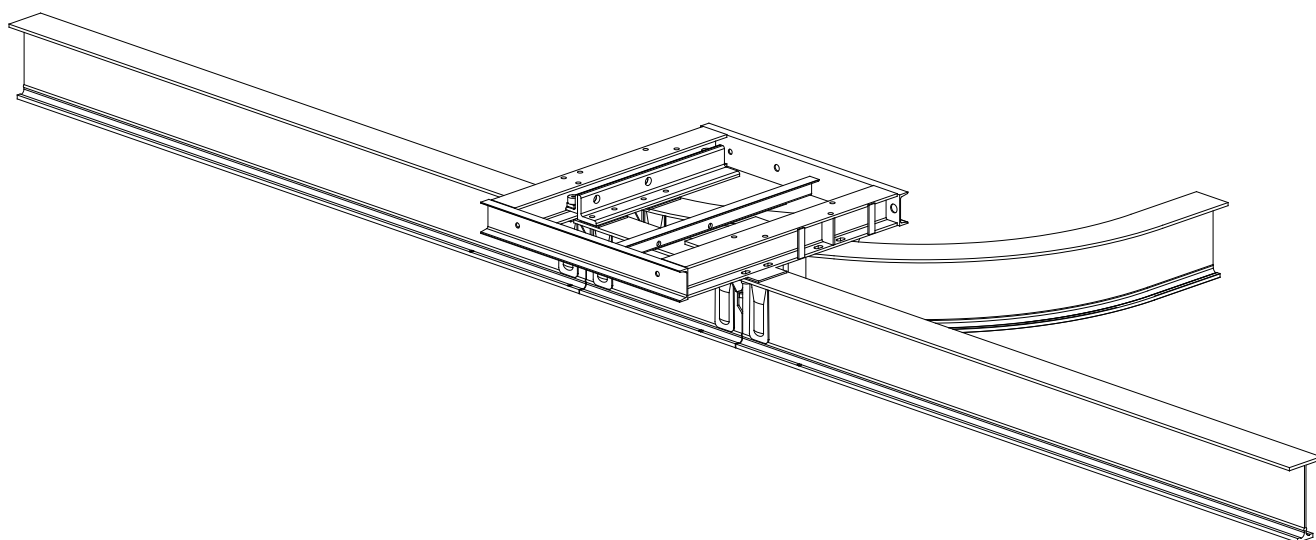


Installation, Operation, & Maintenance Manual



**IMPORTANT!
DO NOT DESTROY**

**JA, LA and KA
Tarca® Switches**

Gorbel® Customer Order No. / Serial No. _____

Gorbel® Dealer _____

Date _____
Month Year

TABLE OF CONTENTS

Introduction..... 1

Installation

 Step 1 - Pre-assembly 2

 Step 2 - End Preps3

 Step 3 -4

 Step 4 - Outriggers.....5

 Step 5 - 6-7

 Step 6 -8

 Step 7 -

 Step 8 -

 Step 9 -

 Step 10-

 Step 11-

 Step 12-

 Step 13- Final Steps

Crane Operator / Start Up Instructions 9

General Safety Requirements 9

Limited Warranty 10

Inspection and Maintenance Schedule 11-14

Questions? Concerns? Comments? Please call (800) 821-0086

INTRODUCTION

Thank you for choosing Gorbel® to solve your material handling needs. The innovative design and heavy-duty construction of the Gorbel® product will provide a superior quality product that will offer years of long term value. The hoist weight allowance is 15% of the crane's capacity (for example, a crane rated for 6000 pounds, allows for a 6000-pound live load plus 900 pounds for the weight of the hoist). There is also an allowance of 15% of the crane capacity for impact caused by hoist use. Gorbel® products will provide many years of dependable service by following the installation and maintenance procedures described herein.

Gorbel® products are shipped in various stages of assembly and are installed under varying circumstances. As a result, a complete guide with descriptions covering all variations is not possible. The following instructions are only to be used as a general guide. Attention should be paid to the warnings and safety suggestions posted in this manual and on the equipment.

Dimensions contained in this installation manual are for reference only and may differ for your particular application.

Normal safety precautions: These include, but are not limited to:

- Checking for obstructions in travel
- Checking that all bolts and threaded rods are tight and have lock washers
- Making sure that end stops are in place and functional (i.e. stopping rolling equipment from exiting rail)
- Making sure that festooning cannot be snagged or pinched, whether it is electric or pneumatic
- For additional safety precautions, see page 28.

WARNING

Please read entire manual prior to starting installation.

WARNING

Gorbel Inc. assumes no responsibility for adequacy or integrity of the mounting surfaces or the structure that the crane may be mounted to. Gorbel Inc. will not be liable for any loss, injury or damage to persons or property, nor for damages of any kind, resulting from the failure or defective operation of any materials not supplied directly by Gorbel Inc. Bracing systems, if used, must be approved by a local professional engineer.

WARNING

Before installing any crane system, it is critical you determine that your building will safely support the loads.

WARNING

Sway bracing is required (except when using flush mounted hangers). For more information see pages 26-27.

WARNING

Equipment described herein is not designed for, and should not be used for, lifting, supporting or transporting humans. Failure to comply with any one of the limitations noted herein can result in serious bodily injury and/or property damage. Check State and Local regulations for any additional requirements.

WARNING

Crane cannot be utilized as a ground: A separate ground conductor is required. For example, systems with 3 phase power require three conductors plus one ground conductor.

WARNING

Reference the American Institute of Steel Construction (AISC) Manual of Steel Construction Specification for Structural Joints using ASTM A325 or A490 Bolts, Installation, Pretensioned Joints, Calibrated Wrench Pretensioning for the proper procedures to follow when using any torque tightening method.

INSTALLATION

➡ **TIP:** Packing list can be found in envelope attached to hardware box: General Arrangement Drawing can be found inserted in this installation manual.

STEP 1 - PRE-ASSEMBLY

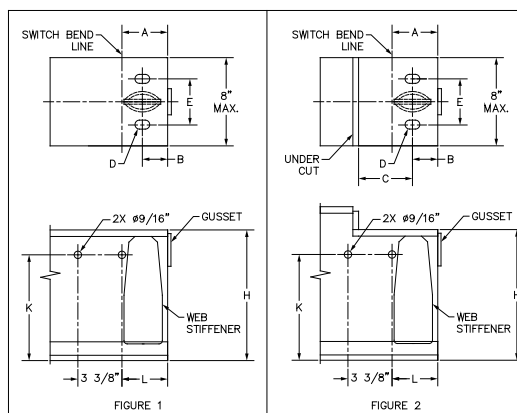
- 1.1 Read entire installation manual before you begin installing your switch.
- 1.2 Study all instructions and drawings provided in this manual.
- 1.3 Check all hole punchings, beam dimensions and suspension fittings prior to installation.
- 1.4 Check packing list to make sure correct quantity of parts is included. Any missing items should be noted and reported to a Gorbel® dealer.
- 1.5 Tools and materials typically needed to assemble switch are as follows:
 - Mallet
 - Tape measure
 - Hand tools
 - Clamps (large C)
 - Spud wrench
 - Leveling tools (transit, laser level, water level, etc.)
 - Lifting device to lift heavy objects
 - Welder (if splices are welded)
 - Torque wrench
 - Steel shims
 - Ladders/man lifts
 - Large square
 - Shop brush

WARNING

Safety ears are required on all carriers.

