTAGE

TRANSFORMER
 H1
 H4
 X1
 X2

CONTACTOR
 W
 W-B
 W-BL
 W
 W1
 W2
 W3
 B1
 B2
 B3

LIMIT SWITCHES
 UPPER
 LOWER
 Y
 BR

TERMINAL STRIPS
 R1
 R2
 R3
 W1
 W2
 W3
 B1
 B2
 B3

POWER CORD
 G
 L
 N

WIRING HARNESS
 ELECTRIC
 BRAKE
 SINGLE
 VOLTAGE

MOTOR
 SINGLE
 VOLTAGE

TRANSFORMER
 H1
 H4
 X1
 X2

CONTACTOR
 W
 W-B
 W-BL
 W
 W1
 W2
 W3
 B1
 B2
 B3

LIMIT SWITCHES
 UPPER
 LOWER
 Y
 BR

TERMINAL STRIPS
 R1
 R2
 R3
 W1
 W2
 W3
 B1
 B2
 B3

POWER CORD
 G
 L
 N

WIRING HARNESS
 ELECTRIC
 BRAKE
 SINGLE
 VOLTAGE

MOTOR
 SINGLE
 VOLTAGE

TRANSFORMER
 H1
 H4
 X1
 X2

CONTACTOR
 W
 W-B
 W-BL
 W
 W1
 W2
 W3
 B1
 B2
 B3

LIMIT SWITCHES
 UPPER
 LOWER
 Y
 BR

TERMINAL STRIPS
 R1
 R2
 R3
 W1
 W2
 W3
 B1
 B2
 B3

POWER CORD
 G
 L
 N

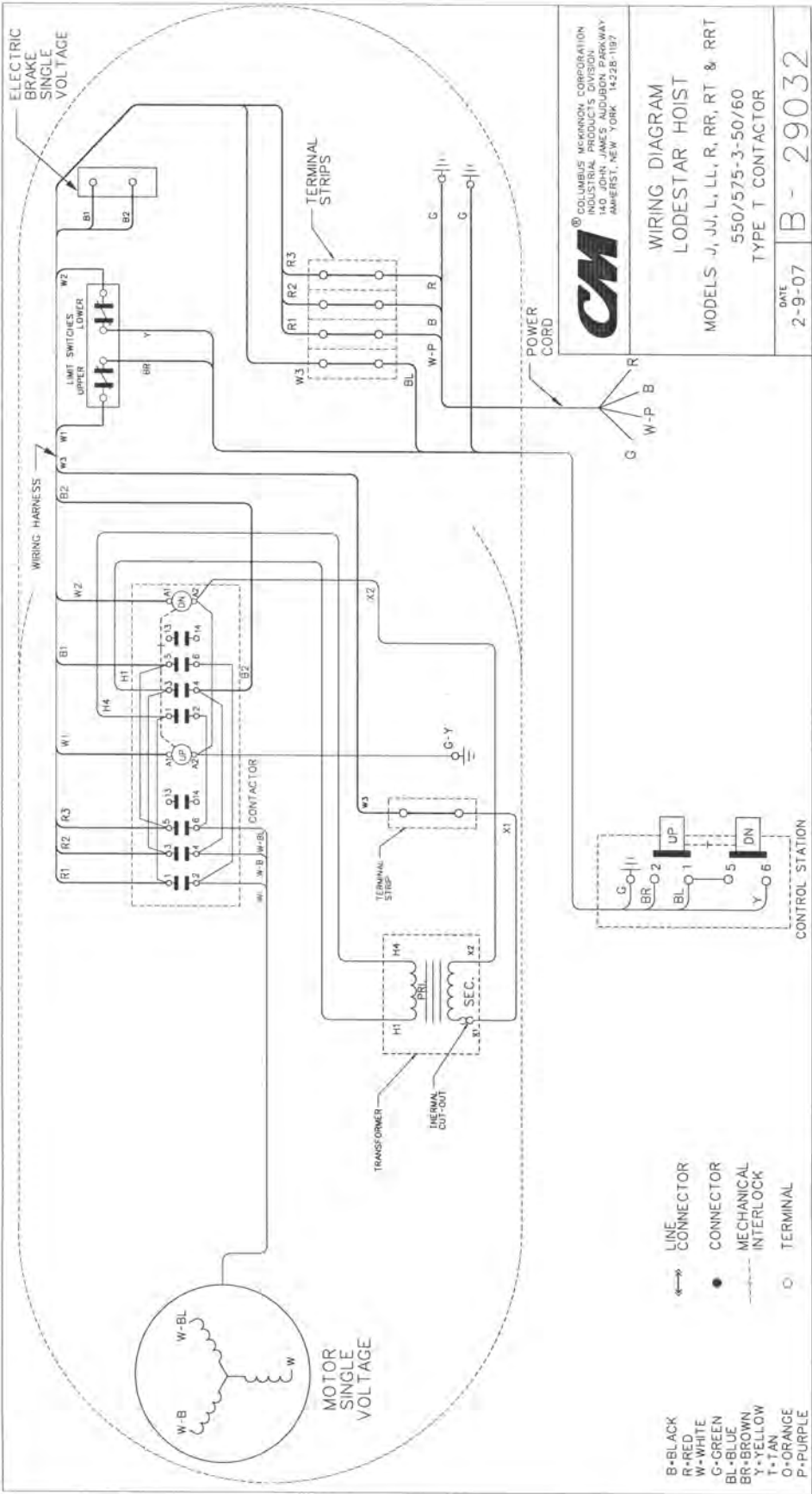
WIRING HARNESS
 ELECTRIC
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 SINGLE
 VOLTAGE

MOTOR
 SINGLE
 VOLTAGE

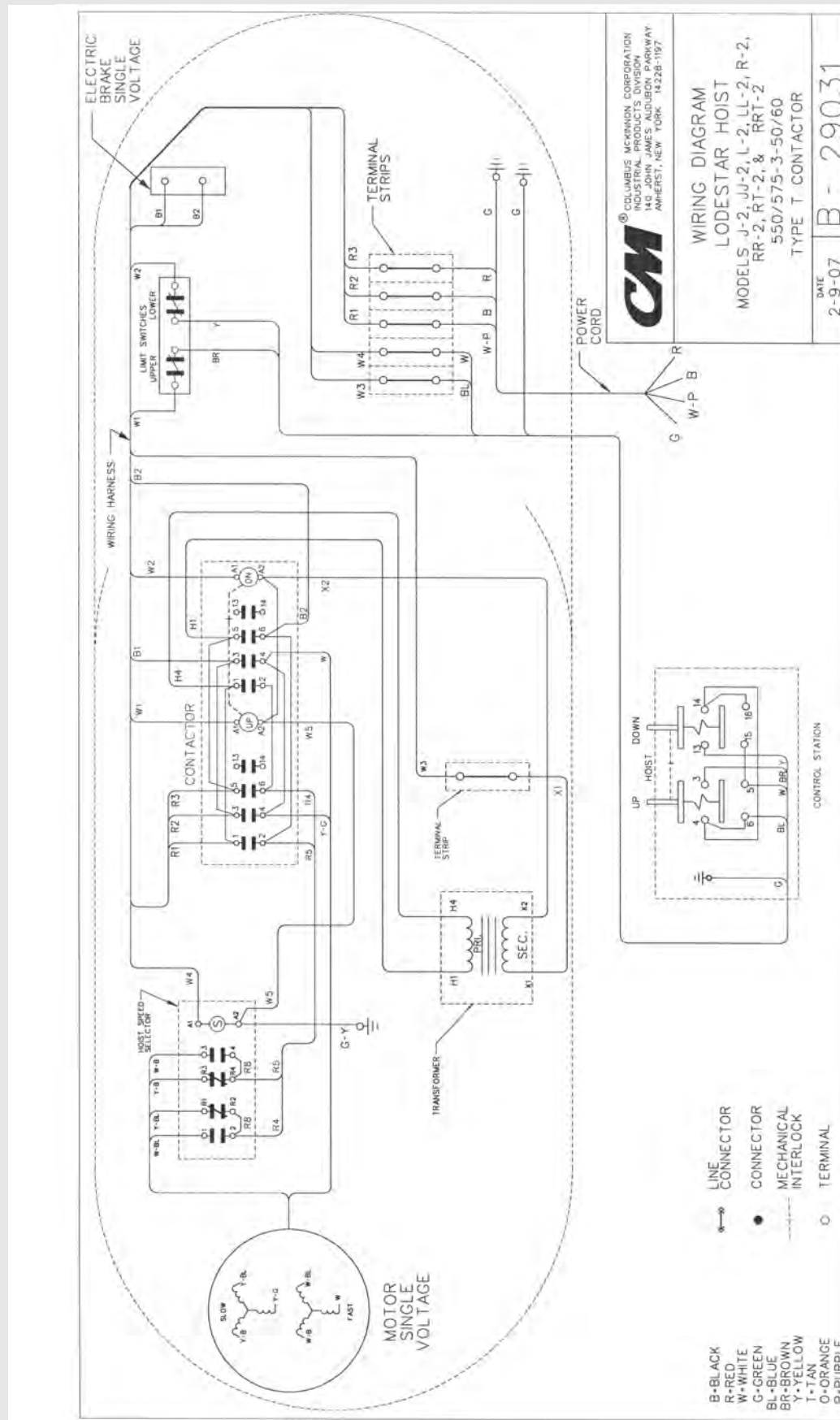
TRANSFORMER
 H1
 H4
 X1
 X2

CONTACTOR

WIRING DIAGRAMS
MODELS J, JJ, L, LL, R, RR, RT & RRT
550/575-3-50/60 VOLT
CSA UNITS



WIRING DIAGRAMS
MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2 & RRT-2
550/575-3-50/60 VOLT



ASSEMBLY INSTRUCTIONS

HOOK OR LUG SUSPENSION

Models E, H, R, RR, E-2, H-2, R-2 and RR-2.

Assemble the dead end bolt and block through the suspension adapter as shown in Figure 19.

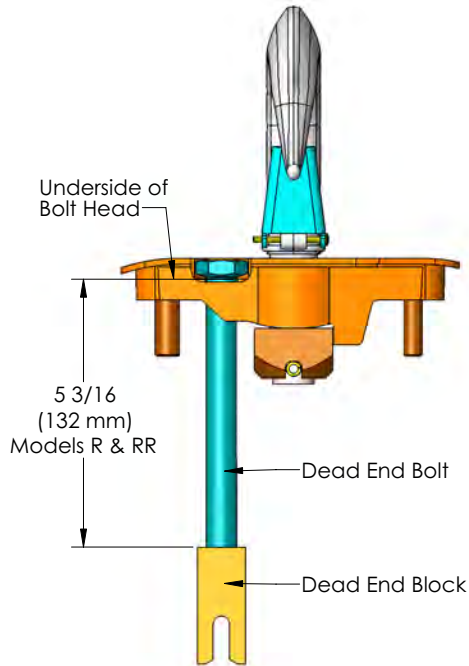


Figure 19. Hook Suspension

WEATHERPROOF HOIST

Check to see that the control station, gasket, neoprene grommet, cover gaskets, motor housing and gear housing gaskets are in good condition and in correct position when reassembling.

GEARING

Models JJ, LL, RR, JJ-2, LL-2, RR-2, RRT and RRT-2 have a special Liftwheel Gear (627-303) and Intermediate Pinion (627-325).

If the gear train in these hoists is disassembled, the following steps must be observed in order to properly orient the three parts when reassembling:

1. Assemble liftwheel gear to liftwheel
NOTE: *These parts have their splines keyed in such a way that they will go together only one way. See Figure 20.*
2. To install the intermediate pinion, align the arrows that are stamped on the pinion and liftwheel gear so they point toward each other.
3. Check operation of gear train by rotating the pinion four (4) complete revolutions; liftwheel gear will turn one (1) complete revolution and the arrows will again be aligned as shown. If the arrows do not align or there is binding between the gear teeth, repeat the above steps.
4. For gearing lubrication instructions, see page 15

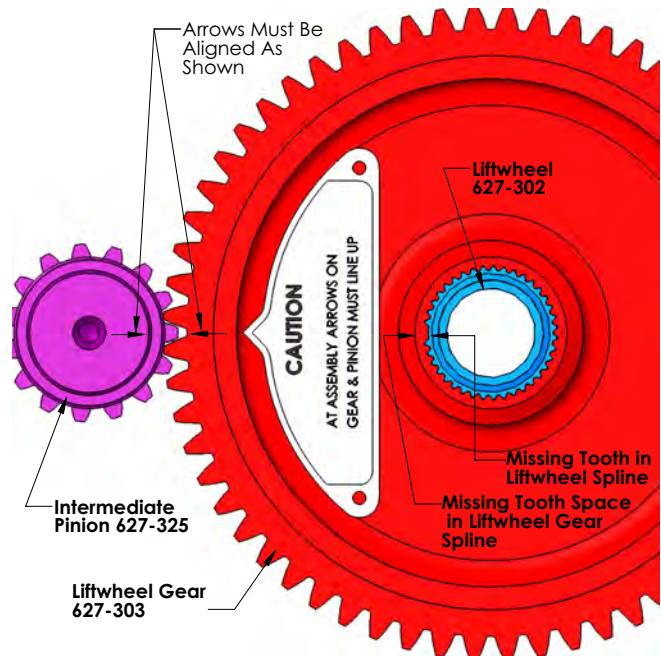


Figure 20. Non-Circular Gearing

FASTENERS

Models A thru H-2 tighten motor housing screws (627-108) to where they have a minimum breakaway torque of 48 pound inch and the brake attaching screws (627-253) have 50 pound inch (5.649 Nm) minimum breakaway torque.

Models J thru RRT-2 tighten limit switch attaching screws (627-220), brake attaching screws (627-253) and hexagonal brake stud (627-265) to where they have a minimum breakaway torque of 50 pound inch (5.649 Nm). The liftwheel gear nut (627-305) should be tighten to a seating torque of 85 pound feet (115 Nm).

LOWER HOOK BLOCK PIN

When removing or installing the lower hook block pin (627-764), care must be taken so as to prevent damaging the pin and/or hook block. These pins are tapered groove pins and as a result, they can only be removed in one direction. To remove the pin, a V-Block, drift and hammer (or slow acting press) are required. The drift should be the same diameter as the pin (5/16" (7.94 mm) diameter for Models A, A-2, AA, AA-2, B, B-2, C, C-2, F and F-2; and 3/8" diameter (9.52 mm) for Models J, J-2, JJ, JJ-2, L, L-2, LL and LL-2), and it should be placed at the small end of the pin. The small end of the pin is the end opposite the end on which the 3 grooves are visible. Place the hook block in the V-Block and drive the pin out using the drift and a hammer or slow acting press.

To re-install the pin, the parts must be arranged the same as they were when the pin was removed. To do this, use the small end of the pin as a gage. First check the holes in the hook block body and determine which hole is the largest. Place the hook block body in the V-Block with the larger hole on top. Next, check each end of the hole in the lower chain block (627-775) and determine which end is the largest. Place the chain in the slot of the chain and insert the chain block, with the large hole on top, into the hook body. Align the holes in the hook block body with the

hole in the chain block and insert the small end of the pin in the hole. Push the pin in by hand until it stops and then use a hammer or slow acting press to drive the pin into position so that the end of the pin is flush with the outside surface of the hook body.



WARNING

Use of improper lower hook chain block pin as well as improper installation of this pin can cause the pin to break and allow the load to fall.

TO AVOID INJURY AND PROPERTY DAMAGE:

Use only CM supplied, special high strength lower hook chain block pin to attach the chain to the lower hook block and install the pin as directed above.

REMOVAL AND INSTALLATION OF LOAD CHAIN



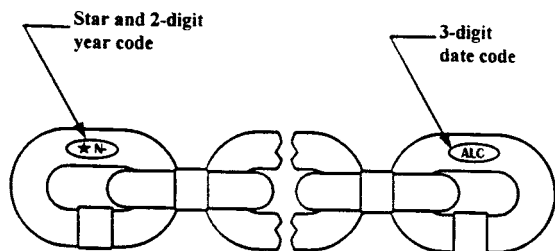
WARNING

Improper installation (reeving) of the load chain can result in a dropped load.

TO AVOID INJURY:

- Verify use of proper size and type of hoist load chain for specific hoist.
- Install load chain properly as indicated below.

USE ONLY CM STAR (★) GRADE LOAD CHAIN AND CM REPLACEMENT PARTS. USE OF OTHER CHAIN AND PARTS MAY BE DANGEROUS AND VOIDS FACTORY WARRANTY.



WARNING

USE OF COMMERCIAL OR OTHER MANUFACTURERS' CHAIN AND PARTS TO REPAIR CM HOISTS MAY CAUSE LOAD LOSS.

TO AVOID INJURY:

Use only CM supplied replacement load chain and parts. Chain and parts may look alike, but CM chain and parts are made of specific material or processed to achieve specific properties.

NOTE: When installing load chain in Models E, H, R, RR, E-2, H-2, R-2 and RR-2 by either of the "starter chain" methods, two loose end connecting links (627-743) must be used.

Hoist load chain can be installed by any one of several methods. The first method is recommended when replacing severely worn load chain and requires disassembling the hoist. Method 2 does not require hoist disassembly, whereas Method 3 requires only partial disassembly.

Method #1

- Disconnect hoist from power supply.
- Remove back frame cover and disengage the limit switch guide plate from the traveling nuts, see page 16 or 17.

- Detach loose end of load chain from hoist frame, see Figure 7. Also on single reeved models, detach the lower hook block from the load chain. On double reeved models E, H, R, RR, E-2, H-2, R-2, and RR-2, unfasten the dead end side of the load chain. On triple reeved Models RT, RRT, RT-2 and RRT-2, detach the load chain from the lower hook block.
- Continue to disassemble the hoist and inspect the liftwheel, chain guides, motor housing and gear housing which if worn or damaged could cause early failure of the new chain. Parts can be easily identified by referring to pages 51 thru 85.
- If the liftwheel pockets, in particular the ends, are worn or scored excessively, replace the liftwheel. If chain guides and housing are worn or cracked, these parts should be replaced.
- Reassemble hoist with the new load chain inserted over the liftwheel. Position chain with the weld on upstanding links away from liftwheel and leave only one foot of chain hanging free on loose end side. Make sure the last chain link is an upstanding link. On double reeved models, make sure that the new load chain has an even number of links. On triple reeved models, make sure that the new chain has an odd number of links. This will prevent twist in chain. To simplify handling when reassembling the hoist, a short undamaged piece of the old chain may be used as a "starter chain". Position this piece of chain in exactly the same manner as explained above for the "new chain", and complete the reassembly of the hoist.
- Attach the loose end link to chain and connect it to the hoist frame with the loose end screw, washer and lockwasher, see Figure 7. **BE SURE THERE IS NO TWIST.**

If a starter chain is used, the loose end link (two links required for double reeved models) can serve as a temporary coupling link to connect together the starter chain in the hoist and the new load chain to be installed. Then, under power, reeve the new load chain through the liftwheel area, replacing the starter chain in unit. Run enough chain through to attach loose end link to hoist frame.

Caution: For double reeved models, be sure to disconnect one of the loose end links from load chain before attaching to hoist frame.

- For single reeved models, attach the hook block to load chain.
- For double reeved models, run the hoist **UP** until only 3 feet (.9 M) in chain remains on dead end side. This will minimize the chance of introducing a twist between hook block and hoist. Allow the chain to hang free to remove twists. Using a wire as a starter, insert the chain, flat link first, into lower hook block (upstanding links will have weld toward sheave) and pull through. Insert last link into slot in dead end block making sure that no twist exists in the reeving at any point. Assemble dead end pin, washer and cotter pin as shown in Figure 7.
- For triple reeved models, run the hoist **UP** until only 4 feet (1.2 M) of chain remains on the dead end side. This will minimize the chance of introducing a twist between the hook block and hoist. Allow the chain to hang free to remove twists. Using a wire as a starter, insert the chain, upstanding link first, into lower hook block (upstanding links will

have welds toward sheave) and pull through. Using a wire as a starter, insert the chain, upstanding link first, into the outboard cloverleaf of the hanger. Make sure there are no twists between the hook block and then pull the chain through. In the sheave hanger, the upstanding links will have the welds toward the sheaves. Run the chain down to the hook block and making sure there are no twists between the sheave hanger and the hook block, insert the end of the chain into the recess in the top of the hook block. Slide the dead end screw, with flat sides vertical, through the hole in the top of the hook block. Place the lockwasher and nut on the threaded end of the dead end screw. Use an Allen wrench to hold the head of the dead end screw stationary and rotate the nut to tighten. To properly tighten the nut, apply a torque of 45 (61Nm) to 55 pound feet (74.6 Nm) while holding the head of the dead end screw stationary.

Also, when tightening this dead end screw, it should be held firmly in position and torqued from the nut end to avoid damaging the screw and/or chain.

- k) Adjust limit switches as described on pages 16 and 17. If the new chain is longer than the old, check to be sure limit switch will allow for new length of lift. In the event maximum adjustment does not allow entire length of lift, check with CM for modification necessary.

Do not allow hook block to hit hoist or allow load chain to become taut between loose end screw and frame or else serious damage will result. If hook should inadvertently hit the hoist-the hoist frames, load chain and hook block should be inspected for damage before further use.

Method #2

Treat the old load chain in hoist as a "starter chain" and proceed with Steps 1a, b, c and f thru k above.

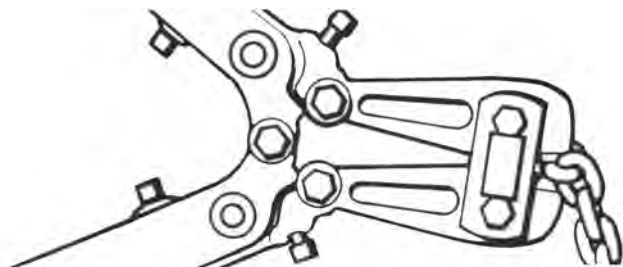
Method #3

- First proceed with Steps 1a, b, c above.
- Then, carefully run the load chain out of the hoist.
- Disconnect hoist from power supply.
- Remove the electric brake assembly.
- Rotate the brake hub by hand, at the same time feeding the load chain through the liftwheel area with hoist upside down or by using a wire to pull the load chain up onto the liftwheel. Position the chain on the liftwheel as explained in Step 1f.
- Refer to Steps 1g thru k above to complete the installation.

CUTTING CHAINS

CM HoistAloy® load chain is hardened and it is difficult to cut. The following methods are recommended when cutting a length of new chain from stock or cutting off worn chain.

