

## ELECTRIC CHAIN HOIST

**CM**  
**LODESTAR®**

Before installing hoist, fill in the information below.

Model Number \_\_\_\_\_

Serial No. \_\_\_\_\_

Purchase Date \_\_\_\_\_

Voltage \_\_\_\_\_

Rated Load \_\_\_\_\_

### **RATED LOADS 1/8 TO 3 TONNES 125 KG TO 3000 KG**

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

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

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



CM HOIST PARTS AND SERVICES ARE AVAILABLE IN THE UNITED STATES AND IN CANADA

PARTS FOR YOUR HOIST ARE AVAILABLE FROM YOUR LOCAL AUTHORIZED REPAIR STATION. FOR THE NAME OF THE NEAREST PARTS OR SERVICE CENTER, VISIT OUR WEB SITE [WWW.CMWORKS.COM](http://WWW.CMWORKS.COM) OR CALL OUR CUSTOMER SERVICE DEPARTMENT.

## **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.

## **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.**

## HOIST SAFETY IS UP TO YOU...

### **WARNING**

DO NOT LIFT MORE THAN RATED LOAD.

#### CHOOSE THE RIGHT HOIST FOR THE JOB...

Choose a hoist with the 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.

#### INSPECT

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

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

Load chain should be properly lubricated.

Hooks that are bent, worn, or whose openings 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.

Chains should be checked for deposits of foreign material which may be carried into the hoist mechanism.

Check brake for evidence of slippage under load.



### **WARNING**

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

DO NOT USE LOAD CHAIN AS A SLING.

#### 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

#### 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.



#### 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.



**VIOLATIONS OF ANY OF THE WARNINGS LISTED MAY RESULT IN SERIOUS PERSONAL INJURY TO THE OPERATOR OR NEARBY PERSONNEL BY NATURE OF 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 mechanical equipment. Skill acquired through specialized experience and study is essential to safe rigging operations. For rigging information, we recommend consulting a standard textbook on the subject.

## TABLE OF CONTENTS

Safety Precautions .....	3-4	Ordering Instructions.....	49
Foreword .....	5	Parts List .....	50-93
General Information		Main Assembly.....	50-59
Specifications.....	6-8	Gearbox Assembly.....	60-65
CM Repair/Replacement policy .....	6, 95	Upper Suspension .....	66-70
Accessories		Lower Hook.....	71-72
Hook Suspensions .....	9	Brake.....	73-74
Lug Suspension .....	9	Control Cord and Station .....	75-76
Latchlok Hooks .....	9	Contactor Plates .....	77-91
Chain Container .....	9	Chain Containers.....	92-93
Installation		Lubricants.....	94
Unpacking Information.....	10	Recommended Spare Parts.....	94
Installing Suspension .....	10-12		
Recommended Torques.....	11-12		
Attaching Load Chain.....	13		
Power Supply and Electrical Connections .....	14-15		
Operating Instructions			
General.....	16		
Operating Instruction-Hoist.....	16-17		
Safety Procedures.....	17		
Inspection			
Inspection.....	18		
Frequent Inspections .....	18-19		
Periodic Inspections.....	18-19		
Preventative Maintenance.....	18		
Hook Inspection .....	18		
Load Chain.....	20		
Maintenance			
Load-limiter .....	21		
Hoist Lubrication .....	21		
Trolley Lubrication .....	21		
Adjustments			
Electric Brake.....	22		
Limit Switches.....	23-24		
Troubleshooting.....	25-28		
Electrical Data .....	29-30		
Typical Wiring Diagrams.....	31-46		
Assembly Instructions			
Hook or Lug Suspensions.....	47		
Lower Hook Block Pin.....	47		
Removal and Installation of Load Chain .....	47-48		
Cutting Chain .....	49		
Testing.....	49		

## LIST OF TABLES

Table	Title .....	Page
1	Lodestar Electric Chain Hoist Specs .....	6-8
2	Recommended Torques.....	11-12
4	Minimum Frequent Inspections .....	19
5	Minimum Periodic Inspections .....	19
6	Limit Switches.....	22
7	Troubleshooting .....	25-28
8	Electrical Data .....	29-30

## LIST OF ILLUSTRATIONS

Figure	Table.....	Page
1	Hook Suspensions.....	9
2	Lug Suspensions .....	9
3	Series 635 Low Headroom Trolley .....	9
4	Series 635 Motor Driven Trolley .....	9
5	Upper or Lower Latchlok Hook.....	9
6	Chain Container .....	9
7	Attaching Load Chain .....	11
8	Contact Block .....	13
12	Voltage Change Board .....	14
13	Locations of Components .....	14
14	Hook Inspection.....	18
15	Chain Wear areas.....	20
16	Gaging Load Chain Wear.....	20
17	Chain Embossing.....	20
18	Limit Switches Models, Models A-H .....	23
18A	Rotatable Limit Switches, Models A-H .....	23
19	Limit Switches, Models J-RRT .....	23
19A	Rotatable Limit Switch, Models J-RRT .....	23
20	Typical Wiring Diagrams .....	31-46
21	Hook Suspensions.....	47
22A	Cutting Chain By Nicking.....	49
22B	Cutting Chain With A Bolt Cutter .....	49

## 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 Limiter, 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.

### SPECIFICATIONS

Table 1.a.

Lodestar Electric Chain Hoists Single Speed 115-1-60											
Model	Load Capacity		Lifting Speed 60Hz units		Lifting Speed 50Hz units		Chain Falls	Chain Size		Chain Weight per length of lift	
	Tonne	kg	ft/min	m/min	ft/min	m/min		in x in	mm x mm	lb/ft	kg/m
A	1/8	125	32	9.8	26.7	8.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
AA	1/8	125	60	18.3	50.0	15.2	1	.250 x .7445	6.35 x 18.9	0.585	0.87
B	1/4	250	16	4.9	13.3	4.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
C	1/4	250	32	9.8	26.7	8.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
E	1/2	500	8	2.4	6.7	2.0	2	.250 x .7445	6.35 x 18.9	1.17	1.74
F	1/2	500	16	4.9	13.3	4.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
J	1/2	500	32	9.8	26.7	8.1	1	.312 x .8583	7.92 x 21.8	0.585	0.87
H	1	1000	8	2.4	6.7	2.0	2	.250 x .7445	6.35 x 18.9	1.17	1.74
L	1	1000	16	4.9	13.3	4.1	1	.312 x .8583	7.92 x 21.8	0.94	1.40
R	2	2000	8	2.4	6.7	2.0	2	.312 x .8583	7.92 x 21.8	1.88	2.80
RT	3	3000	5.3	1.6	4.4	1.4	3	.312 x .8583	7.92 x 21.8	2.82	4.20

Lodestar Electric Chain Hoists Single Speed 115-1-60									
Model	Shortest Distance Between Hooks		Motor Power 60Hz		Motor Power 50Hz		IP Rating	Net Weight 10' lift less upper suspension	
	in	mm	HP	kW	HP	kW		lb	kg
A	16.9	429	0.25	0.19	0.21	0.16	54	72	32.8
AA	19.9	505	0.50	0.37	0.42	0.31	54	76	34.3
B	16.9	429	0.25	0.19	0.21	0.16	54	73	33.1
C	16.9	429	0.50	0.37	0.42	0.31	54	75	34.2
E	21.6	549	0.25	0.19	0.21	0.16	54	78	31.8
F	16.9	429	0.50	0.37	0.42	0.31	54	76	34.5
J	18.1	460	1.00	0.75	0.83	0.62	54	127	57.5
H	21.6	549	0.50	0.37	0.42	0.31	54	81	36.7
L	18.1	460	1.00	0.75	0.83	0.62	54	125	56.7
R	25.8	655	1.00	0.75	0.83	0.62	54	148	67.1
RT	32.1	815	1.00	0.75	0.83	0.62	54	166	75.4

## 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.

# SPECIFICATIONS (CONT.)

Table 1.b.

Lodestar Electric Chain Hoists Single Speed 230/460-3-60 or 220/380-3-50 or 220/415-3-50											
Model	Load Capacity		Lifting Speed 60Hz units		Lifting Speed 50Hz units		Chain Falls	Chain Size		Chain Weight per length of lift	
	Tonne	kg	ft/min	m/min	ft/min	m/min		in x in	mm x mm	lb/ft	kg/m
A	1/8	125	32	9.8	26.7	8.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
AA	1/8	125	60	18.3	50.0	15.2	1	.250 x .7445	6.35 x 18.9	0.585	0.87
B	1/4	250	16	4.9	13.3	4.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
C	1/4	250	32	9.8	26.7	8.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
E	1/2	500	8	2.4	6.7	2.0	2	.250 x .7445	6.35 x 18.9	1.17	1.74
F	1/2	500	16	4.9	13.3	4.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
J	1/2	500	32	9.8	26.7	8.1	1	.312 x .8583	7.92 x 21.8	0.585	0.87
JJ	1/2	500	64	19.5	53.3	16.3	1	.312 x .8583	7.92 x 21.8	0.94	1.40
H	1	1000	8	2.4	6.7	2.0	2	.250 x .7445	6.35 x 18.9	1.17	1.74
L	1	1000	16	4.9	13.3	4.1	1	.312 x .8583	7.92 x 21.8	0.94	1.40
LL	1	1000	32	9.8	26.7	8.1	1	.312 x .8583	7.92 x 21.8	0.94	1.40
R	2	2000	8	2.4	6.7	2.0	2	.312 x .8583	7.92 x 21.8	1.88	2.80
RR	2	2000	16	4.9	13.3	4.1	2	.312 x .8583	7.92 x 21.8	1.88	2.80
RRS	2	2000	16	4.9	13.3	4.1	1	.394 x 1.18	10 x 30	1.45	2.16
RT	3	3000	5.3	1.6	4.4	1.4	3	.312 x .8583	7.92 x 21.8	2.82	4.20
RRT	3	3000	10.7	3.3	8.9	2.7	3	.312 x .8583	7.92 x 21.8	1.88	2.80

Lodestar Electric Chain Hoists Single Speed 230/460-3-60 or 220/380-3-50 or 220/415-3-50									
Model	Shortest Distance Between Hooks		Motor Power 60Hz		Motor Power 50Hz		IP Rating	Net Weight 10' lift less upper suspension	
	in	mm	HP	kW	HP	kW		lb	kg
A	16.9	429	0.25	0.19	0.21	0.16	54	70	31.9
AA	19.9	505	0.50	0.37	0.42	0.31	54	73	32.9
B	16.9	429	0.25	0.19	0.21	0.16	54	71	32.2
C	16.9	429	0.50	0.37	0.42	0.31	54	72	32.8
E	21.6	549	0.25	0.19	0.21	0.16	54	76	30.9
F	16.9	429	0.50	0.37	0.42	0.31	54	73	33.1
J	18.1	460	1.00	0.75	0.83	0.62	54	121	54.7
JJ	18.1	460	2.00	1.49	1.67	1.24	54	127	57.5
H	21.6	549	0.50	0.37	0.42	0.31	54	78	35.4
L	18.1	460	1.00	0.75	0.83	0.62	54	119	53.9
LL	18.1	460	2.00	1.49	1.67	1.24	54	127	57.6
R	25.8	655	1.00	0.75	0.83	0.62	54	142	64.4
RR	25.8	655	2.00	1.49	1.67	1.24	54	150	68.0
RRS	24.8	630	2.00	1.49	1.67	1.24	54	164	74.4
RT	32.1	815	1.00	0.75	0.83	0.62	54	160	72.7
RRT	32.1	815	2.00	1.49	1.67	1.24	54	173	78.4



## SPECIFICATIONS (CONT.)

Table 1.c.

Lodestar Electric Chain Hoists Two Speed 230-3-60 or 460-3-60 or 575-3-60 or 220-3-50 or 380-3-50 or 415-3-50 or 550-3-50											
Model	Load Capacity		Lifting Speed 60Hz units		Lifting Speed 50Hz units		Chain Falls	Chain Size		Chain Weight per length of lift	
	Tonne	kg	ft/min	m/min	ft/min	m/min		in x in	mm x mm	lb/ft	kg/m
A-2	1/8	125	10.7/32	3.3/9.8	8.9/26.7	2.7/8.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
AA-2	1/8	125	20/60	6.1/18.3	16.7/50	5.1/15.2	1	.250 x .7445	6.35 x 18.9	0.585	0.87
B-2	1/4	250	5.3/16	1.6/4.9	4.4/13.3	1.4/4.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
C-2	1/4	250	10.7/32	3.3/9.8	8.9/26.7	2.7/8.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
E-2	1/2	500	2.7/8	0.8/2.4	2.2/6.7	0.7/2	2	.250 x .7445	6.35 x 18.9	1.17	1.74
F-2	1/2	500	5.3/16	1.6/4.9	4.4/13.3	1.4/4.1	1	.250 x .7445	6.35 x 18.9	0.585	0.87
J-2	1/2	500	10.7/32	3.3/9.8	8.9/26.7	2.7/8.1	1	.312 x .8583	7.92 x 21.8	0.585	0.87
JJ-2	1/2	500	21.3/64	6.5/19.5	17.8/53.3	5.4/16.3	1	.312 x .8583	7.92 x 21.8	0.94	1.40
H-2	1	1000	2.7/8	0.8/2.4	2.2/6.7	0.7/2	2	.250 x .7445	6.35 x 18.9	1.17	1.74
L-2	1	1000	5.3/16	1.6/4.9	4.4/13.3	1.4/4.1	1	.312 x .8583	7.92 x 21.8	0.94	1.40
LL-2	1	1000	10.7/32	3.3/9.8	8.9/26.7	2.7/8.1	1	.312 x .8583	7.92 x 21.8	0.94	1.40
R-2	2	2000	2.7/8	0.8/2.4	2.2/6.7	0.7/2	2	.312 x .8583	7.92 x 21.8	1.88	2.80
RR-2	2	2000	5.3/16	1.6/4.9	4.4/13.3	1.4/4.1	2	.312 x .8583	7.92 x 21.8	1.88	2.80
RT-2	3	3000	1.8/5.3	0.5/1.6	1.5/4.4	0.5/1.4	3	.312 x .8583	7.92 x 21.8	2.82	4.20
RRT-2	3	3000	3.6/10.7	1.1/3.3	3/8.9	0.9/2.7	3	.312 x .8583	7.92 x 21.8	1.88	2.80

Lodestar Electric Chain Hoists Two Speed 230-3-60 or 460-3-60 or 575-3-60 or 220-3-50 or 380-3-50 or 415-3-50 or 550-3-50									
Model	Shortest Distance Between Hooks		Motor Power 60Hz		Motor Power 50Hz		IP Rating	Net Weight 10' lift less upper suspension	
	in	mm	HP	kW	HP	kW		lb	kg
A-2	16.9	429	0.25	0.19	0.21	0.16	54	76	34.6
AA-2	19.9	505	0.50	0.37	0.42	0.31	54	78	35.2
B-2	16.9	429	0.25	0.19	0.21	0.16	54	77	34.9
C-2	16.9	429	0.50	0.37	0.42	0.31	54	77	35.1
E-2	21.6	549	0.25	0.19	0.21	0.16	54	82	33.6
F-2	16.9	429	0.50	0.37	0.42	0.31	54	78	35.4
J-2	18.1	460	1.00	0.75	0.83	0.62	54	133	60.2
JJ-2	18.1	460	2.00	1.49	1.67	1.24	54	135	61.1
H-2	21.6	549	0.50	0.37	0.42	0.31	54	83	37.6
L-2	18.1	460	1.00	0.75	0.83	0.62	54	131	59.4
LL-2	18.1	460	2.00	1.49	1.67	1.24	54	135	57.6
R-2	25.8	655	1.00	0.75	0.83	0.62	54	154	61.2
RR-2	25.8	655	2.00	1.49	1.67	1.24	54	158	69.8
RT-2	32.1	815	1.00	0.75	0.83	0.62	54	172	71.6
RRT-2	32.1	815	2.00	1.49	1.67	1.24	54	181	82.1
RRT	32.1	815	2.00	1.49	1.67	1.24	54	173	78.4



## ACCESORIES

### 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® 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, Motor Driven, Universal Trolleys described next.



Figure 2. Lug Suspensions

### 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 and it will also operate on flat flanged beams.

Figure 3. Series 635 Low Headroom Trolley



Figure 4. Series 635 Motor Driven Trolley

### UNIVERSAL TROLLEY

The UTM Universal Trolley are supplied complete with independent controls, wiring and a four directional control station. These trolleys are adaptable to a wide variety of CMCO hoist products when used in conjunction with the appropriate hoist suspension. Trolley is adjustable for operation on American Standard 'S' beams and will also operate on flat flanged beams.

### 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 and it will also operate on flat flanged beams.

### LATCHLOK® HOOKS

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



Figure 5. 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 damage 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: See Electrical Installation instructions**

## INSTALLING THE SUSPENSION

### A. Single Reeved Units:

#### For Models A,B,C,F, J, JJ, L, & LL:

Remove the hook suspension and (2) suspension screws from the packaging. Place the suspension assembly into the recess on top of the hoist so that the adaptor body follows the contour of the hoist. Insert the suspension screws through the holes in the adaptor and hand thread these into the self-locking nuts enclosed in the hoist.

Securely tighten the screws to the recommended seating torque (see Table 2) using a 12 point socket: 3/8" for Models A, B, C, & F and 1/2" for Models J-LL.

#### For Model RRS:

Remove the hook suspension, screw and locknut from the packaging. Slide the suspension assembly into the channel in the top of the hoist. Insert the locknut into the hex recess on the side of the suspension riser, insert the screw through opposite side and hand thread the screw into the self-locking nut.

Securely tighten the screw to the recommended torque (see table 2), using a 3/16" hex bit socket.

## CAUTION

Use of impact tools (electric or pneumatic) may cause premature failure of attaching hardware.

### B. Double Reeved Units:

Remove the hook suspension, (2) suspension screws, (1) dead end pin, (1) washer, and (1) cotter pin from the packaging. It should be noted that the suspension includes a dead end bolt and block for supporting the dead end of the load 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 from the hex recess in the adaptor and turn the bolt and block assembly and reseat 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" (6.35mm) for Models E, E-2, H,

H-2 and 7/16" (11.11mm) for Models R, R-2, RR, RR-2. If the distance is not correct, adjust the position of the dead end block to obtain the proper distance (see fig. 21, p 73.)

Now, insert the suspension screws through the holes in the adaptor and hand thread these into the self-locking nuts enclosed in the hoist frame. Securely tighten the screws to the recommended seating torque (see Table 2) using a 12 point socket: 3/8" for Models E & H and 1/2" for Models R & RR.

The dead end of the load chain is temporarily positioned (a few links from the end) by a wire tie. Do not remove this tie before attaching the chain to the dead end block. (See Fig. 7)

### 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 adaptor and hand thread these into the self-locking nut enclosed in the hoist. Securely tighten the screws to the recommended seating torque (see Table 2) using a 12 point, 1/2" socket.

After the suspension assembly is installed, secure the sheave stud to the suspension adaptor 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.

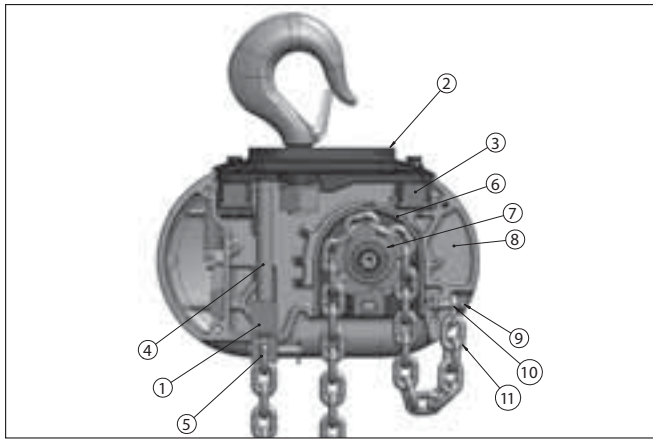
## WARNING

Using other than CM supplied high strength suspension screws to attach the suspension adaptor 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 hand torque these screws to the recommended seating torque as specified in tables 2a and 2b. 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 above recommended torque may break the screw, damage the suspension adaptor, strip the nuts and/or damage the hoist frame.

**SUSPENSION BOLT SHOULD BE REPLACED ANY TIME THE SUSPENSION IS REMOVED FROM THE HOIST**



**Figure 7. Attaching Load Chain Double Reeved Models**

- 1. Dead end block 7. Lift-wheel
- 2. Suspension assembly 8. Motor housing
- 3. Suspension self-locking nut 9. Loose end screw
- 4. Dead end bolt 10. Loose end link
- 5. Dead end link 11. Loose end
- 6. Chain guide

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

**Table 2a. Torque Specification: All Models**

Fastener	Fastener Description	Tool Required	*Recommended Seating Torque	
			ft-lbf	N-m
Brake End cover	1/4-20 Slotted Fillister Head Screw	Slotted Blade Screw Driver	4.0 - 5.0	5.4 - 6.8
Motor End Cover	1/4-20 Slotted Fillister Head Screw	Slotted Blade Screw Driver	4.0 - 5.0	5.4 - 6.8
Reversing contactor Connecting Screws-1ø	Terminal Clamp Screw	Phillips no. 2 or 3/16" slotted head screwdriver	0.6 - 1.0	0.8 - 1.3
Reversing contactor Connecting Screws-3ø	Terminal Clamp Screw	Phillips no. 2 or 3/16" slotted head screwdriver	0.6 - 1.0	0.8 - 1.3
Limit Switch Guide Screws	#10-24 Slotted Fillister Head Screw	Slotted Blade Screw Driver	1.7 - 2.1	2.3 - 2.8
1/4-20 Button Head Screw for Miscellaneous Applications	1/4-20 Button Head Socket Cap Screw	5/32" Hex Driver	4.2 - 5.0	5.6 - 6.8

**Table 2b. Torque Specification: Models A-H**

Fastener	Screw Size	Tool Required	*Recommended Seating Torque	
			ft-lbf	N-m
Motor Housing / Gear Housing / Back Frame Screws	1/4"-20 Socket Head Cap Screw	3/16" Hex Driver	7.9 - 8.3	10.7 - 11.3
Lift-Wheel Nut	1" - 12 Hex Nut	1-1/2" - 6 or 12 Point Socket	55.0 - 60.0	74.6 - 81.3
Brake Attaching Screws	1/4-20 Slotted Fillister Head Screw	Slotted Blade Screw Driver	4.2 - 5.0	5.6 - 6.8
Brake Armature Mounting Screws	M5 Socket Head Cap Screw	4mm Hex Driver	4.0 - 4.7	5.4 - 6.4
Contact Plate Mounting Nuts	1/4-20 Hex Nut	7/16" - 6 or 12 Point Socket	2.0 - 2.5	2.7 - 3.4
Suspension Adapter Screws	3/8"-16 - 12-Point Cap Screw	3/8" - 12 Point Socket	35.0 - 45.0	47.5 - 61.0
"Lower Hook Block Screws-Double Reeved"	1/4"-20 Socket Head Cap Screw	3/16" Hex Driver	5.0 - 5.8	6.8 - 7.9
Loose End Screw	1/4"-20 Hex Cap Screw	7/16" - 6 or 12 Point Socket	4.2 - 5.0	5.6 - 6.8
Chain Stop Screw	1/4"-20 Socket Head Cap Screw	3/16" Hex Driver	5.0 - 5.8	6.8 - 7.9

**Table 2c. Torque Specification: Models J-RR, RT, RRT**

Fastener	Screw Size	Tool Required	*Recommended Seating Torque	
			ft-lbf	N-m
Motor Housing / Gear Housing / Back Frame Screws	5/16"-18 Socket Head Cap Screw	1/4" Hex Driver	14.2 - 15.0	19.2 - 20.3
Lift-Wheel Nut	1-1/8"-12 Hex Nut	1-11/16" - 6 or 12 Point Socket	85.0 - 90.0	115.2 - 122.0
Brake Attaching Screw	5/16-18 Slotted Fillister Head Screw	Slotted Blade Screw Driver	4.2 - 5.0	5.6 - 6.8
Brake Armature Mounting Screws	M6 Socket Head Cap Screw	5mm Hex Driver	7.1 - 7.9	9.6 - 10.7
Stator Mounting Screws	1/4"-20 Hex Cap Screw	7/16" - 6 or 12 Point Socket	4.2 - 5.0	5.6 - 6.8
Suspension Adapter Screws	1/2"-20 12-Point Cap Screw	1/2" - 12 Point Socket	70.0 - 80.0	94.9 - 108.5
Lower Hook Block Screws -Double Reeved	5/16"-18 Socket Head Cap Screw	1/4" Hex Driver	10.0 - 11.3	13.6 - 15.3
Loose End Screw	5/16"-18 Hex Cap Screw	1/2" - 6 or 12 Point Socket	8.0 - 10.0	10.8 - 13.6
Chain Stop Screw	1/4"-20 Socket Head Cap Screw	3/16" Hex Driver	5.0 - 5.8	6.8 - 7.9

**Table 2d. Torque Specification: Model RRS**

Fastener	Screw Size	Tool Required	*Recommended Seating Torque	
			ft-lbf	N-m
Main Frame/Intermediate Frame/Back Frame Screws	5/16"-18 Socket Head Cap Screw	1/4" Hex Driver	14.2 - 15.0	19.2 - 20.3
3rd Pinion Nut	1-1/8"-12 Hex Nut	1-11/16" - 6 or 12 Point Socket	85.0 - 90.0	115.2 - 122.0
Chain Chute Pin Set Screw Torque	1/2-13 Hex Recess Set Screw	1/4" Hex Driver	11.7 - 13.3	15.8 - 18.1
Brake Attaching Screw	5/16-18 Slotted Fillister Head Screw	Slotted Blade Screw Driver	4.2 - 5.0	5.6 - 6.8
Brake Armature Mounting Screws	M6 Socket Head Cap Screw	5mm Hex Driver	7.1 - 7.9	9.6 - 10.7
Stator Mounting Screws	1/4"-20 Hex Cap Screw	7/16" - 6 or 12 Point Socket	4.2 - 5.0	5.6 - 6.8
Suspension Retainer Screw	1/4"-20 Socket Head Cap Screw	3/16" Hex Driver	4.2 - 5.0	5.6 - 6.8
Chain Container Bracket Mounting Screws	9/16"-18 Hex Cap Screw	7/16" Hex Driver	20.0 - 50.0	27.1 - 67.8
Chain Stop Screws	5/16"-18 Socket Head Cap Screw	1/4" Hex Driver	10.0 - 13.0	13.6 - 17.6

\*All Torque values are for clean,dry fasteners. DO NOT apply oil or any other lubricant to the fastener threads

## ATTACHING LOAD CHAIN

### RRS & Single.

1. Suspend the hoist from an adequate support.
2. If replacing existing chain, remove chain block kit from loose end of chain by removing the two (2) screws from opposing sides of the block. Remove lower hook assembly by removing the pin holding the chain into the assembly.
3. Using the connecting link, attach new chain to end of starter chain (existing chain if replacing) and feed through chain guides and over liftwheel. Feed enough chain through to be able to attach the chain block kit to the loose end of the chain by assembling the screws and nuts into the appropriate slots and tightening securely.
4. Attach the lower hook assembly to the appropriate end of the chain, by inserting the end link of the chain into the block, and securing the link with the pin.

### Triple Reeve

1. Suspend the hoist from an adequate support.
2. If replacing existing chain, disconnect "loose end" of chain by removing the screw holding loose end link in place on side of hoist frame. Remove dead end of chain by removing the pin holding dead end link into lower hook assembly block.
3. Using a connecting link, attach new chain to the "loose end" of starter chain (existing chain if replacing) and guide through lower hook block, through upper sheave hanger and over sheave wheel, through center hole of plate, and to dead end (center) slot on lower hook assembly. Make certain load chain is free from twists and binds.
4. Place dead end link into dead end slot, and insert pin. Attach loose end link to frame of hoist, using the provided screw. Tighten all fasteners securely.

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 (1) and secure it with the dead end pin, washer and cotter pin furnished with the suspension. Ensure there are no twists in the chain.
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**

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 14). 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.



## 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 (1) horsepower motor (.75 Kilowatts), that a line with adequate capacity be run directly from the power supply to the hoist to prevent problems with low voltage and circuit overloads.

For grounding of the hoist, the power cord includes a grounding conductor (green yellow, G-Y). 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 hoist identification plate is:

Single Speed Units		Two Speed Units	
Range	Nominal	Range	Nominal
110-120	115	--	--
208-240	230	208-240	230
440-480	460	440-480	460
550-575	575	550-575	575

## THREE PHASE HOIST

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

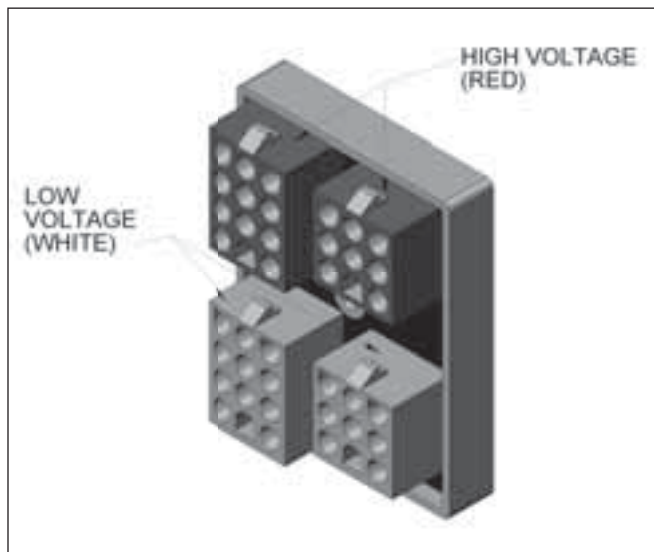


Figure 12. Voltage Change Board

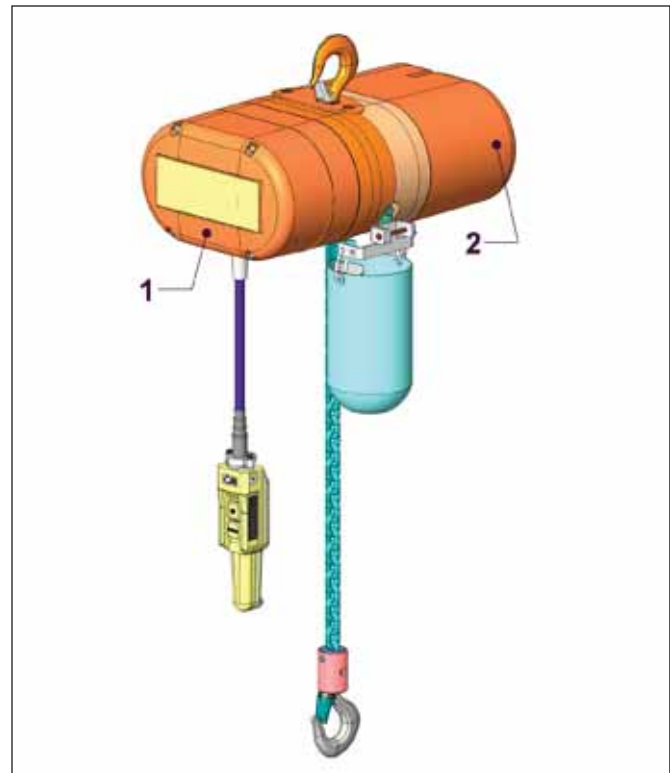


Figure 13. Location of Components

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

The voltage change board is color coded to indicate high and low voltage connections. Connecting the 9 and 12 pin plugs into the "Red" voltage change board receptacles will connect the hoist for high voltage (380-3-50, 415-3-50 or 460-3-60). To change the hoist voltage to low voltage (208-3-60, 220-3-50 or 230-3-60) simply remove the 9 and 12 pin plugs from the "Red" receptacles and insert same into the "White" receptacles located on the voltage change board. Be sure to make a notation of the new hoist voltage on the tag attached to the power cord.

## POWER 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 prior to each usage.

**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 momentarily. If hook raises, connections are correct and can be made permanent.
3. If hook lowers, it is necessary to change direction by inter-changing the Grey lead and the Black lead of hoist power supply. Under no circumstances should the internal wiring of the control device or hoist be changed to reverse hook direction. The wiring is inspected and tested before leaving the factory.

Do not force the Lodestar Load-limiter to compensate for improperly adjusted limit switches or reverse voltage phasing.

## **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.

## CHECKING FOR TWIST IN LOAD CHAIN MODELS E,H, E-2, H-2,R, RR, R-2, RR-2

The best way to check for this condition is to run the lower hook, without a load, up to within about 2 feet (.61 meters) 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 hoist end of the standard power cord with the hoist operating in the, up direction with full load) must be as indicated in the table below.

Nominal Voltage	Minimum Running Voltage	Minimum Starting Voltage
115-1-60	104	98
230-1-60	207	196
230-3-60	187	-
460-3-60	396	-
575-3-60	495	-
220-3-50	198	-
380-3-50	365	-
415-3-50	399	-
550-3-50	495	-

## 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.

## **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.

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 provide (slow blow fuses or inverse-time type circuit breakers) and provisions for grounding the hoist.

Low voltage may also be caused by using an undersized cord and/or connectors 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 Hoist
	Minimum Wire Size	Minimum Wire Size
Up to 50 Feet	#14 AWG	#16 AWG
80 FEET (24.4 M)	#12 AWG	#16 AWG
120 FEET (36.7 M)	#10 AWG	#14 AWG
200 FEET (61.0 M)	Contact Factory	#14 AWG
For runs beyond 200 Feet contact factory.		

## **WARNING**

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

### **TO AVOID INJURY:**

Provide each 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.

## **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 IF HOIST IS EQUIPPED

With hoists that are equipped with an adjustable screw limit switch, the limit switch will automatically stop the hook at any predetermined point when either hoisting or lowering.

### **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.

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

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 (305 mm) 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 (3m) 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 (3m).
3. If adjustment is necessary, see page 23.
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 page 23.

**NOTE: If the hoist is equipped with a chain container/bag, reset the upper and lower limit switches as indicated on page 23.**

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

**NOTE: When chain bag is filled to capacity the bag must be no more than 75% filled.**

## 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" (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 Load-limiter is designed 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 Load-limiter 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.**

It 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 3 concerning dumbwaiter applications.

2. All hoists are equipped with an adjustable screw limit switch, which automatically stops the hook at any predetermined 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 provide 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.

## SAFE OPERATING INSTRUCTIONS AND PROCEDURES

For safety precautions and a list of Do's and Do Not's for safe operation of hoists, refer to page 3.

