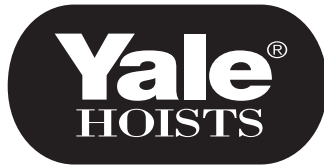


# OPERATING, MAINTENANCE & PARTS MANUAL

MANUAL #: 115633-12



# LODEKING<sup>TM</sup>

**HIGH CAPACITY** ELECTRIC WIRE ROPE HOISTS



**Capacities from 15 to 60 tons**

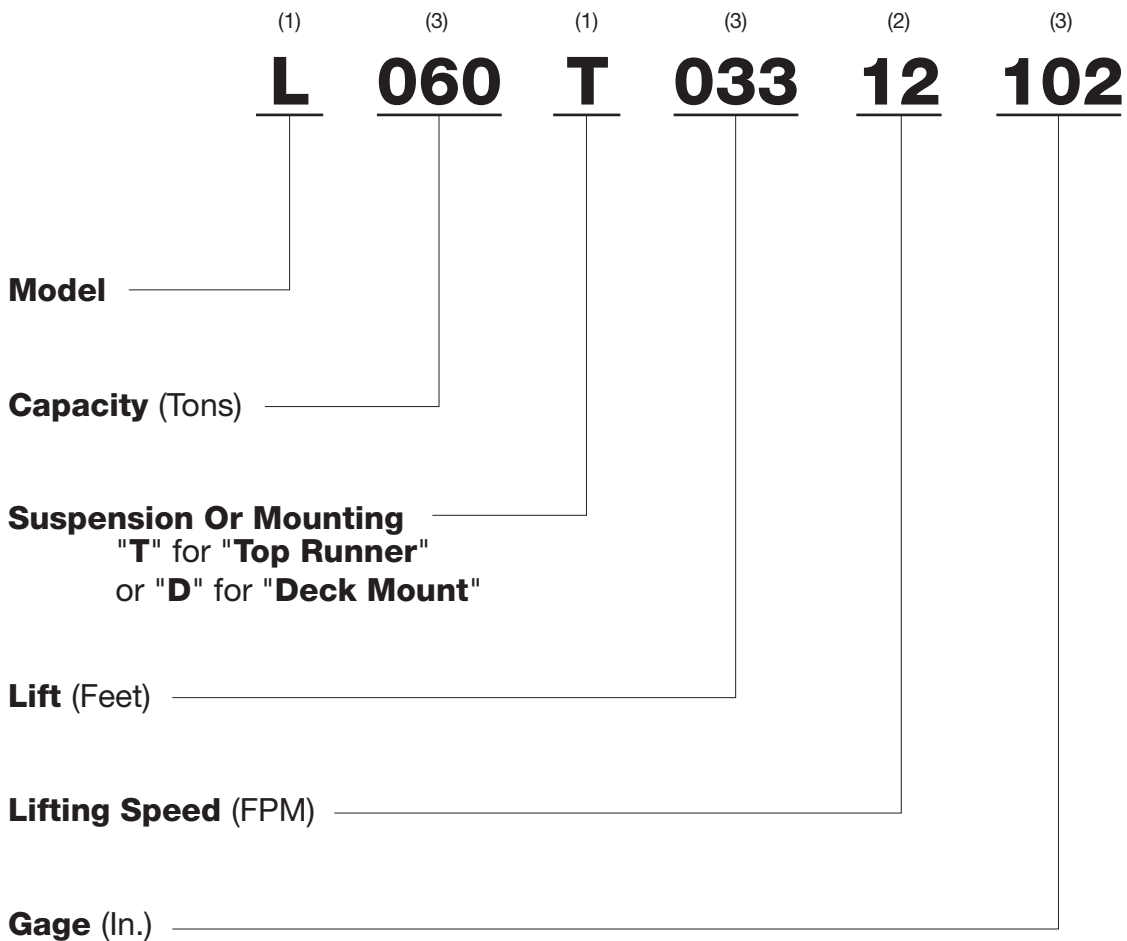
# TABLE OF CONTENTS

<b>ORDERING/MODEL NUMBER SYSTEM</b> .....	3
<b>HOIST OPERATION &amp; MAINTENANCE</b> .....	4-23
Safe Hoisting Practices .....	4
Before Operating Hoist	
Applying the Load	
Moving the Load	
Parking	
Safety Laws for Passenger Elevators	
Inspection, Preventive Maintenance and Testing	
Yale Hoist Duty Service Classifications .....	5
Repair Parts Ordering & Return Information .....	5
Hoist Serial Numbers .....	5
Installation Instructions .....	5
Adjustment of Limit Switches .....	6-7
Basic Suspensions .....	8
Hoist Maintenance and Inspection .....	8-10
Daily Inspection	
Monthly Inspection	
Quarterly Inspection	
Annual Inspection	
Function Testing After Repair	
Wire Rope Maintenance and Inspection	
Reeving .....	10-11
Disassembly & Reassembly .....	12
Troubleshooting .....	13
Hoist Gear Drive Information .....	14-17
Motor Brake Installation & Maintenance .....	18-21
Helical & Bevel Reducer Lubrication .....	22-23
<b>TROLLEY OPERATION &amp; MAINTENANCE</b> .....	24-40
General Information .....	24
Installation .....	24
Start-up and Pre-Operational Inspection .....	25
Operation .....	25-29
Inspection .....	29-30
Maintenance .....	30-33
Replacement Parts .....	34-40
<b>RECOMMENDED SPARE PARTS</b> .....	41
<b>WARRANTY</b> .....	41

# LODEKING MODEL NUMBER SYSTEM

Example: Model # L060T03312102

60-ton LodeKing  
Top running suspension  
33 ft. of lift (12 ft./min.)  
Double reeved  
Gage is 102 in.



## SAFE HOISTING PRACTICES

For your own safety and that of your fellow workers, Material Handling Equipment must be used as recommended by the Manufacturer. Failure to heed the following recommendations could endanger your life. Use good common sense and judgement at all times. Safety is the responsibility of the operator of the equipment. You must be competent and attempt to foresee and avoid all hazardous conditions. To be safe as possible, the hoist must be given proper preventive maintenance and testing as described in the ANSI B30.16 Safety Code For Overhead Hoists and this manual.

### Before Operating Hoist

1. Do not operate hoist unless you are properly trained, physically fit, and authorized to do so. You must be familiar with all operating controls of the hoist, warnings and instructions on the hoist, the safe hoisting practices listed in this manual, ANSI B30.16 Safety Code For Overhead Hoists, and all pertinent Federal, State, and local regulations before beginning operation.
2. Do not allow unqualified personnel to operate the hoist.
3. Test all controls and limit switches and make sure hoist is well lubricated at beginning of each shift. Make sure needed lubrication, adjustments, or repairs are made by appointed personnel before operations are begun.
4. Be familiar with the equipment and its proper care. Do not operate hoist if adjustments or repairs are necessary, if any damage or undue wear is known or suspected, or if any warning, operating, or capacity instructions normally attached to hoist are damaged, obscured or missing. Report these items promptly to the proper person and also notify next operator when changing shifts.
5. Do not operate hoist if it is functioning improperly.
6. Do not operate hoist with an out-of-order sign attached until sign has been removed by a properly authorized person.
7. Do not adjust or repair hoist unless qualified for maintenance of hoist.
8. Be sure the power supply is disconnected before maintenance and repair procedure is performed.
9. Do not use the wire rope as a ground for welding.
10. Do not touch a welding electrode to the wire rope.

### Applying the Load

11. Never wrap the wire rope around the load, or allow it to drag under load.
12. Always use slings or other approved devices to attach load.
13. Be sure the sling is properly seated in the saddle of the hook. Do not allow hook latch to support any part of load.
14. Do not apply a load to tip of hook, or in such a way as to cause bending, or prying forces on the hook or hook support block.
15. Be sure wire ropes are not kinked or twisted or that multiple part ropes are not twisted about each other.
16. Do not operate hoist if wire rope is not seated properly in the grooves of the drum or sheaves.
17. Do not load hoist with less than two wraps of rope on the drum.
18. Center hoist unit over the load before lifting. Avoid side pull.
19. Never pick up a load beyond the rated capacity appearing on the hoist, except for properly authorized tests.
20. Do not use a load limiting device to measure the maximum load to be lifted. It is a safety device only.

### Moving the Load

21. Do not engage in any activity which will divert your attention while operating hoist.
22. Respond to signals from designated personnel only, except for stop signals.
23. Never lift a load with the hoist until you and all other personnel are clear of load.
24. Make sure load has proper clearance before moving.
25. Inch the hoist slowly into engagement with a load, but avoid excessive plugging, inching, and quick reversals of load.
26. Do not lift load more than a few inches until it is well balanced in the sling or lifting device.
27. Each time a load approaching rated capacity is handled, check load brake action by raising load just clear of supports and continuing only after you are sure brake is operating properly.
28. Do not transport load over personnel.
29. Never carry personnel on the hook or the load.
30. Avoid swinging of load or load hook when traveling the hoist.
31. On trolley mounted hoists, avoid sharp contact between trolleys, or between trolleys and rail stops.
32. Do not use limit devices as a normal means of stopping the hoist. These are emergency devices only.
33. Do not exceed the maximum duty cycle specified by the manufacturer.

### Parking

34. Do not leave load suspended in the air for extended or unattended periods.
35. Keep load block above head level when not in use.

### Safety Laws for Passenger Elevators

The safety laws for passenger elevators specify construction details that are not incorporated in Yale Hoists. We recommend that passenger elevator operation equipment be used that meets all state and national safety codes. Yale Hoists will not accept responsibility for applications of Yale Hoists on passenger elevators.

## **WARNING**

**DO NOT USE YALE HOISTS OR TROLLEYS FOR PASSENGER ELEVATOR APPLICATIONS.**

### Inspection, Preventive Maintenance and Testing

A preventive maintenance program should be initiated for this hoist immediately after it is entered into service. The preventive maintenance program should comply with recommendations in the applicable Yale Parts and Instruction Manual, and all pertinent Federal, State and Local regulations. Regular inspections, maintenance and testing required should be followed for the life of the hoist and written inspection records kept as specified. Sample inspection checklists are included in back of this manual. Extra inspection checklists can be obtained from your nearest authorized Yale Distributor.

## YALE HOIST DUTY SERVICE CLASSIFICATIONS

Yale Hoist Duty Class	Typical Areas of Application	Operational Time Ratings			
		Uniformly Distributed Work Periods		Infrequent Work Period Hoist Running 50% Time	
		(3) Max. on Time Min./Hr.	(4) Max. No. of Starts/Hr.	(5) Max. Time From Cold Start Min.	(6) Max. No. of Starts
H3	General Machine Shop, fabricating, assembly, storage and warehousing. Where loads and utilization are randomly distributed, with total running time of equipment not exceeding 15-25% of the work period.	15	150	60	200
H4	High volume handling in steel warehousing, general machine shops, fabricating, assembly, mills and foundries. Total running time does not exceed 35% of work period. Loads at or near rated capacity frequently handled.	21	300	30	300
H5	Material bulk handling in combination with buckets, magnets or heavy attachments. Often cab operated. Duty cycle exceeds 35% and approaches continuous operation. User must specify exact details of operation including attachment weights.	Up to continuous	600	Not Applicable	Not Applicable

### Repair Parts Ordering Information

This parts and instruction manual contains information required to install and maintain your Yale LodeKing Series Electric Hoist. To insure prompt service, each repair parts order should be placed with your local distributor, and must contain the following information:

Please give all information listed below in items 1 through 4. This will enable your distributor to fill your order promptly.

1. Give complete data from hoist nameplate, including hoist serial number, model number, voltage, frequency, and hertz.
2. Give part numbers, description and quantity of parts required.
3. Give correct shipping destination.
4. For ordering motor repair parts, give all data on the hoist, gearcase and motor nameplates.

### Hoist Serial Numbers

The hoist serial number is stamped on the nameplate. The nameplates also designate the model number, capacity, speed, current characteristics, and service rating of the hoist or trolley.

### Return of Parts

If it becomes necessary to return the complete hoist or certain parts to the factory, a letter requesting such a return is necessary. This letter should contain an explanation for requesting the return. A return authorization will be issued giving you clearance for returning the hoist or parts to the factory.

## INSTALLATION INSTRUCTIONS

Before the unit is shipped from the factory it is rigidly tested and carefully adjusted for proper operation. However, the following points must be checked to insure correct installation and avoid damage to the hoist.

1. **ROPE AND DRUM:** Check the hoist rope for any signs of damage and make sure it lies properly in the grooves of the drum and sheaves. Make sure the rope is well lubricated.
2. **LUBRICATION:** Every attempt has been made to ship the hoist with the proper amount of lubricating oil in the gearcase. Before placing the unit-in operation, check the level on the sight gauge. The oil should be level with the level hole. If more oil is needed, consult the Lubrication Chart. Also make sure breather plug hole is cleared.
3. **CURRENT SUPPLY:** make sure the electric current supply corresponds with the rating listed on the hoist nameplate. Make sure duty cycle capabilities of hoist are fully understood by all operators.
4. **ELECTRICAL CONNECTIONS:** Open the control box and check all the electrical connections ~ to be sure they are tight and that none of the hardware vibrated loose during shipment.

5. **PUSH BUTTON CONTROL:**

### WARNING

**TO INSURE CORRECT OPERATION OF THE SAFETY LIMIT STOPS, IT IS VERY IMPORTANT THAT THE HOOK TRAVEL IS IN THE HOISTING DIRECTION WHEN THE 'UP' BUTTON IS PRESSED. IF IT IS NOT, INTERCHANGE ANY TWO OF THE MOTOR LEADS IN THE MOTOR CONDUIT BOX. DO NOT CHANGE PUSHBUTTON WIRING. INTERCHANGING WIRES ON THE LINE SIDE OF THE INVERTER WILL NOT AFFECT SHAFT ROTATION DIRECTION. IF THE HOIST IS OPERATED WITH INCORRECT POWER CONNECTIONS, THE SAFETY LIMIT STOPS WILL BE INEFFECTIVE AND SERIOUS DAMAGE AND DANGEROUS ACCIDENTS MAY RESULT.**

### CAUTION

**THE HOIST MUST BE GROUNDED. TO DO THIS CONNECT A SUITABLE GROUND WIRE IN THE SUPPLY WIRING TO A SOLID GROUND AND TO THE SUPPLY GROUNDING LUG SUPPLIED IN THE HOIST CONTROL PANEL.**

## Adjustments of Limit Switches

- UPPER LIMIT SWITCH:** After the hoist is determined to be running in the proper direction, lower the hook to approximately eight feet (8) below the hoist. Check the limit switch by running the hook upward and lifting the rod or weight by hand. When the rod or weight is lifted from one-half inch (1/2) to two inches (2) the hoist should cutoff. Any further lifting of the rod or weight should close the lowering circuit and cause the hook to lower.
- UPPER AND LOWER LIMIT SWITCH:** (Note warnings and cautions below)
- ROTARY CAM LIMIT SWITCH**  
(SEE NEXT PAGE FOR DIAGRAMS)

### OPERATION

Rotation of drive shaft (D) in either direction causes all cam gear assemblies (I) to turn, actuating the contact blocks (K). A timing line appears in the notch (J) when the corresponding contact block is actuated. Cam for each contact block is independently adjustable. Each contact block contains one normally open and one normally closed contact set.

### ADJUSTMENT

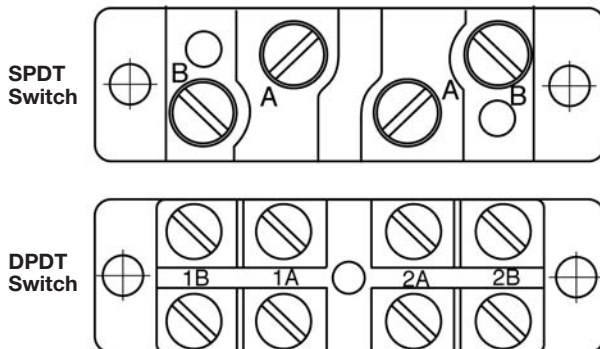
- Operate the equipment until the desired travel limit is reached, taking into account coasting or braking distance.
- Loosen the screw (C) for the cam wheel which actuates the contact block you wish to adjust.
- Insert the adjustment tool (G) into the guide hole (H) closest to the cam wheel being adjusted. Engage teeth on adjustment tool with teeth on cam wheel.
- Rotate adjusting tool, either direction, until the black line (E) appears in the notch (J). This will be the approximate position at which the contact block will be actuated.
- Tighten the cam screw (C). Avoid over-tightening which could damage screw and screw threads.

## CAUTION

TERMINAL OF INDIVIDUAL SNAP SWITCH MUST BE WIRED SAME POLARITY.

### CONTACT BLOCK TERMINALS VIEWED FROM TOP

A Terminals N.C. B Terminals N.O.



\*Timing line is black on white standard dwell cam.  
Line is white on black long dwell cam.

## When Adjusting Limit Switches:

### WARNING

HAZARDOUS VOLTAGE. CAN CAUSE DEATH, SERIOUS PERSONAL INJURY, OR PROPERTY DAMAGE.

DISCONNECT POWER BEFORE WORKING ON THIS EQUIPMENT.

EACH STEP OUTLINED BELOW MUST BE FOLLOWED FOR PROTECTION AGAINST ELECTRICAL SHOCK AND INJURY FROM MOVING COMPONENTS.

### CAUTION

WHEN MOUNTING ROTARY LIMIT SWITCH, ALIGN DRIVE SHAFT (D) WITH COUPLING TO MINIMIZE STRESS ON SHAFT AND BUSHINGS.

DO NOT USE HAMMER OR SIMILAR TOOL TO FORCE COUPLING OR SPROCKET ONTO DRIVE SHAFT.

EXCESSIVE STRESS ON SHAFT MAY RESULT IN DAMAGE TO ROTARY LIMIT SWITCH AND COULD INVALIDATE WARRANTY.

