

Acco[®] LOUDEN[®]

monorail track, fittings
and switches
product series 600 & 700

installation
operation
maintenance
and parts
manual

SERIAL NUMBER

⚠ WARNING

This equipment should not be installed, operated or maintained by any person who has not read all the contents of these instructions. Failure to read and comply with the instructions or any one of the limitations noted herein can result in serious bodily injury or death, and/or property damage.

There are no other warranties which extend beyond the description on the Order Acknowledgment and as it may apply to the specifications provided in this publication. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED. Acco shall in no event be liable for any special, direct, indirect, incidental or consequential damages to anyone beyond the cost of replacement of the goods sold hereby.

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NOTICE

Manual 69880 covers information in reference to standard models of the LOUDEN® Series 600 Monorail Track and Fittings, and Series 700 Switches. This manual includes instructions and parts information for a variety of track and fittings. Therefore, all instructions or parts information may not apply to any one type or size of specific monorail. Disregard those portions of the manual that do not apply. Manual 69880 should be used in conjunction with Manual 69878: Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Series 500 Underhung Cranes; and with Manual 69879: Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Crane and Monorail Accessories. Use of the term MANUAL refers to all of these manuals as applicable. MANUALS FOR SPECIAL ENGINEERED CRANES AND MONORAILS WILL CONTAIN ADDITIONAL PAGES IN ACCORDANCE WITH PRODUCT SPECIFICATIONS.

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NOTICE

TO ORDER PARTS: Provide part number, part description, quantity required, and Product Number or Serial Number of Monorail System.

IMPORTANT INFORMATION AND WARNINGS

SAFETY ALERT SYMBOL

The Safety Alert Symbol is used in this manual to indicate hazards and to alert the reader to information that should be known, understood, and followed in order to avoid DEATH or SERIOUS INJURY.

Read and understand this manual before using the monorail.

Important issues to remember during operation are provided at the monorail control stations, at various locations on the monorail and in the manuals by DANGER, WARNING, or CAUTION instructions or placards, that alert the personnel to potential hazards, proper operation, load limitations, and more.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

CAUTION

These general instructions deal with the normal installation, operation, inspection, and maintenance situations encountered with the equipment described herein. The instructions should not be interpreted to anticipate every possible contingency or to anticipate the final system, crane, or configuration that uses this equipment.

This manual includes instructions and parts information for a variety of crane or monorail types. Therefore, all instructions and parts information may not apply to any one type or size of specific crane or monorail. Disregard those portions of the instructions that do not apply.

Record crane or monorail serial number on the front cover of this manual for identification and future reference to avoid referring to the wrong manual for information or instructions on installation, operation, inspection, maintenance, or parts.

Use only LOUDEN® authorized replacement parts in the service and maintenance of this equipment.

WARNING

Equipment described herein is not designed for and should not be used for lifting, supporting, or transporting humans.

Equipment described herein should not be used in conjunction with other equipment unless necessary and/or required safety devices applicable to the system, crane, or application are installed by the system designer, system manufacturer, crane manufacturer, installer, or user.

Modifications to upgrade, rerate, or otherwise alter this equipment shall be authorized only by the original equipment manufacturer or qualified professional engineer.

Equipment described herein may be used in the design and manufacture of cranes or monorail systems. Additional equipment or devices may be required for the crane or monorail system to comply with applicable crane or monorail design and safety standards. The crane or system designer, crane or system manufacturer, or user is responsible to furnish these additional items for compliance. Refer to ASME B30.11, Safety Standard for Monorails and Underhung Cranes. If a hoist is used with this equipment, refer to ASME B30.16, Safety Standard for Overhead Hoists. If a below-the-hook lifting device or sling is used with this equipment, refer to ASME B30.9, Safety Standard for Slings, or ASME B30.20, Safety Standard for Below-the-Hook Lifting Devices.

Hoists, cranes, and monorails used to handle hot molten material may require additional equipment or devices. Refer to ANSI Z241.2, Safety Requirements for Melting and Pouring of Metals in the Metalcasting Industry.

Electrical equipment described herein is designed and built in compliance with ACCO Chain & Lifting Products interpretation of ANSI/NFPA 70, National Electrical Code. The system designer, system manufacturer, crane designer, crane manufacturer, installer, or user is responsible to assure that the installation and associated wiring of these electrical components is in compliance with ANSI/NFPA 70, and all applicable Federal, State, and Local Codes.

Failure to read and comply with any of the limitations noted herein can result in serious bodily injury or death, and/or property damage.

IMPORTANT INFORMATION AND WARNINGS

DANGER

HAZARDOUS VOLTAGES ARE PRESENT IN THE CONTROL ENCLOSURE, OTHER ELECTRICAL COMPONENTS, AND CONNECTIONS BETWEEN THESE COMPONENTS.

Before performing ANY mechanical or electrical maintenance on the equipment, de-energize (disconnect) the main switch supplying power to the equipment; and lock and tag the main switch in the de-energized position. Refer to ANSI Z244.1, Personnel Protection — Lockout/Tagout of Energy Sources.

Do not operate the equipment without control enclosure cover or covers in place.

Only trained and competent personnel should inspect and repair this equipment.

NOTICE

It is the responsibility of the owner/user to install, inspect, test, maintain, and operate a crane or monorail in accordance with ASME B30.11, Safety Standard for Monorails and Underhung Cranes, OSHA Regulations, and ANSI/NFPA 70, National Electrical Code. If the crane or monorail is installed as part of a total lifting system, it is also the responsibility of the owner/user to comply with the applicable ASME B30 volume that addresses other types of equipment used in the system.

It is the responsibility of the owner/user to have all personnel that will install, inspect, test, maintain, and operate a crane or monorail read the contents of this manual and applicable portions of ASME B30.11, Safety Standard for Monorails and Underhung Cranes, OSHA Regulations, and ANSI/NFPA 70, National Electrical Code. If the crane or monorail is installed as part of a total lifting system, the applicable ASME B30 volume that addresses other types of equipment used in the system must also be read by all personnel.

Any ANSI Standards referenced in this manual may be obtained from the American National Standards Institute, 1430 Broadway, New York, New York 10018.

This manual contains information for safe operation of an underhung crane or monorail. Taking precedence over any specific rule, however, is the most important rule of all — "USE COMMON SENSE". Operation of an underhung crane or monorail involves more than operating the controls. The operator must consider and anticipate the motions and actions that will occur as a result of operating the controls.

If the crane or monorail owner/user requires additional information, or if any information in the manual is not clear, contact ACCO Chain & Lifting Products, York, Pennsylvania or the distributor of the crane or monorail. Do not install, inspect, test, maintain, or operate this equipment unless this information is fully understood.

When contacting ACCO Chain & Lifting Products or the distributor of the crane or monorail, always make reference to the serial number of the equipment.

A regular schedule of inspection of the crane and monorail in accordance with the requirements of ASME B30.11 should be established and records maintained.

WARNING

Before installing, removing, inspecting, or performing any maintenance on a hoist, crane, or monorail; the main switch shall be de-energized. Lock and tag the main switch in the de-energized position in accordance with ANSI Z244.1. Follow other maintenance procedures outlined in this manual and applicable ASME B30 volumes.

Additional WARNINGS are listed in various portions of this manual. Personnel shall read and follow these WARNINGS. Failure to read and comply with these WARNINGS as well as other instructions or any limitations noted in this manual and applicable ASME B30 volumes could result in serious bodily injury or death, and/or property damage.

WARNING

IF LOUDEN® CRANES ARE INSTALLED TO OPERATE ON RUNWAYS THAT ARE COMPRISED OF TRACK OTHER THAN LOUDEN® MONORAIL TRACK; OR IF LOUDEN® MONORAIL TRACK IS USED FOR OPERATION OF CRANES OR CARRIERS NOT MANUFACTURED BY LOUDEN®; THE SYSTEM DESIGNER, SYSTEM MANUFACTURER, OR SYSTEM INSTALLER IS RESPONSIBLE TO DETERMINE THE COMPATIBILITY OF THE CRANE AND MONORAIL TRACK; AND THAT THE LOAD RATINGS OF NEITHER THE CRANE OR MONORAIL TRACK WILL BE EXCEEDED.

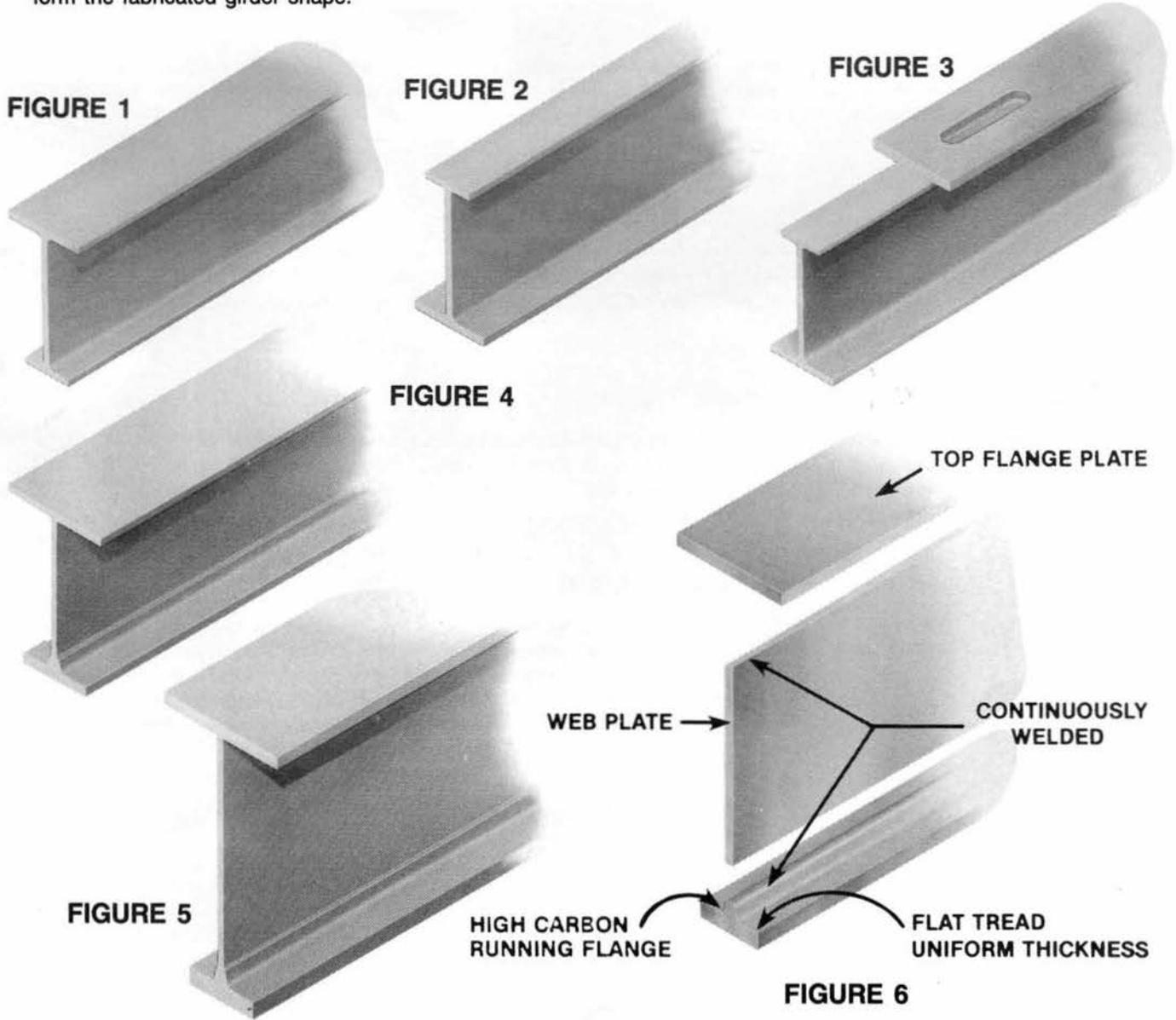
MONORAIL TRACK AND FITTING TYPES

LOUDEN® monorail track and track fittings are available in a variety of configurations. Types of LOUDEN® monorail track are 602 *SuperTrack™*, 603 *SuperTrack™*, 604 *SuperTrack™ Girder*, 605 *TrojanTrack™ Girder*, and 605 *Super-TrojanTrack™ Girder*.

LOUDEN® monorail tracks and fittings are designed to meet span, load, and duty requirements for a wide range of applications. LOUDEN® monorail track is manufactured in accordance with job specifications and requirements. Straight track sections are cut to length with all required holes in place, if specified. Curved sections are machine bent at the factory in accordance with layout drawings and specifications. For specifications on standard location of holes for splice plates and track suspension fittings, refer to the LOUDEN® product catalog; or contact Acco Chain & Lifting Products or the distributor of the monorail system.

LOUDEN® *SuperTrack™* is a high carbon, high manganese rolled steel shape having dimensions in accordance with LOUDEN® specifications. The depth of the shape is nominal 6 inches. One operating or running flange is 2 inches wide and the other operating or running flange is 3.33 inches wide. Refer to Figures 1, 2, and 3.

LOUDEN® *SuperTrack™ Girder*, *TrojanTrack™ Girder*, and *Super-TrojanTrack™ Girder* are three-piece fabricated shapes having a lower operating or running flange width of 3.33 inches. Refer to Figures 4, and 5. The three pieces are a tee section operating or running flange, web plate, and top flange plate. Refer to Figure 6. The operating or running flange is a high carbon, high manganese rolled steel shape having dimensions in accordance with LOUDEN® specifications. The web plate and top flange plate are stripped from steel plate material. All three pieces are continuously welded to form the fabricated girder shape.



MONORAIL TRACK AND FITTING TYPES

General descriptions of different LOUDEN® monorail track series and fittings are presented below for information purposes, and to serve as a guide to aid in using the instructions and parts information outlined in this manual. Detailed specifications can be obtained from catalog data or order specifications. If additional information is required, contact Acco Chain & Lifting Products or the distributor of the monorail system.

LOUDEN® SERIES 602.6 SuperTrack™:

LOUDEN® Series 602.6 *SuperTrack™* is a high carbon, high manganese rolled steel shape having dimensions as shown in Figure 7. The 2 inch wide flange is the operating or running flange, and the 3.33 inch wide flange is the suspension flange. Refer to Figure 1. Maximum permissible wheel load on 602.6 *SuperTrack™* is 750 pounds (1,500 pounds per 2-wheel trolley).

LOUDEN® SERIES 603.6 SuperTrack™:

LOUDEN® Series 603.6 *SuperTrack™* is a high carbon, high manganese rolled steel shape having dimensions as shown in Figure 8. The 3.33 inch wide flange is the operating or running flange, and the 2 inch wide flange is the suspension flange. Refer to Figure 2. Maximum permissible wheel load on 603.6 *SuperTrack™* is 2,500 pounds (5,000 pounds per 2-wheel trolley).

LOUDEN® SERIES 603.7 SuperTrack™:

LOUDEN® Series 603.7 *SuperTrack™* is 603.6 *SuperTrack™* capped with a steel plate welded to the upper or compression flange for increased load carrying capability. Refer to Figures 3 and 9. Maximum permissible wheel load on 603.7 *SuperTrack™* is 2,500 pounds (5,000 pounds per 2-wheel trolley).

⚠ WARNING

DO NOT SUSPEND 603.7 SUPERTRACK™ FROM THE CAPPED MATERIAL OR BAR ADDED TO THE TOP OR COMPRESSION FLANGE. SUSPENSION OF 603.7 SUPERTRACK™ MUST BE MADE ON THE 603.6 TRACK SECTION ONLY.

LOUDEN® SERIES 604 SuperTrack™ GIRDER:

LOUDEN® Series 604 *SuperTrack™ Girder* is a three-piece fabricated shape having dimensions as shown in Figure 10 and Table 1. The 3.33 inch wide flange is the operating or running flange and has a tread thickness of 7/16 inch. The top flange is the suspension flange. Refer to Figure 4. Maximum permissible wheel load on 604 *SuperTrack™ Girder* is 2,500 pounds (5,000 pounds per 2-wheel trolley).

LOUDEN® SERIES 605 TrojanTrack™ GIRDER:

LOUDEN® Series 605 *TrojanTrack™ Girder* is a three-piece fabricated shape having dimensions as shown in Figure 10 and Table 2. The 3.33 inch wide flange is the operating or running flange and has a tread thickness of 13/16 inch. The top flange is the suspension flange. Refer to Figure 5. Maximum permissible wheel load on 605 *TrojanTrack™ Girder* is 3,750 pounds (7,500 pounds per 2-wheel trolley) when transferring through Series 505.7830 latches and switches, or in systems with splices; and 5,000 pounds (10,000 pounds per 2-wheel trolley) when used as bridge girders or runways without splices.

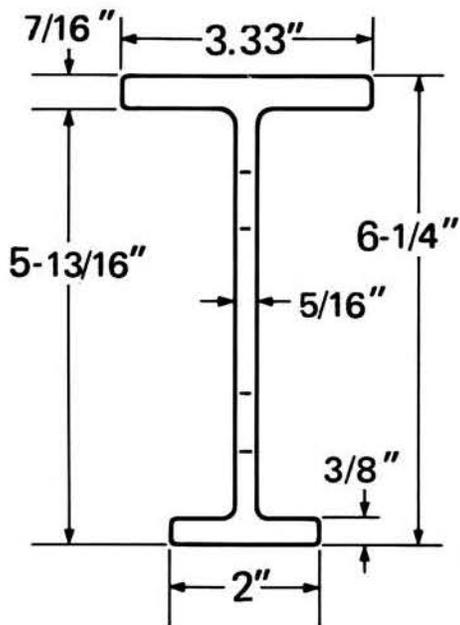
LOUDEN® SERIES 605 Super-TrojanTrack™ GIRDER:

LOUDEN® Series 605 *Super-TrojanTrack™ Girder* is any Series 605 *TrojanTrack™ Girder* that has a minimum top flange thickness of 3/4", has a web thickness of 7/16", and has solid welded web splices and bolted top flange splices. Typical dimensions are as shown in Figure 10 and Table 3. Maximum permissible wheel load on *Super-TrojanTrack™ Girder* is 5,000 pounds (10,000 pounds per 2-wheel trolley). *Super-TrojanTrack™ Girder* is not used with standard latches or standard track switches when wheel load exceeds 3,750 pounds (7,500 pounds per 2-wheel trolley).

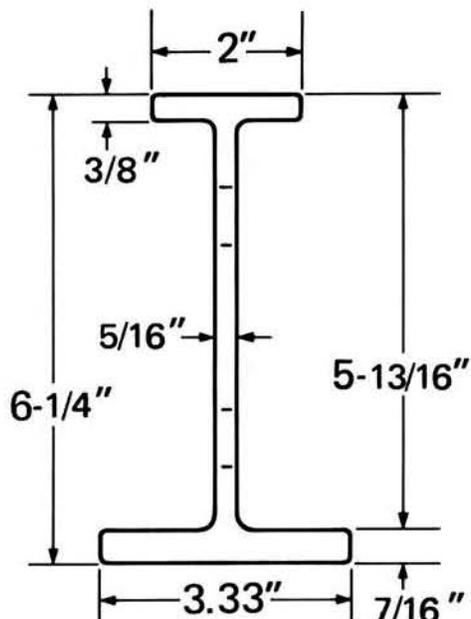
MONORAIL TRACK AND FITTING TYPES

⚠ WARNING

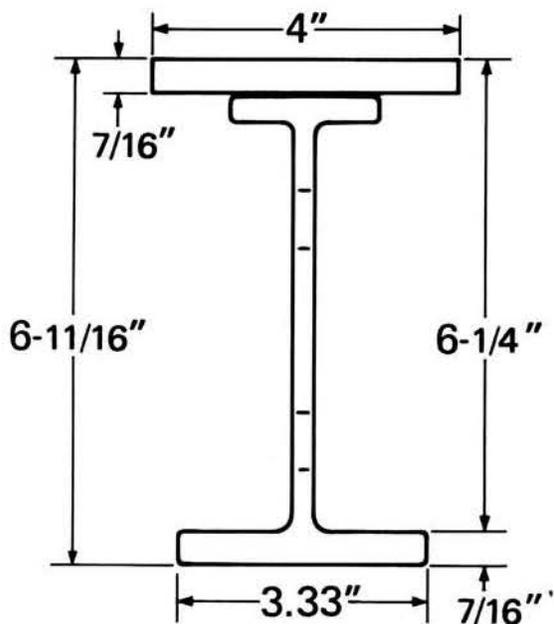
DO NOT WELD TO THE HIGH CARBON, HIGH MANGANESE STEEL MATERIAL OF LOUDEN® TRACK. THIS INCLUDES ALL *SuperTrack™* AND THE LOWER TEE SECTION (OPERATING OR RUNNING) FLANGE OF *SuperTrack® Girder*, *TrojanTrack™ Girder*, AND *Super-TrojanTrack™ Girder*.



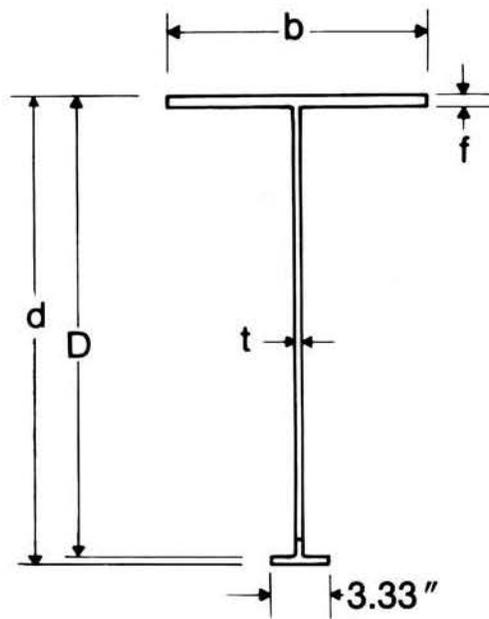
602.6
FIGURE 7



603.6
FIGURE 8



603.7
FIGURE 9



604 & 605
FIGURE 10

MONORAIL TRACK AND FITTING TYPES

TABLE 1
LOUDEN® SERIES 604 SuperTrack™ Girder

| CATALOG NO. WT./FT. | 604.924 24 lbs. | 604.1231 31 lbs. | 604.1435 35 lbs. | 604.1538 38 lbs. | 604.1846 46 lbs. | 604.2153 53 lbs. |
|------------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| D | 9" | 12" | 14" | 15" | 18" | 21" |
| d | 9-7/16" | 12-7/16" | 14-7/16" | 15-7/16" | 18-7/16" | 21-7/16" |
| b | 6" | 6" | 7" | 8" | 10" | 12" |
| f | 7/16" | 5/8" | 5/8" | 5/8" | 5/8" | 5/8" |
| t | 5/16" | 5/16" | 5/16" | 5/16" | 5/16" | 5/16" |

TABLE 2
LOUDEN® SERIES 605 Trojan-Track™ Girder

| CATALOG NO. WT./FT. | 605.1235 35 lbs. | 605.1543 43 lbs. | 605.1850 50 lbs. | 605.2166 66 lbs. | 605.2474 74 lbs. |
|------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| D | 12" | 15" | 18" | 21" | 24" |
| d | 12-13/16" | 15-13/16" | 18-13/16" | 21-13/16" | 24-13/16" |
| b | 6" | 8" | 10" | 12" | 14" |
| f | 5/8" | 5/8" | 5/8" | 5/8" | 5/8" |
| t | 5/16" | 5/16" | 5/16" | 7/16" | 7/16" |

TABLE 3
**LOUDEN® SERIES 605 Trojan-Track™ GIRDER THAT ALSO
QUALIFIES AS 605 Super-TrojanTrack™ GIRDER**

| CATALOG NO. WT./FT. | 605.2785 85 lbs. | 605.3089 89 lbs. | 605.3292 92 lbs. |
|------------------------|---------------------|---------------------|---------------------|
| D | 27" | 30" | 32" |
| d | 27-13/16" | 30-13/16" | 32-13/16" |
| b | 14" | 14" | 14" |
| f | 3/4" | 3/4" | 3/4" |
| t | 7/16" | 7/16" | 7/16" |

MONORAIL TRACK AND FITTING TYPES

TRACK CURVES FOR LOUDEN® SuperTrack™:

The standard track curve for LOUDEN® Series 602.6 SuperTrack™ and Series 603.6 SuperTrack™ has a 3'-4" radius with a 5" straight at each end as shown in Figure 11. A standard track curve made from LOUDEN® Series 603.7 SuperTrack™ is not available; however, curves for use in systems using LOUDEN® Series 603.7 SuperTrack™ are available.

Special track curve information as follows:

- Standard tangent length for square cut end is 12".
- Minimum tangent length for square cut end is 5".
- Minimum tangent length for angle cut end is 14".
- Minimum standard center straight for "S"curve is 12".
- Maximum overall length is 20'-0".
- Minimum curve radius is 1'-6".

Suspension points or hangers are required within 12" of the tangent points and at the center of the arc for curves up to 45° and up to a maximum radius of 10'-0". Additional suspension points or hangers are required if radius exceeds 10'-0". Refer to Figure 12.

Suspension points or hangers are required within 12" of the tangent points and at the center of the arc for curves up to 90° and up to a maximum radius of 6'-0". Additional suspension points or hangers are required if radius exceeds 6'-0". Refer to Figure 13.

Suspension points or hangers are required within 12" of the tangent points and at the 3rd points in the arc for curves up to 90° and a radius that exceeds 6'-0" and up to 10'-0". Additional suspension points or hangers are required if radius exceeds 10'-0". Refer to Figure 14.

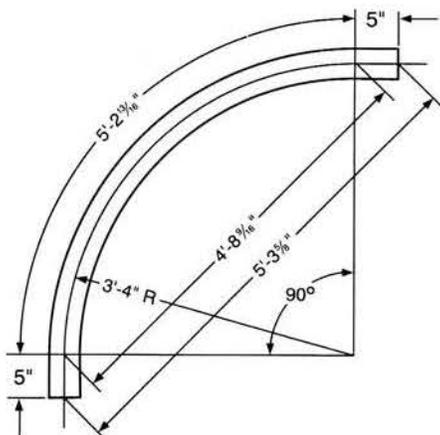


FIGURE 11

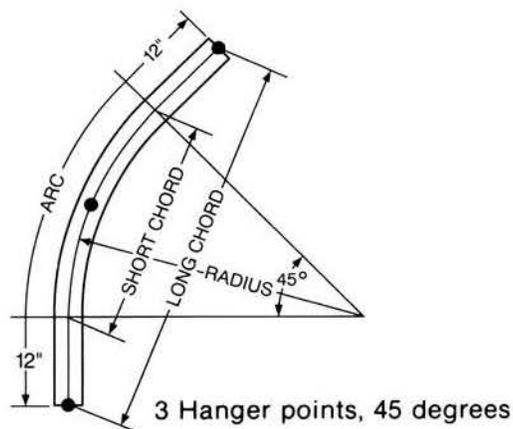


FIGURE 12

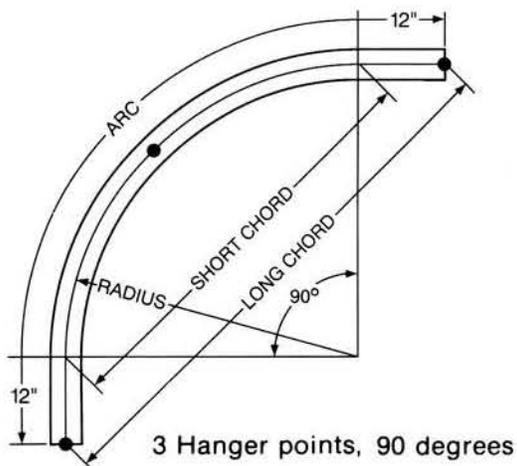


FIGURE 13

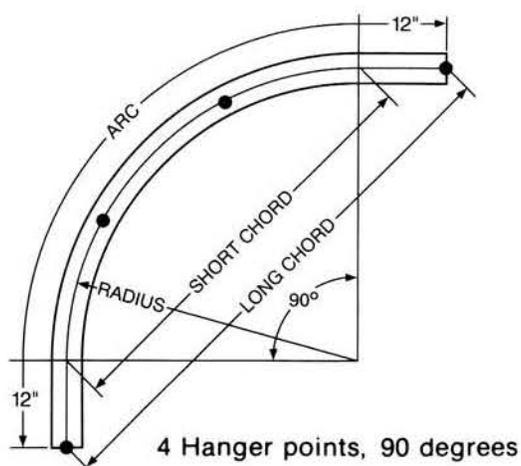


FIGURE 14

MONORAIL TRACK AND FITTING TYPES

WARNING

SUSPENSION POINTS OR HANGERS ARE ALWAYS REQUIRED DIRECTLY OVER SPLICES.

TRACK CURVES FOR LOUDEN® SuperTrack™ and TrojanTrack™ GIRDER:

A standard track curve is not available for LOUDEN® 604 SuperTrack™ Girder, 605 TrojanTrack™ Girder, or 605 Super-TrojanTrack™ Girder.

Special track curves are available for LOUDEN® 604 SuperTrack™ Girder in the following sizes: 604.924; 604.1231; 604.1435; and 604.1538 Special (6" top plate width).

Special track curves are available for LOUDEN® 605 TrojanTrack™ Girder in the following sizes: 605.1235; and 605.1543 Special (6" top plate width).

Special track curves are available for LOUDEN® 605 Super-TrojanTrack™ Girder in accordance with specifications for the job.

Special track curve information as follows:

- Standard tangent length for square cut end is 12".
- Minimum tangent length for square cut end is 5".
- Minimum tangent length for angle cut end is 14".
- Minimum standard center straight for "S" curve is 12".
- Maximum overall length is 20'-0".
- Minimum curve radius is 3'-0" for LOUDEN® 604 SuperTrack™ Girder.
- Minimum curve radius is 5'-0" for LOUDEN® 605 TrojanTrack™ Girder and LOUDEN® 605 Super-TrojanTrack™ Girder.

For LOUDEN® 604 SuperTrack™ Girder and 605 TrojanTrack™ Girder, suspension points or hangers are required within 12" of the tangent points and at the center of the arc for curves up to 45° and up to a maximum radius of 10'-0". Additional suspension points or hangers are required if radius exceeds 10'-0". Refer to Figure 12.

For LOUDEN® 604 SuperTrack™ Girder, suspension points or hangers are required within 12" of the tangent points and at the center of the arc for curves up to 90° and up to a maximum radius of 6'-0". Additional suspension points or hangers are required if radius exceeds 6'-0". Refer to Figure 13.

For LOUDEN® 604 SuperTrack™ Girder, suspension points or hangers are required within 12" of the tangent points and at the 3rd points in the arc for curves up to 90° and a radius that exceeds 6'-0" and up to 10'-0". Additional suspension points or hangers are required if radius exceeds 10'-0". Refer to Figure 14.

For LOUDEN® 605 TrojanTrack™ Girder, suspension points or hangers are required within 12" of the tangent points and at the 3rd points in the arc for curves up to 90° and up to a maximum radius of 10'-0". Additional suspension points or hangers are required if radius exceeds 10'-0". Refer to Figure 14.

WARNING

SUSPENSION POINTS OR HANGERS ARE ALWAYS REQUIRED DIRECTLY OVER SPLICES.

MONORAIL TRACK AND FITTING TYPES

SPLICE ASSEMBLIES:

Splice assemblies are used to hold the ends of two adjoining lengths of LOUDEN® 602 *SuperTrack*™, 603 *SuperTrack*™, 604 *SuperTrack*™ Girder, or 605 *TrojanTrack*™ Girder in alignment by clamping to the web of the track. Splice assemblies consist of: two (2) splice plates; eight (8) shoulder machine screws; eight (8) shoulder machine nuts; and shims, as required. Splice assemblies are not designed for, and therefore not intended for, use as load bearing or load supporting members. Splice assemblies are only to be used for proper alignment of the operating or running tread of two adjoining lengths of LOUDEN® track.



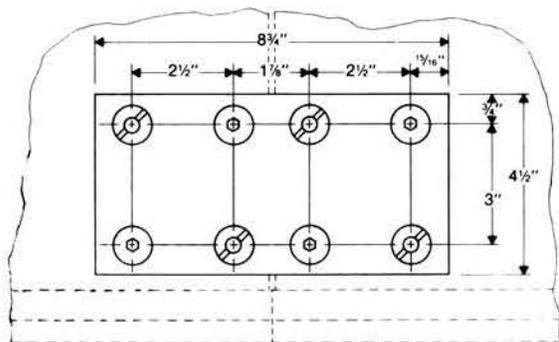
DO NOT USE SPLICE ASSEMBLIES AS LOAD BEARING OR LOAD SUPPORTING MEMBERS. SPLICE ASSEMBLIES ARE TO BE USED FOR ALIGNMENT PURPOSES ONLY. SUSPENSION POINTS OR HANGERS ARE ALWAYS REQUIRED DIRECTLY OVER SPLICES. DO NOT WELD TO THE HIGH CARBON, HIGH MANGANESE STEEL MATERIAL OF LOUDEN® TRACK. THIS INCLUDES ALL *SuperTrack*™ AND THE LOWER TEE SECTION (OPERATING OR RUNNING) FLANGE OF *SuperTrack*™ Girder, *TrojanTrack*™ Girder, AND *SuperTrojanTrack*™ Girder.

Standard splice assemblies are as follows:

- Splice Assembly 607.5011 - To align 5/16" web track to 5/16" web track.
- Splice Assembly 607.5012 - To align 7/16" web track to 7/16" web track.
- Splice Assembly 607.5016 - To align 1/4" web track to 5/16" web track.
- Splice Assembly 607.5013 - To align 5/16" web track to 7/16" web track.
- Splice Assembly 607.5014 - To align 1/4" web Series 604 *SuperTrack*™ Girder track to *SuperTrack*™ Girder furnished prior to March 1, 1978, and to *SuperTrack*™.
- Splice Assembly 607.5015 - To align 5/16" web Series 604 *SuperTrack*™ Girder track to *SuperTrack*™ Girder furnished prior to March 1, 1978, and to *SuperTrack*™.



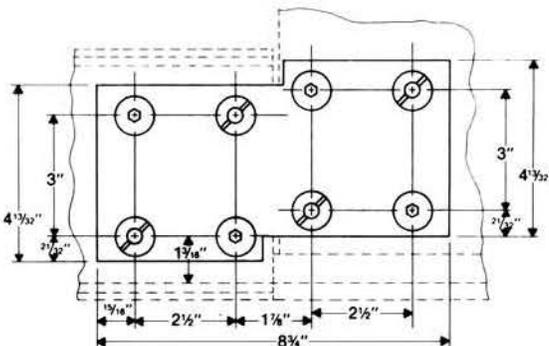
FIGURE 15



SPLICE ASSEMBLIES

607.5011, 607.5012, 607.5013, 607.5016

FIGURE 16



SPLICE ASSEMBLIES

607.5014, 607.5015

FIGURE 17

MONORAIL TRACK AND FITTING TYPES

Bolted splice assemblies are not used to hold the ends of two adjoining lengths of LOUDEN® 605 *Super-TrojanTrack™ Girder* in alignment. Welded web splices and top-flange splices are required for alignment of Series 605 *Super-TrojanTrack™ Girder*.

⚠ WARNING

DO NOT USE BOLTED SPLICE ASSEMBLIES FOR ALIGNMENT OF THE ENDS OF TWO ADJOINING LENGTHS OF LOUDEN® 605 *Super-TrojanTrack™ Girder*.

DO NOT USE SPLICE ASSEMBLIES AS LOAD BEARING OR LOAD SUPPORTING MEMBERS. SPLICE ASSEMBLIES ARE TO BE USED FOR ALIGNMENT PURPOSES ONLY.

SUSPENSION POINTS OR HANGERS ARE ALWAYS REQUIRED DIRECTLY OVER SPLICES.

DO NOT WELD TO THE HIGH CARBON, HIGH MANGANESE STEEL MATERIAL OF LOUDEN® TRACK. THIS INCLUDES ALL *SuperTrack™* AND THE LOWER TEE SECTION (OPERATING OR RUNNING) FLANGE OF *SuperTrack™ Girder*, *TrojanTrack™ Girder*, AND *Super-TrojanTrack™ Girder*.

SUSPENSION ASSEMBLIES:

LOUDEN® monorail track can be attached to or suspended from the building steel or superstructure steel by a variety of methods or means. A large variety of attachment or suspension means are available as standard LOUDEN® catalog items, and are described below.

⚠ WARNING

DO NOT WELD LOUDEN® MONORAIL TRACK DIRECTLY TO BUILDING OR SUPERSTRUCTURE STEEL.

Right Angle Hangers

Right Angle Hanger 607.2013 - Refer to Figure 18. This hanger will suspend non-electrified 602.6 *SuperTrack™* at right angles to building or superstructure steel having flange widths of 2" to 4-5/8".

Right Angle Hanger 607.3013 - Refer to Figure 19. This hanger will suspend 603.6 *SuperTrack™* and 603.7 *SuperTrack™* at right angles to building or superstructure steel having flange widths of 2" to 6-1/4".

⚠ WARNING

DO NOT SUSPEND 603.7 SUPERTRACK™ FROM THE CAPPED MATERIAL OR BAR ADDED TO THE TOP OR COMPRESSION FLANGE. SUSPENSION OF 603.7 SUPERTRACK™ MUST BE MADE ON THE 603.6 TRACK SECTION ONLY.

Parallel Hangers

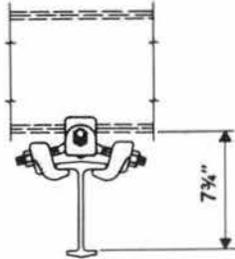
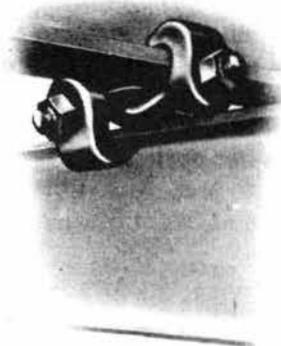
Parallel Hanger 607.2034 - Refer to Figure 20. This hanger will suspend non-electrified 602.6 *SuperTrack™* parallel to building or superstructure steel having flange widths of 3" to 4-5/8".

Parallel Hanger 607.3034 - Refer to Figure 21. This hanger will suspend 603.6 *SuperTrack™* and 603.7 *SuperTrack™* parallel to building or superstructure steel having flange widths of 3" to 6-1/4".

MONORAIL TRACK AND FITTING TYPES

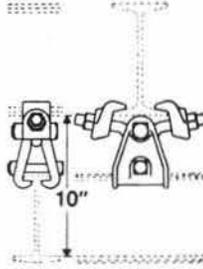
⚠ WARNING

DO NOT SUSPEND 603.7 SUPERTRACK™ FROM THE CAPPED MATERIAL OR BAR ADDED TO THE TOP OR COMPRESSION FLANGE. SUSPENSION OF 603.7 SUPERTRACK™ MUST BE MADE ON THE 603.6 TRACK SECTION ONLY.



