

Tongue Switches 200 Series

These instructions are for 200 Series Tongue Switches, as used with TC/American Crane 200 Series Patented Track rail. See the Index to locate the appropriate pages for the model of switch being used.

DANGER

Lifting Operations

Installation of equipment such as TC/American Crane's Switches requires performance of overhead lifting operations. Proper lifting procedures involve training, skills and experience beyond the scope of this document. Workplace supervisors are responsible to assure that all persons under their supervision are properly trained, properly equipped, and are following safety practices appropriate for the lifting operation being employed.

DANGER

Overhead Mechanical Assembly

Persons performing installation and assembly of overhead equipment must use caution while lifting, assembling and adjusting components. These operations are frequently conducted from manlifts or platforms that require specific knowledge, training and operation skills beyond the scope of this document.

Access to the floor below the work area must be restricted to reduce the potential of personnel injury due to falling objects.

Workplace supervisors are responsible to assure that all persons under their supervision are properly trained, properly equipped, and are following appropriate safety practices.

DANGER

Electrical Equipment Installation, Service and Maintenance

Persons performing installation, service or maintenance activities on, near, or with equipment that is electrically powered are exposed to electrical hazards that could result in serious injury or death if proper precautions are not followed. Before performing such work, disconnect the electrical power source for the system at the disconnect device and lock it out, following appropriate Lockout/Tagout (LOTO) procedures, to prevent electric power from being applied while work is being performed.

All persons must use safe work practices appropriate to the electrical system, and follow all workplace procedures and policies. This requires specific knowledge, equipment and training beyond the scope of this document. Workplace supervisors are responsible to assure that all persons under their supervision are properly trained, properly equipped, and are following appropriate safety practices.

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Switches

TC/American Crane offers several models of switches, for all sizes of our rail. Selection of the appropriate model depends upon the layout of the monorail, the load to be carried, powered travel or hand pushed, service duty class, and other factors.

Switch Model Numbers:

(general information for all switches)

- The first character(s) of the Model Number identifies the rail size used with this switch:
 - 2 = 200 Series Rail
 - 3 = 325 Series Rail
 - 4 = 400 Series Rail
 - 45 = 450 Series Rail
- The second character(s):
 - S = Switch, non-electrified (without conductor bars)
 - ES = Switch, electrified (with conductor bars)
- The intermediate numbers identify a model series, i.e.:
 - 260 = 200 Series, 2-way tongue switch
 - 693 = 600 Series, 2-way glide switch
 - 833 = 800 Series, 3-way glide switch
 - 2710 = 2000 Series, Wye glide switch
 - Etc.
- The next number, or number and letters, may identify the switch as follows:
 - L = Left Hand configuration (or sometimes "LH")
 - R = Right Hand configuration (or sometimes "RH")
 - Y = Wye configuration
 - H = "H" Series rail (in 800 and 2000 Series Switches, 3-way and wye configurations)
 - LH = "H" Series rail (in 800 and 2000 Series Switches, 2-way configurations, left hand)
 - RH = "H" Series rail (in 800 and 2000 Series Switches, 2-way configurations, right hand)
 - 12 = 12" (for 2000 Series only)
 - 12H = 12" deep, "H" Series rail (for 2000 Series only)
 - 14H = 14" deep, "H" Series rail (for 2000 Series only)
 - Etc.

NOTE: See the appropriate section(s) of these instructions for assembly, installation and maintenance details specific to your Switch model.

NOTE: For a specific parts breakdown of the Switch provided with an order, see the drawings provided with that shipment and the Switch Section of TC/American Crane Systems Catalog.

General Installation Instructions

Before beginning the installation:

- When shipment is received, remove all shipping materials and visually inspect all parts for damage. Repair and/or replace if necessary.
- Check packing lists against materials received and identify all parts.
- Gather all TC/American Crane drawings, plus any vendor equipment drawings, and keep in a secure location for reference during installation and start-up, and to give to end user for future reference.
- Store all equipment in a clean, secure area prior to final assembly.

Installing Switches in a Monorail System:

- Check layout drawings for any notes.
- See *General Switch Configuration* section of this document to assist in identifying the switches.
- Tongue switches are shipped with the pull rope arms unbolted and folded forward to make a compact shipment. Fold into position and replace bolts in arms. See Fig. 6B for typical example.
- Begin a monorail installation at one switch location and work out from there, adding straight rails and curves sequentially.
- Refer to *Suspension* section of this document for notes about primary and auxiliary suspension methods, and a caution about setting the rail gap at outgoing rail hangers if substituting hanger rods for the flat head cap screws used during factory switch assembly. Use extreme care when installing and leveling switches so that switches are uniformly and equally suspended, with no twisting of the top plate of the switch.
- If there is more than one switch in a system, add the second and additional switches as the installation progresses. Do not install all switches and then try to force rails into place between them.
- Install all switches, curves and rails snug until all is in place. Then shift and adjust as necessary to assure that straight rails enter and exit the switch straight, and that curves are properly formed and flow smoothly from the switch (verify that rail hangers are properly in line). See *Treadline and Rail Edges Alignment Adjustment Notes* section of this document.
- Make any adjustments for switch rail height, switch throw and tread alignment. See *Switch Adjustments* section of this document.
- Make any final switch leveling adjustments (adjust nuts on threaded rods, or use shims at bolted connections). Use extreme care when installing and leveling switches so that switches are uniformly and equally suspended, with no twisting of the top plate of the switch.
- Tighten all suspension components.
- Rod suspended switches must be rigidly sway braced for stability. Sway bracing materials are by others.

Initial Start-Up:

- After lubrication, operate all switches several times through full switch throw in all directions.
- Verify proper latching at each outgoing rail or curve location.
- Run trolleys through the switches to check clearances and smooth transition.
- Verify that safety stops on the switch properly contact the trolley to prevent it from falling off when the switch rail is not aligned to an outgoing rail.
- NOTE: These switches are not designed to be thrown (moving portion of the switch repositioned) with a load on the rail.

200 Series Tongue Switches

Non-Electrified

2S-260L	2-way, LH	Figure 1
2S-260R	2-way, RH	Not Shown
2S-260Y	Wye	Not Shown
2S-261	3-way	Figure 3

Electrified

2ES-208-LT	2-way, LH	Not Shown
2ES-208-RT	2-way, RH	Figure 2
2ES-210-T	Wye	Not Shown
2ES-209-T	3-way	Not Shown

Switch Configurations: Figure 1 is a 2-way, LH switch. The RH and Wye switches have the same general appearance and construction. For switch distinctions, see Figures 4, 5 and 6.

Non-electrified vs. electrified switches:

Switches may be provided with either Shielded Channel-Bar or Shielded Figure-8 Bar electrical conductors

General construction, installation, operation and adjustment are the same for both types of switches.

But, some parts and dimensions of electrified switches are not the same as non-electrified switches, and electrified switches are made with a deeper rail section (to allow for installation of electrical conductor bar at 7" gage).

See the TC/American Crane Systems Catalog and drawings provided with the shipment for more detail.

Conductor bars: are factory wired back to a junction box mounted on the frame of the switch. Building power must be provided to each switch and field connected at the junction box. Building power must be separately provided to incoming and outgoing runs of electrified straight and curved rails.

