
TSI-4000 User Guide

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TSI-4000 · User Guide

- Ross Part Number: **2400DR-004-02**
- Release Date: April 8, 2022.

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Patents

Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

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This product contains no user serviceable parts. If the unit does not appear to be working properly, please contact Technical Support using the numbers listed under the “**Contact Us**” section of this manual. This product is covered by a generous 1-year warranty and will be repaired without charge for materials or labor within this period. See the “**Warranty and Repair Policy**” section in this manual for details.

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The equipment may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.



If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration. You can also contact Ross Video for more information on the environmental performances of our products.

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If you would like more information on how Ross Video security and privacy practices have been applied to the TSI-4000, what you should know about maintaining security of this product, and how we can partner with you to ensure security throughout this product's life-cycle, contact techsupport@rossvideo.com.

Ross Video has implemented reasonable administrative, technical, and physical safeguards to help protect against security incidents and privacy breaches involving a Ross Video product provided those products are used in accordance with Ross Video instructions for use. However, as systems and threats evolve, no system can be protected against all vulnerabilities and we consider our customers the most important partner in maintaining security and privacy safeguards. If you have any concerns, we ask that you bring them to our attention, and we will investigate. Where appropriate, we will address the issue with product changes, technical bulletins and/or responsible disclosures to customers and regulators. Ross Video continuously strives to improve security and privacy throughout the product life-cycle using practices such as:

- Privacy and Security by Design
- Product and Supplier Risk Assessment
- Vulnerability and Patch Management
- Secure Coding Practices and Analysis
- Vulnerability Scanning
- Access Controls appropriate to Customer Data
- Incident Response
- Clear paths for two-way communication between customers and Ross Video

If you would like to report a potential product related privacy or security issue (incident, breach, or vulnerability), contact techsupport@rossvideo.com.

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Contents

Introduction	9
Documentation Conventions	9
Interface Elements	9
User Entered Text	9
Referenced Guides	9
Menu Sequences	10
Important Instructions	10
Contacting Technical Support	10
Before You Begin	11
Tally Control System Overview	11
TSI-4000 System Overview	11
TSI-4000 Auto-Changeover System	12
Physical Installation	15
Static Discharge	15
Mounting	15
TSI-4000 and TSI-4000-CP Installation	15
TSI-4000 and TSI-4000-CP Interconnection	16
TSI-4000 and TSI-4000-ACO Installation	16
TSI-4000 and TSI-4000-ACO Interconnection	17
TSI-4000-ACO Power	18
TSI-4000 Power	18
Serial Ports	19
Serial Port COM1	19
Serial Ports COM3 to COM12	19
Ethernet Ports	20
USB Ports	21
Diagnostic Connections	21
Unused Connections	21
Setup	23
Controls and Displays Overview	23
Powering On/Off the TSI-4000	23
Button Action	24
Automatic Power On	24
Set Display Brightness	24
Setting Up the Network Interfaces	25
Setting the IP Address and Subnet Mask	25
Setting the Virtual IP Address	26
Remove a Virtual IP Address	27
Set a Gateway Address	27
Apply Network Interface Settings	28
Multiple TSI-4000 Systems	28
Set Local Identity	29
Add to Cluster	29
Modify or Remove from Cluster	30
Apply ID/Cluster Settings	31
Auto-Changeover (ACO) System	31
Button Action	31

Monitor System Health	33
System Status Display	33
System Messages	33
Status Icons	33
Navigation	34
Alarm Conditions Colors	34
Alarm Condition Totals	35
Monitored Item Types	35
Equipment Types	35
Connection Types	36
Specifying How Monitored Items Are Ordered	36
Monitored Item Descriptions	36
Summary Status Button	39
LCD Saver	39
Audible Alarm	39
Temporarily Silence the Alarm	40
Power Supply Alarm	40
Operating the ACO System	41
Overview	41
Status and Control	41
Automatic Mode	41
Manual Mode	41
Override Front Panel Controls	41
Unit Readiness	42
Advanced Alarm Monitoring	43
Suppress Alarms	43
Control the Audible Alarm	44
Disable	44
Enable	44
Adjust the Volume	45
Notification Level	45
Recent Alarm History	45
Status Display Style	46
Alarm Display	46
Monitored Alarm Details	47
Detail Pages	47
TSI-4000	47
TSI Power Supply 1 and TSI Power Supply 2	48
TSI-4000ACO	48
Single Connections	48
Multiple Connections	48
Special Tools and Commands	51
Overview	51
Commands	51
Show MAC Addresses	52
Force Install or Uninstall Removable Components	52
Watchdog System	52
Cancel a Pending Restart	53
Use the Front USB port	53
GPI Network	53
Ping Command	54
TSI-4000ACO Displays and Controls	55

Override Switch	55
TSI-4000ACO Status LEDs	55
READY Status	55
ACTIVE Status	56
Power Status	56
Maintenance	59
Cleaning the LCD	59
Periodic Cleaning	59
TSI-4000 Cleaning	59
TSI-4000PS Cleaning	59
TSI-4000 Power Supply	60
Power Inlet Fuse	60
Replacing a Power Supply	60
TSI-4000 Rear Supports	61
18" (457mm) Mounting Depth	61
19" (483mm) Depth	62
20" (508mm) Depth	63
21" (533mm) Depth	64
22" (559mm) Depth	65
23" (584mm) Depth	66
24" (610mm) Depth	67
25" (635mm) Depth	68
26" (660mm) Depth	69
TSI-4000ACO Rear Supports	71
18" (457mm) Mounting Depth	71
19" (483mm) Depth	72
20" (508mm) Depth	73
21" (533mm) Depth	74
22" (559mm) Depth	75
23" (584mm) Depth	76
24" (610mm) Depth	77
25" (635mm) Depth	78
26" (660mm) Depth	79
Technical Specifications	81
TSI-4000 System Specifications	81
Components	81
Physical	81
Environment	81
Power	82
Network Ports	82
USB Ports	82
Serial Ports	82
TSI-4000ACO System Specifications	82
Components	82
Physical	82
Environment	83
Power	83
Network Ports (per TSI-4000)	83
USB Ports (per TSI-4000)	83
Serial Ports	83

Software Licenses	85
winsock.h	85
SHA-1 code	85
CRC Calculation code	85
String Formatting code	85
Webserver code	85
Web Server code	85
XML Support code	86
JSON Parser	86
3rd Party Library: libhiredis.so.0.13	86
Library: libpthread.so.0	87
Library: libevent-2.0.so.5	87
Library: librt.so.1 => /lib/x86_64-linux-gnu/librt.so.1 (0x00007fe1c39c0000)	88
Tally System Console Software Licenses	89
Service Information	91
Troubleshooting Checklist	91
Warranty and Repair Policy	91

Introduction

This guide covers the installation, configuration, and use of the TSI-4000. The following chapters are included:

- “**Introduction**” summarizes the guide and provides important terms, and conventions.
- “**Before You Begin**” provides general information to keep in mind before installing and configuring your TSI-4000.
- “**Physical Installation**” provides instructions for the physical installation of the TSI-4000.
- “**Setup**” provides a general overview of the configuration options available on the TSI-4000.
- “**Monitor System Health**” outlines how to monitor the health of the TSI-4000 via the LCD and front panel controls.
- “**Operating the ACO System**” outlines the three operating modes when using an Auto Change Over (ACO) System.
- “**Advanced Alarm Monitoring**” outlines how to customize the monitoring settings to aid in troubleshooting a system problem.
- “**Special Tools and Commands**” outlines how to use the TSI-4000 special tools and commands for troubleshooting.
- “**Maintenance**” outlines routine maintenance tasks for the TSI-4000.
- “**TSI-4000 Rear Supports**” presents diagrams that may be used when mounting the TSI-4000 and TSI-4000-CP in a rack.
- “**TSI-4000ACO Rear Supports**” presents diagrams that may be used when mounting the TSI-4000ACO in a rack.
- “**Technical Specifications**” provides technical specification details on the TSI-4000.
- “**Software Licenses**” provides third-party software license information for your TSI-4000.
- “**Service Information**” provides information on the warranty and repair policy for your TSI-4000.

Documentation Conventions

Special text formats are used in this guide to identify parts of the user interface, text that a user must enter, or a sequence of menus and sub-menus that must be followed to reach a particular command.

Interface Elements

Bold text is used to identify a user interface element such as a dialog box, menu item, or button. For example:

In the **Network** tab, click **Apply**.

User Entered Text

Courier text is used to identify text that a user must enter. For example:

In the **Language** box, enter `English`.

Referenced Guides

Text set in bold and italic represent the titles of referenced guides, manuals, or documents. For example:

For more information, refer to the ***DashBoard User Guide***.

Menu Sequences

Menu arrows are used in procedures to identify a sequence of menu items that you must follow. For example, if a step reads “**File > Save As,**” you would click the **File** menu and then click **Save As**.

Important Instructions

Star icons are used to identify important instructions or features. For example:

- ★ Contact your IT department before connecting to your facility network to ensure that there are no conflicts. They will provide you with an appropriate value for the IP Address, Subnet Mask, and Gateway for your device.

Contacting Technical Support

At Ross Video, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24-hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross Video personnel. During business hours (Eastern Time), technical support personnel are available by telephone. After hours and on weekends, a direct emergency technical support phone line is available. If the technical support person who is on call does not answer this line immediately, a voice message can be left and the call will be returned shortly. This team of highly trained staff is available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

- **Technical Support:** (+1) 613-652-4886
- **After Hours Emergency:** (+1) 613-349-0006
- **E-mail:** techsupport@rossvideo.com
- **Website:** <http://www.rossvideo.com>

Before You Begin

This guide is intended to be used by both operations and maintenance personnel. The guide provides an overview of the TSI-4000 system, describes how to install and set-up TSI-4000 system components, and how to operate and maintain the system once it has been configured. The TSI-4000 components covered are:

- TSI-4000 Tally System Interface
- TSI-4000ACO Auto-Changeover
- TSI-4000CP Connector Panel

This chapter provides an overview the Ross Video Tally Control System and the TSI-4000 Tally System Interface, the TSI-4000ACO Auto-Changeover, and the TSI-4000CP Connector Panel units. This information in this chapter is intended to assist the reader in understanding the function of a tally control system and the role of the TSI-4000 in it.

Tally Control System Overview

The high number of video signals in a television organization makes signal identification and utilization very important to the smooth operation of productions and network distribution. The job of the tally control system is to provide connection confidence where video signals are monitored and inform operators and talent how signals are being utilized.

A television production manages video signals from a wide variety of sources including cameras, remote feeds, playback servers, graphics machines, and even feeds from other productions. Several sources are often used together to build a single video feed. Everyone involved in the production from control room staff to on-air talent needs to have information about how all these sources are utilized as quickly as possible, sometimes even before they are utilized. The entire situation becomes more complex when multiple productions, master control, and network distribution all happen simultaneously. And limited resources means that sources are often shared with other productions which can easily lead to costly production mistakes. A system that brings the most important information to the right people at the right moment is essential in this environment. All these requirements are fulfilled by a comprehensive tally control system. The tally control system coordinates with video switchers and routers, monitor walls, news information systems, graphics systems, GPIO, and system operators to make sense of the chaos.

The TSI-4000 Tally Control System fills this role by following signals throughout the system, communicating with switching and routing equipment in real time, to produce an overall picture of how and where video signals flow to monitors and whether those signals are reaching on-air program or transmission feeds.

We offer two types of tally control systems: the TSI-4000 System and the TSI-4000 Auto-Changeover (ACO) System.

TSI-4000 System Overview

A TSI-4000 System includes a TSI-4000 and a TSI-4000-CP Connector Panel.

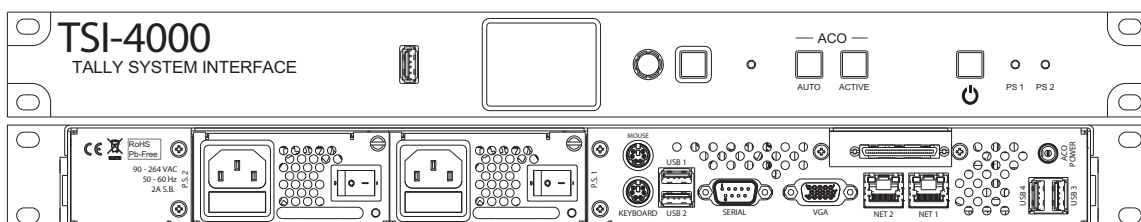


Figure 1 TSI-4000 — Front and Rear Panels

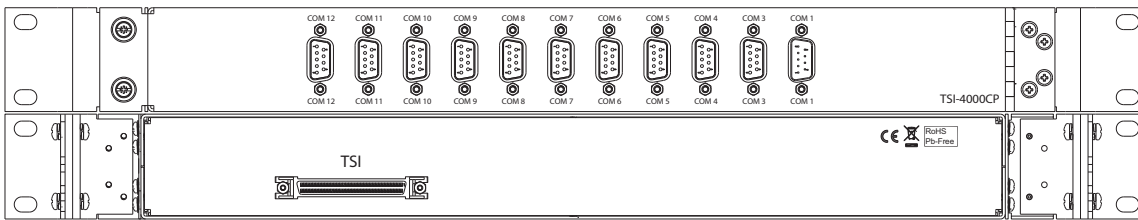


Figure 2 TSI-4000CP — Front and Rear Panels

★ The TSI-4000 and the TSI-4000-CP mount in 1RU.

The TSI-4000 includes these features:

- Front panel full-color LCD and navigation controls to monitor TSI-4000 health and connections to all remote equipment
- Front panel USB port for system backup and maintenance
- Dual plug-in power-supplies
- Two Ethernet network ports, expandable to four
- Programmable operator notification of detected faults
- Audible notification of detected faults

The TSI-4000-CP includes these features:

- Ten RS-422/485 serial ports
- One RS-232 serial port

TSI-4000 Auto-Changeover System

A TSI-4000 Auto-Changeover System includes two TSI-4000s and a TSI-4000-ACO Auto-Changeover to provide continued system operation in the event of a loss of power to, or removal of, either TSI-4000.

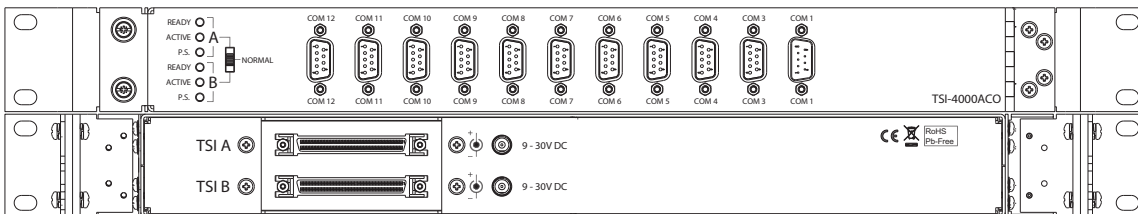


Figure 3 TSI-4000ACO — Front and Rear Panels

★ The TSI-4000 units and the TSI-4000ACO mount in 2RU.

Each TSI-4000 includes these features:

- Front panel full-color LCD and navigation controls to monitor TSI-4000 health and connections to all remote equipment
- Button controls to quickly choose the active TSI-4000
- Front panel USB port for system backup and maintenance
- Dual plug-in power-supplies
- Two Ethernet network ports, expandable to four
- Programmable operator notification of detected faults
- Audible notification of detected faults

The TSI-4000ACO includes these features:

- Ten RS-422/485 serial ports
- One RS-232 serial port
- Status LEDs and TSI-4000 selection override switch

Physical Installation

This chapter assists in the installation and connection of the TSI-4000 Tally System Interface, the TSI-4000CP Connector Panel, and the TSI-4000ACO Auto-Changeover.

If you have questions pertaining to the installation, contact us at the numbers listed in the section “**Contacting Technical Support**”. Our technical staff is always available for consultation, training, or service.

Static Discharge

Throughout this chapter, please heed the following cautionary note:



ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Mounting

Mount the TSI-4000 units in a standard 19” rack equipped with front and rear mounting rails. The TSI-4000 rear support assembly is adjustable for rack depths between 18” (457mm) and 26” (660mm).

Either the TSI-4000CP or TSI-4000ACO attach to the TSI-4000 rear support assembly. With front to rear rack rail depths of less than 22” (559mm), the serial port mating connectors attached to TSI-4000-CP or TSI-4000-ACO may extend beyond the rear of the rack.

There are no special mounting requirements, however, it should be noted that any excessive direct light on the front of the unit can make the LCD and status LEDs difficult to distinguish. Adequate clearance should be provided at the rear of the units for the connectors and cables.

The TSI-4000 uses internal cooling fans. The air is drawn in from both sides of the unit and exhausts to the rear. Ensure the ventilation holes are not blocked by cables or other equipment.

TSI-4000 and TSI-4000-CP Installation

1. Attach the support bars to the rear rack ears using the supplied 6-32 x 1/4” SEMS screws. Refer to the chapter “**TSI-4000 Rear Supports**” for mounting details.
- ★ The support bars are not symmetrical; the support arm must be in the lower position.
2. Detach the TSI-4000-CP from the left mounting bracket by unscrewing the 2 thumbscrews.
3. Attach the TSI-4000-CP left and right mounting brackets to the rear rack ears using the supplied 6-32 x 5/16” SEMS screws. Refer to the chapter “**TSI-4000 Rear Supports**” for mounting details.
4. Connect the 68-pin D-subminiature end of the supplied 68-pin cable assembly to the TSI-4000-CP.
5. Reattach the left mounting bracket to the TSI-4000-CP.
6. Install the TSI-4000 from the front side of the rack.
7. Install the TSI-4000-CP and rear supports from the back side of the rack.
- ★ The support bars insert into the brackets on the left and right side of the TSI-4000.
8. After securing the rear rack ears to the rear rack rails:

- a. Unscrew the 2 thumbscrews.
- b. Swing the TSI-4000-CP out of the way.
- c. Connect the 68-pin VHDCI end of the supplied 68-pin cable assembly to the TSI-4000.

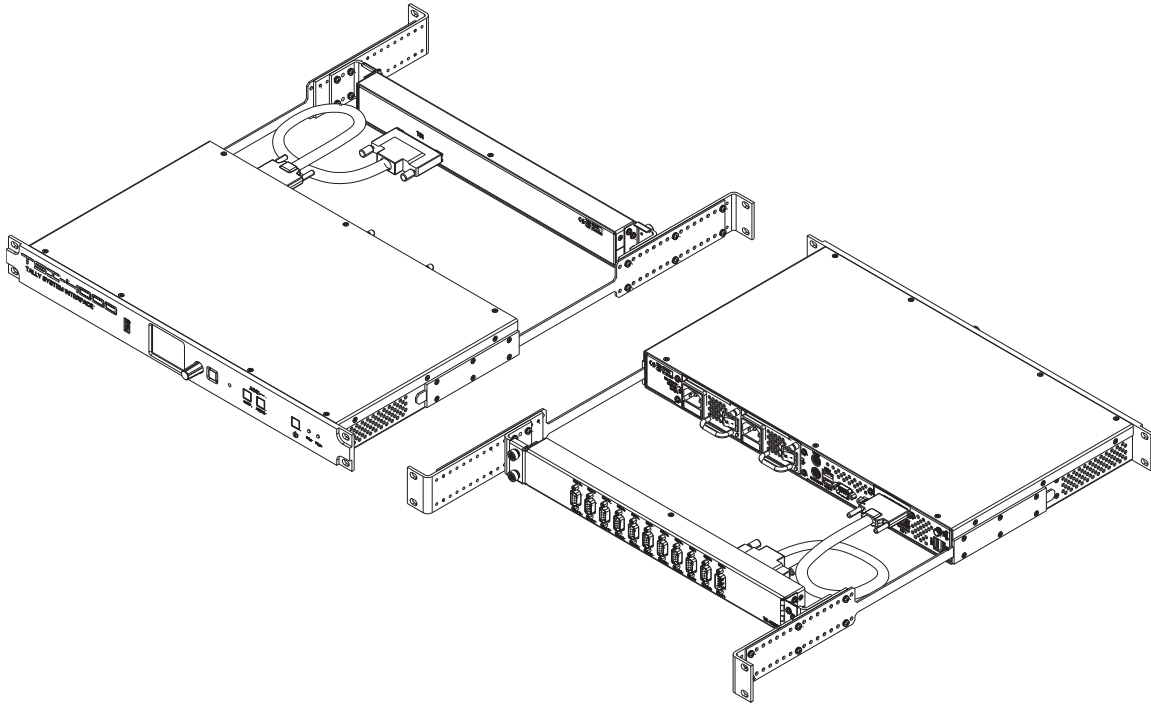


Figure 4 TSI-4000 and TSI-4000-CP Installation

TSI-4000 and TSI-4000-CP Interconnection

The TSI-4000 is connected to the TSI-4000-CP using the supplied 68-pin cable assembly as described in the section “**TSI-4000 and TSI-4000-CP Installation**”.

The 68-pin VHDCI end of the cable assembly connects to the unmarked 68-pin VHDCI jack on the rear of the TSI-4000. The 68-pin D- subminiature end of the cable assembly connects to the 68-pin D- subminiature jack on the rear of the TSI-4000-CP. Refer to **Figure 4**.

TSI-4000 and TSI-4000-ACO Installation

1. Attach the support bars to the rear rack ears using the supplied 6-32 x 1/4” SEMS screws. Refer to the chapter “**TSI-4000ACO Rear Supports**” for details.
- ★ The support bars are not symmetrical; the support arm must be in the lower position.
2. Detach the TSI-4000-ACO from the left mounting bracket by unscrewing the 2 thumbscrews.
3. Attach the TSI-4000-ACO left and right mounting brackets to one set of the rear rack ears using the supplied 6-32 x 5/16” SEMS screws. Refer to the chapter “**TSI-4000ACO Rear Supports**” for details.
4. Connect the 68-pin D-subminiature end of each of the supplied 68- pin cable assemblies to the TSI-4000-ACO.
5. Connect one end of each of the supplied TSI-4000-ACO power cable assemblies to the TSI-4000-ACO.
6. Reattach the left mounting bracket to the TSI-4000-ACO.