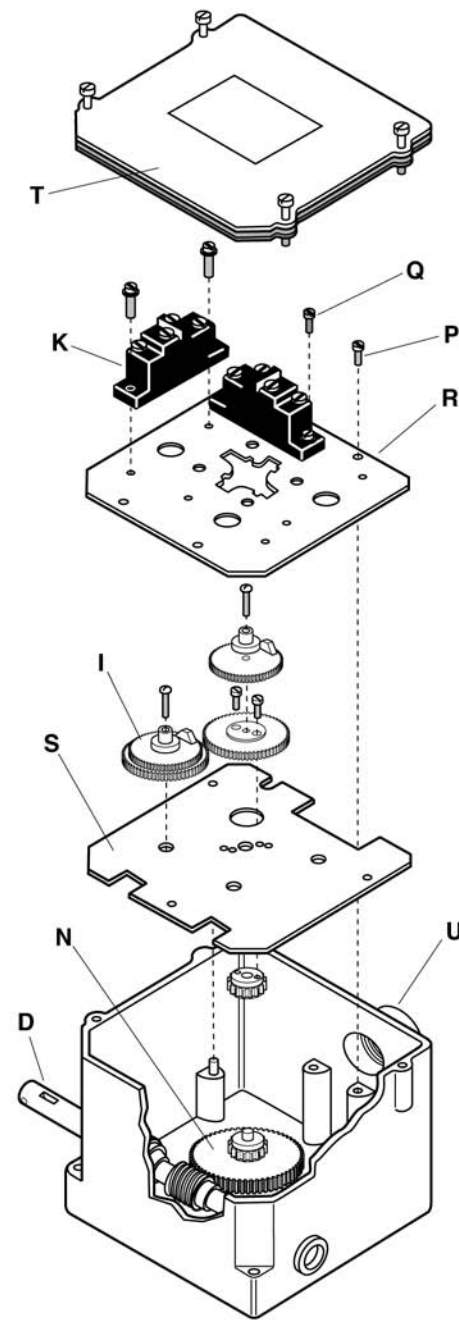
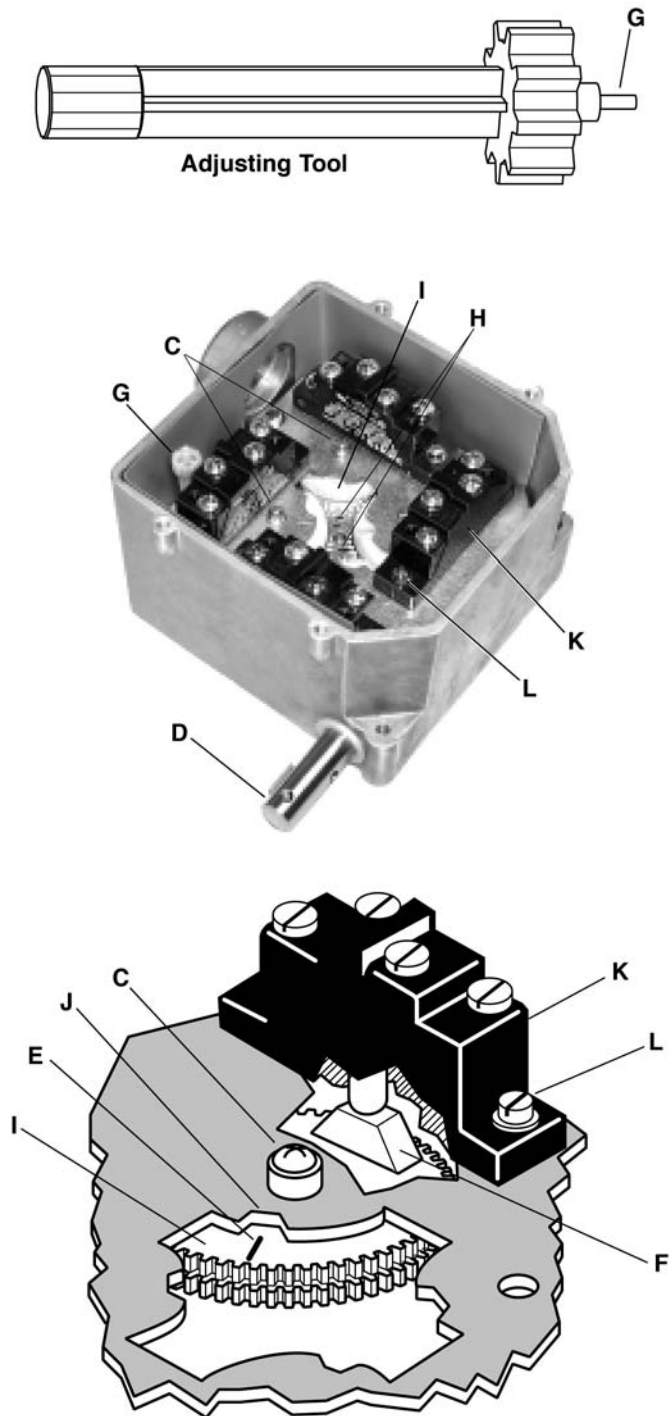
### WARNING

AT LEAST THREE WRAPS OF ROPE MUST REMAIN ON THE DRUM IN THE LOWEST POSITION.

### WARNING

WHEN UPPER PLUGGING LIMIT SWITCH IS USED, MAKE SURE TRAVELING NUT (OR GEARED) LIMIT SWITCH TRIPS FIRST, ALLOWING THE ROD OR WEIGHT TYPE SWITCH TO ACT AS THE BACKUP LIMIT.

## Rotary Cam Limit Switch Adjustment Diagrams



**C - Cam Screw**

**D - Drive Shaft Assembly**

**E - Black Timing Line**  
(Black on white cam for Standard Dwell. White on black cam for Long Dwell)

**F - Cam**

**G - Adjustment Tool**

**H - Guide Hole**

**I - Cam Gear Assembly**  
(White for Standard Dwell. Black for Long Dwell)

**J - Notch**

**K - Contact Block and**  
(2) 6-32 x 1" screws

**L - Contact Block Screws**

**N - Helical/Cam Drive Gear Assembly**

**P - Ground Screw**

**Q - Top Plate Screws**

**R - Switch Mounting Plate**

**S - Cam Mounting Plate**

**T - Cover**

**U - Threaded Outlet**

## Basic Suspensions

The basic hoist suspension type is a top running motorized trolley for double rails. Before mounting on beam or rail, make sure supporting structure has adequate strength to safely support the loading which will be imposed.

On top running motorized trolleys, make sure rail size is correct for wheels and that distance between rails is correct for trolley throughout entire rail lengths.

## Preventative Maintenance Schedule

The required periods between inspections will vary due to the wide range of duty cycles and operating conditions encountered with equipment. The following recommended inspection periods are based on duty of specified service rating with single shift operation (40 hours per week) under normal environmental conditions. If the hoist is used under adverse environmental conditions it should be inspected more frequently.

## Daily Inspection

Inspect the following items before operating hoist:

1. **ELECTRICAL CONNECTIONS:** Check for worn or frayed wires, for loose connections and for damage to, or improper operation of, push button assembly.
2. **LIMIT SWITCH:** Check the upper and lower limit switch by running the hook without load, and at the slowest speed obtainable, to the maximum up and maximum down positions. Then test with increasing speeds up to maximum. The switch should shut the hoist off before the bottom block contacts the rod or weight type limit switch at the upper extreme. Three wraps of rope should remain on the drum at the shut-off point at the lowest extreme. If adjustment is necessary, refer to geared limit switch section.
3. **HOOK:** Check for cracks or deformation. Check for damaged or missing latch. A bent or twisted hook indicates overloading or abuse of unit. Other load bearing components of the hoist or trolley should be inspected if overloading is apparent or suspected. The bottom hook must swivel freely.
4. **WIRE ROPE:** Check for proper seating in drum grooves. Check for wear, unstranding, fraying, kinks, or broken wires in the wire rope, and condition of end connections. (If damage is noted, see wire rope instructions under monthly inspection.)
5. **HOOK DRIFT:** With a load, the hook should stop promptly when the push button is released. Hook drift of more than 2 inches indicates the motor brake is malfunctioning. (See quarterly and annual inspection instructions for more details.)
6. **UNUSUAL CONDITIONS:** Excessive noise, oil leaks, etc. should be investigated.

### CAUTION

DO NOT OPERATE THE HOIST IF ABOVE INSPECTION INDICATES THAT MAINTENANCE IS NEEDED.

## Monthly Inspection

1. **ALL ITEMS UNDER DAILY INSPECTION.**
2. **LUBRICATION:** Check the level and condition of the gearcase lubricant. The level must be maintained at the gearcase sight gauge. If the level is low, check for leaks. Replace gaskets and shaft seals if necessary. An excessively black color lubricant indicates a chemical change in the lubricant caused by excessive heat, which in turn is caused by heavy duty cycles. Lubricant that is very black in color must be replaced to prevent shortened life of drive components. Lubricate wire rope and other points as required. Refer to lubrication chart.

### CAUTION

FOR OPTIMUM LUBRICATION AND COOLING, OIL LEVEL MUST BE MAINTAINED AT THE SIGHT GAUGE LEVEL.

3. **HOOK:** Check hook retaining nuts and collars, and means used to secure them. Replace hook if throat opening allows safety latch to disengage from throat opening, or if there is 10 degrees or more twist from normal plane of hook.
4. **PUSH BUTTON:** Check the ground connections to be sure that the wire cores from the push button cable and the power cord are secured. Tighten the grounding screw and replace the lock-washer if it is missing.
5. **BEARINGS:** Check all bearings for noisy operation, which is an indication of wear.
6. **HARDWARE:** Check for loose bolts, nuts and rivets.
7. **WIRE ROPE:** Check conditions of wire rope using inspection checklist. Refer to wire rope inspection.
8. **WARNING LABELS:** Check for absence or illegibility of warning decals and tags and replace if necessary.

### WARNING

NEVER ALLOW WIRE ROPE TO OPERATE DRY.

9. **SUPPORTING STRUCTURE OR TROLLEY:** Should be checked for continued ability to support the imposed loads. Check for loose suspension or support bolts, axle nuts, etc.
10. **INSPECTION CHECKLIST:** Fill out inspection checklist at the back of this manual, sign, date and file for future reference.

## Quarterly Inspection

1. **ALL ITEMS UNDER DAILY AND MONTHLY INSPECTION.**
2. **MOTOR BRAKE:** Check for excessive or uneven disc wear. Check for excessive magnet gap. Lubricate linkage as required.



## Annual Inspection

1. **ALL ITEMS UNDER DAILY, MONTHLY AND QUARTERLY INSPECTION.**
2. **EQUALIZE SHEAVE, IDLER SHEAVE, AND PINS.**  
Check for cracked or worn sheaves, pins and bearings.
3. **HOOKS:** Magnetic particle or other suitable crack detecting inspection should be performed if need is indicated by external appearance. Check for loose retaining nuts and collars.
4. **LOAD BEARING PARTS:** Check for worn, cracked or distorted parts, such as suspension housings, outriggers, clevises, yokes, hook blocks, suspension bolts, shafts, locking devices and bearings on hoist (also on trolley, if so equipped).
5. **MOTOR BRAKE:** Check for excessive or uneven disc wear. On direct acting, check for excessive magnet gap. Lubricate linkage as required.

### **CAUTION**

**PRIOR TO TESTING, ALL SUPPORTING STRUCTURES, ANCHORAGES, AND/OR SUSPENSIONS MUST BE APPROVED BY THE APPOINTED PERSON FOR THE TEST LOADS USED.**

6. **WIRING AND TERMINALS:** See that all connections are tight. Terminals are to be securely crimped to wires and the insulation sound. Bent terminals can usually be straightened to provide a tight fit. Replace terminals or wire if necessary.
7. **SHEAVES AND DRUMS:** Inspect rope sheaves and drums for excessive wear. When the groove of a sheave or rope drum becomes worn excessively it should be replaced. Worn grooves on the drum or sheave can greatly reduce the useful life of the hoisting rope.
9. **BEARING LUBRICATION:** The motor, sheave, and outer drum bearings are a pre-lubricated sealed design and normally will not need to be lubricated.
10. **INSPECTION CHECKLIST:** Fill out inspection checklist at the back of this manual, sign, date and file for future reference.

## Function Testing After Repair

### **CAUTION**

**PRIOR TO TESTING, ALL SUPPORTING STRUCTURES, ANCHORAGES, AND/OR SUSPENSIONS MUST BE APPROVED BY THE APPOINTED PERSON FOR THE TEST LOADS USED.**

After repair or replacement of parts, function test hoist by operating unloaded hoist into both upper and lower limits, first with slowest speed possible, then with increasing speeds up to maximum. Limit switch mechanisms must be adjusted so they will trip in sufficient time to prevent damage to any part of the hoisting arrangement. See instructions for adjustment of limit switches. Then test operation of hoist and brake by lifting 100% of rated load. (A normal load lifted may be substituted if no load bearing parts were altered.) If hoist is equipped with a load limiting device, and load bearing parts have been altered, the first test load should be only 100% of rated load. The test should be prepared by the person responsible and kept on file for future reference.

## Wire Rope Inspection

All wire rope should be inspected once a month and a signed and dated inspection report maintained. The inspection checklists at the back of this manual can be used to record these inspections. Wire rope should be replaced if any of the following conditions are noted.

1. Twelve randomly distributed broken wires in one rope lay, or four broken wires in one strand in one rope lay.
2. Wear of one-third (1/3) of the original diameter of outside individual wires.
3. Kinking, crushing, birdcaging or any distortion of the wire rope structure.
4. Evidence of heat damage.



Broken Wires

Kinked

Bird Cage

5. Reductions from nominal diameter of more than the following values:

New Rope Diameter	Maximum Reduction
5/16 inch and under	1/64 inch
3/8 inch through 1/2 inch	1/32 inch
9/16 inch through 3/4 inch	3/64 inch
7/8 inch through 1-1/8 inch	1/16 inch

6. Rope clamps should be checked to ensure bolts are properly torqued.

### CAUTION

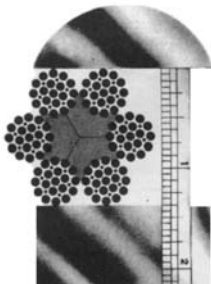
REPLACEMENT WIRE ROPE SHOULD BE THE SAME SIZE, GRADE AND CONSTRUCTION AS THE ORIGINAL WIRE ROPE. BEFORE REPLACING WIRE ROPE, READ REEVING PROCEDURE. AFTER WIRE ROPE REPLACEMENT CHECK FOR PROPER LIMIT SWITCH OPERATION.

### WARNING

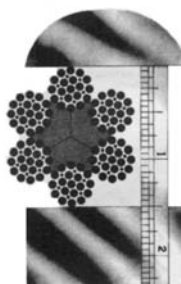
ROPE PILE-ON HOISTING DRUM WILL SEVERELY DAMAGE THE HOISTING ROPE. IF THIS CONDITION IS NOTED, THE HOISTING ROPE SHOULD BE INSPECTED ACCORDING TO THE ABOVE PARAGRAPH ON WIRE ROPE INSPECTION. IF DAMAGED ROPE IS FOUND, CHECK DRUM AND FRAME MEMBERS FOR DAMAGE.

## How to Measure Wire Rope

The correct diameter of a wire rope is the diameter of a circumscribed circle which will enclose all the strands. It is the largest cross-sectional measurement. The measurement should be made carefully with calipers. The illustrations below show the correct and incorrect method of measuring the diameter of wire rope.



Wrong Way



Right Way

## GENERAL INSTRUCTIONS

### Procedure for Reeving Wire Rope on Drum

#### DOUBLE REEVED UNITS

*Note: Rotary cam limit switch must be set for (3) safety wrap.*

1. Anchor the rope in the drum on one side. Install rope retainer.
2. Stretch out rope to make sure there are no twists or kinks.
3. Reeve the free end of the rope through the bottom block and all sheaves.
4. Anchor the free end of the rope in the other side of the drum. Install rope retainer.
5. Push the "UP" button to reeve both sides of the drum, making sure there is enough force on the rope to insure proper reeving in all drum grooves.

*Note: When the bottom block is raised to the upper limit, the block should be at the midpoint of the ungrooved portion of the drum and even with idler sheave. If this is not so, the unit is reeved incorrectly.*

### WARNING

ALL UNITS WITH A LOWER LIMIT SWITCH MUST HAVE A MINIMUM OF THREE WRAPS OF WIRE ROPE ON THE DRUM WHEN THE BOTTOM BLOCK IS IN THE LOWEST POSITION.

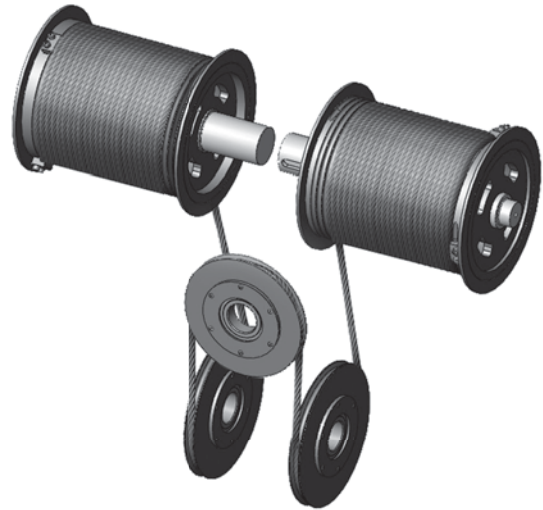
## Reeving Types

Yale powered wire rope hoists and winches are reeved in various ways to gain desired advantages. Proper reeving insures maximum life of the hoist drum, wire rope, and bottom block assembly while obtaining the best characteristics of capacity, lift, and speed for the basic unit.

Reeving is "double", i.e. two ropes coming from the drum. Close headroom hoists are double reeved. "Part" designates the number of times the rope runs between the hoist and bottom block. For example: With 2 part double reeving, the rope runs from the rope drum to the bottom block, up to the equalizer sheave, back to the bottom block, then back to the rope drum, indicating 4 "parts" of rope supporting the load.

The drawings below show the characteristics of each principal method of reeving.

Advantages of double reeved units include minimum lateral hook drift (keeping load in the same approximate position in relation to the drum and beam) and a lower hoist headroom requirement.



**4 Part Reeving**



**6 Part Reeving**



**8 Part Reeving**



**10 Part Reeving**



**12 Part Reeving**

## Disassembly

### CAUTION

**BEFORE DOING MAINTENANCE WORK ON THIS HOIST, READ THE FOLLOWING INSTRUCTIONS THOROUGHLY. REFER TO THE REPLACEMENT PARTS SECTION FOR PARTS IDENTIFICATION.**

To completely disassemble the hoist, follow the disassembly procedures in the order listed.

To disassembly any one specific part of the hoist, follow the instructions for that specific section.

#### 1. REMOVE HOIST ROPE, BOTTOM BLOCK OR BOTTOM HOOK.

- 1) Remove or readjust geared limit to negate lower limit (see instructions (a) through (f)).
- 2) Operate hoist in down direction until no cable remains on the drum. Remove rope clamps and pull rope from the drum.
- 3) Remove power from the hoist.
- 4) Remove rope clamps.
- 5) Remove limit switch weight from the hoist cable.
- 6) Remove pin holding equalizer sheave yoke in hoist frame. (4 part rope only)
- 7) Remove shafts holding the sheaves in the yoke or frame and remove cable.

#### 2. REMOVE MOTOR BRAKE (DIRECT ACTING).

### CAUTION

**DISCONNECT ALL POWER TO THE HOIST BY DISCONNECTING THE POWER FEED LINE BEFORE ATTEMPTING SERVICE OR REPAIR.**

- a. Disconnect encoder cable from encoder.
- b. Remove fan shroud screws and remove shroud.
- c. Loosen set screws holding encoder to shaft and remove encoder.
- d. Remove screws holding fan to shaft and remove fan.
- e. Disconnect brake cable within motor terminal box and remove cable from terminal box.
- f. Remove four socket head screws holding brake to motor. Remove brake.

#### 3. REMOVE GEAR CASE.

- a. Run hoist in down direction and clear all rope from the hoist drum.
- b. Remove drum supports and drums. Caution must be used when removing drums to ensure that the hollow bore does not become nicked or damaged.
- c. Remove bolts (4) from under the gearbox mounting plate.
- d. Lift gear case from trolley frame.