1. Permit only competent personnel to operate unit.
2. 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.
3. **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 and/or attachments to bear against the hook latch and/or hook tip. Apply load to hook bowl or saddle only.**

4. **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 result in twisted chain and a jammed lift wheel.
  - b. The upper limit switch, if so equipped, is by-passed and the load could hit the hoist.
  - c. The chain could be damaged at the hook.
5. Before lifting load, check for twists in the load chain. On double and triple reeved units, a twist can occur if the lower hook block has been capsized between the strands of chain. Reverse the capsize to remove twist.
6. Stand clear of all loads and avoid moving a load over the heads of other personnel. Warn personnel of your intentions to move a load in their area.
7. **DO NOT** leave the load suspended in the air unattended.
8. **DO NOT** use this or any other overhead materials handling equipment for lifting persons.
9. **DO NOT** load hoist beyond the rated capacity shown on ID plate. When in doubt, use the next larger capacity CM Lodestar Hoist.

10. Warn personnel of your intention to lift a load in the area. Tie off the load with auxiliary chains or cables before access to the area beneath the load is permitted.
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. 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 lift only after you are assured the load is free of all obstructions.
13. **DO NOT** allow the load to swing or twist while hoisting.
14. Never operate the hoist when flammable materials or vapors are present. Electrical devices produce arcs or sparks that can cause a fire or explosion.
15. **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

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.

The type of service to which the hoist is subjected can be classified as "Normal", "Heavy", or "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:

Normal or heavy service with abnormal operating conditions or constant exposure to the elements of nature.

**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 found during inspections 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 nondestructive type testing**

## PREVENTATIVE 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 the periodic and frequent inspections with particular attention being paid to the lubrication of the various components using the recommended lubricants (see page 127).

## SUSPENSION INSPECTION CRITERIA

**BRACKETS** - Replace any bracelets found to be cracked or distorted.

**BOLTS** - If the suspension is removed for any reason, including inspection, the suspension bolts should be replaced.

**NYLON THREAD LOCKING NUTS** - It is not necessary to replace the nylon thread locking nuts each time the suspension bolts are replaced as long as new bolts with the locking patch are being used. It is recommend that the nylon thread locking nuts are replaced each time the hoist is torn down to allow these nuts to be replaced.

## HOOK REMOVE CRITERIA

Based on B30-10 Hooks shall be removed from service if damage such as the following is visible and shall only be returned to service when approved by a qualified person:

- Missing or illegible rated load identification or illegible hook manufacturers' identification or secondary manufacturer's identification.
- Excessive pitting or corrosion.
- Cracks, nicks, or gouges.
- Wear--any wear exceeding 10% of the original section dimension of the hook or its load pin.
- Deformation--any visibly apparent bend or twist from the plane of the unbent hook.
- Throat opening-any distortion causing an increase in the throat opening of 5% not to exceed ¼" (6mm).
- Inability to lock - any self-locking hook that does no lock.
- Inoperative latch any damaged latch or malfunctioning latch that does not close the hook's throat.
- Thread wear, damage, or corrosion.
- Evidence of excessive heat exposure or unauthorized welding.
- Evidence of unauthorized alterations such as drilling, machining, grinding, or other modifications.

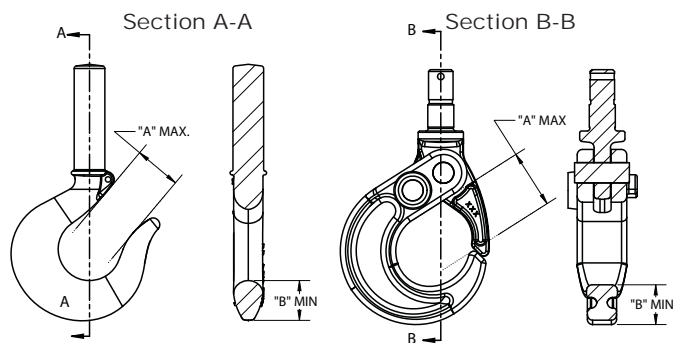


Figure 14. Hook Inspection

Models	Latch Type Hook		Latchlok® Hook	
	"A" Max	"B" Min	"A" Max	"B" Min
A, A-2, AA, AA-2, B, B-2, C, C-2, F AND F-2	1.19" (30.2mm)	.91" (23.1mm)	1.48" (37.7mm)	.75" (18.8mm)
E, E-2, H, H-2, J, J-2, JJ, JJ-2, L, L-2, LL AND LL-2	1.31" (33.3mm)	1.08" (27.5mm)	1.48" (37.7mm)	.75" (18.8mm)
R, R-2, RR, RR-2 AND RRS	1.50" (38.1 mm)	1.43" (36.2mm)	1.92" (48.8mm)	.94" (23.9mm)
RT, RT-2, RRT AND RRT-2	1.50" (38.1 mm)	1.43" (36.2mm)	2.50" (63.5mm)	1.19" (23.9mm)

Table 4. Minimum Frequent Inspections			
TYPE OF SERVICE			ITEM
Normal	Heavy	Severe	
Monthly	Weekly to Monthly	Daily to Weekly	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 18.
			d) Load chain for adequate lubrication, as well as for signs of wear, damaged links or foreign matter - see page 20.
			e) Load chain for proper reeving and twists.

Table 5. Minimum Periodic Inspections			
TYPE OF SERVICE			ITEM
Normal	Heavy	Severe	
Yearly	Every 6 Months	Every 3 Months	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 guide for wear or burring where the chain enters the hoist. Severely worn or damaged parts should be replaced.
			f) External evidence of excessive wear of brake parts, and AC brake adjustment - see page 22.
			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 bearing 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 11.
			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: <ol style="list-style-type: none"> <li>1. Inspect shackle and lug pins for wear. Replace if worn.</li> <li>2. Check dead end screw in lower hook black for wear and tightness*.</li> <li>3. Check shackle pin for proper seating in groove of load bracket.</li> <li>4. Inspect cloverleaf plate on bottom of sheave hanger for wear or burring. Replace if worn.</li> <li>5. Inspect sheave stud nut and seat for wear. Replace if worn or damaged.</li> </ol>

\*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 45).

## INSPECTING THE LOAD CHAIN:

The chain must be inspected at regular intervals, with a minimum of once annually. As the frequency of use increases, the time intervals between inspections must be reduced. During inspection, the chain must be examined along their entire length, including the hidden parts. If the lifting equipment is frequently used with a constant lifting distance or in other words the switch from upward to downward often takes place in the same area, a particularly thorough inspection and lubrication is required in that area. Worn chain can be an indication of worn hoist components. For this reason, the hoist's chain guides, hook blocks and liftwheel (sprocket) should be examined for wear and replaced as necessary when replacing chain.

1. Check to see if chain is dirty or poorly lubricated.
2. Clean the chain with a non-caustic/non-acid type solvent and make a link by link inspection for wear or cracks in the links, twisted or deformed links. Chain with any one of these defects must be replaced.
3. Slack the portion of the chain that normally passes over the lift-wheel (sprocket) or idler sprocket on multi-reeved hoist. Examine the chain links for wear ( see figure 15). If the wire diameter anywhere on the link measures less than 90% of the nominal wire diameter, the chain must be replaced.

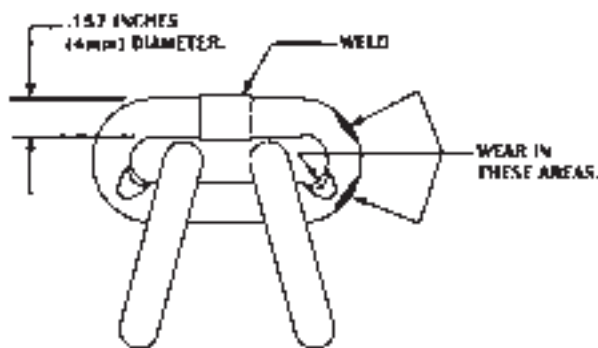
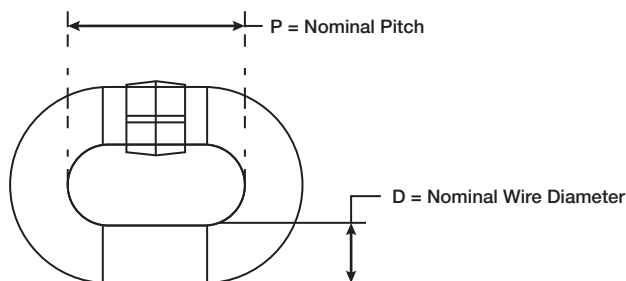


Figure 15. Chain Wear Areas



Models	P	D
A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2, E, E-2, H and H-2	.745" (18.9mm)	.250" (6.3mm)
J, J-2, JJ, J-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, and RRT-2	.858" (21.8mm)	.312" (7.9mm)
RRS	1.18 (30.0mm)	.394" (10.0mm)

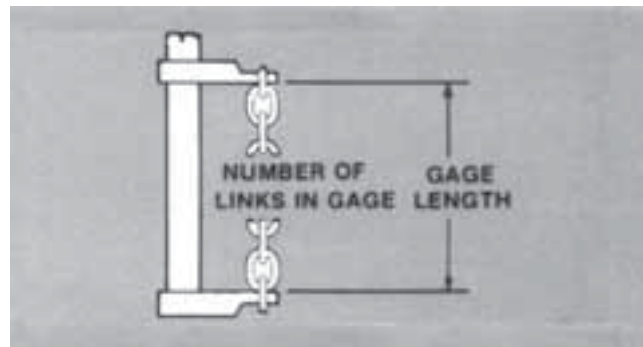


Figure 16. Gaging Load Chain Wear

4. Based upon ASME B30.16, 2012 chain should also be checked for elongation. Select an unworn, unstretched length of the chain (at the slack end for example). Suspend the chain vertically under tension and using a knife blade caliper type gauge, measure the outside length of any convenient number of links, 11 is recommended. Measure the same number of links in the used sections and calculate the percentage in increased length. The chain should be replaced if the length of the used portion is more than 2% longer than the unused portion of the chain. Also, if the pitch of any individual link has elongated by more than 5%, the chain should be replaced.

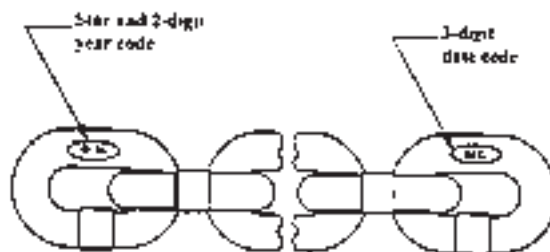


Figure 17. Chain Embossing

**Use only Star (\*) grade load chain and original replacement parts. Use of other chain and parts may be dangerous and voids factory warranty.**

**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 replaced chain into short lengths to prevent use after disposal.

## **⚠ WARNING**

Use of commercial or other manufacturer's 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.



## MAINTENANCE

### LOAD-LIMITER

The Load-limiter should operate for the normal life of the hoist without service. The device has been calibrated at the factory for a specific model of hoist. For proper overload protection, be sure before installing a Load-limiter that it is correct for the unit.

Models	Load-Limiter Part Number	Load-Limiter ID (marked on Load-limiter)
A, A-2, B, B-2, E, E-2	C00000240	240
AA, AA-2, C, C-2, F, F-2, H, H-2	C00000241	241
J, J-2, L, L-2, R, R-2, RT, RT-2	C00000242	242
JJ, JJ-2, LL, LL-2, RR, RR-2, RRS, RRT, RRT-2	C00000243	243

### 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

#### GEARS

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

The gearbox is packed at assembly with grease and should not need to be renewed unless the gears have been removed from the housing and degreased.

If the gears are removed from the housing, wipe the excess grease off with a soft cloth and degrease the gears and housings. Upon reassembly, add grease to gears and housing.

Models A to H hoists require 7 fl. oz. of grease. Model J to RRT excluding RRS hoists require 15 fl. oz. Of grease.

For model RRS hoist: fully coat gear teeth and pack gear box, using a total of 22 fluid ounces of grease

1. Apply 7 ounces of grease on the final gear stage, prior to installing the intermediate frame
2. Apply 15 ounces of grease on the 1st 2 gear stages, prior to installing the back frame.

Also, coat the spline on the end of the drive shaft with a Molydisulphide lubricant such as "Super Herculon".

- The limit switch gears are of molded polymer and require no lubrication.
- Apply a light film of machine oil to the limit switch shaft threads at least once a year.

#### BEARINGS

- All bearings and bushings, except the lower hook thrust bearing, are pre-lubricated and require no lubrication. The lower hook thrust bearing should be lubricated at least once a month.

#### CHAIN GUIDES, LIFTWHEEL AND 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. or equivalent) prior to reassembly. The lubricant must be applied in sufficient quantity to obtain natural runoff and full coverage of these parts.

#### 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, especially in the interlink area.

### WARNING

Used motor oils contain known carcinogenic materials

#### TO AVOID HEALTH PROBLEMS:

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

### TROLLEY LUBRICATION

See appropriate trolley manual.

### 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 138 for information on ordering the paint.

### TEMPERATURE RATING

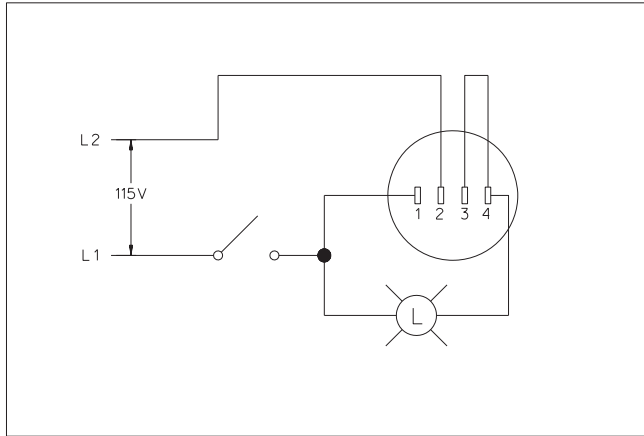
Normal ambient operating temperature, unless otherwise specified, range from 0° f (-17°c) to 150° f (60°c). Contact factory for ambient temperature solutions outside this stated range.

### 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 switch 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 reduce duty cycle, excessive starting, excessive plugging to reduce future malfunctions of the solid state reverse due to overheating.

## BRAKE ADJUSTMENTS

### DC ELECTRIC BRAKE ASSEMBLY

The correct air gap between field and armature is .008-.018 in (0.2-0.45 mm) for models A through H and .008-.020 in (0.2- 0.5 mm) for models J through RRT. The DC brake is not adjustable. As the friction material wears, the brake gap increases. If the maximum air gap is reached, a new friction disc/rotor should be installed.

Table 6a. Limit Switches

Model	Hook Travel w/ 44 T.P.I. Shaft (Standard)		Hook Travel w/ 56 T.P.I. Shaft (Standard)		Hook Travel w/ 64 T.P.I. Shaft (Standard)	
	Max Length of Lift		Max Length of Lift		Max Length of Lift	
	m	ft	m	ft	m	ft
A, A-2, C, C-2	63	206	80	262	91	299
AA, AA-2	117	385	150	491	171	561
B, B-2, F, F-2	32	105	41	133	46	152
E, E-2, H, H-2	16	52	20	67	23	76
L, L-2, J, J-2	39	127	49	162	56	185
JJ, JJ-2, LL, LL-2	76	250	97	318	111	363
R, R-2	20	64	25	81	28	93
RR, RR-2	38	124	48	158	55	181
RT, RT-2	13	42	16	54	19	62
RRT, RRT-T	25	83	32	106	37	121
RRS	38	125	48	159	55	182

Table 6b. Limit Switches

Model	Hook Travel, per Notch		A (minimum distance between top of hook block and bottom of hoist)		B (minimum length of loose end chain)
	mm	in	mm	in	
A, A-2, C, C-2	52.8	2.08	38.1	1.50	6 links
AA, AA-2	98.8	3.89	50.8	2.00	6 links
B, B-2, F, F-2	26.9	1.06	38.1	1.50	6 links
E, E-2, H, H-2	13.5	0.53	44.45	1.75	6 links
L, L-2, J, J-2	30.5	1.20	38.1	1.50	8 links
JJ, JJ-2, LL, LL-2	116.8	4.60	63.5	2.50	8 links
R, R-2	15.2	0.60	63.5	2.50	8 links
RR, RR-2	29.7	1.17	63.5	2.50	8 links
RT, RT-2	10.2	0.40	63.5	2.50	8 links
RRT, RRT-T	19.8	0.78	63.5	2.50	8 links
RRS	30.0	1.18	63.5	2.50	2.50 in



## LIMIT SWITCH ADJUSTMENTS

If limit switch operation has been checked as described on page 16 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 frame cover, see Figure 13.
3. The identification of upper and lower limit switches are indicated on the fiber insulator.
4. Loosen the 2 screws or spring back the rotatable guide to disengage the travel nut

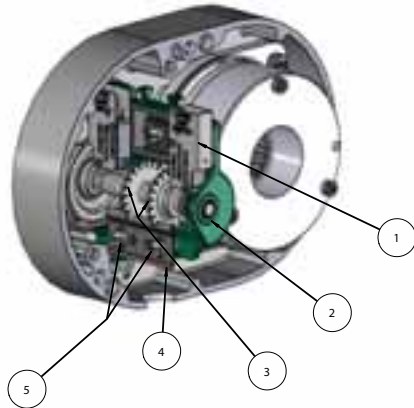
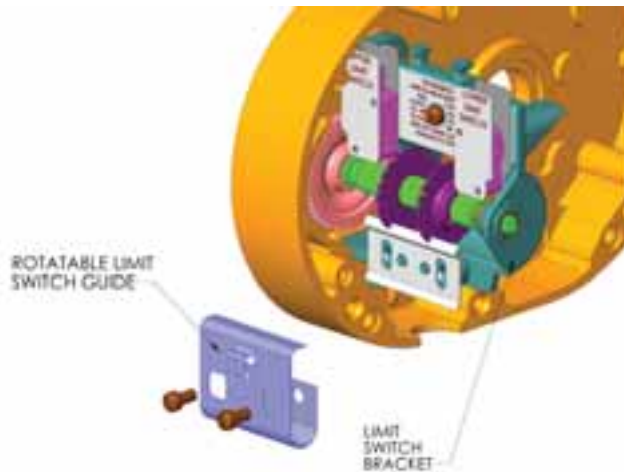


Figure 18. Limit Switches, Models A-H

1. Limit switch sub-assy
2. Limit switch shaft
3. Travelling nuts
4. Guide plate
5. Screws

Figure 18A. Rotatable Limit Switches, Models A-H



## SETTING UPPER LIMIT SWITCH

After completing steps 1 thru 4

5. Refer to table 6 - The "A" Dimensions given are the minimum distance that should be set between the top at hook block and the bottom of the hoist.

**CAUTION: THE "A" DIMENSIONS SHOWN IN TABLE 6 ARE THE MINIMUM ALLOWED FOR SAFE OPERATION AND SHOULD NOT BE REDUCED.**

6. Reconnect hoist to power supply.
7. Run hook to the desired upper position, cautiously operating the hoist without a load.
8. Disconnect hoist from power supply.
9. Moving one travel 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 "UPPER LIMIT SWITCH" until it just breaks the limit switch contacts, cautious not to allow the movement of the other travel nut, if previously set. An audible click will be heard as the switch opens. Continue to rotate the nut toward the switch an additional one full tooth.

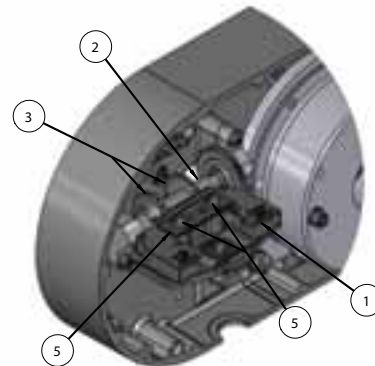


Figure 19. Limit Switches, Models J-RRT

1. Limit switch sub-assy
2. Limit switch shaft
3. Traveling nuts
4. Guide plate
5. Screws

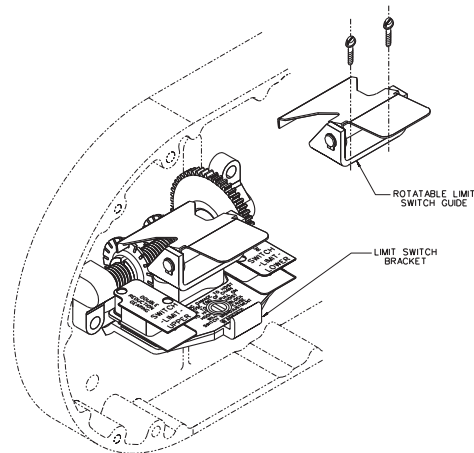


Figure 19A. Rotatable Limit Switches, Models J-RRT

10. Securely reposition the guide plate in the slot
11. Reconnect hoist to power supply and check the stopping point of hook by first lowering the hook about 2 feet (61 cm), 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.

12. Double check setting by lowering the hook about 2 feet (61 cm) and then run the hook into the upper limit with (UP) control held depressed.
13. Fine adjustment of the upper limit setting may be obtained by inverting the stationary guide plate in Step 10. (Not available with the rotatable guide plate.) 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

After completing steps 1 thru 4

5. Refer to Table 6 - The "B" dimensions given are the minimum length of loose end chain left on the non-load side of the lift wheel when the hook is positioned at the lowest allowable hook position.

**CAUTION: THE "B" DIMENSIONS SHOWN IN TABLE 6 ARE THE MINIMUM ALLOWED FOR SAFE OPERATIONS AND SHOULD NOT BE REDUCED.**

6. Reconnect hoist to power supply.
7. Run hook to the desired lower position, cautiously operating the hoist without a load.
8. Disconnect hoist from power supply.
9. Moving one travel nut toward the other increases hook travel and away from the other decreases hook travel. Now, turn the nut nearest the switch indicated as the "LOWER LIMIT SWITCH" until it just breaks the limit switch contacts, cautious not to allow the movement of the other travel nut if previously set. An audible click will be heard as the switch opens. Continue to rotate the nut toward the switch an additional one full tooth.
10. Securely reposition the guide plate in the slot.
11. Reconnect hoist to power supply and check the stopping point of hook by first raising the hook about 2 feet (61 cm) then lower the hook by jogging cautiously until the lower limit switch stops downward motion. The stopping point of the hook should be the desired lower position, if not repeat the above instructions.
12. Double check setting by raising the hook about 2 feet (61 cm) and then run the hook into the lower limit with (DOWN) control held depressed.
13. Fine adjustment of the lower limit setting may be obtained by inverting the stationary guide plate in Step 10. (Not available with the rotatable guide plate). The plate 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.

## CONVERTING LIMIT SWITCH GUIDES

1. Disconnect the hoist from the power supply system.
2. Refer to the exploded views and remove the back frame cover from the hoist.  
Remove and discard the limit switch guide plate - retaining the 2 screws.
3. Refer to Figure 18A and 19A and assemble the limit switch guide plate to the limit switch bracket. Secure using the 2 screws.

## TROUBLE SHOOTING ALL HOISTS TABLE 7

TROUBLE	PROBABLE CASE	REMEDY
1. Hook does not respond to the control station or control device	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 control circuit.	C.) Press the "other" control and the hook should respond. Adjust limit switches as described on page 23.
	D.) Open control circuit-open or shorted winding in transformer, reversing contactor coil or loose connection or broken wire in circuit;mechanical binding in contactor 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 change board are the proper voltage as described on page 14.
	F.) Low Voltage.	F.) Correct low voltage condition as described on page 14.
	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 22.
	H.) Excessive load.	H.) Reduce loading to the capacity limit of hoist as indicated on the identification plate.
2.) Hook moves in 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 or faulty capacitor
	C.) Phase reversal (three phase unit only).	C.) Refer to installation instructions on page 14

## TROUBLE SHOOTING ALL HOISTS TABLE 7

TROUBLE	PROBABLE CASE	REMEDY
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 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 16.
	C.) Phase failure (three phase unit only).	C.) See item 1B.
4.) Hook raises but will not lower.	A.) Open lowering circuit-open or shorted winding in reversing contactor 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 15-16.
	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.
	B.) Phase reversal (three phase unit only).	B.) Refer to installation instruction on page 14.
6.) Hook does not stop promptly.	A.) Brake slipping.	A.) Check brake adjustment as described on page 22.
	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 15.
	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 22.

## TROUBLE SHOOTING ALL HOISTS TABLE 7

TROUBLE	PROBABLE CASE	REMEDY
8.) Motor overheats.	A.) Low voltage.	A.) Correct low voltage condition as described on page 15.
	B.) Excessive load.	B.) See item 1H.
	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 22.
	G.) 115-1-60 Units: Solid state reverse switch exposed to excessive temperature or the switch is damaged.	G.) See page 21.
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 page 15-16.
	B.) Limit Switch Shaft not rotating.	B.) Check for damaged Limit Switch 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 22.
	C.) Binding of Limit Switch Shaft.	C.) Check Limit Switch Bearing for proper seating.

## TROUBLE SHOOTING ALL HOISTS TABLE 7

TROUBLE	PROBABLE CASE	REMEDY
<b>Two Speed Hoists</b>		
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 recommend 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 H2 to H1 H3 to H4	27.9 99.0 111.8
230/380 to 48	X2 to X1 H2 to H1 H3 to H4	5.2 99.0 112.6
220/415 to 24	X2 to X1 H2 to H1 H3 to H4	1.3 100.4 114.9
575 to 115	X2 to X1 H4 to H1	28.4 329.1

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

Models	DC BRAKE COIL VOLTAGE	NOMINAL CURRENT (AMPS)	*D.C. RESISTANCE (OHMS)
A, AA, B, C, E F and H	103	0.243	424.4
A thru H-2	205	0.122	1681
A-2 thru H-2	255	0.098	2601
J, JJ, L, LL, R, RR, RT, RRT	103	0.311	331.5
J thru RRT-2	205	0.161	1273
J thru RRT-2	255	0.118	2167

\*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.

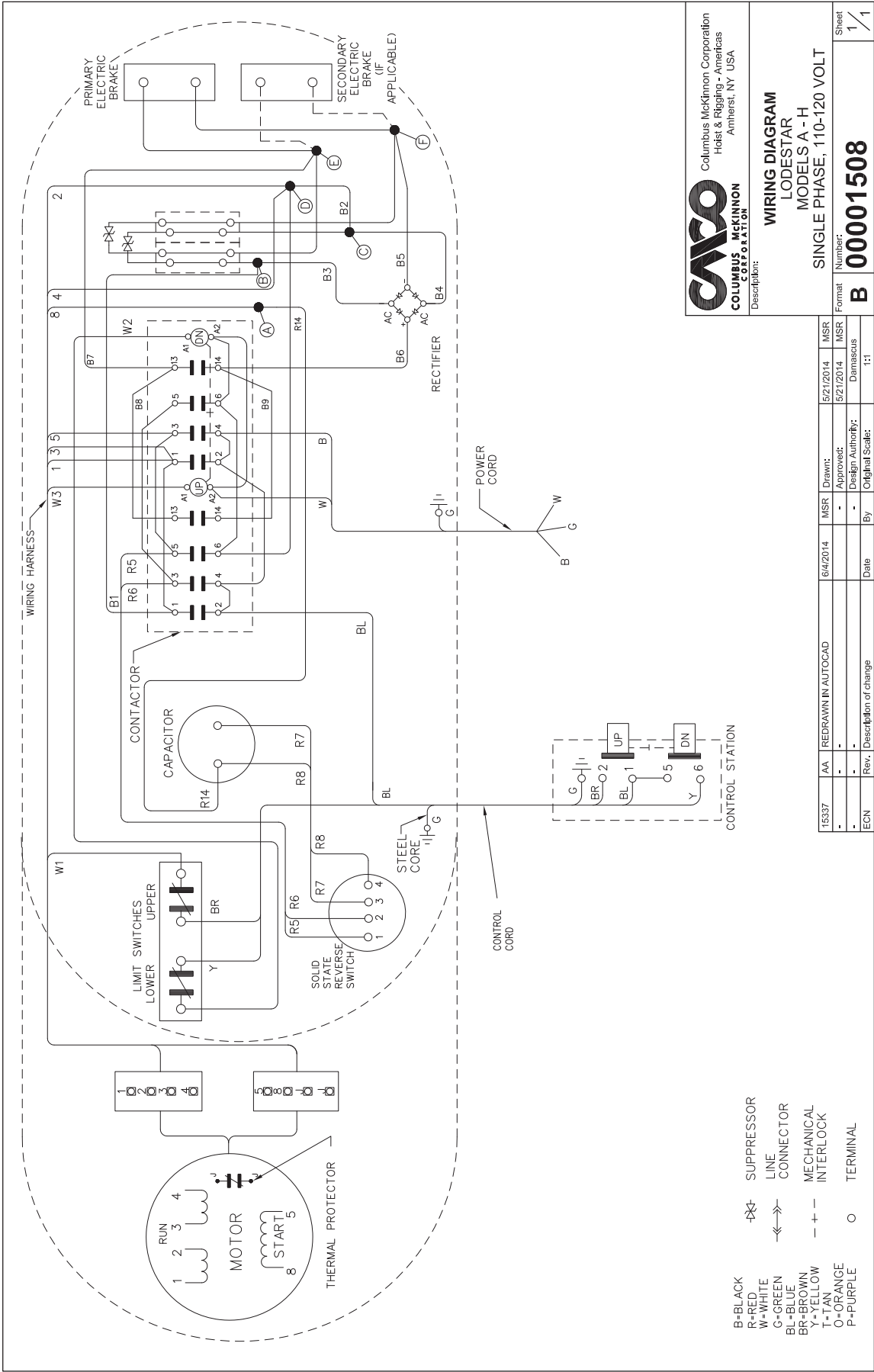


Table 8. Electrical Data for Hoist Components (continued)

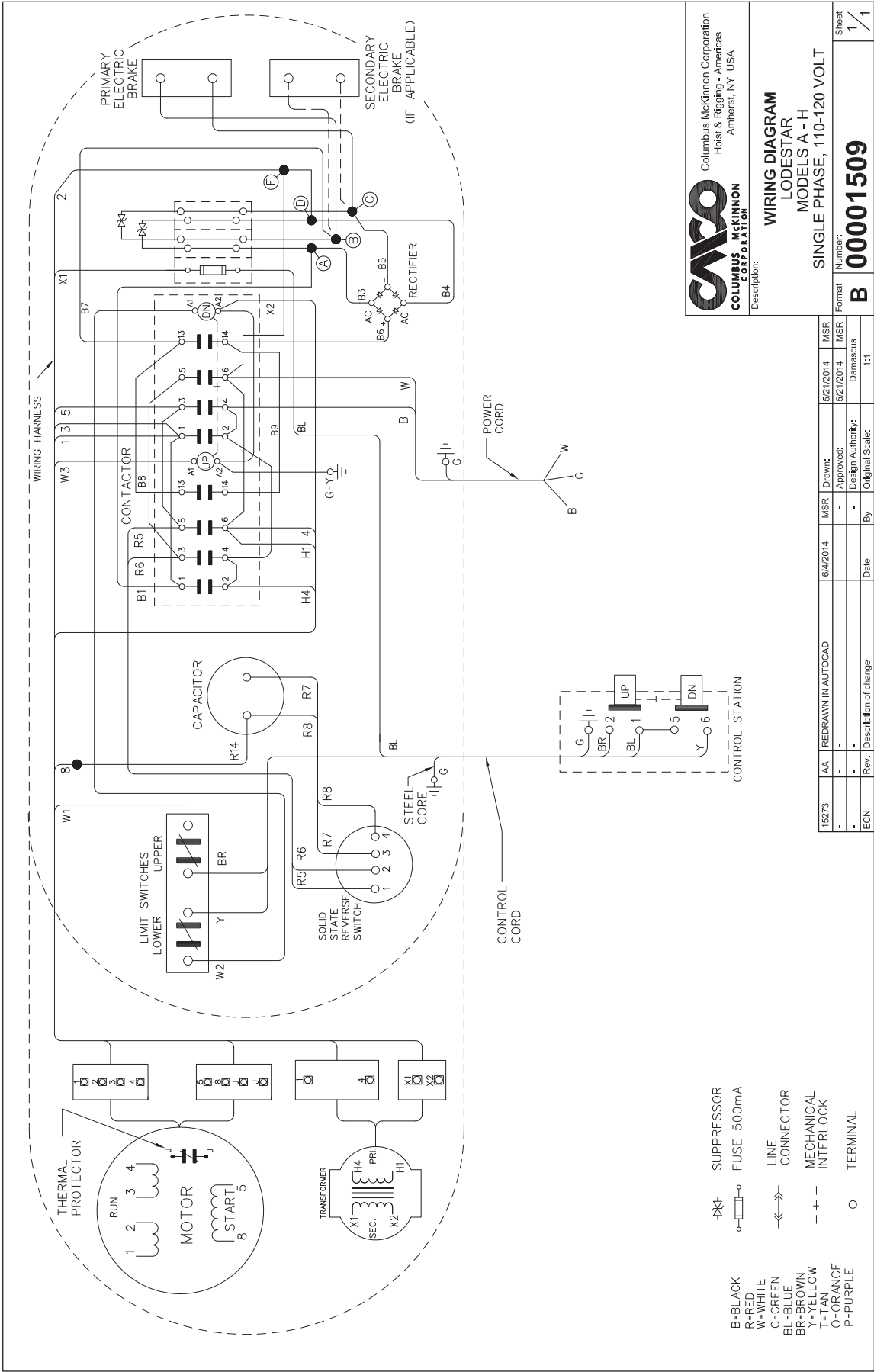
MOdels	Volts-Phase Hertz	H.P. (kW)	Full Load Current (Amps)	Leads	*D.C. Resistance (Ohms)
A,B,E	110-1-50	1/4(.19)	3.2	1 - 2	7.2
				3 - 4	7.2
				5 - 8	5.8
A,B,E	115-1-60	1/4 (.19)	4.6	1 - 2	4.3
				3 - 4	4.3
				5 - 8	4.9
A,B,E	220-1-50	1/4 (.19)	1.6	1 - 2	7.2
				3 - 4	7.2
				5 - 8	5.8
A,B,E	230-1-60	1/4 (.19)	2.3	1 - 2	4.3
				3 - 4	4.3
				5 - 8	4.9
AA,C,F,H	110-1-50	1/2 (.37)	6.4	1 - 2	2.7
				3 - 4	2.7
				5 - 8	3.5
AA,C,F,H	115-1-60	1/2 (.37)	7.2	1 - 2	1.9
				3 - 4	1.9
				5 - 8	3.6
A,B,E	220-1-50	1/2 (.37)	3.2	1 - 2	2.7
				3 - 4	2.7
				5 - 8	3.5
A,B,E	230-1-60	1/2 (.37)	3.6	1 - 2	1.9
				3 - 4	1.9
				5 - 8	3.6
A,B,E	230/460-3-60	1/4 (.19)	1.4/0.7	3 - 6 2 - 5 1 - 4 8 - 9 8 - 7 9 - 7	14.8
	220/380-3-50		1.4/0.7		14.8
	220/415-3-50		1.4/0.7		14.8
	575-3-60		0.5		29.5
	550-3-50		0.6		29.5
					1 - 2 2 - 3 1 - 3
AA,C,F,H	230/460-3-60	1/2 (.37)	1.8/0.9	3 - 6	7.8
	220/380-3-50		2.1/1.0	2 - 5	7.8
	220/415-3-50		2.1/1.0	1 - 4	7.8
	575-3-60		0.8	8 - 9	15.6
	550-3-50		0.9	8 - 7	15.6
				9 - 7	15.6
A-2, B-2, E-2	230-3-60	.08/.25 (.06/.19)	1.6/1.6	12 - 3	17.5
	220-3-50		1.9/2.1	11 - 3	17.5
				11 - 12	17.5
A-2, AA-2, B-2, C-2, E-2, F-2, H-2	230-3-60	.15/.5 (.12/.37)	1.8/2.0	1 - 2	42.5
	220-3-50		2.1/2.4	1 - 3	42.5
	460-3-60		1.0/1.0	2 - 3	42.5
	380-3-50		1.2/1.2	12 - 3	13.5
	415-3-50		1.2/1.2	11 - 3	13.5
	575-3-60		.8/.85	11 - 12	13.5
	550-3-50		.8/.85	1 - 2	25.0
				1 - 3	25.0
				2 - 3	25.0
				12 - 3	63.0
				11 - 3	63.0
				11 - 12	63.0
J,L,R,RT	110-1-50	1 (.75)	11.6	1 - 2	1.1
	115-1-60		9.8	3 - 4	1.1
				5 - 8	1.3

