

INSTALLATION MANUAL



MSTT



CLSTT



CPSTT

TANDEM MAXIMUM SECURITY TURNSTILES

This is the appropriate manual for MSTT, CLSTT & CPSTT turnstiles manufactured on or after October 1, 2010.

Turnstile Serial Number: _____

Table of Contents

1.0 Safety	3
Safety Symbols Used In This Manual.....	3
Important Operating Information	3
CE Compliance and Standards.....	4
2.0 Turnstile Models	5
Configurations and Descriptions of Common Terms.....	5
Components Included With Product.....	6
3.0 Installation	9
Installation Considerations.....	9
Slab Installation Requirements.....	9
Overview of Installation.....	9
Tools Required.....	9
Turnstile Layout and Installation	10
Installation of the Roto Bottom Bearing Housing	11
Installation of the Yoke.....	12
Installation of the OV Section.....	13
Installation of the Bottom Bearing	14
Installation of the Roto Section.....	15
Installation of the Top Channel	16
Stabilizing the Top Channel	18
Turnstile Anchor View.....	19
Turnstile Elevation View.....	20
Turnstile Top View.....	21
Electrical and Activation Wiring Instructions	22
Wiring Schematic.....	24
ATC Controller Terminal Descriptions.....	25
Channel Configurations for All Model Turnstiles.....	32
4.0 Maintenance & Operation	33
Interior Maintenance	34
Adjustment & Lubrication.....	35
Turnstile operations and user instructions.....	38
Troubleshooting.....	40
5.0 Replacement Parts/Spare Parts Kits	42
A: MST-6X/CLST-6X/CPST-6X Top Channel Sub Assembly Details.....	43
B: MST-6X/CLST-6X/CPST-6X Controller Board Sub Assembly.....	44
C: MST-6X/CLST-6X/CPST-6X Opto Interrupter Mounting Plate Sub Assembly.....	45
D: MST-6X/CLST-6X/CPST-6X Cam & Shaft Sub Assembly.....	46
Description of Parts Included in Spare Part Kits.....	48
Appendix A: Yoke Installation for CPST and CLST	50
Appendix B: Technical Specifications	57

1.0 Safety

Safety Symbols Used In This Manual

The following symbols are used throughout the manual to highlight important information and potential risks when installing, servicing or using the turnstiles covered in this manual.



This symbol is used in this manual to warn installers and operators of potential harm. Please read these instructions very carefully.



NOTE

This symbol is used in this manual to designate useful information for the installer and operator. Please read these instructions.



This symbol is used in this manual to designate potential conditions that may pose a risk to pedestrians, personnel, property and equipment. Please read these instructions very carefully.



For questions, please contact Alvarado at (909) 591-8431, Monday – Friday 6:30am to 4:30 PST. Please read this manual completely before installing or operating products.

Important Operating Information



Always follow the installation and operating precautions, including the following:

- Use only skilled individuals to install and service the turnstile.
- The turnstile is not a toy. Do not allow children to play on or near the turnstile. Do not allow horseplay near the turnstile.
- Follow a proper maintenance schedule using skilled individuals.
- Do not operate the turnstile if it has been damaged in any manner. Have a damaged turnstile repaired or adjusted by a skilled service person before placing back in use.
- Do not modify or alter the turnstile.
- Do not operate the turnstile unless the friction brake or self-centering mechanism is adjusted and operating correctly. Maintenance and adjustment information is contained in this manual.
- Use only Alvarado parts when repairing or maintaining the turnstile.
- In access control applications, train all personnel that will be using the turnstile in the proper method of operation. Ensure that new users are properly trained. (See the Turnstile Operation/User Instructions Section provided on page 38).

ALVARADO

CE Compliance and Standards

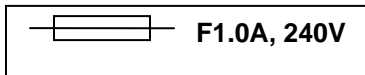
This page defines the product labels required for compliance with LA Electrical Testing Laboratory and International CE standards.

International CE standards:

- a. Label (1) the Outlet Specification.

240V~, 1800W

- b. Label (2) the Fuse Specification.



- c. Label (3) the Warning, Risk of Electric Shock.



- d. Label (4) the Caution, Risk of Danger.



- e. Label (5) the Productive Conductor Terminal.



LA Electrical Testing Laboratory Standards:

Label Specifications:

- a. Label (1) the Outlet Specification.

120V~, 1800 Watts Max.

- b. Label (2) the Fuse Caution.

CAUTION: For continued protection, against risk of fire or shock, replace with the same type and rating fuse.

- c. Label (3) the Warning, Risk of Electric Shock.

WARNING: Risk of electrical shock. Do not remove cover. Refer servicing to qualified service personnel.

- d. Label (4) the Product Ground Terminal.

Ground Terminal: Connect the earth ground wire to the green ground screw.

2.0 Turnstile Models

Alvarado Turnstiles in this manual come in the following configurations. Please read each model description carefully to make sure you understand the functionality of the turnstile you are installing.

MSTT-3

Three-position key lock control allows each turnstile Roto to remain locked in both directions, unlocked in either direction or unlocked in both directions, non-electric.

MSTT-6X, CLSTT-6X, and CPSTT-6X

Each Roto is electrically controlled in both directions.

Configurations and Descriptions of Common Terms

Fail Lock

Turnstile locks when power is removed (or lost). Turnstile will unlock when both power and an activation contact are supplied.

Fail Safe

Turnstile unlocks in the event of power loss. Turnstile will relock when power is supplied.



Fail Lock and Fail Safe functionality are specified by direction. Turnstiles may be Fail Lock in one direction and Fail Safe in the other direction.

NOTE

Activation

Alvarado's turnstile requires a momentary dry contact of 1 second or greater. The turnstile does not buffer activations. Once activated, the turnstile will not accept another activation until either the turnstile arm is rotated or 20 seconds have passed.

Speed Control / Self-Centering

The speed control feature self-adjusts the tension to the user depending on the pushing force exerted. This feature provides an even rotation speed. Self-Centering spring tension and Roto return time can be adjusted, as described in this manual.

Self-centering automatically returns the rotating section to the "home" position (one armset pointing directly at the center of the yoke). This is a standard feature on the Tandem models.

Unlock Override

This option overrides the access control system allowing one or both directions of passage to be unlocked with a key. Locks are located on the underside of the top channel. When both directions have key overrides, the locks are keyed alike.



NOTE

For electrically controlled units, mechanical key overrides are intended for temporary use when the turnstile or access control system has malfunctioned. Mechanical key overrides should only be used under the direction of management and with the supervision of a gate attendant. In case of malfunction, have the access control system and/or the turnstile repaired immediately.

Timed Delay

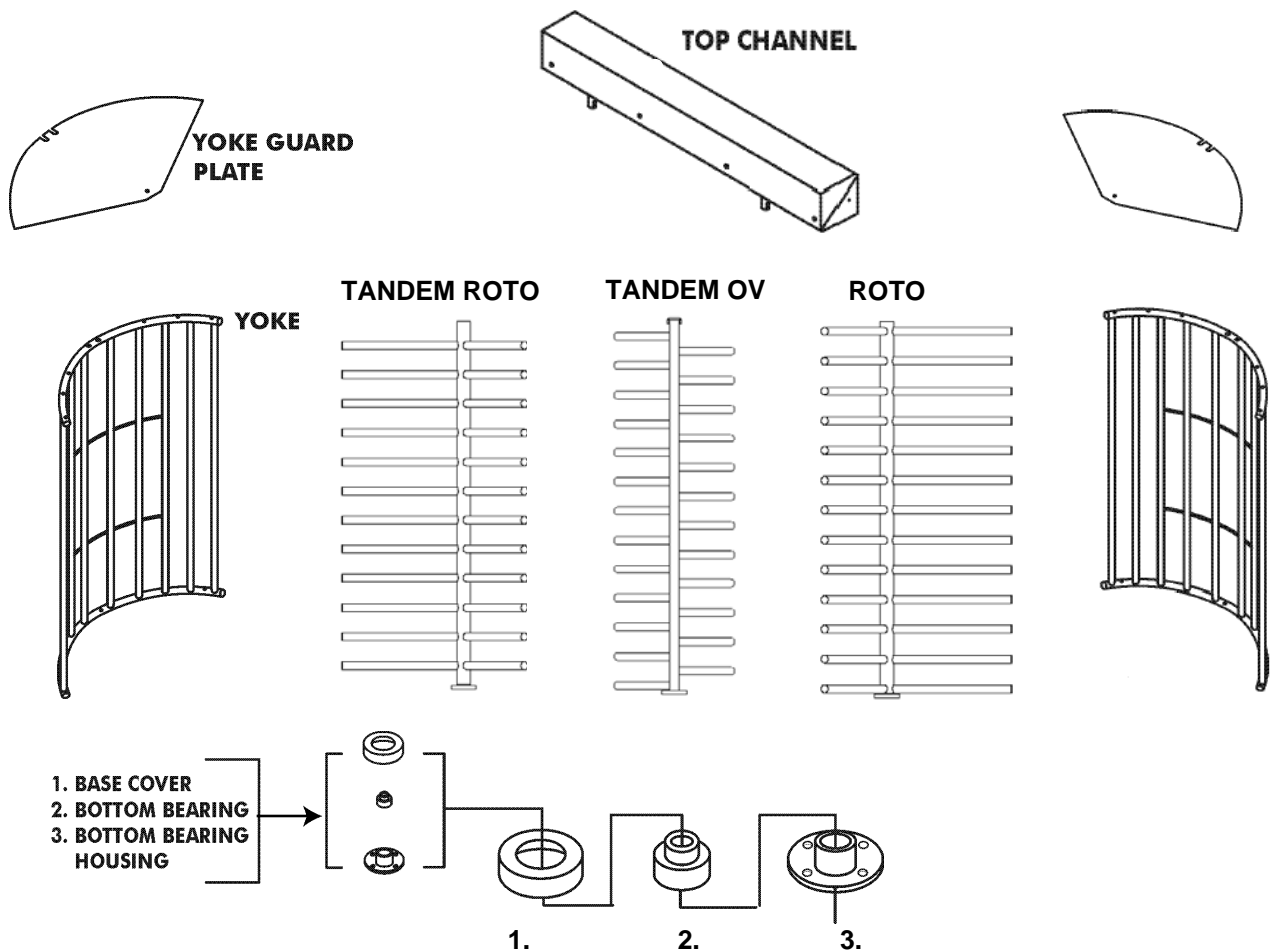
An activation signal unlocks the turnstile for one entry. Once the turnstile is unlocked, the user is allowed a maximum of 20 seconds to pass through the turnstile. If the turnstile is not rotated within the 20-second time frame allowed, the turnstile relocks.

ALVARADO

Components Included With MSTT Models

The following components are included if the turnstile is an MSTT-3 or MSTT-6X:

1. Roto (39 arms)
2. Tandem Roto (36 arms)
3. Top Channel (Qty 1)
4. Yoke Guard Plates (Qty 2)
5. Yokes (Qty 2)
6. Tandem OV (Qty 1)
7. Base Package
 - Top bearing cover (Qty 2)
 - Bottom bearing housing (Qty 2)
 - Base cover (Qty 2)
 - Bottom bearing (Qty 2)
 - Tandem OV base cover (Qty 2)
 - 10-32 x 1/2" Allen head screw (Qty 10)
 - 1/2 -13 x 1" Hex Head Cap Screw (HHCS) (Qty 2)
 - 1/2 -13 x 2 3/4" HHCS (all thread) (Qty 4)
 - 1/2 -13 x 1 1/2" Hex Head Cap Screw (HHCS) (Qty 2)
 - #10 x 3/4" pan head Phillips sheet metal screw (Qty 20)
 - 1/2 - 13 hex nut (Qty 8)
 - 1/2 medium split lock washer (Qty 8)
8. Anchor Package
 - 3/8 anchors (2" length) (Qty 22)
 - 3/8 -16 x 4 1/2" HHCS (Qty 6)
 - 3/8 -16 x 2 1/2" HHCS (Qty 16)
 - 3/8 flat washers (Qty 22)

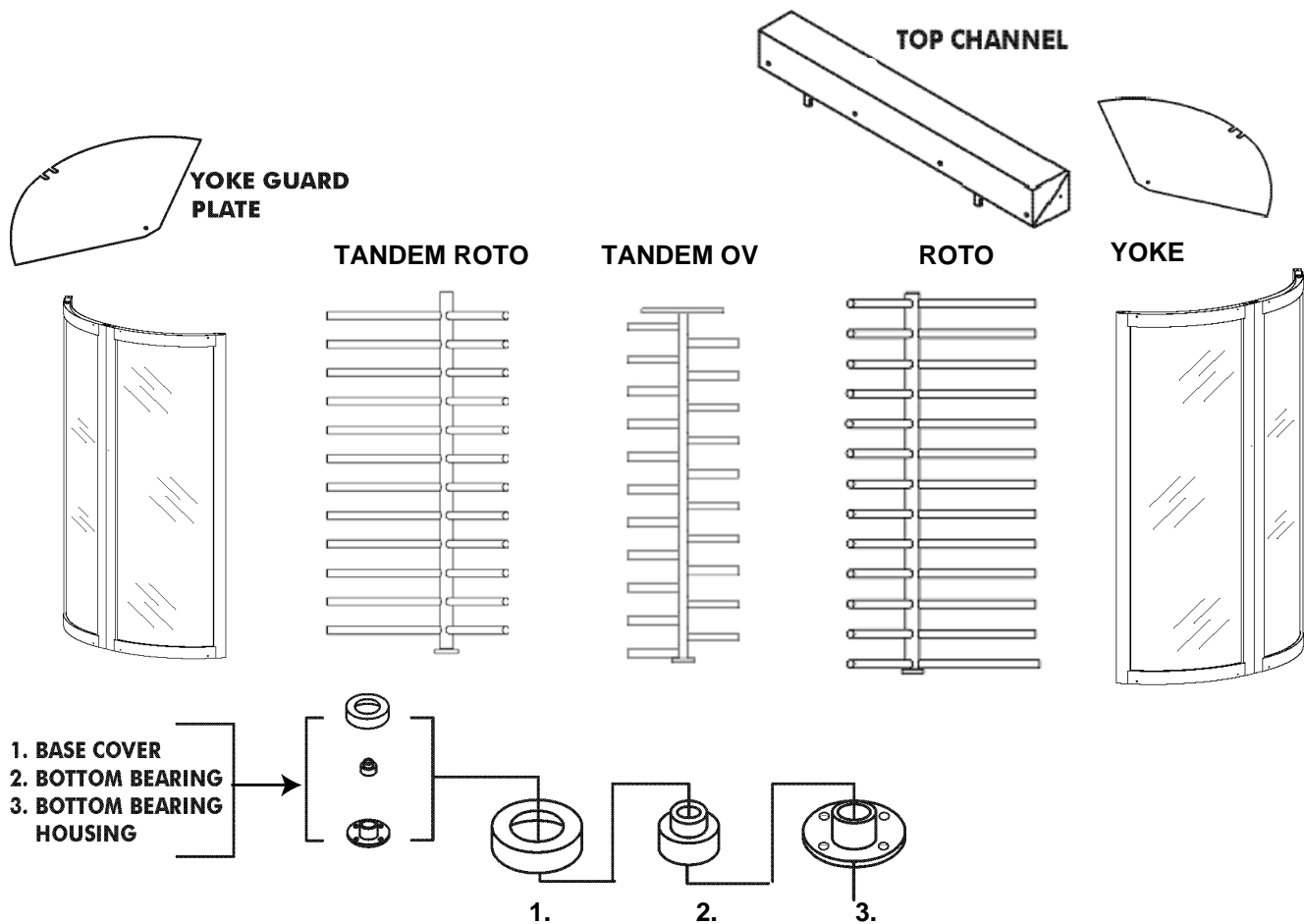


ALVARADO

Components Included With CLSTT Models

The following components are included if the turnstile is a CLSTT-6X:

1. Roto (39 arms)
2. Tandem Roto (36 arms)
3. Top Channel (Qty 1)
4. Yoke Guard Plates (Qty 2)
5. Yokes (Qty 2)
6. Tandem OV (Qty 1)
7. Base Package
 - Top bearing cover (Qty 2)
 - Bottom bearing housing (Qty 2)
 - Base cover (Qty 2)
 - Bottom bearing (Qty 2)
 - Tandem OV base cover (Qty 2)
 - 10-32 x 1/2" Allen head screw (Qty 10)
 - 1/2 -13 x 1" Hex Head Cap Screw (HHCS) (Qty 2)
 - 1/2 -13 x 2 3/4" HHCS (all thread) (Qty 4)
 - 1/2 -13 x 1 1/2" Hex Head Cap Screw (HHCS) (Qty 2)
 - #10 x 3/4" pan head Phillips sheet metal screw (Qty 20)
 - 1/2 - 13 hex nut (Qty 8)
 - 1/2 medium split lock washer (Qty 8)
8. Anchor Package
 - 3/8 anchors (2" length) (Qty 22)
 - 3/8 -16 x 4 1/2" HHCS (Qty 6)
 - 3/8 -16 x 2 1/2" HHCS (Qty 16)
 - 3/8 flat washers (Qty 22)

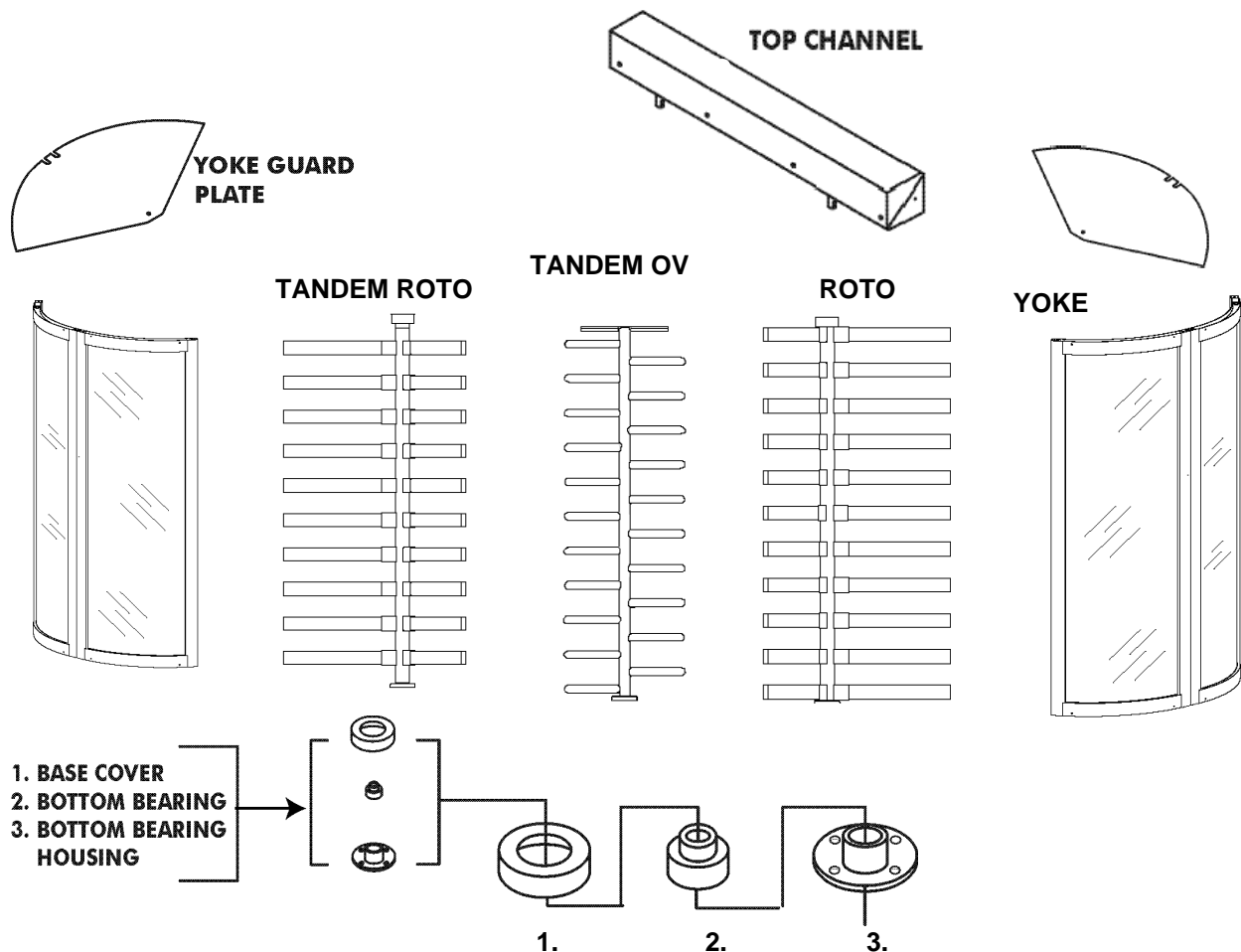


ALVARADO

Components Included With CPST-T Models

The following components are included if the turnstile is a CPSTT-6X:

- | | |
|---|----------------------------------|
| 1. Roto (39 arms) | 8. Anchor Package |
| 2. Tandem Roto (36 arms) | 3/8 anchors (2" length) (Qty 22) |
| 3. Top Channel (Qty 1) | 3/8 -16 x 4 1/2" HHCS (Qty 6) |
| 4. Yoke Guard Plates (Qty 2) | 3/8 -16 x 2 1/2" HHCS (Qty 16) |
| 5. Yokes (Qty 2) | 3/8 flat washers (Qty 22) |
| 6. Tandem OV (Qty 1) | |
| 7. Base Package | |
| Top bearing cover (Qty 2) | |
| Bottom bearing housing (Qty 2) | |
| Base cover (Qty 2) | |
| Bottom bearing (Qty 2) | |
| Tandem OV base cover (Qty 2) | |
| 10-32 x 1/2" Allen head screw (Qty 10) | |
| 1/2 -13 x 1" Hex Head Cap Screw (HHCS) (Qty 2) | |
| 1/2 -13 x 2 3/4" HHCS (all thread) (Qty 4) | |
| 1/2 -13 x 1 1/2" Hex Head Cap Screw (HHCS) (Qty 2) | |
| #10 x 3/4" pan head Phillips sheet metal screw (Qty 20) | |
| 1/2 - 13 hex nut (Qty 8) | |
| 1/2 medium split lock washer (Qty 8) | |



ALVARADO

3.0 Installation

Installation Considerations

Slab Installation Requirements

8' 6" x 6' level concrete pad with a minimum thickness of 4" level solid concrete



NOTE

Do not install turnstile on asphalt. While not required for operation, securing both ends of the turnstile top channel (and/or the center outside portion of the OV and Yoke) to a solid object, framing, fence post, etc. is recommended. This will also reduce vibration of the turnstile during operation.

Overview of Installation

1. Determine the installation location of the turnstile, taking into account the turnstile dimensions, power requirements and activation wiring (if applicable).
2. Mark the installation location for the components using chalk.
3. Run the turnstile power and activation wiring (if applicable).
4. Anchor turnstile components.
5. Secure top portion of turnstile if applicable (see above).
6. Connect power (if applicable).
7. Connect activation wiring (if applicable).

Tools Required

- Heavy Duty Drill or Roto Hammer
- Tape Measure
- 1/8 Allen Wrench
- Twist Drill
- Plumb Bob
- Torque Wrench
- Mallet
- 5/8" Concrete Drill Bit
- Torpedo Level
- #25 (.1495") Drill Bit
- Shop Vac
- 9/16" Combination Wrench
- Mobilgrease XHP 222 with Moly or equivalent
- Ratchet with 9/16" and 3/4" Socket
- Chalk
- Safety Glasses

ALVARADO

Turnstile Layout and Installation

(For All Tandem Turnstiles)

1. Determine the location where the turnstile will be installed, taking into consideration the minimum height and width openings required (See the turnstile anchor and elevation view detailed drawings on pages 19, 20, and 21 for the minimum installation requirements). Once the installation location has been determined snap the centerline of the turnstile. The chalked centerline should be at least 6 inches longer than the overall length. See **Figure 3.1**.
2. Using the turnstile anchoring view drawing on page 19, mark the centerline locations (perpendicular to the turnstile centerline) for both Roto centerlines, both yoke centerlines, and the OV centerline. See **Figure 3.2** below.
3. Center one of the Roto Bottom Bearing Housings at the intersection of the first turnstile and Roto centerlines. Mark the center location of the four anchor holes for the Roto Bearing Housing, see **Figure 3.3**. Move the Roto Bottom Bearing Housing to the side and drill a 5/8" diameter hole at the center of each marked location. Drill each hole 3" deep. For terrazzo, ceramic tile, or brick veneer installations, add the thickness of the finished floor material to the anchor hole depth. For more information review the detailed drawings on pages 19-21.



Figure 3.1 - Locating and marking the centerline of the turnstile.

