IMAGE VIDEO
Division of 1077541 Ontario Limited

TSI-4000 System Instruction Manual

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Revision History

Revision	*Date*	*Changes*
A	May 28, 2015	Original document

Preface

This manual is intended to be used by both operations and maintenance personnel.

The manual 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

The material in this manual is subject to change without notice and should not be construed as a commitment by Image Video. Image Video assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

Reference Documents

For installation assistance refer to the latest revision of the following documents:

- 12658-01 TSI-4000 Front and Rear Layout
- 12658-28 TSI-4000 System 22in Depth Mounting Detail
- 12658-29 TSI-4000 ACO System 22in Depth Mounting Detail
- 12658-30 TSI-4000 System Rear Support Assembly
- 12658-31 TSI-4000 ACO System Rear Support Assembly
- 12660-01 TSI-4000ACO Front and Rear Layout
- 12661-01 TSI-4000CP Front and Rear Layout

For information on configuring the TSI-4000 please refer to the *Tally System Console 2 manual*.

INTRODUCTION

This section of the manual provides an overview an Image 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 section is intended to assist the reader in understanding the function of a tally control system and the role of a TSI-4000 in it.

Figure 1: TSI-4000 Front View

Figure 2: TSI-4000 Rear View

Figure 3: TSI-4000 Auto-Changeover System Front View

Figure 4: TSI-4000 Auto-Changeover System Rear View

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

gets even more complex when multiple productions, master control, and network distribution all happening 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, GPI/O, and system operators to make sense of the chaos.

The Image Video 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.

Image Video offers two types of tally control systems: the TSI-4000 System and the TSI-4000 Auto-Changeover System.

TSI-4000 System

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

The TSI-4000 has 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-4000CP has these features:

- Ten RS-422/485 serial ports and one RS-232 serial port..
- The TSI-4000 and the TSI-4000CP mount in 1 RU.