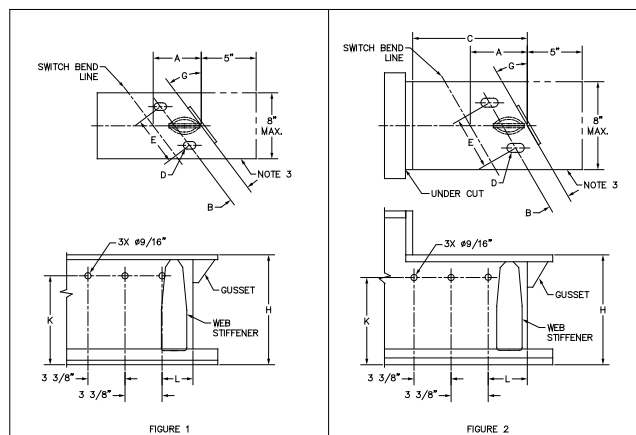
STEP 2 - END PREPS

➔ **NOTE:** May be completed prior to shipping.



| SWITCH TYPE | BEAM SERIES | FIGURE | A | B | C | D (MAX. SLOT) | E | H | K | L | STIFFENER & GUSSET | TYPE END |
|-------------|-------------|--------|--------|----------|--------|------------------|--------|---------|----------|--------|--------------------|----------|
| LA | 4500 | 1 | 3 1/2" | 1 15/16" | — | 11/16" X 1 1/8" | 3 1/2" | 10" | 7 11/16" | 3 1/2" | NO | LA-7 |
| LA | 4600 | 2 | 3 1/2" | 1 15/16" | 4 1/8" | 11/16" X 1 1/8" | 3 1/2" | 10" | 7 11/16" | 3 1/2" | NO | LA-7A |
| KA | 5000 & 5100 | 1 | 3 1/2" | 1 15/16" | — | 13/16" X 1 9/16" | 3 1/2" | 12 1/2" | 9 1/2" | 3 1/2" | NO | KA-7 |
| KA | 5200 & 5660 | 2 | 3 1/2" | 1 15/16" | 4 1/8" | 13/16" X 1 9/16" | 3 1/2" | 12 1/2" | 9 1/2" | 3 1/2" | NO | KA-7A |
| JA | 5000 & 5100 | 1 | 4 1/2" | 3" | 4" | 13/16" X 1 9/16" | 4 3/4" | 12 1/2" | 9 1/2" | 6 1/2" | YES | JA-14B |
| JA | 5200 & 5660 | 2 | 4 1/2" | 3" | 4" | 13/16" X 1 9/16" | 4 3/4" | 12 1/2" | 9 1/2" | 6 1/2" | YES | JA-14A |

Diagram 2A. Straight end preps.



| SWITCH TYPE | BEAM SERIES | FIGURE | A | B | C | D (MAX. SLOT) | E | G | H | K | L | STIFFENER & GUSSET | RIGHT HAND END | LEFT HAND END |
|-------------|-------------|--------|---------|----------|----------|------------------|--------|-----|---------|----------|----------|--------------------|----------------|---------------|
| LA | 4500 | 1 | 4 3/8" | 1 15/16" | — | 11/16" X 1 1/8" | 4 3/8" | 37" | 10" | 7 11/16" | 2 13/16" | NO | LA-B | LA-9 |
| LA | 4600 | 2 | 4 3/8" | 1 15/16" | — | 11/16" X 1 1/8" | 4 3/8" | 37" | 10" | 7 11/16" | 2 13/16" | NO | LA-BA | LA-9A |
| KA | 5000 & 5100 | 1 | 4 3/8" | 1 15/16" | — | 13/16" X 1 9/16" | 4 3/8" | 37" | 12 1/2" | 9 1/2" | 2 13/16" | NO | KA-B | KA-9 |
| KA | 5200 & 5660 | 2 | 4 3/8" | 1 15/16" | — | 13/16" X 1 9/16" | 4 3/8" | 37" | 12 1/2" | 9 1/2" | 2 13/16" | NO | KA-BA | KA-9A |
| JA | 5000 & 5100 | 1 | 5 3/16" | 3" | — | 13/16" X 1 9/16" | 4 3/4" | 30" | 12 1/2" | 9 1/2" | 5 3/4" | YES | JA-15B RH | JA-15B LH |
| JA | 5200 & 5660 | 2 | 5 3/16" | 3" | 11 1/16" | 13/16" X 1 9/16" | 4 3/4" | 30" | 12 1/2" | 9 1/2" | 5 3/4" | YES | JA-15A RH | JA-15A LH |

Diagram 2B. Angular end preps.

STEP 3 -

➡ **TIP:** Start at switch and work out.

Installation Notes

- 3.1 Shim between support steel and top of level switch to avoid twisting frame torque switch mounting bolts to 260 ft-lb. (1/3 turn past snug tight). Inner frame must be level and true to $\pm 1/16"$
- 3.2 Shim incoming beams to match moving beams, adjust gaps and torque bolts to 260 ft-lb. (1/3 turn past snug tight).
- 3.3 All ends of SAFPOWRBAR® to be flared per **diagram 3A**. **Mention Gapping**
- 3.4 Adjust conductor bars on inner frame to line up with incoming conductor bars in both switch positions.

TIP: To replace inside bolts without disassembling inner frame, wrap a thin wire around threads and pull up through hole from either end of inner frame.