For installation of electrical conductor bar systems, see the TC/American Crane *Shielded Channel-Bar Electrical Conductor Installation Instructions* or *Shielded Figure-8 Electrical Conductor Installation Instructions*.

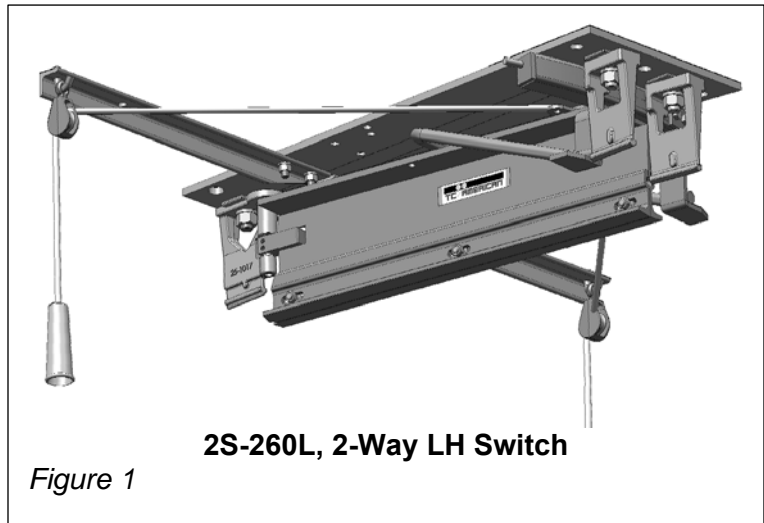


Figure 1

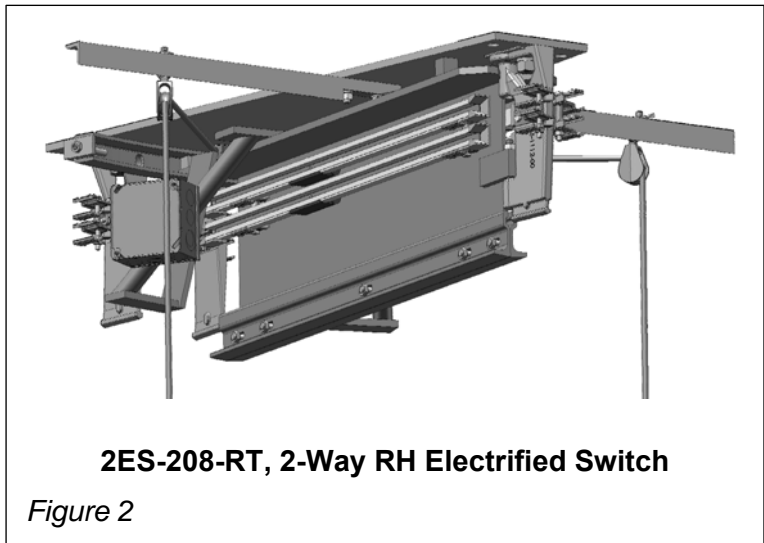


Figure 2

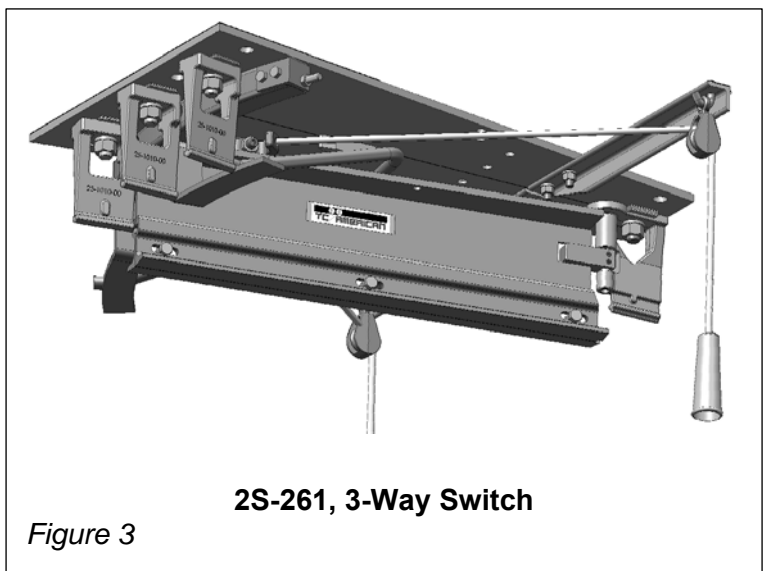


Figure 3

Pull Rope Arms to One Side:

All tongue switch models may be ordered in a configuration that puts both pull rope arms on either the right hand or left hand side of the switch.

3-Way Switches, RH or LH Configuration:

3-way switches may be special ordered as “Configured for RH Installation” or as “Configured for LH Installation.” These switches are made to mount in a straight monorail, with two outgoing rails either to the right or left of the straight.

Note: standard 3-way switch configuration is for the straight rail to be aligned to the center switch position, with one outgoing rail to the left and one to the right.

Typical Shipping Configuration

See Figure 4 for typical shipping configuration for all tongue switches (pull rope arms folded inward, pull ropes wrapped around switch rail). At installation, unwrap ropes, fold arms into correct position and replace bolts. Verify ropes hang freely.

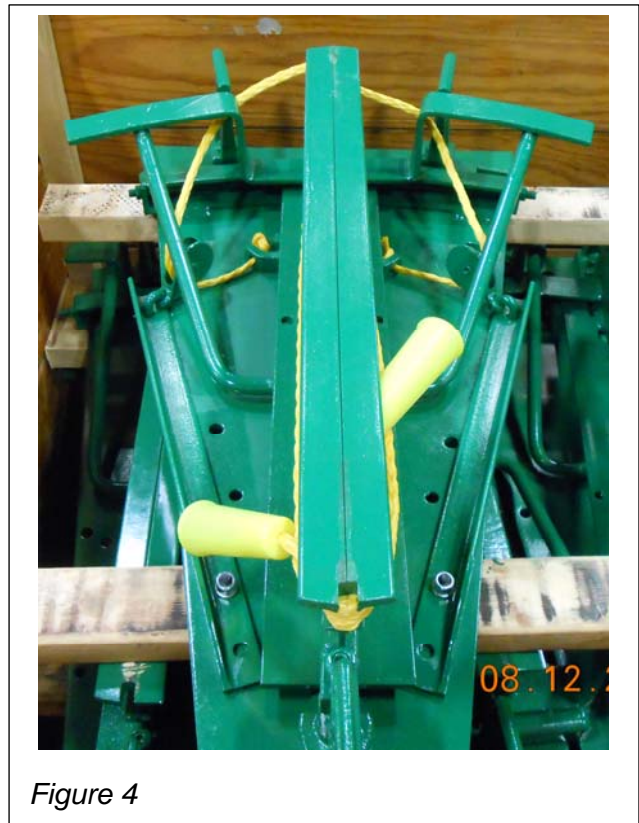


Figure 4

General Tongue Switch Configurations

Figures 5, 6 and 7 are “bottom views” of the 2S-260R, 2S-260R and 2S-260Y switches. Note the relative positions of the incoming rail hanger and the outgoing rail hangers, as mounted on the top plate assembly.

See Figs 5A, 6A and 7A for “top views” of the switches.

