Symmetricom®

TimeSource 3100
GPS Primary Reference Source

Acronyms and Abbreviations

AIS	alarm indication signal
E1	digital transmission (2.048 Mb/s)
ESD	electrostatic discharge
ESF	extended superframe
GPS	Global Positioning System
LOS	loss of signal
MDEV	mean time deviation
pps	pulse per second
PRS	primary reference source
RO	remote oscillator
RU	rack unit (4.45 cm)
SSM	synchronization status messaging
T1	digital transmission (1.544 Mb/s)
TDEV	time deviation
TOD	time of day
UTC	Universal Coordinated Time

What's New in This Manual

This issue of the TimeSource 3100 user manual has the following changes from the previous issue:

- Added "Startup", "Bridging/Holdover Behavior" and "Time Figure of Merit" sections to Chapter 1.

- Removed TimeScan Craft connection key (020-46700-001) from system equipment lists in Chapter 2.

- Added section on TimeWizard software installation application to Chapter 3.

- Added Procedure F, TimeWizard Installation and Operation, to Chapter 3.

- Added TL1 command "RTRV-HDR" for NMA keep alive responses.

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Description

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

Overview

The TimeSource 3100 is a Primary Reference Source (PRS) that receives and processes signals from GPS satellites, and outputs Stratum 1 synchronization signals traceable to UTC. TimeSource 3100 applications include synchronization for central offices, radio base stations, transmission nodes, and other instances where a primary reference source can improve the performance of telephony network facilities.

The TimeSource 3100 creates timing outputs by ensembling signals from several sources. The sources include GPS signals, an onboard local oscillator, and optional E1 or analog and remote oscillator signals. Timing outputs created from the ensemble are composed of the most stable and least noisy parts of each input. Synchronization outputs are delivered in a framed, all-ones, E1 or 2.048 MHz analog signal, a 1 pps signal, T1 signals (optional), and time of day (TOD) signals.

The TimeSource 3100 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 3100 with its GPS input is a stand-alone office PRS. With the optional inputs ensembled, overall system performance is improved, and holdover is extended if GPS signals become 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 3100 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.

Physical Description

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The TimeSource 3100 consists of a shelf, a plug-in card, an antenna, cables, hardware, and software. Optional system configurations include eight additional E1 or analog 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) can be mounted in a 48 cm rack or an ETSI 53.5 cm rack. Other than a communications connector on the front panel, all connectors are at the connector panel.

Figure 1. Shelf
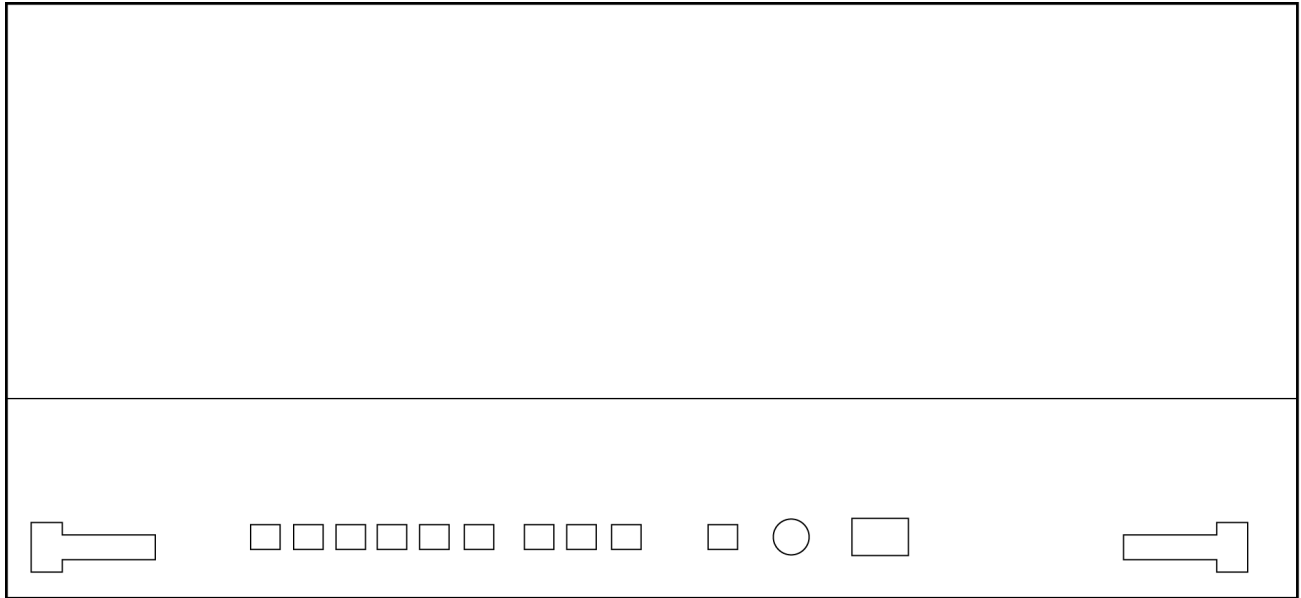
990-72020-01, -02, -05, and -06 Systems
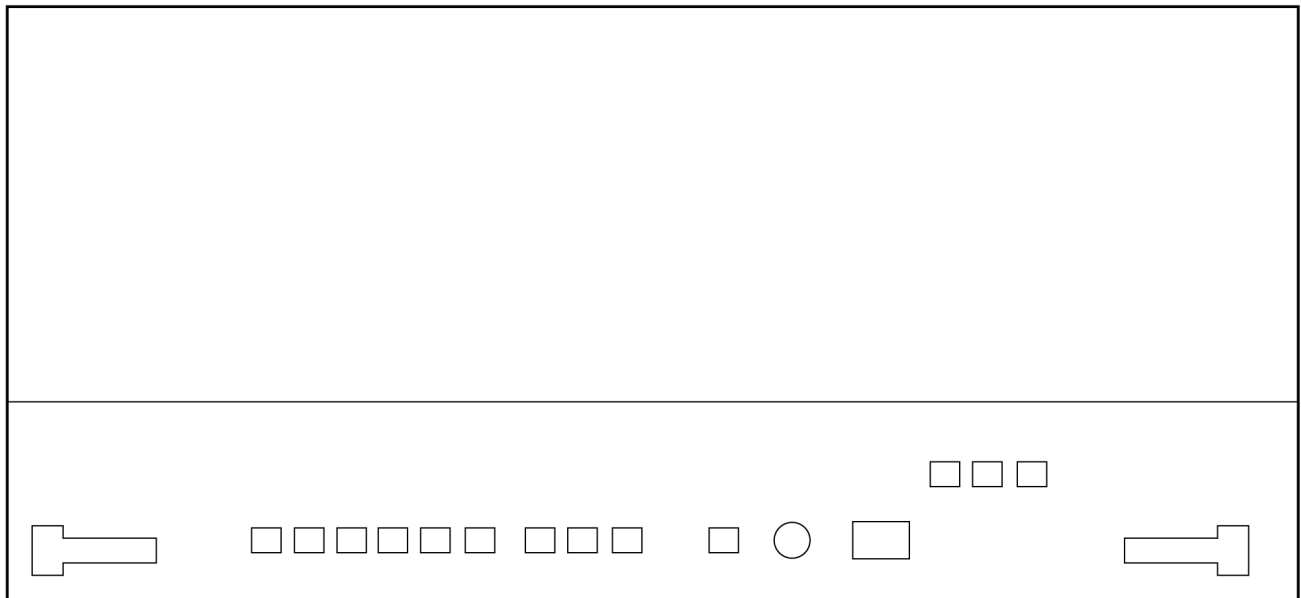
990-72020-04 Systems