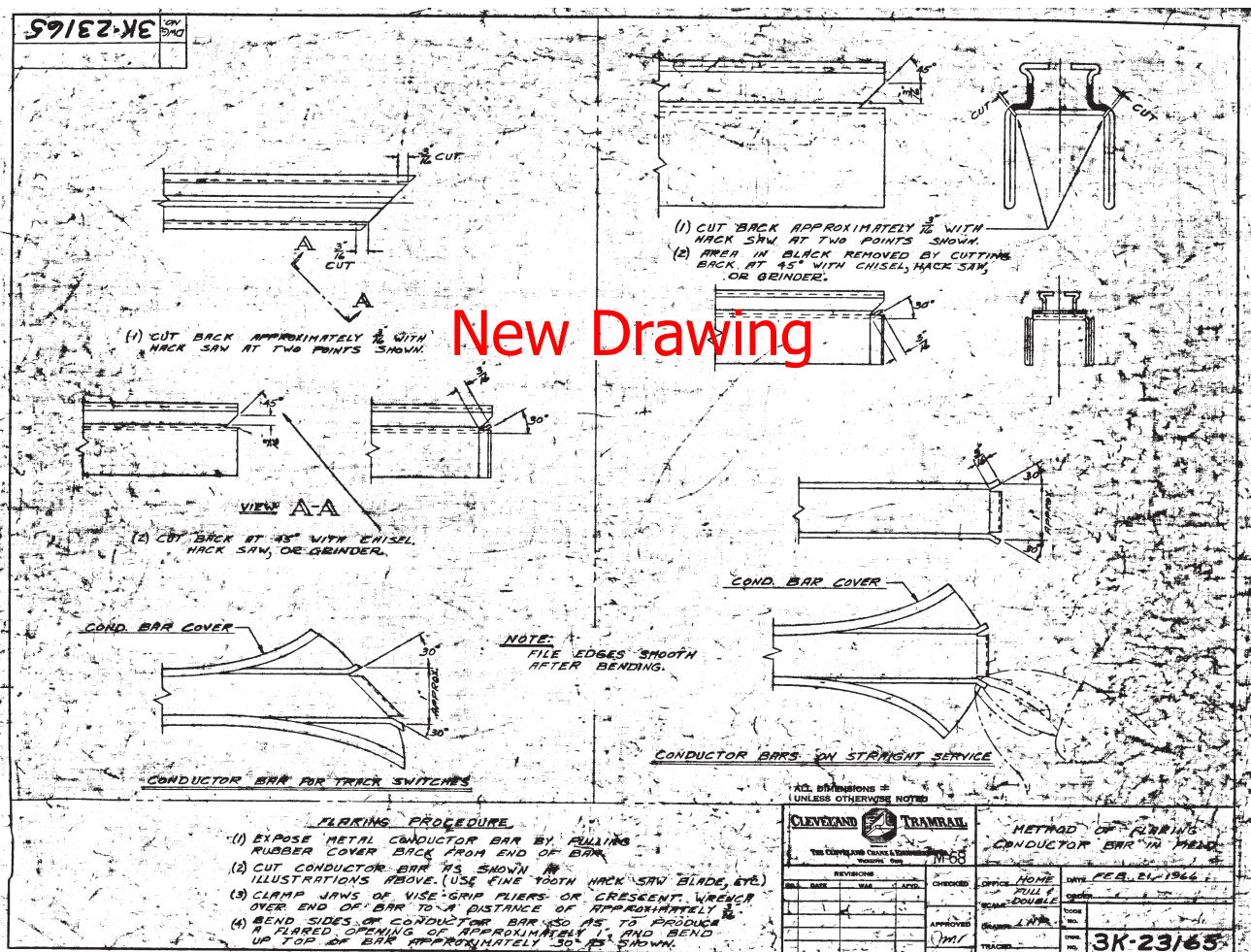


Diagram 3A.

- 3.5 Gaps at rail to be $1/8" \pm 1/16"$.

STEP 4 - OUTRIGGERS



STEP 5 -

➡ **TIP:** To avoid twisting the switch frame when bolting to support steel, use shims to level switch.

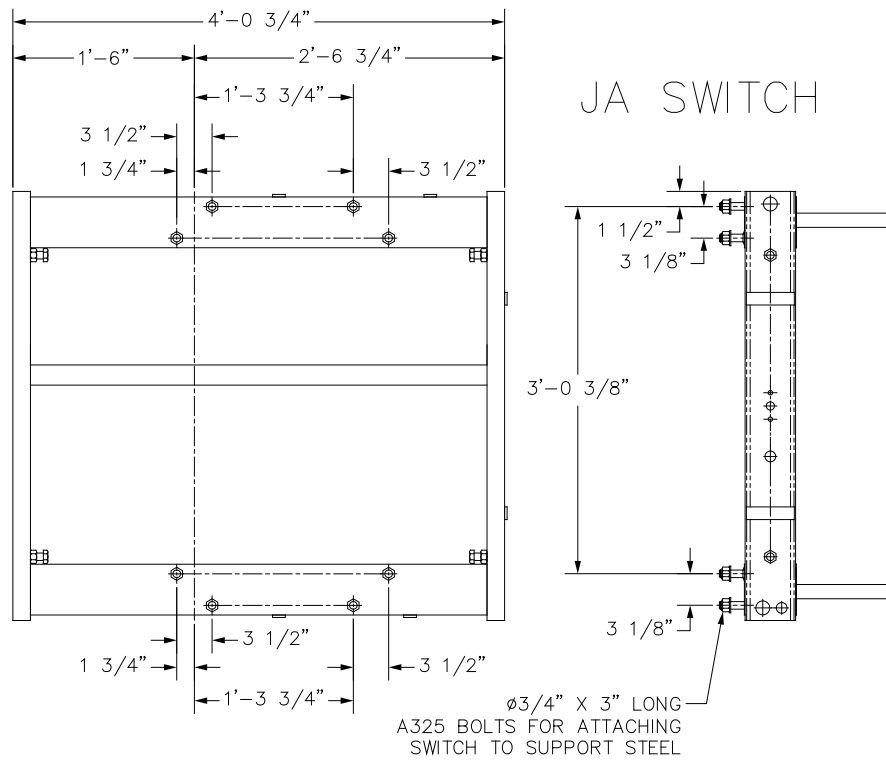


Diagram 5A. JA Switch.