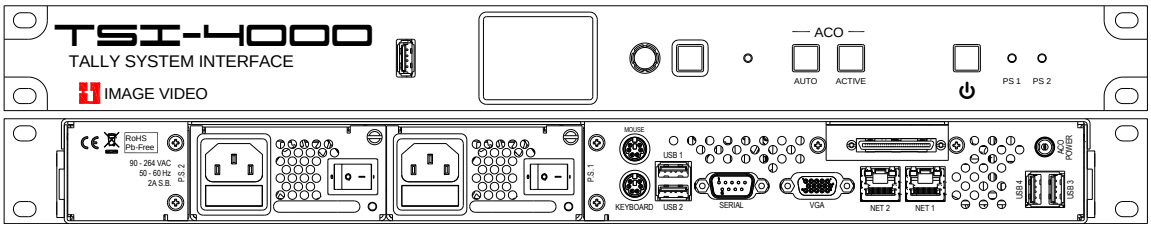


Figure 5: TSI-4000 Front and Rear Layout

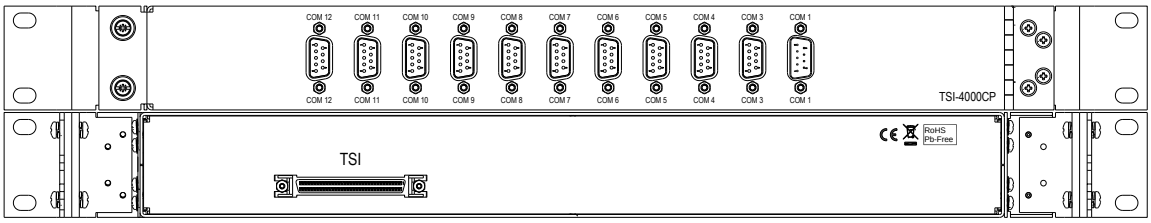


Figure 6: TSI-4000CP Front and Rear Layout

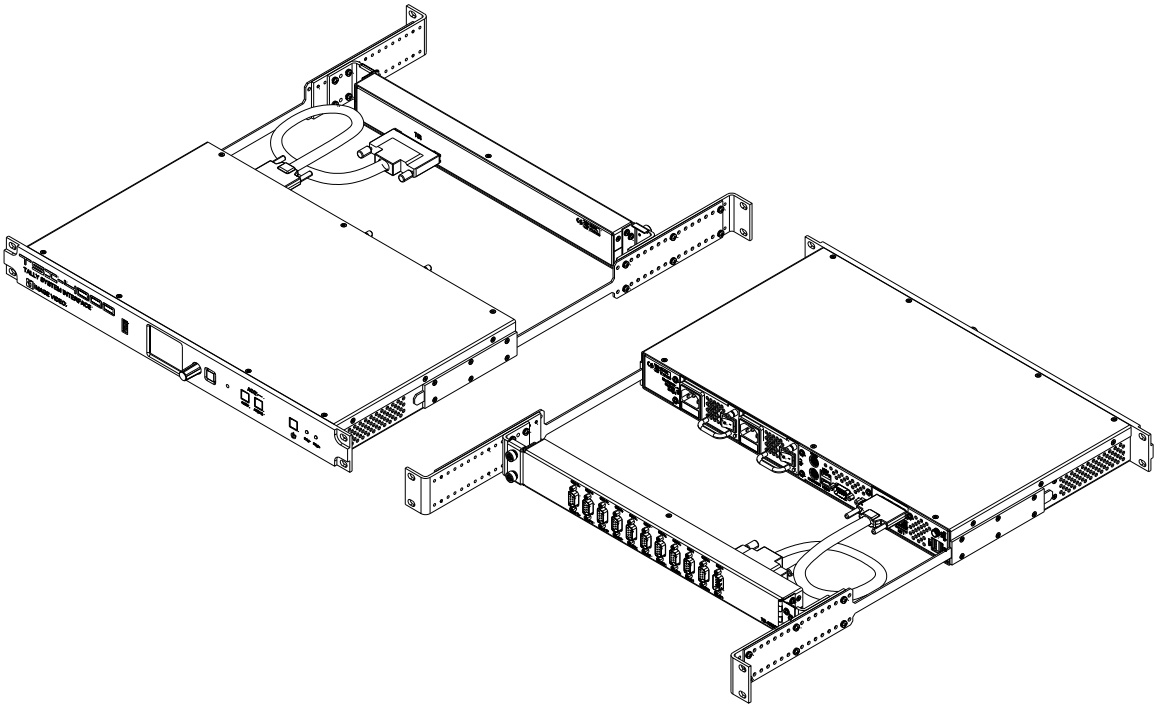


Figure 7: TSI-4000 System Assembled View

TSI-4000 System Specifications

Components

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

Physical

Dimensions	1.75 in. (44.5 mm) high x 19 in. (483 mm) wide depth adjustable between 18 in. (457 mm) and 26 in. (660 mm)
Weight	16.5 lb. (7.5 kg) shipping 21.3 lb. (9.7 kg)

Environmental

Voltage	90 to 264 VAC, 50 to 60 Hz, auto-ranging
Power	30.0 W (max) with 2 supplies powered 26.4 W (max) with 1 supply powered 0.9 power factor (min) per power supply
Temperature	0 °C to +40 °C operating, -20 °C to +60 °C non-operating

Humidity 20% to 80% non-condensing

Network Ports

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

USB Ports

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

Serial Ports

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

TSI-4000 Auto-Changeover System

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

Each TSI-4000 has 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 has these features:

- Ten RS-422/485 serial ports and one RS-232 serial port.
- Status LEDs and TSI-4000 selection override switch.
- The TSI-4000s and the TSI-4000ACO mount in 2 RU.

