

OPERATION, SERVICE AND PARTS MANUAL

***SINGLE AND DOUBLE GIRDER
TOP RUNNING BRIDGES
WITH
INDIVIDUAL MOTOR DRIVEN TRUCKS***



SHAW-BOX®

FOREWORD

This manual contains important information to help you install, operate, maintain and service your new top running single or double girder bridge crane. **We recommend that you study its contents thoroughly before putting the bridge crane 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 bridge crane.

The bridge cranes described in this manual are intended for indoor service. Bridge cranes 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 bridge cranes 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. Bridge 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 single girder cranes described herein are built to 1 through 15 tonne capacities with spans to 60 feet (18.2 meter). 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

The basic construction of single and double girder top running bridges consist of American Standard S, W Section or fabricated box girder(s) rigidly connected to the top and side of each endtruck. 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.

INSTALLATION

GENERAL

The runways on which these cranes will operate must be sufficiently strong enough to support bridge crane, hoisting equipment and rated load. Runway rails must be level and parallel with $\pm 1/8"$. Rail joints must be smooth and held firmly in alignment either by bolted splice bars or by welding. Rails

should be securely fastened to the runway beam.

INSTALLING BRIDGE CRANE

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 (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist; ANSI B30.17-latest edition, Chapter 17-3 Overhead and Gantry Cranes (Top Running Bridge, 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.

Note: It is suggested that the trolley and hoist be installed on the bridge crane at this time so that all wiring connections can be completed.

TYPICAL CONNECTION OF BRIDGE TO ELECTRICAL SERVICE

The crane inter-connection diagram is shown in Figure 10.

⚠ CAUTION

Verify that the crane is furnished for the same voltage, frequency and phase as the runway power supply. Crane voltage is shown on nameplate on bridge panel. Do not operate crane until "Start Up and Pre-Operational Inspection" are made.

⚠ 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.

RUNWAY CONDUCTORS

Motorized bridge cranes and bridge cranes equipped with a motorized trolley or hoist require runway conductors. Install conductors according to manufacturer's instructions and in accordance with National, State and Local codes.

RUNWAY COLLECTORS

Install, adjust and align collectors with runway conductors. Connect collectors to appropriate crane wiring as shown in Crane Inter-Connection Diagram Figure 10.

NOTICE

A minimum of two collector shoes for each conductor bar is required when using variable frequency drives (inverters) on bridge and/or hoist controls, per Section 5.14.7 of CMAA Specifications #70 and #74. Yale•Shaw-Box standard bridge controls utilize variable frequency drive.

CROSS CONDUCTORS & PUSHBUTTON FESTOON

In most cases, the cross conductors and pushbutton festoon, if provided, will be installed on your crane as received; however, if the conductors have been separately shipped, be certain that the instructions covering installation of these conductors are carefully followed. Connect all wiring on the crane (main collectors to bridge panel, bridge panel to cross conductors, bridge panel to bridge

motor) in accordance with the appropriate crane interconnection wiring diagram as shown in Figure 10. If bridge motors quick connection plugs are not pre-wired, connect leads on motor cables from the bridge control panel per Figure 1.

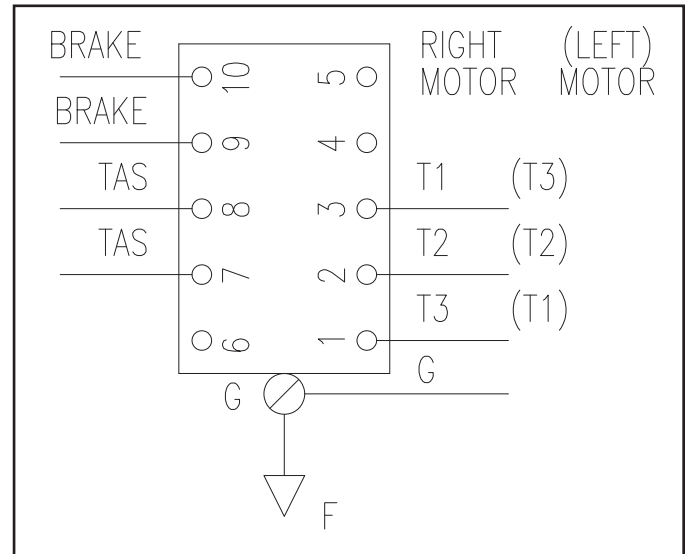


Figure 1. Bridge Gear Motor Quick Connection Plug

⚠ CAUTION

Gearmotors provided with this crane kit 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 single girder crane inspect the clearance between the trolley wheels and toe of flange on bridge girder beam per manufacturers requirements. 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 and the runway end stops to the bridge endtrucks.

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 crane to verify both motors operate in the same direction, in both bridge directions.

10. With no load operate hoist/trolley back and forth the full length of bridge girder and operate the crane the full length of the runway. 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 bridge cranes 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 NOT load bridge beyond rated capacity.

DO NOT subject bridge crane to side loads. 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 bridge crane is supporting.