- Use a 7" (177.8 mm) minimum diameter by 1/8" (3.175 mm) thick abrasive wheel (or type recommended by wheel supplier) that will clear adjacent links.
- Use a bolt cutter (Figure 22) similar to the H.K. Porter No. 0590MTC with special cutter jaws for cutting hard-



ened chain (1" (25.4 mm) long cutting edge).



WARNING

Cutting Chain Can Produce Flying Particles.

TO AVOID INJURY:

- Wear Eye Protection.
- Provide A Shield Over Chain To Prevent Flying Particles.

Fig 22. Cutting Chain with a Bolt Cutter

TESTING

Before using, all altered, repaired or used hoists that have not been operated for the previous 12 months shall be tested by the user for proper operation. First, test the unit without a load and then with a light load of 50 pounds (22.7 kg) times the number of load supporting parts of load chain to be sure that the hoist operates properly and that the brake holds the load when the control is released. Next test with a load of *125% of rated capacity. In addition, hoists in which load sustaining parts have been replaced should be tested with *125% of rated capacity by or under the direction of an appointed person and written report prepared for record purposes. After this test, check that the Protector functions. If the Protector permits lifting a load in excess of 200% of rated metric load, it should be replaced.

NOTE: For additional information on inspection and testing, refer to Code B30.16 "Overhead Hoist" obtainable from ASME Order Department, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300, U.S.A.

*If the Protector prevents lifting of a load of 125% of rated capacity, reduce load to rated capacity.

ORDERING INSTRUCTIONS

The following information must accompany all correspondence orders for replacement parts:

1. Hoist Model Number from identification plate
2. Serial number of the hoist stamped below identification plate.
3. Voltage, phase, hertz from identification plate.
4. Length of lift.,
5. Key number of part from parts list.
6. Number of parts required.
7. Part name from parts list.
8. Part number from the parts list.

If trolley replacement parts are ordered, also include the type and capacity of trolley.

Note: When ordering replacement parts, it is recommended that consideration be given to the need for also ordering such items as gaskets, fasteners, insulators, etc. These items may be damaged or lost during the disassembly or just unfit for future use because of deterioration from age or



WARNING

Using "Commercial" or other manufacturer's parts to repair the CM Lodestar Hoists may cause load loss.

TO AVOID INJURY:

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

service.

Part Numbers for Brake Coils, Brake Assemblies, Rotors, Stators and Attaching Screws

Key No.	Part Name	Models and Voltages													
		A, B, and E				AA, C, F and H				A-2, B-2 and E-2				AA-2, C-2, F-2 and H-2	
		110-1-50 115-1-60	220-1-50 230-1-60	230/460	575-3-60	110-1-50 115-1-60	220-1-50 230-1-60	230/460	575-3-60	230-3-60	460-3-60	575-3-60	230-3-60	460-3-60	575-3-60
627-250	Electric Brake Assembly - Complete	27656	27656	27659	27658	27681	27681	27684	27683	27659	27655	27683	27684	27656	27683
627-259	Brake Coil	51517	51517	51518	51520	51517	51517	51518	51520	51518	51519	51520	51518	51519	51520
627-310	Drive Shaft & Pinion S/A (items 627-311 thru 627-315, as applicable)	27653				27654				27654				27654	
627-413	Rotor & Shaft Assembly	286005	286005	286004	286004	286001	286001	286000	286000	286002	286003	286003	286003	286003	286003
627-415	Stator	287007 (60 HZ)	286007 (60 HZ)	287006	287009	287002 (60 HZ)	286006 (60 HZ)	287001	287005	286011	287004	287010	287003	287004	287010
		286008 (50 HZ)	286009 (50 HZ)			286010 (50 HZ)	286011 (50 HZ)								

Key No.	Part Name	Models and Voltages													
		J, L, R, AND RT				JJ, LL, RR, AND RRT				J-2, L-2, 4-2, AND RT-2				JJ-2, LL-2, RR-2, AND RRT-2	
		115-1-60	230-1-50/60	230/460	575-3-60	230/460	575-3-60	230-3-60	460-3-60	575-3-60	460-3-60	575-3-60	230-3-60	460-3-60	575-3-60
627-250	Electric Brake Assembly - Complete	35646	35646	35647	35649	35648	36688	35647	35649	35622	35648	35649	35648	35623	36688
627-259	Brake Coil	51510	51510	51511	51515	51512	51516	51511	51513	51513	51512	51515	51512	51514	51516
627-310	Drive Shaft & Pinion S/A (items 627-311 thru 627-315, as applicable)	35688 (18 Teeth and 13 Teeth Hub) for Models J, J-2, JJ, & JJ-2 35687 (12 Teeth and 13 Teeth Hub) for Models L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, Rt-2, RRT, and RRT-2													
627-411	Attaching Screws	87377	87377	87377	87377	87336	87377	87336	87336	87336	87336	87336	87336	87336	87336
627-415	*3/4 Motor Assembly	367001	367028	**367040K	367003	**367050K	367009	367014	367015	367018	367020	367021	367022		
627-415A	Motor End Plate	367023													

*3/4 Motor includes Stator, Rotor and Shaft Assembly and End Bell.

**Motor Kit includes 'B1' & 'B2' Brake Jumpers.

Note: Except as indicated above, Electric Brake Assemblies, Brake Coils, Rotor Assemblies and Stators listed under "230/460" are also suitable for operation on 220/380-3-50 or 220/415-3-50. Those listed under "230" are also suitable for operation on 220-3-50 and those listed under "460" are also suitable for operation on 380-3-50 or 415-3-50.

Note: CM Extraction Tool Code 27163 Can Be Ordered Separately for Removal of Individual Wires from Motor or Wiring Harness Plugs.

Lubricant Usage	Type of Lubricant	Part Numbers and Packaged Quantity of Lubricants
Hoist Gears	Grease (Special)	28605 for ½ lb. Can 28616 for 1 lb. Can 28617 for 4 lb. Can
Spline on end of Drive Shafts	Oil-Graphite Mixture	40628 for 1 Pint Can
Load Chain	Oil	28608 for 1 Pint Can 28619 for 1 Gal. Can
Limit Switch Shaft Threads	*Oil	"3 in 1" or Light Machine Oil-obtain locally
Lower Hook Thrust Bearing	*Oil	Heavy Machine Oil-obtain locally

Touch-up Paints for Lodestar Electric Chain Hoists and Series 635 Low Headroom Trolleys:

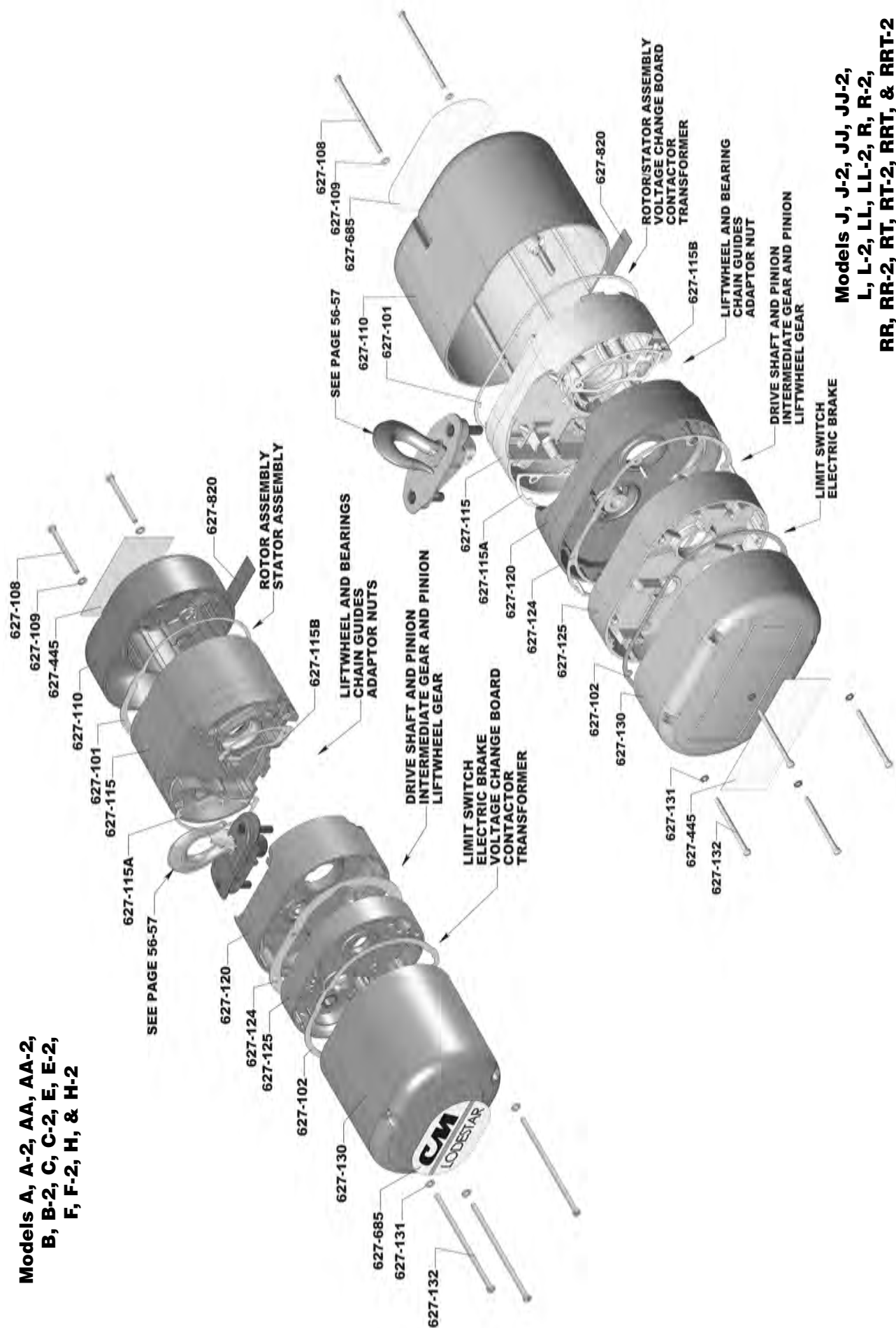
- *Touch-up paints are only available in case quantities.

Note: When painting Hoists or Trolleys, also order warning labels, identification labels, etc. that may be coated during painting.

Notes

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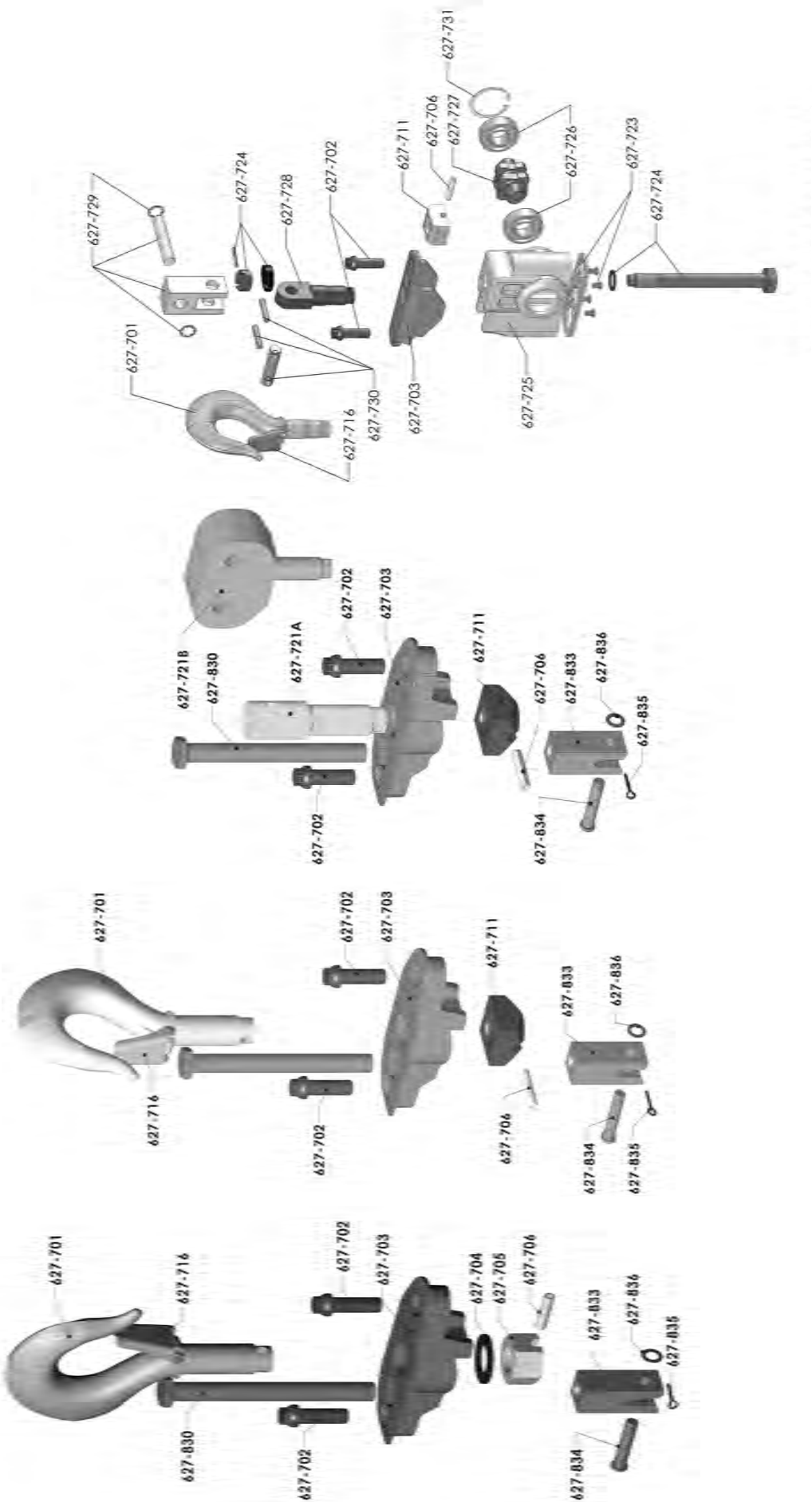
**Models A, A-2, AA, AA-2,
B, B-2, C, C-2, E, E-2,
F, F-2, H, & H-2**



**Models J, J-2, JJ, JJ-2,
L, L-2, LL, LL-2, R, R-2,
RR, RR-2, RT, RT-2, RRT, & RRT-2**

Hoist Frame Components						
Key Number	Part Name	No. Req'd	Models			
			A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2	E, E-2, H, H-2	J, J-2, JJ, JJ-2, L, L-2, LL, LL-12	R, R-2, RR, RR-2, RT, RT-2, RRT, RRT-2
			Part Number			
627-101	Motor Housing Cover Gasket (Weatherproof Units Only)	1	27847			35845
627-102	Back Frame Cover Gasket (Weatherproof Units Only)	1	27848			35840
627-107	Motor Cover and Back Frame Cover Alignment Pins	8	---			983784
627-108	Motor Housing Cover Screws	2	987397			987553
627-109	Motor Housing Cover Screw Lockwashers	2				
	Standard Units		982226			982226
	Weatherproof Units		982251			982251
627-110	Motor Housing Cover	1				
	Orange		27597 (Includes 627-402, 446 & 447)			36071
	Black		27059 (Includes 627-402, 446, 447)			36076
	CSA Covers w/drain slot (Orange)		27095			36023
627-115	Motor Housing	1				
	Orange		27028C		24008C	36078
	Black		27028B		24008B	---
627-115A	Motor Housing Wire Way Gasket	1	28993			29002
627-115B	Motor Housing Spacer Gasket	1	28996			29001
627-120	Gear Housing	1				
	Orange		28669		35620	36604
	Black		28672		35627	---
627-124	Gear Housing Gasket	1	27747			35707
627-125	Back Frame	1				
	Orange		27618 (Includes 627-123 & 627-211)			35090
	Black		27625 (Includes 627-123 & 627-211)			35095
627-130	Back Frame Cover	1				
	Orange		28009C		36008C (Also order 627-445)	
	Black		28009B		36008B (Also order 627-445)	
	CSA Cover w/drain slot (Orange)		27097		36022 (Also order 627-445)	
627-131	Back Frame Cover Screw Lockwasher	As Req'd				
	Standard Units		982226 (3 Required)		982226 (4 Required)	
	Weatherproof Units		982251 (3 Required)		982251 (4 Required)	
627+132	Back Frame Cover Screw	As Req'd	87325 (3 Required)		968752 (4 Required)	
627-245	Back Frame Seal Screw		----		982623	
627-445	Capacity Label		27276 (1/8 Ton), 27277 (1/4 Ton), 27278 (1/2 Ton), 27279 (1 Ton)		35200 (1/2 Ton), 35201 (1 Ton), 35202 (2 Ton), 35203 (3 Ton)	
627-685	Series Label	1	27238		36840	
627-820	Electrical Warning Label	1		24842		

LODESTAR HOIST UPPER SUSPENSION



**627-700
COMPLETE SWIVEL HOOK
SUSPENSION**

**627-710
COMPLETE RIGID HOOK
SUSPENSION**

**627-720
COMPLETE LUG
SUSPENSION**

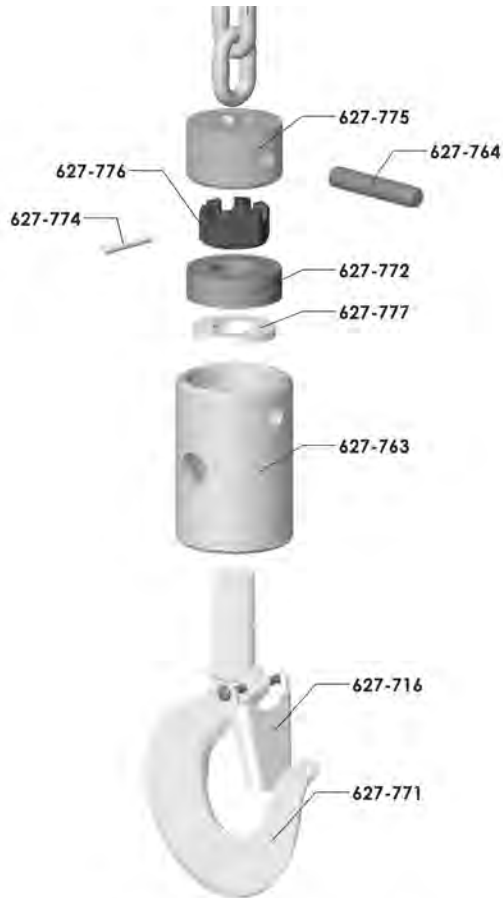
**TRIPLE REEVED SUSPENSION
& SHEAVE HANGER**

Upper Suspension Components						
Key Number	Part Name	No. Req'd	Models			
			A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2	E, E-2, H, H-2	J, J-2, JJ, JJ-2, L, L-2, LL, LL-2	R, R-2 RR, RR-2
			Part Number			
627-700	Swivel Hook Suspension (Includes 627-701 thru 627-706 for Models A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2, J, J-2, JJ, JJ-2, L, L-2, LL, & LL-2.) (Includes 627-701 thru 627-706, 627-830 & 627-833 thru 627-836 for Models E, E-2, H, H-2, R, R-2, RR & R-2) (Includes 627-701 thru 627-703, 627-705 & 627-7-6 for Models RT, RT-2, RRT & RRT-2)	1	2792 (Latch Type Hook)	2793 (Latch Type Hook)	3661 (Latch Type Hook)	3660 (Latch Type Hook) 9557 (Latch Type Hook)
627-701	Upper Hook Latch Type	1	28689	28697	35617	35616
	Latchlok Type	1	28643	28602	36678	36680
627-702	Suspension Adapter Screw	1	27529			
627-703	Suspension Adapter	1	27003B	27013	35740B	35741B
627-704	Upper Hook Washer (Swivel Hook Suspension Only)	1	27786	45930	45930	45918
627-705	Upper Hook Collar Nut (Swivel Hook Suspension Only)	1	27350	45385	35042	35041
627-706	Upper Hook or Suspension Lug Pin (Special Alloy Steel) Specify for Rigid or Swivel Type Suspension	1	27805	45941	983763 (Rigid)	983761 (Rigid)
					983764 (Swivel)	983762 (Swivel)
627-710	Rigid Hook Suspension (Includes 627-701 thru 627-703, 627-706 & 627-711 for Models A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2, J, J02, JJ, JJ-2, L, L-2, LL, & LL-2) (Includes 627-702, 627-703, 627-706, 627-711, 627-733, 627-830 & 627-833, thru 627-836 for Models E, E02, H, H-2, R, R-2, RR & R-2. (Includes 627-702, 627-703, 627-706, 627-711, 627-728, 627-729 thru 627-730 for Models RT, RT-2, RRT & RRT-2		*2788 (Latch Type Hook)	*2789 (Latch Type Hook)	*3651 (Latch Type Hook)	*3658 (Latch Type Hook) *9559 (Latch Type Hook)
627-711	Upper Hook or Suspension Lug Collar (For Rigid Hook and Lug Suspension)	1	27361	27370	35458	35479
627-716	Latch Kit	1	45661	45662	45662	45663
627-720	Lug Suspension (Includes 627-702, 627-703, 627-706 & 627-711 & 627-721A for Models A, A-2, AA, AA-2, B, B-2, C, C-2, F, F02, J, J-2, JJ, JJ-2, L, L-2, LL, & LL-2 (Includes 627-702, 627-703, 627-706, 627-711, 627-721A, 627-830 & 627-823 thru 627-836 for Models E, E-2, H, H-2, R, R-2, RR & RR-2) (Includes 627-702, 627-703, 627-7-6, 627-711, 627-728, 627-729 and 627-730 for Models RT, RT-2, RRT & RRT-2	1	2778 for Series 635 Low Headroom Trolley	2779 for Series 635 Low Headroom Trolley	3677 for Series 635 Low Headroom Trolley	3668 9561
			2992 for Series 635 Motor Driven Trolley	2993 for Series 635 Motor Driven Trolley	3679 for Series 635 Motor Driven Trolley	
627-721A	Suspension Lug For Series 635 Low Headroom Trolley For Series 635 Motor Driven Trolley		27450	27452	35456	35457
			27454	27455	35459	
627-721B	Suspension Lug Special High Strength Bolts, Grade 6 or better required for attachment	1	Contact Factory			
627-723	Cloverleaf Plate & Attaching Screws	1				C246
627-724	Sheave Stud 2/wsher, Slotted Nut, Seat and Retainer Pin					C247
627-725	Sheave Hanger					36011
627-726	Sheave Hanger Bearing					88429
627-727	Upper Sheave					36350
627-728	Suspension Lug					Order Complete Suspension
627-729	Shackle w/Pin and Retainer Rings					Order Complete Suspension
627-730	Suspension Lug Pin w/Retainer Pins					C248
627-731	Bearing Retainer Ring					40740
627-830	Dead End Bolt (Special Alloy)	1		89508		35957
627-833	Dead End Block	1		27397		35418
627-834	Dead End Pin	1		82320		82314
627-835	Dead End Pin Cotter Pin	1		988330		988330
627-836	Dead End Pin Washer	1		987878		987877