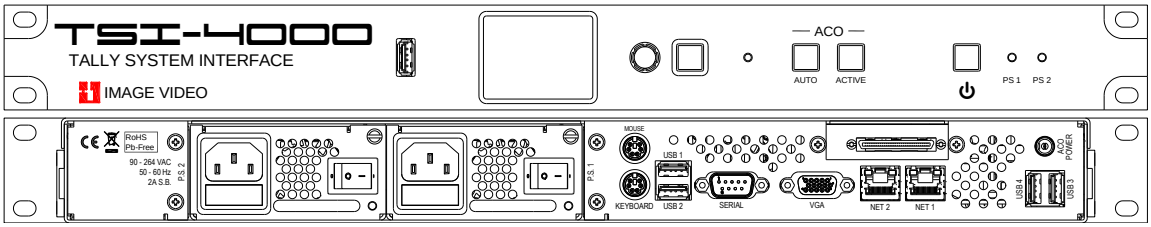


Figure 8: TSI-4000 Front and Rear Layout

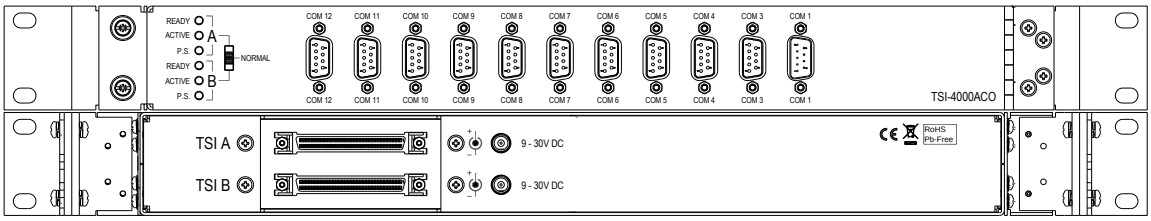


Figure 9: TSI-4000ACO Front and Rear Layout

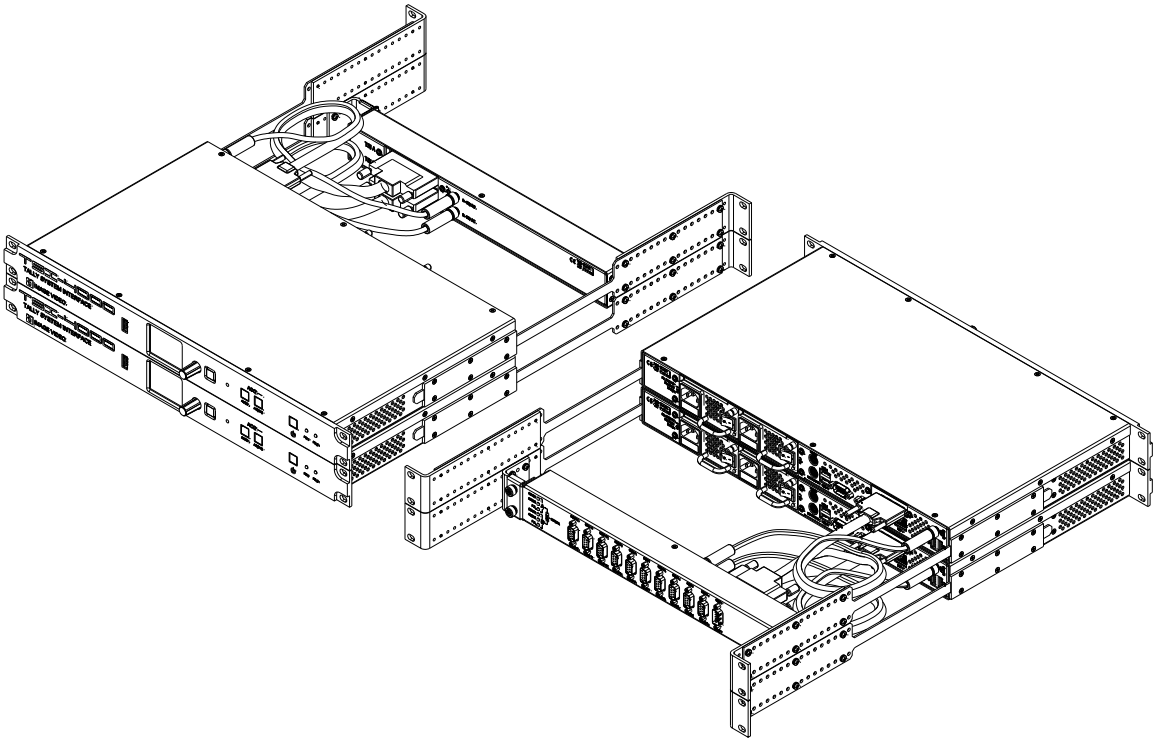


Figure 10: TSI-4000 Auto-Changeover System Assembled View

TSI-4000 Auto-Changeover System Specifications

Components

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

Physical

Dimensions	3.5 in. (89 mm) high x 19 in. (483 mm) wide depth adjustable between 18 in. (457 mm) and 26 in. (660 mm)
Weight	31.5 lb. (14.3 kg) shipping 36 lb. (16.4 kg)

Environmental

Voltage	90 to 264 VAC, 50 to 60 Hz, auto-ranging
Power	68.4 W (max) with 4 supplies powered 60.0 W (max) with 2 supplies powered (1 per TSI-4000)

	0.9 power factor (min) per power supply
Temperature	0 °C to +40 °C operating, -20 °C to +60 °C non-operating
Humidity	20% to 80% non-condensing

Network Ports (per TSI-4000)

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

USB Ports (per TSI-4000)

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

Serial Ports

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

Warranty

Image Video, a Division of 1077541 Ontario Limited, warrants all Image Video manufactured equipment to be free of defects due to faulty materials or improper workmanship. Image Video further warrants that any part which proves defective in materials or workmanship within two (2) years from date of original purchase for use will be replaced or repaired at no cost in accordance with the terms stated below.

If during a period of ninety (90) days from the date of original purchase for use, an Image Video product requires a part replacement, due to defective materials or workmanship, the equipment is to be returned to the factory and the necessary new part will be furnished by Image Video, including the labour directly associated with the repair and all shipping charges, at no cost to the customer.

If a part becomes defective due to faulty materials or improper workmanship after 90 days from date of original purchase for use, but before two (2) years from that date, Image Video will furnish the necessary new part. There will be no charge to the customer for the part. Labour, if required, will be charged to the customer at the established rate. The customer may elect to return the defective equipment to Image Video prepaid. Image Video will furnish the new replacement part and labour at no charge and return the equipment at the customer's expense.

This warranty does not include any Image Video product or parts thereof, which have been subjected to misuse, neglect, improper installation, use in violation of instructions furnished, or accident. It does not extend to units which have been modified or changed outside our factory; nor to units from which the serial number has been removed, defaced or changed; or to accessories not of our manufacture.

This warranty excludes tubes and assembled products not of Image Video manufacturer whether or not they are incorporated in an Image Video product or sold under an Image Video part or model number. Image Video will not be responsible for any expense or loss of revenue or property incurred by the purchaser due to a malfunction in the equipment.

All vendor instruments, components, vacuum tubes, assembled products, and other devices in this system not manufactured by Image Video, shall be warranted according to the agreement supplied by the manufacturing company.

This warranty is in lieu of all others expressed or implied, and no representative or person is authorised to assume any other liability in connection with the sale of our products.

PLEASE CALL OUR SALES DEPARTMENT TO OBTAIN A RETURN AUTHORISATION NUMBER WHEN RETURNING PRODUCTS FOR SERVICE OR REPAIR OR FOR ANY OTHER REASON.