7. Install both TSI-4000 units from the front side of the rack.
8. Install the TSI-4000-ACO and rear supports from the back side of the rack.
- ★ The support bars insert into the brackets on the left and right side of the TSI-4000 chassis.
- ★ The TSI-4000-ACO can be positioned behind either TSI-4000.
9. After securing the rear rack ears to the rear rack rails, unscrew the 2 thumbscrews and swing the TSI-4000-ACO out of the way.
10. Connect the 68-pin VHDCI end of the upper 68-pin cable assembly to the upper TSI-4000.
11. Connect the loose end of the upper TSI-4000-ACO power cable assembly to the ACO POWER connector on the upper TSI-4000.
12. Connect the 68-pin VHDCI end of the lower 68-pin cable assembly to the lower TSI-4000.
13. Connect the loose end of the lower TSI-4000-ACO power cable assembly to the ACO POWER connector on the lower TSI-4000.

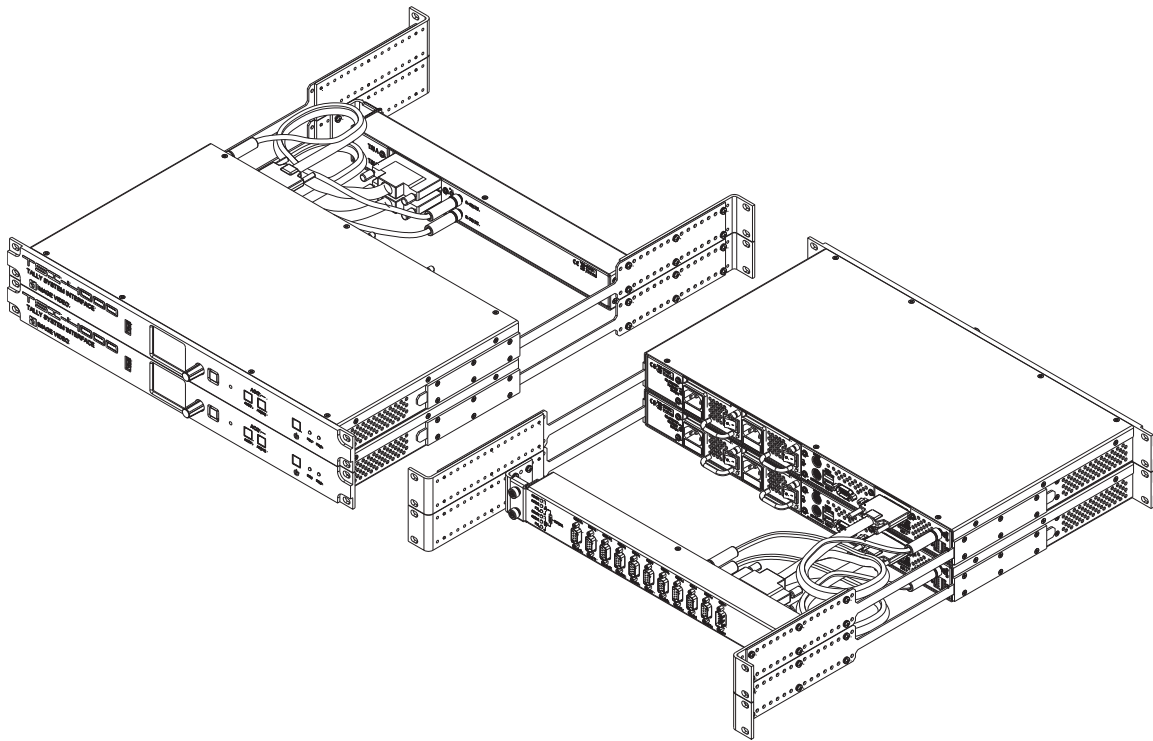


Figure 5 TSI-4000 and TSI-4000-ACO Installation

TSI-4000 and TSI-4000-ACO Interconnection

Each TSI-4000 is connected to the TSI-4000-ACO using the supplied 68-pin and power cable assemblies as described in the section “**TSI-4000 and TSI-4000-ACO Installation**”.

The 68-pin VHDCI end of the cable assembly connects to the unmarked 68-pin VHDCI jack on the rear of the TSI-4000. The 68-pin D- subminiature end of the cable assembly connects to the 68-pin D- subminiature jack on the rear of the TSI-4000-ACO labeled TSI A or TSI B. Refer to **Figure 5**.

One end of each power cable assembly connects to the coaxial power jack labeled ACO POWER on the rear of the TSI-4000 and the other end to the corresponding coaxial power jack on the rear of the TSI-4000-ACO.

TSI-4000-ACO Power

The TSI-4000ACO is powered by external power sources connected to the coaxial power jacks on the rear of the unit. Power from both external sources is internally combined and regulated. The TSI-4000ACO can be powered from either power connector; however, for maximum reliability power sources should be connected to both connectors.

Typically the TSI-4000ACO is powered from the TSI-4000s using the supplied TSI-4000ACO power cable assemblies as described in the section “**TSI-4000 and TSI-4000-ACO Installation**”.

If other power sources are being used, the power connector should be wired according to Table 1 below. The mating connectors are coaxial power plugs with a 2.5mm center pin (Switchcraft 760, Switchcraft 760K, or equivalent).

There is no power switch for the unit. The status of the power sources is indicated by LEDs on the TSI-4000ACO. See “**TSI-4000ACO Status LEDs**” for details.

Table 1 Power Connector Pinouts

Pin #	Function
Center	+9 to +30V DC
Sleeve	Ground



Figure 6 Power Connector

TSI-4000 Power



Caution — *Shock Hazard. Disconnect all power sources before servicing to avoid shock hazard.*

Attention — *Risque d'électrocution. Débranchez toutes les sources d'alimentation avant l'entretien.*

The TSI-4000 is powered by rear mounted dual plug-in power supplies.

Power is applied to the power supply via a fused IEC 320 C14 style power inlet connector. The power supply input range is 100VAC to 240VAC, 50Hz to 60Hz.

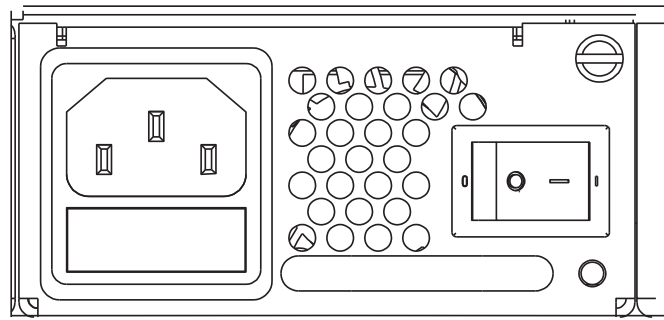


Figure 7 TSI-4000 Power Supply

The power switch controls the flow of the AC power into the supply. When the switch is off the power supply cannot provide power to the TSI-4000. When the switch is on the power supply is able to provide power to the TSI-4000 under control of the front panel. See “**Powering On/Off the TSI-4000**” for details.

★ The power supply has an internal fan that exhausts through the ventilation holes on the face of the supply. Ensure the ventilation holes are not blocked by cables or other equipment.

The LED provides operational status indication of the supply. (Table 2)

Table 2 Power Supply Status LED Indications

Color	Description
Green	The TSI-4000 is powered on and the power supply is operating normally.
Amber	The power supply has AC power and the TSI-4000 is powered off.
Red	The power supply does not have AC power or has detected a fault.
Off	Neither power supply has AC power.

Serial Ports

The TSI-4000 system provides eleven independent serial ports: one RS-232 serial port and ten RS-422/485 serial ports. These ports are used to control and monitor other serially connected devices in the tally control system. Connections to the serial ports are made on the TSI-4000-CP or TSI-4000ACO.

★ The configuration of the TSI-4000 specifies the function of each serial port.

Port **COM1** has RS-232 voltage levels on a male 9-pin 'D' connector and ports **COM3** to **COM12** have RS-422/485 voltage levels on female 9-pin 'D' connectors.

In a TSI-4000 system all serial port connections are on the TSI-4000-CP. In a TSI-4000 Auto-Changeover system all serial port connections are on the TSI-4000ACO. The serial connector pinouts of the TSI-4000-CP and TSI-4000ACO are identical.

To allow access to the TSI-4000 rear panel connections, bundle the serial port cables to the hinge side of the TSI-4000-CP or TSI-4000ACO.

Serial Port COM1

Serial port **COM1** has RS-232 voltage levels. This port uses the standard PC pinout for RS-232 serial links on a male 9-pin 'D' connector. (Table 3) The 4-40 jack-screws allow for mating connector locking.

Table 3 COM1 Connector Pinouts

Pin #	Function
1	DCD (Data Carrier Detect)
2	RxD (data from external device)
3	TxD (data to external device)
4	DTR (Data Terminal Ready)
5	GND (Signal Ground)
6	DSR (Data Set Ready)
7	RTS (Request To Send)
8	CTS (Clear To Send)
9	RI (Ring Indicator)

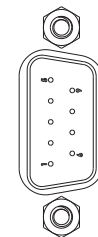


Figure 8 Male DE-9

Serial Ports COM3 to COM12

Serial ports **COM3** to **COM12** have RS-422/485 voltage levels. The ports drivers and receivers are suitable for either RS-422 or RS-485 circuits. These ports use the standard SMPTE pinout for RS-422 serial links on a female 9-pin 'D' connector. (Table 4) The 4-40 jack-screws allow for mating connector locking.

Table 4 COM3 to COM12 Connector Pinouts

Pin #	Function
1	Ground
2	Rx Data - (data from external device)
3	Tx Data + (data to external device)
4	Ground (Tx Data Common)
5	Not connected
6	Ground (Rx Data Common)
7	Rx Data + (data from external device)
8	Tx Data - (data to external device)
9	Ground

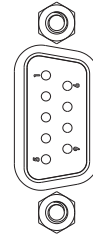


Figure 9 Female DE-9

Adapters are available to convert the female 9-pin 'D' connector to a 6P6C modular jack connector if necessary. The 6P6C modular jack may also be referred to as an RJ-11 or RJ-12 jack in other literature.

Ethernet Ports

The TSI-4000 provides two 10Base-T / 100Base-TX / 1000Base-T Ethernet ports. Up to two additional Ethernet ports can be added using USB-to-Ethernet adapters. The Ethernet ports are used to connect to other networked devices in the tally control system. The plastic retaining spring clip on the plug provides mating connector locking.

Table 5 NET1 and NET2 Connector Pinouts

Pin #	Function
1	BI_DA+
2	BI_DA-
3	BI_DB+
4	BI_DC+
5	BI_DC-
6	BI_DB-
7	BI_DD+
8	BI_DD-

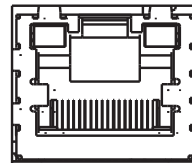


Figure 10 8P8C Modular Jack

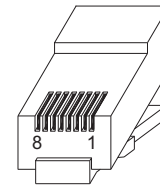


Figure 11 8P8C Modular Plug

The Internet Protocol (IP) settings of each port must be configured from the TSI-4000 front panel. See **“Setting Up the Network Interfaces”** for details. The port hardware automatically sets the data transfer rate to 10Mbps, 100Mbps, or 1Gbps and the transfer mode to half or full- duplex.

★ The configuration of the TSI-4000 specifies the IP settings of each network connected device.

Ethernet ports **NET1** and **NET2** have status LEDs in their connectors. The upper left LED illuminates amber when a 1Gbps connection is established, green when a 100Mbps connection is established, or off when a 10Mbps connection is established or there is no connection. The upper right LED blinks when there is network activity. The TSI-4000 status display also has network activity indicators. See **“Status Icons”** for details.

These ports use the standard IEEE pinout on an 8P8C modular jack. The 8P8C modular jacks may also be referred to as RJ-45 jacks in other literature.

USB Ports

The TSI-4000 provides four USB 2.0 ports on the rear panel and one USB 2.0 port on the front panel. All five ports use USB standard-A receptacle type connectors. (Table 6) The friction fit of the plug provides mating connector locking.

- Rear panel ports USB 1 and USB 2 can be used to connect a keyboard for diagnostic purposes.
- Rear panel ports USB 3 and USB 4 are used for the USB-to-Ethernet adapters.
- The front panel USB port is unlabeled. It is used for system backup and maintenance.

Table 6 USB Connector Pinouts

Pin #	Function
1	+5V
2	D-
3	D+
4	Ground

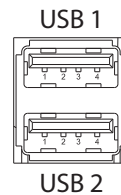


Figure 12 USB 1 and USB 2

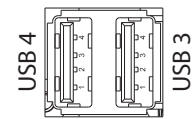


Figure 13 USB 3 and USB 4

Diagnostic Connections

The KEYBOARD and VGA connections can be used for diagnostic purposes as directed by Ross Video support personnel.

A computer keyboard with a PS2 connector and a VGA compatible monitor can be connected if required. A computer keyboard can also be connected to an available USB port.

Unused Connections

The MOUSE and SERIAL connections are not used by the TSI-4000.

Setup

The TSI-4000 must be set up before it can be used in a tally control system. This chapter is a general set-up guide.

- ★ Before proceeding, the administrator of the network to be connected to the TSI-4000 must provide the specific IP addresses and other network parameters.

Controls and Displays Overview

The full-color LCD provides quick access to all system information. Use the rotating **Selector** knob to scan a color-coded status bar and bring information to the display specific to the health of each connection in the system. (**Figure 14**)

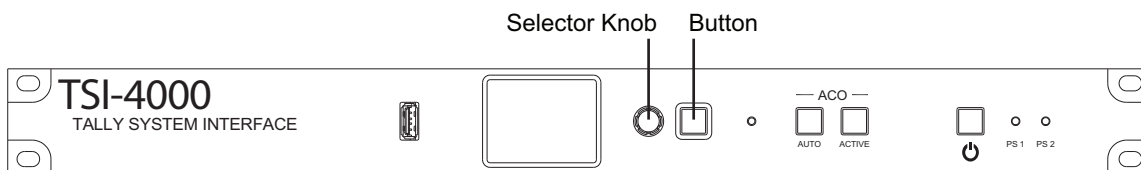


Figure 14 Location of Selector knob and Button

Press the **Selector** knob to present a menu of items to silence or suppress alarms, change system settings, get more detailed connection information, or access special system tools.

Press the button beside the **Selector** knob to cancel a menu selection before confirming it, to back out of a menu item, or to sort the status bar according to type of connection, type of equipment connected, or most recent alarms. The button also indicates the overall health of the system by turning red while any alarm is detected. The button is green while no alarms are present.

Powering On/Off the TSI-4000

Press the Power button to power on or power off the TSI-4000. (**Figure 15**) Once powered on, the unit begins operating as previously configured.

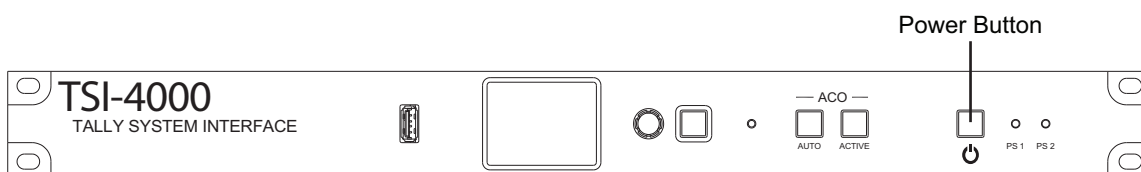


Figure 15 Location of Power Button

The Power button may flash briefly while the unit is powering on or powering off. Once powered on, the Power button is green. Once powered off, the Power button is amber.

If the Power button is off, the unit is not connected to an AC power source or the rear power supply switches are in the off position.

If there is a malfunction, the Power button continues to flash for five seconds. In this case, press the Power button a second time while it is flashing to force the unit to power on or power off.

If there are two power supplies installed and one of the power supplies does not have AC power, the Power button is red while the unit is powered off. This may also indicate a power supply malfunction.

Button Action

The TSI-4000 may be installed in a location where it is easy for accidental operation of the Power button to occur. To help prevent this, use the double action feature of the front panel buttons.

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **Button Actions** item.
4. Select the **Buttons** item.
5. Turn the **Selector** knob to highlight **Press Twice**.
6. Press the **Selector** knob to confirm.

With the double action feature enabled, pressing the Power button only once shows a reminder that the button must be pressed a second time to power the unit on or off.

For auto-changeover systems, the double action setting also applies to the two buttons **AUTO** and **ACTIVE**.

Automatic Power On

For installations where the TSI-4000 must operate continuously, the unit can be setup to automatically power on once AC power is restored following a power interruption. Alternately, the unit can be setup to either resume operating in its most recent power state, or require that it be manually powered on after a power interruption.

★ Initially, the automatic power on setting is Last State.

To set the power on method that will be used after a power interruption

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **Button Actions** item.
4. Select the **Power** item.
5. To resume the previous power state after a power interruption, turn the **Selector** knob to highlight **Last State**.
6. To always power on the unit after a power interruption, turn the **Selector** knob to highlight **Auto On**.
7. To always require the unit to be manually powered on after a power interruption, turn the **Selector** knob to highlight **Manual On/Off**.
8. Press the **Selector** knob to confirm.

Set Display Brightness

The brightness of the LCD back-light can be adjusted to suit various ambient lighting conditions. There are two brightness level settings:

- The normal level is the LCD back-light brightness while the front panel controls are in use. The normal level can be set from 1 to 100% of full brightness.
 - The dim level is the LCD back-light brightness after none of the controls have been used for at least five minutes. The dim level can be set from 0 to 100% of full brightness.
- ★ Set both levels the same for constant LCD brightness. Initially, the normal level is 100% and the dim level is 40%.

To set the normal brightness

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. select the **LCD Backlight** item.
4. Select the **Normal** item.
5. Turn the **Selector** knob to highlight the desired percentage.
6. Turn the **Selector** knob rapidly to select by 10% at a time.
7. Press the **Selector** knob to confirm.

To set the dim brightness

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item
3. Select the **LCD Backlight** item.
4. Select the **Dim** item.
5. Turn the **Selector** knob to highlight the desired percentage.
6. Turn the **Selector** knob rapidly to select by 10% at a time.
7. Press the **Selector** knob to confirm.

Setting Up the Network Interfaces

Up to four Ethernet network interfaces can be specified and used by the TSI-4000. Two are built-in. One or two more may be installed by connecting USB-to-Ethernet adapters at the rear of the unit.

The TSI-4000 requires at least one network interface to allow system configuration from a host computer and to communicate with remote equipment as directed by the system configuration.

Each network interface is designated an IP address and subnet mask. If communication with devices outside of the local subnets is required, a gateway address must also be designated. The gateway address must fall within the subnet of one of the network interfaces. Setting a gateway address is unnecessary if all interested devices fall within the subnet of at least one of the network interfaces.

A network interface can also be assigned a virtual IP address and subnet mask. This feature allows the two TSI-4000 units paired in an auto- changeover system to appear to have a single IP address when communicating with other devices.

Network interfaces can be configured individually or any number of interfaces may be configured at once.

Setting the IP Address and Subnet Mask

To set an IP address and subnet mask

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **Network** item.

The current IP address of each network interface appears along with an interface number from 1 to the number of network interfaces installed.

4. Turn the **Selector** knob to highlight the desired network interface.
5. Press the **Selector** knob.

The current IP address and subnet mask settings of the selected network interface appear.

6. To set the IP address, turn the **Selector** knob to highlight the **Address** item, or to set the subnet mask, turn the **Selector** knob to highlight the **Subnet** item.

The procedure to set either item is the same. The IP address or subnet mask appears in the familiar “dotted quad” format. Each number in the dotted quad is set in turn from left to right.

7. Press the **Selector** knob.

The first number appears with each of the numbers digits at the center of a column of possible digits.

8. Turn the **Selector** knob to highlight the desired number.

- ★ Turn slowly to change the units digit. Turn rapidly to change the tens digit. The previously confirmed value for each digit appears in orange.

9. Once the desired number is highlighted, or the number does not need to be changed, press the **Selector** knob to confirm and move right to the next dotted quad number.

10. Proceed until each number is set as desired.

11. Once the fourth number is set, the new address or subnet setting appears. The other setting can then be modified if desired.

While setting a dotted quad number, return to a previous dotted quad number by pressing the button beside the **Selector** knob until the desired number appears with columns for each digit as before. To cancel the new setting entirely, press the button until the original address and subnet display appears.

- ★ Set the IP address and subnet mask of unused network interfaces to 0.0.0.0.

Once all desired network interface settings are complete, they must be applied before taking effect. See “**Apply Network Interface Settings**”. Menu items with unapplied changes are identified with a yellow bar.

Setting the Virtual IP Address

A virtual IP address is set to permit the two TSI-4000 units paired in an auto-changeover system to appear to have a single IP address when communicating with other devices. To use a virtual IP address, the same IP address must be assigned to one network interface in each TSI-4000 in the pair. Follow the procedure described below twice - once for each unit.

To set a virtual IP address and its subnet mask

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **Network** item.

The current IP address setting of each network interface appears along with an interface number from 1 to the number of network interfaces installed.

4. Turn the **Selector** knob to highlight the desired network interface to be given a virtual IP address.
5. Press the **Selector** knob.
6. If previously set, the current virtual IP address appears below the primary IP address and subnet mask of the network interface.
7. If not previously set, **Add Virtual** appears.
 - a. Turn the **Selector** knob to highlight either of these items.
 - b. Press the **Selector** knob.

- c. The current virtual IP address and subnet mask settings appear. Initially, these are set to the same subnet mask and the first IP address on that subnet. The IP address and subnet mask can be modified just like the IP address and subnet mask as described in “**Setting the IP Address and Subnet Mask**”.
8. After the virtual IP address and subnet mask are set as desired, press the button beside the **Selector** knob.

All network interface settings, including virtual IP addresses, must be applied before taking effect. See “**Apply Network Interface Settings**”. Menu items with unapplied changes are identified with a yellow bar.