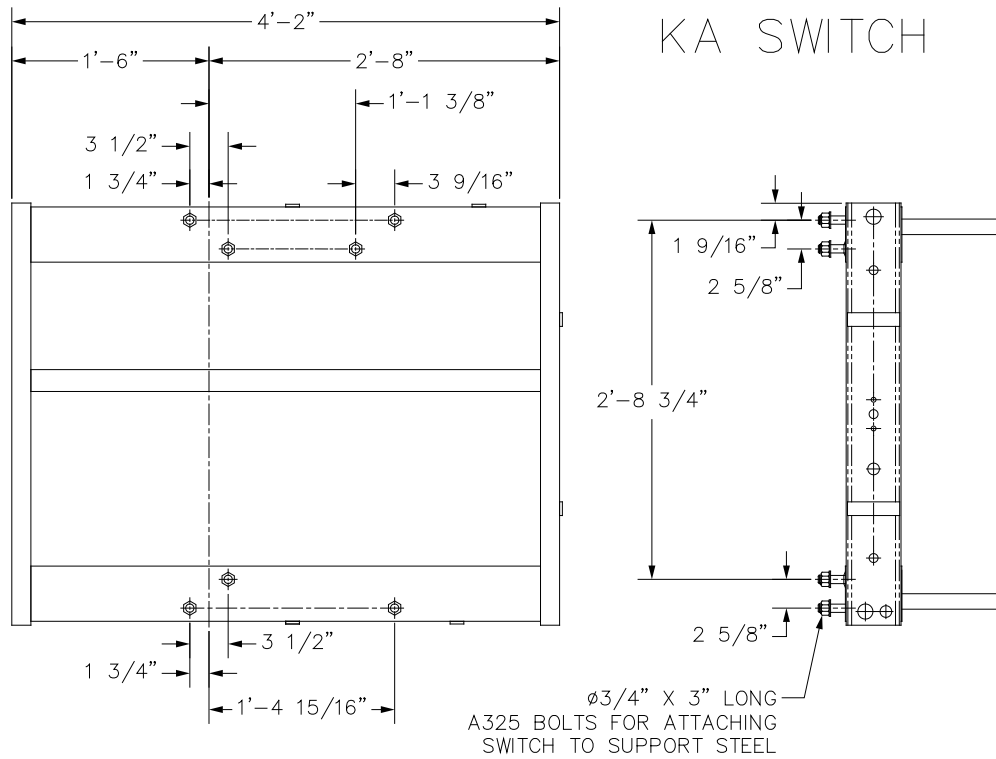


Diagram 5B. KA Switch.

STEP 5 -

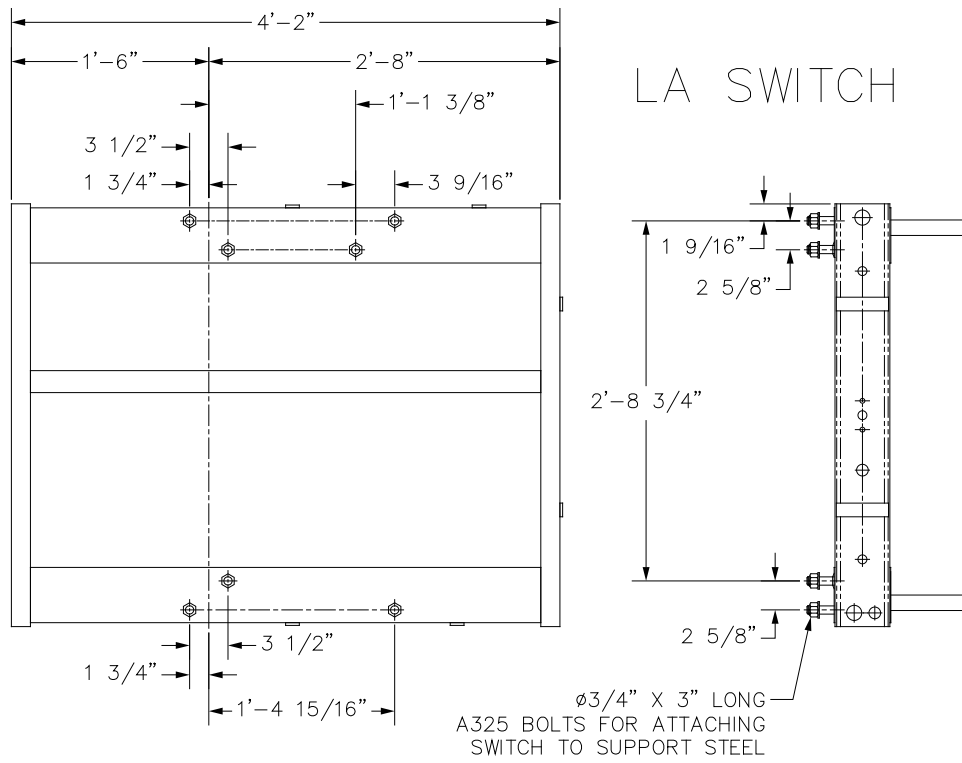
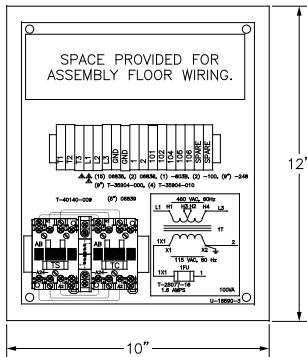


Diagram 5C. LA Switch.

STEP 6 -

Fusing?

Controls



NOTES:

POWER WIRING

WIRES L1, L2, L3, T1, T2, T3 TO BE BLACK # 14 AWG, SRML
ALL OTHER POWER WIRES TO BE BLACK # 8 AWG, SRML
EXCEPT AS SHOWN

GROUND WIRING

ALL GROUND WIRES TO BE GREEN # 8 AWG, SRML
EXCEPT MOTOR AND TRANSFORMER GROUND WIRE
TO BE GREEN # 14 AWG, SRML
EXCEPT AS SHOWN

CONTROL WIRING

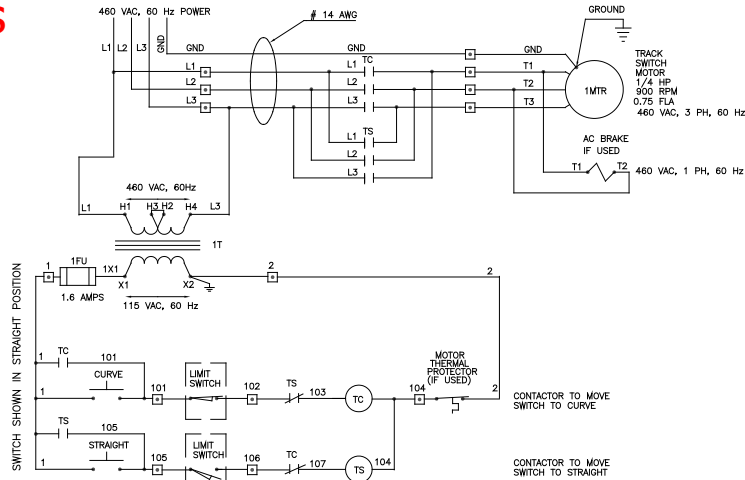
NUMBER 2 CIRCUIT TO BE WHITE # 14 AWG, SRML, ALL OTHER
CONTROL CIRCUITS TO BE RED # 14 AWG, SRML

