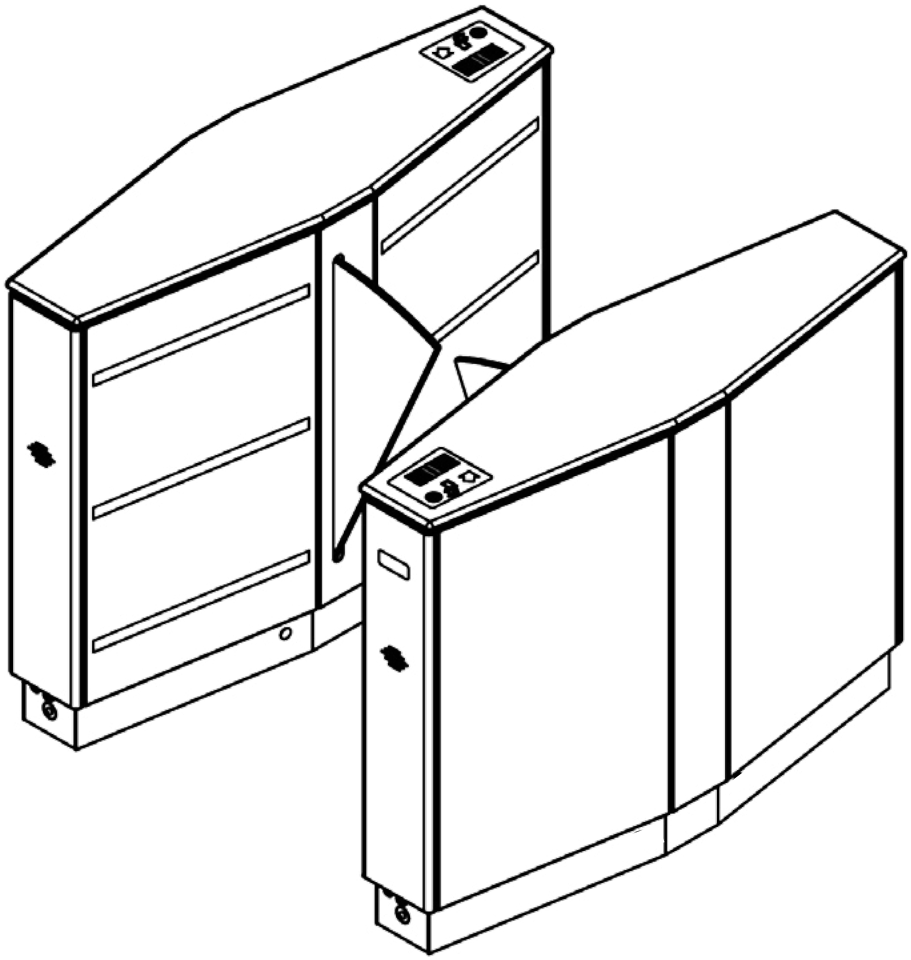
ALVARADO

protecting assets and controlling the flow of people

Supervisor 3500
(SU3500)

Optical Turnstile with Motorized Barrier Wings



Installation Instructions

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PUD3673R1-1

Contents

Contents. 2
Safety Precautions. 3
Safety Icons. 3
Installation Tools. 4
Uncrating. 4
Parts List. 4
Introduction. 5
Pre-Installation Requirements. 6
- Slab Requirements. 6
- Space Requirements (22" Lane). 7
- Space Requirements (36" Lane). 8
- Conduit Requirements. 9
- Electrical Requirements. 9
- Environmental Requirements. 10
- Communication Requirements. 10
- Internal Card Reader Installation Requirements (Optional). 10
- User Training. 10
- Pre-Installation Checklist. 10

Pre-Installation Instructions. 11
- End Panel Removal. 11
- Side Panel Removal. 12
- Lid Removal. 13
- QA Checkpoint Shim Removal. 13
- Turnstile Layout. 14
- Baseplate Assembly (Optional). 15

Installation Instructions. 16
- Anchoring the Turnstile. 16
- Internal Card Reader Installation. 18

Wiring Instructions. 19
- Primary Power. 19
- Crossover Cable. 19
- I/O Control Board (13-0328 Rev. F). 20
- I/O Control Board (13-0328 Rev. F) Terminal Descriptions. 21

Configuring Passage Modes. 22
- Ethernet Communication (Optional). 24

Post-Installation Functions Check. 24
- Passage Modes. 24
- Operating Modes. 25
- Powering On. 25
- Testing Lane Functionality. 26
- Testing Lane Key Control (Optional). 28
- Testing Ethernet Communication (Optional). 29

Finish the Installation. 30
Post-Installation Checklist. 30
Troubleshooting. 31
Appendix A - Setting the Home Position. 32
Appendix B - Multi-Lane Conduit Requirements. 33
Appendix C - External DC Power Supply Enclosure Installation (Optional). 34
Appendix D - Crossover Cable Connection Diagrams. 39
Revision History. 40

Safety Precautions

⚠ WARNING The Supervisor 3500 may present a risk to persons and property if it is not installed and/or operated correctly. Therefore, this manual must be read in its entirety and all safety and operations information must be adhered to. Note the following precautions:

- For indoor use only.
- Use only skilled individuals to install and service the turnstile.
- DO NOT operate the turnstile if it has been damaged in any manner. If damaged, have the unit repaired or adjusted by a skilled service person before use.
- DO NOT modify or alter the turnstile.
- Have skilled individuals maintain the turnstile according to a proper maintenance schedule.
- In access control applications, train all personnel that will be using the turnstile in the proper method of operation. In addition, properly train new users as they are added to the system.
- DO NOT use non-Alvarado parts to repair a damaged turnstile.
- Closely follow the handling instructions for moving or lifting the turnstile during installation.
- Power off the turnstile before connecting or disconnecting any communication or power wiring to the turnstile.

- Pour utilisation à l'intérieur seulement.
- Utilisez uniquement des personnes qualifiées pour installer et entretenir le tourniquet.
- NE PAS faire fonctionner le tourniquet s'il a été endommagé de quelque façon. S'il est endommagé, faire réparer ou ajuster l'unité avant l'utilisation par un(e) préposé(e) à l'entretien qualifié(e).
- NE PAS modifier ou altérer le tourniquet.
- Le tourniquet doit être maintenu selon un calendrier d'entretien adéquat par des personnes qualifiées.
- Dans les applications de contrôle d'accès, former tout le personnel qui utilisera le tourniquet selon la bonne méthode de fonctionnement. De plus, bien former les nouveaux utilisateurs à leur intégration au système.
- NE PAS utiliser des pièces ne provenant pas du Alvarado pour réparer un tourniquet endommagé.
- Suivez strictement les instructions de manutention pour déplacer ou soulever le tourniquet lors de l'installation
- Éteignez le tourniquet avant de brancher ou de débrancher le câblage de communication ou le câblage d'electricité.

- This turnstile can be used by children aged 12 and above, inexperienced persons, or persons with reduced physical, sensory, or mental conditions, if such children or persons are supervised, or have been provided instruction regarding the safe and proper usage. Children shall not play with or around the turnstile.
- The turnstile shall be disconnected from its power source during service and when replacing parts. The turnstile shall be disconnected from its power source before connecting or disconnecting any communication or other activation/feedback control wires. If it is not possible that the technician can check from any point to which he has access that the main power is removed, a disconnection with a locking system in the isolated position shall be provided.

Safety Icons

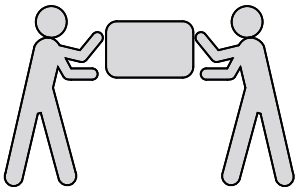
The following symbols are used throughout the manual to highlight important information and potential risks when installing, servicing or using the turnstiles covered in this manual.

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

⚠ CAUTION 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.

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

☎ For questions, please contact Alvarado at (909) 591-8431, Monday – Friday 7:00am to 4:30pm PST. Please read this manual completely before installing or operating the purchased product.



A minimum of two people is required to complete the installation of this product.

Installation Tools

- Tape Measure
- Chalk Line
- Pencil
- Hammer Drill
- 5/8" Concrete Drill Bit
- Shop Vac
- Hammer
- 9/16" Wrench
- Torque Wrench (ft-lbs.)
- Open Wrench
- 9/16" Socket
- Level
- #2 Phillips Head Screwdriver
- Precision Flat Head Screwdriver
- Clear RTV Silicone

Uncrating

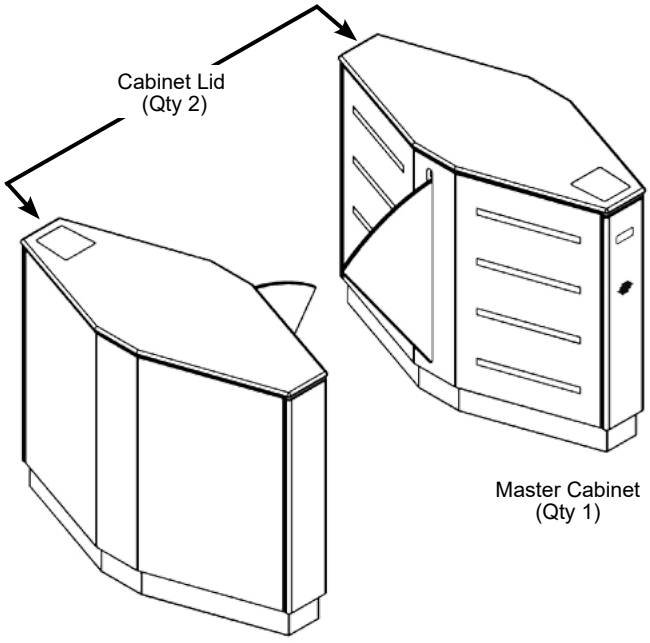


The SU3500 has been packed for shipping to prevent damage to the unit. Two or more installers are required to unload the SU3500 at the installation site. Once the turnstile cabinets have been placed in the installation location, carefully remove the protective packing material from the sides of the cabinets.

Parts List

This product is shipped with all installation hardware and components. If installing a single lane, refer to the Single Lane Parts List below. For additional lanes, refer to the Center Cabinet Parts List. Make sure that none of these parts are missing and/or damaged before beginning installation. If parts are missing and/or damaged, please contact Alvarado.

Single Lane Parts List



Concrete Anchor Package:

- ⅜" x 2" Concrete Anchors (Qty 8)
- ⅜" x 2½" Hex Head Cap Screws (Qty 8)
- ⅜" Flat Washers (Qty 8)

Cabling:

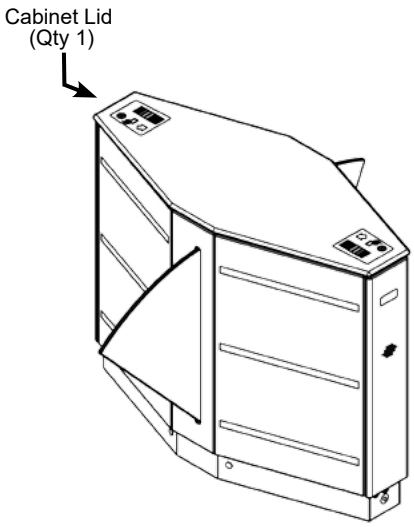
- 8' Crossover Cable (Qty 1)

Software:

- File Management CD (Qty 1)

Center Cabinet Parts List (Per Center Cabinet)

Center Cabinets are used to create additional lanes for multi-lane configurations. Each additional lane includes the parts below.



Concrete Anchor Package:

- ⅜" x 2" Concrete Anchors (Qty 4)
- ⅜" x 2½" Hex Head Cap Screws (Qty 4)
- ⅜" Flat Washers (Qty 4)

Cabling:

- 8' Crossover Cable (Qty 1)

Introduction

This manual covers the physical installation process for SU3500 Optical Turnstiles. A separate *SU3500 User Guide* provides operating instructions and additional information such as configuring turnstiles for bi-directional passage applications and monitoring outputs. It is highly recommended that both this manual and the *SU3500 User Guide* be read in their entirety prior to beginning installation.

SU3500 Cabinets

There are three types of SU3500 cabinets used to create passage lanes: a master cabinet, a slave cabinet, and a center (expansion) cabinet. A single passage lane consists of a master cabinet and a slave cabinet [Figure 1]. The center cabinet is used to create additional passage lanes with the addition of a single cabinet [Figure 2].

Each cabinet has an unsecured and secured side. Alvarado follows what we call the “right-hand rule." User status displays and card readers are always installed on the right-hand side as you enter the turnstile.

Master Cabinet

The center portion of the master cabinet contains the main turnstile controller, I/O control board, motor and motor control board, power supply, sensor receivers, one moving barrier wing, and a power switch located at the base on the secured side.

The reveal of the master cabinet contains a user status display that communicates lane status to the user. A card reader is normally installed during installation underneath the lid below the user status display.

Slave Cabinet

The center portion of the slave cabinet contains a motor and motor control board, sensor transmitters, and one moving barrier wing.

The reveal of the slave cabinet contains a user status display that communicates lane status to the user. A card reader is normally installed during installation underneath the lid below the user status display.

Center Cabinet (Multi-Lane Configuration)

Center cabinets contain both master and slave components. Center cabinets are extension cabinets used in multi-lane applications.

The center portion of the center cabinet contains the main turnstile controller, I/O control board, two motors and two motor control boards, power supply, sensors for both the master and slave side of the center cabinet, two moving barrier wings and a power switch located at the base on the secured side.

The reveal of the center cabinet contains two user status displays that communicate lane status to the user. Two card readers are normally installed during installation underneath the lid below the user status display on both sides of the center cabinet reveal.

Fig. 1 **Single Lane Configuration**

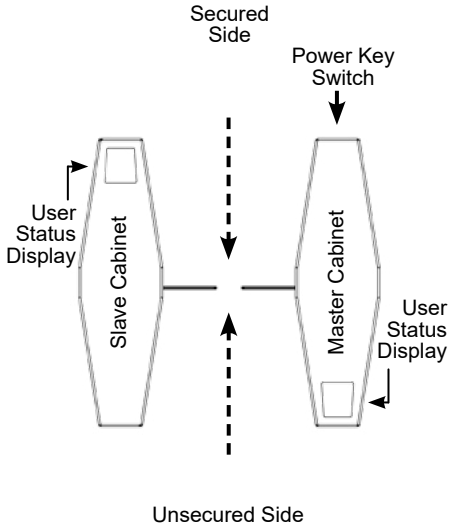
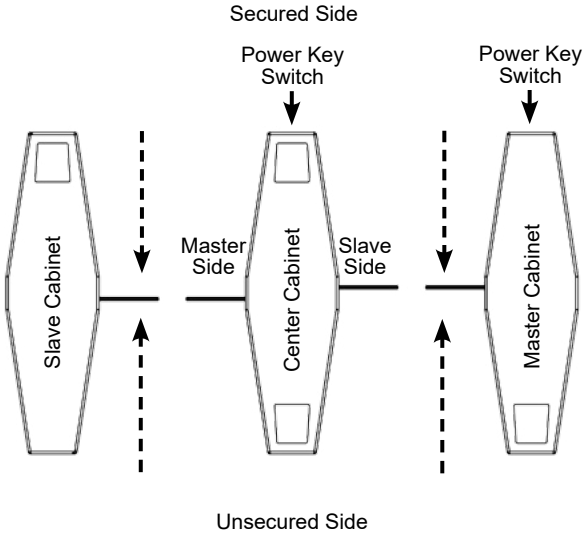


Fig. 2 **Multi-Lane Configuration**



Access Control Integration

There are two types of interfaces to allow an access control system to operate with the SU3500:

Dry Contact

Single passage activation and the various other inputs and outputs available to / from the SU3500 are accessed through the I/O control board located in the master cabinet. The required system input is a voltage-free, momentary dry contact. Outputs are also provided in this form. In rare cases, depending on the access control system, it may be desirable to utilize isolation relays to ensure proper system signaling. Additional information on I/O interfacing is provided later in this manual.

TCP/IP

For select projects, a TCP/IP interface is available. This interface allows a third party access system to communicate to / from the SU3500 using a defined TCP/IP command structure. There is an additional charge for use of the TCP/IP interface and implementation requires programming efforts on the part of the access system provider. Instructions pertaining to the TCP/IP interface is outside the scope of this manual.

Network Communication

SU3500 turnstiles are TCP/IP enabled. Running Ethernet cabling to the SU3500 provides a number of benefits. (1) It allows implementation of Alvarado's TCP/IP control and monitoring software. (2) It allows easy implementation of SU3500 application software updates and enhancements. If SU3500's are networked, updates can be installed over the network. (3) Alvarado has future plans to further develop the TCP/IP capabilities of the SU3500. The benefits of this future development can only be realized if turnstiles are networked.

Pre-Installation Requirements

The pre-installation requirements listed below must be reviewed before installing the turnstile. These notes also serve as a checklist that must be complied with after installation. The installation site should also be evaluated before actual installation of the turnstile to ensure that future turnstile placement is possible and installed as desired. This evaluation includes proper spacing, a firm foundation, and separate conduit runs for power and data lines.

Slab Requirements

The following slab requirements must be taken into consideration when selecting the installation location:

- A level solid concrete pad with a minimum thickness of 4" (102mm).
- Use full sweep electrical conduit underneath the floor.
- Three separate conduits for primary source power, external data, and the crossover cable must be used.
- Cabinets must be installed plumb with the floor while level and square to each other.