Roof Antenna

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The antenna (Figure 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 2. Antenna

31.4 cm

7.6 cm
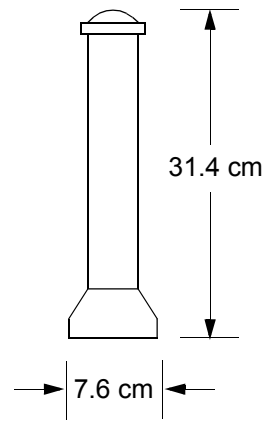
Functional Description

Overview

Figure 3 shows the main functions of the TimeSource 3100. The center of the TimeSource 3100 is the 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 A.

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 the best source.

Table A. Timing Source Characteristics

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

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Figure 3. Block Diagram
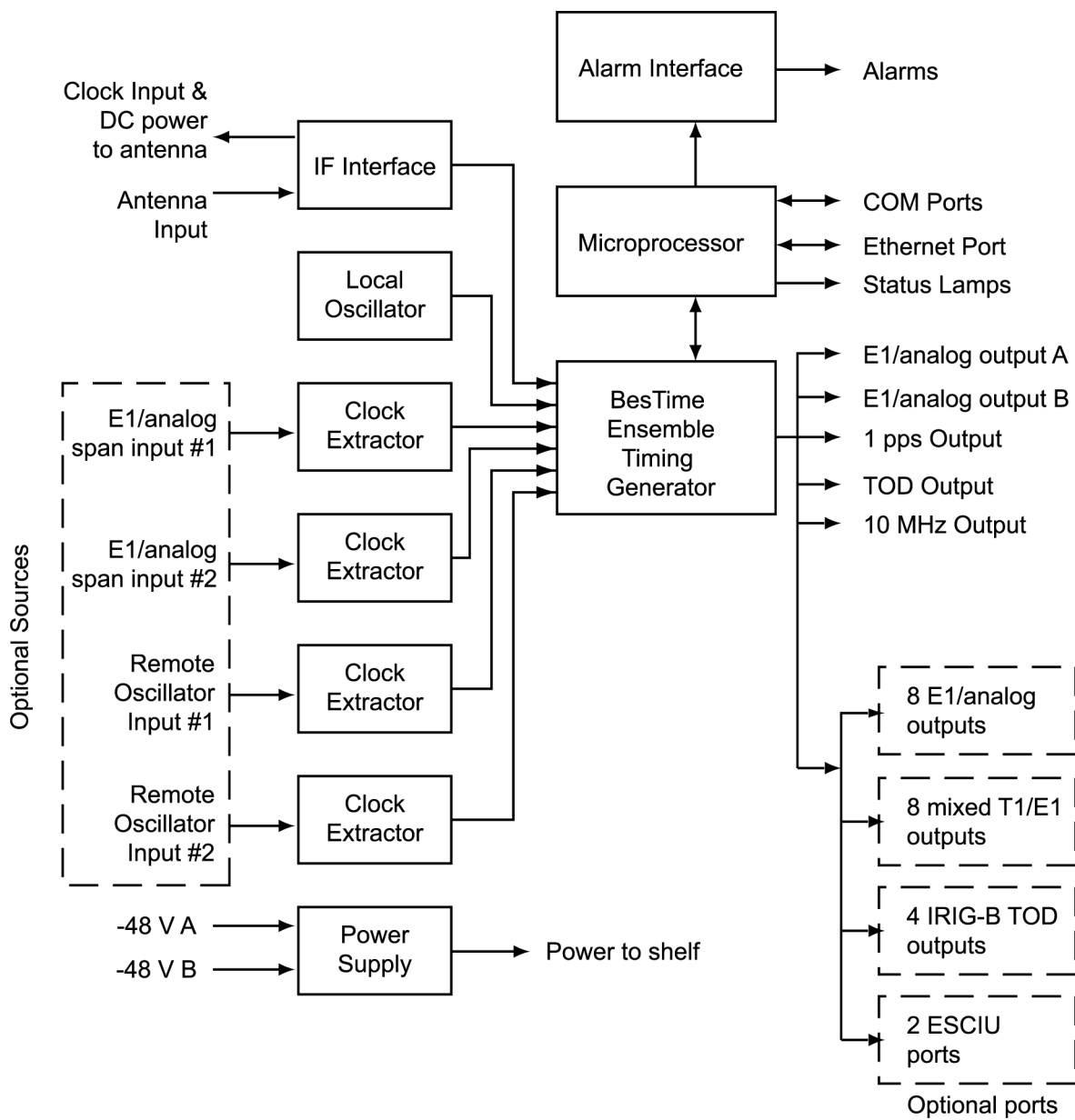
Antenna

The antenna housing includes a volute antenna, 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 in the antenna provides 23 dB of signal gain.