DO keep clear, and make sure others keep clear, of any load the bridge crane is supporting.

DO NOT attempt to operate bridge crane before completing tests and adjustments.

DO NOT run bridge crane into end stops, other bridge cranes, or any obstruction on beam. 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 bridge crane is mounted on an open-end runway rail, then end stops must be installed to prevent bridge crane from running off the end of the runway 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.

GENERAL

Motor driven cranes are usually operated from a pendant push button station or radio control, which controls the bridge electrically. The push button may be suspended from the bridge, trolley or hoist. Push button control stations, supported by a strain cable, have a built-in interlock to prevent energizing opposing motions at the same time.

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 BRIDGE CRANE TO COME TO A COMPLETE STOP BEFORE CHANGING DIRECTION. ABRUPT CHANGE OF BRIDGE DIRECTION WHILE IN MOTION MAY CAUSE ADVERSE OPERATING CHARACTERISTICS OR DAMAGE TO BRIDGE 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 endtrucks of this crane are controlled by inverters, programmable variable frequency control. Standard programming on Yale•Shaw-Box 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 bridge's 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.

NOTICE

Since a variety of hoist/trolley combinations may be used with this type of bridge crane, refer to the manufacturer's instruction manual for this equipment and the specific details on its operation.

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 or bridge) 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 bridge 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 in Figure 2.

⚠ 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 bridge 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 bridge and trolley, both with light and full loads. This will enable you to “spot” loads with the minimum amount of jogging and excessive load swing.

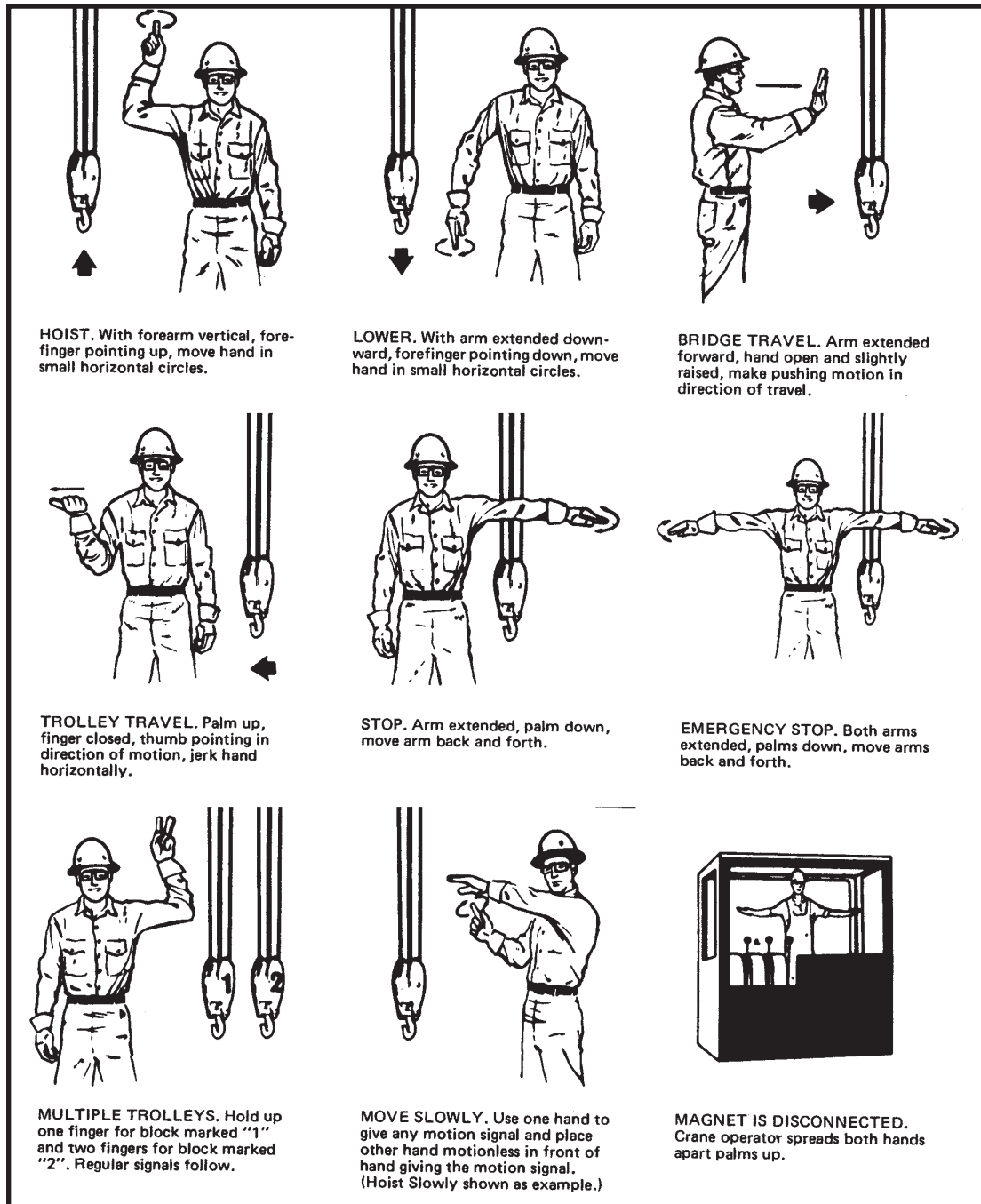


Figure 2. Operator Hand Signals

⚠ 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

<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 found on page 12 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.