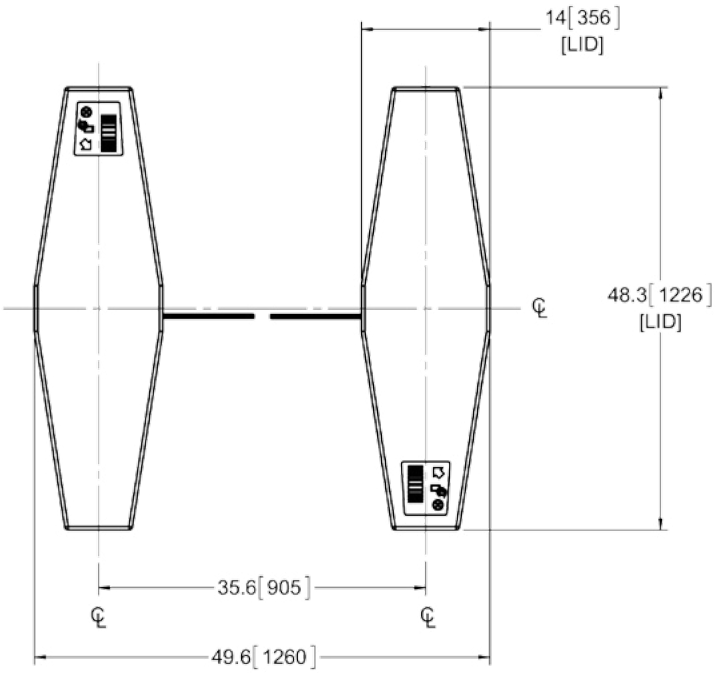
Space Requirements (22" Lane)

NOTE

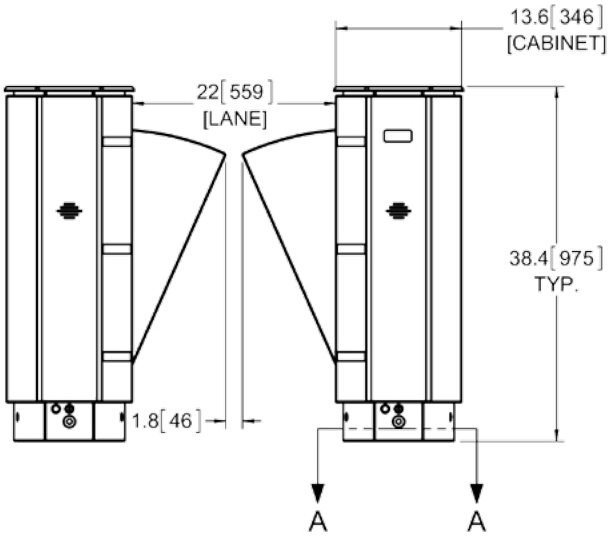
For ease of installation and service, allow 6" of space between cabinets and walls or other surfaces.

Fig. 3 **22" Single Lane - Plan, Elevation & Footprint Drawing**

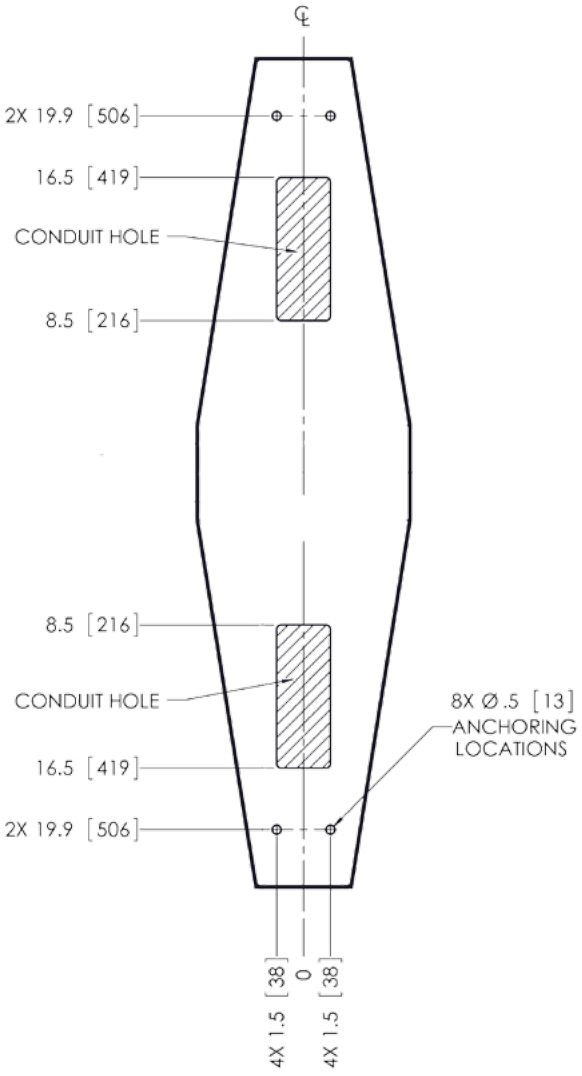
Plan View



Elevation View



Footprint Drawing



All dimensions are approximate.

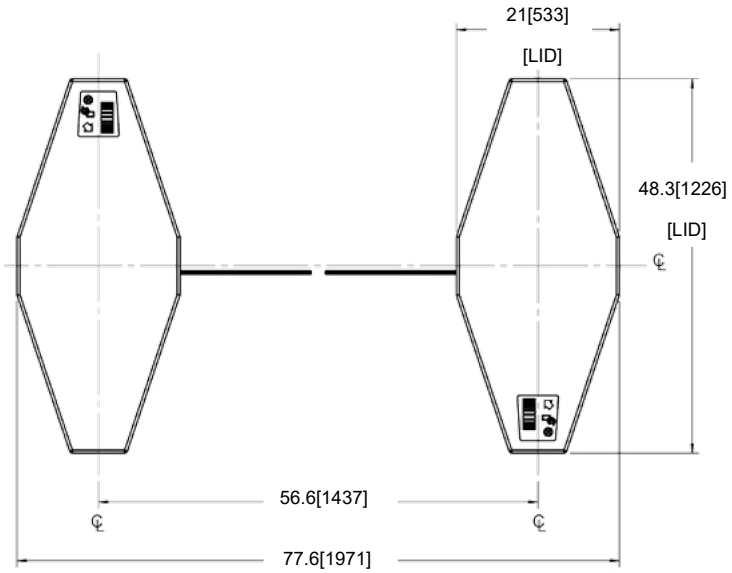
Space Requirements (36" Lane)

NOTE

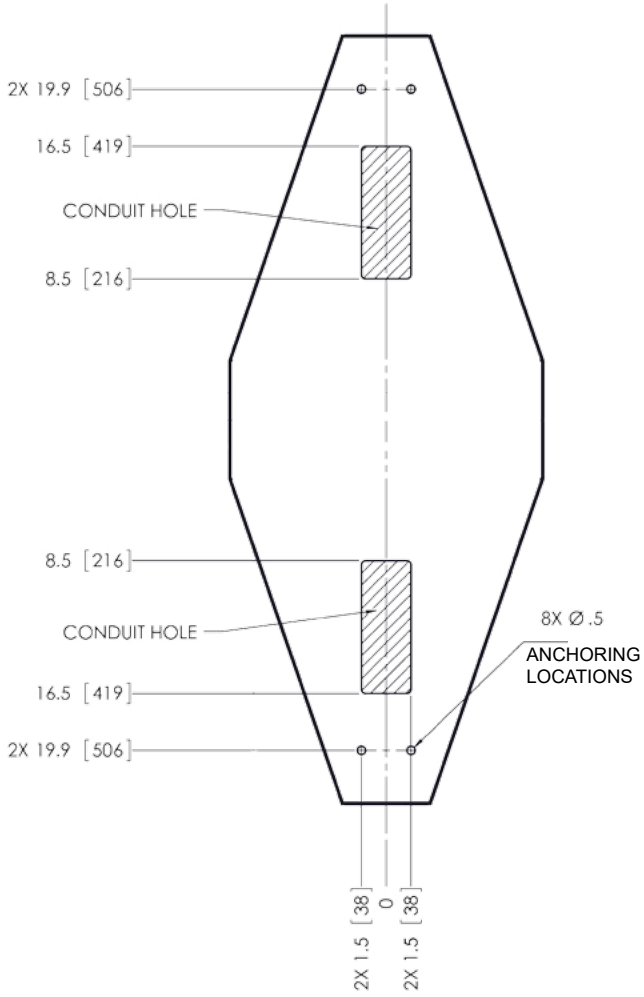
For ease of installation and service, allow 6" of space between cabinets and walls or other surfaces.

Fig. 4 **36" Single Lane - Plan, Elevation & Footprint Drawing**

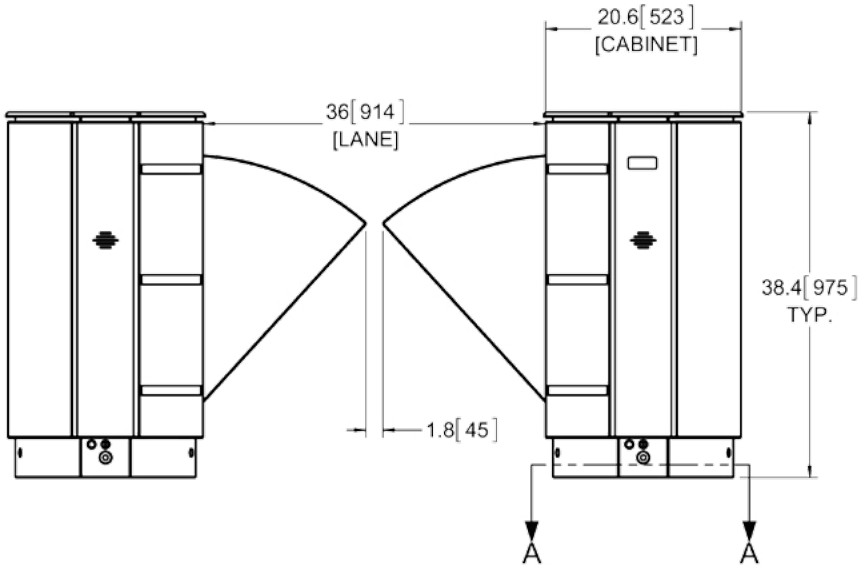
Plan View



Footprint Drawing



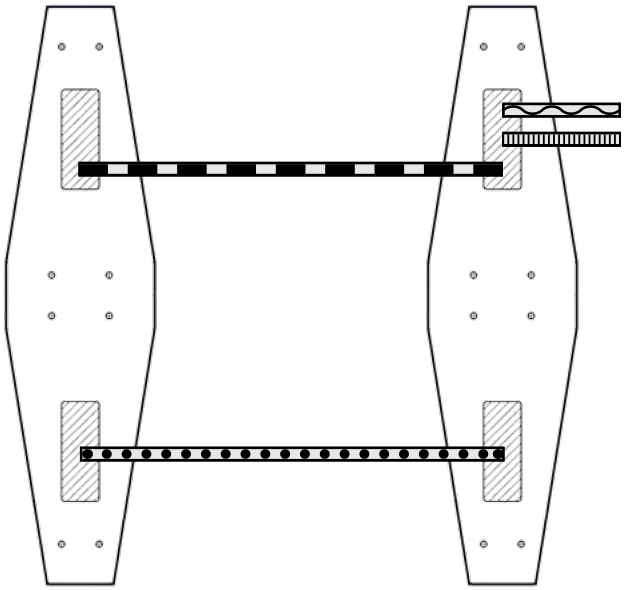
Elevation View



All dimensions are approximate.

Conduit Requirements

Fig. 5 **SU3500 Conduit Lines**



NOTE

The two conduit openings at the ends of each cabinet are 9" x 2.80” (229mm x 71mm). Install the three required conduits in these areas [Figure 5].

Symbology	Description	Conduit Size
	Primary Power**	3/4”
	Access Control / Ethernet	3/4”
	Access Control	3/4”
	Crossover Cable	1.5”

****If the External DC Power Supply option was ordered, use this conduit to route 24VDC.**

NOTE

For multi-lane conduit requirements, refer to Appendix B on Page 33.

NOTE

Seal the floor area around the conduits running up and into the cabinets. This will prevent condensation and debris build-up coming from whatever may be below the floor.

Electrical Requirements

Power Supply	110-120 VAC, 60 Hz or 220/240 VAC, 50 Hz
Power Requirements	Peak power consumption is 300W per lane with all options installed
Operational Voltage	Primary power is stepped down and rectified for low-voltage 24 VDC, 12 VDC, and 5 VDC operation
Fuse	2.5A (slo-blo) located in the master cabinet
Drive Motor	24 VDC (brushless)
Surge Protection	Alvarado suggests the use of surge protection on the high-voltage power line to further protect electronics

Environmental Requirements

- **DO NOT** install the product outdoors. This product is intended for indoor use only.
- **DO NOT** install the SU3500 where infrared lighting (strobe lights, flash photography, etc.) is in the direct path of the optical sensors. Interference may affect the performance of the turnstile.

The following are suggested operating temperature and humidity ranges for the SU3500:

	Operation	Non-Operation/Storage
Temperature Range	10° - 32°C / 50° - 90°F	0° - 40°C / 32° - 104°F
Humidity Range (Non-Condensing)	15% - 85% RH	--

⚠ CAUTION Operating the SU3500 outside the suggested temperature and humidity ranges may negatively affect turnstile performance and could potentially cause damage to turnstile components.

Communication Requirements

Signal Inputs and Outputs To / From Access Control System

Inputs - Signal inputs from outside systems are wired into the SU3500's I/O control board. There are two types of input signals, momentary dry contacts (MDC) and sustained dry contacts (SDC). All input signals must be normally open, voltage-free, dry contacts, with the exception of the fire alarm input, which can be configured (via jumper on the I/O control board) to accept either a normally open or normally closed sustained contact. MDC's must be at least 100ms in duration to register. While the SU3500 can accept signals up to 2 seconds in duration, the suggested MDC input duration is 1 second or less to support rapid throughput in high volume applications.

Outputs – Signal outputs are available from the SU3500's I/O control board. Outputs are normally open, voltage-free, momentary dry contacts. The output signal length is 300ms in duration.

Inability to Provide Specified Inputs - If the access control system does not have dry contact outputs, isolation relays should be used. NEVER connect signal lines containing voltage directly to the I/O control board.

Network Communication

A networked PC with Alvarado's TCP/IP control and monitoring software is required. Adhere to IEEE standards for network cabling requirements.

Internal Card Reader Installation Requirements (Optional)

Card readers or other physical access devices may be installed in the reveal, under the lid on either or both right-hand sides of the lane. Card readers / physical access devices are not supplied by Alvarado. Generally, mullion sized card readers are installed inside the cabinet. For larger-sized card readers, contact Alvarado to verify compatibility prior to installation.

The physical dimensions of the card reader cannot exceed: 1.00" H x 2.75" W x 6.25" D (25mm x 70mm x 159mm).

User Training

All personnel that will be involved with operating the SU3500 should be trained in the proper method of operation. Detailed operation instructions are outside the scope of this manual, but can be found in the *SU3500 User Guide* (also included with the product). If further training is desired, contact Alvarado for information regarding on-site training services.

Pre-Installation Checklist

It is the installer's responsibility to ensure the following steps are completed before beginning the installation.

1. All components and hardware to be installed have been unpacked, correctly identified, and moved to the installation location.
2. The turnstile configuration and layout has been confirmed with the site manager.
3. All applicable requirements in the Pre-Installation Requirements section have been met.

Pre-Installation Instructions

NOTE

It is assumed that the Pre-Installation Checklist steps are complete.