INSTALLATION

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

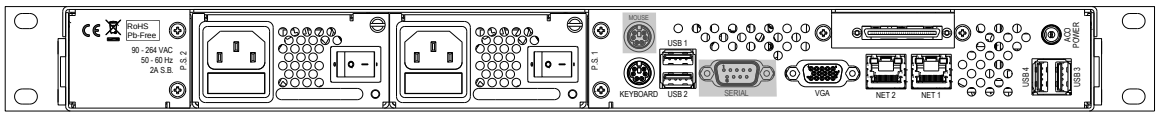


Figure 11: TSI-4000 Rear Layout

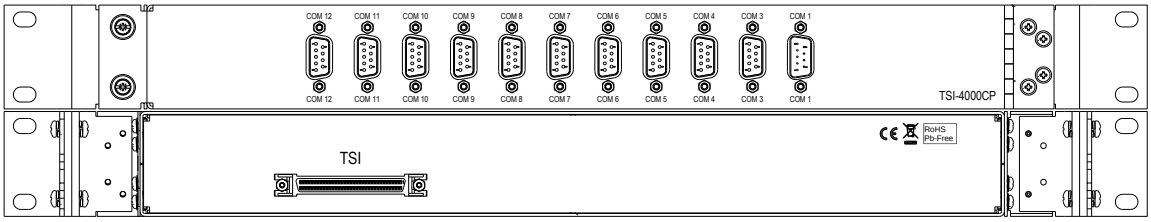


Figure 12: TSI-4000CP Front and Rear Layout

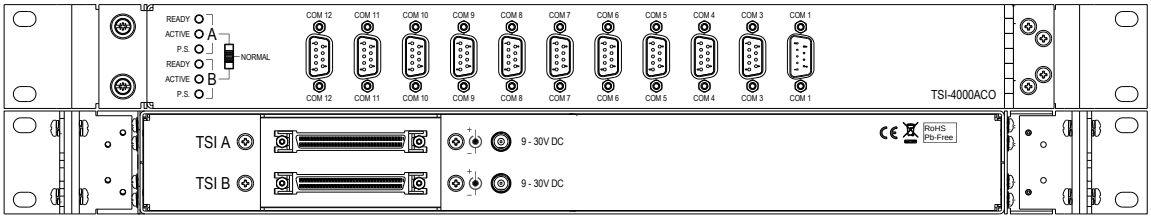


Figure 13: TSI-4000ACO Front and Rear Layout

Mounting

Mount the TSI-4000 units in a standard 19 inch 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-4000CP or TSI-4000ACO 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-4000CP Installation

1. Using drawing *12658-30 TSI-4000 System Rear Support Assembly* as a guide, attach the support bars to the rear rack ears using the supplied 6-32 x 1/4” SEMS screws. Note the support bars are not symmetrical; the support arm must be in the lower position.
2. Detach the TSI-4000CP from the left mounting bracket by unscrewing the 2 thumbscrews.

3. Using drawing *12658-30 TSI-4000 System Rear Support Assembly* as a guide, attach the TSI-4000CP left and right mounting brackets to the rear rack ears using the supplied 6-32 x 5/16” SEMS screws.
4. Connect the 68-pin D-subminiature end of the supplied 68-pin cable assembly to the TSI-4000CP.
5. Reattach the left mounting bracket to the TSI-4000CP.
6. Install the TSI-4000 from the front side of the rack.
7. Install the TSI-4000CP 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, unscrew the 2 thumbscrews, swing the TSI-4000CP out of the way, and connect the 68-pin VHDCI end of the supplied 68-pin cable assembly to the TSI-4000.

TSI-4000 and TSI-4000CP Interconnection

The TSI-4000 is connected to the TSI-4000CP using the supplied 68-pin cable assembly as described in *TSI-4000 and TSI-4000CP Installation* on page 8.

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-4000CP.

TSI-4000 and TSI-4000ACO Installation

1. Using drawing *12658-31 TSI-4000 ACO System Rear Support Assembly* as a guide, attach the support bars to the rear rack ears using the supplied 6-32 x 1/4” SEMS screws. Note the support bars are not symmetrical; the support arm must be in the lower position.
2. Detach the TSI-4000ACO from the left mounting bracket by unscrewing the 2 thumbscrews.
3. Using drawing *12658-31 TSI-4000 ACO System Rear Support Assembly* as a guide, attach the TSI-4000ACO left and right mounting brackets to one set of the rear rack ears using the supplied 6-32 x 5/16” SEMS screws.
4. Connect the 68-pin D-subminiature end of each of the supplied 68-pin cable assemblies to the TSI-4000ACO. Connect one end of each of the supplied TSI-4000ACO power cable assemblies to the TSI-4000ACO.
5. Reattach the left mounting bracket to the TSI-4000ACO.
6. Install both TSI-4000s from the front side of the rack.
7. Install the TSI-4000ACO 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-4000s. The TSI-4000ACO can be positioned behind either TSI-4000.

8. After securing the rear rack ears to the rear rack rails, unscrew the 2 thumbscrews and swing the TSI-4000ACO out of the way.
9. Connect the 68-pin VHDCI end of the upper 68-pin cable assembly to the upper TSI-4000, and connect the loose end of the upper TSI-4000ACO power cable assembly to the ACO POWER connector on the upper TSI-4000.
10. Connect the 68-pin VHDCI end of the lower 68-pin cable assembly to the lower TSI-4000, and connect the loose end of the lower TSI-4000ACO power cable assembly to the ACO POWER connector on the lower TSI-4000.

TSI-4000 and TSI-4000ACO Interconnection

Each TSI-4000 is connected to the TSI-4000ACO using the supplied 68-pin and power cable assemblies as described in *TSI-4000 and TSI-4000ACO Installation* on page 9.

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-4000ACO labeled TSI A or TSI B.

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-4000ACO.

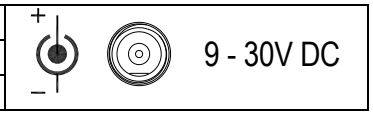
TSI-4000ACO Power

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 *TSI-4000 and TSI-4000ACO Installation* on page 9.