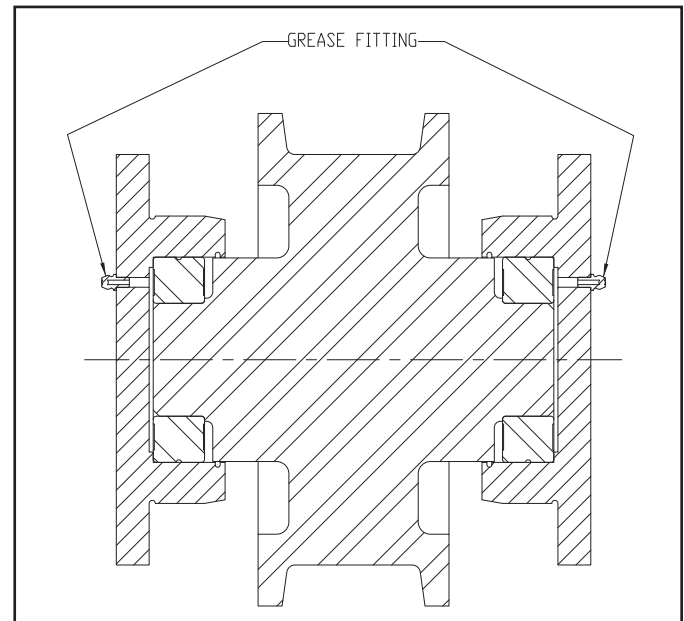


Figure 3. Trailer Wheel

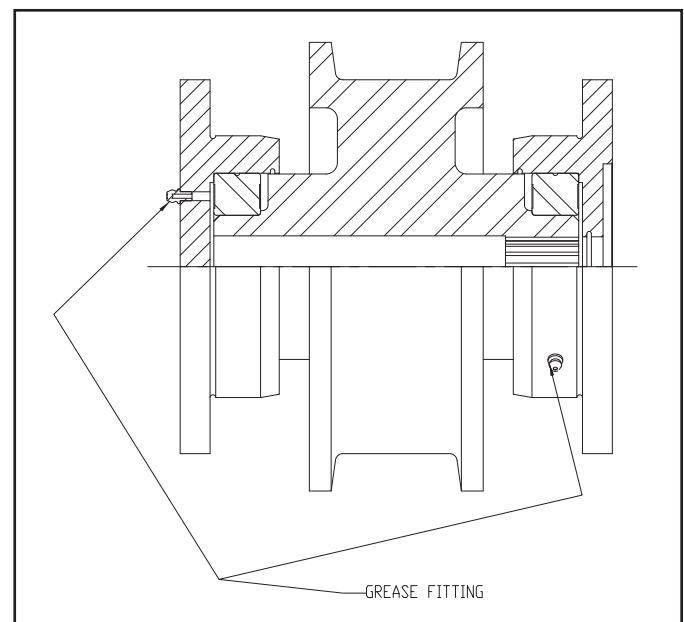


Figure 4. Drive Wheel

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.

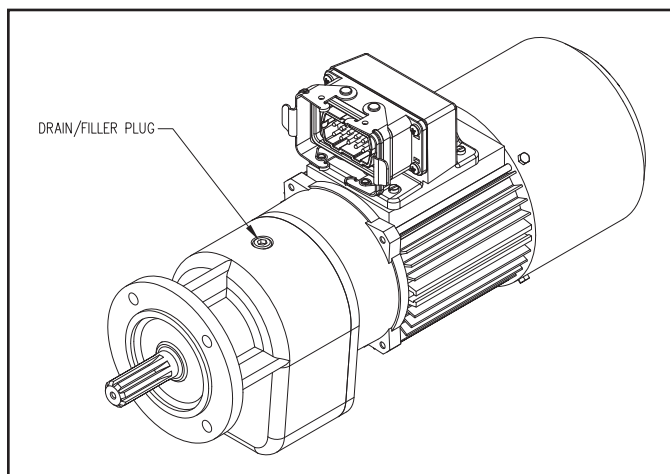


Figure 5. Gearcase Drain/Filler Plug

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.

NOTICE

MAKE SURE ALL JACKING OR LIFTING OF END TRUCK FOR WHEEL REMOVAL IS DONE NEAR THE BRIDGE GIRDER(S) OR **SIMULTANEOUSLY AT EACH END OF THE TRUCK BETWEEN THE WHEEL AND THE GIRDER(S). JACKING OR LIFTING ONLY ONE END OF THE TRUCK MAY PERMANENTLY DAMAGE THE CRANE.**

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 10 for torque specifications.