End Panel Removal

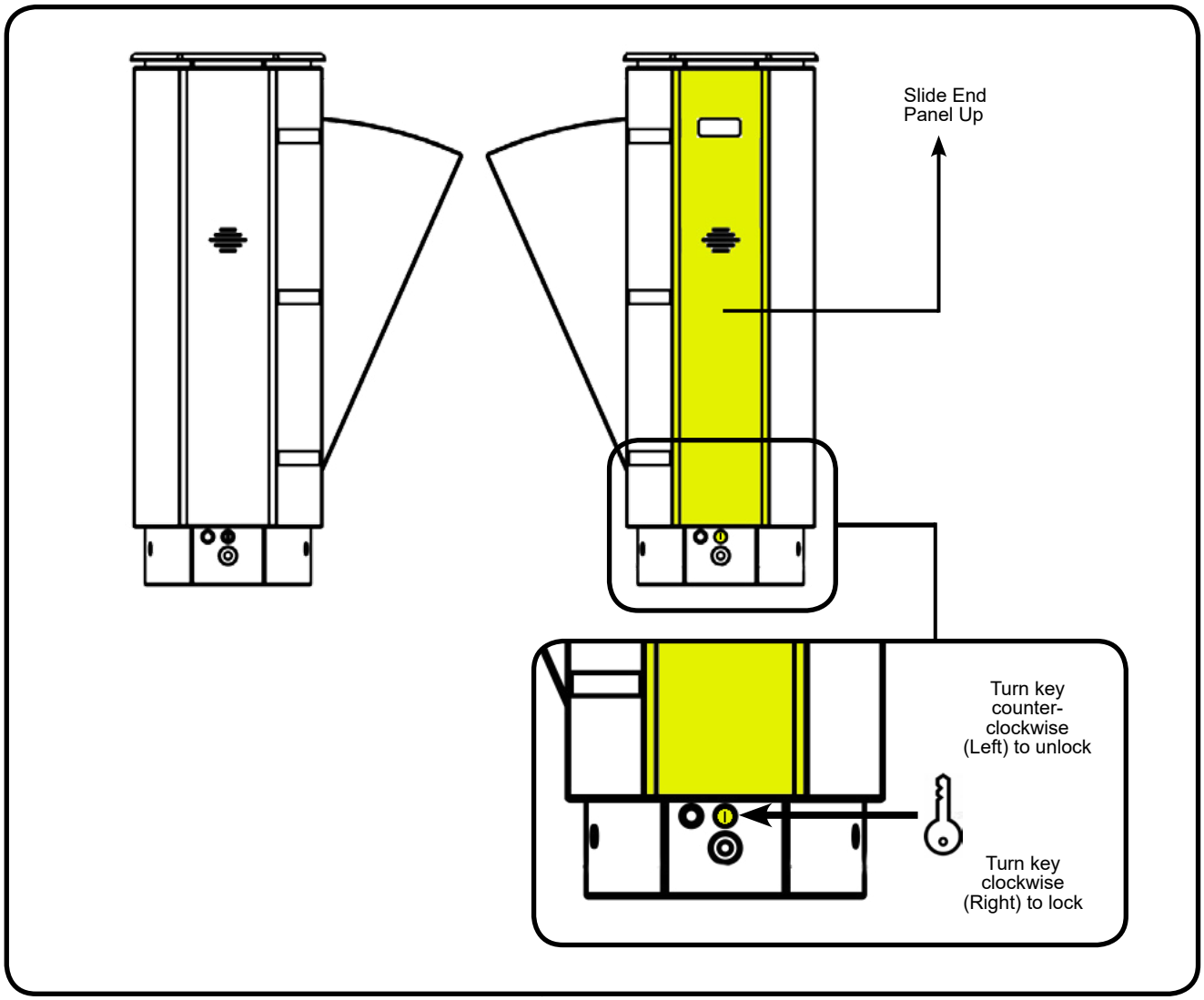
1. Layout the SU3500 cabinets in the location they will be installed.

NOTE

When moving cabinets into place DO NOT attempt to lift the cabinets by the lid as this will damage the lid.

2. Unlock each end panel with the key provided. To remove, slide each unlocked end panel up slightly and then pull it away from the cabinet. See [Figure 6] for more details.

Fig. 6 **Removing End Panels**



Side Panel Removal

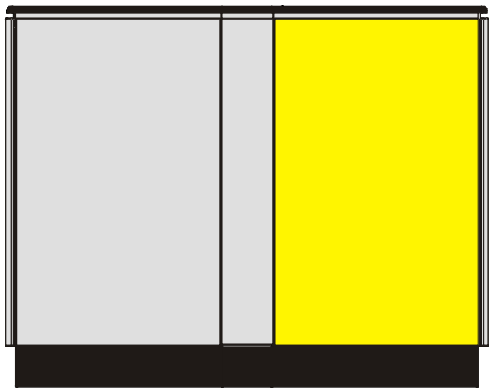
1. After removing the (2) end panels from a cabinet, remove the (4) side panels. A single side panel is attached using pins and a Velcro strip. To remove the side panels, carefully pull the bottom-end of the panel towards you to disengage the Velcro and slide each side panel toward the end of the cabinet until it stops and then pull it up and away from the cabinet. Set the side panels carefully away from the unit. Be sure to note the where the side panel was removed in order to install it back correctly. See [Figure 7] for more details.

NOTE

Do not force open the side panels. Use a screwdriver to carefully loosen any tight fitting side panels. Take care when doing this to prevent damage to the unit. Note the location of the side panel after removing in order to correctly secure it.

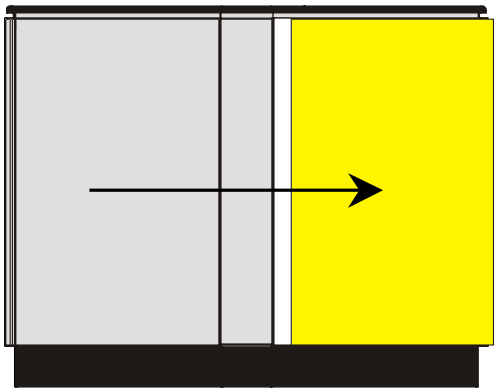
Fig. 7 Removing Side Panels

7A Removing a side panel

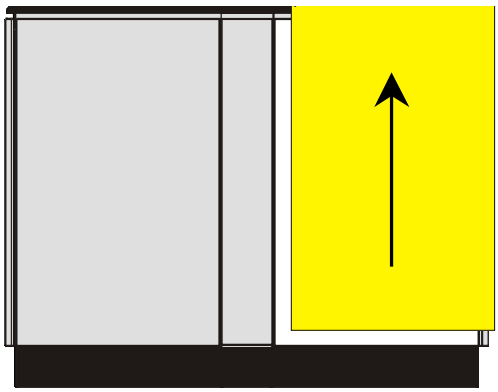


7B Pull bottom-end of panel towards you to disengage Velcro.

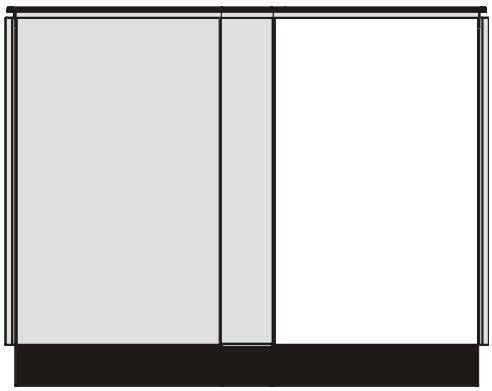
Slide across pins



7C Lift to free side panel from pins



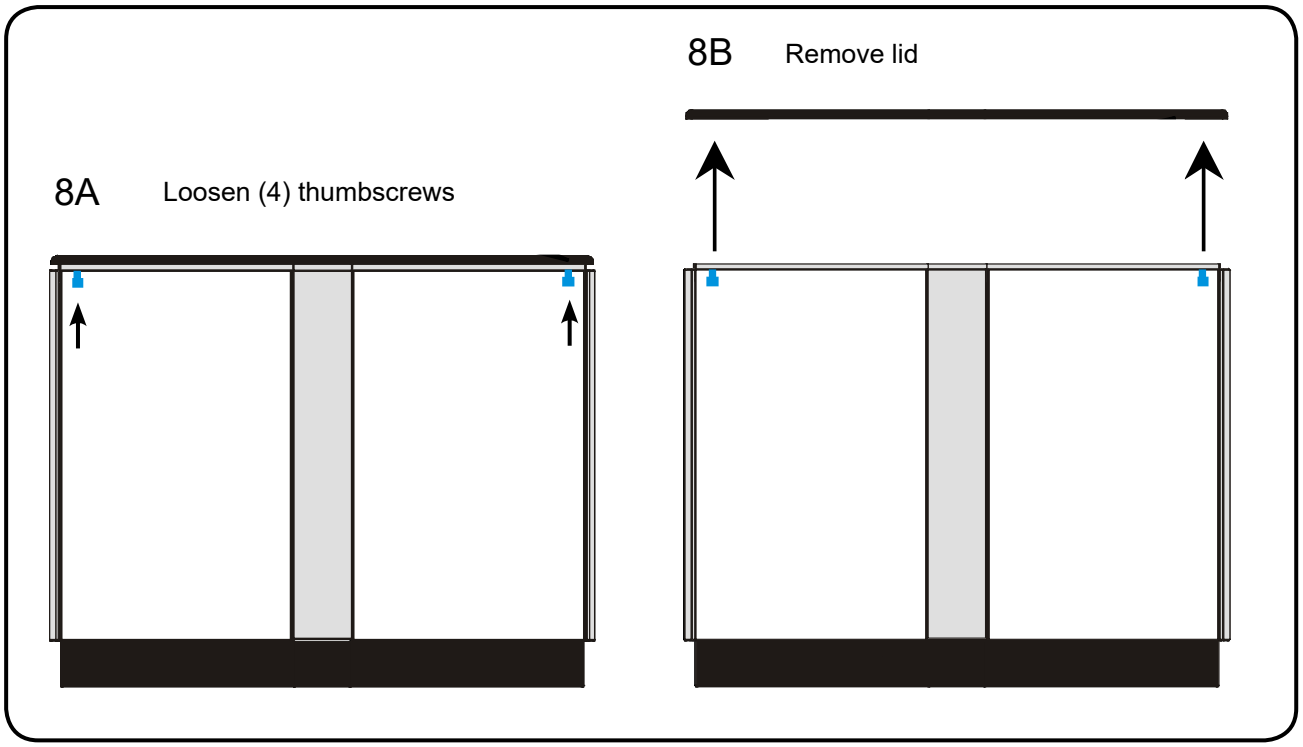
7D Side panel removed



Lid Removal

1. Loosen the (4) thumbscrews under the lid (the thumbscrews are located at the end of the cabinet; two on each end; there is a total of 4 thumbscrews) and remove the lid by lifting the lid carefully off the turnstile. See [Figure 8] for more details.

Fig. 8 **Removing Lids**



QA Checkpoint Shim Removal

IMPORTANT

As part of our QA process brown-colored shims are inserted to set the correct gap for the electromechanical brake. Remove these shims BEFORE powering on the turnstile.

There is one (1) motor shim located in the master cabinet; one (1) motor shim located in the slave cabinet; and two (2) motor shims located in the center cabinet (if applicable).

1. Remove each shim after the cabinet panel has been removed by pulling firmly on the orange pull-tab [Figure 9].

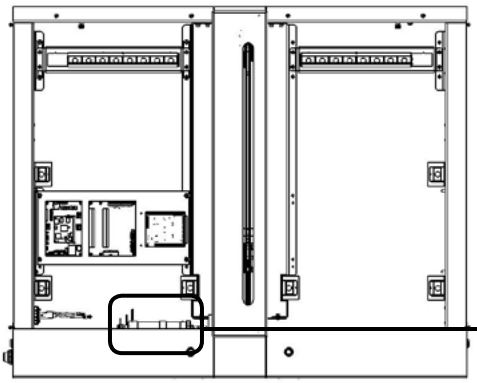
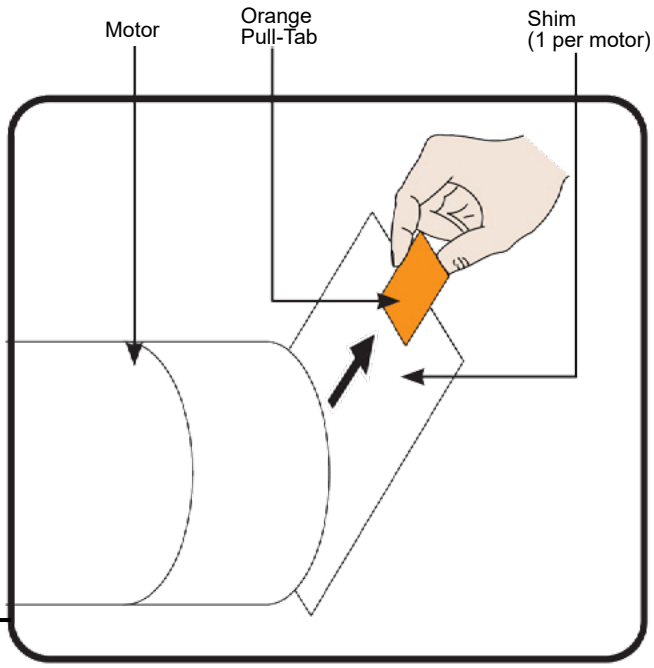


Fig. 9 **Removing Motor Shims**



Turnstile Layout

With the side panels and lids removed, confirm that the cabinets are laid out such that one side of the lane contains the master controller cabinet components and the other side of the lane contains the slave cabinet components. The correct layout for the turnstile master/slave controller board properties is shown in [Figure 10]. A possible common incorrect layout for the turnstile master/slave controller board properties is shown in [Figure 11]. Verify that the master controller cabinet components are facing the slave cabinet components before proceeding.

Fig. 10 **Correct Turnstile Layout**

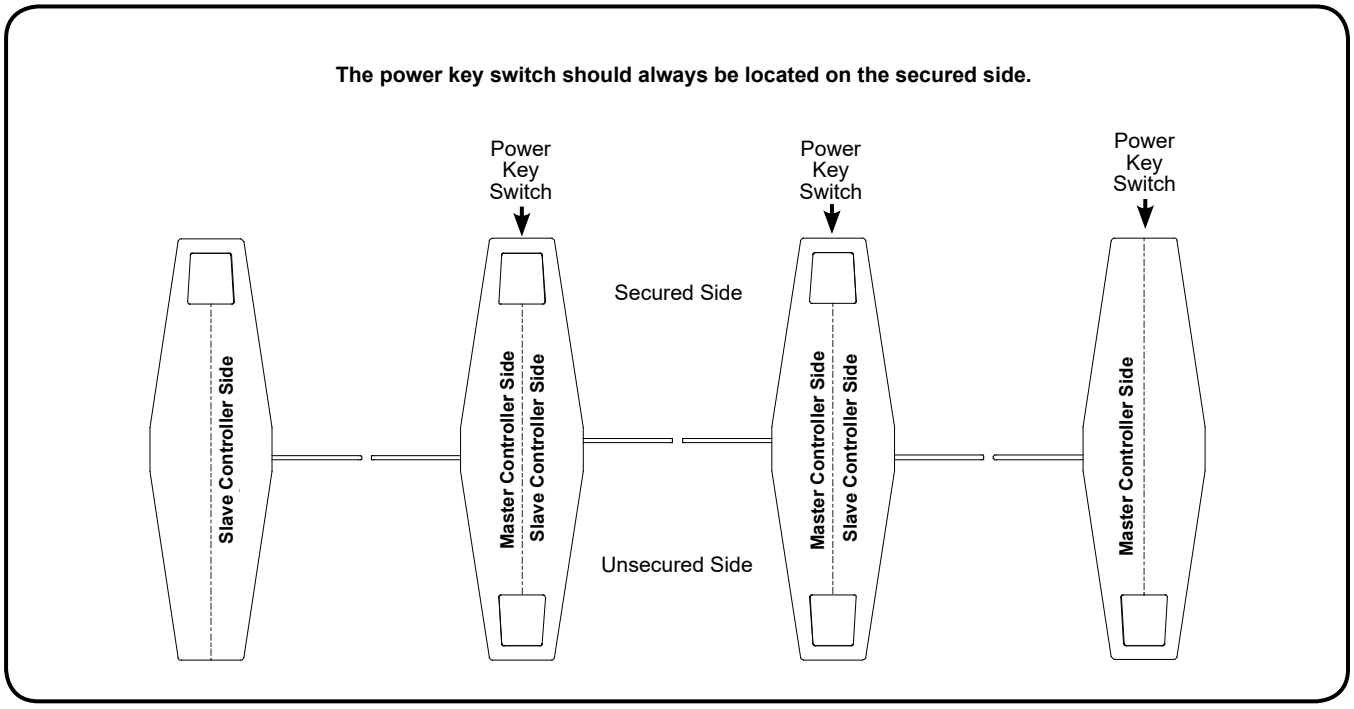
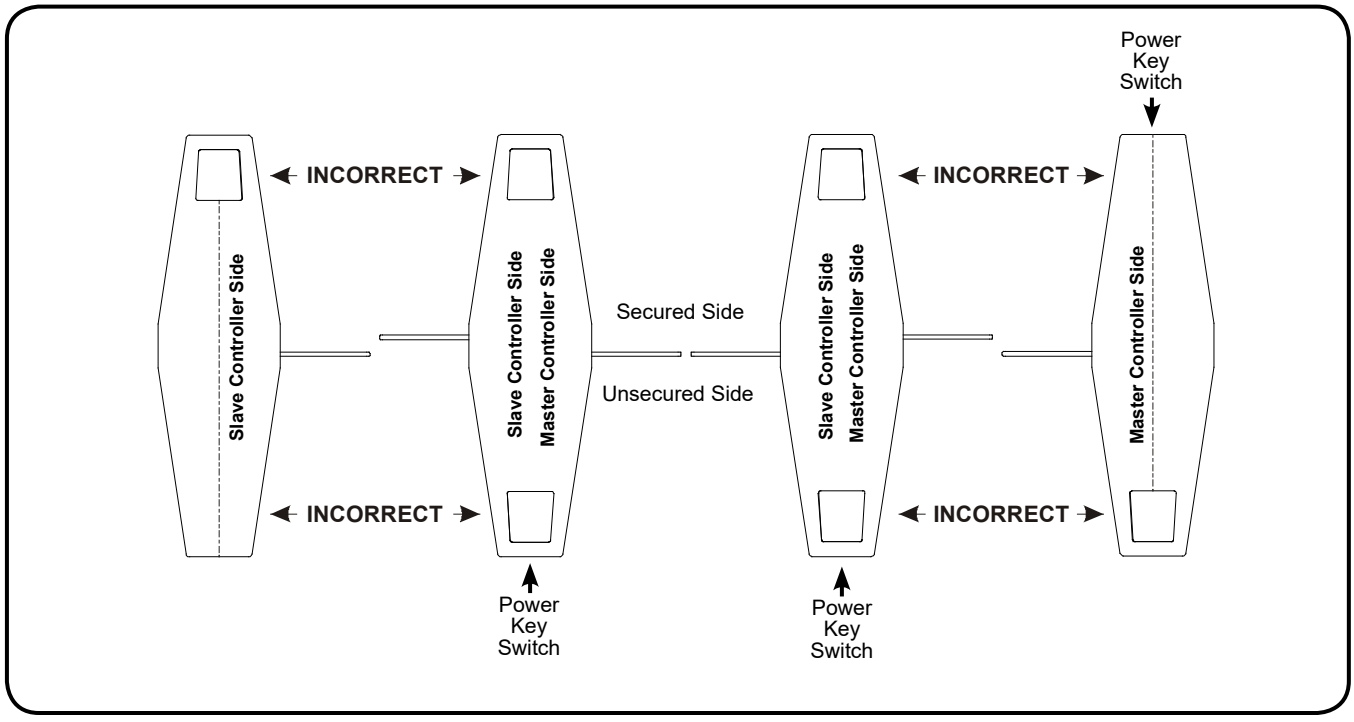