### CAUTION

**THE GEAR CASE ASSEMBLIES CAN BE VERY HEAVY. IF POSSIBLE, IT IS BEST TO SUPPORT THEIR WEIGHT PRIOR TO REMOVAL.**

#### 4. REMOVE LIMIT SWITCH, TRAVELING NUT OR GEARED.

- a. Geared Upper and Lower Limit Switch
  - 1) Disconnect all power from hoist.
  - 2) Remove the cover from the limit switch and disconnect the wiring. Note the color coding or tag the wires so they can be reconnected correctly. Loosen the cord fitting and remove the cord.
  - 3) Remove the bolts and lockwashers that hold the limit switch assembly to the bracket. Remove the limit switch assembly from the bracket.
- b. Weight Operated Upper Limit Switch
  - 1) Disconnect all power from the hoist.
  - 2) Remove the clamping screws holding operating weight around the wire rope and remove the weight.
  - 3) Remove bolts holding the limit switch bracket to the hoist and remove the limit switch assembly.
  - 4) Loosen the clamping screw holding the hub on the limit switch shaft and remove the hub and lever assembly. Note its position carefully so it can be reinstalled correctly.
  - 5) Remove the screws holding the limit switch to the bracket.
  - 6) Remove the limit cover and disconnect the wiring. Note the color coding or tag the wires so they can be reconnected correctly. Loosen the cord fitting and remove the cord from the limit switch.

#### 5. REMOVE CONTROLS OR CONTROL BOX.

- a. Remove all power from the hoist.
- b. Disconnect and tag all wires coming into the control box.
- c. Remove nuts, bolts and lockwashers holding control panel in the box.
- d. Remove control panel.
- e. Disconnect all flex conduit, limit switch cord, push-button cord and power leads from control box.
- f. Remove nuts and lockwashers holding control box and remove. Control box may be heavy and should be supported before removing.

## Reassembly

The assembly sequence is basically the reverse of the disassembly sequence previously described. The following special instructions should be observed during reassembly.

1. Before the gear case is assembled, all internal parts should be inspected for damage or excessive wear. Replace parts as required.
2. Be sure the drum shaft is free of paint or other material which would interfere with installation. Lubricate the shaft with Never-Seez® to prevent galling.
3. Be sure the motor brake is properly adjusted before it is installed on the motor.
4. Bolt gear case to the frame using (4) M30 bolts x (2) 25 mm dowel pins
5. Slide drums into gear case. The drum spacer goes on the drum opposite the motor.
6. Install outer bearing support. It may be required to move the bearing support fore/aft to align the bearing. Check alignment with a dial indicator to measure runout at the outboard shaft. Contact factory if runout exceeds 0.0003"
7. Re-reeve.

## TROUBLESHOOTING

### Load Drifts or Drops

Possible Cause	Remedy
Motor brake slipping*	Adjust brake. Check for oil on brake discs.
Motor brake not closing*	Adjust for proper clearance. See brake instructions.

\* With vector control, the inverter will fault and warning horn will sound in the event of any brake related issues. If these conditions are observed (Brake slip or failure to set), see the hoist inverter manual to troubleshoot inverter related brake faults and the brake manual for proper adjustment of brake.

### Brake Coil Burned Out

Possible Cause	Remedy
Wrong coil	Replace with proper voltage coil.
Motor brake too tight	Adjust brake. See brake instructions.

### Hoist Does Not Operate

Possible Cause	Remedy
Blown or loose fuse	Replace or tighten fuse
Tripped breaker	Reset breaker
Lose terminal screws	Check and tighten all loose screws
Low voltage	Check voltage at line side of mainline contactor (when provided) or line side of hoist fuse base
Low voltage or no voltage to push button circuit	Check voltage at output side of transformer. Wrong voltage tap may have been selected. For example: 460 volt tap used when line voltage is 230 volt. Check control circuit fuse.
Defective push button	Check contact points at push button to see if points touch. If not, replace.
Defective push button cord. (Wire may be pinched, broken or bare.)	Check for lack of continuity or short to ground.
Motor brake coil burned	Replace. Check to make sure coil is proper coil for voltage applied.
Defective stator	Rewind stator
Rotor loose on shaft	Replace

### Motor Overheats, Excessive Amperage Draw

Possible Cause	Remedy
Defective stator	Replace or rewind stator
Worn motor bearings	Replace
Bent rotor shaft	Replace
Rotor dragging in stator	Tighten motor bolts. Check for foreign matter between rotor and stator. Check for worn motor bearings.
Stator loose in frame	Rewind stator if necessary. Reposition and anchor in accordance with motor manufacturers instructions.
Low voltage	Check with local utility company and/or increase wire size.

### Motor Noisy

Possible Cause	Remedy
Motor bolts loose	Tighten
Rotor dragging in stator	Check for bent rotor shaft or worn bearings. Replace worn or damaged parts.
Motor bearings loose	Replace bearings

### Transformer Overheats or Burns Out

Possible Cause	Remedy
Wrong tap used on primary side	Replace transformer if necessary. Primary tap must match line voltage.
Shorted transformer	Replace
Shorted control circuit	Correct short

### Hoist Shocks Operator

Possible Cause	Remedy
Hoist not grounded	Ground hoist
Power leads or control wires shorted to hoist frame.	Repair or replace
Grounded motor	Replace
Slight electrical leakage from any of the electrical components on hoist.	Make sure hoist is properly grounded.

## HOIST GEAR DRIVE

### General Instructions

One can receive the detailed installation and maintenance instructions by entering a serial number (or NORD order number) at the appropriate location on the NORD web site.

1. Record the serial number from your gearmotor, gear reducer, or motor nameplate, or record the serial number found on your order confirmation.
2. Go to [www.nord.com/docs](http://www.nord.com/docs) to download the appropriate operating instructions.

**EXAMPLE:** [www.nord.com/docs](http://www.nord.com/docs)

**Unit Documentation**

You can receive your unit's installation and maintenance instructions by entering a serial number or order number. The order number/serial number can be found on your order confirmation or on the unit's nameplate.

820932346200

---

**Information**

**Serial number** 8209323462.00  
**Model type** 9032.1AX-132 M/4 CJS BRE100 HL F IG22 VZ  
**Mounting position** M4

---

**Documents**

- BIM1040 - 90.1 & 92 Helical Bevel (US-English, 1350 KB)
- BIM1002 - Hollow Keyed Shaft & Fixing Element Kit (US-English, 157 KB)
- BIM1090 - Motor Brakes (US-English, 960 KB)
- Kubler Encoder Wiring (US-English, 200 KB)
- All Documents for 820932346200 (US-English, 2667 KB)
- All Documents for 820932346200 (US-English, 2454 KB)

### Safety Notes

All work including transportation, storage, installation, electrical connection, commissioning, servicing, maintenance and repair must be performed only by qualified specialists or personnel. It is recommended that repairs to NORD Products are carried out by the NORD Service Department. Instructions related to operational safety will be emphasized as shown.

## ⚠ WARNING

**All work involved in the transport, connection, commissioning and maintenance of any NORD product must be carried out by qualified and responsible technicians. All applicable national, regional, and local work regulations and safety requirements must also be complied with. NORD assumes no liability for personal injury, accidental death, or equipment damage and malfunctions resulting from failure to comply with installation or operating instructions, safety notes, or any work regulations and laws!**

**Gear unit installation and maintenance work may only be performed when no power is available to the prime mover or motor. Electric motors, electrical brakes, and variable frequency drives, contain potentially dangerous high-voltage. Prior to installation or maintenance, shut down the power at the circuit breaker or power switch. While working on the drive, make sure the power from the prime mover is isolated or secured on "lock-out" to prevent accidental start-up and to safeguard against injury!**

**Surfaces of motors and gear units may become hot during operation or shortly after start-up. In some instances additional protection against accidental contact may be necessary. Use caution to avoid burns or serious injury!**

### Observe Published Performance Range & Nameplate Data

## ⚠ WARNING

**Observe the data on all reducer nameplates and verify published ratings for the NORD item/s in question. Do not operate any NORD equipment outside the published performance range. Failure to comply may result in damage to the drive unit, driven machine, or the environment.**

#### U.S. Nameplate

NORD GEAR CORPORATION-USA / WWW.NORD.COM

SK ①

S/N ②

RATIO ③ SF ④

TORQUE ⑤ LB-IN

SPEED ⑥ RPM

⑦ MTG POS

NORD DRIVESYSTEMS FOR GEAR LUBRICATION SEE MANUAL UNICASE™

- ① Model/Type
- ② Serial Number
- ③ Gear Ratio
- ④ Service Factor
- ⑤ Torque Rating
- ⑥ Output Speed RPM
- ⑦ Mounting Position

#### European Nameplate

Getriebebau NORD  
Grüß & Co KG  
D - 22934 Bargteheide

type SK ①

No. ②

i= ③

n2= ④ min<sup>-1</sup>

Siehe Wartungsanleitung  
See maintenance instructions  
Voir instructions d'entretien

- ① Model/Type
- ② Serial Number
- ③ Gear Ratio
- ④ Speed

### Transportation and Handling

Make sure that all eyebolts and lifting lugs are tight and lift only at designed points. Protect the mounting surface from possible damage during transportation.

## ⚠ WARNING

**Do not attach other machinery or loads to the NORD assembly, since the supplied lifting bolts are not designed for this purpose.**

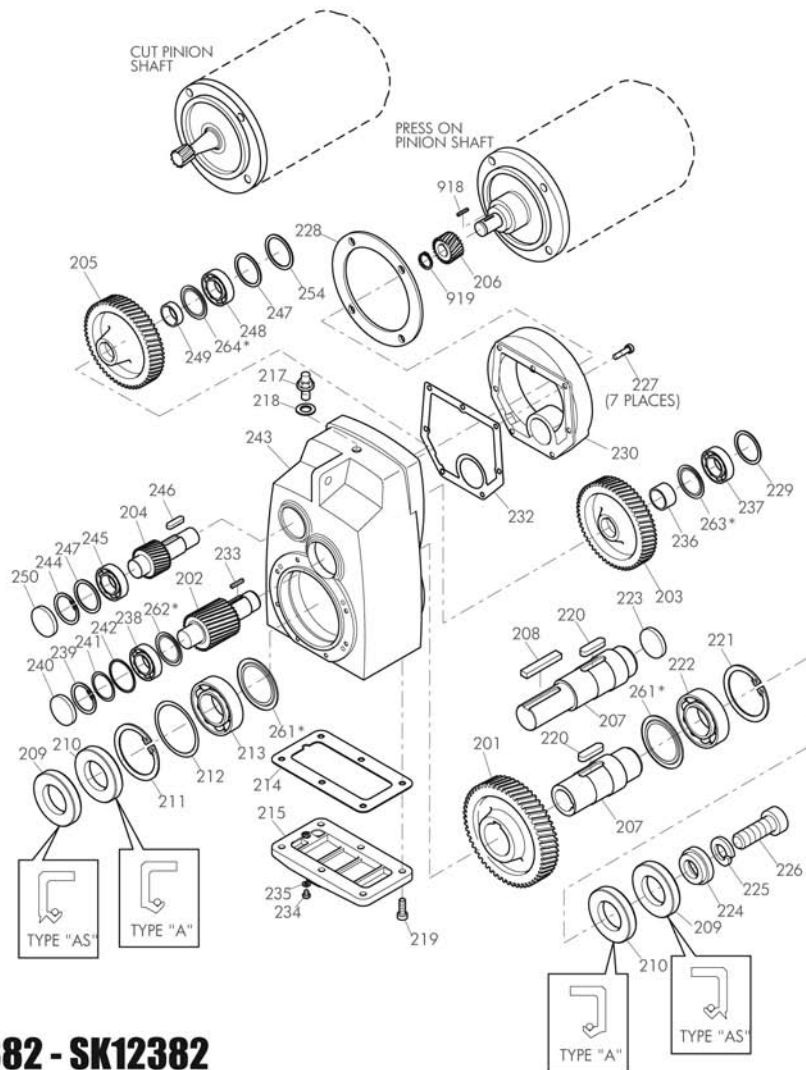
If the gearmotor or assembly is equipped with two suspension eye bolts, then both locations should be used for transportation and placement of the unit; in this case the tension force of the slings must not exceed a 45° angle.

In some instances it may be appropriate to use additional lifting straps or slings in order to assure safe transportation of the assembly. Always use sufficiently rated handling equipment and ensure that adequate safety measures are taken to protect personnel from injury during transportation. Once the NORD assembly is properly installed, remove the transportation fixtures.

### Material Disposal

Properly dispose of all used gear units and internal parts in accordance with all local regulations. In particular, all lubricants must be properly collected and disposed. For confirmation of specific materials used in a specific reducer or gearmotor assembly, please consult NORD with the appropriate unit identification or serial number.

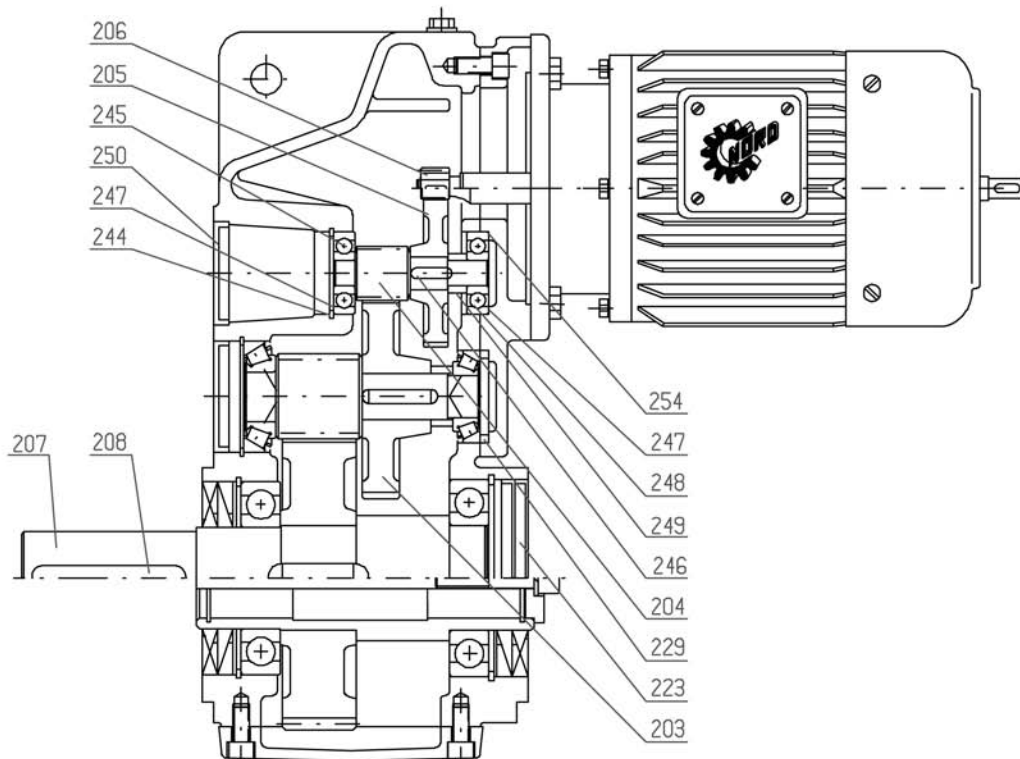
Components	Material
Gear wheels, shafts, rolling bearings, parallel keys, snap rings, spacers, shims, etc.	Steel
Gear housing and housing components	Cast iron or Aluminum (depending on type and size)
Worm gears	Bronze alloy
Radial seals, sealing caps, and rubber components	Elastomers with some steel
Coupling components	Plastic or Elastomer with Steel
Housing gaskets and flat oil seals	Asbestos-free sealing or gasket material (various types used)
Gear Oil	Mineral, SHC-Synthetic or PG-Synthetic (can vary)



## SK 1382 NB + SK 6382 - SK12382

201 Gear	221 Snap Ring	241 Shim
202 Pinion Shaft	222 Anti-Friction Bearing	242 Thrust Washer
203 Gear	223 Bore Plug	243 Gearcase
204 Pinion Shaft	224 Retaining Washer	244 Snap Ring
205 Gear	225 Lock Washer	245 Anti-Friction Bearing
206 Pinion	226 Bolt	246 Key
207 Output Shaft	227 Bolt	247 Shim
208 Key	228 Gasket	248 Anti-Friction Bearing
209 Oil Seal	229 Thrust Washer	249 Spacer
210 Oil Seal	230 Input Cover	250 Bore Plug
211 Snap Ring	232 Gasket	254 Thrust Washer
212 Shim	233 Key	261 Nilos Ring*
213 Anti-Friction Bearing	234 Drain Plug	262 Nilos Ring*
214 Gasket	235 Gasket	263 Nilos Ring*
215 Inspection Cover	236 Thrust Washer	264 Nilos Ring*
217 Vent Plug	237 Anti-Friction Bearing	918 Key
218 Gasket	238 Anti-Friction Bearing	919 Snap Ring
219 Bolt	239 Snap Ring	
220 Key	240 Bore Plug	

\* Conditionally used part



**SK 1382 NB + SK 6382 - SK12382**

203 Gear	229 Thrust Washer	250 Bore Plug
204 Pinion Shaft	244 Snap Ring	254 Thrust Washer
205 Gear	245 Anti-Friction Bearing	261 Nilos Ring*
206 Pinion	246 Key	262 Nilos Ring*
207 Output Shaft	247 Shim	263 Nilos Ring*
208 Key	248 Anti-Friction Bearing	264 Nilos Ring*
223 Bore Plug	249 Spacer	

\* Conditionally used part



## Troubleshooting

This section identifies some of the most common issues involved with NORD Gear speed reducers, and provides recommendations to assist you in defining and answering your questions as you work with our products. You may also contact our Engineering/Application departments if your questions are not answered in the table below.

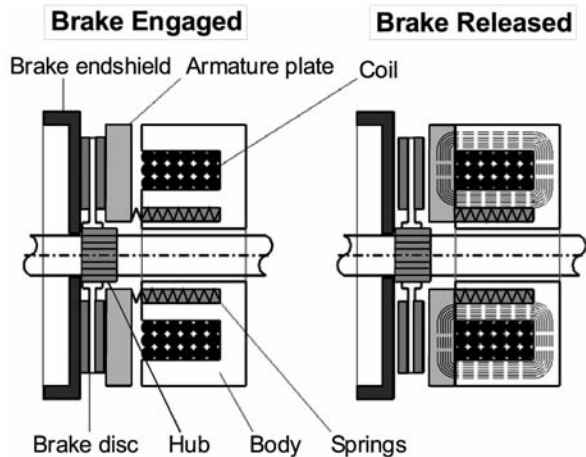
Problem with the Reducer		Possible Causes	Suggested Remedy
Runs Hot	Overloading	Load exceeds the capacity of the reducer	Check rated capacity of reducer, replace with unit of sufficient capacity or reduce the load.
	Improper Lubrication	Insufficient lubrication	Check lubricant level and adjust up to recommended levels.
		Excessive lubrication	Check lubricant level and adjust down to recommended levels.
		Wrong lubrication	Flush out and refill with correct lubricant as recommended.
Runs Noisy	Loose foundation Bolts	Weak mounting structure	Inspect mounting of reducer. Tighten loose bolts and/or reinforce mounting and structure.
		Loose hold down bolts	Tighten bolts.
	Failure of bearings	May be due to lack of lubricant	Replace bearing. Clean and flush reducer and fill with recommended lubricant.
		Overload	Check rated capacity of reducer.
	Insufficient lubricant	Level of lubricant in reducer not properly maintained	Check lubricant level and adjust to factory recommended level.
Output Shaft Does Not Turn	Internal parts are broken or missing	Overloading of reducer can cause damage	Replace broken parts. Check rated capacity of reducer.
		Key missing or sheared off on input shaft	Replace key.
		Coupling loose or disconnected	Properly align reducer and coupling. Tighten coupling.
Oil Leakage	Worn seals	Caused by dirt or grit entering seal	Replace seals. Autovent may be clogged. Replace or clean.
	Unit runs hot or leaks	Overfilled reducer	Check lubricant level and adjust to recommended level.
		Vent clogged.	Clean or replace, being sure to prevent any dirt from falling into the reducer.
	Incorrect fill level	Improper mounting position, such as wall or ceiling mount of horizontal reducer	Check mounting position on the name tag & verify with mounting chart in manual.