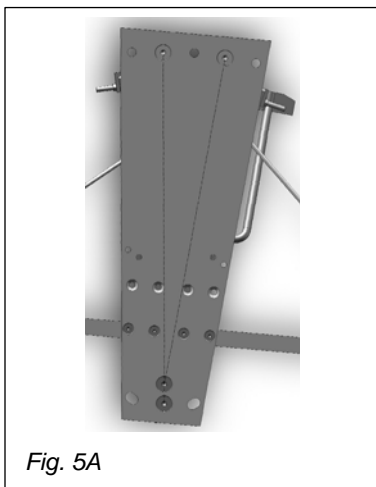


Fig. 5A

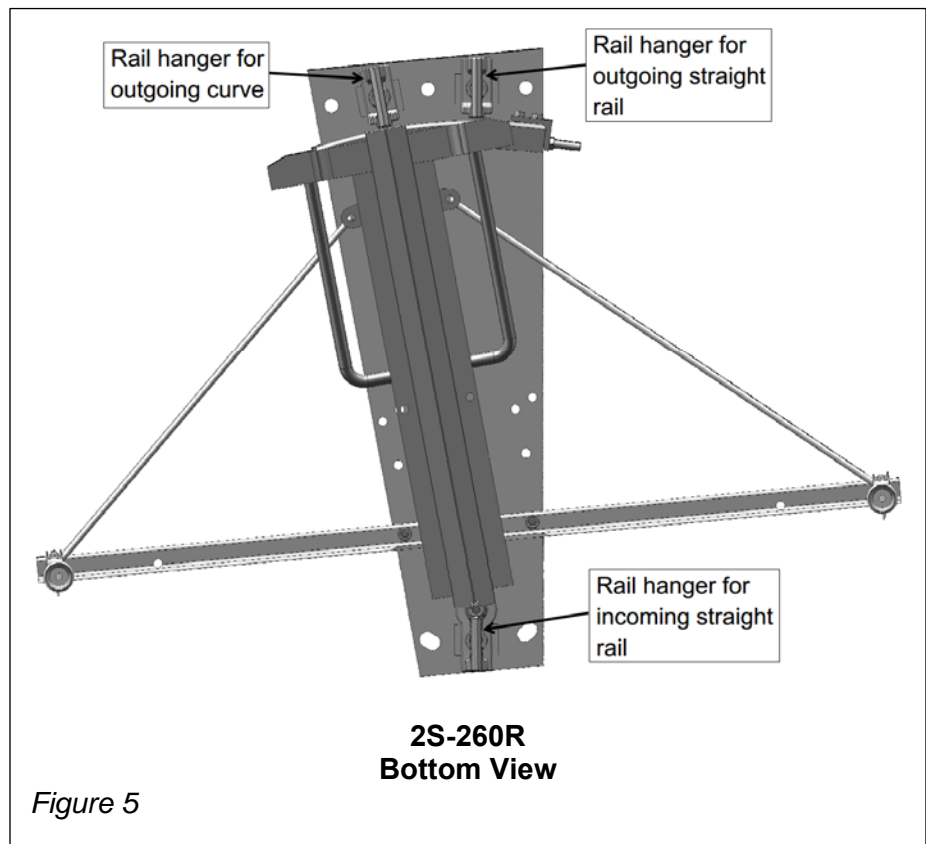
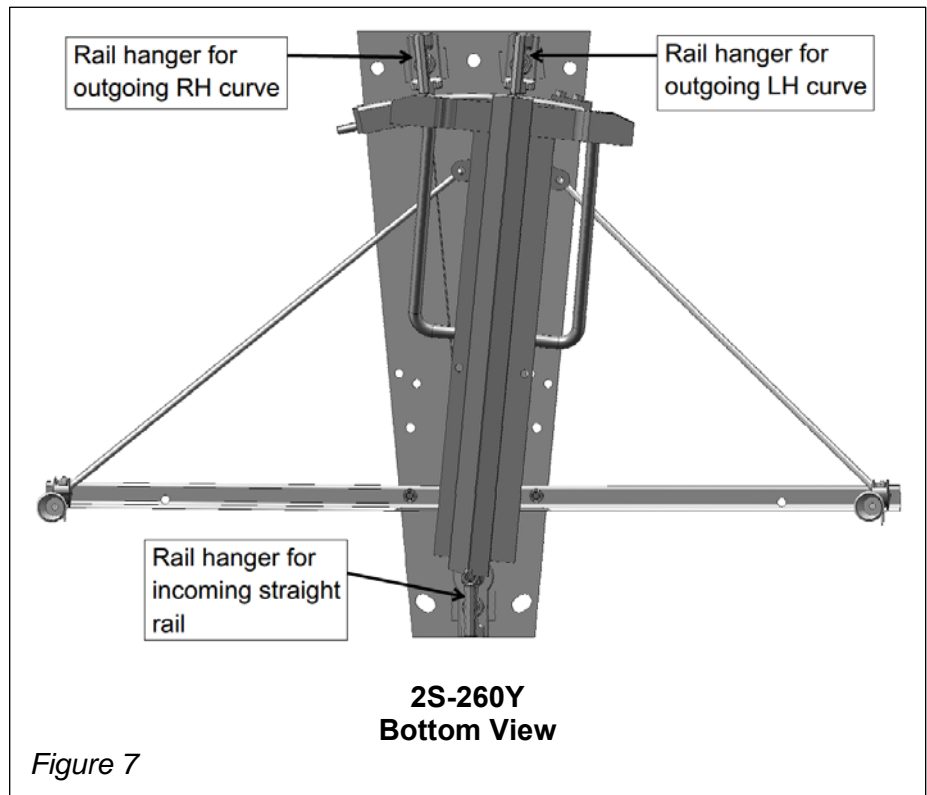
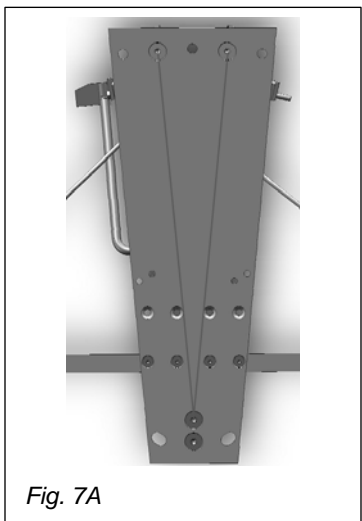
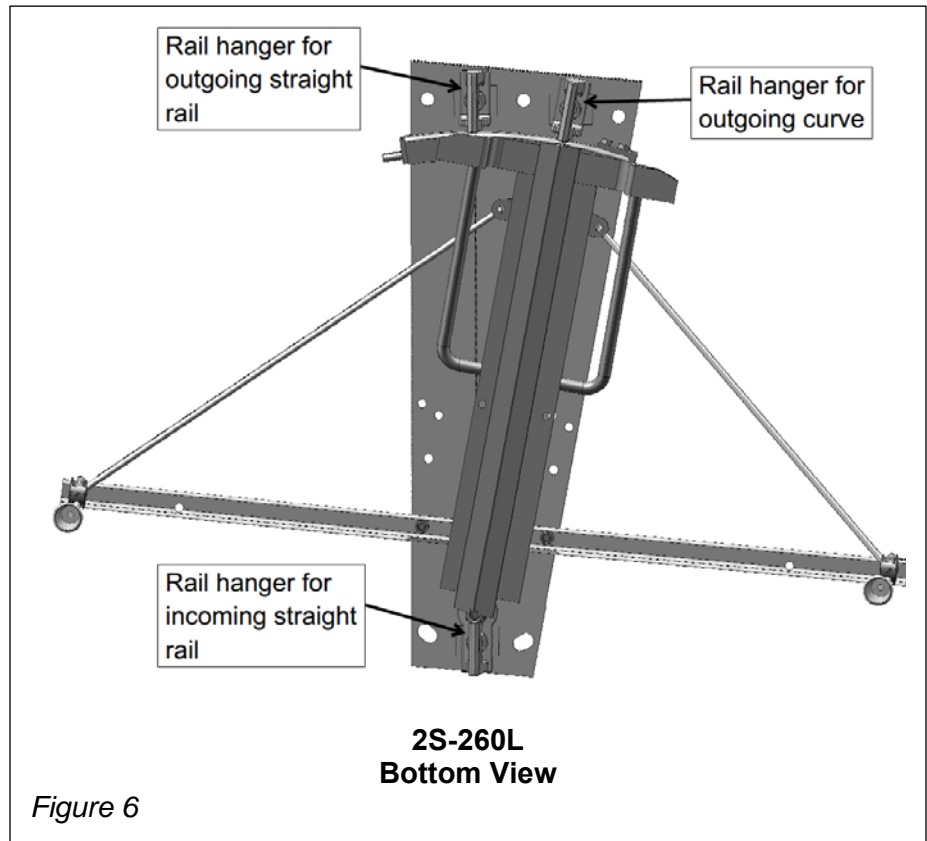
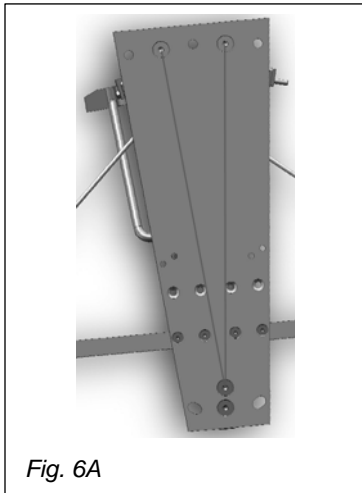