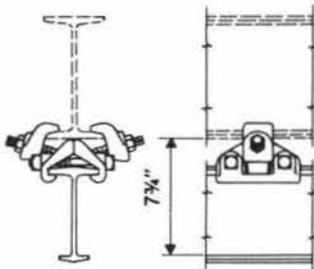
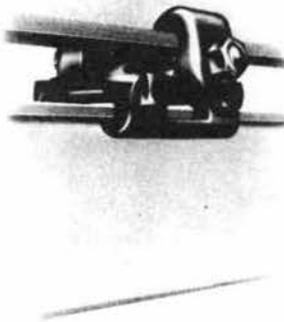
607.2013

FIGURE 18



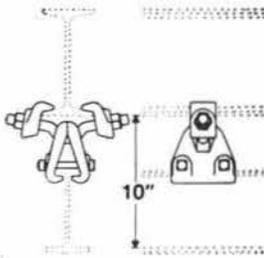
607.3013

FIGURE 19



607.2034

FIGURE 20



607.3034

FIGURE 21



MONORAIL TRACK AND FITTING TYPES

LOUDEN® Gimbal Suspension System

The exclusive LOUDEN® gimbal suspension system aids in reducing excessive bending stresses in the hanger rods used to suspend monorail track. The key to the effectiveness of the system is the multi-plane gimbal washers at both ends of the hanger rod that permits free movement of $\pm 6^\circ$ of the hanger rod in any direction without inducing bending into the rod. A typical hanger rod assembly is shown in Figure 22, and is used with other means to attach to building or superstructure steel and monorail track. Note in Figure 23A how the gimbal washers permit free movement of the hanger rod in any direction within the $\pm 6^\circ$ limit. In Figures 23B and 23C, the hanger rods encounter bending stresses that could cause fatigue failure.

⚠ WARNING

SUSPENSION SYSTEMS USING GIMBAL HANGER RODS REQUIRE SWAY BRACING TO LIMIT MOVEMENT OF THE HANGER ROD TO $\pm 6^\circ$ IN ANY DIRECTION.

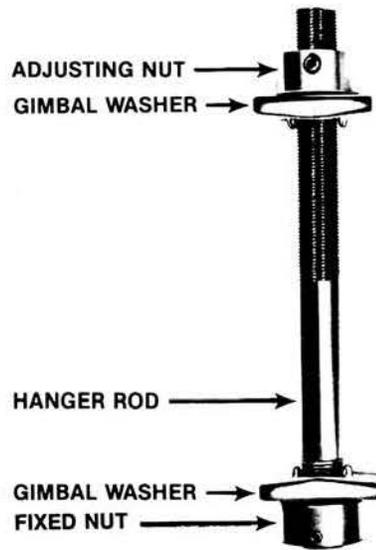


FIGURE 22

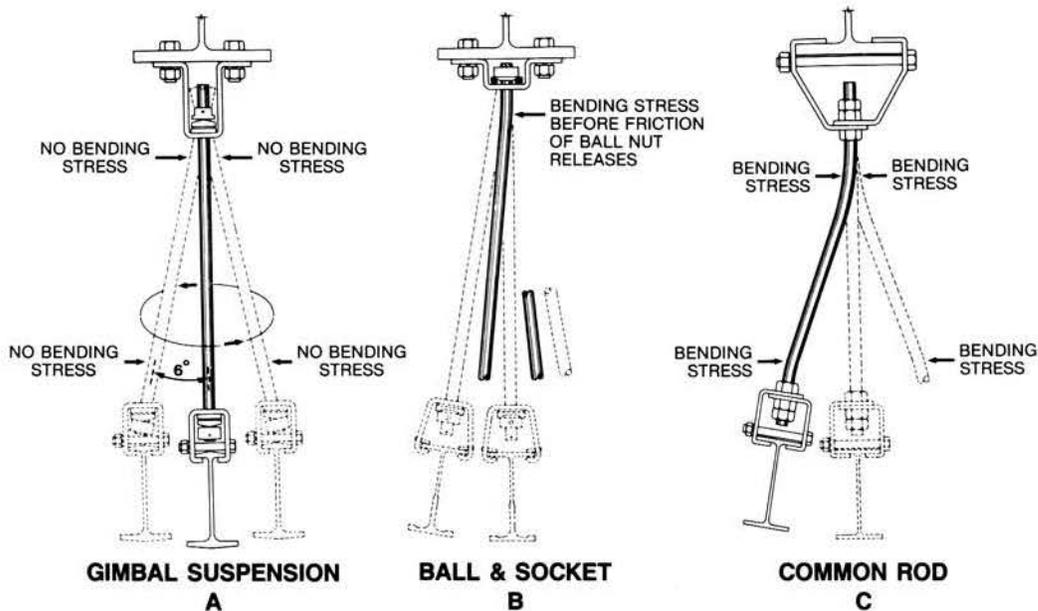


FIGURE 23

MONORAIL TRACK AND FITTING TYPES

LOUDEN® gimbal hanger rod assemblies are available in $\frac{3}{4}$ " diameter (8500 pounds capacity), $1\frac{1}{8}$ " diameter (20,000 pounds capacity), and $1\frac{1}{2}$ " diameter (34,000 pounds capacity). It is recommended that $1\frac{1}{2}$ " diameter rod assemblies only be used in pairs having 50,000 pounds rated capacity. $\frac{3}{4}$ " diameter and $1\frac{1}{8}$ " diameter rod assemblies are standard catalog items. LOUDEN® $\frac{3}{4}$ " diameter gimbal hanger rod assemblies are available in lengths from 4"- to 60", in two inch increments. LOUDEN® $1\frac{1}{8}$ " diameter gimbal hanger rod assemblies are available in lengths from 6"- to 60", in two inch increments. Lengths in excess of 60" or lengths other than two inch increments are available as special items in accordance with job specifications. LOUDEN® $1\frac{1}{2}$ " diameter gimbal hanger rod assemblies are special items furnished in accordance with job specifications. Each gimbal hanger rod assembly includes: one hanger rod with fixed lower nut and 6" thread adjusting length, two gimbal washers, and one adjusting nut with set screw. $\frac{3}{4}$ " diameter and $1\frac{1}{2}$ " diameter hanger rods are made from high strength steel.

⚠ WARNING

DO NOT USE ALL THREAD ROD MATERIAL IN LOUDEN® GIMBAL SUSPENSION SYSTEM IN PLACE OF LOUDEN® GIMBAL RODS.

Adjustable Beam Clamps

Adjustable beam clamps are used to attach the upper end of gimbal hanger rod assemblies to building or superstructure steel beams by clamping to the beam flange. They eliminate the requirement of holes in the building or superstructure steel. Beam clamps have slotted sides that permit access to the gimbal rod adjusting nut, and are equipped with a built-in hardened bearing washer. Refer to Figure 24.

Standard adjustable beam clamp assemblies are as follows:

- Adjustable Beam Clamp 607.254 – For use with $\frac{3}{4}$ " diameter gimbal hanger rods. Adjustable to fit beam flange widths of $3\frac{1}{4}$ " to 7".
- Adjustable Beam Clamp 607.255 – For use with $\frac{3}{4}$ " diameter gimbal hanger rods. Adjustable to fit beam flange widths of 7" to 10".
- Adjustable Beam Clamp 607.257 – For use with $\frac{3}{4}$ " diameter gimbal hanger rods. Adjustable to fit beam flange widths of 10" to $12\frac{1}{2}$ ".

Adjustable beam clamp 607.254, 607.255, and 607.257 can be used in pairs for $1\frac{1}{8}$ " diameter gimbal hanger rods with 17,000 pounds capacity when used with a spreader angle.

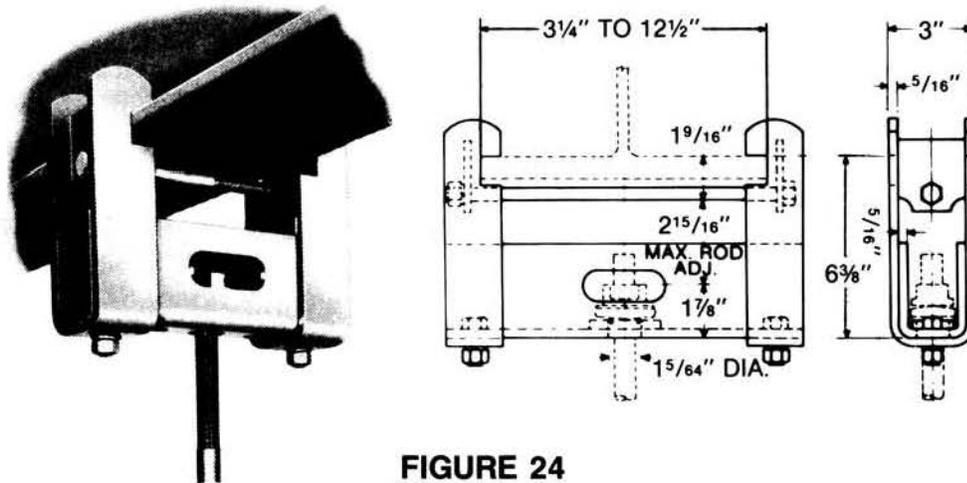


FIGURE 24

MONORAIL TRACK AND FITTING TYPES

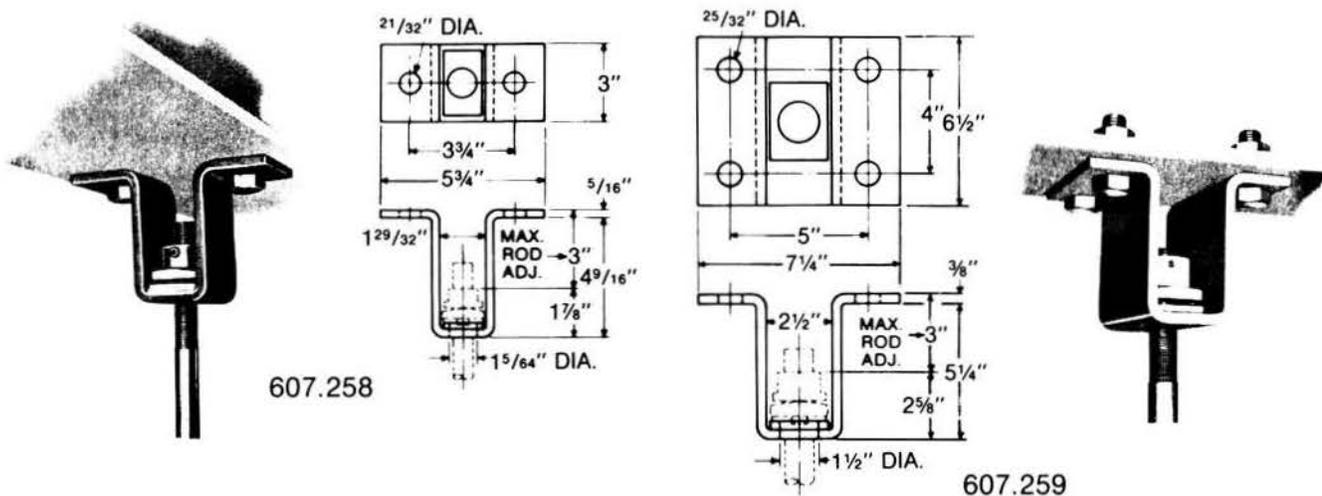


FIGURE 25

Beam Cleats

Beam cleats are used to attach the upper end of gimbal hanger rod assemblies to the lower flange of building or superstructure steel beams by bolting to the beam flange. They are equipped with a built-in hardened bearing washer. Refer to Figure 25.

Standard beam cleat assemblies are as follows:

- Beam Cleat 607.258 – For use with $\frac{3}{4}$ " diameter gimbal hanger rods. Includes two: Grade 5 hex head bolts, Grade 2 hex nuts, and lockwashers.
- Beam Cleat 607.259 – For use with $1\frac{1}{8}$ " diameter gimbal hanger rods. Includes four: Grade 5 hex head bolts, Grade 2 hex nuts, and lockwashers.

⚠ WARNING

BEAM CLEATS SHOULD NEVER BE USED TO ATTACH THE LOWER END OF GIMBAL HANGER ROD ASSEMBLIES TO THE UPPER FLANGE OF GIRDER TRACK. ONLY GIRDER TRACK HANGERS (REFER TO PAGE 18) ARE TO BE USED TO ATTACH THE LOWER END OF GIMBAL HANGER ROD ASSEMBLIES TO THE UPPER FLANGE OF GIRDER TRACK.

NOTICE

IF BUILDING OR SUPERSTRUCTURE HAS SLOTTED HOLES, FLAT WASHERS MUST BE USED UNDER THE BOLT HEAD OR LOCKWASHER AND NUT.

THE USE OF GRADE 5 BOLTS AND GRADE 2 HEAVY HEX NUTS ARE BASED ON A DESIGN FACTOR OF 5 IN ACCORDANCE WITH ANS/MMA MH-27.1. SOME INSTALLATIONS MAY REQUIRE THAT OTHER STANDARDS, SUCH AS AISC, BE FOLLOWED FOR THE ATTACHMENT OF TRACK FITTINGS. SUCH INSTALLATIONS MAY REQUIRE HARDENED FLAT WASHERS, PLATE WASHERS, ASTM A325 BOLTS, TORQUE SETTING REQUIREMENTS, OR OTHER CONDITIONS THAT GOVERN THE INSTALLATION. REFER TO SPECIFIC JOB SPECIFICATIONS AND REQUIREMENTS BEFORE SPECIFYING AND INSTALLING ANY TRACK SYSTEM.

Hardened Bearing Washers

Hardened bearing washers must be used when LOUDEN® gimbal hanger rod assemblies are suspended directly through holes in the building or superstructure steel. The hardened bearing washer is placed between the upper gimbal washer and supporting building or superstructure steel, and must be tack welded in place to the building or superstructure steel.

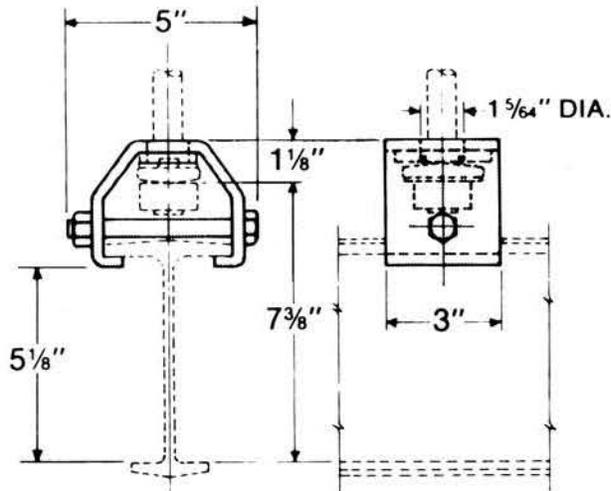
Standard hardened bearing washers are as follows:

- PF-4452 – For use with $\frac{3}{4}$ " diameter gimbal hanger rods.
- PF-4453 – For use with $1\frac{1}{8}$ " diameter gimbal hanger rods.
- 607.4454 – For use with $1\frac{1}{2}$ " diameter gimbal hanger rods.

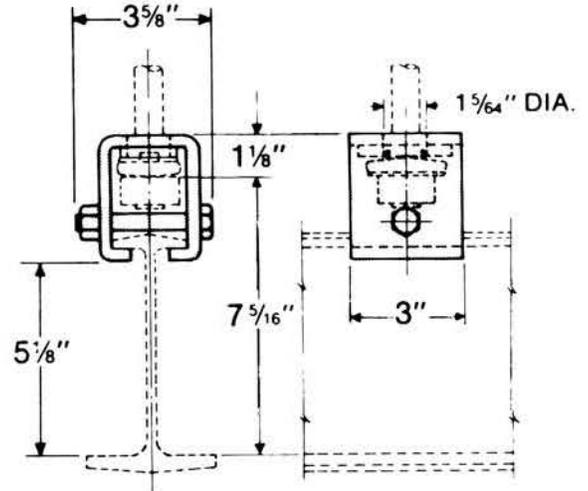
MONORAIL TRACK AND FITTING TYPES

Track Clamps

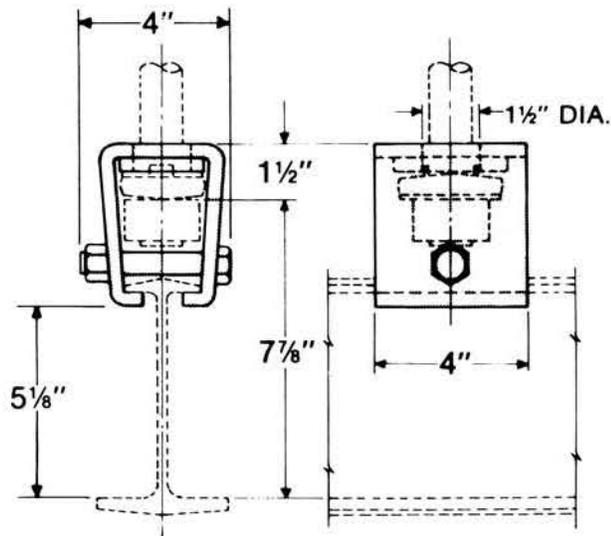
Track clamps are used to attach the lower end of gimbal hanger rod assemblies to the top flange of 602.6 *SuperTrack*™, 603.6 *SuperTrack*™, or 603.7 *SuperTrack*™, and have a built-in hardened bearing washer. Refer to Figures 26, 27, and 28.



607.250
FIGURE 26



607.350
FIGURE 27



607.356
FIGURE 28

Standard track clamp assemblies are as follows:

Track Clamp 607.250 - For 602.6 *SuperTrack*™ supported by 3/4" diameter gimbal hanger rods.

Track Clamp 607.350 - For 603.6 *SuperTrack*™ and 603.7 *SuperTrack*™ supported by 3/4" diameter gimbal hanger rods.

Track Clamp 607.356 - For 603.6 *SuperTrack*™ and 603.7 *SuperTrack*™ supported by 1 1/8" diameter gimbal hanger rods.

MONORAIL TRACK AND FITTING TYPES

Girder Track Hangers

Girder track hangers are used to attach the lower end of gimbal hanger rod assemblies to the top flange of 604 *SuperTrack™ Girder* and 605 *TrojanTrack™ Girder*. They are furnished complete with bolts, nuts, and lockwashers; and do not require a hardened bearing washer. Refer to Figure 29.

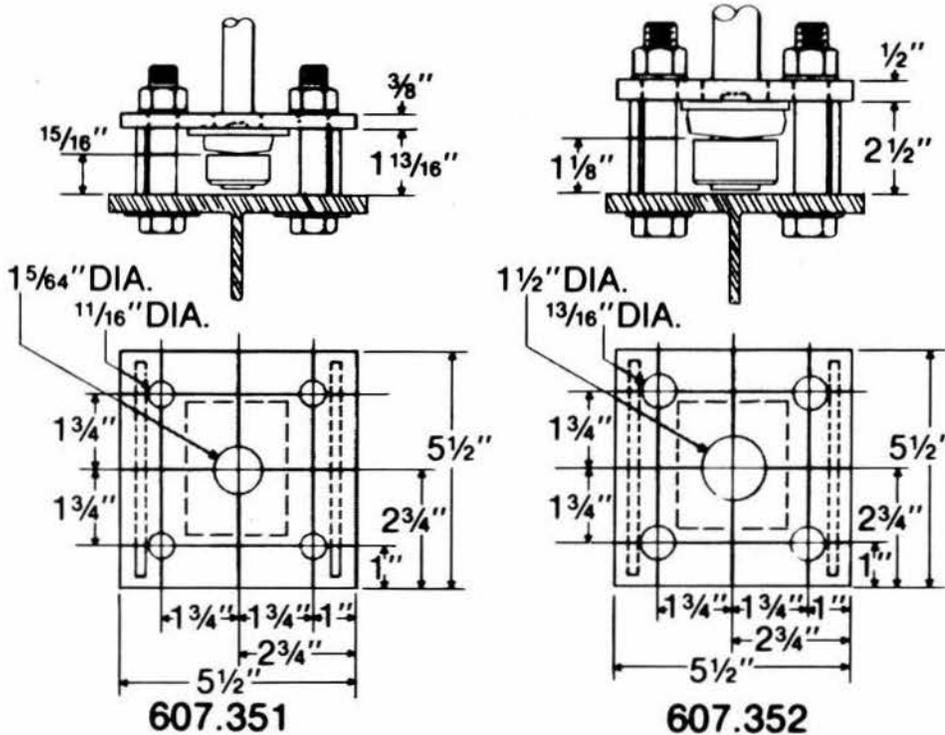


FIGURE 29

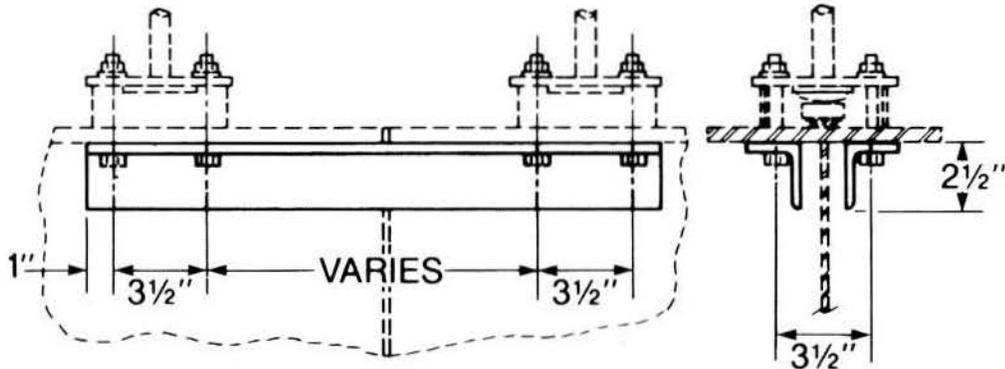
Standard girder track hanger assemblies are as follows:

- Girder Track Hanger 607.351 - For 604 *SuperTrack™ Girder*, 605 *TrojanTrack™ Girder*, and 605 *Super-TrojanTrack™ Girder* supported by $3/4''$ diameter gimbal hanger rods.
- Girder Track Hanger 607.352 - For 604 *SuperTrack™ Girder*, 605 *TrojanTrack™ Girder*, and 605 *Super-TrojanTrack™ Girder* supported by $1\ 1/8''$ diameter gimbal hanger rods.
- Girder Track Hanger 607.353 - For 604 *SuperTrack™ Girder*, 605 *TrojanTrack™ Girder*, and 605 *Super-TrojanTrack™ Girder* supported by $1\ 1/2''$ diameter gimbal hanger rods. (Not shown in Figure 29.)

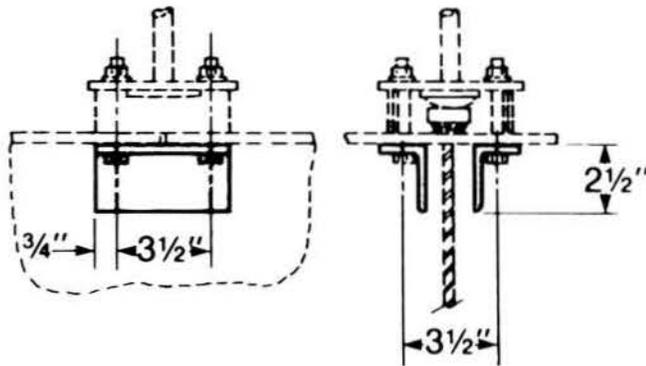
MONORAIL TRACK AND FITTING TYPES

Girder Top Flange Splices

Girder top flange splices must be used with 604 SuperTrack™ Girder and 605 TrojanTrack™ Girder as outlined below. Girder top flange splices must always be used with 605 Super-TrojanTrack™ Girder, and whenever double hanger rods are used. Refer to Figure 30.



607.6003



607.6004

FIGURE 30

Standard girder top flange splices are as follows:

- Girder Top Flange Splice 607.6003 - Must be used at splice points when two girder hangers are used at the splice.
- Girder Top Flange Splice 607.6004 - Must be used at splice points when track end load exceeds maximum end load as shown in Table 4 and when support is by two bolts at the end of each girder. Applies to both bolt direct and girder hanger applications.
- Girder Top Flange Splice 607.6005 - For applications using 1 1/2" diameter gimbal hanger rods in accordance with job specifications only. (Not shown in Figure 30.)

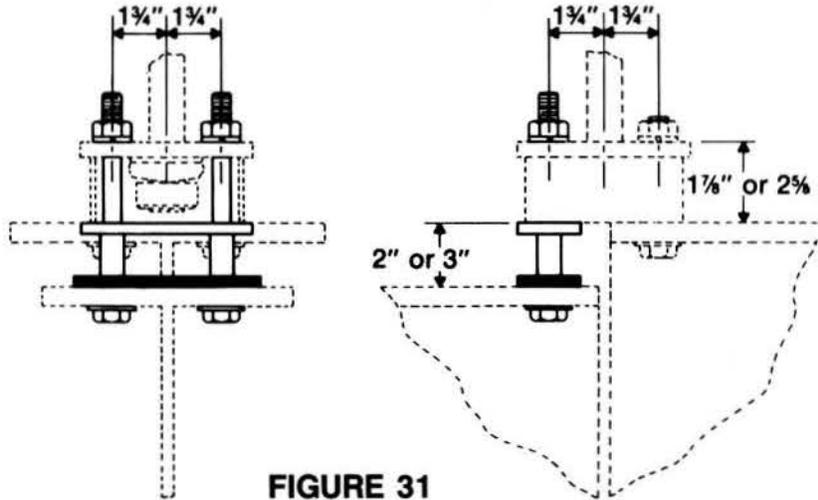
TABLE 4

| TOP FLANGE THICKNESS | MAXIMUM END LOAD |
|----------------------|------------------|
| 5/16" | 4000 pounds |
| 7/16" | 8000 pounds |
| 5/8" | 16000 pounds |
| 3/4" | 24000 pounds |

MONORAIL TRACK AND FITTING TYPES

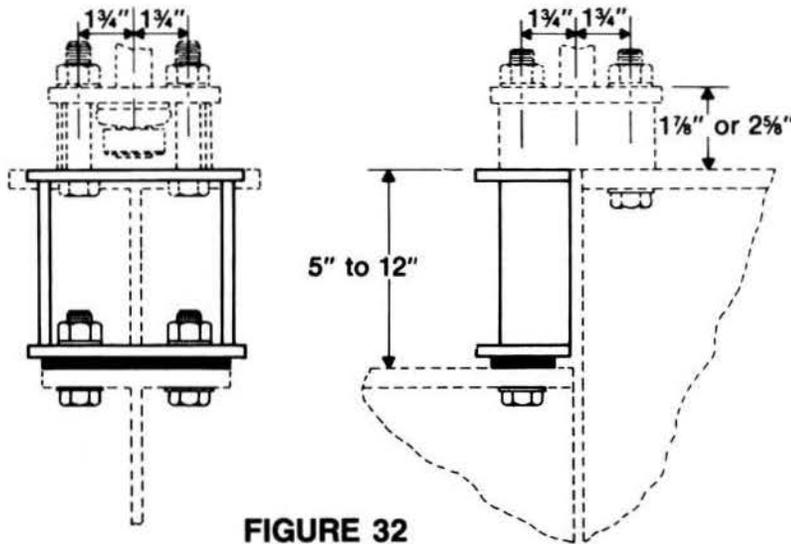
Girder Connectors

Girder connectors are used to connect the ends of two adjoining lengths of girder track of different depths. Girder connectors allow the use of deep depth girders for long spans and smaller depth girders for short spans. Refer to Figures 31 and 32. Girder connectors are furnished with required hardware, including shims; but require the addition of the proper Girder Track Hanger, or bolts for direct bolting.



607.402, 607.403

FIGURE 31



607.405, 607.406, 607.408,
607.409, 607.410, 607.411,
607.412

FIGURE 32

Standard girder connector assemblies are as follows:

- Girder Connector 607.402 – Used to connect girders with 2" depth difference.
- Girder Connector 607.403 – Used to connect girders with 3" depth difference.
- Girder Connector 607.404 – Used to connect girders with 4" depth difference.
- Girder Connector 607.405 – Used to connect girders with 5" depth difference.
- Girder Connector 607.406 – Used to connect girders with 6" depth difference.
- Girder Connector 607.407 – Used to connect girders with 7" depth difference.
- Girder Connector 607.408 – Used to connect girders with 8" depth difference.
- Girder Connector 607.409 – Used to connect girders with 9" depth difference.
- Girder Connector 607.410 – Used to connect girders with 10" depth difference.
- Girder Connector 607.411 – Used to connect girders with 11" depth difference.
- Girder Connector 607.412 – Used to connect girders with 12" depth difference.

MONORAIL TRACK AND FITTING TYPES

Flush Clamps

Flush clamps are used to attach monorail track to building or superstructure steel beams by clamping to the beam flange and eliminate the requirement of holes in the building or superstructure steel. Flush clamps support LOUDEN® track at right angles or parallel to building or superstructure steel by clamping the top flange of the track to the lower flange of the supporting steel. They do allow some adjustability during installation. Refer to Figure 33.

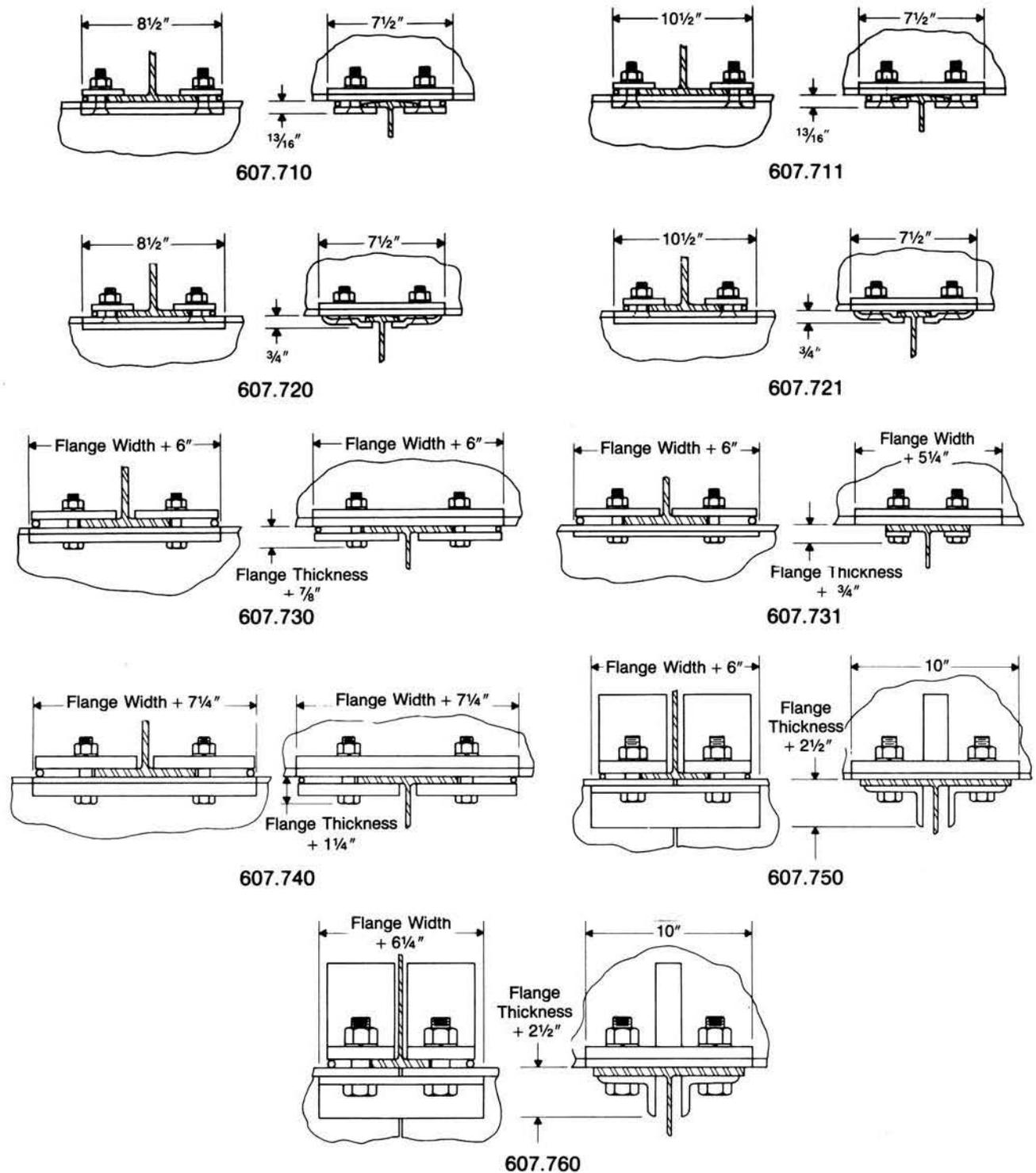


FIGURE 33

MONORAIL TRACK AND FITTING TYPES

Standard flush clamp assemblies are as follows:

- Flush Clamp 607.710 – 5000 pounds capacity. Used to support 602.6 *SuperTrack™* from beam flange widths of 3" to 5 $\frac{3}{8}$ ". For non-electrified systems only.
- Flush Clamp 607.711 – 5000 pounds capacity. Used to support 602.6 *SuperTrack™* from beam flange widths of 5 $\frac{1}{2}$ " to 7 $\frac{1}{4}$ ". For non-electrified systems only.
- Flush Clamp 607.720 – 5000 pounds capacity. Used to support 603.6 *SuperTrack™* and 603.7 *SuperTrack™* from beam flange widths of 3" to 5 $\frac{3}{8}$ ". For non-electrified systems only.
- Flush Clamp 607.721 – 5000 pounds capacity. Used to support 603.6 *SuperTrack™* and 603.7 *SuperTrack™* from beam flange widths of 5 $\frac{1}{2}$ " to 7 $\frac{1}{4}$ ". For non-electrified systems only.
- Flush Clamp 607.730 – 10,000 pounds capacity. Used to support 604 *SuperTrack™ Girder*, 605 *TrojanTrack™ Girder*, and 605 *Super-TrojanTrack™ Girder*. Not to be used with electrified 604.924 *SuperTrack™ Girder*.
- Flush Clamp 607.731 – 10,000 pounds capacity. Used to support electrified 604.924 *SuperTrack™ Girder*. Four slotted holes are required in the top flange of the track.
- Flush Clamp 607.740 – 15,000 pounds capacity. Used to support 604 *SuperTrack™ Girder*, 605 *TrojanTrack™ Girder*, and 605 *Super-TrojanTrack™ Girder*. Not to be used with electrified 604.924 *SuperTrack™ Girder*.
- Flush Clamp 607.750 – 20,000 pounds capacity. Used to support 604 *SuperTrack™ Girder*, 605 *TrojanTrack™ Girder*, and 605 *Super-TrojanTrack™ Girder* with depths of 18" and greater. Four slotted holes are required in the top flange of the track.
- Flush Clamp 607.760 – 30,000 pounds capacity. Used to support 604 *SuperTrack™ Girder*, 605 *TrojanTrack™ Girder*, and 605 *Super-TrojanTrack™ Girder* with depths of 18" and greater. Four slotted holes are required in the top flange of the track.

Girder Track Extensions

When a track system that may require future extension is installed, inclusion of a 12" long girder track extension permits proper placement of superstructure steel and track hanger points. When the track is extended, the girder track extension is removed and replaced with the new section of track, resulting in minimizing future installation costs and reducing future alterations to the existing system. Refer to Figure 34.

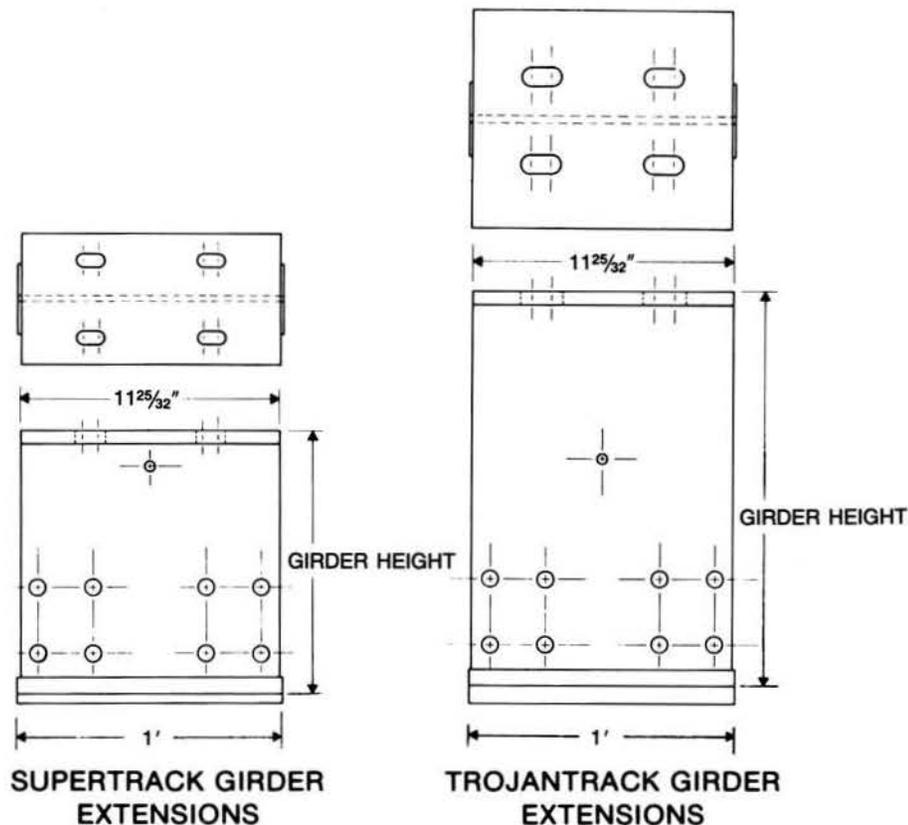


FIGURE 34

MONORAIL TRACK AND FITTING TYPES

Standard girder track extensions for SuperTrack™ Girder are as follows:

- 607.509 – 9" girder depth.
- 607.512 – 12" girder depth.
- 607.514 – 14" girder depth.
- 607.515 – 15" girder depth.
- 607.518 – 18" girder depth.
- 607.521 – 21" girder depth.

Standard girder track extensions for TrojanTrack™ Girder or Super-TrojanTrack™ Girder are as follows:

- 607.612 – 12" girder depth.
- 607.615 – 15" girder depth.
- 607.618 – 18" girder depth.
- 607.621 – 21" girder depth.
- 607.624 – 24" girder depth.
- 607.627 – 27" girder depth.
- 607.630 – 30" girder depth.
- 607.632 – 32" girder depth.