A downconverter converts the L-band GPS signal to IF for long-distance transport on the coaxial antenna cable. The antenna cable provides 125 mA power from the shelf to the antenna, and transports GPS satellite IF signals from the antenna to the shelf.

IF Interface

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

Local Oscillator

A digitally controlled, oven-controlled crystal oscillator (OCXO) develops a highly stable local oscillator signal, independent of factors that exist outside the shelf. This signal 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 shelf.

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 Simple Network Time Protocol (SNTP) 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 SNTP feature. To activate the SNTP feature, enter the TL l command printed on the activation certificate. Once activated, this feature will be permanently enabled. To order the SNTP feature, contact the local Symmetricom sales representative.

BesTime Ensemble Timing Generator

Clock signals from the GPS antenna (via the IF interface), the local oscillator, the optional external sources (E1 span lines and remote oscillators) are used as sources by the BesTime algorithms in the BesTime Ensemble Timing Generator. The signals are analyzed for MTIE, 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 (990-72020-06 Systems Only)

This option enables a user to mix any combination of E1 and T1 outputs. A user can also use any combination of framing. For El, 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 synchronization status messaging (SSM) per TR-33 for El and T1. The module mounts in the OPTIONS I/O mountings on the connector panel.

Eight Additional E1 Outputs (990-72020-02 Systems Only)

This option provides a module for eight additional E l or analog (2.048 MHz) outputs. The module mounts in the OPTIONS I/O mountings on the connector panel. These outputs function the same as the standard E l 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 format.

IRIG-B TOD Outputs (990-72020-05 Systems Only)

This option provides a module for four additional TOD outputs in IRIG-B format. The module mounts in 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.

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.

Two ESCIU Ports (990-72020-04 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 4.)

Figure 4. ESCIU Signals

ESCIU

Pass-through in Return Direction

Relay Bypass Path

Datastream Synchronizer

BesTime Ensemble Timing Generator Synchronizing signal
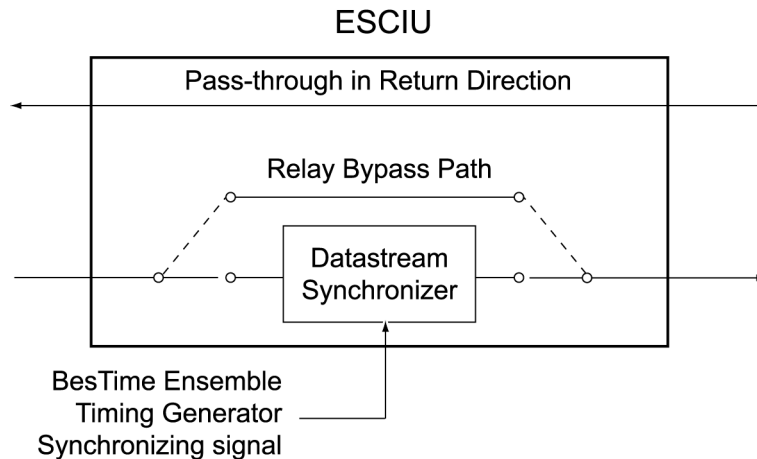
Alarm Interface

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

Communications Ports

Three RS-232 serial communications ports carry TL1 commands, responses, and autonomous messages between the TimeSource 3100 and an external terminal.

Ethernet

TimeSource 3100 has six Ethernet ports to carry TL1 commands, responses, and autonomous messages between the TimeSource 3100 and an external terminal, or an Element Manager. 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, OSMF, 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 Manager, sends autonomous messages, and closes the connection when finished.

Passthrough

The Passthrough feature of the TimeSource 3100 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:

• Provide a no download exclusion for the Passthrough port

• COM 1 or COM2 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 3100

• The TID (SID for DCD) is used to identify commands that go to the DCD product. The TimeSource 3100 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.

Figure 5. shows a TimeSource 3100 Passthrough setup.

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Figure 5. TimeSource 3100 Passthrough Function
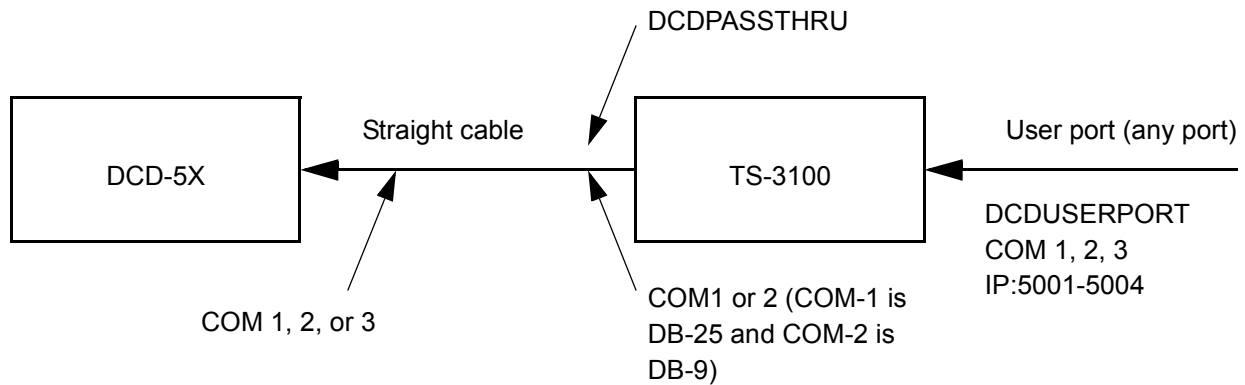
Alarm Programmability

New releases of TimeSource (1.05.03 and higher) allows the user to provision the alarm escalation parameters that were hardcoded in the previous releases of TS3100.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 TS3100 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 RO-X alarms can be programmed for 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).