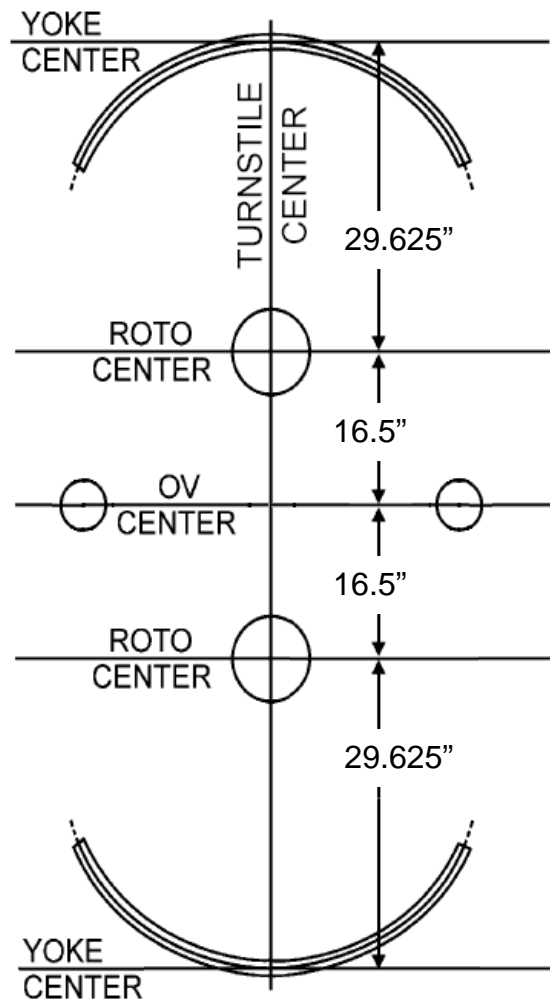
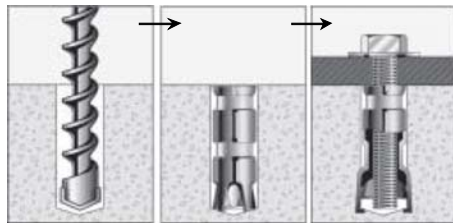


Figure 3.2 - Locating the yoke, Roto, and OV section centerline locations.

ALVARADO

Installation of the Roto Bottom Bearing Housings (For All Tandem Turnstiles)

4. Vacuum out the holes thoroughly. If the holes are not clean, the anchors will not tighten.
5. Insert one anchor into each drilled hole. Ensure that the anchors are flush with the concrete floor. See Figure 3.4.



Drill hole.
Clean hole.
Vacuum debris.

Insert the anchors
with the thread side
down. The anchors
must be flush with
the surface.

Insert the washer.
Insert the bolt.
Tighten bolt.

Anchoring Guide

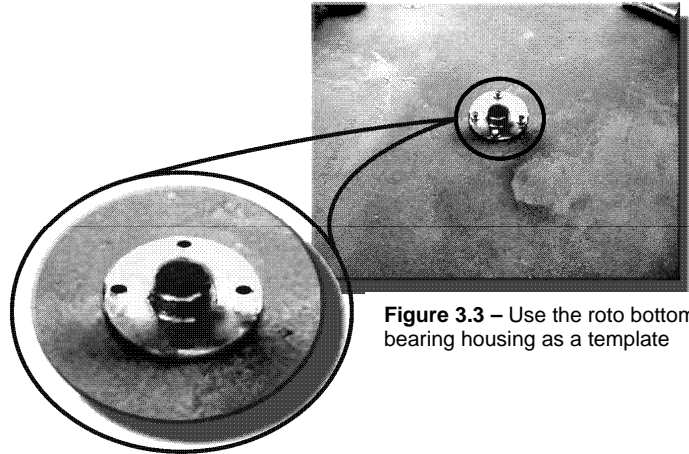


Figure 3.3 – Use the roto bottom bearing housing as a template

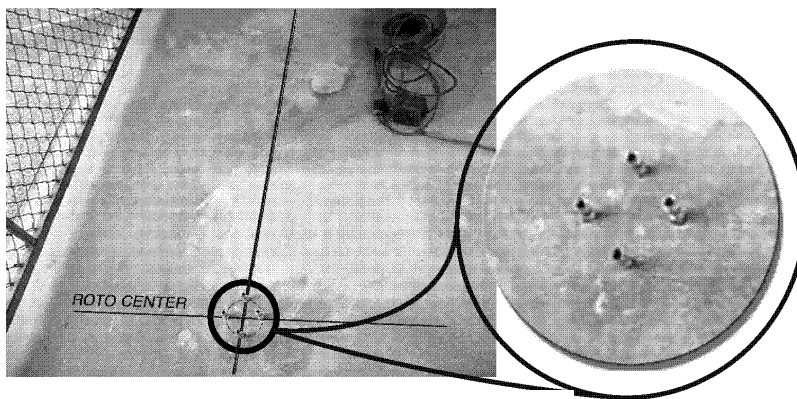


Figure 3.4 - Anchors inserted and ready to be tapped flush into the holes.

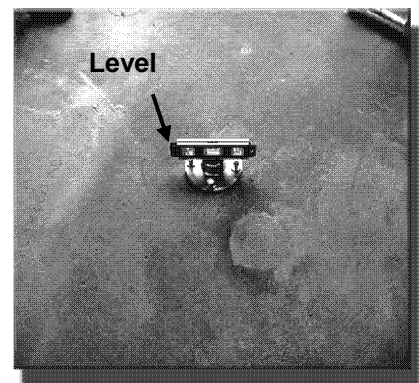


Figure 3.5 - Anchored and level Roto bottom bearing housing. Pictured above

6. Place the Roto Bottom Bearing Housing back over the anchor holes and anchor it with four (4) each 3/8 - 16 x 2 1/2" HHCS bolts and flat washers. Make sure that the housing is level. Shim as needed, see Figure 5.
7. Repeat steps 3 through 6 for the second Roto bottom bearing housing



For CLSTT and CPSTT Models refer to attached Appendix on page 49 for continued installation instructions that are specific for those models.

NOTE

ALVARADO

Installation of the Yokes
(For MSTT Models only)

8. Confirm the location of the center anchor bolt for one of the Yoke sections. This anchor will be located at the intersection of the turnstile and the first yoke centerlines. Drill a 5/8" diameter hole at the center of the marked anchor location. Drill the hole 3" deep. Vacuum out the hole thoroughly and insert one anchor into the drilled hole.
9. Move the Yoke section into position so that the center anchor bolt can be installed.
10. Anchor the center of the Yoke through the curved bottom Yoke arm with one (1) each 3/8 - 16 x 4 1/2" HHCS bolt and flat washer and hand tighten, see Figure 6.
11. Repeat steps 8 through 10 for the second yoke section.

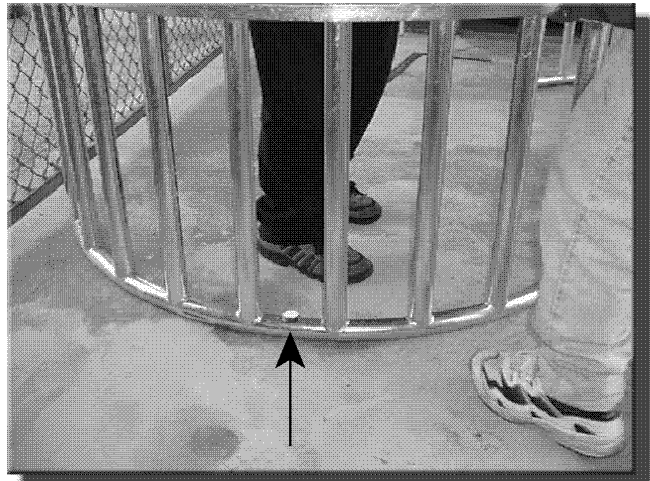


Figure 3.6 – Yoke mounted with the center bolt only.

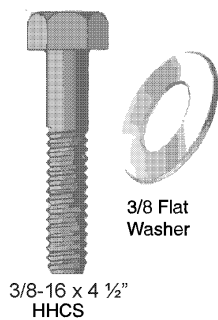


Figure 3.7 - Bolts and Washers

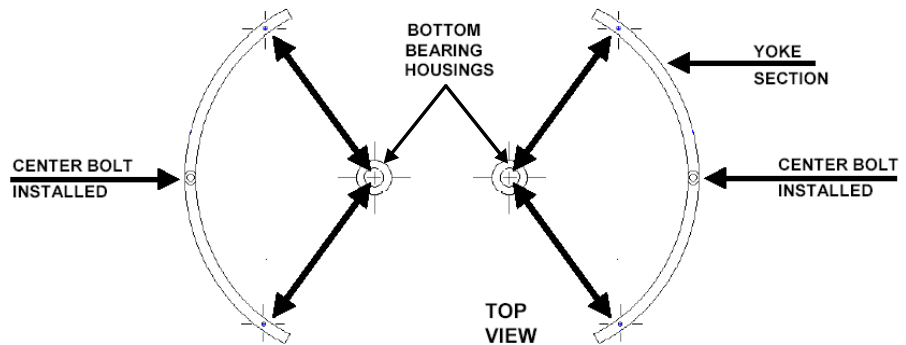


Figure 3.8 - "Squaring the yokes." The Yokes should be positioned such that the center of the nearest Roto Bottom Bearing Housing is equidistant to each of the outer Yoke anchoring holes.

12. Pivot the first yoke about its center anchor bolt and measure the distance from the center of the nearest Roto bottom bearing housing to the center of each of the remaining two (outer) anchor holes in the curved bottom yoke arm. Continue to adjust the yoke position until the outer yoke anchor holes are equidistant from the center of the nearest Roto bottom bearing housing. This "squaring of the yoke" is necessary to ensure that the entrance and exit passage widths are equal (See Figure 3.8).
13. Repeat step 12 for the second yoke section.
14. Mark the two outer yoke mounting holes for each yoke section. Refer to Figure 3.8 to verify that the anchor holes have been marked in the correct locations.
15. Reposition the yoke sections so that the outer anchor holes can be drilled.
16. Drill each hole 3" deep. Vacuum out the holes thoroughly and insert one anchor into each.
17. Reposition the yoke sections so that the outer anchor bolts can be installed.
18. Anchor each of the yokes through the curved bottom Yoke arm with two (2) each 3/8 - 16 x 4 1/2" HHCS bolts and flat washers and hand tighten.
19. Using a torpedo level ensure that the Yoke section installation is vertical. Shim as needed.

ALVARADO

Installation of the OV Section (For All Tandem Turnstiles)



This is very important, 13 arm side of the OV is on the left hand side when viewed from the outside or unsecured side of the turnstile.

NOTE

20. Position the OV section by centering the OV feet on the OV centerline, see **Figure 3.9**. The OV should be positioned such that the 13 arm side of the OV is on the left hand side when viewed from the outside or unsecured side of the turnstile, refer to **Figure 3.10**.
21. Measure the distance from the center of the each Roto Bottom Bearing Housing to the center of each of the OV section feet. Slide the OV section along the OV centerline to adjust the OV position until both OV feet are equidistant from the center of each Roto Bottom Bearing Housing. This “squaring of the OV” is necessary to ensure that the entrance and exit passage widths are equal, see **Figure 3.11**.



Figure 3.9 - Positioning the OV section.

22. Mark the center location of the eight anchor holes for the OV section.
23. Move the OV to the side and drill a 5/8” diameter hole at the center of each marked location. Drill each hole 3” deep. Vacuum out the holes thoroughly and insert one anchor into each drilled hole.
24. Move the OV section back into position over the anchor locations.
25. Anchor the OV with eight (8) each 3/8 - 16 x 2 1/2” HHCS bolts and flat washers. Confirm that the OV installation is level and plumb using a torpedo level. Shim as needed (See **Figure 3.10**).
26. Locate the base covers. Grease the interior portion of the Roto Bottom Bearing Housings. Slide one base cover over each of the Roto Bottom Bearing Housings, refer to **Figure 3.12**.



Figure 3.10 - OV section anchored and level. Picture viewed from the outside or unsecured side of the turnstile.

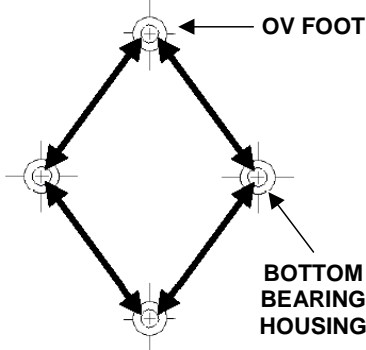


Figure 3.11 - “Squaring the OV.” The OV should be positioned such that the center of the Roto bottom bearing housings are equidistant to each of the OV section feet.

ALVARADO

Installation of the Bottom Bearings
(For All Tandem Turnstiles)

27. Locate the Roto sections and the bottom bearings. Seat the stem of the bottom bearing up into the bottom of the Roto shaft. Repeat this process for each Roto section; refer to **Figures 3.13 and 3.14**.

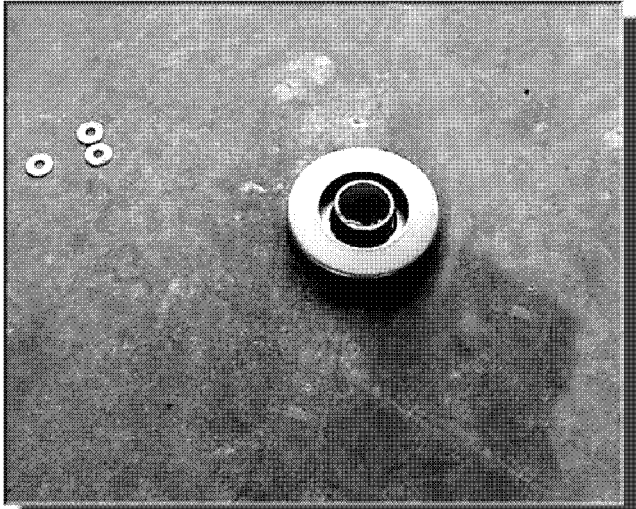


Figure 3.12 - Greased roto bottom bearing housing with base cover.

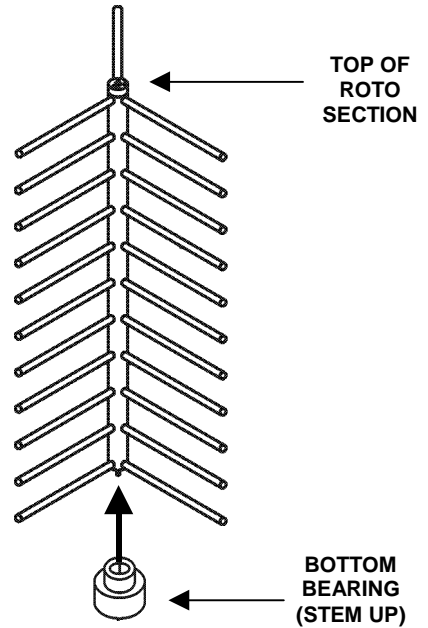


Figure 3.13 - Bottom bearing installation orientation. Pictured above and to the right. Roto section propped upright with foam blocks

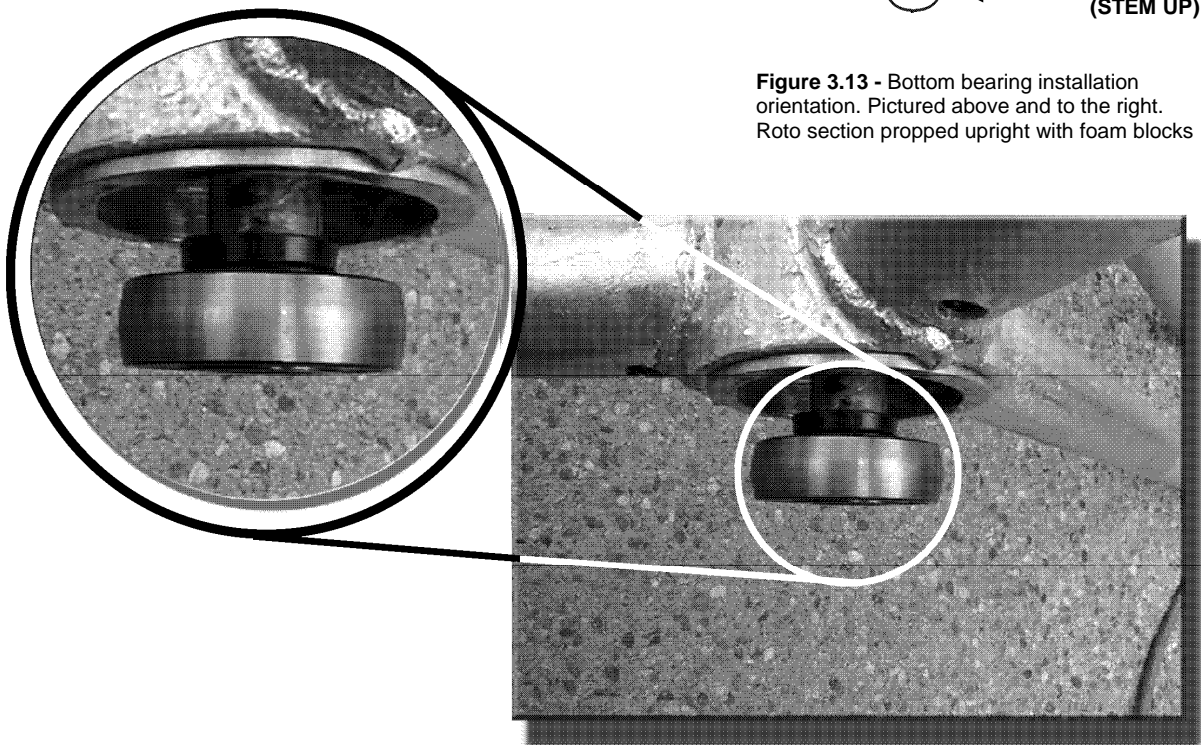


Figure 3.14 - Bottom bearing installed correctly.

ALVARADO

Installation of the Roto Sections (For All Tandem Turnstiles)

28. Apply a light coat of grease to the interior of the grooved cavity at the top of each Roto section See Figures 3.15 and 3.16.
29. Locate the top channel and apply a light coat of grease to each of the splined top channel shafts. See Figure 3.17.



Greasing both the grooved Roto cavities and the shafts will greatly simplify the upcoming installation step of sliding the top channel shafts into the Rotos.

NOTE

30. Set the standard, 39 arm Roto section (with the bottom bearing already installed) into the Roto bottom bearing housing on the right (when viewed from the outside or unsecured side of the turnstile). With a helper supporting the Roto section and holding it upright, confirm that the bearing turns freely and does not bind or stick.
31. Set the tandem, 36 arm Roto section (with the bottom bearing already installed) into the Roto bottom bearing housing on the left (when viewed from the outside or unsecured side of the turnstile). Again, with a helper supporting the tandem Roto section and holding it upright, confirm that the bearing turns freely and does not bind or stick.

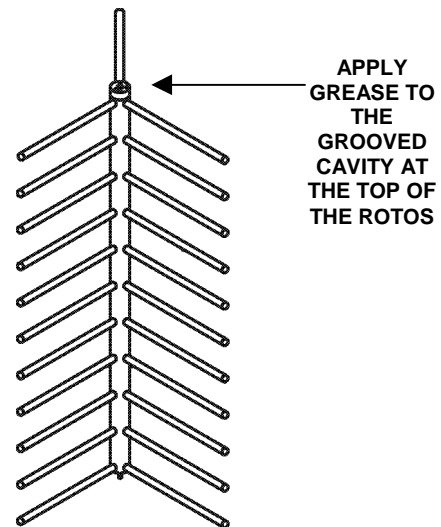


Figure 3.15 - Grease top of Roto



Figure 3.16 - Greased Roto section ready for installation.

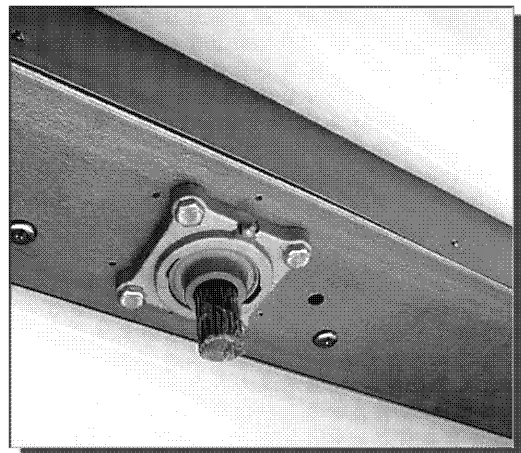


Figure 3.17 - Greased splined top channel shaft ready for installation.

ALVARADO

Installation of the Top Channel (For All Tandem Turnstiles)

32. With a helper supporting the Roto section and holding it upright, raise the top channel up and over the yoke, Roto, and OV sections. Align the splined top channel shaft above the Roto section and carefully lower the top channel onto the yoke and the Roto sections. (See **Figure 3.18a** and the note below)
33. Tighten the set screw found on top of the Roto with an Allen wrench. (See **Figure 3.18b**).

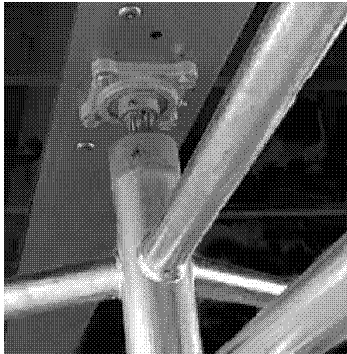


Figure 3.18a - The splined top channel shaft has been aligned and is being seated into the grooved cavity in the top of the Roto section.

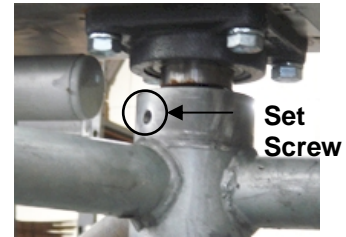


Figure 3.18b - Set screw on top of the Roto.

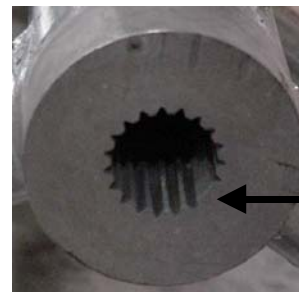


NOTE

On each of the splined top channel shafts, one of the “valleys,” or gaps between the splines, is not uniform and considerably larger than the others. In each of the grooved Roto cavities, one of the “peaks,” or ridges, is also not uniform and is considerably wider than the others. See the pictures below



Location of the large “valley” on the splined shaft



Location of the wide “ridge” on the roto cavity

- To correctly seat the top channel on top of the Rotos, the larger “ridge” in the Roto cavity must be aligned with the larger “valley” on the top channel shaft. The correct placement will force each Roto unit to be positioned with one set of arms pointing directly at the middle part of the yoke section.
- Please be aware that this fit is often very tight. Use a mallet to seat the top channel and shaft while moving the Roto.



When using a mallet to seat the top channel and shafts, be careful to only hit the shafts in the center section. Hitting the friction brake mechanisms or the self-centering mechanisms will only damage these parts and will not aid in the installation.

33. Remove the six (6) each 10-32 x ½” round head socket cap screws from the top channel and remove the top channel cover.

ALVARADO

34. If the turnstile uses an activation device that mounts to a plate or bracket on one or both of the yoke section (such as a card reader), run the associated wiring through the yoke(s) using the pre-installed feeder wire(s). Feed the access control system wires through the openings in the top of the yoke section and into the inside of the top channel. (See **Figures 3.19 and 3.20**).
35. Mount the top channel to the yoke sections using four (4) each $\frac{1}{2}$ -13 x 2 $\frac{3}{4}$ " HHCS bolts, lock washers and nuts. (The bolt locations are identified with white arrows in Figure 21) Do not tighten the bolts yet.

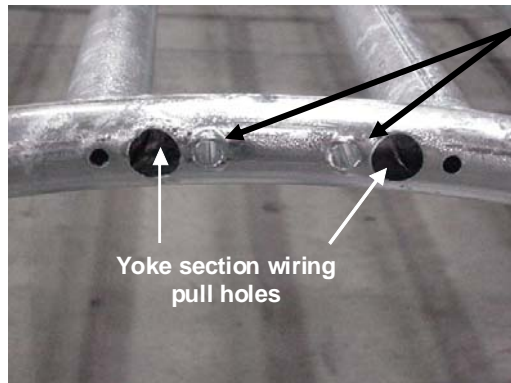


Figure 3.19 - Top view of the Yoke section.