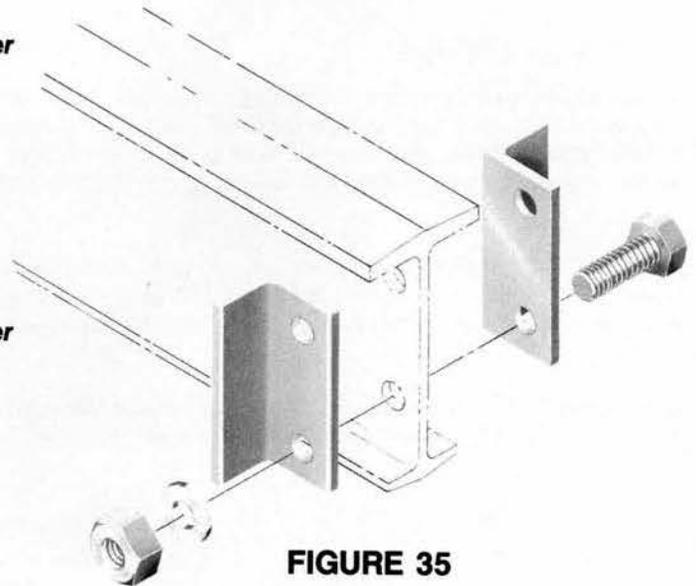


FIGURE 35

Bolted Direct Installations

LOUDEN® monorail track can be bolted directly to the building steel or superstructure steel. In such cases, the system designer and system installer are responsible for: analysis and design of connection and attachment points in accordance with governing specifications; component and hardware selection in accordance with governing specifications; and preparation of material in accordance with governing specifications. In such cases, LOUDEN® track will be furnished with location of holes and slots in accordance with job and order specifications.

END STOP ASSEMBLIES:

Stops are required at the open end or ends of all monorail tracks to prevent the crane, carrier, or trolley from traveling off the monorail track. Stops that engage crane end truck or trolley wheels are not recommended. A structural part of the crane or trolley or bumper should contact the stop. Stops must be so located to prevent overhanging parts of the crane, carrier, trolley, or hoist installed on the monorail track from interfering with other equipment beyond the ends of the monorail track. Various styles of end stops are available. Some typical end stops are shown in Figures 35 and 36.

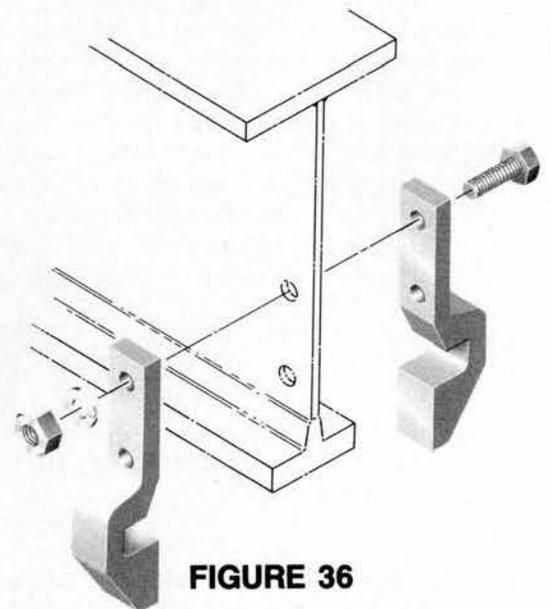


FIGURE 36

MONORAIL TRACK AND FITTING TYPES

TRACK SWITCHES:

A wide selection of monorail track switches are available for use in monorail systems. Switches are rated light-duty, medium-duty, or heavy duty. They are available in tongue or sliding operation models. Sliding switches offer smoother trolley operation than tongue switches because the track sections of sliding switches are curved and form an integral part of the track system curve. Some switches are limited to non-electrical operating systems.

LOUDEN® monorail track switches are available with various operating mechanisms and controls. Depending upon the type of switch, they may be operated manually, by electric motor, or by air cylinder. Switch operation may be accomplished with pull ropes, pushbutton pendant stations, or remote control signals.

SuperTrack™ trolleys having 4½" diameter wheels will operate through either *SuperTrack™* or *TrojanTrack™* switches. *TrojanTrack™* trolleys having 9" diameter wheels will operate through *TrojanTrack™* switches only.

WARNING

DO NOT OPERATE TRACK SWITCHES WHILE A TROLLEY IS POSITIONED ON THE SWITCH TONGUE, OR SWITCH CARRIAGE.

LOUDEN® monorail track switches include:

- light-duty tongue switches with either 2" or 3.33" *SuperTrack™* tongues for non-electrified, manual-operated monorail systems, where the load on the switch will not exceed 3000 pounds.
- light-duty cross-track switches with either 2" or 3.33" *SuperTrack™* tongues for non-electrified, manual-operated monorail systems, where the load on the switch will not exceed 3000 pounds.
- medium-duty sliding switches with 2" *SuperTrack™* carriages for non-electrified monorail systems, where the load on the switch will not exceed 3000 pounds.
- medium-duty sliding switches with 3.33" *SuperTrack™* carriages for non-electrified monorail systems, where the load on the switch will not exceed 5000 pounds.
- heavy-duty sliding switches with 3.33" *SuperTrack™* carriages for electrified monorail systems, where the load on the switch will not exceed 10,000 pounds.
- heavy-duty sliding switches with 3.33" *TrojanTrack™* carriages for electrified monorail systems, where the load on the switch will not exceed 15,000 pounds.

WARNING

DO NOT OPERATE OR USE POWERED TROLLEYS THROUGH ANY TRACK SWITCHES EXCEPT HEAVY-DUTY ELECTRIFIED SWITCHES.

Refer to the LOUDEN® product catalog for detailed specifications and dimensions of LOUDEN® monorail track switches, and application data for use in switch and curve layout.

OTHER ACCESSORIES:

Other accessories, including such items as electrification, motorized trolleys, latches and other track devices, may be part of a monorail system. For information on such accessories, refer to Manual 69879: Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Crane and Monorail Accessories. When LOUDEN® monorail track is used as crane runways, and a LOUDEN® underhung crane is to be installed on the runway, refer to Manual 69878: Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Series 500 Underhung Cranes. When a hoist is to be installed on LOUDEN® monorail track, refer to the manual furnished with the hoist that will be installed on the LOUDEN® monorail track system.

INSTALLATION

PRIOR TO INSTALLING MONORAIL:

1. Read and observe the instructions and warnings contained in this manual. Read and observe any instructions and warning tags attached to the track or fittings.
2. Read and observe the applicable instructions and warnings contained in Manual 69879, Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Crane and Monorail Accessories.
3. If a LOUDEN® crane is being installed as part of the total installation, read and observe the instructions and warnings contained in Manual 69878, Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Cranes.
4. If a hoist is to be installed on the crane or monorail as part of the total installation, read and observe the instructions and warnings contained in the manual furnished with the hoist. Read and observe any instructions and warning tags attached to the hoist.
5. Check for any damage to the monorail track, fittings, and accessories during shipment. If any damage has occurred, place a claim with the carrier. DO NOT install damaged monorail track, fittings, or accessories.
6. Check that the supporting structure where the monorail will be installed has a load rating capable to handle loads equal to the rated load capacity of the monorail system or monorail runway.
7. Warning signs and barriers shall be utilized on the floor area beneath where the monorail or runway will be installed.
8. If the monorail track is to be installed as an extension of an existing monorail or runway, and the original monorail or runway remains energized because of other hoists or cranes operating on the monorail or runway; stops or a signal person(s), located full-time at a visual vantage point for observing the approach of an active hoist(s) or crane(s), shall be provided to prohibit contact by the active hoist(s) or crane(s) with the track being installed, and personnel involved in installing the track.
9. If personnel will be required to work on the monorail or runway during installation, a guard or barrier shall be installed between adjacent runways or monorails for the length of the established work area to prevent contact between persons performing installation and a hoist or crane on the adjacent runway or monorail.
10. If personnel are required to work at elevations in excess of 6 feet above floor or ground level, a fall prevention policy and procedure shall be developed, documented, and implemented prior to installation being started.
11. After the track has been installed, and prior to connecting the monorail or runway electrification to the building or existing monorail or runway electrification, the main switch (disconnect) supplying power to the monorail or runway shall be de-energized. Lock and tag the main switch in the de-energized position in accordance with ANSI Z244.1.
12. Check power supply that will be furnished to the monorail or crane. It must be the same as shown on any electrified accessories, or cranes or hoists that will be used on the monorail or runway.
13. Conductors supplying power to the monorail or runway and associated equipment must be sized to maintain the operating voltage at the equipment at plus or minus 10% of the nominal operating voltage at all times. Standard nominal operating voltages are 200, 208, 230, 460, and 575 volts.
14. Conductors supplying power to the monorail or runway and associated equipment must be protected against short circuit and overcurrent conditions in compliance with ANSI/NFPA 70, National Electrical Code. These requirements are listed in Article 610 and are the responsibility of the owner/user. It is also the responsibility of the owner/user to insure that all protective devices and associated wiring comply with applicable Federal, State, and Local Codes.
15. Check and confirm that all track components and items have been received. If any items are missing, contact Acco Chain & Lifting Products or the distributor of the track.
16. Place track and track components in correct position directly below the structure where the monorail or runway is to be installed. Verify that monorail or runway electrification is properly positioned, if applicable.
17. Check that track lengths and any holes are in accordance with specifications.
18. For direct bolted suspension systems, check if shims will be required, and check length of attaching bolts required.

INSTALLATION

GENERAL INSTALLATION PRACTICE:

1. Holes shall not be made to the building structure or steel without approval and permission of the building designer or owner.
2. All supporting structures or steel to which the monorail track is suspended, shall be designed and installed in accordance with AISC (American Institute of Steel Construction) specifications, or other governing specifications.
3. Welding operations on all supporting steel or equipment shall be performed in accordance with AWS (American Welding Society) specifications.
4. Rail joints at splices shall be ground smooth and level after adjustment to within 1/32 inch. The maximum gap between the operating flange of adjacent rail ends shall not exceed 1/16 inch, except at switches and other accessory components as stated in "INSTALLATION CLEARANCES AND TOLERANCES".
5. Hanger rods and superstructure rods are manufactured from alloy steels. DO NOT weld the rods or weld any connections to these rods.
6. Hanger rods must be plumb.
7. Support is required at every track splice.
8. Bracing of hanger rod suspended track systems is the responsibility of the installer or erector, and must be determined by field conditions to accomplish the following:
 - a. Monorail tracks must be laterally (side) braced to prevent excessive sway. Lateral bracing is normally accomplished at each splice joint.
 - b. Monorail tracks must be longitudinally (end) braced in both directions.
 - c. Crane runways must be laterally (side) braced to prevent excessive sway. Normally, only one runway track is laterally braced, and is normally accomplished at each splice joint.
 - d. Both runway tracks of crane runways must be longitudinally (end) braced in both directions.
9. Monorail curves should be rigidly braced.
10. Monorail switches should be rigidly connected directly to superstructure or supporting steel.
11. It is recommended that bracing be accomplished after the monorail system or crane runways have been leveled, and electrification, if specified, has been installed.
12. Leveling of all monorail tracks or crane runways to obtain the final specified elevation of the track or runway is the responsibility of the installer or erector.
 - a. Check all suspension and hanger fittings provided with hanger locations and elevations shown on the system layout specifications. Verify that the fittings will result in the dimensions required for proper elevation prior to installing the track.
 - b. Refer to "INSTALLATION CLEARANCES AND TOLERANCES" for allowable tolerances for track elevation and straightness; and span variation for crane runways.

INSTALLATION CLEARANCES AND TOLERANCES:

1. A minimum clearance of 2 inches should be provided between a crane and any lateral or overhead obstruction.
2. A minimum clearance of 2 inches should be provided between two non-interlocking cranes that operate on two parallel runways with no intervening walls or structures between them.
3. A maximum clearance of 1/4 inch between the operating flange of adjacent crane bridge girder ends should be provided between two cranes on parallel runways that are designed for interlocking and transfer of the trolley or carrier.
4. Clearance shall be provided at the curves of a monorail system to allow for swing of the load being handled, as well as the overhang of the hoist and trolley or carrier when traveling through the curve. Clearance required must be determined by consideration of the hoist and trolley or carrier size, trolley or carrier design, size of the load, travel speed, and curve radius.

INSTALLATION

- Where track systems cross building expansion joints, provision should be made to accommodate differential expansion of the building and track.
- Track straightness and elevation shall not exceed the tolerances shown in Figure 38.

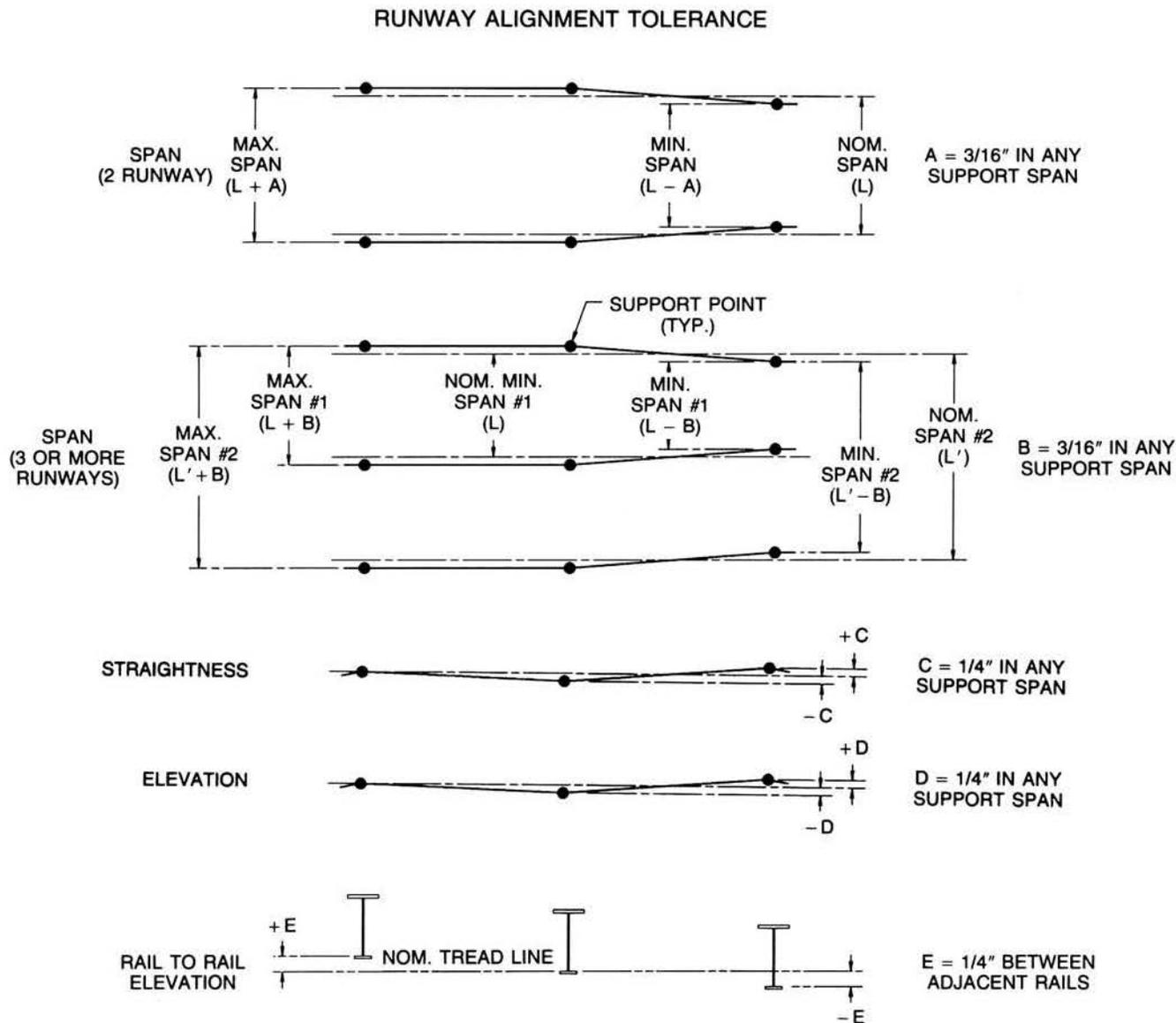


FIGURE 38

- Runway track straightness and elevation, and runway span center-to-center distance shall not exceed the tolerances shown in Figure 38.
- Track operating flange surface misalignment at joints should not exceed 1/32 inch after installation and adjustment.
- The maximum gap between the operating flange of adjacent monorail and runway track ends should not exceed 1/16 inch.
- The maximum gap between the operating flange of adjacent track ends for transfer and interlocking cranes, spur tracks, and fixed transfer sections should not exceed 1/4 inch.

INSTALLATION

11. The maximum gap between the operating flange of adjacent track ends of the incoming tracks and switch tracks of monorail switches should not exceed 3/16 inch.
12. The maximum gap between the operating flange of adjacent track ends of track openers should not exceed 3/16 inch.
13. The maximum gap between the operating flange of adjacent track ends of the movable tracks and stationary tracks of vertical drop or lift sections should not exceed 3/16 inch.
14. The maximum misalignment at joints between the operating flange of adjacent monorail and runway track ends should not exceed 1/32 inch.
15. Interlock mechanisms should limit misalignment at joints between the operating flange of adjacent track ends to a maximum of 1/8 inch.
16. The maximum misalignment at joints between the operating flange of adjacent track ends of the incoming tracks and switch tracks of monorail switches should not exceed 1/16 inch.
17. The maximum misalignment at joints between the operating flange of adjacent track ends of track openers should not exceed 1/16 inch.
18. The maximum misalignment at joints between the operating flange of adjacent track ends of the movable tracks and stationary tracks of vertical drop or lift sections should not exceed 1/16 inch.

NOTICE

ALL CLEARANCES AND TOLERANCES APPLY TO MONORAIL TRACK THAT HAS BEEN COMPLETELY INSTALLED AND ADJUSTED.

INSTALLATION OF TRACK AND FITTINGS:

1. Check tag or marking on each track section and identify each section with location shown on track layout specifications.
2. Check all suspension and hanger fittings provided with hanger locations and elevations shown on the system layout specifications. Verify that the fittings will result in the dimensions required for proper elevation prior to installing the track.
3. Lay out system location from layout specifications or prints. Establish each hanger location from supporting steel. This can be accomplished by a chalk layout on the floor and plumbing up; a line stretched under the steel above; or using a transit to mark each location. BE SURE that layout measurements are from proper building reference.
4. Assemble lower hanger components using track clamps as follows:
 - a. Remove clamp bolt, lockwasher, and nut from track clamp. Refer to Figures 39 and 40.
 - b. Insert gimbal washer, with guides ON TOP, into track clamp and lower these as a unit down over hanger rod until gimbal washer rests on fixed lower rod nut. Refer to Figure 41.

NOTICE

GUIDES ON GIMBAL WASHER MUST FIT UP INTO HOLE IN TRACK CLAMP.

INSTALLATION

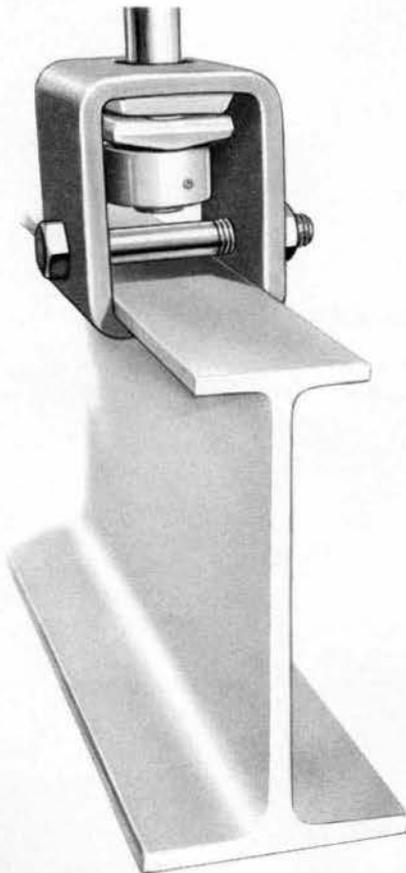


FIGURE 39

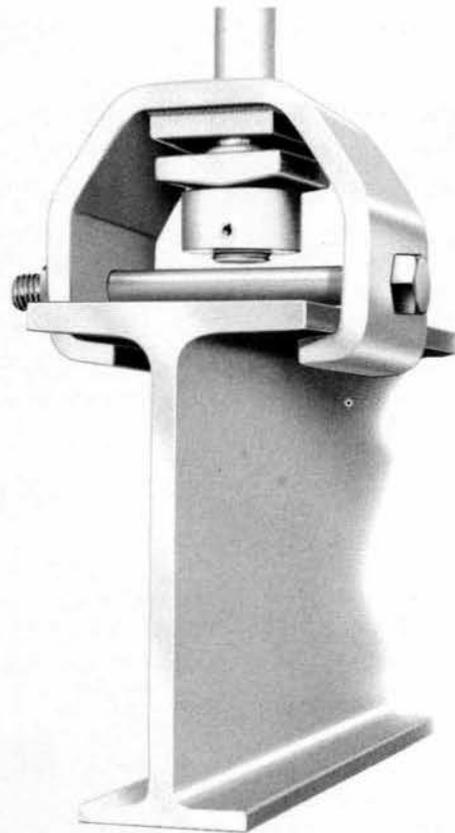


FIGURE 40

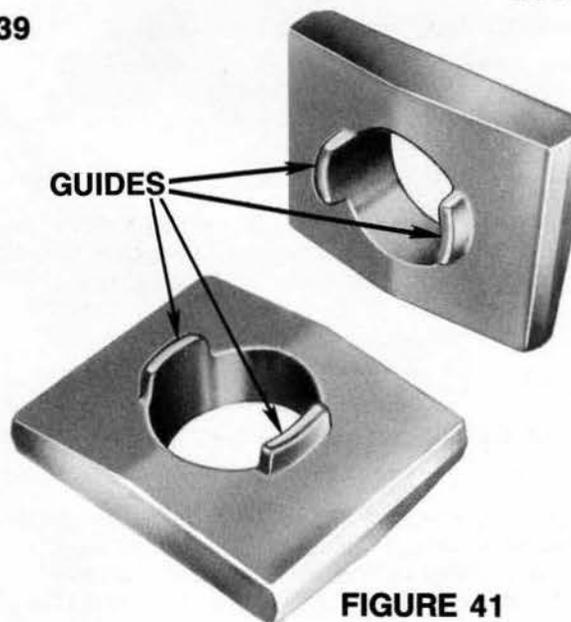


FIGURE 41

5. Assemble lower hanger components using girder track hangers as follows:
 - a. Drop gimbal washer, with guides ON TOP, down over hanger rod until gimbal washer rests on fixed lower rod nut. Refer to Figure 41.
 - b. Slip girder track hanger down over hanger rod onto gimbal washer with guides fitting into hole of girder track hanger. Refer to Figure 29.

INSTALLATION

NOTICE

GUIDES ON GIMBAL WASHER MUST FIT UP INTO HOLE IN GIRDER TRACK HANGER.

6. Assemble upper hanger components using beam cleats as follows:
 - a. Remove plastic cover from threads of hanger rod and slip beam cleat down over hanger rod. Refer to Figure 25.
 - b. Drop gimbal washer, with guides ON BOTTOM, down over hanger rod until gimbal washer rests on beam cleat. Refer to Figure 41.
 - c. Install adjustable top rod nut. DO NOT tighten set screw in nut. Set screw will be tightened after final track adjustment.
 - d. Install beam cleat, hanger rod, and lower hanger assembly as a unit in proper location on supporting steel. Connecting bolts should be snug and capable of slight movement for final adjustment. Bolts will be tightened after final track adjustment.

⚠ WARNING

BEAM CLEATS SHOULD NEVER BE USED TO ATTACH THE LOWER END OF GIMBAL HANGER ROD ASSEMBLIES TO THE UPPER FLANGE OF GIRDER TRACK. ONLY GIRDER TRACK HANGERS (REFER TO PAGE 18) ARE TO BE USED TO ATTACH THE LOWER END OF GIMBAL HANGER ROD ASSEMBLIES TO THE UPPER FLANGE OF GIRDER TRACK.

NOTICE

GUIDES ON GIMBAL WASHER MUST FIT DOWN INTO HOLE IN BEAM CLEAT.

7. Assemble upper hanger components using beam clamps as follows:
 - a. Loosen bolts on beam clamp. Refer to Figure 24.
 - b. Remove plastic cover from threads of hanger rod and slip beam clamp down over hanger rod. Refer to Figure 24.
 - c. Drop gimbal washer, with guides ON BOTTOM, down over hanger rod until gimbal washer rests on beam clamp. Refer to Figure 41.
 - d. Install adjustable top rod nut. DO NOT tighten set screw in nut. Set screw will be tightened after final track adjustment.
 - e. Install beam clamp, hanger rod, and lower hanger assembly as a unit in proper location on supporting steel. Tighten beam clamp to a snug fit with hanger rod centered between clamp ends. Whole assembly should be capable of slight movement for final adjustment. Bolts will be tightened after final track adjustment.

NOTICE

GUIDES ON GIMBAL WASHER MUST FIT DOWN INTO HOLE IN BEAM CLAMP.

8. Raise track sections into position, fitting upper flange of track into track clamps, or bolting girder track to girder track hangers. Washers must be used over slots in track or supporting steel. If track clamps are used, tighten clamp bolts with lockwashers and nuts. Bolts should be snug and capable of slight movement for final adjustment. To vertically adjust hanger rod, hold the adjusting nut and turn the hanger rod using vice-grip pliers or a pipe wrench.
9. Make splices between track sections as each track section is installed. Splice bolts can be entered but left loose, or make-up bolts can be used at this time.

⚠ WARNING

A TRACK HANGER POINT MUST BE CENTERED OVER EACH TRACK SPLICE.

INSTALLATION

10. If top of track of adjacent track ends are not flush when the operating flange of adjacent track ends are aligned, shims are to be inserted under the low side of lower hanger rod fitting to create a level or flush top-of-track condition. Shims must be furnished by the installer or erector and must be tack-welded in place if they are of the slotted type. Shims are also to be inserted under the low side of building or support steel on direct-bolt systems to create a level or flush top-of-track condition.
11. If track switches are to be installed, refer to "INSTALLATION OF TRACK SWITCHES" for instructions on track switch installation.
12. If latches, transfers, or other track accessories are to be installed, refer to Manual 69879, Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Crane and Monorail Accessories.
13. After installation of all track, track switches, and other track devices, final adjustment of the track system or crane runways is required. Refer to "FINAL ADJUSTMENT OF TRACK SYSTEM."
14. After final adjustment has been completed, electrification, if specified, should be installed. Refer to Manual 69879, Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Crane and Monorail Accessories.
15. After final adjustment and installation of electrification has been completed, bracing of hanger suspended track systems and crane runways is required. Refer to "TRACK BRACING."
16. The monorail system or crane runway is now ready for the installation of trolley hoists or underhung cranes, if specified.

If a LOUDEN® crane is being installed as part of the total installation, read and observe the instructions and warnings contained in Manual 69878, Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Cranes.

If a LOUDEN® trolley is being installed as part of the total installation, read and observe the instructions and warning contained in Manual 69879, Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Crane and Monorail Accessories.

If a hoist is to be installed on the crane or monorail trolley as part of the total installation, read and observe the instructions and warnings contained in the manual furnished with the hoist. Read and observe any instructions and warning tags attached to the hoist.

17. Install track or runway end stops at the open end or ends of the monorail or crane runway to prevent a trolley from traveling off the ends of the monorail system or a crane from traveling off the ends of the crane runway. Track or runway stops that engage trolley or crane end truck wheels are not recommended. Check that runway stops will prevent overhanging parts of a crane, trolley or hoist installed on the monorail or crane, from interfering with other equipment beyond the ends of the monorail track system or crane runway.

WARNING

NEVER OPERATE A TROLLEY ON A MONORAIL SYSTEM OR A CRANE ON A CRANE RUNWAY UNLESS TRACK OR RUNWAY END STOPS ARE INSTALLED.

18. Connect electrical power to the monorail system or crane runway.

DANGER

DISCONNECT POWER AND LOCKOUT DISCONNECTING MEANS BEFORE CONNECTING POWER SUPPLY TO MONORAIL SYSTEM OR CRANE RUNWAY.

Only a qualified electrician should connect the power supply to the monorail system or crane runway.

INSTALLATION

INSTALLATION OF TRACK SWITCHES:

TONGUE SWITCHES

1. Switches should be rigidly connected directly to superstructure steel. Place switch in position with connecting bolts snug until radiating tracks are in place. Adjust position as necessary for optimum clearance and level operating flange and tighten bolts.
2. Adjust any misalignment of heel operating flange by raising or lowering heel pivot pin, or shimming one or both sides at top flange of tongue or incoming tracks.
3. Adjust switch so that baffles close off all open ends of incoming track in all switch positions.
4. Lubricate latching mechanism and slide surfaces with Lyondell® EP Moly D Grease, packaged in a 4-ounce squeeze bottle container, and furnished with the switch. For normal service, apply Lyondell® EP Moly D Grease or equivalent to latching mechanism and slide surfaces every 3 months to maintain a coating of lubricant on these surfaces. Apply grease more frequently for heavy duty service or as required. In applications where foreign matter or dirt combines with the grease, the dirty grease should be cleaned off prior to applying new grease. Additional containers of Lyondell® EP Moly D Grease, packaged in a 4-ounce squeeze bottle, can be obtained by ordering Acco® part no. 69807.

SLIDING SWITCHES

1. Switches should be rigidly connected directly to superstructure steel. Place switch in proper location in accordance with layout specifications or prints. Level to proper elevation and secure to superstructure steel. Radiating tracks should be installed from switches and adjusted for alignment with switches, not vice versa.

WARNING

SUPPORT SWITCHES BY USING THE HOLES IN THE LUGS LOCATED ABOVE THE INCOMING RAILS. DO NOT SUPPORT SWITCHES BY USING HOLES WHICH MAY BE LOCATED AT THE FOUR CORNERS OF THE SWITCH. WHEN PROVIDED, THESE HOLES ARE FOR THE ATTACHMENT OF BRACING ONLY.

2. Adjust any misalignment of operating flange by shimming one or both sides at top flange of incoming tracks. If incoming tracks are twisted, they must be bent into correct position.
3.
 - a. **Adjustment of switch throw for manual switches:**
Two bolts, nuts, and lockwashers are provided in stationary frames to act as stops for moving carriage. Adjust these to obtain proper throw and track alignment. After throw adjustment has been completed, check that latch bar drops in place locking carriage in each position. If not, adjust latch cam so it will lock. If switch carriage is difficult to move, check hold down clip as it may be too tight. Adjust as required.
 - b. **Adjustment of switch throw for motor-operated switches:**
Loosen torque limiter on gear motor shaft to allow carriage to be moved by hand. Adjust carriage end stops as described for manual switches. After end stops are adjusted, move carriage to each end position and shim the bell crank arm so bell crank is in exact 180 degree position and locked by toggle action without excessive force against stops.

Tighten torque limiter and observe action with motor operation. The proper setting is obtained by tightening the adjustment nut, turning clockwise, with face spanner wrench sufficiently tight to obtain the required working torque. Tighten adjustment nut gradually, allowing slippage to occur at the start, and continue tightening until torque limiter will pick up and carry the required load. Then lock the adjustment nut by bending a lockwasher tab over the nut. Torque limiter is now ready for operation. If additional working torque is desired, straighten lockwasher tab and turn adjustment nut clockwise until desired torque is achieved. Then once again lock the adjustment nut by bending a lockwasher tab over the nut.

INSTALLATION

NOTICE

ALWAYS LOCK THE TORQUE LIMITER ADJUSTMENT NUT AFTER TORQUE ADJUSTMENT, BY BENDING A LOCKWASHER TAB OVER THE NUT.

- c. **Adjustment of switch throw for air-operated switches:**
Make adjustment by means of the carriage stop-bolt mounted on the stationary frame of the switch. Normal air pressure is based on 80 psi, unless otherwise specified. Lubrication and filter should be located within 10 feet of the switch. Solenoid valves are normally furnished for 115 volt, single-phase A.C. power, unless otherwise specified.
4. On power-operated switches only, check that limit switches disengage motor at each end limit of travel.
 5. Adjust switch so that baffles close off all open ends of incoming track in all switch positions.
 6. Align electrical conductor bars, if specified. Refer to Manual 69879, Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Crane and Monorail Accessories.
 7. Do not lubricate throw mechanism and slide surfaces of sliding switches.

FINAL ADJUSTMENT OF TRACK SYSTEM:

1. Start at most advantageous location and adjust one section of track to specified elevation and alignment. Proceed from this section of track and adjust each connecting section of track to specified elevation and alignment.
2. Alignment of track operating flange, both horizontal and vertical, is the most important part of final adjustment. Splices will hold this alignment when properly installed. Where track hangers span the track joint at the top flange, it is the responsibility of the installer or erector to place shims under one side of the hanger if there is a difference in track girder depths.
3. After entire system has been leveled and aligned, tighten all connection bolts and clamp bolts on track clamps, beam clamps, and girder track hangers. **MAKE SURE** that each device is secured with lockwashers and nuts.

Standard bolts furnished to connect hanger devices to the top flange of girder track or superstructure steel consist of Grade 5 hex head bolts, Grade 2 hex nuts, and spring-type lockwashers. Nuts should be tightened until spring-type lockwasher is flat.

NOTICE

IF BUILDING OR SUPERSTRUCTURE HAS SLOTTED HOLES, FLAT WASHERS MUST BE USED UNDER THE BOLT HEAD OR LOCKWASHER AND NUT.

THE USE OF GRADE 5 BOLTS AND GRADE 2 HEAVY HEX NUTS ARE BASED ON A DESIGN FACTOR OF 5 IN ACCORDANCE WITH ANSI/MMA MH-27.1. SOME INSTALLATIONS MAY REQUIRE THAT OTHER STANDARDS, SUCH AS AISC, BE FOLLOWED FOR THE ATTACHMENT OF TRACK FITTINGS. SUCH INSTALLATIONS MAY REQUIRE HARDENED FLAT WASHERS, PLATE WASHERS, ASTM A325 BOLTS, TORQUE SETTING REQUIREMENTS, OR OTHER CONDITIONS THAT GOVERN THE INSTALLATION. REFER TO SPECIFIC JOB SPECIFICATIONS AND REQUIREMENTS BEFORE SPECIFYING AND INSTALLING ANY TRACK SYSTEM.

INSTALLATION

4. On systems using hanger rod suspension, **TIGHTEN SET SCREWS** in all top rod nuts. Use only the set screw provided with the nut that has a knurled cup point and Nylock pellet. **DO NOT SUBSTITUTE OTHER TYPES OF SET SCREWS.** Head of set screw should be flush with surface of nut when tight. **ALL HANGER RODS MUST BE PLUMB.**
5. After all hangers have been installed and adjusted, splices can be tightened for tread alignment. If make-up bolts were used during installation, remove and replace with splice bolts. Use an impact screwdriver to tighten splice bolts. If hand tools must be used, turn splice bolts as tight as possible and then prick punch to prevent loosening. Operating flange of adjacent track ends may require grinding for smooth operation.

BRACING OF TRACK SYSTEM:

1. Bracing must be added to hanger rod suspended systems to limit the sway of the hanger rods within the design of the gimbal washer design limit. Bracing material is not furnished by Acco as part of the track system.

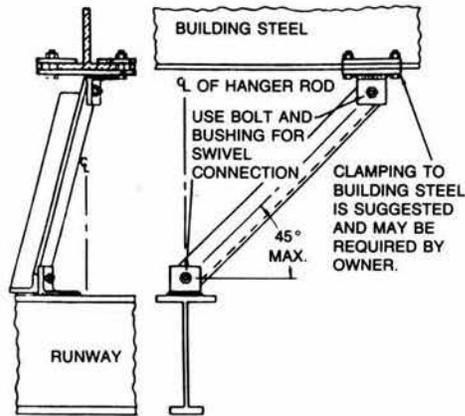
⚠ WARNING

MOVEMENT OR SWAY OF HANGER RODS IN EXCESS OF 6° AS ALLOWED BY THE GIMBAL WASHER DESIGN COULD CAUSE EXCESSIVE STRESSES IN THE HANGER RODS. SUCH STRESSES COULD RESULT IN FAILURE OF HANGER RODS AND SERIOUS BODILY INJURY OR DEATH, AND/OR PROPERTY DAMAGE.

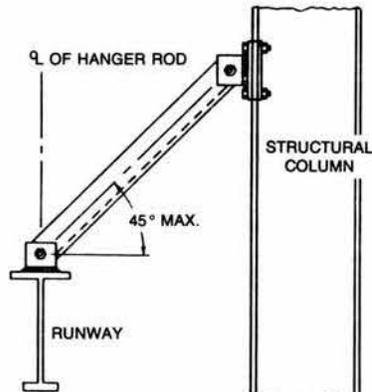
2. Bracing of hanger rod suspended track systems is the responsibility of the installer or erector, and must be determined by field conditions to accomplish the following:
 - a. Monorail tracks must be laterally (side) braced to prevent excessive sway. Lateral bracing is normally accomplished at each splice joint.
 - b. Monorail tracks must be longitudinally (end) braced in both directions.
 - c. Crane runways must be laterally (side) braced to prevent excessive sway. Normally, only one runway track is laterally braced on two-runway system, and is normally accomplished at each splice joint. In a three-runway system, normally only the center runway track is laterally braced.
 - d. Both runway tracks of crane runways must be longitudinally (end) braced in both directions.
 - e. Additional bracing may be necessary and must be determined by field conditions.
3. Regardless of suspension method:
 - a. Monorail curves should be rigidly braced.
 - b. Monorail switches should be rigidly connected directly to superstructure or supporting steel.
 - c. Both runway tracks of crane runways must be longitudinally (end) braced in both directions.
4. It is recommended that bracing be accomplished after the monorail system or crane runways have been leveled, and electrification, if specified, has been installed.
5. The information outlined below should be reviewed prior to installing bracing. This information is provided for reference only and is not to be construed as detailed instructions for any particular system. Figure 42 shows some bracing methods that could be employed, and is not to be construed as detailed instructions for any particular system or the only methods that could be employed.
 - a. Track must be adjusted to its proper height, leveled and aligned before installing bracing. **BRACING MUST NOT BE USED TO FORCE ALIGNMENT OR CARRY ANY OF THE SUPPORTED LOAD.**
 - b. Never attach bracing to hanger rods.
 - c. Bracing must not interfere with or restrict the normal expansion and contraction of the system.
 - d. Install lateral bracing at each suspension point, typically at each splice joint, but not more than 20 feet apart. Additional lateral bracing should only be considered after a crane or trolley hoist is operated on the track.