Remove a Virtual IP Address

To remove a virtual IP address and its subnet mask

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **Network** item.

The current IP address setting of each network interface appears along with an interface number from 1 to the number of network interfaces installed.

4. Turn the **Selector** knob to highlight the desired network interface from which to remove the virtual IP address.
5. Press the **Selector** knob.
6. Turn the **Selector** knob to highlight **Remove Virtual**.
7. Press the **Selector** knob.

All network interface settings, including virtual IP addresses, must be applied before taking effect. See “**Apply Network Interface Settings**”. Menu items with unapplied changes are identified with a yellow bar.

Set a Gateway Address

To set a gateway address

1. Press the **Selector** knob to show the menu.
 2. Select the **Settings** item.
 3. Select the **Network** item.
 4. Turn the **Selector** knob to highlight the last item labeled with **GW** and the current gateway setting.
 5. Press the **Selector** knob.
 - The gateway address appears.
 - If an IP address and subnet mask has been previously set, and if the gateway address was set to 0.0.0.0, the initial gateway address is automatically filled to be the first valid address on the same subnet.
 6. If a different gateway address is desired, modify the address using the method described in “**Setting the IP Address and Subnet Mask**”.
- ★ The gateway setting must be on the same subnet as exactly one network interface. If an incompatible setting is made, the **GW** menu item is identified with a red bar and a compatible setting must be made before any network setting changes can be applied.

To remove a gateway address

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **Network** item.
4. Turn the **Selector** knob to highlight the last item labeled with GW and the current gateway setting.
5. Set the address to 0.0.0.0 using the method described in “**Setting the IP Address and Subnet Mask**”.

Once all desired network interface settings are complete, they must be applied before taking effect. See “**Apply Network Interface Settings**”. Menu items with unapplied changes are identified with a yellow bar.

Apply Network Interface Settings

Once any network interface settings have been changed, those changes must be applied before they can take effect.

To apply all network interface setting changes

1. If the Network menu is not displayed, press the button beside the **Selector** knob to return to the Network menu where an **Apply Changes** item appears.
2. Turn the **Selector** knob to highlight the **Apply Changes** item.
3. Press the **Selector** knob.
4. Turn the **Selector** knob to highlight the **Confirm** item.
5. Press the **Selector** knob.

★ New settings may take a few moments before taking effect.

To discard all network interface setting changes and restore the original settings

1. If the Network menu is not displayed, press the button beside the **Selector** knob to return to the Network menu where an **Apply Changes** item appears.
2. Turn the **Selector** knob to highlight the **Apply Changes** item.
3. Press the **Selector** knob.
4. Turn the **Selector** knob to highlight the **Discard** item.
5. Press the **Selector** knob.

The gateway address, IP addresses, virtual IP addresses and subnet masks of all network interfaces are restored to their most recently applied settings.

★ If the **Apply Changes** item was selected in error, or further network interface settings are yet to be made, turn the **Selector** knob to highlight **Cancel** and press the **Selector** knob. Changes can continue to be made and applied or discarded at a later time.

Multiple TSI-4000 Systems

TSI-4000 units can be set-up to work together in a cluster. Auto-changeover systems pair two TSI-4000 units to operate identically so that either unit is able to handle all system responsibilities in the event that one unit becomes unavailable. Large systems, which have up to 16 units, provide more processing power where information to or from many pieces of equipment must be handled simultaneously. Large systems can even be combined with auto-changeover pairs to produce a more distributed and fault-tolerant solution.

In a multiple TSI-4000 system, the individual units are assigned identity numbers to determine their responsibilities in the cluster. Units paired in a TSI-4000 auto-changeover system are given the same identity number. To allow communication among units in a cluster, each TSI-4000 must be provided with the IP address of the other units in the cluster.

Set Local Identity

A cluster is set-up by setting the identity number of the TSI-4000, and then adding the identity number and IP address of the other units in the cluster.

To set the local identity number of the TSI-4000

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **ID/Cluster** item.
4. Turn the **Selector** knob to highlight the **Local Identity** item.
5. Press the **Selector** knob.

The identity number appears with each of the numbers digits at the center of a column of possible digits.

6. Turn the **Selector** knob to highlight the desired number.

Turn slowly to change the units digit. Turn rapidly to change the tens digit. The previously confirmed value for each digit appears in orange.

7. Once the desired number is highlighted, or the number does not need to be changed, press the **Selector** knob to confirm.

Once all desired cluster settings are complete, they must be applied before taking effect. See "**Apply ID/Cluster Settings**". Menu items with unapplied changes are identified with a yellow bar.

Add to Cluster

To add a remote TSI-4000 unit to the cluster

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **ID/Cluster** item.

The current identity number and IP address of the TSI-4000 units already in the cluster appear.

4. Turn the **Selector** knob to highlight the **Add to Cluster** item.
5. If the **Add to Cluster** item is not visible, turn the **Selector** knob to bring it into view.
6. Press the **Selector** knob.

★ Initially, the identity number 1 and IP address 0.0.0.0 appear.

To set the identity number of the remote TSI-4000

1. Turn the **Selector** knob to highlight the **Identity** item.
2. Press the **Selector** knob.

The identity number appears with each of the numbers digits at the center of a column of possible digits.

3. Turn the **Selector** knob to highlight the desired number.

Turn slowly to change the units digit. Turn rapidly to change the tens digit. The previously confirmed value for each digit appears in orange.

4. Once the desired number is highlighted, or the number does not need to be changed, press the **Selector** knob to confirm.

To set the IP address of the remote TSI-4000

1. Turn the **Selector** knob to highlight the **Address** item.

The IP address appears in the familiar “dotted quad” format. Each number in the dotted quad is set in turn from left to right.

2. Press the **Selector** knob.

3. Turn the **Selector** knob to highlight the desired number.

Turn slowly to change the units digit. Turn rapidly to change the tens digit. The previously confirmed value for each digit appears in orange.

4. Once the desired number is highlighted, or the number does not need to be changed, press the **Selector** knob to confirm and move right to the next dotted quad number. Proceed until each number is set as desired.

5. Once the fourth number is set, the new address setting appears.

6. Press the button beside the **Selector** knob to return to the **ID/Cluster** menu.

7. Repeat the procedure described in this section to add up to a total of 16 remote TSI-4000 units.

★ While setting a dotted quad number, return to a previous dotted quad number by pressing the button beside the **Selector** knob until the desired number appears with columns for each digit as before. To cancel the new setting entirely, press the button until the original address display appears.

★ Setting the identity number or IP address of a remote TSI-4000 in a cluster does not affect the identity number or IP address of the remote TSI-4000 itself. These must be set to match the remote TSI-4000 unit's network interface settings before the units can communicate as part of a system. The order of making cluster or network interface settings in the local and remote units does not matter. Once the last setting is made and the units are connected, they begin operating together.

Once all desired cluster settings are complete, they must be applied before taking effect. See “**Apply ID/Cluster Settings**”. Menu items with unapplied changes are identified with a yellow bar.

Modify or Remove from Cluster

If the arrangement of the TSI-4000 units in a system is changed after original installation, or an error must be corrected, it may become necessary perform some of the steps described in this section again in order to change the settings of the TSI-4000 units already in the cluster or remove them from the cluster.

To modify or remove the identity number or IP address of a remote TSI-4000

1. Press the **Selector** knob to show the menu.

2. Select the **Settings** item.

3. Select the **ID/Cluster** item.

The current identity number and IP address of all TSI-4000 units already in the cluster appear in separate items.

4. Turn the **Selector** knob to highlight the item with the identity number and IP address of the TSI-4000 unit to be modified or removed

5. Press the **Selector** knob.

6. If there are more items than can fit on the screen keep turning the **Selector** knob to bring them into view.

7. To change the identity number or IP address of the remote TSI-4000, follow the procedure for changing those settings as described in **“Add to Cluster”**.
8. To remove the remote TSI-4000 from the cluster, turn the **Selector** knob to highlight **Remove from Cluster** and press the **Selector** knob.
9. Repeat the procedure described in this section to remove other TSI-4000 units as desired.

Once all desired cluster settings are complete, they must be applied before taking effect. See **“Apply ID/Cluster Settings”**. Menu items with unapplied changes are identified with a yellow bar.

Apply ID/Cluster Settings

Once the local identity number, or the identity number or IP address of a remote TSI-4000 unit of has been changed, or units have been added or removed from the cluster:

1. Turn the **Selector** knob to highlight the **Apply Changes** item.
 2. If the Apply Changes item is not visible, turn the **Selector** knob to bring it into view.
 3. Press the **Selector** knob.
- ★ The Apply Changes item only appears where changes have been made but not yet applied.
4. To apply all cluster setting changes:
 - a. Turn the **Selector** knob to highlight **Confirm**.
 - b. Press the **Selector** knob.

★ New settings may take a few moments before taking effect.

To discard all cluster interface setting changes

1. Turn the **Selector** knob to highlight **Discard**.
2. Press the **Selector** knob.

The local identity number and identity number and IP address of all remote TSI-4000 units in the cluster are restored to their most recently applied settings.

★ If the **Apply Changes** item was selected in error, or further cluster settings are yet to be made, turn the **Selector** knob to highlight **Cancel** and press the **Selector** knob. Changes can continue to be made and applied or discarded at a later time.

Auto-Changeover (ACO) System

A TSI-4000 Auto-Changeover system is an installation of a pair of TSI-4000 units connected to a rear-mounted TSI-4000ACO.

In addition to connecting to the ACO, both TSI-4000 units must be set to operate as a cluster using the same identity number. See **“Multiple TSI-4000 Systems”** for the pairing procedure.

Once TSI-4000 units are paired in an auto-changeover system they perform or yield their responsibilities to operate the system as directed by the TSI-4000ACO. Two ACO buttons on the TSI-4000 front panel labeled AUTO and ACTIVE control and monitor the operating mode of the TSI-4000ACO.

★ If one or both of the ACO buttons appear red, there could be an installation problem with the TSI-4000ACO or either of the TSI-4000 units.

Button Action

The TSI-4000 may be installed in a location where it is easy for accidental operation of the ACO buttons to occur. To help prevent this, use the double action feature of the front panel buttons.

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **Button Actions** item.
4. Select the **Buttons** item.
5. Turn the **Selector** knob to highlight **Press Twice**.
6. Press the **Selector** knob to confirm.

With the double action feature enabled, pressing an **ACO** button only once shows a reminder that it must be pressed a second time to use it.

★ The double action feature also applies to the Power button.

Monitor System Health

The main function of the LCD and front panel controls is to monitor the health of TSI-4000 elements and connections to remote equipment. If a problem is detected, an alarm condition appears on the display.

System Status Display

Except for using menus or special tools, the TSI-4000 LCD normally shows the system status display. The display consists of four areas:

- At the upper left there is a total count of current, recent, or canceled alarms.
- At the upper right there are a series of status icons for quick indication of conditions such as network connections and power status.
- At the bottom there is a horizontal status bar using color to indicate the status of each monitored element or connection, grouped and sorted according to equipment type, connection type, or recent activity. Part of the status bar is overlaid with a blue block cursor to indicate the selected monitored element or connection.
- Occupying the majority of the display across the center is a description of the monitored element or connection identified by the blue block cursor in the status bar.

System Messages

Special TSI-4000 system messages may appear, briefly covering the upper display area. System messages describe important events as they occur. Messages include the loading, storing, and completion of tally configuration data, and connection / disconnection of remote control hosts.

Status Icons

Status icons quickly confirm the state of specially monitored system elements with a simple on or off indicator. Each indicator is described in **Table 7**. Some status icons may indicate a problem with the TSI-4000 unit.

Table 7 Status Icons






Icon	Name	Description
	Motherboard Power	One icon appears in green on the right side of the status icon group to indicate power to the motherboard is normal. This icon appears shortly after the TSI-4000 is powered on. Another icon appears in red on the left side of the status icon group if a power-related problem is reported by the TSI-4000 unit's motherboard. Normally the red icon does not appear.
	Fan or Temperature	Appears in red if a cooling fan problem is reported by the TSI-4000 unit's motherboard. Normally, this icon appears briefly while the unit is powered on then disappears. The icon may also appear if the TSI-4000 unit is operating in an environment that is too warm to be adequately cooled by its fan even if the fan is operating properly. The operation of power supply cooling fans are monitored separately and not reported by this icon.

Table 7 Status Icons

Icon	Name	Description
	Network 1 or 2	Appears in green if a good network interface connection has been established. In light network traffic the icon may flash. There are two of these icons. From left to right the icons indicate the status of network interface 1 and 2, respectively. There are no status icons for network interfaces 3 and 4.
	Disk	Flickers in green while the TSI-4000 unit is accessing its internal solid-state disk. This icon also briefly appears in gold after any settings are changed using the menu. If the icon appears red after settings are changed, a problem has been detected and the settings may not have been stored.
	Audible Alarm	Appears in green if the audible alarm is enabled and appears in red with a stroke through it if the audible alarm is disabled. If enabled, the audible alarm sounds and the status icon flashes to notify an operator of a new or continuing alarm condition. If disabled, only the status icon flashes to notify an operator of a new or continuing alarm condition.

Navigation

With a quick glance, the condition of each monitored alarm is visible in the status bar.

To discover the source of the system alarm

- Turn the **Selector** knob to move the blue block cursor in the status bar.
The center area shows an identification and description of the monitored alarm currently selected by the cursor in a color that matches the color in the status bar.

Alarm Conditions Colors

In both the status bar and the center description area, color is used to identify the status, or alarm condition, of each monitored element or connection as described in **Table 8**.

Table 8 Alarm Conditions

Color	Description
Green	No alarm conditions currently or recently detected. The monitored element or connection is operating correctly.
Red	An alarm condition is currently active. A problem is detected with the monitored element or connection.
Orange	An alarm condition is no longer active but was detected recently. The monitored element or connection is now operating normally but a problem was recently detected.
Pink	An alarm condition remains active but has been manually suppressed so other alarms can be more easily noticed. A problem is still detected with the monitored element or connection, however, the operator has chosen to ignore it.
Grey	Information about the monitored element or connection is not available at this time. This condition may occur temporarily while the system powers on. In auto-changeover systems this condition also occurs while the standby unit assumes control.

Several options affecting alarm condition displays are available using a menu. The amount of time a recent alarm, indicated in orange, is displayed can be chosen to be very short, very long, or even disabled. The system can also be set to only show active alarm conditions and hide all others, or to automatically navigate to show the description of each active alarm condition, if any, in turn. See **“System Status Display”** for more information.

Alarm Condition Totals

At the upper left corner of the LCD the most significant alarm conditions are totaled. Any current alarm conditions are counted first and the count appears in red. If there are no current alarm conditions, any past alarm conditions are counted and appear in orange. If there are no current or past alarm conditions, the total number of suppressed alarm conditions appears in pink. If there are no alarm conditions of any kind to report, the message No Faults appears in the upper left corner of the system status display.

Monitored Item Types

To more easily locate a specific monitored item, the items are classified in two ways: equipment type or connection type. Every monitored item appears in only one group within each classification.

Equipment Types

Items are organized according to the purpose of the equipment described by the item.

TSI

Items within the TSI-4000 unit's enclosure. This includes the TSI-4000 processor, motherboard, and dual power supplies.

ACO

Items related to the TSI-4000ACO auto-changeover. This includes the processor inside the ACO and its power supplies. These items only appear if a TSI-4000ACO has been installed.

SWR

Switching equipment. This includes all master control or production switcher devices that have been configured to operate with the TSI-4000, both by serial or Ethernet connection.

RTR

Routing equipment. This includes all routers or similar devices that have been configured to operate with the TSI-4000, both by serial or Ethernet connection.

UMD

Monitoring display equipment. This includes all multi-viewer or discrete display devices that have been configured to operate with the TSI-4000, both by serial or Ethernet connection.

GPI

General purpose input/output equipment. This includes all devices that provide simple input and output controls to drive or sense external equipment and have been configured to operate with the TSI-4000, both by serial or Ethernet connection.

CP

Control panel equipment. This includes devices connected by both serial or Ethernet connection.

Connection Types

Items are organized according to the nature of the connection to the equipment described by the item.

LOC

Local equipment. This includes the TSI-4000 processor inside the unit and the auto-changeover processor inside the TSI-4000ACO. The latter only appears if a TSI-4000ACO is installed.

PS

Power supplies. This includes either one or two TSI-4000 power supply units installed within the TSI-4000 enclosure and one or two power supplies that feed the TSI-4000ACO. The latter only appears if a TSI-4000ACO has been installed and a power supply has been connected.

NET

Ethernet connected remote equipment. This could apply to routing devices, switching devices, monitoring displays, or GPI/O devices. Note that some of these types of devices could be connected in more than one way which would then be monitored by separate items.

COM

Serially connected remote equipment. This could apply to routing devices, switching devices, monitoring displays, or GPI/O devices. Note that some of these types of devices could be connected in more than one way which would then be monitored by separate items.

The group labels for these monitored item types appear inside the status bar to show how monitored items are organized. This allows rapid identification of items with an alarm condition and easier navigation to get the description of an item of interest.

Within each group, items are ordered alphabetically by name.

- ★ If there are many monitored items displayed but only a few in some groups, the label for those groups may be abbreviated to its first letter. If there are currently no items that fall into one of the groups that group label does not appear.

Specifying How Monitored Items Are Ordered

Monitored items can be ordered by connection or equipment type as described previously, or by which items have experienced a recent change to their alarm condition.

To choose the order

- Press the button beside the **Selector** knob to order monitored items by the next type in this sequence: connection, equipment, recent changes.
- ★ Regardless of how items are re-ordered or how often, the alarm conditions associated with items are not affected in any way.

Monitored Item Descriptions

Turn the **Selector** knob to move the status bar cursor and bring the description of a monitored element or connection into view. At any time, one item is completely in view. To help with navigation, two adjacent items are also partially visible to the left and right.

The bottom area of each description is common to all items.

The bottom line identifies the monitored element or connection by a name unique among all items.

Just above the bottom line the amount of time elapsed since the alarm condition of the item assumed its current state. The time is formatted differently according to the first entry in **Table 9** that qualifies.

Table 9 Time Elapsed Entries

Time Format		Time Elapsed
Minutes and seconds	MM:SS	Less than 91 minutes (00:00 to 90:59)
Hours and minutes	HH:MM	Less than 49 hours (1:31 to 48:59)
Days, hours and minutes	d days HH:MM	Less than 91 days (2 days 1:00 to 90 days 23:59)
Months and hundredths of months	M.mm	Less than 2 years (2.99 to 23.96)
Years and hundredths of years	Y.yy	2 years or more (2.00 and up)

The colon separator between hours and minutes flashes every two seconds.

On the same line in a similar format but in smaller text is the amount of time the alarm condition of the item spent in its previous state.

Elapsed time measurements are not synchronized to a clock system and are therefore approximate.

The remaining contents of the description are specific to the item. There are several types of items. Each is described below.

TSI-4000

There is only one of these items. The unit's serial number, local identity number, IP address and subnet mask width for each network interface, auto-changeover status (if applicable), and firmware version and date are listed. If the system is powering on or restarting, this item may appear gray indicating that current information is not available at this time. If the system is restarting the previous information is retained for display.

TSI-4000 Platform

There is only one of these items. The operating system name and version are listed.

TSI-4000 Motherboard

There is only one of these items. Live measurements that apply to the unit's motherboard appear here. It is normal for these numbers to change during system operation. An alarm condition is asserted should any measurement reach a preset limit. If the system is powering on or restarting, this item may appear gray indicating that current information is not available at this time. If the system is restarting the previous information is retained for display.

TSI Power Supply 1 or TSI Power Supply 2

There is one of these items for each installed power supply. Live measurements for five voltage levels, two temperatures, and a fan speed are all listed. An alarm condition is asserted should any measurement reach a preset limit. In addition, the offending measurements appear in yellow.

Power supplies are removable. Removing a power supply also removes the corresponding monitored item from the system status display.

TSI-4000ACO

There is only one of these items. The TSI-4000ACO status appears here including its operating mode and the readiness of both TSI-4000 units. The same information appears on both TSI-4000 units of an auto-changeover pair except for identification of the units designated as A and B.

TSI-4000ACO P.S. A or TSI-4000ACO P.S. B

There is one of these items for each installed power supply. A live measurement of the voltage level appears here. An alarm condition is asserted should the measurement reach a preset limit. Power supplies are removable. Removing a power supply also removes the corresponding monitored item from the system status display.

Router or Switcher

There is one of these items for each router or switcher configured to connect with the TSI-4000. A typical system has at least one router and one switcher. The router or switcher's name, manufacturer, and model are listed first. Depending on the manufacturer, a logo may appear instead of their name. Also listed is a description of the connection to the device which could be an Ethernet port and IP address, or a serial port and communication format parameters. A second IP address may also be listed if the device offers a backup connection.

★ The current status of the connection is listed last. If there is a problem with the connection an alarm condition is asserted.

Displays (UMDs)

There is one of these items for each model of multi-viewer or discrete display port configured to connect with the TSI-4000. A typical system has at least one display. The model and manufacturer are listed first. Depending on the manufacturer, a logo may appear instead of their name. Also listed is a description of the connection to the devices which could be an Ethernet port and up to four IP addresses, or a serial port and communication format parameters.

For Ethernet connected devices, a problem with the connection to at least one device asserts an alarm condition. The devices with a connection problem are listed first and in yellow. The current status of the connection is listed last. If more than one device is configured to be connected, this number is shown along with the number of devices that are currently not connected. Where more than four devices are configured to be connected, individual connection information is also available as described in **"Monitored Alarm Details"**. Individual connection information is not available for serially connected display devices.

TXI Series

There is one of these items if at least one TXI Series product, such as the TXI-48, is configured to connect with the TSI-4000 using Ethernet. Listed below the model and manufacturer is a description of the communication port such as Port 10016 (UDP) followed by up to four IP addresses.

