TimeSource 3600
GPS Primary Reference Source

User's Guide

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How to Use This Guide

This section describes the format, layout, and purpose of this guide.

In This Preface

- Purpose of This Guide
- Who Should Read This Guide
- Structure of This Guide
- Conventions Used in This Guide
- Warnings, Cautions, Recommendations, and Notes
- Related Documents and Information
- Where to Find Answers to Product and Document Questions
- What's New In This Guide

Purpose of This Guide

The *TimeSource 3600 User's Guide* describes the procedures for unpacking, installing, using, maintaining, and troubleshooting the Symmetricom TimeSource 3600 GPS Primary Reference Source. It also describes the alarms and events, the languages that you use to communicate with the TimeSource 3600, default values, and other information.

Who Should Read This Guide

Chapter 1, Overview of the TimeSource 3600, is written for non-technical audiences who need general information about the product. Subsequent chapters contain technical information about the product that describes installation, maintenance, and configuration instructions or details primarily intended for qualified maintenance personnel.

This *User Guide* is designed for the following categories of users:

- **Systems Engineers** – Chapter 1 provides an introduction to the TimeSource 3600, Cross-references in this chapter direct you to detailed system information in other chapters as appropriate.
- **Installation Engineers** – Chapter 2 through Chapter 6 provide detailed information and procedures to ensure proper installation, power-up, operation, configuration, and testing of the TimeSource 3600.
- **Maintenance Engineers** – Chapter 5 provides preventive and corrective maintenance guidelines, as well as procedures for diagnosing and troubleshooting fault indications and alarms.

While Chapter 1 is written for non-technical audiences who need information about the TimeSource 3600 system, other chapters contain detailed information and instructions which are intended to be performed by *qualified personnel only*.

Structure of This Guide

This guide contains the following sections:

Chapter, Title	Description
Chapter 1, Overview of the TimeSource 3600	Provides an overview of the product, describes the major hardware and software features, and lists the system specifications.
Chapter 2, Engineering & Ordering	Provides information to assist in planning the installation and ordering a system appropriate for a specific site.

Chapter, Title	Description
Chapter 3, Installing the TimeSource 3600	Provides the sequential order of procedures for installation and power-up.
Chapter 4, TL1 Reference	Provides information for using the TL1 language.
Chapter 5, Troubleshooting	Provides troubleshooting information using front-panel lamps and error messages. It also describes how to replace a card, return equipment, get technical and/or sales assistance, and obtain manual updates.
Chapter 6, Specifications	Provides equipment specifications.
Index	Provides references to individual topics within this guide.

Conventions Used in This Guide

This guide uses the following conventions:

- **Acronyms and Abbreviations** – Terms are spelled out the first time they appear in text. Thereafter, only the acronym or abbreviation is used.
- **Revision Control** – The title page lists the printing date and versions of the product this guide describes.
- **Typographical Conventions** – This guide uses the typographical conventions described in the table below.

When text appears this way...	... it means:
TimeSource 3600 User's Guide	The title of a document.
TS3600 **CRITICAL** **GPS**	An operating mode, alarm state, status, or chassis label.
Select **File**, **Open**...	Click the Open option on the File menu.
Press **Enter** Press **;**	A named keyboard key. The key name is shown as it appears on the keyboard. An explanation of the key's acronym or function immediately follows the first reference to the key, if required.
`TS3600` `Username:`	Text in a source file or a system prompt or other text that appears on a screen.

When text appears this way...	... it means:
`ED-EQPT` `RTRV-ALM`	A command you enter at a system prompt or text you enter in response to a program prompt. You must enter commands for case-sensitive operating systems exactly as shown.
bridging mode	A word or term being emphasized.
Symmetricom ***does not*** recommend...	A word or term given special emphasis.

Warnings, Cautions, Recommendations, and Notes

Warnings, Cautions, Recommendations, and Notes attract attention to essential or critical information in this guide. The types of information included in each are explained in the following examples.

Warning: To avoid serious personal injury or death, *do not* disregard warnings. All warnings use this symbol. Warnings are installation, operation, or maintenance procedures, practices, or statements, that if not strictly observed, may result in serious personal injury or even death.

Caution: To avoid personal injury, *do not* disregard cautions. All cautions use this symbol. Cautions are installation, operation, or maintenance procedures, practices, conditions, or statements, that if not strictly observed, may result in damage to, or destruction of, the equipment. Cautions are also used to indicate a long-term health hazard.

ESD Caution: To avoid personal injury and electrostatic discharge (ESD) damage to equipment, *do not* disregard ESD cautions. All ESD cautions use this symbol. ESD cautions are installation, operation, or maintenance procedures, practices, conditions, or statements that if not strictly observed, may result in possible personal injury, electrostatic discharge damage to, or destruction of, static-sensitive components of the equipment.

Electrical Shock Caution: To avoid electrical shock and possible personal injury, do not disregard electrical shock cautions. All electrical shock cautions use this symbol. Electrical shock cautions are practices, procedures, or statements, that if not strictly observed, may result in possible personal injury, electrical shock damage to, or destruction of components of the equipment.

Recommendation: All recommendations use this symbol. Recommendations indicate manufacturer-tested methods or known functionality. Recommendations contain installation, operation, or maintenance procedures, practices, conditions, or statements, that provide important information for optimum performance results.

Note: All notes use this symbol. Notes contain installation, operation, or maintenance procedures, practices, conditions, or statements, that alert you to important information, which may make your task easier or increase your understanding.

Related Documents and Information

Other helpful documents and software tools are listed below. See your Symmetricom representative or sales office for a complete list of available documentation.

- *SynCraft management software*
- TimePictra management software

Note: Symmetricom offers training courses designed to enhance your knowledge of the TimeSource 3600. Contact your local representative or sales office for a complete list of courses and outlines.

Where to Find Answers to Product and Document Questions

For additional information about the products described in this guide, please contact your Symmetricom representative or your local sales office. You can also contact us on the web at www.symmetricom.com.

What's New In This Guide

Revision H of this guide contains the following new information:

- Added the alarm conditioning flow chart in Figure 4-4.
- Added Success Rate, on page 39.
- Changed the part number for the IF converter for window antenna gain from 090-72050-71 to 090-72050-72.
- Added the command Retrieve Status Security, on page 180.

Chapter 1 Overview of the TimeSource 3600

This chapter provides an overview of the global positioning system and a physical and functional description of the TimeSource 3600.

In This Chapter

- Overview
- Global Positioning System
- Physical Description
- Functional Description

Overview

The TimeSource 3600 is a Primary Reference Source (PRS) that receives and processes signals from GPS satellites, and outputs Stratum 1 synchronization signals traceable to UTC. TimeSource 3600 applications include synchronization for central offices, wireless base stations, transmission nodes, and other cases where a primary reference source can improve the performance of a telecommunications network infrastructure.

The TimeSource 3600 is also ideal for installation in environments where receiving GPS signals is difficult. Examples of environments hostile to GPS signals include urban canyons which have a very limited view of the sky because of blockage from nearby buildings, and high interference zones where GPS signals are jammed by competing over-the-air signals.

The TimeSource 3600 creates timing outputs by ensembling signals from several sources. The sources include GPS signals, an onboard rubidium local oscillator, and optional E1 or analog signals. Timing outputs created from the ensemble are composed of the most stable and least noisy parts of each input. The performance of the E1 sources can be monitored and classified using standard measures. Synchronization outputs are delivered in a framed, all-ones, E1 format or 2.048 MHz analog signal, a 10 MHz signal, a 1 pps signal, and a choice of time of day (TOD) formats.

The TimeSource 3600 minimizes timing impairments, such as jitter and wander, that are created by network and transmission systems. The synchronization timing is traceable to the GPS, which provides the highest level of synchronization for telephony networks. The TimeSource 3600 with its GPS input is a stand-alone office PRS. With the optional inputs ensembled, holdover is extended if GPS signals are disrupted.

Global Positioning System

The United States Government developed the GPS navigation system. It is a satellite-based, radio navigation aid designed to provide global, all-weather, precise navigation and timing capability to users 24 hours a day.

The satellites, circling the earth at approximately 20,197 km, are arranged in 6 orbits with 4 operational satellites in each orbit. Each satellite has an orbital period of approximately 12 hours. This configuration assures that a minimum of 4 satellites, and as many as 12, are in view anywhere in the world at all times.

The TimeSource 3600 tracks all satellites within its field of view. The performance of each tracked satellite is observed and compared to the others, and available for use in the timing solution. A satellite with unacceptable performance data is dropped from the timing solution.

GPS antennas must have line-of-sight access to the transmitting satellites. Any structure that interferes with, or blocks, the view of the satellites disrupts the reception of the signals, and can adversely impact the timing performance of a receiver.

The TimeSource 3600 bridges frequent GPS outage periods with BesTime algorithms, an ultra-stable Rubidium local oscillator and advanced holdover technology. The technology anticipates the outages and uses BesTime-generated predictor values to optimize the performance of timing without direct satellite input.

Physical Description

The TimeSource 3600 consists of a shelf, a plug-in card, an antenna, cables, hardware, and software. Optional system configurations include eight additional E1 or analog 2.048 Mhz outputs, two E1 synchronous clock insertion unit (ESCIU) ports, four IRIG-B TOD timing outputs, or eight mixed E1/T1 outputs.

The shelf (Figure 1-1) can be mounted in a 48 cm rack or an ETSI 53.5 cm rack. One RU (4.45 cm) of air space above the TimeSource 3600 is required for proper ventilation. Other than a communications connector on the front panel, all connectors are at the connector panel.

Four types of antennas are available:

- roof antenna for installation outdoors, usually on a roof
- mechanical antenna for installation indoors, mounted on a window sill or wall for reception through a window
- self-adhesive antenna for installation indoors, adhered directly to a window
- wall antenna for installation outdoors, through a hole in the wall

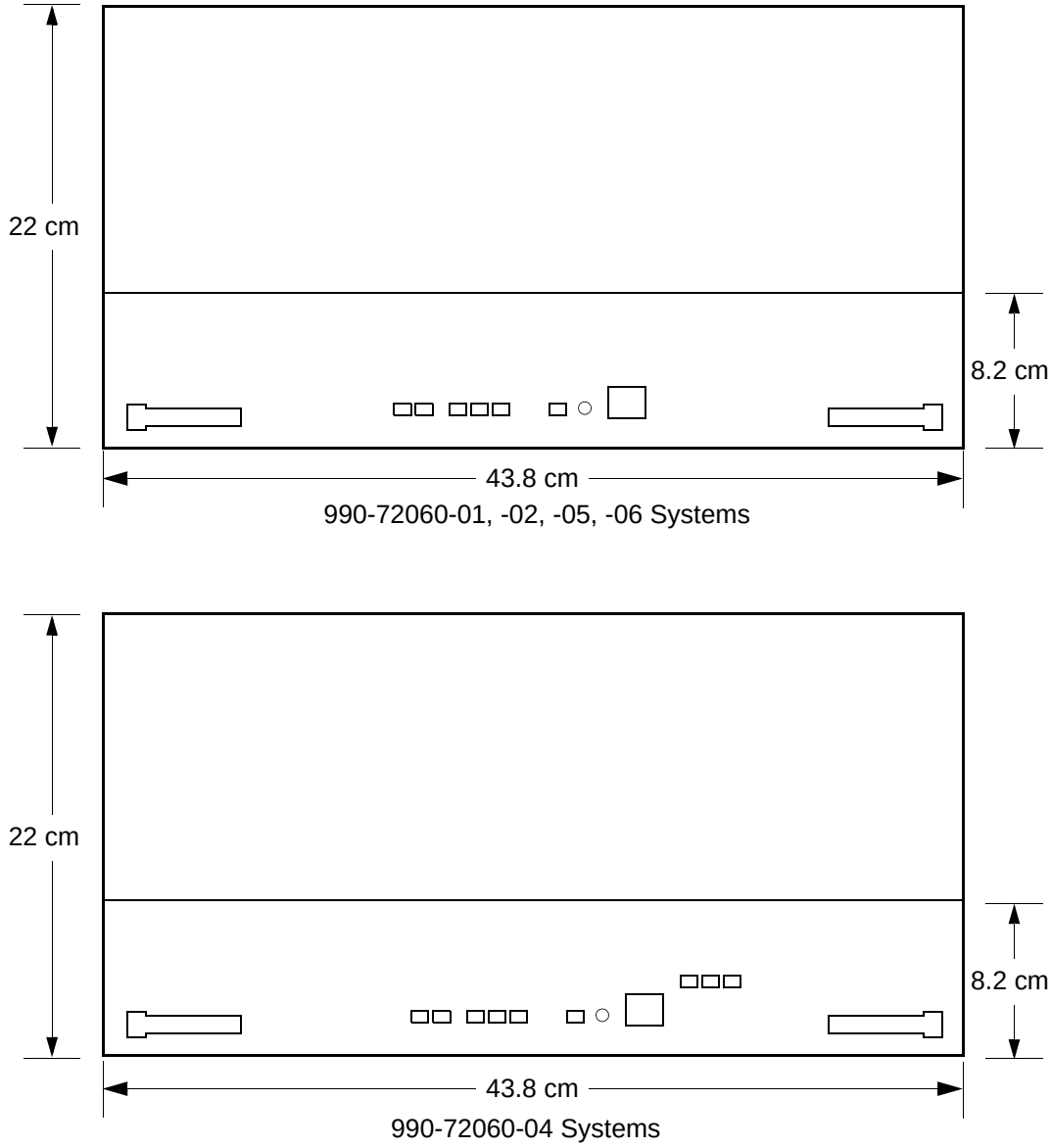


Figure 1-1. Shelf

Roof Antenna

The roof antenna (Figure 1-2) is encased in weather-resistant plastic housing for outdoor installation, usually on a roof. A single coaxial cable carries signals and power between the antenna and the shelf.

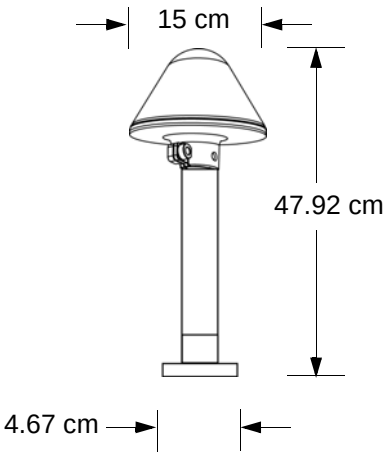


Figure 1-2. Roof Antenna

Mechanical Window Antenna

The mechanical window antenna (Figure 1-3) may be attached to a window sill or wall, in any position that allows the antenna to be moved flush against the window. The antenna can be swung away from the window for window maintenance, and returned to its original position.

A single length of coaxial cable carries signals and power between the antenna assembly and the shelf.

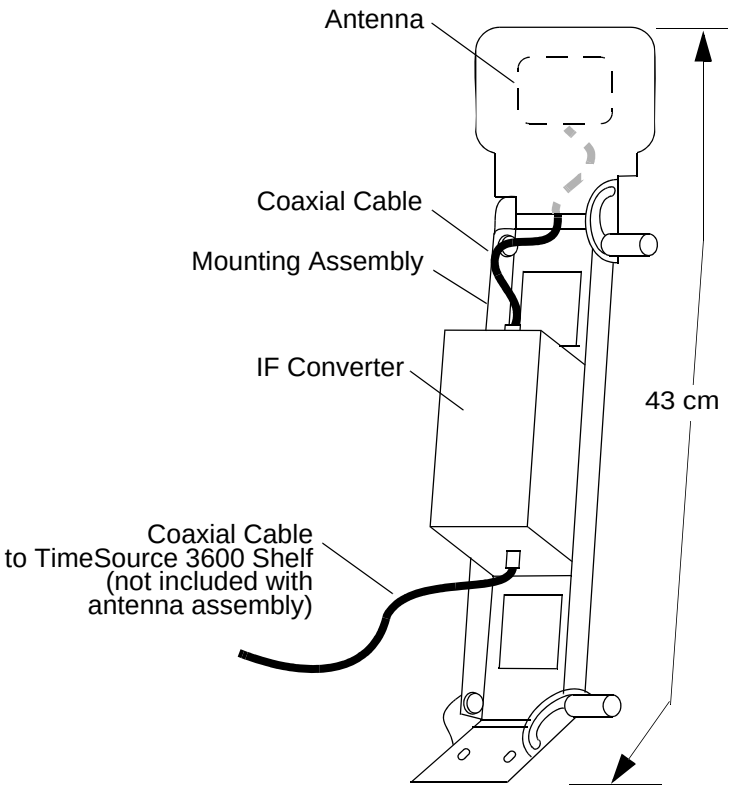


Figure 1-3. Mechanical Window Antenna

Self-Adhesive Window Antenna

The self-adhesive window antenna assembly (Figure 1-4) consists of the antenna and two pieces of self-stick hook-and-loop fabric fasteners (Velcro brand or equivalent). The hook-and-loop fabric attaches directly to a window. Coaxial cables carry signals and power between the antenna and the IF converter, and between the IF converter and the shelf.

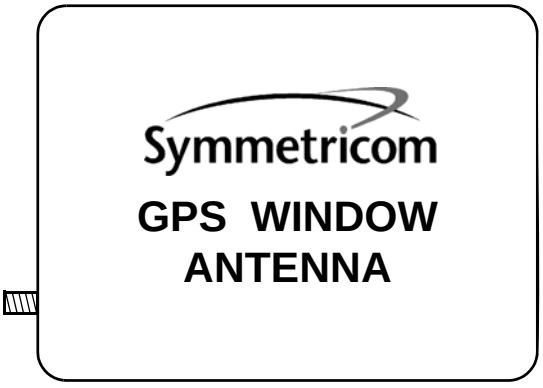


Figure 1-4. Self-Adhesive Window Antenna

Wall Antenna

The wall antenna (Figure 1-5) is mounted on the outside of a building wall. The antenna attaches magnetically to the mounting bracket. The cable from the antenna is routed through a hole drilled in the wall. Coaxial cables carry signals and power between the antenna and the IF converter, and between the IF converter and the shelf.

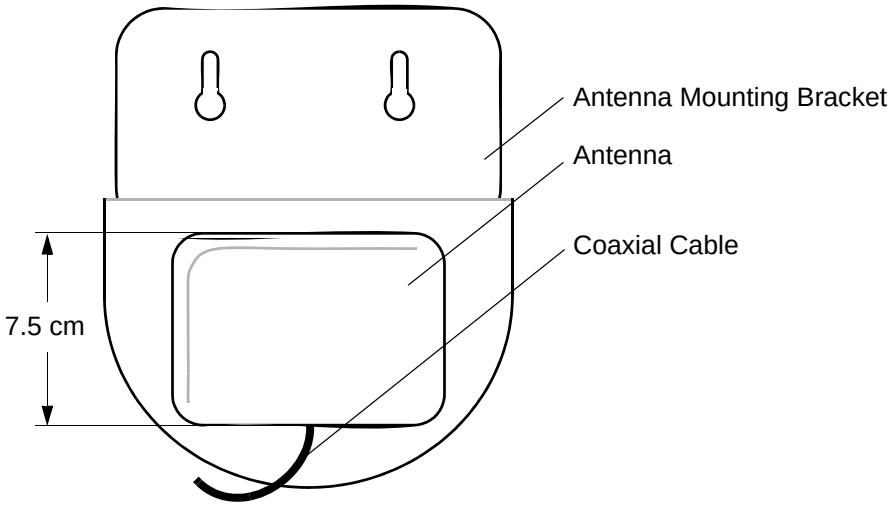


Figure 1-5. Wall Antenna

Functional Description

Figure 1-6 shows the main functions of the TimeSource 3600. The center of the TimeSource 3600 is the BesTime Ensemble Timing Generator, which uses the BesTime algorithm to analyze the phase and frequency relationships, individually and collectively, of the timing sources. Each type of timing source has a particular characteristic that gives it an advantage over other sources, as listed in Table 1-1.

The BesTime algorithm uses the best characteristic of each source to produce an output signal with greater overall accuracy and stability than any single source. The contribution of a source is based on its deviation from the weighted average of all the sources. The more accurate a source, the more weight it has in the final output. Every source is under constant evaluation and its contribution subject to periodic adjustment. The output is essentially the best performance of each individual source.

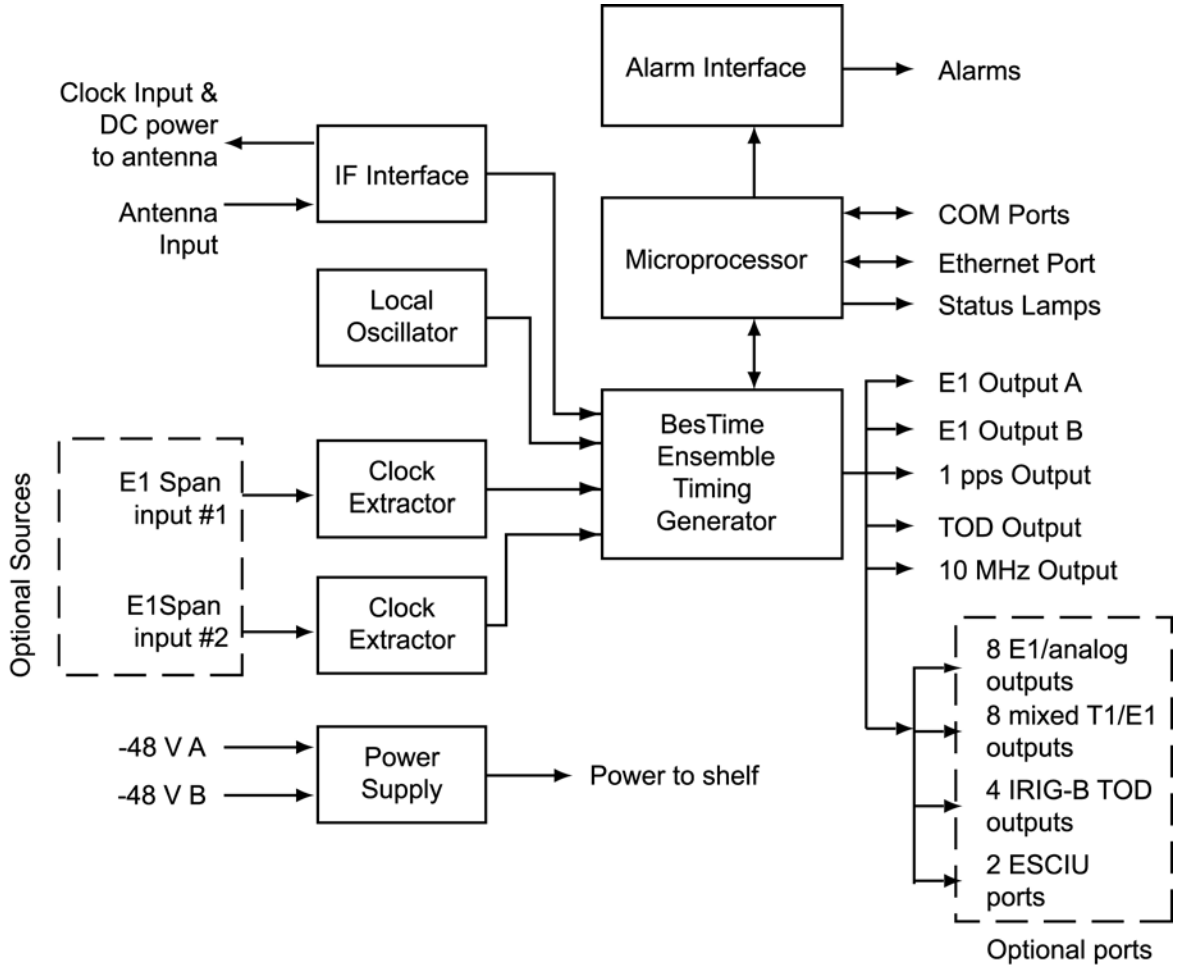


Figure 1-6. Block Diagram

Table 1-1. Timing Source Characteristics

Source	Characteristic
Local Oscillator	Short term stability
E1 Line	Intermediate term stability
GPS Signal	Long term stability

Antenna

The antenna types include a roof antenna, mechanical window antenna, self-adhesive window antenna, or wall antenna. All antennas include a GPS receiver, amplifier, and intermediate-frequency (IF) downconverter.

The GPS Receiver extracts a clock signal from the GPS satellite signals. The receiver can process the signals from all satellites in view, while simultaneously using the Earth location of the receiver and other factors to determine an accurate clock signal.

An amplifier provides signal gain.

The downconverter converts the L1-band GPS signal to IF for long-distance transport on the coaxial antenna cable. The antenna cable provides current from the shelf to the antenna, and transports GPS satellite IF signals from the antenna to the shelf.

Antenna Installation and Lightning Protection

The TimeSource 3600 standard wall antenna kits do not include lightning protectors. When the antenna is installed on the side of the building, the antenna is in the zone of protection and is protected from lightning strikes as described in the Standard for the Installation of Lightning Protection Systems (NFPA 780), 2000 edition.

The zone of protection shall include the space not intruded by a rolling sphere having a radius of 45.72 meters (150 ft). Where the sphere is tangent to earth and resting against a strike termination device, all space in the vertical plane between the two points of contact and under the sphere shall be considered to be in the zone of protection. A zone of protection shall also be formed where such a sphere is resting on two or more strike termination devices and shall include the space between those devices (see Figure 1-7). All possible placements of the sphere shall be considered when determining the zone of protection using the rolling sphere model.

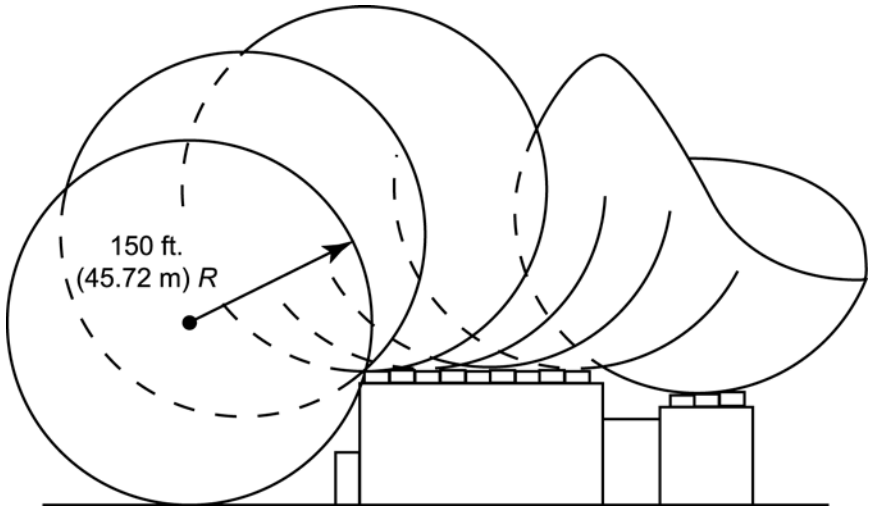


Figure 1-7. Zone of Protection

For structure heights exceeding 45.72 m (150 ft) above earth or above a lower strike termination device, the zone of protection shall be considered to be the space in the vertical plane between the points of contact and under the sphere where the sphere is resting against a vertical surface of the structure and the lower strike termination device or earth. The zone of protection shall be limited to the space above the horizontal plane of the lowest terminal unless it can be extended by further analysis, such as in rolling the sphere to be tangent to earth.

If the wall antenna is installed outside the zone of protection, Symmetricom offers an outdoor and/or indoor lightning protector kits for these installations. Refer to Chapter 2, Engineering & Ordering, for more information on these kits.

IF Interface

An IF interface accepts the signals from the antenna/IF converter, and provides the clock information to the BesTime Ensemble Timing Generator.

GPS Receiver

The GPS Receiver continuously tracks up to eight satellites, using both carrier and code lock. The recovered pseudo-range measurement data is processed to determine precise time and frequency state estimates for the local oscillator. The receiver software is optimized to track and update state estimates, when as few as one satellite is in view.

Local Oscillator

A rubidium oscillator, based on a digitally controlled servo-loop, provides an ultra-stable local oscillator signal, which is sent to the BesTime Ensemble Timing Generator.

Clock Extractors

A clock extractor circuit extracts a timing signal from each external reference source. (External sources, other than the GPS antenna, are optional.) The extracted timing signal is sent to the BesTime Ensemble Timing Generator.

Power Supply

A power converter filters and converts –48 volts dc power supplied to the shelf into the voltages required by the circuitry.

NTP TimeServer

The TimeServer is a Simple Network Time Protocol (SNTP) device. The SNTP TimeServer function is provided via the TimeSource Ethernet interface and associated IP address. User software requests UTC time of day via NTP protocol. The TimeSource SNTP server responds with current UTC time. The TimeServer is compatible with the SNTP RFC-1769 format.

To enable the SNTP feature, a password must be entered using the ED-EQPT TL1 command. If a user makes a fourth attempt of an incorrect password entry, the TimeServer will lock out the user for 1 hour.

Network Time Protocol Password Activation

Use of the Network Time Protocol (NTP) feature requires activation with a password. Activation is accomplished through receipt of a Network Time Protocol Activation Certificate from Symmetricom. This certificate contains the unit purchase order number, unit model number, unit activation date, unit serial number, and unit activation key. The unit activation key is the password that enables the NTP feature. To activate the NTP feature, enter the TL1 command printed on the activation certificate. Once activated, this feature will be permanently enabled. To order the NTP feature, contact the local Symmetricom sales representative.

BesTime Ensemble Timing Generator

Clock signals from the GPS antenna (via the IF interface), local oscillator, and optional E1 span lines are used as sources by the BesTime algorithms in the BesTime Ensemble Timing Generator. The signals are analyzed for MDEV, TDEV, and other phase and frequency characteristics.

The BesTime Ensemble Timing Generator uses mathematical models to analyze each clock. The ensemble algorithms use the comparisons and analyses to generate a highly stable timing signal, which uses the best qualities of all inputs.

E1 or Analog Outputs

The BesTime Ensemble Timing Generator provides the timing for the E1 or analog (2.048 MHz) timing signal available at the E1 OUT A and B connectors. E1 is provided in a framed, all-ones format, which can be set to CAS, CAS4, CCS, or CCS4 framing. 2.048 MHz is provided in accordance with G.703/10.

Eight Mixed E1/T1 Outputs

This feature enables a user to mix any combination of E1 and T1 outputs. A user can also use any combination of framing. For E1, CCS, CAS, CCS with CRC4, and CAS with CRC4 can be used per G.703 table 6. For T1, D4 or ESF can be used per ANSI T1.101. In addition, there is support for analog (2.048 MHz) per G.703 table 10 and support for synchronous status messaging (SSM) per TR-33 for E1 and T1.

Eight Additional E1 or Analog Outputs (990-72060-02 Systems Only)

This option provides eight additional E1 or analog (2.048 MHz) outputs, available with the required option module. The module mounts in the OPTIONS I/O mountings on the connector panel. These outputs function the same as the standard E1 outputs.

TOD Output

The BesTime Ensemble Timing Generator provides the timing for the TOD timing signal available at the RJ-45 connector, which provides time code to devices compatible with NTP Type 4 or Cisco ASCII format.

IRIG-B TOD Outputs (990-72060-05 Systems Only)

This option provides four additional TOD outputs in IRIG-B format. The outputs are available at a BNC output module mounted on the OPTIONS I/O mountings on the connector panel.

The BesTime Ensemble Timing Generator provides the timing for the TOD timing signal, which provides timing code to devices compatible with IRIG-B.

1 PPS Output

The BesTime Ensemble Timing Generator provides the timing for the 1 pulse-per-second timing signal available at the 1 PPS connector, which can be used for application-specific requirements. This signal is not squelched during an alarm.

10 MHz Output

The BesTime Ensemble Timing Generator provides timing for the 10 MHz timing signal available at the 10 MHZ connector, which can be used for local cellular frequency or testing purposes. This signal is not squelched during an alarm.

Two ESCIU Outputs (990-72060-04 Systems Only)

This option provides a module for two E1 ports. The module mounts in the OPTIONS I/O mountings on the connector panel. E1 traffic-carrying signals are synchronized using the Bestime ensemble timing generator. Jitter and wander are also removed before sending the E1 signals to network elements.

If an alarm condition or power failure occurs, relays allow the E1 signals to bypass the system. (See Figure 1-8).

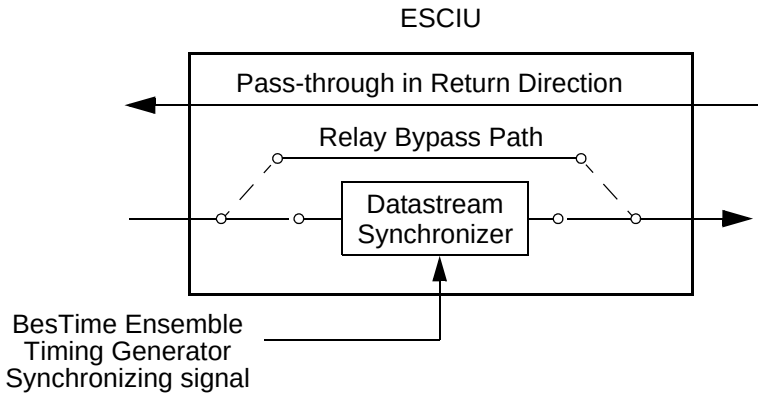


Figure 1-8. Two ESCIU Outputs Option

Alarm Interface

The microprocessor delivers alarms to normally open dry-contact type connections. Alarms are also indicated by the front-panel status lamps.

Communication Ports

Three serial communication ports carry TL1 commands, responses, and autonomous messages between the TimeSource 3600 and an external terminal.

Ethernet

TimeSource 3600 has six Ethernet ports to carry TL1 commands, responses, and autonomous messages between the TimeSource 3600 and an external terminal, or an Element Manager, or both. The user can configure the IP address, subnet mask, and gateway address for the Ethernet ports.

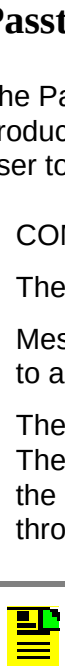
Four ports (5001, 5002, 5003, and 5004) are configured to act as though a serial-port communication terminal were connected to them. These ports communicate TL1 commands, responses and autonomous messages.

Two additional ports communicate with Element Managers, which may have NMS, TimePictra, or similar software. An Element Manager establishes a connection with one port (5551) for TL1 commands and responses. Another port (5550) establishes a connection to an Element Manger, sends autonomous messages, and closes the connection when finished.

Passthrough

The Passthrough feature of the TimeSource 3600 allows the unit to front a DCD product to provide one management interface for a user site. Passthrough allows a user to do the following:

- COM1 or COM2 of the TimeSource is connected to the DCD product
- The user port can be any unused port, including the Ethernet port
- Messages can pass from a user to the DCD product and from the DCD product to a user through the TimeSource 3600
- The TID (SID for DCD) is used to identify commands that go to the DCD product. The TimeSource 3600 passes any TID not its own through to the DCD product. In the reverse direction, all commands received from the DCD product are passed through to the user



Note: The TID of the TL1 command must be the SID of MIS.

- DCD is fully managed except for firmware download.
- GUI interfaces to the DCD product are not supported through the Passthrough, only TL1 responses are available.

Figure 1-9 shows a TimeSource 3600 Passthrough setup.

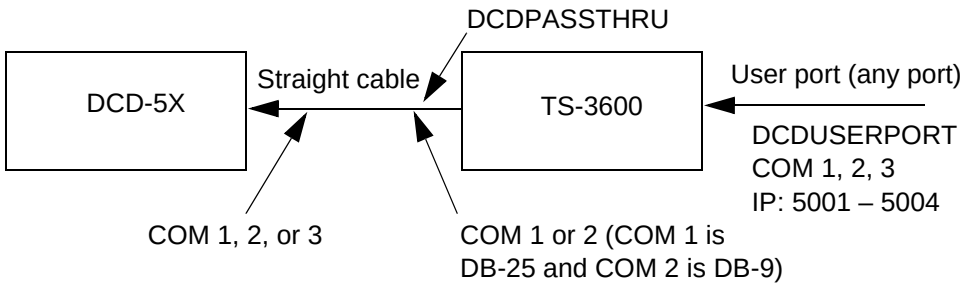


Figure 1-9. TimeSource 3600 Passthrough Function

Alarm Programmability

Releases of TimeSource (1.05.03 and above) allow the user to provision the alarm escalation parameters that were hardcoded in the previous releases of TS3000.hex. The defaults for this release remain the same as were previously hardcoded. This feature can be used to set the programmability for such alarms as GPS, HOLDOVER, SPAN-X, and RO-X.

The TS3600 alarms can be programmed for GPS and HOLDOVER types of events. The SPAN-X alarms can be programmed for AIS, ERROR, and LOS types of events.

The user can set the parameters for SEVERITY1 and SERAFF1 which initially come into effect when the condition is detected. The user can also set the parameters for SEVERITY2 and SERAFF2 which come into effect after TIME (another user programmable parameter).

The system also allows the user to set a parameter to define how outputs should behave in an alarm condition (see ALMOUT and ALMCOND settings). Outputs can be set to AIS, Squelch, or SSM when Holdover alarm severity is set to minor or major. AIS, Squelch, or SSM is not evoked if Holdover severity is set to event (factory default for initial severity). Outputs can also be set to ignore alarm conditions.

Startup

When the TimeSource starts up, the CRIT lamp lights. The CRIT lamp remains on for approximately 50 seconds to 60 seconds and then shuts off.

During startup, the TimeSource performs several self-tests to verify the integrity of the hardware and software. Neither communication nor outputs are possible at this time, and the CRIT lamp is switched on. Once the self-tests are done, a connection to the system can be made and the events viewed.

Two events are initially provided. These events are:

- "Power Up Restart"
- "Settling Period"

In the "Power Up Restart" event, which lasts for approximately 2 minutes, the system does additional checks and starts all the various tasks within the system.

The "Settling Period" event is an informational message that lasts until the TimeSource's BesTime engine reaches the highest possible stable point. The time taken to reach this point depends on satellite availability, type of oscillator, ambient temperature, etc. and may take up to 20 hours to clear. Since "Settling Period" is independent of the quality of the output and is the normal behavior of the system, it is generated as an event rather than an alarm. If "Settling Period" is not cleared after 24 hours, another "Settling Period" event is generated as a marker. This is still Non-Service-Affecting.