INSTALLATION

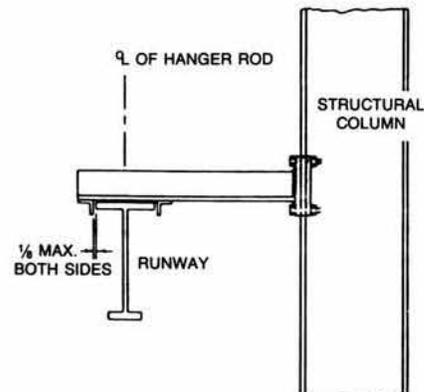
- e. Longitudinal bracing should be installed at only one point on each runway track. Center bracing is recommended for all installations.
- f. Runways suspended from a sloping roof should have bracing attached to the runway track suspended with the shortest length hanger rods.
- g. All holes in bracing should be slotted to eliminate the crane or track load being transmitted to the bracing.
- h. In a direct-interlocking crane system, the runways of each crane closest to the interlocking point should be tied together.



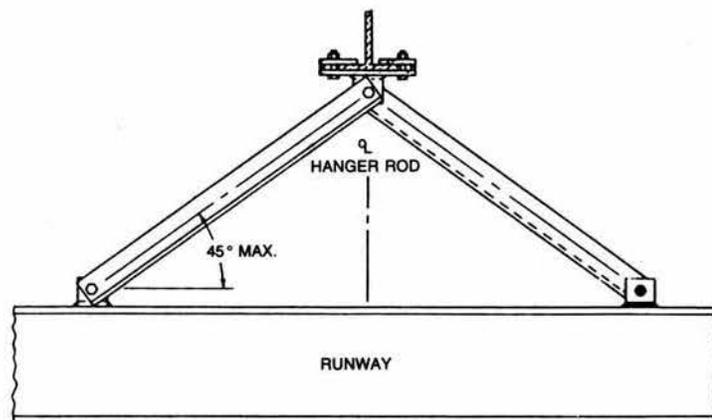
LATERAL BRACING



LATERAL BRACING



LATERAL BRACING



LONGITUDINAL CENTER BRACING

FIGURE 42

INSTALLATION

WARNING

DO NOT SUSPEND 603.7 SUPERTRACK™ FROM THE CAPPED MATERIAL OR BAR ADDED TO THE TOP OR COMPRESSION FLANGE. SUSPENSION OF 603.7 SUPERTRACK™ MUST BE MADE ON THE 603.6 TRACK SECTION ONLY.

DO NOT WELD TO THE HIGH CARBON, HIGH MANGANESE STEEL MATERIAL OF LOUDEN® TRACK. THIS INCLUDES ALL *SuperTrack™* AND THE LOWER TEE SECTION (OPERATING OR RUNNING) FLANGE OF *SuperTrack™ Girder*, *TrojanTrack™ Girder*, AND *Super-TrojanTrack™ Girder*.

BEFORE OPERATING TRACK SYSTEM:

1. Before energizing the power supply, and inspecting and testing the monorail system prior to initial operational use, check that all electrical connections are in accordance with the wiring diagram specified for the system, including any wiring diagrams located in trolley hoist or crane control enclosure of the trolley hoist or crane to be operated on the system.
2. ASME B30.11 requires that all new, altered, or modified monorail systems be inspected by a designated person prior to initial use to verify that the equipment and installation comply with applicable provisions of the standard. Such an inspection should be performed at this time, using ASME B30.11 as the basis for inspection procedures.
3. Energize the power supply to the monorail system.
4. Check crane travel for correct crane motion direction (crane drive motor or motors are properly phased). Since motor rotation of a three-phase AC motor can be changed by reversing any two of the lines feeding power to the motor, the direction of crane motion must be checked to verify that it is correct in accordance with the crane control device markings.

To check crane motion direction or crane drive motor phasing:

MOMENTARILY activate one button or lever of the crane control device and observe the direction of crane motion. If direction of crane travel agrees with the direction marking of the crane control device activated (i.e., crane direction is EAST when the crane EAST control device is activated), crane motor is properly phased. If the direction of crane travel does not agree with the direction marking of the crane control device activated (i.e., crane direction is WEST when the crane EAST control device is activated), crane motor is improperly phased and must be corrected. DO NOT USE CRANE until motor phasing is corrected.

WARNING

DO NOT OPERATE CRANE IF DIRECTION OF CRANE MOTION DOES NOT AGREE WITH THE DIRECTION MARKING ON THE CRANE CONTROL DEVICE ACTIVATED.

WARNING

DO NOT ATTEMPT TO CORRECT AN IMPROPERLY PHASED CRANE BY CHANGING ANY WIRING IN THE CRANE CONTROL DEVICE OR AT THE CRANE CONTACTORS; OR BY CHANGING THE MARKINGS ON THE CRANE CONTROL DEVICE.

INSTALLATION

To correct crane motor phasing:

DANGER

- a. DISCONNECT POWER AND LOCKOUT DISCONNECTING MEANS BEFORE RECONNECTING (REVERSING) POWER LINES TO CRANE.
- b. Only a qualified electrician should reconnect the power lines to the crane.
 - c. Interchange any two lines supplying power to the crane motor only. DO NOT reverse main power leads to the crane as this will also effect the phasing of other motors in the system (i.e. hoist motors).
 - d. Re-energize power supply to the crane.
 - e. Re-check crane travel for correct crane motion. If direction of crane travel agrees with the direction marking of the crane control device activated (i.e., crane direction is EAST when the crane EAST control device is activated), crane motor is properly phased. If the direction of crane travel does not agree with the direction marking of the crane control device activated (i.e., crane direction is WEST when the crane EAST control device is activated), crane motor is improperly phased and must be corrected by repeating steps a through e.
5. Check trolley travel for correct trolley motion direction (trolley drive motor or motors are properly phased). Since motor rotation of a three-phase AC motor can be changed by reversing any two of the lines feeding power to the motor, the direction of trolley motion must be checked to verify that it is correct in accordance with the trolley control device markings.

To check trolley motion direction or trolley drive motor phasing:

MOMENTARILY activate one button or lever of the trolley control device and observe the direction of trolley motion. If direction of trolley travel agrees with the direction marking of the trolley control device activated (i.e., trolley direction is EAST when the trolley EAST control device is activated), trolley motor is properly phased. If the direction of trolley travel does not agree with the direction marking of the trolley control device activated (i.e., trolley direction is WEST when the trolley EAST control device is activated), trolley motor is improperly phased and must be corrected. DO NOT USE TROLLEY until motor phasing is corrected.

WARNING

- DO NOT OPERATE TROLLEY IF DIRECTION OF TROLLEY MOTION DOES NOT AGREE WITH THE DIRECTION MARKING ON THE TROLLEY CONTROL DEVICE ACTIVATED.

WARNING

- DO NOT ATTEMPT TO CORRECT AN IMPROPERLY PHASED TROLLEY BY CHANGING ANY WIRING IN THE TROLLEY CONTROL DEVICE OR AT THE TROLLEY CONTACTORS; OR BY CHANGING THE MARKINGS ON THE TROLLEY CONTROL DEVICE.

INSTALLATION

To correct trolley motor phasing:

DANGER

- a. DISCONNECT POWER AND LOCKOUT DISCONNECTING MEANS BEFORE RECONNECTING (REVERSING) POWER LINES TO TROLLEY.
- b. Only a qualified electrician should reconnect the power lines to the trolley.
 - c. Interchange any two lines supplying power to the trolley motor only. DO NOT reverse main power leads to the crane as this will also effect the phasing of other motors in the system (i.e. hoist motors).
 - d. Re-energize power supply to the trolley.
 - e. Re-check trolley travel for correct trolley motion. If direction of trolley travel agrees with the direction marking of the trolley control device activated (i.e., trolley direction is EAST when the trolley EAST control device is activated), trolley motor is properly phased. If the direction of trolley travel does not agree with the direction marking of the trolley control device activated (i.e., trolley direction is WEST when the trolley EAST control device is activated), trolley motor is improperly phased and must be corrected by repeating steps a through e.
6. Check hoist travel for correct hook motion (hoist motor is properly phased). Since motor rotation of a three-phase AC motor can be changed by reversing any two of the lines feeding power to the motor, the direction of hook motion must be checked to verify that it is correct in accordance with the hoist control device markings.

To check hook motion direction or motor phasing:

DO NOT ACTIVATE THE DOWN BUTTON OR LEVER OF THE HOIST CONTROL DEVICE. MOMENTARILY activate the UP button or lever of the hoist control device and observe the direction of hook motion. If direction of hook travel agrees with the direction marking of the hoist control device activated (i.e., hook direction is UP when the hoist UP control device is activated), hoist motor is properly phased. If the direction of hook travel does not agree with the direction marking of the hoist control device activated (i.e., hook direction is DOWN when the hoist UP control device is activated), hoist motor is improperly phased and must be corrected. DO NOT USE HOIST until motor phasing is corrected.

WARNING

DO NOT OPERATE HOIST IF DIRECTION OF HOOK MOTION DOES NOT AGREE WITH THE DIRECTION MARKING ON THE HOIST CONTROL DEVICE ACTIVATED.

WARNING

DO NOT ATTEMPT TO CORRECT AN IMPROPERLY PHASED HOIST BY CHANGING ANY WIRING IN THE HOIST CONTROL DEVICE OR AT THE HOIST CONTACTORS; OR BY CHANGING THE MARKINGS ON THE HOIST CONTROL DEVICE.

To correct hoist motor phasing:

DANGER

- a. DISCONNECT POWER AND LOCKOUT DISCONNECTING MEANS BEFORE RECONNECTING (REVERSING) POWER LINES TO HOIST.

INSTALLATION

- b. Only a qualified electrician should reconnect the power lines to the hoist.
 - c. Interchange any two lines supplying power to the hoist.
 - d. Re-energize power supply to the hoist.
 - e. Re-check hoist travel for correct hook motion. If direction of hook travel agrees with the direction marking of the hoist control device activated (i.e., hook direction is UP when the hoist UP control device is activated), hoist motor is properly phased and proceed to step 5. If the direction of hook travel does not agree with the direction marking of the hoist control device activated (i.e., hook direction is DOWN when the hoist UP control device is activated), hoist motor is improperly phased and must be corrected by repeating steps a through e.
7. Check that end stops are installed on all open ends of crane runways or monorail track. If end stops are not present on all open ends, DO NOT operate a crane or trolley hoist until end stops are installed.
 8. If travel limit switches are installed on the crane runways or monorail system, operate the crane or trolley hoist to verify limit switch operation.
 9. For crane runways, operate the crane, without a load on the crane, for the entire travel distance of the runway monorail to check that crane and trolley hoist do not interfere with any other items or pieces of equipment located in the path of travel.
 10. If crane has a trolley hoist, operate the trolley hoist, without a load on the hoist hook, for the entire travel distance of the trolley to check that trolley, hoist, load block, and hook do not interfere with any other items or pieces of equipment located in the path of travel.
 11. For monorail systems, operate the trolley hoist or hoists, without a load on the hoist or hoists, for the entire travel distance of the monorail system to check that trolley hoist or hoists do not interfere with any other items or pieces of equipment located in the path of travel.
 12. If monorail system contains switches, check operation of all switches, and check that baffles close off all open ends of incoming track in all switch positions.
 13. If trolley hoist operates in a system with switches, operate trolley through all switches to verify alignment and operation.
 14. If crane or trolley hoist operates in a system with interlocks or transfer sections, operate crane or trolley through all such devices to verify alignment and operation, and check that baffle pins close off all open ends of incoming tracks.

TRACK LOAD TEST:

1. Complete monorails or cranes must be load tested in accordance with ASME B30.11. Therefore, it is the responsibility of the owner/user to load test the monorail, crane runway, crane or final lifting system in accordance with ASME B30.11.
2. All personnel that will operate cranes or trolley hoists on the monorail or crane runway shall read: the OPERATION section of this manual, the WARNINGS contained in this manual; the instruction manual furnished with the crane; instruction and WARNING labels on the crane; the instruction manual furnished with the hoist; and instruction and WARNING labels on the hoist before operating the hoist, crane or lifting system.

OPERATION

Operation of a monorail system or crane runway usually includes the operation of an underhung crane and/or an overhead hoist. Information in this section addresses the monorail, crane, and hoist; however, the operation section of the manuals furnished with the crane and/or hoist must be reviewed for specific operation procedures that apply to the crane and/or hoist.

Operation of an overhead hoist and crane involves more than activating the buttons or levers of the hoist and crane control devices. It is emphasized in the ASME B30 Standards that the use of overhead hoists and cranes are subject to certain hazards that cannot be met by mechanical means, but only by the exercise of intelligence, care, common sense, and experience in anticipating the motions that will occur as a result of activating the hoist or crane controls. Certain precautions are necessary before moving the load and this includes the proper rigging of loads to the hoist hook.

⚠ WARNING

CRANE, HOIST, AND MONORAIL OPERATORS SHALL BE REQUIRED TO READ THE OPERATION SECTION OF THIS MANUAL, THE WARNINGS CONTAINED IN THIS MANUAL, THE OPERATION SECTION AND WARNINGS CONTAINED IN THE MANUAL FURNISHED WITH THE CRANE, INSTRUCTION AND WARNING LABELS ON THE CRANE, THE OPERATION SECTION AND WARNINGS CONTAINED IN THE MANUAL FURNISHED WITH THE HOIST, INSTRUCTION AND WARNING LABELS ON THE HOIST, AND THE OPERATION SECTIONS OF ASME B30.11 AND ASME B30.16; AND TO BE FAMILIAR WITH THE CRANE, HOIST, AND MONORAIL; AND CRANE, HOIST, AND MONORAIL CONTROLS BEFORE BEING AUTHORIZED TO OPERATE THE CRANE, HOIST, AND MONORAIL OR LIFTING SYSTEM.

CRANE, HOIST, AND MONORAIL OPERATORS SHOULD BE TRAINED IN PROPER RIGGING PROCEDURES TO BE FOLLOWED IN THE ATTACHMENT OF LOADS TO THE HOIST HOOK.

CRANE, HOIST, AND MONORAIL OPERATORS SHOULD BE TRAINED TO BE AWARE OF POTENTIAL MALFUNCTIONS OF THE EQUIPMENT THAT REQUIRE ADJUSTMENT OR REPAIR, AND TO BE INSTRUCTED TO STOP OPERATION IF SUCH MALFUNCTIONS OCCUR, AND TO IMMEDIATELY ADVISE THEIR SUPERVISOR SO CORRECTIVE ACTION CAN BE TAKEN.

CRANE, HOIST, AND MONORAIL OPERATORS SHOULD HAVE NORMAL DEPTH PERCEPTION, FIELD OF VISION, REACTION TIME, MANUAL DEXTERITY, AND COORDINATION.

CRANE, HOIST, AND MONORAIL OPERATORS SHOULD NOT BE SUBJECT TO SEIZURES, LOSS OF PHYSICAL CONTROL, PHYSICAL DEFECTS, OR EMOTIONAL INSTABILITY THAT COULD RESULT IN ACTIONS OF THE OPERATOR BEING A HAZARD TO THE OPERATOR OR OTHERS.

CRANE, HOIST, AND MONORAIL OPERATORS SHOULD NOT OPERATE A CRANE, HOIST, MONORAIL, OR LIFTING SYSTEM WHEN UNDER THE INFLUENCE OF ALCOHOL, DRUGS, OR MEDICATION.

MONORAILS, CRANES AND OVERHEAD HOISTS ARE INTENDED ONLY FOR VERTICAL LIFTING SERVICE OF FREELY SUSPENDED UNGUIDED LOADS. DO NOT USE MONORAIL, CRANE OR HOIST FOR LOADS THAT ARE NOT LIFTED VERTICALLY, LOADS THAT ARE NOT FREELY-SUSPENDED, OR LOADS THAT ARE GUIDED. IF SUCH CONDITIONS EXIST, CONTACT ACCO CHAIN & LIFTING PRODUCTS.

BEFORE EACH SHIFT OR BEFORE THE FIRST TIME THE MONORAIL SYSTEM OR CRANE IS TO BE USED EACH SHIFT:

THE OPERATOR:

SHALL visually inspect wire rope for broken wires, broken strands, kinks, and any type of deformation or damage of the rope structure.

SHALL visually inspect hooks for nicks, gouges, deformation of the throat opening, wear on saddle or load bearing point, and twisting.

OPERATION

- SHALL visually inspect hook latches for proper operation or damage that does not allow proper operation.
- SHALL replace warning label or labels if missing or illegible.
- SHALL report any damage or malfunctions to the supervisor.
- SHALL NOT operate monorail, crane, or hoist if any damage or malfunctions exist.
- SHALL NOT operate monorail, crane, or hoist if it is tagged with an out-of-order sign.

BEFORE OPERATING THE MONORAIL SYSTEM OR CRANE AND APPLYING THE LOAD:

THE OPERATOR:

- SHALL be familiar with all operating controls of the monorail, crane, and hoist.
- SHALL be familiar with the OPERATION Section of this manual, the WARNINGS contained in this manual, instructions and WARNING labels on the crane and/or hoist or lifting system, the OPERATION section of the manual furnished with the crane and/or hoist, and the OPERATION Sections of ASME B30.11 and ASME B30.16.
- SHALL be instructed in the operation or operations to be performed.
- SHALL NOT operate monorail, crane, or hoist if any damage or malfunctions exist;
- and**
- SHALL report any damage or malfunctions to the supervisor.
- SHALL NOT operate monorail, crane, or hoist if it is tagged with an out-of-order sign.
- SHALL center crane and/or hoist over load.
- SHALL NOT use the hoist wire rope as a sling to wrap around the load.
- SHALL attach the load to the hoist hook by suitable means such as slings or lifting devices.
- SHALL only attach loads to the hoist hook that do not exceed the rated load capacity of the monorail, crane, hoist, or lifting system.
- SHALL verify that the size of the attachment of the sling or other lifting device to be used is compatible with the size of the hoist hook.
- SHALL verify that the attachment part of the sling or other lifting device is properly seated in the base, bowl, or saddle of the hoist hook.
- SHALL verify that the hook latch operates properly and that the hook latch properly bridges and closes the hook throat opening.
- SHALL verify that the latch of the hoist hook will not support any part of the load.
- SHALL verify that the load or any part of the load will not be applied to and/or not supported by the tip or point of the hook.
- SHALL verify that load will be properly balanced when it is lifted.
- SHALL verify that side loads will not be applied to the monorail, crane, or hoist when the load is lifted.
- SHALL verify that hoist wire rope is not kinked or twisted, and that wire rope parts are not twisted about each other.
- SHALL verify that hoist wire rope is properly seated in the drum grooves and sheaves.
- SHALL notify personnel in the area that a load will be lifted and verify that all personnel are clear of the load.
- SHALL verify that when the load is lifted, it will clear all material, machinery, or other obstructions in the area.

OPERATION

WHILE OPERATING THE MONORAIL SYSTEM OR CRANE AND MOVING THE LOAD:

THE OPERATOR:

- SHALL NOT engage in any activity that will divert the attention of the operator.
- SHALL NOT lift, lower, or transport a load with the monorail, crane or hoist until the operator and all other personnel are clear of the load and the path of the load.
- SHALL verify that the load, crane, and/or hoist will clear all obstacles before moving or rotating the load.
- SHALL avoid moving loads over personnel.
- SHALL NOT lift, lower, or transport personnel by means of the monorail, crane, hoist, trolley, hoist hook, or load.
- SHALL slowly inch the hook into engagement with the load to eliminate wire rope slack and reduce impact loading of the monorail, crane, or hoist.
- SHALL avoid unnecessary inching and quick reversals of direction.
- SHALL only lift the load a few inches to verify that the load is properly balanced before continuing with the lift.
- SHALL only lift the load a few inches to verify that the hoist braking system is functioning properly before continuing with the lift.
- SHALL only traverse the load a few inches to verify that the crane or trolley braking system is functioning properly before continuing with travel.
- SHALL avoid swinging of the load or hoist hook when the crane and/or hoist is traveling.
- SHALL avoid sharp contact between trolleys or between trolleys and stops.
- SHALL avoid sharp contact between cranes or between cranes and stops.
- SHALL NOT use hoist limit switches or devices as a normal means of stopping the hoist.
- SHALL NOT lower the load beyond the point where less than two wraps of wire rope remain at each anchorage on the drum, unless a lower limit device is provided, in which case no less than one wrap of wire rope shall remain at each anchorage on the drum.
- SHALL not operate trolleys into and through switches unless the switch tongue or carriage is positioned in line with the incoming track.

PARKING THE LOAD:

THE OPERATOR:

- SHALL NOT lower a load with the hoist until the operator and all other personnel are clear of the load and the path of the load.
- SHALL verify that the load will clear all obstacles before lowering the load.
- SHALL block loads before landing if slings or other lifting devices must be removed from under the landed load.
- SHALL exercise care when removing a sling from under a landed and blocked load.
- SHALL NOT leave a suspended load unattended unless specific precautions to prevent the load from inadvertent lowering have been instituted and are in place.
- SHALL position the hoist load block and hook above head level for storage when the hoist is not in use.

OPERATION

GENERAL:

THE OPERATOR:

SHALL know hand signals used for hoist and crane operations if a signal-person is used in the operation, and accept signals of only persons authorized to give hand signals EXCEPT to obey a stop signal regardless who gives it.

SHALL NOT adjust or repair a crane or hoist unless qualified and authorized to perform maintenance.

SHALL NOT use a hoist load limiting device as a means to measure the load.

GENERAL DO'S AND DO NOT'S:

DO establish a regular inspection schedule and maintain a record of all inspections performed with special attention directed to wire ropes, hooks, and brakes.

DO remove the crane and hoist from service to perform necessary maintenance and repair.

DO follow recommended maintenance procedures for taking a crane and hoist out of service to inspect and perform maintenance and repair.

DO use the original crane and hoist manufacturer's recommended parts when repairing a crane or hoist and replacing worn or damaged parts.

DO NOT allow unqualified or unauthorized personnel to operate, inspect, maintain, or repair a crane or hoist.

DO NOT operate a crane and hoist that is damaged or has any actual or suspected mechanical or electrical malfunction.

DO NOT attempt to lengthen wire rope or repair damaged wire rope.

DO NOT use the wire rope, any part of the monorail, crane, hoist, or the load block and hook as a ground for welding.

DO NOT allow a welding electrode to be touched to the wire rope.

DO NOT remove or obscure any warnings or warning labels on the monorail, crane, hoist, or lifting system.

DO NOT walk under a suspended load.

DO NOT perform ANY work on a suspended load that requires a worker to be positioned under the suspended load.

WARNING

DO NOT WALK UNDER A SUSPENDED LOAD.

DO NOT PERFORM ANY WORK ON A SUSPENDED LOAD THAT REQUIRES A WORKER TO BE POSITIONED UNDER THE SUSPENDED LOAD.

IF IT IS ESSENTIAL THAT A WORKER BE POSITIONED UNDER A SUSPENDED LOAD TO PERFORM WORK ON THE SUSPENDED LOAD; SUCH WORK SHALL NOT BE STARTED OR PERFORMED UNTIL OTHER AUXILIARY SUPPORTING MEANS ARE PLACED UNDER THE SUSPENDED LOAD. FAILURE TO USE OTHER AUXILIARY SUPPORTING MEANS COULD RESULT IN SERIOUS BODILY INJURY OR DEATH, AND/OR PROPERTY DAMAGE.

MAINTENANCE AND INSPECTION PROCEDURES

Monorails shall be maintained, inspected, and tested in accordance with the MAINTENANCE AND REPAIR, INSPECTION, and TEST sections of this manual and in accordance with the intervals and requirements of ASME B30.11. Hoists shall be maintained, inspected, and tested in accordance with the manual furnished by the hoist manufacturer and in accordance with the intervals and requirements of ASME B30.16. Underhung cranes shall be maintained, inspected, and tested in accordance with the manual furnished by the crane manufacturer and in accordance with the intervals and requirements of ASME B30.11.

Before maintenance or inspections are performed on a hoist, trolley, crane, crane runway, monorail, or monorail support, or crane runway or monorail conductors, the following precautions shall be taken as applicable.

1. The hoist, trolley, or crane to be inspected, tested, or repaired shall be run to a location where it will cause the least interference with other hoists, cranes, and operations in the area.
2. If a load is attached to the crane or hoist, it shall be landed.
3. All controllers shall be placed in the off position.
4. If a trolley hoist is installed on the crane, the trolley shall be blocked to prevent trolley movement.
5. The crane shall be blocked to prevent crane movement.

DANGER

6. HAZARDOUS VOLTAGES ARE PRESENT IN THE CONTROL BOX, OTHER ELECTRICAL COMPONENTS, AND CONNECTIONS BETWEEN THESE COMPONENTS.

The main switch (disconnect) of the monorail, hoist, crane, or lifting system shall be de-energized. Lock and tag the main switch in the de-energized position in accordance with ANSI Z244.1.

7. Warning signs and barriers shall be utilized on the floor beneath the monorail, hoist, crane, or lifting system where overhead maintenance, repair, or inspection work creates a hazardous area on the floor beneath the monorail, hoist, crane, or lifting system.
8. If the monorail or crane runway remains energized because other cranes or hoists on the same monorail or runway are in operation, rail stops or a signal person(s), located full-time at a visual vantage point for observing the approach of an active hoist(s) or crane(s), shall be provided to prohibit contact by the active hoist(s) or crane(s) with the idle hoist or crane; with persons performing maintenance, repair, or inspection; and with equipment used in performing the maintenance, repair, or inspection.
9. A guard or barrier shall be installed between adjacent runways for the length of the established work area to prevent contact between persons performing maintenance, repair, or inspection and a crane on the adjacent runway.
10. Safe access to the monorail, hoist, crane, or lifting system, such as scaffolding, work platforms, etc., shall be provided for personnel that will perform maintenance, repair, or inspection. If personnel are required to work at elevations in excess of 6 feet above floor or ground level, a fall prevention policy and procedure shall be developed, documented, and implemented by the owner/user.
11. After maintenance, repair, or inspection work is completed, and before the monorail, hoist, crane, or lifting system is returned to normal operation:
 - a. Any guards on the monorail, hoist, crane, or lifting system that were removed to perform maintenance, repair, or inspection work shall be reinstalled.
 - b. Any safety devices on the monorail, hoist, crane, or lifting system that were deactivated to perform maintenance, repair, or inspection work shall be reactivated.
 - c. Any parts that were replaced and other loose material shall be removed.
 - d. All equipment used in the maintenance, repair, or inspection work shall be removed.
12. Warning signs, barriers, and guards shall be removed only by authorized personnel.
13. Lock and tag on the main switch (disconnect) of the monorail, hoist, crane, or lifting system shall be removed only by the person that locked and tagged the main switch originally, or an authorized person.
14. If the extent of the maintenance or repair work requires any testing as outlined in the TEST SECTION of this manual; the manual furnished by the hoist manufacturer; the manual furnished by the crane manufacturer; or as required by, as applicable, the provisions of ASME B30.16, or ASME B30.11; such tests shall be conducted before the monorail, hoist, crane, or lifting system is returned to normal operation.

INSPECTION

Inspection procedure for monorails and underhung cranes in regular service is divided into two general classifications as outlined in ASME B30.11. These two general classifications are based upon the intervals at which inspections should be performed. The intervals are dependent upon the nature of the critical components of the monorail or crane, and the degree of exposure of monorail or crane components and parts to wear and deterioration. The degree of exposure is dependent upon monorail or crane activity, severity of monorail or crane service, and the environment of monorail or crane location. These two general classifications of monorail and crane inspection are designated as *frequent* and *periodic*. In addition, daily inspections are required to be performed by the operator at the start of each shift, or at the time the monorail or crane is first used during each shift.

FREQUENT INSPECTION: Frequent inspections are visual inspections and examinations by the operator or other designated personnel with records not required. Nominal inspection intervals are as follows:

Normal service - monthly

Heavy service - weekly to monthly

Severe service - daily to weekly

PERIODIC INSPECTION: Periodic inspections are visual and audio inspections and examinations by designated personnel making records of external conditions to provide the basis for a continuing evaluation of the monorail or crane and components. If the external inspection indicates the need, some disassembly may be required to make a more detailed inspection and examination. Nominal inspection intervals are as follows:

Normal service - annually

Heavy service - semiannually

Severe service - quarterly

WARNING

THE INSPECTION INTERVALS LISTED ABOVE ARE NOMINAL RECOMMENDATIONS FOR REFERENCE PURPOSES ONLY. THEY ARE BASED ON SINGLE SHIFT OPERATION UNDER NORMAL OPERATING CONDITIONS AND NORMAL ENVIRONMENTAL CONDITIONS. ACTUAL OPERATING AND ENVIRONMENTAL CONDITIONS SHOULD BE REVIEWED BY A QUALIFIED PERSON AND INSPECTION INTERVALS ESTABLISHED ON THE RECOMMENDATIONS OF THE QUALIFIED PERSON.

Definitions of service from ASME B30.11 are as follows:

Normal service involves operation of the monorail or crane with randomly distributed loads within the rated load limit, or uniform loads less than 65% of rated load, for not more than 25% of the time for a single work shift.

Heavy service involves operation of the monorail or crane within the rated load limit that exceeds normal service.

Severe service involves operation of the monorail or crane in normal service or heavy service with abnormal operating conditions.

A monorail or crane that is not in regular service, that has been idle for a period of one month or more, but less than one year, shall be inspected in accordance with the requirements for frequent inspection before being placed into service.

A monorail or crane that is not in regular service, that has been idle for a period of one year or more, shall be inspected in accordance with the requirements for periodic inspection before being placed into service.

Required daily inspection items to be performed by the operator at the start of each shift, or at the time the monorail or crane is first used during each shift are shown in Table 5.

INSPECTION

**TABLE 5
DAILY INSPECTIONS BY THE OPERATOR**

| INSPECTION ITEM | DESCRIPTION OF INSPECTION CHECK POINTS |
|--------------------------|--|
| Tagged Monorail or Crane | Check that monorail or crane is not tagged with an out-of-order sign. |
| Control Devices | Check that travel motions agree with control device markings. |
| Brakes | Check that all travel motions do not have excessive drift. |
| Oil Leakage | Check for any sign of oil leakage on the equipment and on the floor area beneath the equipment. |
| Unusual Sounds | Check for any unusual sounds from the equipment and equipment mechanism while operating the equipment. |
| Warning Label | Check that warning label or labels are not missing and that they are legible. |

NOTICE

IF A CRANE IS INSTALLED ON THE MONORAIL RUNWAY, REFER TO THE MANUAL FURNISHED WITH THE CRANE AND ASME B30.11 TO DETERMINE THE DAILY INSPECTION ITEMS THAT MUST BE PERFORMED BY THE OPERATOR.

IF A HOIST IS INSTALLED ON THE MONORAIL OR CRANE, REFER TO THE MANUAL FURNISHED WITH THE HOIST AND ASME B30.16 TO DETERMINE THE DAILY INSPECTION ITEMS THAT MUST BE PERFORMED BY THE OPERATOR.

⚠ WARNING

IF ANY DAMAGE OR MALFUNCTIONS ARE NOTED BY THE DAILY INSPECTION ITEMS OF TABLE 5, THE OPERATOR SHALL NOT OPERATE THE MONORAIL OR CRANE, AND SHALL IMMEDIATELY ADVISE THE SUPERVISOR SO CORRECTIVE ACTION CAN BE TAKEN. IF THE MONORAIL OR CRANE IS TAGGED WITH AN OUT-OF-ORDER SIGN, THE OPERATOR SHALL NOT OPERATE THE MONORAIL OR CRANE.

MONORAIL AND CRANE OPERATORS SHOULD BE TRAINED TO BE AWARE OF MALFUNCTIONS OF THE EQUIPMENT DURING OPERATION, AND TO IMMEDIATELY STOP OPERATION IF SUCH MALFUNCTIONS OCCUR, AND TO IMMEDIATELY ADVISE THE SUPERVISOR SO CORRECTIVE ACTION CAN BE TAKEN.

Recommended items to be checked for deficiencies or damage during frequent and periodic inspections are shown in Table 6. Detailed inspection procedures for some items will be found in specific sections of this manual. These inspections may be performed with the monorail or crane in its normal location and do not require that the monorail or crane be disassembled. Covers and other items normally supplied to allow inspection of components should be opened or removed for these inspections. Any deficiencies or damage such as those listed in Table 6 shall be examined by a designated person to determine whether they constitute a hazard, or whether any disassembly is necessary for a more detailed examination. The monorail or crane operator should make observations during regular operation for any deficiencies or damage that might appear between inspections.

INSPECTION

**TABLE 6
FREQUENT AND PERIODIC INSPECTIONS**

| INSPECTION ITEM | FREQUENCY | | DEFICIENCIES OR DAMAGE TO LOOK FOR |
|--|-----------|----------|--|
| | FREQUENT | PERIODIC | |
| All functional operating mechanisms | • | • | Maladjustment that interferes with proper operation and unusual sounds |
| Control devices | • | • | Improper operation |
| WARNING label(s) | • | • | Missing or illegible |
| Control device markings | • | • | Missing or illegible |
| Lubricant levels (For detailed inspection procedures, refer to LUBRICATION section of this manual and manual furnished with crane, trolley, or hoist) | • | • | Lubricant must be added or replaced |
| Fastening devices (bolts, nuts, pins etc.) | | • | Not properly secured (tightened), damaged or missing parts |
| Brakes | | • | Drift and excessive wear |
| Supporting structure, end trucks, and trolley | | • | Cracks, damage and distortion |
| Crane and trolley wheels | | • | Flat spots, damage, excessive wear |
| End Stops | | • | Cracks, damage, distortion, loose, or missing |
| Baffles | | • | Cracks, damage, distortion or loose; and check that baffle fully closes open ends of incoming track sections |
| Operating flange of track | | • | Cracks, damage, distortion, and smoothness of joint, and wear |
| Splices | | • | Cracks, damage, distortion, and loose splice bolts |
| Hanger Rods & Gimbal Washers | | • | Damage, distortion, vertical plumb, and loose adjusting nut causing bracing to carry load or resulting in operating flange not at proper elevation |
| Electrical apparatus | | • | Pitting, deterioration, wear |
| Contractors | | • | Pitting, deterioration, wear, and improper operation |
| Wiring and fittings | | • | Loose connections, abraded, cut, or nicked insulation |

INSPECTION

NOTICE

IF A CRANE IS INSTALLED ON THE MONORAIL RUNWAY, REFER TO THE MANUAL FURNISHED WITH THE CRANE AND ASME B30.11 TO DETERMINE THE FREQUENT AND PERIODIC INSPECTION ITEMS THAT MUST BE PERFORMED.

IF A HOIST IS INSTALLED ON THE MONORAIL OR CRANE, REFER TO THE MANUAL FURNISHED WITH THE HOIST AND ASME B30.16 TO DETERMINE THE FREQUENT AND PERIODIC INSPECTION ITEMS THAT MUST BE PERFORMED.

⚠ WARNING

IF ANY DAMAGE OR MALFUNCTIONS ARE NOTED BY THE FREQUENT OR PERIODIC INSPECTION ITEMS OF TABLE 6, THE MONORAIL OR CRANE SHALL BE TAGGED WITH AN OUT-OF-ORDER SIGN AND SHALL NOT BE RETURNED TO REGULAR OPERATION UNTIL MAINTENANCE AND REPAIR OF THE DAMAGE OR DEFICIENCIES FOUND DURING THE INSPECTION HAVE BEEN CORRECTED.

Records of the condition of critical components observed during frequent and periodic inspections should be established. This record should also record replacement, maintenance, and repair information. Use of this recorded information will allow a preventative maintenance program to be established for replacement of wearing components on a regular basis, thereby eliminating or reducing unscheduled downtime situations.

If maintenance, adjustment, replacement of parts, or repair of the monorail or crane is required because of any damage or malfunctions noted during the frequent or periodic inspections, refer to the MAINTENANCE AND REPAIR section of this manual and other sections of this manual for specific instructions or parts identification. Before performing any maintenance on the monorail or crane, refer to the MAINTENANCE AND INSPECTION PROCEDURES section of this manual. After performing maintenance, adjustment, or replacement of parts or components, refer to the TEST section of this manual.

REPLACEMENT CRITERIA FOR TRACK WEAR

Recommended criteria for replacement of LOUDEN® track is wear exceeding 10% of the original sectional dimension. Based on this 10% figure, typical replacement criteria for normal sectional dimensions subject to wear are as follows:

| TRACK TYPE & DIMENSION | ORIGINAL | REPLACE |
|----------------------------|-------------|---------|
| SUPERTRACK™ Girder | | |
| Flange Width | 3.390/3.270 | 2.943 |
| Flange Thickness | .470/.410 | .369 |
| TROJANTRACK™ Girder | | |
| Flange Width | 3.390/3.270 | 2.943 |
| Flange Thickness | .840/.780 | .702 |
| SUPERTRACK Section | | |
| 3.33 Flange Width | 3.408/3.288 | 2.959 |
| 3.33 Flange Thickness | .473/.453 | .408 |
| 2.0 Flange Width | 2.080/1.960 | 1.764 |
| 2.0 Flange Thickness | .395/.375 | .338 |

TEST

After installation, it is the responsibility of the owner/user to test the monorail or crane runway in accordance with ASME B30.11. If a crane is installed on the crane runway, it is the responsibility of the owner/user to test the crane in accordance with ASME B30.11, and instructions in the manual furnished with the crane. If a hoist is installed on the monorail or crane, it is the responsibility of the owner/user to test the hoist in accordance with ASME B30.16, and instructions in the manual furnished with the hoist.

Testing of monorail or crane runways after original installation is required when the monorail or crane runway has been altered, reinstalled, modified, or repaired; has been idle for a period of 12 months or longer; or in accordance with specific testing requirements established by the owner/user. General testing requirements are outlined in ASME B30.11 and should be followed. ASME B30.11 lists two types of tests as follows:

1. Operational test
2. Load Test

NOTICE

IF A CRANE IS INSTALLED ON THE CRANE RUNWAY, REFER TO THE MANUAL FURNISHED WITH THE CRANE AND ASME B30.11 TO DETERMINE TEST REQUIREMENTS FOR THE CRANE.

IF A HOIST IS INSTALLED ON THE MONORAIL OR CRANE, REFER TO THE MANUAL FURNISHED WITH THE HOIST AND ASME B30.16 TO DETERMINE TEST REQUIREMENTS FOR THE HOIST.

OPERATIONAL TEST:

All new, altered, reinstalled, modified, or repaired monorail systems, crane runways or cranes; or monorail systems, crane runways, or cranes that have not been used within the preceding 12 months, SHALL be tested by the owner/user before being placed in operational service. The operational test is performed without a load on the monorail, crane runway, or crane and includes: **(1)** operation of control devices; **(2)** lifting and lowering; **(3)** operation of trolley travel; **(4)** operation of crane travel; and **(5)** operation and setting of devices for interlocking mechanisms, track switches, drop sections, lift sections, travel limit switches, and end stops.

Operational test steps are as follows:

1. If monorail or crane has a hoist, check hoist hook travel for correct hook motion (hoist motor is properly phased). Since motor rotation of a three-phase AC motor can be changed by reversing any two of the lines feeding power to the motor, the direction of hook motion must be checked to verify that it is correct in accordance with the hoist control device markings.