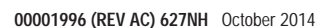
MOdels	Volts-Phase Hertz	H.P. (kW)	Full Load Current (Amps)	Leads	*D.C. Resistance (Ohms)
J,L,R,RT	220-1-50	1 (.75)	5.8	1 - 2	1.1
	230-1-60		4.9	3 - 4 5 - 8	1.1 1.3
J,L,R,RT	230/460-3-60	1 (.75)	3.0/1.5	3 - 6	4.7
	220/380-3-50		3.6/1.8	2 - 5	4.7
	220/415-3-50		3.6/1.8	1 - 4 8 - 9 8 - 7 9 - 7	4.7 9.4 9.4 9.4
	575-3-60		1.5	1 - 2	29.6
	550-3-50		1.8	2 - 3 1 - 3	
JJ, LL, RR, RRS, RRT	230/460-3-60	2 (1.5)	5.8/2.9	3 - 6	2.2
	220/380-3-50		6.4/3.3	2 - 5	2.2
	220/415-3-50		6.4/3.3	1 - 4 8 - 9 8 - 7 9 - 7	2.2 9.4 9.4 9.4
	575-3-60		3.2	1 - 2	14.8
	550-3-50		3.5	2 - 3 1 - 3	
J-2,L- 2,R-2, RT-2	230-3-60	.33/1 (.25/.75)	3.4/5.0	12 - 3	7.7
	220-3-50		3.2/4.7	11 - 3	7.7
	460-3-60		1.5/2.4	11 - 12	7.7
	380-3-50		1.6/2.4	1 - 2	19.4
	415-3-50		1.6/2.4	1 - 3	19.4
	575-3-60		1.1/1.9	2 - 3	19.4
	550-3-50		1.3/2.1	12 - 3	29.9
				11 - 3	29.4
				11 - 12	29.0
				1 - 2	80.2
JJ-2, LL- 2, RR-2, RRT-2	230-3-60	.67/2 (.50/1.5)	5.8/8.8	1 - 3	80.1
	220-3-50		6.6/9.5	2 - 3	82.2
	460-3-60		3.3/5.1	12 - 3	42.9
	380-3-50		3.0/5.0	11 - 3	40.1
	415-3-60		3.0/5.0	11 - 12	53.2
	575-3-60		2.3/3.5	1 - 2	125.7
				1 - 3	125.8
				2 - 3	125.2
				12 - 3	3.2
				11 - 3	3.1
				11 - 12	3.3
				1 - 2	14.1
A-2, AA-2, B-2, C-2, E-2, F-2, H-2	230-3-60	.15/.5 (.12/.37)	1.8/2.0	1 - 3	14.1
	220-3-50		2.1/2.4	2 - 3	14.0
	460-3-60		1.0/1.0	12 - 3	11.4
	380-3-50		1.2/1.2	11 - 3	11.3
	415-3-50		1.2/1.2	11 - 12	11.3
	575-3-60		.8/.85	1 - 2	55.2
J,L,R,RT	110-1-50	1 (.75)	11.6	1 - 3	55.4
	115-1-60		9.8	2 - 3	55.3
				12 - 3	17.0
				11 - 3	17.1
				11 - 12	17.2
				1 - 2	84.1
A-2, B-2, E-2	230-3-60	.08/.25 (.06/.19)	1.6/1.6	1 - 3	84.0
	220-3-50		1.9/2.1	2 - 3	83.6

REFERENCE WIRING DIAGRAMS

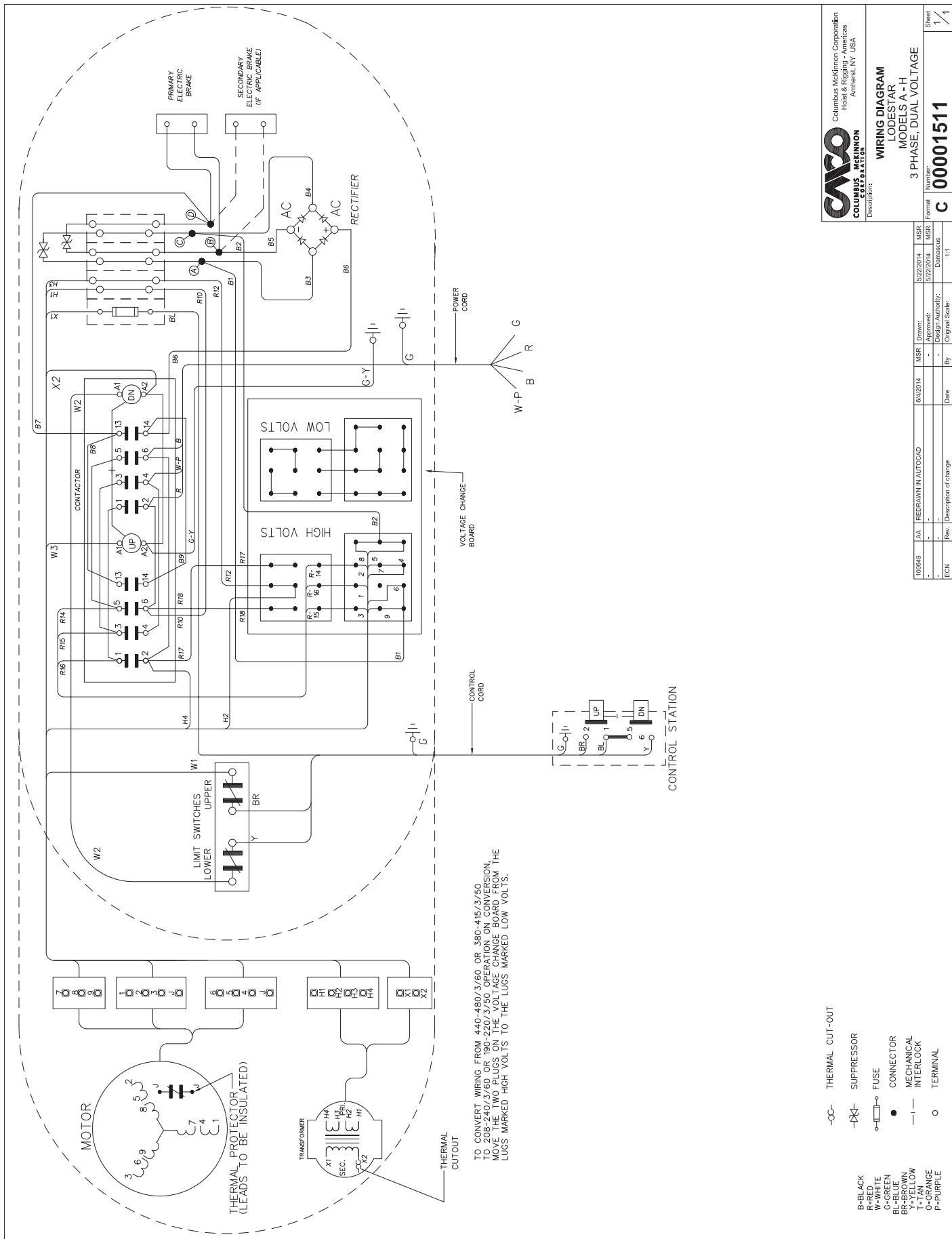


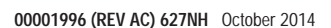
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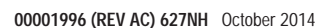


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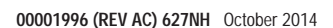
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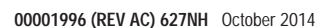


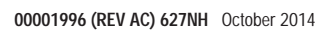
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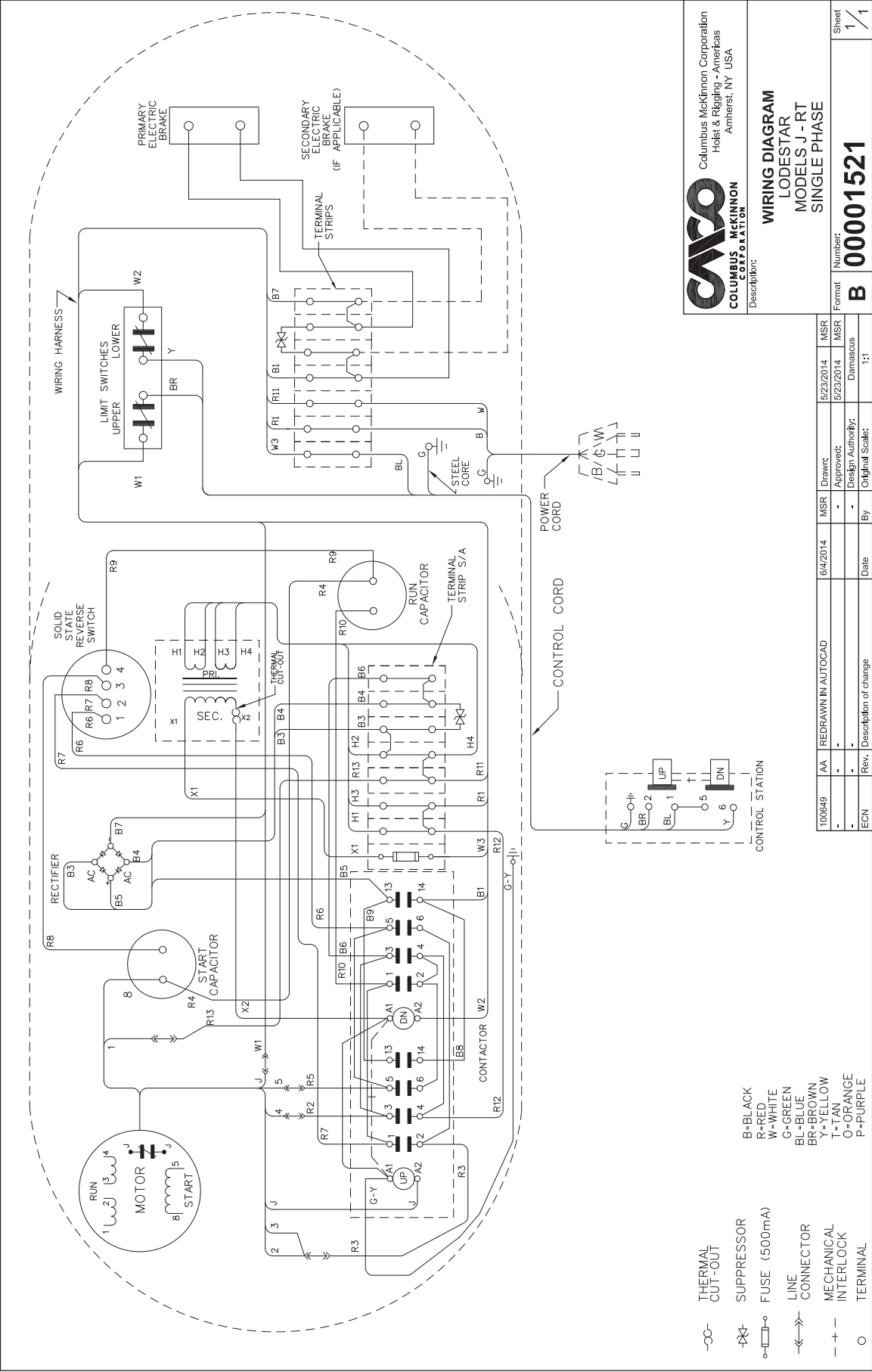


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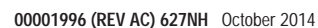


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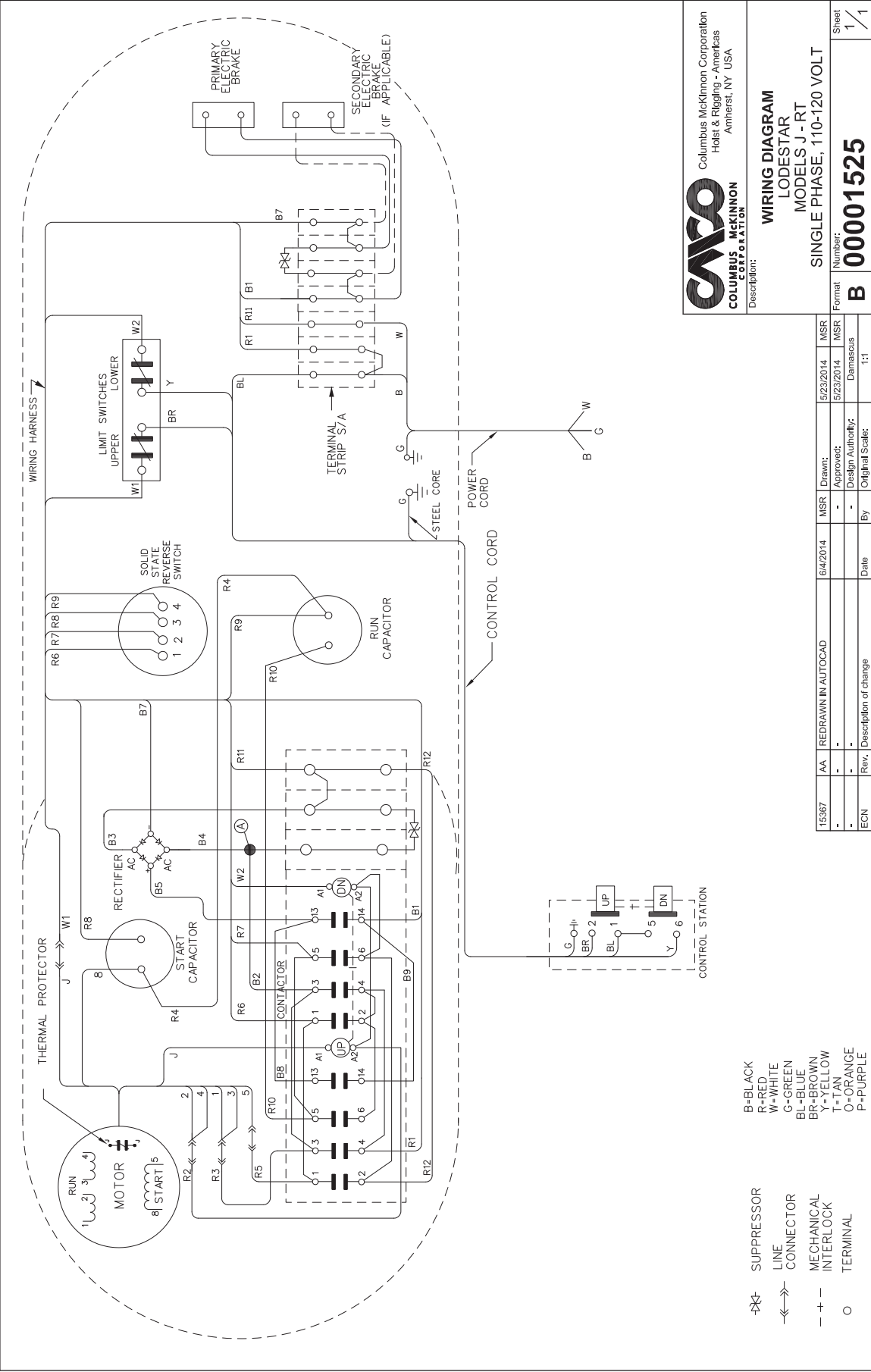
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**LODESTAR**  
**MODELS J - RT**  
**SINGLE PHASE**

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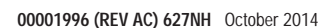
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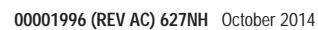
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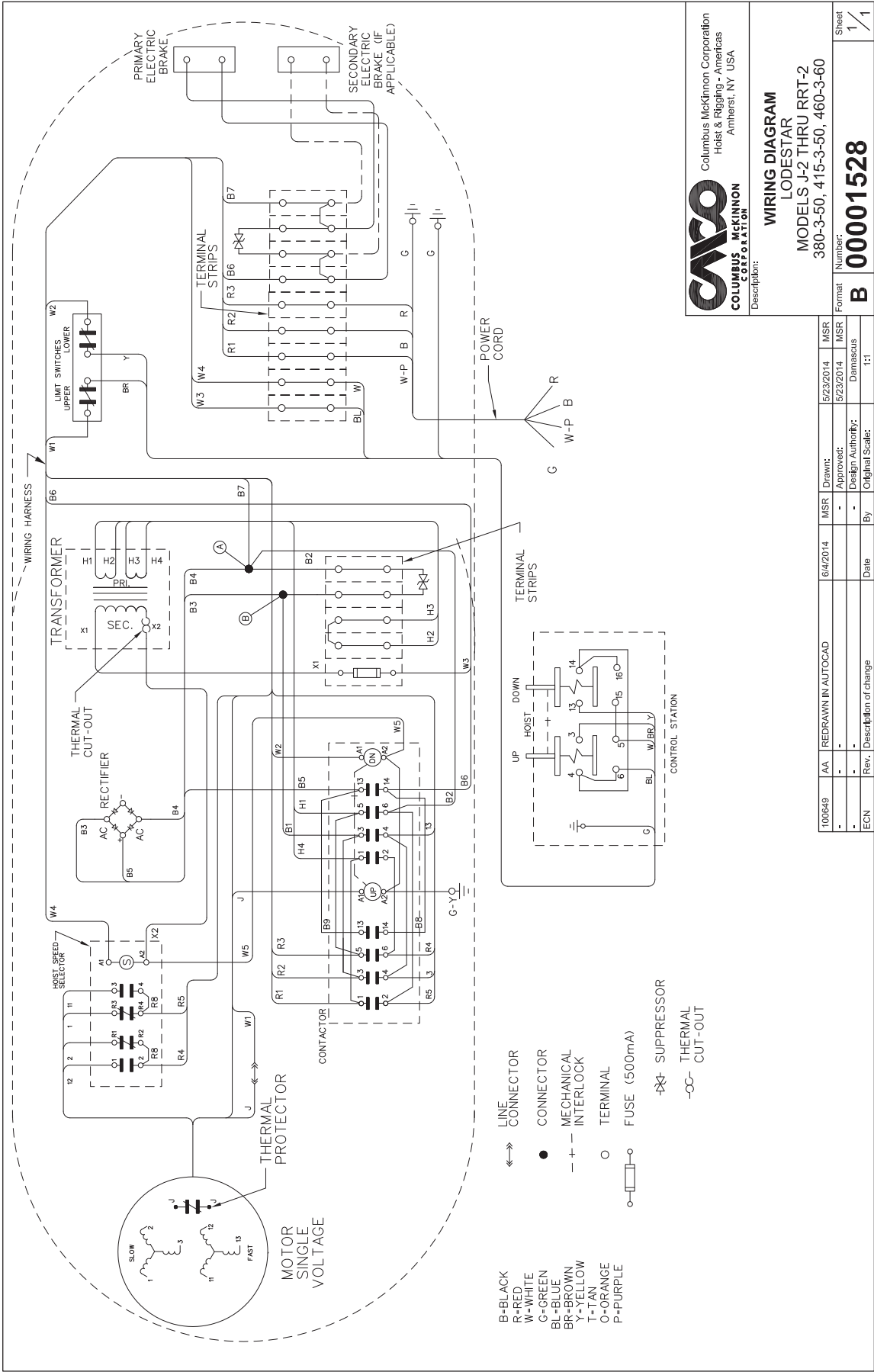


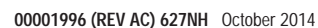


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## ASSEMBLY INSTRUCTIONS

### SWIVEL HOOK OR LUG SUSPENSION

Models E, E-2, H, H-2, R, R-2, RR, RR-2 Assemble the dead end bolt and block through the suspension adapter as shown in Figure 21.



Figure 21. Hook Suspension

### FASTENERS

See tables 2a and 2b for recommended torque values.

#### **⚠ 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 hand torque these screws to the recommended seating torque as specified in tables 2a and 2b. 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 above recommended torque may break the screw, damage the suspension adapter, strip the nuts and/or damage the hoist frame.

**SUSPENSION BOLT SHOULD BE REPLACED ANY TIME THE SUSPENSION IS REMOVED FROM THE HOIST**

**NOTE: RRS USES CHAIN BLOCK ON LOOSE END AND CHAIN IS NOT SECURED TO THE HOIST.**

### LOWER HOOK BLOCK PIN

When removing or installing the lower hook pin, 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" diameter (7.94mm) for Models A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2 and 3/8" (9.52mm) diameter for Models J, J-2, L, L-2, LL, LL-2 and (7/16" diameter (11.11mm) for Model RRS1 and it should be placed on 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 body in the V-Block with the larger hole on top. Next, check each end of the hole in the lower hook chain block and determine which end is the largest. Place the chain in the slot of the chain block and insert the chain block, with the large hole on top, into the hook block 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 block 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:**

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/DAMAGE:**

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

**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.**

#### **⚠ WARNING**

USE OF COMMERCIAL OR OTHER MANUFACTURER'S 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.

The first method is recommended when replacing severely worn load chain and requires disassembling the hoist. Method 2 does not require hoist disassembly, where as 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 23.
- 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 unfasten the dead end side of 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 may cause premature failure of the new chain. Parts can be easily identified by referring to pages Parts List section of table of contents.

- e. If the liftwheel pockets, in particular the ends, are worn or scored, replace liftwheel. If chain guides and housing are worn, cracked or damaged these parts should also be replaced.
- f. Reassemble hoist with the new load chain inserted over the liftwheel. Position chain with the weld on up standing 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.
- g. Attach the loose end link to chain and connect it to the hoist frame with the loose end screw, washer and lock washer, see Figure 7.

#### BE CERTAIN THERE IS NO TWIST.

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

- h. For single reeved models, attach the hook block to load chain and proceed to step K.
- i. 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.
- j. 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 certain that no twist exists in the reeving at any point. Assemble dead end pin, washer and cotter pin as shown in Figure 7.
- k. Adjust limit switches as described in Table 6, page 22. 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 if necessary.
- l. 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 up standing 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 lock washer 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 (61N•m) to 55 pound feet (74.6 N•m) 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.

### **WARNING**

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 block 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 from Method #1, a, b, c and h thru k. 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.

#### Method #3

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



## CUTTING CHAIN

CM® 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.

1. Use a grinder and nick the link on both sides (Figure 22), then secure the link in a vise and break off with a hammer.
2. Use a 177.8 mm (7 inches) minimum diameter by 3.175 mm (1/8 inch) thick abrasive wheel (or type recommended by wheel supplier) that will clear adjacent links.
3. Use a bolt cutter (Figure 23) similar to the H.K. Porter No. 0590MTC with special cutter jaws for cutting hardened chain (25.4mm-1 inch) long cutting edge.

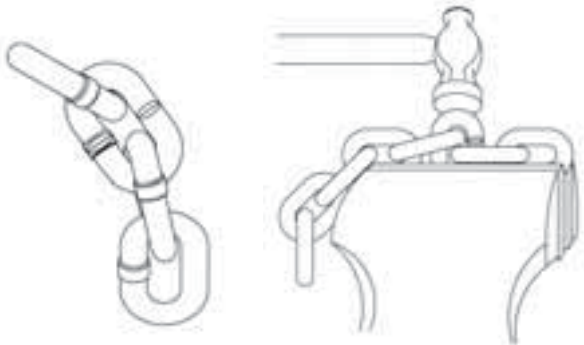
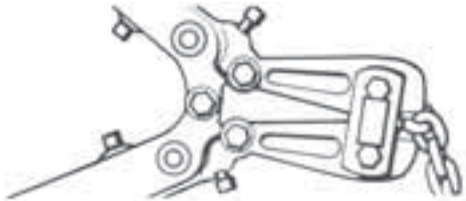


Figure 22A. Cutting Chain by Nicking Figure



22B. Cutting Chain with a Bolt Cutter

### **WARNING**

Cutting Chain Can Produce Flying Particles.

#### TO AVOID INJURY:

- Wear Eye Protection.
- Provide A shield Over Chain to Prevent Flying Particles.

### **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.

### **WARNING**

#### 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 22.7 kg. (50 pounds) 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 Load-limiter functions.

**\*If Load-limiter prevents lifting of a load of 125% of rated capacity, reduce load to rated capacity and continue test.**

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

## ORDERING INSTRUCTIONS

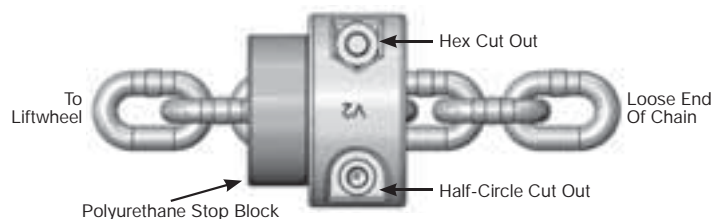
The following information must accompany all correspondence orders for replacement parts:

1. Hoist Model Number from identification plate.
2. Serial number of the hoist stamped below identification plate.
3. Voltage, phase, Hertz from the identification plate.
4. Length of lift.
5. Part number of part from parts list.
6. Number of parts required.
7. Part name from parts list. If trolley replacement parts are ordered, also include the type and capacity of trolley.

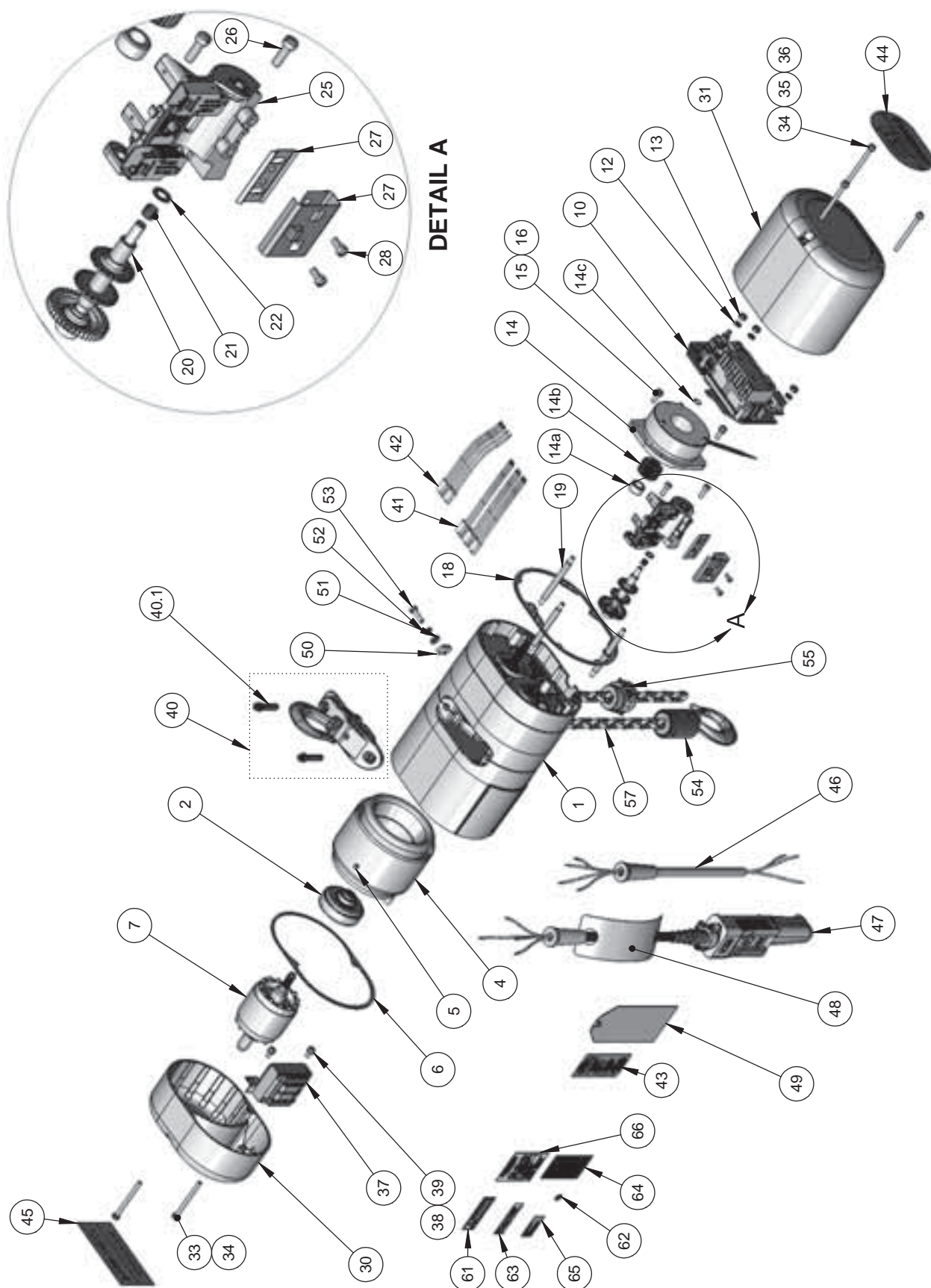
**NOTE: When ordering replacement parts, it is recommended that consideration be given to the need for also ordering such items as gaskets, fasteners, insulators, etc. These items may be damaged or lost during disassembly or just unfit for future use because of deterioration from age or service**

## CHAIN STOP INSTALLATION

Place polyurethane stop block over loose end of chain and slide past desired spot that the chain stop is to be located. Place one half of chain stop on chain. Then place other half on top of the first half of chain stop. (Note: be sure that the half circle cut out side of one stop block half is aligned with hex cut out side.) Place one (1) nut into hex cutout insert one (1) screw with one (1) lock washer through hole opposite nut and loosely tighten. Repeat for second connection. Tighten both screw connections to ensure that they do not come loose.



# MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2



## MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2

Item No.	Description	MODELS A & A-2	MODELS AA & AA-2	MODELS B & B-2	MODELS C & C-2	MODELS E & E-2	MODELS F & F-2	MODELS H & H-2	QTY.
1	GEAR BOX SUB-ASSY - DC TYPE BRAKE SEE GEARBOX SECTION	00000830C	00000831C	00000832C	00000833C	00000832C	00000834C		1
	CLEAN ROOM GEAR BOX SUB-ASSY - DC TYPE BRAKE SEE GEARBOX SECTION	00000835W	00000836W	00000837W	00000838W	00000837W	00000839W		
2	CLUTCH ASSEMBLY	C00000240	C00000241	C00000240	C00000241	C00000240	C00000241		1
3	EMPTY	-							-
4	STATOR - 115/230V-50HZ-1Ø	00000473	00000472	00000473	00000472	00000473	000004721		1
	STATOR - 115/230V-60HZ-1Ø	00000467	00000462	00000467	00000462	00000467	00000462		
	STATOR - 230/460V-3Ø	00000466	00000461	00000466	00000461	00000466	00000461		
	STATOR - 575V-3Ø	00000469	N/A	00000469	00000465	00000469	00000465		
	STATOR-230V-2 SPEED	00000471	00000463	00000471	00000463	00000471	00000463		
	STATOR-460V-2 SPEED	00000464	00000464	00000464	00000464	00000464	00000464		
	STATOR-575V-2 SPEED	00000470	N/A	00000470	00000470	00000470	00000470		
5	STATOR PIN	983541							1
6	MOTOR COVER GASKET	27847							1
7	ROTOR ASSEMBLY 50HZ-1Ø	00000261	00000261	00000261	00000261	00000261	00000261		1
	ROTOR ASSEMBLY 60HZ-1Ø	00000265	00000261	00000265	00000261	00000265	00000261		
	ROTOR ASSEMBLY 3Ø	00000264	00000260	00000264	00000260	00000264	00000260		
	ROTOR ASSEMBLY - 2 SPEED	00000262	00000263	00000262	00000263	00000262	00000263		
8-9	EMPTY	-							-
10	CONTACTOR PLATE ASSEMBLY	SEE CONTACTOR PLATE SECTION							1
11	EMPTY	-							-
12	LOCK WASHER	982226							3
13	CONTACTOR PLATE MOUNTING NUT	982514							3
14	BRAKE ASSEMBLY	SEE DC BRAKE SECTION							1
14a	BRAKE HUB SPACER	SEE DC BRAKE SECTION							0-1
14b	BRAKE HUB	SEE DC BRAKE SECTION							0-2
14c	BRAKE HUB SNAP RING	SEE DC BRAKE SECTION							1
15	LOCK WASHER	982226							2
16	BRAKE MOUNTING SCREW	982708							2
17	EMPTY								
18	BACK FRAME COVER GASKET	27848							1
19	CONTACTOR PLATE MOUNTING STUD	27836							3
20	LIMIT SWITCH SHAFT S/A - 44 TPI	00000521							1
	LIMIT SWITCH SHAFT S/A - 56 TPI	00000522							
	LIMIT SWITCH SHAFT S/A - 64 TPI	00000523							
21	LIMIT SWITCH SHAFT SPRING	28712							1
22	WASHER	987878							1
23-24	EMPTY	-							-

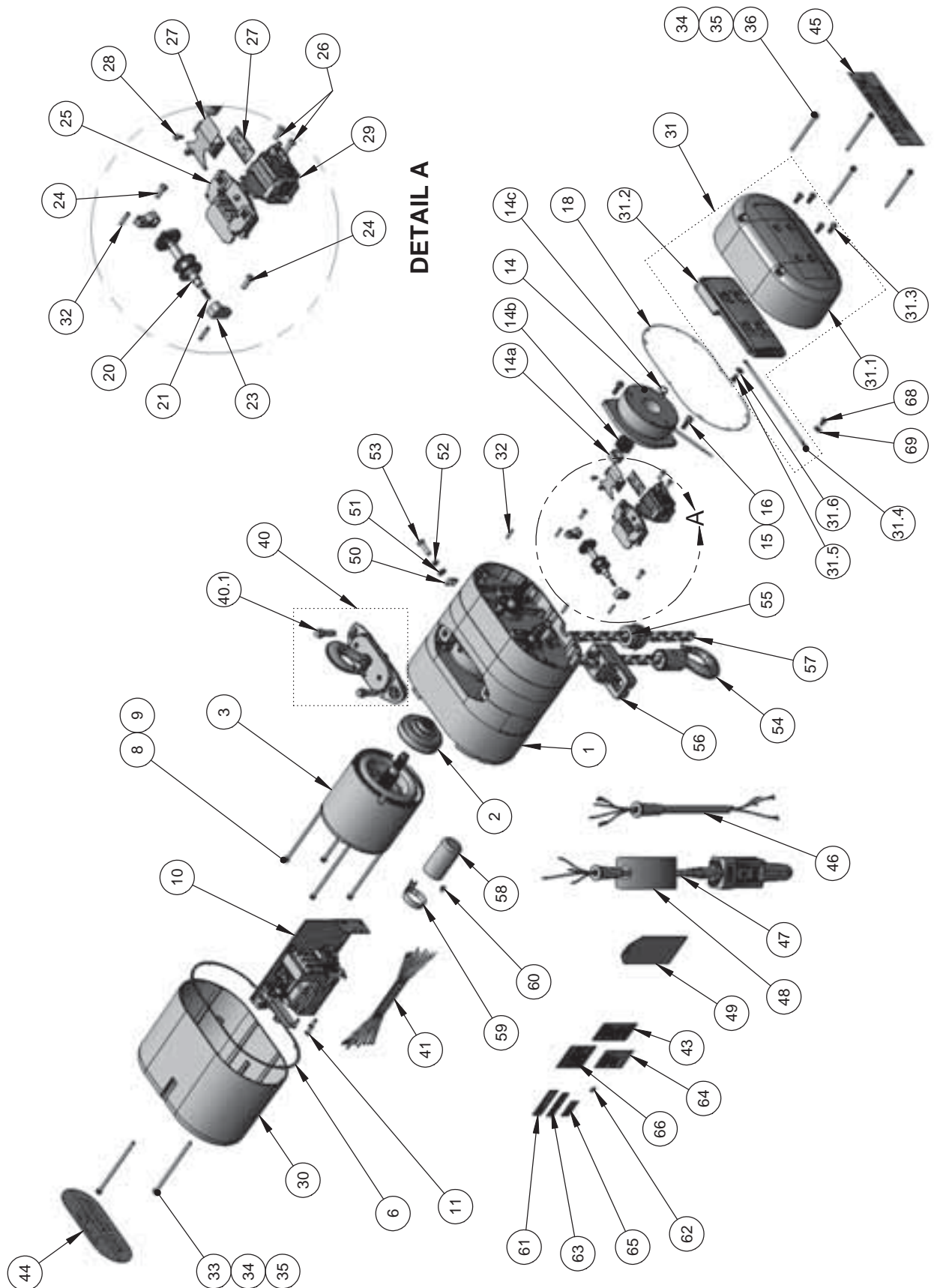
## MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2 (CONT.)