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 2.5 mm centre pin (Switchcraft 760, Switchcraft 760K, or equivalent).

Table 1: TSI-4000ACO Power Connector Pinout

Pin	*Function*	
Centre	+9 to +30V DC	
Sleeve	Ground	

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 Power* on page 43 for details.

TSI-4000 Power

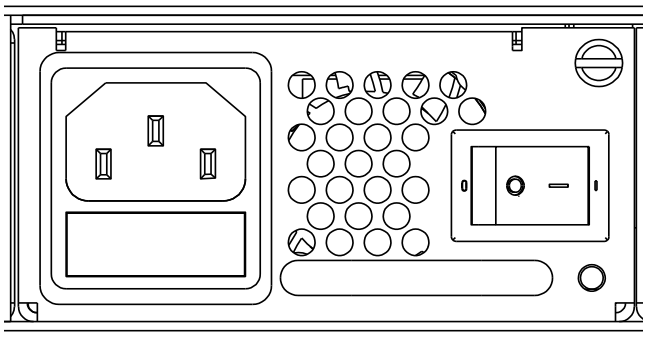


Figure 14: TSI-4000 Power Supply

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 90 VAC to 264 VAC, 50 Hz to 60 Hz.

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 *Power On/Off* on page 15 for details.

The LED provides operational status indication of the supply.

Table 2: Power Supply Status LED Indications

Colour	*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.

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.

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-4000CP or TSI-4000ACO.

The configuration of the TSI-4000 specifies the function of each serial port. See the *Tally System Console 2 manual* for configuration procedures.

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

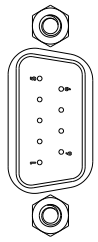
To allow access to the TSI-4000 rear panel connections, bundle the serial port cables to the hinge side of the TSI-4000CP or TSI-4000ACO.

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: COM1 Connector Pinout

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)


Male DE-9

The 4-40 jackscrews allow for mating connector locking.

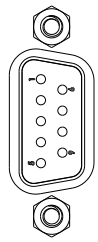
Serial Ports COM3 to COM12

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.

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.

Table 4: COM3 to COM12 Connector Pinout

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


Female DE-9

The 4-40 jackscrews allow for mating connector locking.

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.

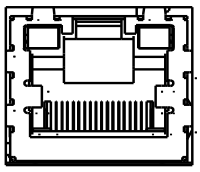
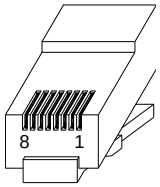
The Internet Protocol (IP) settings of each port must be configured from the TSI-4000 front panel. See *Set Network Interfaces* on page 17 for details. The port hardware automatically sets the data transfer rate to 10 Mbps, 100 Mbps, or 1 Gbps and the transfer mode to half or full-duplex.

The configuration of the TSI-4000 specifies the IP settings of each network connected device. See the *Tally System Console 2 manual* for configuration procedures.

Ethernet ports NET1 and NET2 have status LEDs in their connectors. The upper left LED illuminates amber when a 1 Gbps connection is established, green when a 100 Mbps connection is established, or off when a 10 Mbps 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* on page 23 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.

Table 5: NET1 and NET2 Connector Pinout

Pin #	*Function*		
1	BI_DA+	 8P8C Modular Jack	 8P8C Modular Plug
2	BI_DA-		
3	BI_DB+		
4	BI_DC+		
5	BI_DC-		
6	BI_DB-		
7	BI_DD+		
8	BI_DD-		

The plastic retaining spring clip on the plug provides mating connector locking.

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.

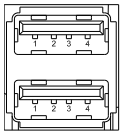
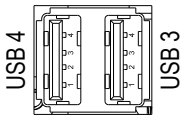
All five ports use USB standard-A receptacle type connectors.

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 Pinout

Pin #	*Function*	USB 1  USB 2 Dual standard-A receptacle	 Dual standard-A receptacle
1	+5V		
2	D-		
3	D+		
4	Ground		

The friction fit of the plug provides mating connector locking.

Diagnostic Connections

The KEYBOARD and VGA connections can be used for diagnostic purposes as directed Image 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.

SET-UP

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

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.

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.

Power On/Off

Press the power button ⏻ to power on or power off the TSI-4000. Once powered on, the unit begins operating as previously configured.

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.

Press the selector knob to show the menu. Select the Settings item, select the Button Actions item, and then the Buttons item. Turn the selector knob to highlight Press Twice, and then 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 set-up to automatically power on once AC power is restored following a power interruption. Alternately, the unit can be set-up to either resume operating in its most recent power state, or require that it be manually powered on after a power interruption.

To set the power on method that will be used after a power interruption, press the selector knob to show the menu. Select the Settings item, select the Button Actions item, and then select the Power item.

- To resume the previous power state after a power interruption turn the selector knob to highlight Last State.
- To always power on the unit after a power interruption turn the selector knob to highlight Auto On.
- To always require the unit to be manually powered on after a power interruption turn the selector knob to highlight Manual On/Off.

Press the selector knob to confirm.

Initially, the automatic power on setting is Last State.

Set Display Brightness

The brightness of the LCD backlight can be adjusted to suit various ambient lighting conditions.

There are two brightness level settings. The normal level is the LCD backlight brightness while the front panel controls are in use. The dim level is the LCD backlight brightness after none of the controls have been used for at least five minutes. The normal level can be set from 1 to 100% of full brightness. The dim level can be set from 0 to 100% of full brightness.