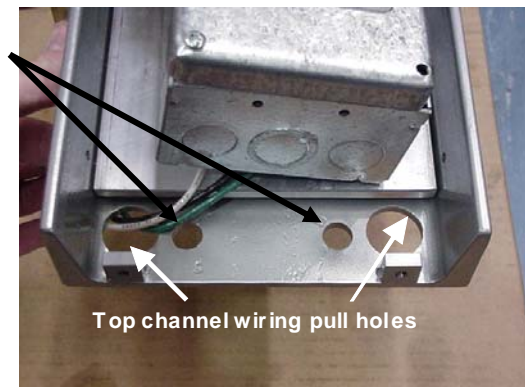


Figure 3.20 - Top view of the Yoke side of the top channel.

37. Slide one of the yoke guard plates, slotted and radius end first, between the top channel and one of the yokes. Ensure that the feeder wire and/or any access control system wiring are not being pinched between the top channel, the yoke, and the yoke guard plate. Secure the yoke guard plate using one (1) each $\frac{1}{2}$ -13 x 1" HHCS bolt, nut and lock washer. (The bolt location is identified with a black arrow in Figure 21). Repeat this process for the other yoke guard plate.



Figure 3.21 - The bolt locations to mount the yoke section to the top channel are identified with white arrows. The bolt location to mount the yoke guard plate to the top channel is identified with a black arrow.

38. Mount the top channel to the OV section using two (2) each $\frac{1}{2}$ -13 x 1 $\frac{1}{2}$ " HHCS bolts, lock washers and nuts. Do not tighten the bolts yet (See **Figures 3.22 and 3.23**).



Figure 3.22 - Bottom view of the Tandem OV to Top Channel mounting holes. The holes are located in the middle of the OV cross channel at the top of the Tandem OV section. Pictured to the left.



Figure 3.23 - Top view of the Top Channel to Tandem OV mounting holes. The holes are located in the middle of the Tandem Top Channel between the Roto cams. Pictured above.

ALVARADO

39. Tighten all of the anchoring bolts (22 bolts total) and all of the top channel mounting bolts (8 bolts total) to 20 ft-lbs. and check the plumb of the turnstile with a torpedo level. Shim the turnstile as necessary, and then tighten the bolts securely (to approximately 40 ft-lbs.).
40. Mark at least six (6) mounting hole locations to mount one of the yoke guard plates to the curved top arm of one of the yokes. The mounting hole locations should be evenly distributed along the yoke guard plate (there should be a minimum of 3 mounting holes on each side of the top channel) to ensure that the yoke guard plate is installed securely and level. Drill a 1/4" diameter hole (using a #25 drill bit) in the locations marked. Drill the pilot hole through both the yoke guard plate and the curved top yoke arm. Attach the yoke guard plate to the curved top yoke arm with at least six (6) each #10 x 3/4" pan head slotted sheet metal screws. Repeat this process for the other yoke guard plate.
41. Attach one of the top bearing covers to the underside of the top channel with five (5) each 10-32 x 1/2" Allen head screws. When properly installed the top bearing cover will mask the top of the Roto and the splined top channel shaft. Repeat this process for the other top bearing cover.
42. Install the OV Base Covers over the OV section feet.
43. For turnstiles without self-centering mechanisms, test the friction break mechanisms. Hold the lock arm(s) open and rotate the Roto section of the turnstile in the appropriate direction(s). There should be a small amount of drag (roughly 3 to 6 lbs.) as the Roto section turns. If there is too much or too little resistance in the friction break mechanism, follow the instructions on page 47 to adjust the friction brake mechanism. Be sure to test BOTH friction break mechanisms.

Stabilizing the Top Channel

41. To further stabilize and reduce vibration of the top channel during use, it is recommended that the top channel be secured to the fence line or other secure, stationary object near the turnstile.
42. The top channel can be further secured with the optional top channel stabilizing option. To install, insert the Alvarado supplied spacer between the top OV arm and the top channel. Secure the spacer and stabilize the top channel using the U-bolt, washers, and nuts provided.



NOTE

For electric models (6X) primary power and control wires can be run through the vertical tube of the OV section. Conduit may also be brought to and directly attached to the top channel cover. See examples below:



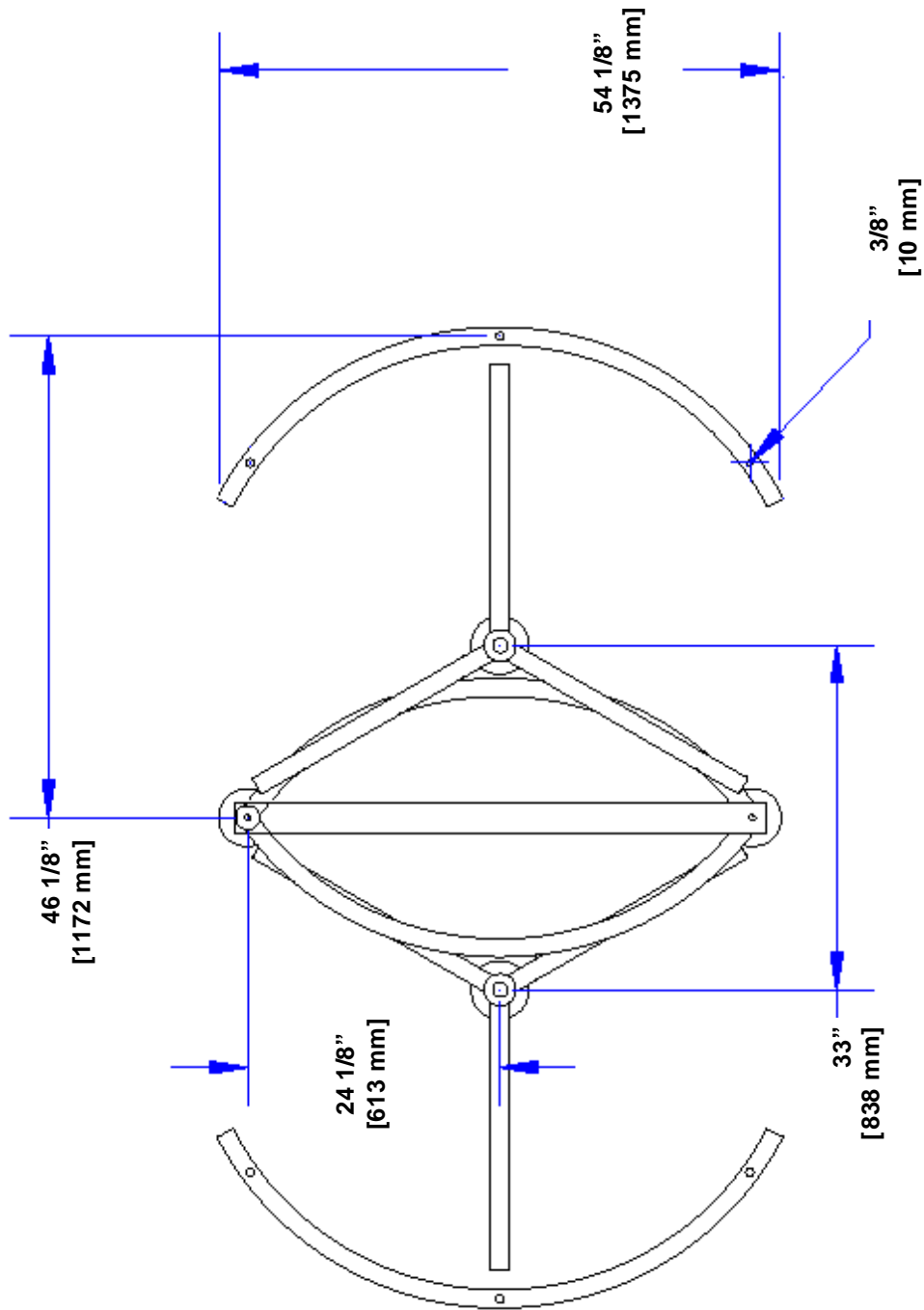
ALVARADO

Turnstile Anchor View
(For MSTT Models only)



The minimum installation width required is 97".

NOTE



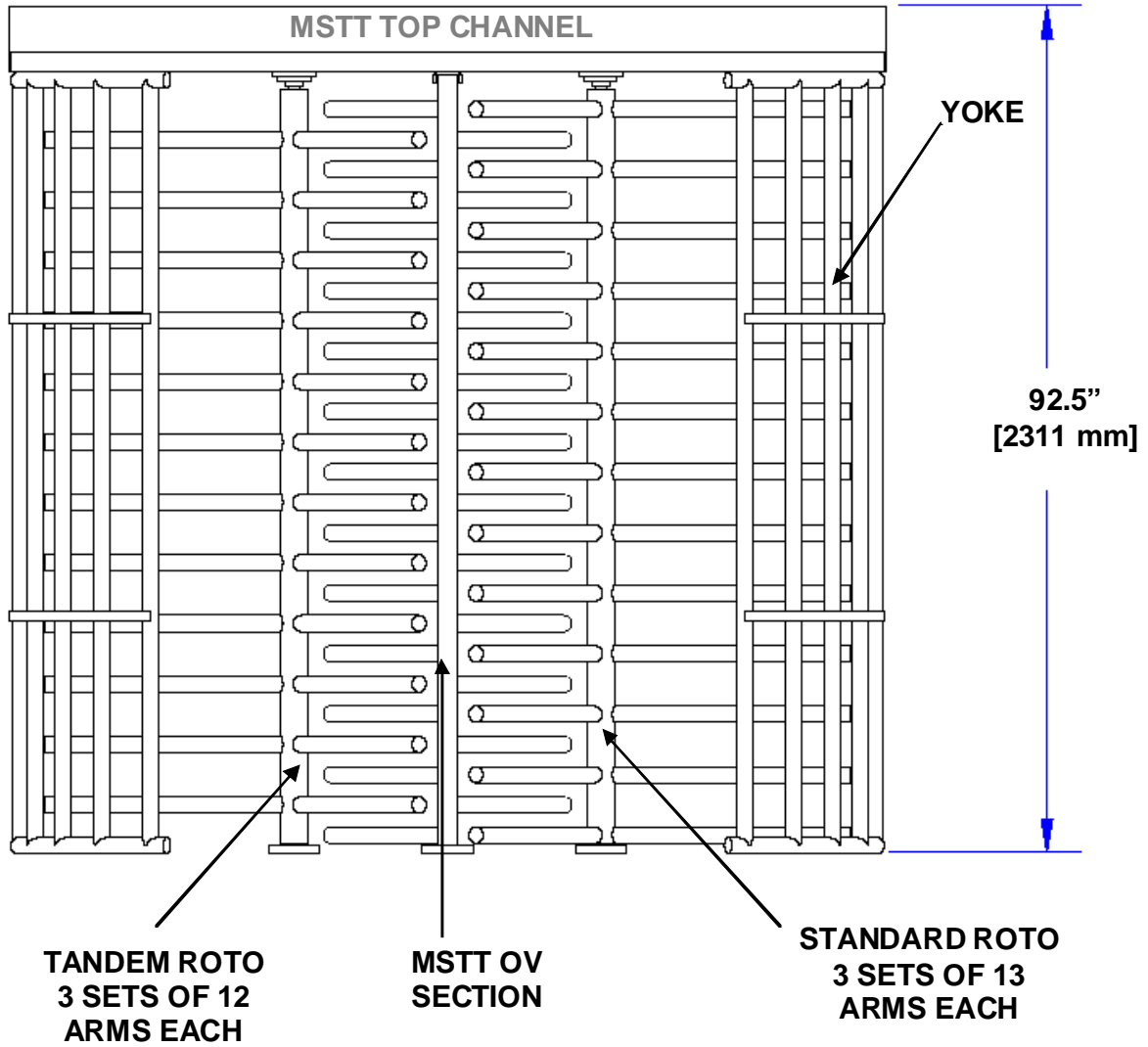
ALVARADO

Turnstile Elevation View
(For MSTT Models only)



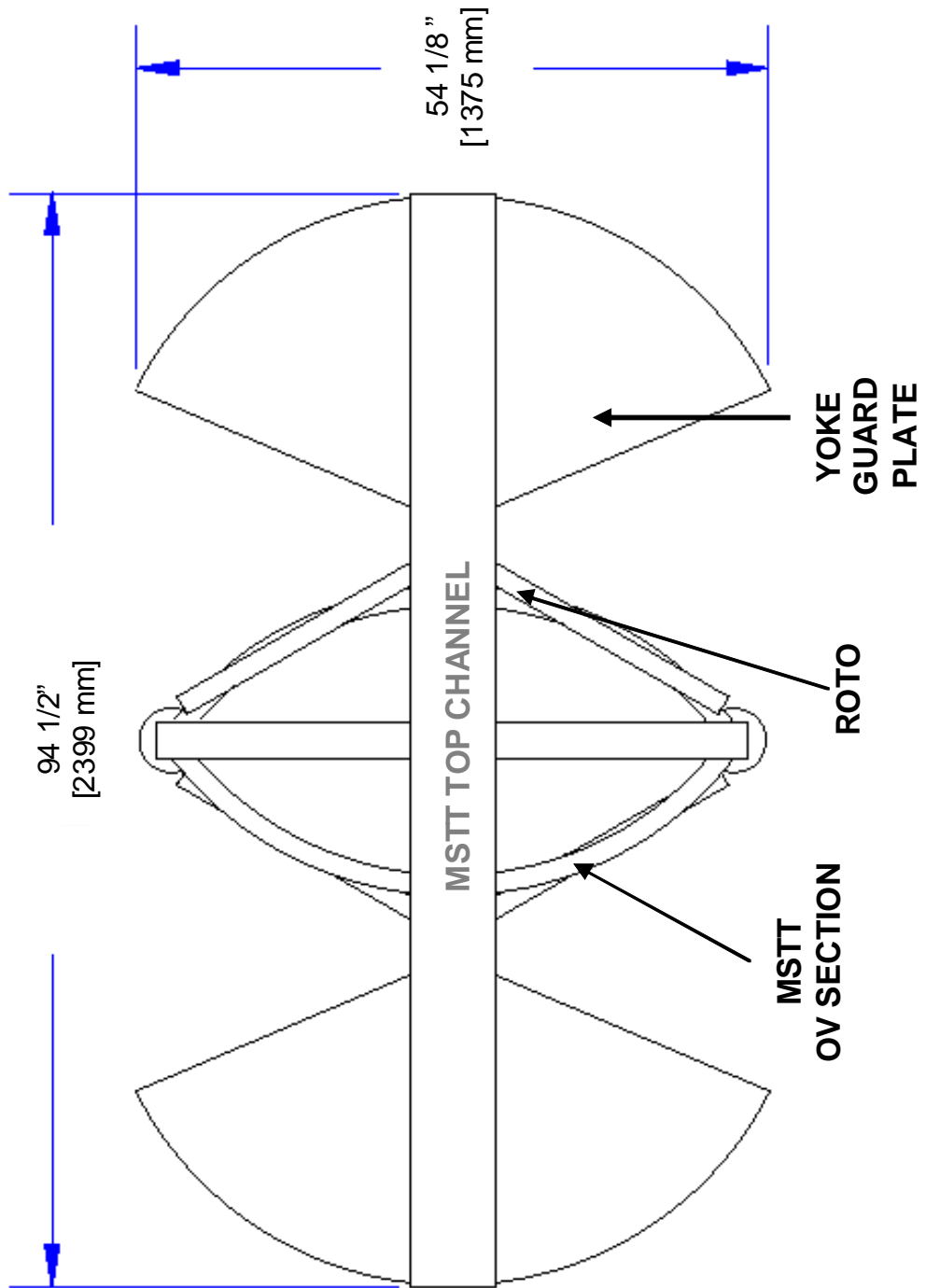
NOTE

The minimum installation height required is 95.5". Viewed From the Outside (or unsecured side) of the Turnstile.



ALVARADO

Turnstile Top View
(For MSTT Models only)



ALVARADO

Electrical and Activation Wiring Instructions

Required Tools

- Wire Strippers
- Flat head screwdriver



Use only skilled electricians to connect power to the unit. Before beginning installation, make sure the power to the unit is off.

Connect Primary Power



Refer to the wiring diagram and schematic shown on page 24 for actual termination points for signal and power wiring.

NOTE

1. Remove the Top Channel Inspection Cover.
2. Turn power off to control board by moving power toggle switch to off position.
3. Using a flathead screwdriver, unscrew the junction box cover to connect 110VAC/220VAC to the transformer/power switch box (Figure 3.21) per local electrical codes based on model received.

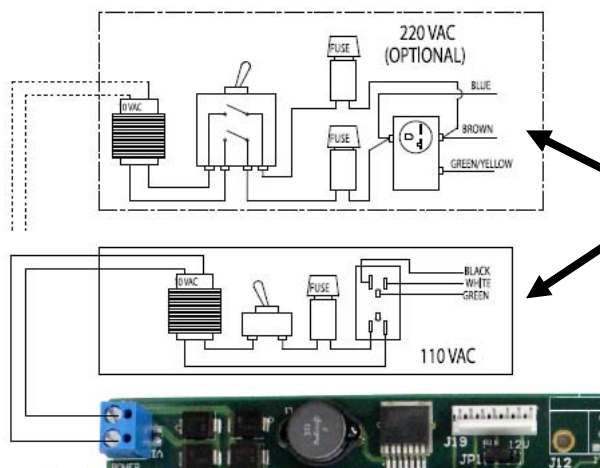


Figure 3.21 – Connect primary power.

Connect Activation Contacts and Turnstile Validation

4. Connect the access control system activation leads to the board. Figure 3.22 depicts the ATC board how it arrives with out activation contacts and turnstile validation. Use the wiring schematic on page 24 to determine appropriate locations.
5. Review all electrical wiring and contacts for exposure to any metal parts that may lead to a short.

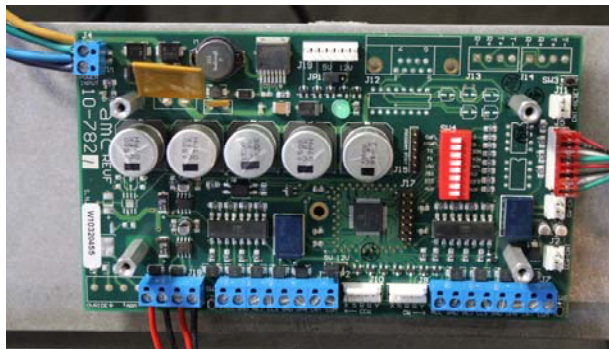
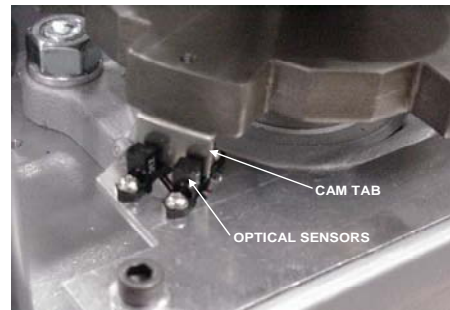


Figure 3.22 – Any connections related to added options or activations for the turnstile are not shown.

ALVARADO

6. Manually rotate the turnstile and inspect the optical sensors for proper alignment and free rotation of the sensor feedback disk. (See Figure 3.23)

Figure 3.23 - Inspect the optical sensor for proper alignment by verifying that the cam tab freely passes through the optical sensor assembly. The cam tab should rotate freely between the sensors and should travel at approximately $\frac{3}{4}$ of the depth of the sensors. This setting is made at the factory but if alignment is upset during the shipping or installation process, loosen and adjust using the sensor mounting screws. Retighten screws



7. Check dip switches on SW4 for proper operation. Refer to the switch section on pages 29 through 31. SW4 switch sets Fail Lock/Fail Safe solenoid operation and time out function. These have been factory set and should not require changes.
8. Turn ON the primary power to the unit by moving power toggle switch to ON position. For both fail-lock and fail-safe units the turnstile should be locked in the controlled direction(s) when power is applied.
9. Turn the primary power OFF again. If the unit is fail-lock, confirm that the turnstile remains locked upon loss of power. If the unit is fail-safe, confirm that the turnstile unlocks upon loss of power. If the unit is fail-lock in one direction and fail-safe in the other direction, confirm that upon loss of power the turnstile remains locked in the fail-lock direction and unlocks in the fail-safe direction.



Refer to channel configuration shown on page 32. For proper orientation of the solenoid for Fail-lock and Fail-safe operation.

NOTE

10. Turn the primary power ON again
11. Locate the Entry Activation Test Button(s) on the controller board inside the turnstile Top Channel. (Test button locations are labeled SW6 & SW7 on the ATC control board. The test buttons are labeled on the wiring diagram on page 23 and Section 3 - Switches on page 29.)



Counter Clockwise (CCW) and Clockwise (CW) rotation is determined by viewing the rotation of the turnstile cam from above while the turnstile top channel cover is removed/open.

NOTE

12. Push the SW7 Activation Test Button for CCW. If the turnstile is functioning correctly the solenoid will energize/activate and the turnstile will unlock.
13. Rotate the Roto in the CCW direction. If functioning correctly, the turnstile will automatically relock.
14. Push the SW7 Activation Test Button again. Observe that the turnstile unlocks, but DO NOT rotate the turnstile arm.
15. Wait for approximately 20 seconds. The unit will "time out" and relock after 20 seconds or the time configured on SW4 if functioning correctly.
16. Repeat steps 12 through 15 for the using the SW6 Activation Test Button for CW direction and confirm correct functionality using the SW6 activation test button.
17. Re-attach the Top Channel Cover.

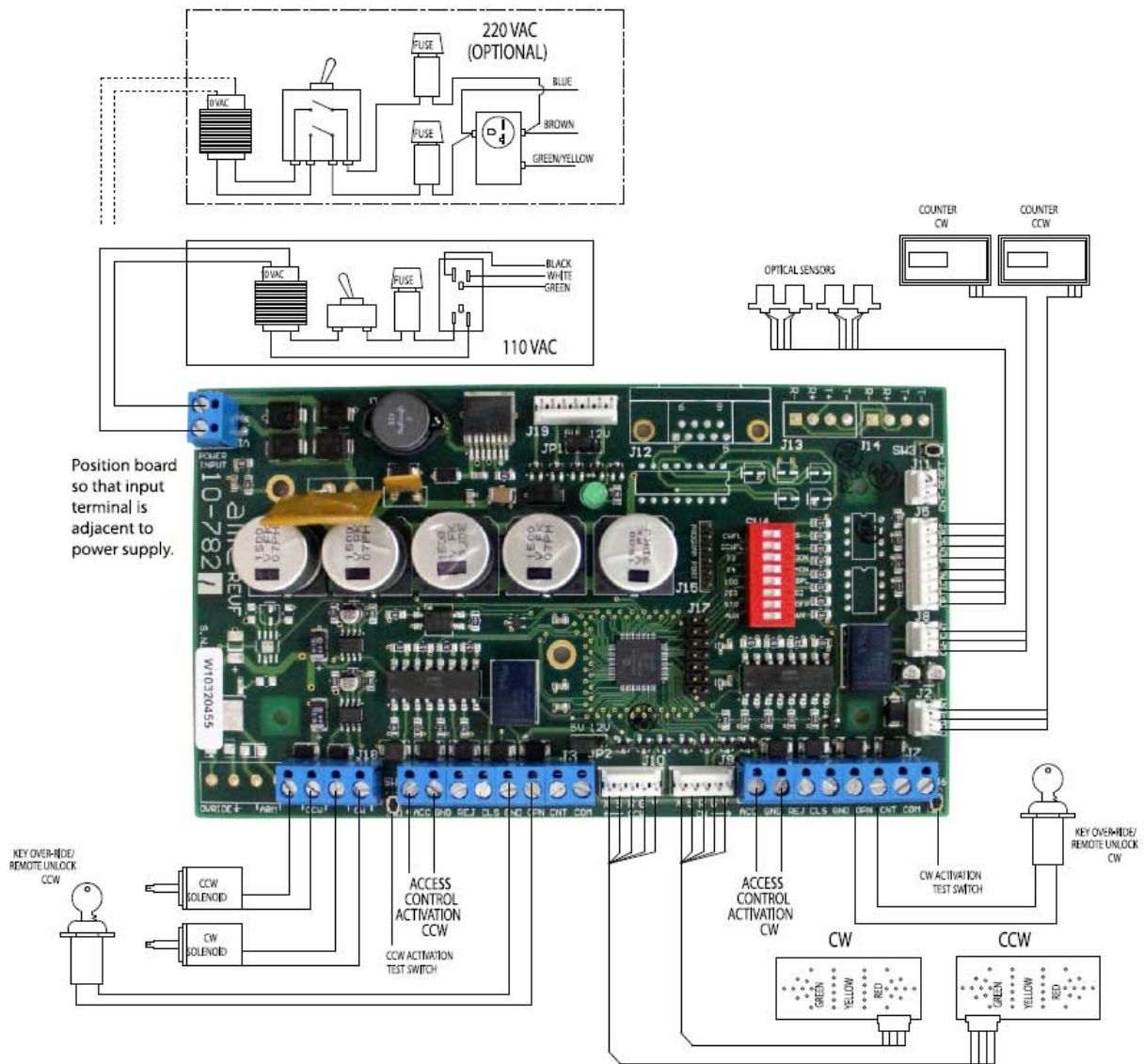


Always test the turnstile after making adjustments to the timed delay feature on SW4. If the adjusted time duration is too short, the unit will relock too quickly and users will not be able to enter through the turnstile.