Item No.	Description	MODELS A & A-2	MODELS AA & AA-2	MODELS B & B-2	MODELS C & C-2	MODELS E & E-2	MODELS F & F-2	MODELS H & H-2	QTY.
25	LIMIT SWITCH BRACKET S/A - 1ø	00000532							1
	LIMIT SWITCH BRACKET S/A - 3ø	00000531							
26	LIMIT SWITCH BRACKET SCREWS	982708							2
27	LIMIT SWITCH SPRING GUIDE	52737							1
	LIMIT SWITCH GUIDE PLATE	28714							
28	LIMIT SWITCH GUIDE MOUNTING SCREW	983614							2
29	EMPTY	-							-
30	MOTOR COVER	27058							1
	MOTOR COVER - CLEAN ROOM	27034							
31	BACK FRAME COVER	28009C							1
	BACK FRAME COVER - CLEAN ROOM	28009W							
32	EMPTY	-							-
33	MOTOR COVER SCREW	987397							2
34	WASHER	982251							5
35	SCREW RETAINER	00001747							3
36	BACK FRAME COVER SCREW	87325							3
37	TRANSFORMER 24V SECONDARY	00000586T							1
	TRANSFORMER 48V SECONDARY	00000587T							
	TRANSFORMER 120V SECONDARY	00000588T							
38	LOCK WASHER	982226							2
39	TRANSFORMER MOUNTING SCREW	982688							2
40	UPPER SUSPENSION ASSEMBLY	SEE SUSPENSION SECTION							1
40.	1 SUSPENSION BOLT	987554							2
41	HARNESS-110/115V-1-50/60, 110/115V CON- TROL	00001516							1
	HARNESS-110/115V-1-50/60, 24/48V CONTROL	00001517							
	HARNESS-220/230V-1-50/60	00001522							
	HARNESS-220/230/380/415/460V-3-50/60	00001518							
	HARNESS-550/575V-3-50/60	00000807							
	HARNESS-220/230V-1-50/60, 2 SPEED	00000764							
	HARNESS-380/415/460V-1-50/60, 2 SPEED	00001519							
	HARNESS-550/575V-1-50/60, 2 SPEED	00000769							
	HARNESS-230-3-60, VFD	00001558							
	HARNESS-460-3-60, VFD	00001559							
42	HARNESS-V1 (3Ø ONLY)	00000749							1
43	WARNING LABEL	00000779							1
44	SERIES LABEL	00000780							1
45	CAPACITY LABEL	00000581		00000772		00000773		00000778	1

## MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2 (CONT.)

Item No.	Description	MODELS A & A-2	MODELS AA & AA-2	MODELS B & B-2	MODELS C & C-2	MODELS E & E-2	MODELS F & F-2	MODELS H & H-2	QTY.
46	POWER CORD-110/115V-1-50/60	29924							1
	POWER CORD-220/230V-1-50/60	29925							
	POWER CORD-3Ø (1 & 2 SPEED)	23606515							
	POWER CORD-CREEP CONTROL	29924							
47	CONTROL CORD	SEE CONTROL CORD SECTION							1
48	WARNING TAG	68209							1
49	INSTRUCTION TAG	29271							1
50	LOOSE END LINK	27351							1
51	WASHER	954802							1
52	LOCK WASHER	982226							1
53	LOOSE END SCREW	927764							1
54	LOWER HOOK BLOCK ASSEMBLY	SEE LOWER HOOK BLOCK SECTION							1
55	CHAIN STOP KIT	24015K							1
56	EMPTY	-							-
57	LOAD CHAIN	85944 (ZINC PLATED)							AS REQ'D
		85889 (BURNISHED AND OILED)							
		85965 (ZINC PHOSPHATE PLATED)							
		85915 (NICKEL PLATED)							
		85952 (STAINLESS STEEL - FOR USE IN CLEAN ROOM HOIST ONLY)							
58-60	EMPTY								
61	ELECTRICAL WARNING LABEL	24842							2
62	ROHS LABEL	00000782							1
63	ELECTRICAL INFORMATION LABEL	24846							1
64	BILINGUAL WARNING LABEL	27248							1
65	MANUFACTURE LABEL	927236							1
66	CHAIN LABEL	928894							1
67	HOIST IDENTIFICATION PLATE/LABEL	CONTACT FACTORY							1

**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**





# 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 (CONT.)

Item No.	Description	MODELS J & J-2	MODELS JJ & JJ-2	MODEL L MODEL L-2	MODELS LL & LL-2	MODELS R & R-2	MODELS RR & RR-2	MODELS RT & RT-2	MODELS RRT & RRT-2	QTY.
1	GEAR BOX SUB-ASSY - DC TYPE BRAKE SEE GEARBOX SECTION	00000845C	00000846C	00000847C	00000845C	00000847C	00000845C	00000848C	00000849C	1
2	CLUTCH ASSEMBLY	00000242	00000243	00000242	00000243	00000242	00000243	00000242	00000243	1
3	3/4 MOTOR - 115V-1Ø	00000401	-	00000401	-	00000401	-	00000401	-	1
	3/4 MOTOR - 230V-1Ø	00000428	-	00000428	-	00000428	-	00000428	-	
	3/4 MOTOR - 230/460V-3Ø	00000440	00000450	00000440	00000450	00000440	00000450	00000440	00000450	
	3/4 MOTOR - 575V-3Ø	00000433	00000439	00000433	00000439	00000433	00000439	00000433	00000439	
	3/4 MOTOR - 230V-2 SPEED	00000414	00000420	00000414	00000420	00000414	00000420	00000414	00000420	
	3/4 MOTOR - 460V-2 SPEED	00000415	00000421	00000415	00000421	00000415	00000421	00000415	00000421	
	3/4 MOTOR - 575V-2 SPEED	00000418	00000422	00000418	00000422	00000418	00000422	00000418	00000422	
4	EMPTY	-								-
5	EMPTY	-								-
6	MOTOR COVER GASKET	35845								1
7	ROTOR ASSEMBLY	-								-
8	LOCK WASHER	982226								4
9	MOTOR MOUNTING SCREW - 1Ø	87377								4
	MOTOR MOUNTING SCREW - 230/460V-3-60 OR 575V-3-60	87377	87336	87377	87336	87377	87336	87377	87336	
	MOTOR MOUNTING SCREW - 2 SPEED	87336								
10	CONTACTOR PLATE ASSEMBLY	SEE SEE CONTACTOR PLATE SECTION								1
11	CONTACTOR PLATE MOUNTING SCREW	983656								3
12	EMPTY	-								-
13	EMPTY	-								-
14	BRAKE ASSEMBLY	SEE BRAKE SECTION								1
14a	BRAKE HUB SPACER	SEE BRAKE SECTION								0-2
14b	BRAKE HUB	SEE BRAKE SECTION								0-2
14c	BRAKE HUB SNAP RING	SEE BRAKE SECTION								1
15	LOCK WASHER	945851								2
16	BRAKE MOUNTING SCREW	SEE BRAKE SECTION								1-2
18	BACK FRAME COVER GASKET	00000236								1
19	EMPTY	-								-
20	LIMIT SWITCH SHAFT S/A - 44 TPI	00000525	00000525	00000524	00000525	00000524	00000525	00000524	00000525	1
	LIMIT SWITCH SHAFT S/A - 56 TPI	00000527	00000527	00000526	00000527	00000526	00000527	00000526	00000527	
	LIMIT SWITCH SHAFT S/A - 64 TPI	00000529	00000529	00000528	00000529	00000528	00000529	00000528	00000529	
21	LIMIT SWITCH SHAFT SPRING	35703								1
22	EMPTY	-								-
23	LIMIT SWITCH BEARING	35751								2
24	LIMIT SWITCH BEARING SCREWS	983656								2
25	LIMIT SWITCH BRACKET S/A	36827								1
26	LIMIT SWITCH BRACKET SCREWS	983656								2
27	LIMIT SWITCH GUIDE PLATE	28714								1
	LIMIT SWITCH GUIDE PLATE-ROTATABLE	52500								
28	LIMIT SWITCH GUIDE MOUNTING SCREW	983614								2



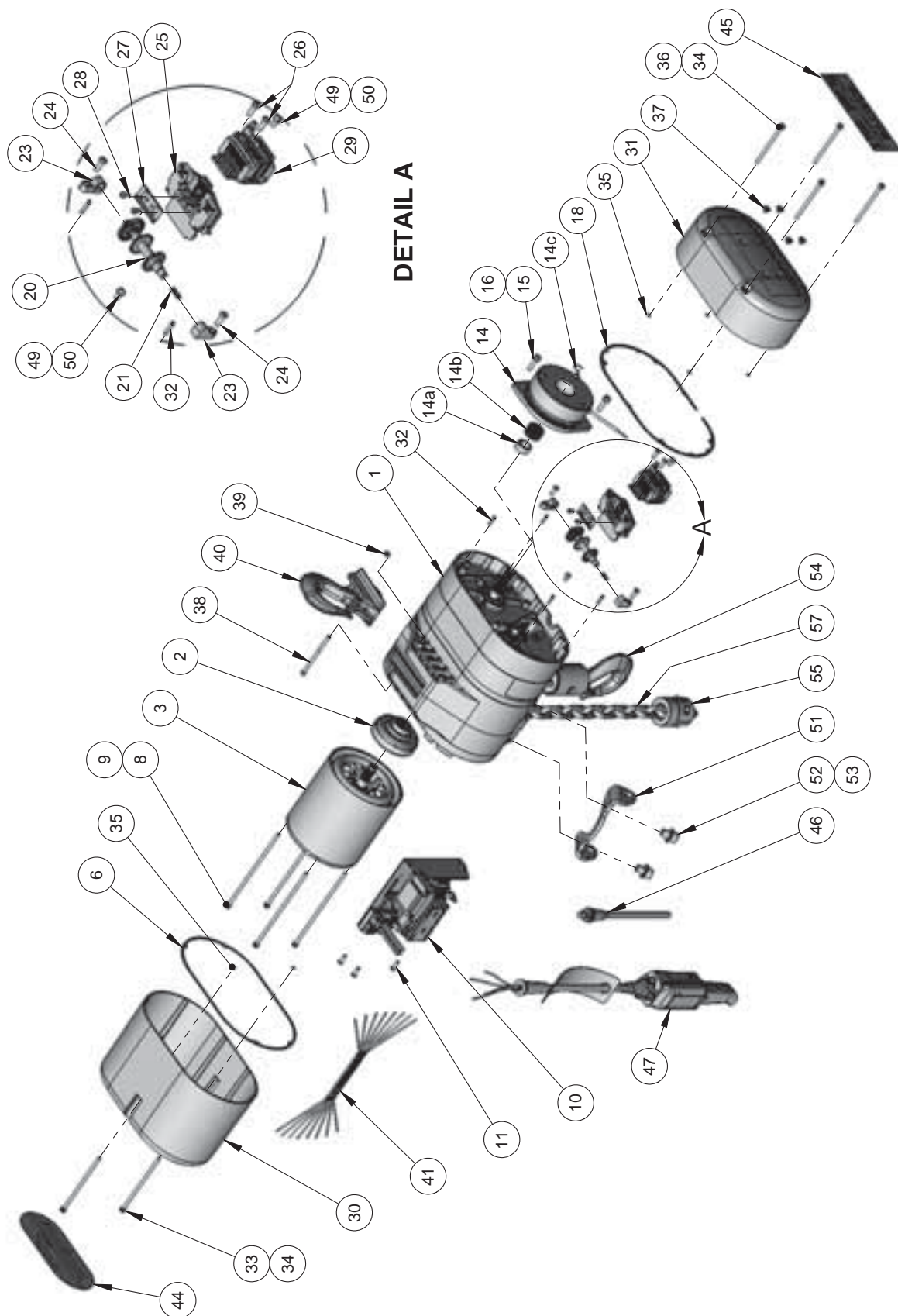
# **MODELS J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, & RRT-2 (CONT.)**

Item No.	Description	MODELS J & J-2	MODELS JJ & JJ-2	MODEL L MODEL L-2	MODELS LL & LL-2	MODELS R & R-2	MODELS RR & RR-2	MODELS RT & RT-2	MODELS RRT & RRT-2	QTY.
29	TERMINAL STRIP S/A (115V-1Ø)	00001739								1
	TERMINAL STRIP S/A (230V-1Ø)	00001738								
	TERMINAL STRIP S/A (230/460V-3Ø)	00001734								
	TERMINAL STRIP S/A (575V-1Ø)	00001735								
	TERMINAL STRIP S/A (230V-2 SPEED)	00001736								
	TERMINAL STRIP S/A (460/575V-2 SPEED)	00001746								
30	MOTOR COVER	36025C								1
31	BACK FRAME COVER ASSEMBLY	00000578C								1
31.1	BACK FRAME COVER	36008C								1
31.2	COUNTER WEIGHT	00000565								1
31.3	COUNTER WEIGHT SCREW	00000576								4
31.4	TETHER	00000575								1
31.5	SCREW	00000577								1
31.6	WASHER	00000554								1
32	BACK FRAME COVER PINS	983784								4
33	MOTOR COVER SCREW	987553								2
34	WASHER	982251								6
35	SCREW RETAINER	00001747								6
36	BACK FRAME COVER SCREW	968752								4
37-39	EMPTY	-								-
40	UPPER SUSPENSION ASSEMBLY	SEE SUSPENSION SECTION								1
40.1	SUSPENSION BOLT	36849								2
41	HARNESS-110/115V-1-50/60, 110/115V CONTROL	00001530								1
	HARNESS-110/115V-1-50/60, 24/48V CONTROL	00001523								
	HARNESS-220/230V-1-50/60	00001523								
	HARNESS- 220/230/380/415/460V-3-50/60	00001531								
	HARNESS-550/575V-3-50/60	00001534								
	HARNESS-220/230V-1-50/60, 2 SPEED	00001532								
	HARNESS-380/415/460V-1-50/60, 2 SPEED	00001533								
	HARNESS-550/575V-1-50/60, 2 SPEED	00001533								
	HARNESS-230-3-60, VFD	000001556								
	HARNESS-460-3-60, VFD	00001556								
42	EMPTY	-								-
43	WARNING LABEL	00000779								1
44	SERIES LABEL	00000781								1
45	CAPACITY LABEL	00000774		00000775		00000776		00000777		1
46	POWER CORD-110/115V-1-50/60	29042								1
	POWER CORD-220/230V-1-50/60	29042								
	POWER CORD-3Ø (1 & 2 SPEED)	23606515								
47	CONTROL STATION AND CORD	SEE CONTROL STATION SECTION								1
48	WARNING TAG	68209								1

# 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 (CONT.)

Item No.	Description	MODELS J & J-2	MODELS JJ & JJ-2	MODEL L MODEL L-2	MODELS LL & LL-2	MODELS R & R-2	MODELS RR & RR-2	MODELS RT & RT-2	MODELS RRT & RRT-2	QTY.
49	INSTRUCTION TAG	29271								1
50	LOOSE END LINK	35367								1
51	WASHER	954807								1
52	LOCK WASHER	945851								1
53	LOOSE END SCREW	987210								1
54	LOWER HOOK BLOCK ASSEMBLY	SEE LOWER HOOK BLOCK SECTION								1
55	CHAIN STOP KIT	24016K								1
56	CONTACT BLOCK	-				00000224C		-		1
57	LOAD CHAIN	85949 (ZINC PLATED)								AS REQ'D
		85979 (BURNISHED AND OILED)								
		85966 (ZINC PHOSPHATE PLATED)								
		85916 (NICKEL PLATED)								
58	SOLID STATE REVERSE SWITCH	35499								1*
59	SOLID STATE REVERSE SWITCH MTG. CLAMP	27275								1*
60	SOLID STATE REVERSE SWITCH MTG. CLAMP SCREW	982873								1*
61	ELECTRICAL WARNING LABEL	24842								2
62	ROHS LABEL	00000782								1
63	ELECTRICAL INFORMATION LABEL	24846								1
64	BILINGUAL WARNING LABEL	27248								1
65	MANUFACTURE LABEL	927236								1
66	CHAIN LABEL	928894								1
67	HOIST IDENTIFICATION PLATE/LABEL (NOT SHOWN)	Contact Factory								1
68	SCREW	00000577								1
69	WASHER	00000554								1

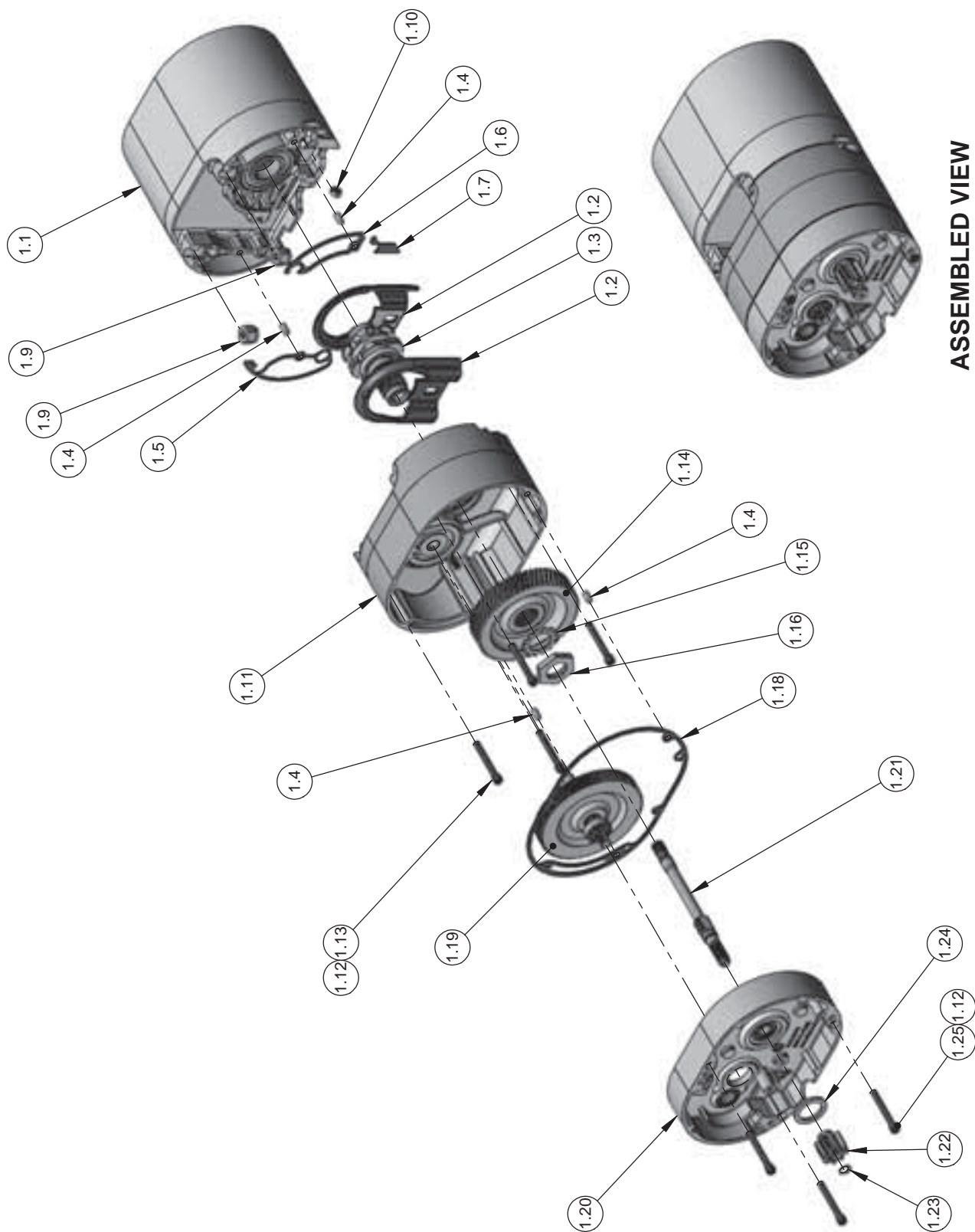
# MODEL RRS



# MODEL RRS

Item No.	Description	Part Number	Qty.
1	GEARBOX ASSEMBLY-ORANGE	10001000C	1
2	CLUTCH ASSEMBLY-V2-2 HP	00000243	1
3	MOTOR - 230/460V-WITH PLUG	10001023	1
	MOTOR 2HP- 575V	10001024	
4	EMPTY	-	-
5	EMPTY	-	-
6	GASKET-MOTOR COVER	10001019	1
7	EMPTY	-	-
8	LOCK WASHER	982226	4
9	MOTOR MOUNTING SCREW	87334	4
10	CONTACTOR PLATE ASSEMBLY	SEE CONTACTOR PLATE SECTION	1
11	CONTACTOR PLATE MOUNTING SCREWS	983656	3
12	EMPTY	-	-
13	EMPTY	-	-
14	BRAKE ASSEMBLY	SEE BRAKE SECTION	1
14a	BRAKE HUB SPACER	00001433	1
14b	BRAKE HUB	00001431	1
14c	BRAKE HUB SNAP RING	10409711	1
15	LOCK WASHER	945851	2
16	BRAKE MOUNTING SCREW	982709	2
17	EMPTY	-	-
18	BACK FRAME COVER GASKET	00000236	1
19	EMPTY	-	-
20	LIMIT SWITCH SHAFT S/A - 44 TPI	00000524	1
	LIMIT SWITCH SHAFT S/A - 56 TPI	00000526	
	LIMIT SWITCH SHAFT S/A - 64 TPI	00000528	
21	LIMIT SWITCH SHAFT SPRING	35703	1
22	EMPTY	-	-
23	LIMIT SWITCH BEARING	35751	2
24	LIMIT SWITCH BEARING SCREWS	983656	2
25	LIMIT SWITCH BRACKET S/A	36827	1
26	LIMIT SWITCH BRACKET SCREWS	983656	2
27	LIMIT SWITCH GUIDE PLATE	28714	1
28	LIMIT SWITCH GUIDE PLATE MOUNTING SCREWS	983614	2
29	TERMINAL STRIP S/A (230/460V-3ø)	00001734	1
	TERMINAL STRIP S/A (575V-3ø)	00001735	
30	MOTOR COVER	36025C	1
31	BACK FRAME COVER	36008C	1
32	BACK FRAME COVER PINS	983784	4
33	MOTOR COVER SCREW	987553	2
34	WASHER	982251	6
35	SCREW RETAINER	00001747	6
36	BACK FRAME COVER SCREW	968752	4
37	HOLE PLUG	00000574	4
38	SUSPENSION RETAINER SCREW	10001047	1
39	SUSPENSION RETAINER NUT	82638	1
40	UPPER SUSPENSION ASSEMBLY	SEE SUSPENSION SECTION	1
41	WIRING HARNESS (230/460V-3ø)	00001531	1
	WIRING HARNESS (575V-3ø)	00001534	
42	LINE CONNECTOR (NOT SHOWN)	982158	1
43	EMPTY	-	-
44	SERIES LABEL	00000781	1
45	CAPACITY LABEL	00000776	1
46	POWER CORD	23606515	1
	KIT, LESS POWER CORD	28039	
47	CONT STATION AND CORD	SEE LOWER HOOK BLOCK SECTION	1
48	EMPTY	-	-
49	GROUND SCREW	987827	2
50	LOCK WASHER	982226	2
51	CHAIN CONTAINER BRACKET	10001041	1
52	WASHER	10001043	2
53	SCREW	982433	2
54	LOWER HOOK ASSEMBLY	10001052	1
55	CHAIN BLOCK KIT	10001029	1
56	CHAIN STARTER LINK (NOT SHOWN)	85960LEL	1
57	LOAD CHAIN, ZINC PLATED	85960EN	REQ'D LIFT +2FT

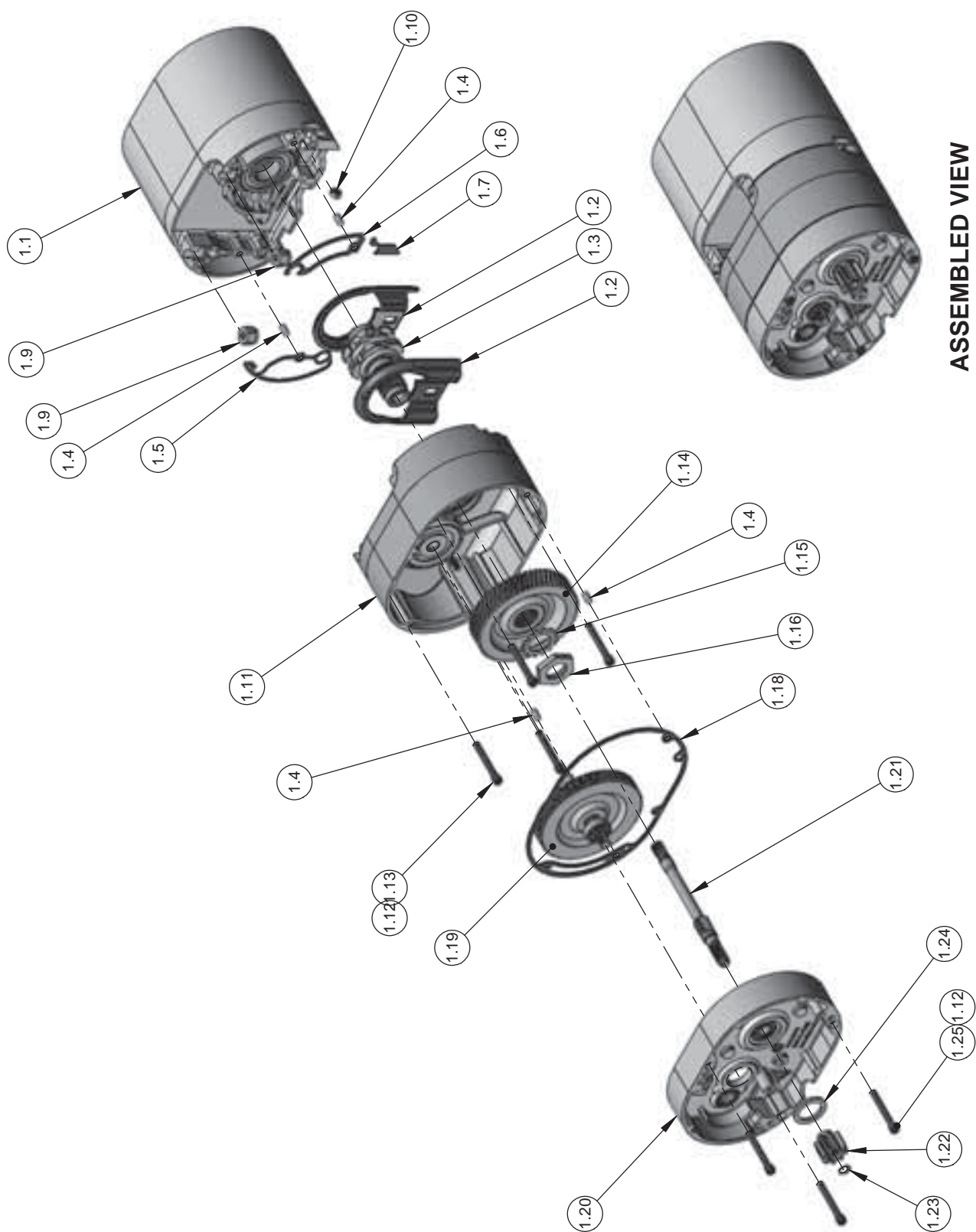
MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2



# MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2 (CONT.)

Item No.	Description	DC TYPE BRAKE					Qty.
		Model A	Model AA	MODELS B/ E	MODELS B/ E	MODELS F/ H	
1	GEARBOX SUB-ASSEMBLY	00000830C	00000831C	00000832C	00000833C	00000834C	1
	CLEAN ROOM GEAR BOX SUB-ASSEMBLY	00000835W	00000836W	00000837W	00000838W	00000839W	
1.1	MOTOR HOUSING SUB-ASSY	00000504C					1
	CLEAN ROOM MOTOR HOUSING 1SUB-ASSY	00000504W					
1.2	CHAIN GUIDE	00000232					2
	CLEAN ROOM CHAIN GUIDE	00000811					
1.3	LIFTWHEEL	00000500					1
	CLEAN ROOM LIFTWHEEL	00000818					
1.4	DOWEL PIN	82354					4
1.5	GASKET-MOTOR HOUSING WIREWAY	00000189					1
1.6	GASKET MOTOR HOUSING	00000190					1
1.7	GASKET MOTOR HOUSING	00000191					1
1.8	EMPTY	-					-
1.9	SUSPENSION NUT	927755					2
1.10	LOOSE END NUT	82638					1
1.11	GEAR HOUSING SUB-ASSY	00000503C	00000503C	00000502C	00000503C	00000502C	1
	CLEAN ROOM GEAR HOUSING SUB-ASSY	00000503W	00000503W	00000502W	00000503W	00000502W	
1.12	LOCK WASHER	940802					7
1.13	GEAR HOUSING SCREW	28830					4
1.14	LIFTWHEEL GEAR	00000160 (45TEETH)	00000159 (36TEETH)	00000161 (59TEETH)	00000160 (45TEETH)	00000161 (59TEETH)	1
1.15	LOCK WASHER	00000199					1
1.16	LIFTWHEEL NUT	00000198					1
1.17	EMPTY	-					-
1.18	GEAR HOUSING GASKET	00000188					1
1.19	INTERMEDIATE SHAFT SUB-ASSY	00000156 (88TEETH/ 12TEETH)	00000157 (88TEETH/ 18TEETH)	00000155 (88TEETH/ 8TEETH)	00000156 (88TEETH/ 12TEETH)	00000155 (88TEETH/ 8TEETH)	1
1.20	BACK FRAME SUB-ASSY	00000505C*					1
	CLEAN ROOM BACK FRAME SUB-ASSY	00000505W*					
1.21	DRIVE SHAFT	00000819 (10 TEETH)					1
1.22	BRAKE HUB	SEE BRAKE SECTION					1
1.23	RETAINING RING	SEE BRAKE SECTION					1
1.24	SPACER	SEE BRAKE SECTION					1
1.25	BACKFRAME SCREW	982699					3