16. Turn power back on to crane and inspect crane for proper operation.

BRIDGE MOTOR BRAKES

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.)	0.3 mm (.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.

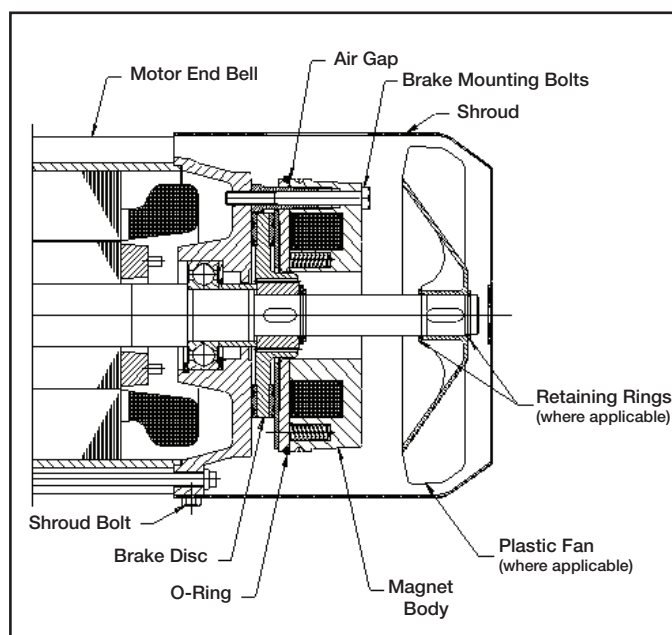


Figure 6. Motor Brake

ELECTRICAL

1. Gearmotors

- a. The bridge 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. Bridge 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 ☐ ANNUAL ☐
SEMI-ANNUAL ☐
INSPECTED BY _____ DATE _____

COMPONENT, UNIT OR PART and location		*Recommended Inspection Interval			CONDITION (Check column best indicating condition when part or unit is inspected. Use note column to the right if condition is not listed below.)							CORRECTIVE ACTION NOTES	
LOCATION	COMPONENT, UNIT OR PART	MONTHLY	SEMI-ANNUAL	ANNUAL	GOOD	ADJUSTMENT REQUIRED	REPAIR REQUIRED (Loose Parts or Wires)	REPLACEMENT REQUIRED (Worn or Damaged)	LUBRICATION REQ. (Low Oil or Grease Rust or Corrosion)	CLEANING OR PAINTING REQUIRED	(Indicate corrective action taken during inspection and note date. For corrective action to be done after inspection, a designated person must determine that the existing deficiency does not constitute a safety hazard before allowing unit to operate. When corrective action is completed, describe and note date in this column.)		
											DATE		
BRIDGE	Motor	<input type="radio"/>											
	Gears & Bearings	<input type="radio"/>											
	Wheels		<input type="radio"/>										
	Trucks			<input type="radio"/>									
	Girders & Connections			<input type="radio"/>									
	Footwalk & Handrail												
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	●		X							Record Hook Throat Opening		
	Hoist Rope	●											
	Rope Drum		<input type="radio"/>										
	Guards		<input type="radio"/>										
	Limit Switch	<input type="radio"/>											
CONTROL PANELS AND PUSHBUTTON	Bridge Panel	<input type="radio"/>											
	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	●											
	Rope Slings & Connect.	●											
	Change Gearcase Lub.			<input type="radio"/>									
	Grounding Faults		<input type="radio"/>										

* See text for DAILY & WEEKLY REQUIREMENTS
○ INSPECTION INTERVAL

● SIGNED & DATED REPORT REQUIRED - OSHA
X MAGNETIC PARTICLE OR EQUIVALENT EXAMINATION REQUIRED.

Typical Inspection Schedule and Maintenance Report form.
User must adjust inspection interval and components to suit his individual conditions and usage.

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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.