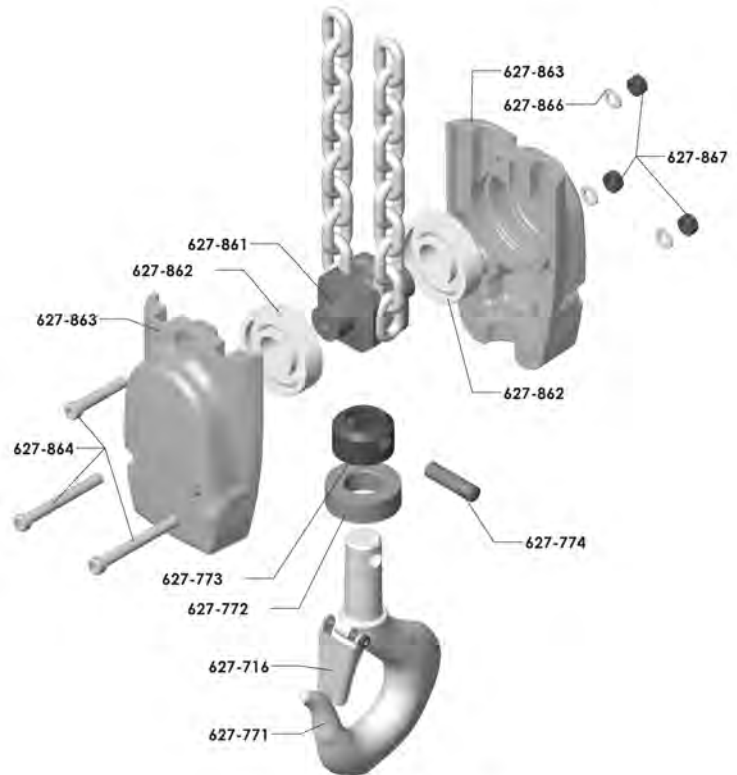
*Contact Factory for Part Numbers of Suspensions with Latchlok Type Hooks

**For Swivel Hook Nut, Part Number is 36352

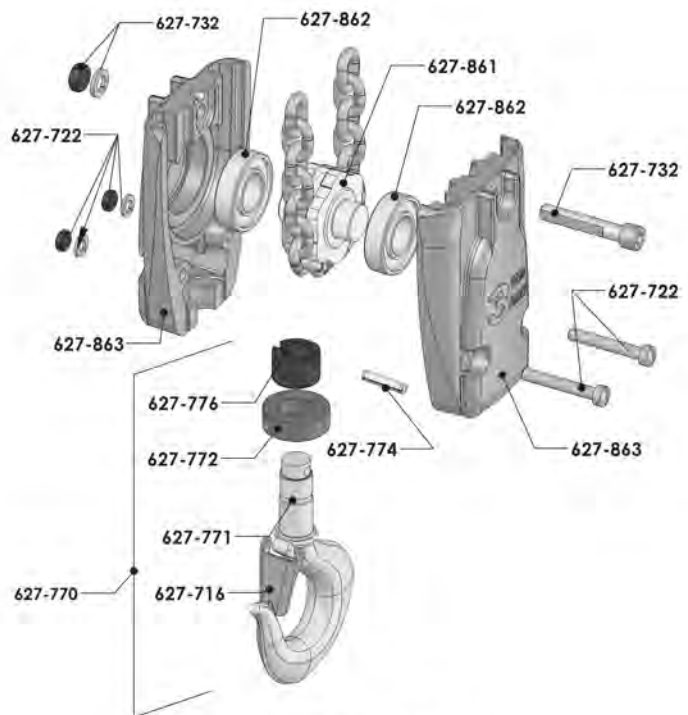
LODESTAR LOWER HOOK BLOCK ASSEMBLY



**627-760
COMPLETE SINGLE REEVED
LOWER HOOK BLOCK ASSEMBLY**



**627-860
COMPLETE DOUBLE REEVED
LOWER HOOK BLOCK ASSEMBLY**



**627-860 TRIPLE REEVED
LOWER HOOK BLOCK ASSEMBLY**

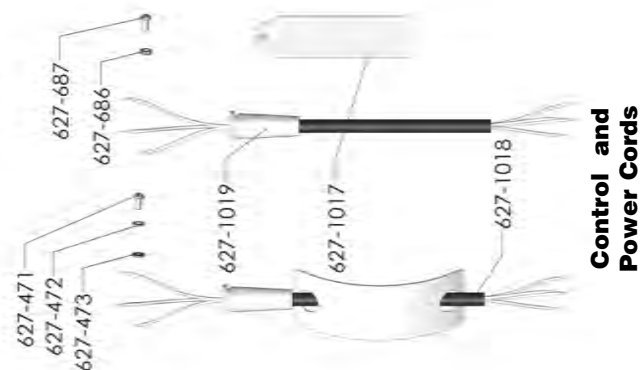
Lower Hook Block Assembly							
Key Number	Part Name	No. Req'd	A, A-2, AA, AA-2, B, B-2, C-2, F, F-2	E, E-2, H, H-2	J, J-2, JJ, JJ-2, L, L-2, LL, LL-2	R, R-2, RR, RR-2	RT, RT-2, RRT, RRT-2,
			Part Number				
627-716	Latch Kit (specify no. req'd)	-	45661	45662	45662	45663	45663
627-722	Hook Block Screws with Nuts and Lockwasher (2 Each)	1	---				
627-732	Dead End Screw with Nut and Lockwasher	1	---				
627-760	Lower Hook Block Assembly	1	**28683	---	35651	---	36607
627-763	Lower Hook Body	1	45401B	---	35370	---	
627-764	Lower Hook Chain Block Pin	1	45943	---	35790	---	
627-770	Lower Hook Block Assembly	1	-	*28665	---	*35645	*36606
627-771	Lower Hook with Latch: Latch Type Hook	1	28686	28687	35611	35612	36606
	Latchlok Type Hook	1	28604	28603	28604	36681	***
	All Other Hook Types	1	Contact Factory				
627-772	Lower Hook Thrust Bearing	1	88485	88478	88485	88505	88505
627-773	Lower Hook Collar	1	---	27359	---	35478	---
627-774	Lower Hook Pin	1	983772	45941	983772	45946	983762
627-775	Lower Hook Chain Block	1	28007	---	35026	---	
627-776	Lower Hook Nut	1	982526	---	982526	---	36352
627-777	Lower Hook Block Washer	1	945921		945921	---	
627-833	Dead End Block	1	---	27397	---	35418	---
627-834	Dead End Pin	1	---	82320	---	82314	---
627-835	Dead End Pin Cotter Pin	1	---	988330	---	988330	---
627-836	Dead End Pin Washer	1	---	987878	---	987877	---
627-837	Contact Block	1	---	---	---	36764	---
627-860	Lower Hook Block Assembly-Complete	1	-	**28685-	---	**35621	*36607
627-861	Hook Block Sheave	1	-	27017		35010	36351
627-862	Hook Block Sheave Bearing	2	-	88429		83674	83670
627-863	Hook Block (Order in Pairs)	2	-	27048		36032	36010
627-864	Hook Block Screw-Long	2	-	982066		982374	
627-865	Hook Block Screw-Short	1	-	986191		982370	
627-866	Hook Block Screw L.W.	3	-	940802		940830	
627-867	Hook Block Screw Nut	3	-	982514		982445	

*Contact CM for Part Number of Suspension with Latchlok Type Hook.

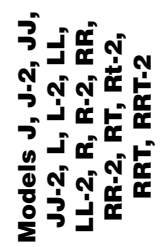
**Latch Type Hook. Contact CM for Part Number of Lower Hook and Body with Latchlok Type Hook.

***For Swivel Hook Nut, Part Number is 36352.

**Models A, A-2, AA,
B, B-2, C, C-2, E, E-2,
F, F-2, H, H-2**

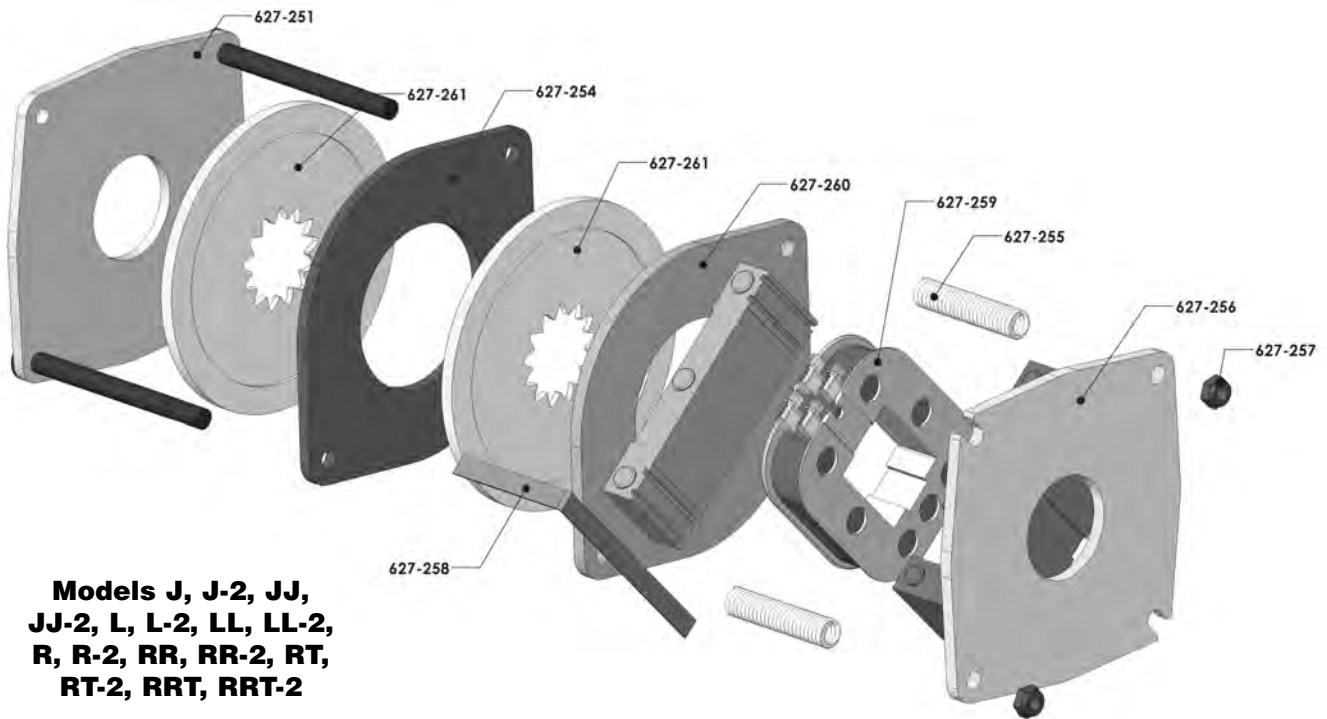
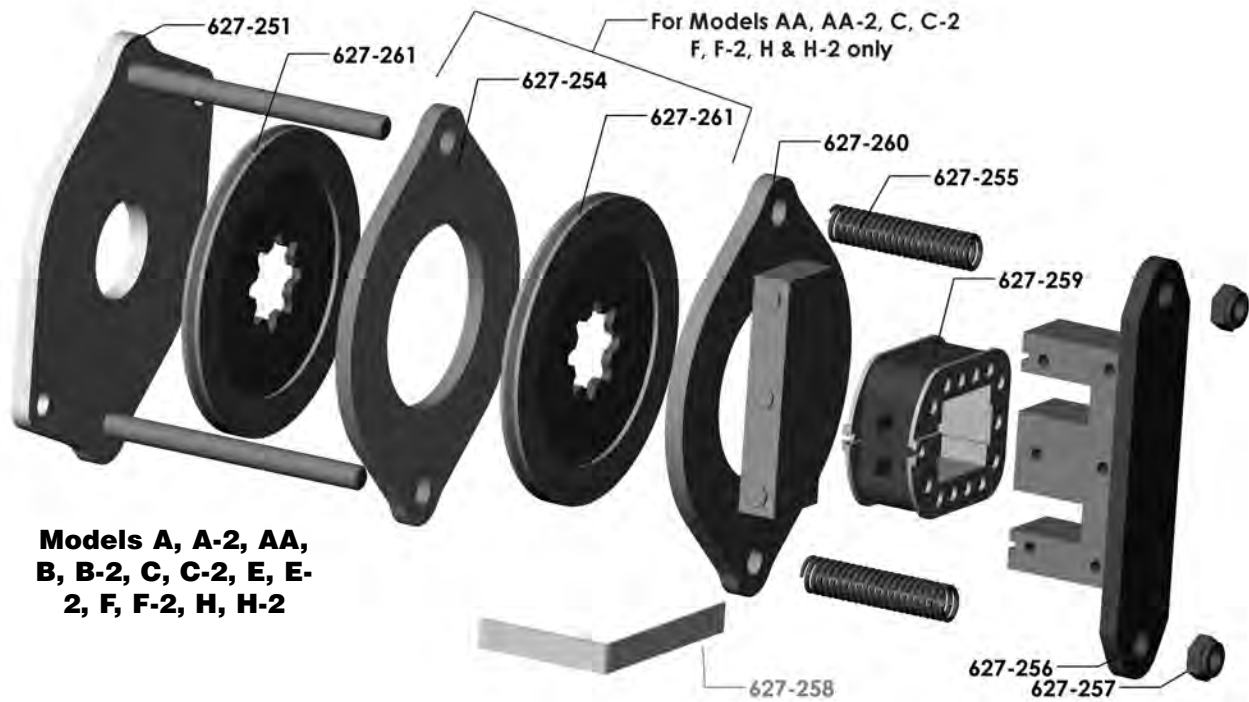


Control and Power Cords



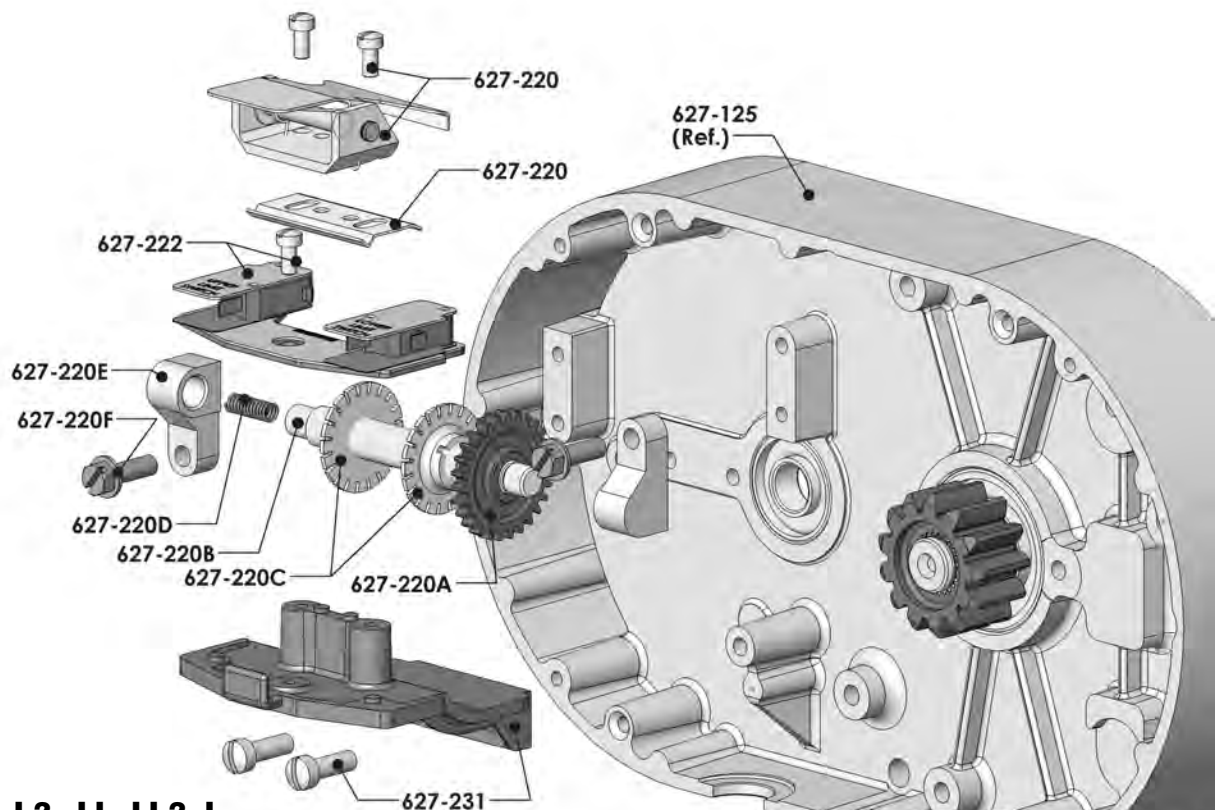
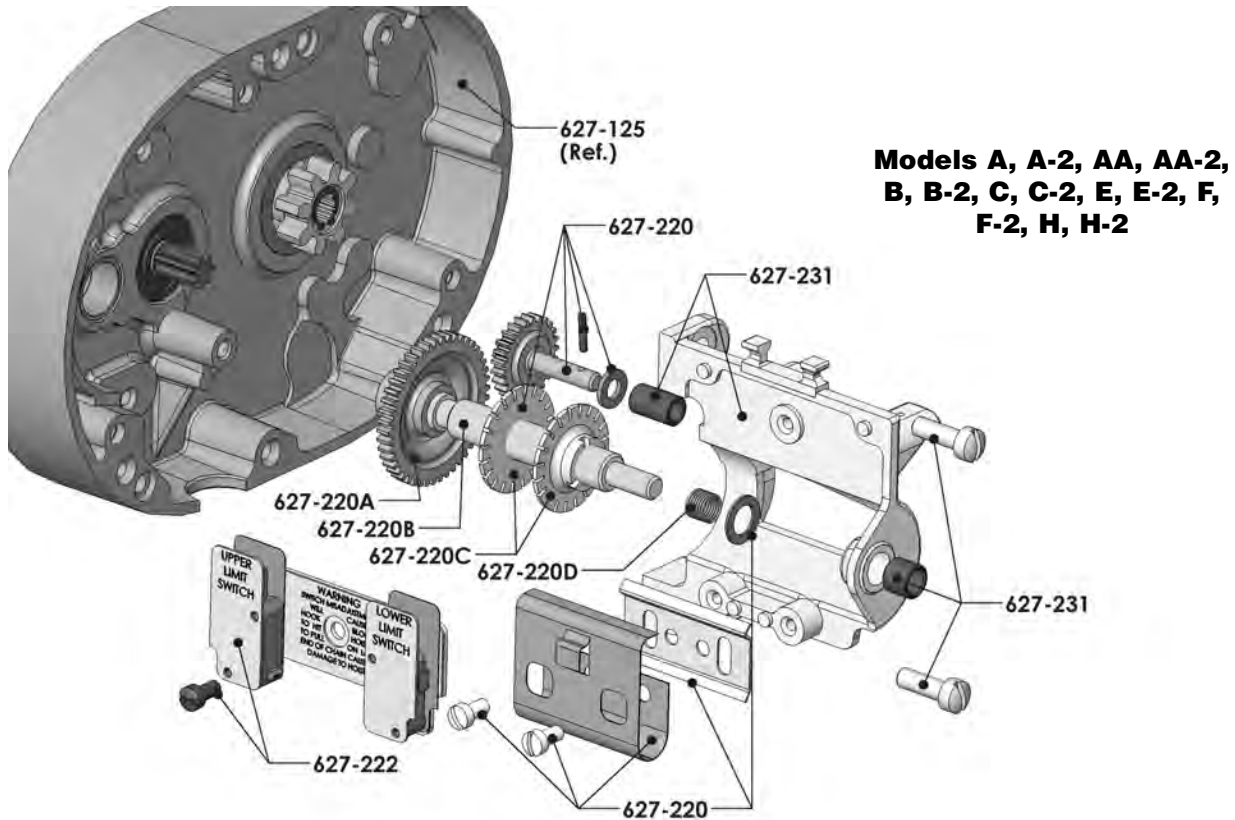
Control End Components								
Key Number	Part Name	No. Req'd	Models					
			A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2	E, E-2,H, H-2	J, J-2, JJ, JJ-2.2 L, L-2, LL, LL-2	R, R-2, RR, RR-2	RT, RT-2, RRT, RRT-2	
			Part Name					
627-123	Back Frame Expansion Plug	1	940837		---	---	---	
627-127	Back Frame Attaching Screw	3	982699		---	---	---	
627-127A	Back Frame Attaching Screw Lockwasher	3	940802		---	---	---	
627-128	Back Frame Attaching Screw	2	---	---	---	982698 (1 3/4"lg.)	---	
627-128A	Back Frame Attaching Screw Lockwasher	2	---	---	---	940830	---	
627-129	Back Frame Attaching Screw	2	---	---	---	987322 (2" lg)	---	
627-129A	Back Frame Attaching Screw Lockwasher	2	---	---	---	940830	---	
627-220	Limit Switch Shaft & Gear Kit	1	---	---	---	36641 (See Separate Parts List on Page 64)	---	
	Rotatable Limits	1	---	---	---	36656 (See Separate Parts List on Page 64)	---	
627-222	Limit Switch Kit	1	---	---	---	31636 (See Separate Parts List on Page 64)	---	
627-250	Electric Brake Assembly - Complete	1	See Separate Parts List on Page 62-63					---
627-252	Brake Attaching Screw Lockwasher	-	982226 (2 Req'd)			945851 (1 Req'd)	---	
627-253	Brake Attaching Screw	-	982708 (2 Req'd)			982709 (1 Req'd)	---	
627-257	Brake Stud Nut	2		945840			---	
627-263	Hex Brake Stud Spring	1		57753			35704	
627-264	Hex Brake Stud Spring Washer	1	---		---		954807	
627-265	Hex Brake Stud	1	---		---		36674	
627-272	Hex Brake Stud Lockwasher	1	---		---		982232	
627-471	Control Cord Attaching Screw	1				987827	---	
627-472	Control Cord Attaching Screw Washer	1				927835	---	
627-473	Control Cord Attaching Screw Lockwasher	1				982226	---	
627-528	Transformer Attaching Screw	2					982688	
627-530	Transformer:							
	220/230 Volt Primary w/115 Volt Secondary						29070	
	220/230 Volt Primary w/48 Volt Secondary						29071	
	220/230 Volt Primary w/24 Volt Secondary						29072	
	220/230 Volt Primary w/115 Volt Secondary with Thermal Cútout for CSA						29075	
	220/230 Volt Primary w/48 Volt Secondary w/Th Thermal Cútout for CSA	1					29076	
	220/230 Volt Primary w/24 Volt Secondary w/Th Thermal Cútout for CSA						29077	
	110/115 Volt Primary w/48 Volt Secondary						29073	
	110/115 Volt Primary w/24 Volt Secondary						29074	
	110/115 Volt Primary w/48 Volt Secondary with Thermal Cútout for CSA						29078	
627-602	Contactor Mounting Plate Stud	3	27836			---	29079	
627-604	Contactor Mounting Plate Stud Lockwasher	3	982226			---	---	
627-605	Contactor Mounting Plate Stud Nut	3	982514			---	---	
627-686	Power Cord Attaching Screw	1				987827	---	
627-687	Power Cord Attaching Screw Lockwasher	1				982226	---	
627-1017	Instruction Tag	1			29271 (Dual Voltage), 927992 (Single Voltage)		---	
627-1018	Power Cord	1	29924 (Single Phase Units) 29925 (220/230-1-50/60 Units) 27589 (Three Phase)			29042 (Single Phase Units) 29430 (Three Phase Units)	---	
627-1019	Control Cord Assembly	1				See Separate parts list on Pages 86-88	39460*	
627-1050	Terminal Strip	4					39452*	
627-1051	Terminal Strip End Clamp	2					---	
627-1065	Terminal Strip Mounting Bracket	1				31639* (220/230-1-50/60 & 110 volt Single Phase w/Transformers)	---	
627-1066	Terminal Strip Mounting Screw	2				29012 All Other Units	951726*	
627-1067	Terminal Strip Mtg. Screw Lockwasher	2					957855*	
627-1068	Terminal Strip Mtg. Bracket Screws	2					958905*	
627-1069	Terminal Strip Mtg. Bracket Screw Lockwasher	2					987873*	
627-1070	Terminal Strip Mtg. Bracket Screw Nut	2					988141*	