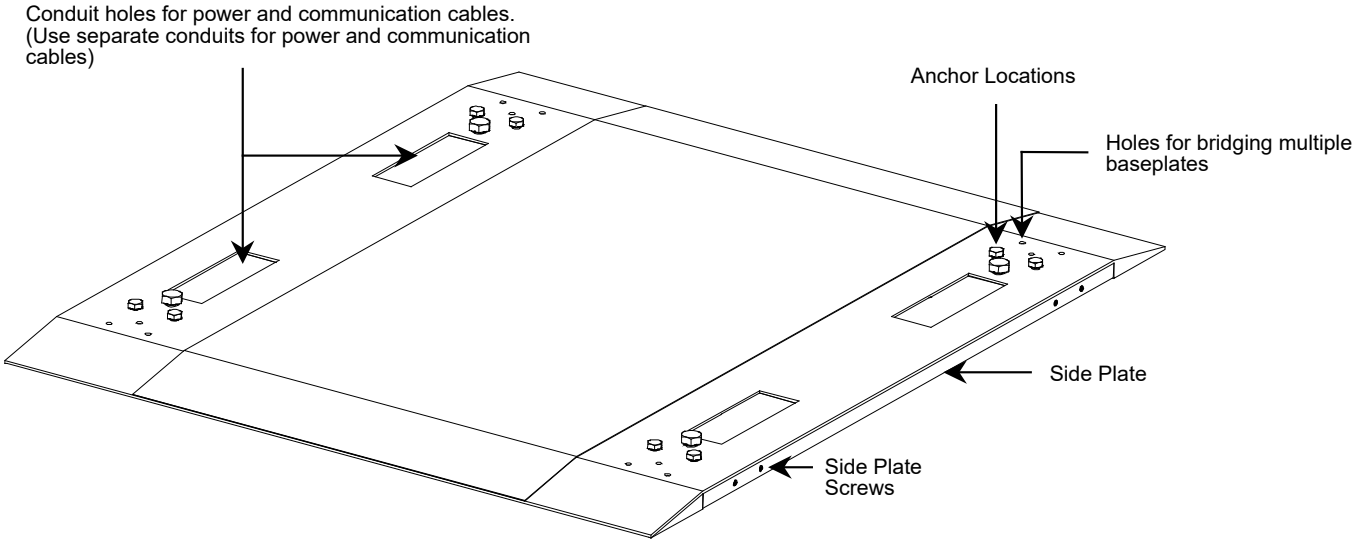
Fig. 11 **Incorrect Turnstile Layout**



Baseplate Assembly (Optional)

An optional SU3500 baseplate may be purchased with the SU3500 turnstile. A baseplate enables installation of the SU3500 turnstile on a solid foundation without the need to drill holes in the ground. The baseplate also provides concealed conduit channels for wiring all power and communication cables. Baseplates come in different sizes and may be bridged together with other baseplates for multiple turnstile lanes. The following information will guide the installer in assembling the baseplate:

Fig. 12 **Baseplate**



Examine the area with a measuring tape and carefully mark the location where the baseplate(s) will be placed. An external power source and external data cables (required for GateKeeper and external controls), must be accessible and provided to the turnstile. The side plate on the baseplate must be removed in order to provide external power/data (or the side plate may be drilled with appropriate holes as needed for concealment). Determine which side plate to remove and remove it by unfastening the (4) screws as shown in [Figure 12].

Place the baseplate carefully in the marked location. The installation process continues in the following sections. Follow the instructions there in order to pull the appropriate cables through the conduit openings.

For multiple lanes, baseplates may be attached together. Holes are provided for bridging multiple baseplates together. The side plate must be removed in order to bridge the baseplates together side by side. Secure the baseplates side by side by fastening the (6) screws provided to the link from the other baseplate (a link is provided for multiple lane baseplates).

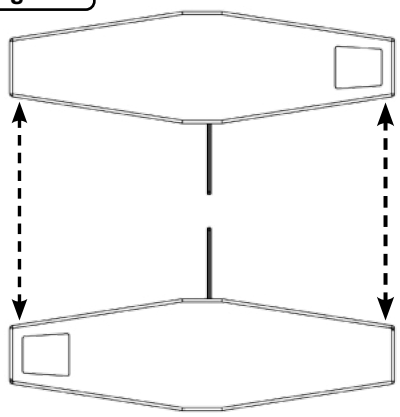
Installation Instructions
Anchoring the Turnstile

NOTE The lane 1 master cabinet is always the right most cabinet in relation to the unsecured side.

1. Place the master cabinet and the slave cabinet in the determined location [see dimensions - Figures 3 -4].
2. Cabinets must be level to each other and square to all neighboring cabinets. This will ensure that all optical sensors are aligned for optimum performance. Use the following procedure to square each cabinet with respect to the floor and other cabinets:

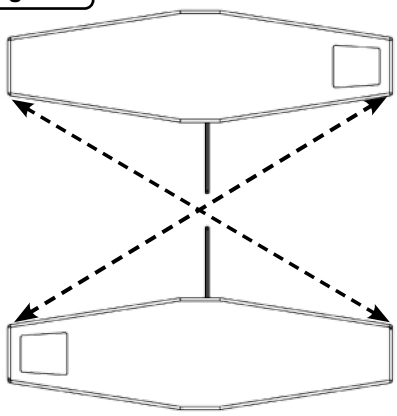
A. Measure the distance from the inside wall of one cabinet to the inside wall of the other cabinet, on both the entry and exit side of the lane for a consistent measurement [Figure 13A].

Fig. 13A



B. Measure the diagonal distance from the end of one cabinet to the end of the opposing cabinet, then measure the opposing diagonal [Figure 13B]. If these distances are equal, the cabinets are square.

Fig. 13B



Anchoring the Turnstile (cont.)

3. Use a pencil and mark each mounting hole location [Figure 14]. There will be a total of four (4) mounting holes per cabinet. Remove the cabinets when complete.
4. Using a 5/8" concrete drill bit, drill the anchor holes 3" in depth at the center of each marked location.

NOTE

The anchor holes must be clean before installing the anchor bolts. If the holes are not clear of debris, the anchor bolts may not tighten correctly.

5. Insert the anchors into each drilled hole [Figure 15]. The threaded end of the anchor must be inserted into the hole first. Use a hammer to tap the anchors into place, if needed. Ensure that the anchors are flush with the concrete floor.
6. If not already done, pull all wires (AC power, access control and crossover cable) through conduit and conduit access holes prior to anchoring cabinets.
7. Using clear RTV silicone, seal the gaps between the conduit and conduit holes.
8. Maneuver each cabinet over the anchor locations. Insert four (4) 3/8" x 2-1/2" anchor bolts and flat washers.
9. Using a torque wrench (ft-lb) and 9/16" socket, torque the anchor bolts to 80 ft-lbs.

Fig. 14 **Marking Anchor Holes**

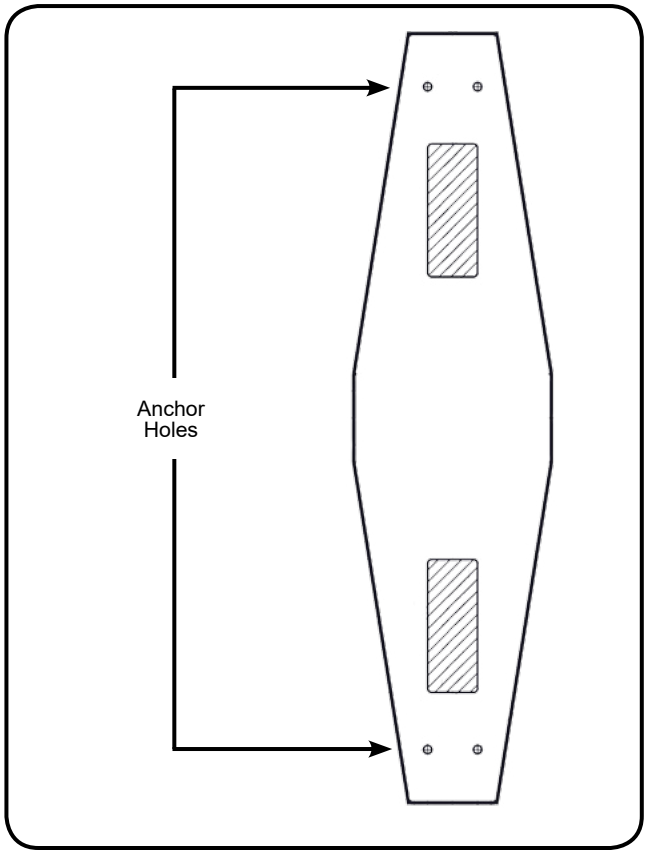
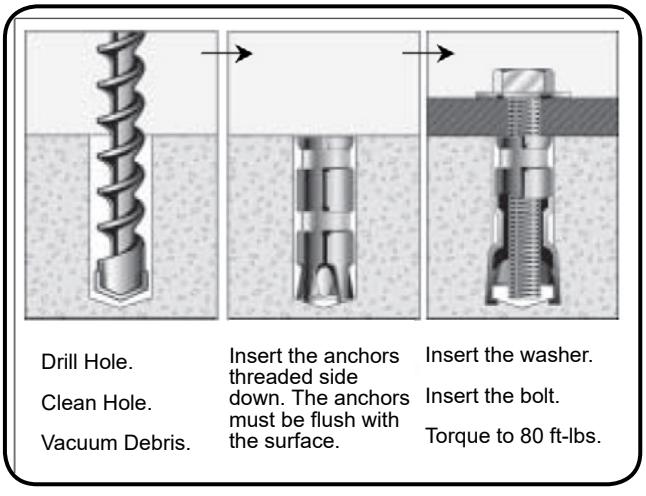


Fig. 15 **Inserting Anchors**



Internal Card Reader Installation

Card readers used in connection with the facility access control system are not included with the SU3500. The SU3500 has sufficient room for the installation of small mullion- or slim-style proximity card readers.

Most card readers do not require separate power inputs. In the event that your reader requires a separate power input – do not pull this power from the SU3500 power supply.

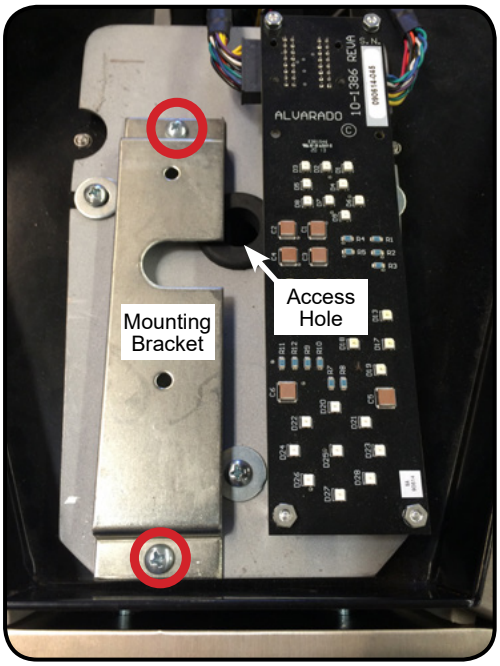
1. Locate the card reader mounting bracket [Figure 16].
2. Using a Phillips-head screwdriver, remove the card reader bracket mounting screws [Figure 16].
3. Install the card reader to the mounting bracket per manufacturer's instructions. Card reader output cable must be routed down through the access hole.

NOTE

If the distance between the installed card reader and reveal lid exceeds the read range of the card reader, shims may be used to elevate the card reader by a maximum of 3/8" (9.5mm).

4. Using a Phillips-head screwdriver, tighten the card reader bracket mounting screws [Figure 16].

Fig. 16 **Card Reader Installation**



Wiring Instructions

NOTE

FOR EXTERNAL DC POWER SUPPLY INSTALLATION INSTRUCTIONS, REFER TO APPENDIX C ON PAGE 34.

Primary Power

IMPORTANT

110VAC and 220VAC primary power (unless ordered otherwise) must be hard wired in place. It is strongly recommended that a licensed electrician perform this procedure in accordance with all applicable local codes.

The primary wiring lines for 110VAC and 220VAC consist of the following:

Terminal	110V	220V
Ground	Green	Green/Yellow
Neutral	White	Blue
Line	Black	Brown

1. Locate the pre-installed power terminal block and attached wiring (located inside the leg on master / center cabinets) [Figure 17].
2. Attach each power wire to the power terminal block with the corresponding color exiting on the other side.
3. Using a Phillips-head screwdriver, tighten each terminal block connection.

Fig. 17 **Power Terminal Block**



NOTES

The orientation of the pre-installed terminal block may differ from what is shown in [Figure 17]. On some installations, the terminal block is rotated 90 degrees.

Some installations may also included a three-pole power terminal block.

Crossover Cable

The included crossover cable interconnects communication signals and low-voltage 24VDC between the master and slave cabinets. The default length of the crossover cable included with the SU3500 is 8'. Optional crossover cable lengths of 20' and 40' are available.

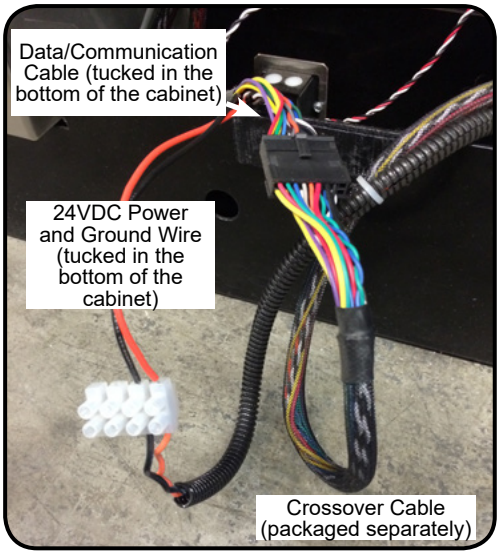
1. Locate the low-voltage terminal block tucked in bottom of the center base in the master cabinet [Figure 18].
2. Insert the 24VDC positive wire (orange) and the negative wire (black) into the terminal block, matching the colors with the other side and tighten [Figure 18].
3. Connect the data connector from the crossover cable to the data connector in the master cabinet [Figure 18].

NOTE

Center cabinets have two crossover cable connectors tucked in the base: one labeled MASTER and one labeled SLAVE. Crossover cables are used to interconnect master and slave connectors. Refer to Appendix D for crossover cable connection diagrams.

4. Repeat Steps 1 – 3 for the slave cabinet.

Fig. 18 **Crossover Cable & Low Voltage**



I/O Control Board (13-0328 Rev. F)

Signal Inputs and Outputs To / From Access Control System

Inputs

Signal inputs from outside systems are wired into the SU3500's I/O control board. There are two types of input signals, momentary dry contacts (MDC) and sustained dry contacts (SDC). All input signals must be normally open (N.O.), voltage-free, dry contacts, with the exception of the fire alarm input, which can be configured (via jumper on the I/O control board) to accept either a normally open or normally closed (N.C.) sustained contact. MDC's must be at least 100ms in duration to register. While the SU3500 can accept signals up to 2 seconds in duration, the suggested MDC input duration is 1 second or less to support rapid throughput in high-volume applications.

NOTE

Factory default fire alarm jumper setting is normally open (N.O.).

Outputs

Signal outputs are available from the SU3500's I/O control board. Outputs are normally open, voltage-free, momentary dry contacts. The output signal length is 300ms in duration.

Inability to Provide Specified Inputs

If the access system cannot provide the specified MDC's, isolation relays should be used. NEVER connect signal lines containing voltage directly to the I/O control board.