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 Warm-up" 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 Warm-up" time, the outputs will generally be squelched. If the outputs are enabled using the TL1 command
(ED-EQPT::TS3100: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 3100, 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 3100, 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 3100 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.

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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. Outputs can be set to AIS, Squelch, or SSM on an alarm. 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

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Engineering & Ordering

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

Site Survey

Perform a site survey as described in Procedure A before ordering the system. Use the guidelines and considerations in the Antenna Location Guidelines section and the Shelf Considerations section.

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Procedure A. Site Survey

Step	Action
1	Determine the shelf location.
2	Determine the best location for mounting the antenna (less than 305 m of cable from the shelf). Use the guidelines and considerations in the Antenna Location Guidelines section.
3	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 as follows: • Valid roof 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	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	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 3100 power inputs.

End of Procedure

Lightning Suppressor Guidelines

- Mount the lightning suppressor within 4.6 meters of a valid, direct, low impedance, low resistance, earth ground connection point. Valid earth grounds include the roof ring ground system, building structural steel, or a Central Office ground plate. If the grounding point is inside the building, mount the suppressor within 15 meters of the cable entry into the building.

Warning: **Metal clamps that form a complete metal circle around the antenna cable or the cable conduit are not allowed. The ring clamp acts like a choke coil to induce currents, which resists current flow and hampers proper lightning protection.**

Warning: **Place the lightning suppressor away from electrical devices or cabling that may induce arcing.**

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

- Route the ground wire as straight as possible (bends in the ground wire increase impedance at lightning frequencies), in accordance with local company practices.

- Treat all exposed connections with an electrically conductive anti-corrosion compound (Kopr-Shield or equivalent).

Warning: **Avoid small-radius turns and unnecessary turns.**

2

Antenna Location Guidelines

The ideal 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. The smaller the field of view, the fewer satellites that can be used in the timing solution for GPS derived time.

Signals closer to the horizon are often subject to multipath effects, which degrade the timing solution. The TimeSource 3100 can be set to ignore, or mask, all signals from the horizon to a chosen angle of elevation (mask angle). (See Figure 6.)

Figure 6. Antenna Field of View
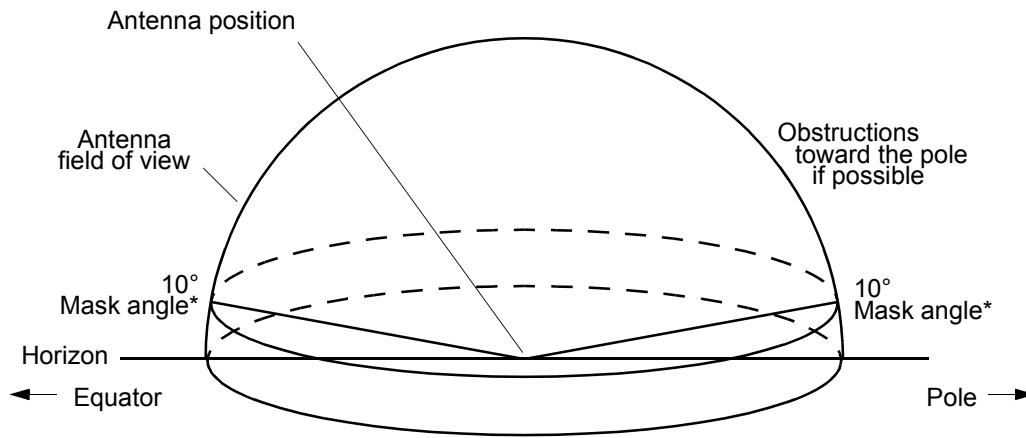
* An angle of 10° masks objects up to about 1 m above the horizon at 6 m from the antenna (illustration at right.)
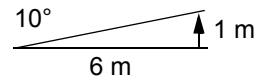
Due to the geometry of the GPS satellite orbits, more satellites are visible in the direction of the equator than the poles. If possible, place the antenna so that the antenna has a clear view toward the equator (toward the south in the northern hemisphere, or toward the north in the southern hemisphere). 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) (Figure 7).

Figure 7. Antenna Location Examples

Tower antenna location (Note 1)

Building antenna location (Note 2)

Water tower

Tree

Roof structure

Antenna tower

Location A

Location B
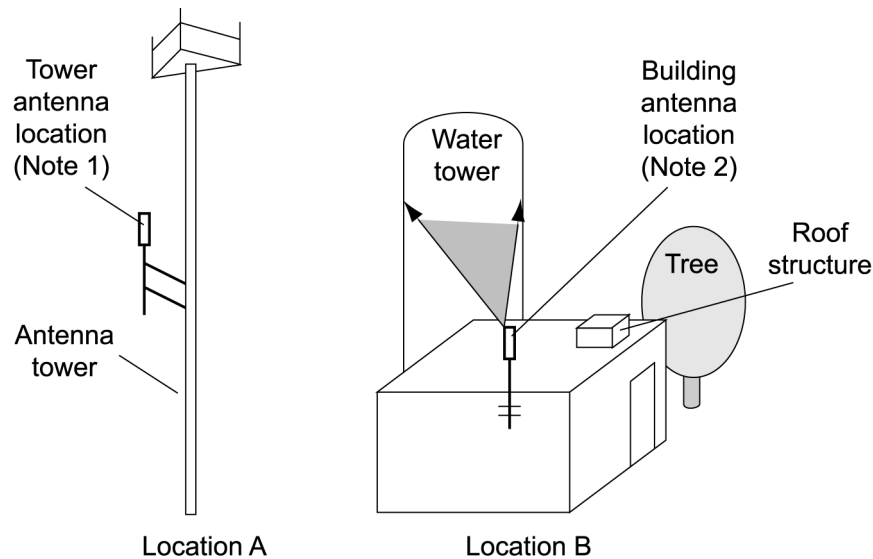
Notes:

1. 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.