To set the normal brightness, press the selector knob to show the menu. Select the Settings item, select the LCD Backlight item, and then the Normal item. Turn the selector knob to highlight the desired percentage. Turn the selector knob rapidly to select by 10% at a time. Press the selector knob to confirm.

To set the dim brightness, press the selector knob to show the menu. Select the Settings item, select the LCD Backlight item, and then the Dim item. Turn the selector knob to highlight the desired percentage. Turn the selector knob rapidly to select by 10% at a time. Press the selector knob to confirm.

Set both levels the same for constant LCD brightness.

Initially, the normal level is 100% and the dim level is 40%.

Set 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. Please refer to the *Tally System Console 2 manual* for configuration procedures.

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 set-up individually or any number of interfaces may be set-up at once.

Set IP Address and Subnet Mask

To set an IP address and subnet mask, press the selector knob to show the menu. Select the Settings item, and then 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. Turn the selector knob to highlight the desired network interface and press the knob. The current IP address and subnet mask settings of the selected network interface appear.

To set the IP address, turn the selector knob to highlight the Address item. 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. To begin, press the selector knob. The first number appears in a column of possible settings with the current setting in the center. Turn the selector knob to choose the desired number. Turn the selector knob rapidly to change by 10 numbers at a time. The previously confirmed number appears in orange.

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. Once the fourth number is set, the new address or subnet settings appear. 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 a column of numbers 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* on page 19. As a reminder, unapplied changes appear in yellow.

Set 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, press the selector knob to show the menu. Select the Settings item, and then 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. Turn the selector knob to highlight the desired network interface to be given a virtual IP address and press the knob. If previously set, the current virtual IP address appears below the primary IP address and subnet mask of the network interface. If not previously set, Add Virtual appears. Turn the selector knob to highlight either of these items and press the knob. The current virtual IP address and subnet mask settings appear. Initially, these are set to 0.0.0.0. The IP address and subnet mask can be modified just like the IP address and subnet mask as described in *Set IP Address and Subnet Mask* on page 17. 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* on page 19. As a reminder, unapplied changes appear in yellow.

Remove Virtual IP Address

To remove a virtual IP address and its subnet mask, press the selector knob to show the menu. Select the Settings item, and then 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. Turn the selector knob to highlight the desired network interface from which to remove the virtual IP address and press the knob. Turn the selector knob to highlight Remove Virtual and press the knob.

All network interface settings, including virtual IP addresses, must be applied before taking effect. See *Apply Network Interface Settings* on page 19. As a reminder, unapplied changes appear in yellow.

Set Gateway Address

To set a gateway address, press the selector knob to show the menu. Select the Settings item, and then the Network item. Turn the selector knob to highlight the last item labeled with GW and the current gateway setting, and then press the knob. The gateway address appears and can be modified just like the IP address and subnet mask as described in *Set IP Address and Subnet Mask* on page 17.

Set the gateway address to 0.0.0.0 if a gateway is not to be used.

Once all desired network interface settings are complete, they must be applied before taking effect. See *Apply Network Interface Settings* below. As a reminder, unapplied changes appear in yellow.

Apply Network Interface Settings

Once any network interface settings have been changed, apply those changes by pressing the button beside the selector knob to return to the Network menu where an Apply Changes item appears. Turn the selector knob to highlight this item, and then press the knob.

The Apply Changes item only appears where changes have been made but not yet applied. Unapplied network interface setting changes appear in yellow.

To apply all network interface setting changes, turn the selector knob to highlight Confirm and press the knob. New settings may take a few moments before taking effect.

To discard all network interface setting changes, turn the selector knob to highlight Discard and press the 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 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.

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.

Set Local Identity

To set the local identity number of the TSI-4000, press the selector knob to show the menu. Select the Settings item, and then the ID/Cluster item. Turn the selector knob to highlight the Local Identity item and press the knob. The current identity number setting appears in a column of possible settings with the current setting in the center. Turn the selector knob to set choose the new desired number. Turn the selector knob rapidly to change by 10 numbers at a time. The previously confirmed number appears in orange. Once the desired number is highlighted, 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* on page 21. As a reminder, unapplied changes appear in yellow.

Add to Cluster

To add a remote TSI-4000 unit to the cluster, press the selector knob to show the menu. Select the Settings item, and then the ID/Cluster item. The current identity number and IP address of the TSI-4000 units already in the cluster appear. Turn the selector knob to highlight Add to Cluster. If the Add to Cluster item is not visible, turn the selector knob to bring it into view. Press the knob. Initially, the identity number 1 and IP address 0.0.0.0 appear.

To set the identity number of the remote TSI-4000, turn the selector knob to highlight the Identity item and press the knob. The current identity number setting appears in a column of possible settings with the current setting in the center. Turn the selector knob to set choose the new desired number. Turn the selector knob rapidly to change by 10 numbers at a time. The previously confirmed number appears in orange. Once the desired number is highlighted, press the selector knob to confirm.

To set the IP address of the remote TSI-4000, 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. To begin, press the selector knob. The first number appears in a column of possible settings with the current setting in the center. Turn the selector knob to set choose the desired number. Turn the selector knob rapidly to change by 10 numbers at a time. The previously confirmed number appears in orange.