LEGEND	
ITEM	NAME
J1	Input Terminals
J2	Output Terminals
JP1	RS485 Termination Resistor
JP2	RS485 Termination Resistor
JP3	Fire Alarm Jumper (N.O. - N.C.)
S1	Entry Side Open Test Button
S2	Entry Side Reject Test Button
S3	Previous Sensor Group
S4	Next Sensor Group
S5	Exit Side Open Test Button
S6	Exit Side Reject Test Button

Fig. 19 Master Cabinet

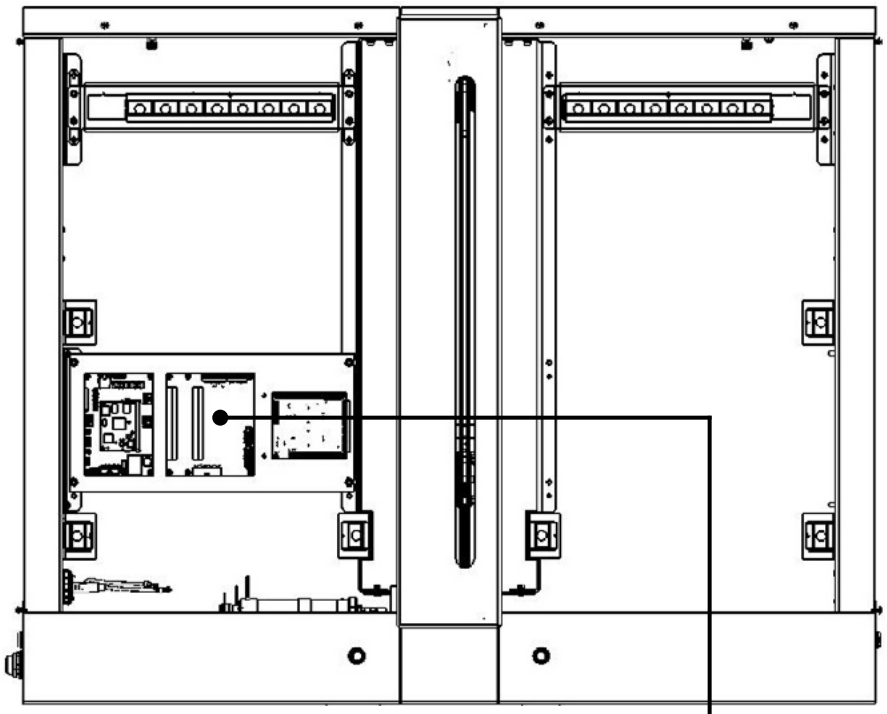
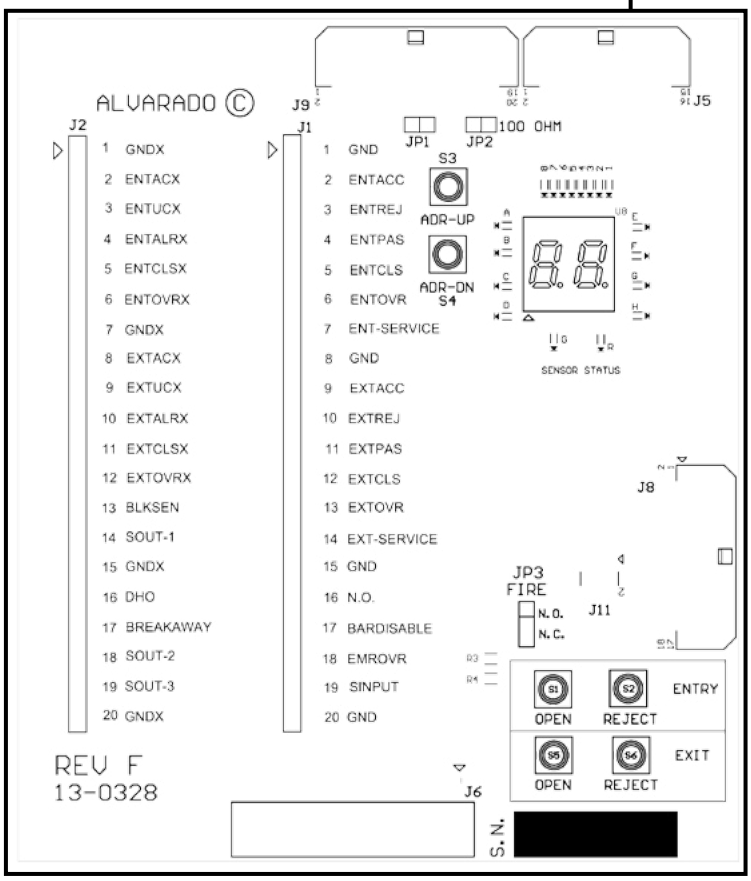


Fig. 19A I/O Control Board (13-0328 Rev. F)



I/O Control Board (13-0328 Rev. F) Terminal Descriptions

J2 Output Contacts					J1 Input Contacts				
Pin #	Pin Name	Function Description	Contact Type	Function & Behavior Description	Pin #	Pin Name	Function Description	Contact Type	Function & Behavior Description
1	GNDX	Ground	N/A	Common output signal ground.	1	GND	Ground	N/A	Common input ground signal.
2	ENTACX	Authorized Passage Entry	MDC	An output occurs when an authorized entry passage is completed.	2	ENTACC	Good Card Entry	MDC	Opens the turnstile for one authorized passage until passage occurs or timeout.
3	ENTUCX	Unauthorized Passage Entry	MDC	An output occurs when an unauthorized entry passage is completed.	3	ENTREJ	Bad Card Entry	MDC	Illuminates the entry side RED User Status Icon for 2 seconds.
4	ENTALRX	Unauthorized Presence Entry	MDC	An output occurs when there is entry into the lane area from the entry direction without authorization.	4	ENTPAS	Free Passage Entry	SDC	Sets the turnstile to Free Passage mode in the entry direction.
5	ENTCLSX	N/A	N/A	Reserved	5	ENTCLS	Close Direction Entry	SDC	Sets the turnstile to No Passage mode in the entry direction.
6	EXTACX	N/A	N/A	Reserved	6	ENTOVR	Single Override Entry	MDC	Opens the turnstile for one authorized passage in the entry direction independent of the access control system. (Typically used for button at security desk.)
7	GNDX	Ground	N/A	Common output signal ground.	7	ENTSERVICE	Visitor Mode	MDC	Places the turnstile in Free Passage/Barrier Disabled Mode in both the entry and exit directions.
8	EXTACX	Authorized Passage Exit	MDC	An output occurs when an authorized exit passage is completed.	8	GND	Ground	N/A	Common input ground signal.
9	EXTUCX	Unauthorized Passage Exit	MDC	An output occurs when an unauthorized exit passage is completed.	9	EXTACC	Good Card Exit	MDC	Opens the turnstile for one authorized passage until passage occurs or timeout.
10	EXTALRX	Unauthorized Presence Exit	MDC	An output occurs when there is entry into the lane area from the exit direction without authorization.	10	EXTREJ	Bad Card Exit	MDC	Illuminates the exit direction RED User Status Icon for 2 seconds.
11	EXTCLSX	N/A	N/A	Reserved	11	EXTPAS	Free Passage Exit	SDC	Sets the turnstile to Free Passage mode in the exit direction.
12	EXTOVRX	N/A	N/A	Reserved	12	EXTCLS	Close Direction Exit	SDC	Sets the turnstile to No Passage mode in the exit direction.
13	BLKSEN	Blocked Sensor	MDC	An output occurs when a sensor is blocked for a defined length of time (default 15 seconds).	13	EXTOVR	Single Override Exit	MDC	Opens the turnstile for one authorized passage in the exit direction independent of the access control system. (Typically used for button at security desk.)
14	SOUT-1	Free Passage Exit	MDC	An output occurs when there is a passage in the exit direction.	14	EXTSERVICE	Horizontal Arm Breakaway	N/A	Available on the SU3000 only.
15	GNDX	N/A	N/A	Common output signal ground.	15	GND	Ground	N/A	Common input ground signal.
16	DHO	Door Held Open	MDC	An output occurs when the barrier wings remain open after the allotted time to close after passage (default 12 seconds).	16	N/O	Normally Open	SDC	Sets the turnstile to Normally Open mode.
17	BREAKAWAY	Barrier Wing Broken Away	MDC	An output occurs when the barrier wing holding force has been exceeded and the barrier wings give way.	17	BARDISABLE	Disables Barrier Wings	SDC	Sets the turnstile to Barrier Disabled mode for barrierless optical turnstile operation.
18	SOUT-2	Crawl Detection	MDC	An output occurs when the crawl sensors detect an unauthorized passage.	18	EMROVR	Emergency Override	SDC (N.O. or N.C.)	Opens barrier wings toward the unsecured side; barrier wings remain open & turnstile is inactive until SDC is removed, or contact is reestablished if N.C. jumper is enabled. (Typically used for fire alwing or life safety systems.)
19	SOUT-3	N/A	N/A	Reserved	19	SINPUT	N/A	N/A	Reserved
20	GNDX	Ground	N/A	Common output signal ground.	20	GND	Ground	N/A	Common output signal ground.

Configuring Passage Modes

The SU3500 provides bi-directional access control in conjunction with a facility access control system. For bi-directional applications, the entry and exit directions can be individually configured to different passage modes to suit facility requirements. For example, a turnstile can be configured for Controlled Passage mode in the entry direction, and Free Passage mode in the exit direction. SU3500 passage modes are described on Page 24. Further information on the smart use of passage modes can be found in the *SU3500 User Guide*.

Turnstile passage modes can be configured in one of three ways:

I/O Control Board

Passage modes are set via wiring to the I/O control board inputs. This method is ideal for facilities that do not require changing passage mode configurations throughout the day. This is the most common method used by our customers. Instructions for wiring to the I/O control board are provided below.

Turnstile Lane Key Control

If this option has been ordered for your turnstiles, two 3-position key switches are installed on the turnstile. Turning the key to one of the three positions allows each turnstile direction to be placed in any of the passage modes. Instructions on using lane key control are provided on Page 27.

GateKeeper

GateKeeper is an optional desktop software application. GateKeeper, along with other functionality, allows the passage modes for both the entry and exit side of the turnstiles to be changed. Instructions on configuring passage modes using GateKeeper is outside the scope of this manual.

Setting Controlled Passage Mode (I/O Control Board)

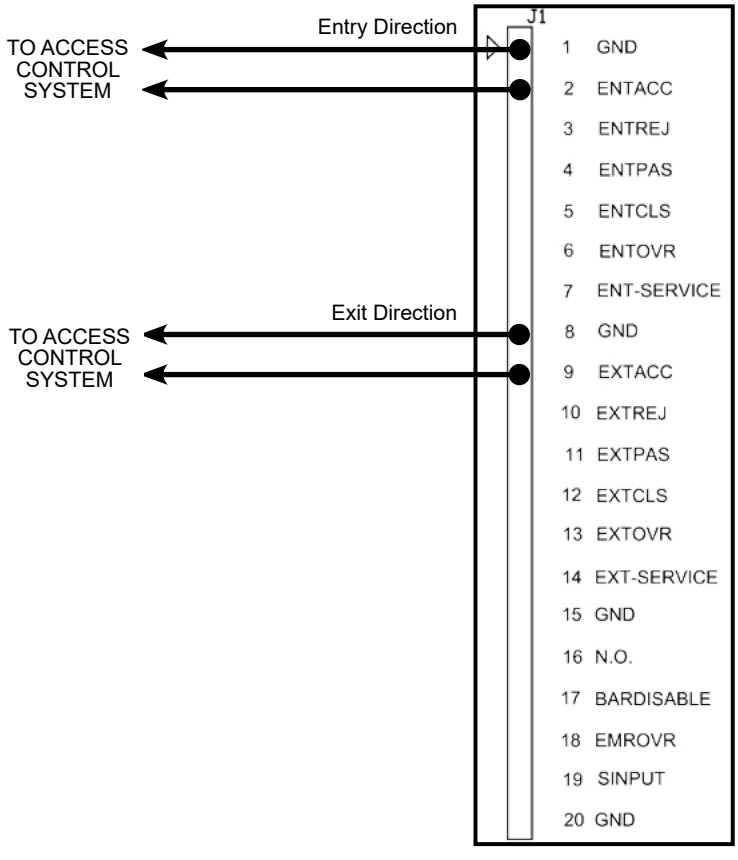
Entry Direction

1. Locate the access control system leads used to indicate an Authorized Passage in the **entry** direction is allowed.
2. Connect leads to the ENTACC and GND terminals on the I/O control boards Input terminal strip (J1) [Figure 20].

Exit Direction

1. Locate the access control system leads used to indicate an Authorized Passage in the **exit** direction is allowed.
2. Connect leads to the EXTACC and GND terminals on the I/O Control Boards Input terminal strip (J1) [Figure 20].

Fig. 20



Setting Free Passage Mode (I/O Control Board)

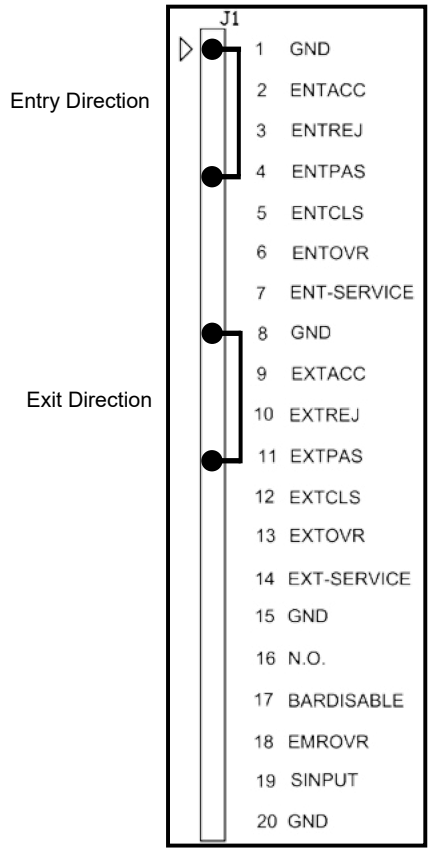
Entry Direction

1. Locate the ENTPAS and GND terminals.
2. Using a wire jumper, connect the ENTPAS and GND terminals [Figure 21].

Exit Direction

1. Locate the EXTPAS and GND terminals.
2. Use a wire jumper to connect the EXTPAS and GND terminals [Figure 21].

Fig. 21



Setting No Passage Mode (I/O Control Board)

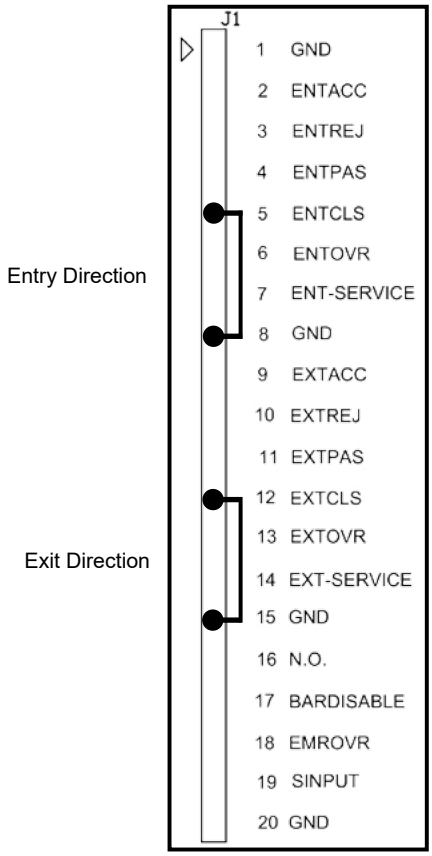
Entry Direction

1. Locate the ENTCLS and GND terminals.
2. Use a wire jumper to connect the ENTCLS and GND terminals [Figure 22].

Exit Direction

1. Locate the EXTCLS and GND terminals.
2. Using a wire jumper, connect the EXTCLS and GND terminals [Figure 22].

Fig. 22



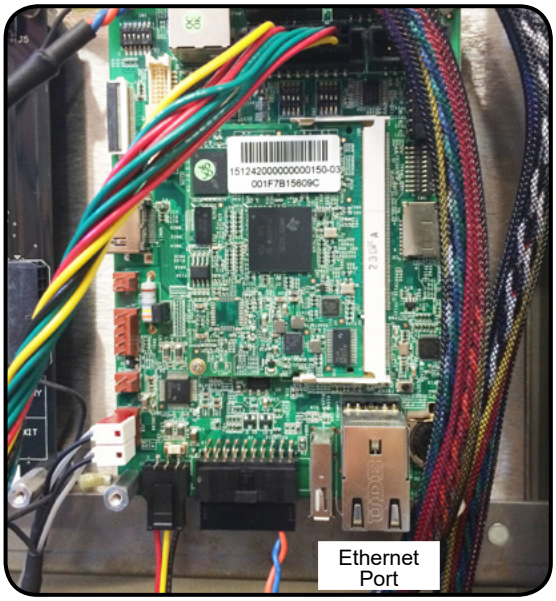
Ethernet Communication (Optional)

NOTE

It is assumed that Ethernet cabling has been run to the turnstile via conduit and pulled through the conduit opening in Step 6 of the Anchoring the Turnstile section.

1. Locate the CPU board on the secured side of the master/ center cabinet.
2. Connect the Ethernet cable to the Ethernet port [Figure 23].

Fig. 23 CPU Board

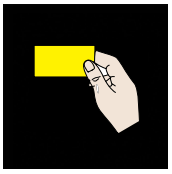
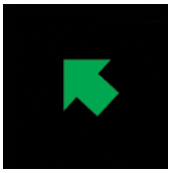


Post-Installation Functions Check

Alvarado turnstiles are thoroughly inspected and tested for proper performance prior to being shipped. Perform the following function checks to verify the turnstiles have been installed properly and are fully operational. If any problems are encountered during the functions check, refer to the Troubleshooting section on Page 30.