2. Place the antenna high enough that the roof structure and tree are below the mask angle, and the water tower does not block a large portion 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 8).

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 or multipath effects).

Figure 8. Sample Rooftop Antenna Mount
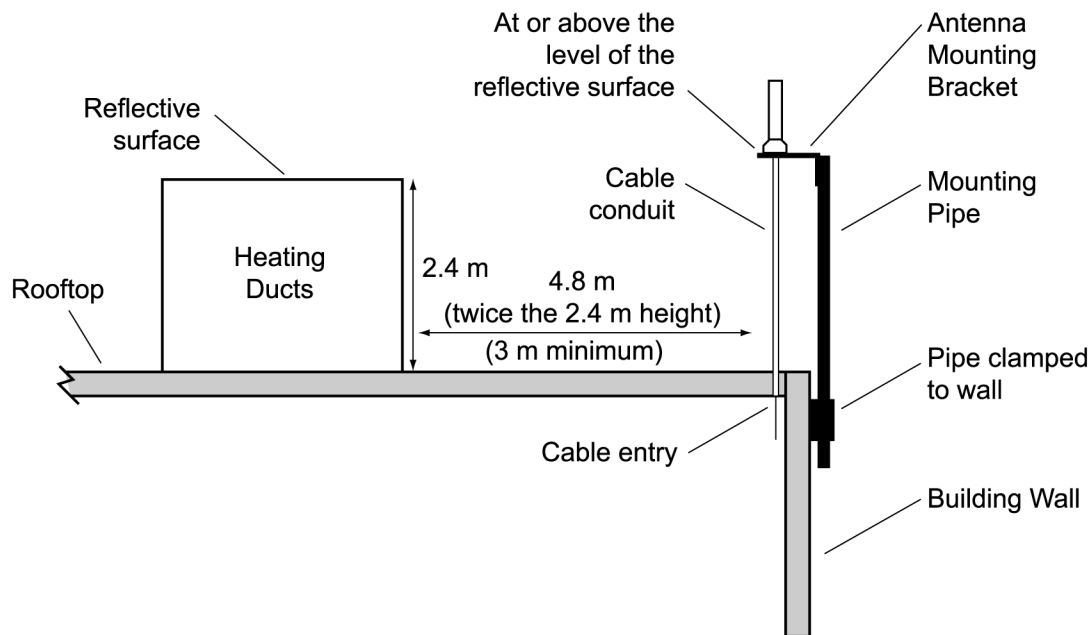
Note: This is an example only. Not all parts are available from Symmetricom.

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 m of the valid earth ground.

2

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.

Two cables are required: one to connect the antenna to the lightning suppressor, and another to connect the lightning suppressor to the TimeSource 3100 Shelf.

Symmetricom offers RG-59/U plenum-rated coaxial cable (0.812 mm [20 AWG], 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)

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)

Remote Oscillator Cabling

If 5 MHz signals from a DCD Shelf are used as remote oscillator inputs, a 5 MHz Isolator Kit must be used between the DCD Shelves listed below and the TimeSource 3100 Shelf. Refer to Field Service Bulletin FSB 098-40620-19R2 for details.

Shelf	Isolator Kit part #
DCD-ST2	093-45110-06
DCD-519	093-45110-06
DCD-419	093-45110-07
DCD-521 (not required with DCD-521/C)	093-45110-06
DCD-523 (backplane Revision D or earlier)	093-45110-06

The 5 MHz Isolator Kit consists of the isolation module, associated screws, two 0.61 meter long RG-59/U, 75 ohm coax cables, and two 1.83 meter lengths of 50 ohm cables. The 0.61 meter long cables have BNC connectors at both ends for connecting to all shelves except for the DCD-419 (Rev. D or later), or SMB-to-BNC connectors for connecting to the DCD-419.

The isolation module is used to reduce potential noise coupling, and match impedances in the cables between the DCD master shelf and TimeSource 3100. It also converts the 5 MHz output from a square wave to a sine wave.

The isolation module is installed between the TimeSource 3100 Shelf and the DCD master shelf. To connect between the module and the DCD Shelf, two 0.61 meter long RG-59/U, 75 ohm coax cables are provided.

If an isolator kit is not required, the following cable options are available:

- Remote oscillator cable kit (093-72001-01) includes:

    - Remote oscillator cables (2) (160-00201-06)

    - Right-angle BNC connector adapters (4)

- Remote oscillator cable (160-00201-06)

2

IRIG-B TOD (990-72020-05 Systems Only)

If using the IRIG-B TOD outputs (990-72020-05 TimeSource 3100 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 adapter (also provided) BNC connectors, to direct the cables from the shelf as desired.

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

2

RJ-422–to–RJ-232 TOD Converter

If 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 RJ-422-to-RJ-232 TOD Converter Kit is required (ordered separately, part number 093-72000-98).

The RJ-422-to-RJ-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 3100 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 3100 Shelf and the converter.

The other cable is an RS-232 data communications cable, 15 meter 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.

2

Shelf Considerations

The TimeSource 3100 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 (Figure 9) to the appropriate positions on the sides of the shelf for flush mounting or 12.7 cm offset mounting. Attach the short side of the mounting ear to the shelf for an ETSI 53.5 cm rack, and attach the long side of the mounting ears to the shelf for a 48 cm rack. Mount the shelf in the rack according to standard company practices.