Lodestar Hoist Brake Components



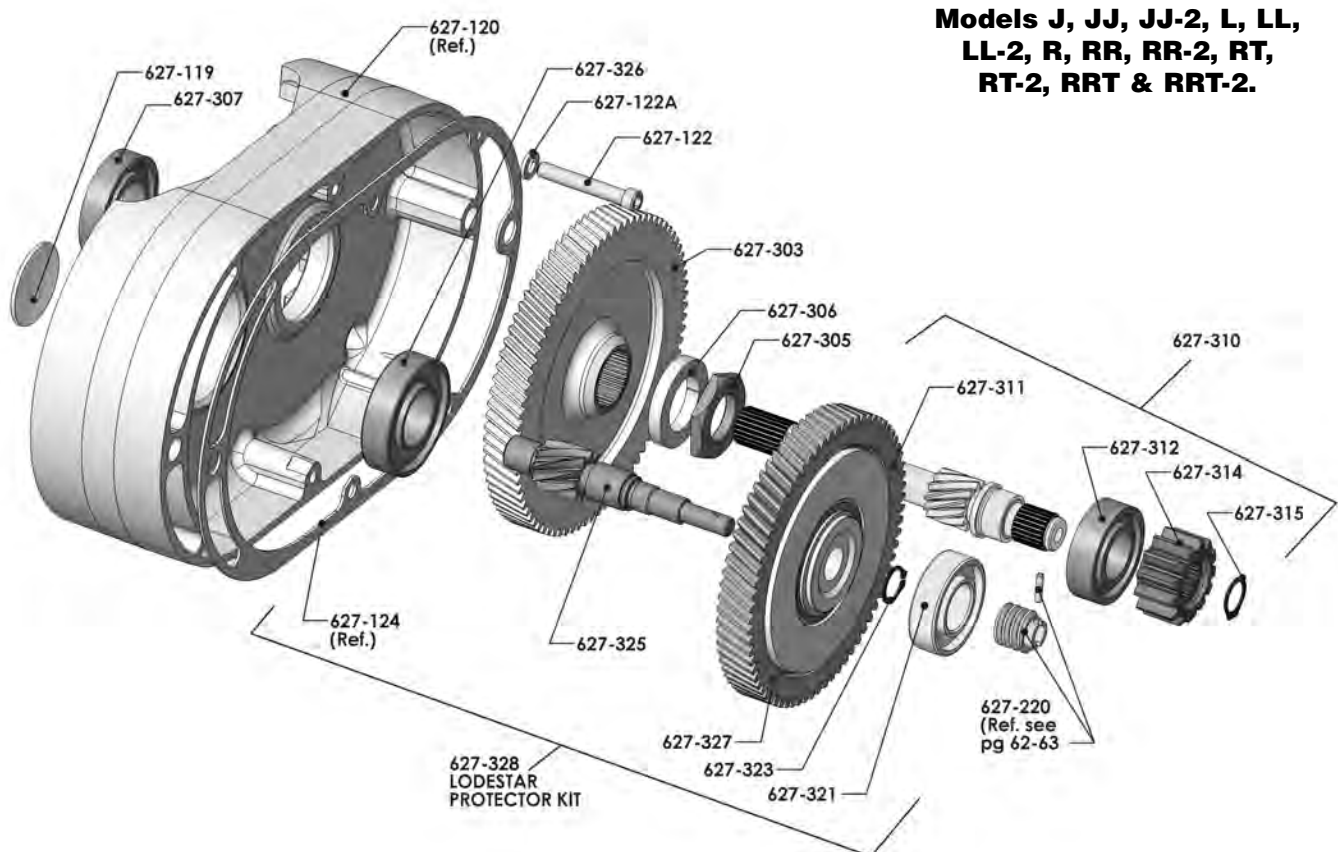
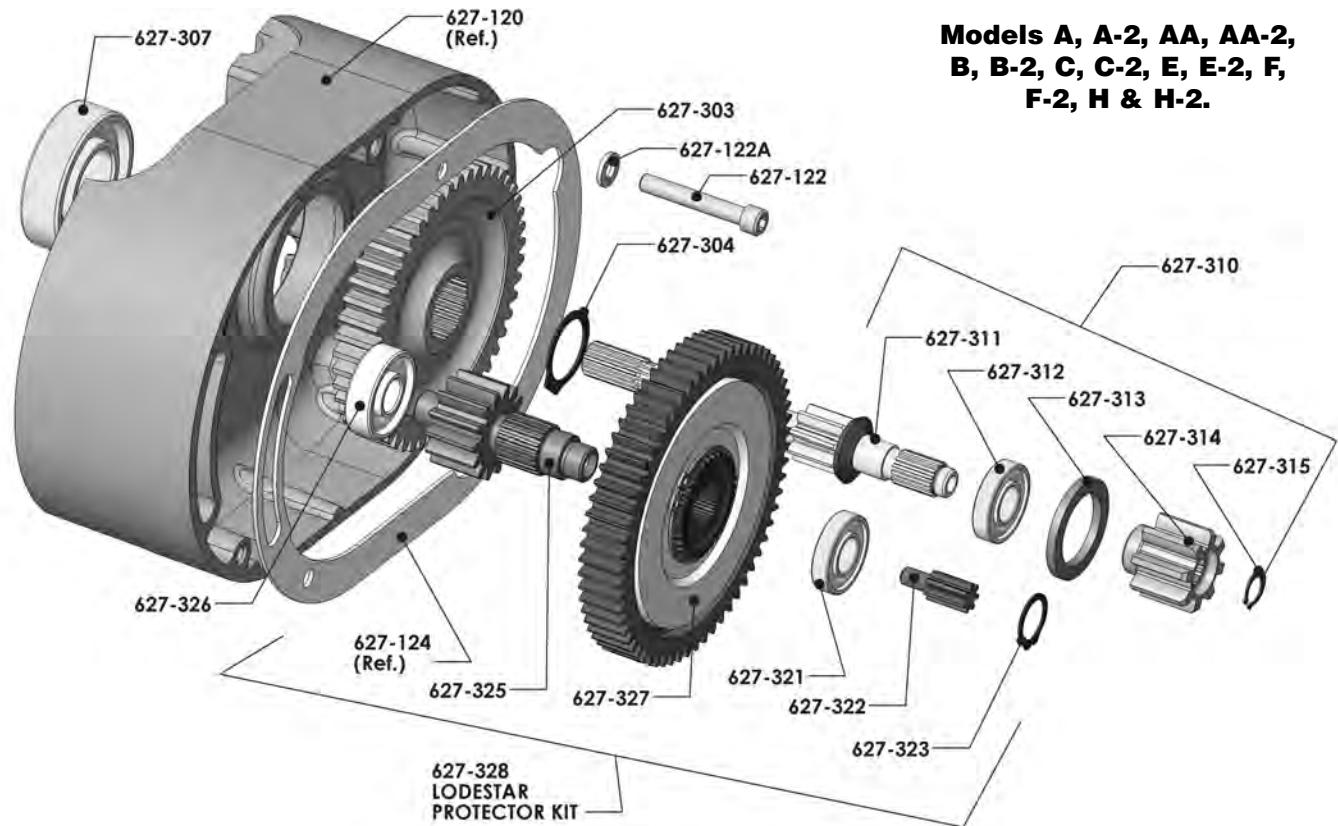
Brake Components				
Key Number	Part Name	No. Req'd	Models	
			A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2, H, H-2	J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, RRT-2
			Part number	
627-251	Brake Base Plate and Studs	1	28668	35643
627-254	Brake Intermediate Plate	1	27091 (For Models AA, AA-2, C, C-2, F, F-2, H & H-2 only)	35069
627-255	Brake Spring	2	27751 (Color Coded Blue)	35716 (Color Coded Yellow for Models J, J-2, L-2, R, R-2, RT and RT-2) 35717 (Color Coded Green for Models JJ, JJ-2, LL, LL-2, RR, RR-2, RRT and RRT-2)
627-256	Brake Field Sub-Assembly	1	28677 (Includes 627-262)	35629
627-257	Brake Stud Nut	2	345840	
627-258	Brake Coil Retainer Strap	1	57753	35704
627-259	Brake Coil	1	See Separate Listing on Page 51	
627-260	Brake Armature Assembly	1	28678	35600 (Includes 627-262)
627-261	Brake Friction Disc	-	27677 (1 Req'd for Models A, A-2, B, B-2, E, E-2) (2 req'd for Models AA, AA-2, C, C-2, F, F-2, H, H-2)	35632 (2 Req'd)

LODESTAR HOIST LIMIT SWITCH COMPONENTS



Models J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, RRT-2

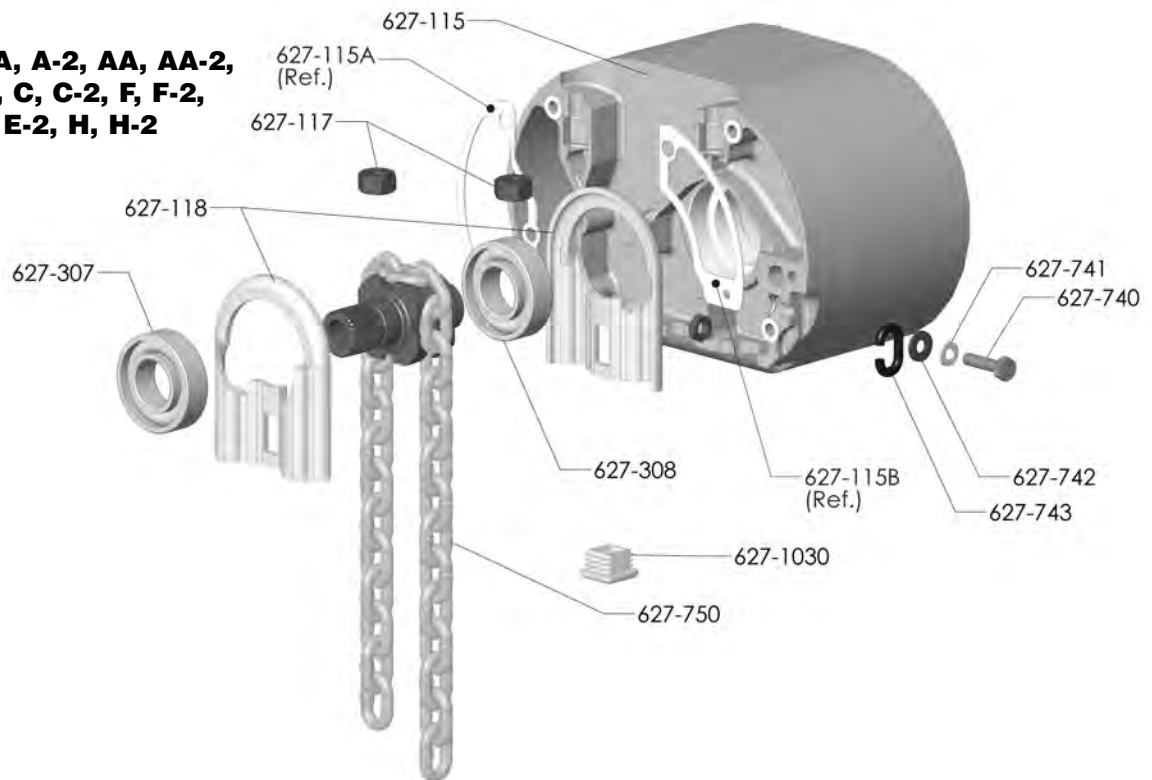
Limit Switch Components				
Key Number	Part Name	No. Req'd	Models	
			A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H, H-2	J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, RRT-2
			Part Number	
627-220	Limit Switch Shaft and Gear Kit	1	27561	36641
	Rotatable Limit Switch		27749	36656
627-220A	Limit Switch Gear	1	27714	35753
627-220B	Limit Switch Shaft (44 thread)	1	70399	36373
	Limit Switch Shaft (56 thread)		27307	36317
	Limit Switch Shaft (64 thread)		27251	36321
627-220C	Travel Nut (44 thread)	2	70053	70053
	Travel Nut (56 thread)		36318	36318
	Travel Nut (64 thread)		36319	36319
627-220D	Spring	1	28712	35703
627-220E	Limit Switch Bearing	2	---	35751
627-220F	Mounting Screws	2	---	983656
627-222	Limit Switch Kit: Three Phase	1	31631	31636
	All Others		31631	
627-231	Limit Switch Bracket Sub-Assembly	1	27502	36644

LODESTAR HOIST GEARING COMPONENTS

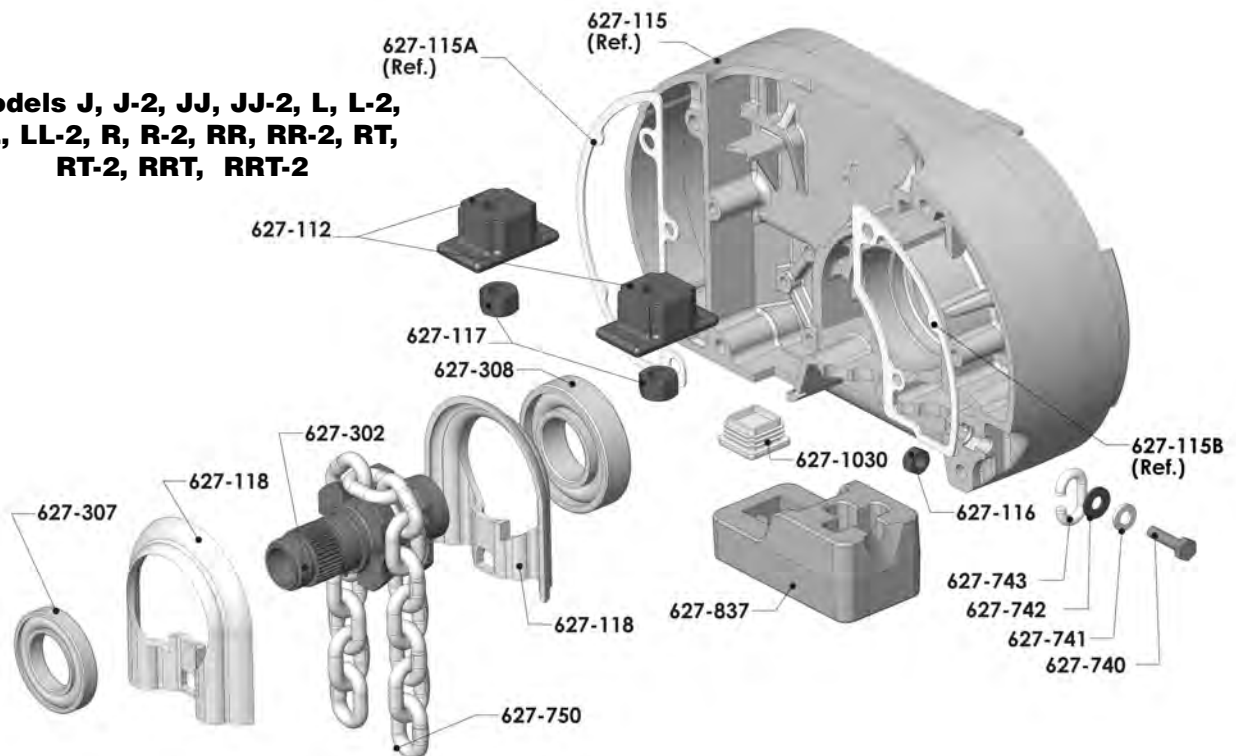
Gearing Components				
Key Number	Part Name	No. Req'd	Models	
			A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H, H-2	J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, RRT-2
			Part Number	
627-119	Gear Housing Plug	1		935495
627-122	Gear Housing Attaching Screw	4	28830	35733
627-122A	Gear Housing Attaching Screw Lockwasher	4	940802	940830
627-303	Liftwheel Gear	1	27010 (47 teeth) Models A, A-2, C & C-2 28380 (39 teeth) Models AA & AA-2 27009 (56 teeth) Models B, B-2, E, E-2, F, F-2, H & H-2	35009 (79 teeth) Models J, J-2, L, L-2, R, R-2, RT & RT-2 35639 (60 teeth) Models JJ, JJ-2, LL, LL-2, RR, RR-2, RRT & RRT-2
627-304	Liftwheel Gear Snap Ring	1	27767	---
627-305	Liftwheel Gear Nut	1	---	35773
627-306	Liftwheel Gear Nut Washer	1	---	986576
627-307	Liftwheel Bearing-Gear End	1	88429	82002
627-310	Drive Shaft and Pinion Sub Assembly (Includes items 627-311 thru 627-315 as applicable)	1	27654 (5-43/64" lg. shaft length) Models AA, AA-2, C, C-2, F, F-2, H & H-2 27653 (5 15/64" lg shat length) Models A, A-2, B, B-2, E & E-2	35688 (18 teeth pinion & 13 teeth hub) Models J, J-2, JJ & JJ-2 35687 (12 teeth pinion & 15 teeth hub) Models L, L-2, LL, LL-2, R, R-2, RR, RR-2, R, RT, RT-2, RRT & RRT-2
627-311	Drive Shaft and Pinion	1	C204 (Models AA, AA-2, C, C-2, F, F-2, H & H-2) C203 (Models A, A-2, B, B-2, E & E-2)	35357 (18 teeth) Models J, J-2, JJ & JJ2 35356 (12 teeth) Models L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT & RRT-2
627-312	Drive Shaft and Pinion Bearing	1	82009	83691
627-313	Drive Shaft and Pinion Bearing Spacer	1	27710	---
627-314	Brake Hub	1	27852 (1 1/2 lg.) for Models AA, AA-2, C, C-2, F, F-2, H & H-2 27851 (2 1/32 lg) for Models A, A-2, B, B-2, E & E-2	35744
627-315	Brake Hub Snap Ring	1	27765	35766
627-321	Intermediate Gear and Pinion Bearing Outboard End	1	82009	88437
627-322	Limit Switch Drive Pinion	1	27712	---
627-323	Intermediate Gear Snap Ring	1	27765	35763
627-325	Intermediate Pinion	1	28624 (14 teeth) Models A, A-2, C & C-2 28625 (22 teeth) Models AA & AA-2 28623 (8teeth) Models B, B-2, E, E-2, F, F-2, H, & H-2	35351 (10 teeth) Models J, J-2, L, L-2, R, R-2, RT & RT-2 35420 (15 teeth) Models JJ, JJ-2, LL, LL-2, RR, RR-2, RRT & RRT-2
627-326	Intermediate Gear and Pinion Bearing Inboard End	1	88440	Order (1) bearing 83670 and (1) Shaft Adapter 24350)
627-327	Lodestar Protector	1	28694 (for Models A, A-2, B, B-2, E & E-2) 28693 (for Models AA & AA-2) 28695 (for Models C, C-2, F, F-2, H & H-2)	36668 (for Models J & J-2) 36669 (for Models JJ & JJ-2) 36670 (for Models L, L-2, R, R-2, RT & RT-2) 36671 (for Models LL, LL-2, RR, RR-2, RRT & RRT-2)
627-328	Lodestar Protect Kit (Includes item 627-124, 627-321, 627-322, 627-323, 627-325 & 627-327 for Models A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2 (Includes items 627-124, 627-321, 627-323, 627-325 & 627-327 for Models J, J-2, L, L-2, R, R-2, RT & RT-2. (Includes items 627-124, 627-323 & 627-327 for Models JJ, JJ-2, LL, LL-2, RR, RR-2, RRT & RRT-2	1	2876 (for Models A & A-2) 2877 (for Models AA & AA-2) 2878 (for Models B, B-2, E & E-2) 2879 (for Models C & C-2) 2880 (for Models F, F-2, H & H-2)	3601 (for Models J & J-2) 3602 (for Models JJ & JJ-2) 3603 (for Models L, L-2, R, R-2 RT & RT-2) 3604 (for Models LL, LL-2, RR, RR-2 RRT & RRT-2)