As soon as the "Power Up Restart" message is cleared, the "BT3 Warmup" event is generated. This is also an informational message that lasts till the time it takes the system to acquire the satellites, warm up the oscillator, and start giving out valid outputs. It may take up to 2 hours for the message to clear, but typically takes approximately 40 minutes. During the "BT3 Warmup" time, the outputs will generally be squelched. If the outputs are enabled using the TL1 command (ED-EQPT:: TS3600:ctag:::ALMCOND=ALW;) they may not be within the PRS mask. In case the system is not able to acquire sufficient number of satellites and/or discipline the oscillator within 2 hours, the event escalates into a Non Service Affecting Minor alarm.

Once the warm up is complete, the system generates valid outputs and the event is cleared.

Bridging/Holdover Behavior

In the TimeSource 3600, alarms are designed with a built-in hysteresis. This means that an alarm is not announced as soon as some error condition is detected. There is a pre-integration time during which the error must persist in order for the alarm to be announced. On the flip side, the error must be clear for a certain time for an alarm condition to be cleared. This ensures that intermittent conditions are not flagged unnecessarily.

During the normal working of the TimeSource 3600, it is a very common occurrence that the GPS satellites may not be visible during certain parts of the day, depending on the installation of the antenna. This is particularly true with wall and, especially, window antenna installations. The TimeSource 3600 has been designed to work around this situation.

The TimeSource 3600 enters "Bridging" mode when all satellite locks are lost. There is no TL1 annunciation that the system has entered "Bridging" mode. This is "Non Service Affecting" and the outputs are not affected. The system runs off its internal oscillator and the outputs are kept within the G.811 PRS mask by the BesTime engine.

When "Bridging" mode persists for more than 30 minutes, the system enters "Holdover" mode and a "Holdover" event is generated. This may or may not affect the outputs depending on the alarm integration parameters that can be set by the user.

The system allows the user to set various parameters for GPS error, Holdover error, and SPAN error conditions. These parameters are:

- Initial Severity
- Initial Service Affecting state
- Integration Time
- Final Severity
- Final Service Affecting state

The system also allows the user to set a parameter to define how outputs should behave in an alarm condition (see ALMOUT and ALMCOND settings). Outputs can be set to AIS, Squelch, or SSM when Holdover alarm severity is set to minor or major. AIS, Squelch, or SSM is not evoked if Holdover severity is set to event (factory default for initial severity). Outputs can also be set to ignore alarm conditions.

When the "Holdover" event is announced, it is announced with the Initial Severity and Initial Service Affecting state. If the "Holdover" event persists for the length of the Integration Time, the alarm is escalated to the Final Severity and Final Service Affecting state.

The "Holdover" event/alarm is cleared when the satellites are visible again.

Time Figure of Merit

Time Figure of Merit (TFOM) is a moving 24 hour measurement reported in nanosecond (ns) against an ideal model. TFOM has a frequency component used to measure GPS wander caused by multipath and a time loop component used to measure long term oscillator wander.

The TFOM alarm threshold is set to 500 ns and is not user configurable. A TFOM below 500 ns indicates a stable clock well within PRS output performance specifications. A TFOM between 500 ns and 800 ns is an early warning of a clock becoming unstable and in danger of going out of PRS specification. When the TFOM exceeds 800 ns, the clock is no longer meeting the stratum 1 MTIE mask.

TFOM is most useful for installations where the antenna has a limited view to the sky. This is defined as any installation where fewer than 4 satellites are in view for greater than 1 hour per day on average. This is typical for installations where the antenna is mounted in a window or on an outside wall of a building, but can also include rooftop installations with partial sky view blockage. TFOM’s primary use is to help troubleshoot multipath issues associated with antenna placement and incorrect latitude, longitude, and/or altitude (location) data entry.

Installations with full view to the sky see 4 satellites 23+ hours a day, seven days a week. It is relatively easy to filter out multipath signals using multiple satellites and simple voting schemes. In addition, rooftop antennas are mounted vertically and all signals below the horizon are obvious multipath interference and can be masked out of the system. With 4 satellites in view, the GPS timing receiver will provide an error-free lock on its location through an automatic survey function.

With wall/window installations, voting schemes become less effective as the number of satellites in view drop. Also, wall/window antennas are mounted horizontally and are prone to seeing multipath signals reflected off nearby structures and the ground. Wall/window installations also require the manual input of location data, creating the potential for errors and the need to detect these errors.

The TimeSource has unique algorithms to account for, and defeat, the added multipath complications and location data entry error possibilities of wall/window antenna installations. Large amounts of multipath or major errors in location data entry are easier to identify and are detected over a relatively short period of time. These short-term errors are normally reported via the TimeSource tracking success rate parameter.

Small amounts of multipath or minor errors in location data entry are difficult to identify because they mimic a true signal or an expected satellite behavior pattern. Single satellite reception over limited periods of time complicates the ability for the internal TimeSource algorithms to filter out these ghost signals and longer periods of time are needed to sort them out. TFOM tracks and reports these long-term errors.

At time of installation, marginal or unacceptable TFOM readings can indicate the need to adjust the antenna placement, the mask angle, and/or the location data. Relatively small changes in the antenna placement can improve the ability of the system to see satellites and therefore improve performance. The mask angle can be adjusted to block out lower elevation portions of the sky if there is good visibility at higher elevations, thereby reducing multipath. Correct location data is very helpful in identifying and tracking satellites.

In addition, a clock may be stable for many weeks, months, or years but could degrade because of changes in its environment. TFOM is useful in detecting these infrequent subtle changes including:

- Maturing foliage or seasonal foliage changes
- Installation of new transmitters nearby (i.e. wireless base station)
- New building construction
- Variations in the day-to-day temperature of the CO

Success Rate

Success rate is a moving 24-hour window indicating the TimeSource's ability to lock to and use the GPS as part of the system's timing solution. This metric is reported as a percentage (%) ratio of the total good minutes that the system uses GPS in a day (maximum 1440 minutes/day). Success rate can range in value from 0% to 100%.

Success rate is determined by totaling all good minutes of satellite(s) visibility that the system is using and dividing by the total maximum possible minutes in a day. When satellites are not being used in the solution, usually because of low satellite visibility or multipath effects, the minutes are not counted in the good minutes category.

The success rate of a rooftop antenna configuration is generally higher than a wall/window antenna configuration since rooftop installations have a better view of the sky. A wall/window installation typically may see only portions of the sky with fewer satellites.

The TFOM (Merit) metric plays a key role in the calculation of Success Rate (see Time Figure of Merit, on page 37). When TFOM is greater than 500 ns, it is a warning that the system clock is becoming unstable and may be going out of PRS specification. Success Rate uses this as a threshold, so when the TFOM value is equal or below 500 ns, minutes are calculated within the good minutes category. Conversely, when the TFOM value is above 500 ns, these minutes are not considered as good minutes.

Chapter 2 Engineering & Ordering

This chapter provides information to assist in planning the installation and ordering a system appropriate for a specific site.

In This Chapter

- Antenna Guidelines
- Shelf Considerations
- Systems
- Antennas
- User-Supplied Tools and Materials

Antenna Guidelines

Perform a site survey as described in Procedure 2-1 before ordering the system. Use the guidelines and considerations in the Roof/Window/Wall Antenna Location and Cabling Guidelines section and Shelf Considerations, on page 49.

Procedure 2-1. Site Survey

Step	Procedure
1.	Determine the shelf location.
2.	Determine the best location for mounting the antenna (less than 330 m of cable from the shelf). Use the guidelines and considerations found in Roof Antenna Location and Cabling Guidelines, on page 43.
3.	If a roof-mounted antenna is installed, determine the location of the grounding point for the lightning suppressor, then determine the location of the lightning suppressor. The cable length between the lightning suppressor and the grounding point must be less than 4.6 m. If the grounding point is inside the building, the cable length between the grounding point and the cable entry must be less than 15 m. Valid lightning suppressor grounding points are: • Valid ring ground system (usually for roof-mounted lightning suppressors) • Structural steel of building (for interior-mounted or exterior-mounted lightning suppressors, attach with a cad weld) • Central Office ground plate (usually for interior-mounted lightning suppressors)
4.	If a roof-mounted antenna is installed, two lengths of cable are required. Plan the cable route and measure the length of cable required between the antenna and the lightning suppressor, and between the lightning suppressor and the shelf.
5.	If a window or wall-mounted antenna is installed, plan the cable route and measure the length of cable required between the antenna and the shelf.
6.	Determine the two separate –48 V power sources for the shelf. If only one –48 V power source is available, it must be cabled to both TimeSource 3600 power inputs.

End of Procedure

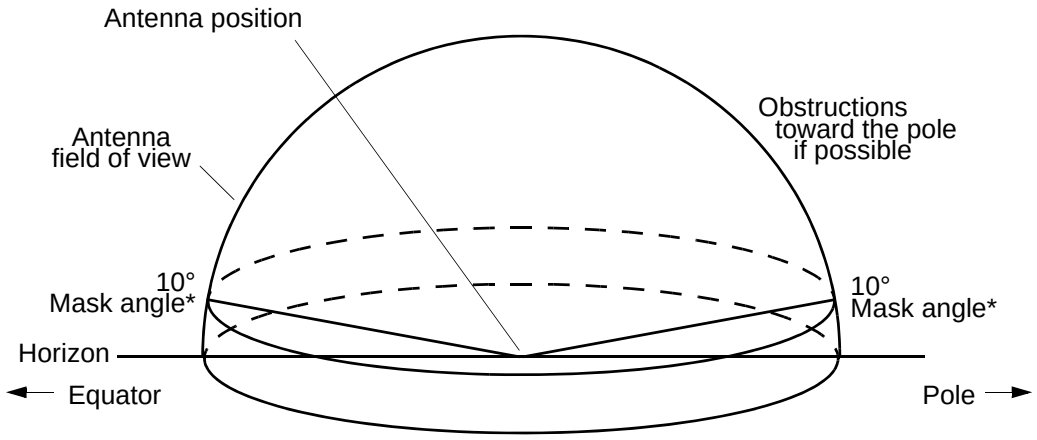
Roof Antenna Location and Cabling Guidelines

Warning: To avoid serious personal injury or death, do not select an antenna location that could be an electrical or physical hazard to work persons or equipment. Avoid proximity to all high-voltage sources. Mount in an easily maintainable location.

The ideal roof antenna location provides a clear, unobstructed view of the sky from the zenith to the horizon line, and 360 degrees around the horizon.

A compromise often must be made between location and satellite field of view. With a smaller field of view, the TimeSource 3600 can use fewer satellites in the solution for GPS derived time. The TimeSource 3600 will operate with an average of one satellite in view for 40 percent of the time in a day.

Signals closer to the horizon are often subject to multipath effects, which degrade the timing solution. The TimeSource 3600 can be set to ignore, or mask, all signals from the horizon up to a chosen angle of elevation (mask angle). (See Figure 2-1..)



* An angle of 10° masks objects up to about 1 m above the horizon at 6 m from the antenna (illustration at right.)

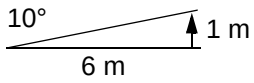


Figure 2-1. Antenna Field of View

Due to the geometry of the GPS satellite orbits, more satellites are visible in the direction of the equator than the poles. If possible, place the antenna so that the antenna has a clear view toward the equator (toward the south in the northern hemisphere, or toward the north in the southern hemisphere). Up to 60 degrees of arc, centered at the pole, may be blocked with little effect in the temperate latitudes. This note is less applicable in latitudes nearer the equator.

The total of obstructions above the mask angle should not obscure more than 25 percent of the total field of view (90 degrees of azimuth see Figure 2-2.).

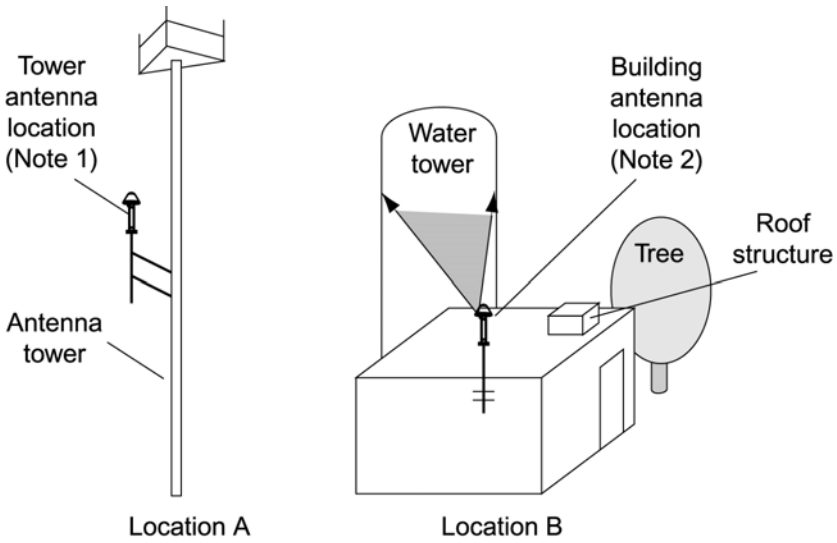


Figure 2-2. Antenna Location Examples

Notes:
Place the antenna high enough on the tower that obstructions are below the mask angle; mount the antenna more than 1 meter away from the tower, and far below the interference of the antennas at the top of the tower. Tower mounting is the least desirable location because of the potential for severe multipath, and difficulty in troubleshooting and maintenance.

Place the antenna high enough that the roof structure and tree are below the mask angle, and the water tower does not block more than 12.5 percent of the sky.

No single obstruction should block a large portion (45 degrees of azimuth) of the view.

The most important obstructions are within 400 meters of the antenna. Obstructions may include, but are not limited to, towers, buildings, other construction, trees, and high-voltage power lines.

Attempt to avoid locating the antenna within 30 degrees azimuth of the transmission direction of any transmitting antenna in the area, even if the transmitting antenna operates at a different frequency. A transmitting antenna may cause the GPS antenna to become overloaded and reduce its reception capabilities.

The minimum horizontal distance from other receiving antennas is 1 meter.

To reduce multipath signal distortions, the minimum horizontal distance from vertical reflective structures (e.g., heating ducts, equipment housings, etc.) is twice the height of the structure, and no less than 3 meters (see Figure 2-3.).

Do not locate the antenna underneath high power lines. If this cannot be avoided, ensure the antenna is placed at least twice as far from the power line as the power line is high (to avoid danger to personnel and multipath effects).

Cables must be run as straight as possible. All cables should be routed in accordance with local company practices.

Note: Keep all impedances as low as possible, otherwise the grounding scheme may be defeated.

Observe the following guidelines during the placement and installation of the cables:

- Route cables as straight as possible (bends in the cable increase impedance at lightning frequencies), in accordance with local company practices.
- Any opening where conduit enters the building must be waterproofed per local company practices.
- Treat all exposed connections with an electrically conductive anti-corrosion compound (Kopr-Shield or equivalent).

Caution: To prevent damage to cables, avoid small-radius turns and unnecessary turns.

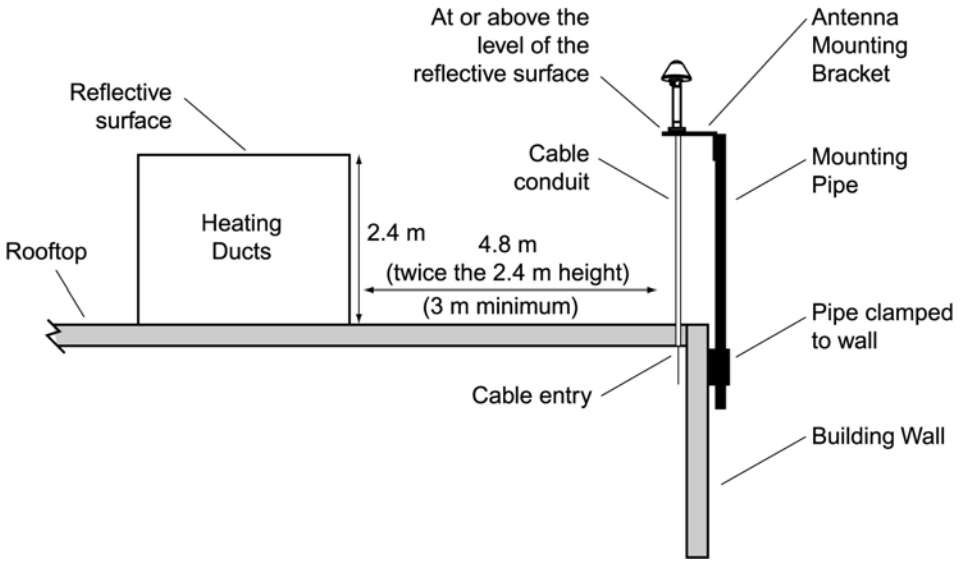


Figure 2-3. Sample Rooftop Antenna Mount

Note: Figure 2-3 is an example only. Not all parts are available from Symmetricom.

Roof Antenna Earth Ground Location Guidelines

The roof ring ground system, a Central Office grounding plate, and building structural steel are examples of valid earth ground points. If the mounting plate cannot be bolted to a valid earth ground, or if the mounting plate is to be installed in a nonmetallic junction box, bolt the mounting plate to a point within 4.6 meters of the valid earth ground.

Roof Antenna Cable Choices

The antenna assembly uses the same coaxial cable for power and antenna signals. The length of cable is determined by circumstances of the installation and site.

Symmetricom offers RG-59/U plenum-rated coaxial cable (20 AWG [0.812 mm], 75 ohm coaxial) with male TNC connectors attached, in the following lengths:

- 3 m cable (060-72010-01)
- 6 m cable (060-72010-02)
- 15 m cable (060-72010-05)
- 30 m cable (060-72010-10)
- 61 m cable (060-72010-20)
- 91 m cable (060-72010-30)
- 152 m cable (060-72010-50)
- 182 m cable (060-72010-60)
- 243 m cable (060-72010-80)
- 305 m cable (060-72010-99)

Two cables are required: one to connect the antenna to the lightning suppressor, and another to connect the lightning suppressor to the TimeSource 3600 Shelf.

Optionally, one length of coaxial cable may be ordered, which must be cut and prepared with end-connectors at the point where the suppressor is located.

The following items, which must be ordered separately, are available for this type of installation:

- TNC connector kit (093-72010-98) includes:

  - TNC connectors for RG-59/U cables (8)
  - Rubber boots (8)
  - TNC adapter connectors (2)
- TNC crimp tool (154-00023-01)

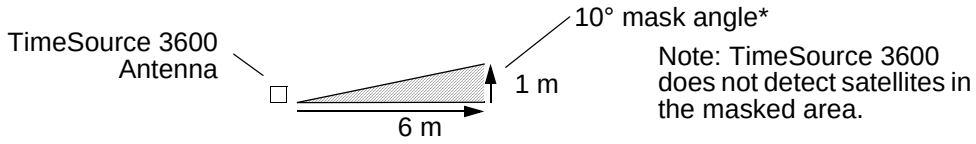
Window and Wall Antenna Location Guidelines

When selecting a window or wall in which to install the antenna, select the window or wall which has the maximum unobstructed view of the sky. Do not select a window or wall which has the view of the sky obstructed by trees, buildings, or towers. The smaller the field of view, the fewer the number of satellites that can be used in the timing solution for GPS derived time. The consequence of this is that the timing generator may experience holdover more often and may eventually go into alarm.

Due to the geometry of the GPS satellite orbits, more satellites are visible in the direction of the equator than the poles. If possible, select a window or wall which has a clear view toward the equator (toward the south in the northern hemisphere, or toward the north in the southern hemisphere). This guideline is less applicable in latitudes nearer the equator and more important nearer the poles.

Certain parts of the sky are blocked from view. These obstructions usually exist from the horizon line and up, for example, a building or mountain. The processor inside the GPS receiver observes every piece of the sky, whether it is blocked or not. If unproductive parts of the sky are masked from the processor's view, the processing time is reduced, and the timing solution can be achieved more quickly.

Note: A band of the sky from the horizon up to a point where a view of the sky begins is called a mask angle. The mask angle typically should not exceed 10 degrees (if the mask angle is set too high, too little of the sky is available to the receiver). Determine the mask angle for the selected antenna location (Figure 2-4) and make a note of it. The mask angle, in degrees, will be entered during the initial setup.



*An angle of 10° masks objects up to about 1 m above the horizon at 6 m from the antenna.

Figure 2-4. Antenna Mask Angle

Window and Wall Antenna Cable Choices

A window or wall antenna includes an attached coaxial cable terminating in a male SMA connector. A separate cable is required to connect the IF converter to the TimeSource 3600 shelf. Two types of plenum-rated cable are available.

The cables with longer length capabilities (060-72010-xx) are RG-59/U (20 AWG [0.812 mm], 75 ohm coaxial) with male TNC connectors attached to each end. Assembled cables are available in the following lengths:

- 3 m cable (060-72010-01)
- 6 m cable (060-72010-02)
- 15 m cable (060-72010-05)
- 30 m cable (060-72010-10)
- 61 m cable (060-72010-20)
- 91 m cable (060-72010-30)
- 152 m cable (060-72010-50)
- 182 m cable (060-72010-60)
- 243 m cable (060-72010-80)
- 305 m cable (060-72010-99)

The more flexible cables (060-72050-xx) are Mini RG-59/U (20 AWG [0.812 mm], 75 ohm coaxial) with male TNC connectors attached to each end. Assembled cables are available in the following lengths:

- 15 m cable (060-72050-05)
- 30 m cable (060-72050-10)
- 61 m cable (060-72050-20)
- 152 m cable (060-72050-50)

IRIG-B TOD (990-72060-05 System Only)

If you are using the IRIG-B TOD outputs (990-72060-05 TimeSource 3600 System), right-angle BNC connectors are provided to prevent small radius turns in the IRIG-B TOD cables. The right-angle BNC connectors may be attached to the IRIG-B BNC connectors, to direct the cables from the shelf as desired.

For each IRIG-B TOD output, a user-supplied cable with BNC connectors on each end is installed between the adapter and the network elements requiring IRIG-B TOD timing.

RS-422–to–RS-232 TOD Converter

If you are using time-of-day (TOD), and the device receiving the time code accepts an RS-232 signal instead of an RS-422 signal (for example, a Cisco router), an RS-422–to–RS-232 TOD Converter Kit is required (ordered separately, part number 093-72000-98).

The RS-422–to–RS-232 TOD Converter Kit consists of a mounting plate with a female RJ-45 connector, a female DB-25 connector, a TOD converter, and two screws.

Install the converter anywhere (for example, on unused space on a rack) within 305 cable meters of the TimeSource 3600 shelf, and within 15 cable meters of the device receiving the time code.

The user must supply two cables. One cable is a Category 5 four-pair RS-422 cable, 305 meter maximum, with RJ-45 connectors on each end. Route this cable between the TimeSource 3600 Shelf and the converter.

The other cable is an RS-232 data communications cable, 15 meters maximum, with a 25-pin male D-type connector and another connector determined by the device receiving the time code. Route this cable between the converter and the device receiving the time code.

Shelf Considerations

The TimeSource 3600 Shelf can be mounted in an ETSI 53.5 cm rack or a 48 cm rack. The shelf is shipped with supplied mounting ears positioned for flush mounting on an ETSI 53.5 cm rack. Attach the mounting ears, as shown in Figure 2-5., for flush mounting or 12.7 cm offset mounting. Attach the long side of the mounting ear to the shelf for an ETSI 53.5 cm rack, and attach the short side of the mounting ears to the shelf for a 48 cm rack. Mount the shelf in the rack according to standard company practices. Leave one RU (4.45 cm) of air space above the TimeSource 3600 Shelf for proper ventilation. Mount the shelf in the rack according to standard company practices.

Note: Two screws can be used in each mounting ear when the holes in the rack are spaced 4.45 cm apart.

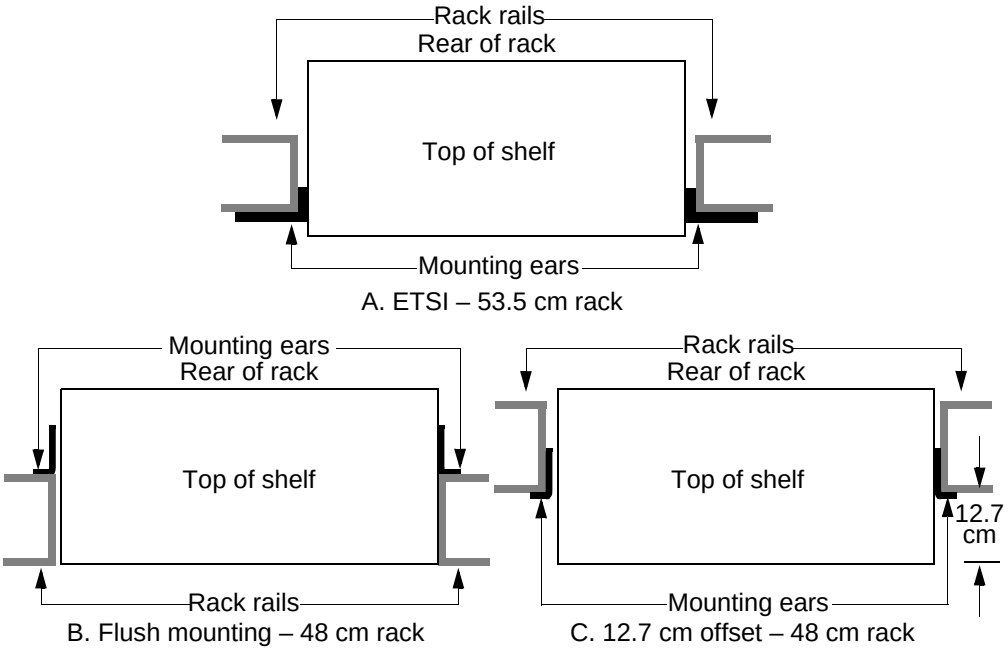


Figure 2-5. Rack Mounting Options

Systems

The TimeSource 3600 Systems available are listed below. The antenna must be ordered separately.

Standard System (Two E1 Outputs)

This system (990-72060-01) includes:

- TimeSource 3100 Shelf (090-72000-11)
- TimeSource 3600 card (090-72060-01)
- Hardware kit (093-72060-87)
- System software compact disc (CD) (992-72060-xx) Version 1.05.04 or higher
- TimeScan Craft (keyless version) software CD (992-46750-xx) Version 7.2.0 or higher

With Eight Additional E1 or 2.048 MHz Outputs

This system (990-72060-02) includes:

- TimeSource 3100 Shelf (090-72000-11)

- TimeSource 3600 card with additional E1 or 2.048 MHz outputs (090-72060-02)
- Hardware kit (093-72060-87)
- System software CD (992-72060-xx) Version 1.05.04 or higher
- TimeScan Craft (keyless version) software CD (992-46750-xx) Version 7.2.0 or higher

With Two E1 Synchronization Insertion (ESCIU) Ports

This system (990-72060-04) includes:

- TimeSource 3100 Shelf (090-72000-11)
- TimeSource 3600 card with ESCIU ports (090-72060-04)
- Hardware kit (093-72060-87)
- System software CD (992-72060-xx) Version 1.05.04 or higher
- TimeScan Craft (keyless version) software CD (992-46750-xx) Version 7.2.0 or higher

With Four IRIG-B TOD Outputs

This system (990-72060-05) includes:

- TimeSource 3100 Shelf (090-72000-11)
- TimeSource 3600 card with IRIG-B TOD outputs (090-72060-05)
- Hardware kit (093-72060-87)
- System software CD (992-72060-xx) Version 1.05.04 or higher
- TimeScan Craft (keyless version) software CD (992-46750-xx) Version 7.2.0 or higher

With Eight Mixed E1/T1 Outputs

This system (990-72060-06) includes:

- TimeSource 3100 Shelf (090-72000-11)
- TimeSource 3600 card with mixed E1/T1 outputs (090-72060-06)
- Hardware kit (093-72060-87)

- System software CD (992-72060-xx)
  Version 1.05.04 or higher
- TimeScan Craft (keyless version) software CD (992-46750-xx) Version 7.2.0 or higher

Antennas

The antennas available are listed below. A TimeSource 3600 System must be ordered separately.

Roof Antenna

Antenna and mounting hardware kit (990-72050-96) includes:

- IF antenna assembly (090-72010-71)
- Mounting hardware kit (093-72010-71) (x1) which includes:
  - Shim, 070-72010-75 (x2)
  - Mast, 070-72010-76 (x1)
  - Flange, 070-72010-77 (x1)
  - Bolts, Pan Head Phillips Screw, 8 - 32 x ¾ inch, 125-83253-12 (x3)
  - #8 Flat washers, 400111-0002 (x3)
  - #8 Split Lock Washer, 125-00521-08 (x3)
  - #8 Nut, 400160-0003 (x3)
- Rooftop antenna installation kit (093-72050-96) includes:
  - Mounting bracket for surge suppressor (070-00300-02)
  - Surge suppressor (143-00018-01)
  - Antenna cable bracket kit (093-00001-01)
  - Miscellaneous installation parts

Mechanical Window Antenna

This antenna kit (990-72050-97) comes as a fully assembled antenna with the following major components:

- Antenna, with cable and SMA connector attached (090-72050-90)
- IF converter for window antenna gain (090-72050-72)
- Mechanical chassis (074-72050-97)

Self-Adhesive Window Antenna

This antenna kit (990-72050-98) includes:

- Antenna (090-71010-87)
- IF converter for window antenna gain (090-72050-72)
- Self-adhesive window antenna installation kit (093-72050-98) includes:
  - RG316 cable, 3 m (060-00062-01)
  - Cable tie mounts (128-00302-02) and cable ties (128-00500-05)

Wall Antenna

Order one of these two available wall antenna kits based on the users antenna cable length installation requirements:

This antenna kit (990-72050-99) includes:

- IF converter for wall antenna gain (090-72050-71)
- Wall antenna kit (093-72050-99) includes:
  - Antenna, with 5.8 m of cable and SMA connector attached (112-00013-01)
  - Antenna mounting bracket (070-00383-02)
  - Clamp tie mounts (128-00302-02) and cable ties (128-00500-05)

OR

This antenna kit (990-72050-95) includes:

- IF converter for wall antenna gain (090-72050-71)
- Wall antenna kit (093-72050-95) includes:
  - Antenna, with 2.4 m of cable and SMA connector attached (112-00013-03)
  - Antenna mounting bracket (070-00383-02)
  - Clamp tie mounts (128-00302-02) and cable ties (128-00500-05)
- Wall antenna indoor lightning suppressor kit (093-72050-94) (optional) includes:
  - Mounting bracket (070-00300-02)
  - Surge protector (143-00018-01)
  - RG59 cable, 0.78 m (060-72010-92)
- Wall antenna L1 outdoor lightning suppressor kit (093-72050-93) (optional) includes:

- Mounting bracket (070-00300-03)
- Surge protector (143-00018-02)
- RG316 cable, 3 m, SMA(m)-SMA(m) (060-00062-01)

User-Supplied Tools and Materials

Ensure that the user-supplied tools and materials listed below are on hand for installation, as applicable.

For Roof Antenna Installation

- 2.5 cm diameter galvanized metal pipe, used as a mast to mount the antenna. Mast should be long enough to position the antenna above any metal object on the roof.
- Screws to attach the lightning suppressor mounting plate.
- Plumb line or bubble level.
- Nonmetallic junction box for lightning suppressor (optional if lightning suppressor mounted indoors).
- 2. 5 cm diameter PVC pipe as conduit for outdoor cables.
- PVC fittings appropriate to the installation and cable route.
- Appropriate tools and materials for cutting and shaping PVC pipe.
- PVC glue
- 4.114 mm (6 AWG) ground wire.
- Spade lugs for 6 AWG ground wire.
- Crimp tool for 6 AWG spade lugs.
- Hardware to attach the ground wire to a valid earth ground.
- Fire-stopping material to seal conduit hole in roof or wall.
- Electrically conductive antioxidant compound (Kopr-Shield or equivalent) to coat exposed connections to prevent oxidation.
- Tool to cut cable, if installation requires custom lengths of cable.
- Phillips Screwdriver
- Wrench
- 1/4 inch hex Allen wrench

For Mechanical Window Antenna Installation

- Drill with bit of appropriate size and type to make pilot holes for the mounting screws
- 2 screws of appropriate size and type to attach the foot of the mechanical chassis to a window sill or wall near a window.
- Screwdriver
- Cable ties or other method of securing cable
- GPS handheld receiver, personal computer with GPS location software, or other method of determining latitude, longitude, and altitude

For Self-Adhesive Window Antenna Installation

- Drill with bit of appropriate size and type to make pilot holes for the mounting screws
- 4 screws of appropriate size and type to attach the IF converter to a wall or other mounting surface.
- Screwdriver
- GPS handheld receiver, personal computer with GPS location software, or other method of determining latitude, longitude, and altitude

For Wall Antenna Installation

- Ladder, or safe method of reaching the antenna location on the exterior wall
- Drill with bits of appropriate size and type to make pilot holes for the antenna mounting bracket screws, and to make a hole through the wall for the antenna cable
- 2 screws of appropriate size and type to attach the antenna mounting bracket to an exterior wall.
- Screwdriver
- Electrically conductive antioxidant compound (Kopr-Shield or equivalent) to coat exposed connections to prevent oxidation
- Fire stopping material to seal the hole in the wall
- GPS handheld receiver, personal computer with GPS location software, or other method of determining latitude, longitude, and altitude

For Shelf Installation

- A Phillips-head screwdriver for installing the TimeSource 3600 Shelf in a rack
- Four screws to mount the shelf in a rack

Outputs, Power, and Miscellaneous

- RG-58 coaxial cable for 1 PPS, 10 MHZ outputs
- Ethernet 10BaseT cable for Ethernet port
- Category 5 four-pair RS-422 cable, with RJ-45 connector for the TOD output, RS-422–to–RS-232 TOD converter
- RS-232 cable with DB-25 connector for the RS-422–to–RS-232 TOD converter
- RS-232 cable with DB-9 connector for COM2 port
- 4.115 mm (6 AWG) ground wire
- 1.47 mm (16 AWG) green insulated ground wire
- 1.47 mm (16 AWG) red insulated wire
- 1.47 mm (16 AWG) black insulated wire

Chapter 3 Installing the TimeSource 3600

This chapter is the sequential order of procedures for installation and power-up.

In This Chapter

- Unpacking
- Installing the Antenna
- Installing the Shelf
- Powering Up the TimeSource 3600
- Installing and Using TimeWizard
- Factory-Set Values

Unpacking

Use the procedures in the order they appear in this chapter to install the TimeSource 3600. If any difficulties are encountered during the installation process, contact Symmetricom's Customer Technical Assistance Center (CTAC). Refer to the Technical Assistance section of the Troubleshooting chapter for telephone numbers.

CTAC includes Product Technical Support for technical information, and Customer Service for information about an order, RMAs, and other information.

ESD Caution: To avoid damage from electrostatic discharge (ESD), when handling electronic equipment, use local office procedures, including:

- Use grounded wrist straps connected to equipment frame ground when handling cards.
- Store cards only in antistatic packaging provided by the factory

Note: Save packing material. All equipment returned *must be packed in the original packing material*. Contact Customer Service if additional packaging is needed.

Unpack equipment carefully; check for completeness against the purchase order. Notify Symmetricom if items are missing.

Inspect equipment for shipping damage, including bent or loose hardware, and broken connectors.

If equipment was damaged in transit, contact Customer Service to request an RMA, and notify the carrier.

Installing the Antenna

Installing a Roof Antenna

Installation procedures are to follow local company procedures and the Installation Job Specification.

Prior to installing the antenna, the site, antenna location, lightning suppressor location, lightning suppressor grounding point, cable route, and all other details should have been planned.

To install the antenna, refer to Figure 3-1 and perform Procedure 3-1. Ensure all user-supplied materials are available.

Warning: To prevent arcing, ensure that the lightning suppressor is placed away from electrical devices and cabling.

Notes:
Recommended grounding points include:

- Valid roof ring ground system.
- Cad weld to building structural steel.
- Central office ground plate within 15 m of antenna cable entrance into building.

Order two cables or a single cable run can be made from the antenna to the TimeSource Shelf. The cable can then be cut at the lightning suppressor location, and TNC connectors attached to the cut ends of the cable. The “xx” in the part number indicates the cable length.