Figure 5



Switch Suspension

Suspension Methods

- A. **Primary:** use hanger rods at each of the switch hangers.
- B. **Auxiliary (Optional):** use hanger rods or bolts at the “auxiliary mounting holes”.

Figure 8: shows the Primary and Auxiliary switch mounting holes for 2-way and wye switches. 3-way switch is similar.

Leveling, All Switches: allow space for leveling switch via threaded hanger rods, or by shims if bolted connection.

Replacing Switch Hanger Hardware with 5/8" Hanger Rods or Bolts:

Fig. 8A is a typical rail hanger and hardware. Remove hardware when using hanger rods at these locations. Place large flat washer over countersunk hole in switch top plate. See note below about rail gap adjustment when substituting hanger rods for the rail hanger hardware.

Switch Rail Gap Note:

see Figure 8A. Factory hardware used at a rail hanger is 5/8" diameter, flat head socket cap screw. The machined mounting hole in the head of the rail hanger is 13/16" diameter.

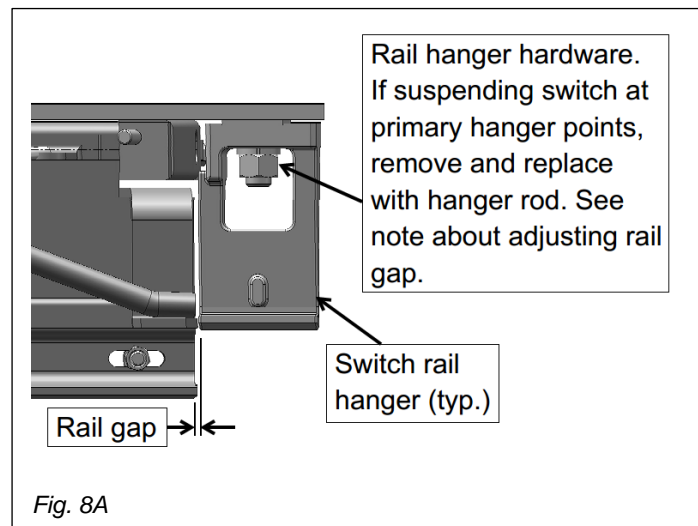
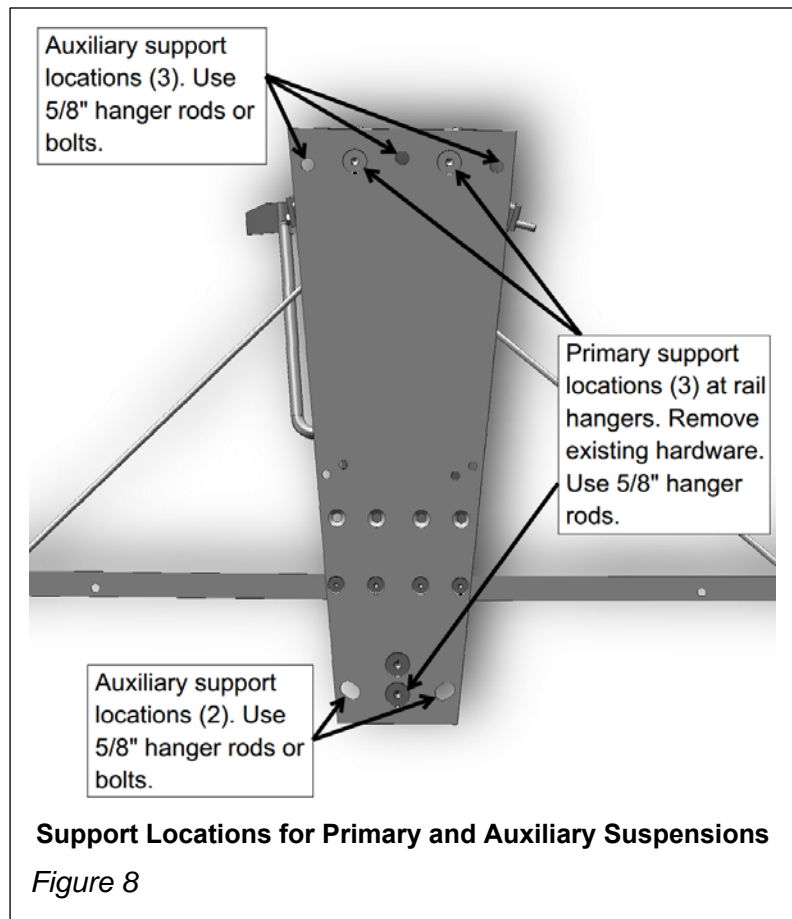
The oversized hole in the rail hanger allows it to be positioned as required to adjust the rail gap. The rail hanger is factory located to hold an approximate maximum 3/16" rail gap.

When replacing the rail hanger cap screw with a hanger rod or bolt, take care to position the hanger so as to not have an excessive rail gap (minor adjustment is made via the oversized hole in rail hanger as compared to cap screw or hanger rod diameter).

Switch Bracing: rod suspended switches must be sway braced, laterally and longitudinally. Sway brace materials are by others.

Attach bracing to switch at auxiliary support holes.

