IMAGE VIDEO
Division of 1077541 Ontario Limited

TSI-3000 Tally System Interface
Instruction Manual

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Revision History

Revision	*Date*	*Changes*
A	January 26, 2011	Original document

Preface

This manual provides an overview, installation, configuration, operation, and maintenance details for the Image Video TSI-3000 Tally System Interface and TSI-3000ACO Auto Change-Over.

The material in this document 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 document.

Throughout this manual the TSI-3000 Tally System Interface is also referred to as the TSI or the TSIs when referring to both TSI-3000s in a redundant system. The TSI-3000ACO Auto Change-Over is also referred to as the ACO.

1 INTRODUCTION

Figure 1: TSI-3000 and TSI3000ACO Front View

1.1 General

This section of the manual provides an overview an Image Video Tally Control System and the TSI-3000 Tally System Interface and TSI-3000ACO Auto Change-Over units. This information in this section is intended to assist the user in understanding the functioning of a tally control system and the role of a TSI-3000 in it.

1.2 Tally Control System Overview

The Image Video tally control system is an essential component of broadcast and production environments. It must determine where signals come from, where they go, and how they are being used. In a typical multi-production environment, signals arriving at the facility's main router are checked for quality, converted and then routed as per studio requirements.

Studios use these and other local signals in production. A basic tally system must:

- Track down the origin of a signal that reaches a specific monitoring point
- Distinctively identify signals which contribute to the on-air path
- Return information back to the signals origin describing its usage

The TSI-3000 based Tally System goes beyond this level of functionality, providing these standard features:

- Scalability – up to 48 controllers can be networked together with each controller having up to four network interfaces installed
- Multiple Tally areas – Each controller supports 8 tally areas - This is ideal for a multi-control room operation

- Distinct identification of signals in use by other studios in shared facility to avoid equipment sharing problems
- Tally Expression Language allows for the creation of custom applications by the end user
- Alternate names for any signal, i.e. descriptive names for remote signals, or abbreviated names to save display space
- Provide additional source names in the same display (i.e. combine a source name with the name of the tie line or signal converter that carries the source)
- Interactive editing of display contents to place messages on infrequently changed displays
- Indicate on-air, next-to-air, or other tally states such as ISO or remote tally with a different color or message
- Interfaces to all routers, switchers and multi-viewers using serial or Ethernet ports
- GPI inputs track other equipment or control display and status functions
- General purpose GPI outputs provide tally or control to other equipment
- TSI-3000 Tally System Interface coordinates all tally system operations
- Ethernet port combines multiple independent tally systems into one facility-wide system
- Change any aspect of tally system from a Windows PC, even while tally system is in use
- Save any number of tally system configuration files to disk and recall later for different productions or operator preferences
- Monitor tally system from PC with on-screen display of multiple monitor walls

The Image Video Tally System quickly identifies originating sources carried to any point in your signal switching system. It traces a signal's path through various types of routing and processing equipment including routing switchers, production switchers, and master control switchers. The tally system can interface to equipment from all major manufacturers including popular multi-image display systems.

1.3 TSI-3000 Tally System Interface Overview

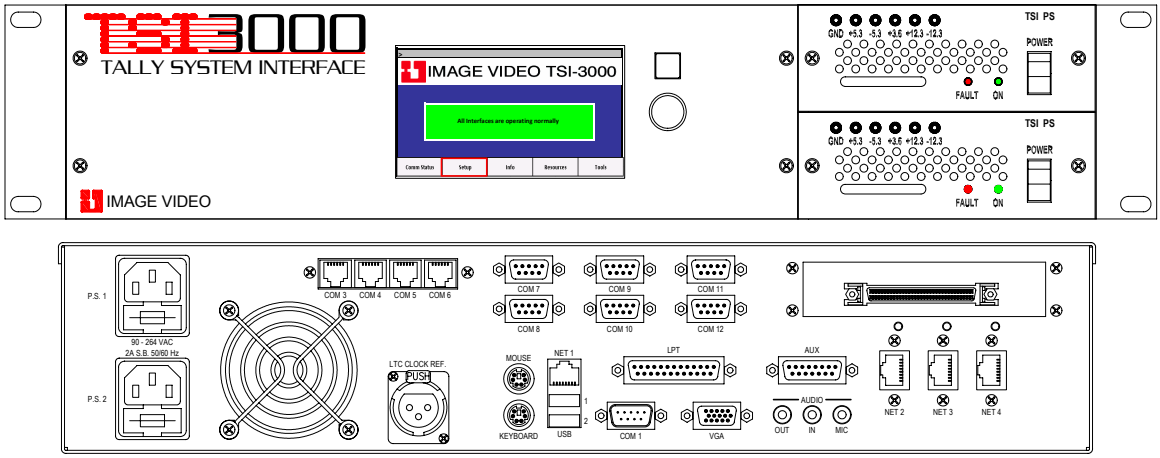


Figure 2: TSI-3000 Front and Rear View

The TSI-3000 is the central component of an Image Video Tally Control System. The TSI interfaces to the signal processing and handling devices to acquire crosspoint and signal flow status; provides the tally logic processing to determine the source at each point in a signal path and the on-air contribution of every source; and controls the tally status display devices. It has a user interface panel for status and configuration on the front and ten RS-422/485 serial I/O ports, one RS-232 serial I/O port, and up to four Ethernet network ports for connection to the other system devices on the rear panel. The unit is housed in a 2 RU chassis and is power by plug-in power supplies. The TSI may be paired with another TSI-3000 and a TSI-3000ACO for controller redundancy.

This unit continuously interrogates the signal processing and handling devices to acquire their crosspoint and signal flow status. Using this acquired data along with the system configuration provided by the tally console program the TSI-3000 software determines the path and on-air contribution of every signal. The TSI controls the tally display devices to show the signal path information and source on-air contribution.

The front user interface panel allows quick confirmation of the system operation and status details when problems are reported. The panel also allows easy entry and editing of the basic setup parameters of the unit and provides configuration tools. The interface panel has a color LCD for information and menu display. The LCD touch screen, a rotary selector and an Escape pushbutton are used to navigate the menus.

The TSI has serial and Ethernet ports on the rear panel for interfacing to other equipment. Ten RS-422/485 serial I/O ports, one RS-232 serial I/O port, and up to four Ethernet network ports are provided.

The TSI is 2 RU high 19 inch rack-mount device. The unit is powered by internal plug-in power supplies. One power supply is standard and a second supply can be added for increased device reliability.

For increased system reliability the TSI can be paired with another TSI-3000 and a TSI-3000ACO Auto Change-Over for redundant controller operation.