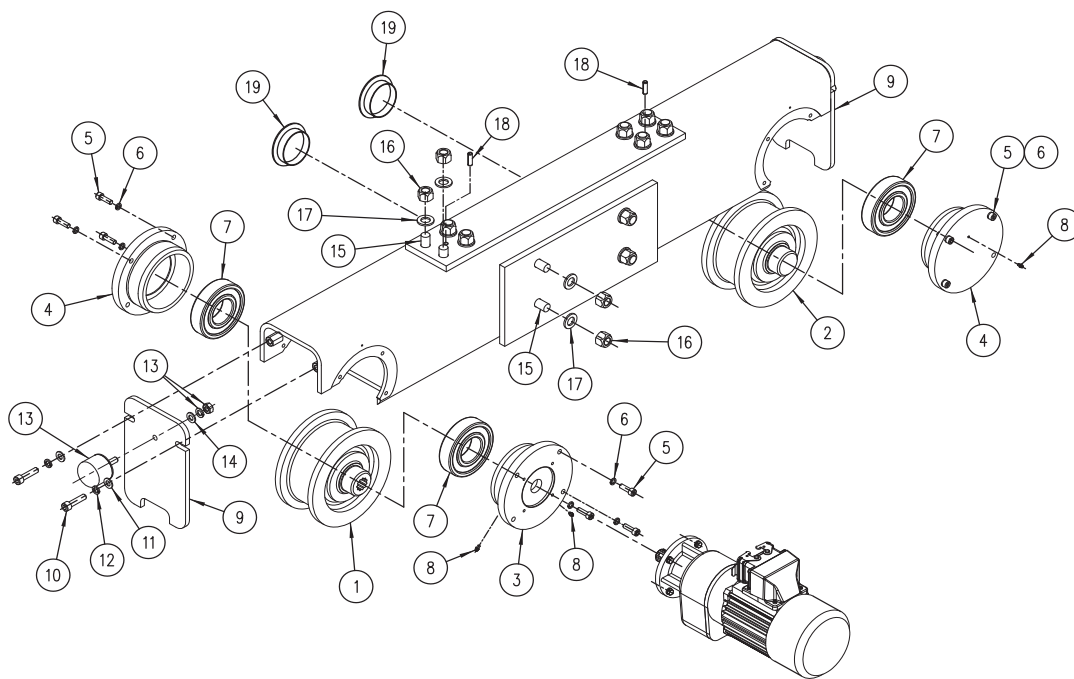
TO AVOID INJURY:

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.

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



45150901-exp

Figure 7. End Truck Assembly

Ref. No.	Description	115 mm Truck			160 mm Truck			200 mm Truck			260 mm Truck		
		Part No.	Quantity		Part No.	Quantity		Part No.	Quantity		Part No.	Quantity	
			S.G.	D.G.		S.G.	D.G.		S.G.	D.G.		S.G.	D.G.
1	Driver Wheel (65 mm tread)	23487501	1	1	23487601	1	1	23487701	1	1	23487801	1	1
	Driver Wheel (88 mm tread)	-	-	-	23487603	1	1	23487703	1	1	23487803	1	1
2	Trailer Wheel (65 mm tread)	23487502	1	1	23487602	1	1	23487702	1	1	23487802	1	1
	Trailer Wheel (88 mm tread)	-	-	-	23487604	1	1	23487704	1	1	23487804	1	1
3	Bearing Cage, Open (Driver)	23487901	1	1	23488001	1	1	23488101	1	1	23488201	1	1
4	Bearing Cage, Closed (Trailer)	23487902	3	3	23488002	3	3	23488102	3	3	23488202	3	3
5	SHCS	11802705	12	12	11802705	12	12	11802728	12	12	11802718	12	12
6	Hi-Collar Lock Washer	11803202	12	12	11803202	12	12	11803202	12	12	11803203	12	12
7	Bearing	10378011	4	4	10378016	4	4	10380106	4	4	10380106	4	4
8	Grease Fitting	-	-	-	-	-	-	NO6099	5	5	NO6099	5	5
9	Rail Sweep (65 mm tread)	23488701	2	2	23488805	2	2	23488901	2	2	23489001	2	2
	Rail Sweep (88 mm tread)	-	-	-	23488806	2	2	23488902	2	2	23489002	2	2
10	M10-1.50 SHCS	11802729	4	4	11802729	4	4	11802729	4	4	11802729	8	8
11	M10 Flat Washer	11803101	4	4	11803101	4	4	11803101	4	4	11803101	8	8
12	M10 Hi-Collar Lock Washer	11803203	4	4	11803203	4	4	11803203	4	4	11803203	8	8
13	Bumper - R1	11680704	2	2	11680704	2	-	-	-	-	-	-	-
	Bumper - R2	11680701	2	2	11680701	2	2	11680701	2	-	-	-	-
	Bumper - R3	-	-	-	11680703	2	2	11680703	2	2	11680703	2	2
	Bumper - R4	-	-	-	-	-	-	11680702	2	2	11680702	2	2
	Bumper - R5	-	-	-	-	-	-	11680705	-	2	11680705	-	2
14	Flat Washer - R1	11803102	2	2	11803102	2	-	-	-	-	-	-	-
	Flat Washer - R2	11803101	2	2	11803101	2	2	11803101	2	-	-	-	-
	Flat Washer - R3	-	-	-	11803101	2	2	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	11802609	12	24	11802609	12	24	11802509	12	24	11802509	14	28
16	Hex Nut	10399109	12	24	10399109	12	24	10399110	12	24	10399110	14	28
17	Washer	11803501	12	24	11803501	12	24	11803502	12	24	11803502	14	28
18	Slotted Roll Pin	11807001	2	4	11807001	2	4	11807001	2	4	11807001	2	4
19	Hand Hole Cap Plug	10849811	4	8	10849811	4	8	10849811	4	8	10849811	4	8