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. Once the fourth number is set, the new address setting appears. Press the button beside the selector knob to return to the ID/Cluster menu. 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 a column of numbers as before. To cancel the new setting entirely, press the button until the original address display appears.

Note 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* below. As a reminder, unapplied changes appear in yellow.

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, press the selector knob to show the menu. Select the Settings item, and then the ID/Cluster item. The current identity number and IP address of all TSI-4000 units already in the cluster appear in separate items. 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 and press the knob. If there are more items than can fit on the screen keep turning the selector knob to bring them into view.

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* on page 20.

To remove the remote TSI-4000 from the cluster turn the selector knob to highlight Remove from Cluster and press the knob. 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* below. As a reminder, unapplied changes appear in yellow.

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, turn the selector knob to highlight the Apply Changes item. If the Apply Changes item is not visible, turn the selector knob to bring it into view. Press the knob. The Apply Changes item only appears where changes have been made but not yet applied.

To apply all cluster setting changes, turn the selector knob to highlight Confirm and press the knob. New settings may take a few moments before taking effect.

To discard all cluster interface setting changes, turn the selector knob to highlight Discard and press the 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 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 additional 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* on page 19 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.

Press the selector knob to show the menu. Select the Settings item, select the Button Actions item, and then the Buttons item. Turn the selector knob to highlight Press Twice, and then 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 cancelled 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.
- Occupying the majority of the display across the center is a description of one of the monitored elements or connections.

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 below. Some status icons may indicate a problem with the TSI-4000 unit.

 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.

 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 though 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 what part of the system is actually the source of alarm, turn the selector knob to move a white cursor bar that appears immediately above one of the monitored alarms. 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.

Green – no alarm conditions currently or recently detected. The monitored element or connection is operating normally.

Red – an alarm condition is currently active. A problem has been 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 being 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. Please see *Alarm Display* on page 35 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 alarms 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.

The equipment type organizes items by 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.

The connection type organizes items by the nature of the TSI-4000 unit's 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 has been 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 below 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.

Choose 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. Initially, the connection type is selected. Press the button to re-order by equipment type. Press again to re-order by recent alarm condition changes with the most recent to the least recent items appearing from left to right. Press a third time to return to order by connection type. 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 top and bottom lines of each description are common to all items.

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

The bottom line shows how much time has elapsed since the alarm condition of the item assumed its current state. The time is displayed in one of three ways as shown by these examples:

:10:34 - minutes and seconds

14:23 - hours and minutes

16 days 5:37 - days, hours and minutes

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, auto-changeover status (if applicable), and firmware version and date are listed. Only one IP address is listed even if more than one network interface has been set up. If the system is powering on or restarting, this item may appear grey indicating that current information is not available at this time. If the system is restarting the previous information is retained for display.

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 grey 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 three 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 three devices are configured to be connected, individual connection information is also available as described in *Monitored Alarm Details* on page 36. Individual connection information in 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 three 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 three TXI Series products are configured to be connected, individual connection information is also available as described in *Monitored Alarm Details* on page 36.

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 up to three 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 than three RCP Series products are configured to be connected, individual connection information is also available as described in *Monitored Alarm Details* on page 36.

Summary Status Displays

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.

The same summary color of red or green also appears in a moving block in the LCD fifteen minutes after the most recent use of the front panel controls. To restore the normal display, turn or press the selector knob or press the adjacent button. To bring the summary display back 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* on page 33 for details.

Temporarily Silence Alarm

To silence the audible alarm, press the selector knob to show the menu, turn the knob to select the Silence Alarm item and press the knob again. If the item does not appear in the menu, the audible alarm is not currently sounding.

The audible alarm is only 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* on page 33.

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 AUTO-CHANGEOVER SYSTEM

To operate the auto-changeover (ACO) system it must be installed and set up as described in *TSI-4000 and TSI-4000ACO Installation* on page 9 and *Multiple TSI-4000 Systems* on page 19.

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 TSI-4000s. 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.

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.

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* on page 42 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 display and button also appear red. Suppressing the alarm makes the item appear pink and restores the summary status display and button to show green (assuming there are no other active alarm conditions). It is useful to acknowledge awareness of the alarm so that new alarm conditions can be more easily noticed.

To suppress alarms, press the selector knob to show the menu, turn the knob to highlight the Suppress Alarms item, and then press the knob again. Silence Alarm appears instead of the Suppress Alarms item if the audible alarm is currently sounding. Wait for four seconds for the audible alarm to stop sounding or turn the knob to highlight the Silence Alarm item, and then press the 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.

Choose the alarms to be suppressed in three different ways.

For all alarms, turn the selector knob to highlight the All item, and then press the knob.

To suppress only the alarm previously selected in the center of the status display, turn the selector knob to highlight the Selected item, and then press the knob.

To choose multiple alarms, turn the selector knob to highlight the Choose item, and then press the knob. The system status display appears with a flashing red cursor above the status bar of monitored items. Turn the selector knob to highlight the desired alarm to be suppressed and press the knob. Repeat to suppress other alarms if desired. If no further selections are made for 10 seconds, or the button beside the knob is pressed once, the cursor becomes white again and normal operation is restored.

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 in 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, press the selector knob to show the menu. Select the Settings item, followed by the Alarm item, and then the Audible item. Turn the selector knob to highlight Disable, and then 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, press the selector knob to show the menu. Select the Settings item, followed by the Alarm item, and then the Audible item. Turn the selector knob to highlight Enable, and then press the selector knob to confirm.