To check hook motion direction or motor phasing:

MOMENTARILY activate the UP button or lever of the hoist control device and observe the direction of hook motion. If direction of hook travel agrees with the direction marking of the hoist control device activated (i.e., hook direction is UP when the hoist UP control device is activated), hoist motor is properly phased. If the direction of hook travel does not agree with the direction marking of the hoist control device activated (i.e., hook direction is DOWN when the hoist UP control device is activated), hoist motor is improperly phased and must be corrected. DO NOT USE HOIST until motor phasing is corrected.

⚠ WARNING

DO NOT OPERATE HOIST IF DIRECTION OF HOOK MOTION DOES NOT AGREE WITH THE DIRECTION MARKING ON THE HOIST CONTROL DEVICE ACTIVATED.

TEST

WARNING

DO NOT ATTEMPT TO CORRECT AN IMPROPERLY PHASED HOIST BY CHANGING ANY WIRING IN THE HOIST CONTROL DEVICE OR AT THE HOIST CONTACTORS; OR BY CHANGING THE MARKINGS ON THE HOIST CONTROL DEVICE.

To correct hoist motor phasing: refer to the manual furnished with the hoist.

2. If monorail system or crane has a motorized trolley, check trolley travel motion for agreement with the direction marking of the trolley control device.

To check trolley motion direction or trolley motor phasing:

MOMENTARILY activate one button or lever of the trolley control device and observe the direction of trolley motion. If direction of trolley travel agrees with the direction marking of the trolley control device activated (i.e., trolley direction is EAST when the trolley EAST control device is activated), trolley motor is properly phased. If the direction of trolley travel does not agree with the direction marking of the trolley control device activated (i.e., trolley direction is WEST when the trolley EAST control device is activated), trolley motor is improperly phased and must be corrected. DO NOT USE TROLLEY until motor phasing is corrected.

WARNING

DO NOT OPERATE TROLLEY IF DIRECTION OF TROLLEY MOTION DOES NOT AGREE WITH THE DIRECTION MARKING ON THE TROLLEY CONTROL DEVICE ACTIVATED.

WARNING

DO NOT ATTEMPT TO CORRECT AN IMPROPERLY PHASED TROLLEY BY CHANGING ANY WIRING IN THE TROLLEY CONTROL DEVICE OR AT THE TROLLEY CONTACTORS; OR BY CHANGING THE MARKINGS ON THE TROLLEY CONTROL DEVICE.

To correct trolley motor phasing:

DANGER

- a. DISCONNECT POWER AND LOCKOUT DISCONNECTING MEANS BEFORE RECONNECTING (REVERSING) POWER LINES TO TROLLEY.

- b. Only a qualified electrician should reconnect the power lines to the trolley.
- c. Interchange any two lines supplying power to the trolley motor only. DO NOT reverse main power leads to the hoist or crane as this will also effect the phasing of the hoist and crane motors.
- d. Re-energize power supply.
- e. Re-check trolley travel for correct trolley motion. If direction of trolley travel agrees with the direction marking of the trolley control device activated (i.e., trolley direction is EAST when the trolley EAST control device is activated), trolley motor is properly phased. If the direction of trolley travel does not agree with the direction marking of the trolley control device activated (i.e., trolley direction is WEST when the trolley EAST control device is activated), trolley motor is improperly phased and must be corrected by repeating steps a through e.

TEST

3. Check crane travel motion for agreement with the direction marking of the crane control device.
To check crane motion direction or crane motor phasing:

MOMENTARILY activate one button or lever of the crane control device and observe the direction of crane motion. If direction of crane travel agrees with the direction marking of the crane control device activated (i.e., crane direction is EAST when the crane EAST control device is activated), crane motor is properly phased. If the direction of crane travel does not agree with the direction marking of the crane control device activated (i.e., crane direction is WEST when the crane EAST control device is activated), crane motor is improperly phased and must be corrected. DO NOT USE CRANE until motor phasing is corrected.

WARNING

DO NOT OPERATE CRANE IF DIRECTION OF CRANE MOTION DOES NOT AGREE WITH THE DIRECTION MARKING ON THE CRANE CONTROL DEVICE ACTIVATED.

WARNING

DO NOT ATTEMPT TO CORRECT AN IMPROPERLY PHASED CRANE BY CHANGING ANY WIRING IN THE CRANE CONTROL DEVICE OR AT THE CRANE CONTACTORS; OR BY CHANGING THE MARKINGS ON THE CRANE CONTROL DEVICE.

To correct crane motor phasing:

DANGER

- a. DISCONNECT POWER AND LOCKOUT DISCONNECTING MEANS BEFORE RECONNECTING (REVERSING) POWER LINES TO CRANE.
- b. Only a qualified electrician should reconnect the power lines to the crane.
 - c. Interchange any two lines supplying power to the crane motor only. DO NOT reverse main power leads to the hoist or crane as this will also effect the phasing of the hoist and trolley motors.
 - d. Re-energize power supply.
 - e. Re-check crane travel for correct crane motion. If direction of crane travel agrees with the direction marking of the crane control device activated (i.e., crane direction is EAST when the crane EAST control device is activated), crane motor is properly phased. If the direction of crane travel does not agree with the direction marking of the crane control device activated (i.e., crane direction is WEST when the crane EAST control device is activated), crane motor is improperly phased and must be corrected by repeating steps a through e.
4. Operate hoist in the raising and lowering direction, without load on the hook, and stop motion to check operation of the hoist motor brake. Refer to the manual furnished with the hoist for instructions on hoist motor brake test and hoist motor brake adjustment.
 5. Check operation of hoist limit switches as outlined in the manual furnished with the hoist.

TEST

⚠ WARNING

NEVER OPERATE HOIST WITHOUT THE PROTECTION OF PROPERLY FUNCTIONING LIMIT SWITCHES.

6. Operate crane in both travel directions, without load on the crane, and stop motion to check operation of the crane drive motor brake. The crane should stop within a distance equal to 10% of the full load travel speed of the crane. If the crane does not stop within this distance, the crane drive motor brake requires adjustment. Refer to the manual furnished with the crane for instructions on crane motor brake test and crane motor brake adjustment.
7. Operate trolley in both travel directions, without load on the trolley, and stop motion to check operation of the trolley drive motor brake. The trolley should stop within a distance equal to 10% of the full load travel speed of the trolley. If the trolley does not stop within this distance, the trolley drive motor brake requires adjustment. Refer to the manual furnished with the hoist or trolley for instructions on trolley motor brake test and trolley motor brake adjustment.
8. If travel limit switches are installed on the monorail or runway operate the crane or trolley hoist to verify limit switch operation. Adjust as required.

⚠ WARNING

NEVER OPERATE A MONORAIL SYSTEM OR CRANE WITHOUT THE PROTECTION OF PROPERLY FUNCTIONING TRAVEL LIMIT SWITCHES.

⚠ DANGER

DISCONNECT POWER AND LOCKOUT DISCONNECTING MEANS BEFORE ADJUSTING LIMIT SWITCHES. LIMIT SWITCHES SHOULD BE ADJUSTED USING A CONTINUITY TESTER OR OTHER TYPE OF TESTER THAT WILL INDICATE OPEN OR CLOSED CIRCUITS WITHOUT THE NEED OF ELECTRICAL POWER.

Only a qualified electrician should adjust switches.

9. For crane runways, operate the crane, without a load on the crane, for the entire travel distance of the runway monorail to check that crane and trolley hoist do not interfere with any other items or pieces of equipment located in the path of travel.
10. If crane has a trolley hoist, operate the trolley hoist, without a load on the hoist hook, for the entire travel distance of the trolley to check that trolley, hoist, load block, and hook do not interfere with any other items or pieces of equipment located in the path of travel.
11. If crane operates in a system with interlocks or transfer sections, operate crane or trolley through all such devices to verify alignment and operation. Adjust as required.

⚠ WARNING

NEVER OPERATE CRANE WITHOUT THE PROTECTION OF PROPERLY FUNCTIONING LOCKING AND SAFETY DEVICES.

12. Crane is now ready to be load tested, if required.

TEST

13. For monorail systems, operate the trolley hoist, without a load on the hoist, for the entire travel distance of the monorail system to check that trolley, hoist load block, and hook do not interfere with any other items or pieces of equipment located in the path of travel.
14. If monorail system contains switches, interlocks, or transfer sections, operate trolley hoist through all such devices to verify alignment and operation. Check that baffles fully close open ends of incoming track to the switch, interlock, or transfer section. Adjust as required.

⚠ WARNING

NEVER OPERATE MONORAIL SYSTEM WITHOUT THE PROTECTION OF PROPERLY FUNCTIONING LOCKING AND SAFETY DEVICES.

15. Monorail system is now ready to be load tested, if required.

LOAD TEST:

All new, altered, reinstalled, modified, or repaired monorail systems and crane runways SHALL be load tested by the owner/user before being placed in operational service.

All cranes in which load suspension parts have been altered, replaced, or repaired SHALL be dynamically tested by the owner/user before being placed in operational service. Refer to the manual furnished with the crane and ASME B30.11 to determine test requirements for the crane.

All hoists in which load suspension parts have been altered, replaced, or repaired SHALL be dynamically tested by the owner/user before being placed in operational service. Refer to the manual furnished with the hoist and ASME B30.16 to determine test requirements for the hoist.

The load test shall be conducted under the direction of a designated person and a record of the test should be made. The test load applied to the monorail system or crane runway shall be not less than 100% of the rated load capacity of the monorail system or crane runway, or greater than 125% of the rated load capacity of the monorail system or crane runway. Functions to be performed during the load test include: **(1)** operation of control devices; **(2)** lifting and lowering; and **(3)** operation of brakes.

Load test steps are as follows:

1. Attach test load to the hoist hook.
2. Before lifting the load, operate the hoist in the lifting direction to take any slack out of the hoist wire rope.
3. Lift the load a few inches and stop the hoist. If brakes stop and hold the load, continue lifting and lowering the load several feet, stopping the hoist several times in each direction to check that the hoist braking system stops and holds the load.
4. If the hoist braking system stops and holds the load, the hoist operates in accordance with the control devices, and no unusual sounds are present during operation, proceed with test.
5. If the hoist braking system does not stop and hold the load, the hoist does not operate in accordance with the control devices, or any unusual sounds are present during operation, corrective action must be taken. Refer to the manual furnished with the hoist.
6. Transport the test load by means of the trolley hoist or carrier the full travel length of the trolley or carrier on the bridge girder; or the full travel length of the monorail system.

TEST

7. For crane runways, transport the test load by means of the crane the full travel length of the crane runway, in one direction with the trolley or carrier as close to the extreme right-hand end of the crane bridge girder as practical, and in the other direction with the trolley or carrier as close to the extreme left-hand end of the crane bridge girder as practical. When cranes operate on more than two runways (multiple-truck cranes), the crane shall transport the test load for the full travel length of the runway with the test load under each of the intermediate end trucks.

Upon completion of the operational and load tests, the crane is ready to be released for operating purposes.

MAINTENANCE AND REPAIR

If maintenance, adjustment, replacement of parts, or repair of the monorail system or crane runway is required because of any damage or malfunctions noted during the daily, frequent, or periodic inspections outlined in the INSPECTION section of this manual; because of conditions found during a monorail system or crane runway test as outlined in the TEST section of this manual; or based upon specific instructions outlined in other sections of this manual; the monorail system or crane runway shall be taken out of service, and maintenance performed as required.

WARNING

BEFORE PERFORMING ANY MAINTENANCE OR ADJUSTMENTS ON THE MONORAIL SYSTEM OR CRANE RUNWAY, REFER TO THE MAINTENANCE AND INSPECTION PROCEDURES SECTION OF THIS MANUAL.

DANGER

HAZARDOUS VOLTAGES ARE PRESENT IN THE CONTROL BOX, OTHER ELECTRICAL COMPONENTS, AND CONNECTIONS BETWEEN THESE COMPONENTS.

The main switch (disconnect) of the crane, or lifting system shall be de-energized. Lock and tag the main switch in the de-energized position in accordance with ANSI Z244.1.

Follow the instructions outlined in various sections of this manual for specific components or portions of the monorail system or crane runway where maintenance or adjustment is required. Refer to the parts identification pages for the specific portion of components where maintenance or adjustment is being performed and to identify any part numbers requiring replacement.

If any instructions are not clear; or if any additional information is required in reference to adjustment, maintenance, or identification of parts; contact Acco Chain & Lifting Products or the distributor of the track and fittings.

LUBRICATION

All moving parts of the monorail system or crane runway for which lubrication is specified should be inspected, checked, and lubricated on a regular basis. The method used to deliver lubricant should be checked for proper delivery of the lubricant. This section applies to LOUDEN® monorail track systems only.

If a crane is installed as part of a crane runway system, lubrication instructions covered in the manual furnished with the crane should be followed. If the crane is a LOUDEN® crane, refer to Manual 69878: Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Series 500 Underhung Cranes.

If a trolley or carrier is installed as part of a monorail system or crane, lubrication instructions covered in the manual furnished with the trolley or carrier should be followed. If the trolley is a LOUDEN® trolley, refer to Manual 69879: Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Crane and Monorail Accessories.

If a hoist is installed as part of a crane or lifting system, lubrication instructions covered in the manual furnished with the hoist should be followed.

All equipment shall be stationary when inspecting, checking, adding or changing lubricants. The main switch (disconnect) of the monorail system, crane runway, or lifting system shall be de-energized. Lock and tag the main switch in the de-energized position in accordance with ANSI Z244.1.

WARNING

BEFORE INSPECTING, CHECKING, ADDING, OR CHANGING LUBRICANTS OF THE MONORAIL SYSTEM, CRANE RUNWAY, OR CRANE, REFER TO THE MAINTENANCE AND INSPECTION PROCEDURES SECTION OF THIS MANUAL.

CAUTION

DO NOT USE LUBRICANTS THAT DO NOT MEET THE SPECIFICATIONS OF THE RECOMMENDED LUBRICANTS.

WARNING

ALL LUBRICANTS:
MAY CAUSE MILD EYE IRRITATION - AVOID CONTACT WITH EYES.
MAY CAUSE MODERATE SKIN IRRITATION - AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. WASH THOROUGHLY AFTER HANDLING.
ARE SLIGHTLY COMBUSTIBLE - KEEP AWAY FROM EXTREME HEAT AND OPEN FLAME.

EXPOSED OR OPEN GEARS, PINIONS, LATCHING MECHANISMS AND SLIDE SURFACES:

Exposed moving parts of switches and other track devices are shipped from the factory without lubricant. Lyondell® EP Moly D Grease, packaged in a 4-ounce squeeze bottle container, is furnished with the devices requiring lubrication. During installation, the Lyondell® EP Moly D Grease should be applied to all moving parts and surfaces of devices requiring lubrication so that a coating of lubricant is on all moving parts and surfaces.

Latching mechanism and slide surfaces of Tongue Switches and Cross Switches should be lubricated.

Throw mechanism and slide surfaces of Sliding Switches should not be lubricated.

LUBRICATION

For normal service of devices requiring lubrication, apply Lyondell® EP Moly D Grease or equivalent to all exposed moving parts and surfaces every 3 months to maintain a coating of lubricant on all moving parts and surfaces. Apply grease more frequently for heavy duty service or as required.

In applications where foreign matter or dirt combines with the grease on exposed moving parts and surfaces, the dirty grease should be cleaned off the parts and surfaces prior to applying new grease.

Additional containers of Lyondell® EP Moly D Grease, packaged in a 4-ounce squeeze bottle, can be obtained by ordering Acco® part no. 69807.

BEARINGS:

Any bearings not located inside gear housings and motors are pre-lubricated and provided with shields or seals, unless provided with lube fittings, for operation in ambient temperatures between 0 °F and 104 °F, and in environments reasonably free from dust, moisture, and corrosive fumes. No additional lubricant is required for bearings with shields or seals. If bearings are provided with lube fittings, check and add NLGI No. 2 grease every 6 months. For other operating conditions, contact Acco Chain & Lifting Products or the distributor of the crane.

LOUDEN® CRANES AND TROLLEYS:

While lubrication instructions are covered in Manual 69878: Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Series 500 Underhung Cranes for LOUDEN® cranes; and Manual 69879: Installation, Operation, Maintenance, and Parts Manual for LOUDEN® Underhung Crane and Monorail Accessories for LOUDEN® trolleys, Tables 7 and 8 are duplicated from those manuals for reference purposes only. Table 7 shows recommended AGMA lubricants for LOUDEN® crane and trolley drive units based on the ambient temperature where the equipment is operating. AGMA stands for American Gear Manufacturers Association. Table 8 lists lubricants of some lubricant manufacturers in accordance with AGMA lubricant numbers.

**TABLE 7
GEAR HOUSING LUBRICANTS
LOUDEN® CRANE & TROLLEY DRIVE UNITS**

| AMBIENT TEMPERATURE | AGMA LUBRICANT |
|------------------------------|-----------------------|
| Below 15° F (-9° C) | Contact Acco |
| 15° to 60° F (-9° to 16° C) | AGMA No. 4 EP |
| 50° to 125° F (10° to 52° C) | AGMA No. 6 EP |
| Above 100° F (38° C) | Contact Acco |

LUBRICATION

**TABLE 8
AGMA LUBRICANTS BY MANUFACTURER**

| MANUFACTURER | AGMA 4EP | AGMA 6EP | AGMA 7 COMP. | AGMA 8 COMP. |
|---------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|
| Amoco Oil Co. | Perma Gear EP 150 | Perma Gear EP 320 | Worm Gear Oil | Cylinder Oil 680 |
| ARCO | Pennant NL Oil 150 | Pennant NL Oil 320 | Modoc 175 | Modoc 175 |
| Chevron USA, Inc. | Gear Compound EP Grade 150 | Gear Compound EP Grade 320 | Cylinder Oil 460X | Cylinder Oil 680X |
| Conoco | Gear Oil Grade 150 | Gear Oil Grade 320 | none | none |
| Exxon Co. USA | Spartan EP Grade 150 | Spartan EP Grade 320 | Cylestic TK-460 | Cylestic TK-680 |
| Gulf Oil Co. | EP Lubricant HD 150 | EP Lubricant HD 320 | Senate 460 | Senate 680D |
| Mobil Oil Corp. | Mobilgear 629 | Mobilgear 632 | 600W Super | Extra Hecia Super |
| Shell Oil Co. | Omala 150 | Omala 320 | Valvata Oil J460 | Valvata Oil J680 |
| Sun Oil Co. | Sun EP 1060 | Sun EP 1090 | Gear Oil 7C | Gear Oil 8C |
| Texaco | Meropa 150 | Meropa 320 | Honor Cylinder Oil 460 | 650T Cylinder Oil |
| ISO Viscosity Grade | 150 | 320 | 460 | 680 |
| Ambient Temperature | 15° to 60° F -9° to 16° C | 50° to 125° F 10° to 52° C | 15° to 60° F -9° to 16° C | 50° to 125° F 10° to 52° C |

TROUBLESHOOTING

If monorail system, crane runway, or crane operates erratically, or not at all, the equipment should be taken out of service. Any problem should be diagnosed and corrected before the equipment is returned to regular service. Refer to Table 9 for some problem areas to consider and investigate.

DANGER

DISCONNECT POWER AND LOCKOUT DISCONNECTING MEANS BEFORE PERFORMING SERVICE TO ELECTRICAL PARTS OF THIS EQUIPMENT.

Only a qualified electrician should perform service to electrical parts of this equipment.

TABLE 9

| PROBLEM | POSSIBLE CAUSE | CORRECTIVE ACTION |
|------------------------------------|---|--|
| Trolley or crane will not operate. | Power failure in power lines. | Check circuit breakers, switches, and connections in power lines. |
| | Low voltage or frequency. | Check voltage and frequency, or power supply. They must agree with data on nameplate. |
| | Motor overheated. Thermostat or thermal overload relays have tripped. | Refer to motor or brake overheating problem area. Check thermostat or thermal overloads. |
| | Improper, loose, or broken wire connection. | Check connections and lead wires. Check connections in control devices. |
| | Brake does not release. | Check connections to magnet coil. Check for open or short circuit. |
| | Magnetic contactor not operating. | Check coil for open or short circuit. Check all connections in control circuit. Check for open contact. Replace as needed. |
| | Control transformer damaged. | Check transformer fuse. Check transformer coil. Check transformer for open winding. |
| Motor burned out. | Replace motor. | |

TROUBLESHOOTING

TABLE 9 (CONTINUED)

| PROBLEM | POSSIBLE CAUSE | CORRECTIVE ACTION |
|--|---|--|
| Trolley or crane moves in wrong direction. | Reverse phasing. Improper electrical connections. | Interchange any two power supply line leads. Check all connections with wiring diagram. |
| Trolley or crane travels in only one direction. | One circuit open. Broken conductor in pendant cable. Magnetic contactor not operating. | Check circuit for loose connections. Check continuity of each conductor in the cable. If one is broken, replace cable. Check coil for open or short circuit. Check all connections in motor circuit. Check for burned contacts. Replace as needed. |
| Trolley or crane will not travel with rated load or does not have proper travel speed. | Trolley or crane overloaded. Low voltage. Trolley or crane drive motor brake dragging. ACM requires adjustment Elevation of operating flange of track out of alignment. | Reduce load to within rated capacity of hoist. Determine cause of low voltage and correct to within 10% of specified name plate voltage. Measure voltage at crane contactor. Check crane drive motor brake adjustment for proper clearance and magnet mounting for proper location and tightness. Adjust as outlined in ACM V section of this manual. Check and adjust elevation of track. |
| Trolley or crane drifts excessively when crane is stopped. | Trolley or crane drive motor brake not holding. | Inspect and check trolley or crane drive motor brake as outlined in manual furnished with trolley or crane. |

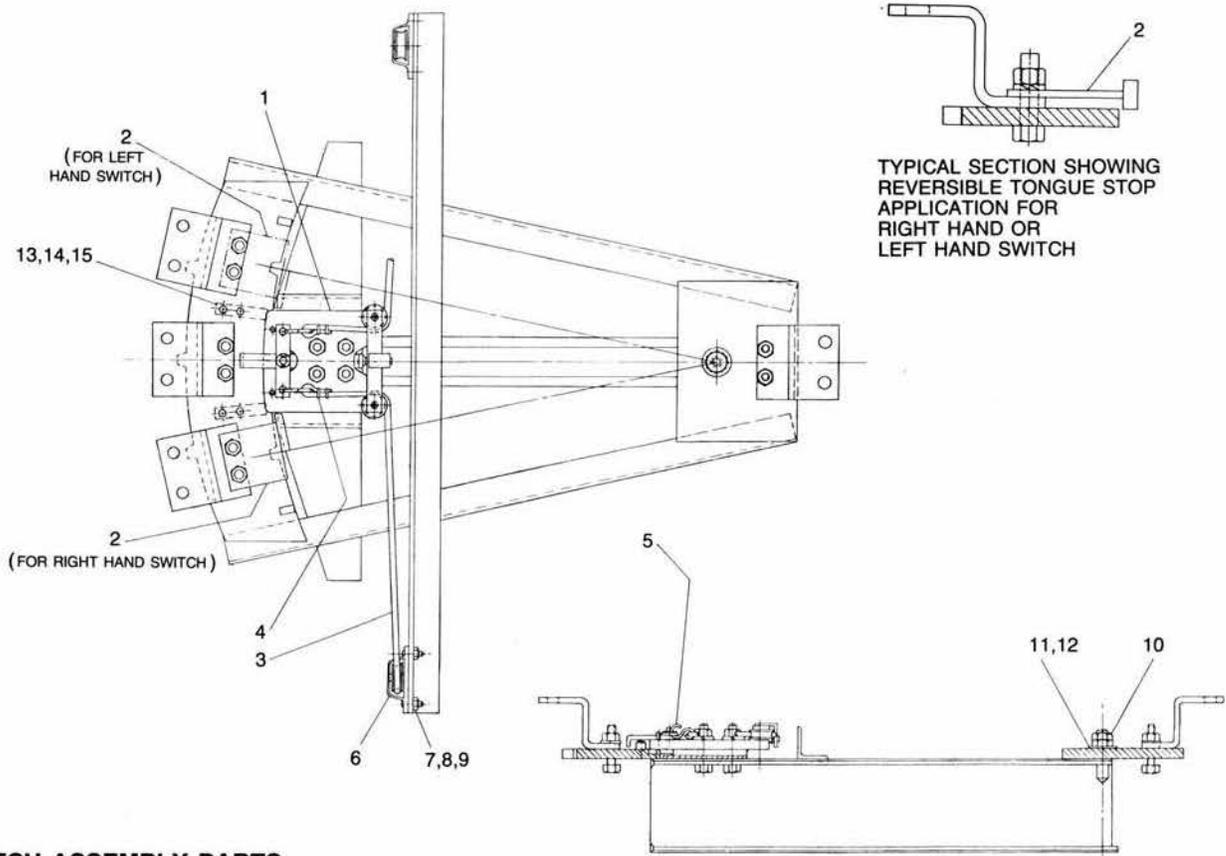
TROUBLESHOOTING

TABLE 9 (CONTINUED)

| PROBLEM | POSSIBLE CAUSE | CORRECTIVE ACTION |
|--|---|---|
| <p>Trolley or crane does not track on beam or bumps as it travels on beam.</p> | <p>Excessive wear of trolley or crane wheel treads or flat spots on trolley or crane wheel treads.</p> <p>Elevation and alignment of joints of operating flange of track out of alignment.</p> <p>Splice plates loose.</p> <p>Switches or other transfer sections not in alignment with incoming tracks.</p> <p>Bracing broken, loose, or binding and preventing track from moving laterally.</p> | <p>Inspect trolley or crane wheels and replace as necessary.</p> <p>Check and adjust elevation and alignment of track.</p> <p>Check and tighten splices.</p> <p>Check and align switch and transfer sections with all incoming tracks.</p> <p>Check all bracing and make repairs as required.</p> |
| <p>Trolley or crane operates intermittently.</p> | <p>Poor collector contact.</p> <p>Broken wires.</p> <p>Worn contacts.</p> | <p>Check for dirt or foreign matter on, and wear of contact surfaces. Clean or replace as necessary.</p> <p>Check wiring. Replace any broken wires.</p> <p>Locate and replace worn or burnt contacts.</p> |
| <p>Oil leaks.</p> | <p>Worn or damaged gaskets and/or oil seals.</p> <p>Joints not tight.</p> | <p>Replace worn or damaged parts.</p> <p>Tighten bolts to recommended torque.</p> |

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ TONGUE SWITCH ASSEMBLY 2" OPERATING FLANGE NON-ELECTRIFIED MANUALLY—OPERATED RIGHT HAND & LEFT HAND 702.6230 3-WAY — 702.6233



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-----------------------------|------|
| 1 | 265009 | Latch Mechanism | 1 |
| 2 | 265116 | Reversible Tongue Stop (a) | 1 |
| 3 | 212980 | Polypropylene Cord (b), (c) | 2 |
| 4 | 260011 | Rope Clip Ring (c) | 4 |
| 5 | 213400 | S-Hook (c) | 2 |
| 6 | 213196 | Pulley Assembly (d) | 2 |
| 7 | 212272 | Screw (d) | 4 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-------------------|------|
| 8 | 210405 | Lock Washer (d) | 4 |
| 9 | 211440 | Hex Nut (d) | 4 |
| 10 | 211715 | Jam Nut | 2 |
| 11 | 213608 | Thrust Bearing | 1 |
| 12 | 210224 | Structural Washer | 1 |
| 13 | 260003 | Baffle Plate (e) | 2 |
| 14 | 210866 | Screw (e) | 4 |
| 15 | 210407 | Lock Washer (e) | 4 |

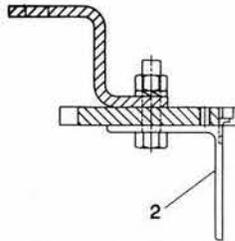
No Recommended Spare Parts

NOTES:

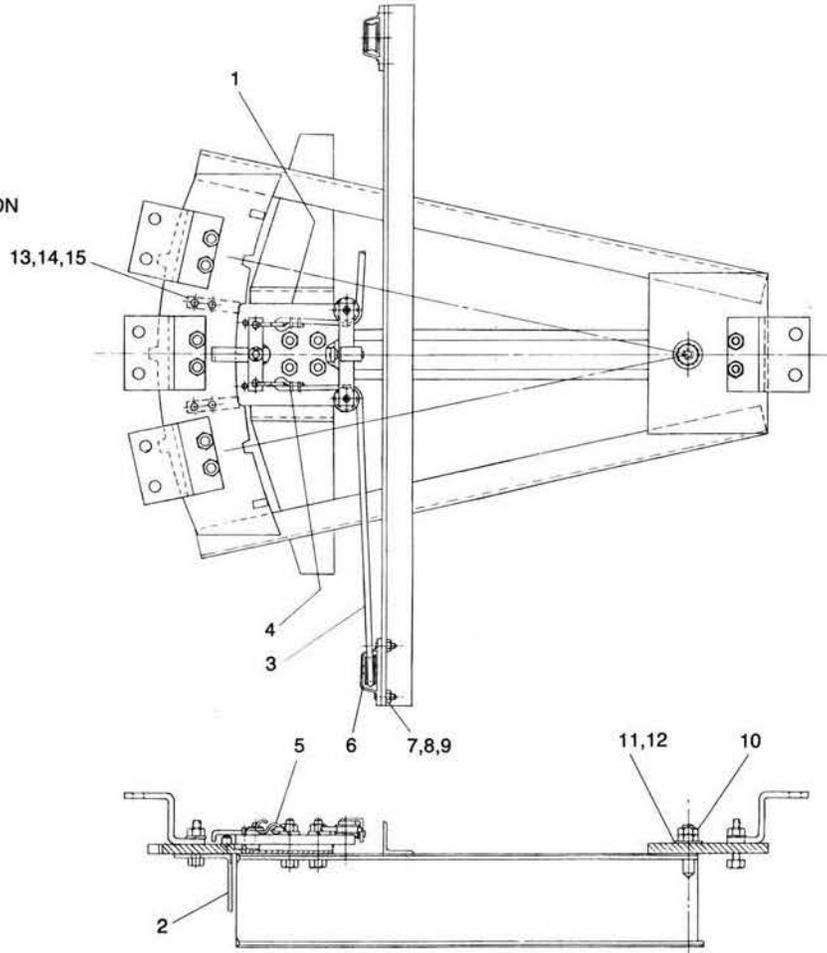
- (a) When 3-way switch is required, this item is to be removed and discarded.
- (b) Standard length equals 15 feet. Specify length required.
- (c) Rope assembly (items 3, 4, 5) is factory assembled but shipped loose for field mounting.
- (d) Pulley and fasteners are shipped loose for field mounting.
- (e) Baffle plates and fasteners are shipped loose. To be installed in field **ONLY** when Louden catalog number 402.375 2-wheel and/or 402.750 4-wheel trolleys are used through switch. Otherwise, discard these items.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ TONGUE SWITCH ASSEMBLY 2" OPERATING FLANGE NON-ELECTRIFIED MANUALLY—OPERATED WYE — 702.6232



SECTION THRU CENTER
SHOWING CENTER POSITION
LOCKOUT AND BAFFLE
APPLICATION



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|--------------------------------|------|
| 1 | 265009 | Latch Mechanism | 1 |
| 2 | 265137 | Center Position Lockout/Baffle | 1 |
| 3 | 212980 | Polypropylene Cord (a), (b) | 2 |
| 4 | 260011 | Rope Clip Ring (b) | 4 |
| 5 | 213400 | S-Hook (b) | 2 |
| 6 | 213196 | Pulley Assembly (c) | 2 |
| 7 | 212272 | Screw (c) | 4 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-------------------|------|
| 8 | 210405 | Lock Washer (c) | 4 |
| 9 | 211440 | Hex Nut (c) | 4 |
| 10 | 211715 | Jam Nut | 2 |
| 11 | 213608 | Thrust Bearing | 1 |
| 12 | 210224 | Structural Washer | 1 |
| 13 | 260003 | Baffle Plate (d) | 2 |
| 14 | 210866 | Screw (d) | 4 |
| 15 | 210407 | Lock Washer (d) | 4 |

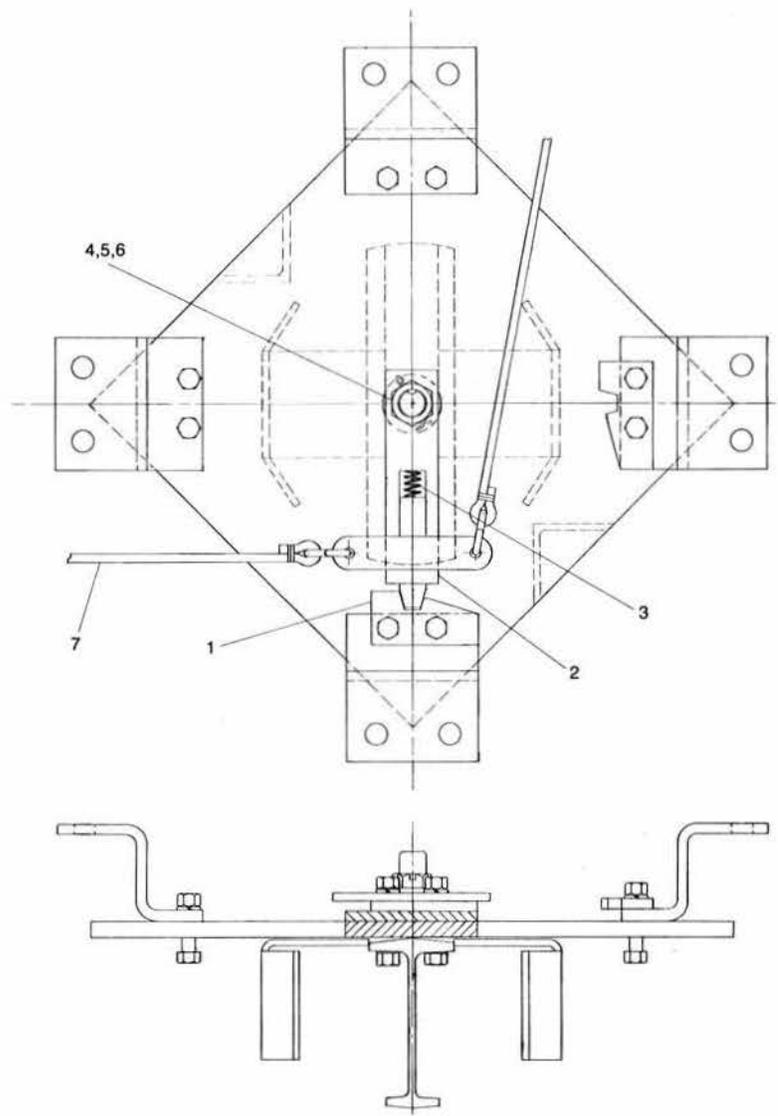
No Recommended Spare Parts

NOTES:

- (a) Standard length equals 15 feet. Specify length required.
- (b) Rope assembly (items 3, 4, 5) is factory assembled but shipped loose for field mounting.
- (c) Pulley and fasteners are shipped loose for field mounting.
- (d) Baffle plates and fasteners are shipped loose. To be installed in field **ONLY** when Louden catalog number 402.375 2-wheel and/or 402.750 4-wheel trolleys are used through switch. Otherwise, discard these items.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ CROSS SWITCH ASSEMBLY 2" OPERATING FLANGE NON-ELECTRIFIED MANUALLY—OPERATED 702.6212



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-----------------|------|
| 1 | 300008 | Latch Block | 2 |
| 2 | 280620 | Latch Assembly | 1 |
| 3 | 214255 | Spring (a) | 1 |
| 4 | 211940 | Slotted Hex Nut | 1 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---------------------------------|------|
| 5▲ | 213613 | Thrust Bearing | 1 |
| 6 | 210480 | Cotter Pin | 1 |
| 7 | 212980 | Polypropylene Cord (b) | 2 |
| 8 | 213180 | Pulley Assembly (Not Shown) (c) | 2 |

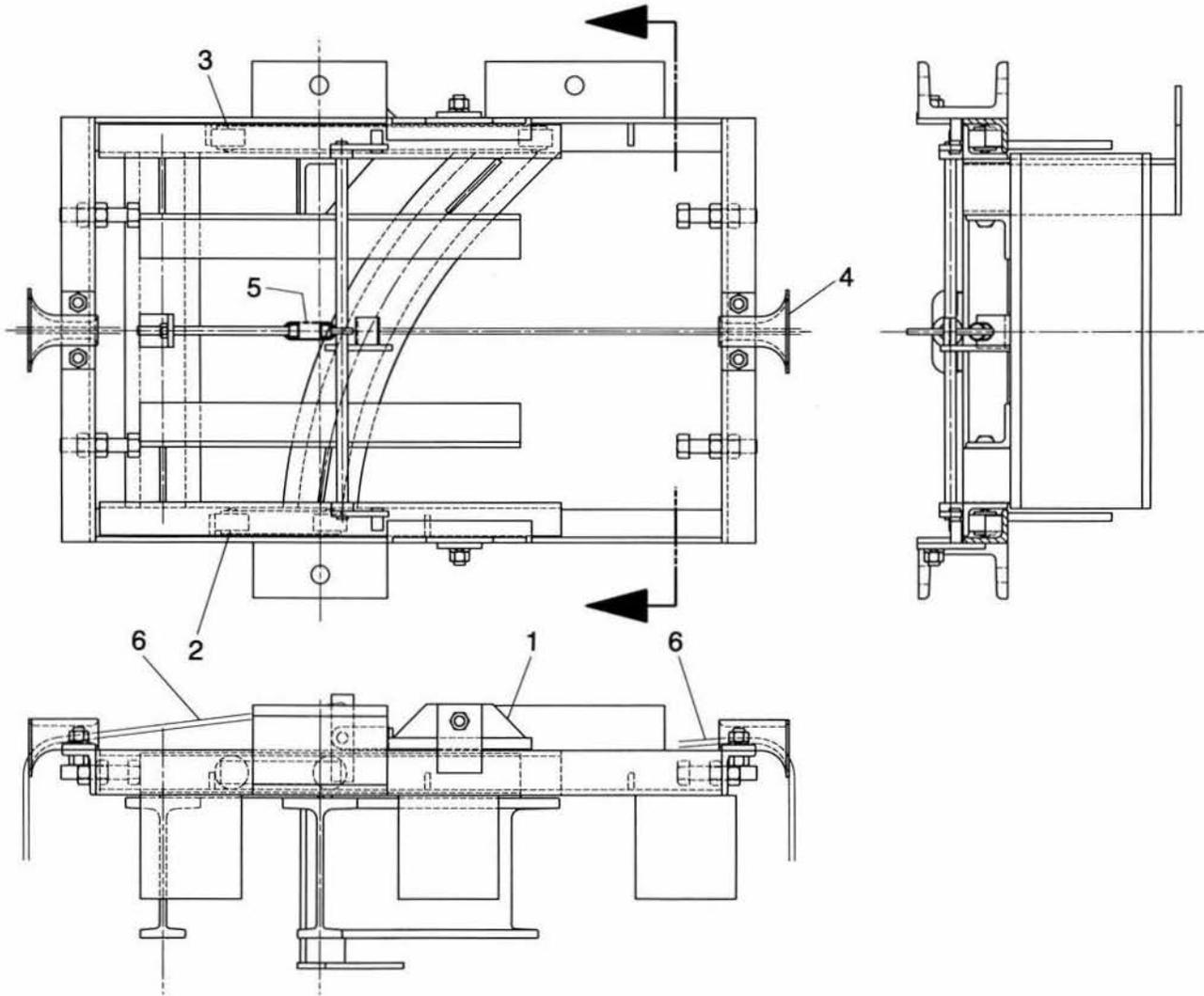
▲ Recommended Spare Part

NOTES:

- (a) Included with item number 2.
- (b) Standard length equals 15 feet. Specify length required.
- (c) Shipped loose for field mounting.