1.3.1 TSI-3000 Specifications

Physical

Dimensions	89 mm high x 483 mm wide x 406 mm deep (3.5 in. high x 19 in. wide x 16 in. deep)
Weight	8.44 kg (18.6 lb.), including 2 power cords 9.94 kg (21.9 lb.), shipping

Environmental

Voltage	90 to 264 VAC, 50 to 60 Hz, auto-ranging
Power	65 VA (max)
Temperature	0 °C to +40 °C operating, -20 °C to +60 °C non-operating
Humidity	20% to 80% non-condensing

Serial Ports

6 RS-422/485 ports on female 9-pin D connectors
4 RS-422/485 ports on 6P6C modular jack connectors

1 RS-232 port on male 9-pin D connector

Network Ports
1 10Base-T / 100Base-TX Ethernet port on 8P8C modular jack connector
3 optional 10Base-T / 100Base-TX Ethernet ports on 8P8C modular jack connectors

Linear Time Code Input

Standards	SMPTE 12M linear time code, auto-sensing 25 Fps, 30 Fps, or 30 Fps with drop-frame
Impedance	> 20Ω, balanced
Connector	3 pin female XLR
Level	0.5 Vp-p to 4.5 Vp-p

1.4 TSI-3000ACO Auto Change-Over Overview

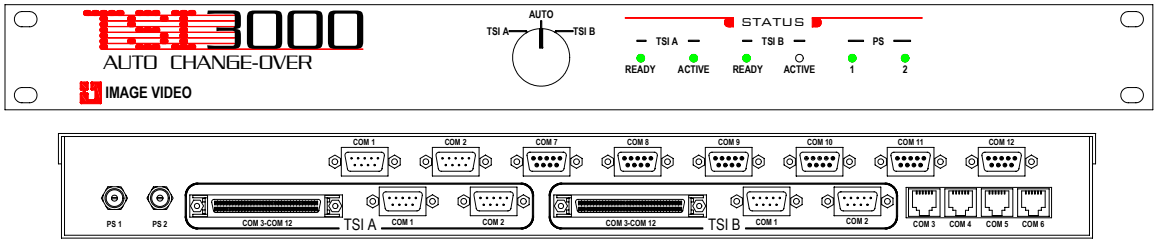


Figure 3: TSI-3000ACO Front and Rear View

The TSI-3000ACO selects the active controller in an Image Video Tally Control System with redundant TSI-3000s. It interfaces to both TSIs to monitor their operational state in order to determine the best controller to run the system. All serial I/O connections are routed through the ACO allowing the ACO to switch all serial I/O connections to the active TSI. The ACO also returns the active TSI selection status back to the TSIs to allow active and backup network connections to be coordinated. Front panel tri-color LEDs show the status of each TSI and the ACO itself. A front panel override control allows manual or automatic selection of the active TSI. The unit is housed in a 1 RU chassis and is powered by redundant wall-mount power supplies.

The interconnection between the TSI and ACO carries all the system serial I/O lines as well as the TSI and ACO intercommunication lines. Cables with high-density connectors are used to keep the number of interconnect cables to a minimum.

Serial port switching is done using multi-pole double-throw relays. The switchover algorithm of the unit prevents needless switching between TSIs. Failsafe relay control logic within the ACO enhances the system reliability.

The front panel LEDs show the status of each TSI and the ACO. Normal conditions are indicated by solid green illumination. Abnormal and error conditions are indicated with blinking, amber, and red illumination.

The ACO is a 1 RU high 19 inch rack mount device. The unit is powered by one or two external power sources. Two wall-mount power adapters are supplied with the unit.

1.4.1 TSI-3000ACO Specifications

Physical

Dimensions	44.5 mm high x 483 mm wide x 406 mm deep (1.75 in. high x 19 in. wide x 16 in. deep)
Weight	6.71 kg (14.8 lb.), including interconnect cables and 2 supplies 8.21 kg (18.1 lb.), shipping

Environmental

Voltage	9 to 35 VDC in; wall-mount power adapter with 115 VAC, 230 VAC or 100 to 240 VAC auto-ranging input provided
Power	18 VA (max)
Temperature	0 °C to +40 °C operating, -20 °C to +60 °C non-operating
Humidity	20% to 80% non-condensing

Serial Port Switching

6 full-duplex RS-422/485 ports on female 9-pin D connectors
4 full-duplex RS-422/485 ports on 6P6C modular jack connectors
2 full-duplex RS-232 ports on male 9-pin D connectors

1.5 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.

2 INSTALLATION

2.1 General

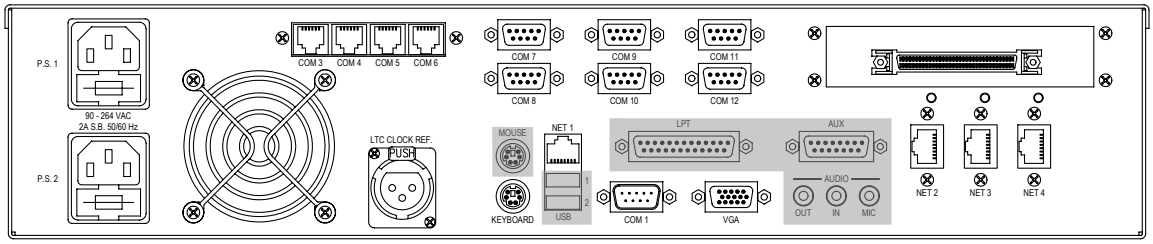


Figure 4: TSI-3000 Rear Panel Layout

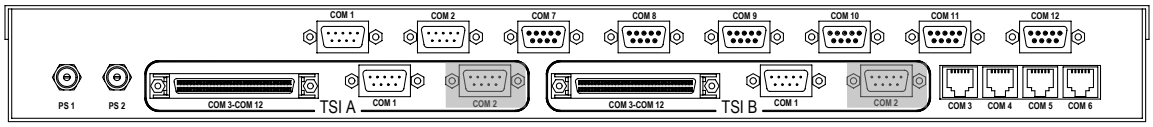


Figure 5: TSI-3000ACO Rear Panel Layout

This section assists in the installation and connection of the TSI-3000 Tally System Interface and the TSI-3000ACO Auto Change-Over.

In non-redundant systems all connections are made to the rear panel of the TSI. In redundant systems all devices monitored and controlled via a serial link are connected to the rear panel of the ACO. The Ethernet and time code connections are made directly to the TSIs.

2.2 Mounting

The TSI-3000 and the TSI-3000ACO units are intended to be mounted in a standard 19 inch 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. Adequate clearance must be provided at the sides of the units for ventilation.

In a redundant system the units are usually arranged with TSI ‘A’ on top, the ACO in the middle and TSI ‘B’ on the bottom. The TSIs are designated as either ‘A’ or ‘B’ depending on whether the TSI is connected to connector group TSI A or TSI B on the rear of the ACO. The ‘A’ or ‘B’ designation is transmitted to the TSIs by the ACO.

2.3 TSI-3000 Power

The TSI is powered by front mounted plug-in power supplies. A single power supply is standard; a second power supply for redundancy can be added at time of order or later as a field upgrade.