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

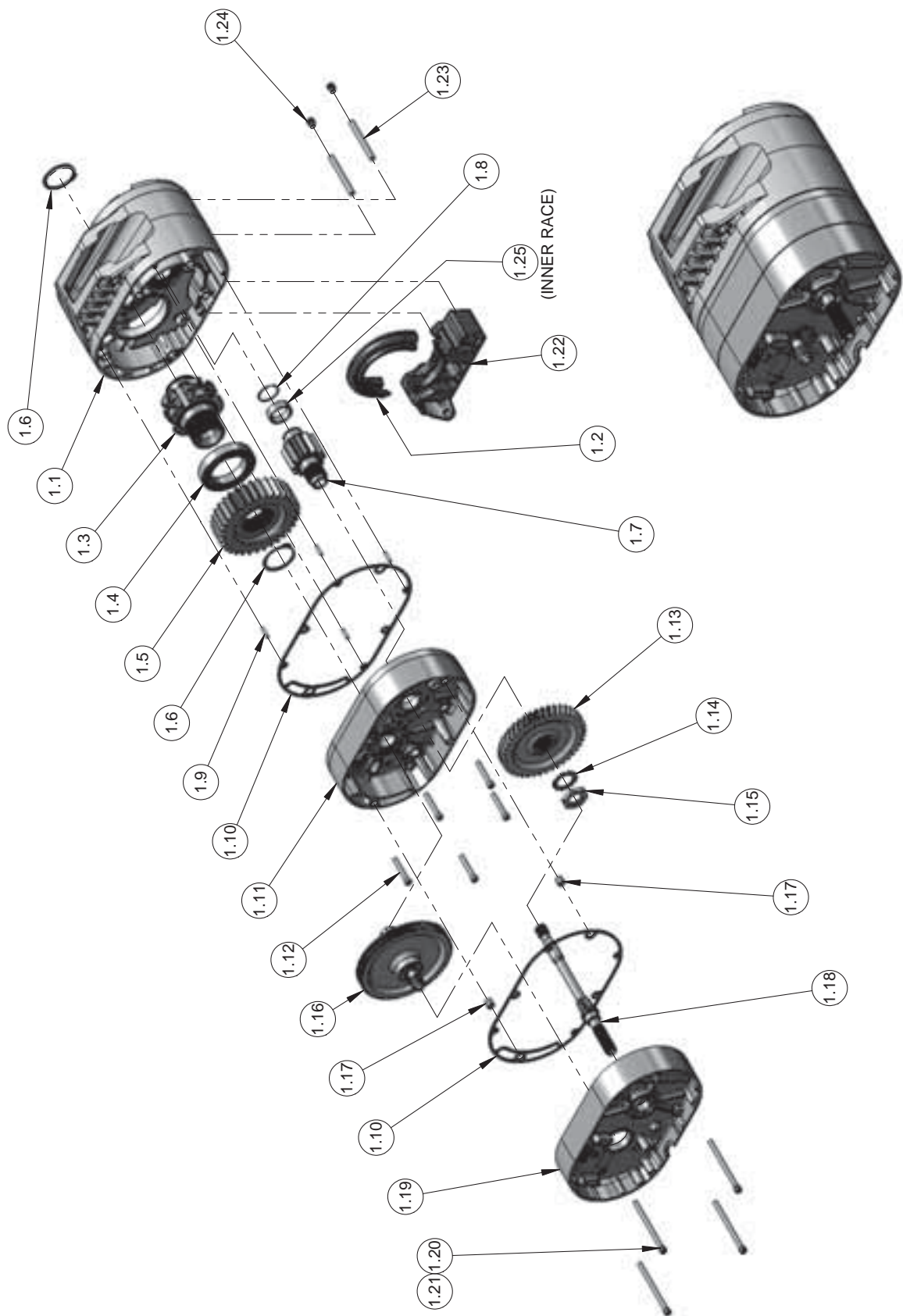




# J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, & RRT-2 (CONT.)

Item No.	Description	DC TYPE BRAKE					Qty.
		MODELS J/LL/RR	MODEL JJ	MODELS L/R	MODEL RT	MODEL RRT	
1	GEARBOX SUB-ASSEMBLY	00000845C	00000846C	00000847C	00000848C	00000849C	1
1.1	MOTOR HOUSING SUB-ASSY	00000509C	00000509C	00000509C	00000513C	00000513C	1
1.2	CHAIN GUIDE	00000235					2
1.3	LIFT-WHEEL	00000501					1
1.4	DOWEL PIN	82354					2
1.5	GASKET-MOTOR HOUSING WIREWAY	00000193					1
1.6	GASKET MOTOR HOUSING	00000194					1
1.7	GASKET MOTOR HOUSING	00000549					1
1.8	SUSPENSION ANCHOR	35066					2
1.9	SUSPENSION NUT	935791					2
1.10	LOOSE END NUT	82639					1
1.11	GEAR HOUSING SUB-ASSY	00000507C	00000508C	00000507C	00000512C	00000512C	1
1.12	LOCK WASHER	940830					8
1.13	GEAR HOUSING SCREW	982682					8
1.14	LIFEWHEEL GEAR	00000163 (66 TEETH)	00000162 (42 TEETH)	00000163 (66 TEETH)	00000163 (66 TEETH)	00000163 (66 TEETH)	1
1.15	LOCK WASHER	986276					1
1.16	LIFTWHEEL NUT	35773					1
1.17	ALIGNMENT BUSHING	35768					2
1.18	GEAR HOUSING GASKET	00000192					1
1.19	INTERMEDIATE SHAFT SUB-ASSY	00000146 (47 TEETH/ 8 TEETH)	00000170 (47 TEETH/ 10 TEETH)	00000171 (92 TEETH/ 8 TEETH)	00000171 (92 TEETH/ 8 TEETH)	00000146 (47 TEETH/ 8 TEETH)	1
1.2	BACK FRAME SUB-ASSY	00000510C					1
1.21	DRIVE SHAFT	00000821 (10 TEETH)	00000821 (10 TEETH)	00000820 (10 TEETH)	00000820 (10 TEETH)	00000821 (10 TEETH)	1
1.22	BRAKE HUB	SEE BRAKE SECTION					1
1.23	RETAINING RING	SEE BRAKE SECTION					1

# RRS GEARBOX

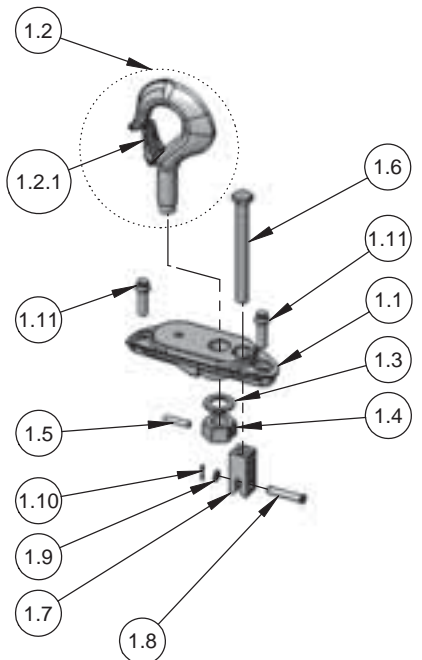


ASSEMBLED VIEW

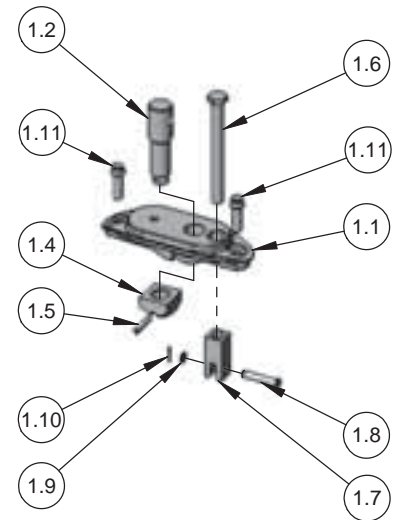
## RRS GEARBOX

Item No.	Description	Part Number	Qty.
1	GEARBOX ASSEMBLY	10001000	1
1.1	MAIN FRAME SUB ASSEMBLY-ORANGE	10001001C	1
1.2	CHAIN GUIDE	10001004	1
1.3	LIFTWHEEL-5PKT-10MM X 30MM	10001074	1
1.4	RADIAL BALL BEARING	10001017	1
1.5	GEAR-33T	10001006	1
1.6	RETAINING RING-EXTERNAL	10001108	2
1.7	PINION SUB-ASSY-12T	10001007	1
1.8	RETAINING RING-EXTERNAL	10001107	1
1.9	SPRING PIN	983784	4
1.1	GASKET-GEAR HOUSING-V2	00000192	2
1.11	INT. FRAME-SUB-ASSY-ORANGE	10001009C	1
1.12	SCREW	982682	5
1.13	GEAR - 42 TEETH	00000162	1
1.14	WASHER-LOCK-EXT TOOTH	986276	1
1.15	NUT	35773	1
1.16	SHAFT SUB-ASSY 10T/92T	10001011	1
1.17	DOWEL, BACK FRAME	35768	2
1.18	DRIVE SHAFT-10T	10001012	1
1.19	V2 BACK FRAME S/A-ORANGE	00000510C	1
1.20	SCREW	80409	4
1.21	LOCK WASHER	940830	4
1.22	CHAIN CHUTE-MACHINED-BLACK	10001014B	1
1.23	DOWEL PIN	10001038	2
1.24	SET SCREW	10001045	2
1.25	CYLINDRICAL ROLLER BEARING	10001016	1

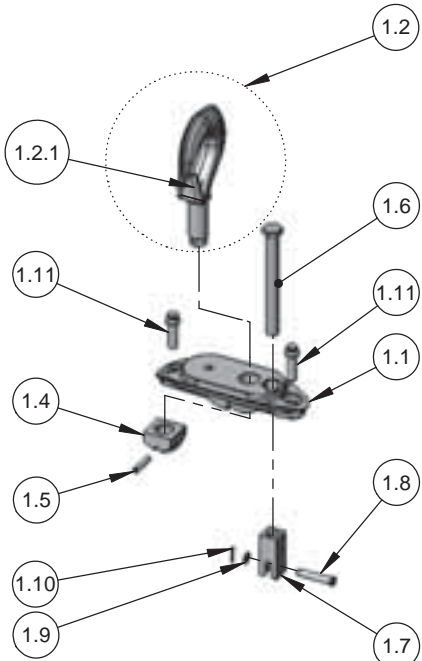
## MODEL A TO RRT-2 EXCLUDES RRS.



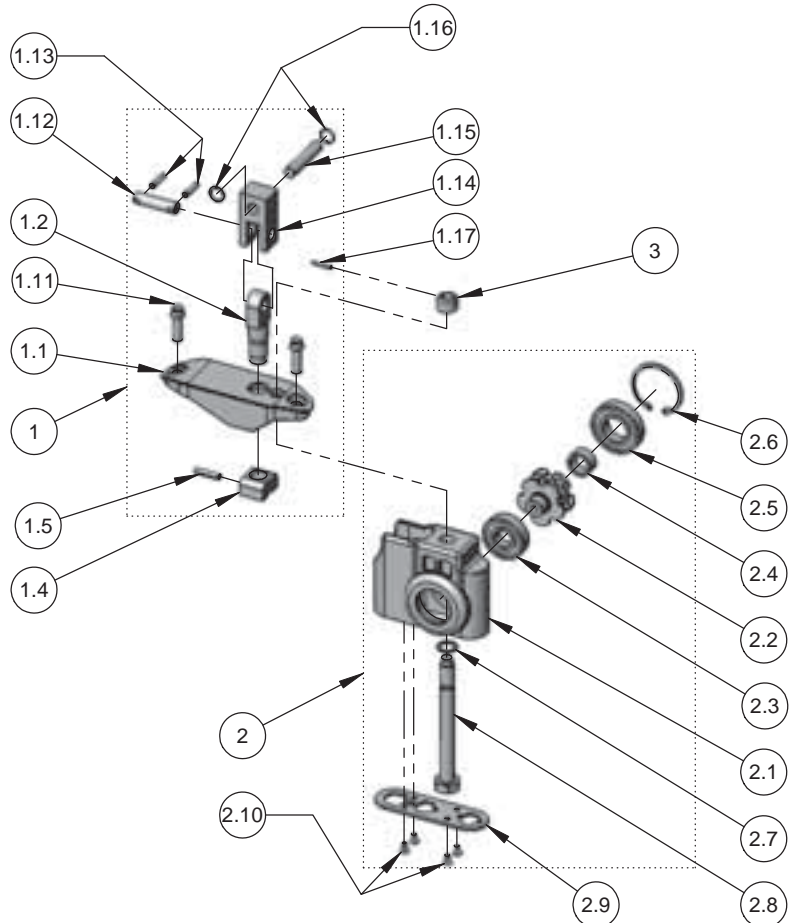
SWIVEL HOOK ASSEMBLY



LUG ASSEMBLY



RIGID HOOK ASSEMBLY



TRIPLE REEVED LUG ASSEMBLY

## UPPER SUSPENSIONS

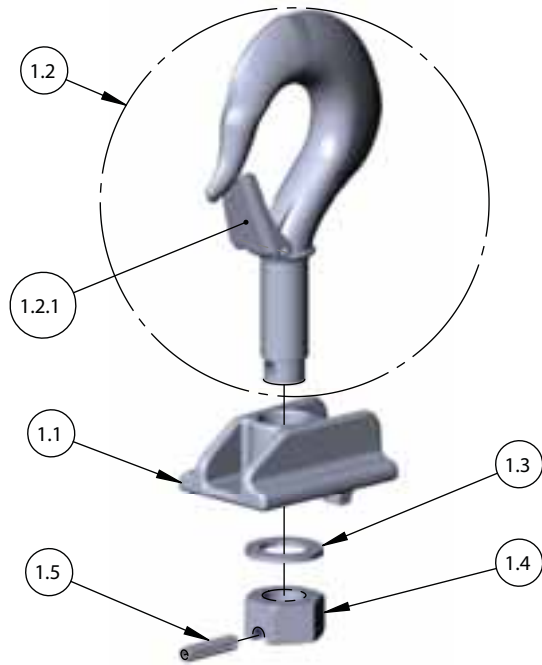
## UPPER SUSPENSIONS

Item No.	Description	Part Numbers					QTY.
		MODELS A, A-2, AA, AA-2, B, B- 2, C, C-2, F, F-2	MODELS E, E-2, H, H-2	MODELS J, J-2, L, L- 2, LL, LL-2	MODELS R, R-2, RR, RR-2	MODELS RT, RT-2, RRT, RRT-2	
1	SWIVEL SUSPENSION ASSEMBLY - W/ LATCH TYPE HOOK	2792NH	2793NH	3661NH	3660NH	9557NH	1
	SWIVEL SUSPENSION ASSEMBLY - W/ LATCHLOK TYPE HOOK	2796NH	-*	3662NH	3663NH	-*	
	RIGID SUSPENSION ASSEMBLY - W/ LATCH TYPE HOOK	2788NH	2789NH	3651NH	3658NH	9559NH	
	RIGID SUSPENSION ASSEMBLY - W/ LATCHLOK TYPE HOOK	2790NH	-*	3652NH	-*	-*	
	LUG SUSPENSION FOR MOTOR DRIVEN TROLLEY	2992NH	2993NH	3679NH	3668NH	9561NH	
	LUG SUSPENSION FOR LOW HEADROOM TROLLEY	2778NH	2779NH	3677NH			
1.1	SUSPENSION ADAPTER	00000218B	00000223B	00000220B	00000221B	00000222B	1
1.2	UPPER HOOK SUB-ASSEMBLY - LATCH TYPE	28689B	28697B	35617B	35616B	36613B	1
	UPPER HOOK SUB-ASSEMBLY - LATCHLOK TYPE	28643	-*	36678	36680	-*	
	SUSPENSION LUG FOR MOTOR DRIVEN TROLLEY	27454	27455	35459	35457	36356	
	SUSPENSION LUG FOR LOW HEADROOM TROLLEY	27450	27452	35456			
1.2.1	LATCH KIT	45661	45661	45662	45663	45663	-**
1.3	THRUST WASHER (FOR SWIVEL SUSPENSIONS ONLY)	27786	45930	45930	45918	-	1
1.4	UPPER HOOK COLLAR FOR SWIVEL SUSPENSIONS	27350	45385	35042	35041	36352	1
	UPPER HOOK COLLAR FOR RIGID HOOK AND LUG SUSPENSIONS	27372	27373	35458	35426	36360	
1.5	SPRING PIN	27805	45941	983764	983762	983762	1
1.6	DEAD END BOLT	-	89508	-	35957	-	1
1.7	DEAD END BLOCK	-	27397	-	35418	-	1
1.8	DEAD END PIN	-	82320	-	82314	-	1
1.9	WASHER	-	987878	-	987877	-	1
1.10	COTTER PIN	-	988330	-	988330	-	1
1.11	SUSPENSION SCREW	987554	987554	36849	36849	36849	2
1.12	SUSPENSION LUG SUPPORT PIN	-	-	-	-	36366	1
1.13	PIN RETAINER	-	-	-	-	983760	2
1.14	SHACKLE	-	-	-	-	36357	1
1.15	SHACKLE SUPPORT PIN	-	-	-	-	36363	1
1.16	RING RETAINER	-	-	-	-	36867	2
1.17	SHEAVE STUD PIN	-	-	-	-	983791	1
2	UPPER SHEAVE HANGER S/A	-	-	-	-	00000285C	1
2.1	UPPER SHEAVE HANGER	-	-	-	-	00000281C	1
2.2	SHEAVE	-	-	-	-	00000274	1
2.3	BEARING 6305ZZ	-	-	-	-	83674	1
2.4	PILOT BUSHING	-	-	-	-	00000284	1
2.5	BEARING 6207ZZ	-	-	-	-	83669	1
2.6	RETAINING RING	-	-	-	-	46800	1
2.7	WASHER	-	-	-	-	36370	1
2.8	SHEAVE STUD	-	-	-	-	36372	1
2.9	CLOVER LEAF PLATE	-	-	-	-	00000282B	1
2.10	SCREW	-	-	-	-	936823	4
3	SHEAVE STUD NUT	-	-	-	-	00000289	1

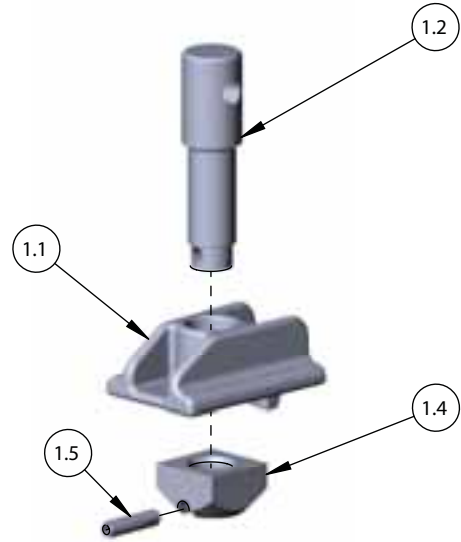
\*Contact factory for Latchlok hooks and assemblies

\*\* Latch Type hooks assemblies come with latches installed

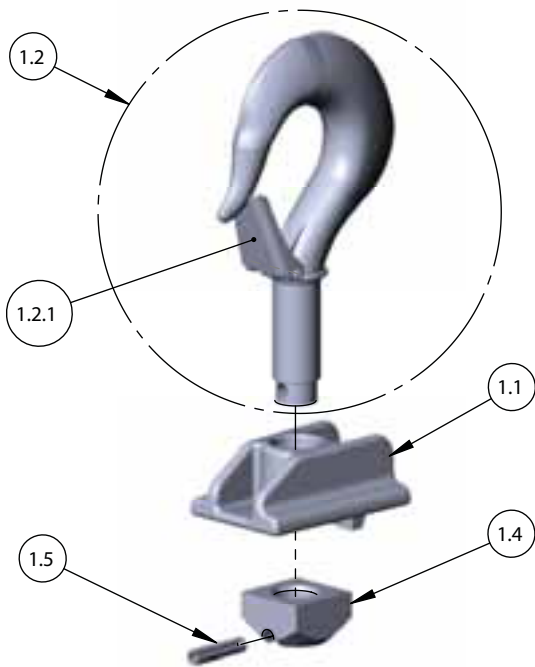
UPPER SUSPENSIONS MODEL RRS



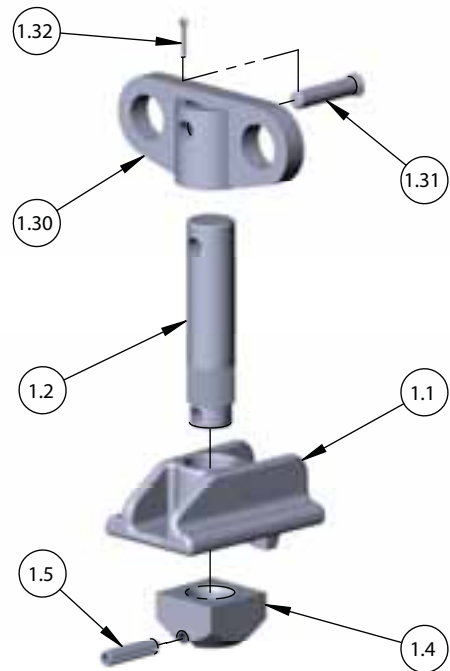
SWIVEL HOOK ASSEMBLY



LUG ASSEMBLY



RIGID HOOK ASSEMBLY



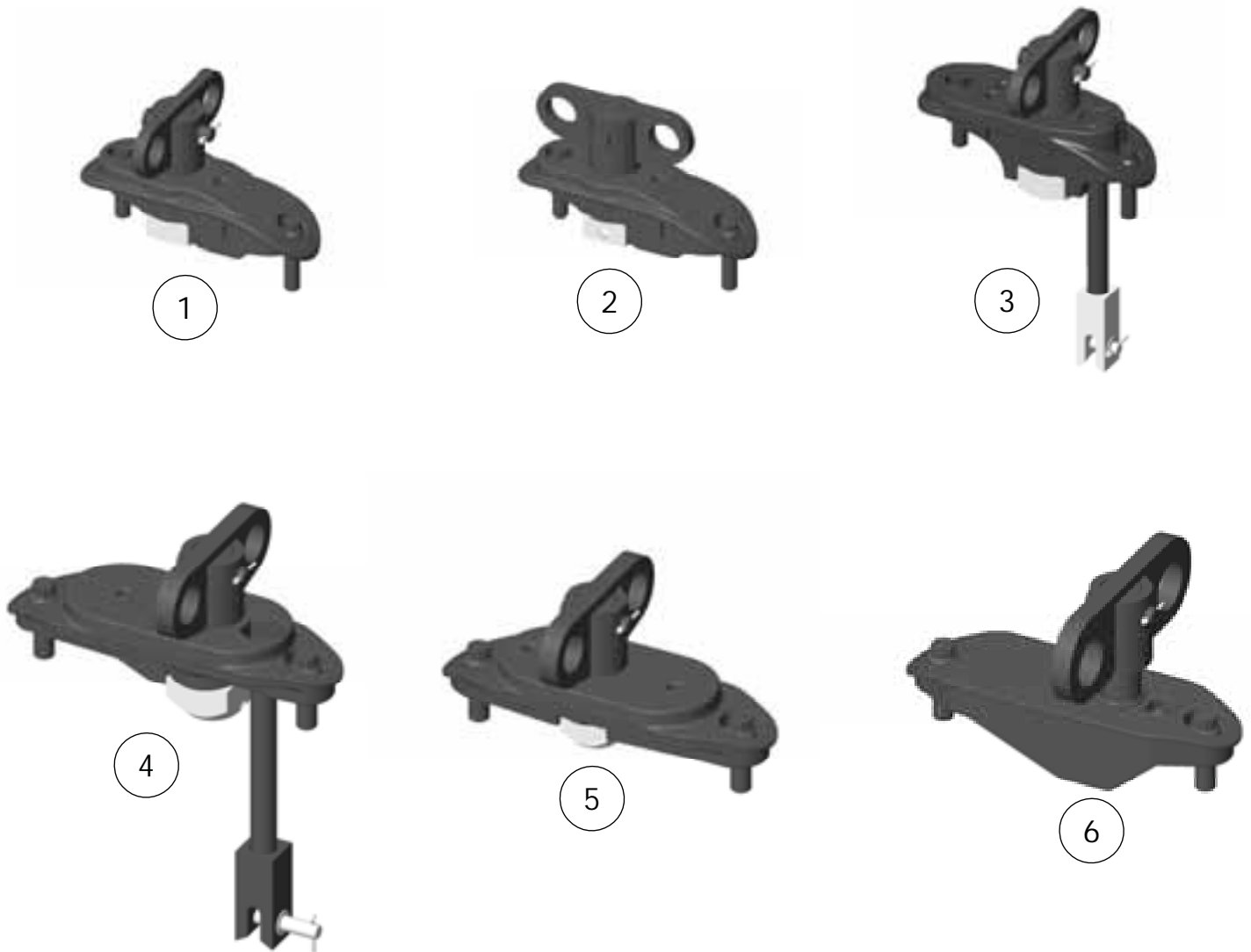
UNIVERSAL TROLLEY LUG ASSEMBLY

## UPPER SUSPENSIONS MODEL RRS

Item No.	Description	Part Number	Qty.
1	SWIVEL SUSPENSION ASSEMBLY - W/ LATCH TYPE HOOK	10001100	1
	SWIVEL SUSPENSION ASSEMBLY - W/ LATCHLOK TYPE HOOK	-*	
	RIGID SUSPENSION ASSEMBLY - W/ LATCH TYPE HOOK	10001101	
	RIGID SUSPENSION ASSEMBLY - W/ LATCH TYPE HOOK CROSS MOUNT	10001101X	
	RIGID SUSPENSION ASSEMBLY - W/ LATCHLOK TYPE HOOK	-*	
	LUG SUSPENSION FOR LOW HEADROOM OR MOTOR DRIVEN TROLLEY	10001103	
	LUG SUSPENSION FOR LOW HEADROOM OR MOTOR DRIVEN TROLLEY CROSS MOUNT	10001103X	
	LUG SUSPENSION FOR UNIVERSAL TROLLEY	10001104	
	LUG SUSPENSION FOR UNIVERSAL TROLLEY CROSS MOUNT	10001104X	
1.1	SUSPENSION ADAPTER	10001050B	1
1.2	UPPER HOOK SUB-ASSEMBLY - LATCH TYPE	35616B	1
	UPPER HOOK SUB-ASSEMBLY - LATCHLOK TYPE	36680	
	SUSPENSION LUG FOR LOW HEADROOM OR MOTOR DRIVEN TROLLEY	35457	
	SUSPENSION LUG FOR UNIVERSAL TROLLEY	00002508	
1.2.1	LATCH KIT	45663	1**
1.3	THRUST WASHER (FOR SWIVEL SUSPENSIONS ONLY)	35426	1
1.4	UPPER HOOK COLLAR FOR SWIVEL SUSPENSIONS	35041	1
	UPPER HOOK COLLAR FOR RIGID HOOK AND LUG SUSPENSIONS	45918	
1.5	SPRING PIN	983762	1
1.6	DEAD END BOLT	35957	1
1.7	DEAD END BLOCK	35418	1
1.8	DEAD END PIN	82314	1
1.9	WASHER	987877	1
1.10	COTTER PIN	988330	1
1.11	SUSPENSION SCREW	36849	2
1.30	LUG ADAPTER	00002503	1
1.31	LUG ADAPTER PIN	00002504	1
1.32	COTTER PIN	H5025P	1

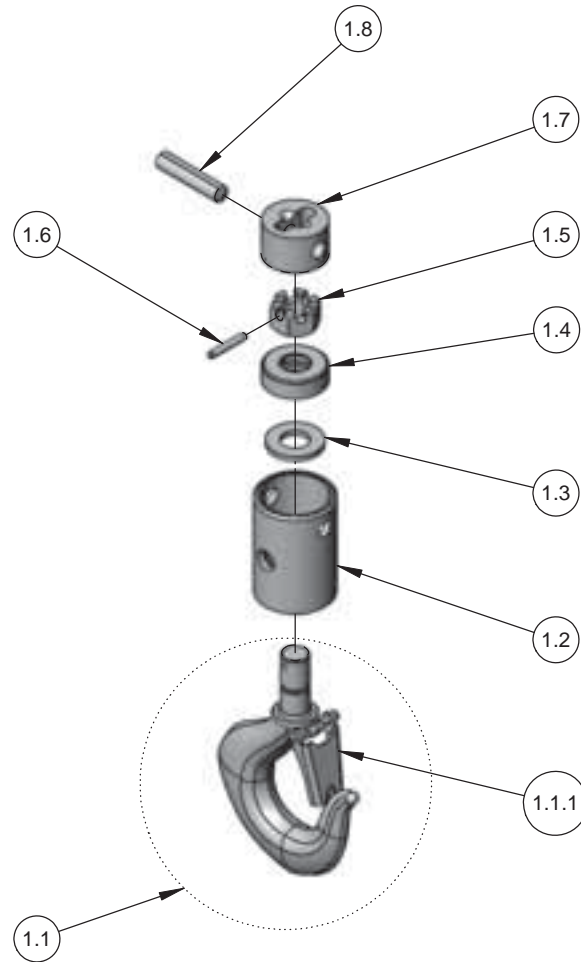


## UPPER SUSPENSIONS UNIVERSAL TROLLEY MODELS A THRU RRT-2 EXCLUDING RRS



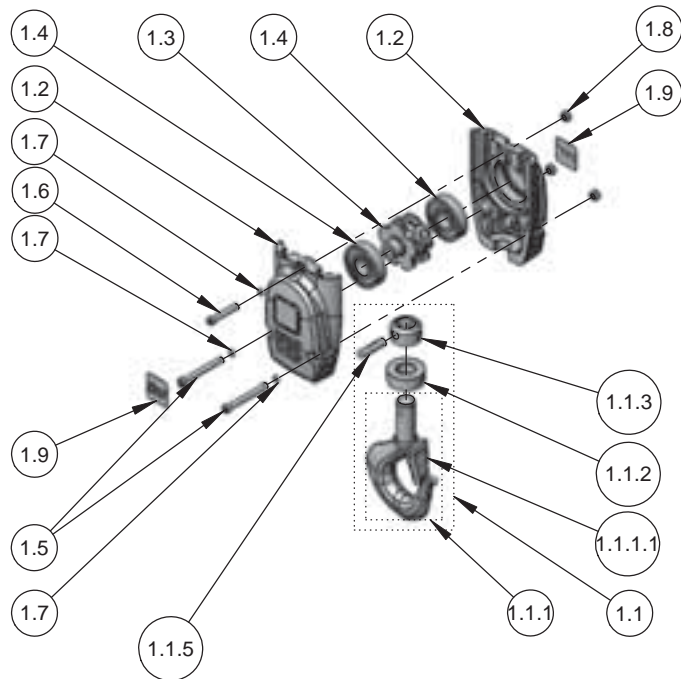
Item No.	Description	Reeving	Part Number
1	UT 1 TON SUSPENSION KIT - PARALLEL MOUNT ONLY	1	2292NHUT
2	UT 1 TON SUSPENSION KIT - CROSS MOUNT ONLY	1	2292NHUTC
3	UT 1 TON SUSPENSION KIT - CROSS OR PARALLEL	2	29923NHUT
4	UT 2 TON SUSPENSION KIT - CROSS OR PARALLEL	1	3677NHUT
5	UT 2 TON SUSPENSION KIT - CROSS OR PARALLEL	2	3668NHUT
6	UT 3 TON SUSPENSION KIT - CROSS OR PARALLEL	3	9561NHUT

## LOWER HOOK BLOCKS SINGLE REEVED

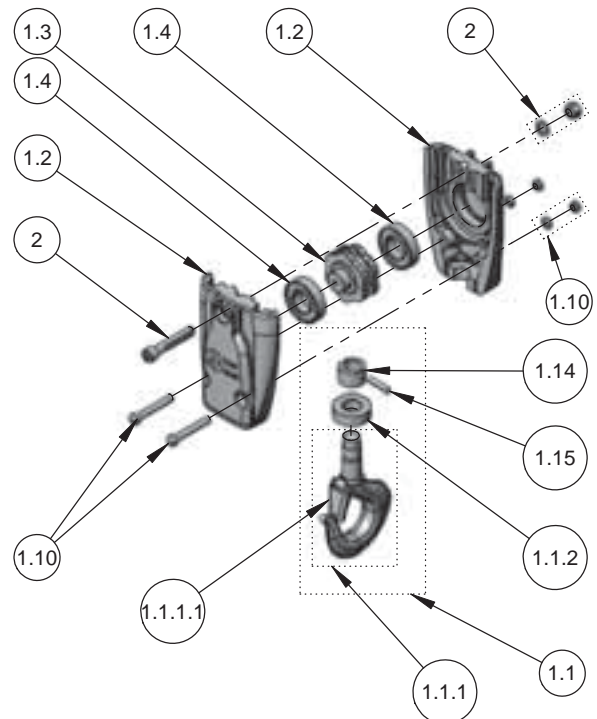


Item No.	Description	SINGLE-REEVED MODELS			Qty.
		A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2	J, J-2, L, L-2, LL, LL-2	RRS	
1	LOWER HOOK BLOCK ASSEMBLY-COMPLETE WITH LATCH TYPE HOOK	*28683	*35651	*10001052	1
1.1	LOWER HOOK WITH LATCH	28686	35611	35612B	1
	LATCHLOK TYPE HOOK	28604	28604	36681	
1.1.1	LATCH KIT	45661	45662	45663	1
1.2	LOWER HOOK BODY	45401B	35370	45399B	1
1.3	LOWER HOOK WASHER	945921	945921	N/A	1
1.4	LOWER HOOK THRUST BEARING	88485	88485	88505	1
1.5	LOWER HOOK NUT	982526	982526	35369	1
1.6	LOWER HOOK NUT PIN	983772	983772	45946	1
1.7	LOWER HOOK CHAIN BLOCK	28007	35026	10001054	1
1.8	LOWER HOOK CHAIN BLOCK PIN	45943	35790	45948	1