## MOTOR BRAKE INSTALLATION & MAINTENANCE

The standard NORD motor brake is "spring-set". When power is removed and the brake is de-energized (power-off), the brake springs exert a force against the armature plate in turn preventing the brake rotor (or brake disc) from rotating. When the brake coil is energized (power-on), a magnetic field builds and pulls the armature plate across the air gap to the brake casing, which releases the brake rotor and allows the motor shaft to rotate.

NORD brakes are DC voltage brakes and in most instances are supplied with a motor mounted brake rectifier for easy connections to AC power. AC power is taken directly from the power line or from the terminal block of the motor and converted to DC by the supplied rectifier.

### Basic Brake Operation



### Brake Air Gap

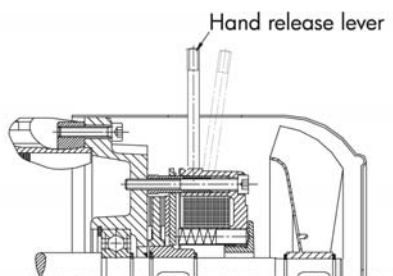
In order to obtain optimal brake performance and maximum brake life, it is necessary to periodically check and reset the brake air gap. As the brake rotor wears and decreases in thickness, the air gap will increase. If the air gap is too large, the brake coil may not have enough magnetic force to pull the metal armature disc across the gap and the brake will drag.

**When a complete brake motor is supplied by NORD, the air gap is already set at the factory. If the brake is ordered as a part, the air gap must be set in the field. All brake air gap adjustments must be made with the brake assembled onto the motor and power off (brake engaged).**

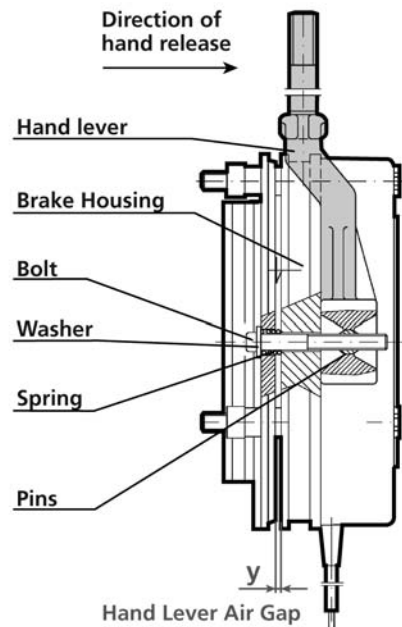
### Hand Release Lever (HL)

It is common to supply the NORD brake with a hand release lever assembly. The hand release lever allows the brake to be manually released without requiring that the brake be energized with voltage. The lever has a spring return that allows the brake to be hand released and returned automatically to its set position. The handle of the hand release lever can be unscrewed for easy removal.

**When a brake motor with hand-lever is supplied by NORD, both the hand lever air gap and brake air gap are set at the factory. When ordered as parts, proper hand-lever and air gap adjustments must be made in the field. Hand-lever adjustments must always be made prior to assembling the brake to the motor. All brake air gap adjustments must be made with the brake assembled to the motor and the power off (brake engaged).**



## Brake Hand-Lever Installation & Adjustment



1. Place the hand-lever over the brake housing (as shown) and align the pins.
2. Screw the bolts with washer and spring into the pins.
3. Using a feeler gage, adjust the hand-lever air gap per the table below.

### Hand-Lever Air Gap Setting

Brake Size	Dimension "y"	
	mm.	in.
BRE 5	1	0.040
BRE 10	1	0.040
BRE 20	1	0.040
BRE 40	1	0.040
BRE 60	1	0.040
BRE 100	1.2	0.047
BRE 150	1.2	0.047
BRE 250	1.2	0.047
BRE 400	1.5	0.059
BRE 800	1.5	0.059
BRE 1200	1.5	0.059

**When setting the hand-lever gap or dimension "y" the magnetic brake coil housing and the anchor plate must be kept uniform all around.**

## WARNING

To assure proper assembly and proper functioning of the brake, the hand-lever must be assembled to the brake, and the hand-lever air gap must be adjusted, before the brake is assembled to the motor.

Once adjusted properly, the hand-lever air gap setting should not be altered, even when readjusting the air gap setting.

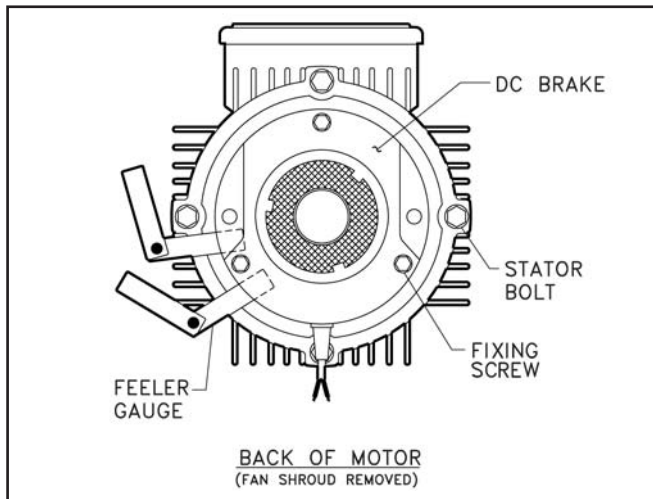
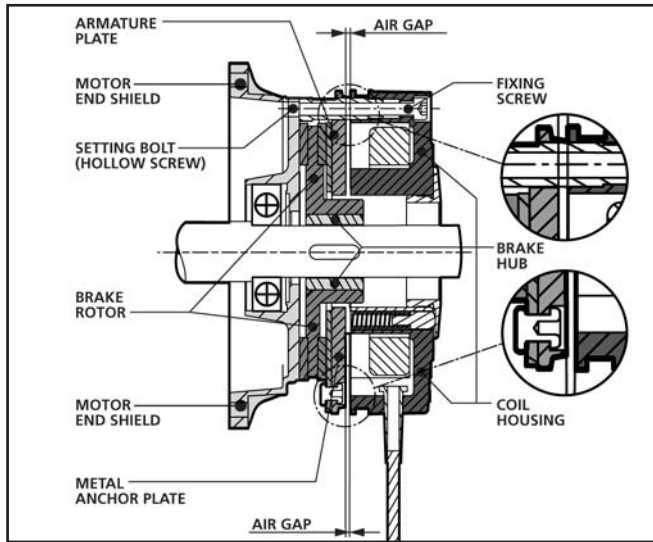
## MOTOR BRAKE INSTALLATION & MAINTENANCE (CONTINUED)

### Setting the Brake Air Gap

NORD spring-loaded brakes are virtually maintenance free. However, the air-gap of the brake rotor or brake disc must be periodically checked and adjusted. If necessary, the worn brake rotor must be replaced. The Brake Air Gap Settings table serves as guide to check and set the brake air gap as needed.

**When a complete brake motor is supplied by NORD, the air gap is already set at the factory. If the brake is ordered as a part, the air gap must be set in the field. All brake air gap adjustments must be made with the brake assembled to the motor and the power off (brake engaged).**

The brake air gap is checked by placing a feeler gage between metal anchor plate and the brake coil housing as shown in the diagram below. This procedure is identical even for the larger BRE800 and BRE1200 twin rotor brakes.



### Procedure

The brake air gap is checked by placing a feeler gage between metal anchor plate and the brake coil housing as shown in the diagram below. This procedure is identical even for the larger BRE800 and BRE1200 twin rotor brakes.

1. Loosen the fixing screws that attach the brake to the motor's end-shield by approximately half a turn.
2. If required, the brake assembly may be loosened slightly from the motor's end shield by turning the threaded setting bolts (hollow screws) that surround the fixing screws, counter clockwise, into the brake coil housing.
3. Depending upon whether or not the air gap needs to be decreased or increased, turn the fixing screws accordingly until the desired nominal air gap (Table 6) is reached, as measured using the appropriate feeler gauge.
  - a. Turning the fixing screws clockwise allows the brake coil housing to be moved towards the anchor plate and reduces the air gap.
  - b. Turning the fixing screws counter-clockwise allows the brake coil housing to be moved away from the anchor plate and increases the air gap.
4. If the setting bolts (hollow screws) were adjusted as suggested in Step 2, re-secure the brake coil housing firmly against the motor's end shield by turning the setting bolts (hollow screws) clockwise, out of the brake coil housing.
5. Tighten the fixing screws to the appropriate torque.
6. Re-check and measure the air gap in multiple locations to check for appropriate spacing. Repeat the steps as needed until the desired air gap spacing is uniform and consistent all the way around the brake.

### Brake Air Gap Settings

Brake Size	Fixing Screw Tightening Torque		Nominal Air Gap Setting*		Maximum Air Gap**	
	lbs./ft.	Nm	in.	mm	in.	mm
BRE 5	2.2	3	0.008	0.2	0.024	0.6
BRE 10	4.4	6	0.008	0.2	0.028	0.7
BRE 20	7.4	10	0.012	0.3	0.031	0.8
BRE 40	7.4	10	0.012	0.3	0.035	0.9
BRE 60	18	25	0.012	0.3	0.039	1.0
BRE 100	18	25	0.016	0.4	0.043	1.1
BRE 150	18	25	0.016	0.4	0.043	1.1
BRE 250	37	50	0.020	0.5	0.047	1.2
BRE 400	37	50	0.020	0.5	0.047	1.2
BRE 800	37	50	0.024	0.6	0.047	1.2
BRE 1200	37	50	0.024	0.6	0.047	1.2

\* Tolerance: + 0.004 in [+ 0.1 mm]

\*\* Brake air gap must be re-adjusted before the stated value.

## MOTOR BRAKE INSTALLATION & MAINTENANCE (CONTINUED)

### Brake Rotor (Brake Disc) Wear Assessment

Periodically the brake rotor or brake disc must also be checked for wear. If the brake rotors wear approaches the minimum allowed thickness, then the part should be replaced. Use the table below to determine whether or not the brake rotor requires replacement.

### Brake Rotor Thickness

Brake Size	Nominal Brake Rotor Thickness*		Minimum Brake Rotor Thickness**	
	in.	mm	in.	mm
BRE 5	0.295	7.5	0.177	4.5
BRE 10	0.335	8.5	0.217	5.5
BRE 20	0.406	10.3	0.295	7.5
BRE 40	0.492	12.5	0.374	9.5
BRE 60	0.571	14.5	0.453	11.5
BRE 100	0.630	16	0.492	12.5
BRE 150	0.709	18	0.571	14.5
BRE 250	0.787	20	0.650	16.5
BRE 400	0.787	20	0.650	16.5
BRE 800	0.787	20	0.650	16.5
BRE 1200	0.866	22	0.689	17.5

\* As new condition.

\*\* Worn condition - brake rotor replacement is required!

### Brake Pad Replacement (reference Spare Parts list on next page)

When the brake pad is worn the pad should be replaced to maintain proper brake operation and ensure safety.

#### Required Tools

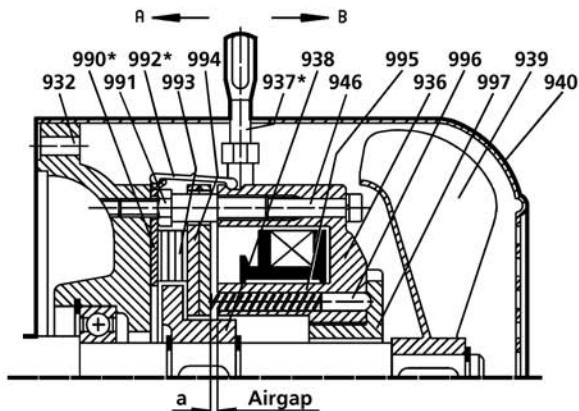
1. Phillips head screw drivers (fan shroud removal)
2. External snap ring pliers (fan and brake hub removal).
3. Large flat head screw driver or small pry bar (fan removal)
4. Metric T-handle wrenches and open-end wrenches.

#### Procedure

1. Remove the fixing screws (946) securing the fan cover (940) to the motor end-shield (932). If the brake has a hand release (937), the lever arm should be removed by unscrewing it.
2. Remove the fan cover (940) and note the position of the hand release slot if applicable.
3. Remove the snap ring holding the cooling fan (939) and carefully remove the cooling fan (939), key and second snap ring (997).
4. If the brake is equipped with a dust boot (992), remove it.
5. Remove the socket head cap screws holding the brake coil (936) to the motor end-shield (932).
6. Remove the brake coil (936), noting the hand release (937) and power cable locations.
7. Slide the brake rotor (993) off the brake hub (938) which is secured to the motor shaft.
8. Clean the brake, install the new brake rotor pad and reassemble the brake in reverse order of the steps outlined.

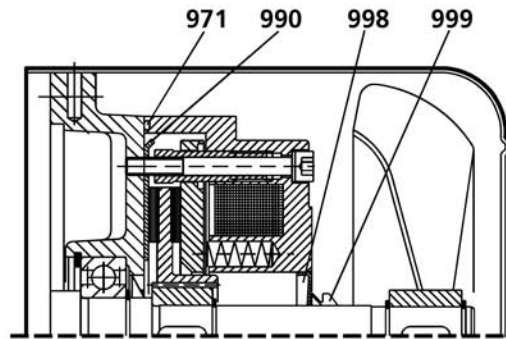
## MOTOR BRAKE INSTALLATION & MAINTENANCE (CONTINUED)

### Parts List - Precima Brakes



#### Normal Design, Enclosure IP55 with following options:

RG – Stainless Steel Disc (Item 990)  
 SR – Dust Boot-includes Option RG (Item 992)  
 HL – Hand Release (Item 937)



#### Optional Brake with optional IP66 enclosure

- |                                   |                               |                                 |
|-----------------------------------|-------------------------------|---------------------------------|
| 932 Non-drive end shield          | 946 Fixing screw              | 994 Armature plate              |
| 936 Brake coil                    | 971 O-ring - optional         | 995 Spring                      |
| 937 Manual brake lever – optional | 990 Friction plate - optional | 996 Pressure plate adjustment** |
| 938 Brake hub                     | 991 Setting bolt              | 997 Adjustable ring **          |
| 939 Fan                           | 992 Dust protection ring      | 998 Bushing/seal - optional     |
| 940 Fan cover                     | 993 Brake rotor               | 999 V-ring - optional           |

\*\* Only for brakes that are 5 Nm to 40 Nm

### Spare Parts

Brake Size	NORD Motor Frame	Brake Rotor [Item 993]	Brake Hub [Item 938]	Brake Hub Bore / (Style)	Hand Release (HL) [Item 937]	Stainless Disc (RG) [Item 990]	Dust Boot (SR) [Item 992]
BRE 5	63/71/80	19120042	19100112	15 mm (hex)	19150042	19130042	19110042
BRE 10	63/71	19120082	19100212	15 mm (hex)	19150082	19130082	19110082
BRE 10	80/90	19120082	19100222	20 mm (hex)	19150082	19130082	19110082
BRE 20	80/90/112	19120162	19100322	20 mm (hex)	19150162	19130162	19110162
BRE 20	100	19120162	19100332	25 mm (hex)	19150162	19130162	19110162
BRE 40	90/100	19120322	19100452	25 mm (spline)	19150322	19130322	19110402
BRE 40	112	19120402	19100442	30 mm (hex)	19150322	19130322	19110402
BRE 60	100	19120602	19100532	25 mm (spline)	19150602	19130602	19110602
BRE 60	112	19120602	19100542	30 mm (spline)	19150602	19130602	19110602
BRE 60	132	19120602	19100552	35 mm (spline)	19150602	19130602	19110602
BRE 100	132/160	19120802	19100652	35 mm (spline)	19150802	19130802	19110802
BRE 150	132	19121502	19100752	35 mm (spline)	19151502	19131502	19111502
BRE 150	160/180	19121502	19100772	45 mm (spline)	19151502	19131502	19111502
BRE 250	160/180	19122402	19100872	45 mm (spline)	19152402	19132500	19112502
BRE 250	200	19122402	19100882	50 mm (spline)	19152402	19132500	19112502
BRE 400	200/225	19124002	19100912	60 mm (spline)	19154003	10114020	19114002

For brake coil part numbers, contact manufacturer.

The large BRE 800 and BRE 1200 twin rotor brakes are supplied to NORD pre-assembled and complete. For parts list details and spare parts information please contact NORD.

## HELICAL & BEVEL REDUCER LUBRICATION

### Importance of Proper Lubrication

Proper gearbox lubrication is essential in order to reduce friction, heat, and component wear. Lubricants reduce heat and wear by inserting a protective “fluid boundary” between mating parts and preventing direct metal to metal contact. Lubricants also help prevent corrosion and oxidation, minimize foam, improve heat transfer, optimize reducer efficiency, absorb shock loads and reduce noise.

Most NORD reducers are shipped from the factory with a pre-determined oil fill level in accordance to the specified reducer size and mounting position.

### Standard Oil Type

The following tables indicate the standard oil fill type used. Please see user manual U11000 for more specific information and for optional helical and bevel gear lubricants:

Serviceable Gear Units	
Helical In-line	Standard Oil Fill: ISO VG 220, Mineral Oil
Clincher Parallel-Shaft	
Right-Angle Bevel	
NORDBLOC® Series In-line	
NORDBLOC®.1 Series In-line	
Standard Series In-line	

For shipping purposes, the following large Clincher™ gear units are supplied without oil: Clincher™ Sizes SK11282, SK11382 and SK12382

Maintenance-free / Lubricated For Life Gear Units	
Clincher™ sizes SK0182NB, SK0282NB & SK1382NB	Standard Oil Fill: ISO VG220 SHC/PAO Synthetic Oil
NORDBLOC® Sizes SK172, SK272, SK371F, SK372, SK373, SK320	

Maintenance-free units are supplied as sealed units with no vent-plug. Consult NORD prior to ordering if interested in ordering any of the above sizes as serviceable gear units.

Consult the sticker adjacent to the fill plug to determine the type of lubricant installed at the factory. Some units have special lubricants designed to operate in certain environments or intended to extend the service life or service temperature range of the lubricant. If in doubt about which lubricant is needed for a certain application, please contact NORD Gear.

### Lubrication Replacement

If the gear unit is filled with mineral oil, the lubricant should be replaced at least after every 10,000 operating hours or after every two years. If the gear unit is filled with synthetic oil, the lubricant should be replaced at least after every 20,000 operating hours or after every four years. Often gear reducers are exposed to extreme ambient conditions, hostile environments, wet conditions, or dirty and dusty operating areas. Especially in these situations, it is important to establish a condition-based oil service interval.