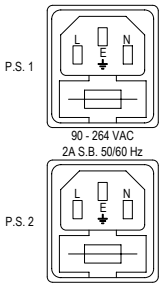


Figure 6: TSI-3000 Power Connectors

Power is applied to the unit via fused IEC 320 C14 style power inlet connectors. Connector P.S. 1 corresponds to the upper power supply position in the TSI-3000 frame and connector P.S. 2 corresponds to the lower power supply position.

The power supply input range is 90 VAC to 264 VAC, 50 Hz to 60 Hz.

The power switches for the unit are on the front panel of the plug-in supplies. The status of each power supply is indicated by LEDs on its front panel. See section 3.4 on page 22 for details.

2.4 TSI-3000ACO Power

The ACO is powered by external power sources connected to connectors PS1 and PS2. Power from both external sources is internally combined and regulated. The ACO can be powered from either power connector; however, for maximum reliability power sources should be connected to both connectors. The standard ACO is equipped with two wall-mount power adapters with locking power output connectors.

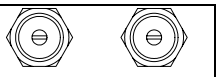
Connect the power adapters outlet plugs into the connectors PS1 and PS2 on the rear of the ACO and plug the adapters into available AC power outlets.

Confirm the wall-mount power adapter conforms to the local AC power source before plugging it into the AC power outlet.

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-3000ACO Power Connector Pinout

Pin	*Function*
Centre	+9 to +35V DC
Sleeve	Ground



There is no power switch for the unit. The status of the power sources is indicated by LEDs on the front panel. See section 3.6 on page 24 for details.

2.5 TSI-3000 and TSI-3000ACO Interconnection

The serial data ports from each TSI are connected to the ACO with the supplied 68-conductor and 9-conductor cables.

The COM1 connector in the TSI A and TSI B groups on the rear of the ACO connects to the COM1 connector on the respective TSIs using the female 9-pin ‘D’ to female 9-pin ‘D’ cables. The COM3-COM12 connectors in the TSI A and TSI B groups connect to the unlabelled 68-pin connectors on the respective TSIs using the male 68-pin half-pitch ‘D’ to male 68-pin half-pitch ‘D’ cables.

The COM2 connections on the rear of the ACO are not used in a TSI-3000 system.

2.6 Serial I/O Ports

The TSI-3000 provides 11 independent serial I/O 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.

The programming of the TSI-3000 specifies the function and setup of each serial I/O port. The TSI-3000 application software configures the data rate and serial word characteristics of each port according to the TSI-3000 programming. See the separate TSI-3000 system programming documentation for details.

The status of the serially connected devices can be monitored from the user interface panel. See section 3.2.4 on page 17 for details.

Port COM1 has RS-232 voltage levels on a male 9-pin 'D' connector, ports COM3 to COM6 have RS-422/485 voltage levels on 6P6C modular jacks, and ports COM7 to COM12 have RS-422/485 voltage levels on female 9-pin 'D' connectors.

In a non-redundant system all serial I/O port connections are made to the rear of the TSI-3000. In a system with redundant TSIs all serial I/O port connections are made to the rear of the TSI-3000ACO. The serial I/O connector pinouts on the ACO are identical to the respective connectors on the TSI.

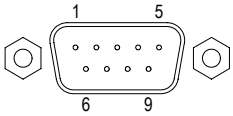
2.6.1 Serial Port COM1

Serial port COM1 has RS-232 voltage levels and male 9-pin 'D' connector.

This port uses the standard PC pinout for RS-232 serial links on a male 9-pin 'D' connector. The port is suitable for any device that needs an RS-232 serial connection. Only the receive data line (RxD) and transmit data line (TxD) are available for external device connection. The port's "modem control lines" are used in the TSI-3000 to TSI-3000ACO interconnection.

Table 2: COM1 Pinout Table

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.

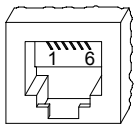
2.6.2 Serial Ports COM3 to COM6

Serial ports COM3 to COM6 have RS-422/485 voltage levels and 6P6C modular jack connectors. The ports drivers and receivers are suitable for either RS-422 or RS-485 circuits.

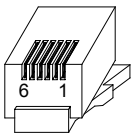
The 6P6C modular jack connector provides a convenient wiring interface to many Image Video products that also use a modular jack for serial I/O. These ports can also be used for any device that needs an RS-422 or RS-485 serial connection. Adapters are available to convert the port to a 9-pin 'D' connector if necessary. The 6P6C modular jacks may also be referred to as RJ-11 or RJ-12 jacks in other literature.

Table 3: COM3 to COM6 Pinout Table

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



6P6C Modular Jack



6P6C Modular Plug

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

When assembling cables with flat cable designed for modular plugs it important to orient the plugs correctly to ensure the cables are wired pin-to-pin. Figure 7 below illustrates correct cable assembly while Figure 8 below illustrates incorrect cable assembly.

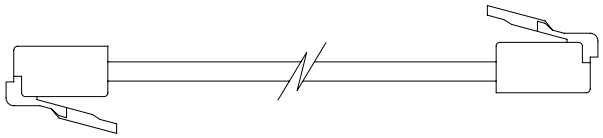


Figure 7: Correct 6P6C Pin-To-Pin Cable Assembly

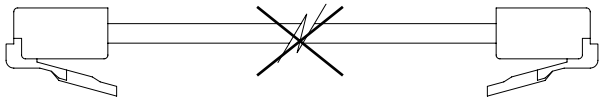


Figure 8: Incorrect 6P6C Pin-To-Pin Cable Assembly

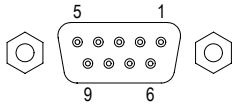
2.6.3 Serial Ports COM7 to COM12

Serial ports COM7 to COM12 have RS-422/485 voltage levels and female 9-pin 'D' connectors. 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. The ports are suitable for any device that needs an RS-422 or RS-485 serial connection. Adapters are available to convert the port to a 6P6C modular jack connector if necessary.

Table 4: COM7 to COM12 Pinout Table

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.

2.7 Ethernet Ports

The TSI-3000 provides up to four 10Base-T / 100Base-TX Ethernet ports. The standard TSI is equipped with one port and up to three additional ports can be added. The Ethernet ports are used to connect to other networked devices in the tally control system. The optional Ethernet ports allow the production equipment networks and tally control system networks to be isolated.

The Internet Protocol (IP) settings of each port must be configured from the user interface panel. See section 3.2.5 on page 19 for details. The port hardware automatically sets the data transfer rate to 10 Mbps or 100 Mbps and the transfer mode to half or full-duplex.

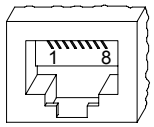
The programming of the TSI-3000 specifies the IP address of each network connected device. See the separate TSI-3000 system programming documentation for details. When the TSI-3000 has more than one Ethernet port the user must ensure the network matches the IP address configuration of the port it is attached to. In a system with redundant TSIs network connections must be made to both TSIs. Only the “Active” TSI-3000 will control any network connected devices.