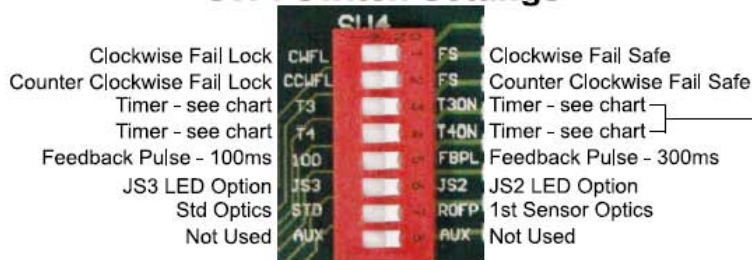
NOTE

ALVARADO

Primary Power Wire Connection for 110 and 220 Options 10-7821 ATC Rev. F (12V) Wiring Schematic



SW4 Switch Settings

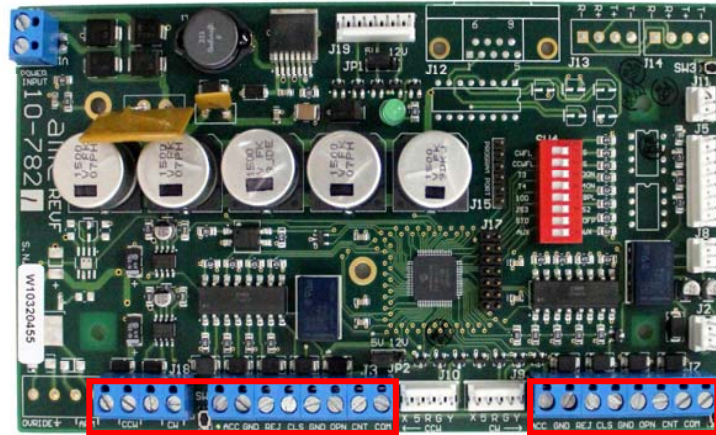


TIMED DELAY RESET TIMER

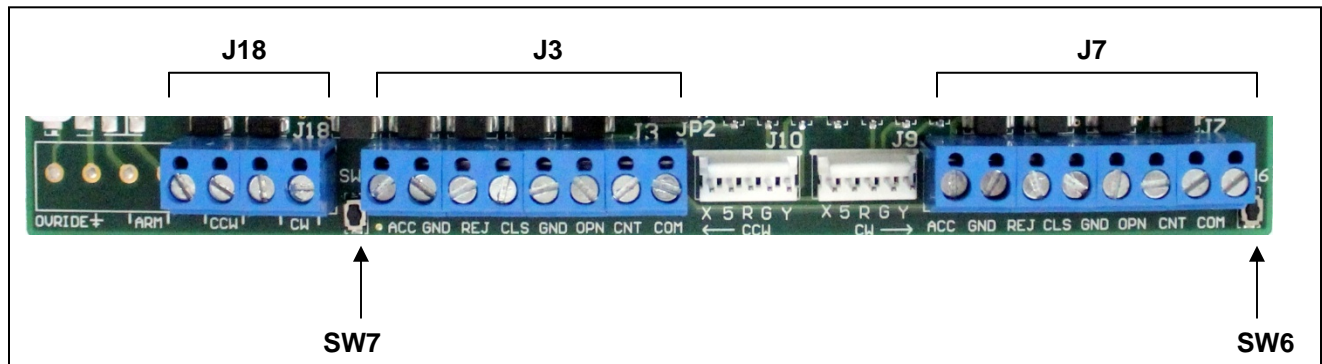
(Positions T3 and T4)		
Switch	Setting	
5 seconds	T3	ON
	T4	ON
10 seconds	T3	ON
	T4	OFF
15 seconds	T3	OFF
	T4	ON
20 seconds (Default Setting)	T3	OFF
	T4	OFF

ALVARADO

Section 1 - ATC Controller Terminal Descriptions



ATC Controller Terminal



Board Location	Name	Description	Explanation
J18	CCW	Solenoid VDC wire connection - Left Hand/Counter Clockwise Direction	Connection for Counter Clockwise Solenoid. Universal polarity.
J18	CCW	Solenoid VDC wire connection - Left Hand/Counter Clockwise Direction	Connection for Counter Clockwise Solenoid. Universal polarity.
J18	CW	Solenoid VDC wire connection - Right Hand/Clockwise Direction	Connection for Clockwise Solenoid. Universal polarity.
J18	CW	Solenoid VDC wire connection - Right Hand/Clockwise Direction	Connection for Clockwise Solenoid. Universal polarity.
SW7	LH/CCW Entry Activation Test Button	Allows user to test turnstile activation - Left Hand/Counter Clockwise Direction	Depressing button simulates input to Location ACC, "Entry Accept". If turnstile solenoid "fires" after depressing button AND relocks after a single rotation of the turnstile arm OR upon time out, the turnstile is functioning correctly in the Left Hand/Counter Clockwise Direction.

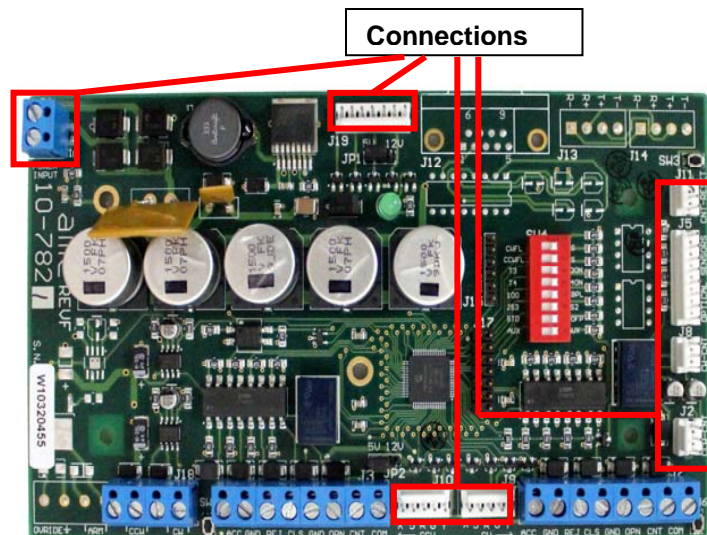
ALVARADO

Board Location	Name	Description	Explanation
J3	ACC Entry Accept	“Card Authorized” input connection from the access control system - Left Hand/Counter Clockwise Direction	This connection is used to tell the turnstile to unlock. The ATC will accept a N/O dry contact signal of .25ms or longer from the access control system and allows one turnstile rotation before relocking.
J3	GND Ground	Ground wire connection from the access control system for ACC/REJ - Left Hand/Counter Clockwise Direction	Ground wire connection position for Entry Activation and Card Reject contact signal.
J3	REJ Entry Reject	“Card Unauthorized” input connection from the access control system - Left Hand/Counter Clockwise Direction	This connection is used to tell the turnstile to remain locked. The access control system has determined that the card presented is unauthorized for entry.
J3	CLS Close Passage	Connection for placing turnstile in always locked “CLOSED” configuration - Left Hand/Counter Clockwise Direction	Providing a continuous dry contact at this terminal places the turnstile in a locked “CLOSED” mode. This mode overrides the access control system operation. If a red entry light is installed (Location J10) it also will be illuminated continuously. Note: this connection is shown using a key switch in the schematic.
J3	GND Ground	Ground wire connection for “OPEN/CLOSE” Lane control - Left Hand/Counter Clockwise Direction	Ground wire connection for “OPEN/CLOSE” passage control.
J3	OPN Open Passage	Connection for placing turnstile in always unlocked “OPEN” configuration - Left Hand/Counter Clockwise Direction	Providing a continuous dry contact at this terminal places the turnstile in an unlocked “OPEN” mode. This mode overrides the access control system operation. If a green entry light is installed (Location J10), it will be illuminated green continuously. Note: this connection is shown using a key switch in the schematic.
J3	CNT Passage Count	Entry confirmation signal upon turnstile rotation - Left Hand/Counter Clockwise Direction	Outputs a dry contact upon rotation of the turnstile. This feature can be used to output a “count” signal to an external system such as Alvarado’s GateWatch or to provide feedback to the access control system that a turnstile rotation has taken place.
J3	COM Passage Count	Entry confirmation signal upon turnstile rotation - Left Hand/Counter Clockwise Direction	Common dry contact connection for CNT count signal output. See J3 CNT description.
J7	ACC Entry Accept	“Card Authorized” input connection from the access control system - Right Hand/Clockwise Direction	This connection is used to tell the turnstile to unlock. The ATC will accept a N/O dry contact signal of .25ms or longer from the access control system and allows one turnstile rotation before relocking.
J7	GND Ground	Ground wire connection from the access control system for ACC/REJ - Left Hand/Counter Clockwise Direction	Ground wire connection position for Entry Activation and Card Reject contact signal.
J7	REJ Entry Reject	“Card Unauthorized” input connection from the access control system - Right Hand/Clockwise Direction	This connection is used to tell the turnstile to remain locked. The access control system has determined that the card presented is unauthorized for entry.

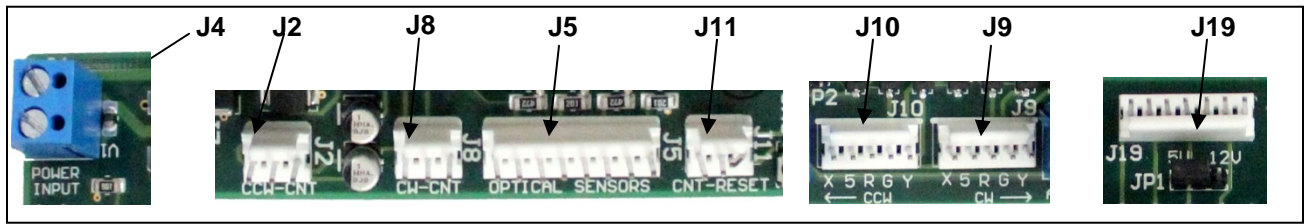
ALVARADO

Board Location	Name	Description	Explanation
J7	CLS Close Passage	Connection for placing turnstile in always locked "CLOSED" configuration - Right Hand/Clockwise Direction	Providing a continuous dry contact at this terminal places the turnstile in a locked "CLOSED" mode. This mode overrides the access control system operation. If a red entry light is installed (Location J10) it also will be illuminated continuously. Note: this connection is shown using a key switch in the schematic.
J7	GND Ground	Ground wire connection for "OPEN/CLOSE" Lane control - Right Hand/Clockwise Direction	Ground wire connection for "OPEN/CLOSE" passage control.
J7	OPN Open Passage	Connection for placing turnstile in always unlocked "OPEN" configuration - Right Hand/Clockwise Direction	Providing a continuous dry contact at this terminal places the turnstile in an unlocked "OPEN" mode. This mode overrides the access control system operation. If a green entry light is installed (Location J10), it will be illuminated green continuously. Note: this connection is shown using a key switch in the schematic.
J7	CNT Passage Count	Entry confirmation signal upon turnstile rotation - Right Hand/Clockwise Direction	Outputs a dry contact upon rotation of the turnstile. This feature can be used to output a "count" signal to an external system such as Alvarado's GateWatch or to provide feedback to the access control system that a turnstile rotation has taken place.
J7	COM Passage Count	Entry confirmation signal upon turnstile rotation - Right Hand/Clockwise Direction	Common dry contact connection for CNT count signal output. See J3 CNT description.
SW6	RH/CW Entry Activation Test Button	Allows user to test turnstile activation - Right Hand/Clockwise Direction	Depressing button simulates input to Location ACC, "Entry Accept". If turnstile solenoid "fires" after depressing button AND relocks after a single rotation of the turnstile arm OR upon time out, the turnstile is functioning correctly in the Right Hand/Clockwise Direction.

Section 2 - Connections



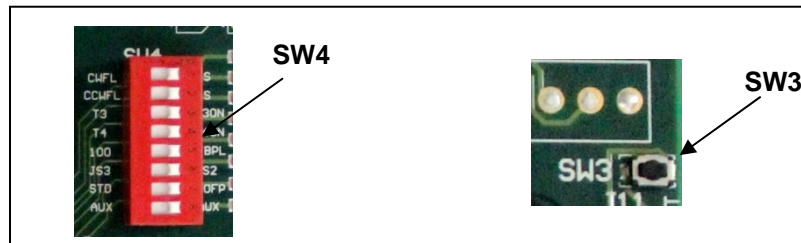
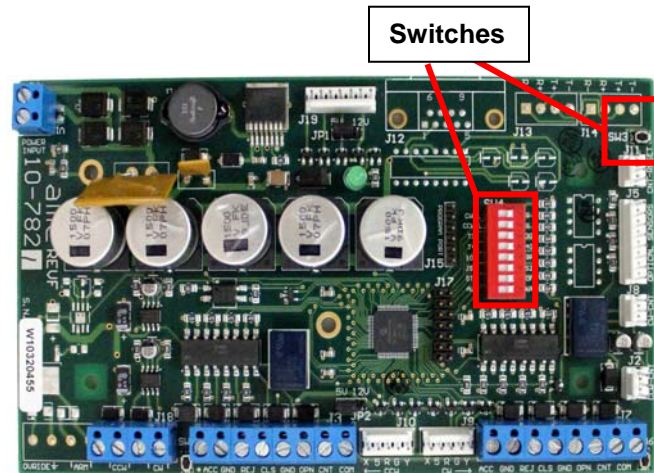
ALVARADO



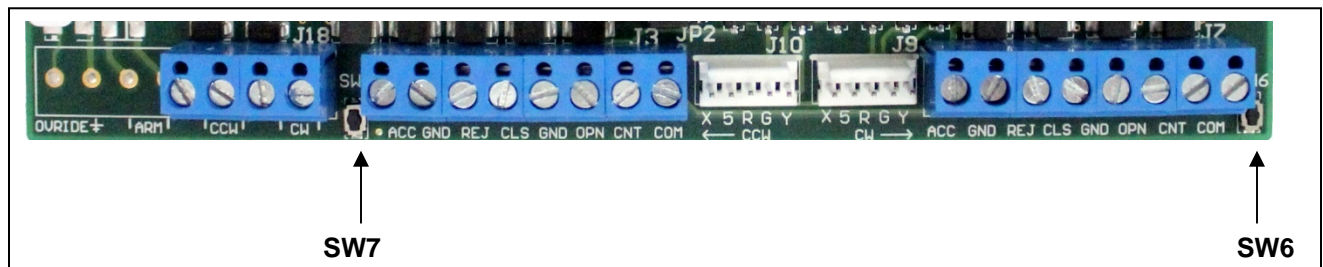
Board Location	Name	Description	Explanation
J2	CCW-CNT	Output of contact closure upon turnstile rotation – Left hand / Counter Clockwise Direction	Single throw, relay output for connection to Alvarado battery powered, digital counter.
J4	Power Input	Connection for low voltage power	The ATC will accept 10 VAC or 13.5 VDC power. If primary power is not run to the turnstile, low voltage power is connected here and the green ground wire must be grounded to the chassis.
J5	Optical Sensors	Connection for sensors	The ATC uses input from the sensors to provide rotation control functionality.
J8	CW-CNT	Output of contact closure upon turnstile rotation - Right Hand / Clockwise Direction	Single throw, relay output for connection to Alvarado battery powered, digital counter.
J9	X5RGY	Connection for Entry Lights - Left Hand/Counter Clockwise Direction	OPTIONAL: Support for 5 and 12 VDC LED lights. Use jumper JP2 to set voltage. If a red / green light board is used, the red light will be lit when the turnstile is powered and ready for card presentation. When a contact is provided to “Entry Accept” (Location ACC), the green light illuminates. The green light stays on for time out setting, or until the turnstile is rotated.
J10	X5RGY	Connection for Entry Lights - Right Hand/ Clockwise Direction	OPTIONAL: Support for 5 and 12 VDC LED lights. Use jumper JP2 to set voltage. If red /green light board is used, the red light will be lit when the turnstile is powered and ready for card presentation. When a contact is provided to “Entry Accept” (Location ACC), the green light illuminates. The green light stays on for time out setting, or until the turnstile is rotated.
J11	CNT-RESET	Connection for counter reset switch	N/O contact connection if blue counter wires are attached to J2 and/or J8 connections. A 3 position electrical key switch is connected here to provide a reset to the individuals counters.
J19		Connection for EL function light board	OPTIONAL: Support for 5 and 12 VDC LED lights. Use jumper JP1 to set voltage. If red/green end light boards are used, the green light signifies that the turnstile is ready to accept an activation for the direction shown. When the CLS and GND connection is closed, the red light will be illuminated and signifies that the turnstile will not accept an activation. Refer to description for CLS on J3 and J7.

ALVARADO

Section 3 - Switches



Board Location	Name	Description	Explanation
SW3	Reset counters	Local Battery Counter Reset Switch	If blue counter wires are attached to the board, depressing this button will reset the counters. If two counters are installed and wired, both counters will be reset.
SW6	RH/CW Entry Activation Test Button	Allows user to test turnstile activation - Right Hand/Clockwise Direction	Depressing button simulates input to Location ACC, "Entry Accept". If turnstile solenoid "fires" after depressing button AND relocks after a single rotation of the turnstile arm OR upon time out, the turnstile is functioning correctly in the Right Hand/Clockwise Direction.
SW7	LH/CCW Entry Activation Test Button	Allows user to test turnstile activation - Left Hand/Counter Clockwise Direction	Depressing button simulates input to Location ACC, "Entry Accept". If turnstile solenoid "fires" after depressing button AND relocks after a single rotation of the turnstile arm OR upon time out, the turnstile is functioning correctly in the Left Hand/Counter Clockwise Direction.



ALVARADO

SW4 Switch Settings

<i>Explanation of switch positioned to left or OFF side</i>	<i>Switch Position</i>	<i>Switch Position</i>	<i>Explanation of switch positioned to right or ON side</i>
Sets solenoid control for the Clockwise direction in fail lock configuration. Power is applied to solenoid upon activation signal to release lock arm for rotation.	CWFL	FS	Sets solenoid control for the Clockwise direction in fail safe configuration. Power is applied to solenoid for locked condition and removed upon activation signal to release lock arm for rotation. Note: Refer to channel configurations on page 32 for proper function.
Sets solenoid control for the Counter Clockwise direction in fail lock configuration. Power is applied to solenoid upon activation signal to release lock arm for rotation.	CCWFL	FS	Sets solenoid control for the Counter Clockwise direction in fail safe configuration. Power is applied to solenoid for locked condition and removed upon activation signal to release lock arm for rotation. Note: Refer to channel configurations on page 32 for proper function.
Adjustment control of the maximum throughput time allowed for an individual to completely travel through the turnstile before the turnstile automatically relocks. Used with switch position T4. Always test operation after adjusting to ensure that the set time allowed is compatible with the functionality required for the turnstile. Refer to the Entry Time Adjusting Control Switch Settings table below. (Default)	T3	T3ON	Adjustment control of the maximum throughput time allowed for an individual to completely travel through the turnstile before the turnstile automatically relocks. Used with switch position T4. Always test operation after adjusting to ensure that the set time allowed is compatible with the functionality required for the turnstile. Refer to the Entry Time Adjusting Control Switch Settings table below.
Adjustment control of the maximum throughput time allowed for an individual to completely travel through the turnstile before the turnstile automatically relocks. Used with switch position T3. Always test operation after adjusting to ensure that the set time allowed is compatible with the functionality required for the turnstile. Refer to the Entry Time Adjusting Control Switch Settings table below. (Default)	T4	T4ON	Adjustment control of the maximum throughput time allowed for an individual to completely travel through the turnstile before the turnstile automatically relocks. Used with switch position T3. Always test operation after adjusting to ensure that the set time allowed is compatible with the functionality required for the turnstile. Refer to the Entry Time Adjusting Control Switch Settings table below.

ALVARADO

Explanation of switch positioned to left or OFF side	Switch Position	Switch Position	Explanation of switch positioned to right or ON side
Sets Length of time of contact closure on CNT and COM feedback to 100ms. (Default)	100	FBPL	Sets Length of time of contact closure on CNT and COM feedback to 300ms.
Sets operation for when a JS3 yellow / green / red light board is used. The yellow light is lit when the turnstile is powered and ready for card presentation. When a contact is provided to "Entry Accept" (Location ACC), the green light illuminates. The green light stays on for a user definable time, or until the turnstile is rotated (See the explanation provided for Switch SW4). When a contact is provided to "Entry Reject" (Location REJ), a Red light illuminates. The red light illuminates for 3 seconds. Requires light board connection to J9 and/or J10.	JS3	JS2	Sets operation for when a JS2 red / green light board is used. The red light will be lit when the turnstile is powered and ready for card presentation. When a contact is provided to "Entry Accept" (Location ACC), the green light illuminates. The green light stays on for 20 seconds, or until the turnstile is rotated. Requires light board connection to J9 and/or J10. (Default)
Sets operation to standard optical sensor configuration for passage feedback after second sensor detection. (Default)	STD	ROFP	Sets operation to custom optical sensor configuration for passage feedback on first sensor detection.
Not used (Default)	AUX	AUX	Not used

TIMED DELAY RESET TIMER (Positions T3 and T4)

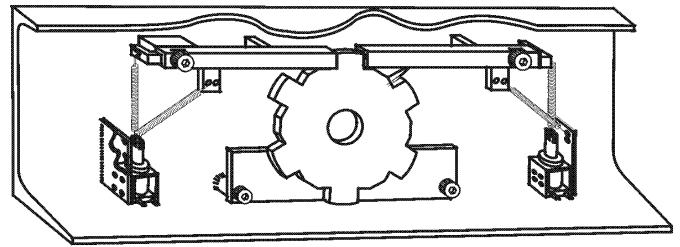
	<u>Switch</u>	<u>Setting</u>
5 seconds	T3	ON
	T4	ON
10 seconds	T3	ON
	T4	OFF
15 seconds	T3	OFF
	T4	ON
20 seconds (Default Setting)	T3	OFF
	T4	OFF

ALVARADO

Channel Configurations for Tandem Turnstiles

Fail Lock (Both Directions)

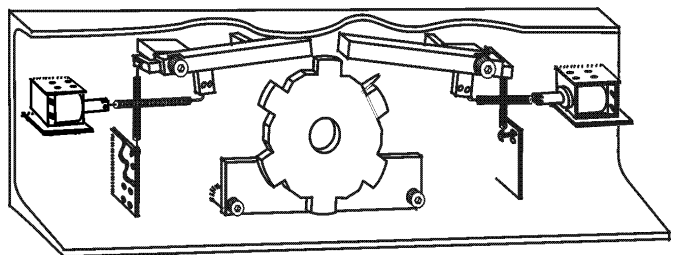
Controlled in both directions.



STATE SHOWN WITH POWER OFF

Fail Safe (Both Directions)

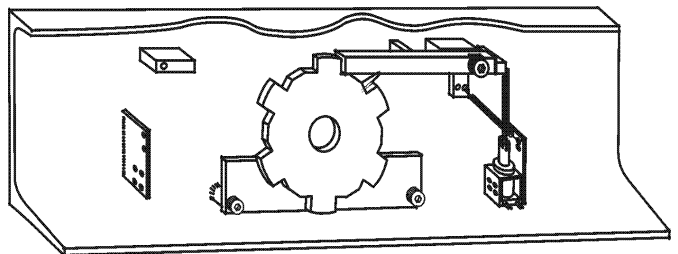
Controlled in both directions.



STATE SHOWN WITH POWER OFF

Clockwise Fail Lock

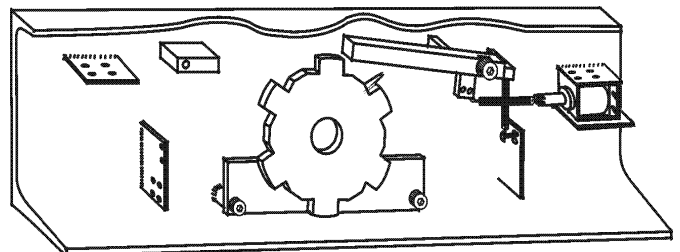
Controlled in clockwise direction
Unlocked in counterclockwise direction



STATE SHOWN WITH POWER OFF

Clockwise Fail Safe

Controlled in the clockwise direction
Unlocked in the counterclockwise direction



STATE SHOWN WITH POWER OFF

ALVARADO

4.0 Maintenance

The frequency of interior maintenance will depend on how often the turnstile is used, the type of personnel using the turnstile and the environment. **Installed turnstiles should be inspected once during the first 30 days after installation.** Thereafter, follow the maintenance schedule below. This schedule is based on what we would call a typical installation – which is a temperate climate where weekly use is up to 7500 activations. If use exceeds this threshold, personnel are abusive to the turnstile or the turnstiles are installed in harsh outdoor environments (such as coastal areas, chemical or refinery plants, very hot or cold locations, or extremely dusty environments), consider increasing the frequency of maintenance to a level suitable for your application.