PARTS LIST — SWITCH ASSEMBLY

**SUPERTRACK™ SLIDING SWITCH ASSEMBLY
2.0" OPERATING FLANGE
NON-ELECTRIFIED
MANUALLY—OPERATED
RIGHT HAND (SHOWN) — 702.7011R
LEFT HAND (OPPOSITE) — 702.7011L**



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|-------------|------------------------|-----|
| 1 | 300766 | Latch Bar | 2 |
| 2 | 300767 | Short Roller Assembly | 1 |
| 3 | 300768 | Long Roller Assembly | 1 |
| 4 | 200019 | Rope Guide | 2 |
| 5 | 214257 | Extension Spring | 1 |
| 6 | 212980 | Polypropylene Cord (a) | 2 |

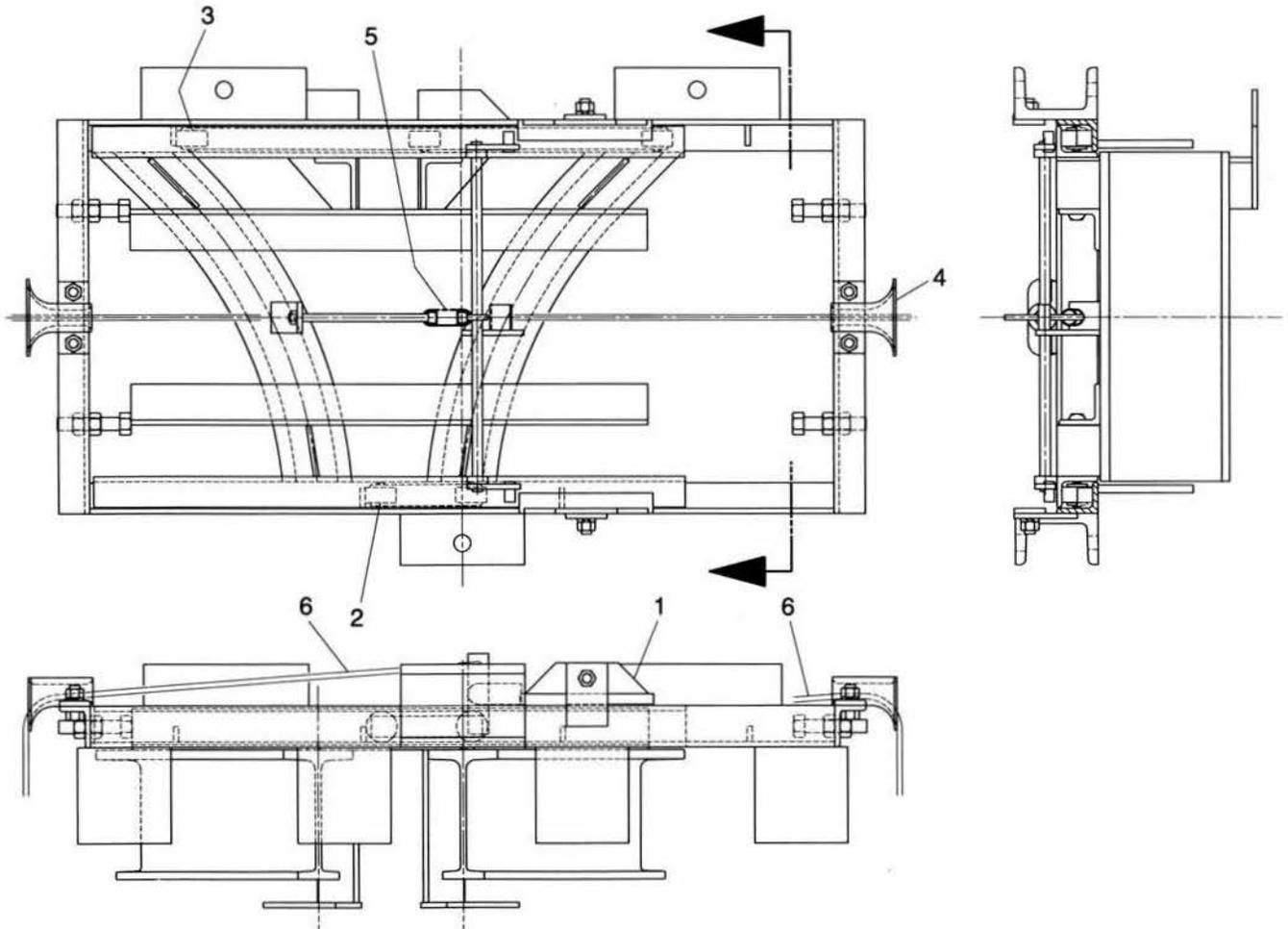
No Recommended Spare Parts

NOTE:

(a) Standard length equals 10 feet. Specify length required.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 2.0" OPERATING FLANGE NON-ELECTRIFIED MANUALLY-OPERATED WYE — 702.7012



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|-------------|------------------------|-----|
| 1 | 300766 | Latch Bar | 2 |
| 2 | 300767 | Short Roller Assembly | 1 |
| 3 | 300790 | Long Roller Assembly | 1 |
| 4 | 200019 | Rope Guide | 2 |
| 5 | 214257 | Extension Spring | 1 |
| 6 | 212980 | Polypropylene Cord (a) | 2 |

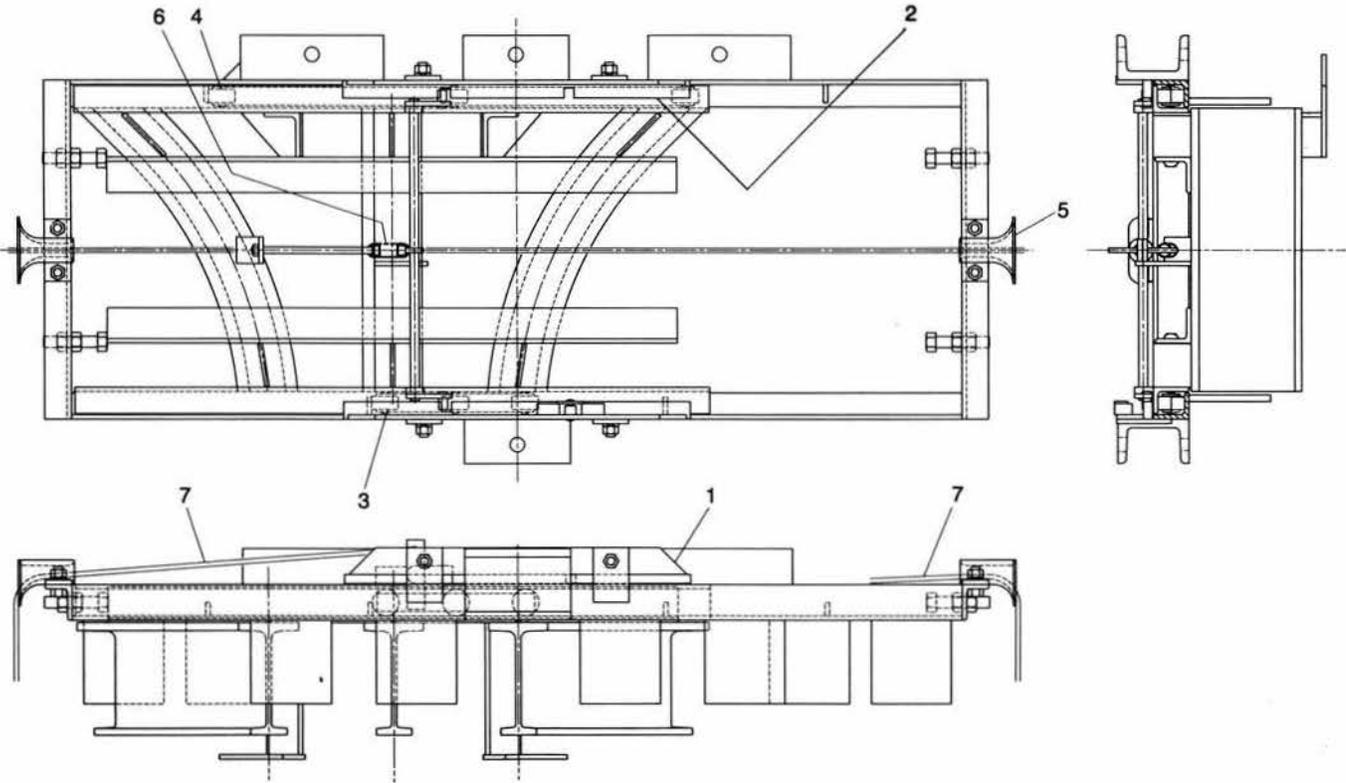
No Recommended Spare Parts

NOTE:

(a) Standard length equals 10 feet. Specify length required.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 2.0" OPERATING FLANGE NON-ELECTRIFIED MANUALLY—OPERATED 3-Way — 702.7013



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|-------------|------------------------|-----|
| 1 | 300795 | Latch Bar | 1 |
| 2 | 300796 | Latch Bar | 1 |
| 3 | 300797 | Short Roller Assembly | 1 |
| 4 | 300798 | Long Roller Assembly | 1 |
| 5 | 200019 | Rope Guide | 2 |
| 6 | 214257 | Extension Spring | 1 |
| 7 | 212980 | Polypropylene Cord (a) | 2 |

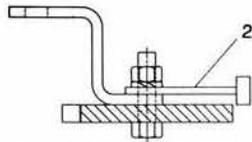
No Recommended Spare Parts

NOTE:

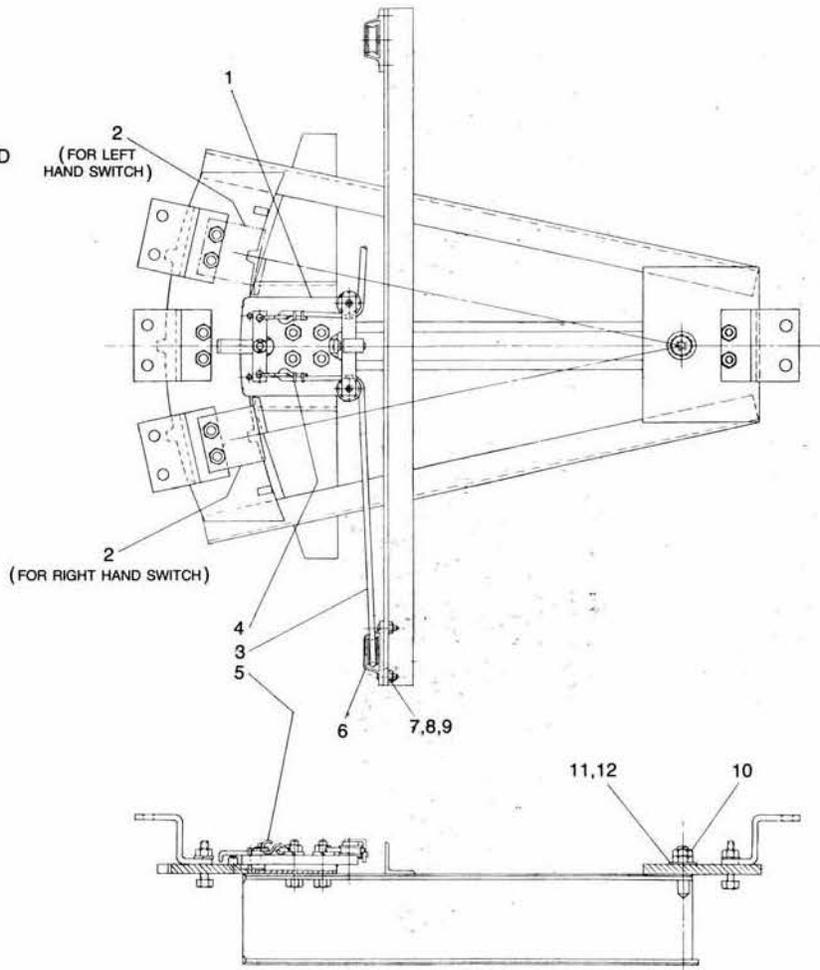
(a) Standard length equals 10 feet. Specify length required.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ TONGUE SWITCH ASSEMBLY 3.33" OPERATING FLANGE NON-ELECTRIFIED MANUALLY—OPERATED RIGHT HAND & LEFT HAND 703.6330 3-WAY — 702.6333



TYPICAL SECTION SHOWING
REVERSIBLE TONGUE STOP
APPLICATION FOR RIGHT HAND
OR LEFT HAND SWITCH



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-----------------------------|------|
| 1 | 265009 | Latch Mechanism | 1 |
| 2 | 265116 | Reversible Tongue Stop (a) | 1 |
| 3 | 212980 | Polypropylene Cord (b), (c) | 2 |
| 4 | 260011 | Rope Clip Ring (c) | 4 |
| 5 | 213400 | S-Hook (c) | 2 |
| 6 | 213196 | Pulley Assembly (d) | 2 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-------------------|------|
| 7 | 212272 | Screw (d) | 4 |
| 8 | 210405 | Lock Washer (d) | 4 |
| 9 | 211440 | Hex Nut (d) | 4 |
| 10 | 211715 | Jam Nut | 2 |
| 11 | 213608 | Thrust Bearing | 1 |
| 12 | 210224 | Structural Washer | 1 |

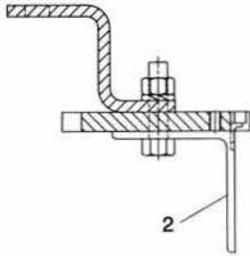
No Recommended Spare Parts

NOTES:

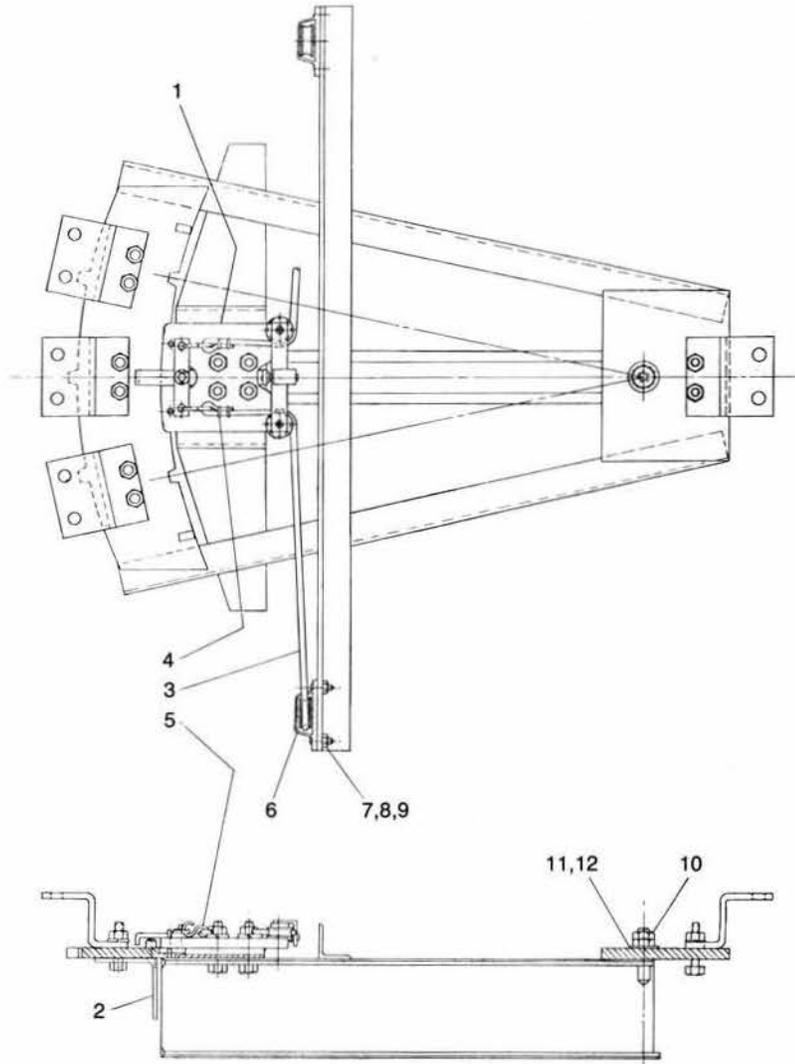
- (a) When 3-way switch is required, this item is to be removed and discarded.
- (b) Standard length equals 15 feet. Specify length required.
- (c) Rope assembly (items 3, 4, 5) is factory assembled but shipped loose for field mounting.
- (d) Pulley and fasteners are shipped loose for field mounting.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ TONGUE SWITCH ASSEMBLY 3.33" OPERATING FLANGE NON-ELECTRIFIED MANUALLY—OPERATED WYE — 703.6332



SECTION THRU CENTER
SHOWING CENTER POSITION
LOCKOUT AND Baffle
APPLICATION



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|--------------------------------|------|
| 1 | 265009 | Latch Mechanism | 1 |
| 2 | 265137 | Center Position Lockout/Baffle | 1 |
| 3 | 212980 | Polypropylene Cord (a), (b) | 2 |
| 4 | 260011 | Rope Clip Ring (b) | 4 |
| 5 | 213400 | S-Hook (b) | 2 |
| 6 | 213196 | Pulley Assembly (c) | 2 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-------------------|------|
| 7 | 212272 | Screw (c) | 4 |
| 8 | 210405 | Lock Washer (c) | 4 |
| 9 | 211440 | Hex Nut (c) | 4 |
| 10 | 211715 | Jam Nut | 2 |
| 11 | 213608 | Thrust Bearing | 1 |
| 12 | 210224 | Structural Washer | 1 |

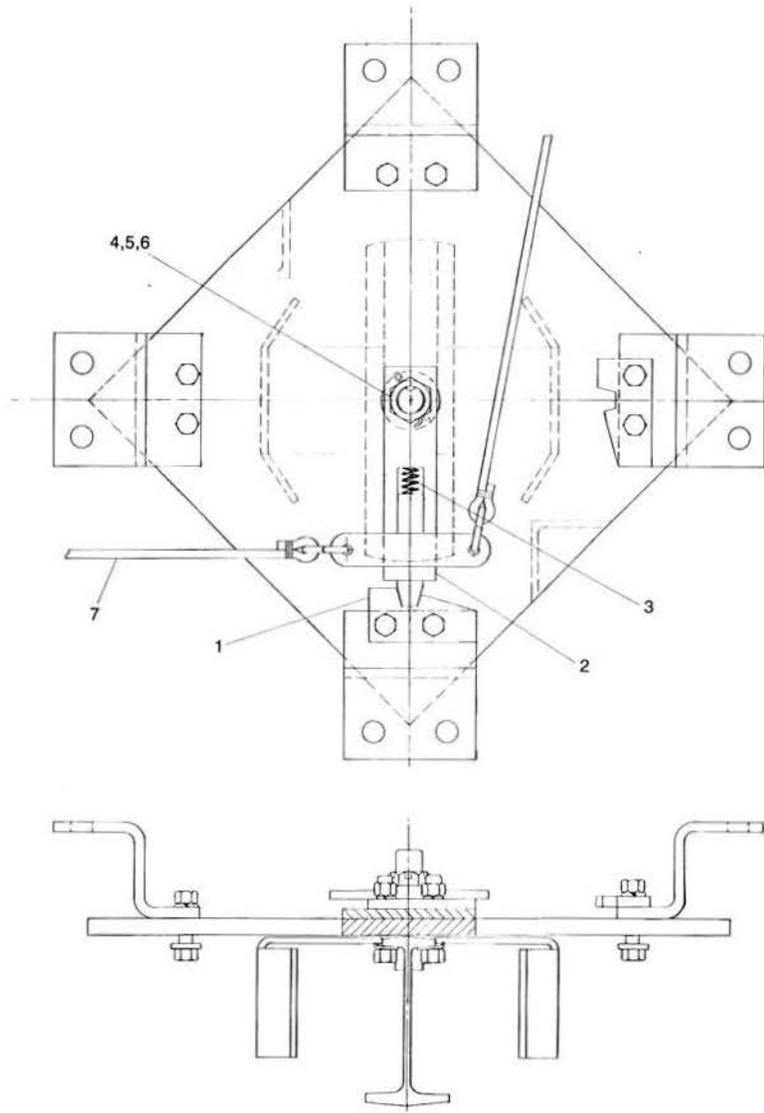
No Recommended Spare Parts

NOTES:

- (a) Standard length equals 15 feet. Specify length required.
- (b) Rope assembly (items 3, 4, 5) is factory assembled but shipped loose for field mounting.
- (c) Pulley and fasteners are shipped loose for field mounting.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ CROSS SWITCH ASSEMBLY 3.33" OPERATING FLANGE NON-ELECTRIFIED MANUALLY—OPERATED 703.6312



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-----------------|------|
| 1 | 300008 | Latch Block | 2 |
| 2 | 280620 | Latch Assembly | 1 |
| 3 | 214255 | Spring (a) | 1 |
| 4 | 211940 | Slotted Hex Nut | 1 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---------------------------------|------|
| 5▲ | 213613 | Thrust Bearing | 1 |
| 6 | 210480 | Cotter Pin | 1 |
| 7 | 212980 | Polypropylene Cord (b) | 2 |
| 8 | 213180 | Pulley Assembly (Not Shown) (c) | 2 |

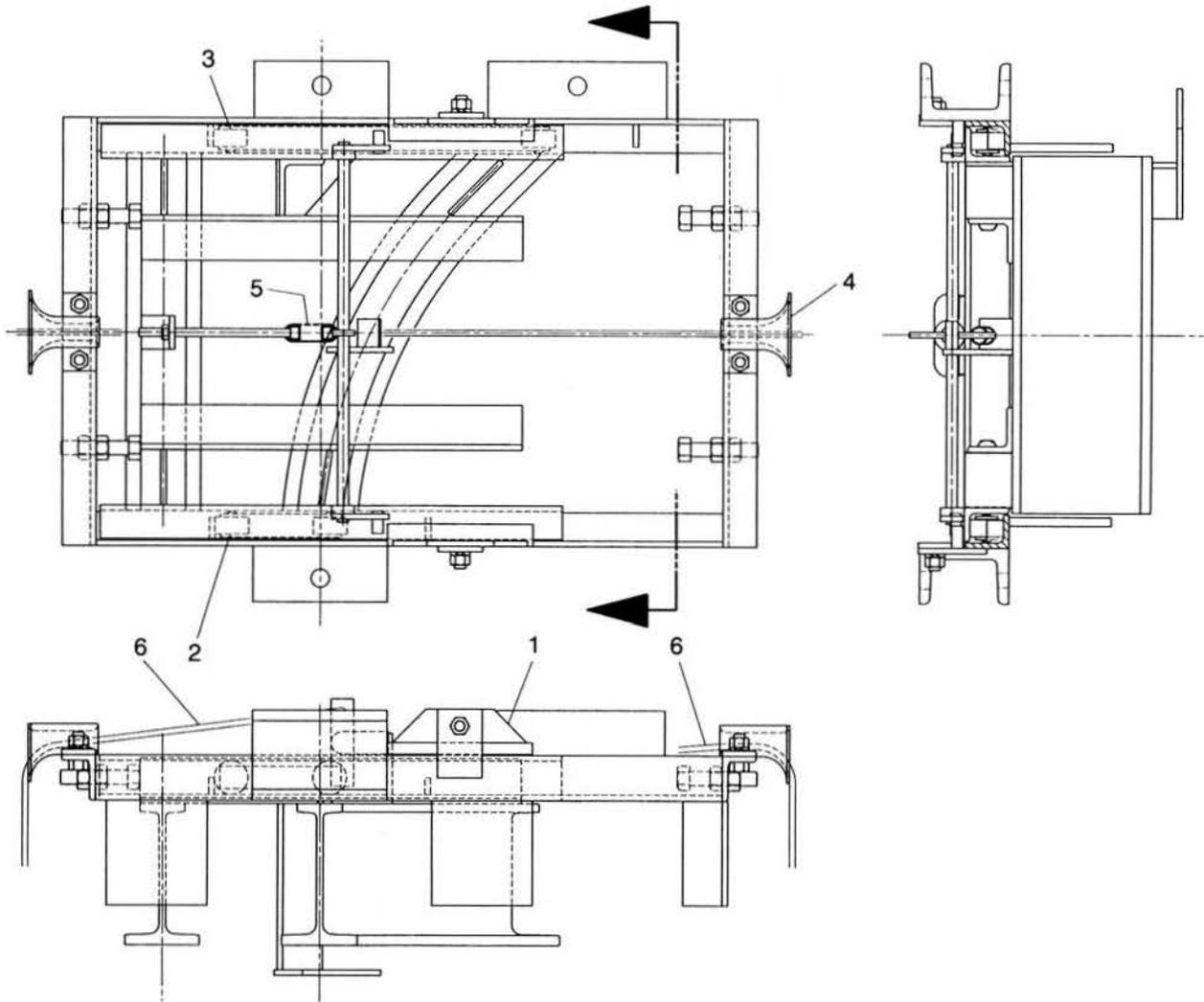
▲ Recommended Spare Part

NOTES:

- (a) Included with item number 2.
- (b) Standard length equals 15 feet. Specify length required.
- (c) Shipped loose for field mounting.

PARTS LIST — SWITCH ASSEMBLY

**SUPERTRACK™ SLIDING SWITCH ASSEMBLY
3.33" OPERATING FLANGE
NON-ELECTRIFIED
MANUALLY—OPERATED
RIGHT HAND (SHOWN) — 703.7011R
LEFT HAND (OPPOSITE) — 703.7011L**



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|-------------|------------------------|-----|
| 1 | 300766 | Latch Bar | 2 |
| 2 | 300767 | Short Roller Assembly | 1 |
| 3 | 300768 | Long Roller Assembly | 1 |
| 4 | 200019 | Rope Guide | 2 |
| 5 | 214257 | Extension Spring | 1 |
| 6 | 212980 | Polypropylene Cord (a) | 2 |

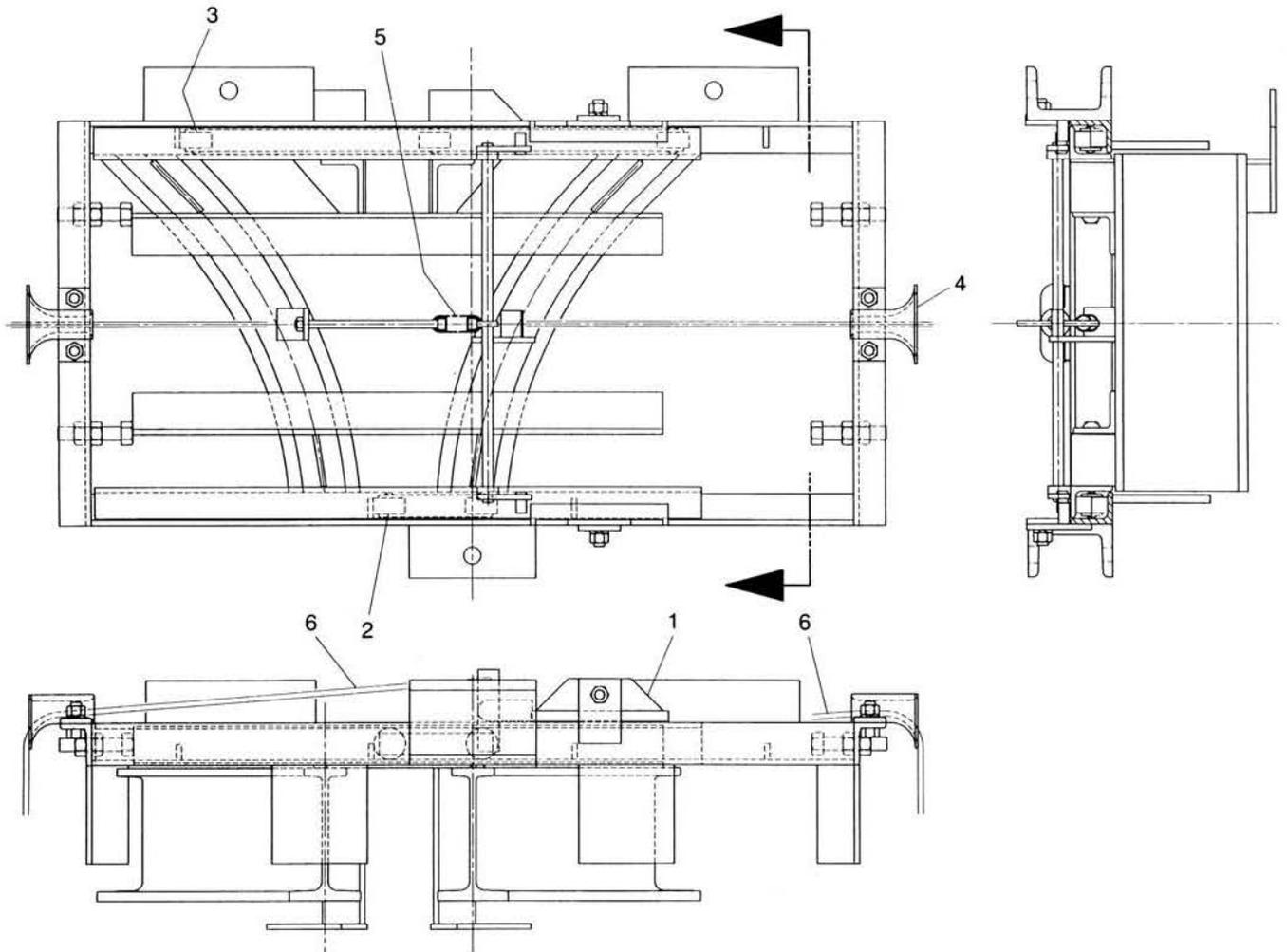
No Recommended Spare Parts

NOTE:

(a) Standard length equals 10 feet. Specify length required.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE NON-ELECTRIFIED MANUALLY—OPERATED WYE — 703.7012



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|-------------|------------------------|-----|
| 1 | 300766 | Latch Bar | 2 |
| 2 | 300767 | Short Roller Assembly | 1 |
| 3 | 300790 | Long Roller Assembly | 1 |
| 4 | 200019 | Rope Guide | 2 |
| 5 | 214257 | Extension Spring | 1 |
| 6 | 212980 | Polypropylene Cord (a) | 2 |

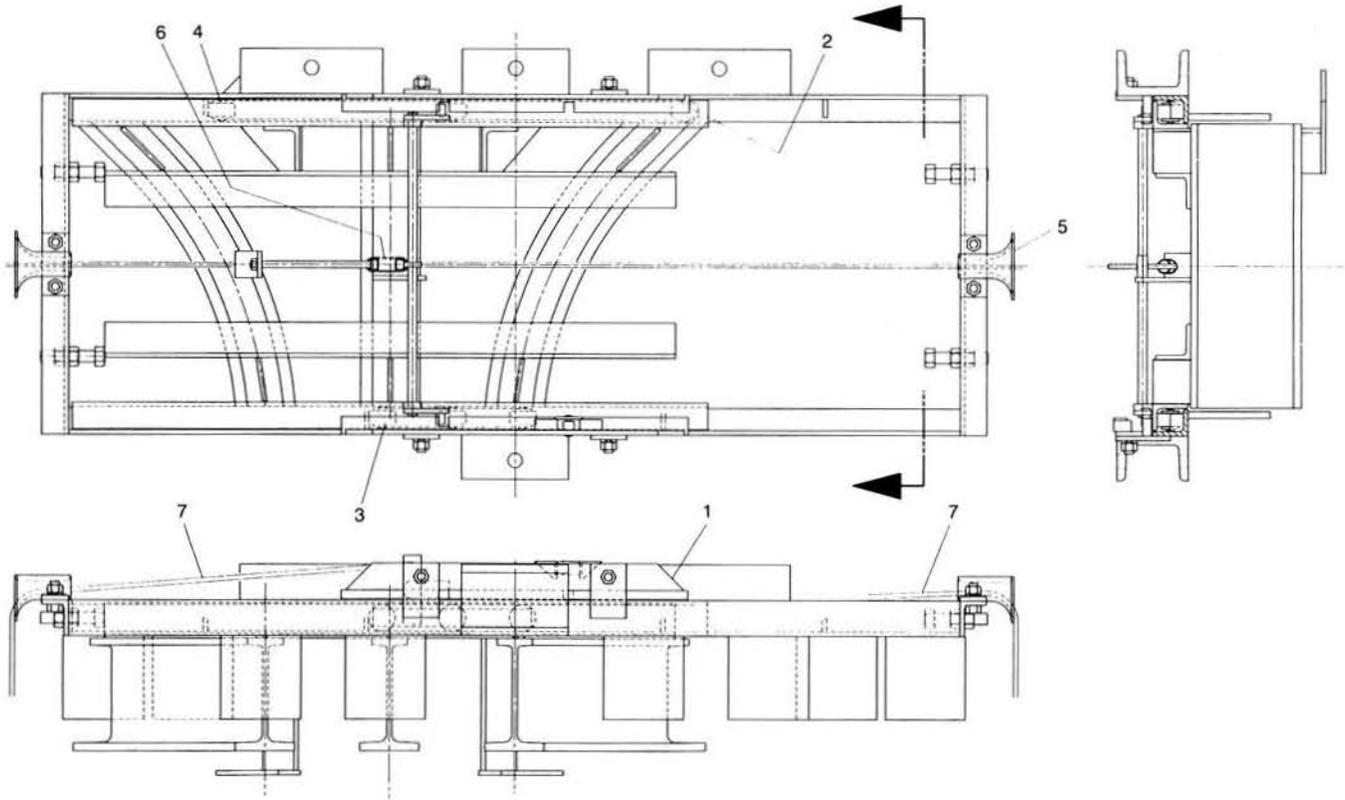
No Recommended Spare Parts

NOTE:

(a) Standard length equals 10 feet. Specify length required.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE NON-ELECTRIFIED MANUALLY-OPERATED 3-Way — 703.7013



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|-------------|------------------------|-----|
| 1 | 300795 | Latch Bar | 1 |
| 2 | 300796 | Latch Bar | 1 |
| 3 | 300797 | Short Roller Assembly | 1 |
| 4 | 300798 | Long Roller Assembly | 1 |
| 5 | 200019 | Rope Guide | 2 |
| 6 | 214257 | Extension Spring | 1 |
| 7 | 212980 | Polypropylene Cord (a) | 2 |

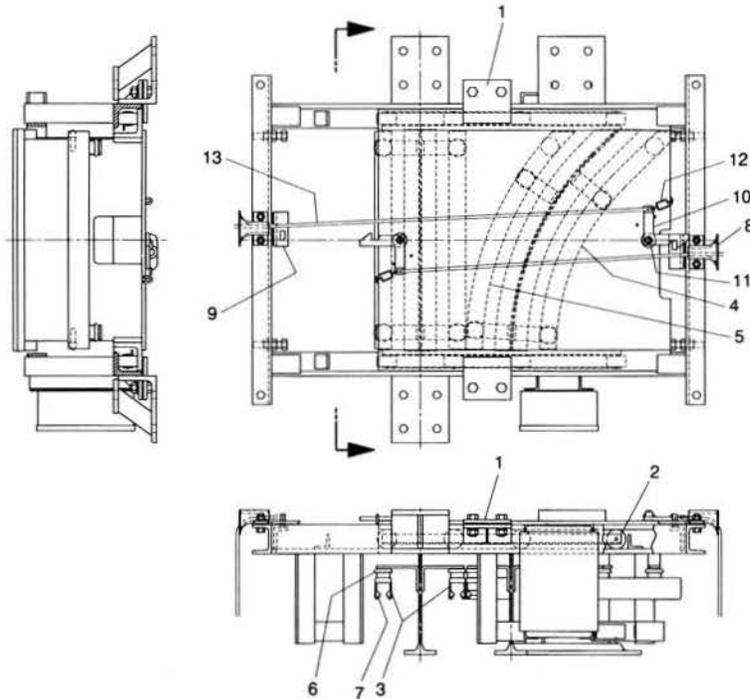
No Recommended Spare Parts

NOTE:

(a) Standard length equals 10 feet. Specify length required.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY
3.33" OPERATING FLANGE
ELECTRIFIED
MANUALLY—OPERATED
RIGHT HAND (SHOWN) — 703.7221R
LEFT HAND (OPPOSITE) — 703.7221L



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|------------------|---|-----|
| 1 | 260579 | Hold-Down Plate | 2 |
| 2 | 260583 | Roller Assembly | 2 |
| 3 | 260676 | Straight Conductor Section | 2 |
| 4 | 260678 260674 | Curved Conductor Right-Hand Switch Left-Hand Switch | 1 |
| 5 | 260677 260675 | Curved Conductor Right-Hand Switch Left-Hand Switch | 1 |
| 6 | 280432 | Support Insulator | 10 |
| 7 | 280433 | Transfer Insulator | 16 |
| 8 | 200019 | Rope Guide | 2 |
| 9 | 260707 | Latch Cam | 2 |
| 10 | 260708 | Crank Arm | 2 |
| 11 | 213617 | Thrust Bearing | 4 |
| 12 | 214257 | Extension Spring | 2 |
| 13 | 212980 | Polypropylene Cord (a) | 2 |