The status of network connected devices can be monitored from the user interface panel. See section 3.2.4 on page 17 for details. Ethernet ports NET2 to NET4 also have a status LED above their connectors. The port LED illuminates green when the port is a connected to a hub or another network device.

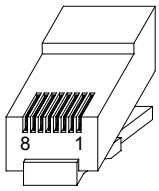
These ports use the standard IEEE pinout on an 8P8C modular jack. The 8P8C modular jacks may also be referred to as RJ-45 jacks in other literature.

Table 5: NET1 to NET4 Pinout Table

Pin #	*Function*
1	Tx+
2	Tx-
3	Rx+
4	not used
5	not used
6	Rx-
7	not used
8	not used



8P8C Modular Jack



8P8C Modular Plug

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

2.8 Linear Time Code Reference

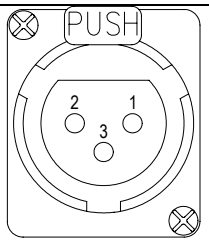
The LTC CLOCK REF. input allows the TSI-3000 to show time-of-day clocks on the connected tally displays.

The TSI-3000 will read a play speed (x1 speed) SMPTE or EBU format linear time code signal. The TSI-3000 can also be programmed to read SMPTE 309M or Leitch format date information from the time code user bits. See the separate TSI-3000 system programming documentation for details.

This input uses a female 3-pin XLR connector.

Table 6: LTC CLOCK REF Pinout Table

Pin #	*Function*
1	Signal Ground
2	Time-Code -
3	Time-Code +



Female 3-pin XLR

The XLR connector provides integral mating connector locking. The + and - connection designations are arbitrary; the phase of the time code signal is not important.

2.9 Diagnostic Connections

The KEYBOARD and VGA connections are used for diagnostic functions under the guidance of Image Video support personnel.

A computer keyboard with a PS2 connector and a VGA compatible monitor are connected if required.

2.10 Unused Connections

The MOUSE, USB 1, USB 2, LPT, AUX, AUDIO OUT, AUDIO IN, and AUDIO MIC connections are not used by the TSI-3000 application software.

2.11 Connector Clearance

The 9-pin ‘D’ connectors spacing on the rear panel of the TSI-3000 and the TSI-3000ACO may restrict the selection of the mating connector backshell. Most 9-pin D connector backshells are less than 0.65” (16.5 mm) high; however, sample parts should be evaluated prior to purchasing production quantities. See Figure 9 below for reference dimensional drawings of these connectors on the TSI-3000 and Figure 10 on page 14 for the connectors on the TSI-3000ACO.