A Few Words about Finishes:

The finish on your turnstile will look better if it is maintained. The frequency of maintenance depends on three factors: (1) the installation location; (2) environmental factors; and (3) the customer's interest in how the turnstile looks. We suggest cleaning the exterior of the turnstile every three months.

Galvanized Finishes:

Hot-dipped galvanized coating is a sacrificial barrier. The zinc will "sacrifice" itself and will eventually disappear leaving base metal. When your turnstile arrives parts may be shiny and bright. The shiny look will fade quickly. This is normal. Parts of your turnstile may have a dull gray finish. During the galvanizing process zinc deposits may leave sharp deposits that users may find uncomfortable if they come in contact with these areas. Alvarado levels these sharp deposits and then applies an additional coat of galvanizing paint. This paint may leave a duller finish where it is applied. The difference in the finish look will go away shortly as the turnstile weathers.

As the zinc corrodes over time, it will leave a white corrosion, often called "white rust" on the surface. This is normal. Over time, as the zinc deteriorates and the underlying steel is exposed, it will leave a reddish-brown "red rust". Factors that determine the rate at which a galvanized finish deteriorates include exposure to chemicals, corrosive fumes, pollutants, moisture, soils, concrete, environment and contact with other metals. In addition, isolated areas of the underlying metal can be exposed if the zinc is scraped away during the installation process. Surface rust areas can be touched up with a cold galvanizing compound. There are many available. We have had good success with Clearco products: www.clearcoproducts.com.

Galvanized coatings can be cleaned with a neutral detergent, such as a car shampoo, clean warm water and a soft brush. Rinse the surface after cleaning. Abrasive cleaners, steel wool and chemical cleaning products should be avoided.

Stainless Steel Finishes:

Stainless steel will not "rust" as you think of regular steel rusting but stainless steel can be "contaminated" by carbon steel through direct contact or through environmental particles that land on the material. The rust you see is much like the rust in a stainless steel sink left by a wet cast iron pan. Stainless steel can also rust if the passive oxide layer of stainless steel is scratched. The exposed iron in the stainless steel can rust. Hard water can also leave spotting and staining on stainless steel.

Stainless steel benefits from cleaning. The method required depends on the frequency of maintenance and the level of cleaning required. You can start with a mild detergent and warm water. Rinse the surface thoroughly and towel dry to prevent water spots. Abrasive cleaners and any product containing bleach should not be used. Commercial stainless steel cleaners can also be used. Follow the directions carefully.

All stainless materials containing sufficient Chromium will benefit from passivation. This process rejuvenates very dirty or damaged finishes by accelerating the natural formation of the oxide film which gives stainless steel its corrosive resistance. We have had very good success with a citric acid product called CitriSurf: www.stellarsolutions.net.

Powdercoat Finishes:

To clean a powdercoat finish, wash the finish with a neutral detergent, such as a car shampoo, and rinse with clean water. In the event that the powdercoat finish is chipped, and bare metal is showing, seal the area as soon as possible. If the area is not sealed, the underlying metal will rust, which could eat away the powdercoat and cause flaking. Touch up paint is available from Alvarado.

ALVARADO

Interior Maintenance

Interior maintenance of the turnstile requires the removal of the turnstile cover.

**Tri-Flow refers to Tri-Flow Lubricant; Mobil refers to Mobil® XHP 222 with Moly; use only specified lubricants or approved equivalent.*

Item/points of contact	Necessary Maintenance	Using Lubricant	Inspect every...	Replace every...
Lock Arms and Bolts	Check the Lock Arm(s) and the Lock Arm Bolt(s) (The lock arm bolt is also referred to as the "Stripper Bolt." Refer to item #3 in the Exploded View diagram and parts list pages). If the lock arm does not move freely, clean and oil the lock arm and bolt. If the lock arm bolt is loose, apply a thread locking compound to the threads, tighten and re-test. The lock arm should move freely, except for the pressure of the return spring.	Tri-Flow	6 Months	2 years
Springs	Inspect and replace worn or damaged springs. Lubricate spring contact points using a tube extension applicator. Note: It is acceptable to lubricate the contact point where the spring connects to the solenoid plunger, but do not lubricate the solenoid plunger arm. The solenoid is designed to operate "dry". Note: Use only Alvarado springs and only the springs designated for the location and use purpose. Turnstile springs are not interchangeable and should be used in designated locations only.	Tri-Flow	6 Months	1 year
Main Cam & Shaft Bearings	Lubricate the two grease nipples on the upper and lower top channel bearings.	Mobil	6 Months	As Required
Solenoids	Clean the solenoid plunger and solenoid cavity area using alcohol wipes and alcohol moistened Q-tips. Do not oil the solenoid plunger.	CLEAN using Alcohol ONLY	6 Months	2 years
Optical Sensor Assembly	Clean & inspect the alignment of the optical sensors. To clean, an alcohol moistened Q-tip works well. The cam tag should rotate freely between the sensors and should travel at approximately ¼ of the depth of the sensors. Loosen and adjust using the sensor mounting screws. Retighten.	None	6 Months	2 years
Electrical Wiring	Inspect all electrical wires and contacts for exposure to metal parts that may lead to a short.	None	6 Months	As Required
Self-Centering Mechanism	Clean and lubricate the two slide rods	Tri-Flow on "rod" Mobil on "bearings"	6 Months	As Required
Friction Brake Mechanism Maintenance	Check the brake tension on the Assembly by holding the lock arm(s) open (manually or by using the key override) and rotating the turnstile in the appropriate direction(s). There should be a small consistent drag (roughly 3 to 6 lbs.) during the rotation. To adjust the drag, unhook the two W Cam Follower Springs and rotate the screw to tighten or loosen the spring tension. Increasing the spring tension increases the brake tension. Decreasing the spring tension decreases the brake tension. If a more substantial adjustment is required, remove the cotter pin from the top of the brake unit. Rotate the tension adjustment clockwise to increase brake tension or counterclockwise to decrease the brake tension. Replace the cotter pin and re-test the turnstile after adjustment. Readjust if necessary.	None	6 months	As Required

ALVARADO

Adjustment & Lubrication

Lock Arms and Bolts

If the lock arm does not move freely, clean and oil the lock arm and bolt. Remove bolt. Apply Tri-Flo to bottom surface of lock arm and shoulder surface of bolt. If the lock arm bolt is loose, apply a thread locking compound such as Blue Loctite to the threads, tighten and re-test. The lock arm should move freely, except for the pressure of the return spring.

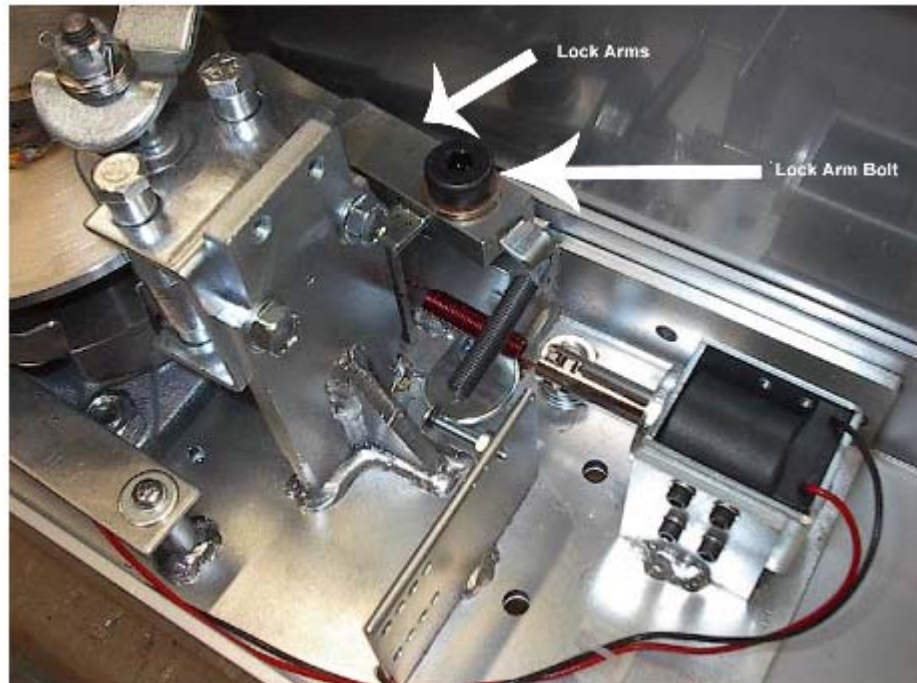


Figure 4.1 - Adjusting the Lock Arm Bolt

Lubricating the Springs:

Lubricate spring contact points with Tri-Flo using a tube extension applicator. Place lubricant on spring body by adding 1 drop on contact points.

DO NOT lubricate the Silver solenoid plunger arm.

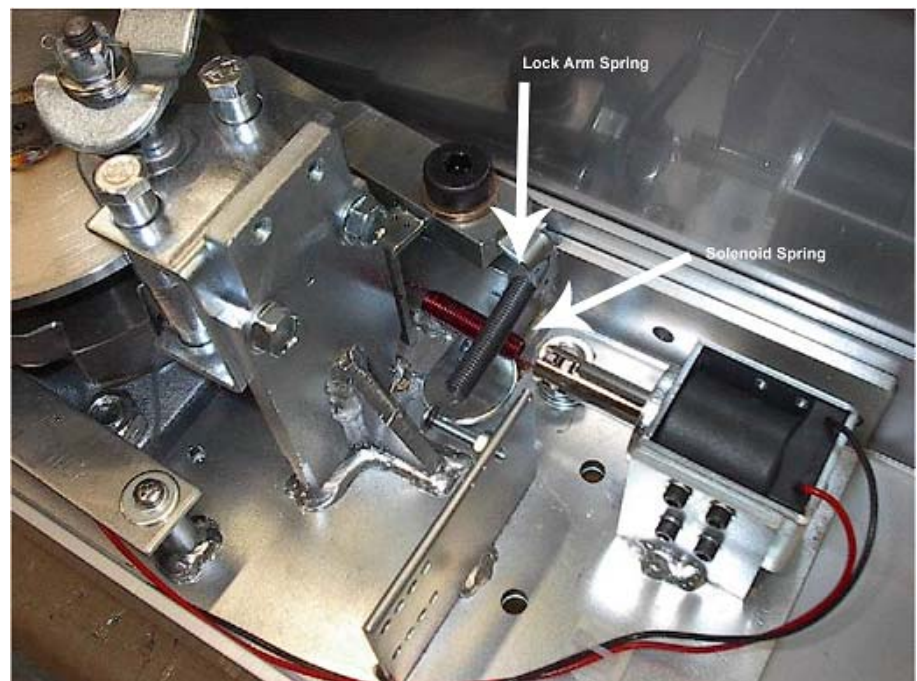


Figure 4.2 – Lubricating springs

ALVARADO

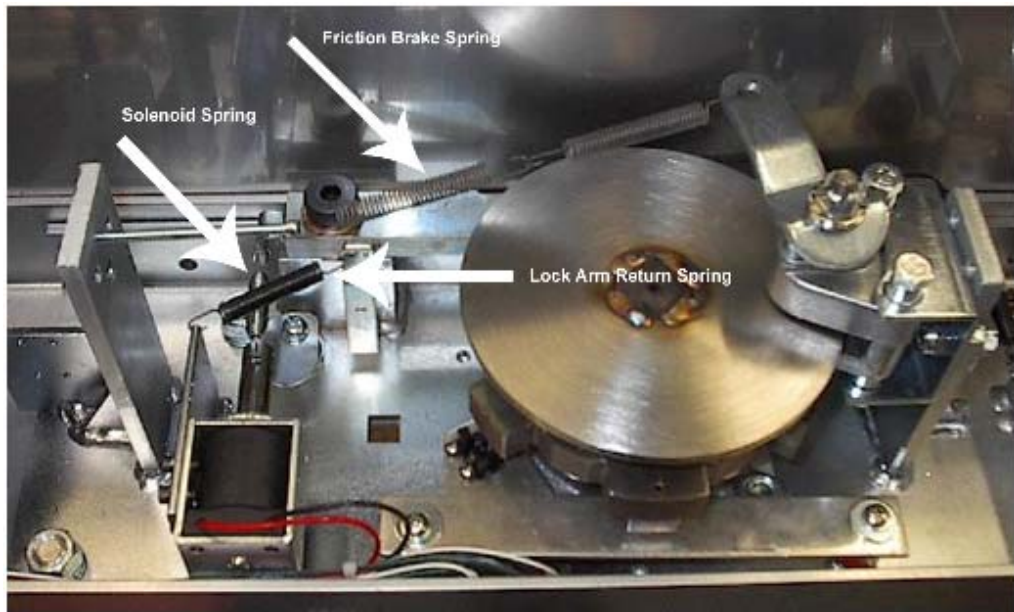


Figure 4.3 - Adjusting the Lock Arm Bolt

Lubricate spring contact points with Tri-Flo using a tube extension applicator. Lubricate spring body and contact points.

Shown to the left are the friction brake springs, solenoid spring and lock arm return spring. Apply lubricant to the contact points of these springs.

Main Cam & Shaft Bearings

Lubricate the two grease fittings on the upper and lower top channel bearings.



Figure 4.4 – Lubricating the bottom bearing of the top channel



Figure 4.5 – Lubricating the top bearing and top channel



NOTE

Note that there is a bearing on both inside the top channel and the outside of the top channel on the bottom.

ALVARADO

Optical Sensor Assembly

Inspecting the Optical Sensor for Proper Alignment:

Inspect the optical sensor for proper alignment by verifying that the cam tab freely passes through the optical sensor assembly. The cam tag should rotate freely between the sensors and should travel at approximately $\frac{3}{4}$ of the depth of the sensors. The sensor assembly should be set correctly from the factory but may need to be adjusted. Loosen the sensor assembly and adjust using the sensor mounting screws. Retighten screws after adjustment.

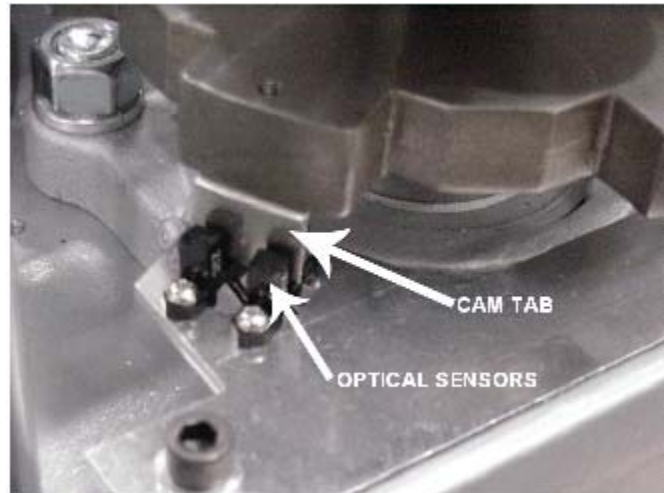


Figure 4.6 – Optical Sensor Assembly

Self-Centering Mechanism

Clean and lubricate the two slide rods.

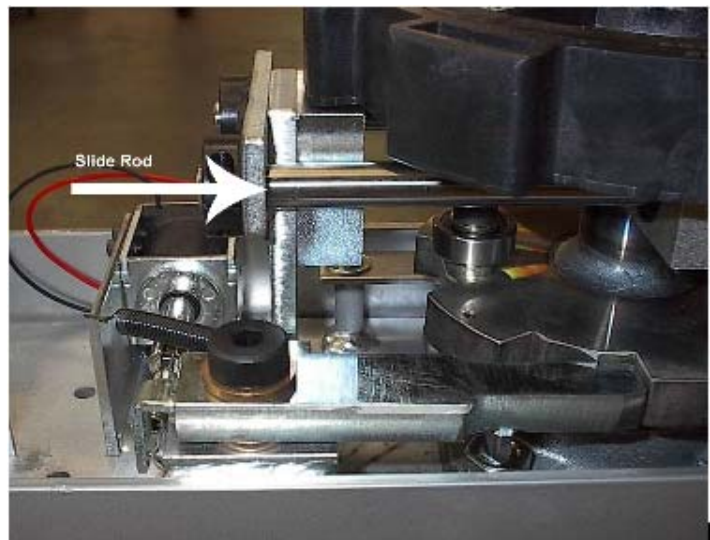


Figure 4.7 – Lubricating the Self-Centering Mechanism

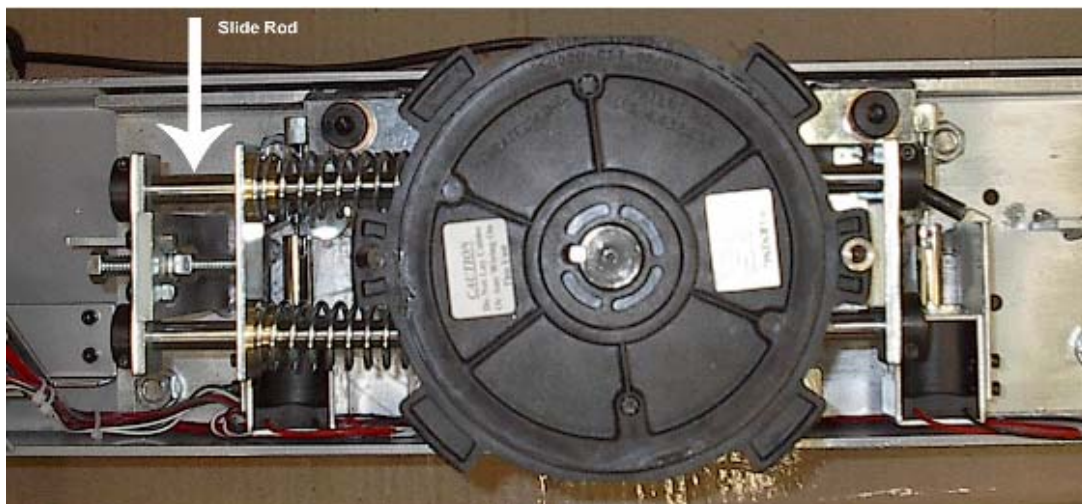


Figure 4.8 – Self Centering Mechanism

ALVARADO

Friction Brake Mechanism

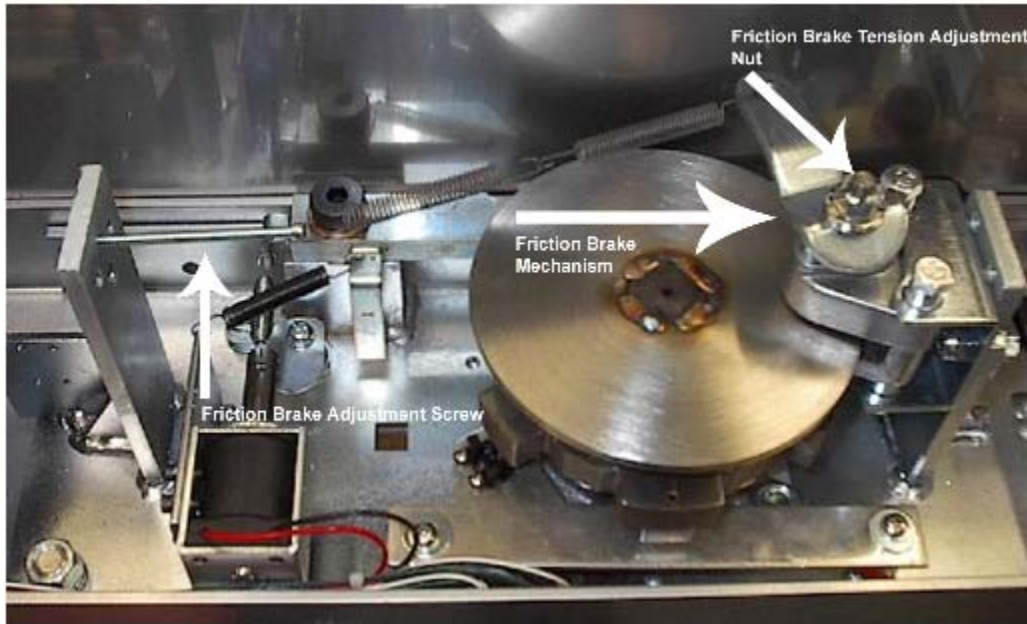


Figure 4.9 - Adjusting the Friction Brake Mechanism

To adjust the friction brake remove the friction brake springs and rotate the friction brake adjustment screw to tighten and increase the friction or loosen to decrease the friction.

If this adjustment is not sufficient, remove the cotter pin on the friction brake tension adjustment nut and rotate the tension adjustment nut clockwise to increase brake friction or counterclockwise to decrease the brake tension

Replace the cotter pin and re-test the turnstile after adjustment.

Turnstile operations and user instructions

Safety Instructions

- Always walk slowly through the turnstile
- Always use caution when using the turnstile
- Inform all users of the proper operation of the turnstile.

A turnstile is NOT a revolving door. In electrically controlled, access control applications (electric models only), the turnstile will unlock and allow only one entrance rotation of 120° per authorized activation. Once the turnstile is unlocked, the user has 20 seconds to enter the turnstile, rotate the arms, and walk through.

The following steps provide a guide to properly use the turnstile.

The turnstile should always be in the “Home” position before access is requested (i.e. an access control card is presented to the card reader). If the turnstile is not in the “Home” position, the user should manually reposition the Roto Section (the arms) to the “Home” position before requesting access. See Figure 4.10.

ALVARADO

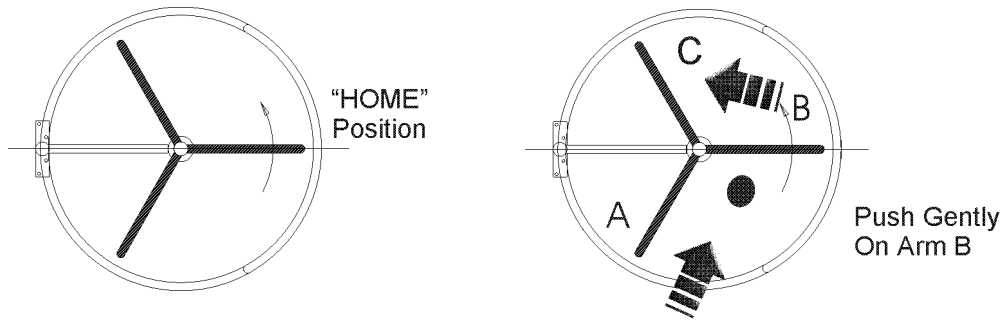


Figure 4.10 – Top view of turnstile showing home position and proper entry

2. Request access (i.e. present an access control card to the card reader) and activate the turnstile. Listen for the turnstile to unlock (the solenoid will “fire” and make a clicking sound) and (if applicable) look for the green light on the card reader display.
3. Immediately step into the turnstile as shown in **Figure 4.10**.



Never grab Roto Arm Section “A” and pull it in front of you. Doing this will result in the Roto section stopping suddenly (after rotating 120°) before the user is all of the way through the turnstile.

4. Keeping your arms extended, gently push on Roto Arm Section “B” and slowly walk through the turnstile. Stay near the Yoke and take short steps. Once you have traveled through the passage area move out of the way of the turnstile arms.



After the user has walked through the turnstile, the turnstile arms will continue to rotate, completing the 120° rotation. Taking long steps could cause the trailing arm section to strike the heels of the user as he or she exits the turnstile. Heel and arm guards are an option that can be purchased from Alvarado.

5. Step completely out of the turnstile.

Other Important Operational Considerations

Users should be made aware that they have a total of 20 seconds to pass through the turnstile before it automatically relocks.



If the user does not complete his entry through the turnstile within the 20-second time frame allowed, the turnstile arms will stop suddenly, before the user is all the way through the turnstile.