A problem with the connection to at least one device asserts an alarm condition. The devices with a connection problem are listed first and in yellow. The current status of the connection is listed last. If more than one device is configured to be connected this number is shown along with the number of devices that are currently not connected. Where more than four TXI Series products are configured to be connected, individual connection information is also available as described in **"Monitored Alarm Details"**.

4211 Series

There is one of these items for each set of 4211 Series products configured to connect with the TSI-4000 using a serial port. This includes TXI Series products connected to the serial port. Listed below the manufacturer and model is the serial port and communication format parameters. The current status of the connection is listed last. A problem with the connection asserts an alarm condition.

RCP Series

There is one of these items for each set of RCP Series products configured to connect with the TSI-4000 using a serial port.

Listed below the manufacturer and model is the serial port and communication format parameters followed by one or more RCP series product serial numbers. A problem with the connection to at least one device asserts an alarm condition. The devices with a connection problem are listed first and in yellow. The current status of the connection is listed last. If more than one device is configured to be connected, this number is shown along with the number of devices that are currently not connected. Where more RCP Series products are configured to be connected than can fit on the screen, individual connection information is available as described in “**Monitored Alarm Details**”.

LCP Series

There is only one of these items for all LCP Series products configured to connect with the TSI-4000 using an Ethernet port.

Listed below the manufacturer and model is Ethernet port followed by one or more LCP series product IP addresses. A problem with the connection to at least one device asserts an alarm condition. The devices with a connection problem are listed first and in yellow. The current status of the connection is listed last. If more than one device is configured to be connected, this number is shown along with the number of devices that are currently not connected. Where more LCP Series products are configured to be connected than can fit on the screen, individual connection information is available as described in “**Monitored Alarm Details**”.

Summary Status Button

A summary of total system health is indicated by the button beside the **Selector** knob. Like the status bar, this button illuminates in red to further indicate an unnoticed alarm condition. This does not necessarily indicate active alarms since a manually suppressed alarm is not counted. With no unnoticed alarms active, the button is green. This button may also flash to indicate other system activities such as the loading and storing of tally configuration data.

LCD Saver

Fifteen minutes after the most recent use of the front panel controls, the LCD saver is engaged. The LCD is partially covered by a moving circular mask. To restore the normal display, turn or press the **Selector** knob or press the adjacent button. To re-engage the LCD saver in less than fifteen minutes, press the button three times quickly.

Audible Alarm

The TSI-4000 is equipped with an audible alarm that can sound each time an alarm condition is detected in a monitored element or connection. The audible alarm sounds for four seconds. If any alarm condition remains active the audible alarm sounds again every 90 seconds.

The audible alarm can be disabled or its volume adjusted. The appearance of alarm conditions on the status display is not affected.

Audible alarms can be limited to just locally monitored elements such a power supply or switcher and router type equipment connections can be included. See “**Advanced Alarm Monitoring**” for details.

Temporarily Silence the Alarm

The audible alarm can only be temporarily silenced. If an alarm condition remains active the audible alarm sounds again in 90 seconds. To disable or adjust the volume of the audible alarm, see “**Advanced Alarm Monitoring**”.

To silence the audible alarm

1. Press the **Selector** knob to show the menu.
2. Turn the **Selector** knob to select the **Silence Alarm** item.
3. Press the **Selector** knob again.

★ If the **Silence Alarm** item does not appear in the menu, the audible alarm is not currently sounding.

Power Supply Alarm

The health of the two TSI-4000 power supplies is indicated in detail in the system status display. For a quick reference, power supply health is also indicated to the right of the Power button on two LED's labeled **PS 1** and **PS 2**.

- With the power supply operating normally, its corresponding LED appears green.
- If a fault has been detected for the power supply, its corresponding LED appears red.
- Consult the system status display for more information about the fault.
- If the power supply is not installed in the TSI-4000 enclosure, the corresponding power supply LED is off.

To help with installation, another status LED is mounted at the rear of each power supply.

Operating the ACO System

To operate the Auto-Changeover (ACO) System it must be installed and set up as described in “**TSI-4000 and TSI-4000-ACO Installation**” and “**Multiple TSI-4000 Systems**”.

Overview

The TSI-4000 Auto-Changeover System employs an independent processor to determine which of two TSI-4000 units should have control the system. The system operates in one of three modes: automatic, manual, or override.

- The **automatic** mode is the normal mode of operation. In this mode the TSI-4000ACO chooses which TSI-4000 is in control of the system based on the health on both units. Unless there are special circumstances involving the TSI-4000 Auto-Changeover system, the automatic mode should always be selected.
- The **manual** mode can be selected from the TSI-4000 front panel to force a specific unit to take control of the system regardless of which unit would be chosen by the TSI-4000ACO. The manual mode can be useful when diagnosing system configuration or connection problems to ensure the same unit remains in control.
- The **override** mode is used when one of the TSI-4000 units has not yet been installed or has been removed from the system for servicing. The override mode prevents the automatic or manual modes from being used.

The TSI-4000 units in an ACO system are designated as either unit A or unit B. Typically the units are installed stacked and with unit A on top.

Status and Control

Each TSI-4000 unit has two front panel buttons dedicated for control of the ACO system. These two buttons, labeled **AUTO** and **ACTIVE**, also illuminate to indicate the current status of the ACO system.

Automatic Mode

To place the ACO system in automatic mode, press the **AUTO** button on either TSI-4000. Depending of the health of each unit, the TSI-4000ACO may immediately change the unit which is in control of the system. The **AUTO** buttons of both units turn green and the **ACTIVE** button of the TSI-4000 unit in control of system turns green while the same button of the other unit turns off.

Manual Mode

To engage manual mode, press the **ACTIVE** button of the unit to be immediately placed in control of the system. The **AUTO** buttons of both units turn amber and the **ACTIVE** button of the TSI-4000 unit in control of the system flashes green while the same button of the other unit turns off.

The status of both TSI-4000s is also indicated on the TSI-4000ACO. See “**TSI-4000ACO Status LEDs**” for details.

Override Front Panel Controls

Use the override mode to force one TSI-4000 unit to be in control of the system while disabling the use of the front panel ACO buttons.

To engage the override mode, move the TSI-4000ACO slide switch from the center **NORMAL** position to the **A** or **B** position to put the **A** or **B** unit in control of the system. The **AUTO** buttons of

both TSI-4000s flash amber and the **ACTIVE** button of the unit in control of the system turns green while the same button of the other unit turns off.

To disengage the override mode and return to the previous mode (automatic or manual), return the slide switch on the TSI-4000ACO to the center **NORMAL** position.

Unit Readiness

The ACO system works by assessing the readiness of each unit. When a TSI-4000 unit powered on or restarted it becomes “ready” after a short time.

The state of readiness used by the ACO system is also indicated on the **ACTIVE** button. This information is useful when choosing to put a TSI-4000 unit in control of the system manually.

If a TSI-4000 unit is not in control of the system and is also not ready to be in control of the system, the **ACTIVE** button appears red. If that unit is forced to be in control of the system, by manual or override selection, the **ACTIVE** button flashes red to indicate the system is currently not operational. The system resumes operation once the unit becomes ready.

In the event of a TSI-4000ACO power interruption or malfunction, the TSI-4000 units are not able to indicate which unit is in control of the system. In this situation the **AUTO** buttons of both TSI-4000s flash red and the **ACTIVE** button of both units remain off.

Advanced Alarm Monitoring

In a healthy system alarms rarely occur or persist and the initial alarm monitoring settings are fine in most situations. There are some situations where it may become necessary to customize these settings to help track down the source of a problem. These include:

- During system installation all equipment may not yet be connected to the TSI-4000 and so some alarms are not yet considered important.
- An alarm frequently comes and goes and needs to be tracked so that an operator does not have to constantly watch the TSI-4000 display.
- The TSI-4000 is operating in an area where the audible alarm may be intrusive.
- Equipment has been removed for repair from the TSI-4000 or the rest of the system.

Alarm monitoring can be customized in these ways:

- Audible alarm can be disabled or set to a lower or higher volume.
- Audible alarm notification can be restricted to just locally monitored elements, or to include switcher and router types of equipment.
- Previously detected alarms can be tracked from 15 seconds up to 8 days.
- Non-alarming items can be excluded from the status display. This is useful in systems with a large number of monitored items.
- The display can be set to automatically highlight active alarms and cycle the center display through each one in turn.

Suppress Alarms

Once an alarm condition has been asserted for a monitored element or connection the status display shows that item in red and the summary status button appears in red. Suppressing the alarm makes the item appear pink and restores the summary status button to show green (assuming there are no other active alarm conditions). This is useful to acknowledge awareness of the alarm so that new alarm conditions can be more easily noticed.

- ★ Before using this procedure, the audible alarm must not be sounding. If the audible alarm is currently sounding, wait for four seconds for the audible alarm to stop sounding.

To suppress all alarms

1. Press the **Selector** knob to show the menu.
2. Turn the **Selector** knob to highlight the **Suppress Alarms** item.
3. Press the **Selector** knob again.

- ★ Once an alarm is suppressed, it remains until the original alarm condition is cleared. If an alarm condition is asserted for that item again, it must be re-suppressed.

4. Turn the **Selector** knob to highlight the **All** item.
5. Press the **Selector** knob.

To suppress only the alarm previously selected in the center of the status display

1. Press the **Selector** knob to show the menu.
2. Turn the **Selector** knob to highlight the **Suppress Alarms** item.
3. Press the **Selector** knob again.
4. Turn the **Selector** knob to highlight the **Selected** item.

5. Press the **Selector** knob.

To suppress one or more specific alarms

1. Press the **Selector** knob to show the menu.
2. Turn the **Selector** knob to highlight the **Suppress Alarms** item.
3. Press the **Selector** knob again.
4. Turn the **Selector** knob to highlight the **Choose** item.

5. Press the **Selector** knob.

The system status display appears and the status bar block cursor flashes.

6. Turn the **Selector** knob to highlight the desired alarm to be suppressed.
7. Press the **Selector** knob.
8. Repeat the procedure to suppress other alarms.
9. If no further selections are made for ten seconds, or the button beside the **Selector** knob is pressed, the blue block cursor stops flashing and normal operation resumes.

★ Attempting to suppress a monitored item where an alarm condition has not been asserted has no effect.

Control the Audible Alarm

If the TSI-4000 is mounted in an area where sounding the audible alarm is undesirable, disable the audible alarm or reduce its volume. If the TSI-4000 is adjacent to other possibly loud equipment, increase its volume.

Disable

If the audible alarm is enabled, a green bell appears in the upper right corner of the status display.

To disable the audible alarm

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **Alarm** item.
4. Select the **Audible** item.
5. Turn the **Selector** knob to highlight **Disable**.
6. Press the **Selector** knob to confirm.

Enable

If the audible alarm is disabled, a red bell with a line through it appears in the upper right corner of the status display.

To enable the audible alarm

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select the **Alarm** item.
4. Select the **Audible** item.
5. Turn the **Selector** knob to highlight **Enable**.

6. Press the **Selector** knob to confirm.

Adjust the Volume

The audible alarm volume can be adjusted to suit ambient sound conditions.

To adjust the audible alarm volume

1. Press the **Selector** knob to show the menu.
2. Select the **Settings** item.
3. Select **Alarm > Audible > Volume**.
4. Turn the **Selector** knob to highlight the desired percentage.
The previous setting appears in orange.
5. Turn the **Selector** knob rapidly to change by 10% at a time.
6. Press the **Selector** knob to confirm.

★ A short “beep” sounds after each adjustment as an example of how loud the audible alarm would be.

Notification Level

The audible alarm can be set to sound for all alarms, just for alarms of locally monitored elements, or for alarms related to switcher and router equipment connections.

To set the notification level

1. Press the **Selector** knob to show the menu.
2. Select **Settings > Alarm > Audible > Level**.
3. Turn the **Selector** knob to highlight the desired notification level. Choose from the following:
 - **Local Only** — only locally monitored elements can sound the audible alarm. This includes the TSI-4000, its motherboard and power supplies, and the TSI-4000ACO and its power supplies.
 - **+Switchers/Routers** — both locally monitored elements and connections to any switcher or router type remote equipment can sound the audible alarm.
 - **All Faults** — all monitored elements and connections can sound the audible alarm.
4. Press the **Selector** knob to confirm the selection.

Recent Alarm History

During system installation or while diagnosing connection problems it may become useful to know if an alarm condition is only briefly asserted for a monitored element or connection. The alarm history feature can help detect this situation. After an alarm condition clears, the alarm condition in the status bar and center area appear in orange to signify a past alarm.

To set the alarm history

1. Press the **Selector** knob to show the menu.
2. Select **Settings > Alarm > History**.
3. Turn the **Selector** knob to highlight the desired alarm history period. Choose from the following:
 - None
 - 15 Seconds
 - 2 Minutes

- 15 Minutes
 - 2 Hours
 - 8 Hours
 - 1 Day
 - 2 Days
 - 8 Days
4. Set the alarm history to an amount of time appropriate to the situation.
 - If a problem alarm occurs frequently, set the history period to be short.
 - If attempting to catch an infrequent alarm, set the history period to a longer time. Even after the original alarm condition was cleared, the alarm condition remains “past” for the amount of time described by the alarm history setting.
 5. Press the **Selector** knob to confirm.
- ★ The monitored items in the center area of the status display show the actual amount of time since the past alarm condition was asserted.
 - ★ The alarm condition of the monitored item returns to normal (shown in green) when the alarm history period has elapsed. To have alarm conditions return to normal immediately, choose an alarm history setting of **None**.

Status Display Style

The appearance of the status display can be adjusted so that the status bar is located at the bottom or top, or removed from the status display entirely.

To set the style

1. Press the **Selector** knob to show the menu.
2. Select **Settings > Alarm > Style**.
3. Turn the **Selector** knob to highlight the desired style. Choose from the following:
 - **Bar** or **Lower Bar** — the status bar appears at the bottom of the display. This is the default.
 - **Upper Bar** — the status bar appears at the top of the display below the status icons.
 - **No Bar** — the status bar does not appear. Monitored items can still be selected but the location, grouping, and ordering of the items is not visible. This style offers a larger center status display so that extra information about monitored items than would otherwise not fit on the status display become visible.
4. Press the **Selector** knob to confirm the selection.

Alarm Display

In some systems it may be desirable to limit the number of monitored items that appear in the status display. Regardless of how items are displayed, all elements and connections are always monitored.

To show only monitored items with active/suppressed alarm conditions in the status display

1. Press the **Selector** knob to show the menu.
2. Select **Settings > Alarm > Show**.

3. Turn the **Selector** knob to highlight the desired alarm display setting. Choose from the following:
 - **Active Only** — only currently monitored items with active alarm conditions appear in the status display. If there are no items to show, the status bar and center areas of the display are empty.
 - **All** — all monitored items appear in the status display regardless of their current alarm conditions.
 - **Auto Show** — all monitored items appear in the status display regardless of their current alarm conditions. After no items are selected for at least 45 seconds, the status display begins to automatically show monitored items with an active alarm condition. Each monitored item is shown for 10 seconds. Turn the **Selector** knob or press the button beside it to temporarily cancel the auto show mode.
4. Press the **Selector** knob to confirm the selection.

Monitored Alarm Details

The description of each monitored element or connection appearing in the status display is as brief as possible, containing only essential information so that a quick assessment of monitored items can be made. When diagnosing a system problem, however, more detail may be needed. Most monitored items offer more detail than the center area of the status display provides.

Monitored items provide additional detail in a series of pages. The contents of the page and the number of pages available are specific to the selected item. See “**Detail Pages**”.

To view detail pages

1. Navigate to the desired item using the **Selector** knob to make its description visible in the status display.
2. Press the **Selector** knob to show the menu.
3. Select the **Detail** item.
4. Press the **Selector** knob.

The first page of detail for the monitored item appears.

- At the bottom of every detail page is a menu bar with the items **PREV**, **DONE**, and **NEXT**.
 - If there are multiple pages, and the last page is not currently visible, the menu item **NEXT** is available. To view the next page, turn the **Selector** knob clockwise.
 - If there are multiple pages, and the first page is not currently visible, the menu item **PREV** is available. To view the previous page, turn the **Selector** knob counter-clockwise.
5. To close a detail page and return to the status screen, select **DONE** by pressing the **Selector** knob.

Detail Pages

Detail pages provide a variety of information about a monitored element or connection, or a group of similar connections.

Detail pages are specific to the item. There are several types of items. Each is described below. Items not listed here do not offer detail pages.

TSI-4000

These pages provide information about the TSI-4000 hardware, firmware, and installed features.

- The first page repeats much of the item descriptions from the system status display. The unit's model, serial number, firmware version and date, local identity number, and front panel processor firmware version are listed.
- The second page lists the IP address and subnet width of each network interface, and the gateway address.
- The third page lists any licenses installed in this unit.
- The fourth page shows product build information such as assembly number, date, and serial number.
- The fifth page lists the front panel processor boot loader firmware version.

TSI-4000 Platform

This page shows solid-state flash disk and memory capacities and how much is currently used.

TSI Power Supply 1 and TSI Power Supply 2

There is one detail page which shows power supply build information such as assembly number, date, and serial number.

TSI-4000ACO

These pages provide information about the readiness of the TSI-4000s, and the TSI-4000ACO hardware and firmware.

- The first and second pages show the status of TSI A and TSI B, respectively. This includes the identification of the unit as either THIS unit or REMOTE unit; the ready status of the unit and, if not ready, a possible reason; and which of the two units are currently selected to operate the system.
- The third page shows the current voltages and connection status of power supply A and B.
- The fourth page shows the TSI-4000ACO firmware version and date.
- The fifth page shows product build information such as assembly number, date, and serial number.

Single Connections

These connections can be Ethernet or serial and connect to any type of equipment. The detail pages provide larger text but offer the same information available in the item description on the status display.

Multiple Connections

These connections can be Ethernet or serial and usually connect to display (UMD) or GPI/O equipment. There can be many devices handled by this item but only a few fit in the item description on the status display. Multiple pages provide a list of all devices in larger text.

- The first page repeats much of this items description from the system status display. This includes the total number of devices expected to be connected and, of those, the number of devices currently not connected, if any.
- The second page lists up to six connections. Depending on the type of equipment connected, each connection may be described with an IP address, serial number, or other device name or identification number. Devices with a connection problem appear in yellow, otherwise they appear in white.
- If there are more than six connections the details are presented in multiple pages with a navigation bar on the last line of the page. The navigation bar lists up to ten page numbers with the currently viewed page's number surrounded by dashes.

- If there are more than ten pages, « and » appears at the left and right side of the navigation bar. Turn the **Selector** knob clockwise to show the next higher page. Turn the **Selector** knob counter-clockwise to show the next lower page. Any page numbers for pages that contain connections where at least one problem has been detected appear in yellow. Other page numbers appear in white.

Special Tools and Commands

The majority of functions accessible from the TSI-4000 front panel are designed to help detect and solve connection problems related to the TSI-4000 and external equipment. Should it become necessary, there are also special tools and commands intended to help with problems internal to the TSI-4000 unit.

Overview

The TSI-4000 utilizes independent processors to drive and monitor the system. The bulk of processing work is handled by the main processor. There is also a processor to handle auto-changeover duties and another processor to handle the front panel controls and displays. This arrangement permits an operator to manage the system using a set of special commands.

Using a special command may become necessary for any of these reasons:

- The unit's firmware is in need of an update as previously advised and provided by the manufacturer.
- The system is configured to be quite heavily loaded and frequent problems are occurring that often result in restarting the unit.
- The system is not operating as expected possibly due to conflicting tally configuration elements, and the operator wishes to clear the tally configuration from the system.
- Too many different removable network interfaces were installed and the system needs to be flushed of them.
- A power supply or the TSI-4000ACO is not operating properly and the operator has decided to remove it from the system.
- The system does not appear to be operating normally and it is believed that restarting the main processor may clear the problem.
- To view the MAC address of the network interfaces.

Commands

To perform a special command

1. Press the **Selector** knob to show the menu.
2. Select the **Tools** item.
3. Select the **Commands** item.
4. Turn the **Selector** knob to choose a command. Choose from the following:
 - The **Restart Only** command instructs the TSI-4000 to restart the system firmware. The system should resume normal operation in a few moments.
 - The **Clear/Restart** command instructs the TSI-4000 to discard its current tally configuration, and then restart the system firmware. The system should be ready to be re-configured in a few moments. A warning message appears to inform the operator that this command has consequences and that action is required to restore the operation of the system.
 - The **Hard Reset** command instructs the TSI-4000 to restart the main processor. The system should resume normal operation in a few minutes. This command starts a five second countdown before action is taken. During that time the command can be canceled by pressing the button beside the **Selector** knob.
 - The **USB Clear/Restart** command instructs the TSI-4000 to uninstall any USB network interfaces, and then restart the system firmware.

5. Press the **Selector** knob.
6. To avoid accidental use of a command, a confirmation is required.
 - a. Turn the **Selector** knob to highlight **Confirm**.
 - b. Press the **Selector** knob.
7. To return to the menu of commands without performing a command, highlight **Cancel** and press the **Selector** knob.

Show MAC Addresses

To show all MAC addresses

1. Press the **Selector** knob to show the menu.
2. Select the **Tools** item.
3. Select the **Advanced** item.
4. Select the **MAC Addresses** item.

The MAC addresses of the installed network interfaces are displayed.

Force Install or Uninstall Removable Components

The TSI-4000 system has three removable components: two power supplies and, if equipped, the TSI-4000ACO. Normally, these parts are automatically sensed when installed or uninstalled and reflected in the system status display. If there is a malfunction in the TSI-4000 unit or any of the components, it may become necessary to force the system to behave as if a component is installed when it actually is not installed, or the reverse, behave as if a component is not installed when it actually is installed.