### Oil Viscosity

Viscosity, or the oil's resistance to shear under load, is often considered the single most important property of any gear oil.

Often one will consider making a viscosity correction to the oil to improve the performance when operating the gear unit at low temperature or high temperature.

In cases of extreme load conditions, gear pairs and anti-friction bearings may be more susceptible to sliding or scuffing wear. In these operating conditions, it may also be beneficial to consider an increased lubrication viscosity and/or a lubrication with improved anti-wear additive packages.

The user should consult with their primary lubrication supplier before considering changes in oil type or viscosity.

### Maximum Oil Sump Temperature Limit

To prevent reducer overheating, the reducer's maximum oil sump temperature limit must not be exceeded for prolonged periods of operation (up to 3 hours continuous operation depending upon reducer size).

Oil Type	Maximum Oil Temperature Limit	
	NORD	AGMA 9005-D94
Mineral	80-85°C (176-185°F)	95°C (203°F)
Synthetic	105°C (220°F)	107°C (225°F)

Use caution when specifying gear reducers for high temperature service. If there is concern about exceeding the allowable safe operating temperatures, please consult NORD to discuss alternatives.

### The Importance of Routine Oil Analysis

Routine oil analysis, sound lubrication practices, and good tracking of oil performance trends will help establish proper lubrication maintenance and change-out intervals. To maximize equipment reliability, NORD Gear generally recommends a condition-based lubrication maintenance program. One may take exceptions to this general recommendation on sealed-for-life or maintenance-free gear units or smaller and less costly gear units. In these instances, the replacement cost of the gear unit is often small compared to the costs associated with this type of oil analysis program.

## WARNING

NORD suggests replacing the gear oil if oil analysis indicates any of the following:

- Viscosity has changed by approximately 10% or more.
- Debris particles (silicon, dust, dirt or sand) exceed 25 ppm.
- Iron content exceeds 150-200 ppm.
- Water content is greater than 0.05% (500 ppm).
- The total acid number (TAN) tests indicate a significant level of oxidative break-down of the oil, and a critical reduction in performance; If the TAN number measured changes by more than 5% over the new oil, then an oil change would be recommended.

## HELICAL & BEVEL REDUCER LUBRICATION (CONTINUED)

### Mounting Position and Oil Fill Quantity

All NORD Gear reducers are shipped from the factory with a pre-determined oil fill level in accordance to the specified reducer size and mounting position. For additional information, please see the separate mounting position diagrams and the corresponding oil fill quantity tables for the specified gear unit.

The gearbox name tag will indicate the mounting position that was provided. For mounting orientations other than shown in the mounting position charts, please consult NORD Gear.

### **WARNING**

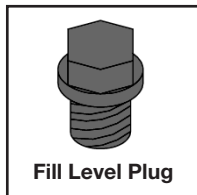
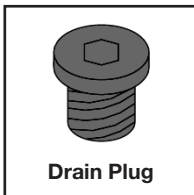
Actual oil volume can vary slightly depending upon the gear case size, mounting and ratio. Prior to commissioning the reducer, check the oil-fill level using the reducer's oil level plug and drain or add additional oil as needed. The minimum acceptable oil level is 0.15 in (4mm) below the oil level hole.

### Oil Plug Locations

All gear units are assembled with the oil fill-level, oil-drain and vent plugs installed in their proper locations, according to the specified mounting position. All standard plugs are metric and utilize sealing gaskets between the head of the plug and the reducer housing.

### Drain and Fill-Level Plugs

All reducer drain plugs are metric socket head cap screws. For easier identification, it is NORD's standard practice to provide a hex-head screw for the fill-level plug. For ease of draining the used oil from the gear reducer, use the socket head screw located at the lowest part of the gearbox.

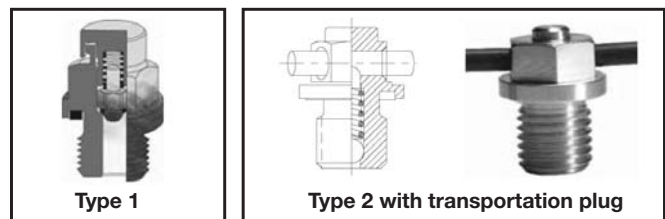


### Vent Plug Locations

Reducer venting allows for air pressure differences that occur during operation, between the inner space of the reducer and the atmosphere, while ensuring leak-free operation. The AUTOVENT™ is standard for all vented gear units, unless otherwise noted.

**AUTOVENT™** - The AUTOVENT™ helps prevent bearing and gear damage by behaving like a check valve to block the entry of foreign material (water, dust, corrosives, etc.). The breather opens at approximately 2-3 psi during operation and closes tightly as the gearbox cools. This option is perfect for humid conditions and wash-down environments, helping to maintain proper oil cleanliness, and reducing foaming and oxidation. NORD may choose to offer one of two style options as shown in Figure 1. The Type 2 AUTOVENT™ comes closed upon delivery with a transportation sealing plug (see Warning).

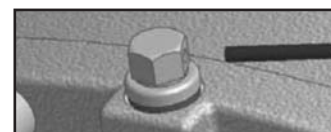
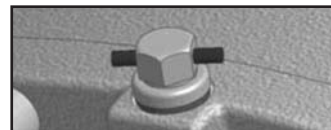
### AUTOVENT™ Types



**Open Vent** - An optional open vent can be supplied by NORD. The open vent comes closed upon delivery with a transportation sealing plug (see Warning).

### **WARNING**

To prevent build-up of excessive pressure, sealed vents must be activated as shown prior to gear unit start up.



**Filtered Vent** - NORD may offer an optional filtered vent, which allows gases to permeate, but does not allow dust and debris to pass through the vent.

This manual contains important information to help you install, operate, maintain and service your new top running trolley. We recommend that you study its contents thoroughly before putting the trolley into use. With proper installation, application of correct operating procedures, and practicing the recommended maintenance suggestions you will be assured of the maximum service from your trolley.

The trolley described in this manual are intended for indoor service. Trolleys to be used for outdoor service require special considerations.

**IMPORTANT:** When ordering replacement parts be sure to include Catalog, Part and Serial Numbers of the endtrucks and or drive gearmotor along with individual part numbers of components needed as identified elsewhere in this manual.

Information given in this manual is subject to change without notice.

## GENERAL DESCRIPTION

### General

These top running trolleys are designed to operate on parallel crane runway beams with ASCE Rail from 25# to 105# rail or square bar. Specific rail range is wheel diameter dependant. Motors are designed for operation on three phase power supplies from 190 to 415 V-50 Hz and 200 to 575 V-60 Hz. Trolley motors and brakes are designed and intended strictly for variable frequency control operated by pushbutton pendant or radio control. Pendant may be located and suspended from an independent festoon or attached directly to the hoist and trolley. Top running double girder cranes described herein are built to 1 through 20 tonne with spans to 50 feet (15.2 meter). Cranes are designed per CMAA Specifications 70 and 74 to meet Class C Moderate Duty Service classification.

### Basic Construction

Each endtruck has a drive and trailer wheel which run on the runway rails. The wheels are double flanged, flat tread with an integral rotating axle supported by anti-friction bearings. Each endtruck is driven by a helical gearmotor and brake. This drive engages the drive wheel by a splined connection.

## INSTALLING TROLLEY

The installation of the crane on the runway shall be performed only by a qualified crane installer.

For information regarding attaching, lifting and moving the loads during installation, refer to ANSI B30.2-latest edition, Chapter 2-3 Overhead and Gantry Cranes (Single or Multiple Girder, Top Running Trolley Hoist); ANSI B30.17-latest edition, Chapter 17-3 Overhead and Gantry Cranes (Trolley, Single Girder, Underhung Hoist) and other applicable codes.

### **WARNING**

**BEFORE INSTALLING THE CRANE ON THE RUNWAY, LOCK THE RUNWAY CONDUCTOR DISCONNECT SWITCH IN THE OPEN (OFF) POSITION.**

Prior to the start of any crane erection the building should be measured to confirm span and clearances. These measurements should be checked against the corresponding crane measurements to insure correctness of "fit". After assuring that the crane fits the building, determine orientation of crane position with respect to the runway. In addition, verify building and runway power supply to ensure it matches the power requirements of the crane.

These types of cranes are usually lifted into position on the runway in one piece. Total weight of this crane should be checked against lifting equipment selected for erection of this crane.

Immediately after the crane is placed on the runway rails check the wheel flange clearances to the rail. Clearance between the side of rail head and inside flange of wheel should be between a total of 3/4" and 1-1/8", depending on the wheel and rail combination and whether or not the truck is centered on the rail. Total wheel float should not be less than the 3/4" as recommended by CMAA Specifications #70 and #74.

### **WARNING**

**Before attempting any electrical connections the main power switch feeding the runway conductors must be LOCKED IN THE OPEN (OFF) POSITION.**

### **NOTICE**

**A FUSED DISCONNECT SWITCH OR CIRCUIT BREAKER MUST BE INSTALLED AND ELECTRICALLY POSITIONED BETWEEN BUILDING POWER SUPPLY AND CRANE RUNWAY CONDUCTOR SYSTEM. THIS DISCONNECT MUST BE LOCKABLE IN THE OPEN POSITION, IN-SIGHT AND IN-REACH FOR THE CRANE OPERATOR, AND CLEARLY LABELED. A SECOND LOCKABLE DISCONNECT IS REQUIRED ON THE BRIDGE CRANE, ELECTRICALLY POSITIONED BETWEEN THE RUNWAY CONDUCTOR SYSTEM AND BRIDGE CONTROLS. REFER TO ARTICLE 610 OF NFPA NO. 70 NATIONAL ELECTRIC CODE, OSHA REGULATION 1910.179, ANSI/ ASME B30.2 AND B30.17, LOCAL, STATE AND PROVINCIAL STANDARDS AND REGULATIONS FOR SPECIFIC REQUIREMENTS.**

### **CAUTION**

**IN ACCORDANCE WITH ARTICLE 610 OF NFPA NO. 70 NATIONAL ELECTRIC CODE A SEPARATE BONDING CONDUCTOR MUST BE RUN FOR GROUND. GROUNDING THROUGH THE WHEELS TO GIRDERS AND RUNWAY STEEL IS NOT PERMITTED.**

### **CAUTION**

**GEARMOTORS PROVIDED WITH THIS TROLLEY ARE INTENDED FOR VARIABLE FREQUENCY CONTROL ONLY. THE BRAKE USED ON THE GEARMOTOR IS A HOLDING BRAKE WITH NO PROVISION FOR TORQUE ADJUSTMENT. SEVERE LOAD SWING WILL RESULT WITHOUT THE CONTROLLED DECELERATION WHEN STOPPING PROVIDED BY THE VARIABLE FREQUENCY CONTROL. THE USE OF CONTACTOR, ACROSS THE LINE STARTING, CONTROLS IS NOT PERMITTED, WILL RESULT IN DAMAGE AND PREMATURE FAILURE OF THESE UNITS AND VOID ANY WARRANTY.**

### **NOTICE**

**PRIOR TO PLACING THE CRANE INTO SERVICE, THE CRANE SHALL RECEIVE AN INITIAL INSPECTION. THIS INSPECTION SHOULD BE PERFORMED BY A QUALIFIED PERSON IN ACCORDANCE WITH ANSI/ ASME B30.2 OR B30.17, LOCAL, STATE AND PROVINCIAL STANDARDS AND REGULATIONS.**



## START-UP AND PRE-OPERATIONAL INSPECTION

After the crane has been installed on the runway and the crane, hoist and trolley has been connected to electrical service but prior to placing into service, as a minimum the following inspections should be made by a qualified person.

1. Check the main collector system for proper adjustment to maintain proper contact with conductors. Check along runway for possible interference if power is supplied by a cable reel or festooned cable.

### **WARNING**

**LOCK MAIN RUNWAY DISCONNECT SWITCH IN OPEN POSITION BEFORE ATTEMPTING TO ADJUST MAIN COLLECTORS OR CONDUCTORS.**

2. Check the cross and pushbutton festoon conductors for adjustment, including cable loop depth, and tracking.
3. Check oil level in both drive gearcases and axle bearing grease fittings (if provided) for proper lubrication. If lubrication is required refer to the LUBRICATION SECTION of this manual.
4. Inspect crane to make certain that all bolted connections and attachments are properly tightened and that all electrical connections are secure.
5. Inspect and adjust the motor brake air gap. Refer to the MAINTENANCE SECTION of this manual.
6. The hoist/trolley should be inspected as instructed in the hoist/trolley manufacturers instruction manual. For a double girder crane inspect the clearance between wheel flanges and the girder rail per manufacturers requirements. If hoist is equipped with adjustable limit switches, confirm settings meet the applications requirements.
7. Inspect the alignment of the trolley end stops to the trolley.
8. Turn power on at both disconnects and mainline. Inspect hoist for reverse phase condition by ensuring push button operation corresponds to intended direction of travel and correct if necessary per manufacturer's instructions.
9. Operate the trolley to verify both motors operate in the same direction.
10. With no load, operate hoist/trolley back and forth the full length of girder. During the operation ensure and verify proper clearances from obstructions per CMAA, ASME B30.2, ASME B30.17 and OSHA requirements.
11. Load testing the crane should be performed in accordance with ANSI/ASME B30.2 or B30.17, local, state and/or provincial codes and regulations. A written report should be prepared during the performance of this test and placed on file.

## OPERATION

### Operator Qualifications

Safe and efficient crane operation requires skill, extreme care, good judgment, alertness, concentration and knowledge of and rigid adherence to proven safety rules and practices. No person should be permitted to operate a crane or hoist:

1. who does not possess the above characteristics.
2. who is not qualified or has handicaps that could adversely affect such operation.
3. who has not been properly instructed.
4. who has not been informed and does not have a thorough knowledge of all applicable safe operating practices, including those in this book as well as of rigging equipment and practices.

## NOTICE

**SEE APPLICABLE NATIONAL, STATE AND LOCAL SAFETY CODES AND REGULATIONS FOR ADDITIONAL REQUIREMENTS RELATING TO SAFE OPERATING PRACTICES, INCLUDING ANSI B30.2 OR ANSI B30.17 - LATEST EDITION.**

### Operating Rules

Operating rules listed below are an earnest effort to encourage SAFETY and are not intended to take precedence over individual plant safety rules and regulations or rules set forth by various applicable codes.

A good operator operates his crane as smoothly as possible and knows and follows the suggested rules below for safe, efficient crane handling.

### Operating Precautions

### **WARNING**

**THESE TROLLEYS HOISTS ARE NOT DESIGNED NOR INTENDED TO BE USED FOR SUPPORT OR TRANSPORT OF PEOPLE OR FOR TRANSPORTING LOADS OVER PEOPLE.**

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

**DO Always center trolley over load when hoisting.**

**DO NOT stand and DO NOT cause or allow others to stand or get under any load the trolley is supporting.**

**DO keep clear, and make sure others keep clear, of any load the trolley is supporting.**

**DO NOT attempt to operate trolley before completing tests and adjustments.**

**Improper and careless operation can result in a hazardous condition for operator and load.**

**ALWAYS be sure load is clear of obstruction before traversing load.**

### **CAUTION**

**IF TROLLEY IS MOUNTED ON A RAIL, THEN END STOPS MUST BE INSTALLED TO PREVENT TROLLEY FROM RUNNING OFF THE END OF THE RAIL RESULTING IN INJURY TO THE OPERATOR AND OTHERS AND DAMAGES TO THE LOAD AND OTHER PROPERTY. END STOPS FOR THE TROLLEY MUST ALSO BE INSTALLED.**

**Refer to hoist and trolley instruction manuals for safety warnings on hoists and trolleys.**

**Read and comply with ANSI B30.2 or B30.17-latest edition.**

**Read and comply with all local, state and national safety codes.**

### **CAUTION**

**MAKE SURE ALL INSTALLATION AND START-UP INSPECTION HAVE BEEN MADE IN ACCORDANCE WITH INSTRUCTIONS FURNISHED WITH THE HOIST AND TROLLEY BEFORE TURNING ON THE POWER.**

## Learning the Controls

After making certain the crane is completely and properly installed, with the crane connected to the electrical service and all the installation and start-up inspections made, the crane operator(s) should learn and become acquainted with the controls.

On cranes having any or all motions electrically operated, the operator should locate the runway disconnect and make sure this switch is locked open (POWER OFF). The operator should now operate the various push buttons to get the "feel" and determine that they do not bind or stick in any position. The operator should become familiar with push button location for their respective motions as well as "start" and "stop" buttons (normally the top two green and red buttons), which operate the crane main line contactor. The mainline contactor will shut off power to all motions.

### **WARNING**

**IF ANY PUSH BUTTON BINDS OR STICKS IN ANY POSITION - DO NOT TURN THE POWER ON - DETERMINE THE CAUSE OF THE MALFUNCTION AND CORRECT IT BEFORE OPERATING THE CRANE.**

## Learning the Controls While Operating Crane with No Load

Having inspected and tried the control, the crane operator is now ready to try the crane under power.

### **CAUTION**

**ALWAYS ALLOW THE TROLLEY TO COME TO A COMPLETE STOP BEFORE CHANGING DIRECTION. ABRUPT CHANGE OF TROLLEY DIRECTION WHILE IN MOTION MAY CAUSE ADVERSE OPERATING CHARACTERISTICS OR DAMAGE TO TROLLEY AND DRIVE COMPONENTS.**

### STEP 1.

Close the crane runway disconnect switch.

### STEP 2.

Close the crane disconnect switch mounted on the crane. The crane main disconnect switch is located in the bridge panel and is operable from the front of the panel without opening the panel. The switch is operated by rotating the handle. The "OFF" and "ON" positions of the switch are marked on the switch assembly.

The bridge control panel also contains a 3-pole mainline contactor. This contactor is connected in the electrical system on the load side of the crane main disconnect switch, so that all the crane power flows through this contactor. The mainline contactor is opened and closed (turned off and on) by means of the stop- start buttons on the pendant push button station. This stop-start circuit, as well as other control circuits, typically operate at 115 volts. This 115 volt control circuit voltage is obtained from a transformer mounted in the bridge control panel.

### STEP 3.

Press the start or green push button which will close the mainline contactor, applying power to all control devices. The crane is now ready for use.

### STEP 4.

The drive motors on the trolley are controlled by inverters, programmable variable frequency control. Standard programming on Yale provided controls is two step infinitely variable. The motion buttons on the pushbutton for the crane, typically labeled "FWD" and "REV" are two step buttons, for this programming. The first step is the initial starting speed of the crane and it also performs a speed hold function. The second step of the button performs an acceleration function.

To operate the crane, press the button for desired direction, FWD or REV, to the first step. The crane will start moving and accelerate to its programmed starting speed. Press the same button further to the second step and the crane will accelerate up to full speed. If the crane reaches a desired speed during this acceleration, back the button off to the first step to hold that speed. If the crane is traveling too fast and you wish to slow it down, release the motion button completely and the crane will start to decelerate. Once the desired slower speed is obtained, press button to the first step to hold that speed. To bring the crane to a stop release the motion button completely, the crane will decelerate to a stop and the holding brakes will set.