Passage Modes

Before beginning the Post-Installation Functions Check, please read the following brief descriptions of the three SU3500 passage modes. More information on SU3500 passage modes can be found in the *SU3500 User Guide*.

Passage Mode	Description	User Status Display	Open / Closed Status Light
Controlled Passage	The barrier wings are closed, securing the lane. Upon receipt of an authorization signal from an access control system the barrier wings retract to the open position, allowing a single passage in the authorized direction. The barrier wings will close after the user has passed through the turnstile or the entry access time (6 second default) has expired. **This is the default passage mode the SU3500s are set to before leaving the factory.**		
Free Passage	An access control authorization signal is not required for a user to pass through the turnstile. Barrier wings are closed until a user enters the turnstile at which time the barrier wings automatically open. The barrier wings will close after the user has passed through the turnstile or the entry access time (6 second default) has expired.	 (Flashing)	
No Passage	No passage is allowed. The barrier wings are closed and remain closed. Valid electronic credentials are ignored and passage is not allowed. The barrier wings will still open in the exit direction if a fire alarm or life safety input is received.		

Operating Modes

The SU3500 offers the following user-configurable operational modes. Refer to the SU3500 User Guide for more information on SU3500 operating modes and configuration instructions.

Normally Closed

The barrier wings are closed, securing the turnstile. Upon receipt of an authorization signal from an access control system the barrier wings open, allowing a single passage in the authorized direction. The barrier wings return to the closed position after the user has passed through the turnstile or the time frame allowed for an entry to occur has expired.

Normally Open

The barrier wings are open, providing a barrier-free passageway. The barrier wings will not close and secure the turnstile unless an unauthorized passage is attempted. Normally Open mode should be used only in select applications.

Barrier Disabled

The barrier wings remain open at all times allowing the SU3500 to function as an optical (barrier free) access control turnstile.

Powering On

NOTE

The keys to power the turnstile ON/OFF are packaged in the hardware box that was shipped with the turnstile.

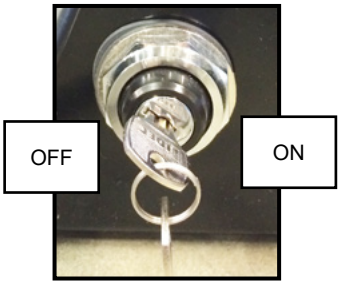
There is a power key switch on the end cabinet of all master and center cabinets.

1. Turn on AC power using the power key switch [Figure 24]. The power-up cycle will take less than one minute to complete.
2. After the power-up sequence has completed, the SU3500 barrier wings will move to the Home position and the SU3500 will enter into Controlled Passage mode [Figure 24], for both the entry and exit directions.

NOTE

Barrier wings are pre-aligned at the factory. However, they may need slight adjustment after installation. Refer to Appendix A on Page 29 for instructions on setting the barrier wing Home/Closed Position.

Fig. 24 **Power Key Switch**



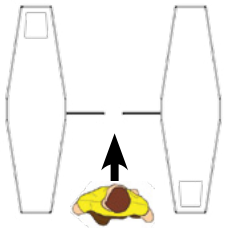
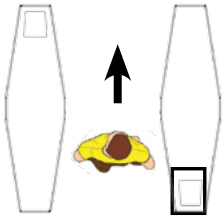
Testing Lane Functionality

Perform the following turnstile functionality tests to validate basic turnstile operation. Tests are provided for Controlled Passage, Free Passage, and No Passage modes.

The following is assumed (Controlled Passage mode tests only):

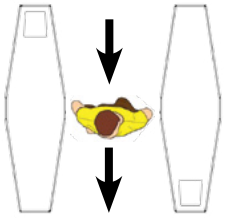
- The access control system is operational and all access control wiring to the turnstile is connected.
- Valid access cards are on hand for activating the turnstile.

CONTROLLED PASSAGE MODE

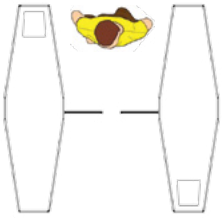
TEST	PROCEDURE	TURNSTILE RESPONSE
Unauthorized Entry / Exit Secured Side  Unsecured Side (Unauthorized Entry shown)	Enter the turnstile without authorization.	• Unauthorized Entry / Exit alarm sounds. • Red stop icon flashes on the User Status Display in the direction of the violation. • Open / Closed Status Light turns red in the direction of the violation. • Barriers remain closed.
Authorized Entry / Exit Secured Side  Unsecured Side (Authorized Entry shown)	Using a valid card, activate the turnstile. Walk through the turnstile. Verify the barriers close upon passage completion.	• Authorized Entry chime sounds. • Green arrow icon illuminates on the User Status Display in the entry / exit direction, respectively. • Open / Closed Status Light is green in the passage direction. • Barriers move to the open position, and close upon passage completion or the timeout period is reached.

Testing Turnstile Functionality (cont.)

FREE PASSAGE MODE

TEST	PROCEDURE	TURNSTILE RESPONSE
Free Passage Entry / Exit Secured Side  Unsecured Side (Free Passage Exit shown)	Enter the turnstile and complete a passage.	• User Status Light green arrow is flashing. • Open / Closed Status Light is flashing green in the Free Passage direction. • Barriers open away from the user entering the turnstile. • Barriers close after passage completion.

NO PASSAGE MODE

TEST	PROCEDURE	TURNSTILE RESPONSE
No Passage Entry / Exit Secured Side  Unsecured Side (No Passage Exit shown)	Enter the turnstile.	• User Status Light red icon is illuminated. • Open / Closed Status Light is red. • Unauthorized Entry alarm sounds when a user enters the turnstile. • Barriers remain closed.

Testing Lane Key Control (Optional)

Optional 3-position lane key control switches can be selected during the ordering process. Lane key control switches are used to change passage modes for both directions of travel. Two (2) lane key control switches are installed per turnstile in the bottom end legs as shown in [Figure 25].

Fig. 25 **Lane Key Control Switch Locations**

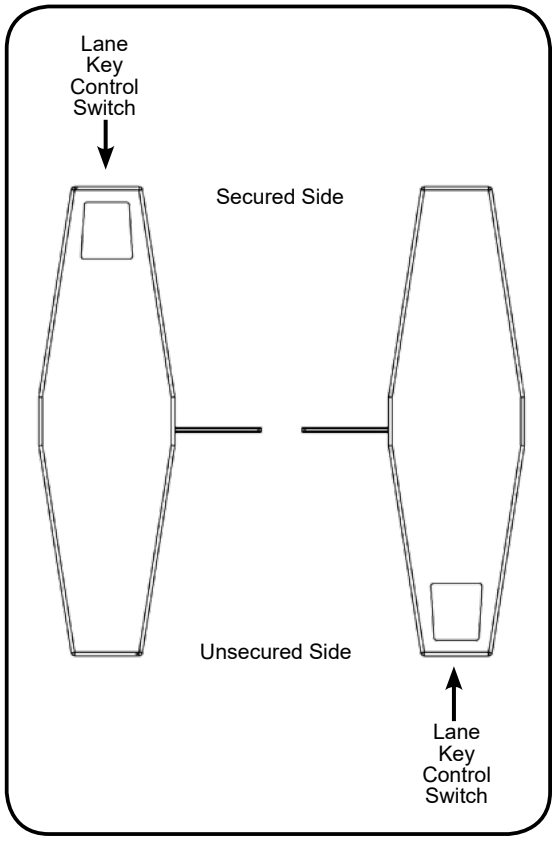
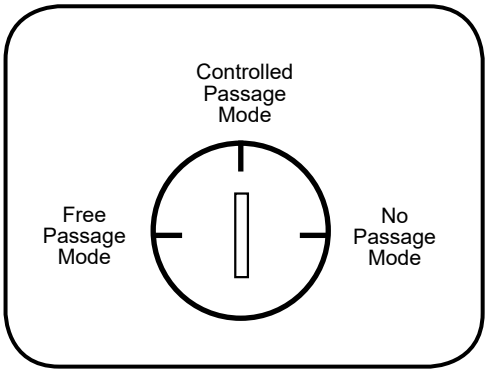


Fig. 26 **Lane Key Control Switch**



NOTE

The keys to the lane key control switches are packaged in the hardware box that was shipped with the turnstile.

Turning the key to one of three positions overrides all existing settings, placing the turnstile in Controlled Passage mode, Free Passage mode or No Passage mode depending on the orientation of the key. Refer to the Passage Modes section on Page 24 for more information.

Testing Ethernet Communication (Optional)

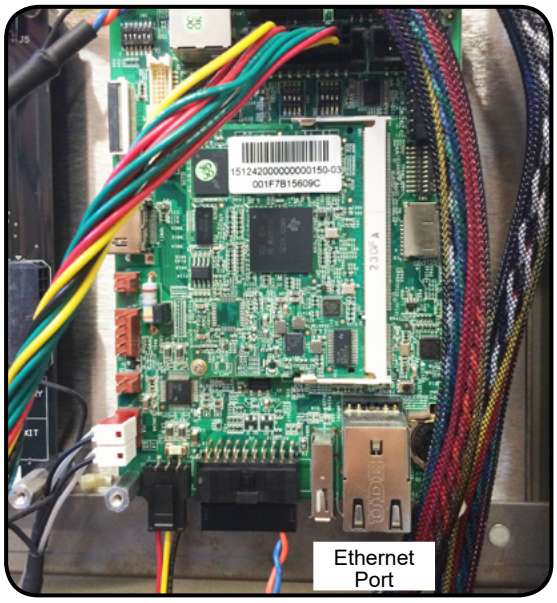
NOTE

The following procedure is applicable to non-networked (standalone) turnstiles. For instructions on testing Ethernet communication over a facility network, please refer to the *SU3500 User Guide*.

Required Items:

- CAT5/6 Ethernet Cable
- Laptop Computer Running Windows 7 or Windows 8

Fig. 27 **CPU Board**



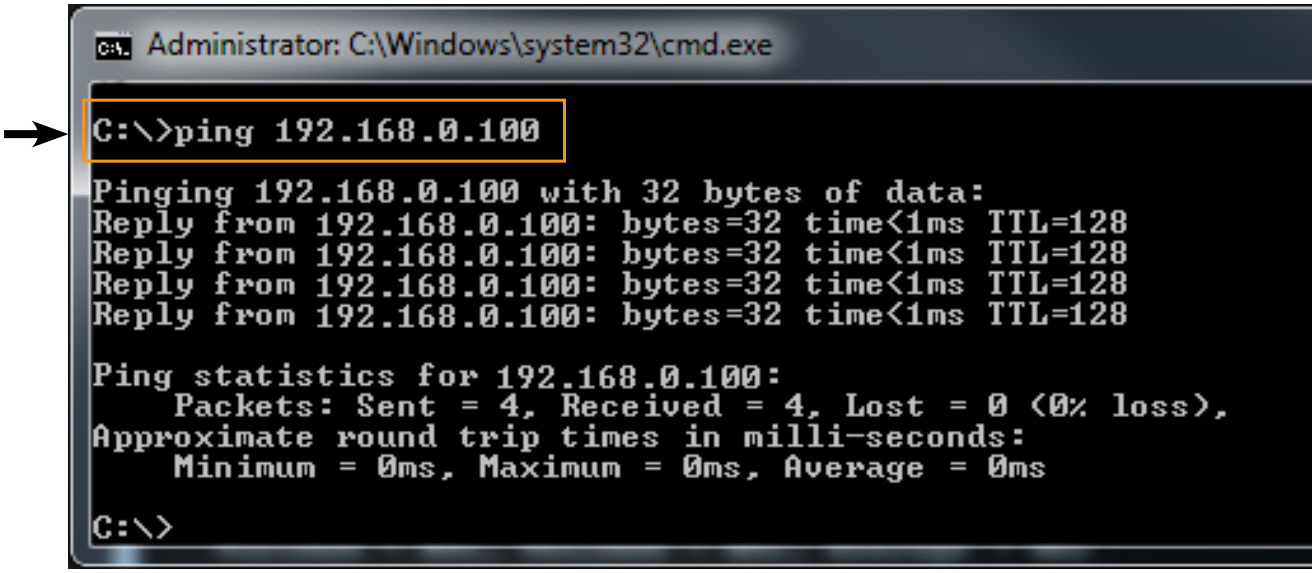
1. Locate the Ethernet port on the CPU board [Figure 27].
2. Connect the Ethernet cable to the Ethernet port.
3. Connect the other end of the Ethernet cable to the laptop computer.
4. Launch **Command Prompt** on the computer by typing **CMD** in the '**Search programs and files**' field.
5. Enter the following command: **ping XXX.XXX.XXX.XXX,** where XXX.XXX.XXX.XXX is the IP address of the turnstile [Figure 28].

NOTE

192.168.0.100 is the default IP address configured by Alvarado. If the turnstile has been assigned a different network IP address, ping that IP address instead. Contact your system administrator for network information.

6. A successful ping will result in the message shown in [Figure 28]:

Fig. 28 **Ping Results**



Finish the Installation

Complete the following steps below only if the primary power, crossover cable, and access control wiring is connected.

1. Replace the lid and secure by tightening the (4) thumbscrews.
2. Replace the cabinet side panels and end panels.
3. Secure the end panels by returning the key to the vertical position.

Post-Installation Checklist

1. Power On
   - ☐ SU3500 boots up successfully.
2. Lane Functionality
   - ☐ User status displays and open / closed status Lights are functioning properly.
   - ☐ Auditory alarms are playing back correctly.
   - ☐ Barrier wings move smoothly between the open and closed positions.
3. Access Control Integration
   - ☐ Installed card readers are successfully reading credentials.
   - ☐ Valid credentials are activating the turnstile.
4. Barrier Wing Alignment
   - ☐ Barrier wings are properly aligned.
5. Attachment
   - ☐ Barrier wings, cabinet lids, end covers, and base covers are securely fastened to the turnstile.
6. Wipe Down Turnstile
   - ☐ Acrylic - Wipe down acrylic barrier wings using a soft cloth and cleaner suitable for acrylic surfaces. We recommend Brillianize and Novus #1 acrylic cleaners.
   - ☐ Stainless Steel – Wipe down stainless steel with a damp cloth or use Alvarado's recommended commercial products (see *SU3500 User Guide*).
   - ☐ Powder Coated - Wipe down power coated surfaces with a damp cloth.
7. Manuals Handoff
   - ☐ Provide both these *SU3500 Installation Instructions*, and the *SU3500 User Guide* to the project or site manager.

Troubleshooting

This basic troubleshooting section is provided to aid installers with the most commonly encountered installation problems. If you require more troubleshooting assistance, see the *SU3500 User Guide*.

Symptom	Possible Cause	Solution
Unit will not turn on	No power	Make sure that there is power to the turnstile power terminal block. Check if LEDs are lit on the I/O control board and the seven-segment display is showing a number.
	Blown fuse	Check fuse. If necessary replace with a 2.5A (slo-blo) fuse.
Constant auditory alarming	Communication/ low-voltage cable	Check the I/O control board to see if amber LEDs are lit. If they are lit, the most likely problem is a loose or improper communication connection. Disconnect the black 16-pin connectors from the I/O control board and motor controller boards, apply contact cleaner / lubricant to connector pins and reseat. Retry operation. If condition persists, perform the same process on the 16-pin connectors going into and out of the light boards and sensor boards. Retry operation. Alvarado technical support has a process document and can provide additional instructions.
Barriers operate erratically	Digital position encoder is not in place	Verify the digital position encoder is secured to the pulley shaft with all the locks tabs in place [Figure 29]. **NOTE: After re-seating the digital position encoder, the barrier Home position must be reset PRIOR to power cycling the turnstile.**
Barriers do not move.	Blown 24VDC fuse on the motor controller board.	Locate the motor controller board fuses [Figure 30]. Using a multimeter, check the 24VDC 6.3A fuse for continuity. If the fuse is blown, contact Alvarado for replacement instructions.
Blocked Sensor auditory alarms sounds after 15 seconds (default).	Wire or cable blocking sensors	Check for a stray wire or cable in front of the transmit and receive operational sensors (horizontal arrays).Tuck any stray wire or cable out of sensor viewing area. If this does not resolve the problem, contact Alvarado technical support for instructions on using the ADR-UP and ADR-DN buttons on the I/O control board to perform diagnostics on sensors.
Barriers either stay open or start to close then open back up	Discrete sensor blocked	Check for a stray wire or cable in front of the individual transmit and receive safety sensors. Tuck any stray wire or cable out of sensor viewing area. If this does not resolve the problem, contact Alvarado technical support for instructions on using the ADR-UP and ADR-DN buttons on the I/O control board to perform diagnostics on sensors.
Barriers do not align in closed position	Home position needs to be reset	Follow the Setting the Home position instructions in Appendix B on Page 28.