To force install or uninstall a removable component

1. Press the **Selector** knob to show the menu.
2. Select the **Tools** item.
3. Select the **Advanced** item.
4. Select the **Install** item.
5. To control the installation of a component, turn the **Selector** knob to choose the desired component by name. Choose from: **Power Supply 1**, **Power Supply 2**, or **Auto-Changeover**.
6. Press the **Selector** knob. The possible settings appear in a list with the current setting in the center. Choose from the following:
 - **Auto Sense** — the TSI-4000 automatically detects installation of the component.
 - **Installed** — the TSI-4000 assumes the component is always installed.
 - **Not Installed** — the TSI-4000 assumes the component is never installed.
7. Press the **Selector** knob to confirm.

Watchdog System

The watchdog system uses an independent processor to monitor the health of the TSI-4000 unit's main processor and force it to restart if it fails to issue a signal to the watchdog system at regular intervals.

Normally, the watchdog system is active. In a heavily configured tally system, the main processor may frequently be unable to signal the watchdog system resulting in occasional restarts. In this case

it may be necessary to disable the watchdog system. It is not recommended to disable the watchdog system where the TSI-4000 is not frequently monitored.

To prevent the watchdog system from restarting the main processor

1. Press the **Selector** knob to show the menu.
2. Select the **Tools** item.
3. Select the **Advanced** item.
4. Select the **Watchdog** item.
5. Turn the **Selector** knob to highlight **Not Used**.
6. Press the **Selector** knob to confirm.

To permit the watchdog system to restart the main processor as necessary

1. Press the **Selector** knob to show the menu.
2. Select the **Tools** item.
3. Select the **Advanced** item.
4. Select the **Watchdog** item.
5. Turn the **Selector** knob to highlight **Active**.
6. Press the **Selector** knob to confirm.

Cancel a Pending Restart

The watchdog system warns the operator one minute before it forces a main processor restart. This gives the operator an opportunity to prevent the restart from happening. During this period, the LCD shows a countdown time in seconds. An audible alert is sounded once every 10 seconds and once every second for the last 10 seconds of the countdown time. This audible alert is sounded even if the audible alarm has been previously disabled.

★ To cancel the pending restart, press the **Selector** knob once. After that, the watchdog system will not restart the main processor again until main processor resumes signaling the watchdog system. If a pending restart is not canceled by pressing the **Selector** knob, the watchdog system will continue to restart the main processor every three minutes.

Use the Front USB port

There is one USB port on the front of the TSI-4000 unit. It provides a simple way to update the various firmware components that control operation of the entire tally system. The system can be completely updated in a few minutes. System component updates can add features to the tally system or provide access and control of new products or equipment.

To use the USB port, obtain the necessary files and instructions from the manufacturer and copy them to a USB flash drive. Insert the flash drive into the USB port and follow all instructions provided with the files.

★ Take extra care to avoid removing the USB flash drive or powering off the TSI-4000 unit while USB procedures are being followed.

GPI Network

The GPI Network command lets the operator discover GPI devices currently connected to the network including those that have not yet had their IP address or other network settings modified for use on that network, and to modify those same network settings.

To use the GPI Network command

1. Press the **Selector** knob to show the menu.
2. Select the **Tools** item.
3. Select the **Advanced** item.
4. Select the **GPI Network** item.
5. Wait while the system searches for GPI devices on the network.
This may take a few seconds depending on how many devices are connected to the network. Once the search is complete, the number of devices found appears beside the GPI Network item. If one or more devices are found, continue with the procedure.
6. Press the **Selector** knob. A list of the IP addresses of discovered GPI devices appears.
The model name of each device also appears. To modify the network settings of a listed device, continue the procedure.
7. Turn the **Selector** knob to highlight the desired IP address of the GPI device to modify.
A visual indication appears on the highlighted device. On TXI Series devices, the **STATUS** LED flashes amber.
8. Press the **Selector** knob.
The current IP address, subnet mask, and gateway settings appear in three items.
9. Turn the **Selector** knob to highlight the item to modify.
10. Press the **Selector** knob.
11. Specify the IP address, subnet mask, or gateway using the method described in "**Setting the IP Address and Subnet Mask**".
12. Repeat steps 7, 8, and 9 to modify other items as desired.
13. Turn the **Selector** knob to highlight the **Apply Changes** item.
This item only appears if any items have been modified.
14. Press the **Selector** knob.
15. Turn the **Selector** knob to highlight the **Confirm** item.
16. Press the **Selector** knob.

Ping Command

The ping command lets the operator test the Ethernet connection to a device even before the TSI-4000 is configured to connect to the device. This action is known as "pinging". The device is selected by its IP address. The operator can choose to ping a device from a list of their IP addresses to which the TSI-4000 is already connected (or trying to be connected), or by directly specifying any IP address.

To ping a device from a preloaded list

1. Press the **Selector** knob to show the menu.
2. Select the **Tools** item.
3. Wait two seconds for the IP address list to be loaded.
The number of IP addresses in the list appears beside the **PING** menu item.
4. Select the **PING** item.
5. Turn the **Selector** knob to highlight the desired IP address of the device to ping.

- Press the **Selector** knob to ping the device once.

A gray ping icon appears to the right of the IP address. The icon turns green if the device responds or red if the device does not respond.

The ping command can be repeated as desired. The first time there is no response the icon turns red after 0.3 seconds. Subsequent attempts require one second before the icon turns red.

To ping a device by directly specifying an IP address

- Press the **Selector** knob to show the menu.
- Select the **Tools** item.
- Select the **PING** item.
- Choose any item that shows the label **ENTER ADDRESS**.
- Press the **Selector** knob.
- Specify the address using the method described in “**Setting the IP Address and Subnet Mask**”.
- Press the **Selector** knob to ping the device once.

A gray ping icon appears to the right of the IP address. The icon turns green if the device responds or red if the device does not respond.

- ★ There is space in the list for only 47 IP addresses. In heavily configured systems, there may be no space to specify another IP address. In this event, it is still possible to specify an IP address that is not in the list by using the same procedure described above but taking step 3 less than two seconds after taking step 2. This action keeps the list from being preloaded.

TSI-4000ACO Displays and Controls

Override Switch

The normal operation of the TSI-4000ACO can be overridden using the slide switch on the front of the TSI-4000ACO.

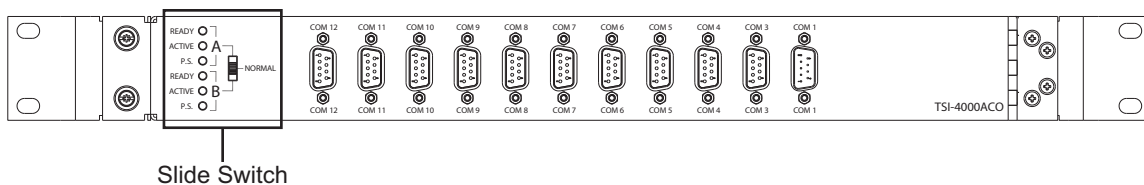


Figure 16 Location of Slide Switch

Moving the slide switch to the **A** or **B** position forces the selection of TSI A or TSI B as the active unit.

When the slide switch is in the middle position, the active TSI-4000 selection is controlled from the ACO pushbuttons on the front of the TSI-4000 units. See “**Operating the ACO System**”.

TSI-4000ACO Status LEDs

The status of the TSI-4000ACO and the TSI-4000s are reported by LEDs on the front of the TSI-4000ACO. Expected conditions are indicated by LEDs illuminated with a solid color. Abnormal conditions are indicated by LEDs illuminated with a flashing color.

READY Status

The READY LEDs on the front of the TSI-4000ACO indicate the ready status of the TSI-4000 as listed in **Table 10**.

Table 10 READY LEDs

Color	Description
Green	Normal operation
Red	The TSI-4000 is powered off or is not connected to the TSI-4000ACO.
Blinking Red	The TSI-4000 has started and is not yet ready to assume control of the system. This may persist if the TSI-4000 is not properly set up.
Blinking Amber	A hardware fault has been detected.

ACTIVE Status

The ACTIVE LEDs on the front panel of the TSI-4000ACO indicate the active status of the TSI-4000s as listed in **Table 11**.

Table 11 ACTIVE LEDs

Color	Description
Green	The TSI-4000 is currently running the system and is healthy. The system is in automatic mode.
Blinking Green	The TSI-4000 is currently running the system and is healthy. The system is in manual mode.
Rapid Blinking Green	The TSI-4000 is currently running the system and is healthy. The system is in override mode.
Off	The TSI-4000 is the standby unit and is not currently running the system.
Red	The TSI-4000 is currently running the system but neither TSI-4000 is ready. The system is in automatic mode.
Blinking Red	The TSI-4000 is currently running the system but the TSI-4000 is not ready. The system is in manual mode.
Rapid Blinking Red	The TSI-4000 is currently running the system but the TSI-4000 is not ready. The system is in override mode.
Blinking Amber	The TSI-4000ACO has an internal relay control fault.

Power Status

The TSI-4000ACO is powered by one or two external power sources. Typically the TSI-4000s supply the power to the TSI-4000ACO.

★ The TSI-4000ACO does not have a power switch. The unit is on whenever power is applied to either of the rear power connectors.

The Power Status (PS) LEDs on the front indicate the power source status as listed in **Table 12**.

Table 12 POWER LEDs

Color	Description
Green	The external power source is connected and is supplying power to the TSI-4000ACO.
Red	The external power source is connected to the TSI-4000ACO; however, there is no power from the source.
Off	There is no external power source connected.
Blinking Red	The external power source is connected; however, it is not supplying enough power to the TSI-4000AC.
Blinking Amber	The TSI-4000ACO has an internal power supply fault.

Maintenance

There are no user serviceable parts in the TSI-4000, the TSI-4000CP, or the TSI-4000ACO. The only routine maintenance tasks for the TSI-4000 are occasionally cleaning the front panel LCD and removing any dust or debris that may be interfering with forced air cooling. There is no routine maintenance necessary for the TSI-4000CP or TSI-4000ACO.



ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Cleaning the LCD

The TSI-4000 front panel LCD should be cleaned occasionally with a solution of 50% distilled water and 50% isopropyl alcohol. Dampen a soft lint-free cloth with the solution and gently wipe the LCD. Do not let any of the solution run down the LCD and do not apply the solution directly to the LCD. Most commercial LCD cleaning cloths and solutions are acceptable. Do not use commercial glass cleaners as the ammonia in them may cause a hazing of the LCD.

Periodic Cleaning

To maintain a proper CPU operating temperature it is necessary to periodically open the TSI-4000 and clean out any dust or debris that may have accumulated on the fans or be restricting air flow. How often this needs to be done is dependent on the environment in which the TSI-4000 is operating

TSI-4000 Cleaning

1. Use the front panel Power button to turn off the TSI-4000.
2. Disconnect any cables from the TSI-4000 and remove it from the rack.
3. Remove the top cover screws and remove the top cover. There are 3 screws on each side and 7 screws on the top.
4. Carefully blow or brush any accumulated dust or debris from inside the TSI-4000. Particular attention should be given to the heat sink on the motherboard.
5. Replace the top cover and the top cover screws.
6. Reinstall the TSI-4000 in the rack and reconnect any previously disconnected cables.
7. Turn on the TSI-4000 and confirm its operation.

TSI-4000PS Cleaning

This procedure can be done without interrupting TSI-4000 operation if the TSI-4000 is powered by the other supply, otherwise use the front panel Power button to turn off the TSI-4000 before starting this procedure.

1. Turn the power switch to the OFF position on the supply to be cleaned.
2. Disconnect the power cord from the supply.
3. Unscrew the retaining screw in the upper-right of the power supply.
4. Remove the power supply from the TSI-4000 chassis by pulling on its handle.

5. Remove the top cover screws and remove the top cover. There are 2 screws on each side and 2 screws on the top.
6. Carefully blow or brush any accumulated dust or debris from inside the power supply.
7. Replace the top cover and the top cover screws.
8. Reinstall the power supply in the TSI-4000 chassis.
- ★ If the TSI-4000 is powered by the other supply, the status LED on the supply illuminates red to indicate it is not providing power.
9. Tighten the retaining screw to secure the power supply to the TSI-4000 chassis.
10. Reconnect the power cord to the supply.
11. Turn on the power switch.
12. Confirm proper operation of the power supply.

TSI-4000 Power Supply

The TSI-4000 plug-in power supplies can be replaced in the field.

Power Inlet Fuse

Each power supply has its own fused power inlet connector on the rear panel of the TSI-4000. The fuse is in the drawer beneath the power connection. The fuse is 2A time-lag, surge-withstanding, high breaking capacity, rated for 250V, in a 5 x 20 mm ceramic body cartridge package. For safety the fuse drawer cannot be opened until the power cord is removed from the power inlet connector. When shipped from the factory, an extra fuse is installed in the spare fuse holder in the fuse drawer.

Replacing a Power Supply

This procedure can be done without interrupting TSI-4000 operation if the TSI-4000 is powered by the other supply, otherwise use the front panel Power button to turn off the TSI-4000 before starting this procedure.

1. Turn the power switch to the OFF position on the supply to be replaced.
2. Disconnect the power cord from the supply.
3. Unscrew the retaining screw in the upper-right of the power supply.
4. Remove the power supply from the TSI-4000 chassis by pulling on its handle.
5. Ensure the power switch is in the off position on the supply to be installed.
6. Insert the new power supply in the empty slot.
- ★ If the TSI-4000 is powered by the other supply, the status LED on the new supply illuminates red to indicate it is not providing power.
7. Tighten the retaining screw to secure the power supply to the TSI-4000 chassis.
8. Reconnect the power cord to the supply.
9. Turn on the power switch.
10. Confirm proper operation of the power supply.

TSI-4000 Rear Supports

This chapter presents diagrams that may be used when mounting the TSI-4000 and TSI-4000-CP in a rack.

18" (457mm) Mounting Depth

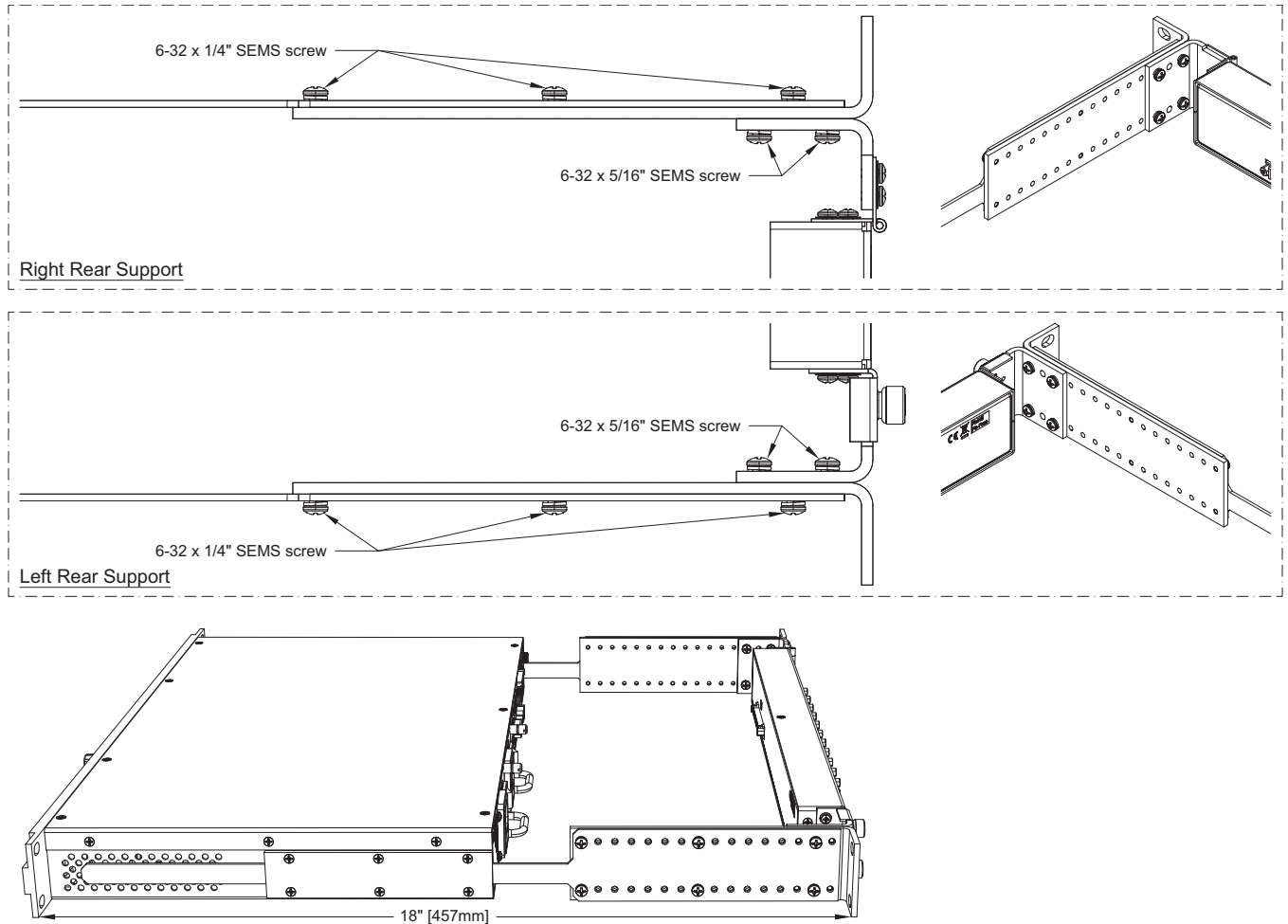


Figure 17 Mounting Depth — 18"

19" (483mm) Depth

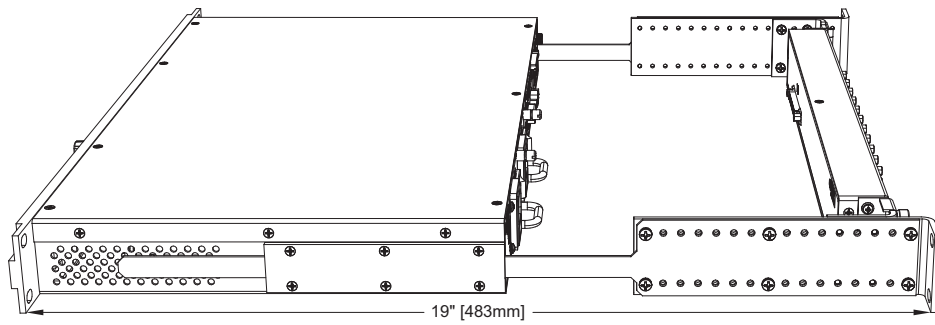
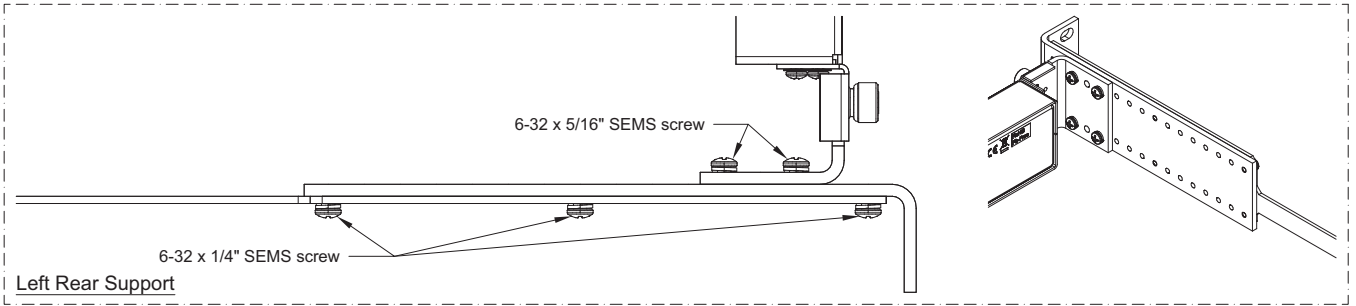
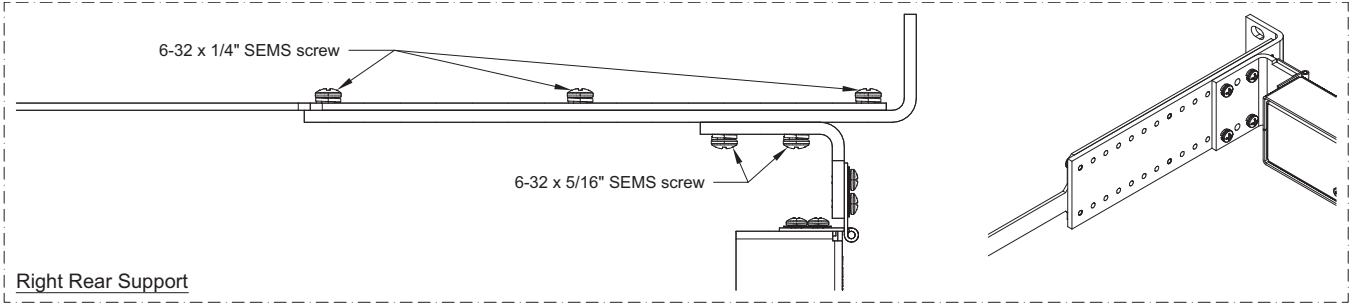


Figure 18 Mounting Depth — 19"