LODESTAR HOIST LIFTWHEEL COMPONENTS

**Models A, A-2, AA, AA-2,
B, B-2, C, C-2, F, F-2,
E, E-2, H, H-2**



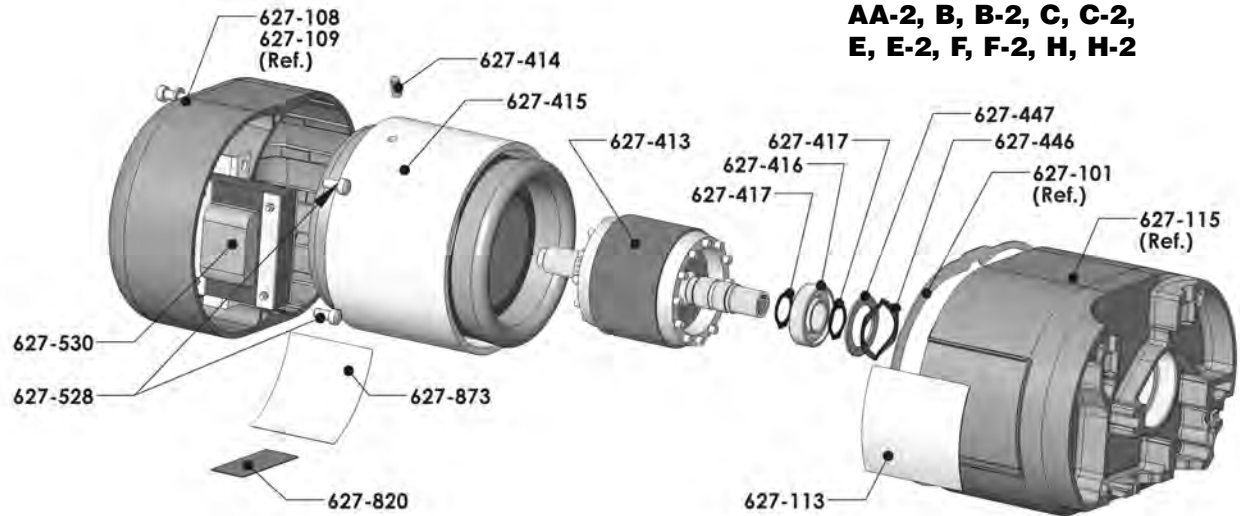
**Models J, J-2, JJ, JJ-2, L, L-2,
LL, LL-2, R, R-2, RR, RR-2, RT,
RT-2, RRT, RRT-2**



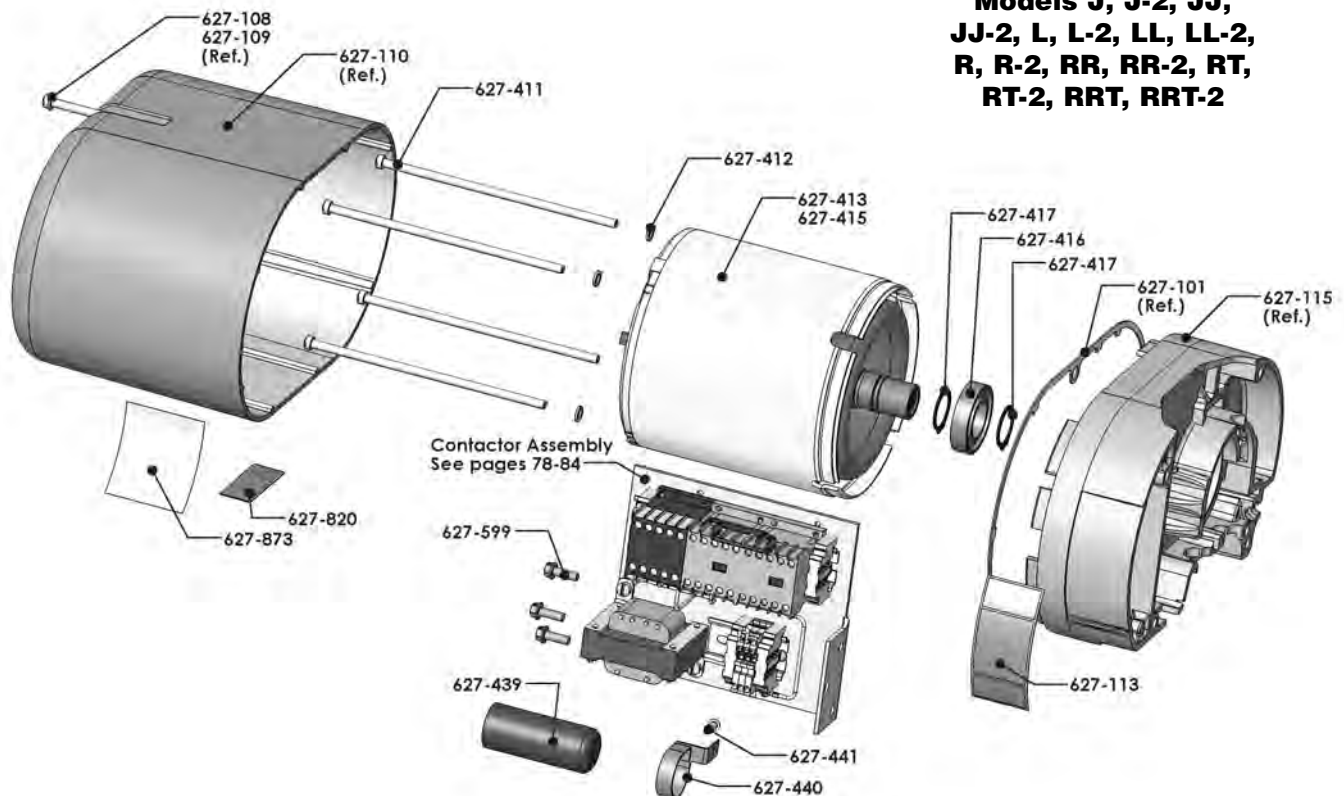
Liftwheel Components							
Key Number	Part Name	No. Req'd	Models				
			A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2	E, E-2, H, H-2	J, J-2, JJ, JJ-2, L, L-2, LL, LL-2	R, R-2, RR, RR-2	RT, RT-2, RRT, RRT-2
			Part Number				
627-112	Suspension Adapter Anchor	2	---		35066		35015
627-116	Loose End Nut	1	82638		82639		
627-117	Suspension Adapter Nut	2	927755		935791		
627-118	Chain Guide	1	27008		35018		
627-302	Liftwheel	1	27360		35421		
627-307	Liftwheel Bearing-Gear End	1	88429		82002		
627-308	Liftwheel Bearing-Motor End	1	88429		83669		
627-740	Loose End Screw	1	927764		987210		
627-741	Loose End Screw Lockwasher	1	982226		945851		
627-742	Loose End Screw Washer	1	954802		954807		
627-743	Loose End Link	1	27351		35367		
627-750	Load Chain (Specify Qty Required)	As Req'd.					
	Burnished in Oil		85889		85979		
	Zinc		85944		85949		
	Niclad		85915		85916		
	Stainless Steel		85952		n/a		
	Zinc Phosphate		85965		85966		
627-837	Contact Block	1	---	---	---	36764	---
627-1030	Dead End Block Hole Plug (For use on Entertainment/Black Units Only)	1	27223	---	---	35291	---

LODESTAR HOIST MOTOR END COMPONENTS

**Models A, A-2, AA,
AA-2, B, B-2, C, C-2,
E, E-2, F, F-2, H, H-2**



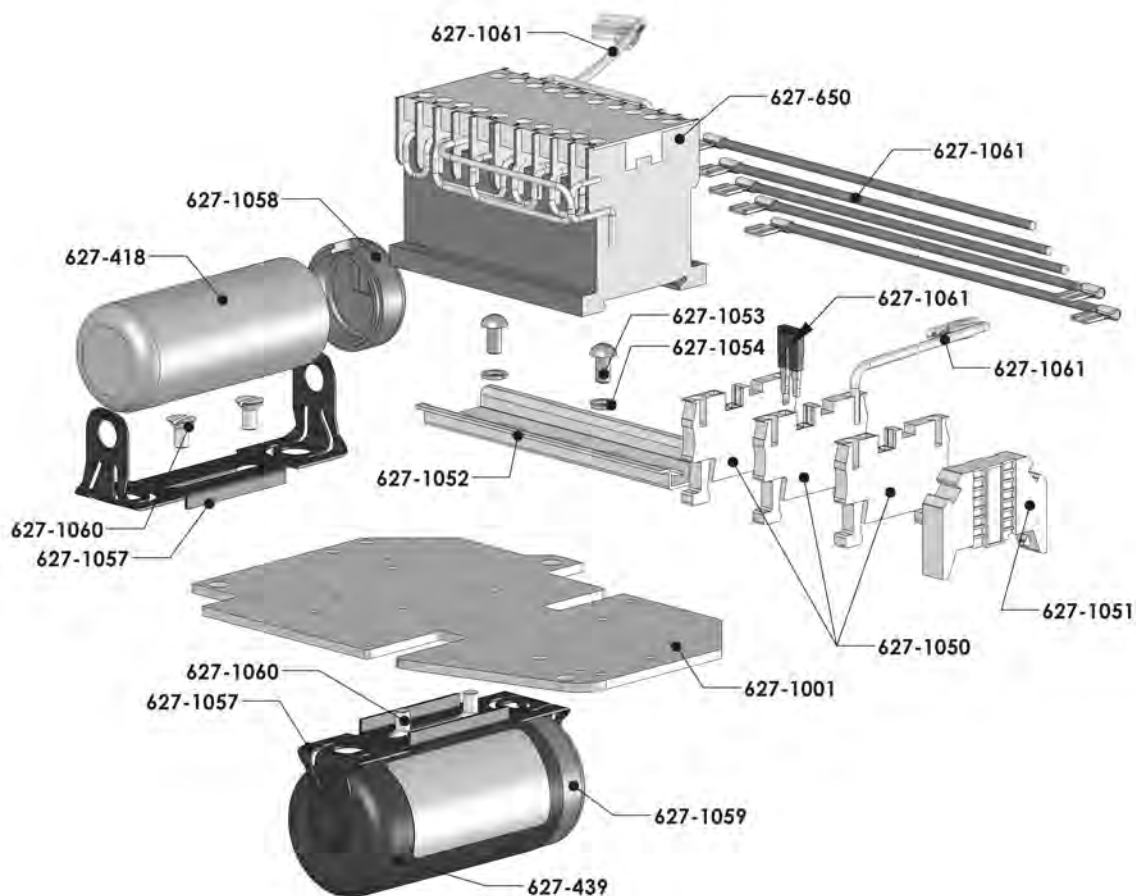
**Models J, J-2, JJ,
JJ-2, L, L-2, LL, LL-2,
R, R-2, RR, RR-2, RT,
RT-2, RRT, RRT-2**



Motor End Components				
Key Number	Part Name	No. Req'd	A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H, H-2	J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, RRT-2
			Part Number	
627-113	Identification Plate	1	Contact Factory	
627-411	Motor Attaching Screw	4	---	See Pg. 51
627-412	Motor Attaching Screw Lockwasher	4		982226
627-413	Rotor and Shaft Sub Assembly	1	See Pg. 51	---
627-414	Stator Pin	1	983541	---
627-415	Stator	1	See Pg. 51	
627-415A	Motor End Plate	1	---	36023
627-416	Motor Shaft Bearing - Inboard End	1	82003	82004
627-417	Motor Shaft Bearing Snap Ring-Inboard End	2	27790	35764
627-439	Solid State Reversing Switch	1	27257 (115/230-1-50/60 Units)	35499 (115/230-1-50/60 Units)
627-440	Switch Clamp	1	27295	27275
627-441	Switch Clamp Screw	1	982873	
627-446	Rotor Wave Washer	1	27292	---
627-447	Rotor Bearing Spacer	1	27291	Contact Factory
627-528	Transformer Attaching Screws	2	982688	
627-530	Transformer & Bracket Mounting Assembly			
	V1 Single Phase Units 110/115-1-50/60 *Units w/Transformer	1	115 Volt Primary with 48 Volt Secondary code 29847	
			115 Volt Primary with 24 Volt Secondary code 29849	
			115 Volt Primary with 48 Volt Secondary w/Thermal Cutout for CSA use code 29848	
			115 Volt Primary with 24 Volt Secondary w/Thermal Cutout for CSA use code 28999	
			V1 Single Phase Units 220/230-1-50/60	220/230 Volt Primary with 115 Volt Secondary code 27771
	220/230 Volt Primary with 48 Volt Secondary code 28850			
	220/230 Volt Primary with 24 Volt Secondary code 27780			
	220/230 Volt Primary with 115 Volt Secondary w/Thermal Cutout for CSA use code 27778			
	220/230 Volt Primary with 48 Volt Secondary w/Thermal Cutout for CSA use code 27777			
	220/230 Volt Primary with 24 Volt Secondary w/Thermal Cutout for CSA use code 28980			
	V1 Three Phase Units *All Three Phase Voltages			230/460 Volt Primary with 115 Volt Secondary code 27771
			230/460 Volt Primary with 48 Volt Secondary code 28850	
			230/460 Volt Primary with 24 Volt Secondary code 27780	
			230/460 Volt Primary with 115 Volt Secondary w/Thermal Cutout for CSA use code 27778	
			230/460 Volt Primary with 48 Volt Secondary w/Thermal Cutout for CSA use code 27777	
			230/460 Volt Primary with 24 Volt Secondary w/Thermal Cutout for CSA use code 28980	
			550/575 Volt Primary with 115 Volt Secondary w/Thermal Cutout for CSA use code 27792	
			550/575 Volt Primary with 48 Volt Secondary w/Thermal Cutout for CSA use code 28798	
			550/575 Volt Primary with 24 Volt Secondary w/Thermal Cutout for CSA use code 28796	
627-599	Contactor Mounting Plate Screw		3	---
627-820	Electrical Warning Label	1	24842	
627-873	Chain Label	1	928894	

CONTACTOR PLATE ASSEMBLIES

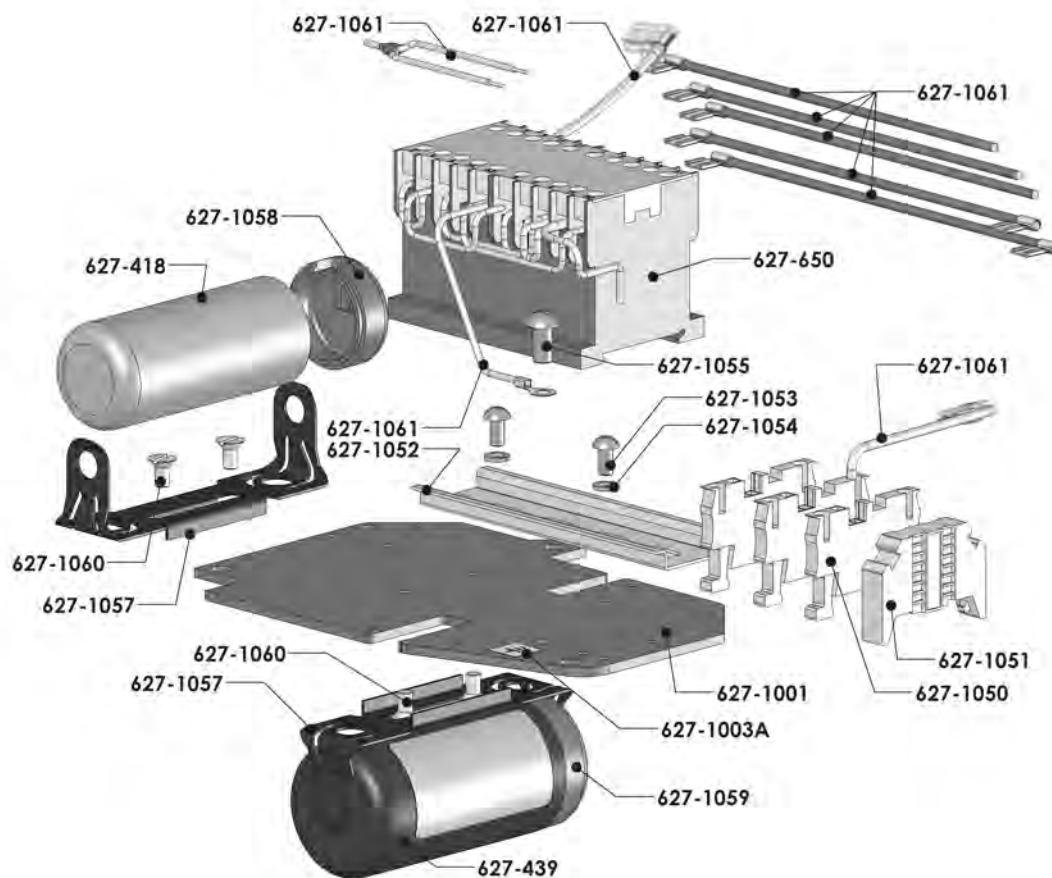
MODELS A, AA, B, C, E, F & H
SINGLE PHASE
110/115-1/50/60



Key Number	Part Name	No. Req'd	Part Number
627-418	Capacitor	1	27716
627-439	Solid State Reversing Switch	1	27257
627-650	Hoist Reversing Contactor	1	28553 (115 Volt Coil)
627-1001	Contactor Mounting Plate	1	31633
627-1050	Terminal Strip	3	29014
627-1051	Terminal Strip End Clamp	1	29015
627-1052	Din Rail Mounting Bracket	1	29312
627-1053	Din Rail Mounting Bracket Screw	2	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	2	987873
627-1057	Capacitor Mounting Bracket or Solid State Reversing Switch Mounting Bracket	2	27910
627-1058	Insulating Capacitor Cap	1	29910
627-1059	Insulating Solid State Reversing Switch Cap	1	27925
627-1060	Capacitor Mounting Bracket or Solid State Reversing Switch Mounting Bracket Screw	4	982696
627-1061	Jumpers:		
	R5	1	29911
	R6	1	29912
	R7	1	29913
	R8	1	29914
	R14	1	27156
	B1	1	29915
	B2	1	29916
	Bridge	1	29047
	Wiring Harness	1	29926

CONTACTOR PLATE ASSEMBLIES

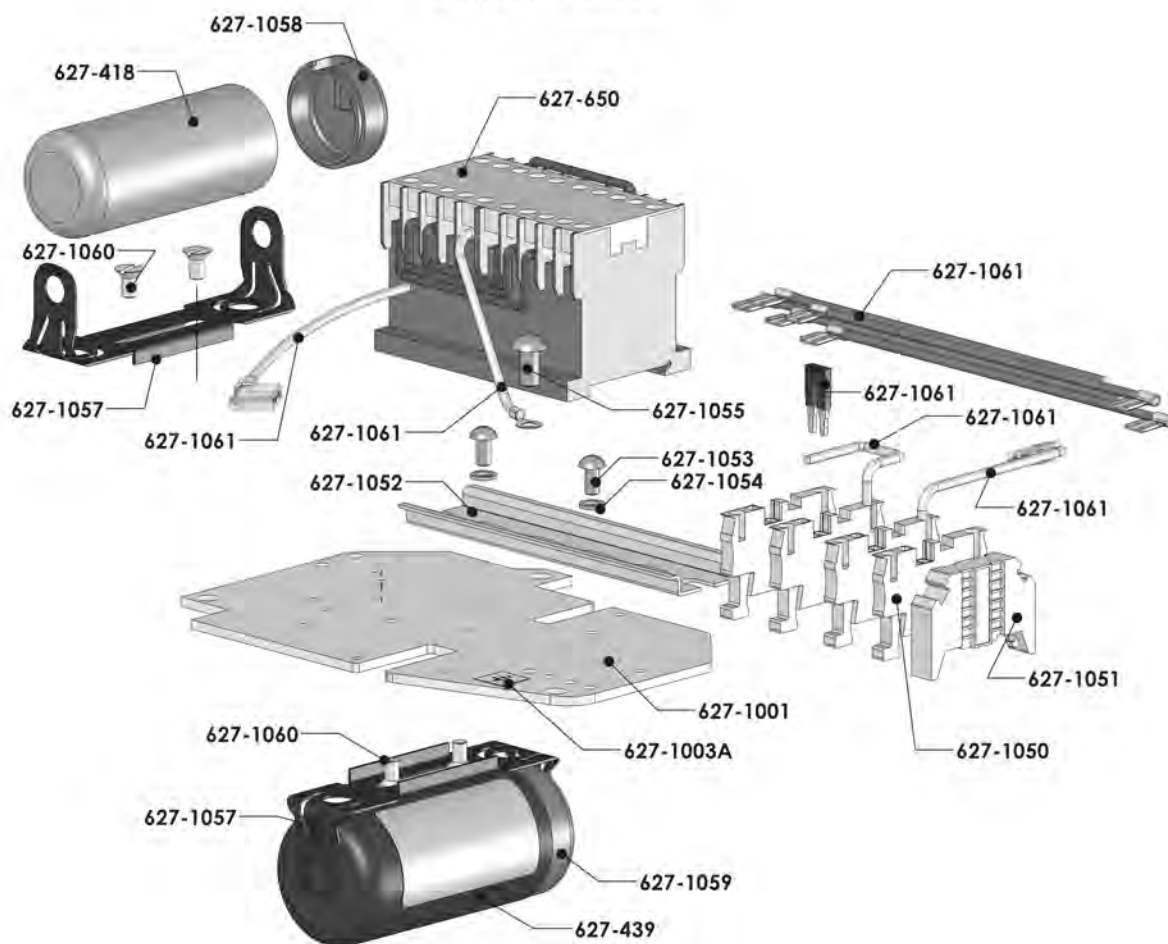
MODELS A, AA, B, C, E, F & H
SINGLE PHASE WITH TRANSFORMER
110/115-1/50/60



Key Number	Part Name	No. Req'd	Part Number
627-418	Capacitor	1	27716
627-439	Solid State Reversing Switch	1	27257
627-650	Hoist Reversing Contactor	1	28545 (48 Volt Coil) 28552 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	31633
627-1003A	Ground Label	1	20940
627-1050	Terminal Strip	3	29014
627-1051	Terminal Strip End Clamp	1	29015
627-1052	Din Rail Mounting Bracket	1	29312
627-1053	Din Rail Mounting Bracket Screw	2	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	2	987873
627-1055	Ground Screw	1	987827
627-1057	Capacitor Mounting Bracket or Solid State Reversing Switch Mounting Bracket	2	27910
627-1058	Insulating Capacitor Cap	1	29910
627-1059	Insulating Solid State Reversing Switch Cap	1	27925
627-1060	Capacitor Mounting Bracket or Solid State Reversing Switch Mounting Bracket Screw	4	982696
627-1061	Jumpers:		
	R5	1	29911
	R6	1	29912
	R7	1	29913
	R8	1	29914
	R14	1	27156
	B1	1	29915
	B2	1	29916
	G-Y	1	27189
	Jumper Assembly	1	29929
	Wiring Harness	1	29927