Practice operating the crane in both directions, accelerating to intermediate and full speeds, decelerating to a slower speed, and bringing it to a stop. Get acquainted with the operating characteristics of this crane, acceleration, deceleration and stopping distances, to ensure smooth load movement, accurate load positioning, and to minimize load swing.

### **NOTICE**

**IF DEFAULT SETTINGS FOR THE TROLLEYS VARIABLE FREQUENCY CONTROL, INVERTER, DOES NOT MEET YOUR SPECIFIC REQUIREMENTS IT CAN BE RE-PROGRAMMED. PROGRAMMING OF THE INVERTER SHALL BE DONE BY A QUALIFIED CRANE TECHNICIAN PER THE MANUFACTURER'S INSTRUCTION MANUAL. EACH CRANE HAS A MAXIMUM SPEED SETTING BASED ON ITS CAPACITY, SPAN, DUTY CLASSIFICATION, ETC. DO NOT EXCEED MAXIMUM SPEED FOR WHICH THE CRANE WAS SPECIFIED WHEN ORDERED.**

### STEP 5.

The trolley motion buttons are typically labeled "Left" and "Right". The hoist motion buttons are typically labeled "Up" and "Down". Practice and become acquainted with these controls.

### STEP 6.

Once the operator(s) are acquainted and comfortable operating the crane and the hoist/trolley, they shall learn the Pre-Shift inspection procedure. Refer to the INSPECTION section of this manual.

### **WARNING**

**IF, WHEN DEPRESSING THE HOIST "UP" BUTTON, THE HOOK SHOULD LOWER - STOP AT ONCE - DO NOT ATTEMPT TO OPERATE AGAIN. REPORT THIS CONDITION TO THE PROPER SUPERVISOR FOR CORRECTION WITH THE INSTRUCTIONS FURNISHED WITH YOUR HOIST MANUAL BY A QUALIFIED CRANE TECHNICIAN.**

Set lower limit switches of the hoist and insure proper functioning per the Hoist Manufacturer's Manual.

When operating the hoist in the up direction CAREFULLY OBSERVE the relationship of the hook block and the bottom of the hoist frame. The hoist upper limit switch, when working properly, should cause the hoist up motion to stop and/or reverse direction.

## **WARNING**

DO NOT CONTACT OR STRIKE THE HOIST FRAME WITH THE HOOK BLOCK. IF THE HOIST MOTION IS NOT INTERRUPTED BY THE LIMIT SWITCH, STOP THE HOIST BY REMOVING YOUR FINGER FROM THE BUTTON AND/OR DEPRESSING THE STOP BUTTON. DO NOT ATTEMPT FURTHER OPERATION UNTIL THE LIMIT SWITCH IS OPERABLE. CONSULT THE HOIST MANUFACTURER'S INSTRUCTIONS.

## **NOTICE**

JOGGING IS THE RAPID AND REPEATED PRESSING OF A MOTION PUSHBUTTON (HOIST/TROLLEY) TO GET THE EQUIPMENT TO MOVE IN SHORT INCREMENTS OR "INCHING". ALTHOUGH JOGGING MAY BE NECESSARY TO POSITION A LOAD, EXCESSIVE JOGGING WILL CAUSE PREMATURE WEAR AND FAILURE OF MOTORS, BRAKES AND CONTROLS. IT WILL ALSO CAUSE THE MOTORS TO QUICKLY OVERHEAT, RESULTING IN THEIR THERMAL PROTECTION TO DISABLE TROLLEY MOTION UNTIL COOLED.

## **WARNING**

THIS EQUIPMENT IS NOT DESIGNED OR SUITABLE AS A POWER SOURCE FOR LIFTING, LOWERING, OR TRANSPORT OF PERSONS.

## Operating the Crane

Once the crane has successfully passed its Start-up and Pre-Operational (Initial) inspection, and all the crane operators have been successfully trained and/or licensed, it is now ready to be placed into service.

## **WARNING**

DO NOT OPERATE A CRANE, HOIST OR TROLLEY HAVING UNUSUAL VIBRATIONS, SOUNDS, WARNINGS OR WITH ANYTHING WRONG OR APPARENTLY WRONG. DANGER MAY BE PRESENT THAT THE CRANE OPERATOR CANNOT SEE. DETERMINE AND CORRECT THE CAUSE OF THE UNUSUAL CONDITIONS AND MAKE CERTAIN THAT THE CRANE CAN BE OPERATED SAFELY.

### STEP 1.

Turn power on to the crane, disconnects and mainline. If not already done so, perform Pre-Shift Inspection, refer to the Inspection Section of this manual.

### STEP 2.

Move the crane to the load making certain the load hook is high enough to clear any obstruction in its path. Position the hoist and trolley so that the load hook is centered over the load. Lower the load hook for load attachment. For larger sized loads, the use of a rigging or load director may need to be used to direct the lift and movement of the load. This person should use the proper hand signals as shown in this manual. The crane operator should respond only the signals of the designated person directing the load, except for emergency stop as shown on the next page: **OPERATOR HAND SIGNALS**.

## **WARNING**

PRIOR TO ATTACHING OR LIFTING A LOAD, KNOW THE WEIGHT OF THE LOAD AND THE BELOW THE HOOK LIFTING DEVICES (SPREADER OR LIFTING BEAMS, MAGNETS, GRABS, SLINGS, ETC.). THE TOTAL WEIGHT OF THE LOAD AND LIFTING DEVICES SHALL NOT EXCEED THE RATED CAPACITY OF THE HOIST AND/OR CRANE.

### STEP 3.

Attach load to load hook. Slowly raise the hook until the slack has been taken out of the below the hook devices. When the floor man signals and the operator is satisfied the load is secure in the sling, lift the load slowly until clear. Now, hoisting speed can be increased and maintained until the load is clear of all obstructions or the floor man gives the signal to stop.

### STEP 4.

Starting slowly and increasing speed as distance permits, move the trolley toward the point where the load is to be lowered. Decelerate and stop by releasing the push button. Final spotting is accomplished by pressing the button to the first step to creep into position.

### STEP 5.

Learn to judge the stopping distance of the trolley, both with light and full loads. This will enable you to "spot" loads with the minimum amount of jogging and excessive load swing.

# OPERATOR HAND SIGNALS



## USE MAIN HOIST

Tap fist on head, then use regular signals.



## USE WHIPLINE (AUXILIARY HOIST)

Tap elbow with one hand, then use regular signals.



## HOIST

With forearm vertical and forefinger pointing up, move hand in small horizontal circle.



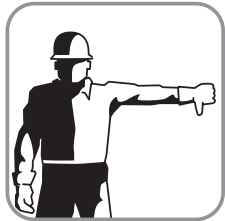
## LOWER

With arm extended downward and forefinger pointing down, move hand in small horizontal circle.



## RAISE BOOM

Arm extended and fingers closed up with thumb pointing upward.



## LOWER BOOM

Arm extended and fingers closed with thumb pointing downward.



## RAISE BOOM & LOWER LOAD

Arm extended and thumb pointing up, flex fingers in and out as long as load movement is required.



## LOWER BOOM & RAISE LOAD

Arm extended and thumb pointing down, flex fingers in and out as long as load movement is required.



## SWING

Arm extended, with fingers in direction of swing of boom.



## EXTEND BOOM (TELESCOPING BOOMS)

With both fists in front of body with thumbs pointing outward.



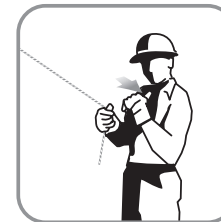
## RETRACT BOOM (TELESCOPING BOOMS)

With both fists in front of body with thumbs pointing toward each other.



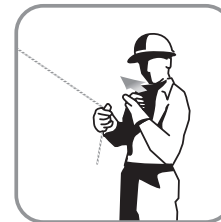
## MOVE SLOWLY (EXAMPLE - "HOIST SLOWLY")

Use one hand to give any motion signal and place the other hand motionless in front of the hand giving the motion signal.



## EXTEND BOOM (TELESCOPING BOOMS)

ONE HAND SIGNAL: One fist in front of the chest with the thumb tapping the chest.



## RETRACT BOOM (TELESCOPING BOOMS)

ONE HAND SIGNAL: One fist in front of the chest with the thumb pointing outward and heel of fist tapping the chest.



## STOP

Arm extended and palm down, move arm horizontally back and forth.



## EMERGENCY STOP

With both arms extended and palms down, move arms horizontally back and forth.



## TRAVEL ONE TRACK - LAND CRANES ONLY

Indicate track to be locked by raising fist on that side. Rotate other fist in front of body in direction that opposite track is to travel (from the crane operator's perspective).



## TRAVEL BOTH TRACKS - LAND CRANES ONLY

Use both fists in front of body, making a circular motion about each other, indicating direction of travel, forward or backward.



## TRAVEL/ BRIDGE TRAVEL

With arm extended forward & hand open & slightly raised, making a pushing motion in the direction of travel.



## DOG EVERYTHING

Clasp hands in front of the body.



## MULTIPLE TROLLEYS

Hold up one finger for block marked "1" and two fingers for block marked "2". Regular hand signals to follow.



## MAGNET IS DISCONNECTED

Crane operator spreads both hands apart with palms up.



## TROLLEY TRAVEL

With palm up, fingers closed and thumb pointing in the direction of motion, jerk hand horizontally.

## **WARNING**

**NEVER LEAVE AN UNATTENDED LOAD HANGING FROM THE CRANE. LOAD MUST BE SAFELY PLACED ON FLOOR PRIOR TO THE CRANE OPERATOR LEAVING THE CONTROLS.**

When crane is not in use, during the work period, it should be parked in a safe location, such as the end of the bay or a location that will not interfere with the movement of people, materials and equipment. Turn power off to the mainline contactor of the crane. Store the pendant against a wall or column to prevent damage from traffic. At the end of the work period or day, park crane as described herein and turn power off at both disconnects.

### Responsibility for Safe Operation

Each crane operator should be held directly responsible for the safe operation of his crane. The crane operator should STOP the crane and refuse to handle loads when:

1. there is any doubt as to **SAFETY**.
2. any unusual vibrations or sounds are noticed before or when starting the lift or traverse motions.
3. there are arguments or disagreements with the floor man or hitchers.
4. the operator feels ill or is not alert.

## INSPECTION

Overhead cranes are subject to four levels of inspection; Initial, Pre-Shift, Frequent and Periodical in accordance with the latest editions of ANSI/ASME B30.2, B30.17 and CMAA 78. These inspections are necessary to ensure the equipment is safe for use and operating at its required performance level. Inspection criteria described herein are general requirements. Specific inspection criteria will be based on the options and accessories provided with your crane. Refer to the manufacturer's maintenance manual for the hoist/trolley and its specific inspection criteria.

### Initial Inspection

New, re-installed, altered, repaired and modified cranes shall be inspected prior to initial use. Inspection of all altered, repaired or modified cranes may be limited to the provisions affected by the work as determined by a qualified crane technician. Inspections shall include, but not limited to, clearances, operating speeds, lubrication, control settings, safety devices, etc. Refer to START UP and PRE-OPERATIONAL INSPECTION elsewhere in this manual.

### Pre-Shift Inspection

A pre-shift inspection shall be performed by the crane operator or designated person at the beginning of each shift, or the first time the crane is used during each shift. This is a visual and operational inspection to ensure the equipment is in good working order. Items to be checked include limit switches, brakes, electrical equipment and all safety devices. Crane is to be operated without a load to check for any unusual sounds, vibrations, or anything that may be apparently wrong. Any discrepancies or suspected discrepancies shall be immediately reported to crane operator's supervisor. Below is a check list which can be used for this inspection.

### Pre-Operation Inspection Checklist

Item	Inspection Instruction
<input type="checkbox"/> Tagged Crane or Hoist	Check that crane or hoist is not tagged with an out-of-order sign.
<input type="checkbox"/> Control Devices	Test run that all motions agree with control device markings.
<input type="checkbox"/> Brakes	Check that all motions do not excessive drift and that stopping distance is normal.
<input type="checkbox"/> Hook	Check for damage, cracks, nicks, gouges, deformations of the throat opening, wear on saddle or load bearing point, and twist. Refer to the manual furnished by the original crane manufacturer.
<input type="checkbox"/> Hook Latch	If a hook latch is required, check for proper operation.
<input type="checkbox"/> Wire Rope	Check for broken wires, broken strands, kinks, and any deformation or damage to the rope structure.
<input type="checkbox"/> Hoist Chain	Check for cracks, nicks, gouges, wear and stretch-check that the chain is in the upper and lower sprockets and in the chain guide.
<input type="checkbox"/> Reeving	Check that the wire rope is properly reeved and that rope parts are not twisted about each other.
<input type="checkbox"/> Limit Switches	Check that the upper limit device stops the lifting motion of the hoist load block before striking any part of the hoist or crane.
<input type="checkbox"/> Oil Leakage	Check for any sign of oil leakage on the crane and on the floor beneath the crane.
<input type="checkbox"/> Unusual Sounds	Check for any unusual sounds from the crane or hoist mechanism while operating the crane or hoist.
<input type="checkbox"/> Warning and Safety Labels	Check that warning and other safety labels are not missing and are legible.
<input type="checkbox"/> Housekeeping and Lighting	Check area for accumulation of material to prevent tripping or slipping. Also check area for poor lighting.

### Frequent Inspection

Frequent inspections are to be performed by a qualified designated person. Inspection intervals vary by class of service, for Class C Service cranes they are to be performed monthly at a minimum. Hooks and wire rope or load chain are to be inspected in monthly intervals as a minimum and recorded including date, serial/trace numbers and a signature. Frequent inspections also include a thorough operational inspection. Items to be inspected include limit switches, lubrication levels in all gearcases, wheels, bearings, etc., brakes, electrical equipment and all safety devices. Crane is to be operated without a load to check for any unusual sounds, vibrations, or anything that may be apparently wrong. The designated person shall determine if conditions found are a hazard and a more detailed inspection is necessary. Refer to the typical Inspection Schedule and Maintenance Report in this manual.

## **NOTICE**

**CRANES THAT HAVE BEEN SITTING IDLE FOR A PERIOD BETWEEN ONE TO SIX MONTHS SHALL RECEIVE THE FREQUENT INSPECTION PRIOR TO ITS USE.**

## Periodic Inspection

Periodic inspections are to be performed by a qualified designated person. Inspection intervals vary by class of service. For Class C Service crane, they are to be performed annually at a minimum. Frequency of this inspection may have to be increased based on the severity of the duty cycle and environmental conditions the crane is subjected to. A written, dated and signed inspection report shall be provided and maintained on file. All worn, damaged or malfunctioning parts are to be repaired or replaced to maintain a SAFE operational crane. Refer to the typical Inspection Schedule and Maintenance Report found elsewhere in this manual.

Items to be inspected include but are not limited to:

1. All functional operating mechanisms for misadjustment interfering with crane operation.
2. Operating parts for excessive wear.
3. All safety devices for malfunction.
4. All connections and mountings for loose bolts, nuts and other fasteners for tightness.
5. All structural members and welds for deformation, cracks or corrosion.
6. All electrical apparatus, including control contactors, limit switches, push button stations for signs of pitted contact points, wear or deterioration.
7. All hoists and trolleys installed on the crane in accordance with the manufacturer's recommendation.

### **WARNING**

ALWAYS LOCK MAIN SWITCH IN THE OPEN POSITION (OFF) BEFORE INSPECTION.

### **NOTICE**

CRANES THAT HAVE BEEN SITTING IDLE FOR SIX MONTHS OR GREATER SHALL RECEIVE A COMPLETE PERIODIC INSPECTION PRIOR TO ITS USE.

## MAINTENANCE

### General

Maintenance services required on top running cranes are, for the most part, simple periodic inspections and adjustments. Procedures for lubrication, routine adjustments and replacement of parts, if required, are described in the following paragraphs.

### Lubrication

#### AXLE BEARINGS

Axle bearings on the 4.5" (115 mm) and 6.3" (160 mm) diameter wheels are permanently lubricated, with no additional lubrication requirements. Axle bearings on the 7.9" (200 mm) and 10.2" (260 mm) diameter wheels require periodical lubrication. To access grease fittings, remove the rail sweep. Fitting is located on the pilot diameter of each bearing cage, four total per endtruck as shown in figures 3 & 4. Lubricate with NLGI #2 General Purpose Grease, every three months. Replace rail sweep upon completion. Using a torque wrench, tighten all bolts to 72 ft. lbs. torque for all size end trucks. Frequency of and type of lubrication used may be adjusted based the severity of the duty cycle and operating environment.

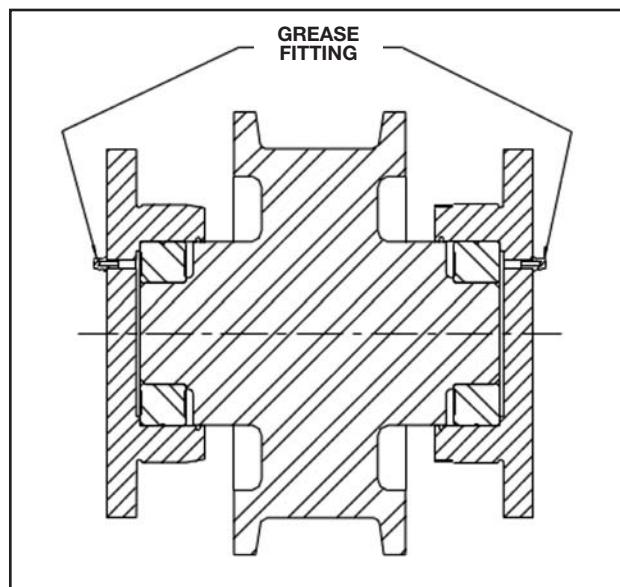


Figure 3: Trailer Wheel

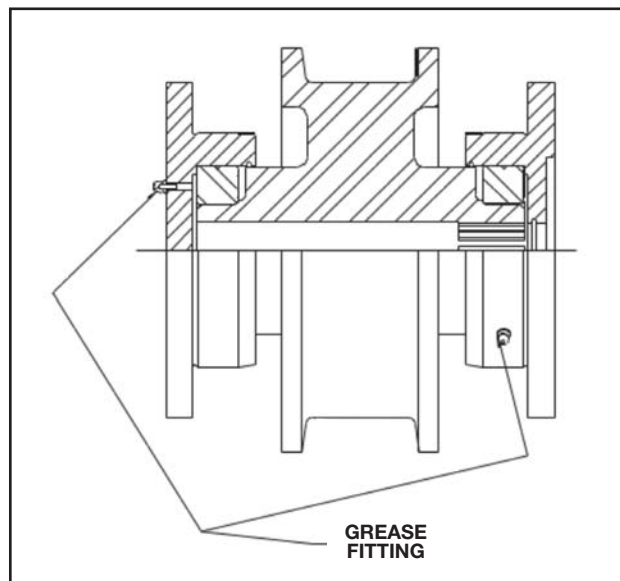


Figure 4: Drive Wheel

## GEARMOTOR (Endtruck)

The gearcase lubricant should be changed after 10,000 hours of use, based on moderate (Class C) service. Lubrication frequency will need to be increased dependant on the severity of service. Oil required is Aral Degol BG 220 gear oil (suitable substitutes are Texaco Pinnacle 220 & Shell Omala 220). Do not mix lubricant types (this applies in particular to mineral and synthetic lubricants). Too much lubricant can lead to overheating. Gearcase is not provided with, nor requires a vent plug.