20" (508mm) Depth

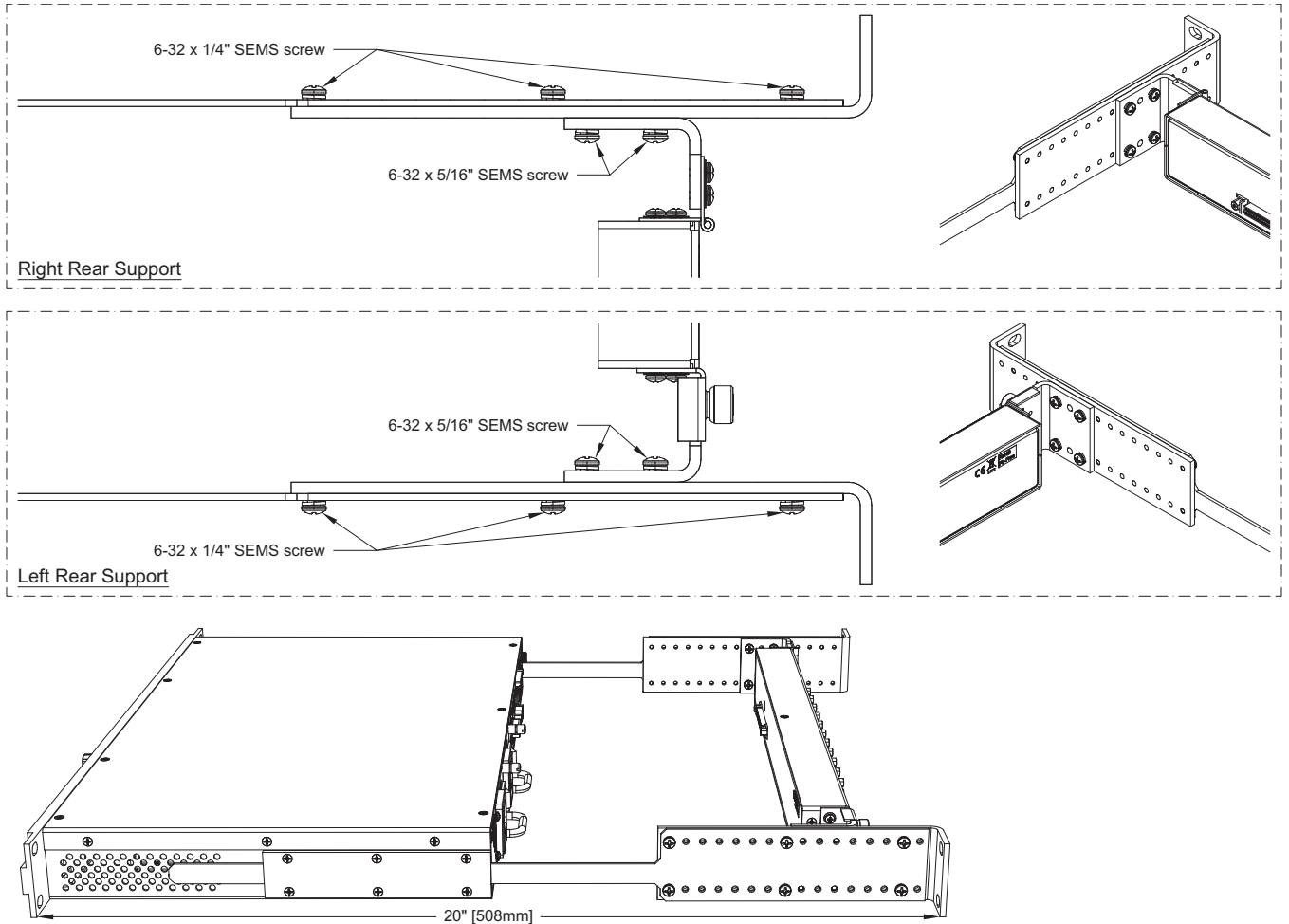


Figure 19 Mounting Depth — 20"

21" (533mm) Depth

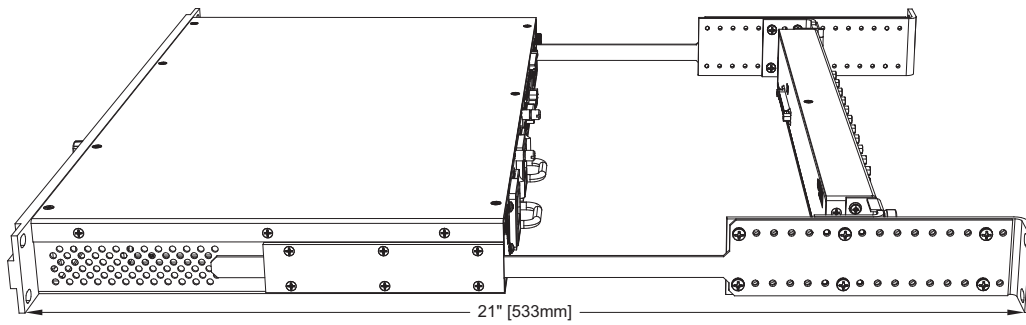
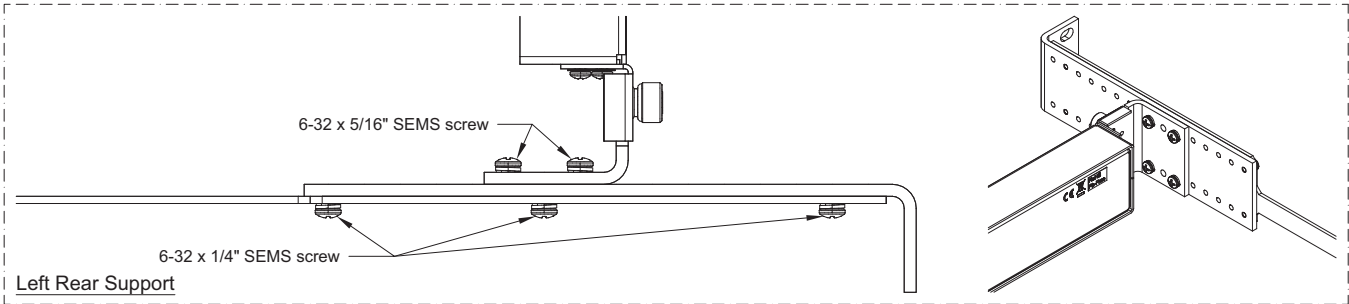
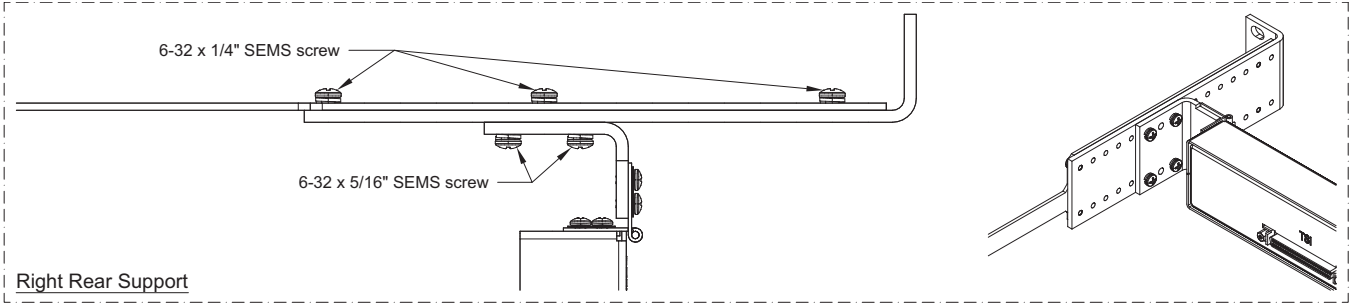


Figure 20 Mounting Depth — 21"

22" (559mm) Depth

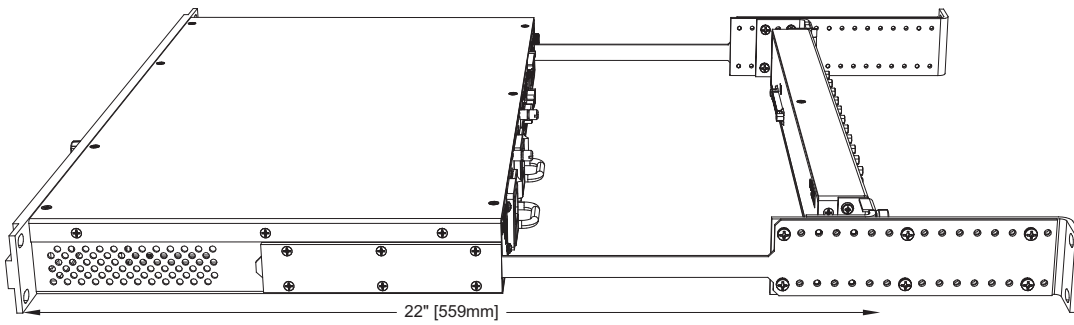
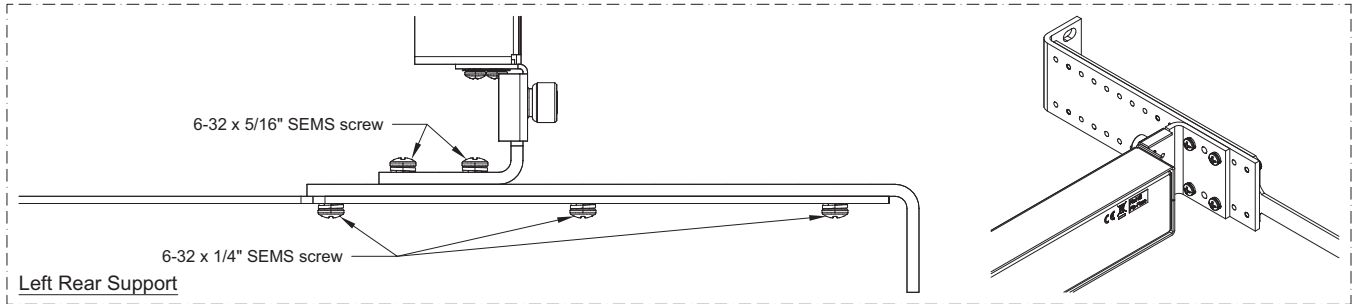
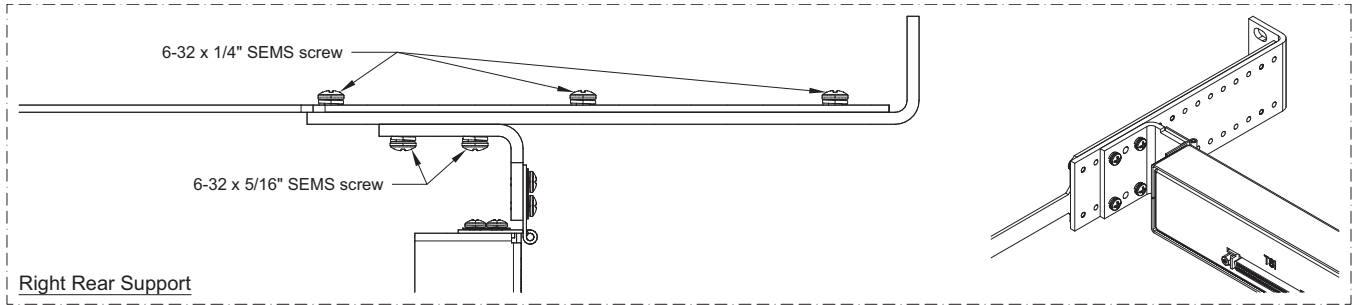


Figure 21 Mounting Depth — 22"

23" (584mm) Depth

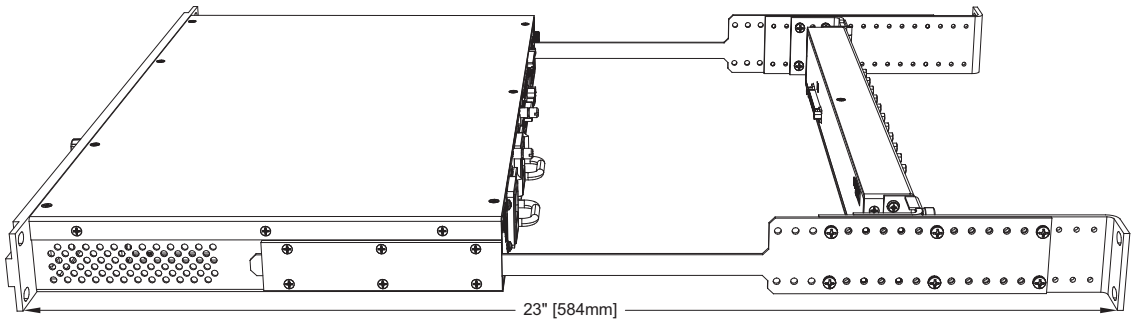
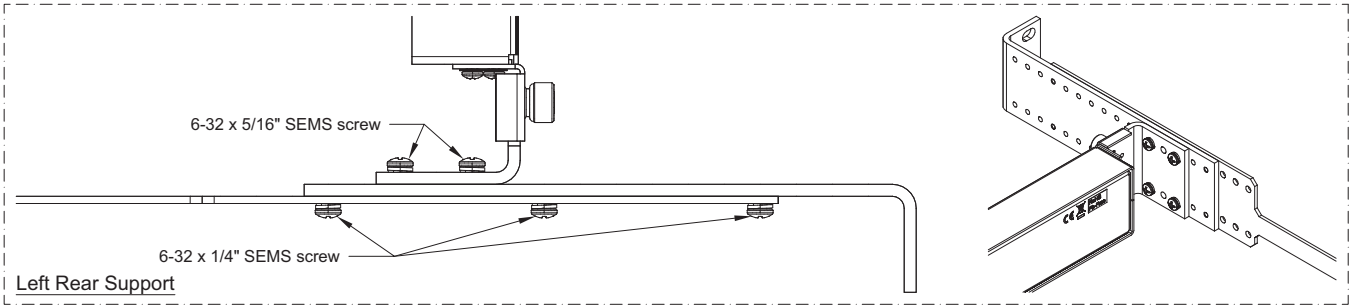
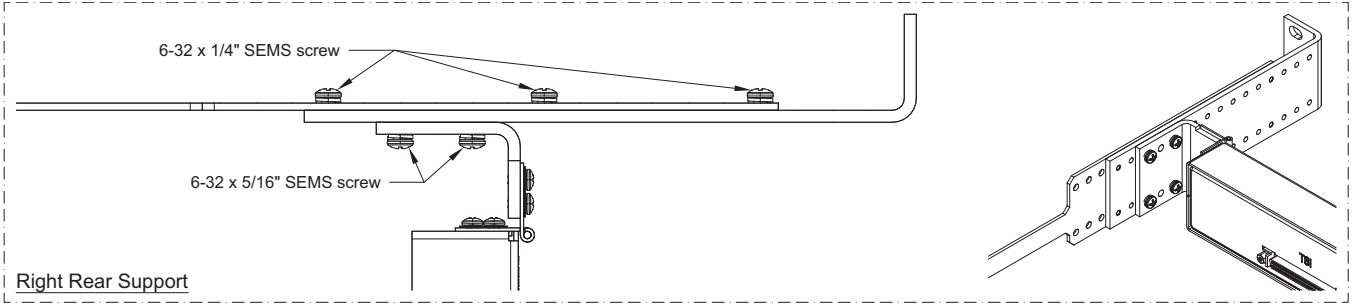


Figure 22 Mounting Depth — 23"

24" (610mm) Depth

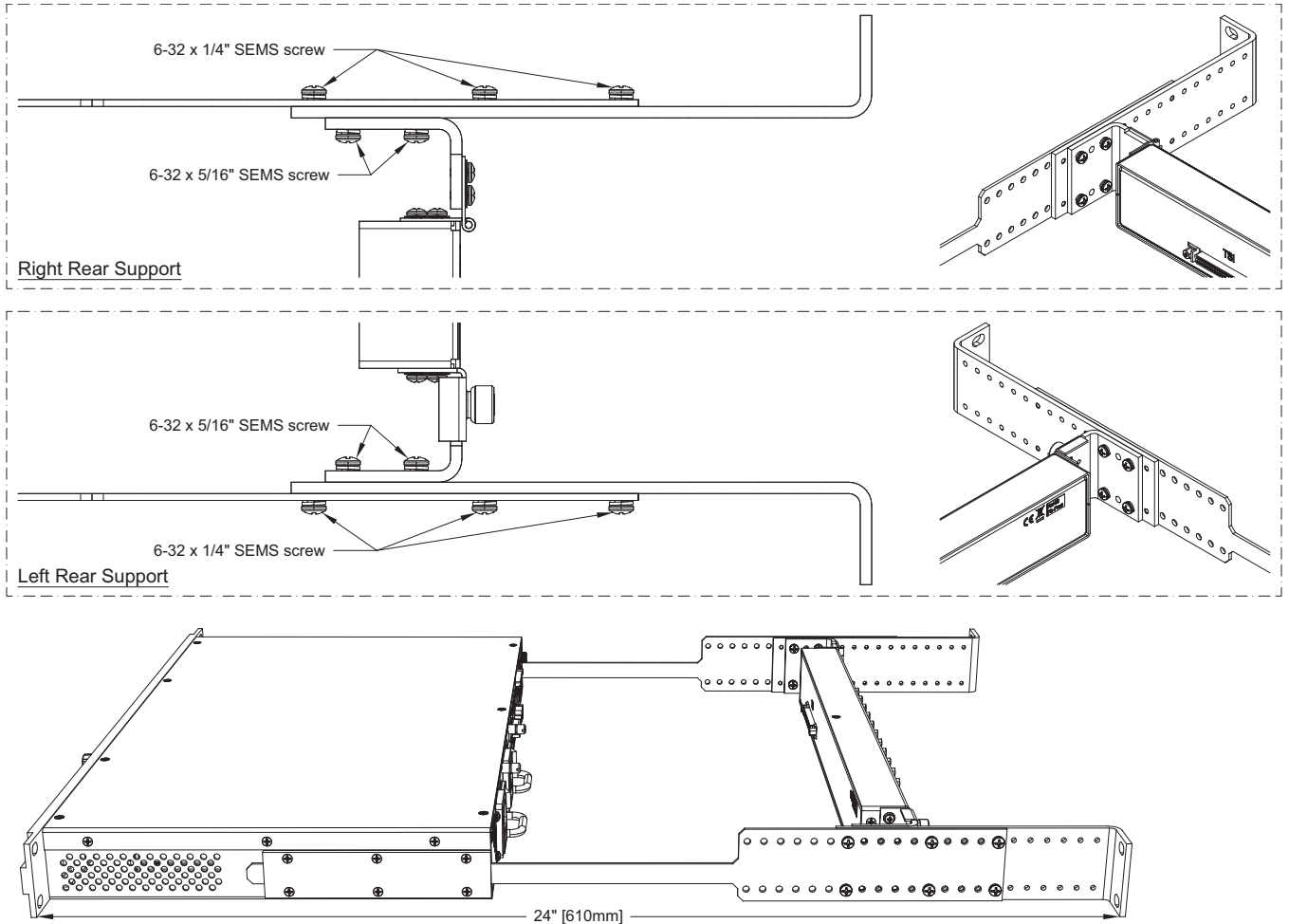


Figure 23 Mounting Depth — 24"

25" (635mm) Depth

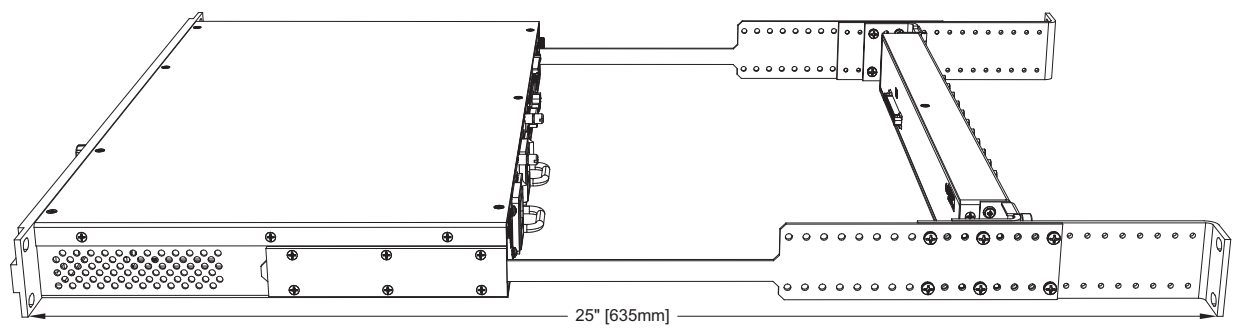
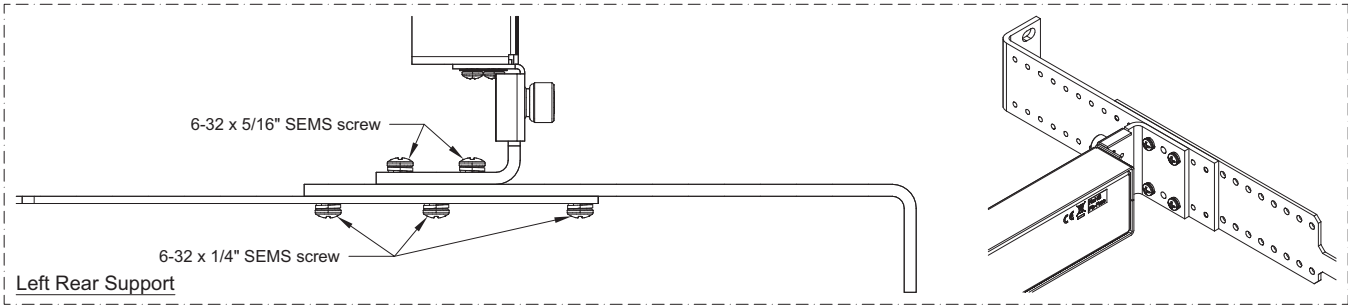
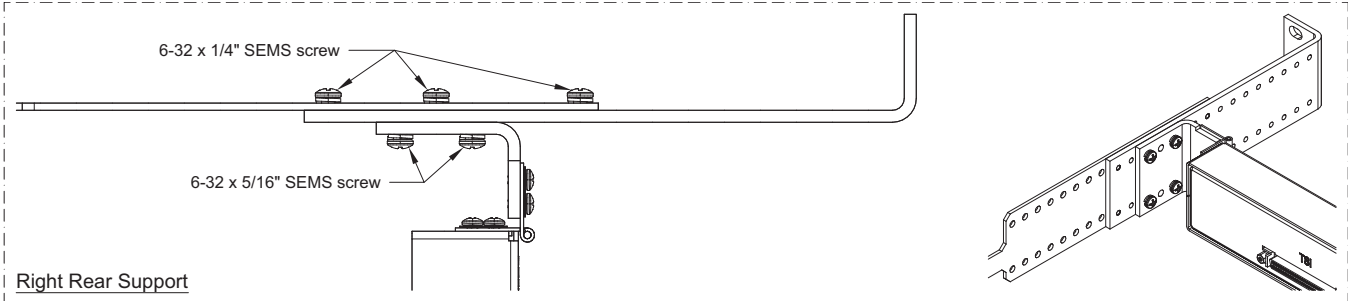