Troubleshooting

Items to check first:

- Always check for and remove debris from the solenoid plunger and cavity area. An alcohol moistened Q-tip works well. DO NOT use water and DO NOT lubricate the solenoid plunger. It is designed to operate “dry”.
- Check wiring for any loose connections. Use the wiring diagram for the turnstile model installed.
- **REMINDER:** *The Entry Activation Test Button(s) on the turnstile control board are an excellent tool for testing the functionality of the turnstile independent from the control system.*

Symptom	Possible Cause	Solution Steps
Turnstile does not unlock	The turnstile is not powered (Fail lock units only)	<ol style="list-style-type: none"> 1. Verify that 110 VAC is being provided to the turnstile. Test by plugging in a 110 VAC device into the junction box. 2. Confirm that the ON/OFF switch is ON. 3. Confirm that the fuse is good. 4. Confirm that the LED on the turnstile control board is on. If the LED is lit, verify the board is receiving 10 VAC from transformer.
		<ol style="list-style-type: none"> 1. Test turnstile functionality independent from the access system using the Entry Activation Test Button(s) on the turnstile control board. If turnstile activates when appropriate button is pressed, the problem is generally the control lead connection or the access system is not providing a proper activation signal. 2. If turnstile does not activate when appropriate test button is pressed, verify power as described in section above. 3. If turnstile does activate when appropriate test button is pressed, ensure control leads are connected to the “Entry Accept” terminal(s). Follow the appropriate board wiring diagram supplied in this manual. 4. If leads are correct and secure, confirm that the access control system is providing an activation signal of 25ms or longer.
	A lock arm spring is missing, broken or worn out.	<ol style="list-style-type: none"> 1. Replace the lock arm spring. <p>Note: Turnstile springs are specifically designed for their purpose. Use only Alvarado springs and use only the springs designated for the location and use purpose. Springs are not interchangeable and should be used in designated locations only.</p>
	The lock arm is sticking or binding in the locked position	<ol style="list-style-type: none"> 1. Clean and lubricate the lock arms. Refer to the Maintenance section for lock arm cleaning instructions.
	The solenoid needs to be cleaned or is defective.	<ol style="list-style-type: none"> 1. Clean the solenoid plunger and clean debris from the cavity area. Alcohol wipes and alcohol moistened Q-tips work well. 2. If solenoid appears clean or cleaning does not improve performance, replace the solenoid.
Turnstile does not relock	The turnstile is not powered (Fail safe units only)	<ol style="list-style-type: none"> 1. Verify that 110 VAC is being provided to the turnstile. Test by plugging in a 110 VAC device into the junction box. 2. Confirm that the ON/OFF switch is ON. 3. Confirm that the fuse is good. 4. Confirm that the LED on the turnstile control board is on. If the LED is lit, verify the board is receiving approximately 10 VAC from the transformer.
	The optical sensor is obstructed, misaligned or damaged.	<ol style="list-style-type: none"> 1. Inspect the optical sensor for proper alignment by verifying that the cam tab freely passes through the optical sensor assembly. See the Maintenance section below for instructions on adjustment. 2. Check the optical sensors for damage. If damaged, replace. 3. If optical sensor is not visibly damaged, clean the sensors using an alcohol moistened Q-tip.
	A lock arm spring is missing, broken or worn out.	<ol style="list-style-type: none"> 1. Replace the lock arm spring. <p>Note: Turnstile springs are specifically designed for their</p>

ALVARADO

		purpose. Use only Alvarado springs and use only the springs designated for the location and use purpose. Springs are not interchangeable and should be used in designated locations only.
	The lock arm is sticking or binding in the locked position	1. Clean and lubricate the lock arms. Refer to the Maintenance section for lock arm cleaning instructions.
	The solenoid needs to be cleaned or is defective.	1. Clean the solenoid plunger and clean debris from the cavity area. Alcohol wipes and alcohol moistened Q-tips work well. 2. If solenoid appears clean or cleaning does not improve performance, replace the solenoid.
The Roto does not turn smoothly	The Cam & Shaft Bearings need to be greased	1. Lubricate the two grease nipples on the upper and lower top channel bearings using recommended grease.
	The Bottom Bearing is installed upside down	Install the Bottom Bearing correctly. Refer to Installation of the OV and Bottom Bearing Assembly earlier in this manual.
	The friction brake mechanism is too tight	1. Adjust the friction brake. Refer to the Maintenance section for instructions on adjusting the friction brake mechanism.
	The Bottom Bearing needs to be replaced	1. Replace Bottom Bearing.
The solenoid plunger is sticking.	The solenoid needs to be cleaned or is defective	1. Clean the solenoid plunger and clean debris from the cavity area. Alcohol wipes and alcohol moistened Q-tips work well. 2. If solenoid appears clean or cleaning does not improve performance, replace the solenoid.
The Roto spins too quickly (Friction Brake Units)	The friction brake mechanism is too loose	1. Adjust the friction brake. Refer to the Maintenance section for instructions on proper adjustment of the friction brake mechanism.
The Roto spins too quickly (Self-Centering Units)	The self-centering mechanism is defective	1. Inspect the self-centering mechanism hardware. 2. Check the self-centering springs. 3. Call Alvarado technical support.
The Roto is hard to spin (Friction Brake Units)	The friction brake mechanism is too tight.	1. Adjust the friction brake. Refer to the Maintenance section for instructions on proper adjustment of the friction brake mechanism.
The Roto is hard to spin (Self-Centering Units)	The self-centering mechanism needs adjustment.	1. The user is pushing too hard on the turnstile arms. The speed control / self centering mechanism is designed to increase friction the harder the user pushes. Instruct the users to slow down their passage rate through the turnstile. 2. Adjust the speed control / self-centering mechanism. Refer to the Maintenance section for instructions on proper adjustment of the mechanism. Note: the speed control / self centering mechanism is designed to increase friction the harder the user pushes.
The Roto takes too long to settle (Self-Centering Units)	The self-centering mechanism needs adjustment.	1. Adjust the speed control / self-centering mechanism. Refer to the Maintenance section for instructions on proper adjustment of the mechanism.
The turnstile vibrates excessively	Anchoring or attachment hardware has loosened.	1. Check and tighten anchoring and attachment hardware.
	The friction brake is not properly adjusted.	1. Adjust the friction brake. Refer to the Maintenance section for instructions on proper adjustment of the friction brake mechanism.
	Application would benefit from securing turnstile and installing OV Stabilizing Bracket	1. Secure both ends of the Top Channel (and/or the center outside portion of the Yoke and OV) to a solid object. 2. Order and install an OV Stabilizing Bracket.
	Application would benefit from installation of Top Channel with speed control	1. Order and install a Top Channel with speed control.
	Users are moving through the turnstile with excessive force	1. Train and/or discipline users.

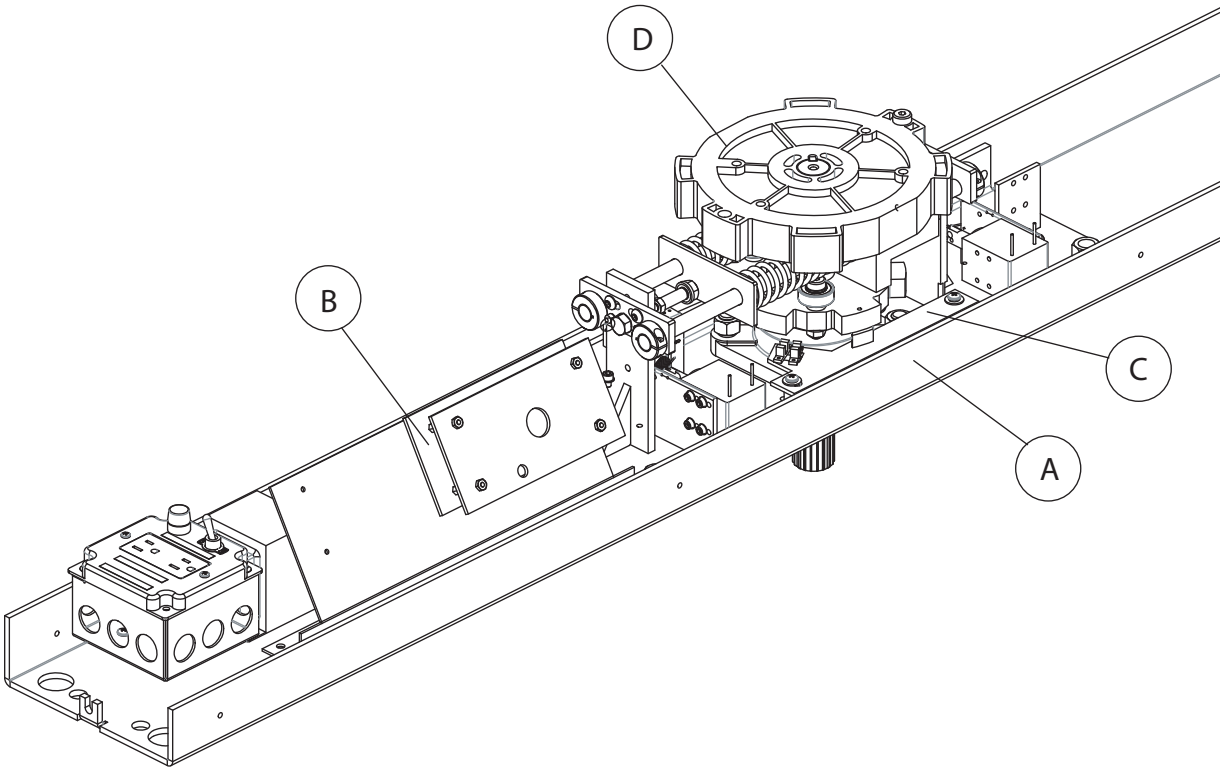
NOTES:

- 1. The Tandem turnstile is designed to receive a momentary dry contact closure. The duration of the contact must be 25 ms or greater.**

ALVARADO

5.0 Replacement Parts/Spare Parts Kits

Channel Assembly/Exploded Parts view



MST-6X/CLST-6X/CPST-6X Sub Assemblies

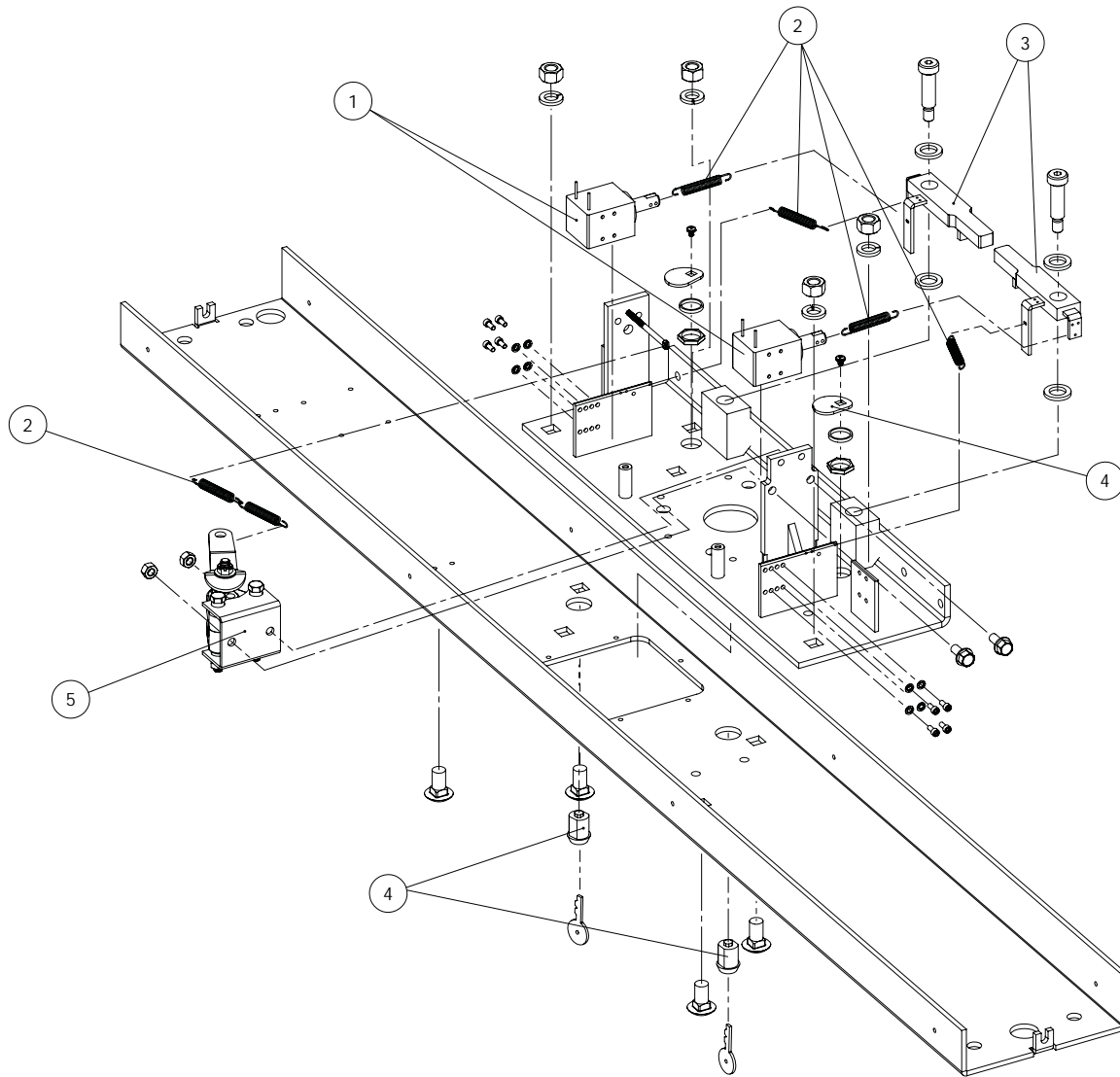
- A. Top Channel Sub Assembly
- B. ATC Controller Board Sub Assembly
- C. Opto Interrupter Mounting Plate Sub Assembly
- D. Cam & Shaft Sub Assembly

* The turnstile model shown is a single Roto MST-6X Fail Lock unit with Key Overrides for both directions. The unit shown is not equipped with a Self-Centering Mechanism. Please note that tandem double Roto MSTT-6X top channels contain the equivalent of two MST-6X top channel components within a single elongated channel.

ALVARADO

A: MST-T/CLST-T/CPST-T Top Channel Sub Assembly Detail

Number Shown on Diagram	Alvarado Spare Part Kit Number	Description
1	50-10-1070	Solenoid (12V DC) Kit
2	50-MST-S1	MST/MSTX Spring Kit
3	50-MST-LA	MST/MSTX Lock Arm Kit
4	11-9401C	Manual Key Override
5	50-04-2055	MST/MSTX Brake Unit Kit

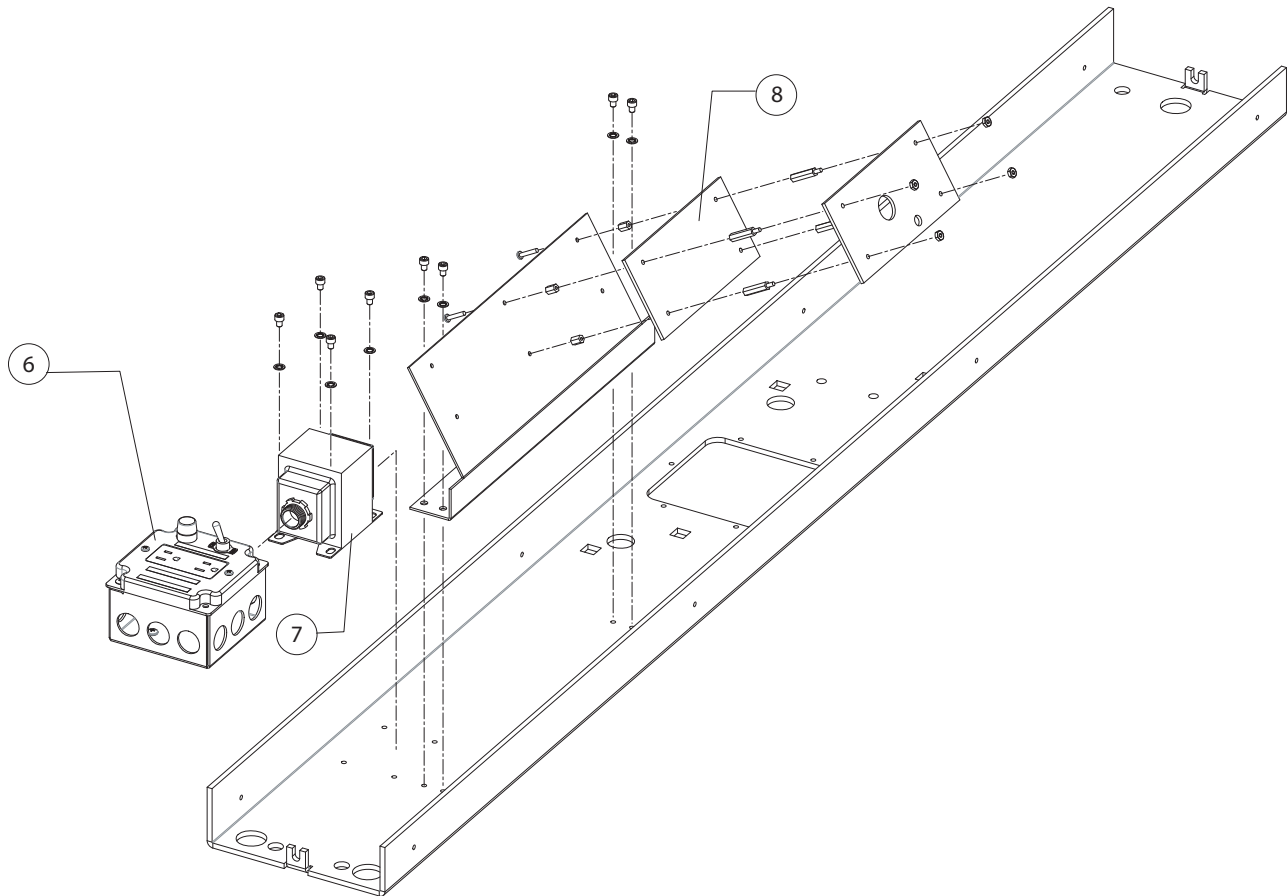


ALVARADO

B: MST-6X/CLST-6X/CPST-6X Controller Board Sub Assembly

Number Shown on Diagram	Alvarado Spare Part Kit Number	Description
6	10-1317	Junction Box
7	10-3008A	Transformer
8	50-10-7821	ATC Rev. F (12V) Driver Board Kit

ATC Controller Board Sub Assembly Exploded View



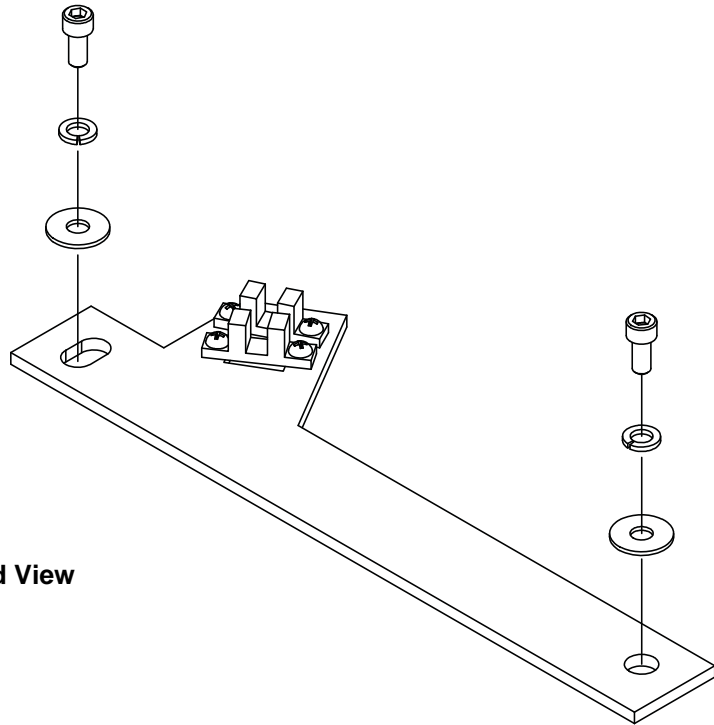
See Page 47 for description of components contained in part kits.

ALVARADO

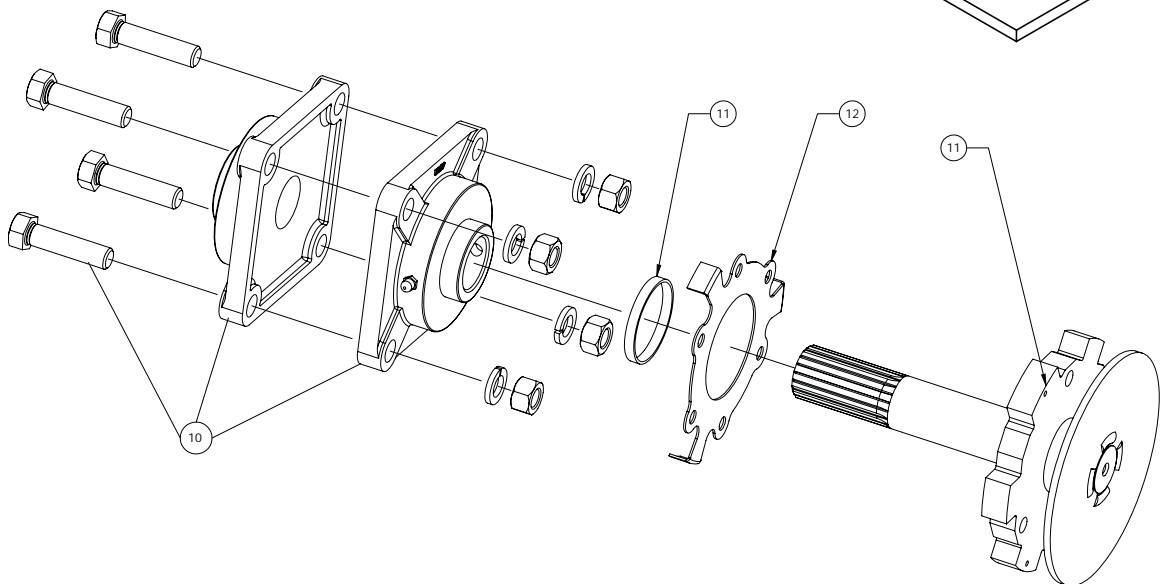
C: MST-T/CLST-T/CPST-T OPTO Interrupter Mounting Plate Sub Assembly

Number Shown on Diagram	Alvarado Spare Part Kit Number	Description
9	50-04-2058A	MSTX Optical Sensor Assy. Kit
10	50-11-4010P	MST/MSTX Top Bearing Kit
11	04-3401R (04-2069R)	MSTX Optical Cam & Shaft Assembly (Tandem Second Cam & Shaft)
12	50-04-2078	MST Optical Encoder Wheel

Opto Interrupter Mounting Plate Sub Assembly Exploded View



Cam & Shaft Sub Assembly Exploded View



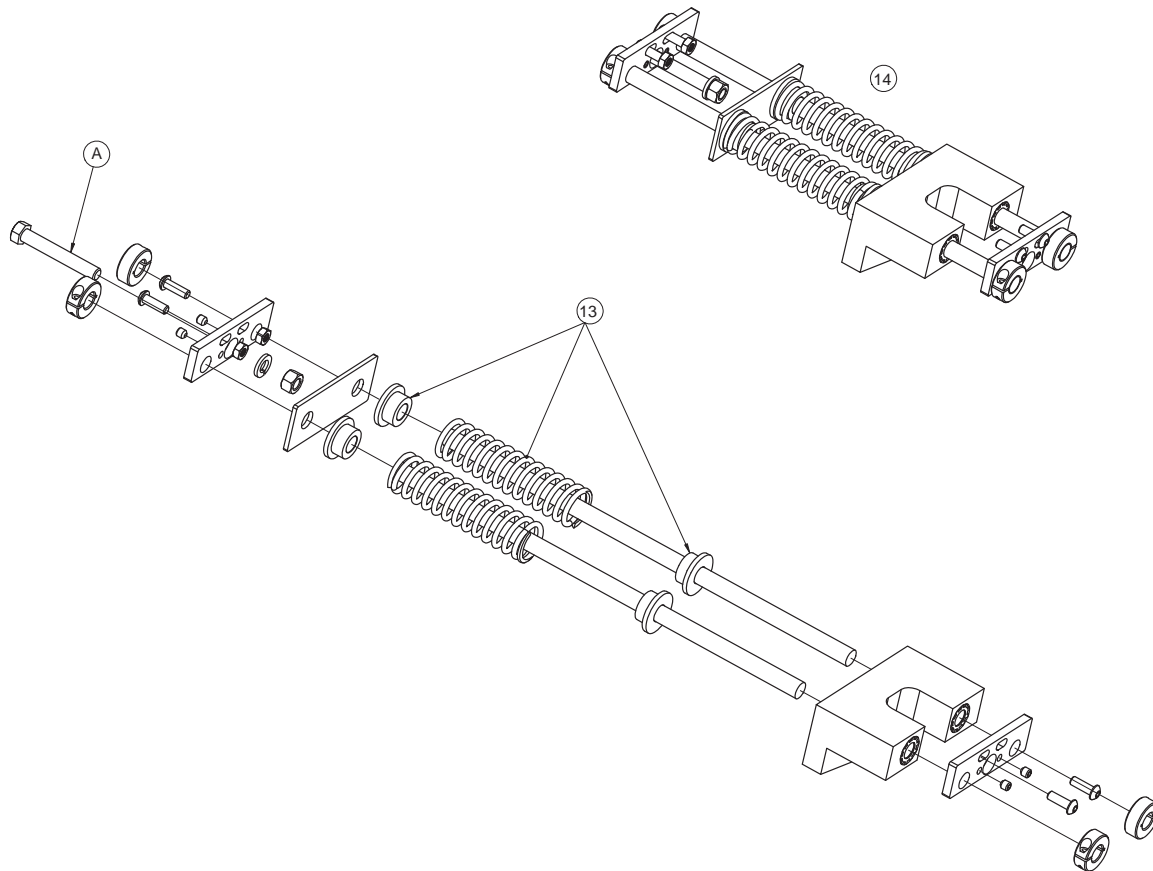
See Page 47 for description of components contained in part kits.