MARKING

ALL WIRES TO BE MARKED ON BOTH ENDS

WARNING

PROPER PHASING MUST BE MAINTAINED
THROUGHOUT SYSTEM



Add motor
operator info

Add electric
baffling

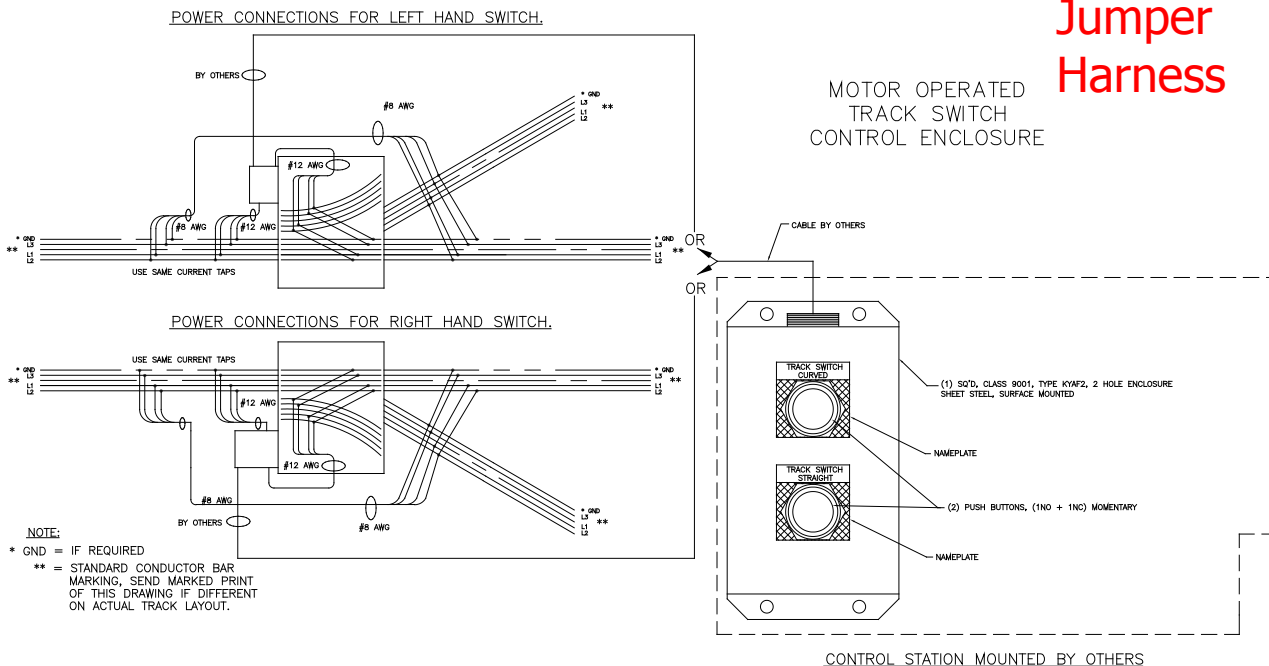
Add

pneumatic?

MOTOR OPERATED
TRACK SWITCH
CONTROL ENCLOSURE

Add Bracing

Diagram 6A. Electrical Schematic.



Jumper
Harness

MOTOR OPERATED
TRACK SWITCH
CONTROL ENCLOSURE

Diagram 6B. Electrical Schematic.

CRANE OPERATOR INSTRUCTIONS

Overhead Patented Track cranes generally handle materials over working areas where there are personnel. Therefore, it is important for the Crane Operator to be instructed in the use of the crane and to understand the severe consequences of careless operation. It is not intended that these suggestions take precedence over existing plant safety rules and regulations or OSHA regulations. However, a thorough study of the following information should provide a better understanding of safe operation and afford a greater margin of safety for people and machinery on the plant floor. It must be recognized that these are suggestions for the Crane Operator's use. It is the responsibility of the owner to make personnel aware of all federal, state and local rules and codes, and to make certain operators are properly trained.

Qualifications

Crane operation, to be safe and efficient, requires skill: the exercise of extreme care and good judgement, alertness and concentration, and rigid adherence to proven safety rules and practices as outlined in applicable and current ANSI and OSHA safety standards. In general practice, no person should be permitted to operate a crane:

- Who cannot speak the appropriate language or read and understand the printed instructions.
- Who is not of legal age to operate this type of equipment.
- Whose hearing or eyesight is impaired (unless suitably corrected with good depth perception).
- Who may be suffering from heart or other ailments which might interfere with the operator's safe performance.
- Unless the operator has carefully read and studied this operation manual.
- Unless the operator has been properly instructed.
- Unless the operator has demonstrated his instructions through practical operation.
- Unless the operator is familiar with hitching equipment and safe hitching equipment practices.

Handling the Trolley Motion

Before a load is handled, the hoist should be positioned directly over the load that is to be handled. When the slack is taken out of the slings, if the hoist is not directly over the load, bring it directly over the load before hoisting is continued. Failure to center the hoist over the load may cause the load to swing upon lifting. Always start the trolley motion slowly and reduce the trolley speed gradually.

Handling the Hoist Motion

Refer to the lifting (hoist) equipment's operating instructions.

GENERAL SUGGESTIONS

Know Your Crane

Crane operators should be familiar with the principal parts of a crane and have a thorough knowledge of crane control functions and movements. The crane operator should be required to know the location and proper operation of the main conductor disconnecting means for all power to the attachments on the crane.

Responsibility

Each crane operator should be held directly responsible for the safe operation of the crane. Whenever there is any doubt as to SAFETY, the crane operator should stop the crane and refuse to handle loads until: (1) safety has been assured or (2) the operator has been ordered to proceed by the supervisor, who then assumes all responsibility for the SAFETY of the lift.

Do not permit **ANYONE** to ride on the hook or a load.

Inspection

Test the crane movement and any attachments on the crane at the beginning of each shift. Whenever the operator finds anything wrong or apparently wrong, the problem should be reported immediately to the proper supervisor and appropriate corrective action taken.

Operating Suggestions

One measure of a good crane operator is the smoothness of the crane operation. The good crane operator should know and follow these proven suggestions for safe, efficient crane handling.