See Suspension section of TC/American Crane systems catalog for pipe brace fittings and clamps, or fabricate brackets locally.



Switch Latching and Operating Mechanisms

2-Way and Wye Tongue Switch and Latch Operation (ref: Fig. 9 and 10)

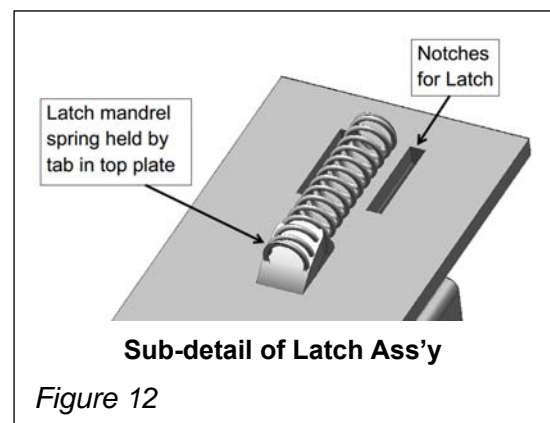
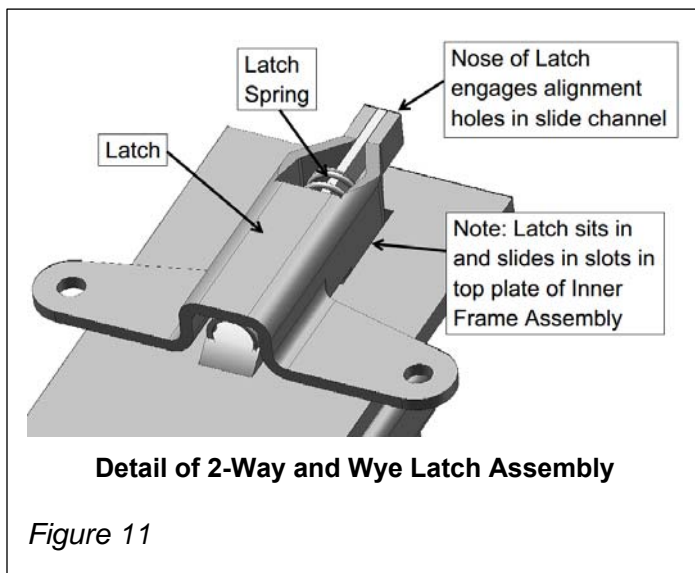
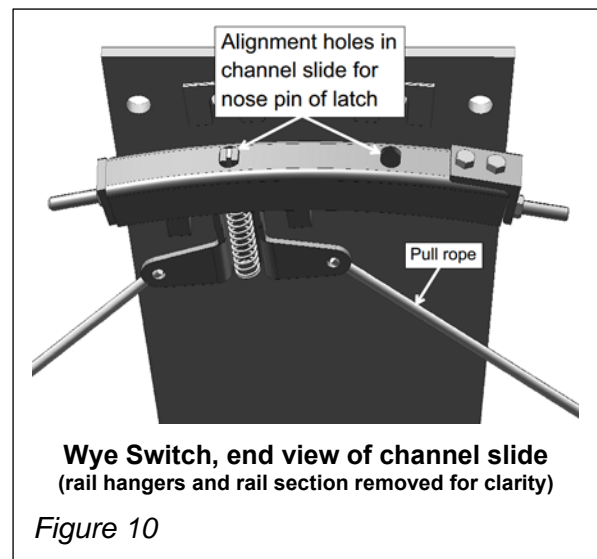
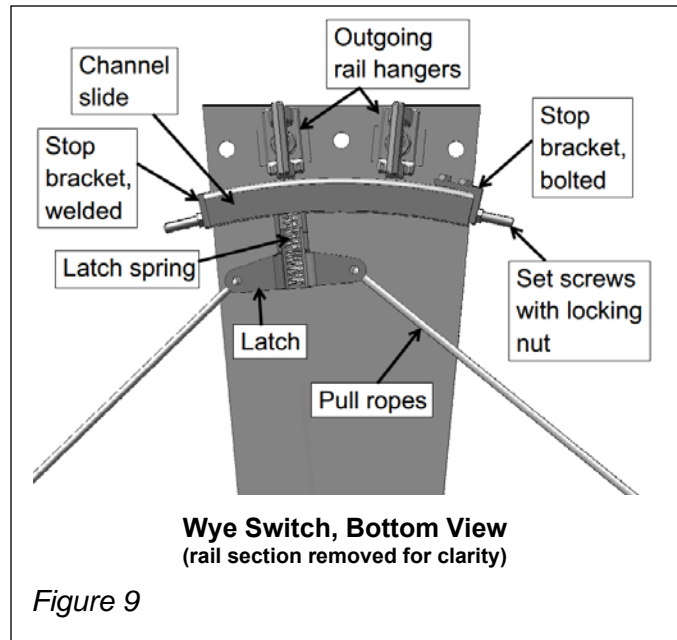
Operation: 2-way and wye switches are operated by pulling on one of the two 5/16" diameter yellow poly ropes connected to the latch mechanism. Each rope is approximately 12' long and is routed from the latch through a sheave mounted on an arm extended to each side of the switch. See Fig. 1.

Rope length may be adjusted as needed to meet the height and layout of the monorail system (by others, unless special ordered). Additional sheaves may be furnished locally to assist in routing the ropes as required.

General Operation: pull the rope on the side of the switch to which you want the pivoting rail section to move. Pulling the rope slides the latch back, toward the pivot point of the switch, disengaging the latch nose from the alignment hole in the channel slide (see Figures 10, 11 and 12).

Continued pull on the rope pivots the switch rail in the direction of pull until it contacts a set screw at the end of the channel slide. Releasing pressure on the rope allows the latch spring to push the nose of the latch into the alignment hole at that side of the switch. Switch movement is complete and normal monorail use at this position may proceed.

Moving Switch with a Load on the Rail: These switches are not designed to be thrown (pivoting portion of the switch repositioned) with a load on the switch rail.



3-Way Switch and Latch Operation

(ref: Fig. 13 and 14, switch in RH position)

Operation: 3-way switches are operated by pulling on one of the two 5/16" diameter yellow poly ropes connected to the latch mechanism. Each rope is approximately 12' long and is routed from the latch through a sheave mounted on an arm extended to each side of the switch. See Figures 3 and 13.

Rope length may be adjusted as needed to meet the height and layout of the monorail system. Additional sheaves may be furnished locally to assist in routing the ropes as required.

- A. Operation from RH to Center position: when the rope attached to the latch arm on the left is pulled, the latch moves back, toward the rail pivot, and disengages the latch nose from the alignment hole in the channel slide (see Figs. 13 and 14). Continued pull on the rope pivots the rail section toward the center of the switch.

As the switch rail reaches the center position of the switch, the latch tailpiece contacts the right hand side of the latch block and stops the switch rail in alignment with the center rail hanger. When pull pressure on the rope is released, the latch spring pushes the latch nose forward to engage the center alignment hole. Switch operation to the center rail position is complete, and normal monorail use at this position may continue.