Fig. 29 **Digital Position Encoder**

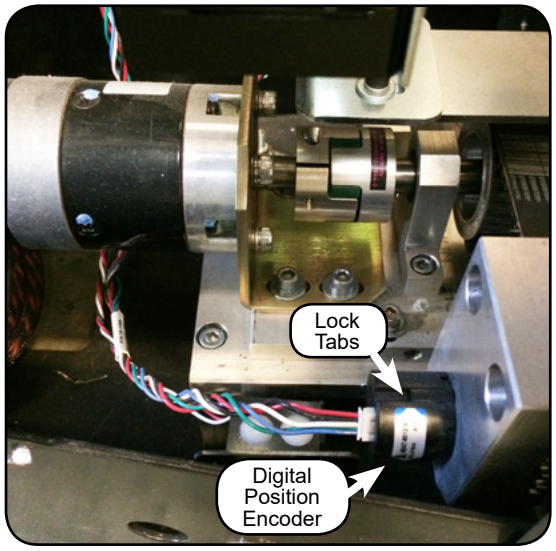
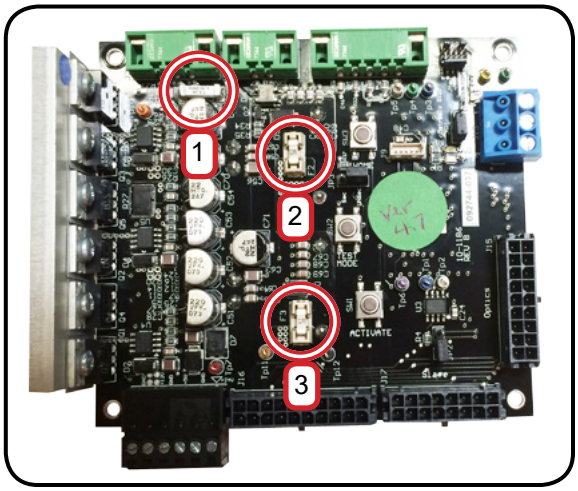


Fig. 30 **Motor Controller Board Fuses**



FUSES

1) 24VDC 6.3A 2) 5VDC 3A 3) 12VDC 2A

Appendix A - Setting the Home Position

1. Locate the motor controller board in the master or center cabinet [Figure A1]. The (D2) LED will be blinking indicating normal operation mode.
2. Press the 'Test Mode' button for two seconds. The (D2) LED will be lit solid. You are now in test mode [Figure A1].
3. Move the barrier wing a couple of inches in both directions and then place it in the Home position [Figure A3].
4. Press the 'Home' button to set.
5. Press the 'Test Mode' button for two seconds to exit test mode. The (D2) LED will return to blinking status indicating normal operation mode.
6. Locate the slave motor controller board in the slave or center cabinet.
7. Repeat Steps 1 through 5 for the slave barrier wing.

Fig. A1 **Motor Controller Board**

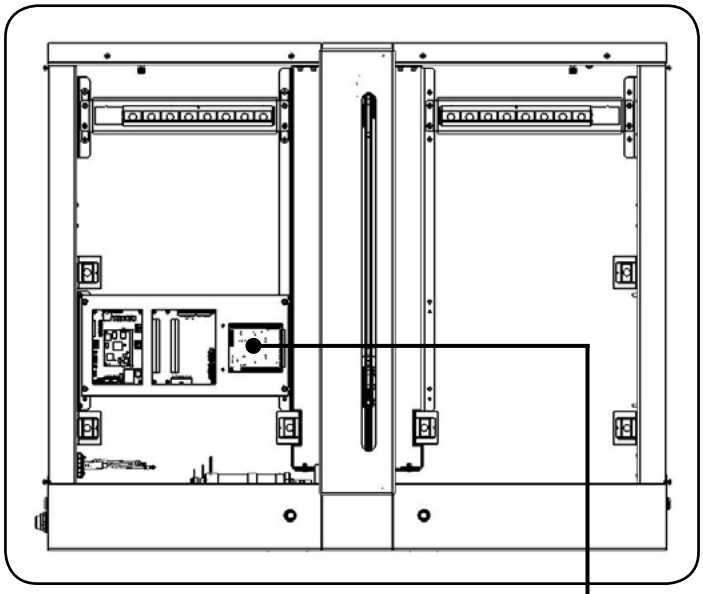


Fig. A2 **Motor Controller Board**

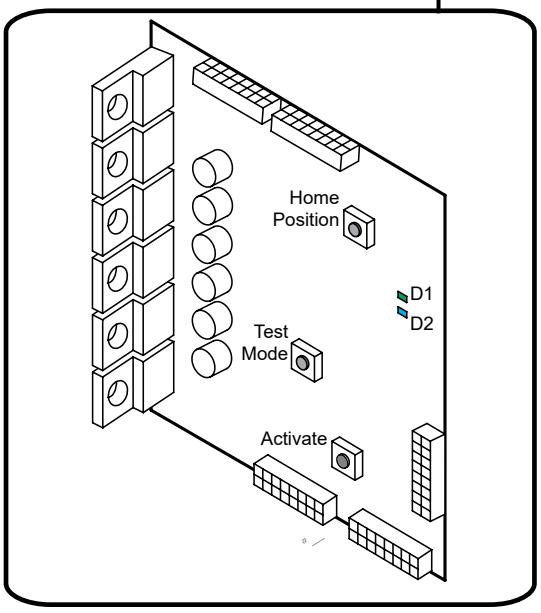
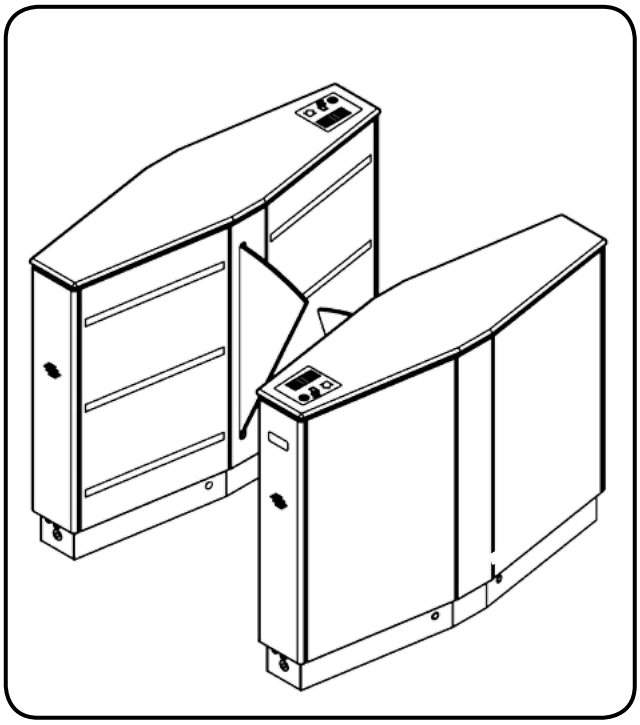
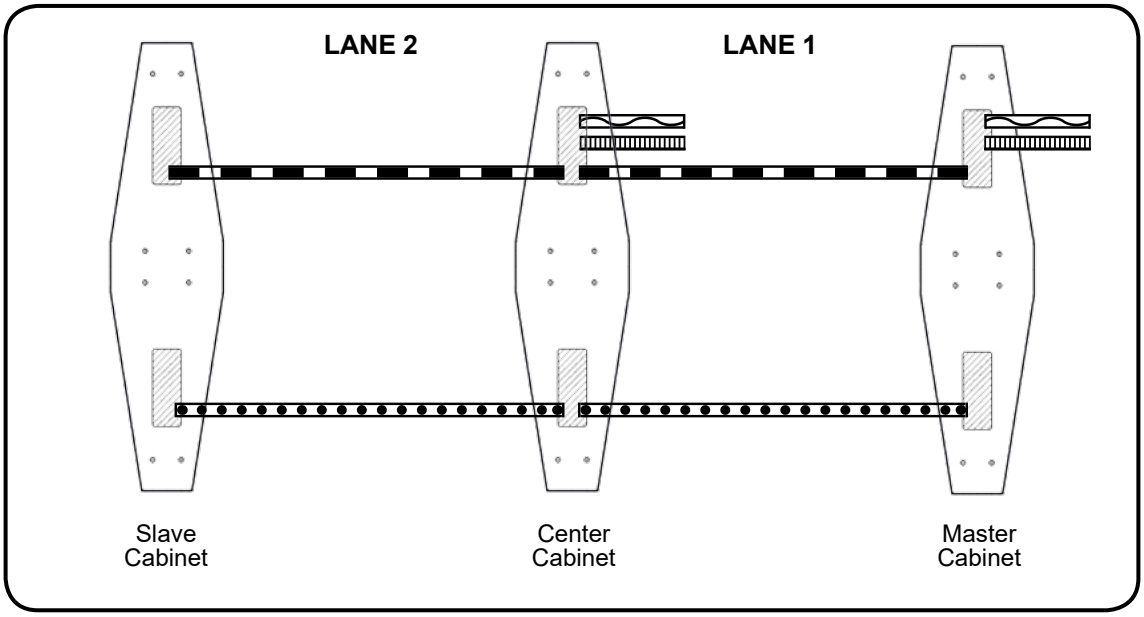


Fig. A3 **Barrier Wing Home Position**

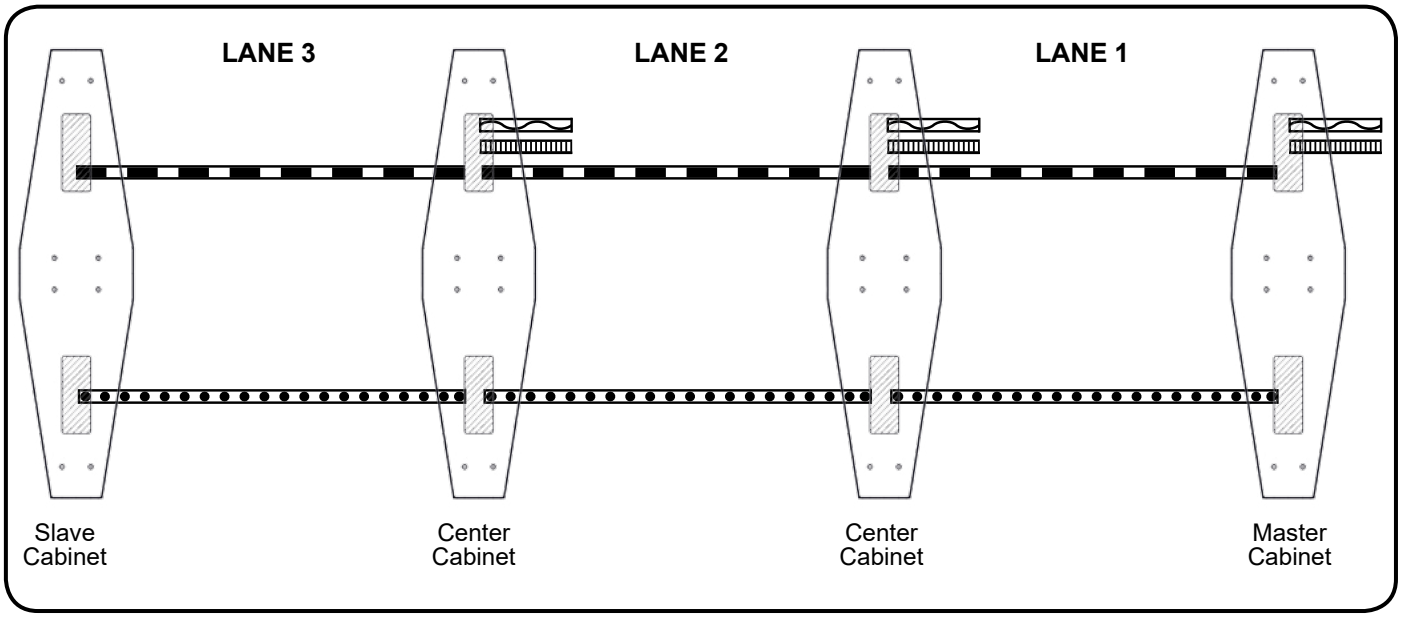


Appendix B - Multi-Lane Conduit Requirements

Two-Lane Configuration



Three-Lane Configuration



Symbology	Description	Conduit Size
	Primary Power**	3/4”
	Access Control / Ethernet	3/4”
	Access Control	3/4”
	Crossover Cable	1.5”

****If the External DC Power Supply option was ordered, use this conduit to route 24VDC.**

Appendix C - External DC Power Supply Enclosure Installation (Optional)

THESE INSTRUCTIONS ARE APPLICABLE FOR EXTERNAL DC POWER SUPPLY INSTALLATIONS ONLY.

Before You Begin

- One power supply is required per lane. Each power supply enclosure can house up to three power supplies. The power supplies are pre-installed at Alvarado prior to shipping. Make sure to locate all required components, and verify the correct number of power supplies are present prior to beginning installation.
- It is assumed that conduit has been run to the master/center cabinet for each lane for low-voltage 24VDC power wiring. Refer to Conduit Requirements section on Pages 9 and 33 for more information.
- Due to the various mounting methods and surfaces available for mounting the enclosure, mounting hardware and detailed mounting instructions are not provided.
- Wire gauge recommendations for 30, 50, and 100 ft. runs are provided on Page 36. If your installation requires runs beyond 100 ft, ensure wire gauge is appropriate and in compliance with local electrical codes.
- The location of the power supply enclosure must adhere to the Environmental Requirements section found on Page 9. Controlled environments such as an electronics closet are ideal.
- See Page 38 for power supply enclosure dimensions.
- It is strongly recommended that a licensed electrician perform this procedure in accordance with applicable local electrical codes.
- Throughout this document, the power supply enclosure is shown with three power supplies installed. The instructions are the same for single and dual power supply installations.

Locate and Mount the Enclosure(s)

⚠ WARNING ENSURE PRIMARY POWER IS SHUT OFF AT THE BREAKER.

1. Determine the installation location for the power supply enclosure(s). If mounting the enclosures to a wall or other surface, use the five (5) provided mounting holes and appropriate hardware [Figure C1].
2. Using a 5/64" Allen wrench, remove the four (4) cover screws and remove the cover [Figure C2].

Fig. C1 **Mounting Holes (Side View)**

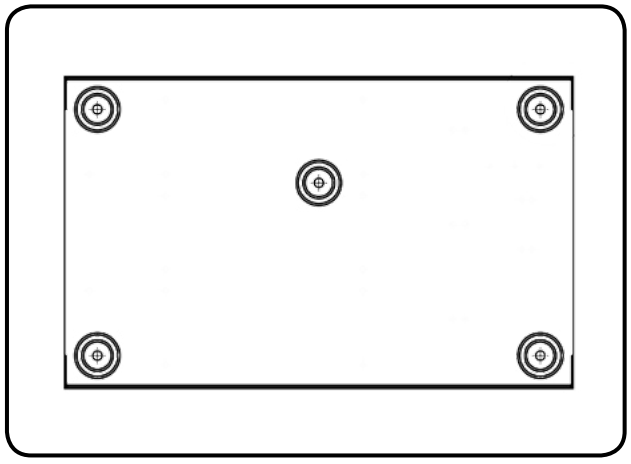
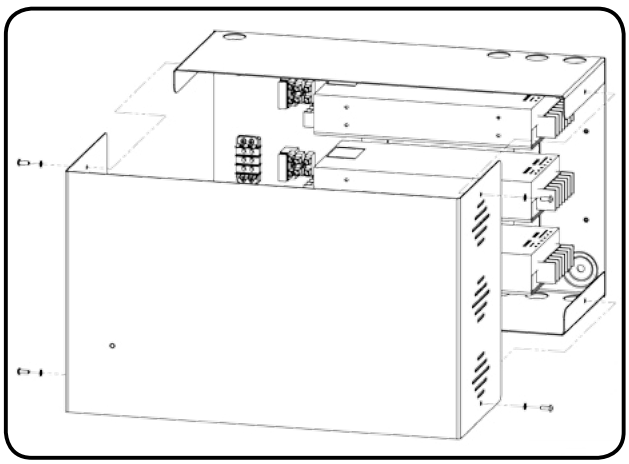


Fig. C2 **Removing Cover Screws**



Connect Primary Power to Enclosure(s)

NOTE

Primary power wiring and connectors are not supplied by Alvarado.

The primary wiring lines for 110VAC and 220VAC consist of the following:

Terminal	110V	220V
Line	Black	Brown
Neutral	White	Blue
Ground	Green	Green/Yellow

3. Route primary power conduit to one of the supplied conduit holes on the enclosure [Figure C3].
4. Locate the pre-installed primary power terminal block [Figure C3]. There is one primary power terminal block per enclosure.
5. Attach each primary power wire to the primary power terminal block according to the table above [Figure C3A].
6. Using a Phillips-head screwdriver, tighten each terminal block connection.
7. Attach the supplied protective cover on the terminial block.
8. Repeat Steps 3 for 7 for additional power supply enclosures.