## LOWER HOOK BLOCKS DOUBLE & TRIPLE REEVED



**DOUBLE-REEVED**



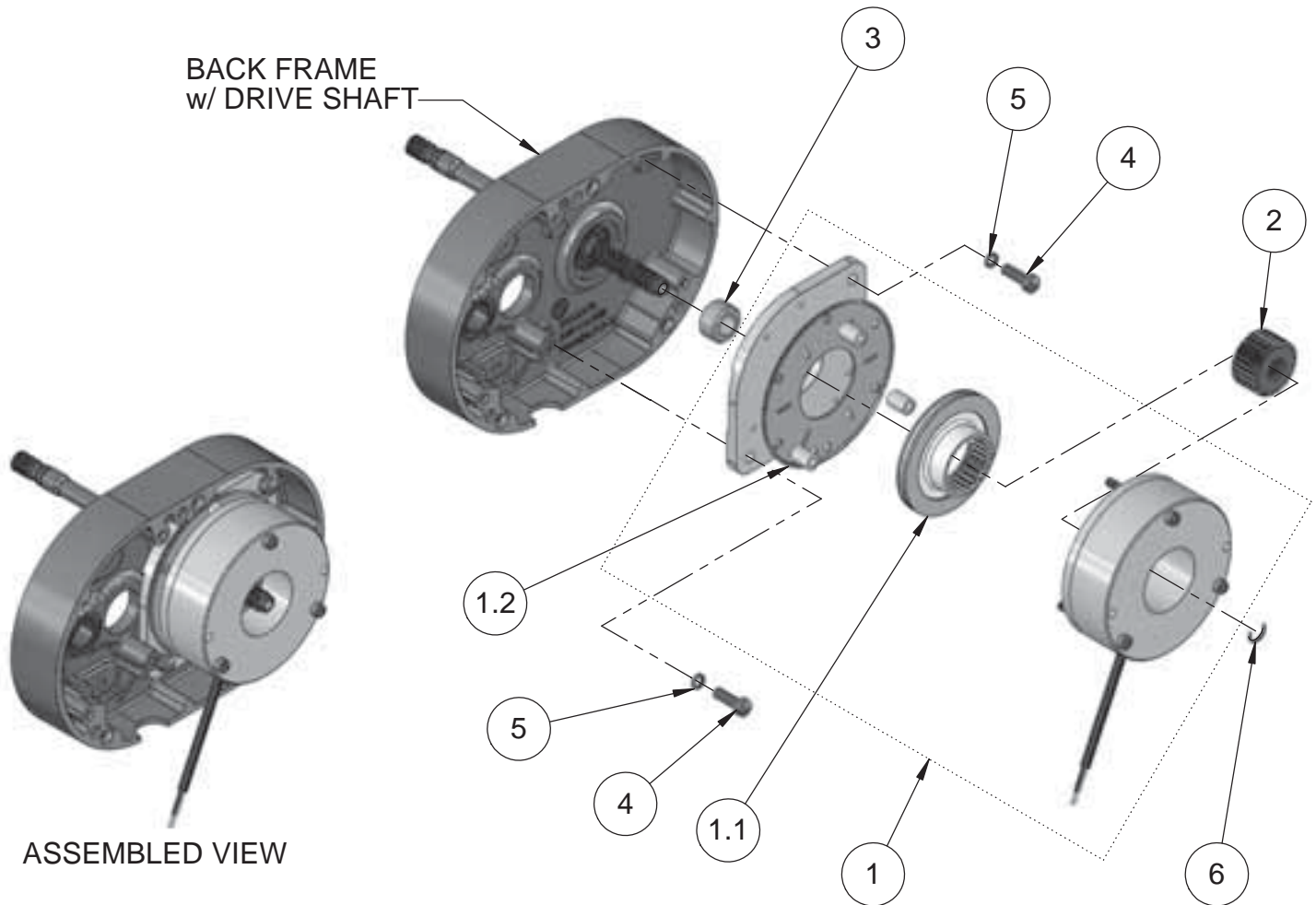
**TRIPLE-REEVED**

Item No.	Description	SINGLE-REEVED MODELS		TRIPLE REEVED MODELS	Qty.
		E, E-2, H, H-2	R, R-2, RR, RR-2	RT, RT-2, RRT, RRT	
1	LOWER HOOK BLOCK ASSEMBLY-COMLETE WITH LATCH TYPE HOOK	*00000272B	*00000277B	*36607	1
1.1	LOWER HOOK ASSEMBLY WITH LATCH AND BRG	28665	35645	36606	1
	LATCHLOK TYPE HOOK ASSEMBLY WITH BRG	—	—	—	
1.1.1	LOWER HOOK WITH LATCH	28687B	35612B	36353B	1
	LATCHLOK TYPE HOOK	28603	36681	*	
1.1.1.1	LATCH KIT	45662	45663	45663	1
1.1.2	LOWER HOOK THRUST BEARING	88478	88505	88505	1
1.1.3	LOWER HOOK COLLAR	45385	35369	—	1
1.1.4	LOWER HOOK NUT	—	—	36352	1
1.1.5	LOWER HOOK PIN	45941	45946	983762	1
1.2	HOOK BLOCK (ORDER IN PAIRS)	00000271B	00000276B	36010B	2
1.3	HOOK BLOCK SHEAVE	00000273	00000274	36351	1
1.4	HOOK BLOCK SHEAVE BEARING	88429	83674	83670	2
1.5	HOOK BLOCK SCREW-LONG	982066	982374	—	2
1.6	HOOK BLOCK SCREW-SHORT	986191	982370	—	1
1.7	HOOK BLOCK LOCK WASHER	940802	940830	—	3
1.8	HOOK BLOCK NUT	982514	982445	—	3
1.9	HOOK BLOCK LABEL	00000766	00000766	—	2
1.10	HOOK BLOCK SCREWS WITH NUTS AND LOCK WASHERS (2 EACH)	—	—	C245	1
2	DEAD END SCREW WITH NUT AND LOCK WASHER	—	—	C249	1

\*Contact CM for Latchlok part number

## DC BRAKE - SINGLE MODELS

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

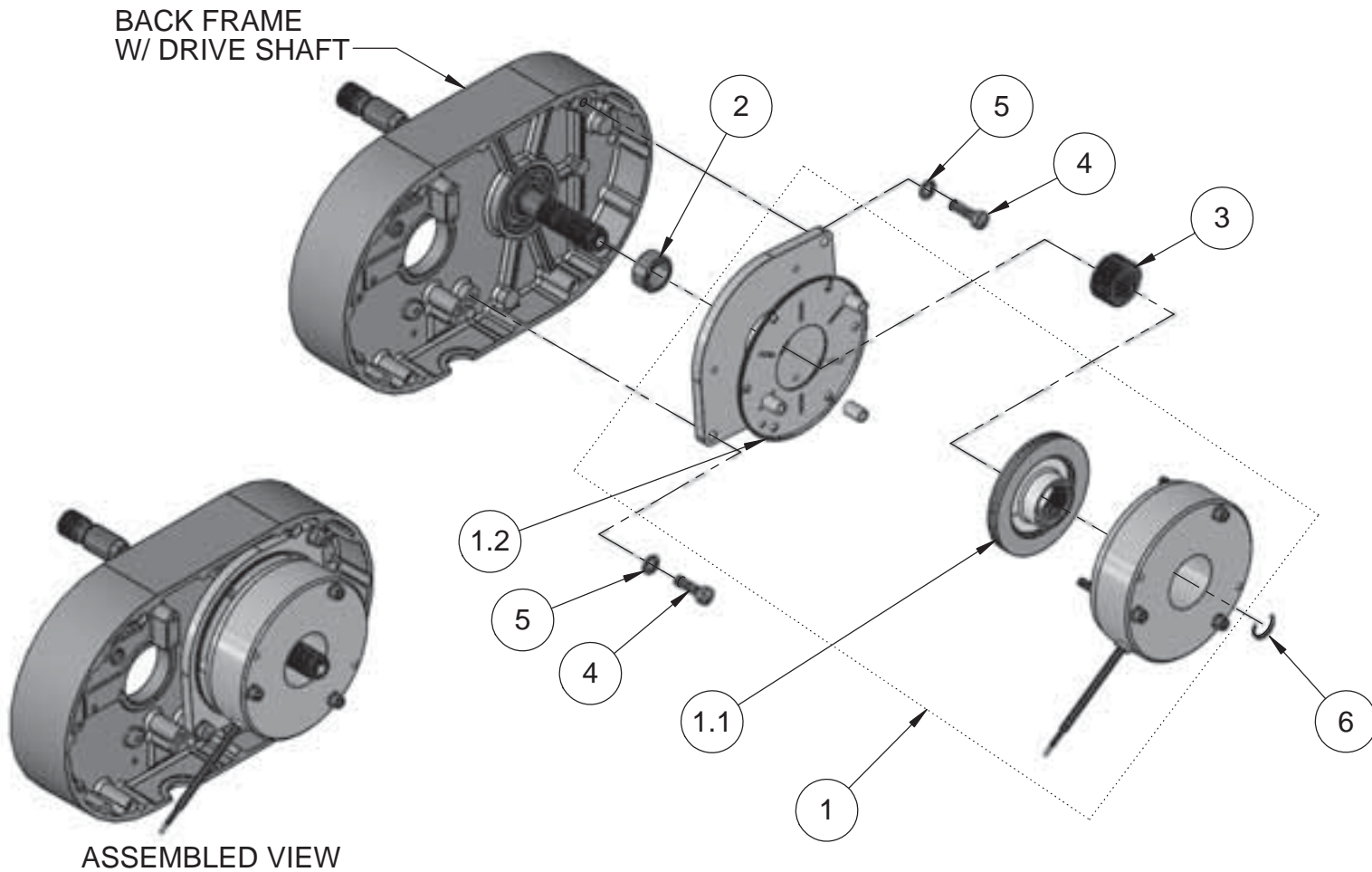


BRAKE ASSEMBLY ITEM 1	Hoist Motor	Brake Coil Voltage
10001243	110/115-1-50/60	103VDC
10001244	220/230-1-50/60 220/230-3-50/60 380/415/480-3-50/60	205VDC
10001245	550/575-3-50/60	255VDC

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	V1 LODESTAR SIZE 8	1
1.1	10001252	V1 LODESTAR SIZE 8 ROTOR	1
1.2	10001251	V1 LODESTAR SIZE 8 FRICTION PLATE	1
2	00001430	V1 LODESTAR SIZE 8 HUB	1
3	00001432	HUB SPACER V1 DC BRAKE	1
4	982708	SCREW 1/4-20 X .75" SL FIL HD	2
5	940802	LOCK WASHER 1/4 x .109 X .062"	2
6	10409710	ROTOR CLIP RETAINING RING	1

## DC BRAKE - SINGLE MODELS

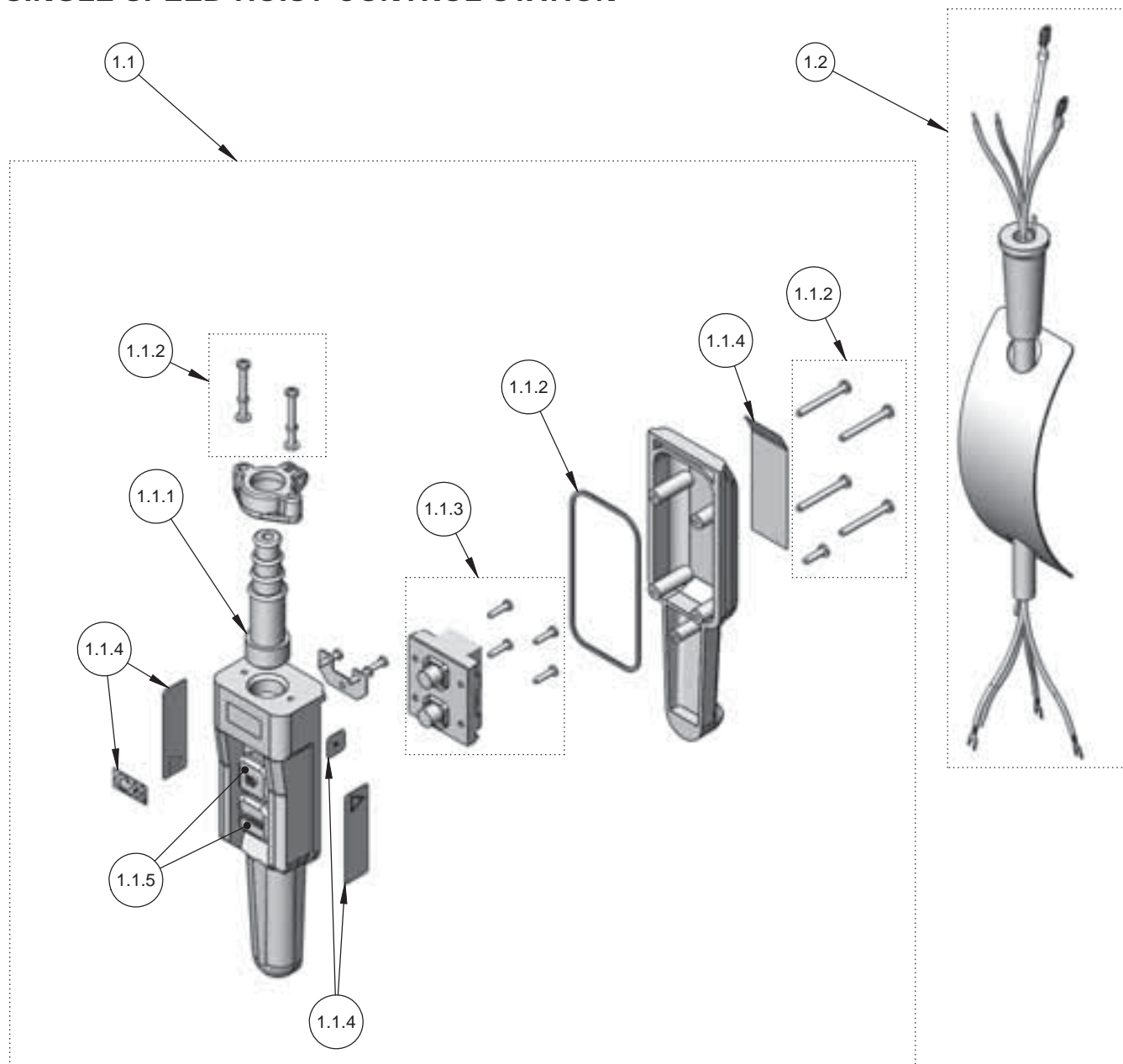
J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RRS, RT, RT-2, RRT & RRT-2



Hoist Model	Brake Assembly Item1	Rotor Item 1.1	Hoist Motor	Brake Coil Voltage
J, J-2, L, L-2, R, R-2, RT, RT-2	10001246	10001253	110/115-1-50/60	103VDC
	10001247	10001253	220/230-1-50/60 220/230-3-50/60 380/415/480-3-50/60	205VDC
	10001248	10001253	550/575-3-50/60	255VDC
JJ, JJ-2, LL, LL-2, RR, RR-2, RRS, RRT, & RRT-2	10001249	00001429	220/230-3-50/60 380/415/480-3-50/60	205VDC
	10001250	00001429	550/575-3-50/60	255VDC

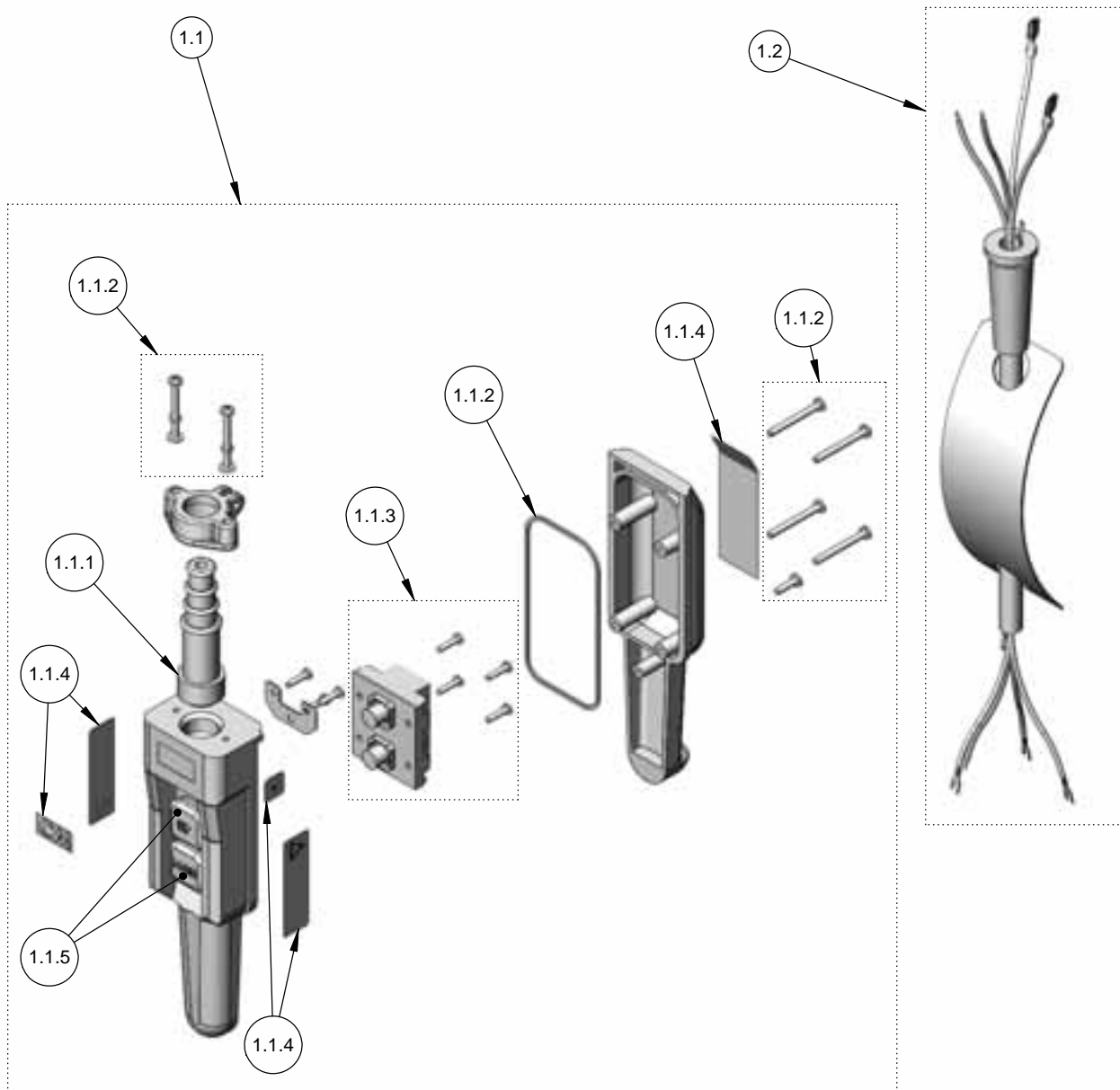
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	V2 LODESTAR SIZE 10 BRAKE	1
1.1	10001253	V2 LODESTAR SIZE 10 ROTOR	1
1.2	00001437	V2 LODESTAR FRICTION PLATE	1
2	00001433	HUB SPACER V2 DC INTORQ BRAKE	1
3	00001431	V2 LODESTAR SIZE 10 HUB	1
4	982709	SCREW 5/16-18UNC-2A x 1"	2
5	945851	LOCK WASHER 5/16 x .125 x .078"	2
6	10409711	ROTOR CLIP RETAINING RING	1

# COMPLETE CONTROL CORD AND STATION ASSEMBLY SINGLE SPEED HOIST CONTROL STATION



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	23606606	STATION ASSEMBLY AND CONTROL CORD FOR 10 FOOT LIFT	1
	23606611	STATION ASSEMBLY AND CONTROL CORD FOR 15 FOOT LIFT	
	23606616	STATION ASSEMBLY AND CONTROL CORD FOR 20 FOOT LIFT	
1.1	58272 2	BUTTON CONTROL STATION	1
1.1.1	58278	GROMMET	1
1.1.2	58275	HARDWARE KIT	1
1.1.3	58255	1-SPEED INSERT	1
1.1.4	58276	WARNING LABEL KIT	1
1.1.5	58277	BUTTON LABEL KIT	1
1.2	29353	CONTROL CORD - 10 FOOT LIFT	1
	29353-15	CONTROL CORD - 15 FOOT LIFT	
	29353-20	CONTROL CORD - 20 FOOT LIFT	

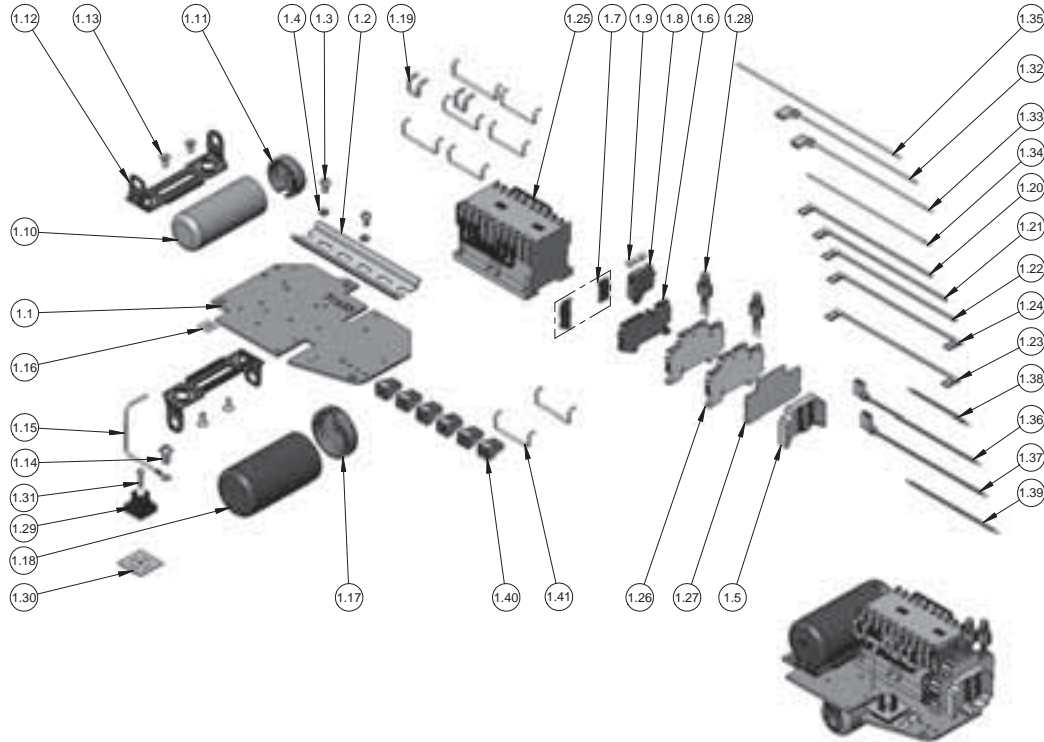
## COMPLETE CONTROL CORD AND STATION ASSEMBLY TWO SPEED HOIST CONTROL STATION



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	29348	STATION ASSEMBLY AND CONTROL CORD FOR 10 FOOT LIFT	1
	29348-15	STATION ASSEMBLY AND CONTROL CORD FOR 15 FOOT LIFT	
	29348-20	STATION ASSEMBLY AND CONTROL CORD FOR 20 FOOT LIFT	
1.1	58273 2	BUTTON CONTROL STATION	1
1.1.1	58278	GROMMET	1
1.1.2	58275	HARDWARE KIT	1
1.1.3	58256	2 - SPEED INSERT	1
1.1.4	58276	WARNING LABEL KIT	1
1.1.5	58277	BUTTON LABEL KIT	1
1.2	29349	CONTROL CORD - 10 FOOT LIFT	1
	29349-15	CONTROL CORD - 15 FOOT LIFT	
	29349-20	CONTROL CORD - 20 FOOT LIFT	



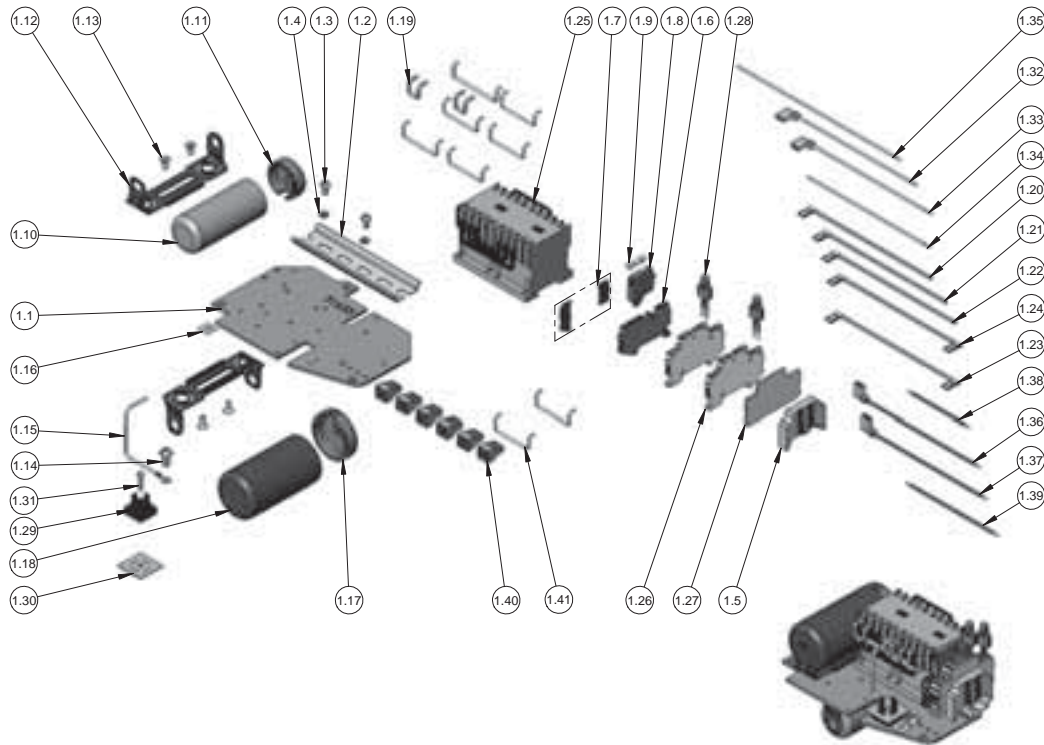
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE AND TRANSFORMER 110/115-1-50/60 MODELS A, AA, B, C, E, F & H



CONTACTOR BKT S/A	REVERSING CONTACTOR	SECONDARY VOLTAGE
00001675	28860	24 V
00001676	24797	48 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR PLATE S/A	1
1.1	31633	CONTACTOR PLATE	1
1.2	29312	DIN-RAIL 5.00" LONG	1
1.3	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.4	987873	LOCK WASHER #10 ASA MEDIUM	2
1.5	909J13	TERMINAL STRIP END CLAMP	1
1.6	29018	FUSIBLE TERMINAL STRIP	1
1.7	00000398	TERMINAL STRIP COVER SEGMENT	1
1.8	29019	TERMINAL STRIP CARTRIDGE	1
1.9	00000393	FUSE-5MM X 20MM-500MA	1
1.10	27716	CAPACITOR	1
1.11	29910	CAPACITOR CAP	1
1.12	27910	CAPACITOR MOUNTING BRACKET	2
1.13	982696	SCREW 10-32 UNF-2A X 3/8 LG	4
1.14	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.15	27189	JUMPER-G/Y-#16 AWG	1
1.16	20940	GROUND LABEL	1
1.17	27925	SOLID STATE SWITCH CAP	1
1.18	27257	REVERSE SWITCH	1
1.19	51845	JUMPER	2
1.20	27156	JUMPER R14	1
1.21	29911	JUMPER R5	1
1.22	29912	JUMPER R6	1
1.23	29913	JUMPER R7	1
1.24	29914	JUMPER R8	1
1.25	SEE TABLE	REVERSING CONTACTOR	1
1.26	00001506	TERMINAL STRIP	2
1.27	00001507	TERMINAL STRIP PARTITION	1
1.28	00000535	SURGE SUPPRESSOR	2
1.29	70246	RECTIFIER	1
1.30	70274	RECTIFIER INSULATOR	1
1.31	957854	ROUND HEAD MACHINE SCREW	1
1.32	00001500	B3-JUMPER	1
1.33	00001501	B4-JUMPER	1
1.34	00001504	JUMPER-B7	1
1.35	00001502	JUMPER-B1	1
1.36	00000376	B5 JUMPER	1
1.37	00000205	B6 JUMPER	1
1.38	00000537	B8 JUMPER	1
1.39	00000538	B9 JUMPER	1
1.40	11782704	CONNECTOR PUSHWIRE ORANGE	6
1.41	51847	JUMPER	8

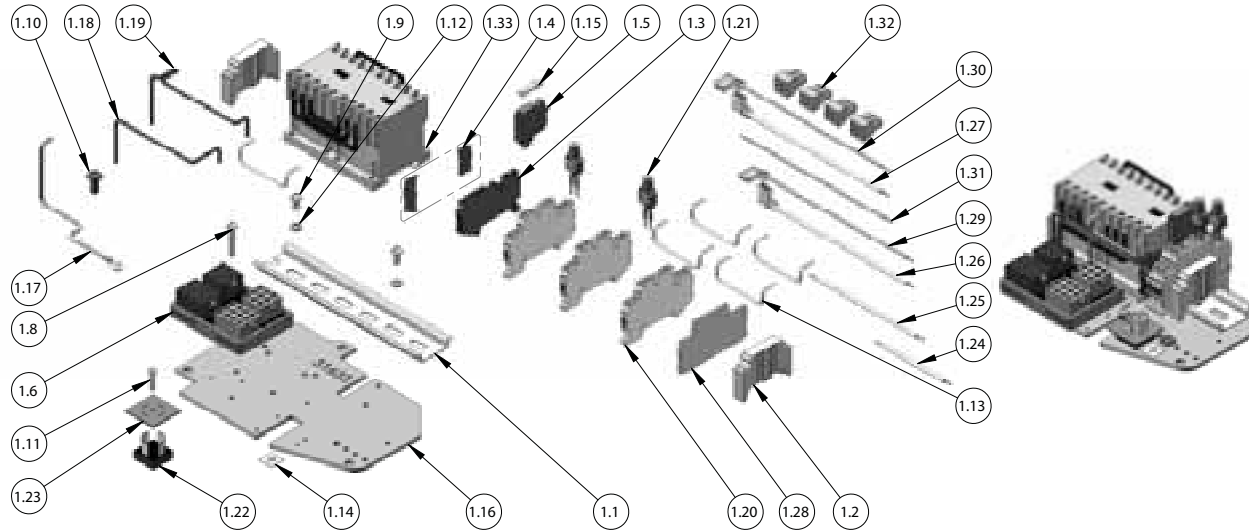
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE AND TRANSFORMER 110/115-1-50/60 MODELS A, AA, B, C, E, F & H



CONTACTOR BKT S/A	REVERSING CONTACTOR	SECONDARY VOLTAGE
00001677	28860	24 V
00001678	24797	48 V
00001679	24799	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR PLATE S/A	1
1.1	31633	CONTACTOR PLATE	1
1.2	29312	DI1.3 982686 SCREW #10-32 UNF-2A X 3/8" SL	2
1.3	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.4	987873	LOCK WASHER #10 ASA MEDIUM	2
1.5	909J13	TERMINAL STRIP END CLAMP	1
1.6	29018	FUSIBLE TERMINAL STRIP	1
1.7	00000398	TERMINAL STRIP COVER SEGMENT	1
1.8	29019	TERMINAL STRIP CARTRIDGE	1
1.9	00000393	FUSE-5MM X 20MM-500MA	1
1.10	27716	CAPACITOR	1
1.11	29910	CAPACITOR CAP	1
1.12	27910	CAPACITOR MOUNTING BRACKET	2
1.13	982696	SCREW 10-32 UNF-2A X 3/8 LG	4
1.14	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.15	27189	JUMPER-G/Y-#16 AWG	1
1.16	20940	GROUND LABEL	1
1.17	27925	SOLID STATE SWITCH CAP	1
1.18	27257	REVERSE SWITCH	1
1.19	51847	JUMPER	8
1.20	51845	JUMPER	2
1.21	27156	JUMPER R14	1
1.22	29911	JUMPER R5	1
1.23	29912	JUMPER R6	1
1.24	29913	JUMPER R7	1
1.25	29914	JUMPER R8	1
1.26	SEE TABLE	REVERSING CONTACTOR	1
1.27	00001506	TERMINAL STRIP	2
1.28	00001507	TERMINAL STRIP PARTITION	1
1.29	00000535	SURGE SUPPRESSOR	2
1.30	70246	RECTIFIER	1
1.31	70274	RECTIFIER INSULATOR	1
1.32	957854	ROUND HEAD MACHINE SCREW	1
1.33	00001500	B3-JUMPER	1
1.34	00001501	B4-JUMPER	1
1.35	00001504	JUMPER-B7	1
1.36	00001502	JUMPER-B1	1
1.37	00000376	B5 JUMPER	1
1.38	00000205	B6 JUMPER	1
1.39	00000537	B8 JUMPER	1
1.40	00000538	B9 JUMPER	1
1.41	11782704	CONNECTOR PUSHWIRE ORANGE	7
1.42	29014	TERMINAL STRIP	1
1.43	00001503	JUMPER-B2	1

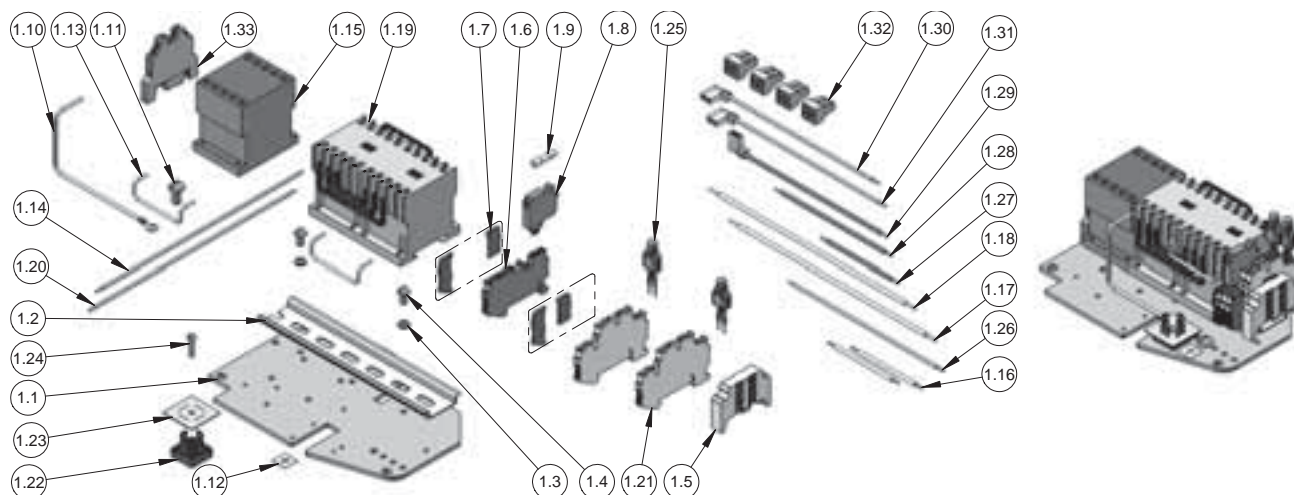
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 1-SPEED, DUAL VOLTAGE UNITS 220/230-380/415/460-3-50/60 MODELS A, AA, B, C, E, F & H



CONTACTOR BKT S/A	REVERSING CONTACTOR	SECONDARY VOLTAGE
00001680	28860	24 V
00001681	24797	48 V
00001682	24799	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR BKT S/A BHSE	1
1.1	29010	DIN-RAIL 6.50" LONG	1
1.2	909J13	TERMINAL STRIP END CLAMP	2
1.3	29018	FUSIBLE TERMINAL STRIP	1
1.4	00000398	TERMINAL STRIP COVER SEGMENT	1
1.5	29019	TERMINAL STRIP CARTRIDGE	1
1.6	10001233	VOLTAGE CHANGE BOARD	1
1.8	987862	SCREW #8-32UNC-2A X 1"	1
1.9	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.10	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.11	957854	SCREW #6-32 NC-2 X 5/8" ROUND	1
1.12	987873	LOCK WASHER #10 ASA MEDIUM	2
1.13	51847	Jumper 14 AWG Black,	5
1.14	20940	GROUND LABEL	1
1.15	00000393	FUSE-5MM X 20MM-500MA	1
1.16	31633	CONTACTOR PLATE	1
1.17	27189	JUMPER-G/Y-#16 AWG	1
1.18	00000750	JUMPER WIRE	1
1.19	00000751	JUMPER WIRE	1
1.20	00001506	TERMINAL STRIP	3
1.21	00001505	SURGE SUPPRESSOR	2
1.22	70246	RECTIFIER	1
1.23	70274	RECTIFIER INSULATOR	1
1.24	00000537	B8 JUMPER	1
1.25	00000538	B9 JUMPER	1
1.26	00000376	B5 JUMPER	1
1.27	00000205	B6 JUMPER	1
1.28	00001507	TERMINAL STRIP PARTITION	1
1.29	00001501	B4-JUMPER	1
1.30	00001500	B3-JUMPER	1
1.31	00001504	JUMPER-B7	1
1.32	11782704	CONNECTOR PUSHWIRE ORANGE	4
1.33	SEE TABLE	REVERSING CONTACTOR	1