Adjust Volume

The audible alarm volume can be adjusted to suit ambient sound conditions. To adjust the audible alarm volume, press the selector knob to show the menu. Select the Settings item, followed by the Alarm item, the Audible item, and then the Volume item. Turn the selector knob to highlight the desired percentage. The previous setting appears in orange. Turn the selector knob rapidly to change by 10% at a time. 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, press the selector knob to show the menu. Select the Settings item, followed by the Alarm item, the Audible item, and then the Level item. Turn the selector knob to highlight the desired notification level.

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.

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, press the selector knob to show the menu. Select the Settings item, followed by the Alarm item, and then the History item. Turn the selector knob to highlight the desired alarm history period. The following settings are available: None, 15 Seconds, 2 Minutes, 15 Minutes, 2 Hours, 8 Hours, 1 Day, 2 Days, and 8 Days.

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. Select the monitored item in the center area of the status display to see the actual amount of time since the 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.

Alarm Display

In some systems in 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 or suppressed alarm conditions in the status display, press the selector knob to show the menu. Select the Settings item, followed by the Alarm item, and then the

Show item. Turn the selector knob to highlight the desired alarm display setting.

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 ten seconds. The white cursor flashes to indicate the auto show mode is active. Turn the selector knob or press the button beside it to temporarily cancel the auto show mode.

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. To view detail pages, first navigate to the desired item using the selector knob to make its description visible in the status display. Press the selector knob to show the menu, highlight the Detail item, and then press the knob. The first page of detail for the monitored item appears.

The contents of the page and the number of pages available are specific to the selected item. See the *Detail Pages* section below.

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.

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 this items description from the system status display. The unit's model, serial number, firmware version and date, local identity number, IP address, and front panel processor firmware are listed. Only one IP address is listed even if more than one network interface has been set up.
- The second page shows solid-state flash disk and memory capacities and how much is currently used.
- The third page lists any licenses installed in this TSI-4000 unit.
- The fourth page shows product build information such as assembly number, date, and serial number.

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.

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, press the selector knob to show the menu. Select the Tools item and then the Commands item. Turn the selector knob to choose a command and press the selector knob. To avoid accidental use of a command, a confirmation is required. Turn the selector knob to highlight Confirm and press the knob. To return to the menu of commands without performing a command, highlight Cancel and press the knob. The commands are described below.

- 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.
- The Hard Reset command instructs the TSI-4000 to restart the main processor. The system should resume normal operation in a few minutes.

- The USB Clear/Restart command instructs the TSI-4000 to uninstall any USB network interfaces, and then restart the system firmware.

Show MAC Addresses

To show all MAC addresses, press the selector knob to show the menu. Select the Tools item, followed by the Advanced item, and then 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, press the selector knob to show the menu. Select the Tools item, followed by the Advanced item, and then the Install item.

To control the installation of a component, turn the selector knob to choose the desired component by name. Choose one of Power Supply 1, Power Supply 2, or Auto-Changeover.

To choose the normal setting and have the TSI-4000 sense component installation automatically, turn the selector knob to highlight Auto Sense and then press the selector knob to confirm.

To have the TSI-4000 assume the component is always installed, turn the selector knob to highlight Installed and then press the selector knob to confirm.

To have the TSI-4000 assume the component is never installed, turn the selector knob to highlight Not Installed and then 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, press the selector knob to show the menu. Select the Tools item, followed

by the Advanced item, and then the Watchdog item. Turn the selector knob to highlight Not Used and then press the selector knob to confirm.

To permit the watchdog system to restart the main processor as necessary, press the selector knob to show the menu. Select the Tools item, followed by the Advanced item, and then the Watchdog item. Turn the selector knob to highlight Active and then 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.

Important 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 cancelled 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.

TSI-4000ACO

TSI4000ACO Override Switch

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

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 the TSI-4000s. See *Operating the Auto-Changeover System* on page 31.

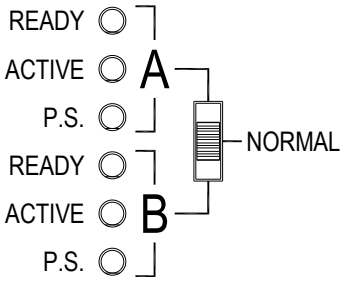


Figure 15: TSI-4000ACO Override Switch and Status LEDs

TSI-4000ACO Status LEDs

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

Ready Status

The READY LEDs on the front of the TSI-4000ACO indicate the ready status of the TSI-4000s as listed in Table 7 below.

Table 7: READY LED Indications

READY LED	*Description*
Green	Normal
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 8 below.

Table 8: ACTIVE LED Indications

ACTIVE LED	*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.
Fast Blinking Green	The TSI-4000 is currently running the system and is healthy. The system is in override mode.

ACTIVE LED	*Description*
Off	The TSI-4000 is the standby unit 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.
Fast 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.

TSI-4000ACO Power

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 P.S. LEDs on the front indicate the power source status as listed in Table 9 below.

Table 9: TSI-4000ACO Power LED Indications

Power LED	*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-4000ACO.
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 TSI-4000 plug-in power supplies can be replaced in the field.

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.

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 is it 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 and confirm proper operation of the power supply.

TSI-4000 Power Supply

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 2 A time-delay (slow-blow), 250 V, in a 5 x 20 mm 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 and confirm proper operation of the power supply.