Fig. C3 **Primary Power Terminal Block**

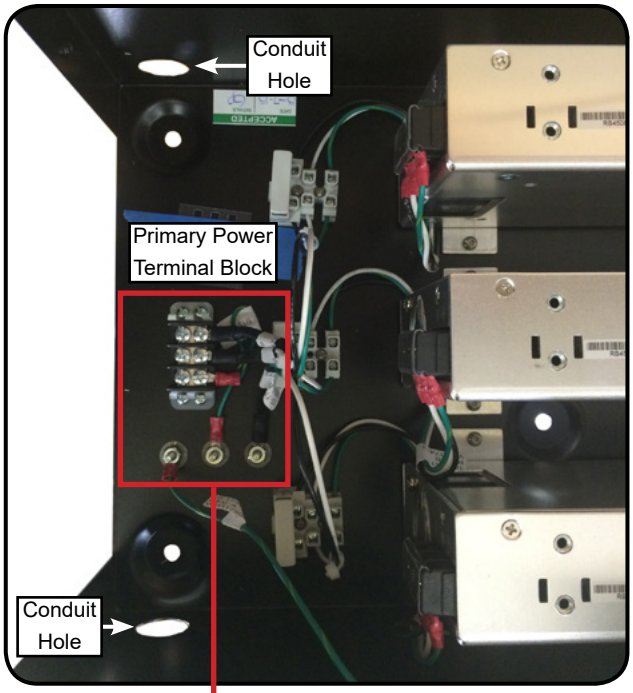
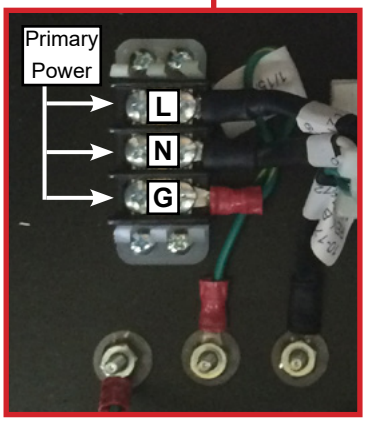


Fig. C3A



Connect Low-Voltage 24VDC from Enclosure to Turnstile(s)

NOTE

Twelve (12) spade connectors are supplied by Alvarado for connecting low-voltage 24VDC power to the turnstiles. If you do not require all twelve connectors, only use what is needed.

Due to the differences of each installation scenario, 24VDC wire is not supplied by Alvarado. See the recommendations below for selecting the best wire for your installation.

DISTANCE	GAUGE
30 ft (9.14m)	16 AWG
50 ft (15.24m)	14 AWG
100 ft (30.48m)	12 AWG

9. Route 24VDC power conduit(s) to supplied conduit holes on the enclosure. See [Figure C7] on Page 39 for location of 24VDC conduit holes.

TIP

If connecting to multiple turnstiles, it is recommended to label each power supply i.e. Lane 1, Lane 2, Lane 3, etc.

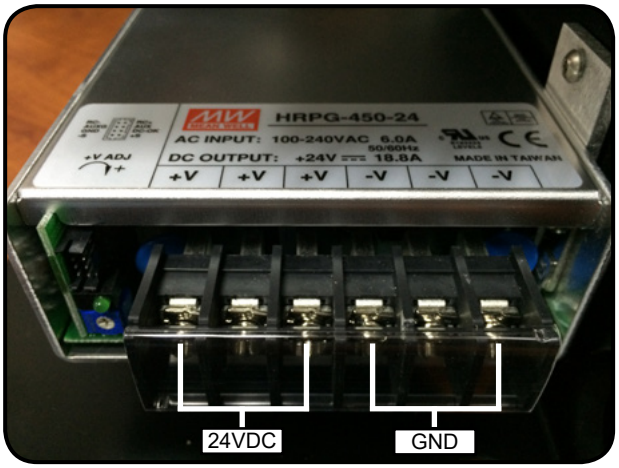
10. For each power supply to be connected, locate the output terminal block [Figure C4]. Each terminal block has three (3) 24VDC (+V) and three (3) ground (-V) terminals. You will only require one (+V) and one (-V) per lane.

NOTE

The 24VDC (+V) and GND (-V) terminals are common.

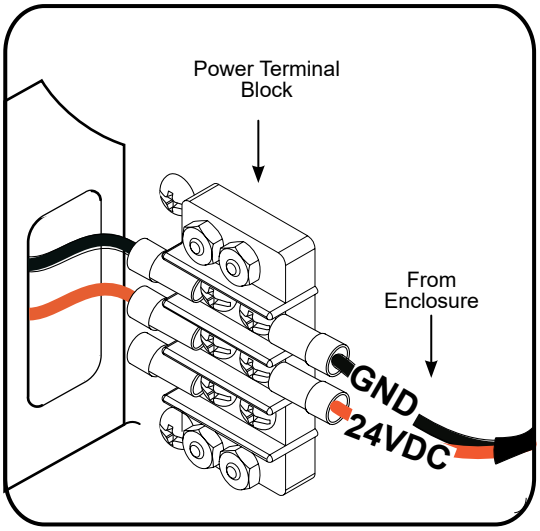
11. Using the supplied spade connectors, connect the 24VDC (+V) and ground (-V) wires to the output terminal block [Figure C4].

Fig. C4 **Power Supply Output Terminal Block**



12. At the turnstile, using the supplied connectors, connect the 24VDC and GND wires to the power terminal block as shown in [Figure C5].
13. Repeat Steps 9 - 12 for additional power supplies and turnstiles.

Fig. C5 **Turnstile Power Terminal Block**



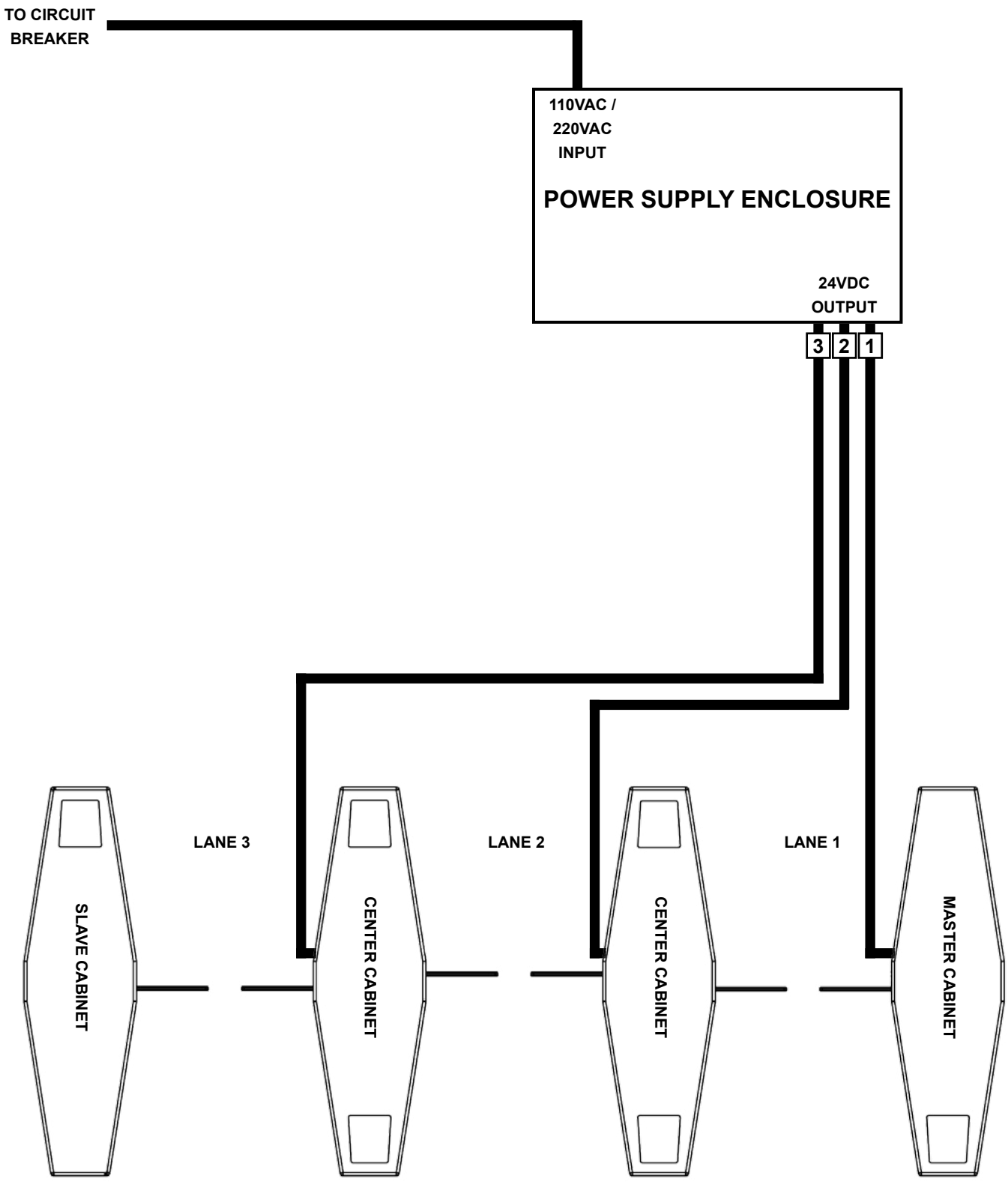
NOTE

The type and orientation of the pre-installed terminal block may differ from what is shown in [Figure C5]. On some installations, the terminal block is 4-pole and rotated 90 degrees .

Return to Crossover Cable Connection section located on Page 19 to continue the installation.

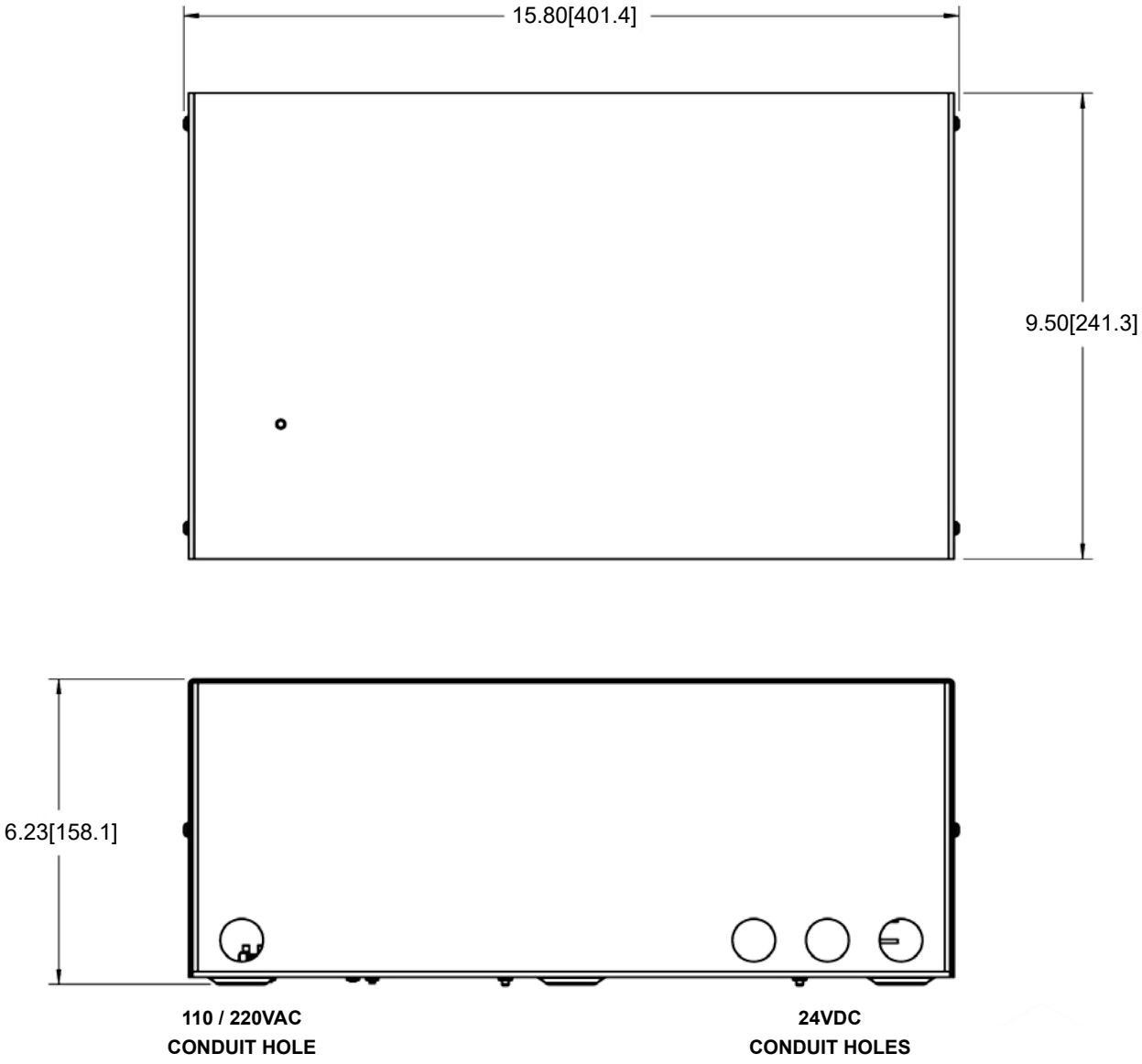
External DC Power Supply Connection Diagram

Fig. C6 **Connection Diagram**



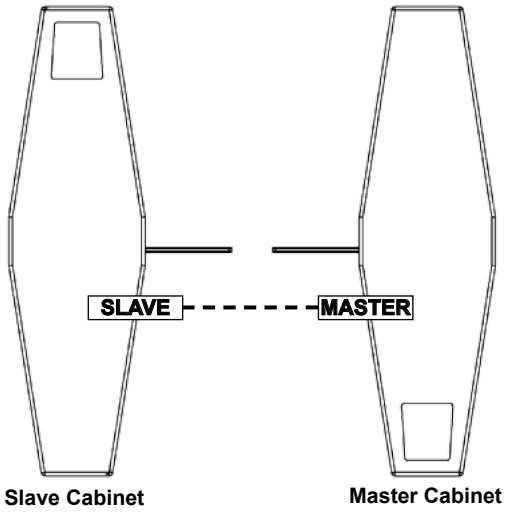
Power Supply Enclosure Dimensions

Fig. D7 **Dimensions**

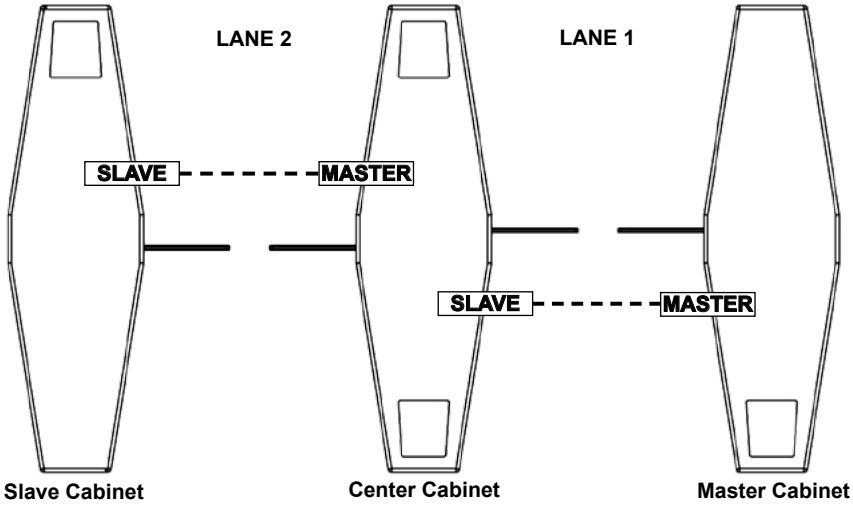


Appendix D - Crossover Cable Connection Diagrams

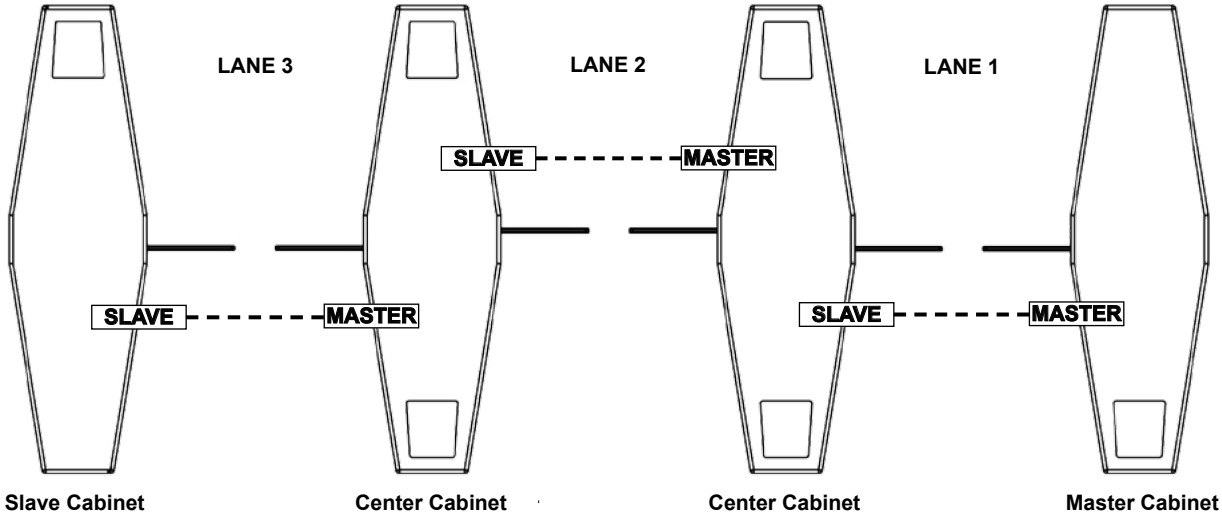
One-Lane Configuration



Two-Lane Configuration



Three-Lane Configuration



Revision History

Revision	Date	Author	Description
1-0	07/18/14	A. Flores	Initial creation. Replaces *SU3500 Installation and Maintanence Guide (PUD2890)*.
1-1	11/13/15	A. Flores	Updated crossover cable length to 8'. Appendix B - Multi-Lane Conduit Requirements Appendix C - External DC Power Supply Enclosure Installation Appendix D - Crossover Cable Connection Diagrams

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