Figure 24 Mounting Depth — 25"

26" (660mm) Depth

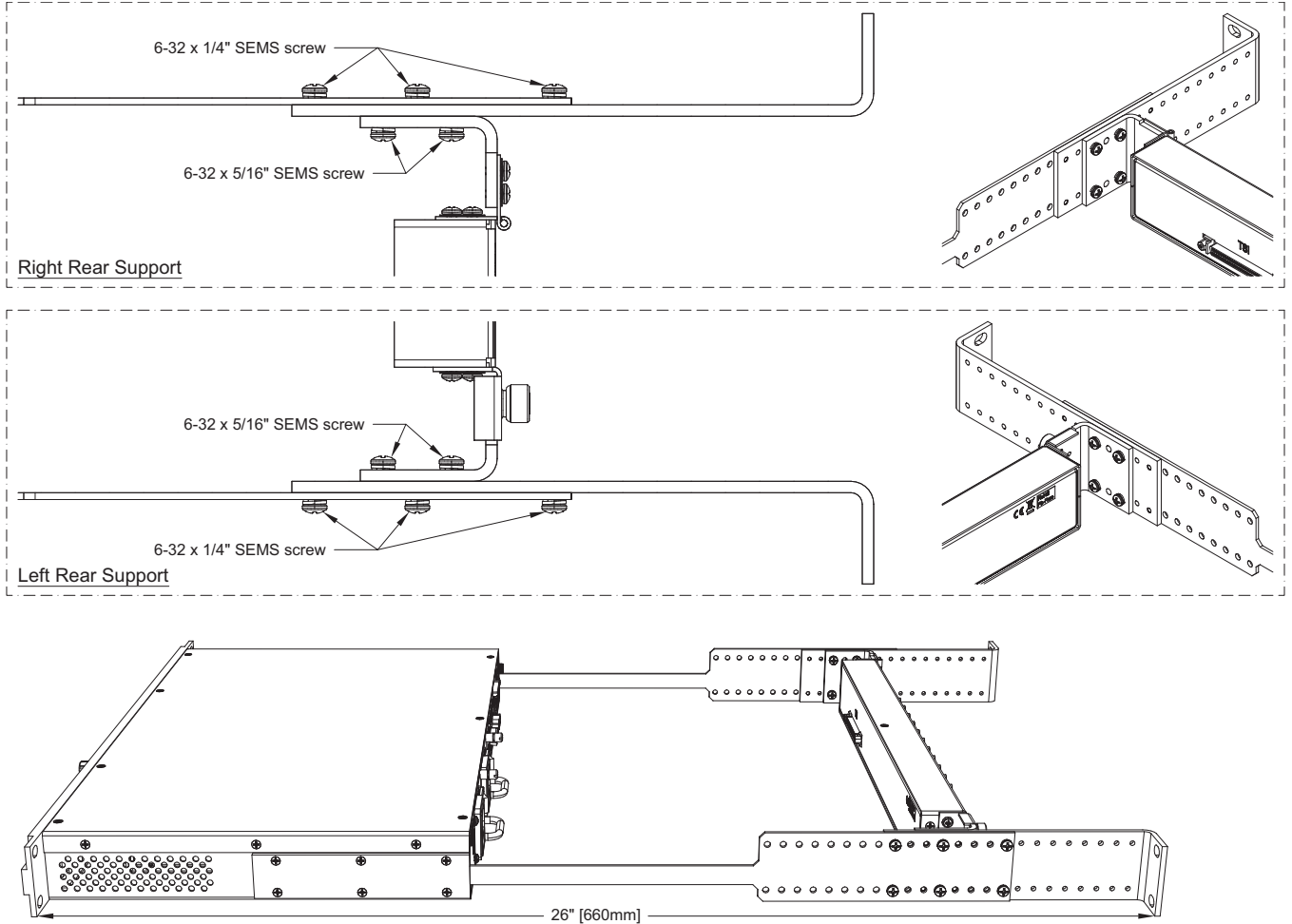


Figure 25 Mounting Depth — 26"

TSI-4000ACO Rear Supports

This chapter presents diagrams that may be used when mounting the TSI-4000ACO in a rack.

18" (457mm) Mounting Depth

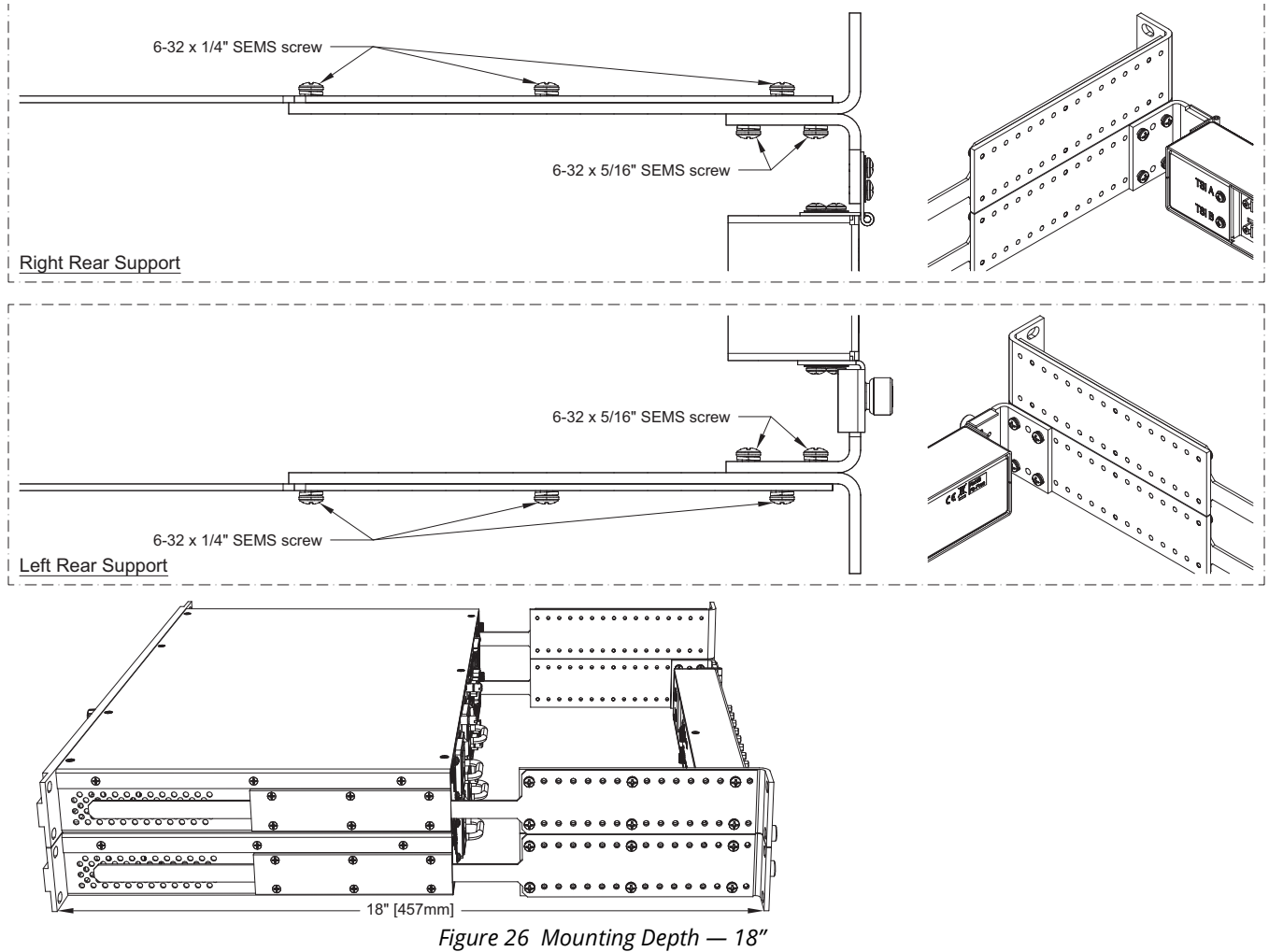


Figure 26 Mounting Depth — 18"

19" (483mm) Depth

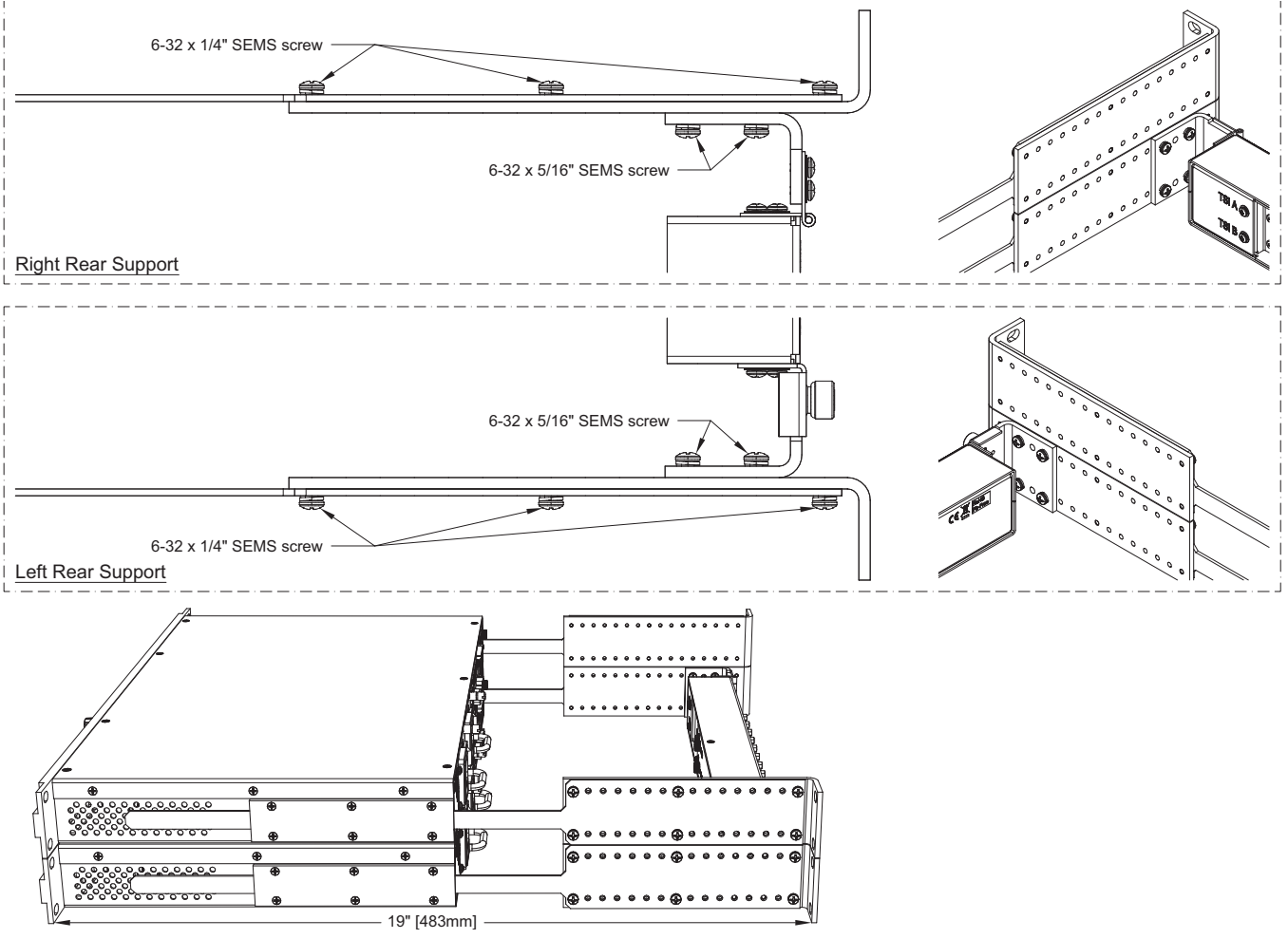


Figure 27 Mounting Depth — 19"

20" (508mm) Depth

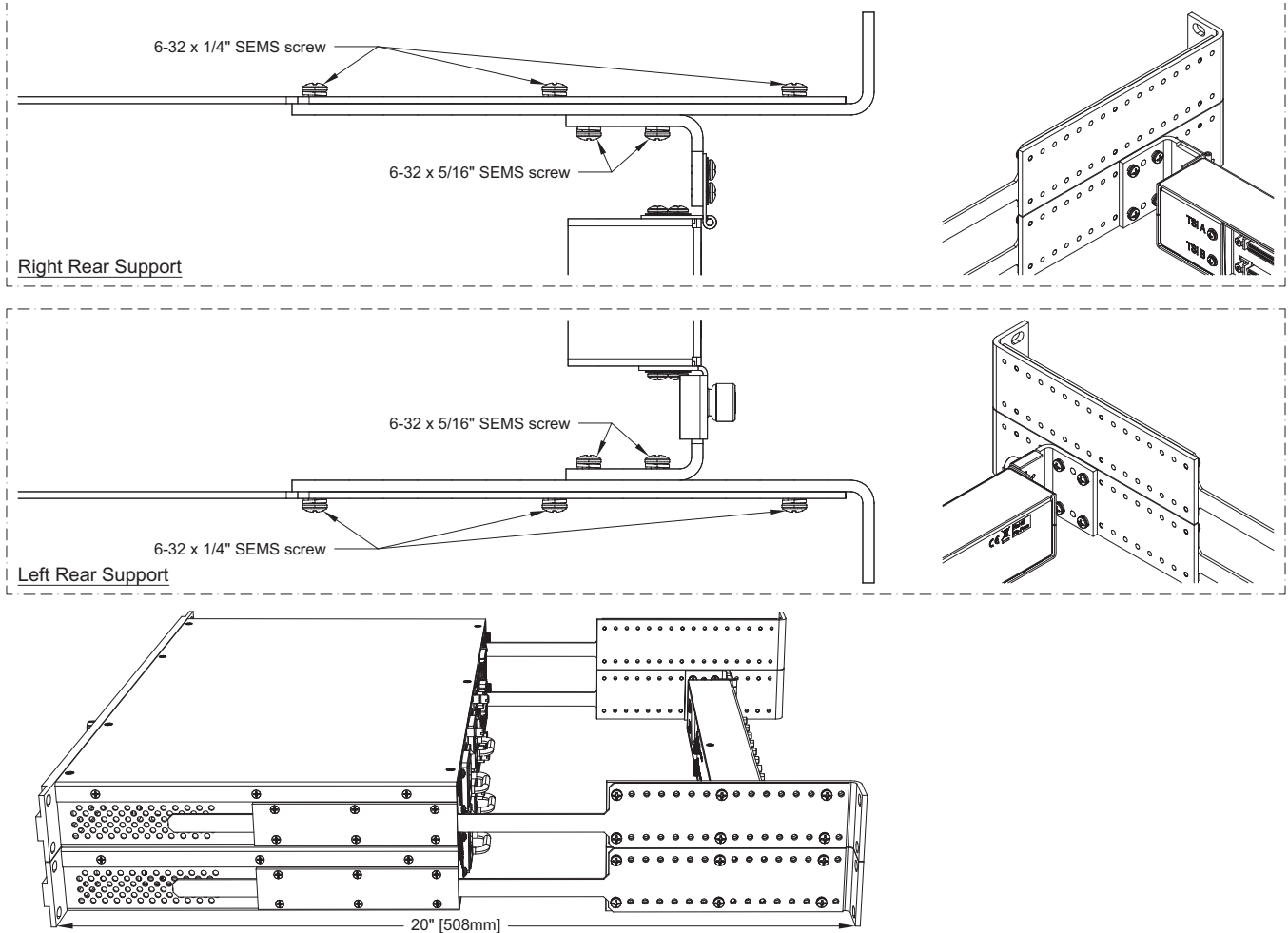


Figure 28 Mounting Depth — 20"

21" (533mm) Depth

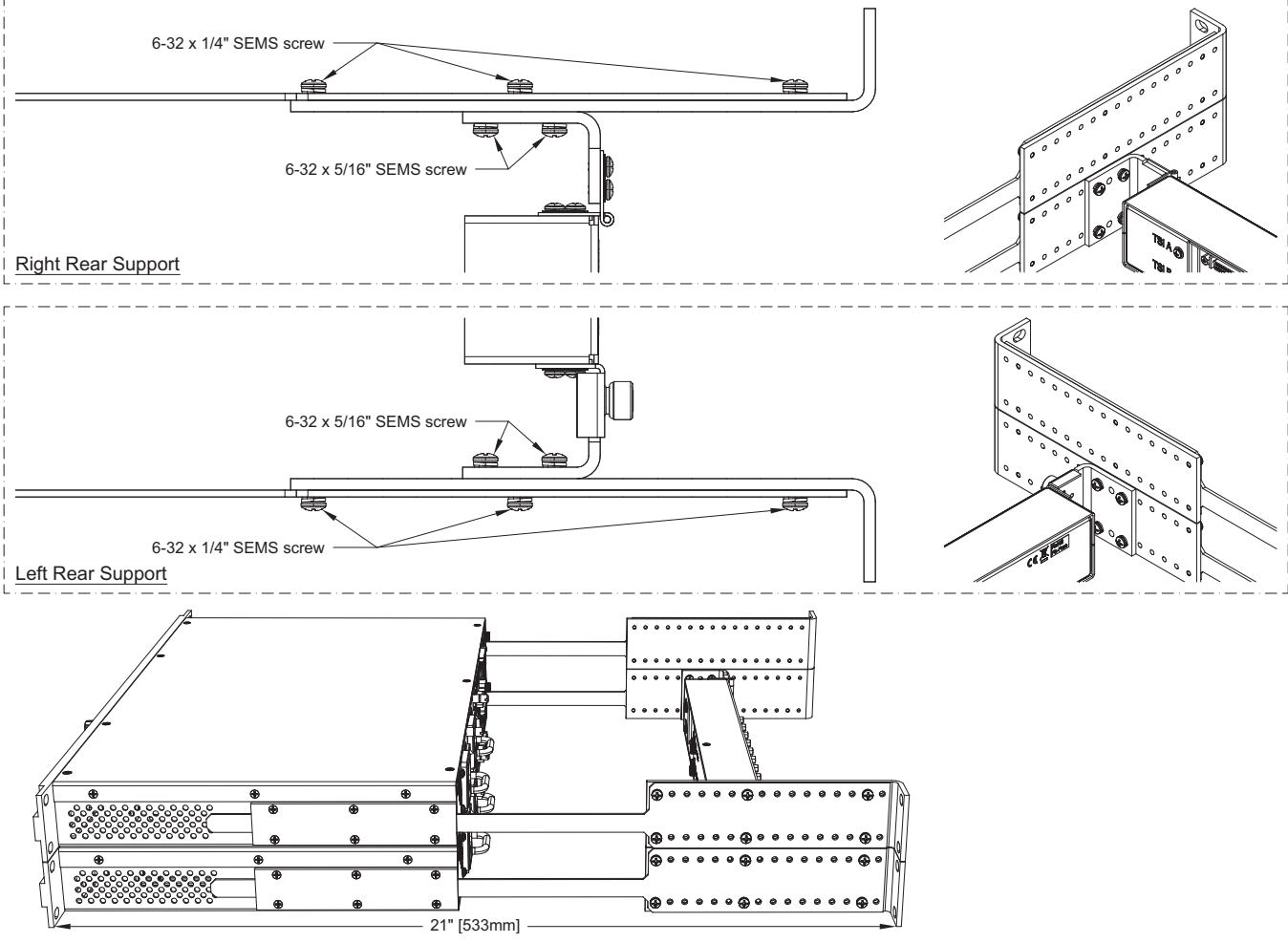


Figure 29 Mounting Depth — 21"

22" (559mm) Depth

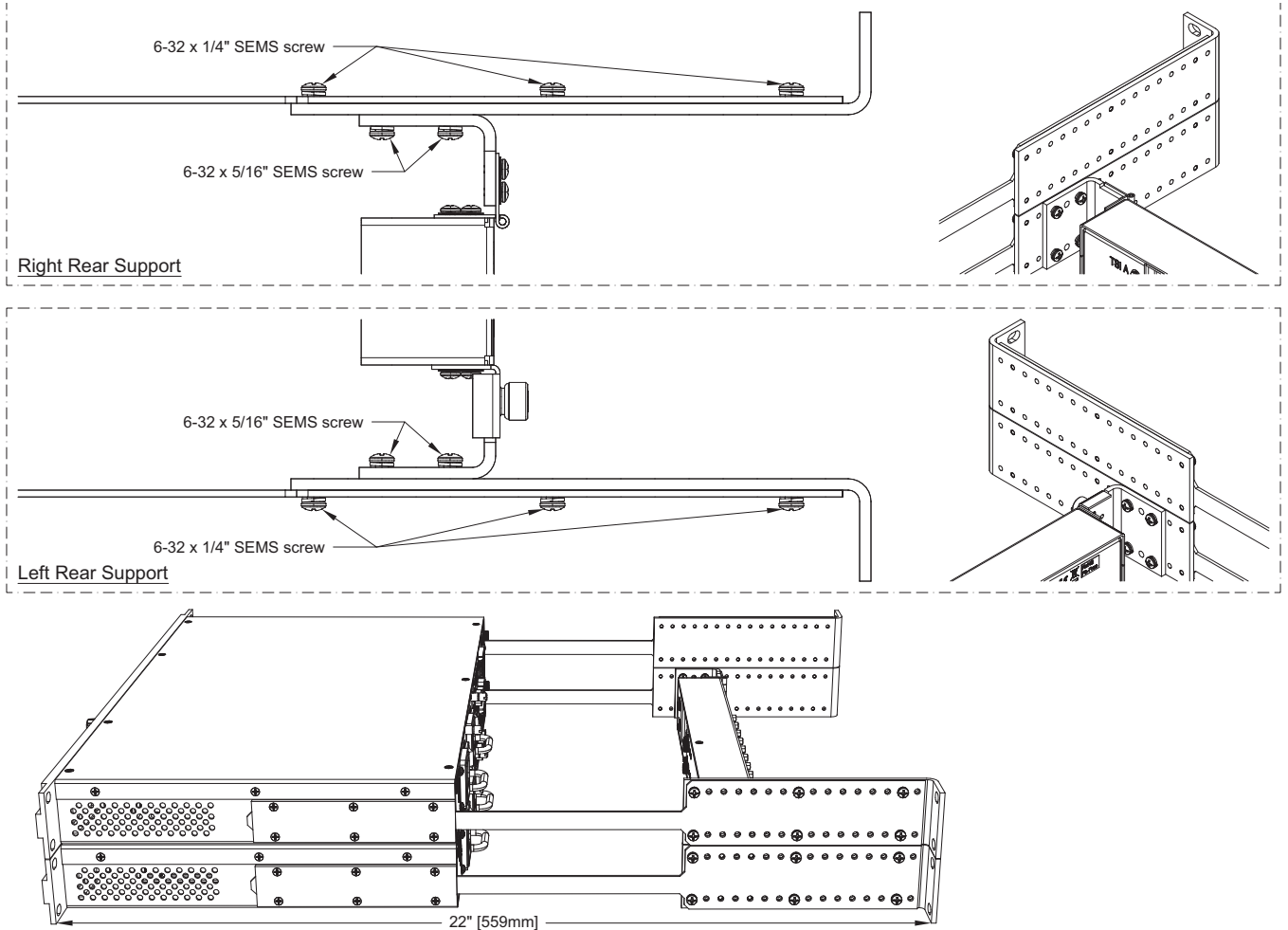


Figure 30 Mounting Depth — 22"