CONTACTOR PLATE ASSEMBLIES

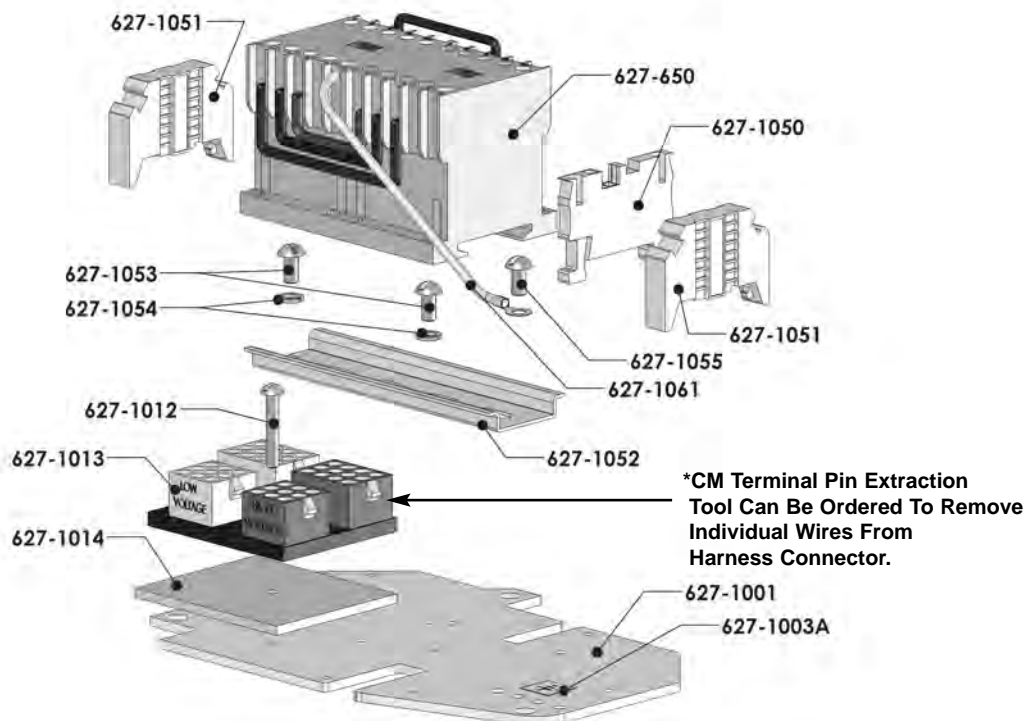
MODELS A, AA, B, C, E, F & H
SINGLE PHASE
220/230-1-50/60



Key Number	Part Name	No. Req'd	Part Number
627-418	Capacitor	1	27716
627-439	Solid State Reversing Switch	1	27257
627-650	Hoist Reversing Contactor	1	28553 (110 Volt Coil) 28545 (48 Volt Coil) 28552 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	31633
627-1003A	Ground Label	1	20940
627-1050	Terminal Strip	4	29014
627-1051	Terminal Strip End Clamp	1	29015
627-1052	Din Rail Mounting Bracket	1	29312
627-1053	Din Rail Mounting Bracket Screw	2	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	2	987873
627-1055	Ground Screw	1	987827
627-1057	Capacitor Mounting Bracket or Solid State Reversing Switch Mounting Bracket	2	27910
627-1058	Insulating Capacitor Cap	1	29910
627-1059	Insulating Solid State Reversing Switch Cap	1	27925
627-1060	Capacitor Mounting Bracket or Solid State Reversing Switch Mounting Bracket Screw	4	982696
627-1061	Jumpers:		
	R5	1	29911
	R6	1	29912
	R7	1	29913
	R8	1	29914
	R14	1	27156
	B1	1	29915
	B2	1	29916
	Bridge	1	27047
	Contactor Jumper	1	51547
	G-Y	1	27189
	Wiring Harness	1	29928

CONTACTOR PLATE ASSEMBLIES

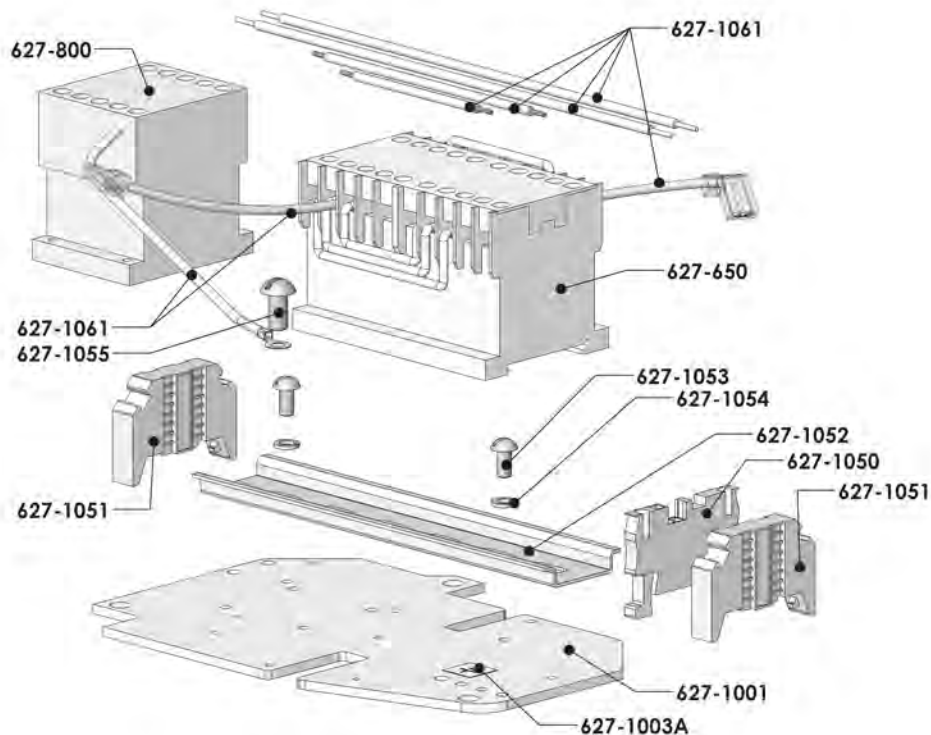
MODELS A, AA, B, C, E, F & H
3 PHASE, DUAL VOLTAGE
220/230-3-50/60
380/415/460-3-50/60



Key Number	Part Name	No. Req'd	Part Number
627-650	Hoist Reversing Contactor	1	24799 (110 Volt Coil) 24797 (48 Volt Coil) 28860 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	31633
627-1003A	Ground Label	1	20940
627-1012	Voltage Change Board Mounting Screw	1	987862
627-1013	Voltage Change Board	1	27672
627-1014	Voltage Change Board Insulator	1	27685
627-1050	Terminal Strip	1	29014
627-1051	Terminal Strip End Clamp	2	29015
627-1052	Din Rail Mounting Bracket	1	29312
627-1053	Din Rail Mounting Bracket Screw	2	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	2	987873
627-1055	Ground Screw	1	987827
627-1061	Jumper: G-Y Motor Wiring Harness Wiring Harness	1 1 1	27189 27603 29801
*627-1063	CM Terminal Pin Extraction Tool (Not Shown)	1	27163

CONTACTOR PLATE ASSEMBLIES

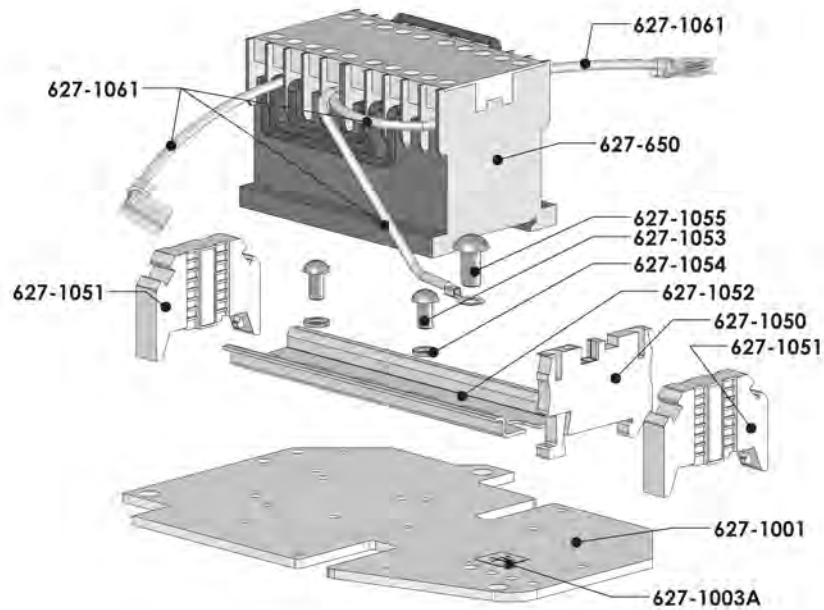
Models A-2, AA-2, B-2, C-2, E-2, F-2 & H2
 3 PHASE, TWO SPEED
 220/230-3-50/60
 380/415/460-3-50/60
 550/575-3-50/60



Key Number	Part Name	No. Req'd	Part Number
627-650	Hoist Reversing Contactor	1	28553 (115 Volt Coil) 24797 (48 Volt Coil) 28860 (24 Volt Coil)
627-800	Hoist Speed Selecting Contactor	1	28870 (115 Volt Coil) 28871 (48 Volt Coil) 28878 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	31633
627-1003A	Ground Label	1	20940
627-1050	Terminal Strip	1	29014
627-1051	Terminal Strip End Clamp	2	29015
627-1052	Din Rail Mounting Bracket	1	29312
627-1053	Din Rail Mounting Bracket Screw	2	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	2	987873
627-1055	Ground Screw	1	987827
627-1061	Jumpers: R10 R13 B1 B2 Contactor Jumper Contactor Jumper G-Y Wiring Harness	1 1 1 1 2 2 1 1	27609 27610 29915 29916 51845 51847 27189 29802

CONTACTOR PLATE ASSEMBLIES

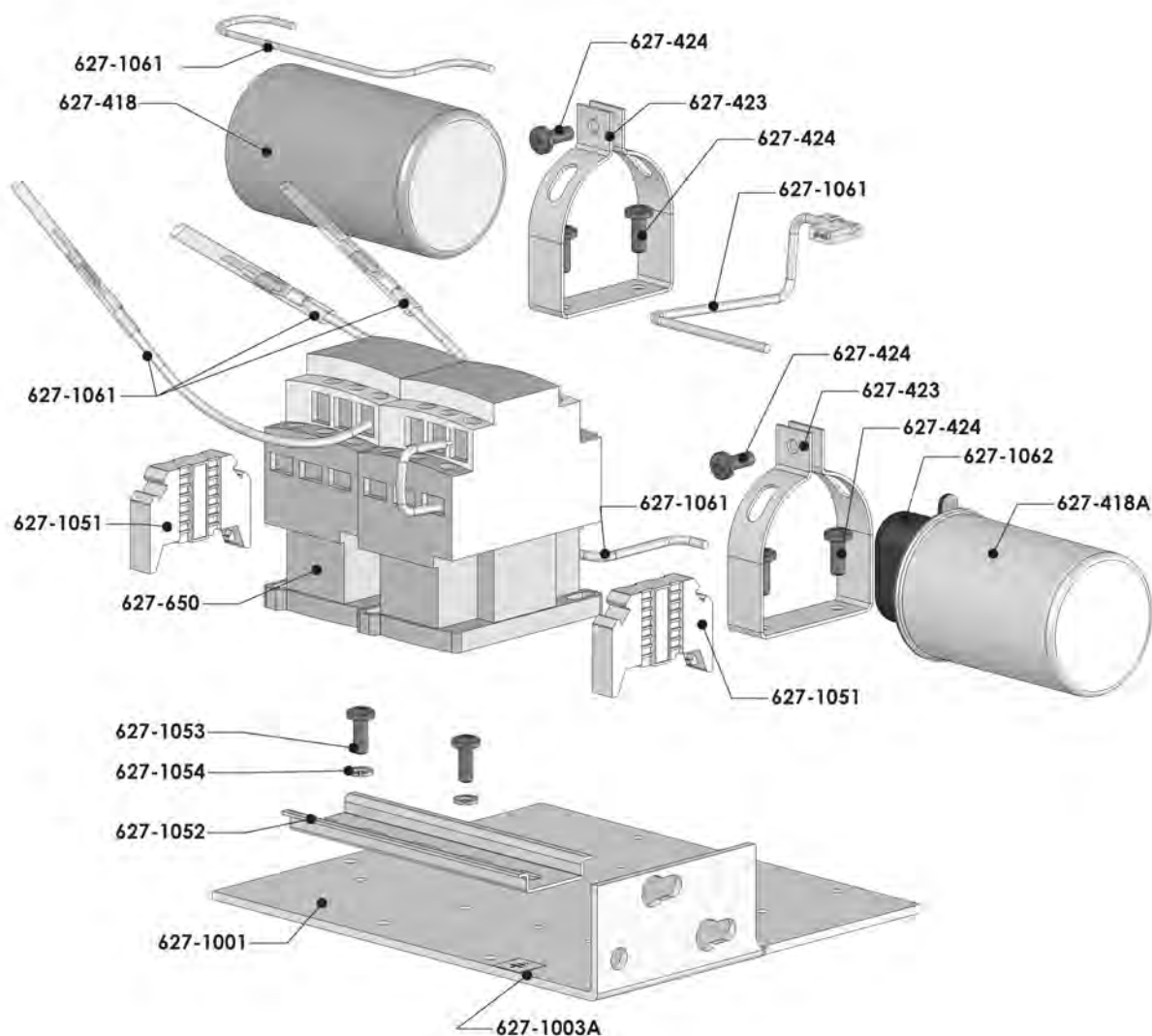
Models A, AA, B, C, E, F & H
3 PHASE
550/575-3-50/60



Key Number	Part Name	No. Req'd	Part Number
627-650	Hoist Reversing Contactor	1	24799(115 Volt Coil) 24797 (48 Volt Coil) 28860 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	31633
627-1003A	Ground Label	1	20940
627-1050	Terminal Strip	1	29014
627-1051	Terminal Strip End Clamp	2	29015
627-1052	Din Rail Mounting Bracket	1	29312
627-1053	Din Rail Mounting Bracket Screw	2	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	2	987873
627-1055	Ground Screw	1	987827
627-1061	Jumpers:		
	B1	1	29915
	B2	1	29916
	Contactor Jumper	1	51847
	G-Y	1	27189
	Wiring Harness	1	27160

CONTACTOR PLATE ASSEMBLIES

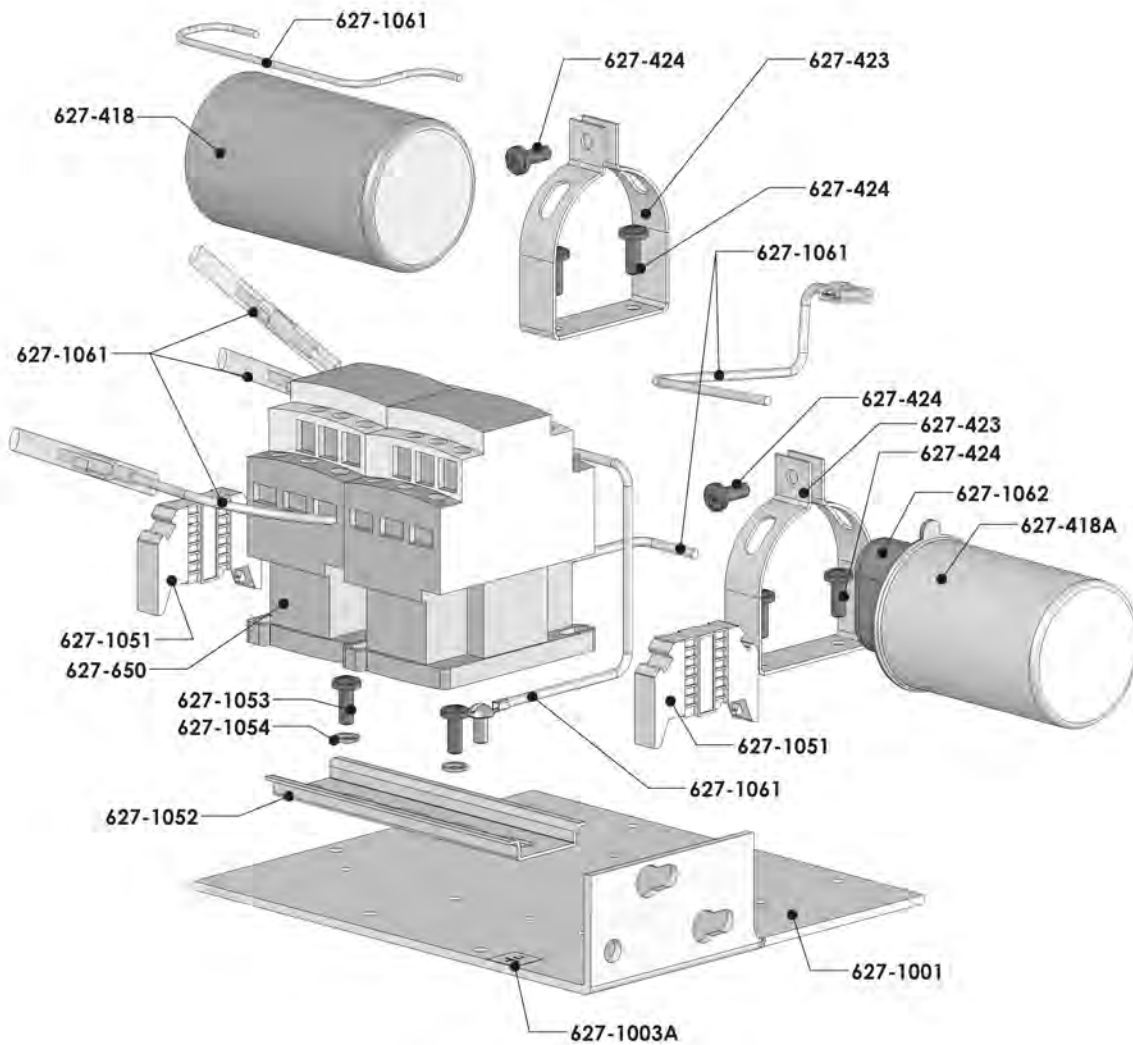
MODELS J, L, R, & RT
SINGLE PHASE
110/115-1-50/60



Key Number	Part Name	No. Req'd	Part Number
627-418	Start Capacitor	1	35279
627-418A	Run Capacitor	1	35278
627-423	Start/Run Capacitor Mounting Clamp	2	35268
627-424	Mounting Clamp Screw	6	982873
627-650	Hoist Reversing Contactor	1	27142 (115 Volt Coil) 27138 (48 Volt Coil) 27139 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	29013
627-1003A	Ground Label	1	20940
627-1051	Terminal Strip End Clamp	2	29015
627-1052	Din Rail Mounting Bracket	1	29009
627-1053	Din Rail Mounting Bracket Screw	2	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	2	987873
627-1061	Jumpers:		
	R2	1	29036
	R3	1	29037
	R4	1	29035
	R5	1	29038
	R10	1	29034
	Contactor Jumper	1	51845
	Wiring Harness	1	29039
627-1062	Rubber Insulating Boot	1	35285

CONTACTOR PLATE ASSEMBLIES

**MODELS J, L, R, & RT
SINGLE PHASE
220/230-1-50/60**

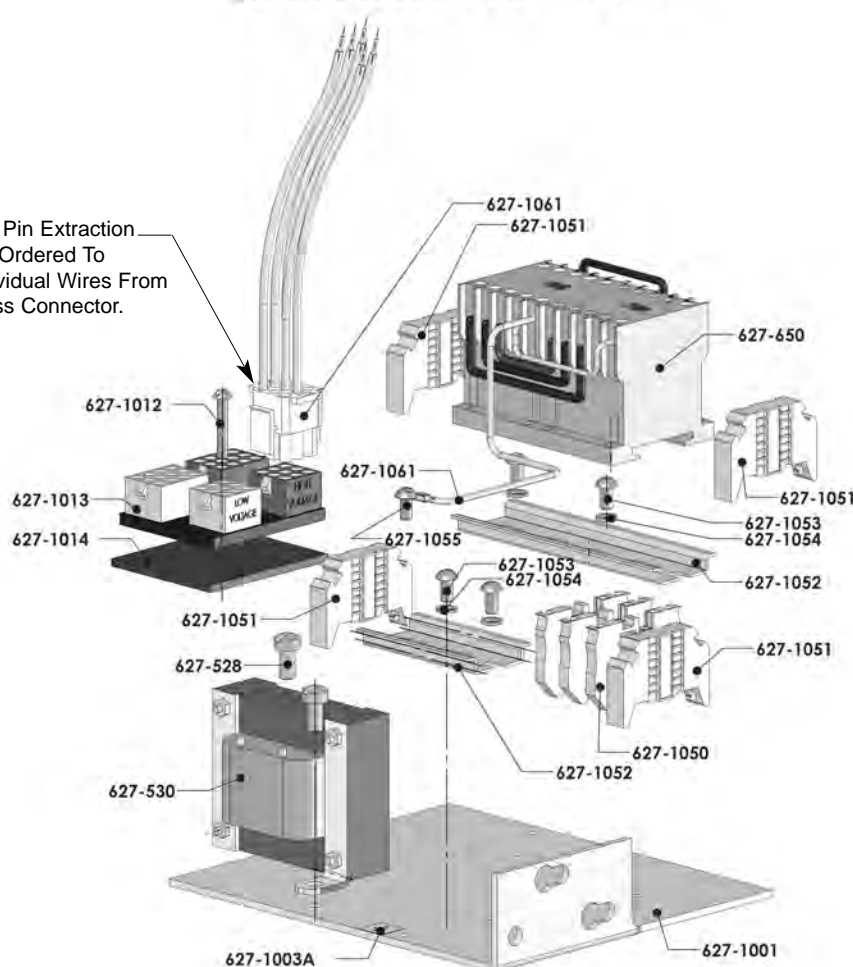


Key Number	Part Name	No. Req'd	Part Number
627-418	Start Capacitor	1	35279
627-418A	Run Capacitor	1	35278
627-423	Start/Run Capacitor Mounting Clamp	2	35268
627-424	Mounting Clamp Screw	6	982873
627-650	Hoist Reversing Contactor	1	27013 (115 Volt Coil) 27104 (48 Volt Coil) 27105 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	29013
627-1003A	Ground Label	1	20940
627-1051	Terminal Strip End Clamp	2	29015
627-1052	Din Rail Mounting Bracket	1	29009
627-1053	Din Rail Mounting Bracket Screw	2	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	2	987873
627-1061	Jumpers:		
	R2	1	29036
	R3	1	29037
	R4	1	29035
	R5	1	29038
	R9	1	29113
	R10	1	29034
	G-Y	1	27189
	Wiring Harness	1	29044
627-1062	Rubber Insulating Boot	1	35285

CONTACTOR PLATE ASSEMBLIES

MODEL J, JJ, L, LL, R, RR, RT, & RRT
DUAL VOLTAGE, 3 PHASE
220/230-3-50/60, 380/415/460-3-50/60

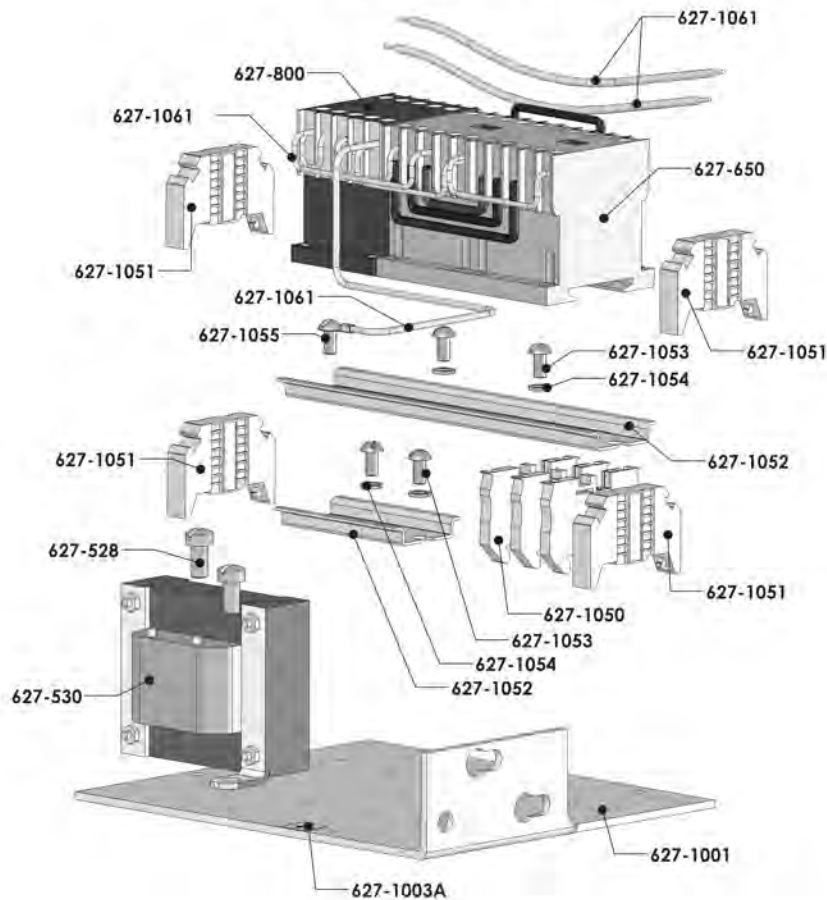
*CM Terminal Pin Extraction Tool Can Be Ordered To Remove Individual Wires From Motor/Harness Connector.