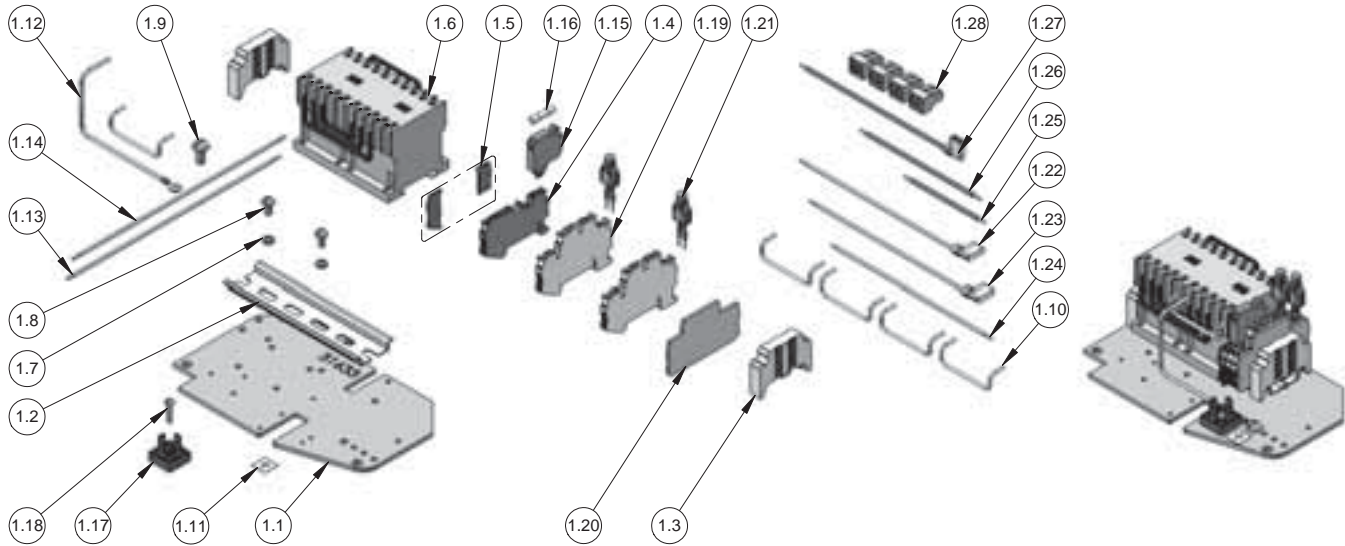
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 2-SPEED UNITS 220/230-3-50/60 MODELS A-2, AA-2, B-2, C-2, E-2, F-2 & H-2



CONTACTOR BKT S/A	REVERSING CONTACTOR	SPEED SELECTOR	SECONDARY VOLTAGE
00001683	28860	28878	24 V
00001684	24797	28871	48 V
00001685	24799	28870	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR PLT S/A 2-SPEED	1
1.1	31633	CONTACTOR PLATE	
1.2	29010	DIN-RAIL 6.50" LONG	1
1.3	987873	LOCK WASHER #10 ASA MEDIUM	2
1.4	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.5	909J13	TERMINAL STRIP END CLAMP	1
1.6	29018	FUSIBLE TERMINAL STRIP	1
1.7	00000398	TERMINAL STRIP COVER SEGMENT	2
1.8	29019	TERMINAL STRIP CARTRIDGE	1
1.9	00000393	FUSE-5MM X 20MM-500MA	1
1.10	27189	JUMPER-G/Y-#16 AWG	1
1.11	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.12	20940	GROUND LABEL	1
1.13	51847	JUMPER	6
1.14	00001503	JUMPER-B2	1
1.15	SEE TABLE	CONTACTOR	1
1.16	51845	JUMPER	1
1.17	27609	JUMPER	1
1.18	27610	JUMPER	1
1.19	SEE TABLE	REVERSING CONTACTOR	1
1.20	00001502	JUMPER-B1	1
1.21	00001506	TERMINAL STRIP	2
1.22	70246	RECTIFIER	1
1.23	70274	RECTIFIER INSULATOR	1
1.24	957854	ROUND HEAD MACHINE SCREW	1
1.25	00000535	SURGE SUPPRESSOR	2
1.26	00001504	JUMPER-B7	1
1.27	00000537	B8 JUMPER	1
1.28	00000538	B9 JUMPER	1
1.29	00000205	B6 JUMPER	1
1.30	00001500	B3-JUMPER	1
1.31	00001501	B4-JUMPER	1
1.32	11782704	CONNECTOR PUSHWIRE ORANGE	4
1.33	10001433	EARTH GROUNDING BLOCK	1

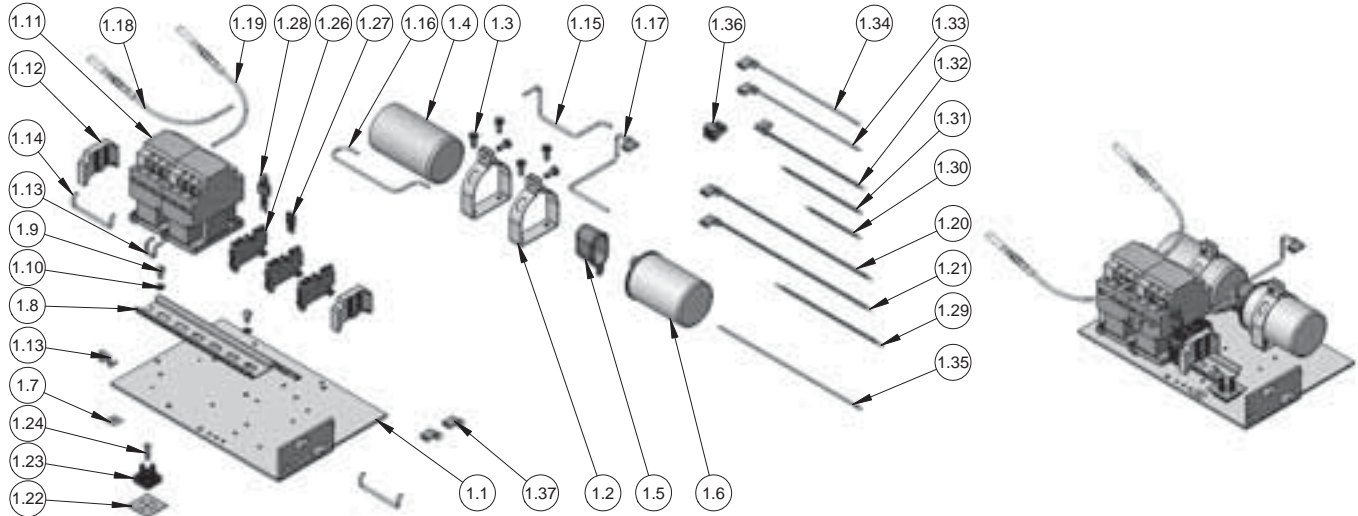
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 550/575-3-50/60 MODELS A, AA, B, C, E, F & H



CONTACTOR BKT S/A	REVERSING CONTACTOR	SECONDARY VOLTAGE
00001689	28860	24 V
00001690	24797	48 V
00001691	24799	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR PLT S/A	1
1.1	31633	CONTACTOR PLATE	1
1.2	29312	DIN-RAIL 5.00" LONG	1
1.3	909J13	TERMINAL STRIP END CLAMP	2
1.4	29018	FUSIBLE TERMINAL STRIP	1
1.5	00000398	TERMINAL STRIP COVER SEGMENT	1
1.6	SEE TABLE	REVERSING CONTACTOR	1
1.7	987873	LOCK WASHER #10 ASA MEDIUM	2
1.8	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.9	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.10	51847	JUMPER	5
1.11	20940	GROUND LABEL	1
1.12	27189	JUMPER-G/Y-#16 AWG	1
1.13	00001502	JUMPER-B1	1
1.14	00001503	JUMPER-B2	1
1.15	29019	TERMINAL STRIP CARTRIDGE	1
1.16	00000393	FUSE-5MM X 20MM-500MA	1
1.17	00001551	RECTIFIER	1
1.18	957854	ROUND HEAD MACHINE SCREW	1
1.19	00001506	TERMINAL STRIP	2
1.20	00001507	TERMINAL STRIP PARTITION	1
1.21	00001505	SURGE SUPPRESSOR	2
1.22	00001500	B3-JUMPER	1
1.23	00001501	B4-JUMPER	1
1.24	00001504	JUMPER-B7	1
1.25	00000537	B8 JUMPER	1
1.26	00000538	B9 JUMPER	1
1.27	00000205	B6 JUMPER	1
1.28	11782704	CONNECTOR PUSHWIRE ORANGE	4

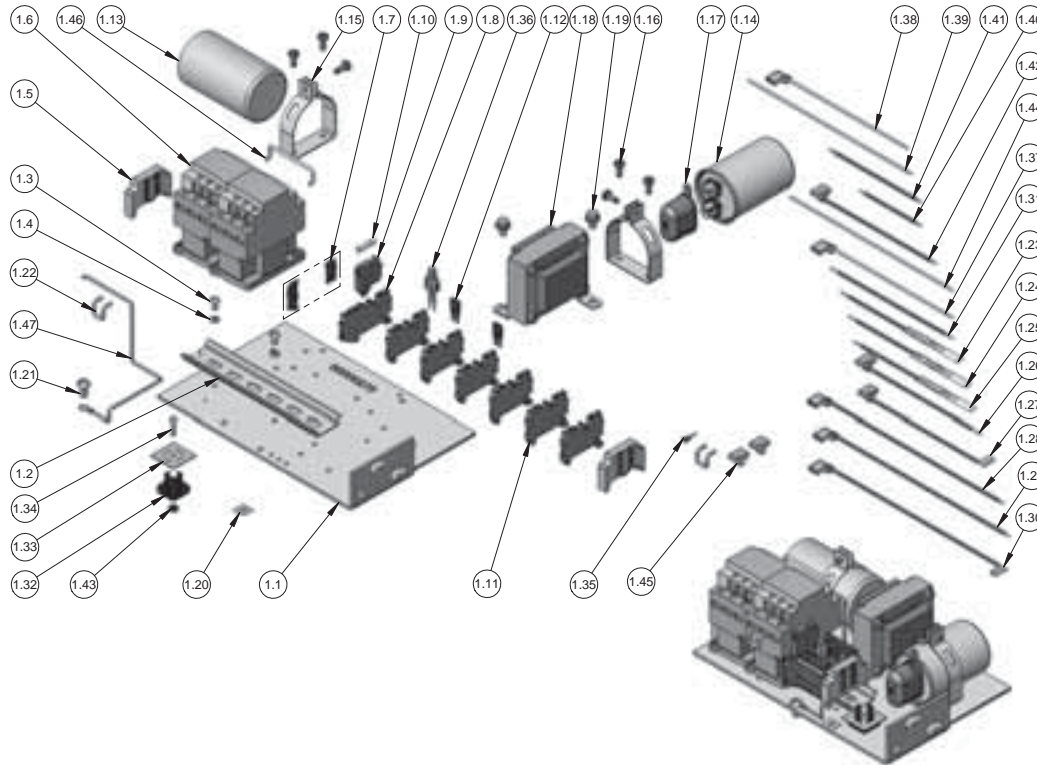
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 110/115-1-50/60 MODELS J, L, R & RT



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	00001695	CONTACTOR BRACKET S/A	1
1.1	00000278	CONTACTOR BRACKET	1
1.2	35268	CLAMP	2
1.3	982873	MACHINE SCREW PAN HEAD	6
1.4	35279	START CAPACITOR	1
1.5	35285	RUN CAPACITOR INSULATOR	1
1.6	35278	CAPACITOR, RUN	1
1.7	20940	GROUND LABEL	1
1.8	29010	DIN-RAIL 6.50" LONG	1
1.9	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.10	987873	LOCK WASHER #10 ASA MEDIUM	2
1.11	28905	REVERSING CONTACTOR	1
1.12	909J13	TERMINAL STRIP END CLAMP	2
1.13	51845	JUMPER	2
1.14	51847	JUMPER	2
1.15	29034	JUMPER (R10)	1
1.16	29035	JUMPER (R4)	1
1.17	00000758	JUMPER V2 1 PHASE (R9)	1
1.18	29036	JUMPER (R2)	1
1.19	29037	JUMPER (R3)	1
1.20	00000755	JUMPER V2 1 PHASE (R7)	1
1.21	00000757	JUMPER V2 1 PHASE (R6)	1
1.22	70274	RECTIFIER INSULATOR	1
1.23	70246	RECTIFIER	1
1.24	957854	ROUND HEAD MACHINE SCREW	1
1.25	982470	HEX HEAD MACHINE NUT	1
1.26	29014	TERMINAL STRIP	3
1.27	29047	TERMINAL STRIP BRIDGE	1
1.28	00000535	SURGE SUPPRESSOR	1
1.29	00000336	JUMPER (R12)	1
1.30	00000537	B8 JUMPER	1
1.31	00000538	B9 JUMPER	1
1.32	00000376	B5 JUMPER	1
1.33	00001500	B3-JUMPER	1
1.34	00001501	B4-JUMPER	1
1.35	00001503	JUMPER-B2	1
1.36	11782704	CONNECTOR PUSHWIRE ORANGE	1
1.37	983197	WIRING TERMINAL	2



# CONTACTOR PLATE ASSEMBLY FOR USE WITH AC BRAKE AND TRANSFORMER 110/115-1-50/60 MODELS J, L, R & RT

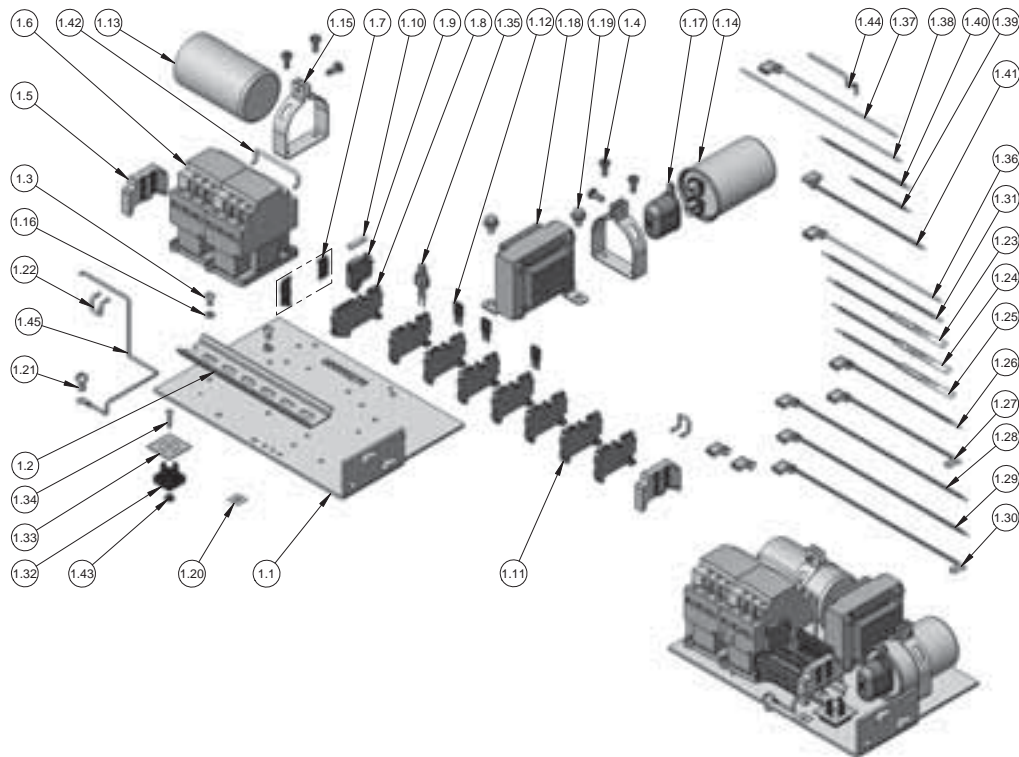


CONTACTOR BKT S/A	REVERSING CONTACTOR P/N	TRANSFORMER P/N	SECONDARY VOLTAGE
00001696	24791	00000592T	24 V
00001697	28906	00000593T	48 V
00001698	24791	00000594T	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR BKT S/A	1
1.1	00000278	CONTACTOR BRACKET	1
1.2	29010	DIN-RAIL 6.50" LONG	1
1.3	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.4	987873	LOCK WASHER #10 ASA MEDIUM	2
1.5	909J13	TERMINAL STRIP END CLAMP	2
1.6	SEE TABLE	REVERSING CONTACTOR	1
1.7	00000398	TERMINAL STRIP COVER SEGMENT	1
1.8	29018	FUSIBLE TERMINAL STRIP	1
1.9	29019	TERMINAL STRIP CARTRIDGE	1
1.10	00000393	FUSE-5MM X 20MM-500MA	1
1.11	29014	TERMINAL STRIP	6
1.12	29047	TERMINAL STRIP BRIDGE	2
1.13	35279	START CAPACITOR	1
1.14	35278	CAPACITOR, RUN	1
1.15	35268	CLAMP	2
1.16	982873	MACHINE SCREW PAN HEAD	6
1.17	35285	RUN CAPACITOR INSULATOR	1
1.18	SEE TABLE	TRANSFORMER-V2-110/115 PRIMARY	1
1.19	25861	SCREW 1/4-20 UNC-2A X 3/8" HEX	2
1.20	20940	GROUND LABEL	1
1.21	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.22	51845	JUMPER	2
1.23	29038	JUMPER (R5)	1
1.24	29037	JUMPER (R3)	1
1.25	29036	JUMPER (R2)	1
1.26	29034	JUMPER (R10)	1
1.27	29035	JUMPER (R4)	1
1.28	00000755	JUMPER V2 1 PHASE (R7)	1
1.29	00000757	JUMPER V2 1 PHASE (R6)	1
1.30	00000758	JUMPER V2 1 PHASE (R9)	1
1.31	00000336	JUMPER (R12)	1
1.32	70246	RECTIFIER	1
1.33	70274	RECTIFIER INSULATOR	1
1.34	957854	ROUND HEAD MACHINE SCREW	1
1.35	982237	DUAL ENTRY WIRE FERRULE	1
1.36	00000535	SURGE SUPPRESSOR	1
1.37	00001501	B4-JUMPER	1
1.38	00001500	B3-JUMPER	1
1.39	00001737	JUMPER 'B6'	1
1.40	00000537	B8 JUMPER	1
1.41	00000538	B9 JUMPER	1
1.42	00000376	B5 JUMPER	1
1.43	982470	HEX HEAD MACHINE NUT	1
1.44	00001503	JUMPER-B2	1
1.45	983197	WIRING TERMINAL	2
1.46	51847	JUMPER	1
1.47	GROUND JUMPER	JUMPER-G/Y-#16 AWG	1



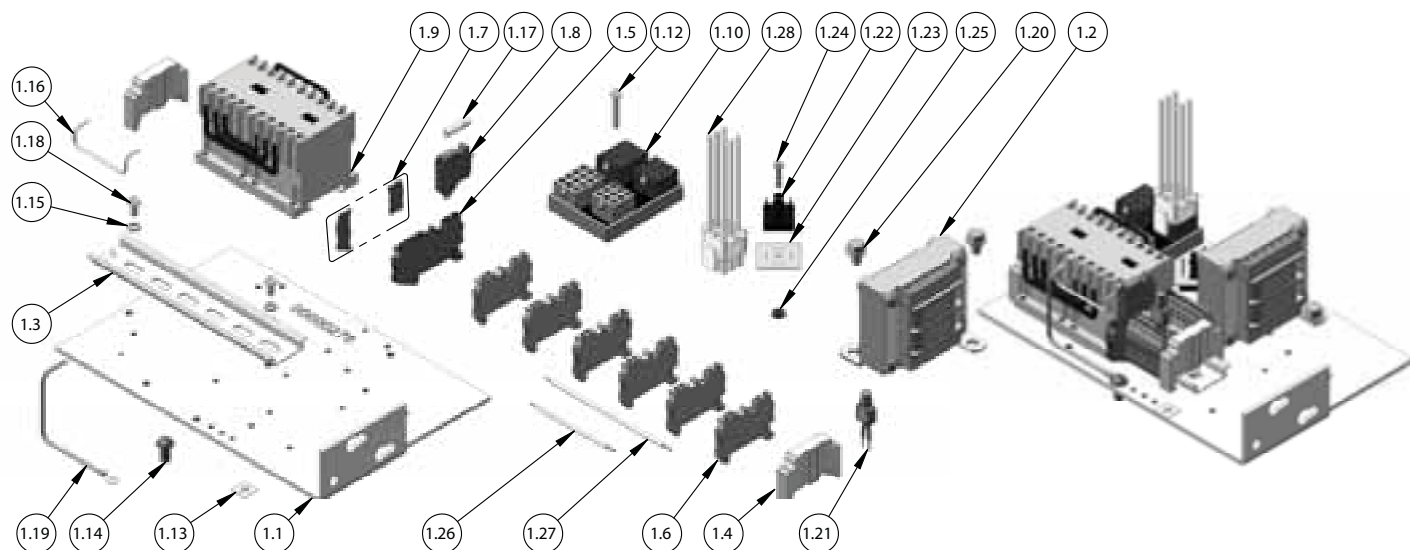
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 1-SPEED UNITS 220/230-1-50/60 MODELS J, L, R & RT



CONTACTOR BKT S/A	REVERSING CONTACTOR P/N	TRANSFORMER P/N	SECONDARY VOLTAGE
00001698	24791	00000594T	24 V
00001699	28906	00000595T	48 V
00001700	28905	00000596T	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR BKT S/A	1
1.1	00000278	CONTACTOR BRACKET	1
1.2	29010	DIN-RAIL 6.50" LONG	1
1.3	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.4	982873	MACHINE SCREW PAN HEAD	6
1.5	909J13	TERMINAL STRIP END CLAMP	2
1.6	SEE TABLE	REVERSING CONTACTOR	1
1.7	00000398	TERMINAL STRIP COVER SEGMENT	1
1.8	29018	FUSIBLE TERMINAL STRIP	1
1.9	29019	TERMINAL STRIP CARTRIDGE	1
1.10	00000393	FUSE-5MM X 20MM-500MA	1
1.11	29014	TERMINAL STRIP	7
1.12	29047	TERMINAL STRIP BRIDGE	3
1.13	35279	START CAPACITOR	1
1.14	35278	CAPACITOR, RUN	1
1.15	35268	CLAMP	2
1.16	987873	LOCK WASHER #10 ASA MEDIUM	2
1.17	35285	RUN CAPACITOR INSULATOR	1
1.18	SEE TABLE	TRANSFORMER-V2-230/460 PRIMARY	1
1.19	25861	SCREW 1/4-20 UNC-2A X 3/8" HEX	2
1.20	20940	GROUND LABEL	1
1.21	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.22	51845	JUMPER	2
1.23	29038	JUMPER (R5)	1
1.24	29037	JUMPER (R3)	1
1.25	29036	JUMPER (R2)	1
1.26	29034	JUMPER (R10)	1
1.27	29035	JUMPER (R4)	1
1.28	00000755	JUMPER V2 1 PHASE (R7)	1
1.29	00000757	JUMPER V2 1 PHASE (R6)	1
1.30	00000758	JUMPER V2 1 PHASE (R9)	1
1.31	00000336	JUMPER (R12)	1
1.32	70246	RECTIFIER	1
1.33	70274	RECTIFIER INSULATOR	1
1.34	957854	ROUND HEAD MACHINE SCREW	1
1.35	00000535	SURG SUPPRESSOR	1
1.36	00001501	B4-JUMPER	1
1.37	00001500	B3-JUMPER	1
1.38	00001737	JUMPER 'B6'	1
1.39	00000537	B8 JUMPER	1
1.40	00000538	B9 JUMPER	1
1.41	00000376	B5 JUMPER	1
1.42	51847	JUMPER	1
1.43	982470	HEX HEAD MACHINE NUT	1
1.44	00000321	JUMPER-R13	1
1.45	27190	JUMPER-G/Y-#16 AWG	1
1.46	983197	WIRING TERMINAL	2

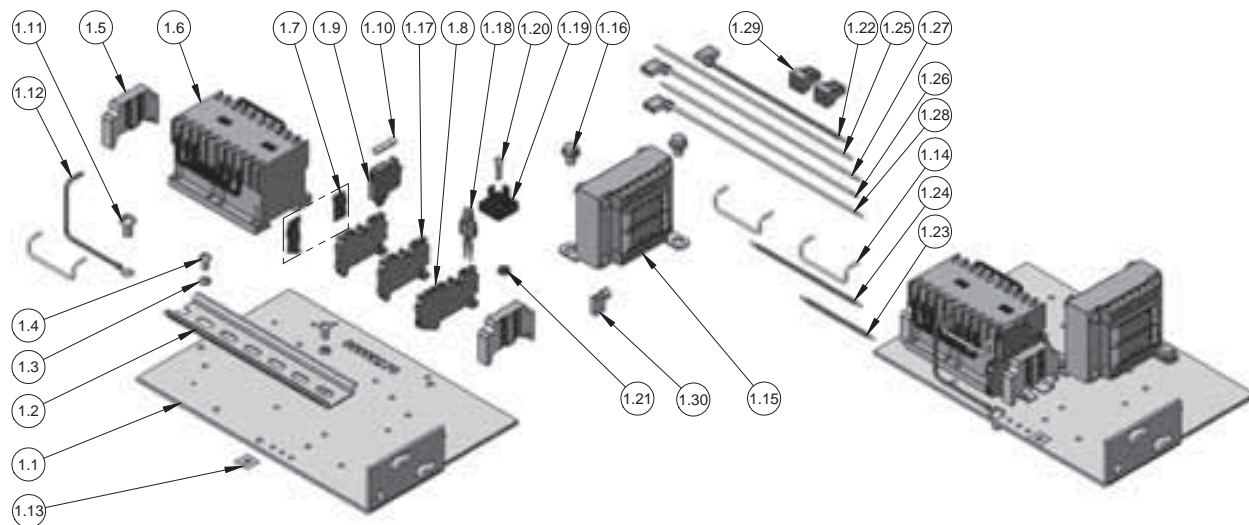
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 1-SPEED, DUAL VOLTAGE UNITS 220/230-380/415/460-3-50/60 MODELS J, JJ, L, LL, R, RR, RT & RRT



CONTACTOR BKT S/A	TRANSFORMER	REVERSING CONTACTOR	SECONDARY VOLTAGE
00001701	00000594T	28860	24 V
00001702	00000595T	24797	48 V
00001703	00000596T	24799	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR BKT S/A BHSE	1
1.1	00000278	CONTACTOR BRACKET	1
1.2	SEE TABLE	TRANSFORMER-V2-230/460	1
1.3	29010	DIN-RAIL 6.50" LONG	1
1.4	909J13	TERMINAL STRIP END CLAMP	2
1.5	29018	FUSIBLE TERMINAL STRIP	1
1.6	29014	TERMINAL STRIP	6
1.7	00000398	TERMINAL STRIP COVER SEGMENT	1
1.8	29019	FUSIBLE TERMINAL STRIP	1
1.9	SEE TABLE	REVERSING CONTACTOR	1
1.10	27672	VOLTAGE CHANGE BOARD	1
1.12	987862	SCREW #8-32UNC-2A X 1"	1
1.13	20940	GROUND LABEL	1
1.14	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.15	987873	LOCK WASHER #10 ASA MEDIUM	2
1.16	51847	JUMPER	1
1.17	00000393	FUSE-5MM X 20MM-500MA	1
1.18	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.19	27189	JUMPER-G/Y-#16 AWG	1
1.20	25861	SCREW 1/4-20 UNC-2A X 3/8" HEX	2
1.21	00000535	SURGE SUPPRESSOR	1
1.22	70246	RECTIFIER	1
1.23	70274	RECTIFIER INSULATOR	1
1.24	957854	SCREW #6-32 NC-2 X 5/8" ROUND	1
1.25	982470	NUT #6-32 UNC-2A HEX MACHINE	1
1.26	00000537	B8 JUMPER	1
1.27	00000538	B9 JUMPER	1
1.28	00000204	HARNESS V2/CONTACTOR	1

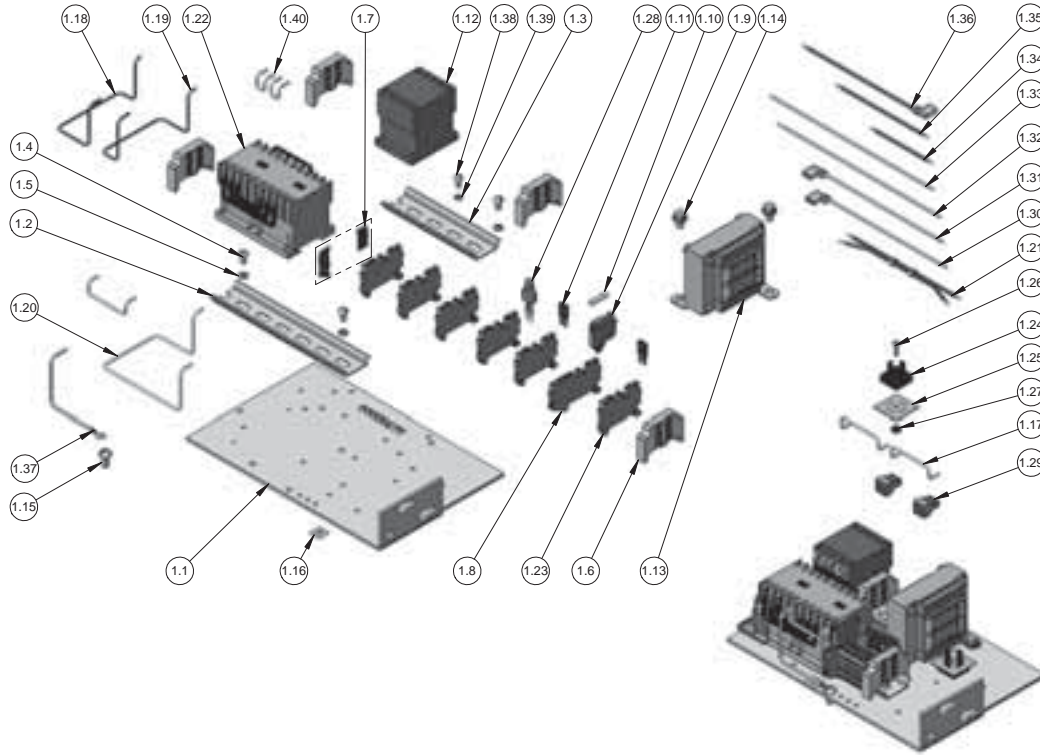
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 550/575-3-50/60 MODELS J, JJ, L, LL, R, RR, RT & RRT



CONTACTOR BKT S/A	TRANSFORMER	REVERSING CONTACTOR	SECONDARY VOLTAGE
00001710	00000597T	28860	24 V
00001711	00000598T	24797	48 V
00001712	00000599T	24799	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR BKT S/A BHSE	1
1.1	00000278	CONTACTOR BRACKET	1
1.2	29010	DIN-RAIL 6.50" LONG	1
1.3	987873	LOCK WASHER #10 ASA MEDIUM 2	
1.4	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.5	909J13	TERMINAL STRIP END CLAMP	2
1.6	SEE TABLE	REVERSING CONTACTOR	1
1.7	00000398	TERMINAL STRIP COVER SEGMENT 1	
1.8	29018	FUSIBLE TERMINAL STRIP	1
1.9	29019	TERMINAL STRIP CARTRIDGE	1
1.10	00000393	FUSE-5MM X 20MM-500MA	1
1.12	27189	JUMPER-G/Y-#16 AWG	1
1.13	20940	GROUND LABEL JUMPER-G/Y-#16 AWG	1
1.14	51847	JUMPER	3
1.15	SEE TABLE	TRANSFORMER-V2-575V PRIMARY	1
1.16	25861	SCREW 1/4-20 UNC-2A X 3/8" HEX	2
1.17	29014	TERMINAL STRIP	2
1.18	00001505	SURGE SUPPRESSOR	1
1.19	00001551	RECTIFIER	1
1.20	957854	ROUND HEAD MACHINE SCREW	1
1.21	982470	HEX HEAD MACHINE NUT	1
1.22	00000376	B5 JUMPER	1
1.23	00000537	B8 JUMPER	1
1.24	00000538	B9 JUMPER	1
1.25	00001502	JUMPER-B1	1
1.26	00001503	JUMPER-B2	1
1.27	00001535	JUMPER 'B4'	1
1.28	00001536	JUMPER 'B3'	1
1.29	11782704	CONNECTOR PUSHWIRE ORANGE	2
1.30	983197	WIRING TERMINAL	1

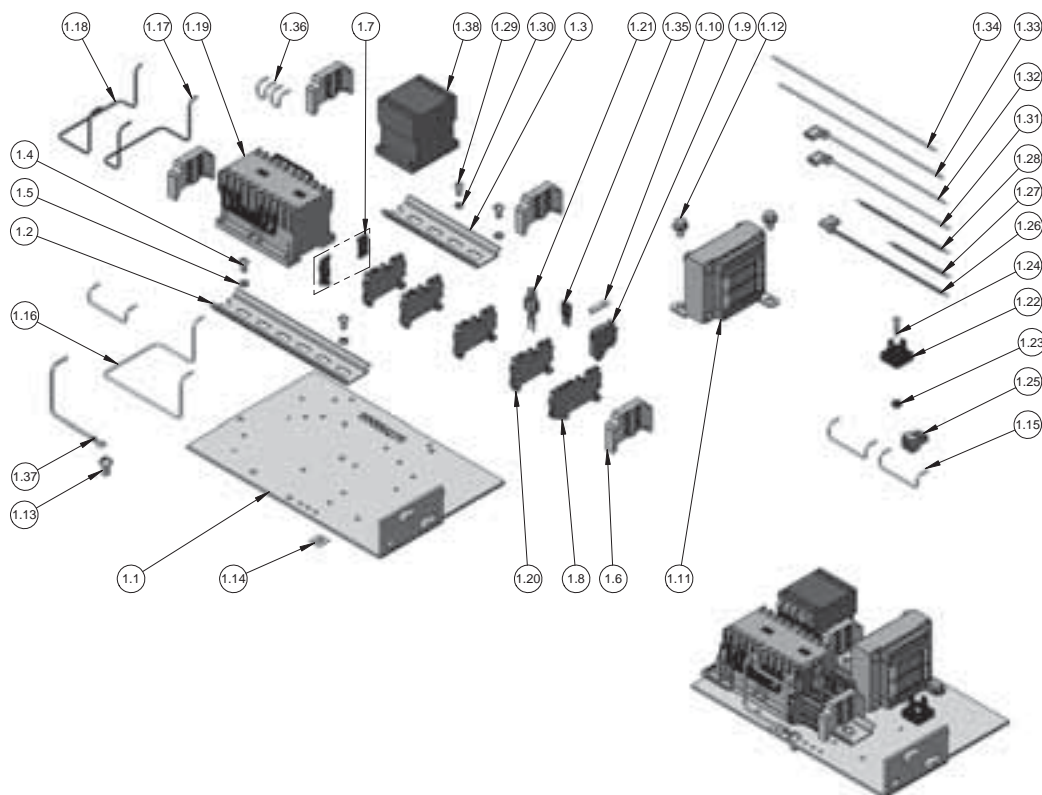
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 2-SPEED UNITS 220/230-3-50/60 MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2 & RRT-2