23" (584mm) Depth

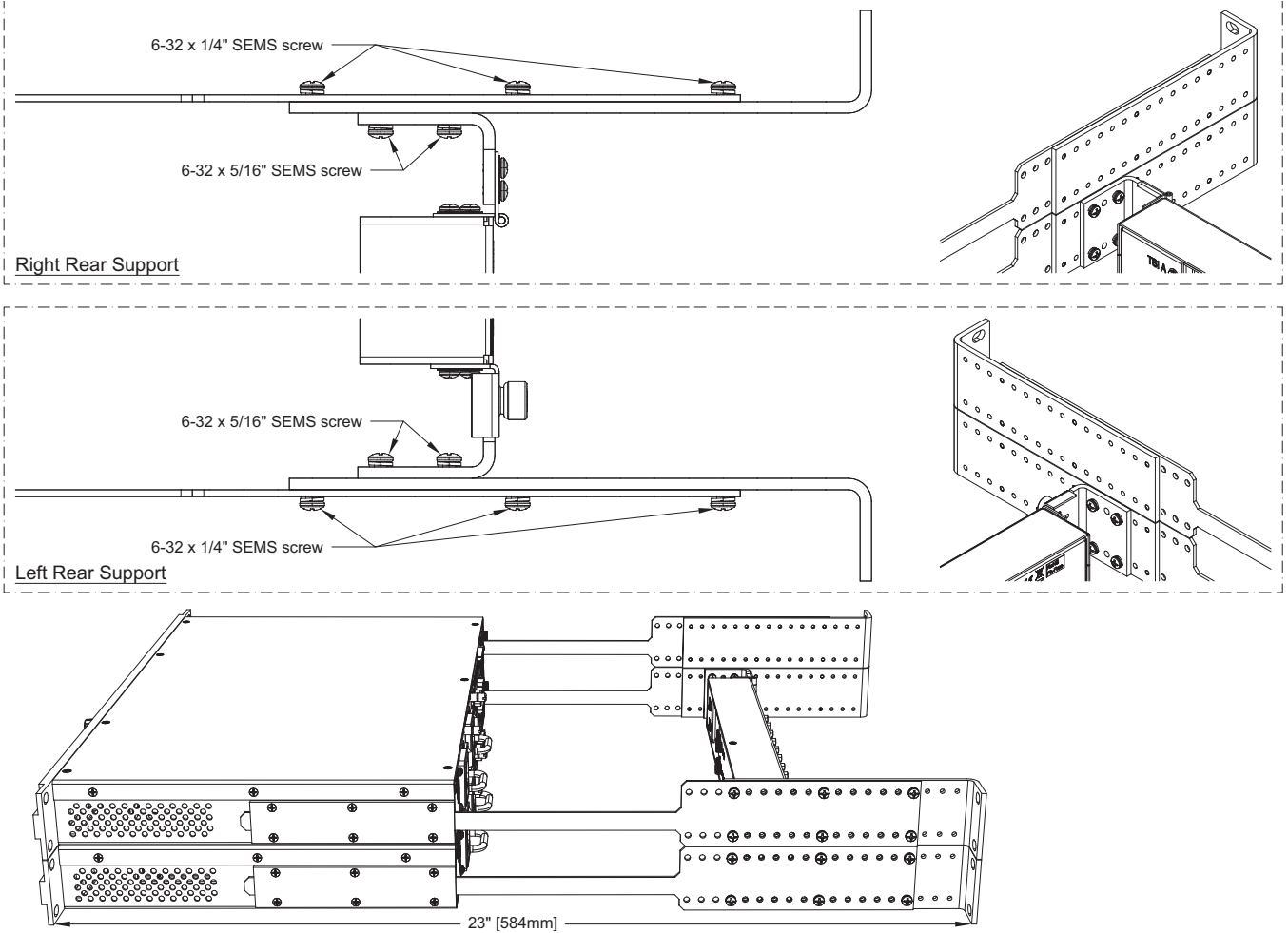


Figure 31 Mounting Depth — 23"

24" (610mm) Depth

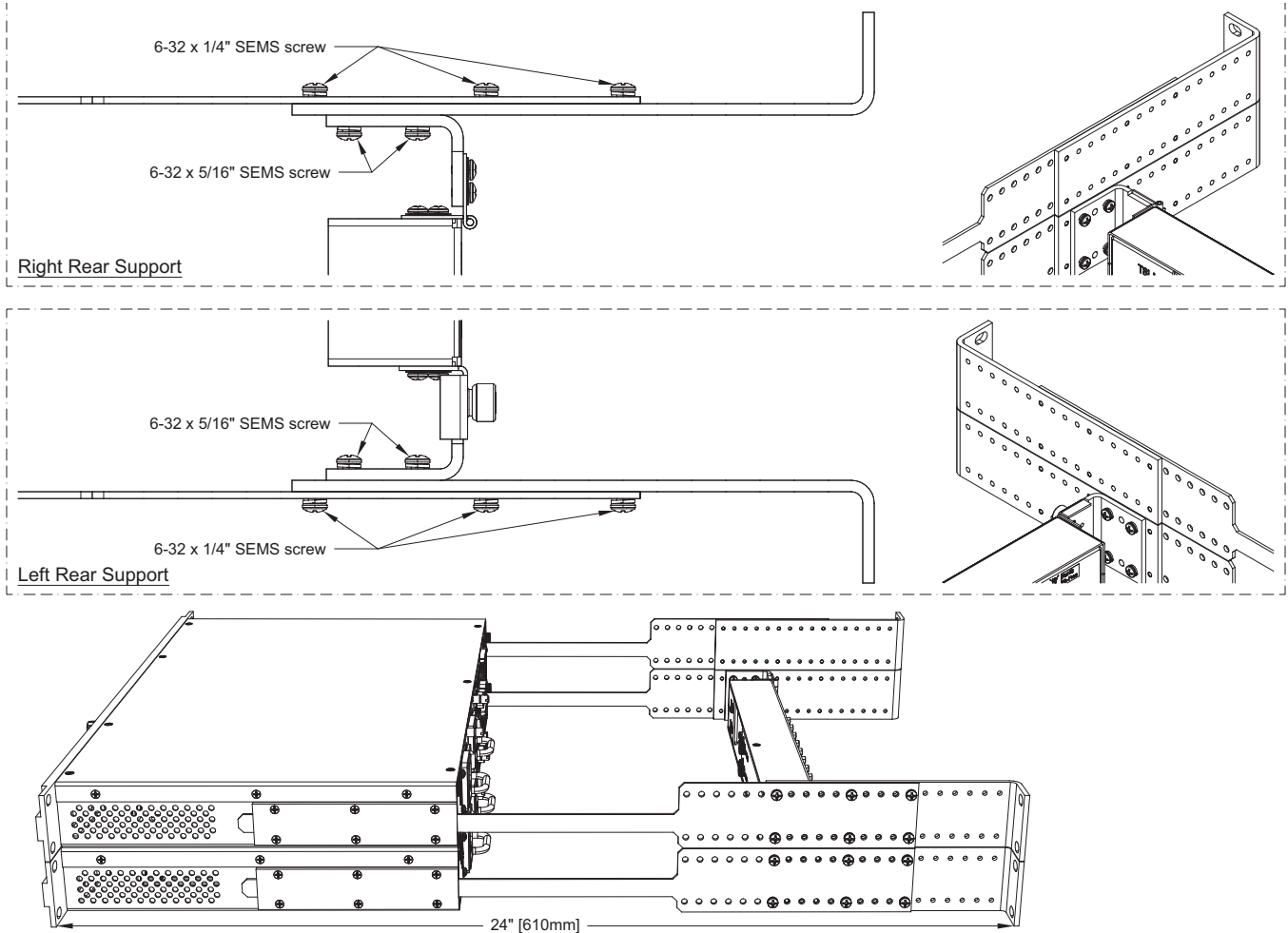


Figure 32 Mounting Depth — 24"

25" (635mm) Depth

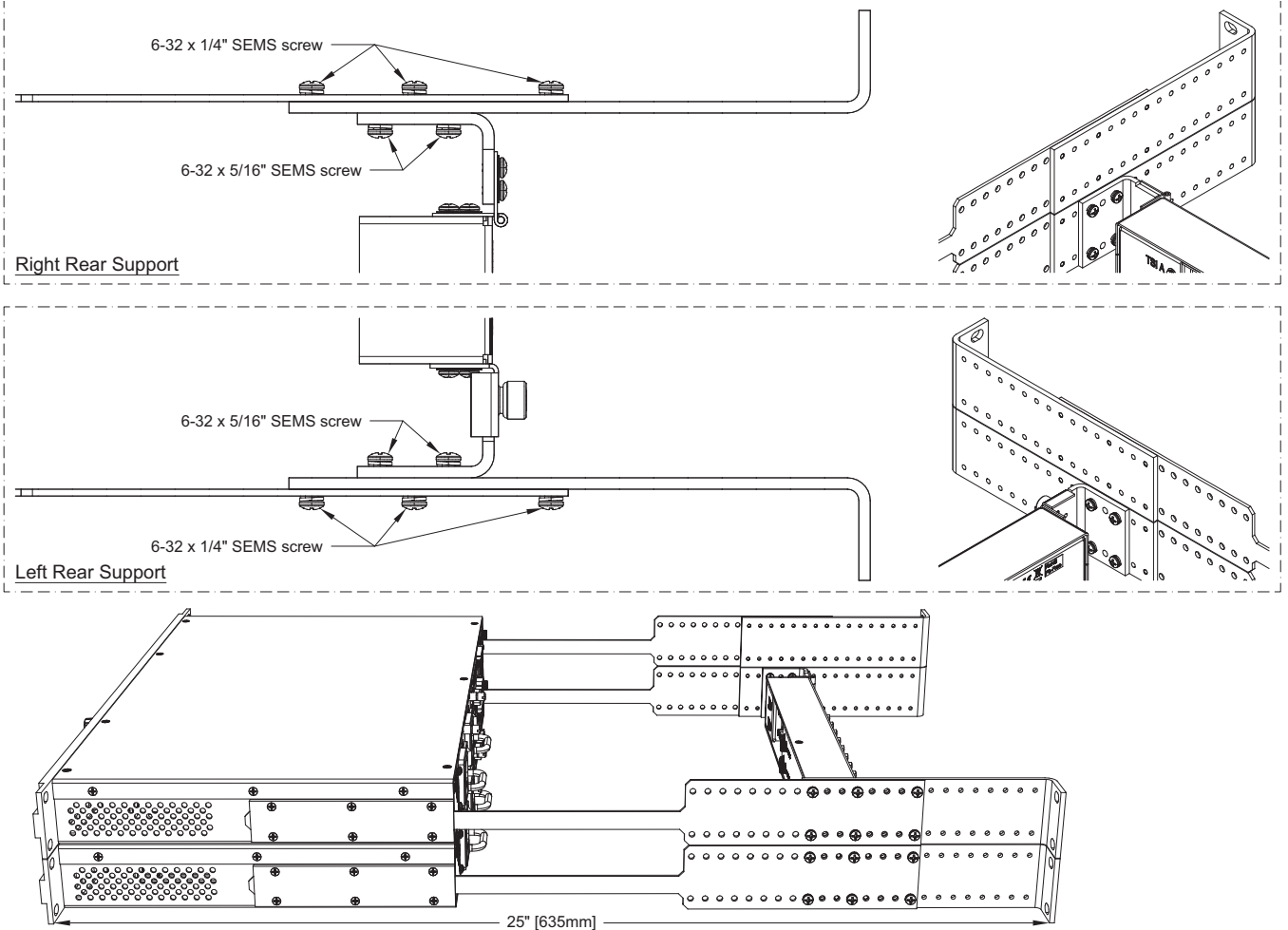


Figure 33 Mounting Depth — 25"

26" (660mm) Depth

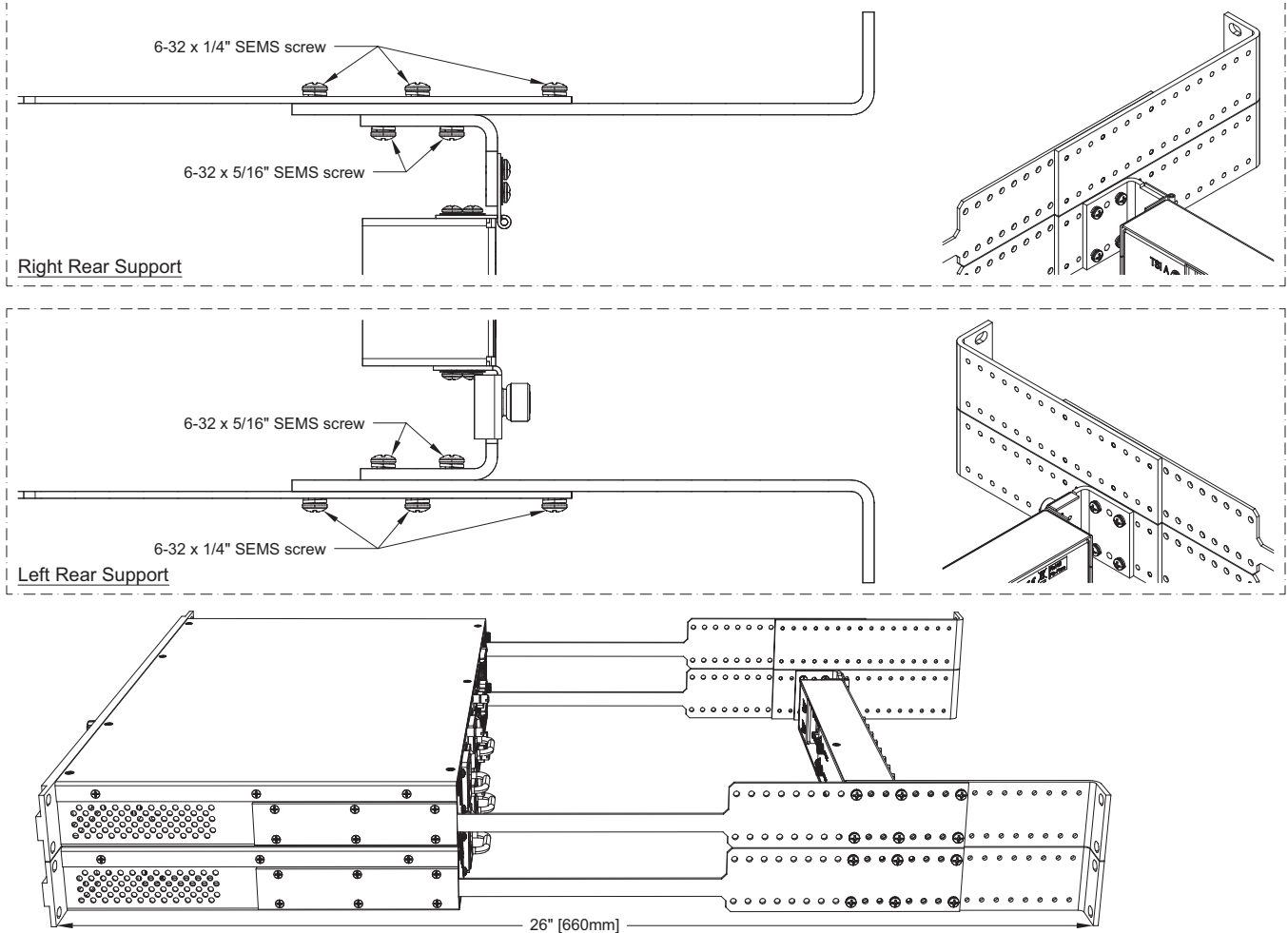


Figure 34 Mounting Depth — 26"

Technical Specifications

This chapter provides technical information for TSI-4000.

★ Specifications are subject to change without notice.

TSI-4000 System Specifications

Components

- 1 x TSI-4000 Tally System Interface
- 1 x TSI-4000CP Connector Panel
- 2 x Rear support rack ear
- 2 x Rear support bar
- 2 x Power cord
- 1 x TSI-4000 to TSI-4000CP/ACO interconnect cable

Physical

Table 13 Technical Specifications — Physical

Item	Specifications
Dimensions	1.75" (44.5 mm) high x 19" (483 mm) wide Depth adjustable between 18" (457 mm) and 26" (660 mm)
Weight	16.5lb (7.5kg) Shipping: 21.3lb (9.7kg)

Environment

Table 14 Technical Specifications — Environment

Item	Specifications
Temperature	0°C to +40°C operating -20°C to +60°C non-operating
Humidity	20% to 80% non-condensing

Power

Table 15 Technical Specifications — Power

Item	Specifications
Voltage	100 to 240VAC, 50 to 60Hz, auto-ranging
Current	1.0 to 0.5A
	0.9 power factor (min) per power supply

Network Ports

- 2 x 10Base-T / 100Base-TX / 1000Base-T Ethernet port on 8P8C (RJ-45) modular jack connector
- 2 x optional 10Base-T / 100Base-TX Ethernet port using a USB to Ethernet adapter

USB Ports

- 4 x USB 2.0 ports on the rear panel with standard-A receptacle type connectors
- 1 x USB 2.0 port on the front panel with standard-A receptacle type connector

Serial Ports

- 10 x RS-422/485 ports with female 9-pin D connectors
- 1 x RS-232 port with male 9-pin D connector

TSI-4000ACO System Specifications

Components

- 2 x TSI-4000 Tally System Interface
- 1 x TSI-4000ACO Auto-Changeover
- 4 x Rear support rack ear
- 4 x Rear support bar
- 4 x Power cord
- 2 x TSI-4000 to TSI-4000CP/ACO interconnect cable
- 2 x TSI-4000ACO power cable

Physical

Table 16 Technical Specifications — Physical

Item	Specifications
Dimensions	3.5" (89 mm) high x 19" (483 mm) wide Depth adjustable between 18" (457 mm) and 26" (660 mm)
Weight	31.5lb (14.3kg) Shipping 36lb (16.4kg)

Environment

Table 17 Technical Specifications — Environment

Item	Specifications
Temperature	0°C to +40°C operating -20°C to +60°C non-operating
Humidity	20% to 80% non-condensing

Power

Table 18 Technical Specifications — Power per TSI-4000

Item	Specifications
Voltage	100 to 240VAC, 50 to 60 Hz, auto-ranging
Current	1.0 to 0.5A 0.9 power factor (min) per power supply

Network Ports (per TSI-4000)

- 2 x 10Base-T / 100Base-TX / 1000Base-T Ethernet port on 8P8C (RJ-45) modular jack connector
- 2 x optional 10Base-T / 100Base-TX Ethernet port using a USB to Ethernet adapter

USB Ports (per TSI-4000)

- 4 x USB 2.0 ports on the rear panel with standard-A receptacle type connectors
- 1 x USB 2.0 port on the front panel with standard-A receptacle type connector

Serial Ports

- 10 x RS-422/485 ports with female 9-pin D connectors
- 1 x RS-232 port with male 9-pin D connector

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SHA-1 in C

Written by Steve Reid <steve@edmweb.com>

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3rd Party Library: libhiredis.so.0.13

Description: minimalistic C client library for Redis

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Library: libpthread.so.0

Description: lightweight pthread API

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Website: <https://www.openhub.net/p/libpthread-stubs>

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Library: libevent-2.0.so.5

Description: event notification library

Debian: <https://packages.debian.org/stretch/libevent-2.0-5>

Developer: <https://tracker.debian.org/pkg/libevent>

Website: <https://libevent.org/>

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Library: librt.so.1 => /lib/x86_64-linux-gnu/librt.so.1 (0x00007fe1c39c0000)

Description: POSIX.1b RealTime extension library

Website: <https://openwrt.org/packages/pkgdata/librt>

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Service Information

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In the event of problems with your unit, the following basic troubleshooting checklist may help identify the source of the problem. If the unit still does not appear to be working properly after checking all possible causes, please contact your Ross products distributor, or the Technical Support department at the numbers listed in “**Contacting Technical Support**”.

1. **Visual Review** — Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the units, and any associated peripheral equipment for signs of trouble.
2. **Power Check** — Monitor the power indicator LED(s) for the presence of power. Verify that the power cable is connected to a power source and that power is available at the power main.
3. **Connected Equipment** — Verify that externally connected equipment and devices are working properly.

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