Key Number	Part Name	No. Req'd	Part Number
627-528	Transformer Mounting Screw	2	982688
627-530	Transformer	1	29734 (115 V Secondary) 29756 (48 V Secondary) 29809 (24 V Secondary) 29811 (115 V Secondary with Thermal Cutout) 29983 (48 V Secondary with Thermal Cutout) 29982 (24 V Secondary with Thermal Cutout)
627-650	Hoist Reversing Contactor	1	24799 (115 Volt Coil) 24797 (48 Volt Coil) 28860 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	29013
627-1003A	Ground Label	1	20940
627-1012	Conversion Board Mounting Screw	1	987862
627-1013	Conversion Board	1	27672
627-1014	Conversion Board Insulator	1	27685
627-1050	Terminal Strip	3	29014
627-1051	Terminal Strip End Clamp	4	29015
627-1052	Din Rail Mounting Bracket	1	29009
	Contactor Bracket	1	29008
	Terminal Strip Bracket		
627-1053	Din Rail Mounting Bracket Screw	4	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	4	987873
627-1055	Ground Screw	1	987827
627-1061	Jumpers:		
	Contactor Jumper	1	51847
	G-Y	1	27189
	Wiring Harness	1	27102
	Wiring Harness	1	29670
*627-1063	CM Terminal Pin Extraction Tool (Not Shown)	1	21763

CONTACTOR PLATE ASSEMBLIES

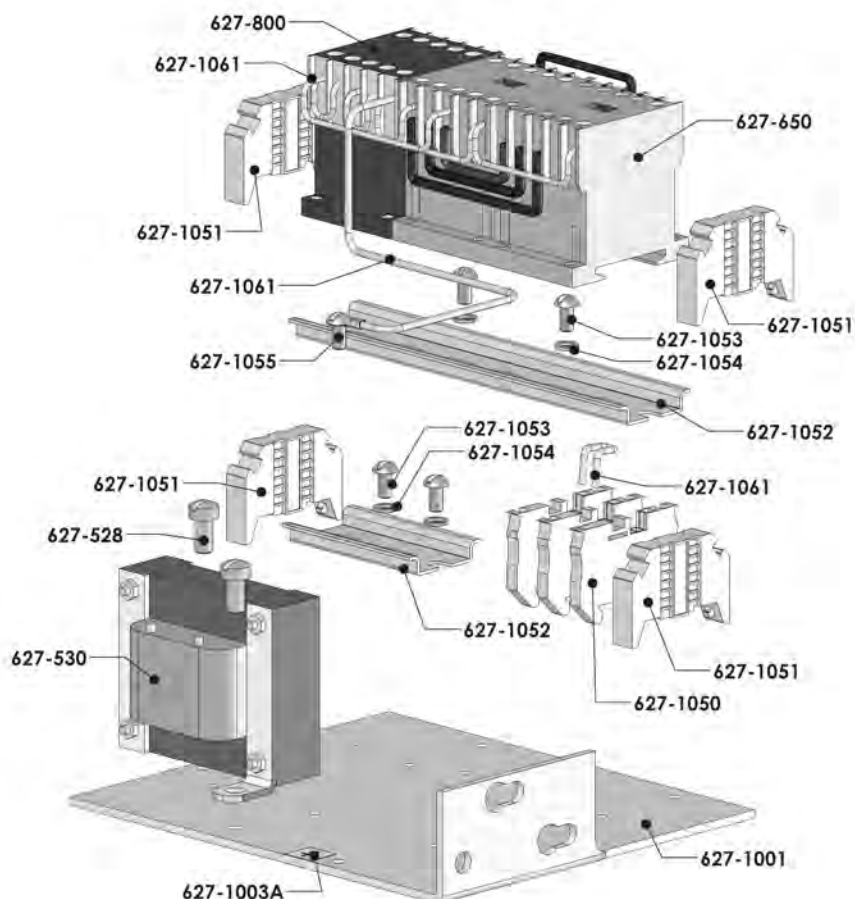
MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2, & RRT2
3 PHASE, TWO SPEED
220/230-3-50/60



Key Number	Part Name	No. Req'd	Part Number
627-528	Transformer Mounting Screw	2	982688
627-530	Transformer	1	29734 (115 V Secondary) 29756 (48 V Secondary) 29809 (24 V Secondary) 29811 (115 V Secondary with Thermal Cutout) 29983 (48 V Secondary with Thermal Cutout) 29982 (24 V Secondary with Thermal Cutout)
627-650	Hoist Reversing Contactor	1	24799 (115 Volt Coil) 24797 (48 Volt Coil) 28860 (24 Volt Coil)
627-800	Hoist Speed Selecting Contactor	1	28870 (115 Volt Coil) 28871 (48 Volt Coil) 28878 (24 volt Coil)
627-1001	Contactor Mounting Plate	1	29013
627-1003A	Ground Label	1	20940
627-1050	Terminal Strip	3	29014
627-1051	Terminal Strip End Clamp	4	29015
627-1052	Din Rail Mounting Bracket	1	29010
	Contactor Bracket	1	29008
	Terminal Strip Bracket	1	29008
627-1053	Din Rail Mounting Bracket Screw	4	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	4	987873
627-1055	Ground Screw	1	987827
627-1061	Jumpers:		
	R4	1	27652
	R5	1	27657
	R7	1	27760
	R8	1	27762
	W5	1	27736
	G-Y	1	27189
	Speed Selector Jumper	2	51845
	Wiring Harness	1	27897

CONTACTOR PLATE ASSEMBLIES

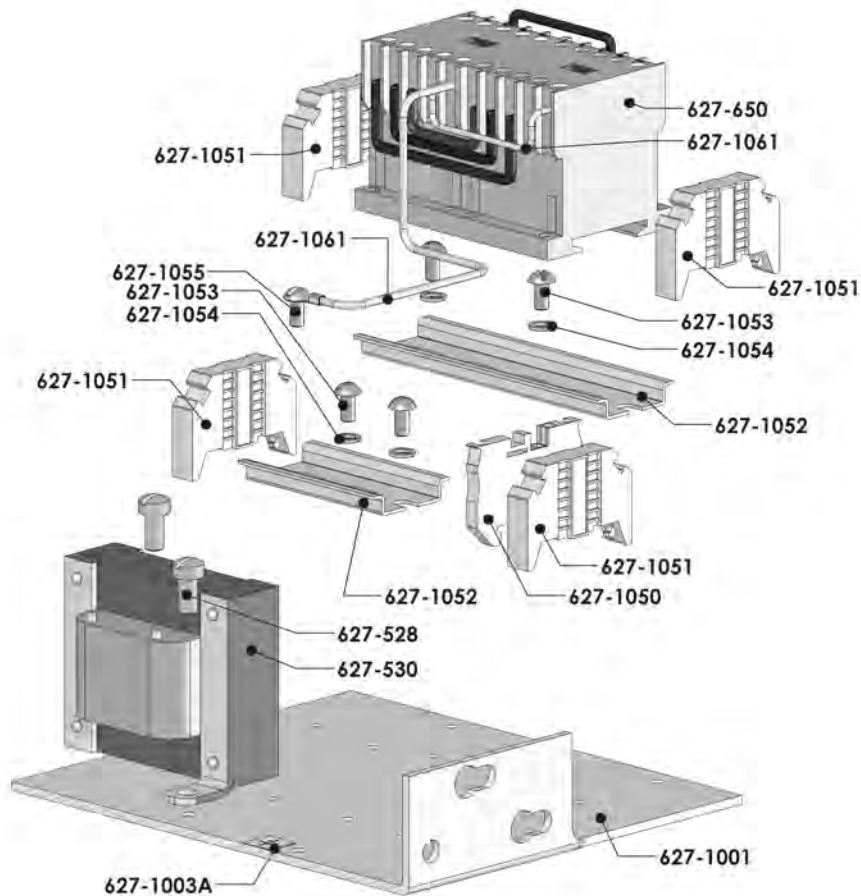
MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2, & RRT-2
3 PHASE, TWO SPEED
380/415/460-3-50/60



Key Number	Part Name	No. Req'd	Part Number
627-528	Transformer Mounting Screw	2	982688
627-530	Transformer	1	29734 (115 V Secondary) 29756 (48 V Secondary) 29809 (24 V Secondary) 29811 (115 V Secondary with Thermal Cutout) 29983 (48 V Secondary with Thermal Cutout) 29982 (24 V Secondary with Thermal Cutout)
627-650	Hoist Reversing Contactor	1	24799 (115 Volt Coil) 24797 (48 Volt Coil) 28860 (24 Volt Coil)
627-800	Host Speed Selecting Contactor	1	28870 (115 Volt Coil) 28871 (48 Volt Coil) 28878 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	29013
627-1003A	Ground Label	1	20940
627-1050	Terminal Strip	3	29014
627-1051	Terminal Strip End Clamp	4	29015
627-1052	Din Rail Mounting Bracket	1	29010
	Contactor Bracket	1	29008
	Terminal Strip Bracket	1	
627-1053	Din Rail Mounting Bracket Screw	4	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	4	987873
627-1055	Ground Screw	1	987827
627-1061	Jumpers:		
	R4	1	27652
	R5	1	27657
	W5	1	27736
	G-Y	1	27189
	Contactor Jumper	1	51847
	Terminal Strip Jumper	1	51845
	Speed Selector Jumper	2	51845
	Wiring Harness	1	29600

CONTACTOR PLATE ASSEMBLIES

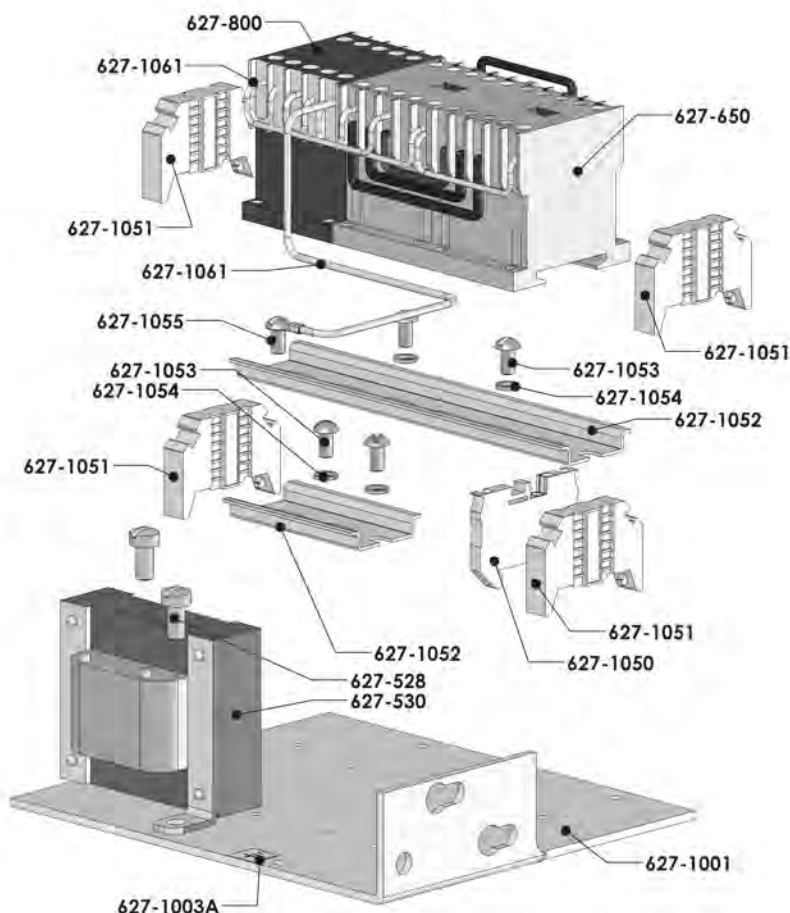
MODELS J, JJ, L, LL, R, RR, RT, & RRT
3 PHASE, SINGLE SPEED
550/575-3-50/60



Key Number	Part Name	No. Req'd	Part Number
627-528	Transformer Mounting Screw	2	982688
627-530	Transformer	1	29807 (115 V Secondary) 29805 (115 V Secondary with Thermal Cutout) 29789 (48 V Secondary with Thermal Cutout) 29984 (24 V Secondary with Thermal Cutout)
627-650	Hoist Reversing Contactor	1	24799 (115 Volt Coil) 24797 (48 Volt Coil) 28860 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	29013
627-1003A	Ground Label	1	20940
627-1050	Terminal Strip	1	29014
627-1051	Terminal Strip End Clamp	4	29015
627-1052	Din Rail Mounting Bracket	1	29009
	Contactor Bracket	1	29008
	Terminal Strip Bracket	1	29008
627-1053	Din Rail Mounting Bracket Screw	4	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	4	987873
627-1055	Ground Screw	1	987827
627-1061	Jumpers:		
	Contactor Jumper	1	51847
	G-Y	1	27189
	Wiring Harness	1	29601

CONTACTOR PLATE ASSEMBLIES

MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2, & RRT-2
3 PHASE, TWO SPEED
550/575-3-50/60



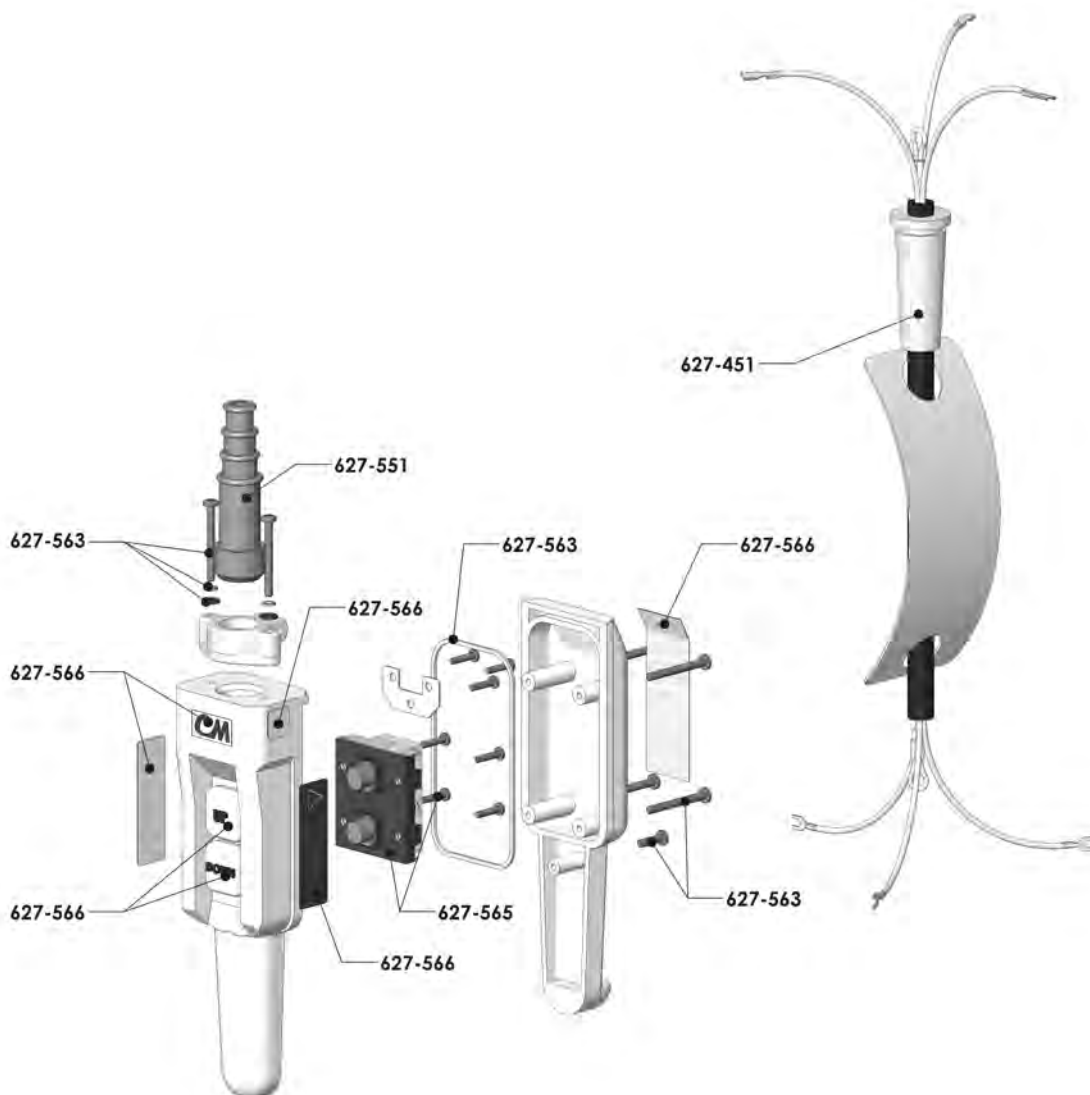
Key Number	Part Name	No. Req'd	Part Number
627-528	Transformer Mounting Screw	2	982688
627-530	Transformer	1	29807 (115 V Secondary) 29805 (115 V Secondary with Thermal Cutout) 29789 (48 V Secondary with Thermal Cutout) 29984 (24 V Secondary with Thermal Cutout)
627-650	Hoist Reversing Contactor	1	24799 (115 Volt Coil) 24797 (48 Volt Coil) 28860 (24 Volt Coil)
627-800	Host Speed Selecting Contactor	1	28870 (115 Volt Coil) 28871 (48 Volt Coil) 28878 (24 Volt Coil)
627-1001	Contactor Mounting Plate	1	29013
627-1003A	Ground Label	1	20940
627-1050	Terminal Strip	1	29014
627-1051	Terminal Strip End Clamp	4	29015
627-1052	Din Rail Mounting Bracket	1	29009
	Contactor Bracket	1	29008
	Terminal Strip Bracket	1	29008
627-1053	Din Rail Mounting Bracket Screw	4	982686
627-1054	Din Rail Mounting Bracket Screw Lockwasher	4	987873
627-1055	Ground Screw	1	987827
627-1061	Jumpers:		
	R4	1	27652
	R5	1	27657
	W5	1	27736
	Contactor Jumper	2	51845
	Contactor Jumper	1	51847
	G-Y	1	27189
	Wiring Harness	1	29600

NOTES

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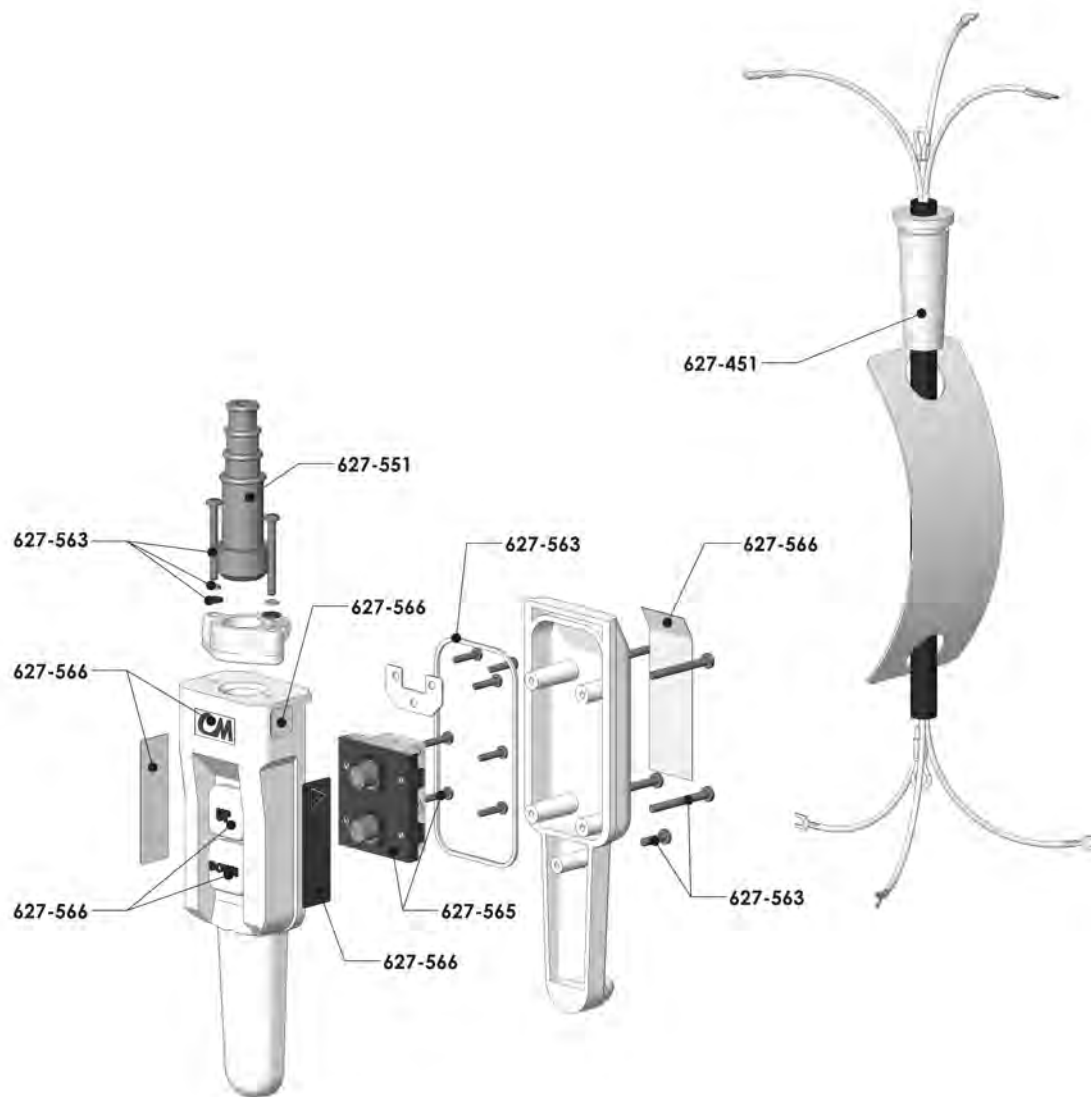
LODESTAR HOIST CONTROL STATION