CONTACTOR BKT S/A	TRANSFORMER	REVERSING CONTACTOR	SPEED SELECTING CONTACTOR	SECONDARY VOLTAGE
00001704	00000594T	28860	28878	24 V
00001705	00000595T	24797	28871	48 V
00001706	00000596T	24799	28870	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR BKT S/A	1
1.1	00000278	CONTACTOR BRACKET	1
1.2	29010	DIN-RAIL 6.50" LONG	1
1.3	29009	DIN-RAIL 4.50" LONG	1
1.4	982686	SCREW #10-32 UNF-2A X 3/8" SL	3
1.5	987873	LOCK WASHER #10 ASA MEDIUM	3
1.6	909J13	TERMINAL STRIP END CLAMP	4
1.7	00000398	TERMINAL STRIP COVER SEGMENT	1
1.8	29018	FUSIBLE TERMINAL STRIP	1
1.9	29019	TERMINAL STRIP CARTRIDGE	1
1.10	00000393	FUSE-5MM X 20MM-500MA	1
1.11	29047	TERMINAL STRIP BRIDGE	2
1.12	SEE TABLE	CONTACTOR	1
1.13	SEE TABLE	TRANSFORMER-V2-230/460	1
1.14	25861	SCREW 1/4-20 UNC-2A X 3/8" HEX	2
1.15	987827	W 1/4-20 UNC-2A X 1/2"	1
1.16	20940	GROUND LABEL	1
1.17	51847	JUMPER	3
1.18	27652	JUMPER (R4)	1
1.19	27657	JUMPER (R5)	1
1.20	27736	JUMPER (W5)	1
1.21	00000327	'H5/H6' JUMPER HARNESS	1
1.22	SEE TABLE	REVERSING CONTACTOR	1
1.23	29014	TERMINAL STRIP	6
1.24	70246	RECTIFIER	1
1.25	70274	RECTIFIER INSULATOR	1
1.26	957854	ROUND HEAD MACHINE SCREW	1
1.27	982470	HEX HEAD MACHINE NUT	1
1.28	00000535	SURGE SUPPRESSOR	1
1.29	11782704	CONNECTOR PUSHWIRE ORANGE	2
1.30	00001500	B3- JUMPER	1
1.31	00001501	B4- JUMPER	1
1.32	00001502	JUMPER-B1	1
1.33	00001503	JUMPER-B2	1
1.34	00000537	B8 JUMPER	1
1.35	00000538	B9 JUMPER	1
1.36	00000376	B5 JUMPER	1
1.37	27189	GROUND JUMPER	1
1.38	982683	SCREW #8-32 UNC-2A X 3/8"	1
1.39	957844	LOCK WASHER #8 ASA MEDIUM	1
1.40	27662	JUMPER	2

# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 2-SPEED UNITS 380/415/460-3-50/60 MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2 & RRT-2

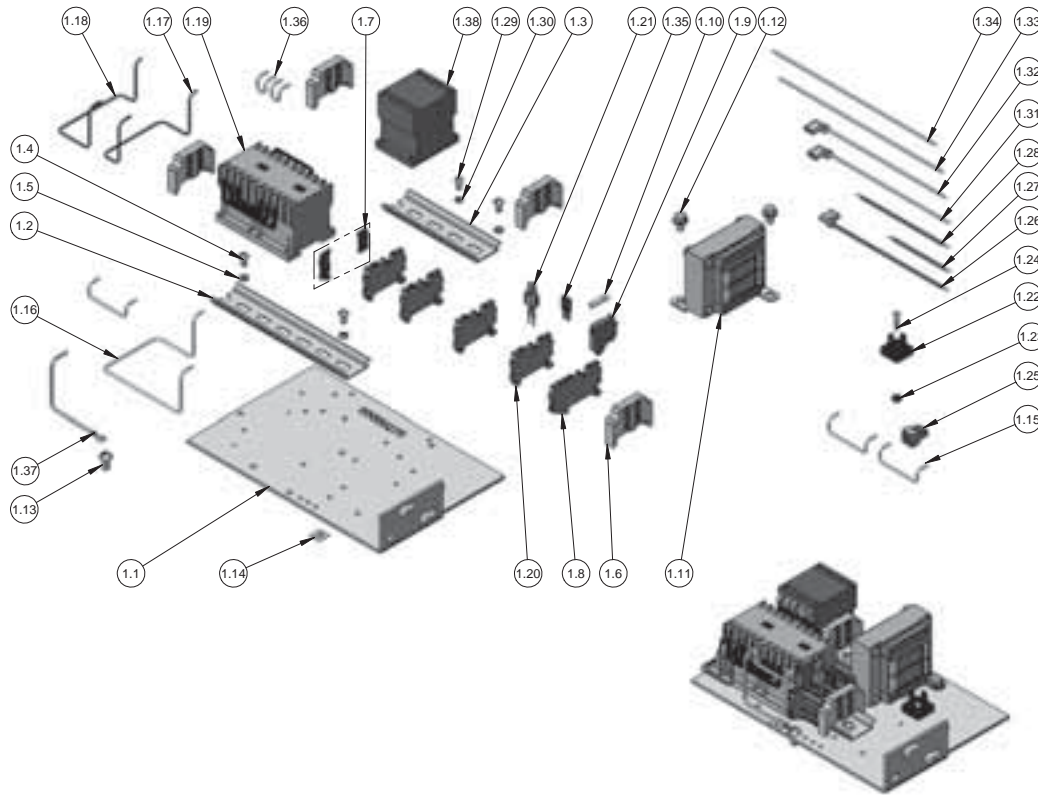


CONTACTOR BKT S/A	TRANSFORMER	REVERSING CONTACTOR	SPEED SELECTING CONTACTOR	SECONDARY VOLTAGE
00001707	00000594T	28860	28878	24 V
00001708	00000595T	24797	28871	48 V
00001709	00000596T	24799	28870	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR BKT S/A	1
1.1	00000278	CONTACTOR BRACKET	1
1.2	29010	DIN-RAIL 6.50" LONG	1
1.3	29009	DIN-RAIL 4.50" LONG	1
1.4	982686	SCREW #10-32 UNF-2A X 3/8" SL	3
1.5	987873	LOCK WASHER #10 ASA MEDIUM	3
1.6	909J13	TERMINAL STRIP END CLAMP	4
1.7	00000398	TERMINAL STRIP COVER SEGMENT	1
1.8	29018	FUSIBLE TERMINAL STRIP	1
1.9	29019	TERMINAL STRIP CARTRIDGE	1
1.10	00000393	FUSE-5MM X 20MM-500MA	1
1.11	SEE TABLE	TRANSFORMER-V2-230/460	1
1.12	25861	SCREW 1/4-20 UNC-2A X 3/8" HEX	2
1.13	20940	GROUND LABEL	1
1.14	51847	JUMPER	3
1.15	27652	JUMPER (W5)	1
1.16	27657	JUMPER (R4)	1
1.17	27736	JUMPER (R5)	1
1.18	SEE TABLE	REVERSING CONTACTOR	1
1.19	29014	TERMINAL STRIP	6
1.20	00000535	SURGE SUPPRESSOR	1
1.21	70246	RECTIFIER	1
1.22	982470	HEX HEAD MACHINE NUT	1
1.23	957854	ROUND HEAD MACHINE SCREW	1
1.24	11782704	CONNECTOR PUSHWIRE ORANGE	2
1.25	00000376	B5 JUMPER	1
1.26	00000537	B8 JUMPER	1
1.27	00000538	B9 JUMPER	1
1.28	982683	SCREW #8-32 UNC-2A X 3/8"	1
1.29	957844	LOCK WASHER #8 ASA MEDIUM	1
1.30	27662	JUMPER	2
1.31	00001500	B3-JUMPER	1
1.32	00001501	B4-JUMPER	1
1.33	00001502	JUMPER-B1	1
1.34	00001503	JUMPER-B2	1
1.35	29047	TERMINAL STRIP BRIDGE	1
1.36	27662	JUMPER	2
1.37	27189	GROUND JUMPER	1
1.38	LC1K09	CONTACTOR	1



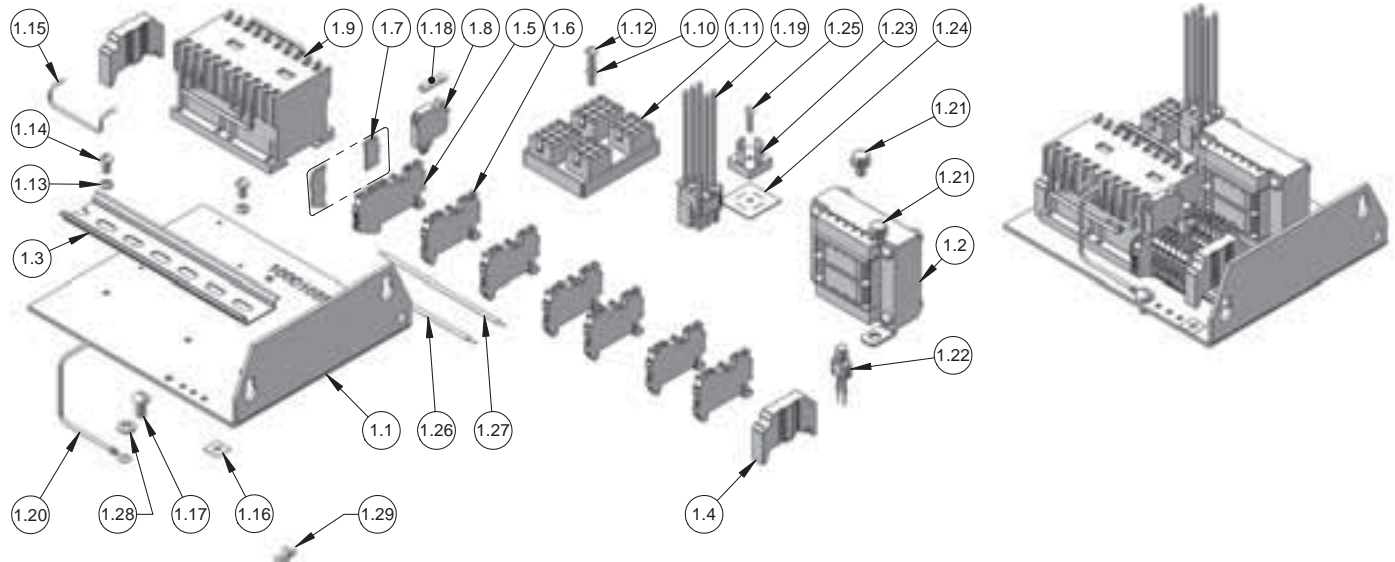
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 2-SPEED UNITS 550/575-3-50/60 MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2, RRT-2



CONTACTOR BKT S/A	TRANSFORMER	REVERSING CONTACTOR	SPEED SELECTING CONTACTOR	SECONDARY VOLTAGE
00001713	00000597T	28860	28878	24 V
00001714	00000598T	24797	28871	48 V
00001715	00000599T	24799	28870	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CONTACTOR BKT S/A	1
1.1	00000278	CONTACTOR BRACKET	1
1.2	29010	DIN-RAIL 6.50" LONG	1
1.3	29009	DIN-RAIL 4.50" LONG	1
1.4	982686	SCREW #10-32 UNF-2A X 3/8" SL	3
1.5	987873	LOCK WASHER #10 ASA MEDIUM	3
1.6	909J13	TERMINAL STRIP END CLAMP	4
1.7	00000398	TERMINAL STRIP COVER SEGMENT	1
1.8	29019	TERMINAL STRIP CARTRIDGE	1
1.9	00000393	FUSE-5MM X 20MM-500MA	1
1.10	29018	FUSIBLE TERMINAL STRIP	1
1.11	SEE TABLE	CONTACTOR	1
1.12	SEE TABLE	TRANSFORMER-V2-230/460	1
1.13	25861	SCREW 1/4-20 UNC-2A X 3/8" HEX	2
1.14	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.15	20940	GROUND LABEL	1
1.16	51847	JUMPER	3
1.17	27662	JUMPER	2
1.18	27652	JUMPER (R4)	
1.19	27657	JUMPER (R5)	1
1.20	27736	JUMPER (W5)	
1.21	SEE TABLE	REVERSING CONTACTOR	1
1.22	29014	TERMINAL STRIP	6
1.23	00001551	RECTIFIER	1
1.24	957854	ROUND HEAD MACHINE SCREW	1
1.25	982470	HEX HEAD MACHINE NUT	1
1.26	00000376	B5 JUMPER	1
1.27	00000537	B8 JUMPER	1
1.28	00000538	B9 JUMPER	1
1.29	982683	SCREW #8-32 UNC-2A X 3/8"	1
1.30	00001500	B3-JUMPER	1
1.31	00001501	B4-JUMPER	1
1.32	11782704	CONNECTOR PUSHWIRE ORANGE	2
1.33	957844	LOCK WASHER #8 ASA MEDIUM	1
1.34	27189	GROUND JUMPER	1
1.35	982683	SCREW #8-32 UNC-2A X 3/8"	1
1.36	983197	WIRING TERMINAL	1

# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 1-SPEED, DUAL VOLTAGE UNITS 220/230-380/415/460-3-50/60 MODELS: RRS

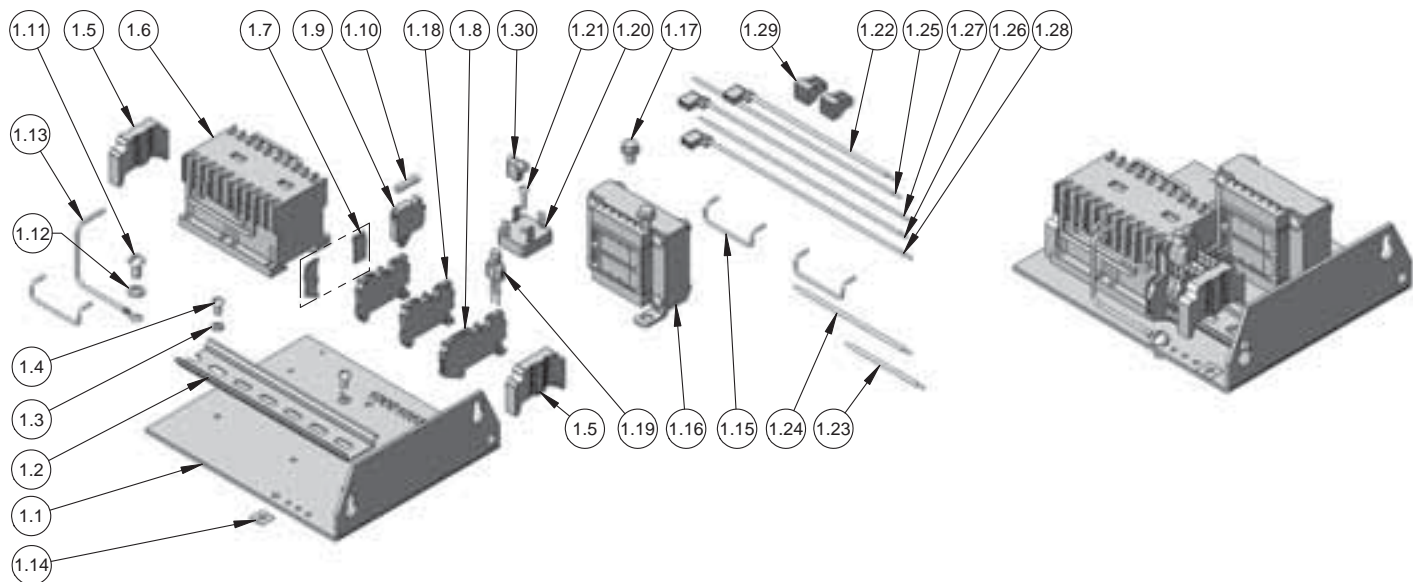


CONTACTOR BKT S/A	TRANSFORMER	REVERSING CONTACTOR	SECONDARY VOLTAGE
10001058	00000594T	28860	24 V
10001059	00000595T	24797	48 V
10001060	00000596T	24799	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CTRLS ASSY-DUAL VOLTAGE	1
1.1	10001055	CONTACTOR CONTROLS BRACKET	1
1.2	SEE TABLE	TRANSFORMER-V2-230/460 PRIMARY	1
1.3	29010	DIN-RAIL 6.50" LONG	1
1.4	909J13	TERMINAL STRIP END CLAMP	2
1.5	29018	FUSEIBLE TERMINAL STRIP	1
1.6	29014	TERMINAL STRIP	6
1.7	00000398	TERMINAL STRIP COVER SEGMENT	1
1.8	29019	TERMINAL STRIP CARTRIDGE	1
1.9	SEE TABLE	REVERSING CONTACTOR	1
1.10	957844	LOCK WASHER	1
1.11	10001233	VOLTAGE CHANGE BOARD	1
1.12	987862	SCREW #8-32UNC-2A X 1"	1
1.13	987873	LOCK WASHER #10 ASA MEDIUM	2
1.14	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.15	51847	JUMPER	1
1.16	20940	GROUND LABEL	1
1.17	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.18	00000393	FUSE-5MM X 20MM-500MA	1
1.19	00001733	HARNESS V2/CONTACTOR	1
1.20	27189	JUMPER-G/Y-#16 AWG	1
1.21	25861	SCREW 1/4-20 UNC-2A X 3/8" HEX	2
1.22	00000535	SURGE SUPPRESSOR	1
1.23	70246	RECTIFIER	1
1.24	70274	INSULATOR, RECTIFIER	1
1.25	957854	SCREW #6-32 NC-2 X 5/8" ROUND	1
1.26	00000537	B8 JUMPER	1
1.27	00000538	B9 JUMPER	1
1.28	982226	LOCK WASHER 1/4 X .109 X .062"	1
1.29	983197	WIRING TERMINAL	1



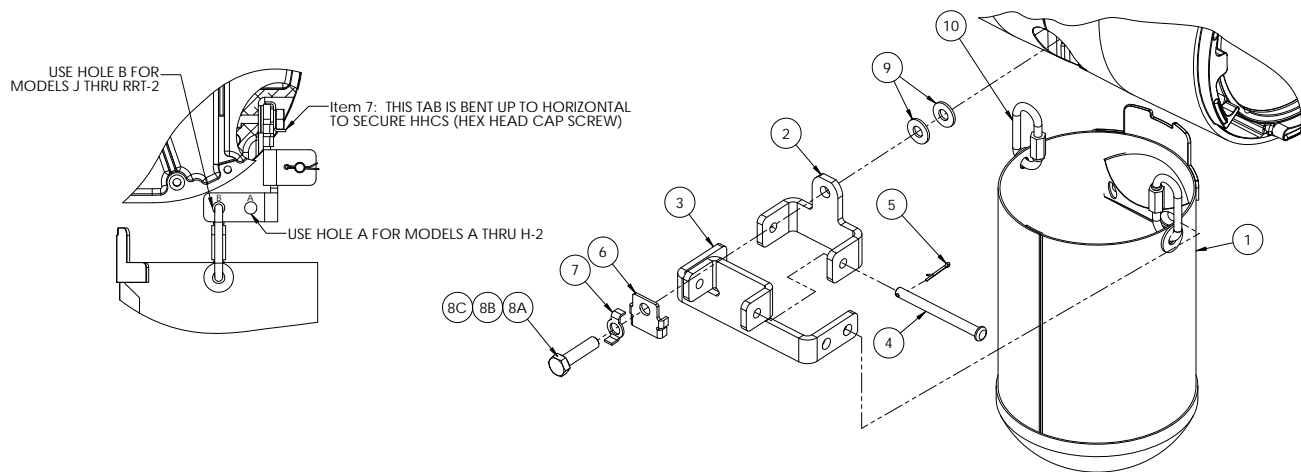
## CONTACTOR PLATE ASSEMBLY 550/575-3-50/60 FOR USE WITH DC BRAKE MODELS: RRS



CONTACTOR BKT S/A	TRANSFORMER	REVERSING CONTACTOR	SECONDARY VOLTAGE
10001061	00000597T	28860	24 V
10001062	00000598T	24797	48 V
10001063	00000599T	24799	110 V

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SEE TABLE	CTRLS ASSY-575V	1
1.1	10001055	CONTACTOR CONTROLS BRACKET	1
1.2	29010	DIN-RAIL 6.50" LONG	1
1.3	987873	LOCK WASHER #10 ASA MEDIUM	2
1.4	982686	SCREW #10-32 UNF-2A X 3/8" SL	2
1.5	909J13	TERMINAL STRIP END CLAMP	2
1.6	SEE TABLE	REVERSING CONTACTOR	1
1.7	00000398	TERMINAL STRIP COVER SEGMENT	1
1.8	29018	FUSEIBLE TERMINAL STRIP	1
1.9	29019	TERMINAL STRIP CARTRIDGE	1
1.10	00000393	FUSE-5MM X 20MM-500MA	1
1.11	987827	SCREW 1/4-20 UNC-2A X 1/2"	1
1.12	982226	LOCK WASHER 1/4 X .109 X .062"	1
1.13	27189	JUMPER-G/Y-#16 AWG	1
1.14	20940	GROUND LABEL	1
1.15	51847	JUMPER	3
1.16	SEE TABLE	TRANSFORMER-V2-575V PRIMARY	1
1.17	25861	SCREW 1/4-20 UNC-2A X 3/8" HEX	2
1.18	29014	TERMINAL STRIP	2
1.19	00001505	SURGE SUPPRESSOR	1
1.20	00001551	RECTIFIER	1
1.21	957854	SCREW #6-32 NC-2 X 5/8" ROUND	1
1.22	00000376	B5 JUMPER	1
1.23	00000537	B8 JUMPER	1
1.24	00000538	B9 JUMPER	1
1.25	00001502	JUMPER-B1	1
1.26	00001503	JUMPER-B2	1
1.27	00001535	JUMPER 'B4'	1
1.28	00001536	JUMPER 'B3'	1
1.29	11782704	CONNECTOR PUSHWIRE ORANGE	2
1.30	983197	WIRING TERMINAL	1

## 5" METAL AND FABRIC CHAIN CONTAINER INSTALLATION INSTRUCTIONS

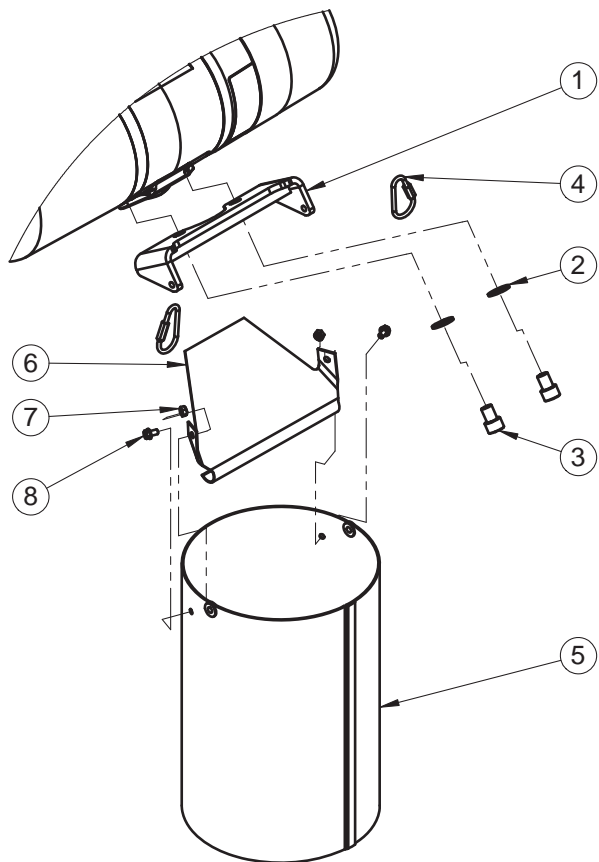
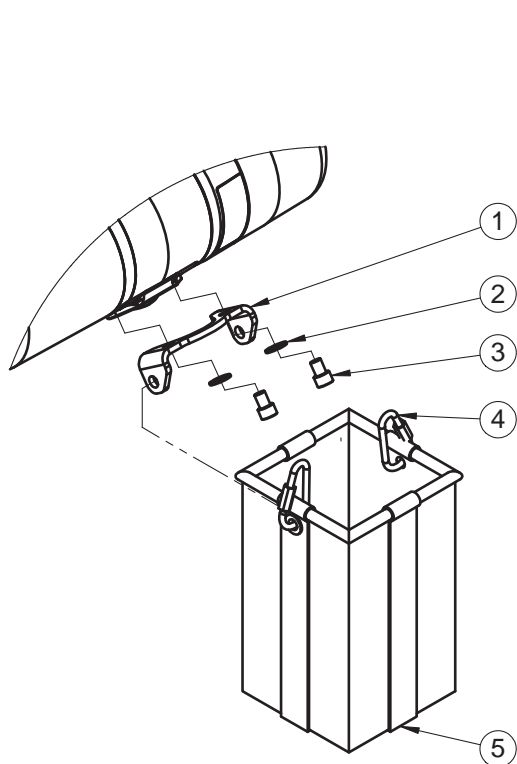


CHAIN CONTAINER BUCKET LENGTH VS. MODEL AND LIFT (TABLE A)

A THRU C2 & F THRU F-2	E, E-2, H, &H-2	J THRU LL-2	R THRU RR-2	RT THRU RRT-2	BUCKET LENGTH (INCHES)	METAL CONTAINER PART NUMBERS	FABRIC CONTAINER PART NUMBERS
LIFT IN FEET					—	—	—
10	5 -	—	—	—	8	2450	3813PNH
10 - 20	5 - 10	10	5	—	11	2451	3814PNH
20 - 30	10 - 15	10 - 15	5 - 7.5	5	14	2452	3810PNH
30 - 40	15 - 20	15 - 20	7.5 - 10	5 - 6.3	17	2453	3815PNH
40 - 50	20 - 25	20 - 25	10 - 12.5	6.3 - 8.3	20	2454	3816PNH
50 - 60	25 - 30	25 - 30	12.5 - 15	8.3 - 10	23	2455	3811PNH
60 - 90	30 - 45	30 - 40	15 - 20	10 - 13.3	31	2456	3817PNH
90 - 100	45 - 50	40 - 60	20 - 30	13.3 - 20	36	2457	3812PNH
100 - 140	50 - 70	60 - 90	30 - 45	20 - 30	48	2458	3818PNH

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	24650	CHAIN CONTAINER BUCKET/BAG	1
-		CHAIN CONTAINER KIT 5" DIAMETER (CONSIST OF THE BELOW ITEMS)	1
2		UPPER BRACKET	1
3		LOWER BRACKET	1
4		PIN CLEVIS	1
5		COTTER PIN-1/16 X 3/4 LG	1
6		ADAPTER (V2) FOR MODELS J THRU RRT-2	1
7		SCREW HEAD RETAINER	1
8A		HHCS 5/16-18 UNC-2A X 1 ¼ USE ONLY ON HOIST WITH SERIAL # BEGINNING WITH "NL" MODELS J THRU RRT AND WJ & WR	1
8B		HHCS 1/4-20 UNC-2A X 1 1 USE ONLY ON MODELS A THRU H-2	1
8C		HHCS 5/16-18 UNC-2A X 1 USE ONLY ON HOIST WITH SERIAL # BEGINNING WITH "L" OR "LW" MODELS J-RRT AND WJ & WR	1
9		WASHER 5/16 X 11/16 X .065 SAE USED ONLY ON HOIST WITH SERIAL # BEGINNING WITH "NL"	2
10		QUICK LINK	2

# RRS METAL AND FABRIC CHAIN CONTAINER INSTALLATION INSTRUCTION



CANVAS CHAIN CONTAINER BUCKET LENGTH VS LIFT	
Lift in Feet	Canvas Container Kit
20	10001562
30	10001568
40	10001569
50	10001570
60	10001571

METAL CHAIN CONTAINER BUCKET LENGTH VS LIFT	
Lift in Feet	Canvas Container Kit
30	10001563
55	10001564
80	10001565
105	10001566
130	10001567

Item #	Description	Metal Kit Part #	Qty.	Canvas Kit Part #	Qty.
1	CHAIN CONTAINER BRACKET	SEE TABLE FOR PART NUMBER BASED ON LIFT	1	SEE TABLE FOR PART NUMBER BASED ON LIFT	1
2	WASHER		2		2
3	SOCHET HEAD CAP SCREW		2		2
4	QUICK LINK		2		2
5	CHAIN CONTAINER		1		1
6	CHAIN CONTAINER RAMP		1		-
7	RAMP NUT		2		-
8	RAMP HEX BOLT		2		-

## LUBRICANTS

Part Number for Packaged Lubricants Used in the Lodestar Electric Chain Hoists (Refer to page 21 for Lubrication Instructions)		
Lubricant Usage	Type of Lubricant	Part Numbers and Packaged Quantity of Lubricants
Hoist Gears	Grease (Special)	Models A to H uses 28605
		Model J to RRT excluding RRS uses 28617
		Model RRS uses 1 each of both 28605 and 28617
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

\*These oils are not furnished by CM in Packaged Quantities. When ordering lubricants, specify the type of lubricant, part number and packages quantity required.

Touch-up Paints for Lodestar Electric Chain Hoists:

Hoist Order \*(1) case (12-12 oz. Aerosol Cans) of Black Touch-up paints Part Number 84189.

Hoist Order \*(1) case (12-12 oz. Aerosol Cans) of Orange Touch-Up paint Part Number 84190.

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

**NOTE:** When painting hoists, also order warning labels, identification labels, etc. that may be coated during painting.

## 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.

Part Description	Models A-H	Models J-RRT	Model RRS	Qty Required for Each Hoist
Limit Switch Kit	31631	31636 (excludes RRS)	31636	1
Solid State Reverse Switch (Single Phase Units Only)	27257	35499	n/a	1
Start Capacitor (Single Phase Units Only)	27716	35279	n/a	1
Run Capacitor (Single Phase Units Only)	-	35278	n/a	
Transformer	SEE CONTACTOR PLATE SECTION	SEE CONTACTOR PLATE SECTION	SEE CONTACTOR PLATE SECTION	0 or 1
Control Station Hardware Kit w/ Gasket	SEE CONTROLS SECTION	SEE CONTROLS SECTION	SEE CONTROLS SECTION	1
Control Station Button Insert Kit	SEE CONTROLS SECTION	SEE CONTROLS SECTION	SEE CONTROLS SECTION	1
Contactor	SEE CONTACTOR PLATE SECTION	SEE CONTACTOR PLATE SECTION	SEE CONTACTOR PLATE SECTION	1
Fuse - 500mA	00000393	00000393	00000393	
Speed Selector Relay (2-Speed Units Only)	SEE CONTACTOR PLATE SECTION	SEE CONTACTOR PLATE SECTION	SEE CONTACTOR PLATE SECTION	1
CM Terminal Pin-Extraction Tool (Dual Voltage Only)	27163	27163	27163	1
Suspension Bolts	987554	36846	10001047/82638	2(1 EA RRS)

## This image shows a full page of blank white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for writing or drawing. There are no margins, text, or other markings present.

# WARRANTY

## WARRANTY AND LIMITATION OF REMEDY AND LIABILITY

A. Seller warrants that its products and parts, when shipped, and operating (including installation, construction and start-up), when performed, will meet applicable specifications, will be of good quality and will be free from defects in material and workmanship. All claims for defective mechanical components under this warranty must be made in writing immediately upon discovery and in any event, within three (3) years from shipment of the applicable item unless Seller specifically assumes installation, construction or start-up responsibility. All claims for defective mechanical components when Seller assumes installation, construction or start-up responsibility and all claims for defective work must be made in writing immediately upon discovery and in any event, within three (3) years from completion of the applicable work by Seller, provided; however, all claims for defective mechanical components must be made in writing no later than (42) months after shipment. All claims for defective electrical components under this warranty must be made in writing immediately upon discovery and in any event, within one (1) year from shipment of the applicable item unless Seller specifically assumes installation, construction or start-up responsibility. All claims for defective electrical components when Seller assumes installation, construction or start-up responsibility and all claims for defective work must be made in writing immediately upon discovery and in any event, within one (1) year from completion of the applicable work by Seller, provided; however, all claims for defective electrical components must be made in writing no later than eighteen (18) months after shipment. Defective items must be held for Seller's inspection and returned to the original f.o.b. point upon request. THE 'FOREGOING IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESS, IMPLIED AND STATUTORY, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY THIRD PARTY WITH RESPECT TO ANY GOOD, WHETHER IN CONTRACT, TORT OR OTHER THEORY OF LAW, FOR LOSS OF PROFITS OR LOSS OF USE, OR FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, DIRECT OR INDIRECT DAMAGES, HOWSOEVER CAUSED.

B. Upon Buyer's submission of a claim as provided above and its substantiation, Seller shall at its option either (i) repair or replace its product, part or work at either the original f.o.b. point of delivery or at Seller's authorized service station nearest Buyer; or (ii) refund an equitable portion of the purchase price. All claims are to be submitted in accordance with our published warranty process.

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

D. 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: (i) damaged or misused following Seller's delivery to the carrier; (ii) not maintained, inspected, or used in compliance with applicable law and Seller's written instructions and recommendations; (iii) installed, repaired, altered or modified without compliance with such laws, instructions or recommendations; or (4) repaired with parts or accessories other than those supplied by CMCO.

E. The foregoing is Seller's only obligation and Buyer's exclusive remedy for breach of warranty and is Buyer's exclusive remedy hereunder by way of breach of contract, tort, strict liability or otherwise. Any action for breach of this agreement must be commenced within one (1) year after the cause of action has accrued.



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