- B. Operation from Center to LH position: pull again on the left hand rope. This pulls the latch back again, but the latch also "cocks" slightly to the left (see *Latch Set Screw Adjustment* on the next page), causing the tailpiece to pass ahead and to the left side of the latch block. Continued pull on the rope pivots the rail section toward the left hand position of the switch. As the rail section contacts a set screw on the left, the rail stops and is aligned with a hole in the channel slide. When pull pressure on the rope is released, the latch spring pushes the latch nose forward to engage the left hand alignment hole. Switch operation to the left rail position is now complete – normal monorail use at this position may continue.

- C. Switch movement from LH to the RH side is the opposite of the description above.

NOTE: direct rail pivot from full RH to full LH, or full LH to full RH cannot be made; the rail swing (pivot) must stop at the center position, and pressure released on the pull rope, before continuing to move to the far LH or RH position (this allows the tailpiece of the latch to "jog" around the latch block).

Moving Switch with a Load on the Rail: These switches are not designed to be thrown (pivoting portion of the switch repositioned) with a load on the switch rail.

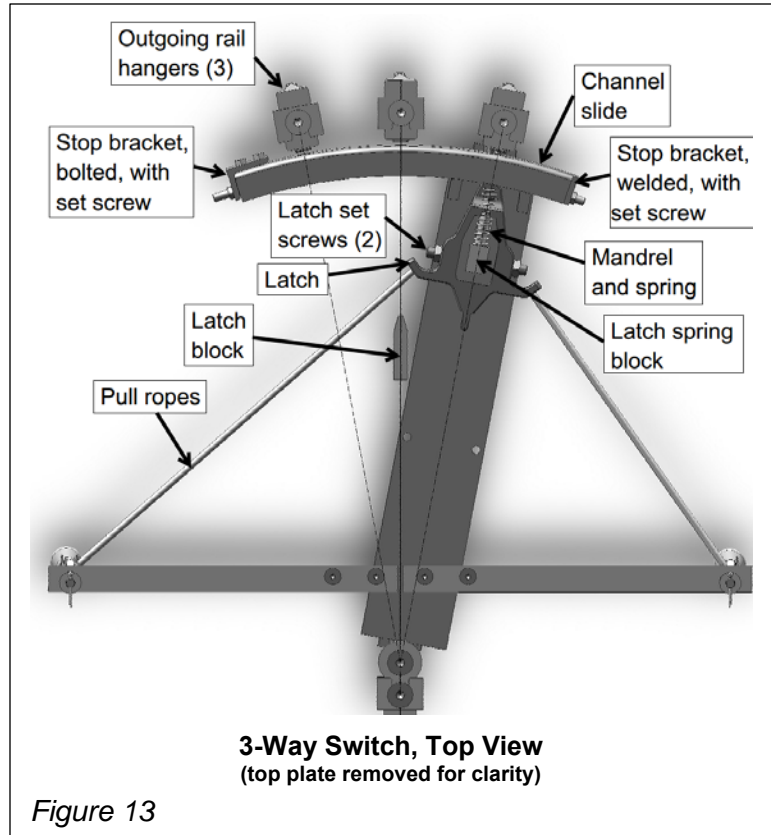


Figure 13

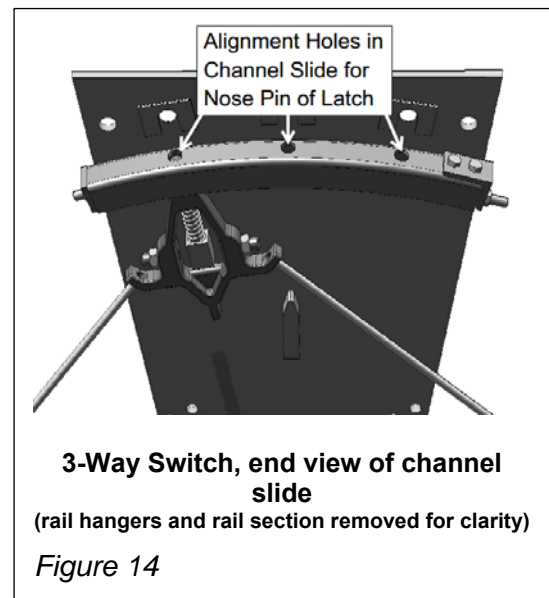
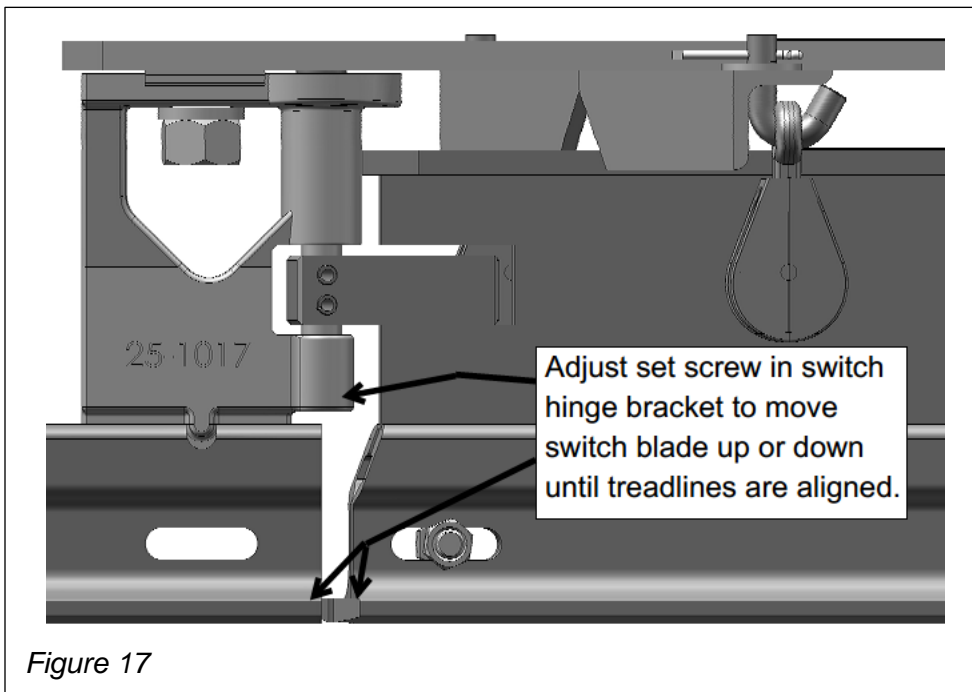
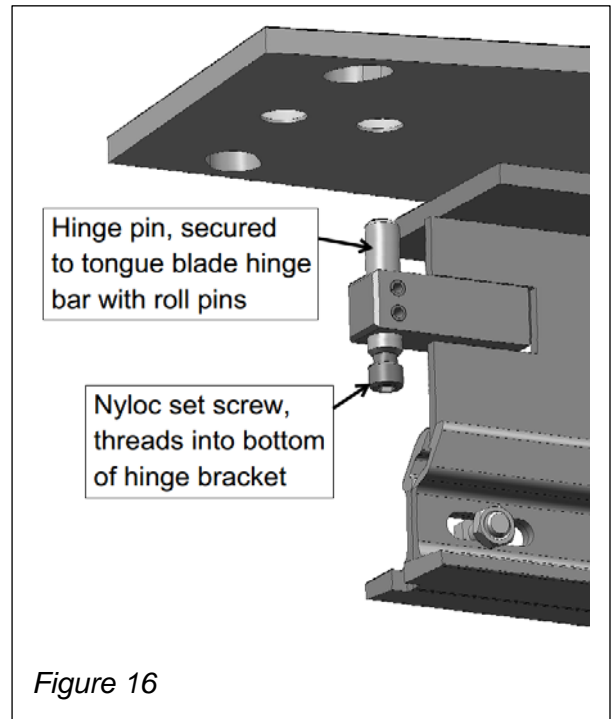
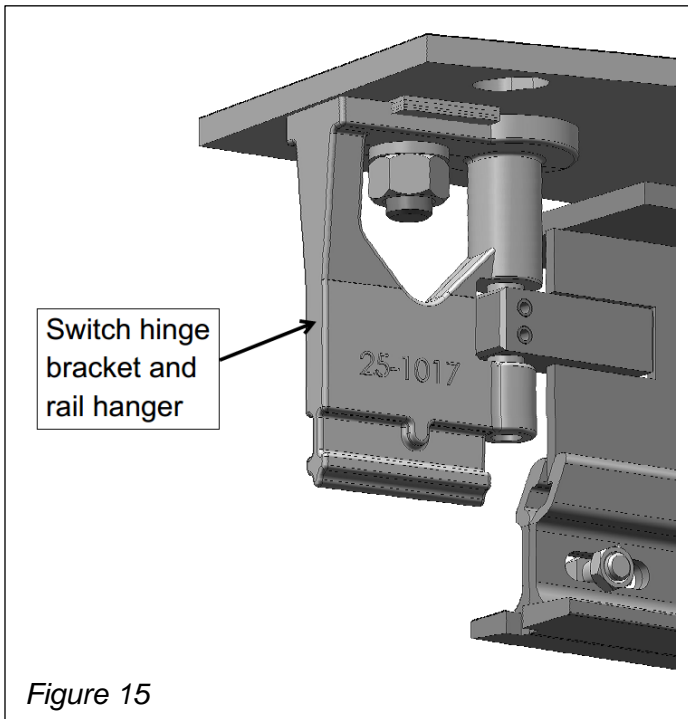