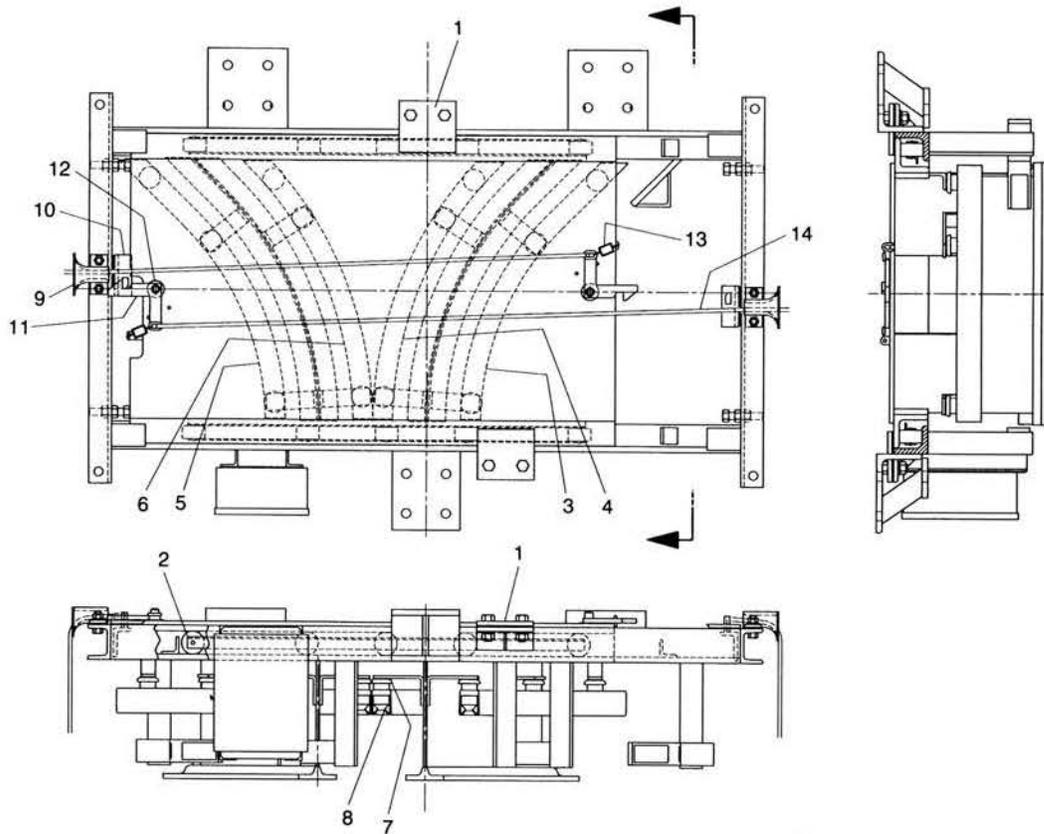
No Recommended Spare Parts

NOTE:

(a) Standard length equals 15 feet. Specify length required.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED MANUALLY—OPERATED WYE — 703.7222



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|-------------|------------------------|-----|
| 1 | 260579 | Hold-Down Plate | 2 |
| 2 | 260584 | Roller Assembly | 2 |
| 3 | 260678 | Curved Conductor (RH) | 1 |
| 4 | 260677 | Curved Conductor (RH) | 1 |
| 5 | 260674 | Curved Conductor (LH) | 1 |
| 6 | 260675 | Curved Conductor (LH) | 1 |
| 7 | 280432 | Support Insulator | 12 |
| 8 | 280433 | Transfer Insulator | 16 |
| 9 | 200019 | Rope Guide | 2 |
| 10 | 260707 | Latch Cam | 2 |
| 11 | 260708 | Crank Arm | 2 |
| 12 | 213617 | Thrust Bearing | 4 |
| 13 | 214257 | Extension Spring | 2 |
| 14 | 212980 | Polypropylene Cord (a) | 2 |

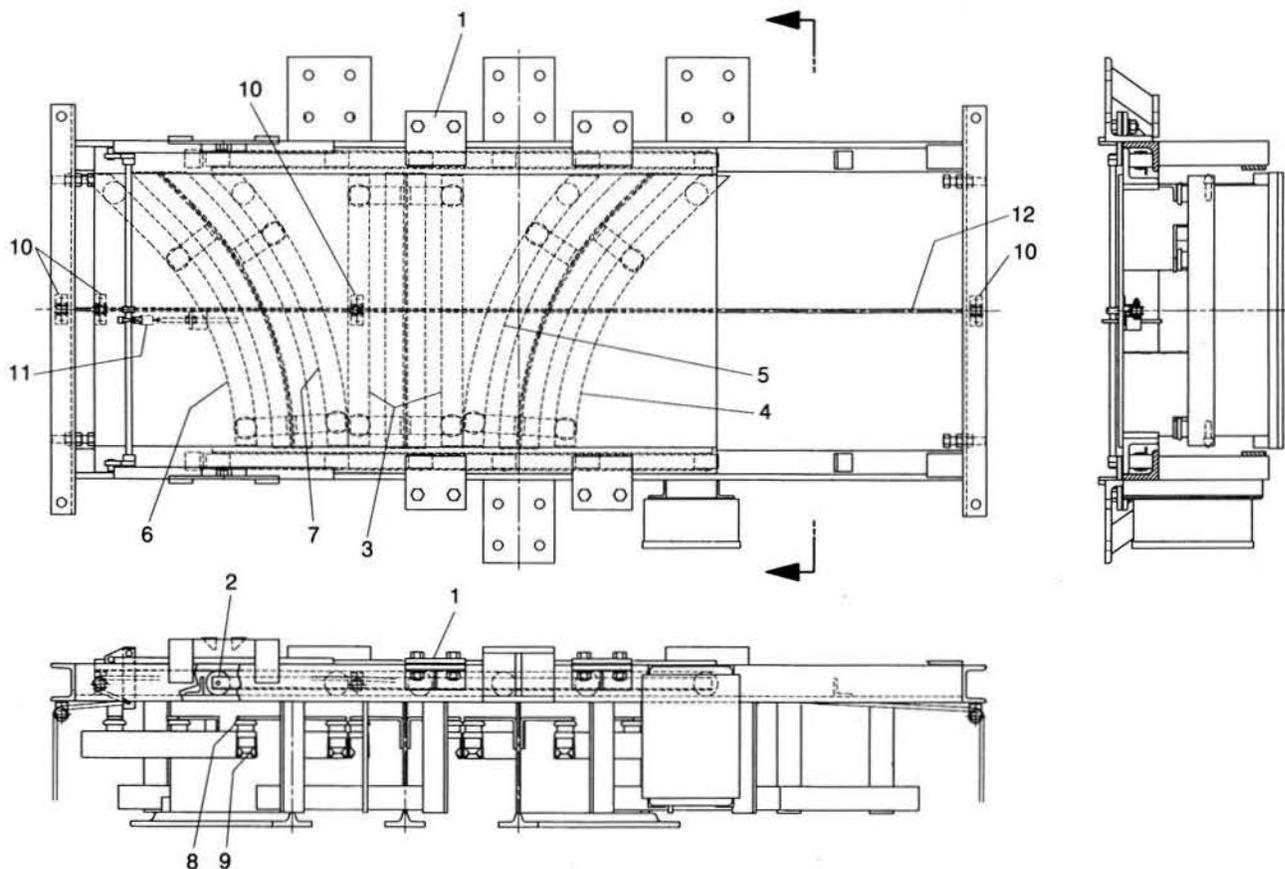
No Recommended Spare Parts

NOTE:

(a) Standard length equals 15 feet. Specify length required.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED MANUALLY—OPERATED 3-WAY — 703.7223



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|-------------|----------------------------|-----|
| 1 | 260579 | Hold-Down Plate | 4 |
| 2 | 260585 | Roller Assembly | 2 |
| 3 | 260676 | Straight Conductor Section | 2 |
| 4 | 260678 | Curved Conductor (RH) | 1 |
| 5 | 260677 | Curved Conductor (RH) | 1 |
| 6 | 260674 | Curved Conductor (LH) | 1 |
| 7 | 260675 | Curved Conductor (LH) | 1 |
| 8 | 280432 | Support Insulator | 16 |
| 9 | 280433 | Transfer Insulator | 24 |
| 10 | 260004 | Pulley Assembly | 4 |
| 11 | 214257 | Extension Spring | 1 |
| 12 | 212980 | Polypropylene Cord (a) | 1 |

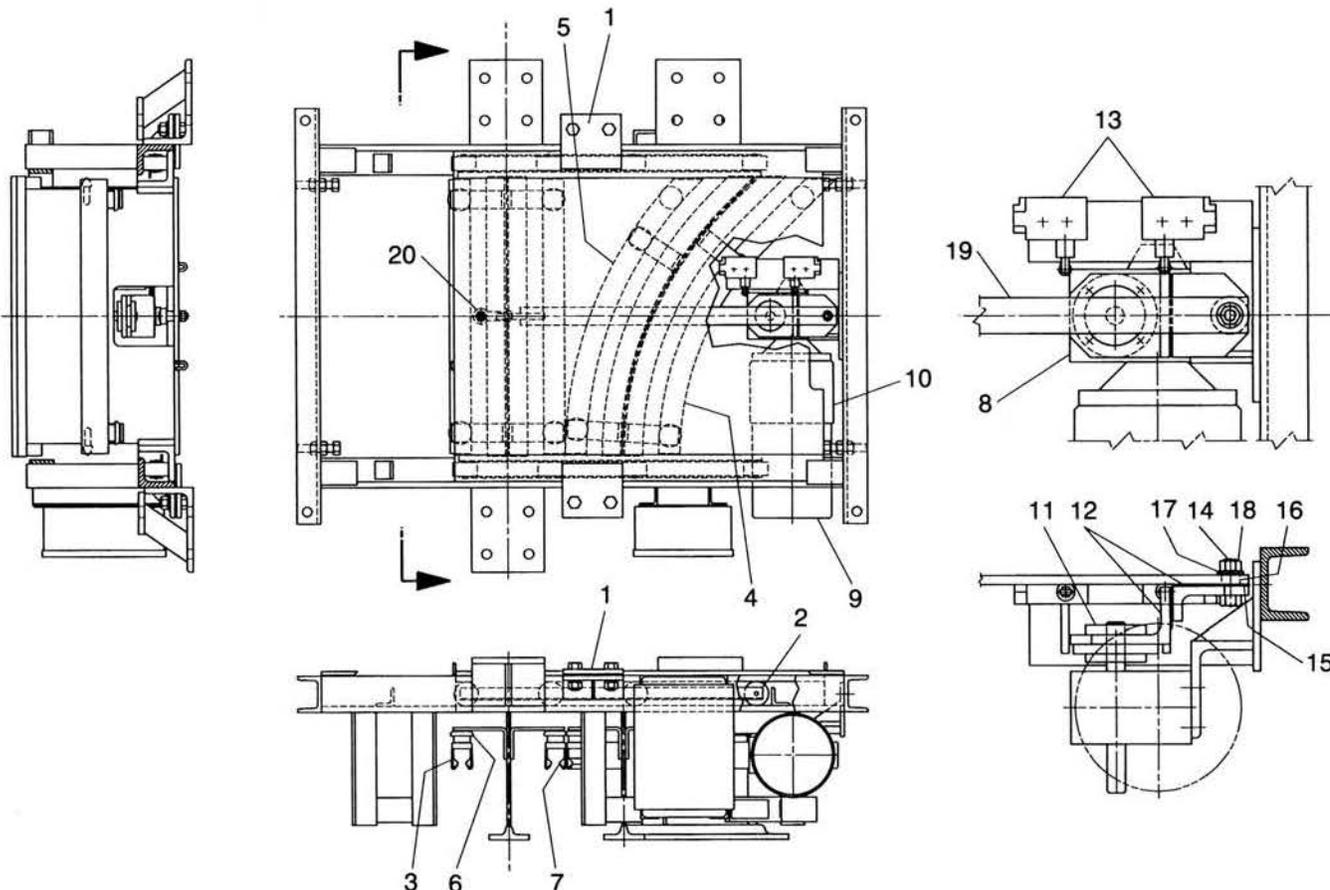
No Recommended Spare Parts

NOTE:

(a) Standard length equals 36 feet. Specify length required.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED MOTOR—OPERATED RIGHT HAND (SHOWN) — 703.7225R LEFT HAND (OPPOSITE) — 703.7225L



SWITCH ASSEMBLY PARTS

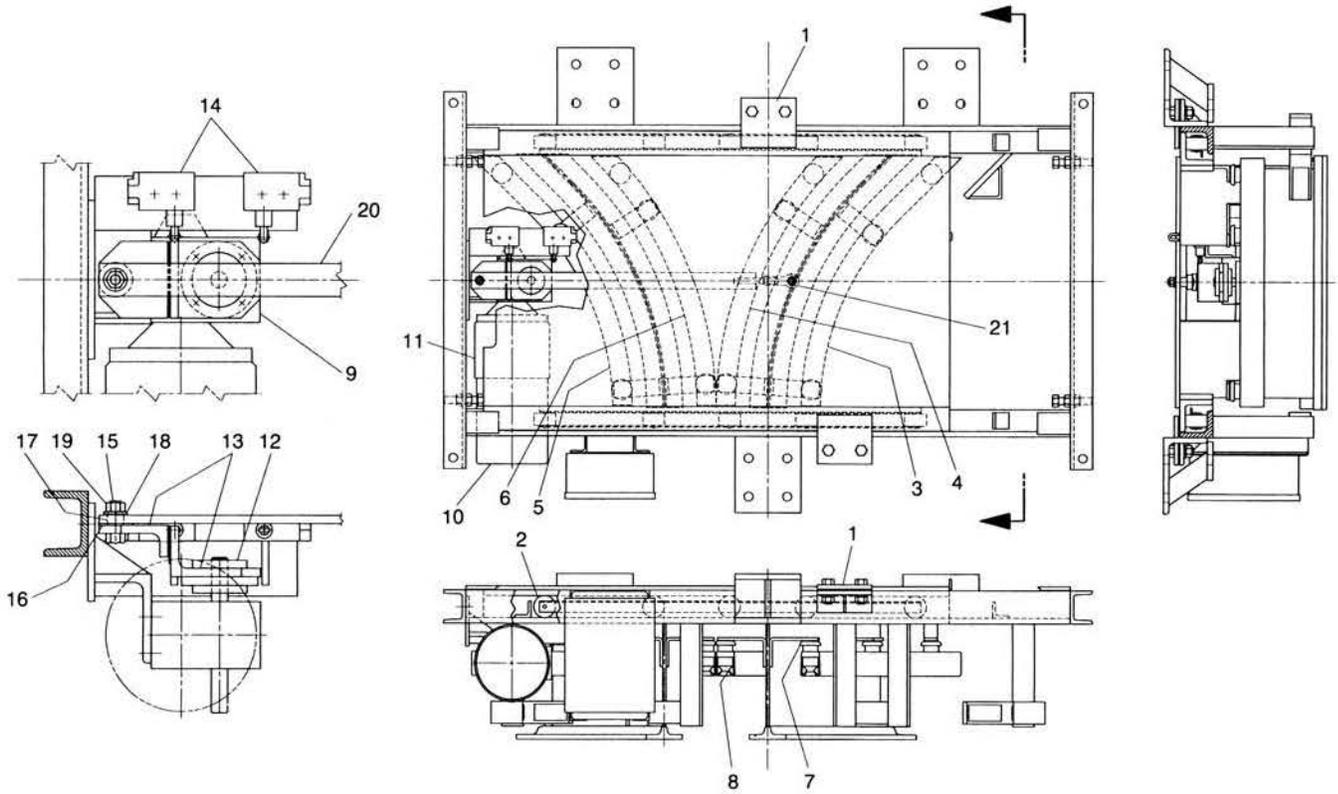
| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|----------------------------|------|
| 1 | 260579 | Hold-Down Plate | 2 |
| 2 | 260583 | Roller Assembly | 2 |
| 3 | 260676 | Straight Conductor Section | 2 |
| 4 | 260678 | Curved Conductor (RH) | 1 |
| 4 | 260674 | Curved Conductor (LH) | 1 |
| 5 | 260677 | Curved Conductor (RH) | 1 |
| 5 | 260675 | Curved Conductor (LH) | 1 |
| 6 | 280432 | Support Insulator | 10 |
| 7 | 280433 | Transfer Insulator | 16 |
| 8 | 222651 | Gear Box | 1 |
| 9 | 61010-29 | Motor | 1 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---------------------|------|
| 10 | 222642 | Brake | 1 |
| 11 | 213197 | Torque Limiter | 1 |
| 12 | — | Bell Crank Assembly | 1 |
| 13 | 221924 | Limit Switch | 2 |
| 14 | 210927 | Screw | 1 |
| 15 | 213608 | Thrust Bearing | 1 |
| 16 | 560005 | Spacer Tube | 1 |
| 17 | 210219 | Washer | 1 |
| 18 | 211612 | Locknut | 1 |
| 19 | — | Throw Arm | 1 |
| 20 | 213177 | Ball Joint | 1 |

No Recommended Spare Parts

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED MOTOR—OPERATED WYE — 703.7226



SWITCH ASSEMBLY PARTS

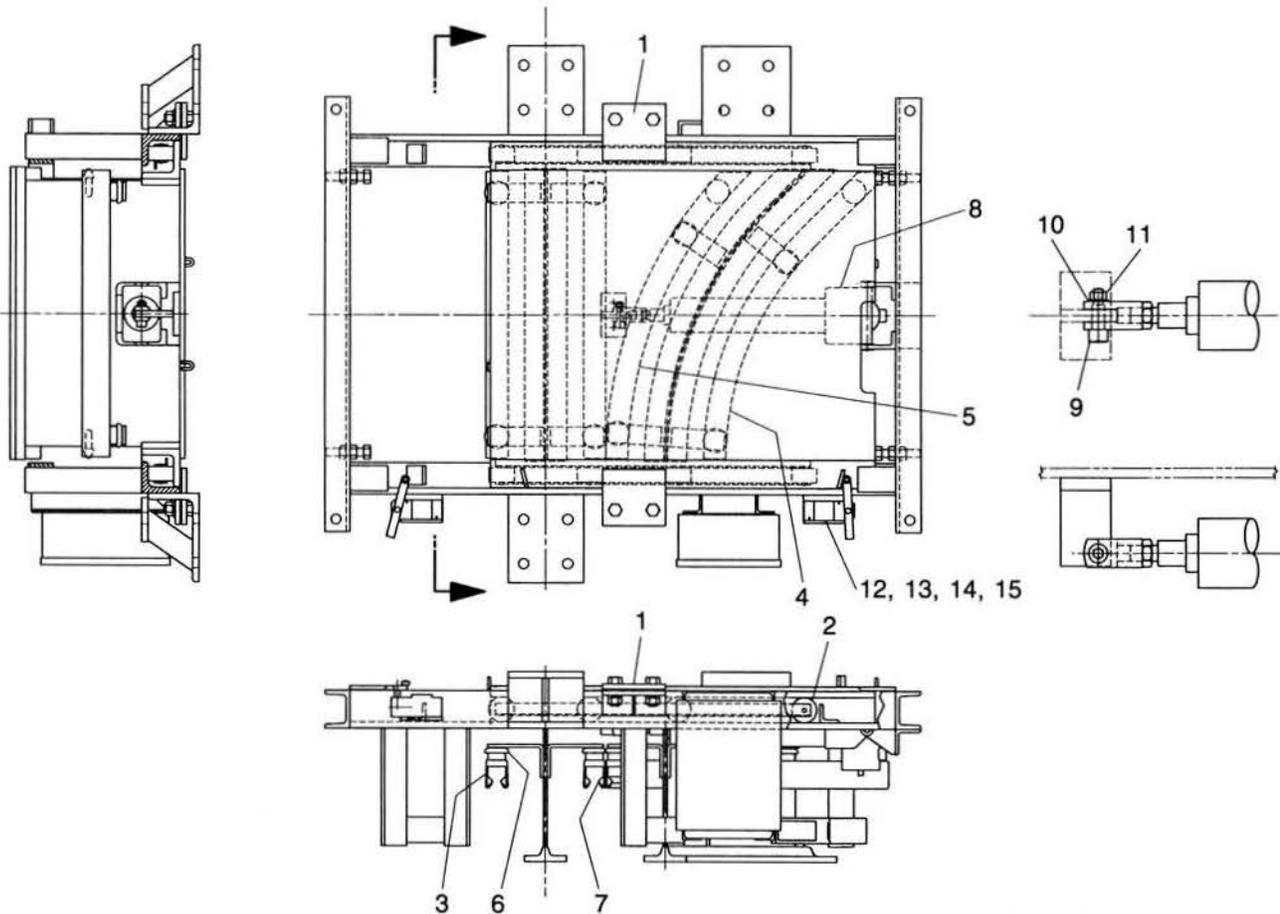
| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-----------------------|------|
| 1 | 260579 | Hold-Down Plate | 2 |
| 2 | 260584 | Roller Assembly | 2 |
| 3 | 260678 | Curved Conductor (RH) | 1 |
| 4 | 260677 | Curved Conductor (RH) | 1 |
| 5 | 260674 | Curved Conductor (LH) | 1 |
| 6 | 260675 | Curved Conductor (LH) | 1 |
| 7 | 280432 | Support Insulator | 12 |
| 8 | 280433 | Transfer Insulator | 16 |
| 9 | 222651 | Gear Box | 1 |
| 10 | 61010-29 | Motor | 1 |

No Recommended Spare Parts

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---------------------|------|
| 11 | 222642 | Brake | 1 |
| 12 | 213197 | Torque Limiter | 1 |
| 13 | — | Bell Crank Assembly | 1 |
| 14 | 221924 | Limit Switch | 2 |
| 15 | 210927 | Screw | 1 |
| 16 | 213608 | Thrust Bearing | 1 |
| 17 | 560005 | Spacer Tube | 1 |
| 18 | 210219 | Washer | 1 |
| 19 | 211612 | Locknut | 1 |
| 20 | — | Throw Arm | 1 |
| 21 | 213177 | Ball Joint | 1 |

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED AIR—OPERATED RIGHT HAND (SHOWN) — 703.7227R LEFT HAND (OPPOSITE) — 703.7227L



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|----------------------------|------|
| 1 | 260579 | Hold-Down Plate | 2 |
| 2 | 260583 | Roller Assembly | 2 |
| 3 | 260676 | Straight Conductor Section | 2 |
| 4 | 260678 | Curved Conductor (RH) | 1 |
| 4 | 260674 | Curved Conductor (LH) | 1 |
| 5 | 260677 | Curved Conductor (RH) | 1 |
| 5 | 260675 | Curved Conductor (LH) | 1 |
| 6 | 280432 | Support Insulator | 10 |
| 7 | 280433 | Transfer Insulator | 16 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---------------------------------|------|
| 8 | 222451 | Air Motor with Solenoid Valve | 1 |
| 9 | 212751 | Stripper Bolt | 1 |
| 10 | 210217 | Washer | 1 |
| 11 | 211548 | Locknut | 1 |
| 12 | 221892 (a) | Limit Switch Plug-In Unit | 2 |
| 13 | 221897 (a) | Limit Switch Plug-In Receptacle | 2 |
| 14 | 221883 (a) | Limit Switch Adjustable Arm | 2 |
| 15 | 221901 (a) | Limit Switch Turret Head | 2 |

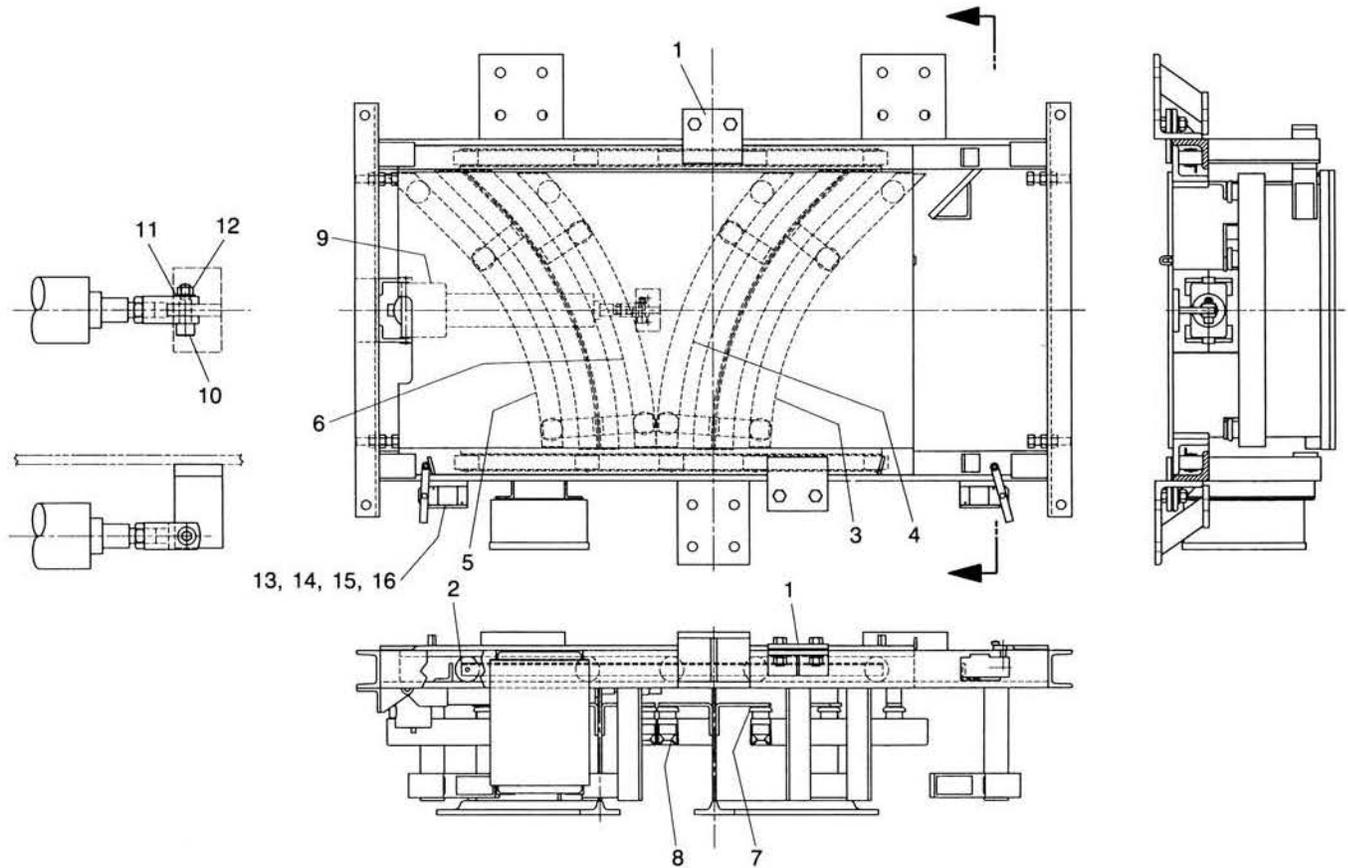
No Recommended Spare Parts

NOTE:

(a) Optional.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED AIR—OPERATED WYE — 703.7228



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-----------------------|------|
| 1 | 260579 | Hold-Down Plate | 2 |
| 2 | 260584 | Roller Assembly | 2 |
| 3 | 260678 | Curved Conductor (RH) | 1 |
| 4 | 260677 | Curved Conductor (RH) | 1 |
| 5 | 260674 | Curved Conductor (LH) | 1 |
| 6 | 260675 | Curved Conductor (LH) | 1 |
| 7 | 280432 | Support Insulator | 12 |
| 8 | 280433 | Transfer Insulator | 16 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---------------------------------|------|
| 9 | 222451 | Air Motor with Solenoid Valve | 1 |
| 10 | 212751 | Stripper Bolt | 1 |
| 11 | 210217 | Washer | 1 |
| 12 | 211548 | Locknut | 1 |
| 13 | 221892 (a) | Limit Switch Plug-In Unit | 2 |
| 14 | 221897 (a) | Limit Switch Plug-In Receptacle | 2 |
| 15 | 221883 (a) | Limit Switch Adjustable Arm | 2 |
| 16 | 221901 (a) | Limit Switch Turret Head | 2 |

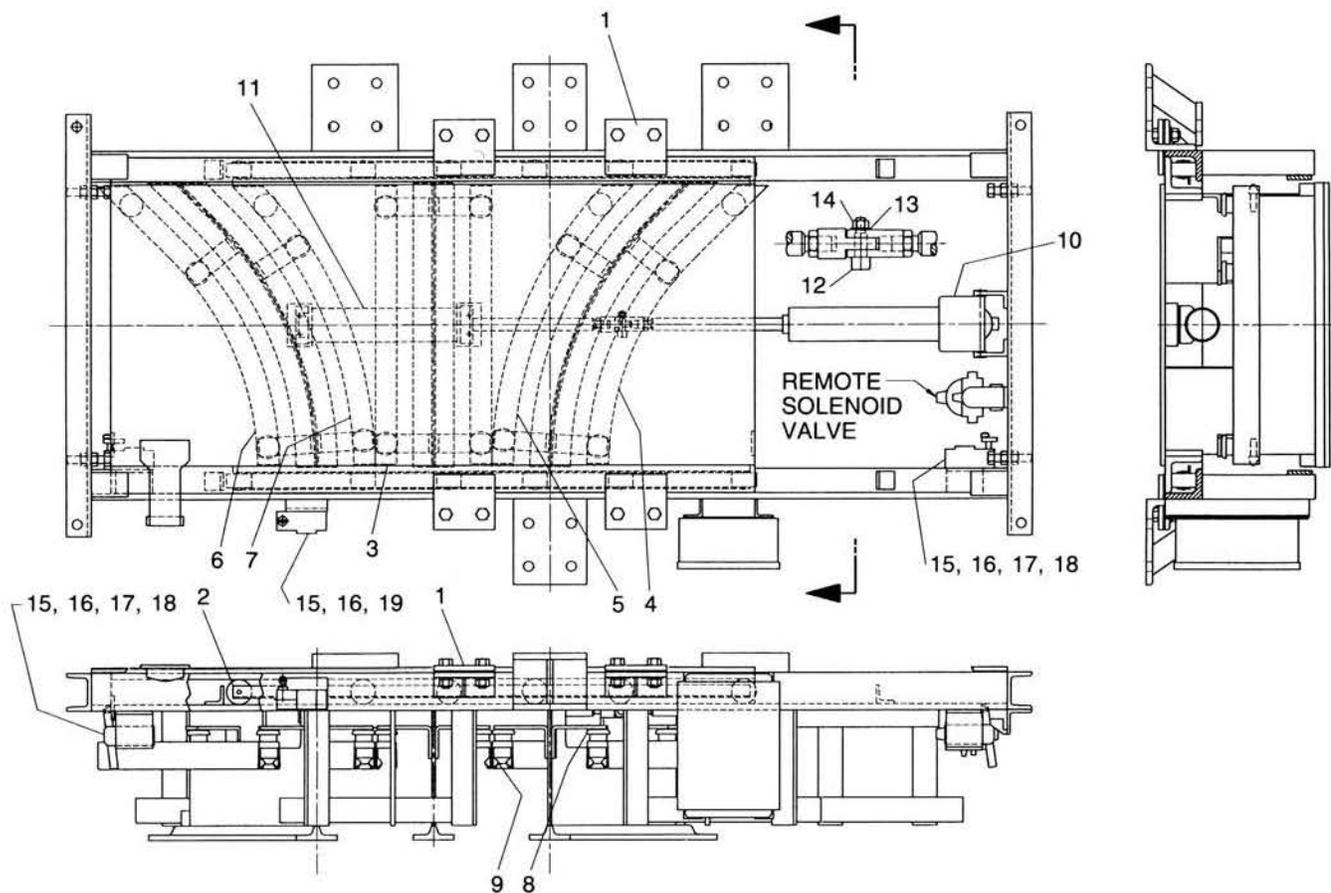
No Recommended Spare Parts

NOTE:

(a) Optional.

PARTS LIST — SWITCH ASSEMBLY

SUPERTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED AIR—OPERATED 3-WAY — 703.7229



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-------------------------------|------|
| 1 | 260579 | Hold-Down Plate | 4 |
| 2 | 260585 | Roller Assembly | 2 |
| 3 | 260676 | Straight Conductor Section | 2 |
| 4 | 260678 | Curved Conductor (RH) | 1 |
| 5 | 260677 | Curved Conductor (LH) | 1 |
| 6 | 260674 | Curved Conductor (RH) | 1 |
| 7 | 260675 | Curved Conductor (LH) | 1 |
| 8 | 280432 | Support Insulator | 16 |
| 9 | 280433 | Transfer Insulator | 24 |
| 10 | 222451 | Air Motor with Solenoid Valve | 1 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---|------|
| 11 | 222004 | Air Motor, 10" Stroke, with Remote Solenoid Valve | 1 |
| 12 | 212751 | Stripper Bolt | 1 |
| 13 | 210217 | Washer | 1 |
| 14 | 211548 | Locknut | 1 |
| 15 | 221892 (a) | Limit Switch Plug-In Unit | 3 |
| 16 | 221897 (a) | Limit Switch Plug-In Receptacle | 3 |
| 17 | 221883 (a) | Limit Switch Adjustable Arm | 2 |
| 18 | 221901 (a) | Limit Switch Turret Head | 2 |
| 19 | 221903 (a) | Limit Switch Side Roller Plunger | 1 |

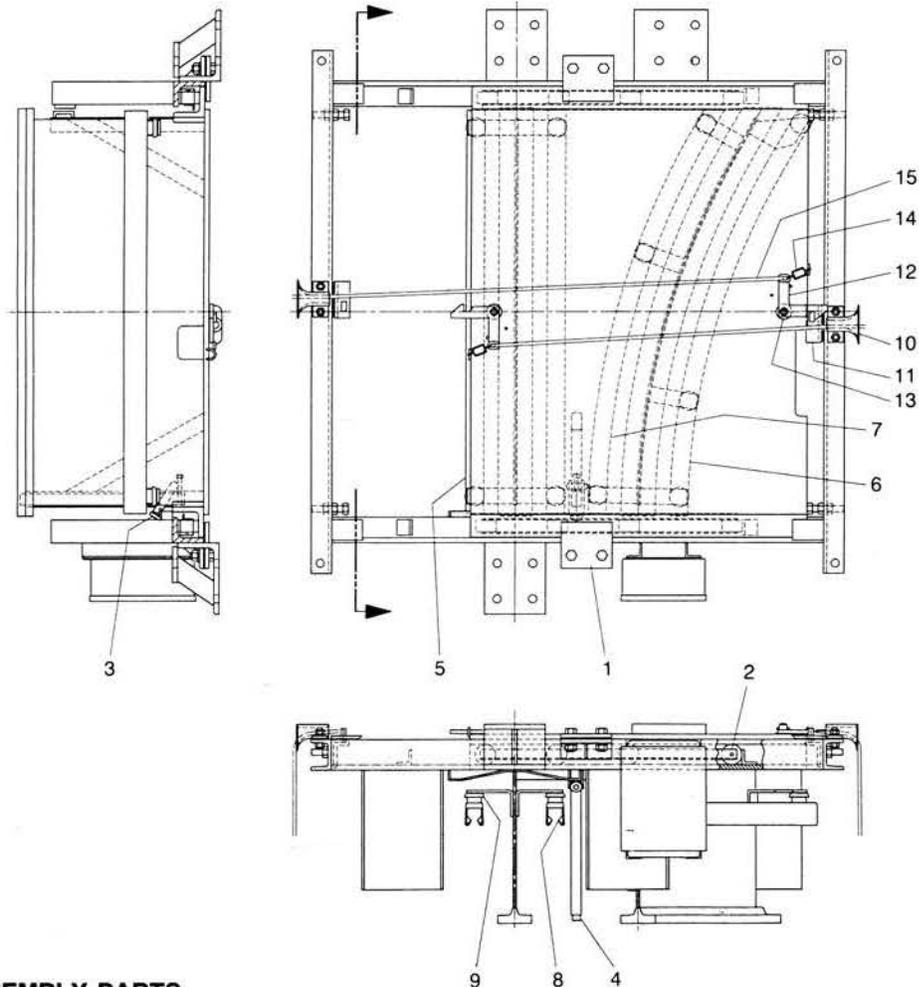
No Recommended Spare Parts

NOTE:

(a) Optional.

PARTS LIST — SWITCH ASSEMBLY

TROJANTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED MANUALLY—OPERATED RIGHT HAND (SHOWN) — 703.7131R LEFT HAND (OPPOSITE) — 703.7131L



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---|------|
| 1 | 260579 | Hold-Down Plate | 2 |
| 2 | 260583 | Roller Assembly | 2 |
| 3 | 260622 | Cam Roller Assembly | 1 |
| 4 | 260625 | Baffle Pin | 1 |
| 5 | (b) | Straight Conductor Section | 2 |
| 6 | (b) | Curved Conductor Right-Hand Switch Left-Hand Switch | 1 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---|------|
| 7 | (b) | Curved Conductor Right-Hand Switch Left-Hand Switch | 1 |
| 8 | 280433 | Transfer Insulator | 16 |
| 9 | 280432 | Support Insulator | 10 |
| 10 | 200019 | Rope Guide | 2 |
| 11 | 260707 | Latch Cam | 2 |
| 12 | 260708 | Crank Arm | 2 |
| 13 | 213617 | Thrust Bearing | 4 |
| 14 | 214257 | Extension Spring | 2 |
| 15 | 212980 | Polypropylene Cord (a) | 2 |

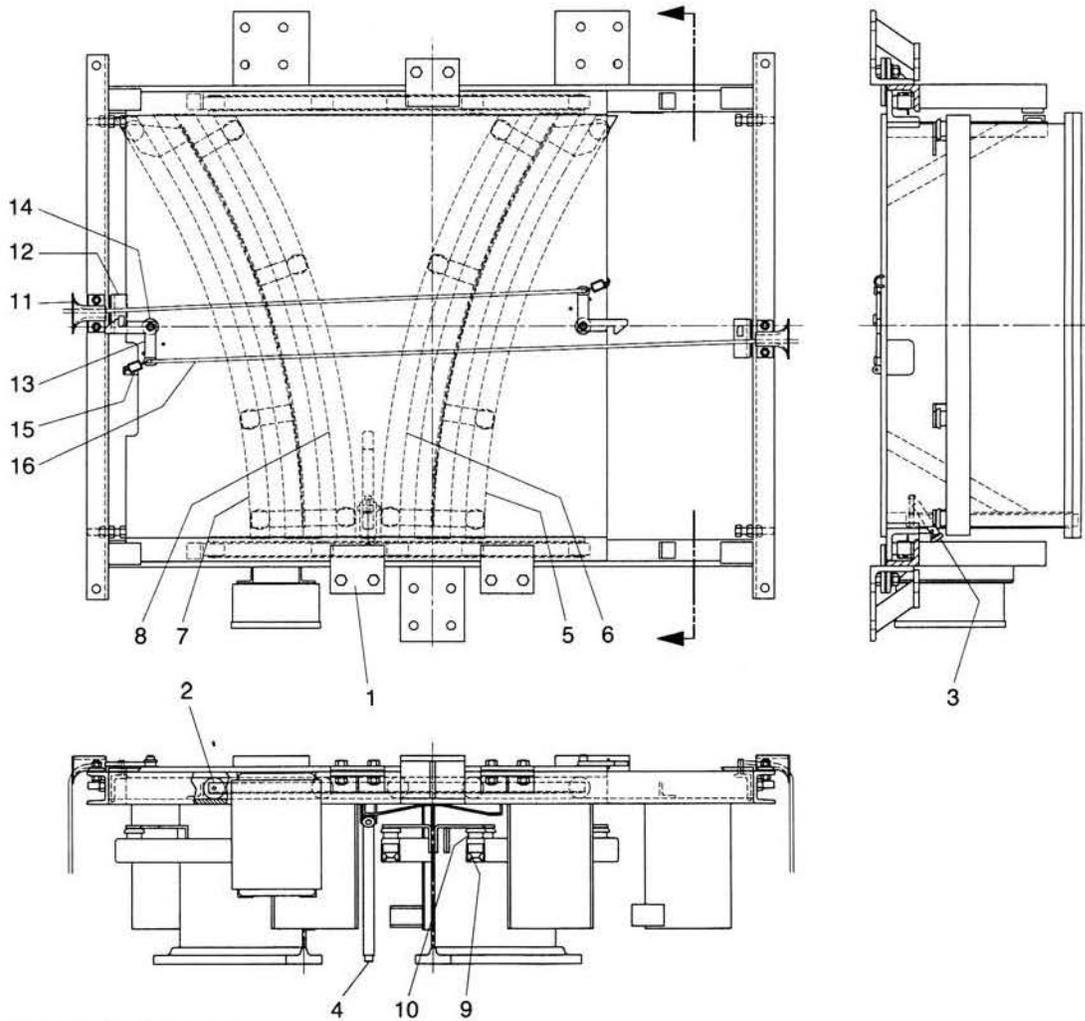
No Recommended Spare Parts

NOTES:

- (a) Standard length equals 15 feet. Specify length required.
- (b) Contact Acco Chain & Lifting Products.