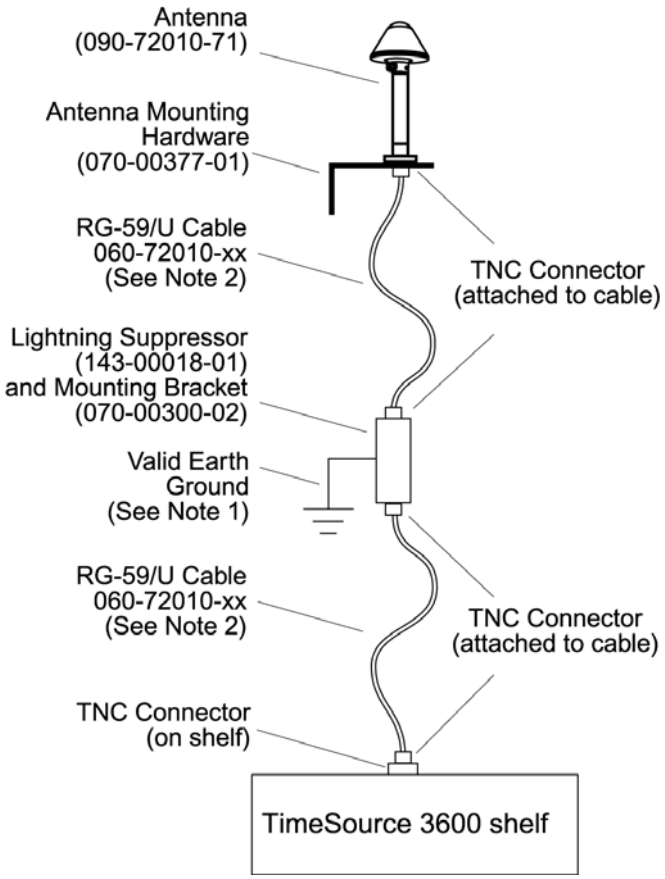
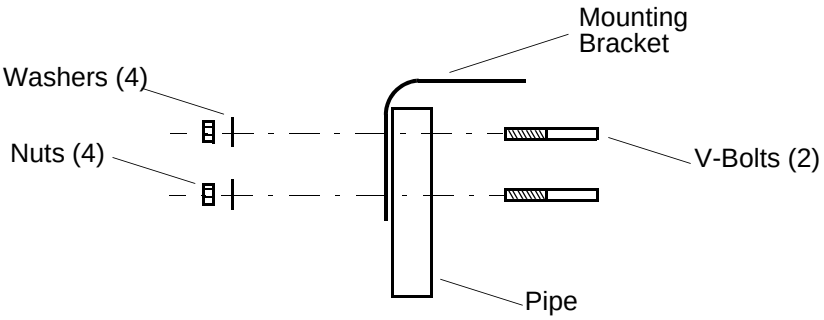
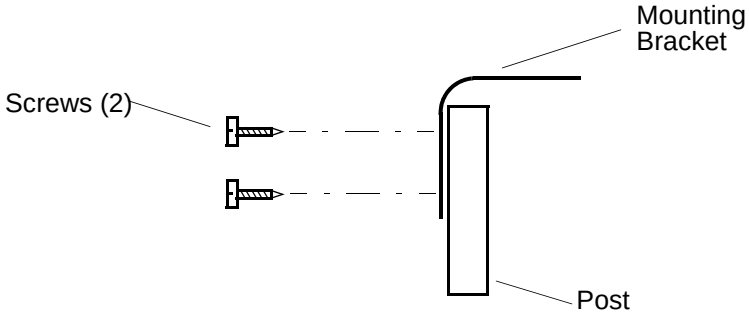
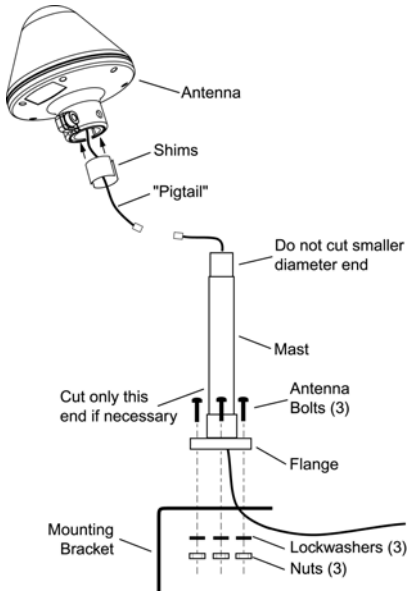


Figure 3-1. Roof Antenna-to-Shelf Cabling

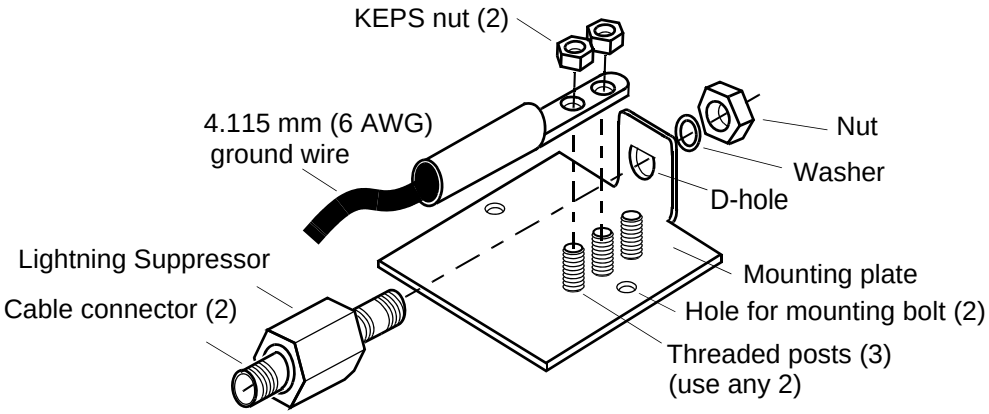
Procedure 3-1. Mounting a Roof Antenna and Connecting the Cable

Step	Procedure
1.	Attach the antenna mounting bracket to a pipe (2.5 cm diameter) or a wood post. ■ If mounting the bracket to a pipe, slide the two V-bolts over the pipe, and through the mounting bracket slots; then place the provided four washers and four nuts over the V-bolts, against the mounting bracket. Leave the V-bolts loose enough to allow for final adjustments.  ■ If mounting the bracket to a wood post, use the provided two self-tapping screws in two diagonally positioned mounting bracket slots, and attach to the post. 

Procedure 3-1. Mounting a Roof Antenna and Connecting the Cable (Continued)

Step	Procedure
2.	Mount the antenna and mast assembly to the “L” bracket ■ Connect the mast to the flange using PVC glue. ■ Feed the cable through the bottom of the mast as illustrated. ■ Connect the cable to the antenna “pigtail” and pull the cable back through the mast. ■ Mount the antenna to the mast using the supplied shims. ■ Mount the antenna and mast assembly to the “L” bracket using the supplied nuts, bolts, and washers. 
3.	Using a plumb line or bubble level, ensure the antenna is within 5° of vertical (perpendicular to the horizon), and tighten the mounting bracket bolts.
4.	Bolt the lightning suppressor mounting plate to a flange that is attached to a valid earth ground. The roof ring ground system, a Central Office grounding plate, and building structural steel are examples of valid earth ground points. If the mounting plate cannot be bolted to a valid earth ground, bolt the mounting plate to a point within 4.6 m of the chosen valid earth ground. If the mounting plate is to be installed in a nonmetallic junction box, perform the installation, and bolt the assembly near the chosen valid earth ground.

Procedure 3-1. Mounting a Roof Antenna and Connecting the Cable (Continued)

Step	Procedure
5.	Slide the longer bolt of the lightning suppressor through the D-hole, and attach with a nut and a washer (provided). 
6.	Install a 2.5 cm nonmetallic conduit from the antenna to the lightning suppressor, and from the lightning suppressor to the cable entrance into the building.
7.	Install a user-supplied bracket, preferably non-metallic, to support the vertical section of conduit to the antenna.
8.	Connect a cable to the antenna, route the cable through the conduit, and connect the cable to the lightning suppressor.
9.	Connect a cable to the lightning suppressor, route the cable through the conduit into the building, and route the cable through the building to the TimeSource 3600 Shelf location.
10.	If the lightning suppressor was not mounted directly to a valid earth ground, crimp a length of 4.115 mm (6 AWG) ground cable to the two-hole terminal, slide the terminal over two of the three threaded posts on the lightning suppressor mounting plate, and attach the terminal to the mounting plate with two KEPS nuts. Use the two posts that allow the least bending of the 4.115 mm (6 AWG) ground cable.
11.	Attach the other end of the cable to a valid earth ground.
12.	Install fire-stopping material in all holes opened in the roof and/or walls during this procedure.
13.	Check all connections for tightness to prevent arcing and intermittent operation.
14.	Coat all exposed connectors with an electrically conductive antioxidant compound (e.g., Kopr-Shield spray).

End of Procedure

installing a Mechanical Window Antenna

Installation procedures are to follow local company procedures and the Installation Job Specification.

Prior to installing the antenna, the site, antenna location, cable route, and all other details should have been planned.

For best results, choose a window facing the equator (facing south in the northern hemisphere, facing north in the southern hemisphere), and with the fewest obstructions of the sky.

To install the antenna, refer to Figure 3-2 and perform Procedure 3-2.

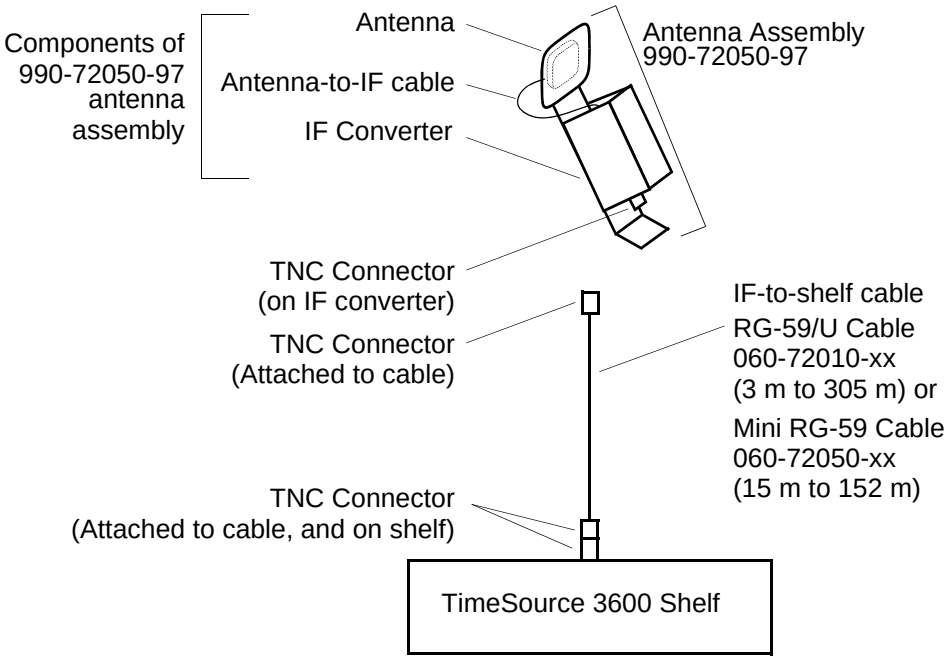


Figure 3-2. Mechanical Window Antenna-to-Shelf Cabling

Procedure 3-2. Mounting a Mechanical Window Antenna and Connecting the Cable

Step	Procedure
	Prerequisite: Observe all guidelines, considerations, Dangers, Warnings, Cautions, and Notes in the Engineering and Ordering chapter. **Symmetricom Parts:** ■ Mechanical Window Antenna (990-72050-97) ■ A length of RG-59/U plenum-rated coaxial cable (060-72010-xx), or ■ A length of Mini RG-59/U plenum-rated coaxial cable (060-72050-xx) **User-Supplied Materials:** ■ Drill with bit of appropriate size and type to make pilot holes for the mounting screws ■ Two screws of appropriate size and type to attach the foot of the mechanical chassis to a window sill or wall near a window ■ Screwdriver ■ Cable ties or other method of securing cable ■ GPS handheld receiver, personal computer with GPS location software, or other method of determining latitude, longitude, and altitude
1.	At the window chosen in Chapter 2, Engineering and Ordering, attach the base of the mechanical window antenna to the chosen location (sill, wall, etc.) using user-supplied screws (Figure 3-3).
2.	Use the pivots on the mechanical window antenna to place the antenna section flat against the window.
3.	Tighten the pivot screws to secure the antenna (Figure 3-4).
4.	Connect the antenna cable to the IF downconverter on the mechanical window antenna assembly and route the cable to the TimeSource 3600 Shelf location.
5.	Secure the cable using local company procedures.
6.	Check all connections for tightness to prevent intermittent operation.

End of Procedure

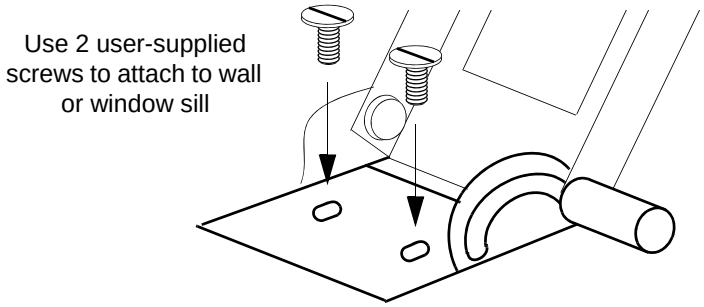


Figure 3-3. Attaching the Mechanical Window Antenna

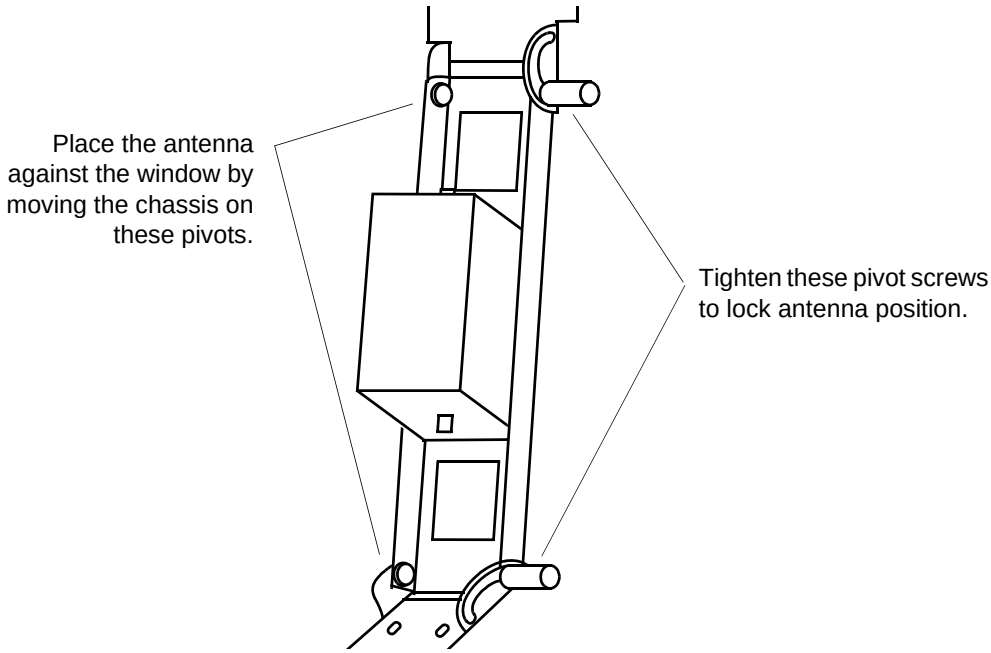


Figure 3-4. Mechanical Window Antenna Pivot Screws

Installing a Self-Adhesive Window Antenna

Prior to installing the antenna, the site, antenna location, cable route, and all other details should have been planned.

Installation procedures are to follow local company procedures and the Installation Job Specification.

For best results, choose a window facing the equator (facing south in the northern hemisphere, facing north in the southern hemisphere), and with the fewest obstructions of the sky.

To install the antenna, refer to Figure 3-5 and perform Procedure 3-3.

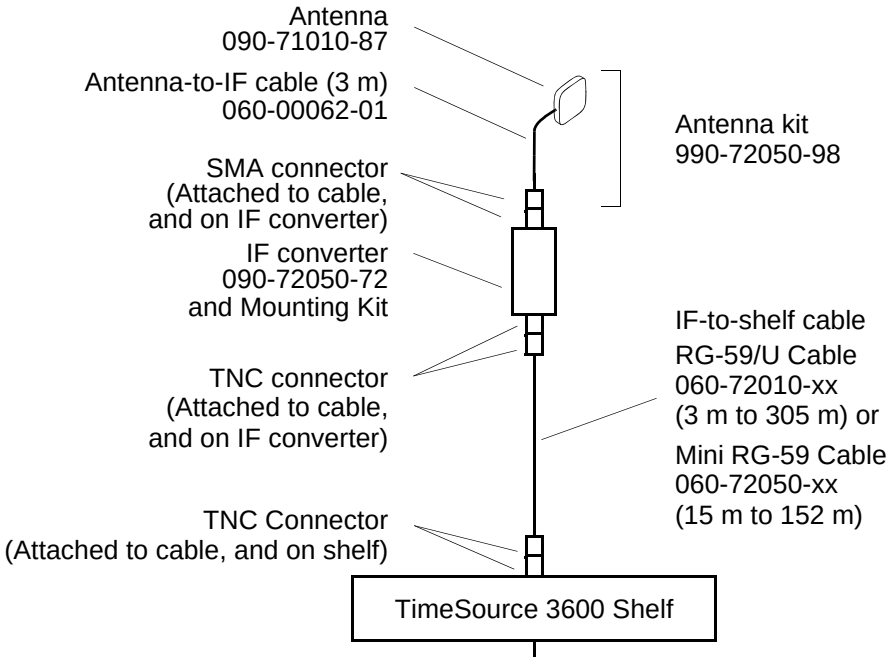


Figure 3-5. Self-Adhesive Window Antenna-to-Shelf Cabling

Procedure 3-3. Mounting a Self-Adhesive Window Antenna and Connecting the Cable

Step	Procedure
	Prerequisite: Observe all guidelines, considerations, Dangers, Warnings, Cautions, and Notes in the Engineering and Ordering chapter. **Symmetricom Parts:** ■ Self-Adhesive Window Antenna kit (990-72050-98) ■ A length of RG-59/U plenum-rated coaxial cable (060-72010-xx), or ■ A length of Mini RG-59/U plenum-rated coaxial cable (060-72050-xx) **User-Supplied Materials:** ■ Drill with bit of appropriate size and type to make pilot holes for the mounting screws ■ Four screws of appropriate size and type to attach the IF converter to a wall or other mounting surface ■ Screwdriver ■ GPS handheld receiver, personal computer with GPS location software, or other method of determining latitude, longitude, and altitude
1.	Peel off the backing of one of the self-adhesive hook-and-loop strips and stick the strip to the antenna (Figure 3-6).
2.	Attach the hook-and-loop side of the other strip to the hook-and-loop side of the strip on the antenna.

Procedure 3-3. Mounting a Self-Adhesive Window Antenna and Connecting the Cable (Continued)

Step	Procedure
3.	Peel off the backing and stick the antenna to the position on the window selected in Chapter 2, Engineering & Ordering.
4.	Use user-supplied screws to mount the IF downconverter to a suitable wall or other structure (Figure 3-7). Be sure the distance along the cable route between the IF downconverter and the antenna is no more than 3 m.
5.	Route and connect the antenna cable to the antenna side of the IF downconverter.
6.	Connect a cable to the TimeSource 3600 shelf side of the IF downconverter and route the cable to the shelf location.
7.	Secure the cable using local company procedures.
8.	Check all connections for tightness to prevent intermittent operation.

End of Procedure

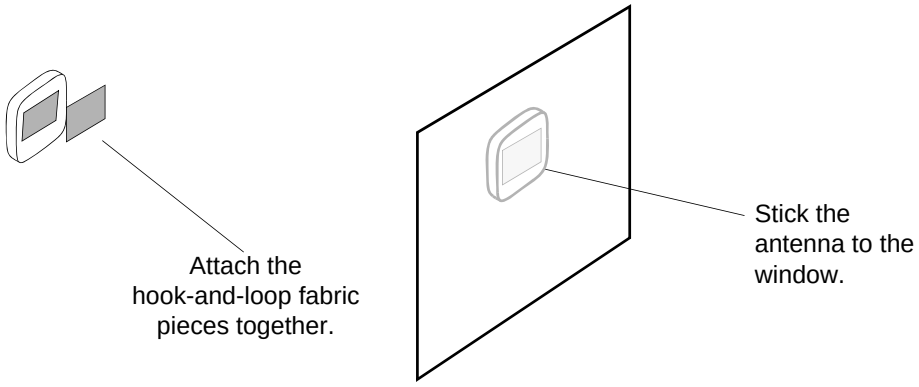


Figure 3-6. Attaching the Self-Adhesive Window Antenna to a Window

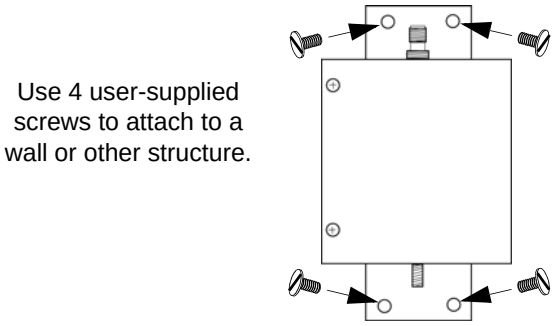


Figure 3-7. Attaching the IF Converter

Installing a Wall Antenna

Prior to installing the antenna, the site, antenna location, cable route, and all other details should have been planned.

Installation procedures are to follow local company procedures and the Installation Job Specification.

For best results, choose a wall facing the equator (facing south in the northern hemisphere, facing north in the southern hemisphere), and with the fewest obstructions of the sky.

To mount the antenna through the wall, refer to Figure 3-8 and follow Procedure 3-4.

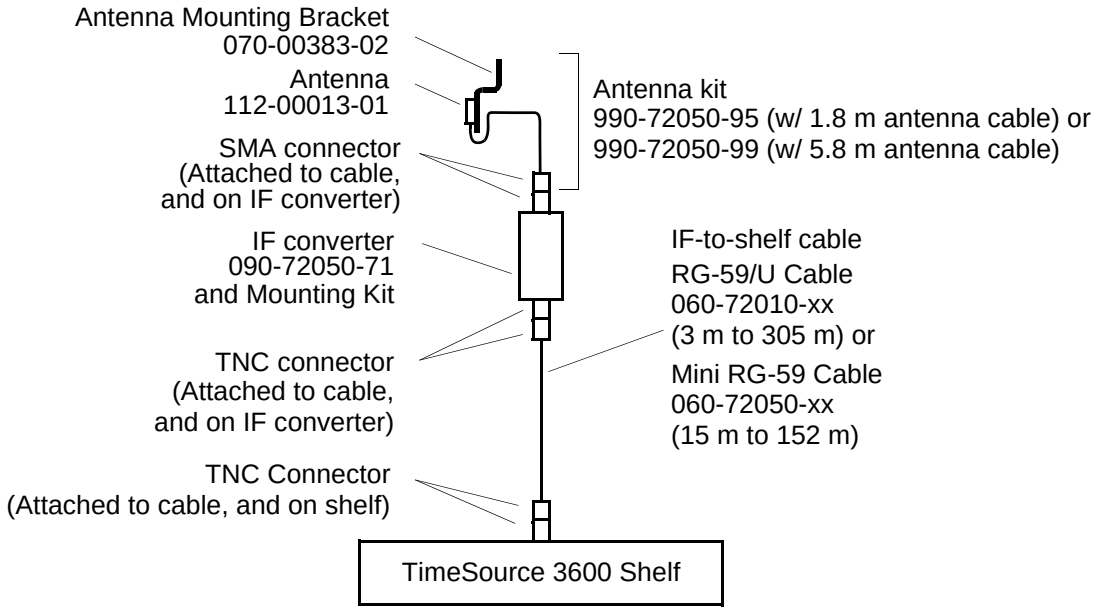
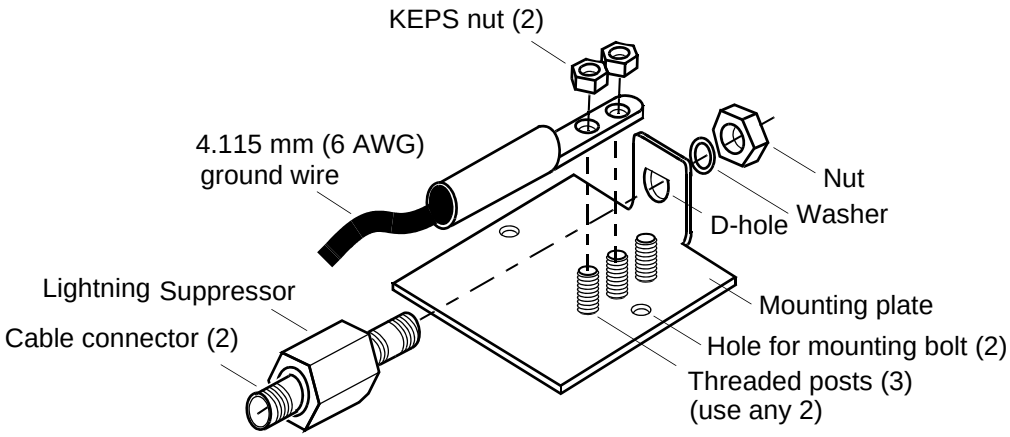


Figure 3-8. Wall Antenna-to-Shelf Cabling

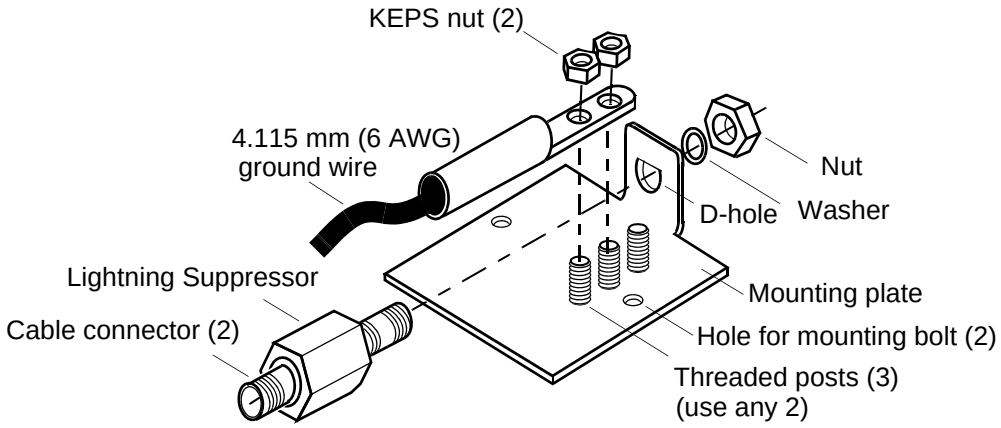
Procedure 3-4. Installing a Wall Antenna

Step	Procedure
	Prerequisite: Observe all guidelines, considerations, Dangers, Warnings, Cautions, and Notes in the Engineering and Ordering chapter. **Symmetricom Parts:** ■ Wall Antenna (990-72050-95 with 1.8 m antenna cable or 990-72050-99 with 5.8 m antenna cable) ■ Wall Antenna Indoor Lightning Suppressor Kit (093-72050-94) (optional) ■ Wall Antenna Outdoor Lightning Suppressor Kit (093-72050-93) (optional) ■ A length of RG-59/U plenum-rated coaxial cable (060-72010-xx), or ■ A length of Mini RG-59/U plenum-rated coaxial cable (060-72050-xx) **User-Supplied Materials:** ■ Ladder, or safe method of reaching the antenna location on the exterior wall ■ Drill with bits of appropriate size and type to make pilot holes for the antenna mounting bracket screws, and to make a hole through the wall for the antenna cable ■ Two screws of appropriate size and type to attach antenna mounting bracket to an exterior wall ■ Screwdriver ■ Electrically conductive antioxidant compound (Kopr-Shield or equivalent) to coat exposed connections to prevent oxidation ■ Fire-stopping material to seal the hole in the wall ■ GPS handheld receiver, personal computer with GPS location software, or other method of determining latitude, longitude, and altitude
1.	Attach the IF downconverter (Figure 3-7) inside the building to a suitable wall or other structure. Be sure the distance along the cable route between the IF converter and the antenna is no more than 1.8 m or 5.8 m depending on wall antenna cable length used. Include allowances for the drip loop and local company procedures for cable routing.
2.	Use Figure 3-9 to determine the spacing of the 2 holes for mounting the bracket, and the distance to the hole for passing the cable into the building.
3.	Drill a 10-mm hole in the wall for the antenna cable. The diameter of the hole should be larger than the outer diameter of the SMA connector on the antenna cable, which will pass through the hole from the antenna to the inside of the building.
4.	Drill two pilot holes for the user-supplied screws or bolts that attach the mounting bracket to the outside wall.
5.	Using two screws or bolts, mount the antenna bracket assembly to the outside wall.
6.	Place the magnetic side of the antenna on the outside of the mounting bracket.
7.	Push the SMA connector of the antenna cable through the hole drilled in the wall in Step 3 Be sure the antenna cable forms a drip loop between the antenna and the cable entry into the building (Figure 3-10).
8.	Route the antenna cable to the antenna side of the IF converter and connect the cable.

Procedure 3-4. Installing a Wall Antenna (Continued)

Step	Procedure
9.	Connect a cable to the TimeSource 3600 shelf side of the IF converter and route the cable to the shelf location.
10.	Secure the cable using local company procedures.
11.	Install fire-stopping material in all holes opened in the roof and/or walls during this procedure.
12.	Check all connections for tightness to prevent intermittent operation.
13.	If no optional Lightning Suppressors are to be installed, the Wall Antenna Installation is complete.
14.	If the optional Wall Antenna Indoor Lighting Suppressor Kit (093-72050-94) is not required, then go to Step 23 Otherwise, proceed with the next step.
15.	Mount the indoor lightning suppressor mounting bracket to the inside wall.
16.	Mount and secure the lightning suppressor in the lightning suppressor mounting bracket as shown in Step 17
17.	Slide the longer bolt of the lightning suppressor through the D-hole, and attach with a nut and a washer (provided). 
18.	If the lightning suppressor was not mounted directly to a valid earth ground, crimp a length of 4.115 mm (6 AWG) ground cable to the two-hole terminal, slide the terminal over two of the three threaded posts on the lightning suppressor mounting plate, and attach the terminal to the mounting plate with two KEPS nuts. Use the two posts that allow the least bending of the 4.115 mm (6 AWG) ground cable.
19.	Attach the other end of the cable to a valid earth ground.
20.	Route the wall antenna cable to the antenna side of the IF converter and connect the cable.
21.	Connect the IF converter to the lightning suppressor using the 0.6 m RG-59 cable provided.
22.	Connect the user provided RG-59 cable from the lightning suppressor to the TimeSource 3600 shelf.

Procedure 3-4. Installing a Wall Antenna (Continued)

Step	Procedure
23.	If the optional Wall Antenna Outdoor Lighting Suppressor Kit (093-72050-93) is not required, the Wall Antenna Installation is complete. Otherwise, proceed with the next step.
24.	Mount the outdoor lightning suppressor mounting bracket to the outside wall shown in Figure 3-11.
25.	Mount and secure the lightning suppressor in the lightning suppressor mounting bracket as shown in Step 26
26.	Slide the longer bolt of the lightning suppressor through the D-hole, and attach with a nut and a washer (provided). 
27.	If the lightning suppressor was not mounted directly to a valid earth ground, crimp a length of 4.115 mm (6 AWG) ground cable to the two-hole terminal, slide the terminal over two of the three threaded posts on the lightning suppressor mounting plate, and attach the terminal to the mounting plate with two KEPS nuts. Use the two posts that allow the least bending of the 4.115 mm (6 AWG) ground cable.
28.	Attach the other end of the cable to a valid earth ground. Attaching to an earth ground located outside the building is the most desirable.
29.	Route the wall antenna cable to the antenna side of the outdoor lightning suppressor and connect the cable.
30.	Route the 3 m RG-316 cable provided from the outdoor lightning suppressor through the wall to the IF converter and connect both ends.
31.	Connect the user provided RG-59 cable from the IF converter to the TimeSource 3600 shelf.
32.	Install fire-stopping material in all holes opened in the roof and/or walls during this procedure.

End of Procedure

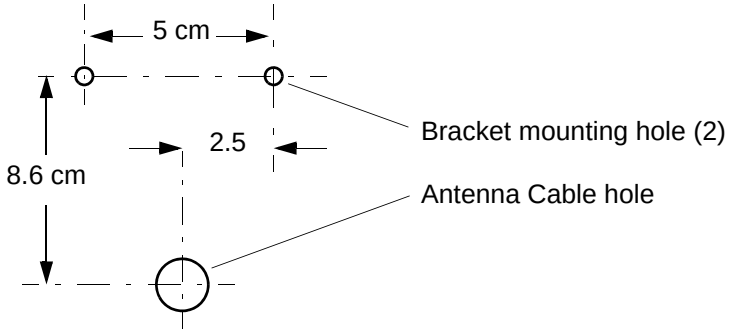


Figure 3-9. Hole Spacing

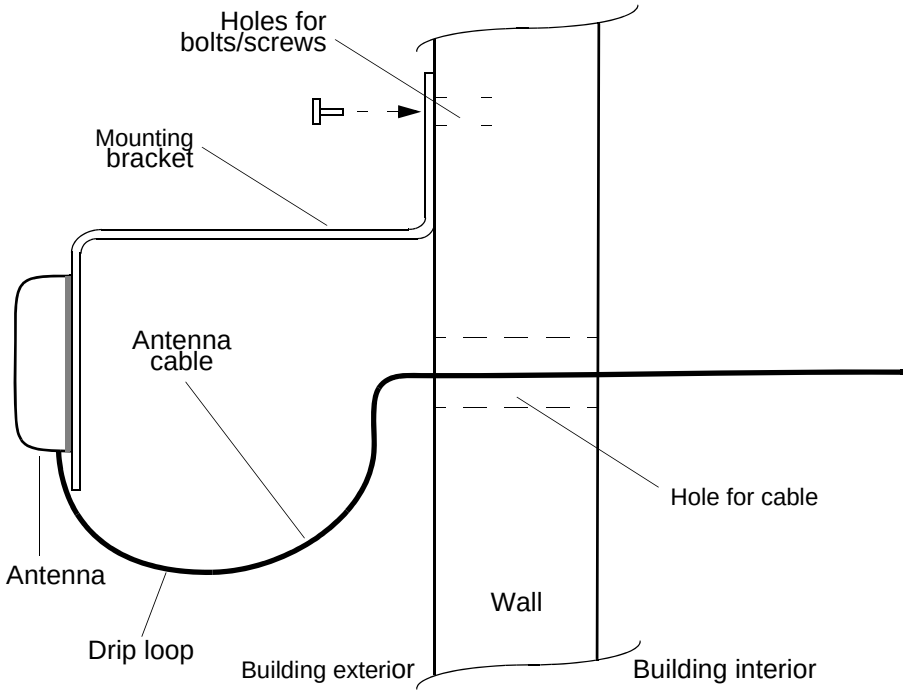


Figure 3-10. Wall Antenna Mounting

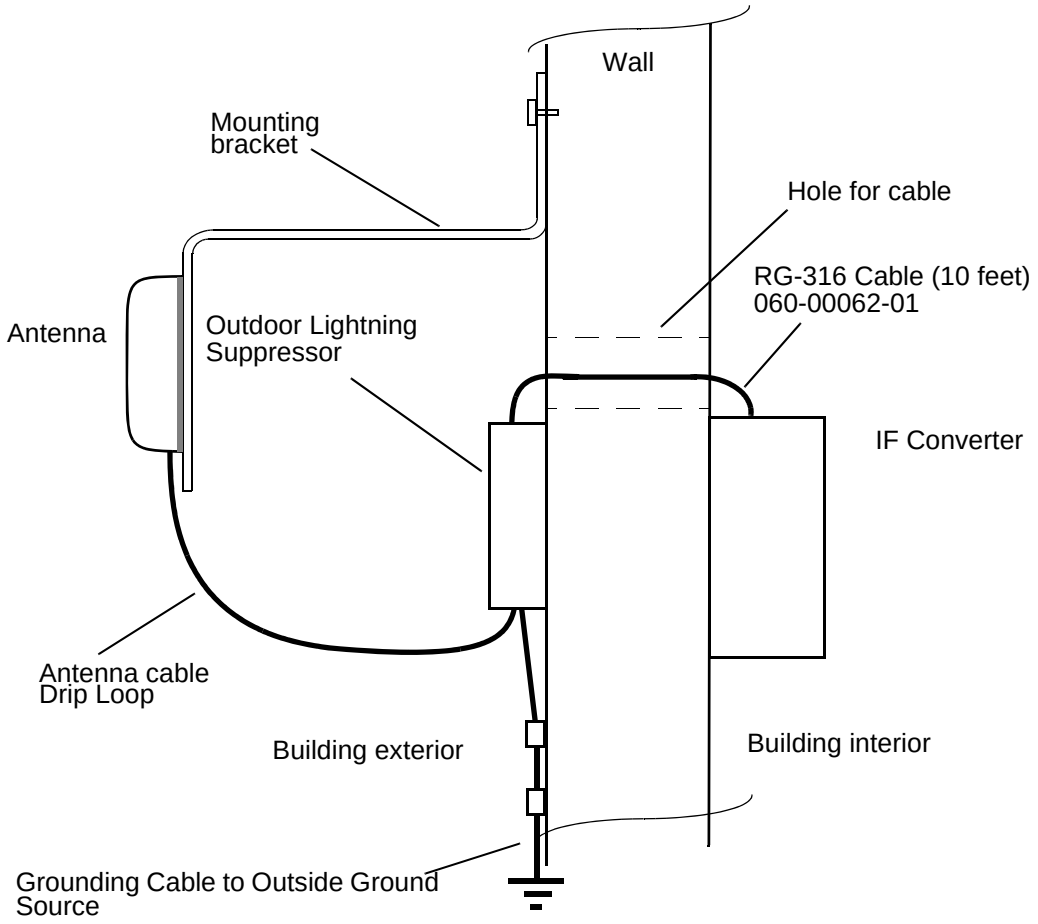


Figure 3-11. Wall Antenna Outdoor Lightning Suppressor Mounting

Installing the Shelf

Rack Mounting

The shelf is shipped with the ears positioned for ETSI 53.5 cm mounting as illustrated inFigure 3-12A. For 48 cm racks, the shelf can be positioned to the rear of the rack rail for flush mounting (Figure 3-12B) or to the front of the rack rail for 12.7 cm offset mounting (Figure 3-12C). Leave 1 RU (4.45 cm) of air space above the TimeSource 3600 Shelf for proper ventilation. Mount the shelf in the rack according to standard company practices.

Note: Two screws may be used in both mounting ears if the holes in the rack are spaced 4.45 cm apart.

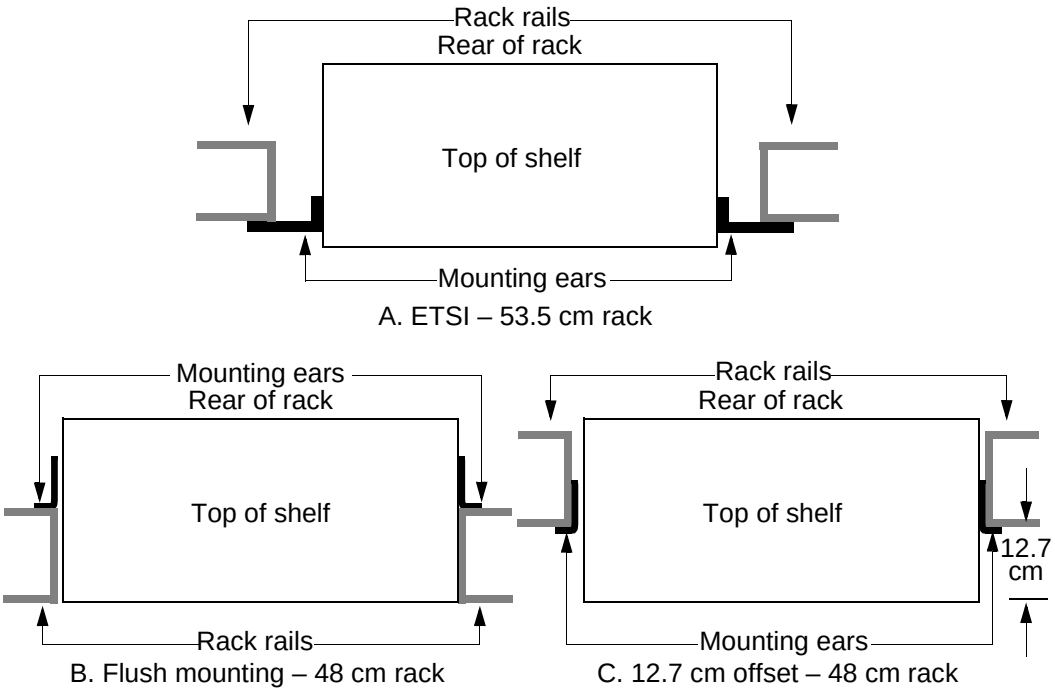


Figure 3-12. Rack Mounting Options

Installing Output Modules

ESD Caution: To avoid electrostatic discharge (ESD) damage, wear an ESD wrist strap when making connections to the connector panel. Failure to observe this warning may result in equipment damage.