Figure 14

Switch Adjustments (all models)

A. Tongue Switch Rail Height Adjustment

Incoming Rail Hanger: Adjust the tongue switch rail as required to align the treadline of the incoming rail to the treadline of the switch rail. Use 1/4" hex wrench. Turn set screw into the hinge bracket, with contact against the hinge pin, to raise the switch blade assembly, turn it out of the bracket to lower the blade. See Figures 15, 16 and 17.



Outgoing Rail and Curve Hangers: The outer end of the tongue switch rail is supported by and slides on the inside of the curved slide channel. See Figure 18 and 19. The outgoing rail and curve hangers are factory set to correct elevation so that these rails will be aligned to the tongue switch rail. Should any vertical adjustment be required, add or remove shims as required.

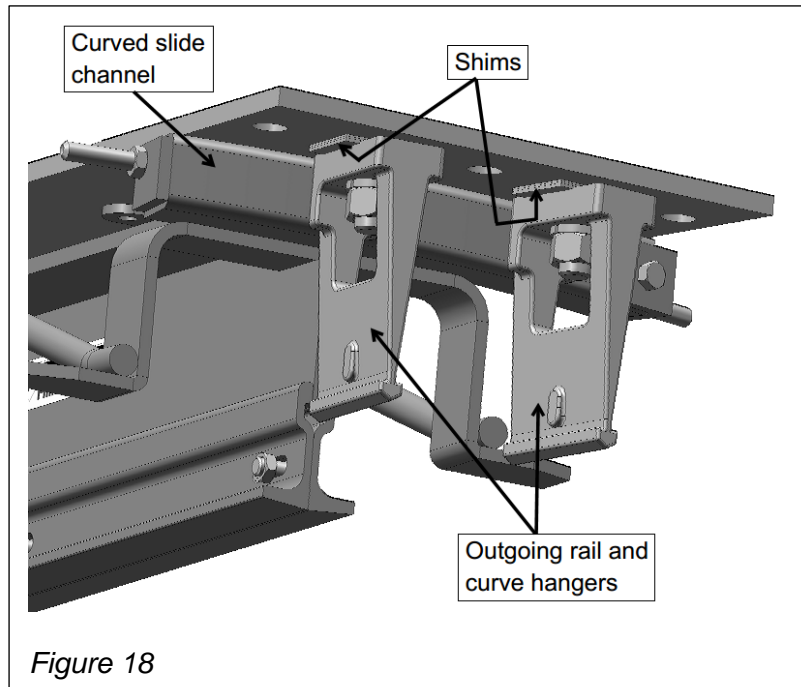


Figure 18

B. Tongue Switch Throw:

2-Way and Wye Switches: full throw to left and right is adjusted with a set screw at each end of the curved slide channel. When the switch rail is fully thrown and locked in place, the sides of the switch rail should be in line with the sides of the outgoing straight or curved rail.

To adjust, loosen set screw (see Figure 19) and swing the tongue switch rail left or right to align the nose of the latch with a corresponding alignment hole in the slide channel (see Figure 10). With the latch nose fully engaged into the slide channel hole, adjust set screw to contact the edge of the top flange of the switch rail and the stop block (see Figure 19). Tighten locking nut. Repeat process for other side. Use 3/16" hex wrench for set screw. Allow for the slight oversize of the alignment hole as compared to the nose of the latch.

Operate switch through several cycles of movement to be sure the throw is properly adjusted. The nose of the switch latch should easily and positively engage the hole in the slide channel at the end of full pivot travel of the switch rail.

3-Way Switches: same process for full left and right as described for 2-Way and Wye Switches. The center alignment is factory set by the alignment of the latch hole in the slide channel and the location of the center rail hanger.

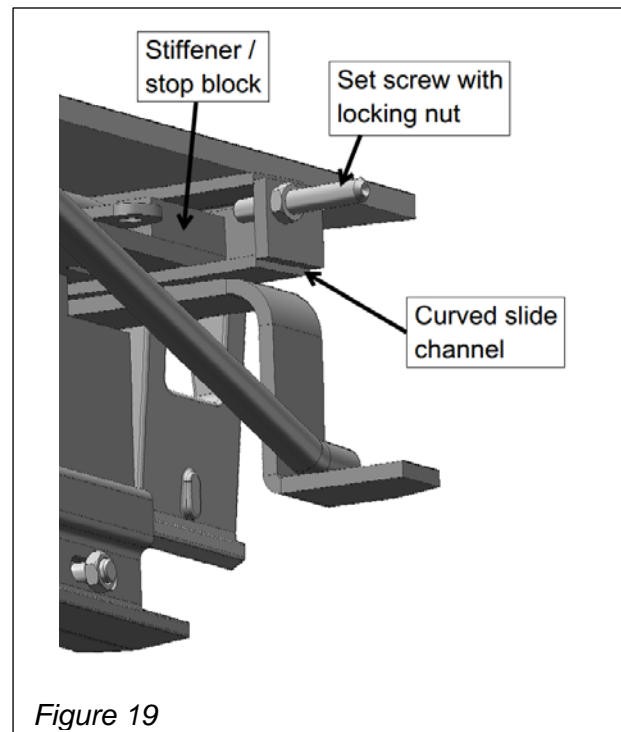
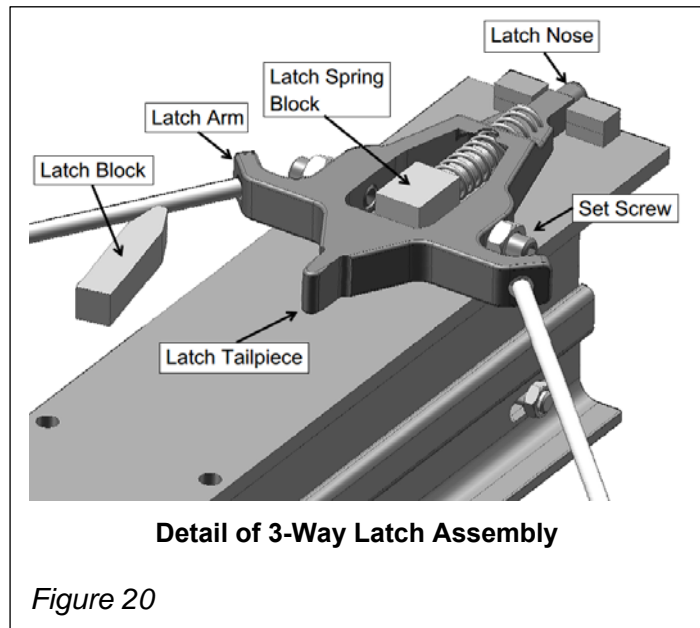