Motor Horsepower	KW	Gearcase Oil Capacity (liters)
0.75	.55	.18
1.0	.75	.18
1.5	1.2	.40
2.0	1.5	.55
3.0	2.2	.55

### TO CHANGE GEARCASE OIL:

1. Disconnect and lock out power supply.
2. Unplug motor connection.
3. Unbolt complete gearmotor from endtruck. Gearmotors weigh up to approximately 75 lbs.
4. Remove drain/filler plug on top of gearcase as shown in figure 5. Tip motor to drain oil in to proper container. Properly dispose of used oil.
5. Fill gearcase with correct amount of oil per chart above and replace drain/filler plug.
6. Mount complete gearmotor back on endtruck and bolt back into place. Using a torque wrench, tighten all bolts to 7.5 ft. lbs. torque for 115 mm (4.5") and 160 mm (6.3") end trucks and 18 ft. lbs. torque for 200 mm (7.9") and 260 mm (10.2") end trucks.
7. Re-install motor plug
8. Turn power back on to crane and test run, checking for any signs of leaks.

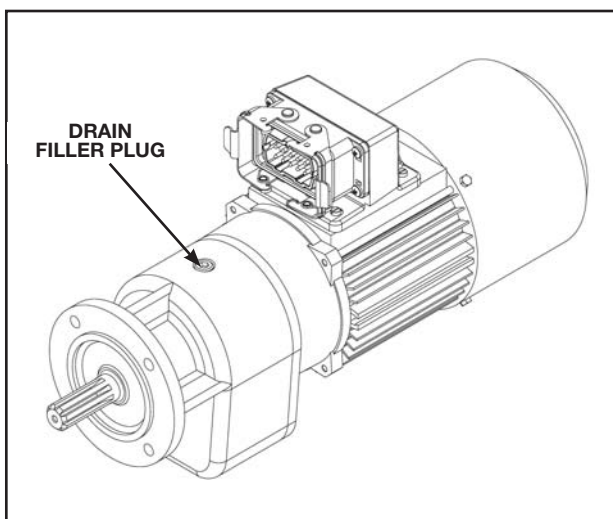


Figure 5: Gearcase Drain/Filler Plug

## HOIST & TROLLEY

For hoist and trolley lubrication instructions refer to the manufacturer's manuals.

## Wheel and Bearing Removal & Replacement

Refer to parts illustration Figure 7.

To remove the wheels follow the steps below:

1. Remove load and below the hook devices from hook. Move hoist and trolley to opposite end of crane from end work is being done.

### **WARNING**

**MAKE SURE THAT TRUCK IS ADEQUATELY SUPPORTED SO THAT IT CANNOT DROP WHEN WHEEL IS REMOVED. DUE TO THE WEIGHT OF THE WHEELS AND BEARING CAGES, MAKE SURE THAT THE PROPER EQUIPMENT IS IN PLACE TO SAFELY REMOVE THE WHEELS AND BEARING CAGES FROM THE END TRUCK. ALSO LOCK MAIN RUNWAY DISCONNECT SWITCH IN THE OPEN POSITION (OFF) WHEN WORKING ON WHEELS ADJACENT TO RUNWAY CONDUCTORS.**

2. Disconnect power and lock out.
3. Remove load from wheel axle. This can be accomplished by jacking or lifting at the girder(s). Jacking or lifting only one end of the truck may permanently damage the crane.
4. If working on driver wheel, unplug motor leads from gearmotor and remove gearmotor from bearing cage. Remove rail sweep from endtruck and bolts from bearing cages.
5. Jack endtruck to height that will allow bearing cage to roll out from end of endtruck.
6. Roll wheel, bearings and bearing caps assembly from under endtruck and remove from runway. Be careful not to drop bearing caps, bearings and wheel from runway height.
7. Remove bearing caps, bearings should stay on wheel axle.
8. Remove bearings from axle. Depending on the condition of the bearings and axles, a bearing puller may be required. Be careful not to damage bearing fits on axle.
9. Inspect axle bearing diameter and wheel tread diameter and flange for excessive wear, spalling and work hardening on the tread and flange, nicks and gouges on bearing diameters, etc. Replace wheel if necessary.
10. Prior to re-assembling bearings to axle, pack the roller bearings with grease. Use NLGI #2 general purpose grease unless the severity of the duty cycle and/or operating environment warrants otherwise. Press bearings onto wheel axle, ensure they are fully seated.
11. Assemble both bearing caps onto bearings
12. Place wheel assembly onto runway rail and roll it into place in the endtruck. Orient the grease fitting (if provided) on bearing cap, pointing towards the rail sweep.
13. Carefully lower endtruck, ensuring bearing caps and the endtruck pilot diameters align properly. Install and tighten bearing cap bolts. Using a torque wrench, tighten all bolts to 36 ft. lbs. torque for 115 mm (4.5"), 160 mm (6.3") and 200 mm (7.9") end trucks and 72 ft. lbs. torque for 260 mm (10.2") end trucks.
14. Lower endtruck onto runway rail.
15. Re-install rail sweep and gearmotor. Connect motor power plug. Refer to [page 30](#) for torque specifications.
16. Turn power back on to crane and inspect crane for proper operation.

## MOTOR BRAKES

Standard motor brakes are DC rectified solenoid activated, spring set disc type brakes. Brake is intended to be used strictly as a holding brake and does NOT have any torque adjustment for decelerating and stopping the crane. Deceleration and stopping is to be provided by the variable frequency (inverter) motor control.

### Brake Air Gap Inspection

To inspect brake air gap refer to figure 6:

1. Disconnect and lock out power supply
2. Remove brake cover
3. Carefully roll the o-ring back towards the magnet body exposing the air gap between the armature plate and magnet. Use feeler gauge and measure the gap between the armature plate and magnet. If gap exceeds maximum allowed, replace the brake.

Motor Horsepower	KW	Normal Air Gap	Maximum Air Gap	Brake Mounting Bolt Torque
0.75	.55	0.2 mm (.008 in.)	0.3mm (.012 in.)	3 Nm (2.2 ft. lbs.)
1.0	.75			
1.5	1.2	0.4 mm (.016 in.)		
2.0	1.5			
3.0	2.2			

4. Roll o-ring back into place and re-install brake cover.
5. Turn power back on to crane and test brakes for proper operation.

### Brake Rectifier Removal and Replacement

Rectifier is located inside the motor conduit box cover. To replace follow these steps:

1. Disconnect and lock out power supply.
2. Unplug motor leads and open conduit box.
3. Remove rectifier and unplug wires.
4. Plug wires into replacement rectifier.
  - a. Connect brake leads to DC side of rectifier, terminals marked "+" & "-".
  - b. Connect leads from the plug to the AC side, two terminals marked "~".
5. Re-assemble in reverse order disassembly.
6. Turn power onto crane and test for proper operation.

### Brake Removal and Replacement

If brake air gap exceeds the maximum allowed, or is not functioning properly, the brake may need to be replaced. Follow these instructions.

1. Turn power off to crane and lock out
2. Unplug motor leads, open motor conduit box and disconnect brake leads from rectifier
3. Remove brake cover
4. Remove retaining ring and fan (if applicable).
5. Remove (3) mounting bolts holding brake magnet body in place. Pull brake leads from motor, remove magnet, brake coil and rotor.
6. Re-assemble in reverse order, and tighten mounting bolts to specified torque.
7. Turn power back on to crane and test brakes for proper operation.

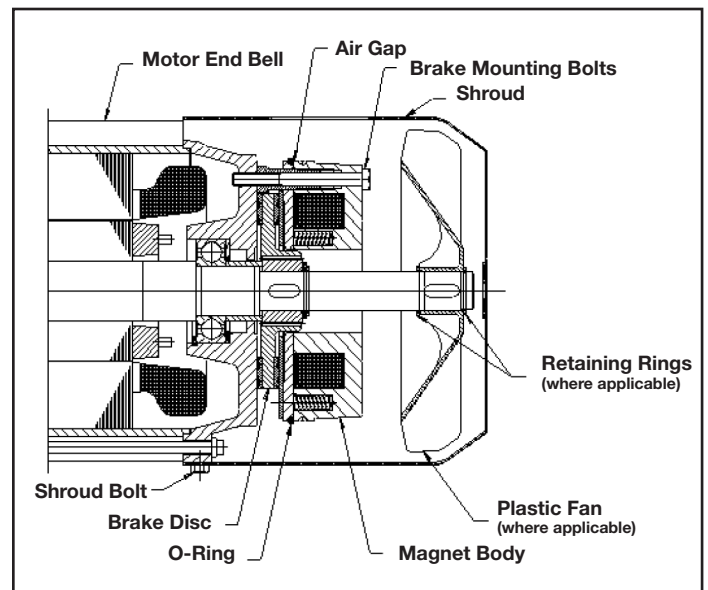


Figure 6: Motor Brake

## Electrical

### 1. Gearmotors

- a. The gearmotors are inverter duty. If gearmotor requires any service or repairs, other than what is described in this manual, the complete gearmotor must be replaced.
- b. For hoist and trolley motors, consult the hoist and trolley literature.

### 2. Control Panel

- a. All connections should be checked frequently for tightness.

### 3. Hoist and Trolley

Panel, brakes, limit switches, etc. Consult hoist and trolley literature for maintenance and spare parts information.



# INSPECTION SCHEDULE AND MAINTENANCE REPORT

CRANE SERIAL NO. (MFGRS.) \_\_\_\_\_  
 CAPACITY \_\_\_\_\_  
 TYPE \_\_\_\_\_  
 VOLTAGE \_\_\_\_\_

CUSTOMER CRANE IDENTITY NO. \_\_\_\_\_  
 LOCATION IN PLANT \_\_\_\_\_  
 THIS INSPECTION IS  MONTHLY  SEMI-ANNUAL  ANNUAL  
 INSPECTED BY \_\_\_\_\_ DATE \_\_\_\_\_

COMPONENT, UNIT OR PART AND LOCATION		*RECOMMENDED INSPECTION INTERVAL			CONDITION <small>(Check column best indicating condition when part or unit is inspected. Use note column to the right if condition is not listed below.)</small>					CORRECTIVE ACTION NOTES
LOCATION	Component, Unit or Part	Monthly	Semi-Annual	Good	Adjustment Required	Repair Required <small>(Loose Parts Or Wires)</small>	Replacement Required <small>(Worn Or Damaged)</small>	Lubrication Required <small>(Low Oil Or Grease Rust Or Corrosion)</small>	Cleaning Or Painting Required	DATE
LOCATION										
HOIST	Motor	<input type="radio"/>								
	Motor Brake	<input type="radio"/>								
	Mechanical Load Brake	<input type="radio"/>								
	Overload Clutch	<input type="radio"/>								
	Couplings	<input type="radio"/>								
	Gears, Shafts & Bearings	<input type="radio"/>								
	Upper Block	<input type="radio"/>								
	Lower Block	<input type="radio"/>								
	Hook & Throat Opening	<input checked="" type="radio"/>								Record Hook Throat Opening
	Hoist Rope	<input checked="" type="radio"/>		X						
	Rope Drum		<input type="radio"/>							
	Guards		<input type="radio"/>							
	Limit Switch	<input type="radio"/>								
CONTROL PANELS & PUSHBUTTON	Trolley Panel	<input type="radio"/>								
	Hoist Panel	<input type="radio"/>								
	Pushbutton		<input type="radio"/>							
	Wiring		<input type="radio"/>							
TROLLEY	Motor	<input type="radio"/>								
	Brake (When so Equip.)	<input type="radio"/>								
	Couplings	<input type="radio"/>								
	Gears, Shafts & Bearings	<input type="radio"/>								
	Frame			<input type="radio"/>						
	Wheels		<input type="radio"/>							
	Bumpers		<input type="radio"/>							
	Guards		<input type="radio"/>							
	Conductors	<input type="radio"/>								
	Collectors	<input type="radio"/>								
RUNWAYS	Monorail Joints		<input type="radio"/>							
	Monorail		<input type="radio"/>							
	Main Conductors	<input type="radio"/>								
	Main Collectors	<input type="radio"/>								
MISC	General Condition		<input type="radio"/>							
	Load Attach. Chains	<input checked="" type="radio"/>								
	Rope Slings & Connect.	<input checked="" type="radio"/>								
	Change Gearcase Lub.			<input type="radio"/>						
	Grounding Faults		<input type="radio"/>							

\* See text for daily & weekly requirements      ● Signed & dated report required - OSHA      Typical Inspection Schedule and Maintenance Report form. User must adjust inspection interval and components to suit their individual conditions and usage.  
 ○ Inspection interval      X Magnetic particle or equivalent examination required.

## REPLACEMENT PARTS

The following parts lists and illustrations cover standard model cranes. Typical units are used as the basis for the exploded parts illustrations; therefore, certain variations may occur from the parts information given. For this reason always give the catalog number, sales order number, model number, motor horsepower, voltage, phase and frequency when ordering replacement parts. For motors, gear cases and electrical components, give complete nameplate data.

### **WARNING**

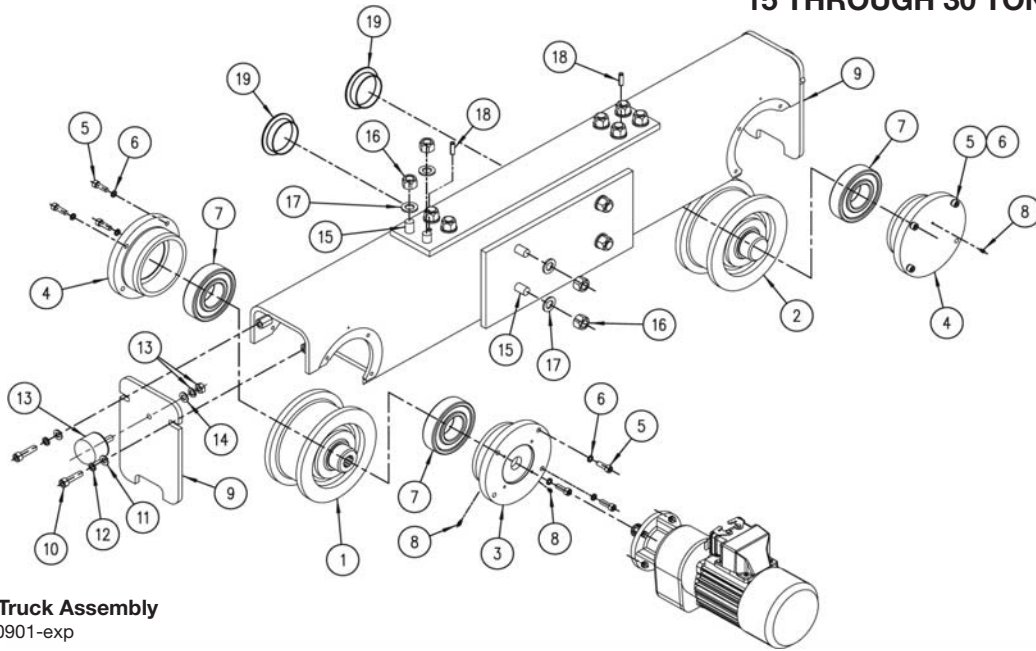
**NON-FACTORY AUTHORIZATIONS OR MODIFICATION OF EQUIPMENT AND USE OF NON-FACTORY REPAIR PARTS CAN LEAD TO DANGEROUS OPERATION AND INJURY.**

#### **TO AVOID INJURY:**

**DO NOT ALTER OR MODIFY EQUIPMENT WITHOUT FACTORY AUTHORIZATION.**

**DO USE ONLY FACTORY PROVIDED REPLACEMENT PARTS.**

The numbers assigned to the parts of the various assemblies in the parts lists, may not be the part numbers used in manufacturing the part. They are identification numbers, that when given with the catalog number permits us to identify, select or manufacture, and ship the correct part needed.



**Figure 7: End Truck Assembly**  
45150901-exp

Ref. No.	Description	15 & 20 Ton Capacity 200 mm Truck			25 & 30 Ton Capacity 260 mm Truck		
		Part no.	Quantity		Part no.	Quantity	
			S.G.	D.G.		S.G.	D.G.
1	Driver Wheel (65 mm tread)	23487701	1	1	23487801	1	1
	Driver Wheel (88 mm tread)	23487703	1	1	23487803	1	1
2	Trailer Wheel (65 mm tread)	23487702	1	1	23487802	1	1
	Trailer Wheel (88 mm tread)	23487704	1	1	23487804	1	1
3	Bearing Cage, Open (Driver)	23488101	1	1	23488201	1	1
4	Bearing Cage, Closed (Trailer)	23488102	3	3	23488202	3	3
5	SHCS	11802728	12	12	11802718	12	12
6	Hi-Collar Lock Washer	11803202	12	12	11803203	12	12
7	Bearing	10380106	4	4	10380106	4	4
8	Grease Fitting	N06099	5	5	N06099	5	5
9	Rail Sweep (65 mm tread)	23488901	2	2	23489001	2	2
	Rail Sweep (88 mm tread)	23488902	2	2	23489002	2	2
10	M10-1.50 SHCS	11802729	4	4	11802729	8	8
11	M10 Flat Washer	11803101	4	4	11803101	8	8
12	M10 Hi-Collar Lock Washer	11803203	4	4	11803203	8	8
13	Bumper - R1	-	-	-	-	-	-
	Bumper - R2	11680701	2	-	-	-	-
	Bumper - R3	11680703	2	2	11680703	2	2
	Bumper - R4	11680702	2	2	11680702	2	2
	Bumper - R5	11680705	-	2	11680705	-	2
14	Flat Washer - R1	-	-	-	-	-	-
	Flat Washer - R2	11803101	2	-	-	-	-
	Flat Washer - R3	11803101	2	2	11803101	2	2
	Flat Washer - R4	11803103	2	2	11803103	2	2
	Flat Washer - R5	11803103	-	2	11803103	-	2
15	H.S. Hex Head Bolt Cl. 8.8	11802509	12	24	11802509	14	28
16	Hex Nut	10399110	12	24	10399110	14	28
17	Washer	11803502	12	24	11803502	14	28
18	Slotted Roll Pin	11807001	2	4	11807001	2	4
19	Hand Hole Cap Plug	10849811	4	8	10849811	4	8