If you have an E1 8-output module, an IRIG-B 4-output module, or a ESCIU 2-port module supplied with the system, install the module as follows:

1. Remove the shelf cover to access the shelf connector panel.
2. Plug the module into the OPTIONS I/O connector on the connector panel (refer to Figure 3-13).
3. Align the three spring-loaded screws on the module with the threaded holes on the panel.
4. Use a medium flat-blade screwdriver to lock each screw in place. Torque the screws evenly to prevent skewing the module.

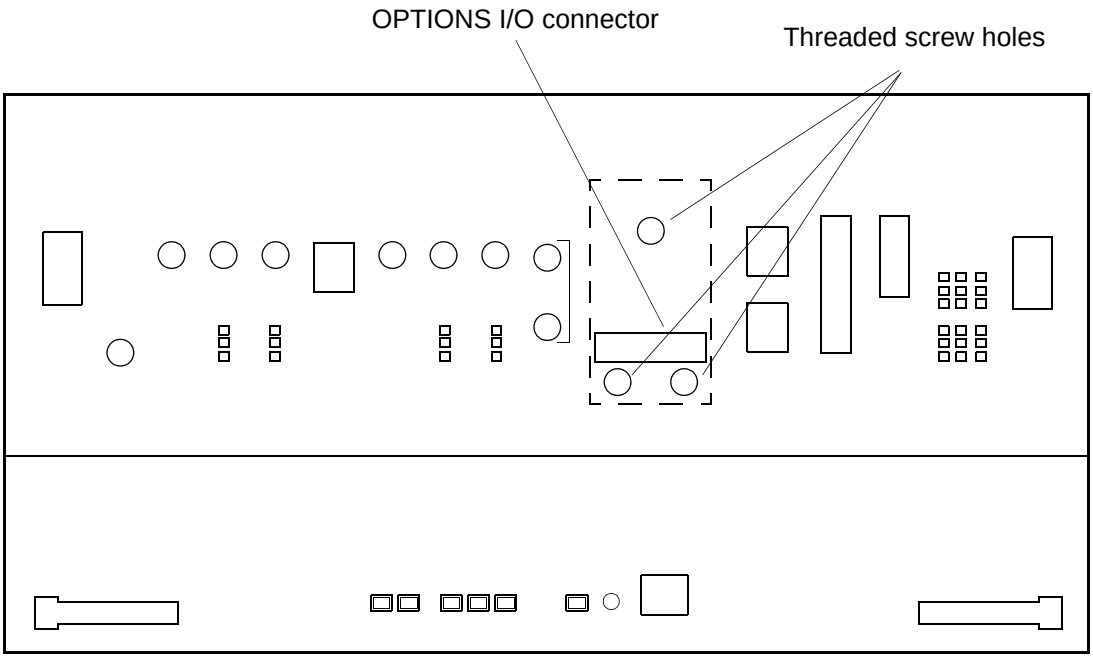


Figure 3-13. Options I/O Connector

Making Power and Signal Connections

ESD Caution: To avoid electrostatic discharge (ESD) damage, wear an ESD wrist strap when making connections to the connector panel. Failure to observe this warning may result in equipment damage.

ESD Caution: To avoid equipment damage, do not pierce, peel, or otherwise violate the integrity of the faceplate overlay. The faceplate on the card contains a plastic overlay bonded to the metal plate with an adhesive. The overlay is an integral part of the ESD protection. Failure to observe this warning may result in equipment damage.

The Craft connection is made at the shelf front panel. All other connections are made at the shelf connector panel. To access the shelf connector panel, remove its cover.

Figure 3-14 shows the connectors on the front panel and connector panel. All connectors can be located using this illustration.

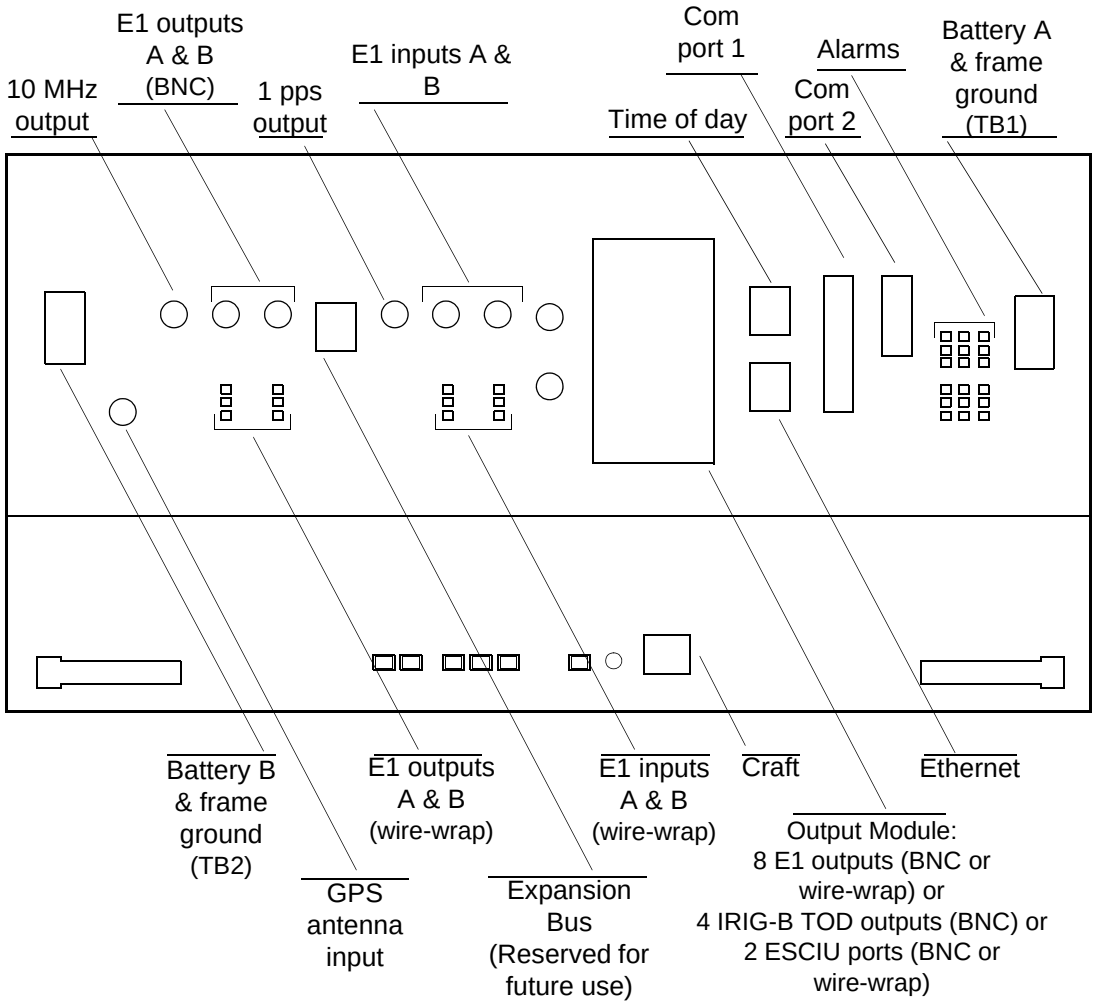


Figure 3-14. Connector Panel and Front Panel Connector

Making Frame Ground Connections

Frame ground connections are made on power terminal blocks TB1 and TB2. Refer to Figure 3-14 for the location of the terminals on the shelf connector panel, and refer to Figure 3-15 for the terminal connections.

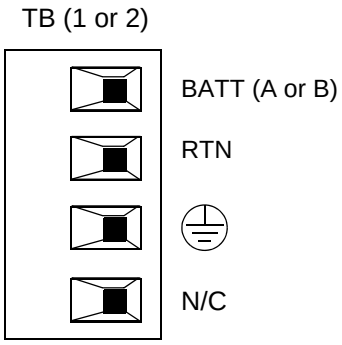


Figure 3-15. Connector Panel Terminal Block Connections

Ensure the frame ground wires are long enough to reach from the shelf connector panel to the frame ground connection. Use one 1.47 mm (16 AWG) green insulated wire to connect the ⏚ terminal of power terminal block TB1 to the frame ground, and use another 1.47 mm (16 AWG) green insulated wire to connect the ⏚ terminal of TB2 to frame ground.

Make the ground connection, following one of the methods described below, depending on whether a ground rod is installed:

With ground rod

Solder the frame ground connection to the 4.115 mm (6 AWG) frame ground rod run vertically on each side of the rack. Two methods are acceptable:

- Crimp an appropriate-size spade lug (user-supplied) to the 1.47 mm (16 AWG) wire, bend the lug around the 4.115 mm (6 AWG) rod, and solder.
- Strip enough insulation from the 1.47 mm (16 AWG) wire to permit three complete turns around the 4.115 mm (6 AWG) rod, and solder.

Note: When soldering, use a 25 watt soldering iron to ensure the 4.115 mm (6 AWG) rod is heated sufficiently to prevent a cold solder connection.

Without ground rod

Crimp the supplied spade lug to the 1.47 mm (16 AWG) wire, and screw the lug to a screw hole on the rack. Remove the paint and sand the area around the screw hole to ensure proper conductivity. Coat the connection with an electrically conductive antioxidant compound, for example, Kopr-Shield spray.

Crimp the supplied spade lug to the other end of the 1.47 mm (16 AWG) wire, and connect it to the ⏚ terminals on TB1 and TB2 (Figure 3-15).

Making Power Connections

Caution: To avoid electrical shock and possible personal injury, power source protective fusing must be provided as part of the installation. This equipment is intended for installation in a restricted access location.

Caution: To avoid damage to the system, do not apply power to the TimeSource 3600 before instructed in this procedure. Before connecting the power cables to the TimeSource 3600, ensure the fuses are removed from the fuse panel that supplies power to the power cables.

Note: Input power is reverse polarity protected; there are no user replaceable fuses in the TimeSource 3600.

Power connections are made on power terminal blocks TB1 and TB2. Refer to Figure 3-14 for the location of the terminals on the shelf connector panel, and refer to Figure 3-15 for the terminal connections.

Ensure the power wires are long enough to reach from the shelf connector panel to the office battery source connection.

Use two 1.47 mm (16 AWG) stranded wires for the power connection, one with red insulation (BATT), and the other with black insulation (RTN).

Connect the power wires with red insulation to the BATT (-48V) wire receptacles on TB1 and TB2. Connect the power wires with black insulation to the RTN wire receptacles on TB1 and TB2.

Note: Two separate office battery supplies (–48V A and –48V B) are recommended. If separate office battery supplies are not available, connect a single office battery to both inputs (TB1 and TB2) to avoid a standing battery-failure alarm.

GPS Antenna

Use the supplied 90 degree adapter to connect the coaxial cable from the lightning suppressor or IF downconverter to the TNC connector labeled GPS ANT. Refer to Figure 3-14 for the connector location.

10 MHz Output

Connect a user-supplied RG-58 coaxial cable from the connector labeled 10 MHz to the equipment that will use the 10 MHz output signal. See Figure 3-14 for the connector location.

E1 or Analog Synchronization Outputs

Caution: To avoid damage to the system, do not connect the E1 output line directly to a point outside the building. The E1 output circuits do not provide lightning protection.

Connect the E1 or analog synchronization outputs at the wire-wrap pins or BNC connectors labeled E1 OUT A and E1 OUT B. If using the wire-wrap pins, connect the tip wire to the pins labeled T, the ring wire to the pins labeled R, and the shield to the pins labeled S. See Figure 3-14 for the location of the connectors and pins, and Figure 3-16 for the wire-wrap connections.

Notes:

1. For wire-wrap connections, the shield pin is provided to ground the cable shield at the shelf, if required. Normally, the shield is grounded at the source. Grounding the shield at both ends is not recommended.
2. A BNC connector can be used for one output, and a wire-wrap connector can be used for the other output, but do not use the BNC and wire-wrap connectors of the same output simultaneously. For example, a BNC connector can be used for output A and the wire-wrap pins for output B, but do not use the output A BNC connector with the output A wire-wrap connector.

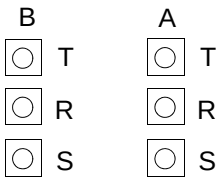


Figure 3-16. E1 or Analog Output Wire-Wrap Connections

1 PPS Output

Connect a user-supplied RG-58 coaxial cable from the connector labeled TTL PPS to the equipment that will use the 1 pulse-per-second TTL output signal. See Figure 3-14 for the connector location.

Connecting E1 or Analog Reference Inputs

Caution: To avoid damage to the system, do not connect the E1 output line directly to a point outside the building. The E1 output circuits do not provide lightning protection.

E1 or analog reference sources, traceable to an independent Stratum 1 source, can be connected to further increase holdover stability, or to be monitored by the TimeSource 3600. In either case, connect reference inputs to the wire-wrap pins or BNC connectors labeled SPAN IN A and SPAN IN B. If using the wire-wrap pins, connect the tip wire to the pin labeled T, the ring wire to the pin labeled R, and the shield (if connected at the TimeSource 3600) to the pin labeled S. See Figure 3-14 for the location of the connectors and pins, and Figure 3-17 for the wire-wrap connections.

Notes:

1. The shield pin is capacitively coupled to ground. Normally, the shield is grounded at the source. Grounding the shield at both ends is not recommended.
2. A BNC connector can be used for one input, and a wire-wrap connector can be used for the other input, but do not use the BNC and wire-wrap connectors of the same input simultaneously. For example, a BNC connector can be used for input A and the wire-wrap pins for input B, but do not use the input A BNC connector with the input A wire-wrap connector.

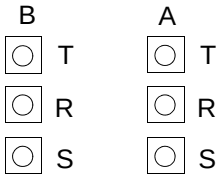


Figure 3-17. E1 or Analog Input Wire-Wrap Connections

Module for Additional E1 or Analog Outputs (990-72060-02 System Only)

Connect up to eight optional E1 or analog outputs at the wire-wrap or BNC output module. See Figure 3-14 for the connector location, and Figure 3-18 for the connections.

Note: The shield pin is capacitively coupled to ground, therefore, the shield must be connected at the source end. The shield may also be connected at the TimeSource 3600 end for additional longitudinal noise protection.

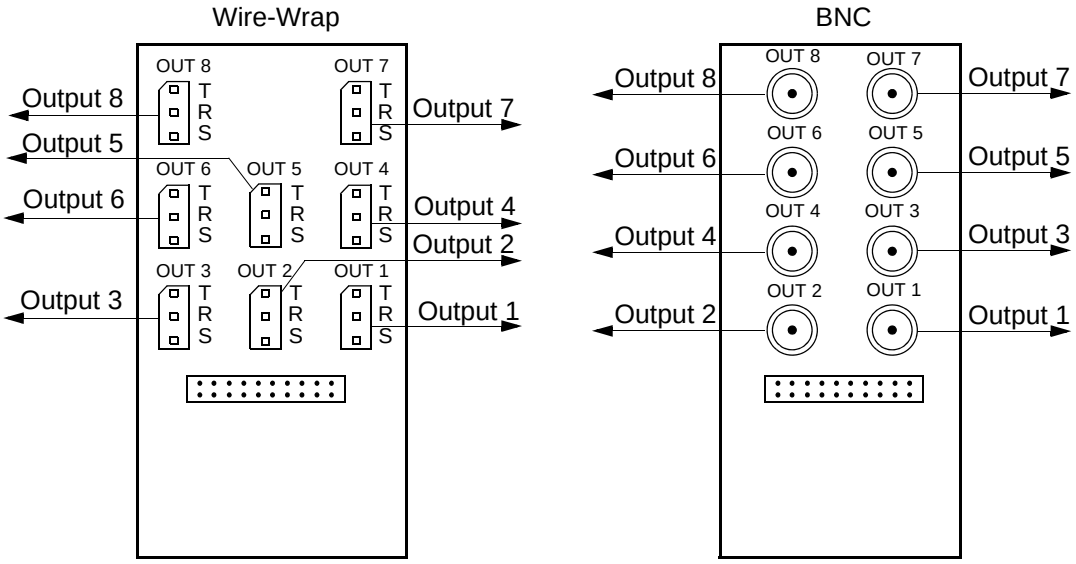


Figure 3-18. Eight E1 or Analog Input Connections

Module for IRIG-B TOD Outputs (990-72060-05 System Only)

Connect up to four optional IRIG-B TOD outputs at the output module. See Figure 3-14 for the connector location, and Figure 3-19 for the connections.

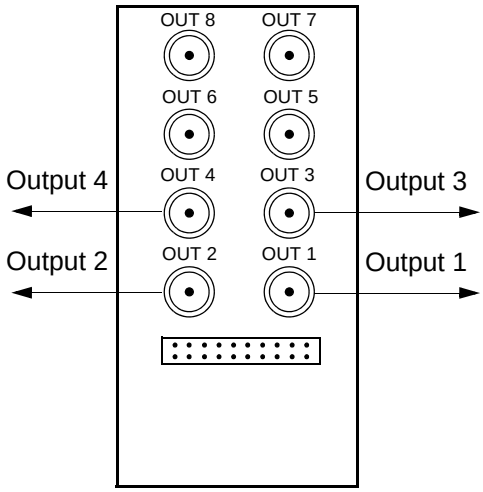


Figure 3-19. IRIG-B TOD Output Connections

Note: As shown in Figure 3-19, outputs 5, 6, 7 and 8 are not used.

Module for Mixed E1/T1 Outputs (990-72060-06 System Only)

Connect up to eight optional mixed E1/T1 outputs at the wire-wrap or BNC output module. Refer to Figure 3-14 for the connector location and Figure 3-20 for the connections.

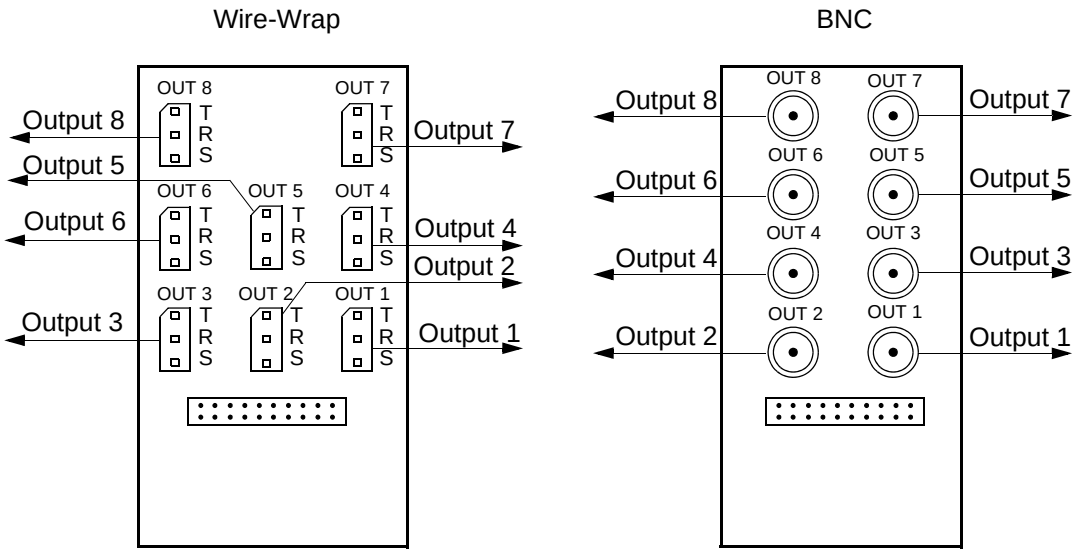


Figure 3-20. Eight Mixed E1/T1 Outputs Connections

Module for ESCIU Ports (990-72060-04 System Only)

The ESCIU ports (Figure 3-21) have a different function than the synchronization outputs. A synchronization output provides an all-ones reference clock signals for network elements. An ESCIU port carries live E1 traffic, and synchronizes the live traffic as it passes through. The ESCIU module can synchronize 2 spans in one direction. The return direction passes through as it is.

The ESCIU ports can connect at the digital distribution frame (DDF). The network elements receiving the ESCIU output signal must be able to receive E1 signals that conform to CCITT G.703 paragraph 6 specifications. The network element can be configured to extract its timing from the live E1 traffic signal.

A bypass relay directs E1 traffic around the ESCIU circuitry to maintain span continuity if a TimeSource 3600 fault occurs.

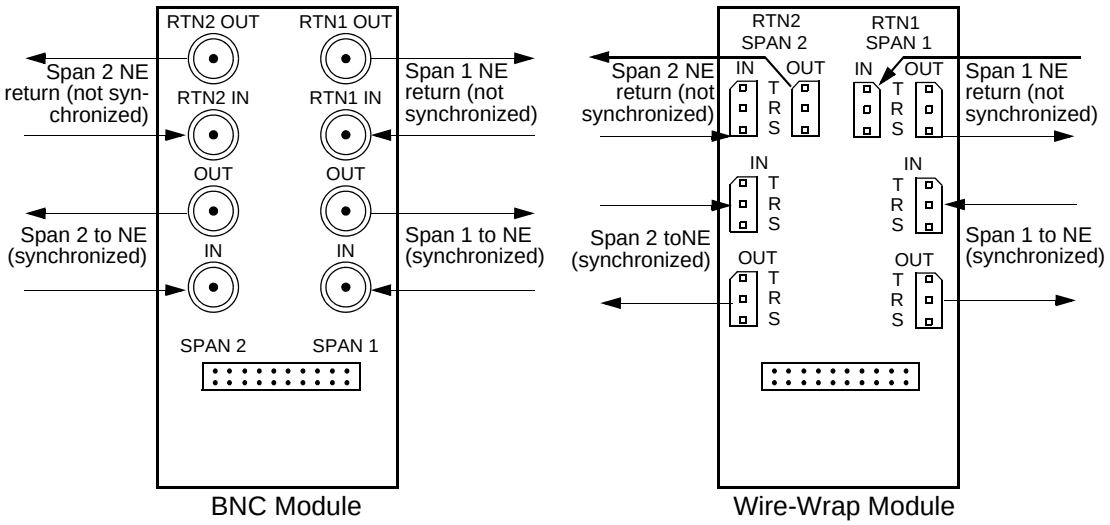


Figure 3-21. Connector Layout of ESCIU Modules

Cutover Procedures for Out-of-Service Equipment

If DDF access jack sets *are not* cabled to the ESCIU module, the following out-of-service cutover procedure must be used. Consult the local company Installation Job Specifications to ensure that the network element to be retimed is connected to the ESCIU module correctly. Refer to Figure 3-22 for the following procedure:

1. Remove from service (turn down) the traffic trunks on the E1 system to be cutover to the ESCIU module.

2. Remove the existing cabling in both directions between the transmit (OUT) and receive (IN) terminals of the NEs that will connect to the ESCIU module.

3. In the direction not to be synchronized by the ESCIU module, connect new cables from the ESCIU module RTNx IN connector to the NE transmit (OUT) terminal, and connect from the ESCIU module RTNx OUT connector to the NE receive (IN) terminal.

4. In the direction to be synchronized by the ESCIU module, connect new cables from the ESCIU module IN connector to the NE transmit (OUT) terminal, and connect from the ESCIU module OUT connector to the NE receive (IN) terminal.

5. Verify that there are no alarms on the NEs on the E1 system. If there are alarms, recheck the new cabling between the NEs and the ESCIU module.

Note: If the TimeSource 3600 is still in warm-up or searching for GPS satellites, alarms may be present. All synchronization-related alarms should clear while the TimeSource 3600 is in steady-state operation.

6. Restore (turn up) the traffic trunks to service.

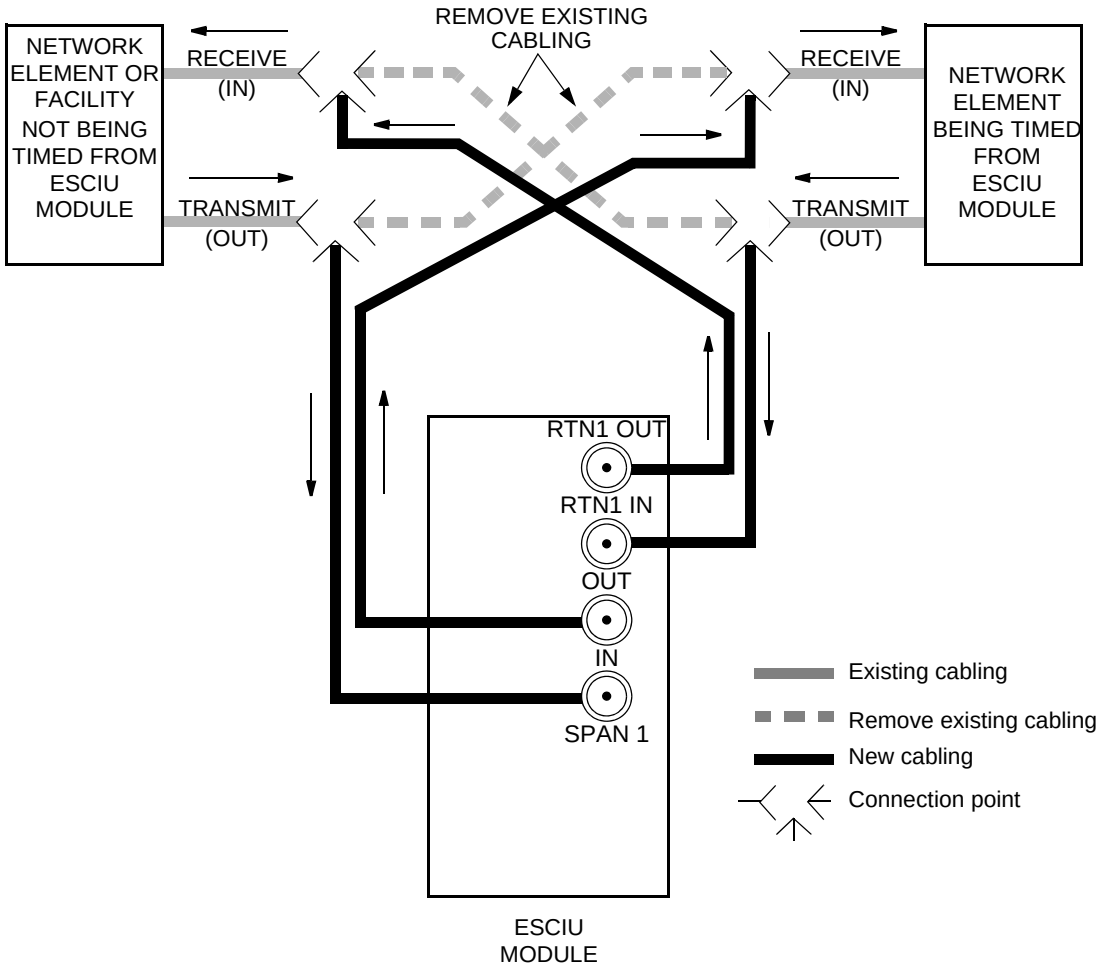


Figure 3-22. ESCIU Cutover without Jacks (Out-of-Service)

Cutover Procedures for In-Service Equipment

If standard digital signal level access jack sets, such as DDF or DSX-1 jacks, were cabled to the ESCIU module, the following in-service cutover procedure must be used. Consult the local company Installation Job Specifications to ensure that the network element to be retimed from the ESCIU module is connected to the ESCIU module A OUT terminals. Refer to Figure 3-23 for the following procedure:

1. Patch a bridging repeater from the MON jack of one NE to the IN jack of the other NE in both directions of transmission on the E1 system to be cutover. Place a 75 Ω termination plug in the OUT jack in each direction.

2. Remove the cross-connect wiring from the OUT and IN jacks (off-normal side of jacks) in both directions of transmission.

3. In the direction not to be synchronized by the ESCIU module, connect new cables from the ESCIU module RTNx IN connector to the NE transmit (OUT) terminal, and connect from the ESCIU module RTNx OUT connector to the NE receive (IN) terminal.

4. In the direction to be synchronized by the ESCIU module, connect new cables from the ESCIU module IN connector to the NE transmit (OUT) terminal, and connect from the ESCIU module OUT connector to the NE receive (IN) terminal.

5. Remove the 75 Ω (E1) termination plug from the OUT jack and patch cords from the NE IN jack. The E1 system bit stream is now going through the ESCIU module.

6. Verify that there are no alarms on the NEs on the E1 system. If there are alarms, repeat Step 1 and recheck the cross-connect wiring. Repeat Step 5.

Note: If the TimeSource 3600 is still in warm-up or searching for GPS satellites, alarms may be present. All synchronization-related alarms should clear while the TimeSource 3600 is in steady-state operation.

7. Remove the remaining patch cords from the NE MON jack.

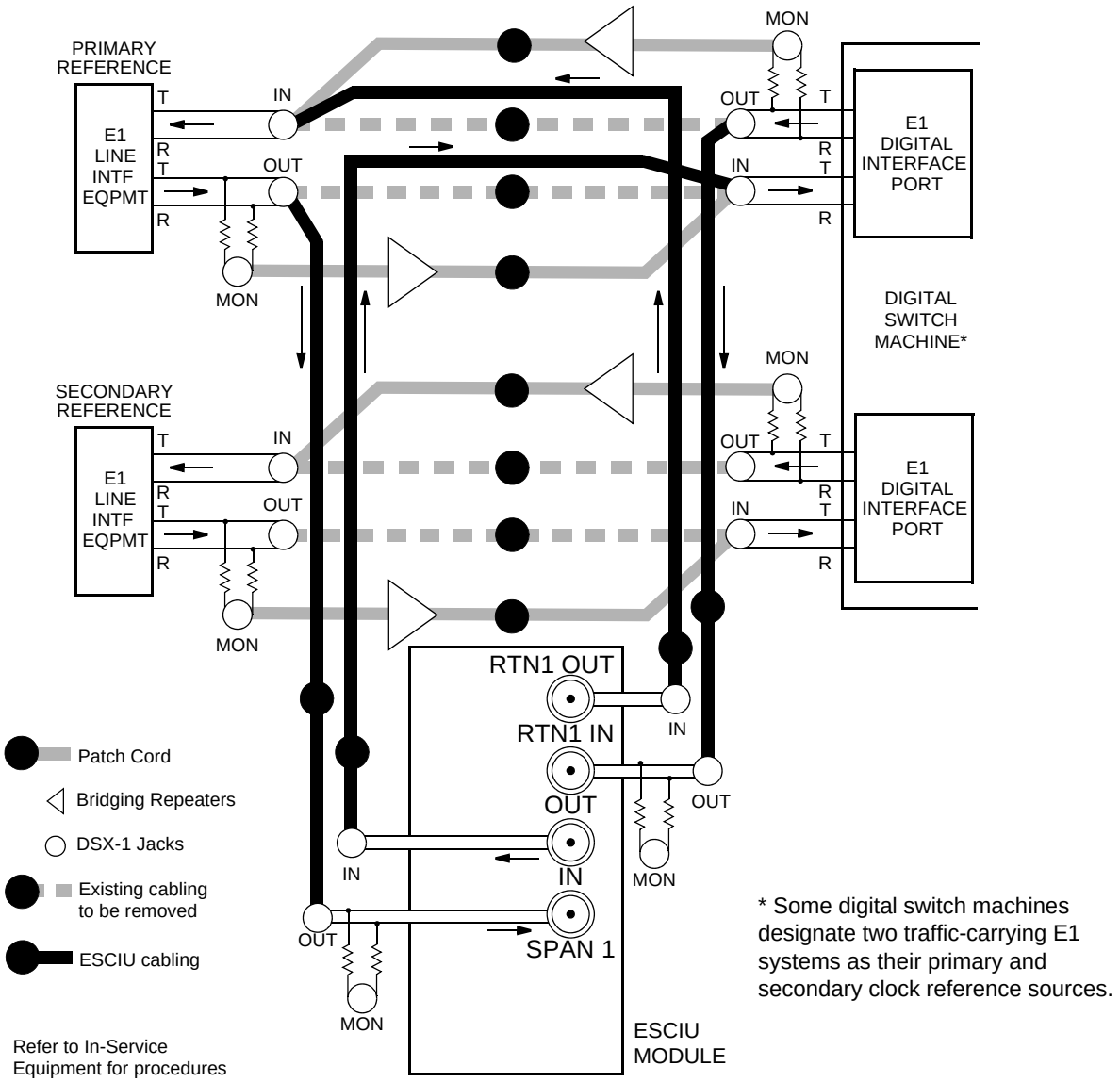


Figure 3-23. ESCIU Cutover with Jacks (In-Service)

Time of Day Output

Connect a time of day (TOD) output at the female RJ-45 connector labeled TOD. See Figure 3-14 for the connector location, and Table 3-1 for the connector pinouts.

Table 3-1. TOD Connector Pinouts

Pin	Signal	Abbreviation	Direction
1	1 pps A	TOD PPS +	From TimeSource 3600
2	1 pps B	TOD PPS –	From TimeSource 3600
3	12 V power source	TOD P12V	—
4	Receive data B	TOD RXD –	To TimeSource 3600
5	Receive data A	TOD RXD +	To TimeSource 3600
6	Circuit ground	TOD GND	—
7	Transmit data A	TOD TXD +	From TimeSource 3600
8	Transmit data B	TOD TXD –	From TimeSource 3600

Note: Pins not listed are reserved for future use.

If the device receiving the time code (for example, Cisco router) accepts an RS-232 cable instead of an RS-422 cable, follow Procedure 3-5 to install the RS-422–to–RS-232 TOD converter.

Note: Before performing Procedure 3-5, ensure that the appropriate Cisco router or NTP Type 4 compatible device is installed, and power applied, per manufacturer's instructions.

Procedure 3-5. Installing the RS-422–to–RS-232 TOD Converter

Step	Procedure
1.	Secure the provided mounting plate to the RS-422–to–RS-232 TOD converter, using the two provided screws. The plate may be attached to the top or front of the converter, depending on the desired surface (for example, a rack or cabinet) to which the converter will be mounted (see Figure 3-24). **Notes:** 1. Due to distance constraints, the converter must be placed no more than 305 m from the TimeSource 3600 Shelf, and no more than 15 m from the device receiving the time code. 2. The converter dimensions are 7.5 cm by 3.8 cm by 2.5 cm. 3. The mounting plate dimensions are 7.5 cm by 5 cm.
2.	Secure the converter to the desired surface, using the slots in the plate and user-supplied bolts.
3.	Install a user-supplied Category 5 four-pair RS-422 cable, with RJ-45 connectors on each end, between the TimeSource 3600 Shelf and the converter (see Figure 3-25).
4.	Install a user-supplied RS-232 cable, with DB-25 connectors on each end, between the converter and the device receiving the time code (see Figure 3-25). See Table 3-2 for the DB-25 connector pinouts.

End of Procedure

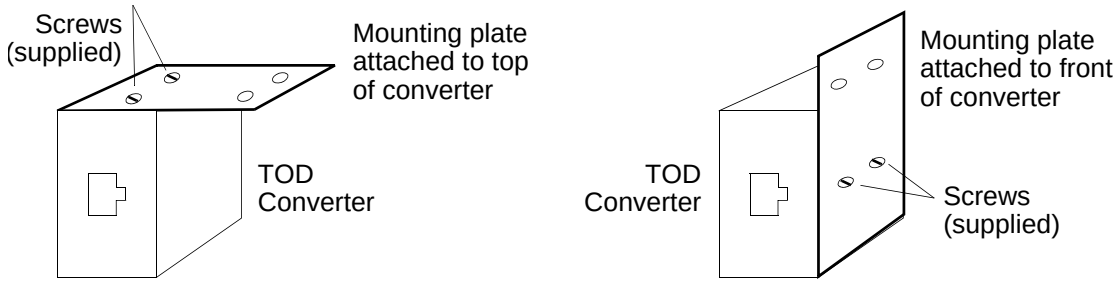


Figure 3-24. RS-422–to–RS-232 TOD Converter Mounting Plate

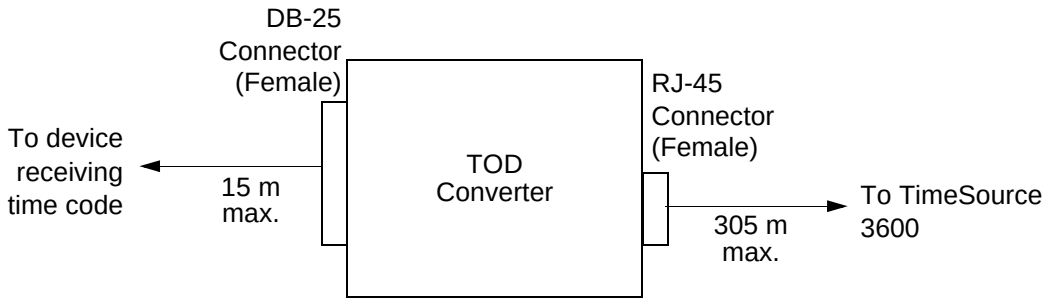


Figure 3-25. RS-422–to–RS-232 TOD Converter Connections

Table 3-2. Converter DB-25 Connector Pinouts

Pin	Signal
1	Frame ground
3	Data output (RS-232)
5	1 pps (RS-232)
7	Signal ground

Note: Pins not listed are reserved for future use.

Ethernet

Connect a user-supplied Ethernet cable from the network to the 10base-T Ethernet connector labeled E-NET. See Figure 3-14 for the connector location, and Table 3-3 for the connector pinouts.