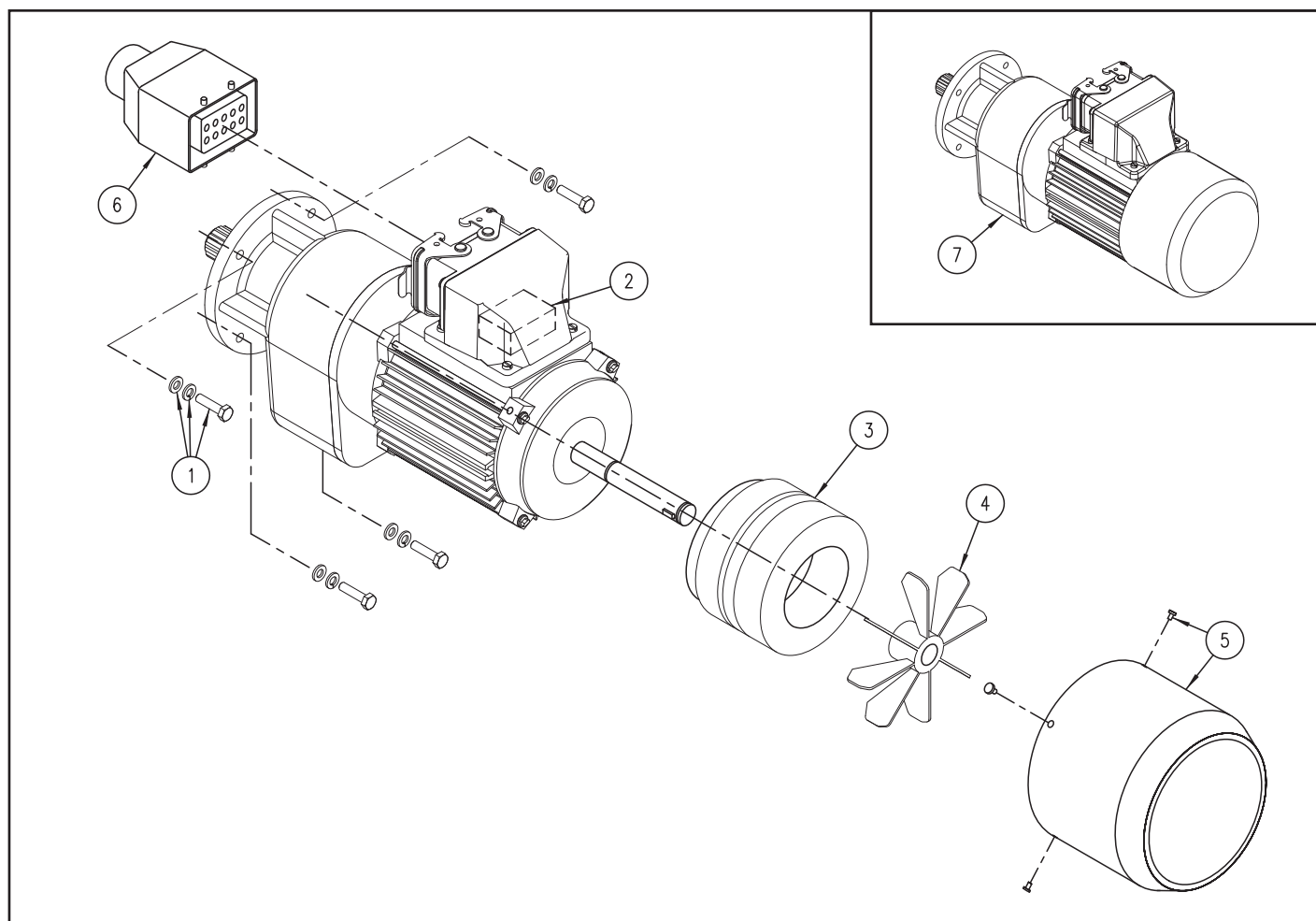


Figure 8. Gearmotor

Gearmotor Repair Parts							
Ref. No.	Description	Qty	115 mm Truck (0.55 kW, ¾ hp)	160 mm Truck (0.75 kW, 1 hp)	200 mm Truck (1.2 kW, 1½ hp)	260 mm Truck (1.55 kW, 2 hp)	260 mm Truck (2.2 kW, 3 hp)
			Part Number	Part Number	Part Number	Part Number	Part Number
1	Mounting Hardware Kit	1	45152050	45152051	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	45152055		45152059	45152061	
	Complete Brake Kit 250VDC, (575V)	1	45152056		45152060	45152062	
4	Fan Kit (where applicable)	1	45152075		45152077	45152078	
5	Shroud Kit	1	45152080		45152082	45152083	
6	Mating Easy Connect Plug (where applicable)	1	11829301				
Complete Gearmotor Assembly							
7	190volt-3phase-50Hz, 208/230volt-3phase-60Hz	1	45152001	45152011	45152021	45152031	45152041
	380volt-3phase-50Hz, 460volt-3phase-60Hz		45152003	45152013	45152023	45152033	45152043
	575volt-3phase-60Hz		45152004	45152014	45152024	45152034	45152044