Figure 19

C. 3-Way Latch Set Screw Adjustment

Set screws located near the two latch arms (see Figure 20) control the amount of “cocking” of the latch to the left or right as the ropes are pulled.

Factory set clearance of the set screw to the latch spring block is approximately 1/8” on each side. Excessive clearance will allow too much “cock” and will make the latch difficult to pull back. Too little clearance will not provide enough “cock” to allow the tailpiece to move across the latch block.



D. Treadline and Rail Alignment Adjustment Notes: minor misalignment of the treadline and edges of the switch blade rail to the treadline and edges of the outgoing rail or curves may be caused by various manufacturing tolerances in fabrication, plus clearance of the latch nose to the slide channel holes. Satisfactory final adjustments and alignment may therefore be considered to be a result of the fine art of installation.

Verify that straight rails are, in fact, exiting the rail in a straight line along the monorail path. If the straight rail exits at an angle, the edges of the straight rail will not be aligned with the edges of the switch rail. Note that the switch rail hanger, being held by a single bolt, can be loose and pivoted so that it is not “straight” with the switch (see Figures 5, 6 and 7). Adjust supports of the outgoing straight rail to hold it in proper alignment.

Verify that curved rails make a smooth transition from the switch to the monorail path. Curves that may be “underbent” or “overbent” deviate from the monorail path and may cause the switch rail hanger to pivot on the switch frame, thus causing the edges of the curved rail to be out of alignment with the edges of the switch rail.

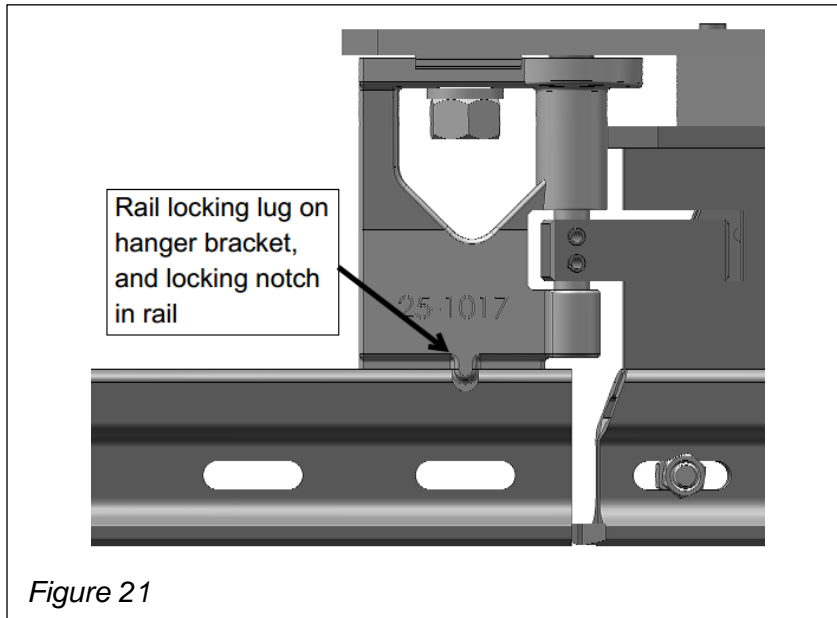
Verify that the switch is supported securely, rigidly and level, whether by hanger rods, bolts or other support structure. Rod suspended systems (switches, curves and rail) must be braced to prevent movement. The monorail system must be fully aligned and leveled before installing bracing. The frame of the switch must not be twisted by unequal tightening of hanger rods, unequal shimming or a support structure that can flex. The switch must not be forced into position or alignment.

All of the above are a part of normal installation. Installers must take care to properly suspend, align, shim and adjust all points within the switch and monorail components, recognizing that they have the final responsibility and ability to provide the customer with a properly operating system.

Rail Locking Lug and Notch / Rail Supported at Switch

Rails provided by TC/American Crane with “switch connection” end preps have a notch cut into the head of the 2R3-5T rail, as shown in Figure 21. This notch aligns with a lug on the incoming and outgoing rail hangers of switches. This locking lug and notch accurately and securely holds the end of the rail at the correct spacing to the switch, and prevents the rail from creeping closer to the switch or from pulling away.

The incoming straight rail and the straight or curved outgoing rails are suspended from the switch frame by the switch hangers, as shown in Figure 21.



Lubrication

General Lubrication Information

1. Latch Mechanism

Lubricate the latch mechanism (see Figures 10 and 14) upon installation. Work grease into and under the latch where it slides on the top flange of the switch rail, and between guides or slots.

2. Channel Slide

Lubricate the inside lower surface of the channel slide where the end of the rail section rides upon it. See Figure 18.

3. Hinge Pin

Lubricate hinge pin where it pivots in the switch hinge bracket and rail hanger. See Figures 15 and 16. Remove countersunk cap screw for access to upper end of hinge pin in the rail hanger.

Lubrication Frequency

Recommended approximately each 6 months for normal operation, more frequently for heavy useage. Each application must be evaluated on its own merits, including: service duty, number of operations per shift, and operating environment.

Maintenance personnel should develop and maintain a record of all monthly inspections. Frequency of lubrication may be adjusted to match operational demands, based upon inspection reports.

Recommended Switch Lubricants

(for standard industrial operating environments)

Latch Mechanism	Good grade multi-purpose lithium grease
Channel Slide	Good grade multi-purpose lithium grease
Hinge Pin	Good grade light machine oil

Note: TC/American Crane does not normally make a "brand name" recommendation for lubricants. Each customer may have a preference based upon many legitimate reasons. TC/A recommends to use a "good quality" lubricant and, when one is chosen, to not mix them.

Adjust lubrication type and frequency based upon the operating environment and customer requirements.

NOTE: before lubricating equipment that will be taken onto a customer's site, check with the customer for any preferences on brands or types (to maintain customer stock uniformity of products used and records maintenance).

NOTE: have Material Safety Data Sheet (MSDS) info available for any lubricants brought onto a work site.

NOTE: verify with customer that lubricants being used will not have an effect upon any production processes.