Table 3-3. Ethernet 10base-T RJ-45 Connector Pinouts

Pin	Signal	Abbreviation	Direction
1	Transmit data +	TXD +	From TimeSource 3600
2	Transmit data –	TXD –	From TimeSource 3600
3	Receive data +	RXD +	To TimeSource 3600
4	—	—	—
5	—	—	—
6	Receive data –	RXD –	To TimeSource 3600
7	—	—	—
8	—	—	—

Communication Port 1

To provide an RS-232 link for TL1 command access to the TimeSource 3600, connect to port 1 at the female 25-pin D connector labeled COM1. See Figure 3-14 for the location of the connector. See Table 3-4 for the connector pinouts.

Note: The COM1 connector transmits data on pin 2, and receives data on pin 3. Be sure the other equipment receives data from the transmitting pin, and transmits data to the receiving pin.

Table 3-4. COM1 Pinouts

Pin	Signal	Abbreviation	Direction
2	Transmit data	TXD	From TimeSource 3600
3	Receive data	RXD	To TimeSource 3600
4	Request to send	RTS	From TimeSource 3600
5	Clear to send	CTS	To TimeSource 3600
7	Signal ground	GND	—
20	Data terminal ready	DTR	From TimeSource 3600

Note: Pins not listed are reserved for future use.

Communication Port 2

To provide an RS-232 link for TL1 command access to the TimeSource 3600, connect to port 2 at the female 9-pin D connector labeled COM2. See Figure 3-14 for the location of the connector, and Table 3-5 for the connector pinouts.

Note: The COM2 connector transmits data on pin 2, and receives data on pin 3. Be sure the other equipment receives data from the transmitting pin, and transmits data to the receiving pin.

Table 3-5. COM2 Connector Pinouts

Pin	Signal	Abbreviation	Direction
2	Transmit data	TXD	From TimeSource 3600
3	Receive data	RXD	To TimeSource 3600
4	Signal Ground	GND	—
5	Data terminal ready	DTR	From TimeSource 3600
7	Clear to send	CTS	To TimeSource 3600
8	Request to send	RTS	From TimeSource 3600

Note: Pins not listed are reserved for future use.

Craft Port

To provide an RS-232 link for TL1 command access to the TimeSource 3600, connect to the craft port at the female RJ-45 connector labeled Craft on the front panel. A Craft-port-to-PC cable is supplied with the TimeSource 3600 for making this connection. See Figure 3-14 for the location of the connector, and Table 3-6 for the connector pinouts.

Note: The Craft connector transmits data on pin 2, and receives data on pin 3. Be sure the other equipment receives data from the transmitting pin, and transmits data to the receiving pin.

Table 3-6. Craft Pinouts

Pin	Signal	Abbreviation	Direction
2	Transmit data	TXD	From TimeSource 3600
3	Receive data	RXD	To TimeSource 3600
5	Signal ground	GND	—
6	Data terminal ready	DTR	From TimeSource 3600

Note: Pins not listed are reserved for future use.

Alarms Output

Connect the TimeSource 3600 alarms to the office alarm panel at the critical (CR), major (MJ), and minor (MN) wire-wrap pins. See Figure 3-14 for the location of the alarm pins, and Figure 3-26 for the connections.

Connect the upper group of pins (AUD) for audible alarms and the lower group of pins (VIS) for visible alarms. Connect the alarm circuit between the NO and C pins for normally open contacts, or between the NC and C pins for normally closed contacts.

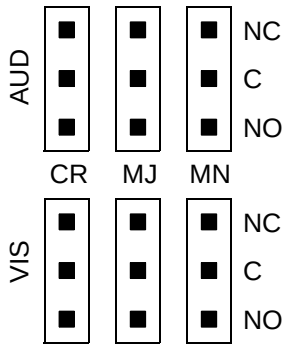


Figure 3-26. Alarm Connections

Powering Up the TimeSource 3600

To power the TimeSource 3600, follow the steps in Procedure 3-6. Before starting this procedure, be sure the antenna, shelf, and all connections appropriate for this installation have been installed, and that the host computer is set to communicate with the TimeSource 3600.

Note: If using the TimeScan Craft software program for the power-up procedure, see the TimeScan Craft manual for the appropriate TimeScan commands to use in place of the TL1 commands in Procedure 3-6.

Procedure 3-6. Power-Up

Step	Procedure
Test Equipment: ■ Grounding wrist strap ■ Digital multimeter (Fluke 77 or equivalent) ■ Laptop computer with communications software (e.g., Windows Hyperterminal, ProComm Plus, CrossTalk)	
1.	On the computer connected to the TimeSource 3600, start a VT100 terminal mode session via communication software that supports the Y-modem protocol (such as Hyperterminal, or a commercial package such as PROCOMM PLUS or CrossTalk).
2.	On the computer connected to the TimeSource 3600, set the communication software to communicate with the port that is connected to the TimeSource 3600.
3.	On the computer connected to the TimeSource 3600, set the RS-232 communication parameters to 8 data bits, no parity bit, 1 stop bit, and 9600 baud.
4.	On the computer connected to the TimeSource 3600, connect the computer communication port to the COM1, COM2, or Craft port on the TimeSource 3600. A craft port-to-PC communication cable is provided in the hardware kit for this purpose.
5.	Ensure that the TimeSource 3600 plug-in card is not installed in the shelf.
6.	Ensure that all fuses that supply power to the TimeSource 3600 Shelf are removed from the fuse panel.

Procedure 3-6. Power-Up (Continued)

Step	Procedure
7.	At the shelf end of the battery leads, use the multimeter to measure the voltage between the following: **Test Point** / **Test Point** / **Result** Battery A lead / Battery B lead / 0 V Battery A lead / TB1: RTN A / 0 V Battery A lead / TB1: ⏚ / 0 V Battery B lead / TB2: RTN B / 0 V Battery B lead / TB2: ⏚ / 0 V
8.	Attach a grounding wrist strap to the wrist, and plug the other end into the ground jack at the upper-right corner of the front of the plug-in card.
9.	Pull out the latching levers at each end of the front panel so that the levers are pointing directly out from the front panel.
10.	Push the card into the shelf until the latching levers begin to move in.
11.	Push the latching levers flat against the front panel to complete the card insertion.
12.	Tighten the knurled screw above each latching lever to secure the card in the shelf.
13.	Unplug and remove the grounding wrist strap.
14.	Install the battery source fuse(s) in the rack fuse bay that supplies power to the TimeSource 3600. The TimeSource 3600 enters its warm-up mode after approximately 60 s when power is applied. During the warm-up period, the following conditions exist: ■ Status GPS lamp is green ■ Status SYS lamp is off ■ E1 outputs are squelched, sending AIS (factory setting), or sending an SSM message, as specified in the ED-EQPT command ■ Additional eight E1 outputs (if equipped) are squelched, sending AIS (factory setting), or sending an SSM message, as specified in the ED-EQPT command ■ Four IRIG-B outputs (if equipped) are squelched ■ ESCIU ports (if equipped) are on (unreliable while Status SYS lamp is off) ■ 10 MHz and 1 pps outputs are on (unreliable while Status SYS lamp is off) ■ TOD output is not enabled (factory setting) **Notes:** 1. The CRIT lamp and other alarm indication lamps may light. The host computer may display transient and standing alarm condition messages. Ignore alarms while the Status SYS lamp is off during warm-up, unless alarms apply to inputs and outputs that were previously entered. 2. TL1 commands may be entered during warm-up. Inputs and outputs can be enabled, and system parameters can be set or changed.

Procedure 3-6. Power-Up (Continued)

Step	Procedure
15.	**Note:** If using the TimeScan Craft software program for the power-up procedure, see the TimeScan Craft manual for the appropriate TimeScan commands to use in place of the TL1 commands in this Procedure. Use the Activate User command to log onto the system. `ACT-USER::TELECOM:<ctag>::TS3000!!;`

16.	Skip this step if the current unit is equipped with a roof antenna.
	Use the Edit Equipment command to change the antenna locating mode to manual and to enter the latitude, longitude, and altitude. In manual mode, the survey process used to determine the antenna's exact position starts with this information.
	Note: Enter data carefully. When entering degrees, an error of a single degree will cause the system location accuracy to be off by as much as 100 km.
	`ED-EQPT::GPS:<ctag>:::ANTMODE=MANUAL,MANLAT=a-b-c-d, MANLONG=e-f-g-h,MANELEVALT=i;`
	a – north (a = N) or south (a = S) of the equator
	b – degrees of latitude (b = 0 to 179)
	c – minutes of the degree (c = 0 to 59)
	d – decimal fraction of the minute (d = 000 to 999)
	e – east (e = E) or west (e = W) of the Greenwich Meridian
	f – degrees of longitude (f = 0 to 179)
	g – minutes of the degree (g = 0 to 59)
	h – decimal fraction of the minute (h = 000 to 999)
	i – elevation, or altitude, of the antenna in meters
	Example command to set the latitude, longitude, and altitude of the antenna:
	`ED-EQPT::GPS:<ctag>:::ANTMODE=MANUAL,MANLAT=N-37-19-016, MANLONG=W-121-59-246,MANELEVALT=12;`
	Notes:
	1. The TimeSource 3600 can find its position on the earth without latitude, longitude, and altitude entered, but the process may take several hours, and may not result in the position accuracy (within 200 m) required for the system to perform to specification. It is recommended that the information be obtained and manually entered by the user.
	2. Latitude, longitude, and altitude data can be obtained through the use of a GPS hand-held receiver (user supplied). Location mapping software is also available for personal computers, which can be used to obtain latitude and longitude. When the entered figures are within 200 m of the actual coordinates, the TimeSource 3600 typically delivers UTC traceable timing within 1 h of applying power. Warm-up times vary greatly depending on the window location and antenna placement.
	3. Obtain latitude, longitude, and altitude outdoors when using a GPS hand-held receiver, to ensure an accurate reading. Do not use the GPS hand-held receiver inside the building near the window or wall where the antenna will be installed. GPS hand-held receivers do not provide an accurate location reading when used indoors.

Procedure 3-6. Power-Up (Continued)

Step	Procedure

17.	If UTC time is desired, skip to Step 18. Use the Edit Date command to set the local date and time.
	`ED-DAT:::<ctag>::yyyy-mm-dd,hh-mm-ss:MODE=LOCAL;`
	
	yyyy – year (yyyy = 1998 to 2096)
	mm – month (mm = 01 to 12)
	dd – day (dd = 01 to 31)
	hh – hours (hh = 00 to 23)
	mm – minutes (mm = 00 to 59)
	ss – seconds (ss = 00 to 59)
	Example command to set local time:
	`ED-DAT:::123::2000-06-15,14-25-00:MODE=LOCAL;`

18.	If UTC time is not desired, skip to Step 19 Use the Edit Date command to set the system for UTC time.
	`ED-DAT:::<ctag>::yyyy-mm-dd:MODE=UTC;`
	
	yyyy – year (yyyy = 2000 to 2099)
	mm – month (mm = 01 to 12)
	dd – day (dd = 01 to 31)
	Example command to set UTC time:
	`ED-DAT:::123::2000-06-15:MODE=UTC;`

19.	Use the Retrieve Equipment command to identify whether and how the inputs have been provisioned. `RTRV-EQPT::ALL:<ctag>;` **Notes:** 1. Observe those results with an <aid> of SPAN-a. If MONITOR=ALW appears for an input, that input has previously been entered. If ENSEMBLER=ALW appears for an input, that input has been set to be ensembled. 2. Note the results of the Retrieve Equipment command to set the remaining parameters in this procedure. 3. Factory default settings are found at the end of this Power Up procedure section.
20.	If the results of Step 19 indicate the span inputs (if used) are set as desired, skip to Step 24 Use the Enter Equipment command to monitor each available span input, and to specify whether those inputs are to be ensembled. `ENT-EQPT::SPAN-a:<ctag>:::ENSEMBLER=b;` a – span input (a = A or B) b – whether this input is ensembled (b = ALW ensembles the input; b = INH inhibits the input from being ensembled)

Procedure 3-6. Power-Up (Continued)

Step	Procedure
21.	Use the Edit Equipment command to set the output signal framing format for the two standard E1 outputs, and set the mode for each E1 output during an alarm. `ED-EQPT::E1-a:<ctag>:::FRAMING=b,ALMOUT=c;` a – E1 output (a = A or B) b – framing format (b = CAS, CAS4, CCS, or CCS4, or NONE for analog) c – E1 output during alarm (c = AIS, SQUELCH, or SSM) (for SSM, framing format must be CAS4 or CCS4)
22.	If not using a 990-72060-02 system, skip this step. Use the Edit Equipment command to set the output signal framing format for each additional E1 output, and set the mode for each E1 output during an alarm. `ED-EQPT::OPT-a:<ctag>:::FRAMING=b,ALMOUT=c;` a – E1 output module port (a = 1 to 8) b – framing format (b = CAS, CAS4, CCS, or CCS4, or NONE for analog) c – E1 output during alarm (c = AIS, SQUELCH, or SSM) (for SSM, framing format must be CAS4 or CCS4)
23.	If not using performance monitoring, skip to Step 24. Use the Initialize Register command to reset the performance monitoring data to zero for all input E1 spans. `INIT-REG-EQPT::ALL:<ctag>::ALL;`
24.	If not using Ethernet, go to Step 28. Use the Edit Equipment command while connected to COM1, COM2, or the CRAFT port to set the IP address, subnetwork mask, and gateway address for the current TimeSource 3600 unit, as required for proper operation in the managed element network. (These parameters affect all Ethernet ports. The Ethernet port should be closed and all users logged off before issuing this command.) `ED-EQPT::TS3600:<ctag>:::IPNE=a, IPSUBNET=a, IPGATE=a;` IPNE=a – This unit's IP address in the form a.a.a.a (each a is an independent value of 0 to 255) IPSUBNET=a =Subnet mask in the form a.a.a.a (each a is an independent value of 0 to 255) IPGATE=a – Gateway IP address in the form a.a.a.a (each a is an independent value of 0 to 255)

Procedure 3-6. Power-Up (Continued)

Step	Procedure
25.	Ports 5001, 5002, 5003 and 5004 on the TimeSource 3600 are used as though they were serial TL1 communication ports. The following values are set at the factory and appear at reset: MONMSG – INH (monitors only the current port for messages) KEEPALIVE = 0 – does not send a COMPLD message to keep connection open) ENDOFTEXT = 0 – does not include an end-of-text code with a TL1 message) ECHO = ALW – (echoes characters back to the sending terminal) COMPRI = ALW1 – (normal communication, including autonomous messages) AUTOLOGOFF = 20 – (does not log off the user during inactivity) SWCONTROL = INH – (uses no flow control) If these values require change, use the Edit Communications command to set communications parameters for TL1 communications. `ED-COM::COM-a:<ctag>:::[MONMSG=b[,]][KEEPALIVE=c[,]] [ENDOFTEXT=d[,]][ECHO=b[,]][COMPRI=e[,]][AUTOLOGOFF=c[,]] [SWCONTROL=b];` COM-a – User IP port (a = 5001, 5002, 5003 or 5004) MONMSG=b – Monitors messages on all ports (b = ALW), or current port (b = INH) KEEPALIVE=c – Inactive minutes until the unit sends a COMPLD message to keep the connection from being closed (c = 0 to 255) ENDOFTEXT=d – Hex code added to responses before semicolon (d = 0 (disabled) to 9F) ECHO=b – Echoes characters received so they appear on the user's screen as typed (b = ALW), or inhibits echo (b = INH) COMPRI=e – Sets the communication port capabilities as follows: ALW0 = normal communication, no autonomous messages ALW1 = normal communication, autonomous messages ALW2 = autonomous messages received, logged on or not INH = closes connection and keeps port from use (command must go to another port) (if the port is in use, this command also logs off the user) AUTOLOGOFF=c – Inactive minutes until the unit logs off the user, keeping the connection open (c = 0 to 255) SWCONTROL=b – uses software (XON/XOFF) flow control (b = ALW), or no flow control (b = INH)

Procedure 3-6. Power-Up (Continued)

Step	Procedure
26.	If not using an Element Manager, skip to Step 28. If not using a separate port to send autonomous messages to an Element Manager, skip to Step 27. Use the Edit Equipment command to set the IP address and port address of the Element Manager. Port 5550 connects to this address when the TimeSource 3600 develops a TL1 autonomous message, sends any messages, and closes the connection. An alternate Element Manager may be set up in case port 5550 cannot make a connection to the primary Element Manager. `ED-EQPT::TS3600:<ctag>:::IPEM1=a,IPEM1PORT=b[,IPEM2=a] [,IPEM2PORT=b][,IPINACT=c];` IPEM1=a – Primary Element Manager's IP address in the form a.a.a.a (each a is an independent value of 0 to 255) IPEM1PORT=b – Primary Element Manager's Ethernet port address (b = 0 to 65535) IPEM2=a – Alternate Element Manager's IP address in the form a.a.a.a (each a is an independent value of 0 to 255) IPEM2PORT=b – Alternate Element Manager's Ethernet port address (b = 0 to 65535) IPINACT=c – Disconnects from the Element Manager if an autonomous message is not developed during this number of 100-ms units of inactivity (0 to 10,000, where 0 deactivates the timer)

Procedure 3-6. Power-Up (Continued)

Step	Procedure
27.	Use the Edit Communications command to set the communications parameters of port 5551. An Element Manager connects to port 5551 for TL1 command and response messages. The following values for port 5551 are set at the factory and appear at reset: MONMSG=INH – (monitors only the current port for messages) KEEPALIVE=0 – (does not send a COMPLD message to keep connection open) ENDOFTEXT=0 – (does not include an end-of-text code with a TL1 message) ECHO=INH – (does not echo characters received) COMPRI=ALW1 – (normal communication, including autonomous messages) AUTOLOGOFF=20 – (does not log off the user during inactivity) SWCONTROL=INH – (uses no flow control) If these values require change, use the Edit Communications command to set communications parameters for TL1 communications. `ED-COM::COM-5551:<ctag>:::[MONMSG=b[,]][KEEPALIVE=c[,]] [ENDOFTEXT=d[,]][ECHO=b[,]][COMPRI=e[,]][AUTOLOGOFF=c[,]] [SWCONTROL=b];` MONMSG=b – Monitors messages on all ports (b = ALW), or current port (b = INH) KEEPALIVE=c – Inactive minutes until the unit sends a COMPLD message to keep the connection from being closed (c = 0 to 255) ENDOFTEXT=d – Hex code added to responses before semicolon (d = 0 (disabled) to 9F) ECHO=b – Echoes characters received so they appear on the user's screen as typed (b = ALW), or inhibits echo (b = INH) COMPRI=e – Sets the communication port capabilities as follows: ALW0 = normal communication, no autonomous messages ALW1 = normal communication, autonomous messages ALW2 = autonomous messages received, logged on or not INH = closes connection and keeps port from use (command must go to another port) (if the port is in use, this command also logs off the user) AUTOLOGOFF=c – Inactive minutes until the unit logs off the user, keeping the connection open (c = 0 to 255) SWCONTROL=b – uses software (XON/XOFF) flow control (b = ALW), or no flow control (b = INH)

Procedure 3-6. Power-Up (Continued)

Step	Procedure
28.	If the results of Step 19 indicate the antenna cable delay and elevation mask are set as desired, skip to Step 29. Use the Edit Equipment command to set the length of cable between the antenna and the TimeSource 3600 Shelf. This number should have been recorded during installation. Use the same command to set the antenna elevation mask angle. `ED-EQPT::GPS:<ctag>:::ANTCBLDLY=a,ANTELEVMASK=b;` a – antenna cable delay in meters (a = 0 to 330) b – antenna elevation mask angle in degrees (b = 0 to 45) (see note below) **Note:** The antenna elevation mask is that portion of the sky from which the TimeSource 3600 masks out satellite signals, measured as an angle of elevation from the horizon. Reflections or other anomalies may disturb signals received from an area of the sky that has obstructions, usually the area near the ground. Masking that part of the sky may allow the receiver to acquire GPS signals more quickly and accurately. Factory setting is 10.
29.	If not using the TOD output, skip to Step 30. Use the Edit Equipment command to set the TOD output. `ED-EQPT::TS3600:<ctag>:::TOD=b;` b – TOD format (b = Cisco or NTP4)
30.	If not using ESCIU ports, skip to Step 31. Use the Edit Equipment command to specify how the ESCIU performs during holdover: `ED-EQPT::TS3600:<ctag>:::BYPASS=a;` a – E1 traffic bypasses the ESCIU circuitry (a = ALW) or continues to be synchronized during holdover (a = INH).
31.	Use the Edit Equipment command to allow or inhibit alarm conditioning on the outputs. Inhibiting the alarm conditioning forces the TimeSource 3600 to continue to output valid timing signals while in major alarm. This may be useful when testing, troubleshooting, or in installations where a TimeSource 3600 that is in major alarm may produce better timing signals than other sources (for example, offices without additional holdover clocks in a distribution shelf). `ED-EQPT::TS3600:<ctag>:::ALMCOND=b;` b – alarm conditioning of the outputs (b = ALW or INH)
32.	Use the Copy Memory command to copy the database from volatile to nonvolatile memory within the TimeSource 3600. `CPY-MEM:[tid]:TS3600:<ctag>::WKG,,AUX:DATA;` **Note:** Although the database is automatically copied to nonvolatile memory once per hour, it is recommended that the Copy Memory command be executed each time the database is changed.

Procedure 3-6. Power-Up (Continued)

Step	Procedure
33.	When the GPS signals have been acquired and the outputs are stable enough to output a signal, the TimeSource enters a settling period. During the settling period, the following conditions exist: ■ Status GPS lamp is green ■ Status SYS lamp is green ■ Any Span lamp is green when its input is connected, entered, contains valid framing, and is usable for ensembling ■ All outputs are functioning according to specifications or in a slightly degraded mode ■ A TL1 autonomous “settling period” event message exists. **Notes:** 1. In roof antenna installations, the nominal time to reach normal operation (output a PRS signal) is 20 min. If normal operation has not been reached after 40 min, refer to the Troubleshooting chapter. 2. The settling period is the condition where this clock is beyond the warm-up state but not yet in steady state operation. Steady state operation is indicated by the clearing of the “settling period” event. 3. In window or wall antenna installations, the nominal time to reach normal operation (output a PRS signal) is variable, depending on the view of the sky and the satellite positions at the time of power-up, and may take up to several hours. If normal operation is not reached, refer to the Troubleshooting chapter. 4. The TimeSource 3600 develops and sends timing within the PRS specification during normal operation and during any event (other than settling period) or minor alarm, but not during a major or critical alarm.

End of Procedure

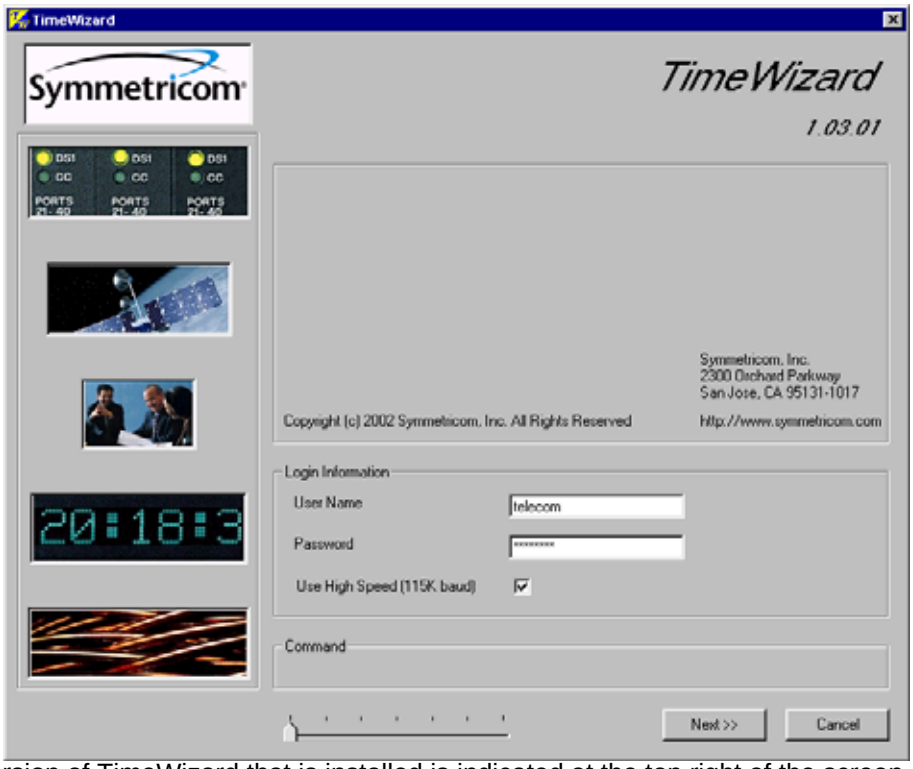
Installing and Using TimeWizard

The TimeWizard Software Installation application was created to facilitate installing software upgrades for the TimeSource 3600. Procedure 3-7 shows how to install the TimeWizard application and how to use TimeWizard to download software upgrades.

Procedure 3-7. TimeWizard Installation and Operation

Step	Procedure
Use this procedure to install the firmware in the TimeSource 3600 to configure the GPS and Holdover alarms, using the TimeWizard application. **Requirements:** 1. A PC running Windows 95/98/NT 4.0/2000/XP. 2. The TimeSource 3600 System CD provided.	
Hardware Installation	
1.	Connect the TimeSource 3600 to the PC with a serial cable.
Install the TimeWizard Software	
2.	Insert the TimeSource 3600 System CD provided into the PC's CD-ROM drive. If AutoRun is enabled on the PC, the CD should automatically launch the Install Shield wizard for installation of the TimeWizard application. If Install Shield launches, continue with Step 5. If Install Shield does not automatically launch, continue with the next step.
3.	The Windows Explorer, double-click “setup.exe” in the root directory of the CD to start the Install Shield wizard.
4.	Follow the prompts in the Install Shield wizard to install TimeWizard in the preferred directory. Continue with the next step after the TimeWizard installation is complete.

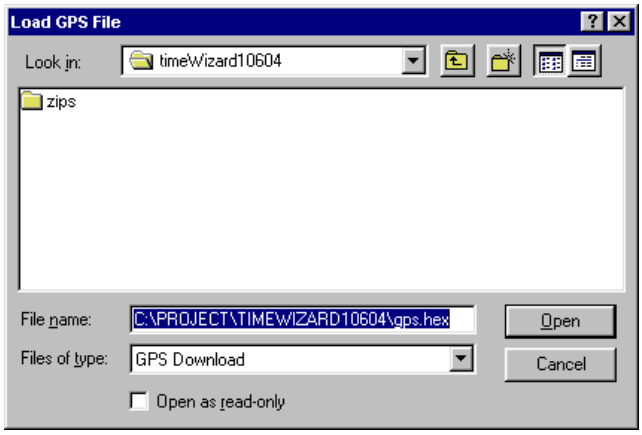
Procedure 3-7. TimeWizard Installation and Operation (Continued)

Step	Procedure
5.	From the Windows desktop, click **Start**, **Programs**, **TimeWizard** to start the TimeWizard application. When TimeWizard starts, the "TimeWizard" main screen appears:  The version of TimeWizard that is installed is indicated at the top right of the screen. The progress indicator at the bottom of the screen shows which of the seven screens you are currently viewing. **Note:** The factory default TimeSource username of "telecom" and password of "TS3000!!" appear in the Login Information area of the screen.
6.	If the user name or password of the TimeSource have been changed, enter the proper user name or password, otherwise, continue with the next step.
7.	To select the high-speed download option, in which the firmware download takes place at approximately 12 times the default speed of 9600 baud, select the Use High Speed (115K baud) check-box, then click **Next>>** to progress to the next screen. If you do not wish to use the high-speed download option, leave the Use High Speed (115K baud) check-box unselected and click **Next>>**. **Note:** In most cases, it is desirable to proceed with the Use High Speed (115K baud) check-box selected. In certain instances, as when the PC's communications port does not support a 115K baud rate, de-select the Use High Speed (115K baud) check-box before proceeding.

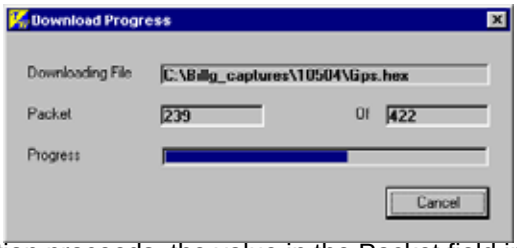
Download the GPS.hex Firmware

Note: If you are not downloading GPS.hex firmware, click **Next>>** again to advance to the "Download TS3000.hex" screen, then skip to Step 13.

Procedure 3-7. TimeWizard Installation and Operation (Continued)

Step	Procedure
8.	After you click **Next>>** in Step 7, the "Download GPS.hex" screen appears: The versions of the GPS.hex and TS3000.hex firmware that are currently installed in the TimeSource are shown in the GPS.hex Ver and TS3000.hex Ver fields. Current satellite information is shown in the GPS Status field.
9.	Click **ver Unknown** to open the Load GPS File dialog box: 

Procedure 3-7. TimeWizard Installation and Operation (Continued)

Step	Procedure
10.	In the Load GPS File dialog box, navigate to the GPS.hex firmware file to be downloaded, then click **Open**. The message "`Verifying version for C:\`*directory*`\Gps.hex (approx 10 secs)`" appears in the Command area of the screen. Once TimeWizard has verified that the version of the firmware is correct, the text on the **ver Unknown** button changes to show the version of the firmware to be downloaded. After TimeWizard verifies the firmware version, select the Download GPS.hex check-box, then click **Next>>** to start downloading the firmware.
11.	When the firmware download operation starts, the Download Progress dialog box appears:  As the download operation proceeds, the value in the Packet field increases, and the Progress bar shows the progress of the operation. When the firmware download is complete, the Download Progress dialog box closes. *After* the Download Progress dialog box closes, continue with the next step. **Notes:** 1. The firmware download operation can be aborted at any time by clicking the Cancel button in the Download Progress dialog box. 2. If the download fails for any reason, a screen appears with instructions to contact Symmetricom. If this happens, exit the application, check the cable connections, and restart TimeWizard.
12.	After the Download Progress dialog box closes, continue to monitor the messages reported in the Commands area of the screen. After the firmware file finishes downloading from the PC to the TimeSource, the TimeSource requires more time to complete the firmware upgrade process. During this time, it should not be interrupted. When the firmware upgrade is fully complete, TimeWizard automatically advances to the next screen. After the screen automatically advances, continue with the next step.

Download the TS3000.hex Firmware

Note: If you are not downloading TS3000.hex firmware, click **Next>>** again, then skip to Step 18.

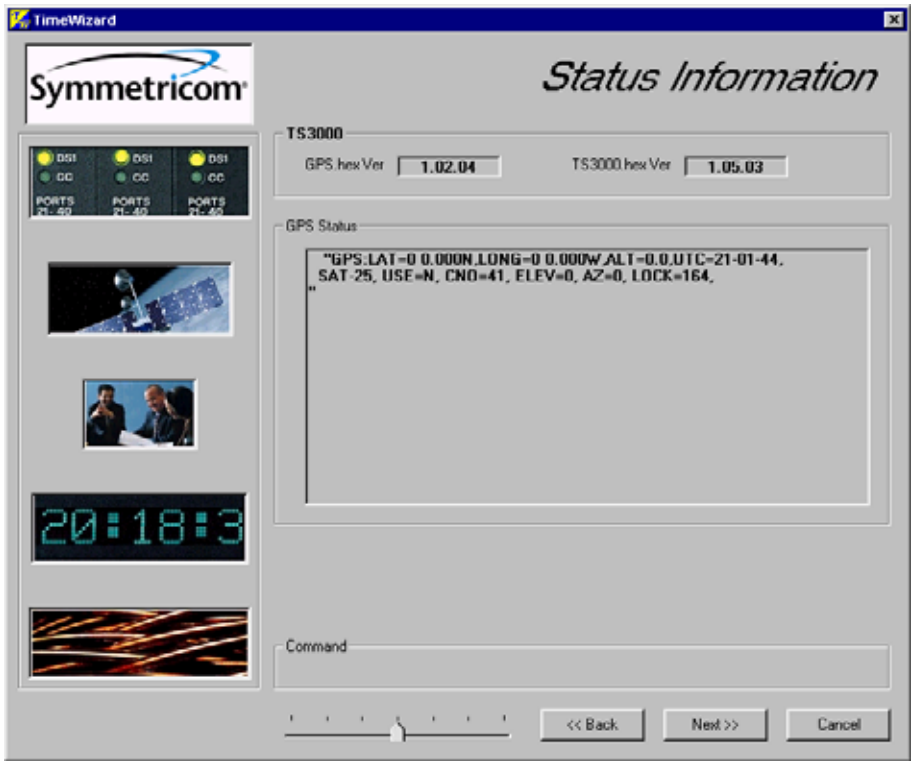
13.	The "Download TS3000.hex" screen appears very similar to the "Download GPS.hex" screen shown in Step 8, and contains the same information.
14.	Click **ver Unknown** to open the Load TS3000 File dialog box, which appears very similar to the dialog box shown in Step 9.

Procedure 3-7. TimeWizard Installation and Operation (Continued)

Step	Procedure
15.	In the Load TS3000 File dialog box, navigate to the TS3000.hex firmware file to be downloaded, then click **Open**. The message "`Verifying version for C:\`*directory*`\ts3000.hex (approx 30 secs)`" appears in the Command area of the screen. Once TimeWizard has verified that the version of the firmware is correct, the text on the **ver Unknown** button changes to show the version of the firmware to be downloaded. After TimeWizard verifies the firmware version, select the Download TS3000.hex check-box, then click **Next>>** to start downloading the firmware.
16.	When the firmware download operation starts, the Download Progress dialog box appears. As the download operation proceeds, the value in the Packet field increases, and the Progress bar shows the progress of the operation. When the firmware download is complete, the Download Progress dialog box closes. *After* the Download Progress dialog box closes, continue with the next step. **Notes:** 1. The firmware download operation can be aborted at any time by clicking the Cancel button in the Download Progress dialog box. 2. If the download fails for any reason, a screen appears with instructions to contact Symmetricom. If this happens, exit the application, check the cable connections, and restart TimeWizard.
17.	After the Download Progress dialog box closes, continue to monitor the messages reported in the Commands area of the screen. After the firmware file finishes downloading from the PC to the TimeSource, the TimeSource requires more time to complete the firmware upgrade process. During this time, it should not be interrupted. When the firmware upgrade is fully complete, TimeWizard automatically advances to the next screen. **Note:** After the TS3000.hex download operation successfully completes, the TimeSource reboots so that it can use the newly installed firmware. Upon rebooting, the system's output might enter the degraded region of the PRS mask for up to one hour. For systems equipped with a Rubidium internal oscillator, the system output will be within the PRS mask if the unit has been in service and alarm free for more than 24 hours. Systems with Rubidium oscillators are the 090-72050-xx and the 090-72060-xx. After the screen automatically advances, continue with the next step.

Procedure 3-7. TimeWizard Installation and Operation (Continued)

Step	Procedure
	Verify the Firmware Versions
18.	The “Status Information” screen appears as follows:



Verify that GPS.hex Ver and TS3000.hex Ver fields show that the correct versions of the GPS.hex and TS3000.hex firmware are now installed, then click **Next>>**.

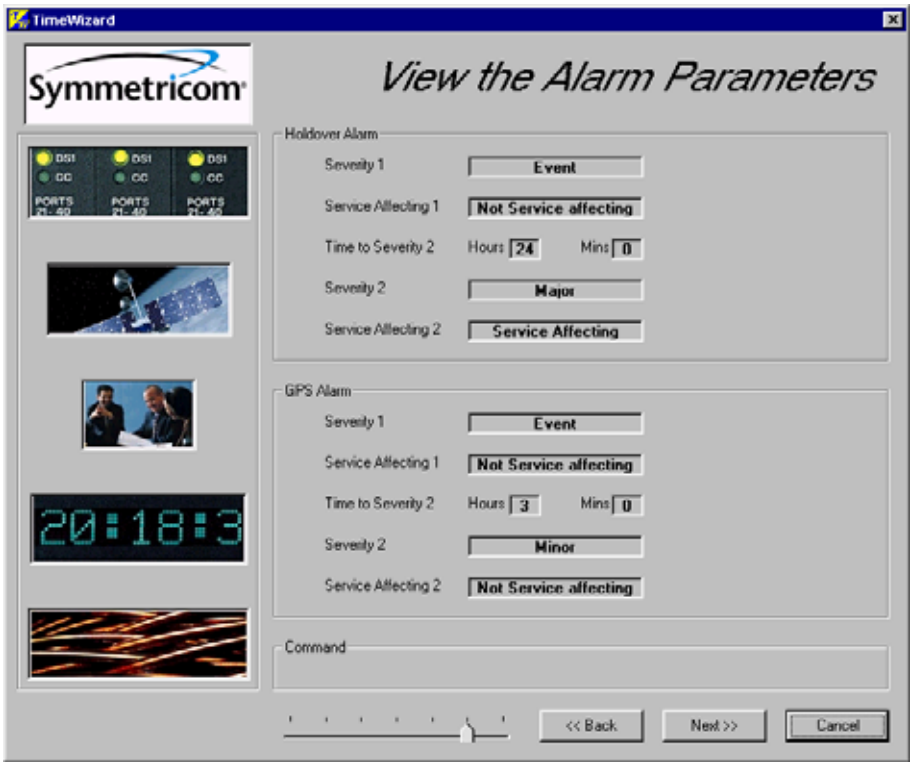
Procedure 3-7. TimeWizard Installation and Operation (Continued)

Step	Procedure
	Setup the Alarm Parameters
19.	The “Set the Alarm Parameters” screen appears:

The Load and Save buttons allow a file to be generated that saves the alarm parameters in a file called TS3Kconf.sym as default. The file name for a configuration can be saved by selecting the Save button and providing a file name. The Load button allows the user to load a saved file that will automatically configure the Alarm Parameters screen.