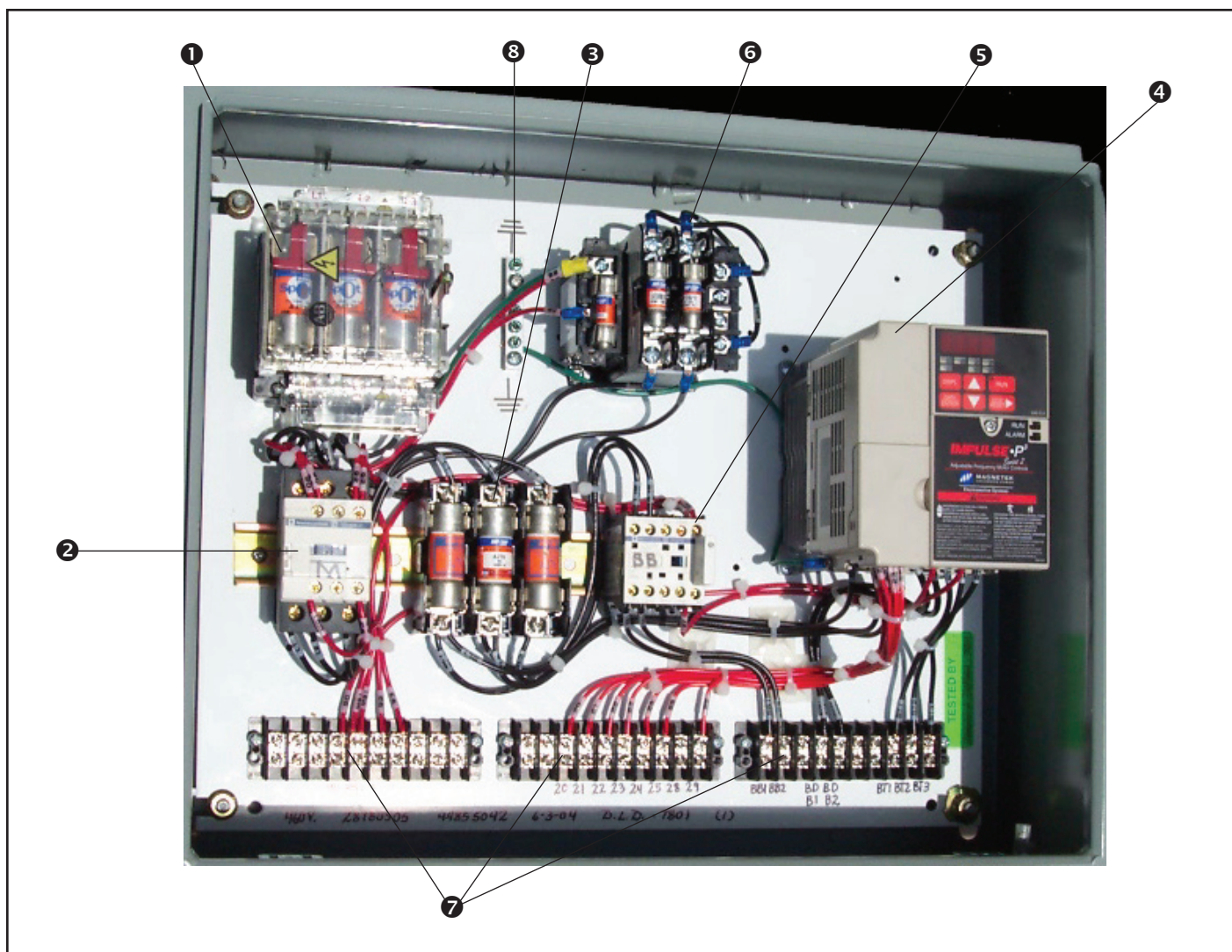


Figure 9. Electrical Enclosure.

Reference Number	Part Number	Quantity Required	Description
1	33190201	1	Fused Disconnect Switch
	33190202		30A Switch
		3	60A Switch
	11695215		Replacement Fuses - 600V
2	11695230	1	15 AMP
	11695260		30 AMP
			60 AMP
	33311033		Mainline Contactor
	33311036		30A
			60A

Figure 9. Electrical Enclosure (Continued)

Reference Number	Part Number	Quantity Required	Description
3	11695303	1	Fuse Base (30 amp)
	11695313		Fuse Base (60 amp)
		3	Fuses - 600V
	11695202		2 AMP
	11695203		3 AMP
	11695204		4 AMP
	11695205		5 AMP
	11695206		6 AMP
	11695208		8 AMP
	11695210		10 AMP
	11695212		12 AMP
	11695215		15 AMP
	11695220		20 AMP
	11695225		25 AMP
	11695230		30 AMP
	11695240		40 AMP
4		1	Variable Frequency Drive
	44849123		2 HP, 230V
	44849124		3 HP, 230V
	44849125		5 HP, 230V
	44849126		7.5 HP, 230V
	44849142		2 HP, 460V
	44849143		3 HP, 460V
	44849144		5 HP, 460V
	44849145		7.5 HP, 460V
	44494651		2 HP, 575V
	44494652		3 HP, 575V
	44494653		5 HP, 575V
	44494654		7.5 HP, 575V
5	33310931 & 33311996	1	Brake Relay (For V.F.C. Control)
6		1	Fused Transformer
	22946771		75VA, 230/460V
	22946772		75VA, 208/277V
	22946773		75VA, 575V
	22946711		100VA, 230/460V
	22946712		100VA, 208/277V
	22946713		100VA, 575V
		3	Fuses - 600V
	11696305		.6 AMP
	11696307		.8 AMP
	11696308		1 AMP
	11696310		1.4 AMP
	11696312		2 AMP
7	11741010	3	Terminal Boards
8	11785601	1	Ground Lug