PARTS LIST — SWITCH ASSEMBLY

TROJANTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED MANUALLY—OPERATED WYE — 703.7132



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-----------------------|------|
| 1 | 260579 | Hold-Down Plate | 3 |
| 2 | 260584 | Roller Assembly | 2 |
| 3 | 260622 | Cam Roller Assembly | 1 |
| 4 | 260625 | Baffle Pin | 1 |
| 5 | (b) | Curved Conductor (RH) | 1 |
| 6 | (b) | Curved Conductor (RH) | 1 |
| 7 | (b) | Curved Conductor (LH) | 1 |
| 8 | (b) | Curved Conductor (LH) | 1 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|------------------------|------|
| 9 | 280433 | Transfer Insulator | 16 |
| 10 | 280432 | Support Insulator | 12 |
| 11 | 200019 | Rope Guide | 2 |
| 12 | 260707 | Latch Cam | 2 |
| 13 | 260708 | Crank Arm | 2 |
| 14 | 213617 | Thrust Bearing | 4 |
| 15 | 214257 | Extension Spring | 2 |
| 16 | 212980 | Polypropylene Cord (a) | 2 |

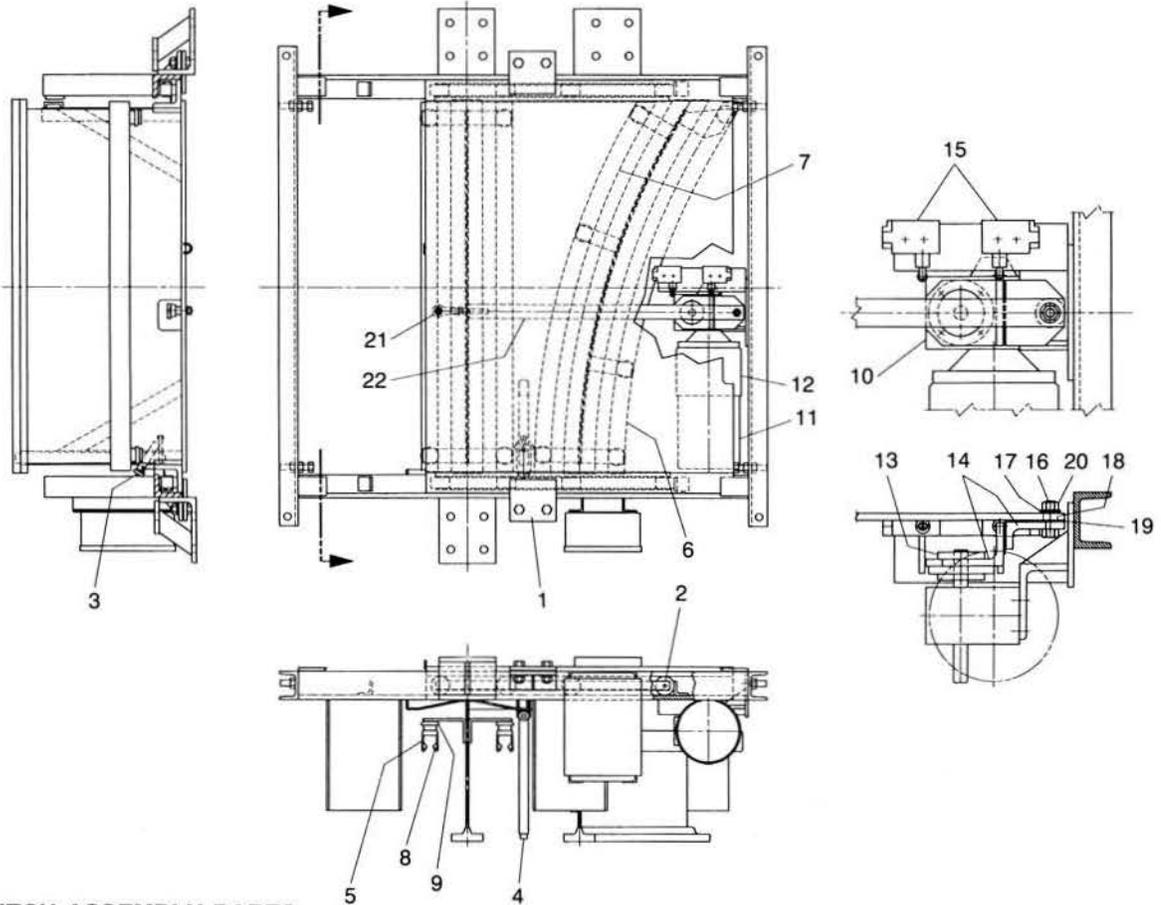
No Recommended Spare Parts

NOTES:

- (a) Standard length equals 15 feet. Specify length required.
- (b) Contact Acco Chain & Lifting Products.

PARTS LIST — SWITCH ASSEMBLY

TROJANTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED MOTOR—OPERATED RIGHT HAND (SHOWN) — 703.7135R LEFT HAND (OPPOSITE) — 703.7135L



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|--|------|
| 1 | 260579 | Hold-Down Plate | 2 |
| 2 | 260583 | Roller Assembly | 2 |
| 3 | 260622 | Cam Roller Assembly | 1 |
| 4 | 260625 | Baffle Pin | 1 |
| 5 | (a) | Straight Conductor Section | 2 |
| 6 | (a) | Curved Conductor (RH) Curved Conductor (LH) | 1 |
| 7 | (a) | Curved Conductor (RH) Curved Conductor (LH) | 1 |
| 8 | 280433 | Transfer Insulator | 16 |
| 9 | 280432 | Support Insulator | 10 |
| 10 | 222651 | Gear Box | 1 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---------------------|------|
| 11 | 61010-29 | Motor | 1 |
| 12 | 222642 | Brake | 1 |
| 13 | 213197 | Torque Limiter | 1 |
| 14 | — | Bell Crank Assembly | 1 |
| 15 | 221924 | Limit Switch | 2 |
| 16 | 210927 | Screw | 1 |
| 17 | 210219 | Washer | 1 |
| 18 | 560005 | Spacer Tube | 1 |
| 19 | 213608 | Thrust Bearing | 1 |
| 20 | 211612 | Locknut | 1 |
| 21 | 213177 | Ball Joint | 1 |
| 22 | — | Throw Arm | 1 |

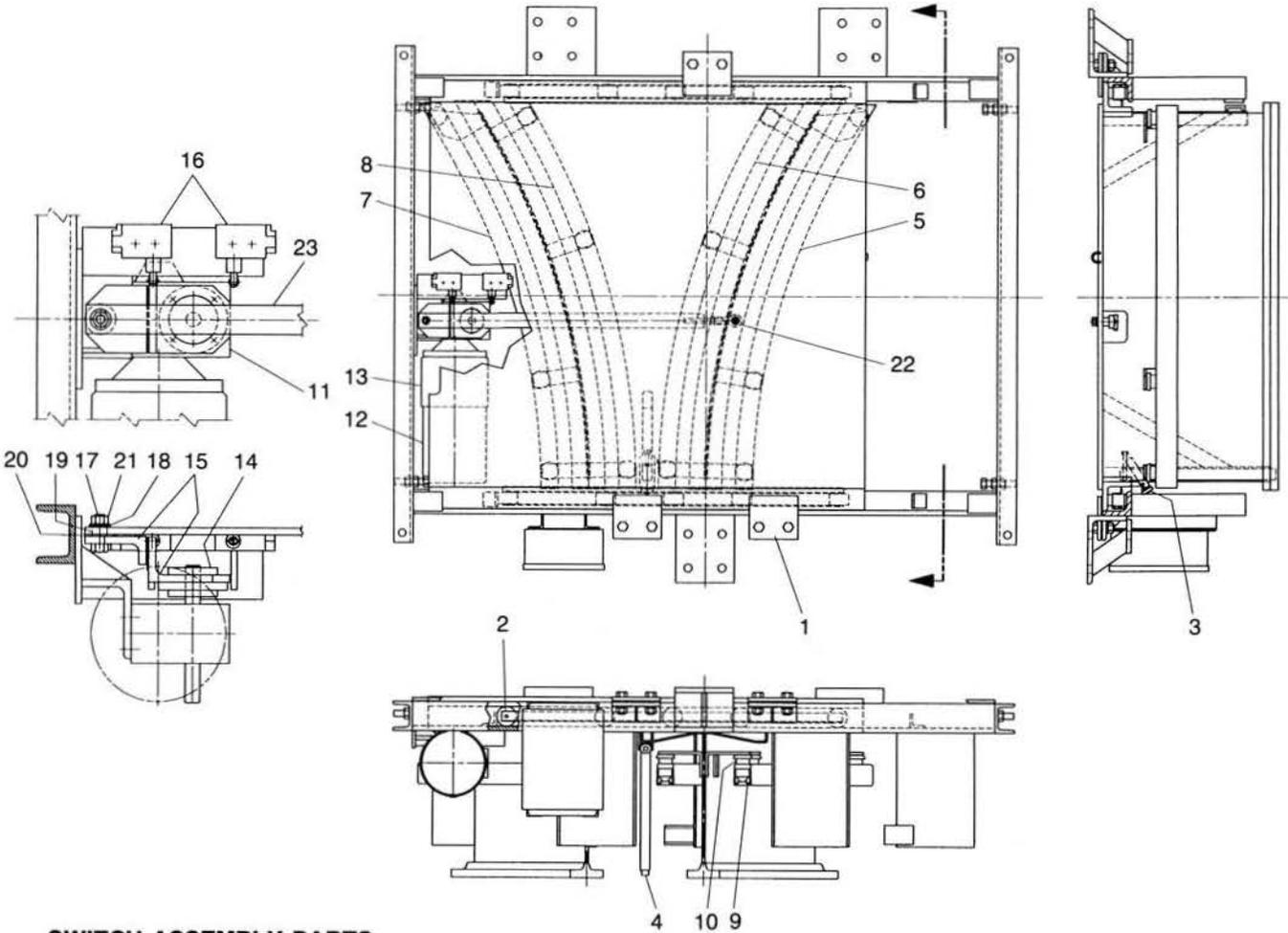
No Recommended Spare Parts

NOTE:

(a) Contact Acco Chain & Lifting Products.

PARTS LIST — SWITCH ASSEMBLY

TROJANTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED MOTOR—OPERATED WYE — 703.7136



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-----------------------|------|
| 1 | 260579 | Hold-Down Plate | 3 |
| 2 | 260584 | Roller Assembly | 2 |
| 3 | 260622 | Cam Roller Assembly | 1 |
| 4 | 260625 | Baffle Pin | 1 |
| 5 | (a) | Curved Conductor (RH) | 1 |
| 6 | (a) | Curved Conductor (RH) | 1 |
| 7 | (a) | Curved Conductor (LH) | 1 |
| 8 | (a) | Curved Conductor (LH) | 1 |
| 9 | 280433 | Transfer Insulator | 16 |
| 10 | 280432 | Support Insulator | 12 |
| 11 | 222651 | Gear Box | 1 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---------------------|------|
| 12 | 61010-29 | Motor | 1 |
| 13 | 222642 | Brake | 1 |
| 14 | 213197 | Torque Limiter | 1 |
| 15 | — | Bell Crank Assembly | 1 |
| 16 | 221924 | Limit Switch | 2 |
| 17 | 210927 | Screw | 1 |
| 18 | 210219 | Washer | 1 |
| 19 | 560005 | Spacer Tube | 1 |
| 20 | 213608 | Thrust Bearing | 1 |
| 21 | 211612 | Locknut | 1 |
| 22 | 213177 | Ball Joint | 1 |
| 23 | — | Throw Arm | 1 |

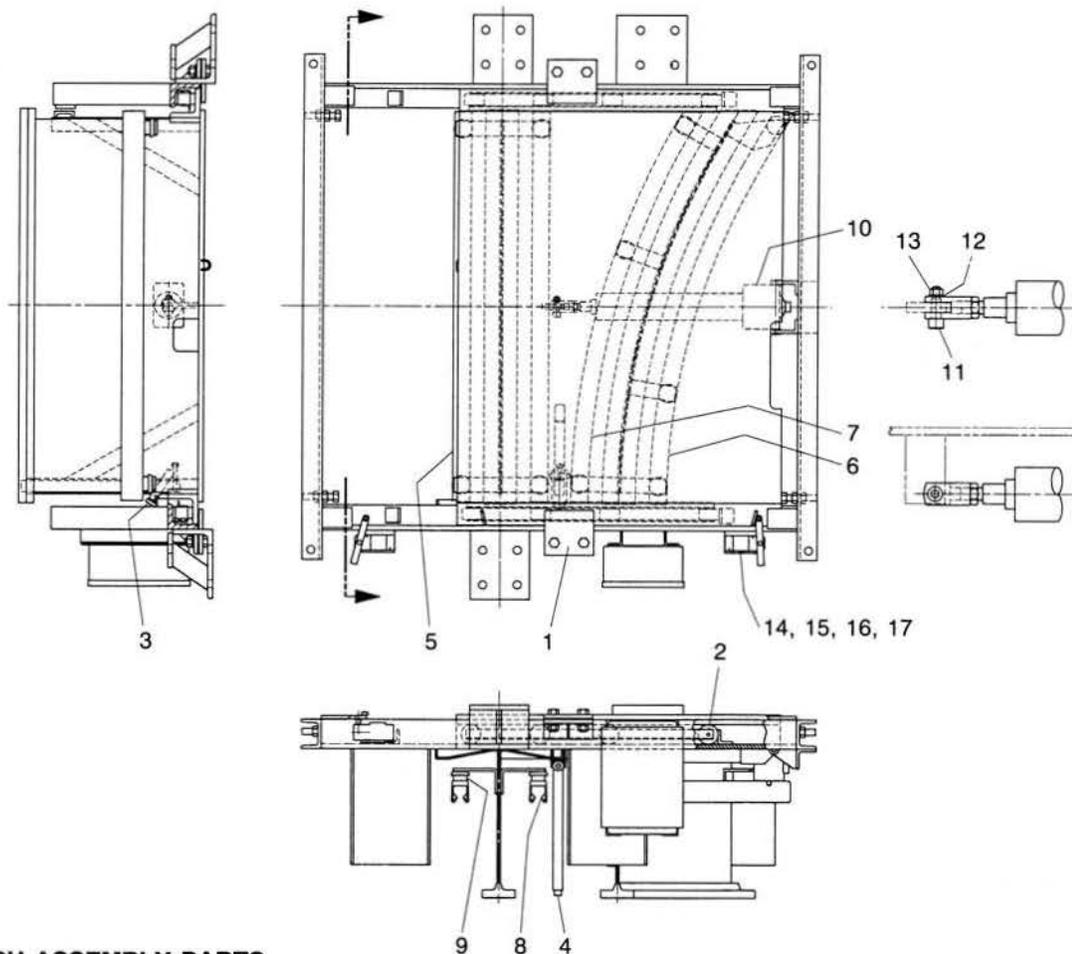
No Recommended Spare Parts

NOTE:

(a) Contact Acco Chain & Lifting Products.

PARTS LIST — SWITCH ASSEMBLY

TROJANTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED AIR—OPERATED RIGHT HAND (SHOWN) — 703.7137R LEFT HAND (OPPOSITE) — 703.7137L



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|----------------------------|------|
| 1 | 260579 | Hold-Down Plate | 2 |
| 2 | 260583 | Roller Assembly | 2 |
| 3 | 260622 | Cam Roller Assembly | 1 |
| 4 | 260625 | Baffle Pin | 1 |
| 5 | (b) | Straight Conductor Section | 2 |
| 6 | (b) | Curved Conductor (RH) | 1 |
| | | Curved Conductor (LH) | 1 |
| 7 | (b) | Curved Conductor (RH) | 1 |
| | | Curved Conductor (LH) | 1 |
| 8 | 280433 | Transfer Insulator | 16 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---------------------------------|------|
| 9 | 280432 | Support Insulator | 10 |
| 10 | 222452 | Air Motor with Solenoid Valve | 1 |
| 11 | 212751 | Stripper Bolt | 1 |
| 12 | 210217 | Washer | 1 |
| 13 | 211546 | Locknut | 1 |
| 14 | 221892 (a) | Limit Switch Plug-In Unit | 2 |
| 15 | 221897 (a) | Limit Switch Plug-In Receptacle | 2 |
| 16 | 221883 (a) | Limit Switch Adjustable Arm | 2 |
| 17 | 221901 (a) | Limit Switch Turret Head | 2 |

No Recommended Spare Parts

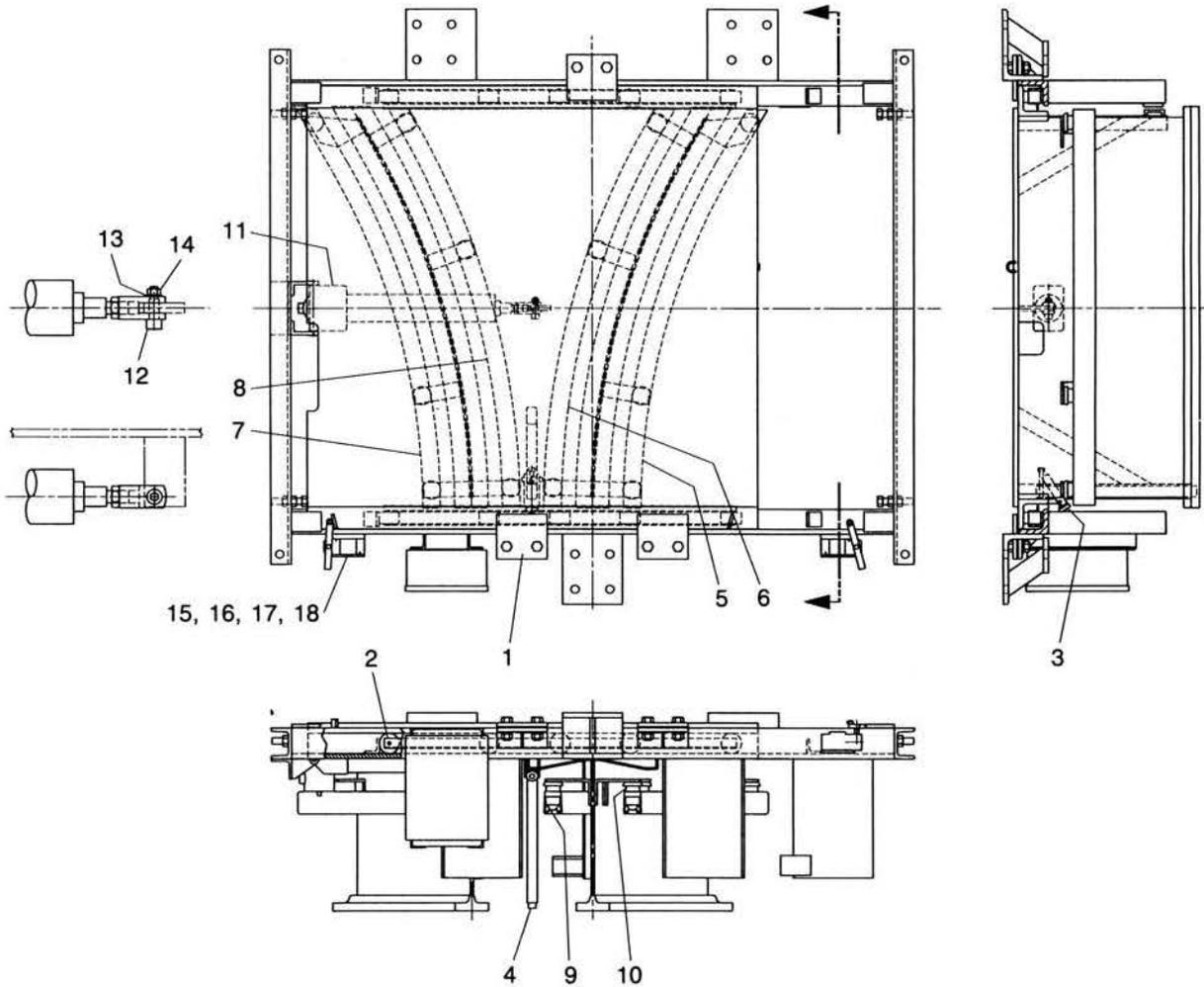
NOTES:

(a) Optional.

(b) Contact Acco Chain & Lifting Products.

PARTS LIST — SWITCH ASSEMBLY

TROJANTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED AIR—OPERATED WYE — 703.7138



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-----------------------|------|
| 1 | 260579 | Hold-Down Plate | 3 |
| 2 | 260584 | Roller Assembly | 2 |
| 3 | 260622 | Cam Roller Assembly | 1 |
| 4 | 260625 | Baffle Pin | 1 |
| 5 | (b) | Curved Conductor (RH) | 1 |
| 6 | (b) | Curved Conductor (RH) | 1 |
| 7 | (b) | Curved Conductor (LH) | 1 |
| 8 | (b) | Curved Conductor (LH) | 1 |
| 9 | 280433 | Transfer Insulator | 16 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---------------------------------|------|
| 10 | 280432 | Support Insulator | 12 |
| 11 | 222452 | Air Motor with Solenoid Valve | 1 |
| 12 | 212751 | Stripper Bolt | 1 |
| 13 | 210217 | Washer | 1 |
| 14 | 211546 | Locknut | 1 |
| 15 | 221892 (a) | Limit Switch Plug-In Unit | 2 |
| 16 | 221897 (a) | Limit Switch Plug-In Receptacle | 2 |
| 17 | 221883 (a) | Limit Switch Adjustable Arm | 2 |
| 18 | 221901 (a) | Limit Switch Turret Head | 2 |

No Recommended Spare Parts

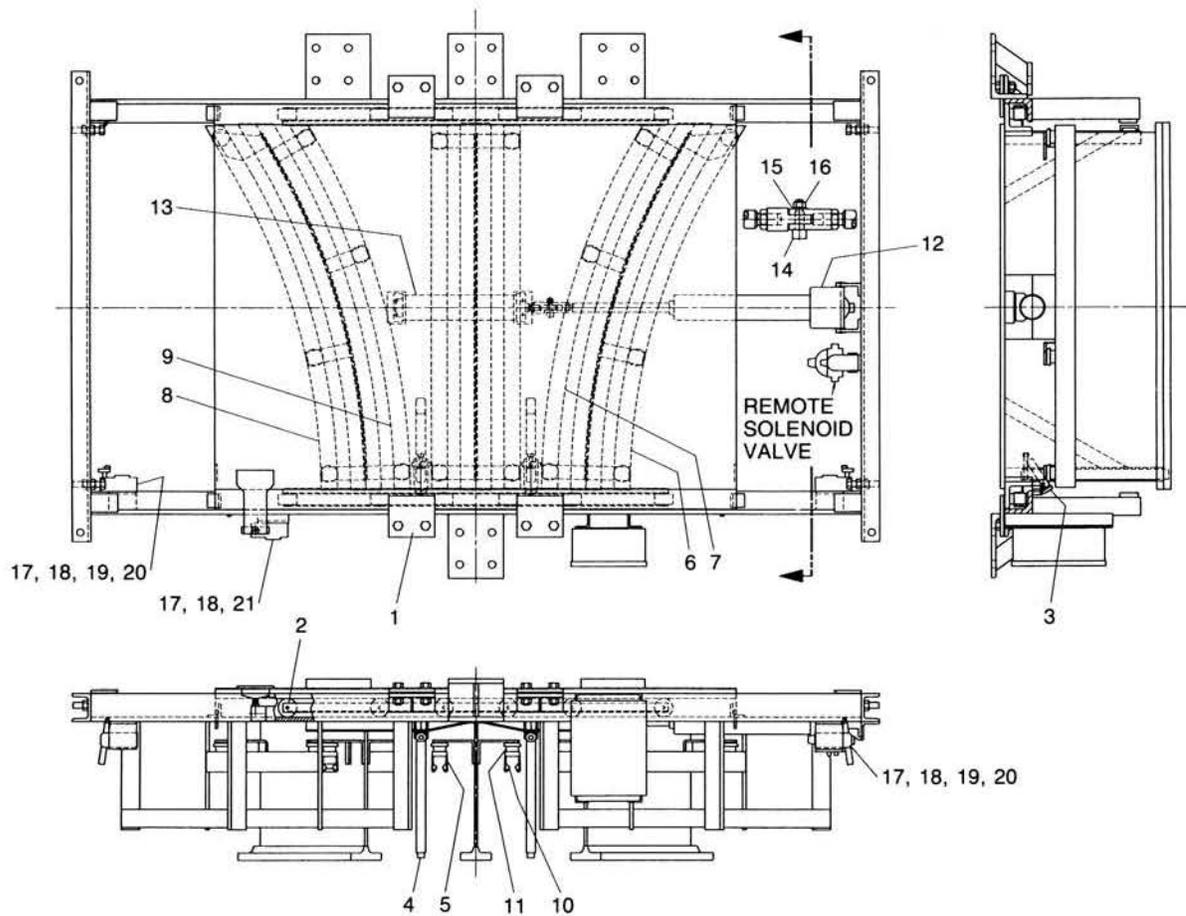
NOTES:

(a) Optional.

(b) Contact Acco Chain & Lifting Products.

PARTS LIST — SWITCH ASSEMBLY

TROJANTRACK™ SLIDING SWITCH ASSEMBLY 3.33" OPERATING FLANGE ELECTRIFIED AIR—OPERATED 3-WAY — 703.7139



SWITCH ASSEMBLY PARTS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|----------------------------|------|
| 1 | 260579 | Hold-Down Plate | 4 |
| 2 | 260585 | Roller Assembly | 2 |
| 3 | 260622 | Cam Roller Assembly | 2 |
| 4 | 260625 | Baffle Pin | 2 |
| 5 | (b) | Straight Conductor Section | 2 |
| 6 | (b) | Curved Conductor (RH) | 1 |
| 7 | (b) | Curved Conductor (LH) | 1 |
| 8 | (b) | Curved Conductor (RH) | 1 |
| 9 | (b) | Curved Conductor (LH) | 1 |
| 10 | 280433 | Transfer Insulator | 24 |
| 11 | 280432 | Support Insulator | 16 |

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|---|------|
| 12 | 222452 | Air Motor with Solenoid Valve | 1 |
| 13 | 222005 | Air Motor, 12 1/2" Stroke, with Remote Solenoid Valve | 1 |
| 14 | 212751 | Stripper Bolt | 1 |
| 15 | 210217 | Washer | 1 |
| 16 | 211546 | Locknut | 1 |
| 17 | 221892 (a) | Limit Switch Plug-In Unit | 3 |
| 18 | 221897 (a) | Limit Switch Plug-In Receptacle | 3 |
| 19 | 221883 (a) | Limit Switch Adjustable Arm | 2 |
| 20 | 221901 (a) | Limit Switch Turret Head | 2 |
| 21 | 221903 (a) | Limit Switch Side Roller Plunger | 1 |

No Recommended Spare Parts

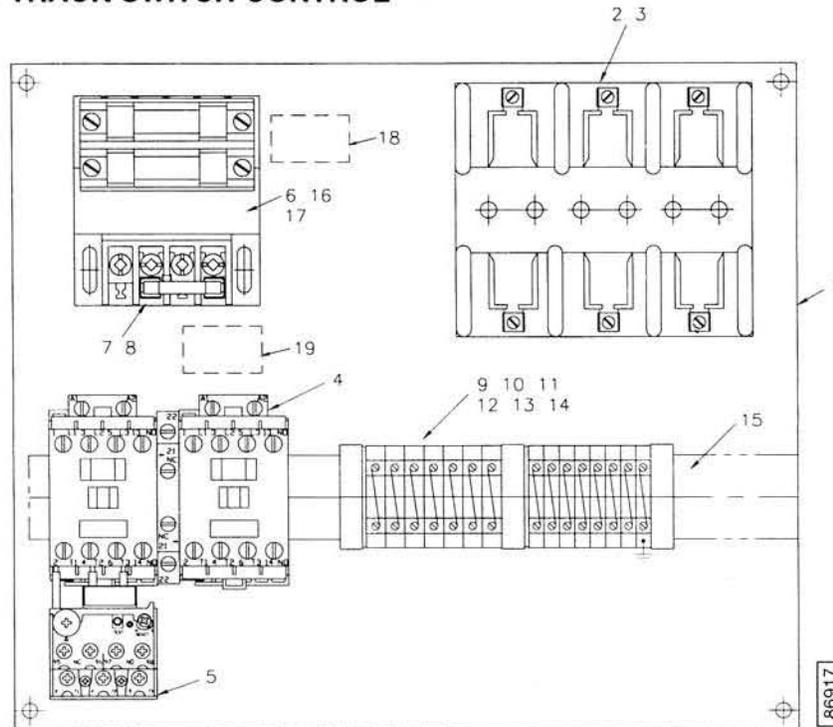
NOTES:

(a) Optional.

(b) Contact Acco Chain & Lifting Products.

PARTS LIST – TRACK SWITCH CONTROL

MOTOR OPERATED TRACK SWITCH CONTROL



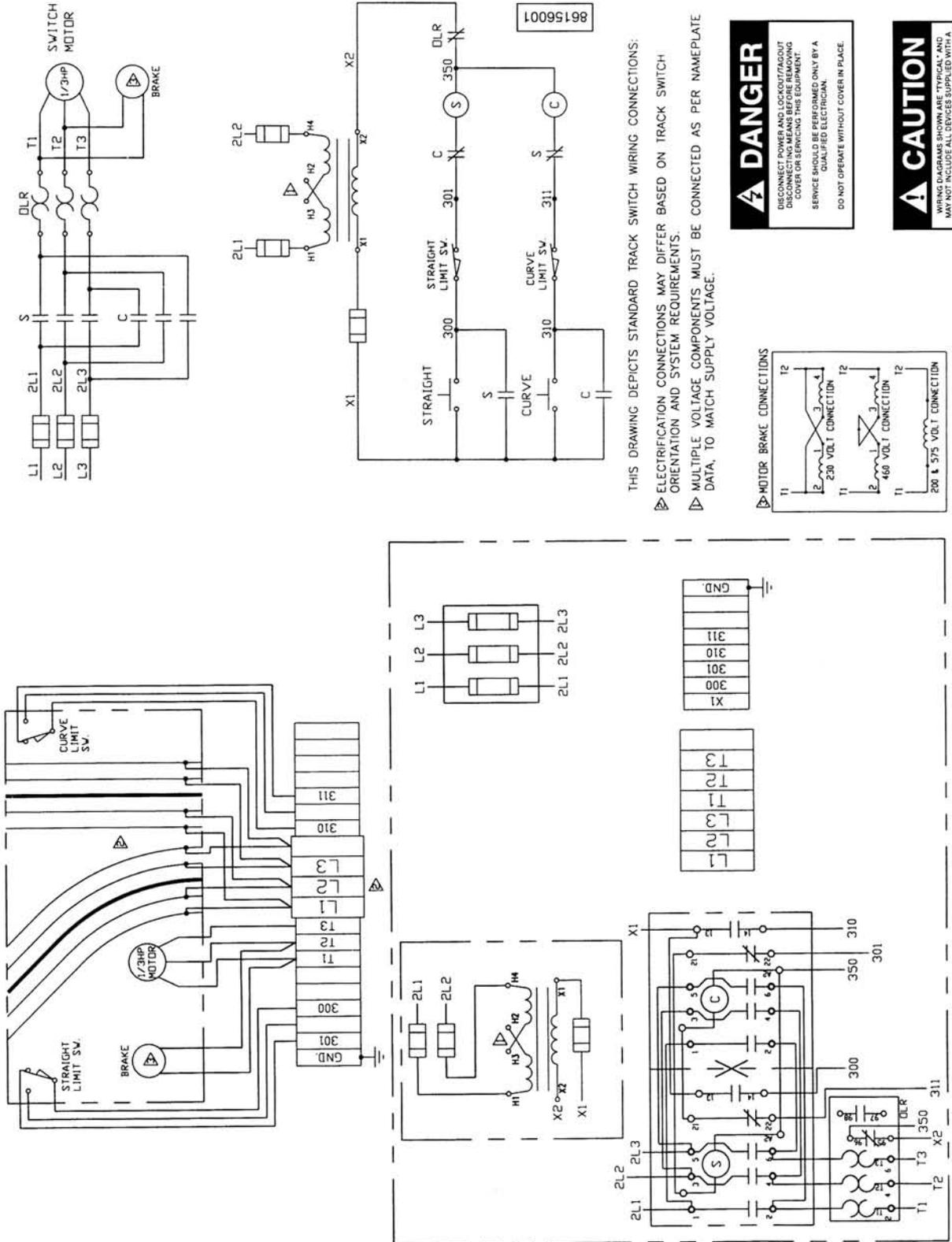
REPLACEMENT PARTS FOR MOTOR OPERATED TRACK SWITCH CONTROL

| ITEM | PART NO. | DESCRIPTION |
|------|-----------|--|
| 1 | 86815 | Panel, Drilled |
| 2 | PA7341 | Fuse Block |
| 3 ▲ | 86709-030 | Fuse, 3A. Motor Circuit for 200V. Supply |
| | 86709-020 | Fuse, 2A. Motor Circuit for 230V. Supply |
| | 86709-010 | Fuse, 1A. Motor Circuit for 460V. and 575V Supply |
| 4 | 86727-01 | Contactor, Reversing |
| 5 | 86736-05 | Overload Relay, 1.0 - 1.6A., for 200V and 230V. Supply |
| | 86736-04 | Overload Relay, 0.60 - 1.0A., for 460V. Supply |
| | 86736-01 | Overload Relay, 0.16 - 0.2A., for 575V. Supply |
| 6 | 52549-02 | Transformer, 50VA, 200V. - 120V. |
| | 52549-14 | Transformer, 50VA, 230/460V. - 120V. |
| | 52549-37 | Transformer, 50VA, 575V. - 120V. |
| 7 | 52549-80 | Fuse Holder |
| 8 ▲ | PA7328 | Fuse 1A |
| 9 | 86710-01 | Terminal Block, Control |
| 10 | 86710-02 | Terminal Block, Power |
| 11 | 86710-04 | Terminal Block, Grounding |
| 12 | 86710-05 | Terminal Block, Anchor |
| 13 | 86710-06 | Terminal Block, Power Barrier |
| 14 | 86710-07 | Terminal Block, Control Barrier |
| 15 | PA7231 | Din Rail - 12.5" Long |
| 16 | 52429-81 | Transformer Fuse Block, Primary |
| | 86724-006 | Transformer Fuse, Primary - 200 V. |
| | 86724-005 | Transformer Fuse, Primary - 230 V. |
| | 86724-003 | Transformer Fuse, Primary - 460 V. |
| 17 ▲ | 86724-002 | Transformer Fuse, Primary - 575 V. |
| | PA7231 | Label, Transformer Fuse, Type CC |
| 18 | PA5865 | Label, Transformer Fuse, Type ABC |

▲ Recommended Spare Parts

TYPICAL WIRING DIAGRAM

MOTOR OPERATED TRACK SWITCH CONTROL



GENERAL CONDITIONS OF WARRANTY

WARRANTIES: The Seller warrants to the original using Buyer thereof that the goods sold under this Agreement are free from defects in workmanship and materials for a period of one year from the date of shipment to the original using Buyer. No other express warranties are given and no affirmation of Seller or Seller's agents, by word or action, shall constitute a warranty. No warranty is made for components and accessories made by others when such items are warranted by their respective manufacturers.

Installation or operation of the equipment in any manner other than as recommended by Seller, shall void the warranty.

Any variations in details between the goods furnished herein and those covered in Buyer's specifications are due to standards of manufacture not to be construed as exceptions to the specifications.

DISCLAIMER OF IMPLIED WARRANTIES:

- (a) SELLER MAKES NO WARRANTY OF MERCHANTABILITY IN RESPECT TO THE GOODS SOLD UNDER THIS AGREEMENT.
- (b) This sale is made WITHOUT ANY WARRANTY BY SELLER THAT THE GOODS ARE SUITABLE FOR ANY PARTICULAR PURPOSE.
- (c) Buyer hereby waives all other warranties, guarantees, obligations, liabilities, rights, and remedies arising by law or otherwise including any obligation or liability of the Seller arising from tort, and Buyer shall indemnify Seller from any liability, loss, damage, or claim arising from Buyer's tortious use of the goods sold hereby.

REMEDIES:

- (a) Under no conditions shall any goods be returned to Seller without its prior written consent.
- (b) The Buyer's sole and exclusive remedy for breach of any warranty is limited to Seller furnishing, at its expense, duplicate or repaired parts F.O.B. Seller's plant with installation at Buyer's expense if discovery of a claimed defect occurs during the allowable warranty period, and if Seller's inspection determines a defect exists.
- (c) The quantity of material shown by invoice shall in all cases govern settlement for shortages, unless notice of shortage, appropriately documented, is given to the carrier and the Seller upon delivery by the Carrier.
- (d) Claims for errors, deficiencies or imperfections shall be deemed waived by the Buyer unless Seller is notified in writing of the basis of such claims within 10 days after discovery of claimed defect and such discovery occurs within the warranted period.
- (e) Neither Buyer nor User shall be entitled under this Agreement to recover from Seller any incidental or consequential damages of any nature including but not limited to the cost of any labor expended by others in connection with the goods sold hereby by reason of any alleged nonconformity or breach of warranty on the part of the Seller, nor costs of material or account thereof, nor any lost profits whether determinable or speculative.



Acco Chain & Lifting Products Division

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