Figure 9. Rack Mounting Options

Rack rails

Rear of rack

Top of shelf

Mounting ears

A. ETSI - 53.5 cm rack

Mounting ears

Rear of rack

Top of shelf

Rack rails

B. Flush mounting - 48 cm rack

Rack rails

Rear of rack

Top of shelf

Mounting ears

C. 12.7 cm offset - 48 cm rack
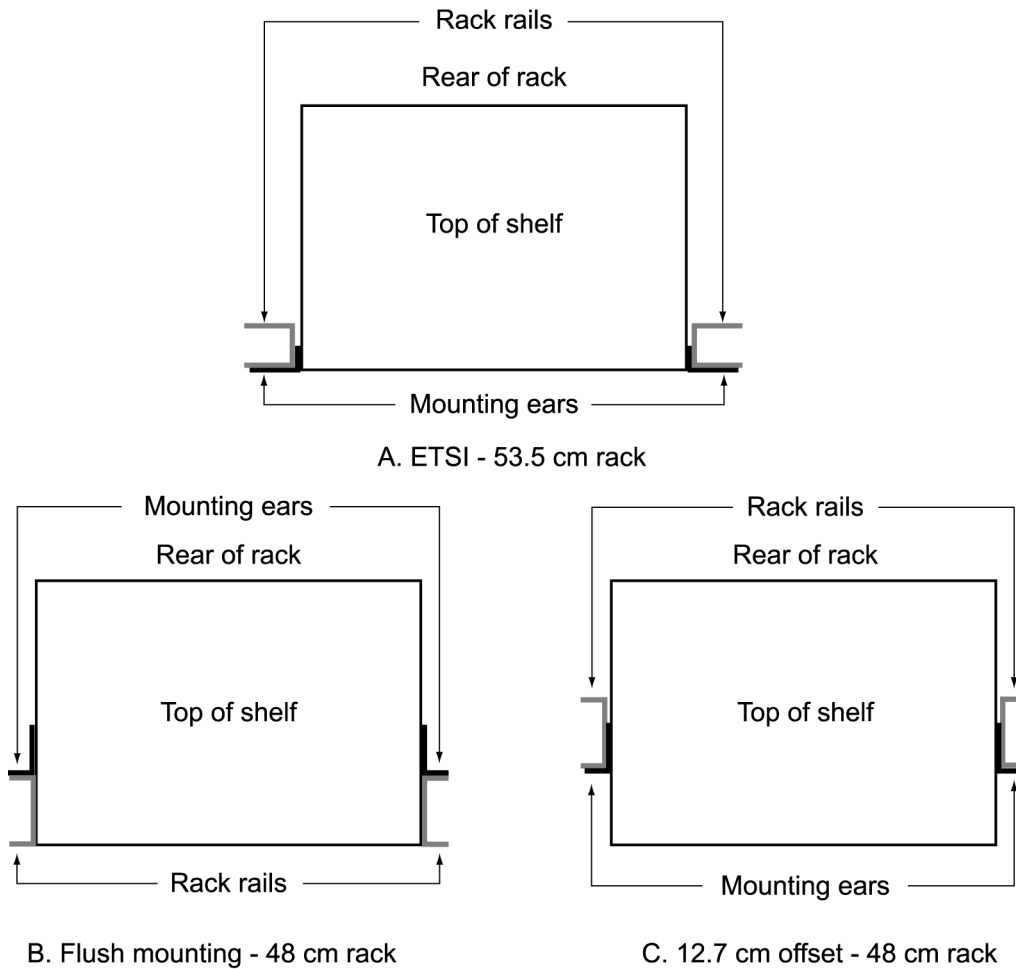
Systems

The TimeSource 3100 Systems available are listed below.

Standard System (Two E1 or 2.048 MHz Outputs)

This system (990-72020-01) includes:

- TimeSource 3100 Shelf (090-72000-11)

- TimeSource 3100 card (090-72020-01)

- Antenna (090-72010-97)

- Antenna mounting kit (093-00001-01)

- Hardware kit (093-72020-97) includes:

  - Lightning suppressor (143-00018-01)

  - Lightning suppressor mounting bracket (070-00300-02)

  - Craft port-to-PC communications cable (060-00067-01)

- System software (992-72020-05 or later)

With Eight Additional E1 or 2.048 MHz Outputs

This system (990-72020-02) includes:

- TimeSource 3100 Shelf (090-72000-11)

- TimeSource 3100 card with expansion E1 or 2.048 MHz outputs (090-72020-02)

- Antenna (090-72010-97)

- Antenna mounting kit (093-00001-01)

- Hardware kit (093-72020-97) includes:

    - Lightning suppressor (143-00018-01)

    - Lightning suppressor mounting bracket (070-00300-02)

    - Craft port-to-PC communications cable (060-00067-01)

- System software (992-72020-05 or later)

Note: This system requires one of the following separately ordered output modules:

- BNC output module (990-72100-01)

- Wire-wrap output module (990-72100-02)

With Eight Additional Mixed E1/T1Outputs

This system (990-72020-06) includes:

- TimeSource 3100 Shelf (090-72000-11)

- TimeSource 3100 card with mixed E1/T1 outputs (090-72020-06)

- Antenna (090-72010-97)

- Antenna mounting kit (093-00001-01)

- Hardware kit (093-72020-97) includes:

    - Lightning suppressor (143-00018-01)

    - Lightning suppressor mounting bracket (070-00300-02)

    - Craft port-to-PC communications cable (060-00067-01)

- System software (992-72020-05 or later)

Note: This system requires the following separately ordered output module:

- Wire-wrap output module (990-72100-02)

2

With Two E1 Synchronization Insertion (ESCIU) Ports

This system (990-72020-04) includes:

- TimeSource 3100 Shelf (090-72000-11)

- TimeSource 3100 card with ESCIU ports (090-72020-04)

- Antenna (090-72010-97)

- Antenna mounting kit (093-00001-01)