627-450 Complete Control Cord and Station Assembly Single Speed Hoist Control Station



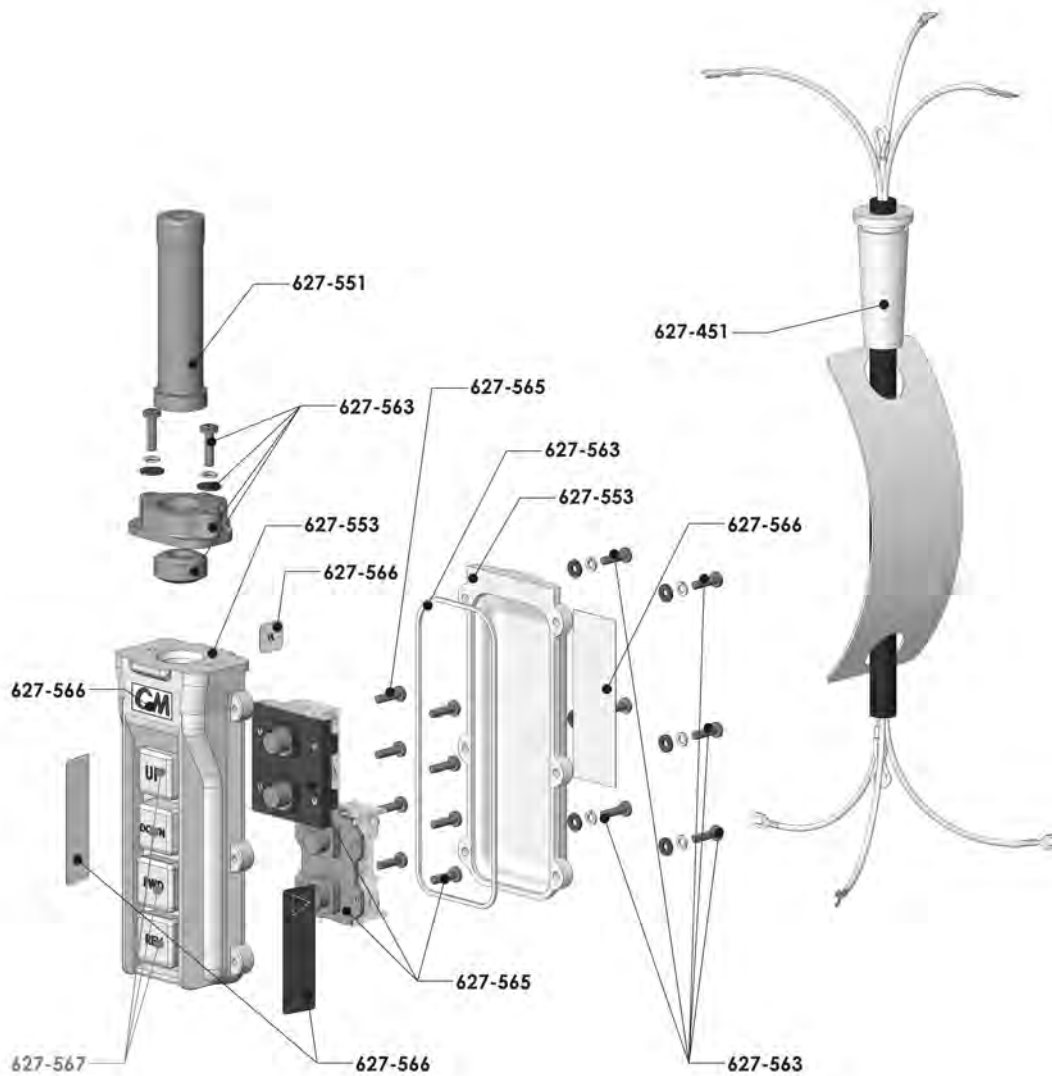
Single Speed Hoist Control Station			
Key Number	Part Name	No. Req'd	Part Number
627-450	Control Cord and Station Assembly	1	29333 for 10' Lift 29334 for 15' Lift 29335 for 20' Lift 29336 for 10' Lift for CSA Units
627-451	Standard Control Cord Assembly	1	29350 for 10' Lift 29351 for 15' Lift 29352 for 20' Lift 29353 for 10' Lift for CSA Units
627-551	Control Station Grommet	1	58278
627-552	Control Station (Includes 627-551 thru 627-567)	1	58272
627-563	Control Station Hardware Kit w/gasket	1	58275
627-565	Control Station 1-speed Insert	1	58255
627-566	Control Station Warning Label Kit (Includes Exterior Labels)	1	58276
627-567	Control Station Button Label Kit	1	58277

**627-450 Complete Control Cord and Station Assembly
Two Speed Hoist Control Station**



Two Speed Hoist Control Station			
Key Number	Part Name	No. Req'd	Part Number
627-450	Control Cord and Station Assembly	1	29337 for 10' Lift 29348 for 10' Lift for CSA Units
627-451	Standard Control Cord Assembly	1	29354 for 10' Lift 29349 for 10' Lift for CSA Units
627-551	Control Station Grommet	1	58278
627-552	Control Station (Includes 627-551 thru 627-567)	1	58273
627-563	Control Station Hardware Kit w/gasket	1	58275
627-565	Control Station 2-speed Insert	1	58256
627-566	Control Station Warning Label Kit (Includes Exterior Labels)	1	58276
627-567	Control Station Button Label Kit	1	58277

**627-450 Complete Control Cord and Station Assembly
Four Directional Hoist Control Station**



Four Directional Control Station			
Key Number	Part Name	No. Req'd	Code
627-451	Standard Control Cord Assembly	1	51708
627-551	Control Station Grommet	1	58278
627-552	Control Station (Includes 627-551 Thru 627-567)	1	58220 CM
627-553	Control Station Housing Kit (Includes Housing, Boots, Collar, Gasket & Hardware)	1	58288
627-563	Control Station Hardware Kit w/gasket	1	58279
627-565	Control Station 1-Speed Insert	1	58255
	Control Station 2-Speed Insert	1	58256
627-566	Control Station Warning Label Kit	1	58276
627-567	Control Station Button Label Kit	1	58277

89

89

SERIES 635 LOW HEADROOM TROLLEY PARTS LIST

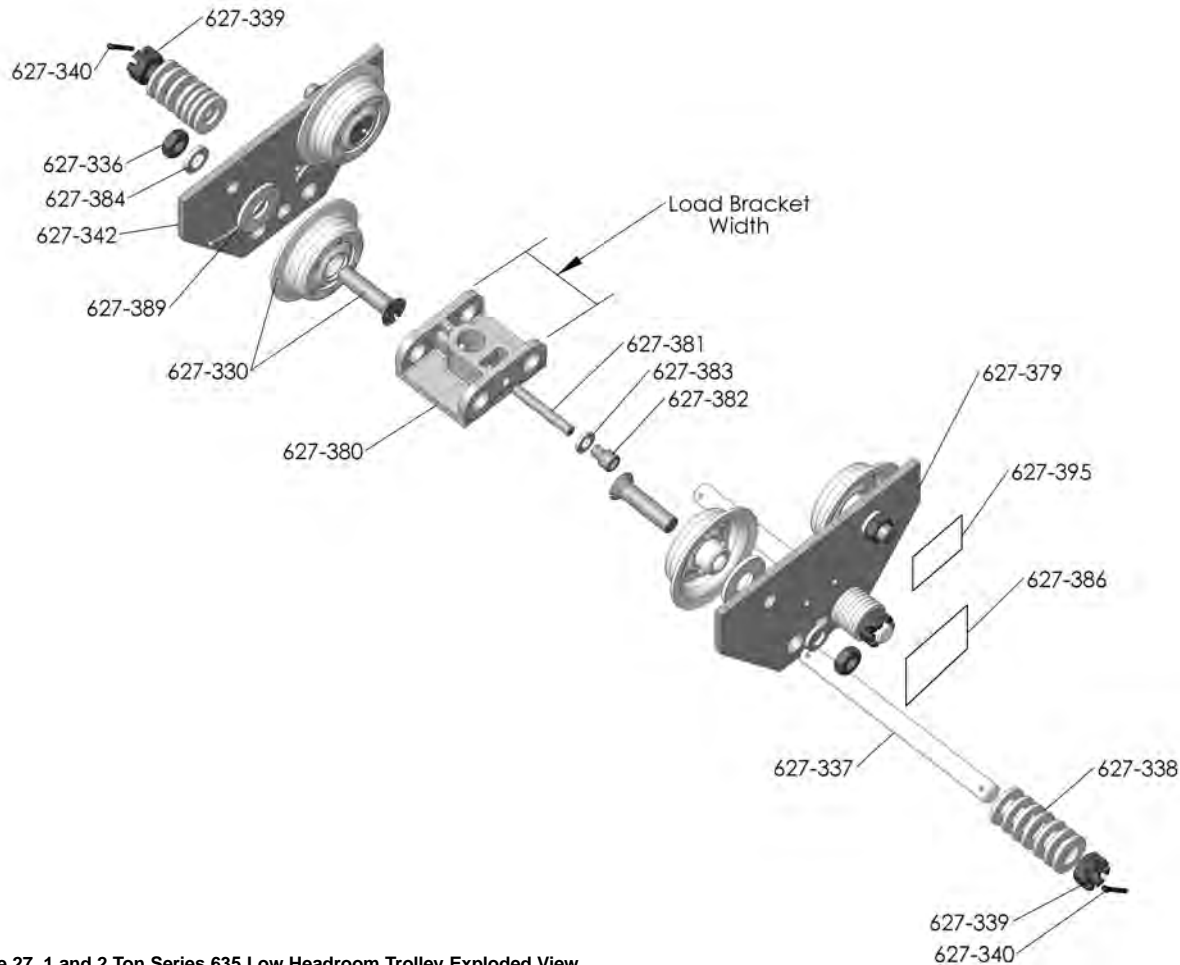


Figure 27. 1 and 2 Ton Series 635 Low Headroom Trolley Exploded View

Key No.	Part Name	No. Req'd.		Part Number	
		1 Ton	2 Ton	1 Ton	2 Ton
627-330	TrackWheel	4	4	35774	50762
627-336	TrackWheel Stud Nut	4	4	982520	948804
627-337	Suspension Bolt (Special Alloy Special Alloy Steel Bolt)				
	*9 5/32" Long	2	-	35450	-
	**10 1/4" Long	2	-	35407	-
	† 10" Long	-	2	-	35445
	†† 12 1/16" Long	-	2	-	35414
627-338	Trolley Spacer Washers				
	* 0.165" Thick	40	-	35782	-
	**0.125" Thick	38	-	958822	-
	† 0.165" Thick	-	32	-	35783
	†† 0.125" Thick	-	38	-	988039
627-339	Suspension Bolt Nut	4	4	948803	958818
627-340	Suspension Bolt Nut Cotter Pin	4	4	988343	988368
627-342	***Side Frame, Plain Side, w/o Trolley Guards	2	2	35640	35654
	***Side Frame, Plain Side, Trolley Guards	2	2	35635	35636
627-379	***Side Frame, I.D., Plate Side, w/o Trolley Guards	2	2	35640	35654
	***Side Frame, I.D., Plate Side, Trolley Guards	2	2	35635	35636
627-380	Load Bracket	1	1	-	-
	* 3 7/16" Wide			35019	-
	**5 13/32" Wide			35024	-
	† 4 3/16" Wide			-	35033
	†† 6 11/16" Wide			-	35043

Key No.	Part Name	No. Req'd.		Part Number	
		1 Ton	2 Ton	1 Ton	2 Ton
627-381	Vertical Load Bar Pin (Special Alloy Steel Pin)	1	1		
	*2 11/16" Long			35371	-
	**2 7/8" Long			-	35413
	† 3 3/4" Long			-	35400
627-382	Vertical Load Bar Pin Screw	1	1		
	* 1/2" Long			982383	-
	**1 1/4" Long			982386	-
	† 3/4" Long			-	982433
627-383	Vertical Load Bar Pin Screw L.W.			-	987209
	†† 1 1/2" Long			-	987209
627-383	Vertical Load Bar Pin Screw L.W.	1	1	983548	983547
627-384	TrackWheel Stud Nut L.W.	4	4	987923	987924
627-386	Identification Label	1	1	36916	36917
627-389	TrackWheel Washer	-	1	-	987903
627-395	Warning Label	1	1	936984	936984

* These items are for the 1-Ton Trolley for operation on 2.66" thru 5.64" flange widths.

** These items are for the 1-Ton Trolley for operation on over 5.64" thru 7.00" flange widths.

*** If side frame is equipped with spacer block, contact factory.

† These items are for the 2-Ton Trolley for operation on 3.33" thru 6.00" flange widths.

†† These items are for the 2-Ton Trolley for operation on over 6.00" thru 8.25" flange widths.

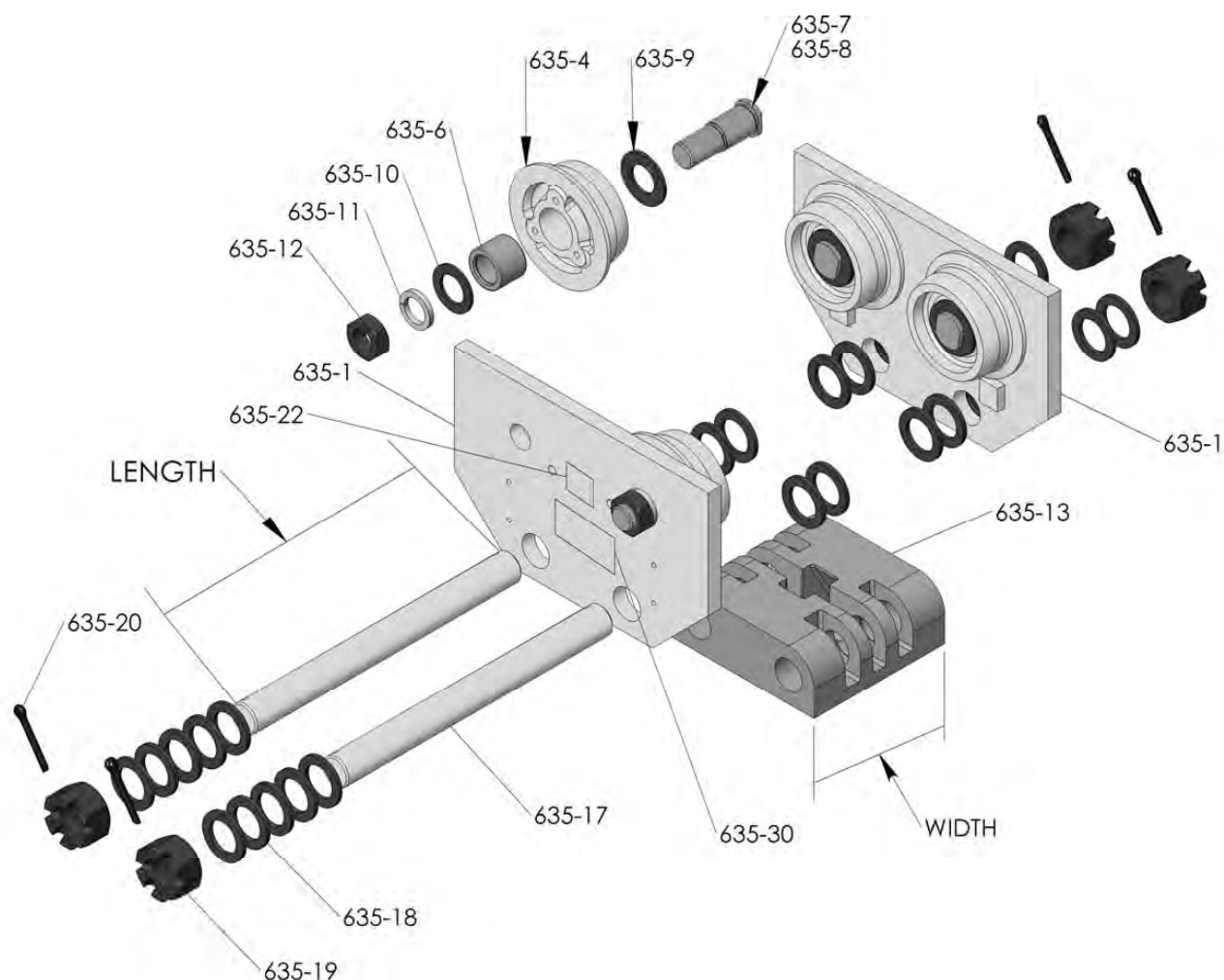


Figure 28. 3 Ton Series 635 Low Headroom Trolley Exploded View

Key No.	No. Required	Part Name	Part Number
635-1	2	Side Frame-Plain Side (Does Not Include Wheels)	36696 For 4.0" Thru 5.63" Flange Widths, 36629 For Over 5.63" Thru 7-1/4" Flange Widths. If Frame is Equipped With Trolley Guards, Contact Factory.
635-4	4	TrackWheel Plain	39002
635-6	4	TrackWheel Bearing	82113
635-7	4	TrackWheel Stud	36361
635-9	4	TrackWheel Washer-Steel	81014
635-10	4	TrackWheel Washer-Oilite	82046
635-11	4	TrackWheel Stud Lockwasher	987926
635-12	4	TrackWheel Stud Nut	988155
635-13	1	Load Bracket (Specify Width)	36012 (4-13/16" Wide), 36021 (6-7/16" Wide)
635-17	2	Suspension Bolt (Specify Length)	36367 (10-31/32" Long) For 4.00" Thru 5.63" Flange Widths 36380 (13-3/32" Long) For Over 5.63" Thru 7.25" Flange Widths If Bolt Length is Over 13-3/32", Contact Factory
635-18	30	Spacer Washer	936827
635-19	4	Suspension Bolt Nut	945835
635-20	4	Suspension Bolt Cotter Pin	988382
635-22	1	Warning Label	936984
635-30	1	Identification Label	936829

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Note: When ordering parts, always furnish hoist model and serial number, motor horsepower, voltage, phase, frequency and rated capacity of hoist on which the parts are to be used. For the location of the nearest CM Master Parts Depot, see the list located on the inside front cover.

LIMITATION OF WARRANTIES, REMEDIES AND DAMAGES

THE WARRANTY STATED BELOW IS GIVEN IN PLACE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE, NO PROMISE OR AFFIRMATION OF FACT MADE BY ANY AGENT OR REPRESENTATIVE OF SELLER SHALL CONSTITUTE A WARRANTY BY SELLER OR GIVE RISE TO ANY LIABILITY OR OBLIGATION.

Seller warrants that on the date of delivery to carrier the goods are free from defects in workmanship and materials.

SELLER'S SOLE OBLIGATION IN THE EVENT OF BREACH OF WARRANTY OR CONTRACT OR FOR NEGLIGENCE OR OTHERWISE WITH RESPECT TO GOODS SOLD SHALL BE EXCLUSIVELY LIMITED TO REPAIR OR REPLACEMENT, F.O.B. SELLER'S POINT OF SHIPMENT, OF ANY PARTS WHICH SELLER DETERMINES TO HAVE BEEN DEFECTIVE or if Seller determines that such repair or replacement is not feasible, to a refund of the purchase price upon return of the goods to Seller.

Any action against Seller for breach of warranty, negligence or otherwise, must be commenced within one year after such cause of action occurs.

NO CLAIM AGAINST SELLER FOR ANY DEFECT IN THE GOODS SHALL BE VALID OR ENFORCEABLE UNLESS BUYER'S WRITTEN NOTICE THEREOF IS RECEIVED BY SELLER WITHIN ONE YEAR FROM THE DATE OF SHIPMENT.

Seller shall not be liable for any damage, injury or loss arising out of

the use of the goods if, prior to such damage, injury or loss, such goods are (1) damaged or misused following Seller's delivery to carrier; (2) not maintained, inspected, or used in compliance with applicable law and Seller's written instructions and recommendations; or (3) installed, repaired, altered or modified without compliance with such law, instructions or recommendations.

UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES AS THOSE TERMS ARE DEFINED IN SECTION 2-715 OF THE UNIFORM COMMERCIAL CODE.

INDEMNIFICATION AND SAFE OPERATION

Buyer shall comply with and require its employees to comply with directions set forth in instructions and manuals furnished by Seller and shall use and require its employees to follow such instructions and manuals and to use reasonable care in the use and maintenance of the goods. Buyer shall not remove or permit anyone to remove any warning or instruction signs on the goods. In the event of personal injury or damage to property or business arising from the use of the goods, Buyer shall within 48 hours thereafter give Seller written notice of such injury or damage. Buyer shall cooperate with Seller in investigating any such injury or damage and in the defense of any claims arising therefrom.

If Buyer fails to comply with this section or if any injury or damage is caused, in whole or in part, by Buyer's failure to comply with applicable federal or state safety requirements, Buyer shall indemnify and hold Seller harmless against any claims, loss or expense for injury or damage arising from the use of the goods.



WARNING

Alterations or modifications of equipment and use of non-factory repair parts can lead to dangerous operation and injury.

TO AVOID INJURY:

- Do not alter or modify equipment.
- Do use only CM replacement parts.