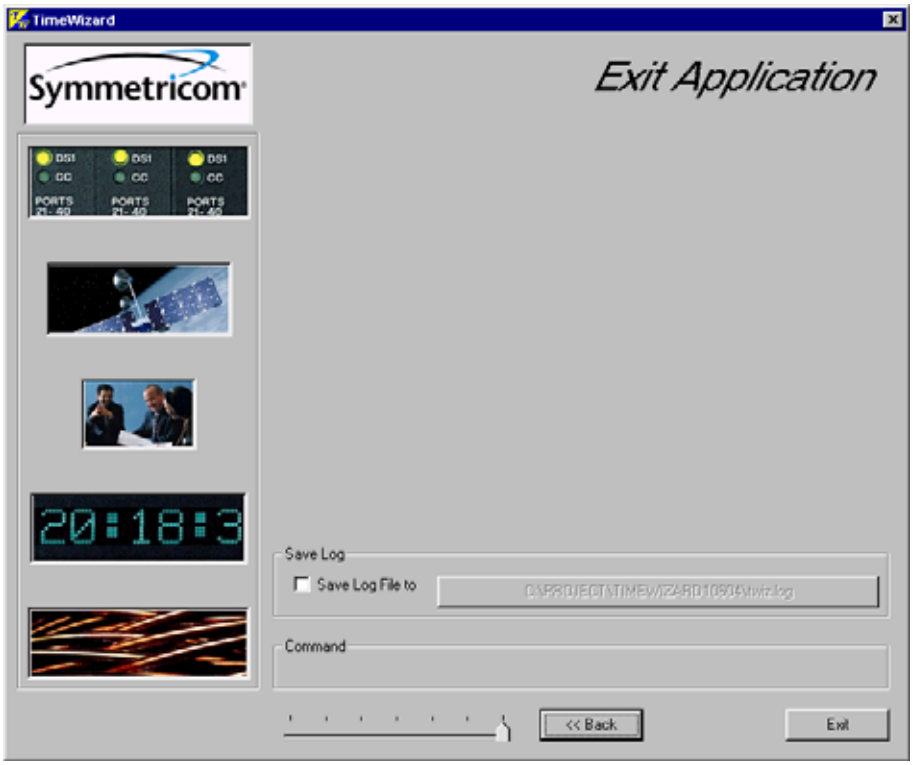
This screen allows the parameters for GPS and Holdover alarm conditions to be modified. If you do not want to modify any of the alarm parameters, click **Next>>** and continue with Step 21 Otherwise, continue with the next step.

Procedure 3-7. TimeWizard Installation and Operation (Continued)

Step	Procedure
20.	Choose the alarm parameters as desired. When you are finished modifying the alarm parameters described below, click **Next>>**. Setting and Description Severity 1 – The initial severity of the alarm. Service Affecting 1 – The initial service affecting status of the alarm condition. Time to Severity 2 – If the Escalate Alarm check-box is selected, the alarm will be escalated to the severity and service affecting status selected under Severity 2 and Service Affecting 2, after the time period selected under Hours and Mins has been reached. If the Escalate Alarm check-box is not selected, the alarm will not be escalated. Severity 2 – The severity of the alarm after it has been escalated. Service Affecting 2 – The service affecting status of the alarm condition after the alarm has been escalated.
21.	The “View the Alarm Parameters” screen appears.  This screen confirms the alarm parameter settings from the previous screen. If the settings are correct, click **Next>>** to continue. If the settings are not correct, click **<<Back** to return to the “Set the Alarm Parameters” screen, and correct the settings.

Procedure 3-7. TimeWizard Installation and Operation (Continued)

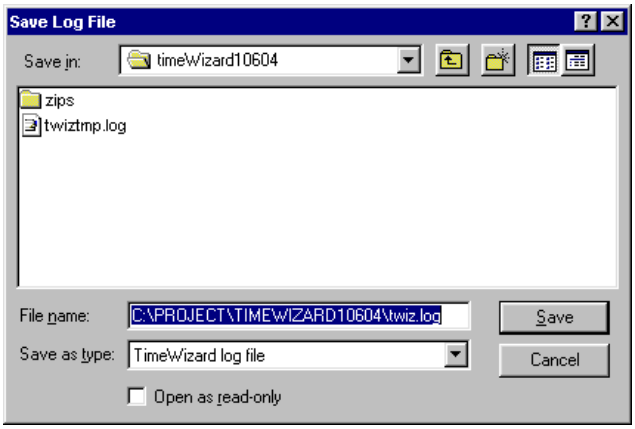
Step	Procedure
	Save the Log File, if Desired
22.	The “Exit Application” screen appears.



This screen allows you to save the log file from the download operation, or exit TimeWizard without saving the log file.

If you do not wish to save the log file, ensure that the Save Log File to check-box is not selected, then click **Exit** to complete the TimeWizard firmware installation procedure. To save the log file, continue with the next step.

Procedure 3-7. TimeWizard Installation and Operation (Continued)

Step	Procedure
23.	Select the **Save Log File to** check-box, then click the button that is adjacent to the check-box to invoke the Save Log File dialog box: 
24.	In the **Save Log File** dialog box, navigate to the location to where the log file is to be stored, enter a name for the log file into the **File Name** field, then click **Save** to save the log file.
25.	Click **Exit** to complete the TimeWizard firmware installation procedure.

End of Procedure

Factory-Set Values

The parameter values initially set at the factory are shown in Table 3-7.

Table 3-7. Parameter Factory Settings

<aid>	Parameter Setting
TS3600	TOD=NONE ALMCOND=ALW IPNE=0.0.0.0 IPSUBNET=255.255.255.255 IPGATE=0.0.0.0 IPEM1=0.0.0.0 IPEM1PORT=0 IPEM2=0.0.0.0 IPEM2PORT=0 IPINACT=0 BYPASS=ALW (990-72060-04 systems only) DCDPASSTHRU=INH DCDUSERPORT=2
TS3600 HOLDOVER ALARM	TIME=72-0 SEV1=EV SEV2=MJ SAFF1=NSA SAFF2=SA
TS3600 GPS ALARM	TIME=10-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA
GPS	ANTCBLDLY=0 ANTELEVMASK=10 ANTMODE=AUTO MANLAT=N-0-0-0 MANLONG=W-0-0-0 MANELEV=0

Table 3-7. Parameter Factory Settings (Continued)

<aid>	Parameter Setting
SPAN-A, SPAN-B	ENSEMBLER=INH MONITOR=INH SSM=INH SIGNAL=DIGITAL SSMCHANNEL=4
SPAN-A, SPAN-B LOS ALARM	TIME=24-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA
SPAN-A, SPAN-B AIS ALARM	TIME=24-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA
SPAN-A, SPAN-B ERROR ALARM	TIME=24-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA
E1-A, E1-B	FRAMING=CAS4 ALMOUT=AIS
COM-1, COM-2, COM-3	BAUD=9600 MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=ALW COMPRI=ALW1 AUTOLOGOFF=20 HWCONTROL=INH SWCONTROL=INH PARITY=NONE STOP=1

Table 3-7. Parameter Factory Settings (Continued)

<aid>	Parameter Setting
COM-5001, COM-5002, COM-5003, COM-5004	MONMSG=INH KEEPALIVE=0 ENDOF TEXT=00 ECHO=ALW COMPRI=ALW1 AUTOLOGOFF=20 SWCONTROL=INH
COM-5551	MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=INH COMPRI=ALW1 AUTOLOGOFF=20 SWCONTROL=INH
OPT-1, OPT-2, OPT-3, OPT-4, OPT-5, OPT-6, OPT-7, OPT-8 (990-72060-02, and 990-72060-06, systems only)	FRAMING=CAS4 ALMOUT=AIS
OPT-1, OPT-2 (990-72060-04 systems only)	ALMOUT=AIS MONITOR=ALW

Chapter 4 TL1 Reference

This chapter provides information for using the TL1 language.

In This Chapter

- Conventions
- Command Format
- Response Format
- Parameters
- Autonomous Messages
- Tasks/Commands
- Commands

Conventions

Uppercase letters in a command designate parameter values which must be entered as shown. Lowercase letters in a command are the parameter name, and the specific values that must be entered for the parameter. Parameters, on page 120 describes the parameters and the values where a value is the same for all parameters. Parameter values for a particular command are listed with the command. The system accepts either uppercase, lowercase, or a mixture of both, but upper and lower case cannot be mixed within a parameter block.

The following symbols are used in the input and response messages:

[ ]	encloses an optional parameter
{ }	encloses a group of parameters, at least one of which must be entered
|	separates alternatives in a group of parameters, at least one of which must be entered
^	indicates a space (used in the description of the response format, but not used in the command responses)
–	separates command code fields
:	separates parameter blocks
,	separates parameters within a block
;	terminates a command, and causes execution
" "	encloses text to be parsed by a machine
/* */	encloses comments for humans
< >	encloses a TL1 named variable
\" \"	encloses a description of a condition
...	indicates the previous line in a response may be repeated as required

Command Format

A command consists of a command code of up to three fields separated by hyphens, followed by parameter blocks separated by colons. Figure 4-1 shows the command format. Parameter blocks consist of one or more parameters separated by commas.

Parameter blocks may be null (contain no parameters), or contain one or more parameters. Two colons occur next to each other if a parameter block is null.

Multiple parameters in a parameter block are separated by commas. Two commas occur next to each other if a parameter is null.

Entering a semicolon at the end of the command indicates that the command statement is completed to the interpreter, and executes the command.

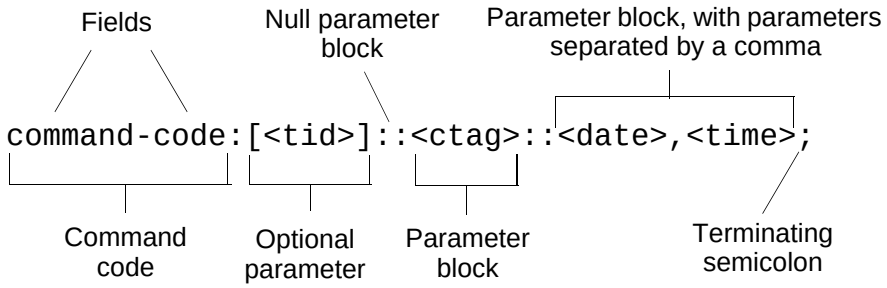


Figure 4-1. Command Format

Response Format

When a command is received and processed, a response is returned. All responses include a source identifier (<sid>), the date, the time, an M to indicate that it is a response to a command, and the correlation tag (<ctag>) that was entered with the command.

Figure 4-2 shows the completed response format. COMPLD indicates that the command was completed without error.

Note: If the command was a query, additional information would be displayed before the semicolon.

```
^^^<sid>^<date>^<time>
M^^<ctag>^COMPLD
^^^/*LINK:<link>,CMD:<co
mmand>*/
```

Figure 4-2. Completed Response Format

Figure 4-3 shows the denied response format. DENY indicates that the command was denied due to an error. The <errcde> parameter indicates the corresponding error type, or cause of the error.

```
^^^<sid>^<date>^<time>
M^^<ctag>^DENY
^^^<errcde>
^^^/*  <error
message>  */
^^^/*LINK:<link>,CMD:<co
```

Figure 4-3. Deny Response Format

Parameters

The parameters that may be used in commands, responses, and messages are defined in Table 4-1. When a parameter uses the same values in every instance, those values are listed with the parameter in the table. When the context requires different values for a parameter, the value is listed with the parameter in the applicable commands, responses, and messages.

Table 4-1. Parameter Definitions

Parameter	Definition
<aid>	Access identifier for the object of the command or message. It may have more than one part.
<almcde>	Alarm code. Identifies the severity of the alarm based on its priority of action. If multiple alarms are reported, almcde is the highest severity of those reported.
<atag>	Automatic message tag. It is incremented by one for each autonomous message. The <atag> value is a whole number from 001 through 999, which is reset to 001 at reset or when it rolls over.
<command>	Echo of the entered command.
<conddescr>	Text description of the condition. The <conddescr> value is limited to 64 characters starting and ending with a back slash and a double quotation mark (\"). Refer to Chapter 5, Troubleshooting for the list of values.
<condeff>	Effect on the condition of the equipment.
<condtype>	Type of alarm condition.
<ctag>	Correlation tag used to correlate input and response messages. The ctag contains 1 to 6 characters. It must be included in a command, and the same ctag is returned in the response.
<date>	Date in the 8-digit form: yyyy-mm-dd (command) or yyyy:mm:dd (response or message), where yyyy is the year, mm is the month (01 to 12), and dd is the day of the month (01 to 31). For example, May 3, 2000 is 2000-05-03.

Table 4-1. Parameter Definitions (Continued)

Parameter	Definition
<errcde>	Four-character mnemonic error code, which is one of the following: EFON = equipment feature option not provided ENEQ = not equipped ICNV = command not valid IDNV = invalid data in command IDRG = invalid data range in command IIAC = invalid aid in command IICT = invalid correlation tag IIDT = invalid data parameter in command IISP = invalid syntax or punctuation IITA = invalid tid PIUI = invalid or duplicate uid or pid (privileged users only) RALB = All units of requested type are busy RCBY = circuit is busy SCSN = invalid command sequence SDBE = internal database error SNIS = not in service SNVS = not in a valid state SRCN = requested condition currently exists SRQN = request invalid SWFA = working unit failed
<error message>	Error code text message.
<link>	Communication link identifier.
<modifier>	Equipment initiating the alarm or event message, which is one of the following: TS3600 = system software GPS = GPS receiver software SPAN-x = E1 span input
<mondat>	Date of the performance monitoring data.
<montm>	Time of the performance monitoring data.
<montype>	Data type of the performance monitoring data.
<monval>	Value of the performance monitoring data.
<ntfcncde>	Notification code showing the alarm severity, which is one of the following: CR = critical MJ = major MN = minor
<ocrdat>	Occurrence date in the 8-digit form: yyyy-mm-dd (command) or yyyy:mm:dd (response or message), where yyyy is the year, mm is the month (01 to 12), and dd is the day of the month (01 to 31). For example, May 3, 2000 is 2000-05-03.

Table 4-1. Parameter Definitions (Continued)

Parameter	Definition
<ocrtm>	Occurrence time in the 6-digit form: hh-mm-ss (command) or hh:mm:ss (response or message), where hh is hours (00 to 23), mm is minutes (00 to 59), and ss is seconds (00 to 59). For example, 2:34 pm is 14:34:00.
<pid>	Private identifier, factory-set to “TS3000!!”. It is the initial password for the TELECOM <uid>. Passwords are encrypted when stored in the TimeSource 3600, and are never transmitted from the shelf. The pid contains a case-insensitive string of 8 to 10 ASCII characters, and must include at least one letter, one numeral, and one special character from the following: ! " $ % & ' ( ) * + - . / < > ? @
<sid>	Source identifier of the equipment sending the message. The <sid> may contain a maximum of 20 characters (limited to letters, digits, and hyphens), and may begin with a letter. The <sid> is recommended to be the equipment’s CLLI code.
<spec_block>	Replaced by a number of parameters within the command. Parameters are in the format <name>=<value>, may be entered in any order, and must be separated by a comma.
<srveff>	Identifies whether the alarm condition is service affecting: SA = service affecting NSA = not service affecting
<tid>	Target identifier of the equipment to which the command is directed. The tid must be a valid TL1 identifier of a maximum of 20 characters (limited to letters, digits, and hyphens) beginning with a letter. The <tid> is recommended to be the target's CLLI code, and can also be used as the <sid>. The <tid> can be null if the OS directly interfaces to the target. The <tid> can be omitted only if connection is made directly to a single TimeSource 3600 Shelf.
<time>	Current time in the six-digit form: hh-mm-ss (command) or hh:mm:ss (response or message), where hh is hours (00 to 23), mm is minutes (00 to 59), and ss is seconds (00 to 59). For example, 5:11:49 a.m. is 05:11:49.
<uap>	User access level, used by a system administrator to assign a given level of access to system users. User access level ranges from 1 to 5, with 1 being the lowest access level, and 5 being the highest access level.
<uid>	User identifier, factory-set to TELECOM. The <uid> contains alphanumeric, case-insensitive strings of 6 to 10 characters provisioned as valid login IDs.
<uout>	User inactivity password which indicates the number of days a system user has not logged on to the system. The user inactivity timeout range is 0 to 180 days, with 0 indicating no timeout.
<utc>	Universal Coordinated Time (UTC) in the 6-digit form: hh-mm-ss, where hh is hours (00 to 23), mm is minutes (00 to 59), and ss is seconds (00 to 59). For example, 2:34 pm is 14-34-00.
<vldty>	Validity of the performance monitoring data.

Autonomous Messages

Autonomous messages are sent out when an alarm or event occurs. Two types of autonomous messages are used:

- Report Alarm: reports alarms
- Report Event: reports events that are not alarms, or that have not yet become alarms

Autonomous messages are listed on the following pages. After the message name, a definition of the message is given.

Report Alarm

This autonomous message appears when an alarm is raised, and appears again when the alarm is cleared.

Message:

```
^^^<sid> <date> <time>
M^^<almcde> <atag> REPT ALM EQPT <modifier>
^^^"<aid>:<ntfcncde>,<condtype>,<srveff>,
        <ocrdat>,<ocrtm>,,,:\"<conddescr>\
        "[:<dgntype>]"
```

Note: Refer to Table 4-1 for parameter definitions.

Report Event

This autonomous message appears when an event is raised, and again when the event is cleared; also appears when a transient event occurs. An event is a state of the TimeSource 3600 that does not cause an alarm.

Message:

```
^^^<sid> <date> <time>
M^^<atag> REPT EVT EQPT <modifier>
^^^"<aid>:<condtype>,<condeff>,<ocrdat>,<ocrtm>
        ,,,,:\"<conddescr>\"[:<dgntype>]"
```

Note: Refer to Table 4-1 for parameter definitions.

Tasks/Commands

To perform each task, use the command listed beside that task in Table 4-2.

Table 4-2. Commands for Tasks

Task	Command	Page
Log user onto system	Activate User	126
Log user off of system	Cancel User	127
Copy software program or database	Copy Memory	128
Delete equipment from the database	Delete Equipment	130
Delete a user from system	Delete User Security	131
Change communication port parameters	Edit Communication	132
Change the system date and time	Edit Date	135
Change equipment parameters	Edit Equipment	137
Enter equipment into the database and allow the equipment to be used for monitoring	Enter Equipment	146
Enter a new user and configure the new user's user name, password, and access level	Enter User Security	147
Reset the alarm log	Initialize Log	148
Reset to zero all performance monitoring parameters associated with a given aid	Initialize Register	149
Reset the system processor or GPS receiver processor	Initialize System	150
Deactivate the audible office alarm	Operate Alarm Cutoff All	151
Display current system alarms	Retrieve Alarm All	152
Display current alarms for specific equipment	Retrieve Alarm Equipment	153
Display current communication port parameter settings	Retrieve Communication	154

Table 4-2. Commands for Tasks (Continued)

Task	Command	Page
Display current system alarms and events	Retrieve Condition All	157
Display current alarms and events for specific equipment	Retrieve Condition Equipment	158
Display parameter settings of equipment	Retrieve Equipment	159
Display GPS status information	Retrieve GPS Status	166
Display header information	Retrieve Header	168
Display information about equipment	Retrieve Inventory	169
Display alarm log data	Retrieve Log	171
Display performance monitoring data	Retrieve Performance Monitoring	172
Display the current users logged in to each port that is currently being used	Retrieve Status Security	180
Display security parameters for a single user or for all users	Retrieve User Security	181
Set the name of the equipment	Set Source Identifier	182

Commands

The commands used with the TimeSource 3600 are listed on the following pages. After the command name, a definition of the command is given. The definition is followed by the actual command, followed by the variables that can be used with the command.

The response format shows how the response will appear, with additional definitions of the response parameters where required.

Activate User

This command logs the user onto the system and begins a session. The factory-set user name is “TELECOM”, and the factory-set password is “TS3000!!”. The user name and password are not case sensitive (either uppercase or lowercase can be used). The command format is:

```
ACT-USER:[<tid>]:<uid>:<ctag>::<pid>;
```

Parameter	Description
<uid>	Assigned user name
<pid>	Assigned password

Command Example:

```
ACT-USER::TELECOM:<ctag>::TS3000!!;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Cancel User

This command logs the current user off the system, and logs other users off the system as well, provided the current user has access rights of 5. The user name is not case sensitive, but must otherwise be entered exactly as assigned.

To cancel another user, type the command with the UID as the user name to be logged out.

The command format is:

```
CANC-USER:[<tid>]:<uid>:<ctag>;
```

Parameter	Description
<uid>	Assigned user name

Command Example:

```
CANC-USER::TELECOM:<ctag>;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Copy Memory

This command copies a software program from an external computer to the TimeSource 3600, or copies the system database to nonvolatile memory.

The Software Release Notice (included with this software release) contains detailed instructions for copying programs from an external computer to nonvolatile memory.

Note: Clear any existing alarms before using this command.

The database is automatically copied to nonvolatile memory once per hour. However, if power to the TimeSource 3600 is interrupted before the automatic copying occurs, changes made since the last automatic copy will be lost. To avoid the possibility of losing database changes, the Copy Memory command may be used to copy database changes to nonvolatile memory after any changes are made.

To copy a program from an external computer to nonvolatile memory within the TimeSource 3600, the command format is:

```
CPY-MEM:[<tid>]:<aid>:<ctag>::AUX,,WKG:PGM;
```

Aid	Item Addressed
TS3000	System software
GPS	GPS receiver software
DEV2	TimeSource 3600 (standard) (990-72060-01 systems)
DEV4	TimeSource 3600 with four TOD IRIG-B outputs (990-72060-05 systems)
DEV6	TimeSource 3600 with eight additional E1 or 2.048 MHz outputs (990-72060-02 systems)
DEV8	TimeSource 3600 with two ESCIU ports (990-72060-04 systems)
DEV10	TimeSource 3600 with mixed E1/T1 outputs (990-72060-06)

Command Example:

```
CPY-MEM::TS3000:<ctag>::AUX,,WKG:PGM;
```

Response Format:

```
<sid> <date> <time>
M  <ctag> COMPLD
   /*LINK:<link>,CMD:<command>*/
;
```

To copy a database from volatile to nonvolatile memory within the TimeSource 3600, the command format is:

```
CPY-MEM:[<tid>]:<aid>:<ctag>::WKG,,AUX:DATA;
```

Aid	Item Addressed
TS3600	System Database

Command Example:

```
CPY-MEM::TS3600:<ctag>::WKG,,AUX:DATA;
```

Response Format:

```
    <sid> <date> <time>
M  <ctag> COMPLD
   /*LINK:<link>,CMD:<command>*/
;
```

Delete Equipment

This command deletes the specified equipment from the database, removes the input from the ensembling algorithm, and stops the monitoring for that input. Alarms are not reported for deleted equipment. The command format is:

```
DLT-EQPT:[<tid>]:<aid>:<ctag>::<spec_block>
```

Aid	Value	Item Addressed
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
OPT-a	a = 1	ESCIU port 1 (990-72060-04 systems only)
	a = 2	ESCIU port 2 (990-72060-04 systems only)

Command Example:

```
DLT-EQPT::SPAN-A:<ctag>;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Delete User Security

This command allows a system administrator to delete a user. The command format is:

```
DLT-USER-SECU:[<tid>]:<uid>:<ctag>;
```

Parameter	Description
<uid>	Assigned user name

Command Example:

```
DLT-USER-SECU::TELECOM:<ctag>;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Edit Communication

This command changes communication port parameters. The command format is:

```
ED-COM:[<tid>]:<aid>:<ctag>:::<spec_block>;
```

Aid	Value	Item Addressed
COM-a	a = 1	Serial communication port 1 (COM1)
	a = 2	Serial communication port 2 (COM2)
	a = 3	Serial communication port 3 (Craft)
	a = 5001	Ethernet user interface port 5001 (Note: 1)
	a = 5002	Ethernet user interface port 5002 (Note: 1)
	a = 5003	Ethernet user interface port 5003 (Note: 1)
	a = 5004	Ethernet user interface port 5004 (Note: 1)
	a = 5551	Ethernet element manager interface port 5551(Note: 2)

Note:

1 Ethernet ports 5001, 5002, 5003, and 5004 are set up to act as serial communication ports, so that a terminal program on a computer connected to these ports can communicate effectively.

2 Ethernet port 5551 is set up to allow an element manager to connect with it for TL1 commands and responses. TL1 autonomous messages are sent through port 5550, which connects to an element manager to send one or a group of autonomous messages, then disconnects. Port 5550 is not to be reconfigured.

The parameters which can be entered in the <spec_block> are listed below. For any specific <aid> entered in a command, only certain parameters are valid. For each valid parameter, choose the appropriate value from the Value column. When entering multiple parameters, separate the parameters with commas.

Aid	Parameter	Value	Description
COM-a	MONMSG=b	b = ALW	View messages from all ports
		b = INH	View messages from this port only
	KEEPALIVE=b	b = 1 to 255	Inactive minutes until the unit sends a COMPLD message to keep the connection from being closed
		b = 0	No COMPLD message is output
	ENDOFTEXT=b	b = 1 to 9F	Hex code at end of all responses
		b = 0	No hex code at end of responses
	ECHO=b	b = ALW	Echoes characters received so they appear on the user's screen as typed
		b = INH	Local echo is disabled
	COMPRI=b	b = ALW0	TL1 commands and responses, no autonomous messages sent
		b = ALW1	TL1 commands and responses, autonomous messages
		b = ALW2	TL1 commands and responses, autonomous messages whether logged on or not
		b = INH	Closes connection, logs off any user (if logged on), and keeps port from use. Releases a telnet session from an Ethernet port (a port cannot close itself)
	AUTOLOGOFF=b	b = 1 to 255	Inactive minutes until the unit logs off the user, keeping the connection open
		b = 0	Autologoff is disabled
	HWCONTROL=b (See Note: 1 and Note: 2)	b = ALW	Serial port CTS/RTS flow control is enabled
		b = INH	Serial port CTS/RTS flow control is not enabled
	SWCONTROL=b (See Note: 1 and Note: 2)	b = ALW	XON/XOFF flow control is enabled
		b = INH	XON/XOFF flow control is not enabled

Aid	Parameter	Value	Description
COM-a (cont'd)	BAUD=b (See Note: 3)	b = 115	Serial port baud rate is 115 kbaud
		b = 57.6	Serial port baud rate is 57.6 kbaud
		b = 38.4	Serial port baud rate is 38.4 kbaud
		b = 19.2	Serial port baud rate is 19.2 kbaud
		b = 9600	Serial port baud rate is 9600 baud
		b = 4800	Serial port baud rate is 4800 baud
		b = 2400	Serial port baud rate is 2400 baud
		b = 1200	Serial port baud rate is 1200 baud
	PARITY=b (See Note: 3)	b = EVEN	Even parity is enabled on serial port
		b = ODD	Odd parity is enabled on serial port
		b = NONE	No parity is enabled on serial port
	STOP=b (See Note: 3)	b = 1	1 stop bit on serial port
		b = 2	2 stop bits on serial port

Note:

1 Flow control is not implemented on communication port 3 (Craft port).

2 XON/XOFF flow control is simulated for Ethernet ports.

3 Baud rate, parity, and stop bits can only be configured on serial communication ports (1, 2, and 3).

Command Example:

```
ED-COM::COM-1:<ctag>:::BAUD=9600,MONMSG=ALW,
          KEEPALIVE=30,ENDOFTEXT=0,ECHO=ALW,
COMPRI=ALW1,AUTOLOGOFF=30,HWCONTROL=ALW,
          SWCONTROL=ALW,PARITY=NONE,STOP=1;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Edit Date

This command changes the system date and time. The command format is:

```
ED-DAT:[<tid>]::<ctag>::<date>,[<time>]
          :[MODE=a];
```

Parameter	Value	Description
date in the format a-b-c	a = <year>	4-digit year
	b = 01 to 12	Month
	c = 01 to 31	Day
time in the format a-b-c (Note: 1)	a = 00 to 23	Hour of the day
	b = 00 to 59	Minutes
	c = 00 to 59	Seconds
MODE=a	a = UTC (Note: 2)	Uses Universal Coordinated Time from GPS (cannot set time by TL1 command)
	a = LOCAL	Uses local time for hours, UTC for minutes and seconds

Note:

1 The <time> value can only be entered when MODE=LOCAL, or in the same command as MODE=LOCAL, otherwise the command is denied. A successful command with <time> changes the display of time to conform to the nearest 30 minutes, relative to UTC.

For example, when the UTC time is 01:12:10, setting the local time to 18:50:30 will actually set the clock to 18:42:10, because 18:42:10 is the closest 30 minute jump, relative to UTC, from 18:50:30. This is done to accommodate 30-minute time zones and still keep the local time accurate to UTC.

2 If a command includes MODE=UTC, and the GPS signal is not present, the command is denied.

The date/time behavior is as follows:

- During warm-up:
  - The date/time displayed starts from 1970 and increments from there. If the ED-DAT command is used to set the time in local mode, the time is changed as specified in the command.
- After warm-up:

- If the ED-DAT command has not been used to set the local mode time, then UTC date and time are displayed.
- If the ED-DAT command has been used to set the local mode time, then it is changed in the manner described as follows.
- The date given in the ED-DAT command is retained. The local hours, minutes, and seconds are set to the nearest 30-minute divisible difference from UTC. Refer to the following examples:

  Example 1. UTC time= 01:00:00. Local time= 18:01:10 will set the local time to 18:00:00.

  Example 2. UTC time= 01:00:00. Local time= 18:25:30 will set the local time to 18:30:00.

  Example 3. UTC time= 01:12:10. Local time= 18:50:30 will set the local time to 18:42:10.

- During Holdover Event
  - The date/time continues to increment normally.
- During Holdover Alarm
  - The date/time continues to increment normally.

Example to set date without changing time or mode:

```
ED-DAT:::<ctag>::2000-08-13;
```

Example to change to local time:

```
ED-DAT:::<ctag>::2000-08-13,07-00-00:MODE=LOCAL;
```

Example to change from local to UTC time:

```
ED-DAT:::<ctag>::2000-08-13:MODE=UTC;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Edit Equipment

This command changes equipment parameters. Additionally, this command can cause an input to be ensembled. The command format is:

```
ED-EQPT:[<tid>]:<aid>:<ctag>:::<spec_block>;
```

Aid	Value	Item Addressed
TS3600	—	System-wide configuration
GPS	—	GPS configuration
SPAN-a	a = A	Span A input
	a = B	Span B input
E1-a	a = A	E1 A output
	a = B	E1 B input
OPT-a	a = 1 to 8	E1 option outputs: 1 through 8 (990-72060-02 and 990-72060-06 systems only)
OPT-a	a = 1 to 2	ESCIU option ports: 1 or 2 (990-72060-04 systems only)

The parameters which can be entered in the <spec_block> are listed below. For any specific <aid> entered in a command, only certain parameters are valid. For each valid parameter, choose the appropriate value from the Value column. When entering multiple parameters, separate the parameters with commas.

Aid	Parameter	Value	Description
TS3600	TOD=a	a = CISCO	Serial message sent in Cisco format
		a = NTP4	Serial message sent in NTP Type 4 format
		a = NONE	No serial message sent
	ALMCOND =a	a = ALW	Alarm conditioning for E1, TOD, and IRIG-B outputs is enabled
		a = INH	Alarm conditioning for E1, TOD, and IRIG-B outputs is disabled

Aid	Parameter	Value	Description
TS3600 (cont'd)	IPNE=a.b.c.d (See Note: 1)	a = 0 to 255	IP address of this TimeSource 3600 (command must be sent from COM1, COM2, or Craft port to set this parameter)
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPSUBNET=a.b.c.d (See Note: 1)	a = 0 to 255	Subnet mask for this TimeSource 3600 (command must be sent from COM1, COM2, or Craft port to set this parameter)
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	BYPASS=a (990-72060-04 systems only)	a = AIS	When the ESCIU detects an LOS on an input spans, AIS is output to the NE (the E1 alignment sequence is blocked)
		a = PASSTHRU	When the ESCIU detects an LOS on one of its input spans, the E1 alignment sequence is passed through to the NE with the original input alarm
	IPGATE=a.b.c.d (See Note: 1)	a = 0 to 255	Default gateway IP address for this TimeSource 3600 (command must be sent from COM1, COM2, or Craft port to set this parameter)
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPEM1=a.b.c.d (See Note: 1, Note: 2, Note: 3)	a = 0 to 255	IP address of primary element manager (port 5550 connects to this element manager to send autonomous messages, disconnects when transmit is complete)
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	

Aid	Parameter	Value	Description
TS3600 (cont'd)	IPEM1PORT=a (See Note: 1, Note: 2, Note: 3)	a = 0 to 65535	Port address of primary element manager (port for IPEM1 address)
	IPEM2=a.b.c.d (See Note: 1, Note: 2, Note: 3)	a = 0 to 255	IP address of alternate element manager (if used) (port 5550 connects to this element manager if connection cannot be made to the primary element manager)
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPEM2PORT=a (See Note: 1, Note: 2, Note: 3)	a = 0 to 65535	Port address of alternate element manager (port for IPEM2 address)
	IPINACT=a (See Note: 1)	a = 0 to 10000	Port 5550 closes the connection to the Element Manager if no autonomous messages are sent during this number of 100-ms units (0 to 10,000, where 0 deactivates the timer, for example, 100 = 10 s)
	ALARM=x	x = HOLDOVER	HOLDOVER alarm
		x = GPS	GPS alarm
SPAN A & B	ALARM=x	x = LOS	LOS alarm
		x = AIS	AIS alarm
		x = ERROR	ERROR alarm
TS3600, SPAN A & B	TIME=x	x = HH-MM	Hour (00-999) and minute (00-59) time to escalate alarm
		x = 0	No alarm escalation

Aid	Parameter	Value	Description
TS3600, SPAN A & B (cont'd)	SEVERITY1=x (See Note: 4)	x = CR	Severity of initial alarm prior to escalation
		x = MJ	
		x = MN	
		x = EV	
		x = NA	
	TIME=x	x = HH-MM	Hour (00-999) and minute (00-59) time to escalate alarm
		x = 0	No alarm escalation
	SEVERITY1=x (See Note: 5)	x = CR	Severity of initial alarm prior to escalation
		x = MJ	
		x = MN	
		x = EV	
		x = NA	
	SEVERITY2=x (See Note: 5)	x = CR	Severity of escalated alarm
		x = MJ	
		x = MN	
		x = EV	
		x = NA	
	SERAFF1=x (See Note: 5)	x = SA	Service affecting state of initial alarm prior to escalation
		x = NSA	
	SERAFF2=x (See Note: 5)	x = SA	Service affecting state of escalated alarm
		x = NSA	
TS3600	NTPPWD=x (See Note: 6)	x = 6 ASCII characters	NTP Password (contact factory)

Aid	Parameter	Value	Description
GPS	ANTCBLDLY=a (See Note: 7)	a = 0 to 300	Antenna cable length (meters)
	ANTELEVMASK=a (See Note: 6)	a = 0 to 45	Antenna elevation mask angle (degrees)
	ANTMODE=a (See Note: 8)	a = AUTO	Automatic survey-in mode (use only with roof antenna configuration)
		a = MANUAL	Manual survey-in mode (do not use with roof antenna configuration)
	MANLAT=a-b-c-d (See Note: 7)	a = N	North latitude
		a = S	South latitude
		b = 0 to 179	Degrees of latitude
		c = 0 to 59	Minutes of latitude
		d = 0 to 999	Decimal minutes of latitude
	MANLONG= a-b-c-d (See Note: 7)	a = E	East longitude
		a = W	West longitude
		b = 0 to 179	Degrees of longitude
		c = 0 to 59	Minutes of longitude
		d = 0 to 999	Decimal minutes of longitude
	MANELEVALT=a (See Note: 7)	a = 0 to 8000	Antenna elevation (meters)
SPAN-a	ENSEMBLER=b (See Note: 9	b = ALW	Span is ensembled
		b = INH	Span is not ensembled
	SSM=b (See Note: 8 and Note: 10)	b = ALW	SSM qualifies span input
		b = INH	SSM does not qualify span input
	SIGNAL=b (See Note: 11)	b = ANALOG	Span input signal is 2.048 MHz (analog)
		b = DIGITAL	Span input signal is 2.048 Mb/s (digital)

Aid	Parameter	Value	Description
SPAN-a (cont'd)	SSMCHANNEL=b (See Note: 8 and Note: 9)	b = 4	Uses Sa4 bit
		b = 5	Uses Sa5 bit
		b = 6	Uses Sa6 bit
		b = 7	Uses Sa7 bit
		b = 8	Uses Sa8 bit
E1-a	ALMOUT=b	b = AIS	Output is AIS during holdover alarm
		b = SQUELCH	No output during holdover alarm
		b = SSM	Output includes SSM during holdover alarm (SSM requires either CAS4 or CCS4 output framing)
	FRAMING=b	b = CAS	Output framing is CAS
		b = CAS4	Output framing is CAS4
		b = CCS	Output framing is CCS
		b = CCS4	Output framing is CCS4
		b = NONE	No framing (analog) (See Note: 12)
OPT-a (Additional E1 outputs on 990-72060-02 systems only)	ALMOUT=b	b = AIS	Output is AIS during holdover alarm
		b = SQUELCH	No output during holdover alarm
		b = SSM	Output includes SSM during alarm (SSM requires either CAS4 or CCS4 output framing)
	FRAMING=b	b = CAS	Output framing is CAS
		b = CAS4	Output framing is CAS4
		b = CCS	Output framing is CCS
		b = CCS4	Output framing is CCS4
		b = NONE	No framing (analog) (See Note: 12)

Aid	Parameter	Value	Description
OPT-a (ESCIU ports on 990-72060-04 systems only)	ALMOUT=b	b = AIS	When the ESCIU detects LOS on an input span, an all-ones signal (AIS), without the E1 frame alignment sequence, is output to the downstream network element
		b = PASSTHRU	All traffic passes through to the downstream network element, including the LOS alarm signal
OPT-a (990-72060-06 systems only)	ALMOUT=b	b = AIS	Output is AIS during alarm
		b = SQUELCH	Output is squelched during alarm
		b = SSM	Outputs are at ‘STU’ quality level for ESF framing and at ‘SSUT’ quality level for CAS4 and CCS4 framing during holdover alarm (SSM requires CAS4, CCS4,or ESF output framing)
	FRAMING =b	b = CAS	Output framing is CAS
		b = CAS4	Output framing is CAS4
		b = CCS	Output framing is CCS
		b = CCS4	Output framing is CCS4
		b = D4	Output framing is D4
		b = ESF	Output framing is ESF
		b = NONE	Output framing is NONE (analog) (see Note: 12)
TS3600	DCDPASSTHRU	INH	DCD port communication is inhibited
		ALW1	COM1 is the DCD interface port
		ALW2	COM2 is the DCD interface port
	DCDUSERPORT=x (See Note: 13)	x = 1	COM1
		x = 2	COM2
		x = 3 or 5001, 5002, 5003, 5004	COM3 or IP port 5001 to 5004

Note:

1 This parameter affects all Ethernet ports. Close the Ethernet ports and log off all users before issuing a command with this parameter. The TimeSource does no filtering to verify an improper network address entry. Users should verify correct network addresses with Network Administrators and take care to enter correct addresses.