1. The crane should be moved smoothly and gradually to avoid abrupt, jerky movements of the load. Slack must be removed from the sling and hoisting ropes before the load is lifted.
2. Center the crane over the load before starting the hoist to avoid swinging the load as the lift is started. Loads should not be swung by the crane to reach areas not under the crane.
3. Crane-hoisting ropes should be kept vertical. Cranes shall not be used for side pulls.
4. Be sure everyone in the immediate area is clear of the load and aware that a load is being moved.
5. Do not make lifts beyond the rated load capacity of the crane, sling chains, rope slings, etc.
6. Make certain that before moving the load, load slings, load chains, or other lifting devices are fully seated in the saddle of the hook with hook latch closed (if equipped with hook latch).
7. Check to be sure that the load and/or bottom block is lifted high enough to clear all obstructions when moving boom or trolley.
8. At no time should a load be left suspended from the crane unless the operator has the push button with the power on, and under this condition keep the load as close as possible to the floor to minimize the possibility of an injury if the load should drop. When the crane is holding a load, the crane operator should remain at the push button.
9. Do not lift loads with sling hooks hanging loose. If all sling hooks are not needed, they should be properly stored, or use a different sling.
10. All slings or cables should be removed from the crane hooks when not in use (dangling cables or hooks hung in sling rings can inadvertently snag other objects when the crane is moving).
11. Operators shall not carry loads and/or empty bottom blocks over personnel. Particular additional caution should be practiced when using magnet or vacuum devices. Loads, or parts of loads, held magnetically could drop. Failure of power to magnets or vacuum devices can result in dropping the load. Extra precaution should be exercised when handling molten metal in the proximity of personnel.
12. Whenever the operator leaves the crane the following procedure should be followed:
 - Raise all hooks to an intermediate position.
 - Spot the crane at an approved designated location.
 - Place all controls in the "off" position.
 - Open the main switch to the "off" position.
 - Make visual check before leaving the crane.
13. In case of emergency or during inspection, repairing, cleaning or lubrication, a warning sign or signal should be displayed and the main switch should be locked in the "off" position. This should be done whether the work is being done by the crane operator or by others.
14. Contact with rotation stops or trolley end stops shall be made with extreme caution. The operator should do so with particular care for the safety of persons below the crane, and only after making certain that any persons on the other cranes are aware of what is being done.
15. ANY SAFETY FEATURES AND MECHANISMS BUILT IN OR OTHERWISE PROVIDED WITH THE CRANE BY CLEVELAND TRAMRAIL ARE REQUIRED FOR THE SAFE OPERATION OF THE CRANE. DO NOT, UNDER ANY CIRCUMSTANCES, REMOVE OR OTHERWISE IMPAIR OR DISABLE THE PROPER FUNCTIONING OF ANY CRANE SAFETY MECHANISMS OR FEATURES BUILT-IN OR OTHERWISE PROVIDED BY CLEVELAND TRAMRAIL FOR SAFE OPERATION OF THE CRANE. ANY REMOVAL, IMPAIRMENT OR DISABLING OF ANY SUCH SAFETY MECHANISMS OR FEATURES OR OTHER USE OR OPERATION OF THE CRANE WITHOUT THE COMPLETE AND PROPER FUNCTIONING OF ANY SUCH SAFETY MECHANISMS OR FEATURES AUTOMATICALLY AND IMMEDIATELY voids ANY AND ALL EXPRESS AND IMPLIED WARRANTIES OF ANY KIND OR NATURE.

LIMITED WARRANTY

It is agreed that the equipment purchased hereunder is subject to the following LIMITED warranty and no other. Gorbel warrants the manual or motorized Patented Track Crane products to be free from defects in material or workmanship for a period of two years or 4,000 hours use from date of shipment in class C service. This warranty shall not cover failure or defective operation caused by operation in excess of recommended capacities, misuses, negligence or accident, and alteration or repair not authorized by Gorbel. No system shall be modified after manufacture without the written authorization of Cleveland Tramrail Inc. Any field modification without the written authorization of Gorbel Inc. shall void Gorbel's warranty obligation. This warranty shall not cover wearable parts, including but not limited to wheels, gears, pinions, bearings, motors, electrical controls, and crane electrification. OTHER THAN AS SET FORTH HEREIN, NO OTHER EXPRESS WARRANTIES, AND NO IMPLIED WARRANTIES, ORAL OR WRITTEN, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE MADE BY GORBEL WITH RESPECT TO ITS PRODUCTS AND ALL SUCH WARRANTIES ARE HEREBY SPECIFICALLY DISCLAIMED. GORBEL SHALL NOT BE LIABLE UNDER ANY CIRCUMSTANCES FOR ANY INCIDENTAL, SPECIAL, AND/OR CONSEQUENTIAL DAMAGES WHATSOEVER, WHETHER OR NOT FORESEEABLE, INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOST PROFITS AND ALL SUCH INCIDENTAL, SPECIAL, AND/OR CONSEQUENTIAL DAMAGES ARE HEREBY ALSO SPECIFICALLY DISCLAIMED. Gorbel's obligation and Purchaser's or end user's sole remedy under this warranty is limited to the replacement or repair of Gorbel's products at the factory, or at the discretion of Gorbel, at a location designated by Gorbel. Purchaser or end user shall be solely responsible for all freight and transportation costs incurred in connection with any warranty work provided by Gorbel hereunder. Gorbel will not be liable for any loss, injury or damage to persons or property, nor for damages of any kind resulting from failure or defective operation of any materials or equipment furnished hereunder. Components and accessories not manufactured by Gorbel are not included in this warranty. Purchaser's or end user's remedy for components and accessories not manufactured by Gorbel is limited to and determined by the terms and conditions of the warranty provided by the respective manufacturers of such components and accessories.

A) DISCLAIMER OF IMPLIED WARRANTY OF MERCHANTABILITY

Gorbel and Purchaser agree that the implied warranty of merchantability is excluded from this transaction and shall not apply to the goods involved in this transaction.

B) DISCLAIMER OF IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE

Gorbel and Purchaser agree that the implied warranty of fitness for particular purpose is excluded from this transaction and shall not apply to the goods involved in this transaction.

C) DISCLAIMER OF EXPRESS WARRANTY

Gorbel's agents, or dealer's agents, or distributor's agents may have made oral statements about the machinery and equipment described in this transaction. Such statements do not constitute warranties, and Purchaser agrees not to rely on such statements. Purchaser also agrees that such statements are not part of this transaction.

D) DISCLAIMER OF SPECIAL, INCIDENTAL AND CONSEQUENTIAL DAMAGES

Gorbel and Purchaser agree that any claim made by Purchaser which is inconsistent with Gorbel's obligations and the warranty remedies provided with Gorbel's products, and in particular, special, incidental and consequential damages, are expressly excluded.

E) DEALER OR DISTRIBUTOR NOT AN AGENT

Gorbel and Purchaser agree that Purchaser has been put on notice that dealer or distributor is not Gorbel's agent in any respect for any reason. Gorbel and Purchaser also agree that Purchaser has been put on notice that dealer or distributor is not authorized to incur any obligations or to make any representations or warranties on Gorbel's behalf other than those specifically set forth in Gorbel's warranty provided in connection with its product.