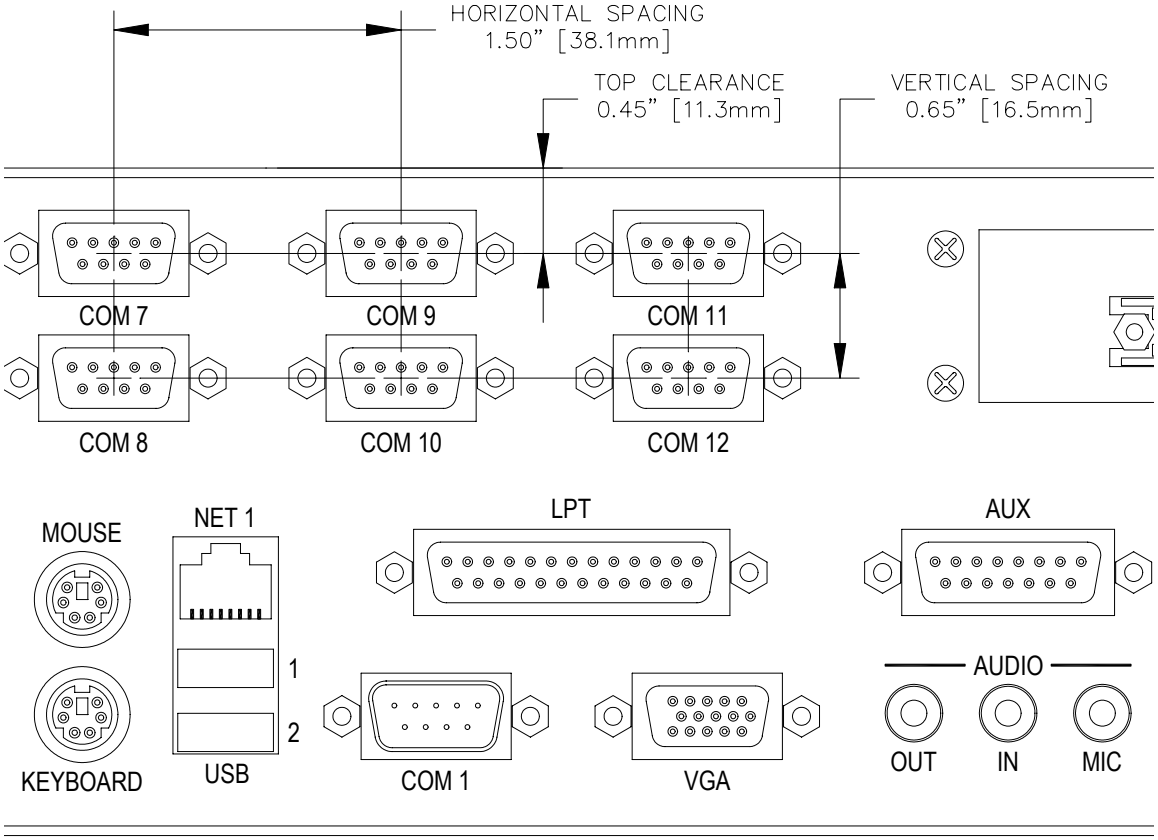


Figure 9: TSI-3000 Connector Clearance

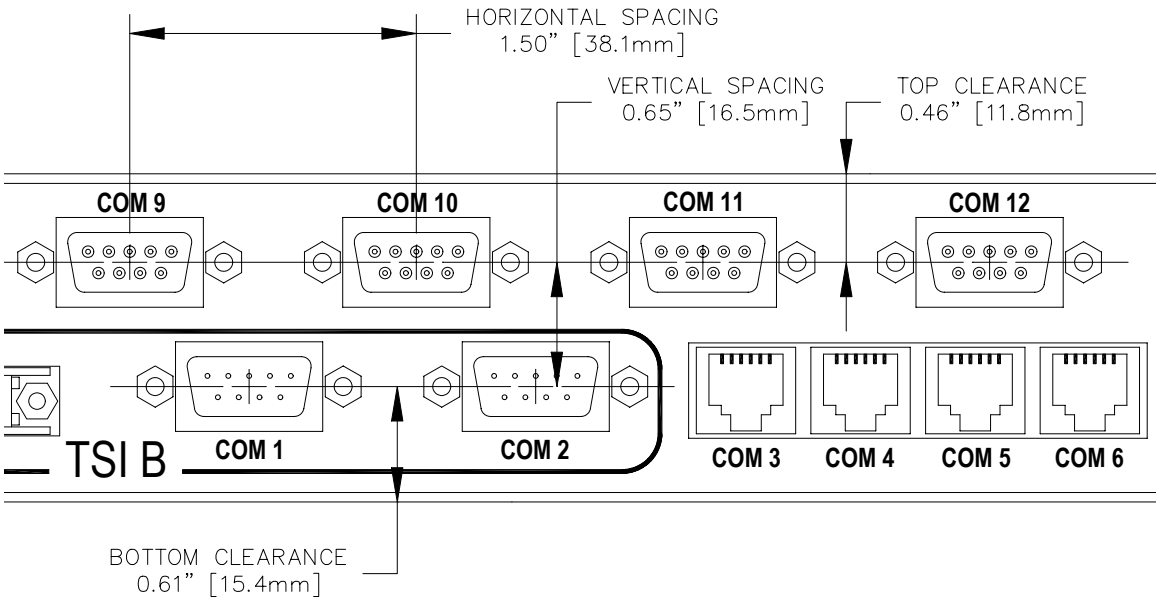


Figure 10: TSI-3000ACO Connector Clearance

3 CONFIGURATION AND OPERATION

3.1 General

This section describes the configuration and operation of the TSI-3000 and the TSI-3000ACO. The controls and displays of the TSI-3000 and the TSI-3000ACO are used to configure and monitor their operational status; they are not used for routine operation of the system. The tally control system is programmed with the Tally System Configuration Console program running on an external computer. See the separate TSI-3000 system programming documentation for details. The tally control system operation is mostly automated by its programming; however, manually operated interface devices such as a remote control panel can be programmed into the system.

The TSI-3000 user interface panel is used to configure the basic setup of the TSI and monitor the operation of the TSI and the external devices connected to it.

The unit ID and network interface of the TSI can also be setup from an external computer using the Image Video Product Setup Console or Image Video Tally System Console 2 program.

The TSI-3000ACO front panel selector switch controls the selection of the active TSI-3000 in a system with redundant TSI-3000s. The front panel status LEDs indicates the readiness of both TSI-3000s.

3.2 TSI-3000 User Interface Panel

3.2.1 Overview

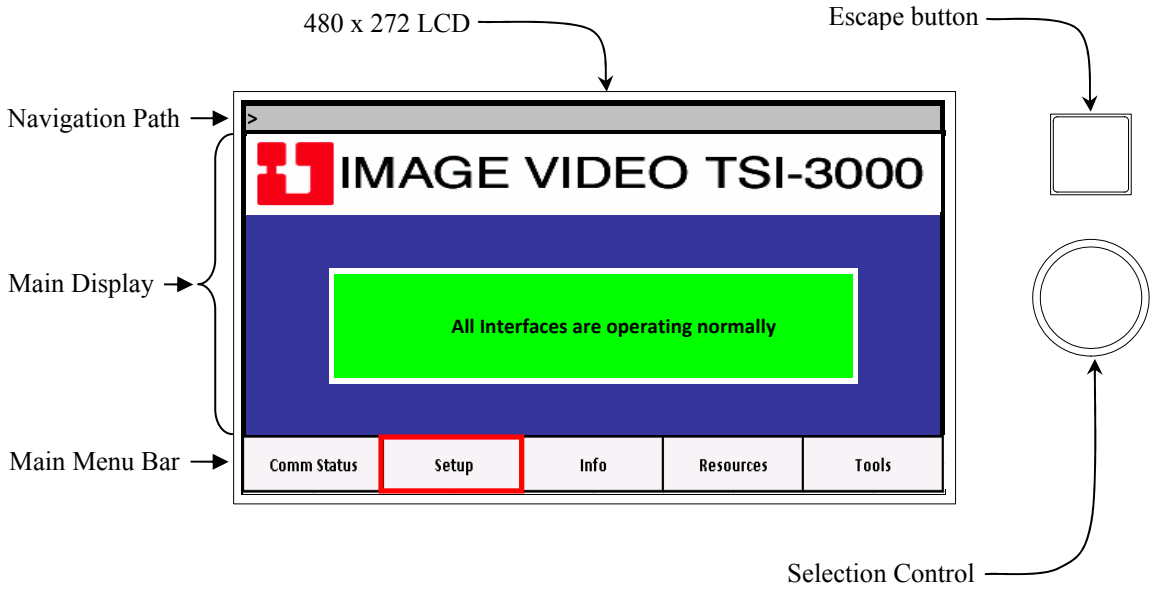


Figure 11: TSI-3000 User Interface Panel

The TSI-3000 User Interface Panel is used to configure and monitor the TSI and the external devices connected to it. The panel has a 480 x 272 colour LCD with integrated

touch panel, a rotary selector with integrated pushbutton, and an illuminated pushbutton. The rotary selector is referred to as the Selection Control and the illuminated pushbutton is referred to as the Escape button.

The User Interface Panel provides display of overall status, display of communication status, setup of the TSI-3000 network parameters, display of operation information, display of internal hardware resources, and configuration tools. A hierarchical menu structure is used to navigate the various status and setup screens.

3.2.2 General Operation

The User Interface Panel display shows status messages, entry fields, menu items and the current menu level. The display is divided into three areas: navigation path, main display area and main menu bar. Items on the screen can be selected by either touching the screen or using the Selection Control.

The navigation path is the top section of the screen. This part of the screen shows the menu level of the information presented in the main display area.

The main display area is the center section of the screen. This part of the screen shows the information of the current level as a grid of cells. In some menu levels the cells in this area can be selected to edit the cell's data, navigate to other screens or execute controller functions.

A main menu bar is the bottom section of the screen. This part of the screen shows navigation and command buttons for the main display area.

Buttons and cells can be selected by either touching the screen or using the Selection Control. The border of a button or selectable cell will flash while it is touched and activate when released. A button or selectable cell can also be activated by rotating the Selection Control to highlight the button or cell and then pressing the Selection Control. The border of a highlighted cell will be white in the main display area and red in the main menu bar. Touch either the main display area or the main menu bar to move the focus of the Selection Control.

An editable cell will change from blue to white characters when selected. Rotate the Selection Control to modify the cell value. Press the Selection Control to accept the modified value or the Escape button to restore the previous value. Cells with dotted decimal values will highlight the first octet when selected and move to the next octet when the Selection Control is pressed. The modified cell is only accepted after the fourth press of the Selection Control.

The Escape button is used to go back to a previous menu level and to discard a data entry.

On start-up the User Interface Panel displays its firmware version. The display will change to the main status screen after the TSI-3000 application software has loaded and started.