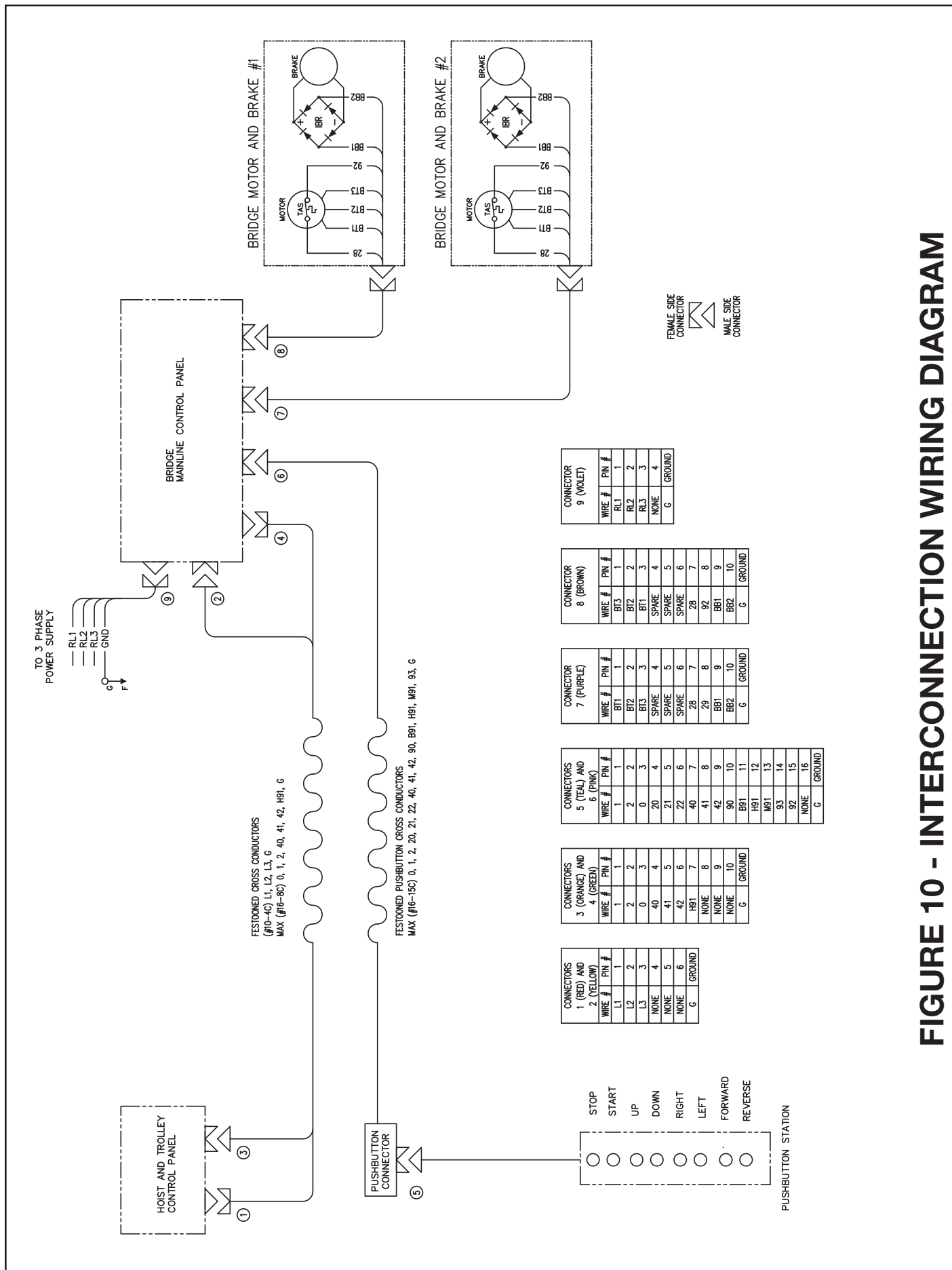


FIGURE 10 - INTERCONNECTION WIRING DIAGRAM

[illegible]

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.

IN USA

Yale•Lift-Tech

P.O. Box 769

Muskegon, MI 49443-0769

www.yaleshawbox.com

Phone: **800 742-9269**

Fax: **800 742-9270**

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.

**SHAW-BOX**