F) MERGER

This warranty agreement constitutes a final and complete written expression of all the terms and conditions of this warranty and is a complete and exclusive statement of those terms.

G) PAINTING

Every crane (excluding components) receives a quality paint job before leaving the factory. Unfortunately, no paint will protect against the abuses received during the transportation process via common carrier. We have included at least one (1) twelve ounce spray can for touchup with each crane ordered (unless special paint was specified). If additional paint is required, contact a Gorbel® Inside Sales Representative at 1-800-821-0086 or 1-585-924-6262.

Title and Ownership:

Title to the machinery and equipment described in the foregoing proposal shall remain with Gorbel and shall not pass to the Purchaser until the full amount herein agreed to be paid has been fully paid in cash.

Claims and Damages:

Unless expressly stated in writing, goods and equipment shall be at Purchaser's risk on and after Seller's delivery in good shipping order to the Carrier. Gorbel shall in no event be held responsible for materials furnished or work performed by any person other than it or its authorized representative or agent.

Cancellations:

If it becomes necessary for the Purchaser to cancel this order wholly or in part, he shall at once so advise Gorbel in writing. Upon receipt of such written notice all work will stop immediately. If the order entails only stock items, a flat restocking charge of 15% of the purchase price will become due and payable by Purchaser to Gorbel. Items purchased specifically for the canceled order shall be charged for in accordance with the cancellation charges of our supplier plus 15% for handling in our factory. The cost of material and/or labor expended in general fabrication for the order shall be charged for on the basis of total costs to Gorbel up to the time of cancellation plus 15%.

Returns:

No equipment, materials or parts may be returned to Gorbel without express permission in writing to do so.

Extra Charge Delay: If Purchaser delays or interrupts progress of Seller's performance, or causes changes to be made, Purchaser agrees to reimburse Gorbel for expense, if any, incident to such delay.

Changes and Alterations:

Gorbel reserves the right to make changes in the details of construction of the equipment, as in its judgement, will be in the interest of the Purchaser; will make any changes in or additions to the equipment which may be agreed upon in writing by the Purchaser; and Gorbel is not obligated to make such changes in products previously sold any customer.

Third Party Action:

Should Gorbel have to resort to third party action to collect any amount due after thirty (30) days from the date of invoice, the Purchaser agrees to pay collection costs, reasonable attorney's fees, court costs and legal interest.

OSHA Responsibilities:

Gorbel agrees to fully cooperate with Purchaser in the design, manufacture or procurement of safety features or devices that comply with OSHA regulations. In the event additional equipment or labor shall be furnished by Gorbel, it will be at prices and standard rates then in effect, or as may be mutually agreed upon at the time of the additional installation.

Equal Employment Opportunity:

Gorbel agrees to take affirmative action to ensure equal employment opportunity for all job applicants and employees without regard to race, color, age, religion, sex, national origin, handicap, veteran, or marital status. Gorbel agrees to maintain non-segregated work facilities and comply to rules and regulations of the Secretary of Labor or as otherwise provided by law or Executive Order.

PERIODIC INSPECTION AND LUBRICATION RECOMMENDATIONS

The following is a checklist to be followed in performing periodic inspections and preventative maintenance on Gorbel® Tarca® Systems. It is intended that this checklist be supplemented with any additional instruction sheets and maintenance manuals sent with each job.

The frequency of inspection and lubrication recommendations presented herein is based upon normal operating conditions of one complete handling cycle every 10 minutes throughout a 40-hour week. If the actual duty cycle of a particular unit is greater or less than this, the inspections and lubrications should be performed more frequently or less frequently in proportion.

Each industry has conditions peculiar to it, which may cause wear of certain parts. The tabulation given is only general and may be supplemented by an individual maintenance department program to meet its own particular requirements. Particular attention should be given to corrosive conditions, excessive vibrations, extreme ambient temperature variations, and rough handling conditions.

Questions regarding damaged, worn or cracked equipment components should be directed to the Gorbel® Customer Service Department at 800-821-0086 or 585-924-6262.

The recommendations contained herein are to be supplemented by any vendor instructions, which are included in this manual.

WARNING: Power should be off and locked when performing maintenance on any part of the system.

* State and local codes may require inspection and maintenance checks more often. Please check the state and local code manuals in your area.

TRACK SWITCHES

| COMPONENT | MAINTENANCE | FREQUENCY |
|-------------------|--|-----------------------------|
| Outer Frame | Check for loose support bolts and levelness of frame in both directions. Check for excessive wear at latch holes or on latch cams. | Every 2,000 hours or yearly |
| Inner Frame | Check rollers (should not rock with level outer frame). Check latch pin or rollers for full and positive engagement. Make sure operator fasteners are tight and in proper position. Check crank and fasteners for wear and proper tightness. | Every 2,000 hours or yearly |
| Slides or Rollers | Clean. Check for wear and lubricate with molycote. | Every 2,000 hours or yearly |
| Jumper Harness | Check for loose or corroded connections or abrasion. | Every 2,000 hours or yearly |
| Grounds | Check for continuity. | Every 2,000 hours or yearly |
| Track | Check for worn ends. Check for raised tread. Check for track width. Check for cracked welds. Replace track or switch if badly worn. Check alignment at rail gaps. Should be within +/- 1/16 vertically and horizontally. If realignment is necessary, adjust throw first then shim and align adjacent rails. | Every 2,000 hours or yearly |
| Electrical | Check control panel and/or junction box terminals. Check contacts. Tighten loose screws. | Every 2,000 hours or yearly |

TRACKS, RUNWAYS & HANGERS

| COMPONENT | MAINTENANCE | FREQUENCY |
|---|--|----------------------------------|
| Top Hanger Bracket/ Beam Clips/ Threaded Rod | Check that lock washers are compressed and nuts tightened to manufacturer's specifications. | Every 1,000 hours or 6 months |
| Lower Hanger Bracket | Check that lock washers are compressed and nuts tightened to manufacturer's specifications. | Every 1,000 hours or 6 months |
| Sway Brace Connection | Check for loose bolts & cracked fittings. | Every 1,000 hours or 6 months |
| Track | Check for rail wear (replace if raised portion of tread is gone). Check welds for incipient cracks. Check underside of rail for wear from drive rollers if using tractor drives. When groove is 1/8" deep, replace track. Check side of rail for wear. When width has decreased more than 1/8", replace track. | Every 2,000 hours or yearly |
| Joints | Check for loose or worn hardware or if welded type, for incipient cracks. Check for track alignment and that wheel rolling surface is flush. | Every 2,000 hours or yearly |
| End Stops | Check for loose bolts and for incipient cracks. | Every 2,000 hours or yearly |
| Paint | Clean periodically and repaint where corrosion is present. | Every 2,000 hours or yearly |