ALVARADO

D: MSTX/CLSTX/CPSTX Cam & Shaft Sub Assembly

Number Shown on Diagram	Alvarado Spare Part Kit Number	Description
13	15-1000	MST-SC SPRING & BUSHING KIT
14	04-8633	MST SELF-CENTERING ASSEMBLY
A	N/A	Adjustment Bolt

Self-Centering Mechanism Compression Spring Close-up



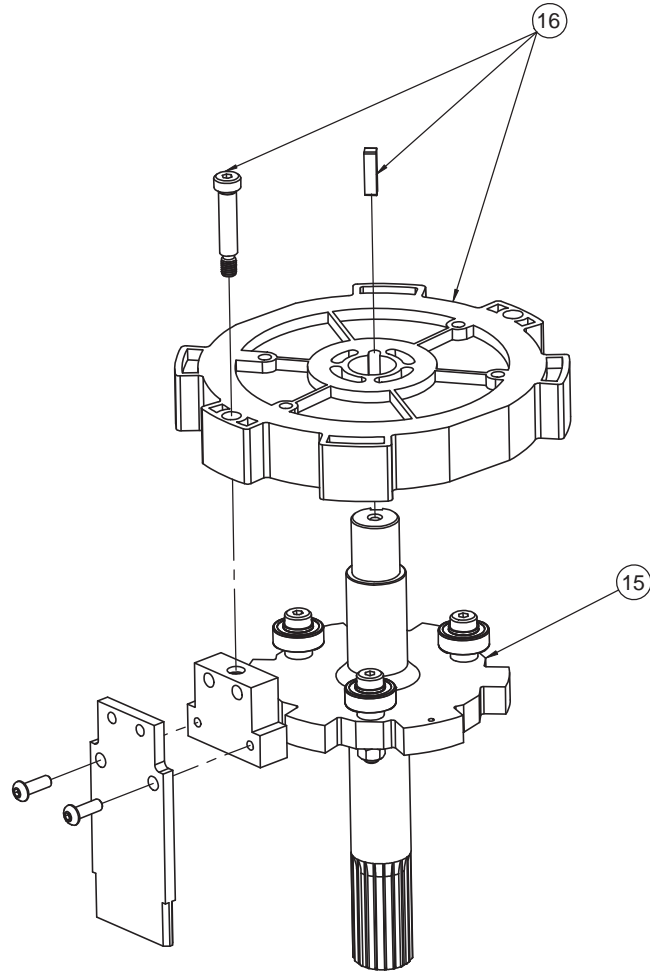
See Page 48 for the corresponding numbered parts listing.

ALVARADO

D: MSTX/CLSTX/CPSTX Cam & Shaft Sub Assembly (continued)

Number Shown on Diagram	Alvarado Spare Part Kit Number	Description
15	04-8696R (04-8695R)	MSTX-SC2 Optical Cam & Shaft (Tandem Second Cam & Shaft)
16	50-04-8693-2	MST Speed Governor Kit

Self-Centering Mechanism



See Page 48 for the corresponding numbered parts listing.

ALVARADO

Description of Parts Included in Spare Parts Kits

PART NUMBER SHOWN	KIT PART NUMBER	DESCRIPTION	Qty per turnstile	QTY Per Kit
1	50-10-1070	SOLENOID (12 VDC) KIT	2	
		Solenoid (12V DC)		2
		Screw, 8-32 X 3/8 SHCS-BLK OXIDE		8
		Lock-Washer, #8 Internal Tooth -Zinc		8
2	50-MST-S1	MST SPRING KIT	2	
		Screw, MST Brake Spring		1
		W Cam Follower Spring (Used on Brake Disc)		2
		MST Solenoid Return Spring		2
		MST Fail-lock Solenoid Spring		2
		MST Fail-safe Solenoid Spring (RED)		2
3	50-MST-BK	MST LOCK ARM, BOLT and BEARING KIT	2	
		Bolt, 5/8 x 1 1/2", Shoulder		2
		Bearing, Plain, 5/8 ID x 1/8 Thick		4
4	11-9401C	Manual Key Override	4	
5	50-04-2055	MSTX BRAKE UNIT KIT	2	
		MSTX BRAKE UNIT		1
		Screw, 5/16 - 18 X 1" Hex Head Cap Zinc		2
		Nut, Lock, 5/16 - 18 Zinc		2
		MST, Screw, Brake Spring		1
		W Cam Follower Spring		2
6	10-1317	110VAC Junction Box	2	
7	50-10-3008A	TRANSFORMER,110VAC-10.5VAC,KIT	2	
		TRANSFORMER T07046B		1
		8-32 X 3/8 SHCS-BLK OXIDE		4
		10-32 X 1/4 SHCS-PLAIN		4
		#8 INTERNAL TOOTH LCKWSHER-ZINC		4
		#10 INTERNAL TOOTH LOCKWASHER		4
8	50-10-7821	MSTX (ATC) DRIVER BOARD KIT	2	
		MSTX / EDCX (ATC) Standard Driver Board		1
		Standoff, 1", 6-32, Male Female		4
9	50-04-2058A	MSTX OPTICAL SENSOR ASSEMBLY KIT	2	
		MSTX OPTICAL SENSOR ASSEMBLY		1
		Screw, 1/4 - 20 x 5/8" SHCS		2
		Lock Washer, 1/4",		2
		Washer, 1/4" Flat		2
		Screw, 10-32 x 3/4" PHPMS		2
		Washer, #10 Flat		2
		Lock Washer, #10 Internal tooth		2

ALVARADO

PART NUMBER SHOWN	KIT PART NUMBER	DESCRIPTION	Qty per turnstile	QTY Per Kit
10	50-11-4010P	MST/MSTX TOP BEARING KIT	2	
		MST/MSTX Top Bearing		2
		Screw, 1/2-13 X 2" Hex Head Cap - Zinc		4
		Nut, 1/2-13 Hex - Zinc		4
		Washer, Lock, 1/2" Med Split - Zinc		4
11	04-2069R	MSTX OPTICAL CAM & SHAFT	1	
		MSTX Optical Cam & Shaft		1
	04-3401R	Washer, Flat, 2 1/2" OD Tandem Models only	2	1
		MSTX TANDEM OPTICAL CAM & SHAFT		
12	50-04-2078	MSTX, OPTICAL ENCODER WHEEL KIT	2	
		MSTX, Wheel, Encoder, Optical		1
		Nut, 5/16-18, Lock, Thin, ZINC		3
		Bolt, 5/16-18 X 7/8" BHSCS-B.O.		3
13	15-1000	MST-SC SPRING & BUSHING KIT	2	
		MST-SC2, Return Spring		2
		MST-SC2, Alignment Bushing, Spring		4
14	04-8633	MST SELF-CENTERING ASSEMBLY	2	
		MST-SC2 End Plate		2
		MST-SC2 Spring Plate		1
		Shaft		2
		MST-SC2 Centering Shoe Assembly		1
		Collar, 1/2" I.D.		4
		Alignment Bushing		4
		MST-SC2 Return Spring		2
		Screw, 1/4-20 x 3/4 BHSCS		4
		Set Screw, 1/4-28 x 1/4 Cup Point		4
		Screw, 3/8-16 x 2-1/2" HH Cap		1
		Nut, Hex 3/8-16		1
		Lock Washer, 3/8 Split		1
		Nut, Hex, 1/4"-20 -ZINC		2
15	04-8695R	MSTX-SC2, OPTICAL CAM & SHAFT	1	
		MSTX-SC2, Optical Cam & Shaft		1
		Washer, Flat, 2 1/2" OD Tandem Models only		1
	04-8696R	MSTX-SC2, TANDEM OPTICAL CAM & SHAFT	2	
		MSTX-SC2, Optical Cam & Shaft		1
		Washer, Flat, 2 1/2" OD		1
16	50-04-8693-2	MST SPEED GOVERNOR KIT	2	
		MST, Speed Governor, 250		1
		MST, Key, Speed Governor		1
		Bolt, 5/16-18 X 1-1/2", Shoulder		1

ALVARADO

Appendix A: Installation Instructions for CLSTT & CPSTT Models only

Layout of the Yoke Sections

8. Determine the installation location for the first two (2) half yoke sections. Identify the threaded aluminum block at the top of each half yoke section's extruded aluminum frame (See **Figure A.1**). Position the half yoke sections together to form a full yoke such that the threaded aluminum blocks are together at the top of the yoke assembly and so that the edges of each half section are flush together at the intersection of the yoke and turnstile centerlines.
9. Keeping the ends of the two (2) half yoke sections flush together rotate the yoke as a complete assembly about the intersection of the turnstile and yoke centerlines. Continue to adjust the position of the yoke as a complete assembly until the outer yoke edges are equidistant from the center of the Roto bottom bearing housing. This "squaring of the yoke" is necessary to ensure that the entrance and exit passage widths are equal (See **Figure A.2**).
10. Trace the entire outline of the yoke assembly. After the yoke location has been marked move the two (2) half yoke sections to the side.
11. Repeat steps 8-10 for the second set of two half-yoke sections.
12. Locate the four (4) aluminum yoke mounting channels for the first yoke. Position the yoke mounting channels within the traced outlines of the first half yoke assemblies. One yoke mounting channel should be positioned 4" from each end of each half yoke assembly with the ground side of the channel facing out (away from the bottom bearing housing). See **Figure A.3** on the following page.

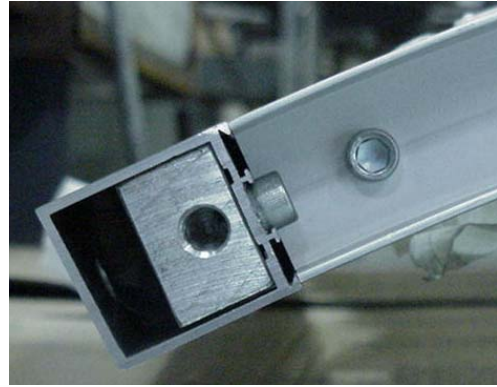


Figure A.1 – View of the threaded aluminum block located at the top of each half yoke section.

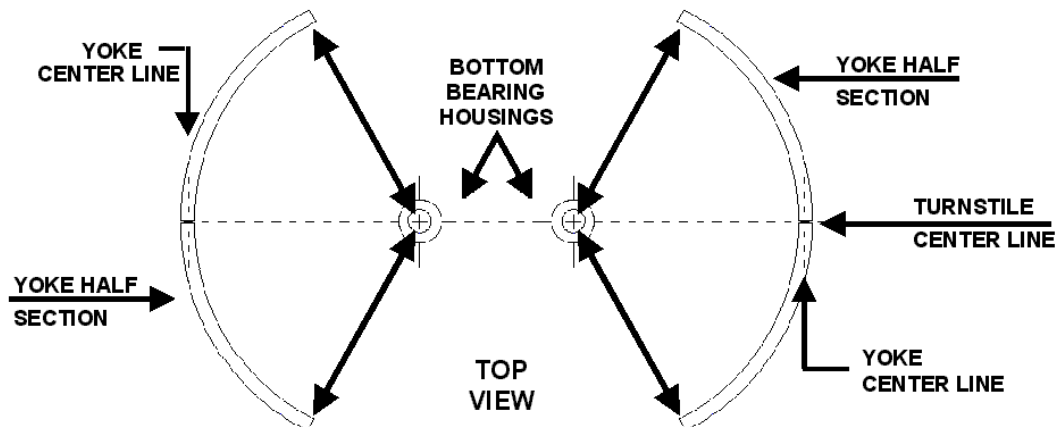


Figure A.2 - "Squaring the yokes." The yokes should be positioned such that each set of half yokes are flush together at the intersection of the turnstile and yoke center lines and the center of the nearest Roto bottom bearing housing is equidistant to the outer edges of the yoke assembly.

13. Mark the four yoke mounting channel mounting holes and set the yoke mounting channels to the side. Confirm that the yoke mounting holes marked are equidistant from the bottom bearing housing (See **Figure A.4**).
14. Repeat steps 12 and 13 for the second half-yoke assembly.
15. Drill a 5/8" hole 3" deep. Vacuum out the holes thoroughly and insert one anchor into each.

ALVARADO

16. Reposition the yoke mounting channels over the anchor holes (See Figure A.5).

17. Anchor each yoke mounting channel with one (1) each 3/8 - 16 x 2 1/2" HHCS bolts and flat washers and hand tighten.

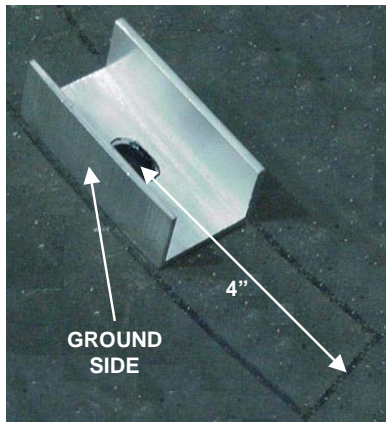


Figure A.3 -Placing the aluminum yoke mounting channels. One yoke mounting channel should be positioned 4" from each half yoke end with the ground, curved side of the channel facing out.

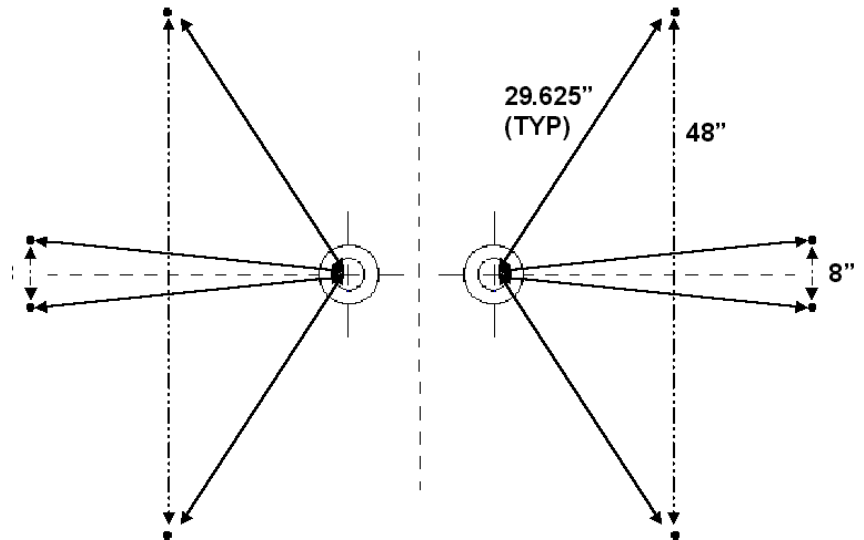


Figure A.4 - Each yoke mounting hole should be located approximately 29.625" from the center of the bottom bearing housing. The two outer yoke mounting holes should be positioned approximately 48" from each other (24" from the turnstile centerline). The two inner yoke mounting holes should be positioned approximately 8" from each other (4" from the turnstile centerline). Pictured to the right.

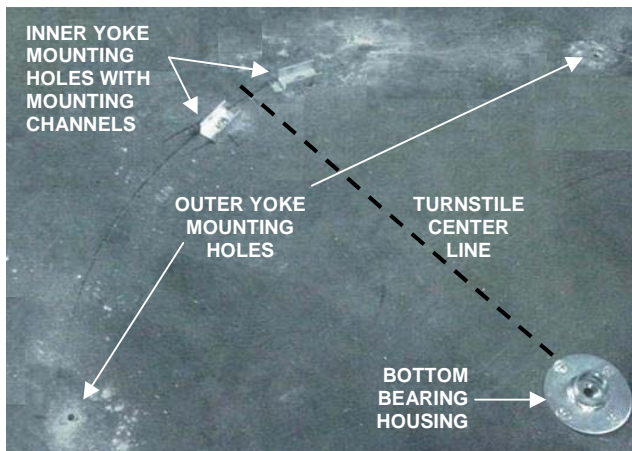


Figure A.5 - Anchoring the yoke mounting channels.

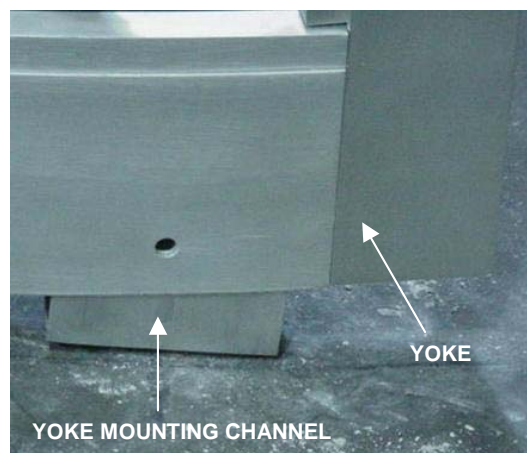


Figure A.6 - Positioning the half yoke sections on the yoke mounting channels.

ALVARADO

20. Position the half yoke sections on the yoke mounting channels (See **Figure A.6**). Verify that the ends of the two half yoke sections are still flush together.
21. Remove the half yoke sections and tighten all eight anchor bolts securely (to approximately 40 ft-lbs.).
22. Reposition the half yoke sections over the yoke mounting channels.



Be sure to orient the half yoke sections such that the threaded aluminum block ends of each half yoke are together along the turnstile centerline. (See Figure A.6).

NOTE

23. Ensure that the edges of each half yoke section are positioned correctly and flush together before proceeding with securing the yoke section assembly.
24. Locate the yoke section mounting holes. The holes are located along the lower, outer edge of the yoke assembly. There are two (2) holes per half yoke section. Each hole is located approximately 4" from each edge of the half yokes (See **Figure 13**). An aluminum yoke mounting channel should be located behind each yoke mounting hole (See **Figure A.7**).
25. Secure the yoke sections to the aluminum yoke mounting channels with a ¼-20 x 1" mounting screw through each yoke mounting hole (See **Figure A.8**).
26. Repeat steps 31 through 34 for the second yoke section.

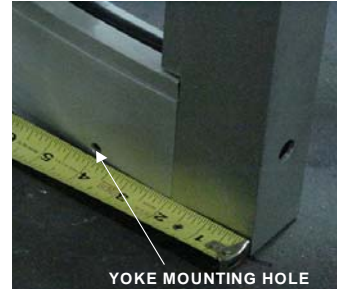


Figure A.7



Figure A.8 - Securing the yoke sections to the aluminum yoke mounting channels.



Continue at "Installation of OV section" on page 13.

NOTE

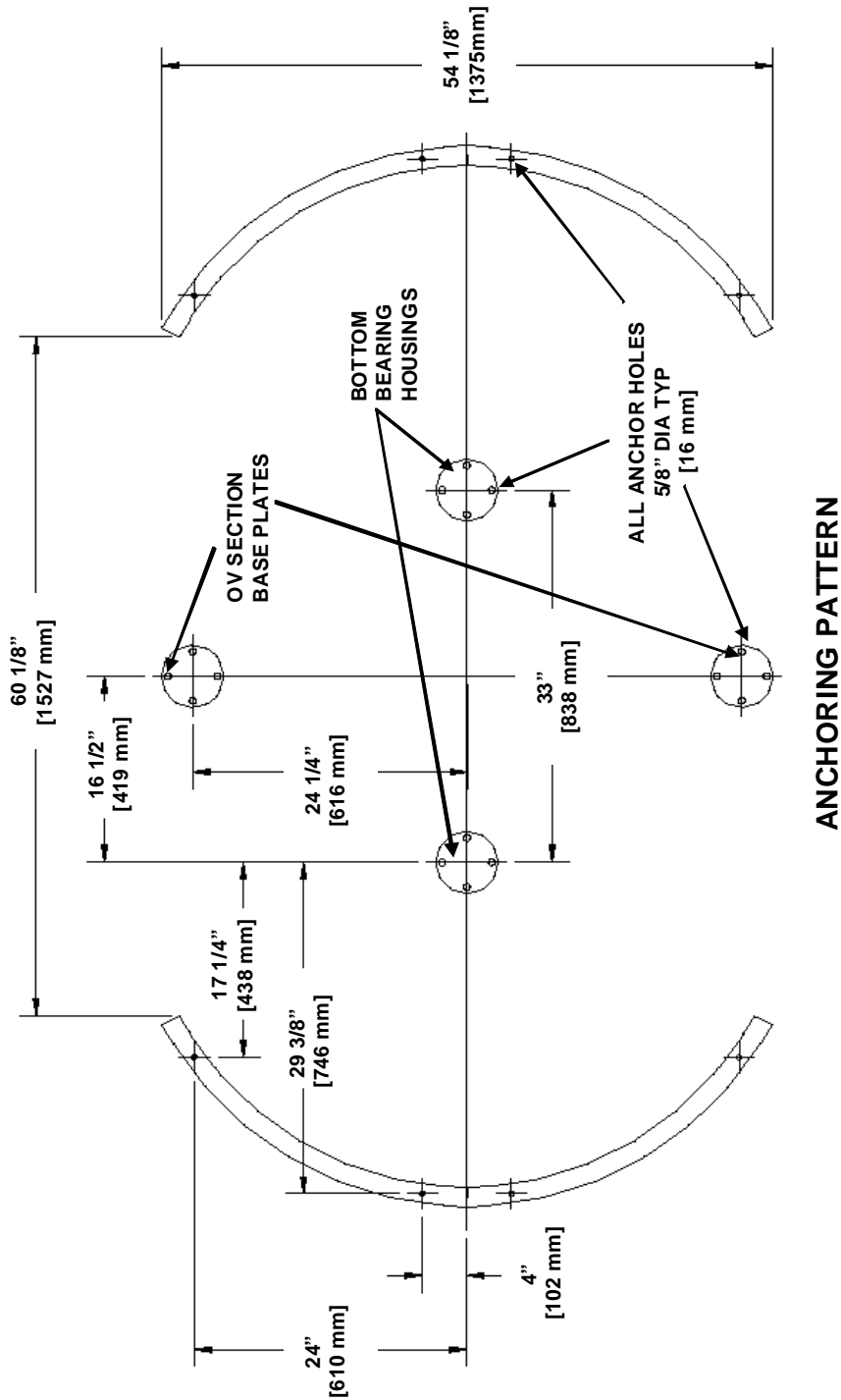
ALVARADO

Turnstile Anchor View
 (For CLSTT & CPSTT Models only)



The minimum installation width required is 102".