- Hardware kit (093-72020-97) includes:

    - Lightning suppressor (143-00018-01)

    - Lightning suppressor mounting bracket (070-00300-02)

    - Craft port-to-PC communications cable (060-00067-01)

- System software (992-72020-05 or later)

Note: This system requires the following separately ordered ESCIU connector module. Choose:

- 75 Ω BNC unbalanced connector module (990-72100-04)

- 120 Ω wire-wrap balanced connector module (990-72100-05)

With Four IRIG-B TOD Outputs

This system (990-72020-05) includes:

- TimeSource 3100 Shelf (090-72000-11)

- TimeSource 3100 card with IRIG-B TOD outputs (090-72020-05)

- Antenna (090-72010-97)

- Antenna mounting kit (093-00001-01)

- Hardware kit (093-72020-97) includes:

  - Lightning suppressor (143-00018-01)

  - Lightning suppressor mounting bracket (070-00300-02)

  - Craft port-to-PC communications cable (060-00067-01)

- System software (992-72020-05 or later)

Note: This system requires a separately ordered BNC output module (990-72100-03).

User-Supplied Tools and Materials

Ensure that the user-supplied tools and materials listed below are on hand for installation of the antenna.

For 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, shaping, and connecting PVC pipe.

- 4.115 mm (6 AWG) ground wire.

- Spade lugs for 4.115 mm (6 AWG) ground wire.

- Crimp tool for 4.115 mm (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.

For Shelf Installation

Ensure that a Phillips-head screwdriver is on hand for installing the TimeSource 3100 Shelf in a rack and four (4) screws to mount the shelf in the rack.

Outputs, Power, and Miscellaneous

- RG-58 coaxial cable for 1 PPS, 10 MHz outputs (if used)

- Ethernet 10BaseT cable for Ethernet port (if used)

- Category 5 four-pair RS-422 cable, with RJ-45 connector for the TOD output, RS-422-to-RS-232 TOD converter (if used)

- RS-232 cable with DB-25 connector for the RS-422-to-RS-232 TOD converter (if used)

- RS-232 cable with DB-9 connector for COM2 port (if used)

- 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

- E1 cable

2

2

Installation

This chapter provides the steps required for installation and power-up.

Chapter 3

Unpacking

Install the TimeSource 3100, using steps in the order given in this chapter. 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.

Warning: **When handling electronic equipment, use local office procedures regarding electrostatic discharge (ESD), 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.

3

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Antenna

These installation procedures are to be used in support of local company procedures and the Installation Job Specification.

Prior to installing the antenna, the site, antenna location, lightning suppressor location, cable route, and all other details should be planned.
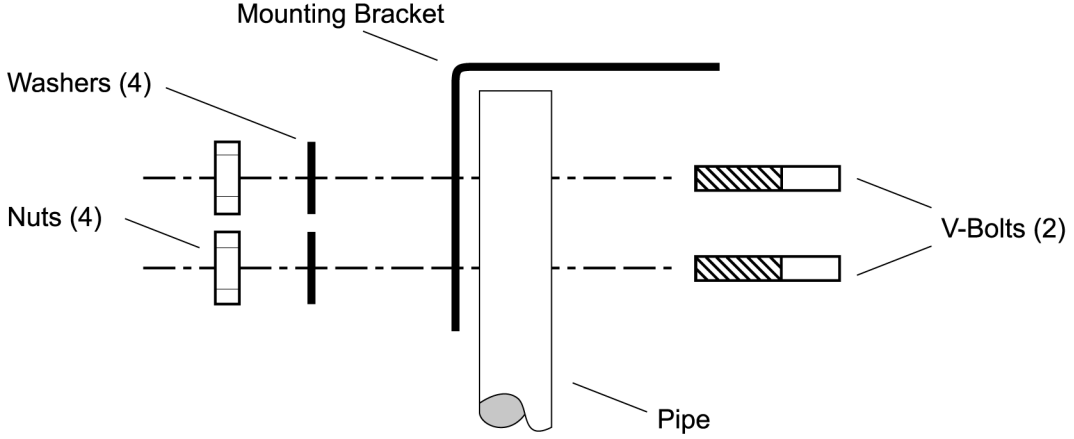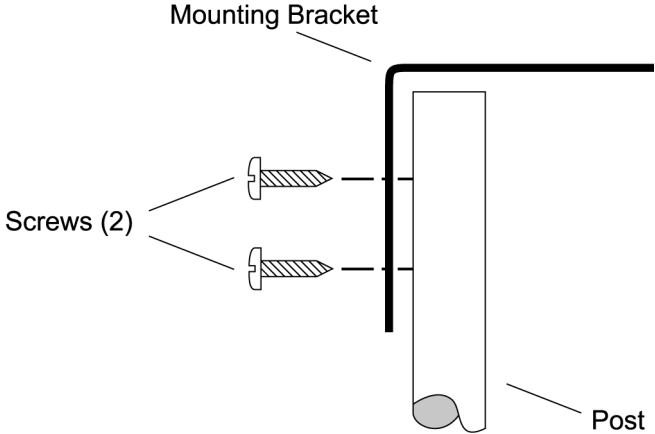
To install the antenna, refer to Figure 10, and perform Procedure B.