3.2.3 Main Status Screen

The main display area of the main status screen shows a colour coded cell with a message summarizing the TSI-3000 operational and connectivity status. The background colour of the cell gives the overall connectivity status. Green indicates all programmed external

devices are communicating as expected with the TSI-3000. Amber indicates some external devices are not communicating properly. Red indicates no external devices are communicating with the TSI-3000.

In a system with redundant TSI-3000s the message summary cell on backup TSI will show “THIS UNIT IS IN BACKUP MODE”.

Selecting the summary message cell activates the communication status pages.

Buttons in the main menu bar activate the sub-pages described below.

3.2.4 Communication Status Pages

The communication status pages show status of the external devices programmed to communicate with the TSI-3000. There is one page with the summary of all devices and individual detail pages for each device.

3.2.4.1 Communication Summary Page

The communication summary page gives the connectivity status of all the serial ports and any network connected devices. This page is shown when the Comm Status button or the summary message is selected from the main status screen. This page is also shown when escaping from a detailed serial connectivity page.

Each serial port and networked device is represented as a colour coded cell with the name of the device. The device name comes from the tally system configuration. The background colour of the cell shows the connectivity status. Green indicates the device is communicating as expected. Amber indicates some but not all of the known devices on the port are communicating. Red indicates that none of the known devices are communicating on the given port.

Selecting a device cell displays the detailed connectivity status of the device.

Serial ports without a programmed external device are not selectable. These ports are displayed with the serial port name (COM1, COM3, etc) on a grey background.

Pressing the Escape button or selecting the Main Page button in the main menu bar will return to the main status screen.

3.2.4.2 Detailed Serial Connectivity Page

The detailed serial connectivity page shows the programmed and operational details of a serial port. This page is shown when a serial port is selected in the communication summary page.

The information on the page is presented in three columns: Property, Status and Assessment. The property column identifies the information, the status column is the current state of the property, and the assessment column is the evaluation of the status. The assessment will indicate OK or Error for the properties that can be evaluated. The background colour of the assessment indicates the severity of any problems: green for no error, amber for a non-critical warning, and red for an error. A grey background is used for static text cells and blue for areas without a cell.

Pressing the Escape button will return to the communication summary page. Selecting the Main Page button in the main menu bar will return to the main status screen.

Table 7: Detailed Serial Connectivity Information

Property	*Description*
Device Name	This is the name of the device configured to use the serial port. The name taken from tally system configuration. This property does not have an assessment.
Device Type	This is model name of the device or the name of the protocol for the device configured to use the serial port. This property does not have an assessment.
Serial Format	This is the format of the serial data transmitted and received on the serial port. It is presented as baud rate / data bits / parity bits / stop bits. This property does not have an assessment.
Character Transmit	This property shows if serial data is being transmitted on this port.
Character Receive	This property shows if serial data is being received on this port.
Receive Errors	This property shows if characters with parity or framing errors are being received on this port. These types of errors are usually caused by a wrong baud rate or a bad cable.
Protocol Errors	This property shows if characters or messages that violate the serial protocol for the device are being received. This type of error is usually caused by a wrong protocol selection in the remote device, a wrong protocol selection in the tally system configuration, or the interface cable being connected to the wrong port.

3.2.4.3 Detailed Network Connectivity Page

The detailed network connectivity page shows the programmed and operational details of the devices configured to communicate with the TSI-3000 with a network connection. This page is shown when a network configured device is selected in the communication summary page.

The information on the page is presented in three columns: Property, Status and Assessment. The property column identifies the information, the status column is the current state of the property, and the assessment column is the evaluation of the status. The assessment will indicate OK or Error for the properties that can be evaluated. The background colour of the assessment indicates the severity of any problems: green for no error, amber for a non-critical warning, and red for an error. A grey background is used for static text cells and blue for areas without a cell.

Pressing the Escape button will return to the communication summary page. Selecting the Main Page button in the main menu bar will return to the main status screen. Selecting the Prev or Next buttons in the main menu bar will change to the previous or next device of the same type.

Table 8: Detailed Network Connectivity Information

Property	*Description*
Device Name	This is the name of the device configured to use a network connection. The name taken from tally system configuration. This property does not have an assessment.
Device Type	This is model name of the device or the name of the protocol for the device configured to use a network connection. This property does not have an assessment.
IP Address / Port	This is the configured Internet Protocol address and port of the device. It is presented with the IP address in standard dotted decimal notation followed by the port number. This property does not have an assessment.
Device On Network	This property shows when the device is connected to the TSI or has actively refused a connection request from the TSI.
Device Responding	This property shows if the device is responding to the TSI. The cell will show “Device Connected” for devices using TCP messages when the TSI has established connection to the device and “N/A” for devices using UDP messages.
Transmitting Messages	This property shows if the TSI is sending messages to the device. The cell will show “N/A” if the TSI does not send messages to the device.
Receiving Messages	This property shows if the TSI is receiving messages from the device. The cell will show “N/A” if the device is not expected to transmit.
Protocol Errors	This property shows if characters or messages that violate the protocol for the device are being received. This type of error is usually caused by a wrong protocol or port selection in the remote device or by a wrong IP address, protocol or port selection in the tally system configuration.

3.2.5 TSI-3000 Setup Page

The TSI-3000 setup page shows the unit identification and network interface settings of the TSI-3000. This page is shown when the Setup button is selected from the main status screen.

The Unit ID cell is the unique number assigned to a TSI or TSI redundancy pair to distinguish it in a tally control system with several TSIs. This field is an integer with a range of 1 to 56. In a system with only one TSI or TSI redundancy pair the Unit ID should be set to 2.

The Gateway cell is the IP address of the gateway the TSI will route messages through when a direct network connection to the message destination is not available. This field is a dotted decimal number. The gateway IP address must be within the subnet range of one

of the installed network interfaces. If a gateway is not available or not needed the gateway should be set to “0.0.0.0”.

The NET1 IP Address cell is the Internet Protocol address the TSI will use for itself on the network connected to the NET1 port. This field is a dotted decimal number. The IP address must be within the subnet range of other devices also connected to the NET1 network. If the NET1 network connection is not needed the IP Address should be set to “0.0.0.0”.

The NET1 Subnet Mask sets the range of IP addresses the TSI can directly connect to on the network connected to the NET1 port. This field is a dotted decimal number.

The NET2 to NET4 cells are the settings of the optional network interfaces. The cells are set in the same manner to the NET1 cells. The IP address range of the installed networks must not overlap. The settings of uninstalled network interfaces are ignored.

Pressing the Escape button when not modifying a cell will return to the main status screen. Any changed cells will not be saved.

Selecting the Discard Changes button in the main menu bar will restore the cells to the values they had when the TSI-3000 setup page was entered. A prompt is displayed after the Discard Changes button is selected to confirm the user’s intent to restore the cells values. Select NO to leave the cell values as they are and YES to discard any changes to the cell values.