SAFPOWRBAR® CONDUCTOR BAR

| COMPONENT | MAINTENANCE | FREQUENCY |
|---------------------|---|--------------------------------|
| Bar | Check for corrosion, bowing, or sagging. Check alignment at moving gaps. Realign if necessary. | Every 2,000 hours or yearly |
| Couplings | Check bolt or screw tightness. Check for corroded contact surfaces. | Every 2,000 hours or yearly |
| Supports | Check for loose bolts and/or screws and bent brackets. | Every 2,000 hours or yearly |
| Insulators | Check for loose bolts, sheared support ears, current carrying deposits on surface. | Every 2,000 hours or yearly |
| Bar Covering | Check for accidental abrasion and peeled covering. | Every 2,000 hours or yearly |
| Current Taps | Check bolt and terminal screw tightness. Check for corroded contact surface. | Every 2,000 hours or yearly |
| Grounds | Check for ground continuity. Check at load side of disconnect switch (current off), with meg-ohm tester, for overall system insulation resistance. | Every 2,000 hours or yearly |
| Collectors | Check for worn shoes. Check flexible leads from wheel clevis pigtail or slide shoe shaft. Check tightness of lead connections. Check for cracked insulators. On type "ST" collectors, check for free movement or pantograph. Lubricate pivot pins as required. Collector bracket tubes should be vertical within 1/16". Replace if necessary. | Every 750 hours or 4 months |

TROLLEY & CARRIERS

| COMPONENT | MAINTENANCE | FREQUENCY |
|--|---|-------------------------------|
| Structural Frame & Load Bars | Check for incipient cracks in welds and castings. Check for loose bolts. | Every 2,000 hours or yearly |
| Eye Bolts, Suspension Pins & Ball Joint Rocker Assembly | Check for loose or missing set screws or lock pins. Grease spherical bearing housing monthly through grease fitting or repack with clean grease at three (3) month intervals. Use Bentone grease type NLGI Grade 1 (Lubriplate Brand 930-AA or equal). Check for cracks and excessive wear. Note: When lubricating through grease fitting or repacking, suspension pins and ball joint rocker assembly should be raised approximately 1/4". | Every 150 hours or 1 month |
| Wheels & Guide Rollers | Check for loose wheel bearings. Check wheels for proper contact and tracking on rail. Check wheel diameter for wear (replace when 1/4" under original diameter). Check axle nuts for tightness. Lubricate using Bentone grease type NLGI Grade 1 (Lubriplate Brand 930-AA or equal). | Every 500 hours or 3 months |
| Geared Drive | Check oil level. Change oil as ambient temperature requires (see Lube List). Check gear wear through backlash. Check for worn bearings (excessive noise). Check for loose bolts in gear case cover. | Every 750 hours or 4 months |
| Belt Drive | Check for belt wear | Every 750 hours or 4 months |
| Motors | Check motor after active use for excessive heat (130° C or 226° F max. with class "B" insulation). Check motor bearings and oil seals. Tighten loose bolts. Blow out dust. Lubricate. Also see motor manufacturer's recommendations. | Every 1,000 hours or 6 months |
| Control | Check for burned contacts. Check mechanical latch devices for wear and freedom of movement. Check for loose connections. | Every 1,000 hours or 6 months |
| Electric Brakes (Disc) | Adjust air gap for wear. Check lining thickness. Check for broken shading coils. Check rotating disc at spline for excessive wear. See manufacturer's recommendations. | Every 750 hours or 4 months |
| Head | Check for thrust washer wear and integrity. | Every 1,000 hours or 6 months |

HOIST (Refer to Hoist Manufacturer)

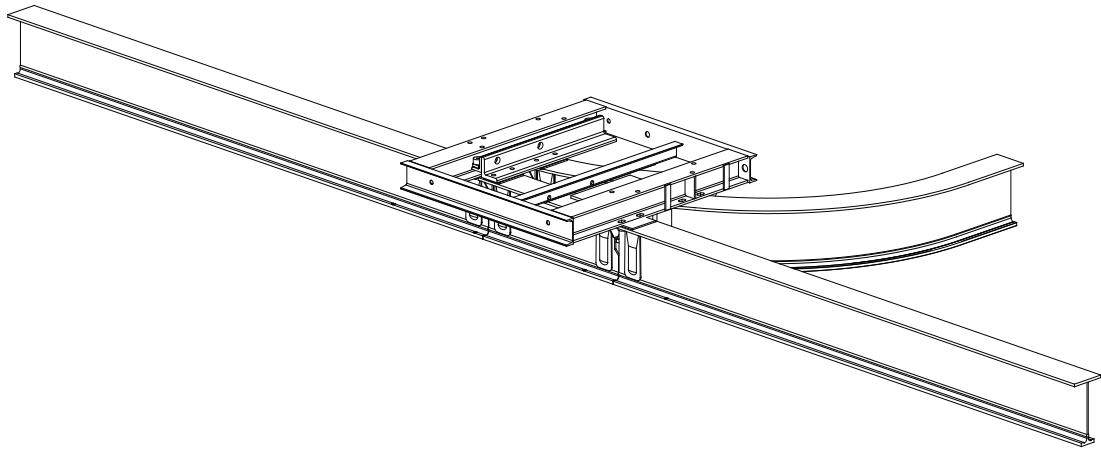
RECOMMENDED LUBRICANT LIST

Bushings and thrust washers without grease fitting, spray lube or general purpose oil.
Bushings and thrust washers with grease fittings:
Multi-purpose application and high temperature application:
Bentone grease type, NLGI Grade 1 (Lubriplate Brand 930-AA or equal).

Ball or roller bearings through alemite fittings:
Multi-purpose application and high temperature application:
Bentone grease type, NLGI Grade 1 (Lubriplate Brand 930-AA or equal).

Series “W” motor heads Straight mineral oil - SAE-50
Type “MT” & “CH” tractors..... Straight mineral oil - SAE-50
Compact drives (“L”)..... A.G.M.A. #8 compound

NOTE: When above equipment is used outdoors, we recommend a field change in oil (in some cases as low as SAE-10), when cold weather arrives. Consult local lubrication engineer for recommended greases in acid fume atmosphere.



GORBEL
A C L A S S A B O V E

600 Fishers Run, P.O. Box 593
Fishers, NY 14453-0593
Phone: (800) 821-0086
Fax: (800) 828-1808
E-Mail: info@gorbel.com
<http://www.gorbel.com>
©2010 Gorbels, Inc.
All Rights Reserved