2 Port 5550 makes a connection to this element manager to send TL1 autonomous messages, and closes the connection when the transmission is complete.

3 Port 5551 accepts a connection from this element manager for TL1 commands and responses.

4 When setting alarm integration time (SEVERITY or SERAFF), the type of alarm (HOLDOVER, GPS, LOS, AIS, or ERROR) has to be specified. For example, ED-EQPT::TS3600:CTAG:::ALARM=HOLDOVER, TIME=72-00, SEVERITY1=EV, SERAFF1=NSA, SEVERITY2=MJ, SERAFF2=SA; will generate a holdover event as soon as the condition is detected with an NSA flag. Once this condition has existed for 72 hours, TS3600 will generate a major alarm with an SA flag. These parameters can then be verified using the RTRV-EQPT command.

5 When setting alarm integration time (SEVERITY or SERAFF), the type of alarm (HOLDOVER, GPS, LOS, AIS, or ERROR) has to be specified. For example, ED-EQPT::TS3600:CTAG:::ALARM=HOLDOVER, TIME=72-00, SEVERITY1=EV, SERAFF1=NSA, SEVERITY2=MJ, SERAFF2=SA; will generate a holdover event as soon as the condition is detected with an NSA flag. Once this condition has existed for 72 hours, TS3600 will generate a major alarm with an SA flag. These parameters can then be verified using the RTRV-EQPT command.

6 If the dbinit jumper is changed, the NTP password has to be re-entered.

7 When the TimeSource 3600 uses a roof antenna, only the parameters ANTCBLDLY and ANTELEVMASK, and the mode ANTMODE=AUTO, are allowed.

8 The TimeSource 3600 uses the MANLAT, MANLONG, and MANELEV values for latitude, longitude, and elevation when ANTMODE=MANUAL becomes active. The TimeSource 3600 uses these values as starting points for processing the antenna position. Changes to these values are ignored while the TimeSource 3600 is in the AUTO mode.

9 A span must have been put into service using the ENT-EQPT command before setting the ENSEMBLER and SSM parameters.

10 The span input must be a digital 2.048 Mb/s E1 signal to use SSM. If not, the command is denied.

11 The span must be put into service using the ENT-EQPT command before using this parameter.

12 When output framing is set to NONE (analog), ALMOUT=SQUELCH turns off the outputs during holdover alarm. ALMOUT=AIS or ALMOUT=SSM converts E1 output framing to digital format to provide alarm signaling during alarm. Set alarm condition to disabled to maintain analog output during alarm.

13 All commands on DCDUSERPORT having TID which equals SID of the DCD are forwarded to the DCD. Similarly, the responses from the DCD are sent to the provisioned DCDUSERPORT.

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

The flow chart in Figure 4-4 illustrates the alarm conditioning possible with the TimeSource 3600.

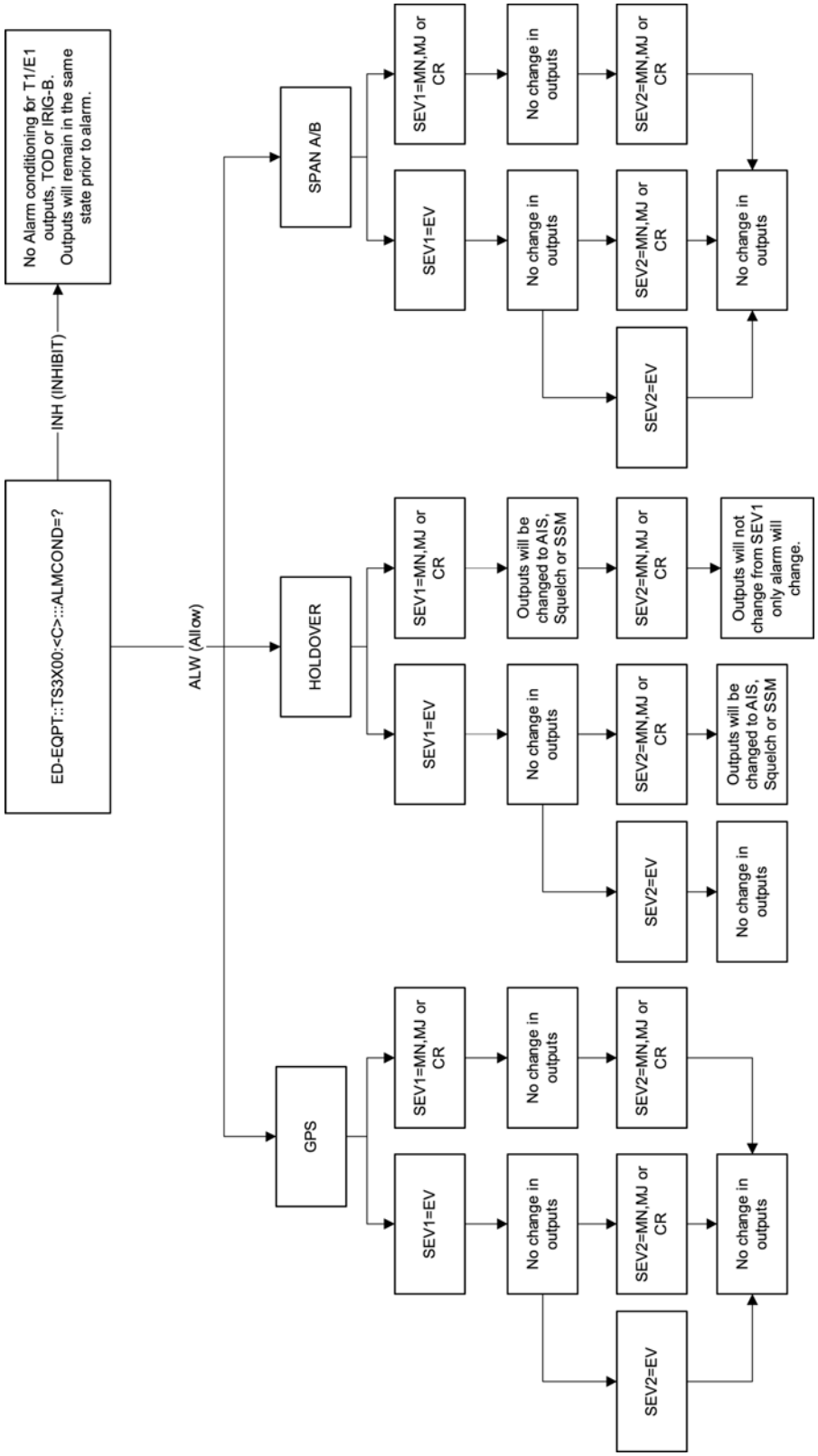


Figure 4-4. Alarm Conditioning Flow Chart

Enter Equipment

This command puts optional inputs in service, and causes the selected input to be monitored. Additionally, this command can cause an input to be ensembled. All in-service inputs are monitored. The Delete Equipment command must be used to take an input out of service. The command format is:

```
ENT-EQPT:[<tid>]:<aid>:<ctag>:::<spec_block>;
```

Aid	Value	Item Addressed
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
OPT-a (990-72060-04 systems only)	a = 1	ESCIU port 1
	a = 2	ESCIU port 2

The parameters which can be entered in the <spec_block> are listed below. For any specific <aid> entered in a command, only certain parameters are valid. For each valid parameter, choose the appropriate value from the Value column. When entering multiple parameters, separate the parameters with commas.

Aid	Parameter	Value	Description
SPAN-a	ENSEMBLER=b	b = ALW	Span is monitored and ensembled
		b = INH	Span is monitored, but not ensembled

Example to set an input to be monitored, but not ensembled:

```
ENT-EQPT:[<tid>]:SPAN-A:<ctag>;
```

Example to set an input to be monitored and ensembled:

```
ENT-EQPT:[<tid>]:SPAN-A:<ctag>:::ENSEMBLER=ALW;
```

Response Format:

```
   <sid> <date> <time>
M  <ctag> COMPLD
   /*LINK:<link>,CMD:<command>*/
;
```

Enter User Security

This command allows a system administrator to enter a new user, and the new user's user name, password, and access level. The command format is:

```
ENT-USER-SECU:[<tid>]:<uid>:<ctag>::<pid>,,<uap>;
```

Parameter	Description
<uid>	User name – must start with an alpha character and have a maximum of 10 characters.
<pid>	Password – has to be a minimum of 8 characters and a maximum of 10 characters. It must contain at least one digit and one of the following characters: ! $ % ' ( ) * + . / < > ? @ Password cannot be the same as User ID even if extra characters are appended to password at the end.
<uap>	Access level (1 to 5). Levels 1 to 4 do not allow the user to enter or delete users. Level 5 allows the user to enter or delete users.

Command Example:

```
ENT-USER-SECU::TELECOM:<ctag>::TS3000!!,,1;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Initialize Log

This command clears the alarm log. The command format is:

```
INIT-LOG:[<tid>]::<ctag>::almlog;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Initialize Register

This command resets to zero all the performance monitoring associated with the entered aid. The command can be used to reset either span independently or both spans at the same time. The command format is:

```
INIT-REG-EQPT:[<tid>]:<aid>:<ctag>::ALL;
```

Aid	Value	Item Addressed
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
ALL	—	E1 span A and span B inputs

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Initialize System

This command resets the specified processor.

Caution: Using this command with an <aid> of TS3600 will cause a loss of outputs until GPS satellites are reacquired if ALMOUT is SQUELCH, or unstable outputs if ALMOUT is not SQUELCH.

The command format is:

```
INIT-SYS:[<tid>]:<aid>:<ctag>::1;
```

Aid	Item Addressed
TS3600	System software
GPS	GPS receiver software

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Operate Alarm Cutoff All

This command deactivates (silences) the audible office alarm. The command format is:

```
OPR-ACO-ALL:[<tid>]:ALL:<ctag>;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
;
```

Retrieve Alarm All

This command displays all current system alarms. The command format is:

```
RTRV-ALM-ALL:[<tid>]:ALL:<ctag>;
```

If there are no alarms:

```
   <sid> <date> <time>
M  <ctag> COMPLD
   /*LINK:<link>,CMD:<command>*/
;
```

If there is at least one alarm:

```
   <sid> <date> <time>
M  <ctag> COMPLD
   "<aid>:<ntfcncde>,<condtype>,<srveff>,
<ocrdat>,<ocrtm>,,:\"<conddescr>\""...
   /*LINK:<link>,CMD:<command>*/
;
```

Refer to Chapter 5, Troubleshooting for a list of all <conddescr> messages and the recommended action.

Retrieve Alarm Equipment

This command displays current alarms for the specified equipment. The command format is:

```
RTRV-ALM-EQPT:[<tid>]:<aid>:<ctag>;
```

Aid	Value	Item Addressed
TS3600	—	System (all TS3600 alarms)
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
GPS	—	GPS receiver

If there are no alarms:

```
   <sid> <date> <time>
M  <ctag> COMPLD
   /*LINK:<link>,CMD:<command>*/
;
```

If there is at least one alarm:

```
   <sid> <date> <time>
M  <ctag> COMPLD
   "<aid>:<ntfcncde>,<condtype>,<srveff>,
         <ocrdat>,<ocrtm>,,:\"<conddescr>\""...
   /*LINK:<link>,CMD:<command>*/
;
```

Refer to Chapter 5, Troubleshooting for a list of all <conddescr> messages and the recommended action.

Retrieve Communication

This command displays communication port parameter settings. The command format is:

```
RTRV-COM:[<tid>]:<aid>:<ctag>;
```

Aid	Value	Item Addressed
COM-a	a = 1	Serial communication port 1
	a = 2	Serial communication port 2
	a = 3	Serial communication port 3
	a = 5001	Ethernet user interface port 5001
	a = 5002	Ethernet user interface port 5002
	a = 5003	Ethernet user interface port 5003
	a = 5004	Ethernet user interface port 5004
	a = 5551	Ethernet element manager interface port 5551
ALL	—	All communication ports

Response Format:

```
   <sid> <date> <time>
M  <ctag> COMPLD
   "<aid>:::<spec_block>"...
   /*LINK:<link>,CMD:<command>*/
;
```

The parameters which may be displayed in the <spec_block> are listed below.

Parameter	Value	Description
MONMSG=a	a = ALW	View messages from all ports
	a = INH	View messages from this port only
KEEPALIVE=a	a = 1 to 255	Inactive minutes until the unit sends a COMPLD message to keep the connection from being closed
	a = 0	No COMPLD message is output

Parameter	Value	Description
ENDOFTEXT=a	a = 1 to 9F	Hex code at end of all responses
	a = 00	No hex code at end of responses
ECHO=a	a = ALW	Echoes characters received so they appear on the user's screen as typed
	a = INH	Local echo is disabled
COMPRI=a	a = ALW0	TL1 commands and responses, no autonomous messages sent
	a = ALW1	TL1 commands and responses, sends autonomous messages
	a = ALW2	TL1 commands and responses, sends autonomous messages whether or not logged on
	a = INH	Closes connection, logs off a user (if logged on), and keeps port from use (a port cannot close itself)
AUTOLOGOFF=a	a = 1 to 255	Inactive minutes until the unit logs off the user, keeping the connection open
	a = 0	Autologoff is disabled
SWCONTROL=a	a = ALW	XON/XOFF flow control is enabled
	a = INH	XON/XOFF flow control is not enabled
HWCONTROL=a	a = ALW	Serial port CTS/RTS flow control is enabled
	a = INH	Serial port CTS/RTS flow control is not enabled
BAUD=a	a = 115	Serial port baud rate is 115 kbaud
	a = 57.6	Serial port baud rate is 57.6 kbaud
	a = 38.4	Serial port baud rate is 38.4 kbaud
	a = 19.2	Serial port baud rate is 19.2 kbaud
	a = 9600	Serial port baud rate is 9600 baud
	a = 4800	Serial port baud rate is 4800 baud
	a = 2400	Serial port baud rate is 2400 baud

Parameter	Value	Description
PARITY=a	a = EVEN	Even parity bit is enabled
	a = ODD	Odd parity bit is enabled
	a = NONE	Parity bit is disabled
STOP=a	a = 1	1 stop bit
	a = 2	2 stop bits

Retrieve Condition All

This command displays all current system alarms and events. The command format is:

```
RTRV-COND-ALL:[<tid>]:ALL:<ctag>;
```

If there are no alarms or events:

```
   <sid> <date> <time>
M  <ctag> COMPLD
   /*LINK:<link>,CMD:<command>*/
;
```

If there is at least one alarm or event:

```
   <sid> <date> <time>
M  <ctag> COMPLD
   "<aid>:<ntfcncde>,<condtype>,<srveff>,
         <ocrdat>,<ocrtm>,,,:\"<conddescr>\""...
   /*LINK:<link>,CMD:<command>*/
;
```

Refer to Chapter 5, Troubleshooting for a list of all <conddescr> messages and the recommended action.

Retrieve Condition Equipment

This command displays current alarms and events for the specified equipment. The command format is:

```
RTRV-COND-EQPT:[<tid>]:<aid>:<ctag>;
```

Aid	Value	Item Addressed
TS3600	—	System
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
GPS	—	GPS receiver

Command Example:

```
RTRV-COND-EQPT::TS3600:<ctag>;
```

If there are no alarms:

```
   <sid> <date> <time>
M  <ctag> COMPLD
   /*LINK:<link>,CMD:<command>*/
;
```

If there is at least one alarm:

```
   <sid> <date> <time>
M  <ctag> COMPLD
   "<aid>:<ntfcncde>,<condtype>,<srveff>,
<ocrdat>,<ocrtm>,,,\"<conddescr>\""...
   /*LINK:<link>,CMD:<command>*/
;
```

Refer to Chapter 5, Troubleshooting for a list of all <conddescr> messages and the recommended action.

Retrieve Equipment

This command displays parameter settings for the specified equipment. The command format is:

```
RTRV-EQPT:[<tid>]:<aid>:<ctag>;
```

Aid	Value	Item Addressed
ALL	—	All aids for this command
TS3600	—	System
GPS	—	GPS receiver
SPAN-a	a = A	Span A input
	a = B	Span B input
E1-a	a = A	E1 A output
	a = B	E1 B output
OPT-a	a = 1 to 8	Additional E1 outputs: 1 through 8 (990-72020-02 systems only) Mixed E1/T1 outputs (990-72060-06 systems only)
	a = 1 or 2	ESCIU ports: 1 or 2 (990-72060-04 systems only)

Command Example:

```
RTRV-EQPT::ALL:G;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    "<aid>::::<spec_block>"...
    /*LINK:<link>,CMD:<command>*/
;
```

The parameters which may be displayed in the <spec_block> are listed below.

Aid	Parameter	Value	Description
TS3600	BYPASS=a (990-72060-04 systems only)	a = AIS	When the ESCIU detects LOS on an input span, an all-ones signal (AIS), without the E1 alignment sequence, is output to the downstream network element
		a = PASSTHRU	When the ESCIU detects LOS on an input span, the LOS alarm signal, with the E1 alignment sequence, is passed through to the downstream network element
	TOD=a	a = CISCO	Serial message sent is Cisco format
		a = NTP4	Serial message sent is NTP Type 4 format
		a = NONE	No serial message is sent
	ALMCOND=a	a = ALW	Alarm conditioning for outputs is enabled
		a = INH	Alarm conditioning for outputs is disabled
	IPNE=a.b.c.d	a = 0 to 255	This unit's IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPSUBNET=a.b.c.d	a = 0 to 255	Subnetwork mask
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPGATE=a.b.c.d	a = 0 to 255	Default gateway IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	

Aid	Parameter	Value	Description
TS3600 (cont'd)	IPEM1=a.b.c.d	a = 0 to 255	Primary element manager IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPEM1PORT=a	a = 0 to 65535	Primary element manager port address
	IPEM2=a.b.c.d	a = 0 to 255	Alternate element manager IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPEM2PORT=a	a = 0 to 65535	Alternate element manager port number
	IPINACT=a	a = 0 to 10000	Port 5550 closes the connection to the Element Manager if no autonomous messages are sent during this number of 100-ms units (0 to 10,000; 0 deactivates the timer. For example, 100 = 10 s)
	IPNTP=a	a = ALW	SNTP feature activated
	DCDPASSTHRU	INH	DCD port communication is inhibited
		ALW1	COM1 is the DCD interface port
		ALW2	COM2 is the DCD interface port
	DCDUSERPORT=a (See Note: 1)	a = 1	COM1
		a = 2	COM2
		a = 3 or 5001, 5002, 5003, 5004	COM3 or IP port 5001 to 5004
	ALARM=x	x = HOLDOVER	HOLDOVER alarm
		x = GPS	GPS alarm

Aid	Parameter	Value	Description
GPS	ANTCBLDLY=a	a = 0 to 305	Antenna cable length (meters)
	ANTELEVMASK=a	a = 0 to 45	Antenna elevation mask angle (degrees)
	ANTMODE=a	a = AUTO	Automatic survey-in mode
		a = MANUAL	Manual survey-in mode (do not use for roof antenna)
	MANLAT=a-b-c-d	a = N	North latitude
		a = S	South latitude
		b = 0 to 179	Degrees of latitude
		c = 0 to 59	Minutes of latitude
		d = 0 to 999	Decimal minutes of latitude
	MANLONG= a-b-c-d	a = E	East longitude
		a = W	West longitude
		b = 0 to 179	Degrees of longitude
		c = 0 to 59	Minutes of longitude
		d = 0 to 999	Decimal minutes of longitude
	MANELEV=a	a = 0 to 8000	Antenna elevation (meters)
SPAN-a	ENSEMBLER=b	b = ALW	E1 span is ensembled
		b = INH	E1 span is not ensembled
	MONITOR=b	b = ALW	E1 span is monitored
		b = INH	E1 span is not monitored
	SSM=b	b = ALW	SSM message is used to qualify input
		b = INH	SSM message is not used to qualify input
	SIGNAL=b	b = ANALOG	Span input signal is 2.048 MHz
		b = DIGITAL	Span input signal is 2.048 Mb/s

Aid	Parameter	Value	Description
SPAN-a (cont'd)	SSMCHANNEL=b	b = 4	Uses Sa4 bit
		b = 5	Uses Sa5 bit
		b = 6	Uses Sa6 bit
		b = 7	Uses Sa7 bit
		b = 8	Uses Sa8 bit
E1-a	FRAMING=b	b = CAS	Output framing is CAS
		b = CAS4	Output framing is CAS4
		b = CCS,	Output framing is CCS
		b = CCS4	Output framing is CCS4
		b = NONE	Output framing is NONE (if an analog signal).
	ALMOUT=b	b = AIS	Output during holdover alarm is AIS
		b = SQUELCH	No output during holdover alarm
		b = SSM	Output is 'SSUT' quality level message during holdover alarm (SSM requires output framing of CAS4 or CCS4)
OPT-a (990-72060-02 systems only)	FRAMING=b	b = CAS	Output framing is CAS
		b = CAS4	Output framing is CAS4
		b = CCS,	Output framing is CCS
		b = CCS4	Output framing is CCS4
		b = NONE	Output framing is NONE (if an analog signal).
	ALMOUT=b	b = AIS	Output during holdover alarm is AIS
		b = SQUELCH	No output during holdover alarm
		b = SSM	Output is 'SSUT' quality level message during holdover alarm (SSM requires output framing of CAS4 or CCS4)

Aid	Parameter	Value	Description
OPT-a (990-72060-04 systems only)	MONITOR=b	b = ALW	TimeSource 3600 uses monitoring information to generate an alarm
		b = INH	TimeSource 3600 does not use monitoring information to generate an alarm
	ALMOUT=b	b = AIS	When the ESCIU detects LOS on an input span, an all-ones signal (AIS), without the E1 alignment sequence, is output to the downstream network element
		b = PASSTHRU	When the ESCIU detects LOS on an input span, the LOS alarm signal, with the E1 alignment sequence, is passed through to the downstream network element
OPT-a (990-72060-06 systems only)	FRAMING=b	b = CAS	Output framing is CAS
		b = CAS4	Output framing is CAS4
		b = CCS,	Output framing is CCS
		b = CCS4	Output framing is CCS4
		b = D4	Output framing is D4
		b = ESF	Output framing is ESF
		b = NONE	Output framing is NONE (analog)
	ALMOUT=b	b = AIS	Output during holdover alarm is AIS
		b = SQUELCH	No output during holdover alarm
		b = SSM	Outputs are at ‘STU’ quality level for ESF framing and at ‘SSUT’ quality level for CAS4 and CCS4 framing during holdover alarm (SSM requires output framing of CAS4, CCS4, or ESF)
SPAN A & B	ALARM=x	x = LOS	LOS alarm
		x = AIS	AIS alarm
		x = ERROR	ERROR alarm

Aid	Parameter	Value	Description
TS3600, SPAN A & B	TIME=x	x = HH-MM	Hour (00-999) and minute (00-59) time to escalate alarm
		x = 0	No alarm escalation
	SEV1=x (See Note: 2)	x = CR	Severity of initial alarm prior to escalation
		x = MJ	
		x = MN	
		x = EV	
		x = NA	
	SEV2=x (See Note: 2)	x = CR	Severity of escalated alarm
		x = MJ	
		x = MN	
		x = EV	
		x = NA	
TS3600, SPAN A & B, (cont'd)	SAFF1=x (See Note: 2)	x = SA	Service affecting state of initial alarm prior to escalation
		x = NSA	
	SAFF2=x (See Note: 2)	x = SA	Service affecting state of escalated alarm
		x = NSA	

Note:

1 All commands on DCDUSERPORT TID which equal SID of the DCD are forwarded to the DCD. Similarly, the responses from the DCD are sent to the provisioned DCDUSERPORT.

2 When setting alarm integration time (SEVERITY or SERAFF), the type of alarm (HOLDOVER, GPS, LOS, AIS, or ERROR) has to be specified. For example, ED-EQPT::TS3600:CTAG:::ALARM=HOLDOVER, TIME=72-00, SEVERITY1=EV,SERAFF1=NSA, SEVERITY2=MJ, SERAFF2=SA; will generate a holdover event as soon as the condition is detected with an NSA flag. Once this condition has existed for 72 hours, TS3600 will generate a major alarm with an SA flag. These parameters can then be verified using the RTRV-EQPT command.

Retrieve GPS Status

This command displays the position of the GPS receiver, UTC time, and status information for each of the GPS satellites in view. The command format is:

```
RTRV-GPS-STAT:[<tid>]:GPS:<ctag>;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    "<aid>:LAT=a,LONG=a,ALT=a,UTC=a
    ANTMODE=a,MERIT=a,SUCCESS=a%

    SAT-a,USE=a,CNO=a,ELEV=a,AZ=a,
          LOCK=a..."
    /*LINK:<link>,CMD:<command>*/
;
```

Parameter	Value	Description
LAT=a	a = dd.mm.fffN	Current latitude north in degrees, minutes, and decimal-fractions of a minute
	a = dd.mm.fffS	Current latitude south in degrees, minutes, and decimal-fractions of a minute
LONG=a	a = ddd.mm.fffE	Current longitude east in degrees, minutes, and decimal-fractions of a minute
	a = ddd.mm.fffW	Current longitude west in degrees, minutes, and decimal-fractions of a minute
ALT=a	a = mm.mmm	Altitude in meters to the thousandth of a meter, referenced to mean sea level
UTC=a	a = hh-mm-ss	Universal Coordinated Time (UTC), where hh is hours (00 to 23), mm is minutes (00 to 59), and ss is seconds (00 to 59)
ANTMODE=a	a = AUTO	Automatic survey-in mode
	a = MANUAL	Manual survey-in mode
MERIT=a	a = bbb	Timing error estimate in ns
SUCCESS=a	a = bb	Percentage of time satellites are visible
SAT=a	a = 1 to 25	Satellite identification number

Parameter	Value	Description
USE=a	a = Y	Satellite in use
	a = N	Satellite not in use
CNO=a	a = nn	Satellite carrier-to-noise ratio
ELEV=a	a = dd	Satellite elevation in degrees
AZ=a	a = ddd	Satellite azimuth in degrees
LOCK=a	a = 1 to 2500	Seconds since the receiver locked to the satellite carrier

Retrieve Header

This command allows for NMA integration to use as a keep alive message. The command format is:

```
RTRV-HDR:[<tid>]::<ctag>;
```

Response Format:

```
RTRV-HDR:::114;
TELECOM1 1997-12-08 15:04:13
M 114 COMPLD
```

Retrieve Inventory

This command displays information about the specified equipment. The command format is:

```
RTRV-INVENTORY:[<tid>]:TS3600:<ctag>;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    "TS3600::::CARD=TS3600,
    MACID=a,
    TYPE=a,
    PART=a,
    SERIAL=a,
    SOFTVER_TS3000=a,
    SOFTVER_GPS=a,
    SOFTVER_DEV=a"
    /*LINK: x, CMD:<command>*/
;
```

Parameter	Value	Description
CARD=TS3600	—	System
MACID=a.b.c.d.e	a = 00 to FF in hexadecimal format	MAC address
	b = 00 to FF in hexadecimal format	
	c = 00 to FF in hexadecimal format	
	d = 00 to FF in hexadecimal format	
	e = 00 to FF in hexadecimal format	

Parameter	Value	Description
TYPE=a	a = NO OPTION BOARD	TimeSource 3600 (standard) (990-72060-01 systems)
	a = E1 OPTION BOARD	TimeSource 3600 with eight additional E1 outputs (990-72060-02 systems)
	a = SCIU OPTION BOARD	TimeSource 3600 with 2 ESCIU ports (990-72060-04 systems)
	a = IRIG OPTION BOARD	TimeSource 3600 with 4 TOD IRIG-B outputs (990-72060-05 systems)
	a = MIXED E1/T1 OPTION BOARD	TimeSource 3600 with eight mixed E1/T1 outputs (990-72060-06 systems)
PART=a	—	a = Part number
SERIAL=a	—	a = Serial number
SOFTVER_ TS3000=a	a = bb.cc.dd	System software version
SOFTVER_GPS= a	a = bb.cc.dd	GPS receiver software version
SOFTVER_ DEV=a	a = bb.cc.dd or bb.cc.dd-ee.ff.gg	Device software version

Retrieve Log

This command retrieves the alarm log. The command format is:

```
RTRV-LOG:[<tid>]::<ctag>::almlog;
```

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    "<logtype>"
    "<aid>:<ntfcncde>,<condtype>,<srverff>,
    <ocrdat>,<ocrtm>,,[,]:<conddescr>,
          [:<dgntype>]"*/
    /*LINK:<link>,CMD:<command>*/
;
```

Parameter	Description
<ntfcncde>	Severity of alarm: critical, major, or minor
<condtype>	Single type of alarm condition being reported on this particular line, i.e., LOS, FAIL, TBD for each alarm
<srverff>	Alarm is service affecting (SA) or non-service affecting (NSA)
<ocrdat>	Occurrence date in MOY-DOM format, where MOY=1 to 12 and DOM=1 to 31
<ocrtm>	Occurrence Time of Day in HOD-MOH-SOM format, where HOD=0 to 23, MOH=0 to 59, SOM=0 to 59
<conddescr>	Text string of no more than 64 characters enclosed within a pair of escape quotes (\)
<dgntype>	TL1 identifier up to 16 characters in length

Retrieve Performance Monitoring

This command retrieves the performance monitoring data from the TimeSource 3600. This data includes MTIE, TDEV, PHASE1S, and PHASE1M. For current 24 hour data, MTIE, TDEV, and PHASE1S data are grouped every 15 minutes. In addition, there are 7 daily summaries of MTIE, TDEV, and PHASE1M. Each value type can be retrieved for both span inputs A and B.

MTIE data includes the following time intervals in seconds: 1, 4, 10, 40, 100, 300, 900, 1800, 3600, 7200, 14400, 28800, and 86400.

TDEV data includes the following time intervals in seconds: 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, and 1024.

PHASE1S data includes 900 seconds of phase values.

PHASE1M data includes 60 minutes of phase values.

The command format is:

```
RTRV-PM-EQPT:[<tid>]:SPAN-a:<ctag>::<montype>
        ,,,,,[<mondat>][<montm>];
```

Parameter	Value	Description
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
<montype>	MTIE	MTIE data reported
	TDEV	TDEV data reported
	PHASE1S	1-second phase data reported
	PHASE1M	1-minute phase data reported
<mondat>=x	x = 1 to 12	Monitor date, month of the year
	x = 1 to 31	Monitor date, day of the month
<montm>=x	x = 0 to 23	Monitor time, hour past midnight
	x = 0 to 59	Monitor time, minutes past the hour

MTIE Response Format:

```
    <sid> <date> <time>
 M  <ctag>COMPLD
    "SPAN-a:MTIE-a,<monval>,<vldty>
          ,,,,<mondat>,<montm>"
          ...
          ...
          ...
    "SPAN-a:MTIE-a,<monval>,<vldty>
          ,,,,<mondat>,<montm>"
    /*LINK:<link>,CMD:<command>*/
 ;
```

MTIE Data types

- One 15 minute bin from the last 24 hours of data. To select a 15 minute bin, enter mondat and montm. Any mondat/montm combination outside of the past 24 hour window is denied. Any time increment may be entered. The system rounds the value to the nearest bin. Entered minutes of 1 to 15 correspond to the first 15 minute bin, 16 to 30 correspond to the second 15 minute bin, etc.
- One day summary from the last 7 days of daily summaries. To select one daily summary, enter mondat, but do not enter montm. Any mondat not in the previous 7 day window is denied.

Parameter	Value	Description
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
MTIE-a	a = 1S, 2S, 4S, 10S, 40S, 100S, 300S, 900S, 1800S, 3600S, 7200S, 14400S, 28800S, or 86400S	MTIE monitored type, where a is time intervals in seconds
<monval>	One 15 min bin from the last 24 h of data	Monitored value
<vldty>	COMPL	Data is valid
	NA	Data is not valid
MONDAT=a-b	a = 1 to 12	Monitor date, month of the year
	b = 1 to 31	Monitor date, day of the month
MONTM=a-b	a = 0 to 23	Monitor time, hour of the day
	b = 0 to 59	Monitor time, minute of the hour

MTIE Response Example:

```
    TS3600-2009 2000-05-25 11:01:58
 M  G COMPLD
    "SPAN-A:MTIE-1S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-4S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-10S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-40S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-100S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-300S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-900S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-1800S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-3600S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-7200S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-14400S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-28800S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-86400S,1,COMPL
          ,,,,,2000-05-25,11-00-00"
    /*LINK:5002,CMD:RTRV-PM-EQPT::
          SPAN-A:G::MTIE*/
 ;
```

TDEV Response Format:

```
    <sid> <date> <time>
 M  <ctag>COMPLD
    "SPAN-a:TDEV-a,<monval>,<vldty>
          ,,,,<mondat>,<montm>"
          ...
          ...
          ...
    "SPAN-a:TDEV-a,<monval>,<vldty>
          ,,,,<mondat>,<montm>"
    /*LINK:<link>,CMD:<command>*/
 ;
```

TDEV Data types

- One 15 minute bin from the last 24 hours of data. To select a 15 minute bin, enter mondat and montm. Any mondat/montm combination outside of the past 24 hour window is denied. Any time increment may be entered. The system rounds the value to the nearest bin. Entered minutes of 1 to 15 correspond to the first 15 minute bin, 16 to 30 correspond to the second 15 minute bin, etc.

- One day summary from the last 7 days of daily summaries. To select one daily summary, enter mondat, but do not enter montm. Any mondat not in the previous 7 day window is denied.

Parameter	Value	Item Addressed
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
TDEV=a	a = 1S, 2S, 4S, 8S, 16S, 32S, 64S, 128S, 256S, 512S, or 1024S	TDEV monitored type, where a is time intervals in seconds
<monval>	One 15 min bin from the last 24 h of data	Monitored value
<vldty>	COMPL	Data is valid
	NA	Data is not valid
MONDAT=a-b	a = 1 to 12	Monitor date, month of the year
	b = 1 to 31	Monitor date, day of the month
MONTM=a-b	a = 0 to 23	Monitor time, hour of the day
	b = 0 to 59	Monitor time, minute of the hour

TDEV Response Example:

```
    TS3600-2009 2000-05-25 11:01:58
 M  G COMPLD
    "SPAN-A:TDEV-1S,0,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:TDEV-2S,0,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:TDEV-4S,0,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:TDEV-8S,0,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:TDEV-16S,0,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:TDEV-32S,0,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:TDEV-64S,0,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:TDEV-128S,0,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:TDEV-256S,0,COMPL
          ,,,,,2000-05-25,11-00-00"
    "SPAN-A:TDEV-512S,0,COMPL
          ,,,,,2000-05-25,11-00-00"
```

```
   "SPAN-A:TDEV-1024S,0,COMPL
         ,,,,,2000-05-25,11-00-00"
   /*LINK:5002,CMD:RTRV-PM-EQPT::
         SPAN-A:G::TDEV*/
;
```

PHASE1S Response Format:

```
    <sid> <date> <time>
M   <ctag>COMPLD
   "SPAN-a:PHASE1S,<monval>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<vldty>,,,,
<mondat>,<montm>"
         ...
         ...
         ...
   "SPAN-a:PHASE1S,<monval>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<vldty>,,,,
<mondat>,<montm>"
;
```

PHASE1S Data types:

- One 15 minute bin from the last 24 hours of data as 900 seconds of data. To select a 15 minute bin, enter mondat and montm. Any mondat/montm combination outside of the past 24 hour window is denied. Any time increment may be entered. The system rounds the value to the nearest bin.
- Entered minutes of 1 to 15 correspond to the first 15 minute bin, 16 to 30 correspond to the second 15 minute bin, etc.
- The first monitor value is the first second of the 900 second window.
- The 900 seconds of data is broken into 9 groups of 100 seconds. For each group of 100 seconds, the first value is the absolute 1 second phase for that group. The absolute 1 second phase value is followed by 99 seconds of delta phase values.

Parameter	Value	Item Addressed
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
PHASE1S	—	Phase 1S monitored type, which shows 900 s of phase values
<monval>	First s of the 100 s data group. There are 9 groups of 100 s.	Absolute monitored phase value
<D>	The difference (D) from the proceeding number	99 s of delta phase values which follow the absolute 1 s phase value
<vldty>	COMPL	Data is valid
	NA	Data is not valid
MONDAT=a-b	a = 1 to 12	Monitor date, month of the year
	b = 1 to 31	Monitor date, day of the month
MONTM=a-b	a = 0 to 23	Monitor time, hour of the day
	b = 0 to 59	Monitor time, minute of the hour

PHASE1S Response Example:

```
   TS3600-2009 2000-05-25 11:01:58
M  G COMPLD

"SPAN-A:PHASE1S,-325,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,COMPL,,,,2
000-10-13,12-45-00"

   "SPAN-A:PHASE1S,-323,0,0,0,0,0,0,0,1,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,COMPL,,,,2000-10-13,12-46-40"

   "SPAN-A:PHASE1S,-321,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,-1,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,COMPL,,,,2000-10-13,12-48-20"
```

```
   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,NA,,,,2000
-10-13,12-50-00"

   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,NA,,,,2000
-10-13,12-51-40"

"SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,NA,,,,2000
-10-13,12-53-20"

   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
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0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,NA,,,,2000
-10-13,12-55-00"

   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,NA,,,,2000
-10-13,12-56-40"

   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,NA,,,,2000
-10-13,12-58-20"

  /* LINK: 5001, CMD: RTRV-PM-EQPT::SPAN-A:C:: PHASE1S,,,,,
*/

;
```

PHASE1M Response Format:

```
   <sid> <date> <time>
M  <ctag>COMPLD
   "SPAN-a:PHASE1M,<monval>,<monval>,
         <monval>,<monval>,<monval>,<monval>,
         ...
         ...
         ...
         <monval>,<monval>,<monval>,<monval>,
         <vldty>,,,,<mondat>,<montm>"
   /*LINK:<link>,CMD:<command>*/
;
```

PHASE 1M Data types

- The TimeSource 3600 collects a full 7 days of 1 minute phase data.
- The 1 minute phase data is displayed in 1 hour groups. Each request for 1 minute phase is synchronized to the hour.
- Any mondat/montm combination outside of the past 7 day window is denied. Any time increment may be entered. The system rounds the value to the nearest hour, i.e., the minute and second field of the montm is ignored.
- The first value (monval) is the oldest value in the range selected. For example, if montm = 8:45:32, the first monval will exceed time 8:00:00 followed by the value at 8:01:00, etc.

Parameter	Value	Item Addressed
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
PHASE1M	—	Phase 1M monitored type, which shows 1 min phase data in 1 h groups of data
<monval>	Oldest value in the range selected from the <montm> value assigned in the command	Absolute monitored phase value
<vldty>	COMPL	Data is valid
	NA	Data is not valid
MONDAT=a-b	a = 1 to 12	Monitor date, month of the year
	b = 1 to 31	Monitor date, day of the month
MONTM=a-b	a = 0 to 23	Monitor time, hour of the day
	b = 0 to 59	Monitor time, minute of the hour

PHASE1M Response Example:

```
    TS3600-2009 2000-05-25 11:01:58
  M  G COMPLD
     "SPAN-A:PHASE1M,0,0,0,0,0,0,0,0,0,0,0,0,0,
  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
           0,0,COMPL,,,,,2000-05-25,100-00"
     /*LINK:5002,CMD:RTRV-PM-EQPT::
           SPAN-A:G::PHASE1M*/
  ;
```

Retrieve Status Security

This command allows a system administrator with level 5 access to identify the current users logged in to each port that is currently being used. The command format is:

```
RTRV-STATUS-SECU:[<tid>]::<ctag>;
```

Response Format Example:

```
[<tid>] 05-12-25 16:30:45
M <ctag> COMPLD
"COM-1:<user name>"
"COM-2:<user name>"
"COM-3:<user name>"
"COM-5551:<user name>"
"COM-5001:<user name>"
"COM-5002:<user name>"
"COM-5003:<user name>"
"COM-5004:<user name>"
```

Retrieve User Security

This command allows a system administrator to retrieve security parameters for a single user or for all users. The command format is:

```
RTRV-USER-SECU:[<tid>]:<uid>:<ctag>;
```

Parameter	Value	Item Addressed
<uid>	(user name)	Single user
	ALL	All users

Response Format:

```
     <sid> <date> <time>
  M  <ctag> COMPLD
     "<aid>:,<uap>;,UOUT=<uout>"...
     /*LINK:<link>,CMD:<command>*/
  ;
```

Parameter	Description
<uap>	Access level (1 to 5)
<uout>	(Displayed, but not implemented) Password for this account expires in this number (0 to 180) of days of inactivity; 0 indicates no expiration

Set Source Identifier

This command sets the name of the equipment sending the message. The command format is:

```
SET-SID:[<tid>]::<ctag>::<sid>;
```

Parameter	Description
<sid>	Source identifier – can be up to 20 uppercase or lowercase ASCII characters

Response Format:

```
    <sid> <date> <time>
 M  <ctag> COMPLD
    /*LINK:<link>,CMD:<command>*/
 ;
```

Chapter 5 Troubleshooting

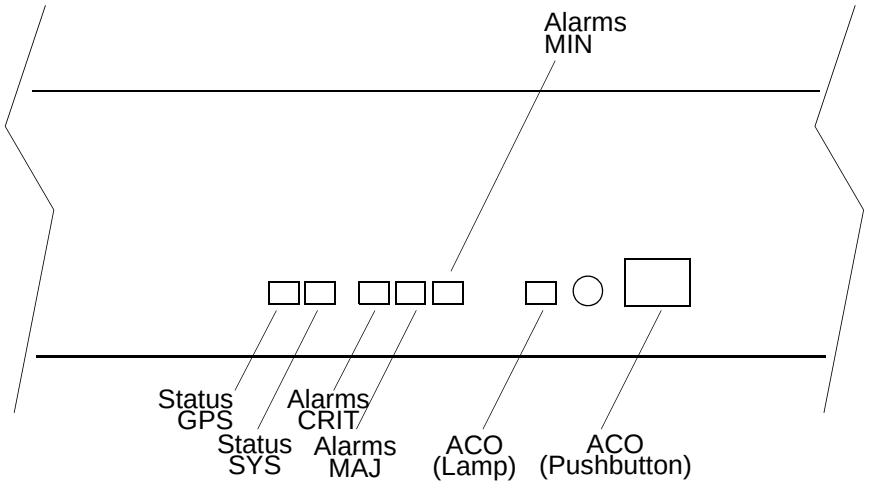
This chapter provides troubleshooting information using front-panel lamps and error messages. It also describes how to replace a card, return equipment, and obtain manual updates.

In This Chapter

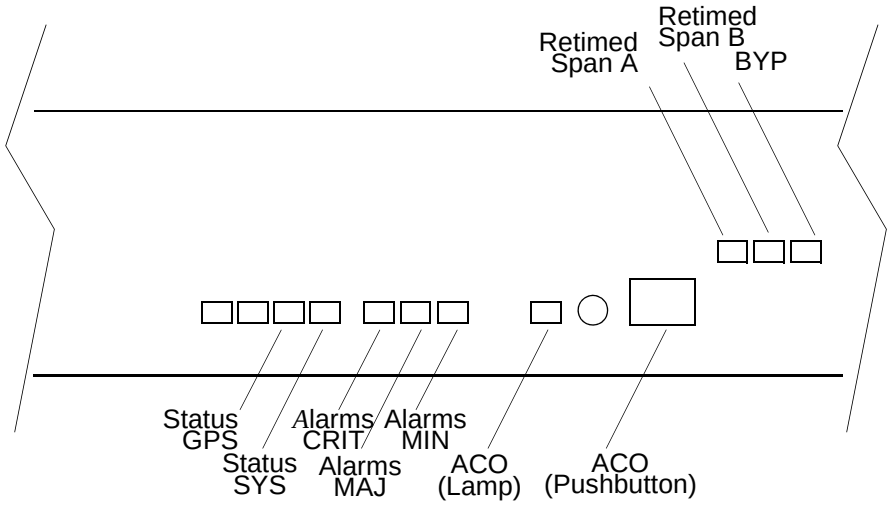
- Troubleshooting with Front Panel Items
- Troubleshooting with Error Messages
- Replacing Cards
- Returning the TimeSource
- User Guide Updates

Troubleshooting with Front Panel Items

All front panel items are shown in Figure 5-1. The items are described in Table 5-1. Use Table 5-1 to troubleshoot the system based on the front-panel lamps.



990-72060-01, -02, -05, -06 Systems



990-72060-04 Systems

Figure 5-1. Controls and Indicators

Table 5-1. Front Panel Items

Name	State	Description	Action
Status GPS	Off	System is not powered.	If in warm-up, none required.If there is no power, apply power.
	Green	GPS is successfully tracking satellites, or is in warm-up.	None required.
	Yellow	A GPS event has occurred.	None required.
	Red	A GPS event, which has existed per the user alarm setting, has escalated to a minor alarm.	Refer to Table 5-2 to determine which type and combination of antenna alarms exist, and the recommended action.
Status SYS	Off	System is in warm-up mode or is not powered.	If in warm-up, none required. If there is no power, apply power.
	Green	The output signal is PRS.	None required.
	Red	The system has been in holdover per the user alarm setting, or there is a hardware fault.	Refer to Table 5-2 to determine which type and combination of alarms exist, and the recommended action.
Alarms CRIT	Off	There is no critical alarm.	None required.
	Red	A critical alarm has occurred because of a hardware failure.	Replace the plug-in card using Procedure 5-1.
Alarms MAJ	Off	There is no major alarm.	None required.
	Red	The system has been in holdover per the user alarm setting.	Refer to Table 5-2 to determine which type and combination of antenna alarms exist, and the recommended action.

Table 5-1. Front Panel Items (Continued)

Name	State	Description	Action
Alarms MIN	Off	There is no minor alarm.	None required.
	Yellow	A minor alarm has occurred because Battery A or B has failed.	Troubleshoot and repair the specified –48 V battery input.
		A minor alarm has occurred because a software download is required.	Refer to Table 5-2 to determine which software needs to be downloaded and the recommended action.
		A minor alarm has occurred because an event (GPS error, temperature error, or span input problem) has escalated to a minor alarm.	Refer to Table 5-2 to determine which event occurred and the recommended action.
		A minor alarm has occurred because the antenna failed.	Refer to Table 5-2 to determine whether the minor alarm is due to antenna failure and the recommended action.
ACO (Lamp)	Off	The alarm cutoff function has not been activated.	None required. Press the ACO pushbutton to silence all audible alarms.
	Green	The alarm cutoff function has been activated.	None required.
ACO (Pushbutton)	—	Silences all audible alarms when pressed.	None required.
Retimed Span A or B (990-72060-04 systems only)	Off	This port has not been entered via the Enter Equipment command.	None required. If desired, enter this port via the Enter Equipment command.
	Green	This port has been entered via the Enter Equipment command, and no alarms are present.	None required.
Retimed Span A or B (990-72060-04 systems only)	Red	An event (loss of signal) has occurred on this port	Troubleshoot the traffic-carrying span input signal source; check the ESCIU port cable and connections.

Table 5-1. Front Panel Items (Continued)

Name	State	Description	Action
BYP (990-72060-04 systems only)	Off	Traffic-carrying E1 data stream is being retimed by the TimeSource 3600 System.	None required.
	Red	Traffic-carrying E1 data stream is bypassing the TimeSource 3600 System and not being retimed because the system is in holdover.	Refer to Table 5-2 to troubleshoot the GPS and SPAN x error messages.

Troubleshooting with Error Messages

Use the information in Table 5-2 to troubleshoot the system based on the condition description (conddescr) parameter in a message.

Note: If only the character “C” is displayed on the terminal every few seconds, the TimeSource 3600 system has restarted with corrupt software. Download and install the system software again, using the procedure in the Software Release Document that came with the software.

Table 5-2. Message Troubleshooting

Message	Meaning	Action
CRITICAL ALARMS		
HARDWARE FAULT	A failure has been detected on the shelf hardware.	Replace the plug-in card.
MAJOR ALARMS		
HOLDOVER	All inputs (GPS signal and span inputs) are lost or unacceptable, and the system is now using the internal oscillator.	Troubleshoot the GPS and SPAN x error messages.
MINOR ALARMS		
PWR x FAIL	The specified –48 V battery input has failed.	Troubleshoot, and repair, the specified –48 V battery input.

Table 5-2. Message Troubleshooting (Continued)

Message	Meaning	Action
BT3 WARMUP	The system is in a power-up state when it should not be.	Perform the same action as shown in GPS ERROR message.
DEVICE DOWNLOAD REQUIRED	The hardware device software is corrupt or missing.	Download and install the appropriate hardware device (DEV) software, using the procedure in the Software Release Document that came with the software.
GPS ERROR	The GPS receiver is reporting an error.	If the installation includes a roof antenna, or if the message is accompanied by the HIGH CURRENT FAULT or LOW CURRENT FAULT message, follow the recommended action for the HIGH CURRENT FAULT or LOW CURRENT FAULT message. If the installation includes a window or wall antenna: 1. Note the satellite tracking success rate reported by the RTRV-GPS-STAT command. 2. If the success rate is better than 40%, follow the recommended action for the HIGH CURRENT FAULT or LOW CURRENT FAULT message. 3. If the success rate is less than 40%, check that the latitude, longitude, and altitude data (position data) are correct. 4. If the position data are correct and the error repeats, move the antenna to a location with an improved view of the sky. 5. If the error repeats, follow the recommended action for the HIGH CURRENT FAULT or LOW CURRENT FAULT message.
GPS DOWNLOAD REQUIRED	The GPS software is corrupt or missing.	Download, and install, the GPS receiver (GPS) software, using the procedure in the Software Release Document that came with the software.

Table 5-2. Message Troubleshooting (Continued)

Message	Meaning	Action
HIGH CURRENT FAULT LOW CURRENT FAULT	Current to antenna is outside specification.	If not accompanied by the GPS ERROR alarm, none required. If accompanied by the GPS ERROR alarm: 1. Check the cable connections between the TimeSource 3600 Shelf and the antenna. 2. If the error repeats, remove the antenna cable from the rear of the shelf, and measure the dc voltage from the connector center pin to the connector housing on the shelf TNC antenna connector. 3. If the voltage is not 24 V DC ±2 V dc, replace the TimeSource 3600 card using Procedure 5-1. 4. If the voltage is 24 V DC ±2 V dc, measure the current between the connector center pin and the connector housing on the shelf TNC antenna connector. 5. If the current is less than 110 mA or more than 150 mA, replace the TimeSource 3600 card using Procedure 5-1. If not (nominal current is 125 mA), re-connect the antenna cable to the rear of the shelf. 6. Remove the antenna cable from the antenna, and measure dc voltage and current from the connector center pin to the connector housing on the cable connector. 7. If the readings are 24 V DC and 125 mA, replace the antenna. If not, verify the cable path. Replace cables, lightning suppressor, or IF converter as necessary. 8. If the error repeats, replace the antenna.
SPAN x AIS	An AIS has been received on the specified input span.	Troubleshoot the specified input span signal (check the source).

Table 5-2. Message Troubleshooting (Continued)

Message	Meaning	Action
SPAN x ERROR	An error has been detected on the specified input span.	Troubleshoot the specified input span signal (include checks for signal frequency and jitter).
SPAN x LOSS OF SIGNAL	The signal on the specified input span has been lost.	Troubleshoot the specified input span signal (check the cable, connections, source).
TEMPERATURE ERROR	A temperature error has been detected on the internal oscillator.	If this occurs momentarily during power-up, none required. If this does not occur during power-up: 1. Check that the ambient air temperature is within the TimeSource 3600 environmental specifications. If not, correct the ambient temperature with heating or air conditioning. 2. If the ambient air temperature is within the TimeSource 3600 environmental specifications, replace the plug-in card.
TS3600 DOWNLOAD REQUIRED	The system software is corrupt or missing.	Download and install the system (TimeSource 3600) software again, using the procedure in the Software Release Document that came with the software.
EVENTS		
BT3 WARMUP	The system is in a power-up state.	Wait for the system to power up (20 min to several hours, depending on antenna placement and view of the sky).
COM-x USER TIMEOUT LOGOFF	The user was auto logged off.	If COM-x is the port this message was received on, retry logging in. If not, none required.
DISCONNECTED USER LOGOFF	A user was logged off by the system administrator.	None required.
HOLDOVER	All inputs (GPS signal, span inputs) are lost or unacceptable. The system is using the internal oscillator.	None required.

Table 5-2. Message Troubleshooting (Continued)

Message	Meaning	Action
CRITICAL ACO EVENT	The ACO pushbutton has been pressed to deactivate a critical audible alarm.	None required.
DOWNLOAD FAILED	The software download has failed.	Retry the software download.
DOWNLOAD IN PROGRESS	Software is being downloaded.	Wait until the download has been completed.
DOWNLOAD SUCCESSFUL	The software has been downloaded successfully.	None required.
GPS ERROR	The GPS receiver is reporting an error.	None required.
MAJOR ACO EVENT	The ACO pushbutton has been pressed to deactivate a major audible alarm.	None required.
MINOR ACO EVENT	The ACO pushbutton has been pressed to deactivate a minor audible alarm.	None required.
POWER UP RESTART	The system processor has just started up.	None required.
SCIU x LOSS OF SIGNAL	The signal on the specified ESCIU port has been lost.	Troubleshoot the traffic-carrying span input signal source, ESCIU port cable, and ESCIU port connections.
SCIU x SLIP	The specified ESCIU port has a frame slip.	Troubleshoot the traffic-carrying span input signal source.
SETTLING PERIOD	The system is between the power-up state and steady-state operation, and signals may be degraded.	None required.
SOFTWARE DOWNLOADING ON LINK	Software is being downloaded at specified communication port.	None required.
SPAN x AIS	An AIS has been received on the specified input span.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24 h.
SPAN x ERROR	An error has been detected on the specified input span.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24 h.
SPAN x LOSS OF SIGNAL	The signal on the specified span input has been lost.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24 h.

Table 5-2. Message Troubleshooting (Continued)

Message	Meaning	Action
SPAN x SSM QUALITY PRS	The quality level of the signal detected on the specified span is PRS.	Make note of the specified input span.
SPAN x SSM QUALITY SEC	The signal on the specified span input has degraded to an SSM quality level of SEC.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24 h.
SPAN x SSM QUALITY SSUL	The signal on the specified span input has degraded to an SSM quality level of SSUL.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24 h.
SPAN x SSM QUALITY SSUT	The signal on the specified span input has degraded to an SSM quality level of SSUT.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24 h.
TEMPERATURE ERROR	A temperature error has been detected on the internal oscillator.	Wait until this escalates to a minor alarm, or check that the ambient air temperature is within the TimeSource 3600 environmental specifications. If not, correct the ambient temperature with heating or air conditioning.

Replacing Cards

To replace the plug-in card, follow the steps in Procedure 5-1, and refer to Figure 5-2.

Procedure 5-1. Replacing Cards

Step	Procedure
1.	Put on an ESD wrist strap.
2.	Plug the ESD wrist strap into the ESD jack on of the front panel of the shelf.
	On the Faulty Card
3.	Loosen the two retaining screws that secure the plug-in card in the shelf.
4.	Pull out on the two latching levers to disconnect the card from the shelf connectors.

Procedure 5-1. Replacing Cards

Step	Procedure
5.	Pull the card completely out of the shelf.
	On the Replacement Card
6.	Pull out the latching levers at each end of the front panel of the card so that the levers are pointing directly out from the front panel of the card.
7.	Insert the new card into the tracks at each side of the shelf, and slide the card into the shelf until the latching levers begin to move in.
8.	Push the latching levers flat against the front panel of the card to complete the card insertion.
9.	Tighten the knurled screw above each latching lever to secure the card in the shelf.
10.	Unplug and remove the grounding wrist strap.
11.	Reconfigure the system per application requirements.

End of Procedure

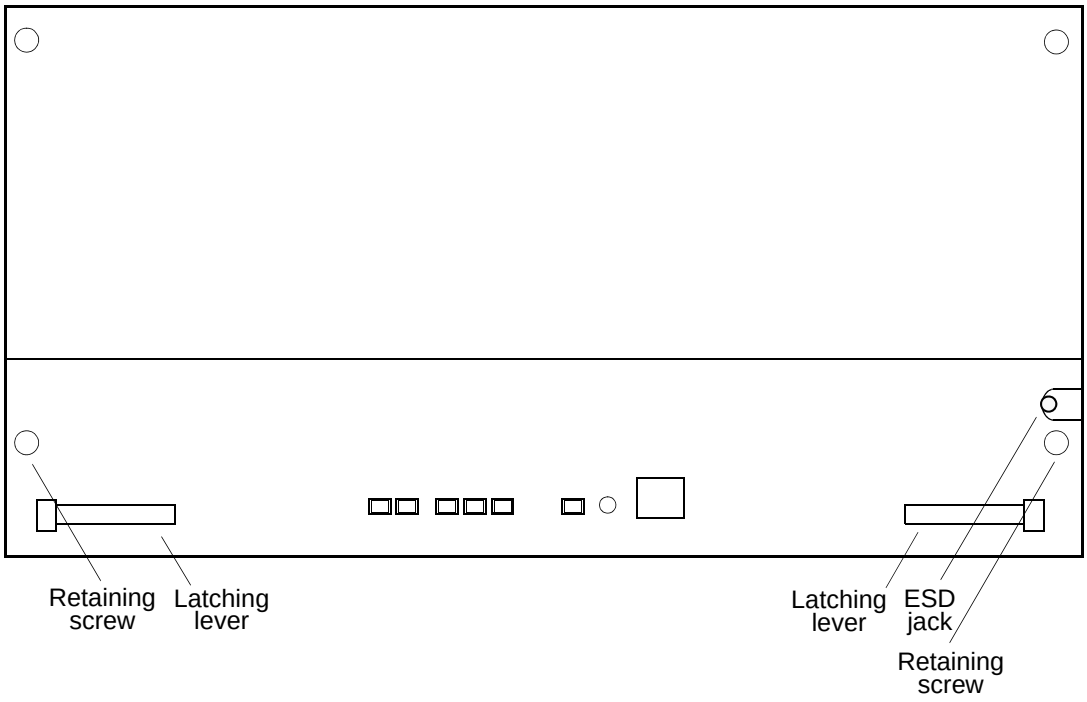


Figure 5-2. Front of Shelf

Returning the TimeSource

You should return the equipment to Symmetricom only after you have exhausted the troubleshooting procedures described earlier in this chapter, or if Symmetricom Global Services has advised you to return the unit.

Note: Please retain the original packaging for re-shipping the product. If the original packaging is not available, contact Symmetricom Global Services (SGS) for assistance.

Repacking the Unit

Return all units in the original packaging. If the original packaging is not available, contact Symmetricom Global Services. Use standard packing procedures for products being returned for repair to protect the equipment during shipment. Connectors should be protected with connector covers or the equipment should be wrapped in plastic before packaging. Ensure that the display and connectivity panels are protected when packaged.

Equipment Return Procedure

To return equipment to Symmetricom for repair:

1. Call Symmetricom Global Services (SGS) at 888-367-7966 (toll-free in USA only), 408-428-7907, or +49 700 3288 6435 in Europe, Middle East, or Africa to obtain a return material authorization number (RMA) before returning the product for service.

   You can request an RMA on the internet at https://www.symmetricom.com/Support/req_repair.htm.

   Retain the assigned RMA number for future reference.

2. Provide a description of the problem, product item number, serial number, and warranty expiration date.

3. Provide the return shipping information (customer field contact, address, telephone number, and so forth.)

4. Ship the product to Symmetricom, transportation prepaid and insured, with the Return Material Authorization (RMA) number and item numbers or part numbers clearly marked on the outside of the container to the address given with the RMA.

   Repaired equipment is returned to you with shipping costs prepaid by Symmetricom.

User Guide Updates

From time to time, this User Guide may be updated. The updated version of the guide will be available for downloading in electronic form via the Internet. After downloading, the guide can be viewed on a computer or printed out.

Manual updates are available at:

http://www.symmetricom.com/support/

Note: If you are downloading a manual for the first time, you will need to register with Symmetricom. If you are currently registered, login and download the manual update.

Chapter 6 Specifications

This chapter provides equipment specifications.

In This Chapter

- Antennas
- Communication and Ethernet Ports
- Time of Day Outputs
- Input Ports
- Output Ports
- Office Alarms
- Simple Network Time Protocol
- Power
- Shelf

Antennas

Roof Antenna	
Type	Active antenna, right-hand circular polarized, with proprietary IF interface
Cable Length	Maximum 330 m from antenna to shelf
Dimensions (excluding mount)	
Height	16.5 cm
Diameter	15 cm
Weight	0.70 kg
Operating Temperature	–30 °C to +80 °C
Storage Temperature	–40 °C to +80 °C
Operating Humidity	0% to 100% relative humidity

Mechanical Window Antenna	
Type	Patch antenna and proprietary IF interface
Cable Length	Maximum 305 m from antenna to shelf
Dimensions: (antenna, including mechanical mounting device)	
Height	45.7 cm
Width	7.9 cm
Depth	6.9 cm
Weight	510 g

Wall Antenna	
Type	Patch antenna and proprietary IF interface
Cable Length	Maximum 305 m from antenna to shelf
Dimensions: (not including mounting and peripheral equipment)	
Height	12.5 mm

Wall Antenna (Continued)	
Width	37 mm
Depth	46 mm
Weight	35 g

Self-Adhesive Window Antenna	
Type	Patch antenna and proprietary IF interface
Cable Length	Maximum 305 m from antenna to shelf
Dimensions	
Height	7.6 cm
Width	10.2 cm
Depth	4.3 cm
Weight	170 g

Communication and Ethernet Ports

Port 1	
Connector Type	25-pin, female D connector
Connector Label	COM1
Connector Location	Connector panel
Electrical Interface	RS-232 (DTE equivalent)
Pin that transmits data	2
Pin that receives data	3
Baud Rate	1200 b/s 2400 b/s 4800 b/s 9600 b/s (factory default) 19.2 kb/s 38.4 kb/s 57.6 kb/s

Port 1 (Continued)	
	115 kb/s
Data Bits	8
Parity Bit	None Even Odd
Stop Bits	1 2
Flow Control	None Software (XON/XOFF) Hardware (CTS/RTS)

Port 2	
Connector Type	9-pin, female D connector
Connector Label	COM2
Connector Location	Connector panel
Electrical Interface	RS-232 (DCE equivalent)
Pin that transmits data	2
Pin that receives data	3
Baud Rate	1200 b/s 2400 b/s 4800 b/s 9600 b/s (factory default) 19.2 kb/s 38.4 kb/s 57.6 kb/s 115 kb/s
Data Bits	8
Parity Bit	None Even Odd

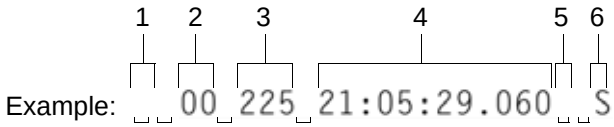
Port 2 (Continued)	
Stop Bits	1 2
Flow Control	None Software (XON/XOFF) Hardware (CTS/RTS)

Craft Port	
Connector Type	RJ-45
Connector Label	Craft
Connector Location	Front panel
Electrical Interface	RS-232 (DTE equivalent)
Pin that transmits data	2
Pin that receives data	3
Baud Rate	1200 b/s 2400 b/s 4800 b/s 9600 b/s (factory default) 19.2 kb/s 38.4 kb/s 57.6 kb/s 115 kb/s
Data Bits	8
Parity Bit	None Even Odd
Stop Bits	1 2
Flow Control	None

Ethernet Ports	
Connector Type	RJ-45 (10Base-T)
Connector Label	Ethernet
Connector Location	Connector panel
Electrical Interface	10Base-T Ethernet
Data Rate	10Mb/s
Protocol	TCP/IP (interface)
Setup Language	TL1 (application layer)

Time of Day Outputs

Network Time Protocol (NTP), Type 4, Format 2 Driver Format	
Connector Type	RJ-45
Connector Label	TOD
Connector Location	Connector panel
Electrical Interface	RS-485
Baud Rate	9600 b/s
Data Bits	8
Parity Bit	None
Stop Bit	1
Data Format	See Figure 6-1

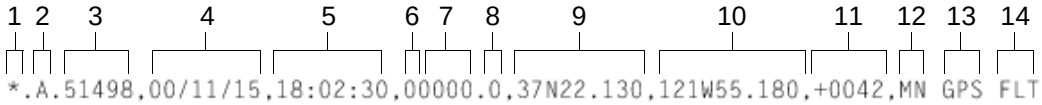


1 Alarm field: blank space = receiver has satellite availability; ? = no satellite available
2 Year (2000 in this example)
3 Day of year (the 225th day of the year in this example)
4 Hours:minutes:seconds:milliseconds
5 Leap second: blank space = no leap second; L = upcoming leap second
6 Daylight savings time indicator: S = standard time; D = daylight savings time

Figure 6-1. NTP Type 4 Data Format

Cisco Systems	
Connector Type	RJ-45
Connector Label	TOD
Connector Location	Connector panel
Electrical Interface	RS-485
Baud Rate	9600 b/s
Bit Configuration	8 data bits, No parity, 1 stop bit
Data Format	See Figure 6-2

Example:



1 Satellite availability: * = valid, ! = not valid
2 Revision
3 Modified Julian date (number of days past midnight, Nov 17, 1858)
4 Year/month/day
5 Hours:minutes:seconds
6 Indicator of time zone offset (+, –, or 0)
7 Time zone offset
8 Leap second indicator
9 Latitude
10 Longitude
11 Altitude above mean sea level in meters
12 Alarm severity: EV = event, MN = minor, MJ = major, CL = critical
13 Alarm source
14 Alarm cause: holdover, BT3 warm-up, or hardware fault

Figure 6-2. Cisco Systems Data Format

IRIG-B TOD Outputs (990-72060-05 System Only)	
Connector Type	BNC
Connector Labels	OUT1 OUT2 OUT3 OUT4
Connector Location	Connector panel output module
Impedance	600 Ω

IRIG-B TOD Outputs (990-72060-05 System Only) (Continued)	
Number of Outputs	4
Type of Output	Amplitude modulated
Amplitude	6 V peak-to-peak maximum terminated with 600 Ω
Time Format	
Binary Coded Decimal (BCD)	Seconds: 0 – 59 Minutes: 0 – 59 Hours: 0 – 23 Days: 0 – 364 Years: 0 – 99
Non BCD	Seconds of day: 0 – 86399

Input Ports

E1 Inputs	
Connector Type	Wire-wrap pins for 120 Ω balanced terminations BNC for 75 Ω unbalanced terminations (Use only BNC or only wire-wrap connector, not both, for one input.)
Connector Label	
BNC	SPAN IN A SPAN IN B
Wire-Wrap (2 sets)	T R S
Connector Location	Connector panel
Impedance	120 Ω ±5% balanced or 75 Ω ±5% unbalanced
Bit Rate	2.048 Mb/s
Format	E1

E1 Inputs (Continued)	
Framing	CAS CAS4 CCS CCS4
Line Code	HDB3
SSM	
State	Enable Disable
Framing	CAS4 CCS4
Channels	Sa4 Sa5 Sa6 Sa7 Sa8
Amplitude	+3 dB to –33 dB

Analog 2.048 MHz Inputs	
Connector Type	Wire-wrap pins for 120 Ω balanced terminations BNC for 75 Ω unbalanced terminations (Use only BNC or only wire-wrap connector, not both, for one input.)
Connector Label	
BNC	SPAN IN A SPAN IN B
Wire-Wrap (2 sets)	T R S
Connector Location	Connector panel
Impedance	120 Ω ±5% balanced or 75 Ω ±5% unbalanced
Frequency	2.048 MHz
Format	Analog

Output Ports

1 PPS Outputs	
Connector Type	BNC
Connector Label	TTL PPS
Connector Location	Rear panel
Impedance	50 Ω
Frequency	1 pps
Amplitude	Transistor-transistor logic (TTL) levels
Time Accuracy	100 ns with respect to Universal Coordinated Time (UTC) when locked to GPS signal
GPS Holdover Time Error	3 µs for 72 h (0 °C to +50 °C ± 5 °C) after one week of steady-state operation
Format	Logic low with logic high pulse of 1 µs
Rise Time	Less than 20 ns

E1 Standard Outputs	
Connector Type	Wire-wrap pins for 120 Ω balanced terminations BNC for 75 Ω unbalanced terminations (Use only BNC or only wire-wrap connector, not both, for one output.)
Connector Label BNC Wire-Wrap (2 sets)	 E1 OUT A E1 OUT B T R S
Connector Location	Connector panel
Impedance	120 Ω balanced or 75 Ω unbalanced
Bit Rate	2.048 Mb/s
Frequency Accuracy	1×10^{-12}

E1 Standard Outputs (Continued)	
GPS Holdover Stability	1 x 10^{-11} for 72 h (0 °C to +50 °C ± 5 °C) after one week of steady-state operation 1 x 10^{-10} for 30 days after one week of steady-state operation
Format	Framed all 1s
Line Code	HDB3
Amplitude	3.0 V nominal terminated with 120 Ω balanced 2.37 V nominal terminated with 75 Ω unbalanced
Framing	CAS CAS4 CCS CCS4
Output During Alarms	AIS Squelch SSM
SSM	
State	Enable Disable
Framing	CAS4 CCS4
Channels	Sa4 Sa5 Sa6 Sa7 Sa8

Additional E1 Outputs (990-72060-02 System Only)	
Connector Type	Wire-wrap pins for 120 Ω balanced terminations BNC for 75 Ω unbalanced terminations
Connector Labels	
Wire-Wrap (8 sets)	T R S

Additional E1 Outputs (990-72060-02 System Only) (Continued)	
BNC	OUT1 OUT2 OUT3 OUT4 OUT5 OUT6 OUT7 OUT8
Connector Location	Connector panel output module
Impedance	120 Ω balanced or 75 Ω unbalanced
Bit Rate	2.048 Mb/s
Frequency Accuracy	1×10^{-12}
GPS Holdover Stability	1×10^{-11} for 72 h (0 °C to +50 °C ± 5 °C) after one week of steady-state operation
	1×10^{-10} for 30 days after one week of steady-state operation
Format	Framed all 1s
Line Code	HDB3
Amplitude	3.0 V nominal terminated with 120 Ω balanced 2.37 V nominal terminated with 75 Ω unbalanced
Framing	CAS CAS4 CCS CCS4
Output During Alarms	AIS Squelch SSM
SSM State	 Enable Disable

Additional E1 Outputs (990-72060-02 System Only) (Continued)	
Framing	CAS4 CCS4
Channels	Sa4 Sa5 Sa6 Sa7 Sa8

Analog 2.048 MHz Standard Outputs	
Connector Type	Wire-wrap pins for 120 Ω balanced terminations BNC for 75 Ω unbalanced terminations (Use only BNC or wire-wrap connector for a single output.)
Connector Label BNC Wire-Wrap (2 sets)	 E1 OUT A E1 OUT B T R S
Connector Location	Connector panel
Impedance	120 Ω balanced or 75 Ω unbalanced
Frequency	2.048 MHz
Frequency Accuracy	1×10^{-12}
GPS Holdover Stability	1×10^{-11} for 72 h (0 °C to +50 °C ± 5 °C) after one week of steady-state operation 1×10^{-10} for 30 days after one week of steady-state operation
Format	Square wave
Amplitude (nominal)	1.5 V terminated with 120 Ω balanced 1.18 V terminated with 75 Ω unbalanced

Note: For E1/T1 common specifications, refer to the E1/T1 Common Outputs list. For E1 specific specifications, refer to the E1 Outputs list. For T1 specific specifications, refer to the T1 Outputs list.

Mixed E1/T1 Common Outputs (990-72060-06 System Only)	
Connector Type	Wire-wrap
Connector Label	T, R, S
Connector Location	Connector panel output module
Frequency Accuracy	1×10^{-12}
Output During Alarms	AIS, Squelch, SSM

E1 Outputs (990-72060-06 System Only)	
Impedance	120 Ω balanced or 75 Ω unbalanced
Bit Rate	2.048 Mb/s
Format	Framed all 1s
Line Code	HDB3
Amplitude	3.0 V nominal terminated with 120 Ω balanced
Framing	CAS, CAS4, CCS, CCS4
GPS Holdover Stability	1×10^{-11} for 72 h (0 °C to +50 °C ± 5 °C) after one week of steady-state operation 1×10^{-10} for 30 days after one week of steady-state operation

T1 Outputs	
Impedance	100 Ω
Bit Rate	1.544 Mb/s
Format	DS1, framed all 1s
Line Code	Alternate mark inversion (AMI)
Amplitude	2.4 V to 3.6 V terminated with 100 Ω
Framing	ESF, D4

T1 Outputs (Continued)	
GPS Holdover Stability: (after one week of steady-state operation)	1×10^{-10} per day 3.2×10^{-11} per day with span input meeting ANSI T1.101 network specification 99% probability (rubidium) 1×10^{-11} per day over a 10 °C range between 0 °C and +50 °C with an ST2E remote oscillator input (quartz)

10 MHz Output	
Connector Type	BNC
Connector Label	10 MHz
Connector Location	Connector panel
Impedance	50 Ω
Frequency	10 MHz
Stability	5×10^{-12} Root Allen Variance (RAV) at 10 s
Phase Noise	–110 dBc @ 10 Hz –135 dBc @ 100 Hz –140 dBc @ 1 kHz –145 dBc @ 10 kHz
Harmonic Distortion	–40 dBc
Spurious Distortion	–70 dBc
Format	Sine wave
Amplitude	1 V peak-to-peak minimum, 50 Ω termination 3.7 V peak-to-peak typical, 50 Ω termination

ESCIU Ports (990-72060-04 System Only)	
Connector Type	75 Ω BNC 120 Ω Wire-wrap
Connector Labels	

ESCIU Ports (990-72060-04 System Only) (Continued)	
Wire-wrapSPAN 1	RTN1 (T, R, S) (2 sets of pins) IN (T, R, S) OUT (T, R, S)
SPAN 2	RTN2 (T, R, S) (2 sets of pins) IN (T, R, S) OUT (T, R, S)
BNCSPAN 1	RTN1 OUT RTN1 IN OUT IN
SPAN 2	RTN2 OUT RTN2 IN OUT IN
Connector Location	Connector panel output module
Electrical Interface	E1 (ITU G.703 and G.704)
Ports	Two bidirectional: (E1 signals are buffered and retimed in forward direction, passed through in reverse direction)
Maximum cable length	150 m (either direction, to or from DDF)
CSU Functionality	None
Output During LOS Alarm	AIS LOS
Input jitter tolerance	ITU G.823 (1993) requirements
Input wander tolerance	±125 μs

Office Alarms

Connector Panel Contacts	
Connection	Wire-wrap pins
Type	Dry contact
Contact Rating	1 A @ 30 V dc 0.5 A @ 60 V dc 0.5 A @ 125 V ac

Connector Panel Contacts (Continued)	
Severity	Critical Major Minor
State	Normally open and normally closed
Style	Audible and visible

Front Panel Lamps	
Label	Alarms (CRIT, MAJ, MIN, ACO) Status (GPS, SYS)
Type	Light emitting diode

Front Panel Control	
Label	ACO
Type	Push-button switch
Function	Alarm cutoff (deactivates audible office alarms)

Simple Network Time Protocol

Protocol Type	SNTP (Simple Network Time Protocol) compliant with RFC-1769 for unicast applications
SNTP Accuracy	SNTP timestamp derived from UTC time via integrated GPS receiver within –300 microseconds
SNTP Alarm Indications	1. SNTP packet will indicate Stratum 2 in NTP packet header if GPS is out of lock. 2. The “ref id” field changes from GPS at Stratum 1 to the IP address at Stratum 2 to signify that the reference is the TimeSource clock itself. 3. SNTP packet will indicate “clock not synchronized” in LI field as a “3” value after user defined alarm integration time.
Password Activated	Contact factory

Power

Connector Type	Terminal block
Connector Labels	TB1 TB2
Voltage	–40 V dc to –72 V dc (A & B feed)
Current	750 mA maximum
Steady-State Power	30 W maximum
Recommended Fuse for Battery Feed	3 A

Shelf

Mechanical	
Rack Mounting	48.5 cm rack 53.5 cm rack
Mounting Positions	Flush 12.7 cm offset (48.5 cm rack only)
Dimensions	
Width	48.3 cm
Height	22.2 cm maximum
Depth	30.5 cm maximum
Weight	5.9 kg

Environmental	
Operating Temperature	0 °C to +50 °C
Operating Humidity	Up to 95% non condensing
Electromagnetic	CE

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