Selecting the Save and Reboot button in the main menu bar will restore save any changes to the cell values and initiate a TSI-3000 reboot. A prompt is displayed after the Save and Reboot button is selected to confirm the user’s intent to save the new cells values and reboot the TSI. Select NO to continue editing the cell values and YES to save the new cells values and reboot the TSI. After the reboot the new settings will be used. **NOTE**, after the Save and Reboot operation is confirmed by selecting YES, the reboot cannot be cancelled and will occur in approximately 30 seconds.

3.2.6 TSI-3000 Operation Information Page

The TSI-3000 Operation Information page shows information about the application software and the installed output licenses. This page is shown when the Info button is selected from the main status screen.

The details on this page are required when requesting additional output licenses. The displayed cells cannot be edited.

Press the Escape button to the main status screen.

3.2.7 TSI-3000 Internal Hardware Resources Page

The TSI-3000 Internal Hardware Resources page shows information about the available memory. This page is shown when the Resources button is selected from the main status screen.

The displayed cells cannot be edited.

Press the Escape button to the main status screen.

3.2.8 TSI-3000 Configuration Tools Page

The TSI-3000 Configuration Tools page shows a submenu of tools to aid solving exceptional configuration issues. This page is shown when the Tools button is selected from the main status screen. A Yes / No confirmation is required for any tools that have a detrimental impact on the TSI-3000 operation.

Press the Escape button to the main status screen.

3.2.8.1 Clear Configuration

The “Clear Config & Reboot” tool removes all user configuration files from the internal storage device and then restarts the TSI-3000. The configuration stored by the TSI-3000 is effectively a merge of consecutive configuration uploads. Usually incremental changes to the system are changes to existing information which is overwritten and replaced. It is possible that configuration items from older sessions need to be cleared out in order for the system to work correctly, for example where a large number of items have been deleted from the configuration console and not the TSI-3000. In these cases it can be useful to clear the TSI-3000 configuration and reload the newest configuration from the tally System Console.

The TSI network interface IP address setup and the inter-TSI network configuration are not affected by this tool.

3.2.8.2 Remove Inter-TSI Network Configuration

The “Remove From TSI Network & Reboot” tool removes all inter-TSI network configuration files from the internal storage device and then restarts the TSI-3000. This operation is an easy method to change a TSI from being part of a group of inter-connected TSIs to a standalone unit. The TSI network interface IP address setup and the user configuration files are not affected.

3.2.8.3 Start FTP Server

The “Exit to FTP” tool stops most of the TSI main application program leaving only the FTP server running. This operation is needed when changes must be made to the file system without the application program having files open.

Cycle the TSI power off and on after completing the FTP operation to restart the TSI application program.

3.3 TSI-3000 Setup Using External Computer

The unit ID and network interface parameters of the TSI can be setup from an external computer using the Image Video Product Setup Console program or the Image Video Tally System Console 2 program.

3.3.1 Setup Using Product Setup Console

The Image Video Product Setup Console program allows the Unit ID and network setup parameters to be examined and modified.

At start-up the Product Setup Console program will send broadcast messages on the network to discover all Image Video network-enabled products on the network and will

display a table of the discovered devices information fields. The Unit ID, Saved IP Address, Subnet Mask, and Default Gateway fields of the TSI devices can be modified. Scroll through the Serial Number column to find the TSI to be setup.

To change a TSI unit ID or network parameter click on field to be changed, modify the field value and press Enter. Changed fields are indicated with a bold text.

Click on the Apply button when all the changes are complete to send the changes to the TSI. The TSI will reboot 30 seconds after receiving the changes.

3.3.2 Setup Using Tally System Console 2

The TSI Discovery function of the Image Video Tally System Console 2 program allows the Unit ID and network setup parameters to be examined and modified.

Click on menu Management → Configuration → TSI Discovery to access the function and then click Discover TSIs on Network to find the available TSIs.

Select the TSI to be modified in the Discovered TSI list. The Unit ID, IP Address, Subnet Mask, and Default Gateway parameters of the selected TSI will be displayed in the TSI System Information box. Click the Modify ID, Modify IP, Subnet Mask, or Gateway buttons to changes the corresponding parameter.

Click OK to accept the changed value. The TSI will reboot 30 seconds after receiving the changes.

3.4 TSI-3000 Power

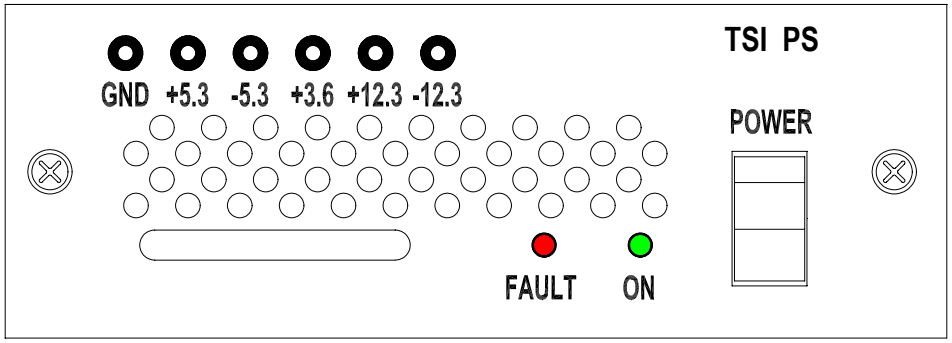


Figure 12: TSI PS Front View

The TSI-3000 is powered by one or two TSI PS internal plug-in power supplies. The standard TSI is equipped with one power supply. For power supply redundancy an optional second power supply can be installed. With power supply redundancy both supplies share the load equally; however, should one supply fail or be turned off the other supply will assume the full load without disruption of system operation. These supplies have a wide input voltage range allowing for operation in any country.

The power switch for the TSI PS is on its front panel. The supply also has front panel status LEDs and test points for each DC power rail to assist in fault analysis.

The ON LED illuminates green when the supply is powered. The FAULT LED illuminates red when any of the power supply outputs are not within range; this fault

condition could be due to the power supply being switched off, the power cord not being plugged in, or an internal fault.

3.5 TSI-3000ACO Operation

3.5.1 TSI-3000ACO Operational Mode

The TSI-3000ACO operates in one of three modes: automatic selection of the active TSI-3000, manual selection of the 'A' TSI-3000, and manual selection of the 'B' TSI-3000. The operating mode is selected using the front panel rotary switch.

The ACO continually monitors the heartbeat signal from both TSIs to determine if they are ready to be the active TSI. The TSIs must continually send a properly formatted heartbeat signal to be considered ready.

3.5.1.1 Automatic Mode

The active TSI can be selected automatically by putting the rotary switch in the AUTO position.