NOTE



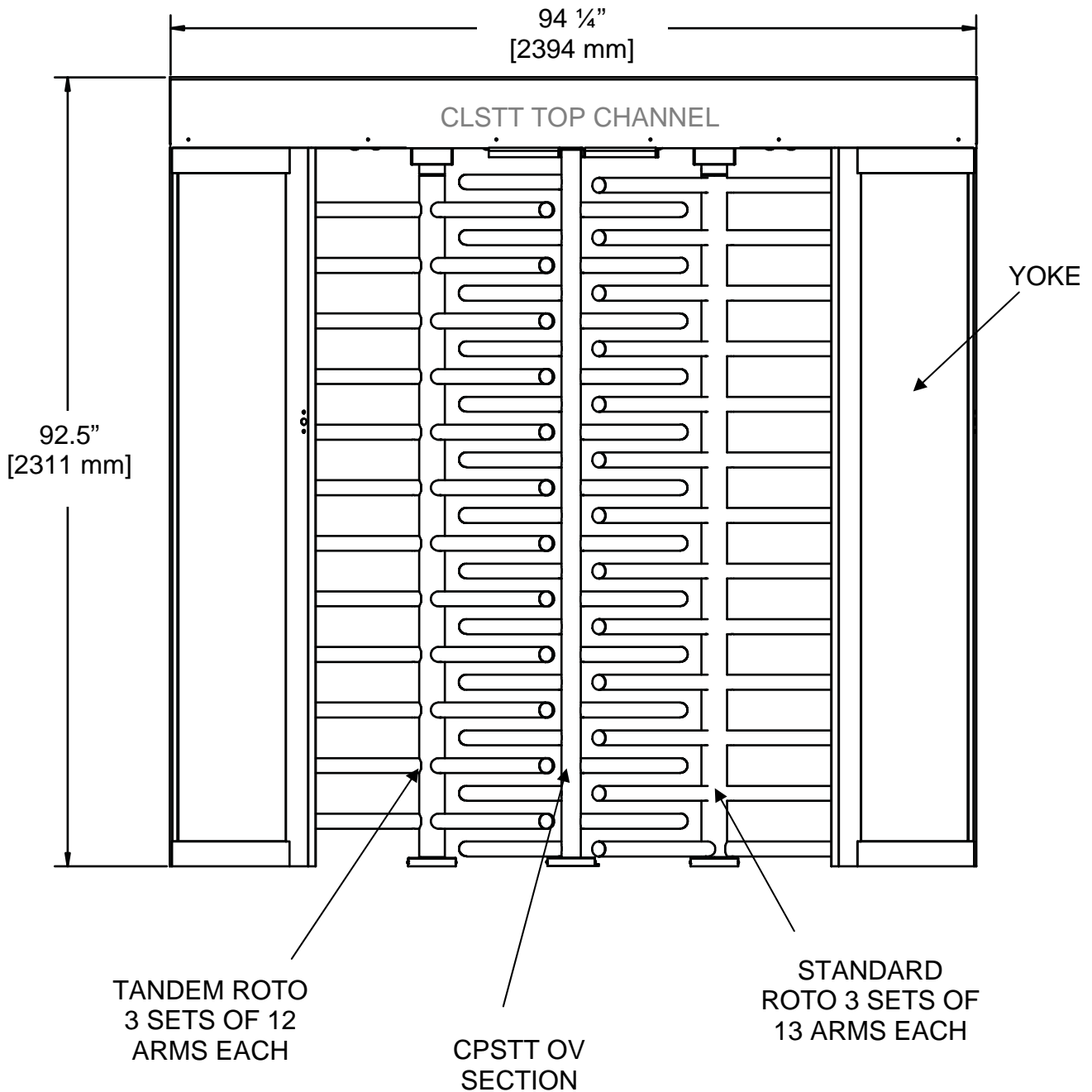
ALVARADO

Turnstile Elevation View
(For CLSTT Models only)



NOTE

The minimum installation height required is 95.5". Viewed from the outside (or unsecure side) of the turnstile.



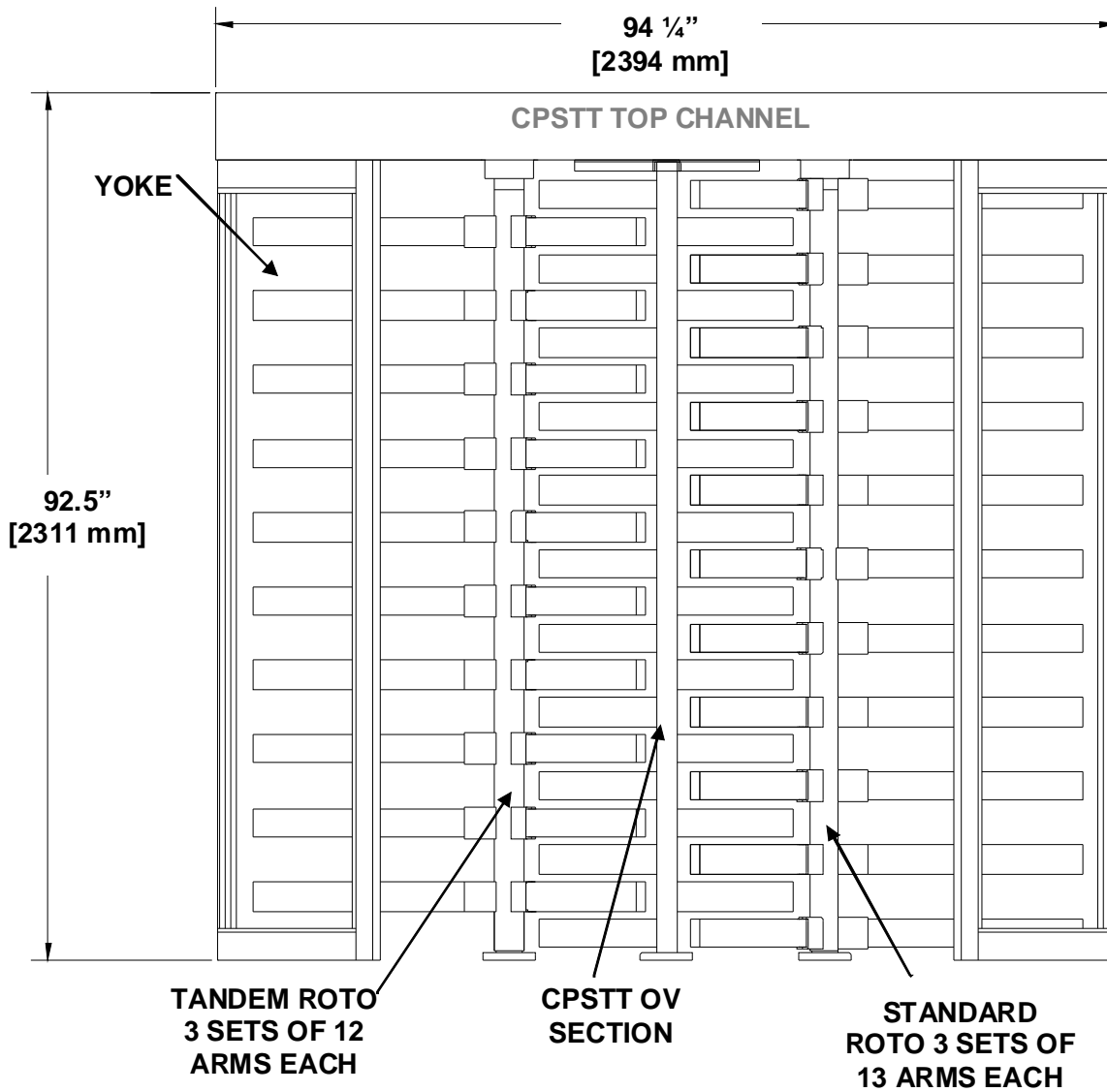
ALVARADO

Turnstile Elevation View
(For CPSTT Models only)



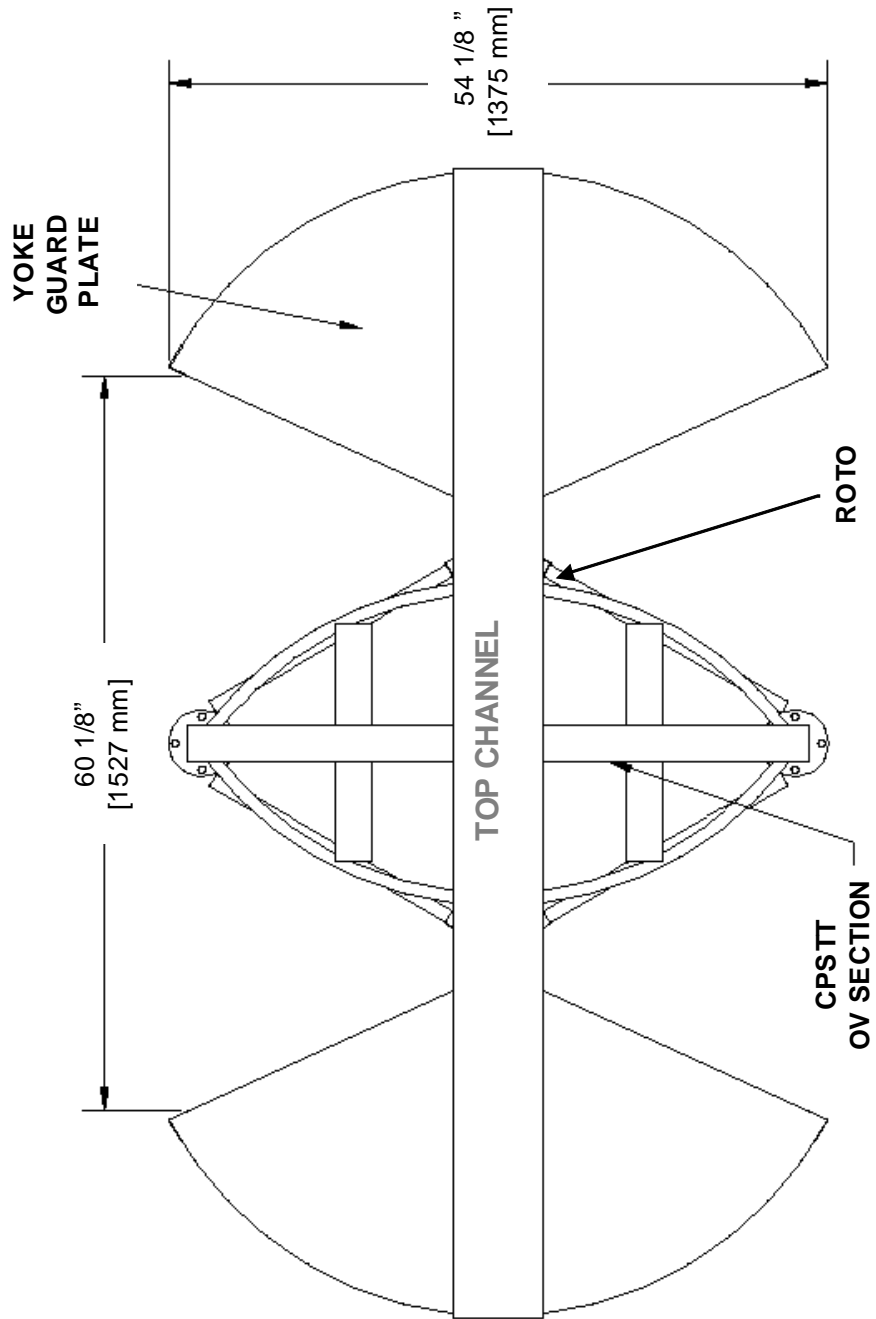
NOTE

The minimum installation height required is 95.5". Viewed from the outside (or unsecure side) of the turnstile.



ALVARADO

Turnstile Top View
(For CSLTT & CPSTT Models only)



ALVARADO

Appendix B: Technical Specifications

Dimensions

MSTT, CLSTT & CPSTT	<u>Unit Height:</u>	92.5" (2350 mm)
	<u>Unit Width:</u>	94.5" (2400mm)
	<u>Unit Depth:</u>	54.125" (1375 mm)

Materials

<u>Yokes</u> (Curved Sections) MSTT	Formed and welded cold rolled steel (or #304 stainless steel). A fully welded, continuous assembly consisting of 10 pieces of vertically aligned 1 3/4" x 16-gauge tubing notched and welded to two curved, horizontal tubes bent to an inside radius of 28 3/4". Two 3/16" x 1" straps are welded to the outside of the ten tubes for additional support. No external fasteners are used in the construction of the yoke. Exterior welds on stainless steel units are ground and polished. There are two yokes for each tandem turnstile.
<u>Yokes</u> (Curved Sections) CPSTT & CLSTT	Two piece assembly consisting of 3/16" thick polycarbonate panel contained within an extruded aluminum frame. Each frame consists of two 1 3/4" wide vertical pieces and two 3 3/8" wide horizontal pieces bent to a centerline radius of 29 3/8". The polycarbonate panel section also has a centerline radius of 29 3/8" and is securely contained within the inside perimeter of the frame. Polished to a #4 satin finish. There are two yokes for each tandem turnstile.
<u>Yoke Guard Plates</u> All models	Cold rolled steel (or #304 stainless steel). 16-gauge sheet bolted to the top of the channel / yoke assemblies. There are two yoke guard plates for each tandem turnstile.
<u>Rotos</u> (Rotating Sections) CPSTT	Formed and welded cold rolled steel (or #304 stainless steel). Comprised of three arm sections positioned 120 degrees apart from one another. There are two Rotos for each tandem turnstile. Each arm section of the "standard" Roto contains 11 arms for a total of 33 arms per Roto. Each arm section of the "tandem" Roto contains 10 arms for a total of 30 arms per Roto. Each arm is constructed from 1" x 3" clear Lexgard®MP 1000 laminate with a Margard® surface, glued and press fit into a steel "boot" which is welded to a vertical 3" OD x 3/16" wall tube. All exterior welds are ground smooth and polished. Rotos are polished to a #4 satin finish. There are two Rotos for each tandem turnstile.
<u>Rotos</u> (Rotating Sections) CLSTT & MSTT	Formed and welded cold rolled steel (or #304 stainless steel). Each arm is constructed from 1-3/4" OD x 14-gauge tubing, notched and welded to a vertical 3" OD x 3/16" wall tube, and capped with a 1-3/4" OD x 10-gauge cap. The "standard" Roto contains 13 arms per section (39 per Roto); the "tandem" Roto contains 12 arms per section (36 per Roto). No external fasteners are used in the construction of the Rotos. All exterior welds are ground smooth and polished. Available in #4 satin or powder coated finish. There are two Rotos for each tandem turnstile.
<u>OV</u> (Barrier Section) All Models	Formed and welded cold rolled steel (or #304 stainless steel). Consists of 25 1-3/4" OD x 16-gauge tubing arms bent to an inside radius of 28-3/4" and 2 2-1/4" OD x 11-gauge vertical tubes. No external fasteners are used in the construction of the OV. All exterior welds are ground smooth and polished. Available in #4 satin or powder coated finish.
<u>Top Channel</u>	Formed and welded 304 stainless steel. The "U" channel is composed of 7" wide 10-gauge steel with a 16-gauge cover. All exterior welds are ground smooth and polished. Top channel is polished to a #4 satin finish.

ALVARADO

All tubing and sheet metal materials meet appropriate ASTM standards.

Function The MSTT, CPSTT, & CPSTT models are an electric lock controlled, full height, tandem turnstile designed to provide controlled access into and out of high security facilities in locations where two turnstiles are required, but space for two separate units is not available.

Available Configurations

The MSTT is designed to interface with virtually any access control system or reader to provide the electric locking control required in controlled access facilities. The following configurations of the MSTT are available:

MSTT-3 Using key lock control, each turnstile can be configured to provide free passage in both directions; free passage in one direction and restricted passage (locked) in the opposite direction; or restricted passage (locked) in both directions.

MSTT-6X Each turnstile has separate electric lock controls in both directions.

The CPSTT-6X is designed to interface with virtually any access control system or reader to provide the electric locking control required in controlled access facilities. The following configurations of the CPSTT-6X are available:

CPSTT-6X Each turnstile has separate electric lock controls in both directions.

The CLSTT-6X is designed to interface with virtually any access control system or reader to provide the electric locking control required in controlled access facilities. The following configurations of the CLSTT-6X are available:

CLSTT-6X Each turnstile has separate electric lock controls in both directions.

Control Mechanism Components	<u>Cam and Shaft Assemblies</u>	The lobed cam is precision investment cast stainless steel welded to a splined shaft. The splined shaft fits into a reciprocal splined coupling in the top of the Roto, creating a solid non-slip connection between the parts. There are two cam and shaft assemblies for each tandem turnstile, one for the "standard" Roto and one for the "tandem" Roto. A "standard" cam and shaft assembly is not interchangeable with a "tandem" cam and shaft assembly.
	<u>Top Bearing Assemblies</u>	Each cam and shaft assembly rotates in a bearing assembly consisting of two fully protected precision bearings.
	<u>Friction Brake Assemblies</u>	The braking mechanism consists of a precision investment cast steel circular disc brake that rotates and maintains contact with two disc brake pads to provide friction braking during the rotation of the turnstile. The friction braking tension is adjustable. There are two friction brake assemblies for each tandem turnstile.
	<u>Mechanical Turnstile Control</u>	The locking and unlocking of the unit is controlled with stainless steel lock arms that are moved into the appropriate locked or unlocked position by continuous duty rated solenoids and spring assemblies. There is one solenoid and spring assembly per lock arm, and one lock arm per direction, allowing for independent control of each rotational direction.
	<u>Opto Interrupter Rotation Wheel Assembly</u>	This assembly consists of two opto interrupters (small, industrial grade, transmit and receive LED's), and a rotation wheel. As the turnstile arm is rotated, the rotation wheel passes between the two opto interrupters, signaling the Alvarado Turnstile Controller (ATC) that a turnstile rotation has occurred. The ATC uses this information to re-lock and provide access control functionality without the need for mechanical microswitches. There are two opto interrupter rotation wheel assemblies and two ATCs for each tandem turnstile.

ALVARADO

Electrical Components and Functionality

The following are the electrical requirements and standard functionality of the MSTT-3, MSTT-6X, CLSTT-6X, CPSTT-6X:

<u>Power Supply</u>	110 VAC, 60 Hz Low voltage primary power of 10 VAC or 13.5 VDC may also be supplied by connecting power directly to each ATC.
<u>Power Rating</u>	Maximum power consumption is 150 W per turnstile.
<u>Operational Voltage</u>	Primary power is stepped down and rectified for low voltage 12 VDC operation.
<u>On/Off Switch</u>	An on/off switch is located on each power junction box inside the MSTT-6X top channel. Two power junction boxes are provided for each electrically controlled turnstile. A visible green LED is illuminated on the ATC when the power is “on”.
<u>Power Receptacles</u>	The power junction box inside the MSTT-6X top channel includes two 110 VAC power receptacles providing a convenient way for installers or technicians to power tools or equipment they may need as they test or maintain the MSTT-6X in the field.
<u>Surge Protection</u>	Each ATC has line to line surge protection for single-phase low voltage AC input to 125 amps. Each ATC also contains a varistor that switches to a high impedance state to protect the circuit in the event of a power surge.
<u>Bi-directional Solenoid Drivers</u>	Each ATC provides one solenoid driver per rotation direction.
<u>Activation</u>	Activation for either direction of operation is achieved by supplying a momentary dry contact of any duration to the ATC. A terminal strip connection is provided on the ATC for this purpose.
<u>Timed Delay Auto Re-Lock</u>	An activation signal unlocks the turnstile for one entry. Once the turnstile is unlocked, the user is allowed a maximum of 20 seconds to pass through the turnstile. If the turnstile arms are not rotated within the 20-second time frame allowed, the turnstile automatically relocks.
<u>Field Activation Testing</u>	Each ATC provides a field activation testing button, for each electrically controlled direction. This feature provides a simple way for installers to test the functionality of the MSTT-6X and isolate problems in the field.
<u>Remote Unlocking</u>	Each ATC accepts inputs from a continuous dry contact emitting device to bypass the access control system and allow the MSTT-6X to be remotely unlocked or “opened” in the electrically controlled direction(s). A terminal strip connection is provided on the ATC for this purpose.

Outputs

Terminal strip connections are provided for the following output signals:

<u>Feedback / Turnstile Rotation Count</u>	The ATC provides a double pole, single throw, relay in each direction of operation. This allows the ATC to provide a “feedback” signal in the form of a relay output to the access control provider or an external counting system. A terminal strip connection is provided on the ATC for this purpose.
--	--

Available Finishes

<u>Galvanized (MSTT)</u>	All exterior tubing and sheet metal surfaces receive a coating of hot molten zinc meeting ASTM Standards A123 through A153.
<u>Powder Coated (MSTT, CLSTT)</u>	Available in a wide variety of colors. Sub-assemblies are sand blasted to prepare for the powder coating finish. The powder is

ALVARADO

electro statically applied, then baked to assure proper curing and adhesion.

Stainless Steel
(MSTT, CLSTT, CPSTT)

All external fabricated materials are composed of #304 stainless steel (noted in the descriptions above as #304 SS) and polished to a #4 satin finish.

Shipping Details

MSTT turnstiles are shipped in eight main sections: the Top Channel, the Yoke sections (2), the Rotos (2), the OV, and the Yoke Guard Plates (2). Each section is fully fabricated as a sub-assembly for easy installation. Each MSTT-6X unit includes mounting hardware (anchors, bolts, washers, etc.) to mount the unit to a standard concrete pad. Alvarado ships products throughout the world.

CLSTT and CPSTT turnstiles are shipped in ten main sections: the Top Channel, the Yoke sections (shipped as 4 half yokes), the Rotos (2), the OV, and the Yoke Guard Plates (2). Each section is fully fabricated as a sub-assembly for easy installation. Each CLSTT-6X unit includes mounting hardware (anchors, bolts, washers, etc.) to mount the unit to a standard concrete pad. Alvarado ships products throughout the world.

Installation Details

All Tandem units must be installed on a firm foundation in a manner that allows the required power and activation signal cabling to be pulled into the top channel. The recommended platform is 102" by 72" by 4" deep, level concrete. No embedded fasteners are needed for installation. Installation should be performed by a skilled installer following the manufacturer's directions and instructions (supplied with the turnstile).

Approximate Weight

MSTT	Approximately 1,100 lb. (499 Kg) per turnstile.
CLSTT	Approximately 1,300 lb. (590 Kg) per turnstile.
CPSTT	Approximately 1,600 lb. (726 Kg) per turnstile.

ALVARADO

USER MANUAL STATEMENTS

Česky Czech	Alvarado Manufacturing Company na tímto prohlašuje, že tento Model MST je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 2004/108/EC - 2006/95/EC.
Dansk Danish	Undertegnede Alvarado Manufacturing Company erklærer herved, at følgende udstyr Model MST overholder de væsentlige krav og øvrige relevante krav i direktiv 2004/108/EF – 2006/95/EF
Deutsch German	Hiermit erklärt Alvarado Manufacturing Company, dass sich das Gerät Formen MST in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 2004/108/EG – 2006/95/EG befindet.
Eesti Estonian	Käesolevaga kinnitab Alvarado Manufacturing Company seadme Model MST vastavust direktiivi 2004/108/EU – 2006/95/EU põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
English	Hereby, Alvarado Manufacturing Company, declares that this Model MST is in compliance with the essential requirements and other relevant provisions of Directive 2004/108/EC – 2006/95/EC.
Español Spanish	Por medio de la presente Alvarado Manufacturing Company declara que el Modelo MST cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 2004/108/CE – 2006/95/CE.
Ελληνική Greek	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Alvarado Manufacturing Company ΔΗΛΩΝΕΙ ΟΤΙ ΜΟΝΤΕΛΟ MST ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 2004/108/ΕΚ – 2006/95/ΕΚ.
Français French	Par la présente contrat Alvarado Manufacturing Company déclare que, Modelo MST est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 2004/108/CE – 2006/95/CE.
Italiano Italian	Con la presente Alvarado Manufacturing Company dichiara che questo Modello MST è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2004/108/CE – 2006/95/CE.
Latviski Latvian	Ar šo Alvarado Manufacturing Company deklarē, ka model MST atbilst Direktīvas 2004/108/EK – 2006/95/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių Lithuanian	Šiuo Alvarado Manufacturing Company deklaruoja, kad šis model MST atitinka esminius reikalavimus ir kitas 2004/108/EB – 2006/95/EB Direktyvos nuostatas.
Nederlands [Dutch]	Hierbij verklaart Alvarado Manufacturing Company dat het toestel Voorbeeld MST in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 2004/108/EG – 2006/95/EG.
Malti [Maltese]	Hawnhekk, Alvarado Manufacturing Company, jiddikjara li dan model MST jikkonforma mal-htigijiet essenzjali u ma provvedimenti oħrajn rilevanti li hemm fid-Dirrettiva 2004/108/EC – 2006/95/EC.
Magyar Hungarian	Alulírott, Alvarado Manufacturing Company nyilatkozom, hogy a Minta MST megfelel a vonatkozó alapvető követelményeknek és az 2004/108/EC – 2006/95/EC irányelv egyéb előírásainak.
Polski Polish	Niniejszym Alvarado Manufacturing Company, że, Model MST jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 2004/108/EC – 2006/95/EC.
Português Portuguese	Alvarado Manufacturing Company declara que este Modelo MST está conforme com os requisitos essenciais e outras disposições da Directiva 2004/108/CE – 2006/95/CE..
Slovensko Slovenian	poučen Alvarado Manufacturing Company, da je ta Modelo MST v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 2004/108/ES – 2006/95/ES.
Slovensky Slovak	Alvarado Manufacturing Company týmto vyhlasuje, že model MST spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 2004/108/ES – 2006/95/ES.
Suomi Finnish	Alvarado Manufacturing company vakuuttaa täten että, Esikuvallinen MST tyyppinen laite on direktiivin 2004/108/EY – 2006/95/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Svenska Swedish	Härmed intygar Alvarado Manufacturing Company att denna Modell MST står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 2004/108/EC – 2006/95/EG.
Íslenska Icelandic	Hér með lýsir Alvarado Manufacturing Company yfir því að model MST er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 2004/108/CE – 2006/95/CE.
Norsk Norwegian	Alvarado Manufacturing Company erklærer herved at utstyret Modell MST er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 2004/108/EF – 2006/95/EF.

ALVARADO