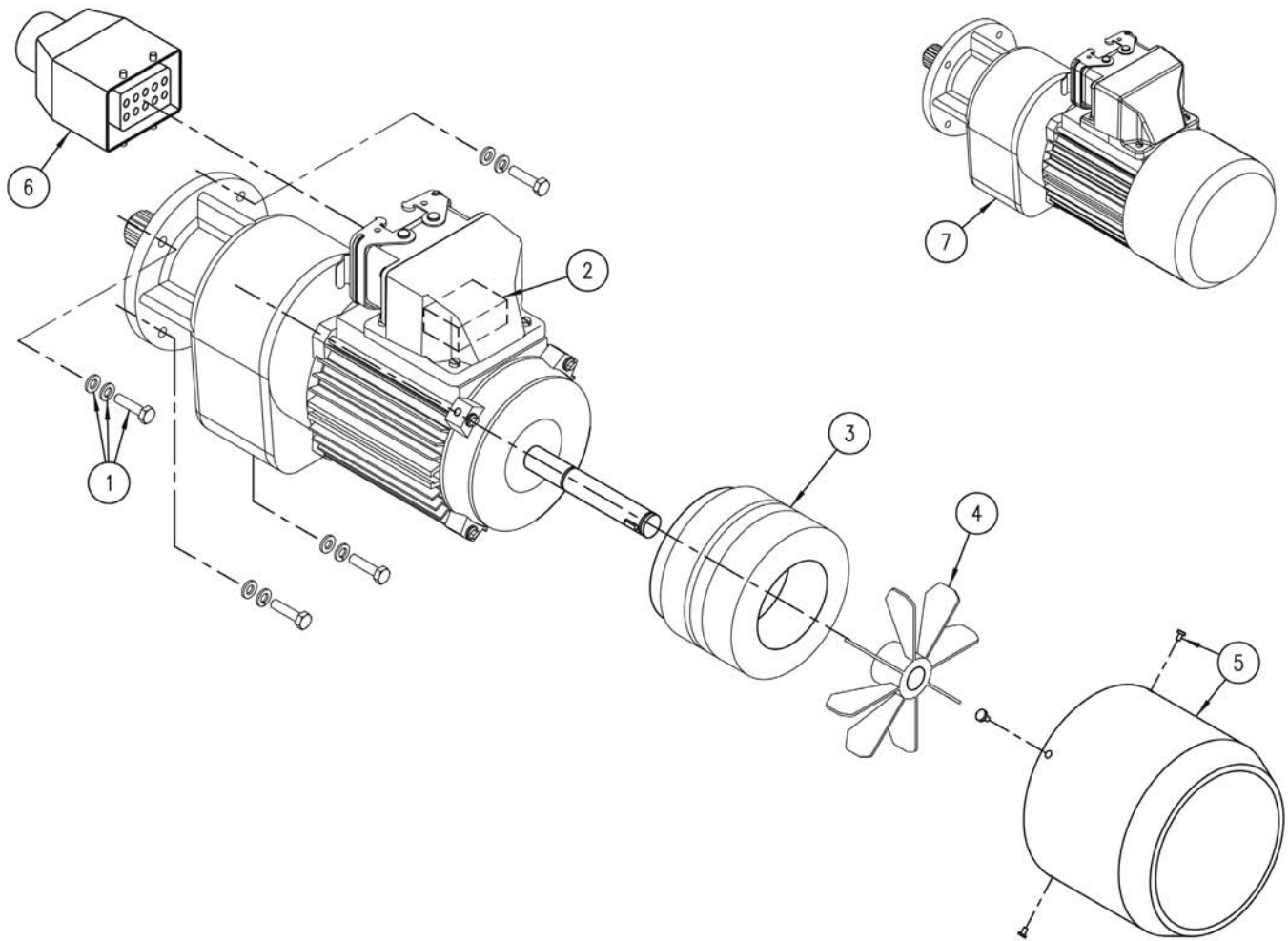
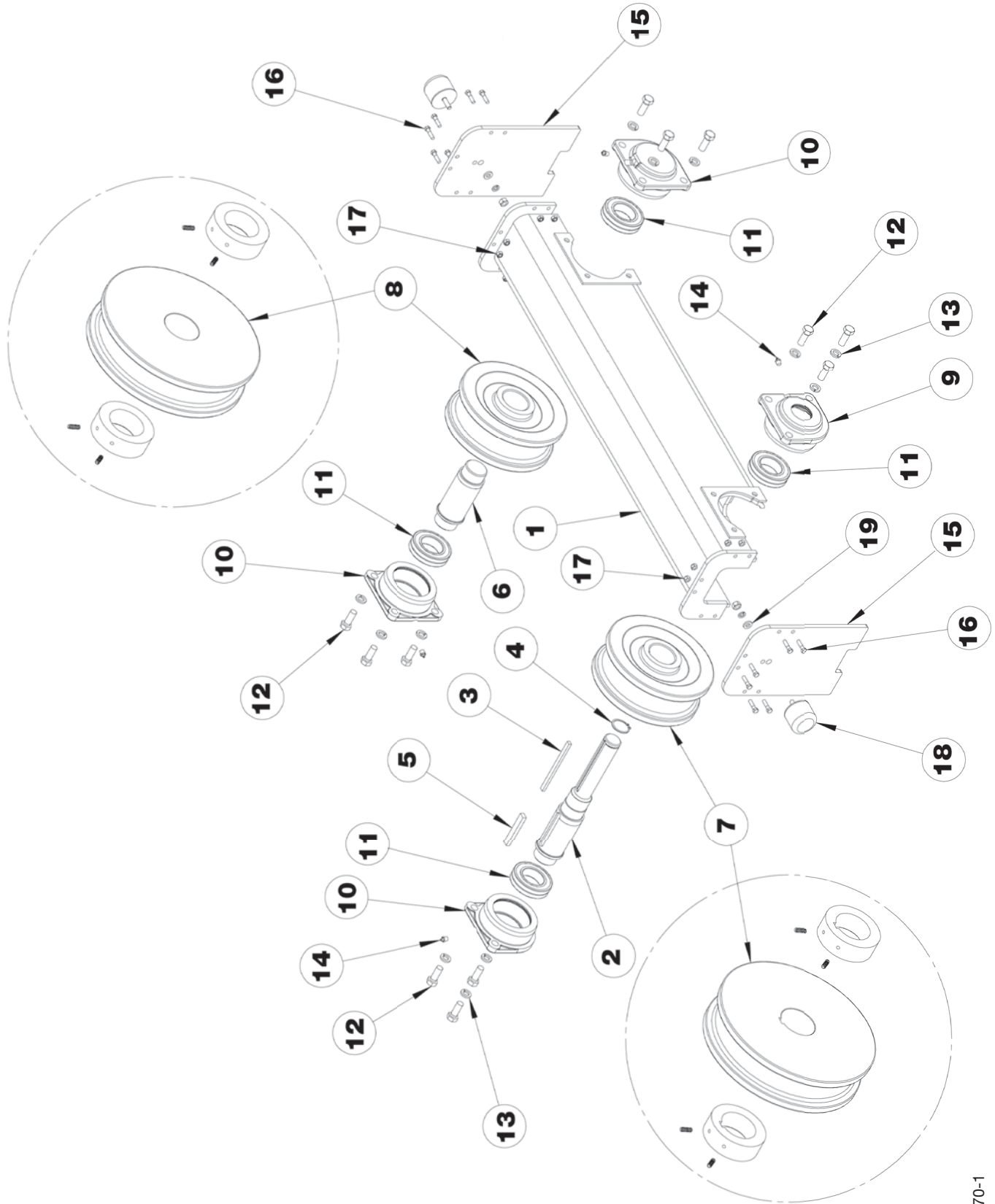


Figure 8: Gearmotor

Ref. No.	Description	Quantity	15 & 20 Ton Capacity		25 & 30 Ton Capacity	
			200 mm Truck (1.2 kW, 1½ hp)		260 mm Truck (1.55 kW, 2 hp)	
			Part Number	Part Number	Part Number	Part Number
<b>Gearmotor Repair Parts</b>						
1	Mounting Hardware Kit	1	45152052		45152053	
2	Brake Rectifier, (380/460V & 575V)	1		45152065		
	Brake Rectifier, (190/200-230V)	1		45152066		
3	Complete Brake Kit 180VDC, (190/200-230V & 380/460V)	1	45152059		45152061	
	Complete Brake Kit 250VDC, (575V)	1	45152060		45152062	
4	Fan Kit (where applicable)	1	45152077		45152078	
5	Shroud Kit	1	45152082		45152083	
6	Mating Easy Connect Plug (where applicable)	1		11829301		
<b>Complete Gearmotor Assembly</b>						
7	190volt-3phase-50Hz, 208/230volt-3phase-60Hz	1	45152021	45152031	45152041	
	380volt-3phase-50Hz, 460volt-3phase-60Hz		45152023	45152033	45152043	
	575volt-3phase-60Hz		45152024	45152034	45152044	



332370-1

**PARTS LIST**

Reference No.	Component Description	Quantity Required*	Truck Wheel Size		
			40 through 50 Ton Capacity	60 Ton Capacity	
			12 in. Key No.	15 in. Key No.	
1	Truck Tube Weldment  (Order by wheelbase (in.))	1	42	TRT-1021	TRT-1051
			48	TRT-1022	TRT-1052
			54	TRT-1023	TRT-1053
			60	TRT-1024	TRT-1054
			66	TRT-1025	TRT-1055
			72	TRT-1026	TRT-1056
			78	TRT-1027	TRT-1057
			84	TRT-1028	TRT-1058
			90	TRT-1029	TRT-1059
			96	TRT-1030	TRT-1060
			102	TRT-1031	TRT-1061
			108	TRT-1032	TRT-1062
			114	TRT-1033	TRT-1063
			120	TRT-1034	TRT-1064
			126	TRT-1035	TRT-1065
			132	TRT-1036	TRT-1066
			138	TRT-1037	TRT-1067
144	TRT-1038	TRT-1068			
150	TRT-1039	TRT-1069			
156	TRT-1040	TRT-1070			
162	TRT-1041	TRT-1071			
168	TRT-1042	TRT-1072			
174	TRT-1043	TRT-1073			
2	Driver Axle  (Order by reducer)	1	LT2282	TRT-1121	-
			LT3282	TRT-1122	TRT-1131
			LT4282	TRT-1123	TRT-1132
			LT5282	TRT-1124	TRT-1133
			LT6282	-	TRT-1134
			LT7282	-	-
			Center Drive	TRT-1125	TRT-1135
3	Reducer Key  (Order by reducer)	1	LT2282	TRT-1161	-
			LT3282	TRT-1162	TRT-1171
			LT4282	TRT-1163	TRT-1172
			LT5282	TRT-1164	TRT-1173
			LT6282	-	TRT-1174
			LT7282	-	-
			Center Drive	TRT-1165	TRT-1175
4	Axle Retaining Ring  (Order by reducer)	1	LT2282	TRT-1211	-
			LT3282	TRT-1212	TRT-1221
			LT4282	TRT-1213	TRT-1222
			LT5282	TRT-1214	TRT-1223
			LT6282	-	TRT-1224
			LT7282	-	-
			Center Drive	-	-
5	Driver Wheel Key	1	TRT-1242	TRT-1243	
6	Trailer Axle	1	TRT-1252	TRT-1253	

\* Quantities listed are for one (1) complete end truck

**PARTS LIST**  
(CONTINUED)

Reference No.	Component Description		Quantity Required*	Truck Wheel Size	
				40 through 50 Ton Capacity	60 Ton Capacity
				12 in. Key No.	15 in. Key No.
7	Driver Wheel (Order by rail size & tread type)**	20#-30#, ST	1		
		20#-30#, TT			
		40#-60#, ST			
		40#-60#, TT			
		30#-50#, ST		TRT-1311	TRT-1321
		30#-50#, TT		TRT-1312	TRT-1322
		55#-105#, ST		TRT-1313	TRT-1323
	55#-105#, TT	TRT-1314	TRT-1324		
8	Trailer Wheel (Order by rail size & tread type)**	20#-30#, ST	1		
		20#-30#, TT			
		40#-60#, ST			
		40#-60#, TT			
		30#-50#, ST		TRT-1411	TRT-1421
		30#-50#, TT		TRT-1412	TRT-1422
		55#-105#, ST		TRT-1413	TRT-1423
	55#-105#, TT	TRT-1414	TRT-1424		
9	Bearing Cage with hole		1	TRT-1502	TRT-1503
10	Bearing Cage w/o hole		3	TRT-1512	TRT-1513
11	Wheel Bearing		4	TRT-1522	TRT-1523
12	Bearing Cage Bolt		12	TRT-1532	TRT-1533
13	Bearing Cage Lockwasher		12	TRT-1542	TRT-1543
14	Lubrication Fitting		4	TRT-1552	TRT-1553
15	Rail Sweep ( 20#-30# Rail)		2		
	Rail Sweep ( 40#-60# Rail)				
	Rail Sweep ( 30#-50# Rail)			TRT-1611	TRT-1621
	Rail Sweep ( 55#-105# Rail)			TRT-1612	TRT-1622
16	Rail Sweep Bolt		12	TRT-1652	TRT-1653
17	Rail Sweep Locknut		12	TRT-1662	TRT-1663
18	Bumpers (Includes nuts & lockwashers)	R3	2	TRT-1771	TRT-1771
		R4		TRT-1772	TRT-1772
		R5		TRT-1773	TRT-1773
		R6		TRT-1774	TRT-1774
		R7		TRT-1775	TRT-1775
		R8		TRT-1776	TRT-1776
19	Flat Washers	R3	2	TRT-1781	TRT-1781
		R4		TRT-1782	TRT-1782
		R5		TRT-1783	TRT-1783
		R6		TRT-1784	TRT-1784
		R7		TRT-1785	TRT-1785
		R8		TRT-1786	TRT-1786

\* Quantities listed are for one (1) complete end truck

\*\* ST = Straight Tread Wheels  
TT = Tapered Tread Wheels

\*\* If bronze wheels or rail sweeps are required, follow the Key No. with a "B" for bronze.

For example, a 9" bronze driver wheel for 20#-30# rail with straight tread must be ordered as TRT-1301B

**PARTS LIST**  
(CONTINUED)

Reference No.	Component Description		Quantity Required*	Truck Wheel Size	
				40 through 50 Ton Capacity	60 Ton Capacity
				12 in. Key No.	15 in. Key No.
<b>Wheel Assemblies</b> (Order by drive type, rail size, & tread type) **	<b>DRIVER WHEEL ASSEMBLY</b> LT2282	20#-30#, ST	1	-	-
		20#-30#, TT		-	-
		40#-60#, ST		-	-
		40#-60#, TT		-	-
		30#-50#, ST		TRT-2055	-
		30#-50#, TT		TRT-2056	-
		55#-105#, ST		TRT-2057	-
		55#-105#, TT		TRT-2058	-
	<b>DRIVER WHEEL ASSEMBLY</b> LT3282	20#-30#, ST	1	-	-
		20#-30#, TT		-	-
		40#-60#, ST		-	-
		40#-60#, TT		-	-
		30#-50#, ST		TRT-2063	TRT-2113
		30#-50#, TT		TRT-2064	TRT-2114
		55#-105#, ST		TRT-2065	TRT-2115
	55#-105#, TT	TRT-2066	TRT-2116		
	<b>DRIVER WHEEL ASSEMBLY</b> LT4282	30#-50#, ST	1	TRT-2067	TRT-2117
		30#-50#, TT		TRT-2068	TRT-2118
		55#-105#, ST		TRT-2069	TRT-2119
		55#-105#, TT		TRT-2070	TRT-2120
	<b>DRIVER WHEEL ASSEMBLY</b> LT5282	30#-50#, ST	1	TRT-2071	TRT-2121
		30#-50#, TT		TRT-2072	TRT-2122
		55#-105#, ST		TRT-2073	TRT-2123
		55#-105#, TT		TRT-2074	TRT-2124
	<b>DRIVER WHEEL ASSEMBLY</b> LT6282	30#-50#, ST	1	-	TRT-2125
		30#-50#, TT		-	TRT-2126
		55#-105#, ST		-	TRT-2127
		55#-105#, TT		-	TRT-2128
	<b>DRIVER WHEEL ASSEMBLY</b> LT7282	30#-50#, ST	1	-	-
		30#-50#, TT		-	-
55#-105#, ST		-		-	
55#-105#, TT		-		-	
		<b>Approximate Weight of Assembly (lbs.)</b>	<b>235</b>	<b>415</b>	
<b>Center Drive Assembly</b>	20#-30#, ST	1	-	-	
	20#-30#, TT		-	-	
	40#-60#, ST		-	-	
	40#-60#, TT		-	-	
	30#-50#, ST		TRT-2089	TRT-2139	
	30#-50#, TT		TRT-2090	TRT-2140	
	55#-105#, ST		TRT-2091	TRT-2141	
	55#-105#, TT		TRT-2092	TRT-2142	
		<b>Approximate Weight of Assembly (lbs.)</b>	<b>235</b>	<b>415</b>	
<b>Trailer Wheel Assembly</b>	20#-30#, ST	1	-	-	
	20#-30#, TT		-	-	
	40#-60#, ST		-	-	
	40#-60#, TT		-	-	
	30#-50#, ST		TRT-2097	TRT-2147	
	30#-50#, TT		TRT-2098	TRT-2148	
	55#-105#, ST		TRT-2099	TRT-2149	
	55#-105#, TT		TRT-2100	TRT-2150	
		<b>Approximate Weight of Assembly (lbs.)</b>	<b>225</b>	<b>400</b>	

\* Quantities listed are for one (1) complete end truck

\*\* If bronze wheels or rail sweeps are required, follow the Key No. with a "B" for bronze.

\*\* ST = Straight Tread Wheels  
TT = Tapered Tread Wheels

For example, a 9" bronze driver wheel for 20#-30# rail with straight tread must be ordered as TRT-1301B



## RECOMMENDED SPARE PARTS FOR YOUR YALE CRANE

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

- 1 Set of Wheel Bearings
- 1 Set of Fuses

Note: When ordering parts always furnish the part number and the manufacturer's serial number.

## WARRANTY WARRANTY AND LIMITATION OF REMEDY AND LIABILITY

- A. Seller warrants that its products and parts, when shipped, and its work (including installation, construction and start-up), when performed, will meet applicable specifications, will be of good quality and will be free from defects in material and workmanship. All claims for defective products or parts under this warranty must be made in writing immediately upon discovery and in any event, within one (1) year from shipment of the applicable item unless Seller specifically assumes installation, construction or start-up responsibility. All claims for defective products or parts when Seller specifically assumes installation, construction or start-up responsibility and all claims for defective work must be made in writing immediately upon discovery and in any event, within one (1) year from completion of the applicable work by Seller, provided; however, all claims for defective products and parts 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.
- B. Upon Buyer's submission of a claim as provided above and its substantiation, Seller shall at its option either (i) repair or replace its product, part or work at either the original f.o.b. point of delivery or at Seller's authorized service station nearest Buyer or (ii) refund an equitable portion of the purchase price.
- C. This warranty is contingent upon Buyer's proper maintenance and care of Seller's products, and does not extend to normal wear and tear. Seller reserves the right to void warranty in event of Buyer's use of inappropriate materials in the course of repair or maintenance, or if Seller's products have been dismantled prior to submission to Seller for warranty inspection.
- D. The foregoing is Seller's only obligation and Buyer's exclusive remedy for breach of warranty and is Buyer's exclusive remedy hereunder by way of breach of contract, tort, strict liability or otherwise. In no event shall Buyer be entitled to or Seller liable for incidental or consequential damages. Any action for breach of this warranty must be commenced within one (1) year after the cause of action has accrued.



COLUMBUS MCKINNON  
CORPORATION

FAMILY OF BRANDS



ABELL-HOWE

**BUDGIT**  
*Hoists*

**CHESTER**  
**HOIST**

**COFFING**  
HOISTS



**SHAW-BOX**

Phone (800) 888.0985 • (716) 689.5400 • Fax: (716) 689.5644 • [www.cmworks.com](http://www.cmworks.com)