In the automatic mode the TSI that is selected as the active unit is determined by the ready state of both TSIs. The ACO will only switch to the standby TSI if the currently selected TSI is not ready and the standby TSI is ready. If both TSIs are ready or not ready the active selection will not change.

3.5.1.2 Manual Mode

Either TSI can be manually selected as the active TSI by putting the rotary switch in the TSI A or TSI B position as required.

Manual selection of the 'A' or 'B' TSI cannot be overridden by the selection logic of the ACO.

3.5.1.3 Power Off Selection

The 'A' TSI is selected when the ACO is off.

3.5.2 TSI-3000ACO Status Display

The status of the TSI-3000ACO and the TSI-3000s are displayed by tricolour LEDs on the front panel of the ACO. Expected conditions are indicated by LEDs illuminated with a solid colour. Abnormal conditions are indicated by LEDs illuminated with a flashing colour.

3.5.2.1 Ready Status

The READY LEDs on the front panel of the ACO indicate the ready status of the TSIs. The possible status conditions are listed in Table 9 below.

Table 9: READY LED Indications

LED Colour	*Condition*	*Description*
Green	Ready	A proper heartbeat signal is being received from the TSI. This is the normal condition.

LED Colour	*Condition*	*Description*
Red	Not ready	No heartbeat signal is being received from the TSI. This problem is usually caused by the TSI being turned off or not connected to the ACO.
Blinking Red	Fault	A bad heartbeat signal is being received from the TSI. This problem is usually caused by a faulty TSI.

3.5.2.2 Active Status

The ACTIVE LEDs on the front panel of the ACO indicate the active status of the TSIs. The possible status conditions are listed in Table 10 below.

Table 10: ACTIVE LED Indications

LED Colour	*Condition*	*Description*
Green	Automatic Selection	This ready TSI has been automatically selected as the active unit.
Blinking Green	Manual Selection	This ready TSI has been manually selected as the active unit.
Off	Not Selected	This TSI has been selected as the standby unit.
Red	Not Ready Selection	This not ready TSI has been selected as the active unit. The usual cause of this problem is when neither TSI is ready or a not ready TSI has been manually selected.
Blinking Amber	TSI-3000ACO Fault	The ACO has an internal relay control fault. Either the relays are not changing to what the control logic has selected (the ACTIVE LED of the selected TSI will be blinking amber) or the relay state cannot be determined (both ACTIVE LEDs will be blinking amber).

3.6 TSI-3000ACO Power

The TSI-3000ACO is powered by one or two wall-mount power adapters. The standard ACO is equipped with two power adapters.

The TSI-3000ACO does not have a power switch. The unit is on whenever power is applied to either of the rear power connectors. The PS1 and PS2 LEDs on the front panel indicate the power source status of the ACO. The possible status conditions are listed in Table 11 below.

Table 11: TSI-3000ACO Power Status LED Indications

LED Colour	*Condition*	*Description*
Green	Power Source Okay	The external power source is connected and is supplying power to the ACO.

LED Colour	*Condition*	*Description*
Red	Power Source Off	The external power source is connected to the ACO; however, there is no power from the source. The problem is usually caused by the power adapter being unplugged from the wall outlet.
Off	Power Source Disconnected	The external power source is not connected. The problem is usually caused by the power adapter being unplugged from the ACO.
Blinking Red	Power Source Fault	The external power source is connected; however, it is not supplying enough power to the ACO. The problem is usually caused by an incorrect or faulty external power adapter.
Blinking Amber	TSI-3000ACO Fault	The ACO has an internal power supply fault.

4 MAINTENANCE

4.1 General

There are no user serviceable parts in the TSI-3000 or the TSI3000ACO. If a fault is suspected the user interface panel and the status LEDs can be used to diagnose the trouble to either an external device problem or an internal fault.

The TSI-3000 plug-in power supplies can be replaced in the field by qualified personnel.

The only routine maintenance tasks for the TSI-3000 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 TSI3000ACO.

4.2 Cleaning the LCD

The TSI-3000 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.

4.3 Periodic Cleaning

To maintain a proper CPU operating temperature is it necessary to periodically open the TSI-3000 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 the TSI is operating in.

1. Turn off the TSI.
2. Disconnect any cables from the TSI 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 6 screws on the top.
4. Carefully blow or brush any accumulated dust or debris from inside the TSI. Particular attention should be given to the CPU heat sink assembly.
5. Replace the top cover and the top cover screws.
6. Reinstall the TSI in the rack and reconnect any previously disconnected cables.
7. Turn on the TSI and confirm its operation.

4.4 TSI-3000 Power Supply

4.4.1 Power Inlet Fuse

Each power supply has its own fused power inlet connector on the rear panel of the TSI-3000. 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.

4.4.2 Exchanging a TSI PS

This procedure is for **qualified personnel only**. Regardless of the power switch position, **dangerous voltages are accessible** when there is power at either rear panel power connector and a power supply slot is uncovered. **Do not leave the TSI-3000 unattended** while there is power at either rear panel power connector and a power supply slot is uncovered.

This procedure can be done without interrupting the TSI-3000 operation if the TSI-3000 has a redundant power supply; the other power supply will power the TSI-3000.

1. Turn the power switch off on the supply to be exchanged.
2. Remove the 2 screws securing the power supply front panel to the TSI-3000 frame.
3. Remove the power supply by pulling on its front panel handle.
4. Ensure the power switch is in the off position on the supply to be installed.
5. Insert the new power supply in the empty slot. Press on the lower corners of the front panel to ensure it is fully seated. If the TSI is powered by the other supply, the fault LED on the just inserted supply will illuminate to indicate it not providing power.
6. Install the 2 front panel screws to secure the power supply to the TSI-3000 frame.
7. Turn on the power switch and confirm the power LED illuminates and the fault LED goes off.

4.4.3 Installing a Second TSI PS

This procedure is for **qualified personnel only**. Regardless of the power switch position, **dangerous voltages are accessible** when there is power at either rear panel power connector and a power supply slot is uncovered. **Do not leave the TSI-3000 unattended** while there is power at either rear panel power connector and a power supply slot is uncovered.

It is recommended that this procedure be done with power disconnected from both rear panel power connectors. While it is possible to do this procedure without interrupting the TSI-3000 operation, **EXTREME CARE** must be taken to ensure the unsecured blank cover plate does not fall inside the TSI-3000 and contact a live power connection.

1. Disconnect the power from both rear panel power connectors.
2. Remove the 2 screws securing the blank cover plate to the TSI-3000 frame.
3. Remove the blank cover plate.
4. Ensure the power switch is in the off position on the supply to be installed.
5. Insert the new power supply in the empty slot. Press on the lower corners of the front panel to ensure it is fully seated.
6. Install the 2 front panel screws to secure the power supply to the TSI-3000 frame.
7. Reconnect the power to both rear panel power connectors.
8. Turn on the power switch and confirm the power LED illuminates and the fault LED goes off.