Warning: **Ensure that the lightning suppressor is placed away from electrical devices or cabling that may induce arcing.**

Figure 10. Antenna-to-Shelf Cabling
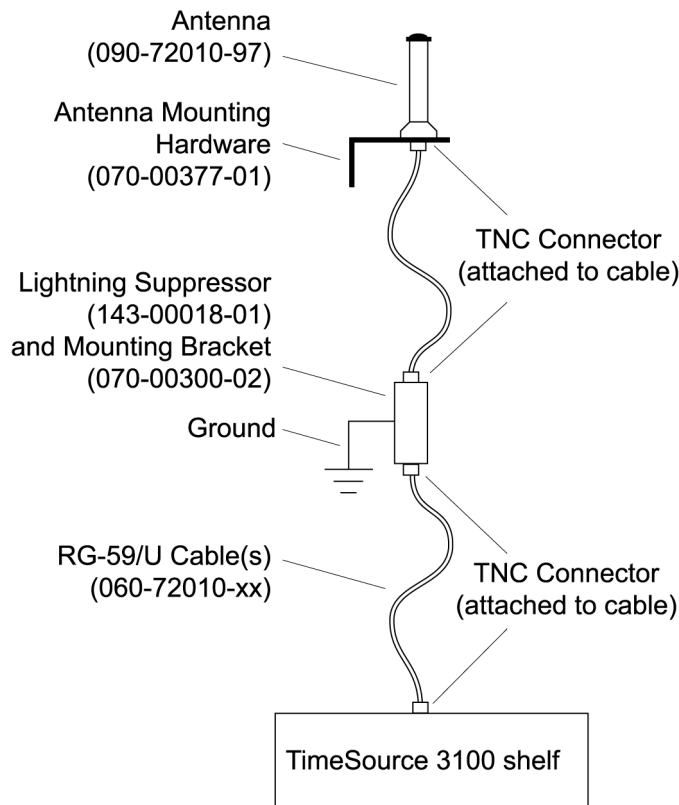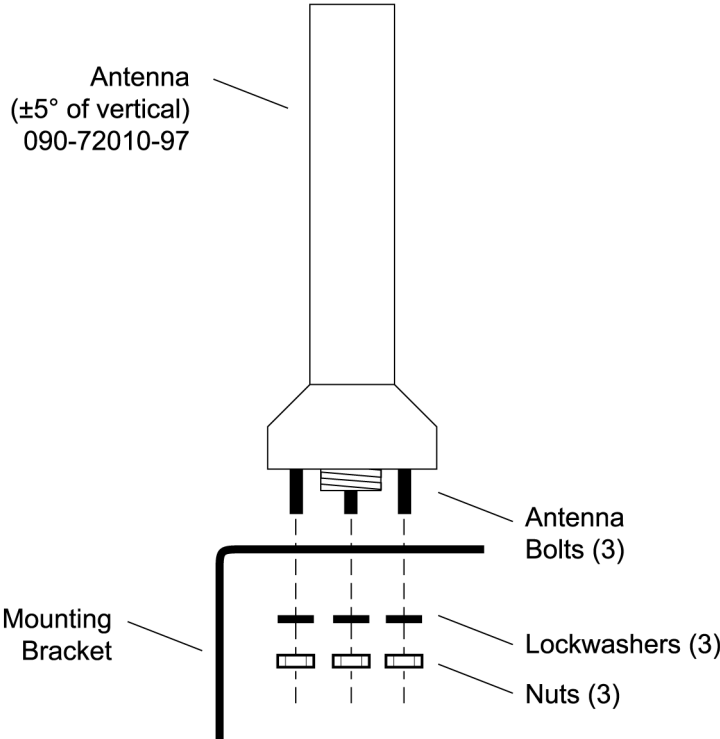
Procedure B. Antenna Mounting and Cable Connection
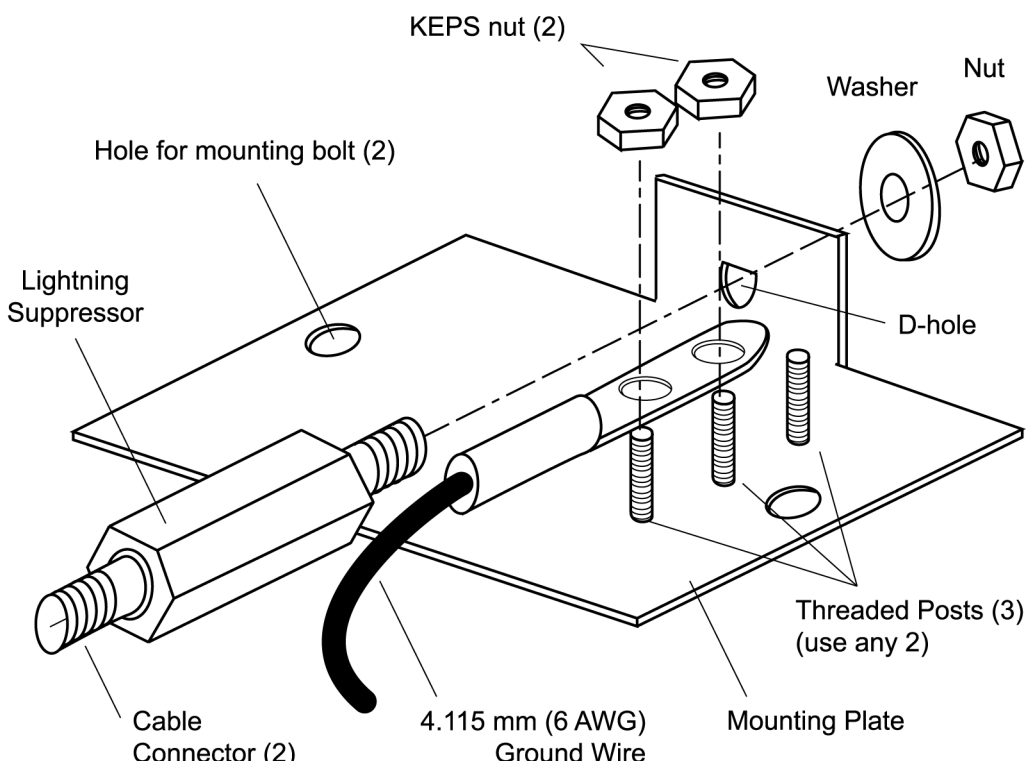
Step	Procedure
1	Attach the antenna mounting bracket to a pipe (2.5 cm diameter) or a wood post.

- 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.

Mounting Bracket

Washers (4)

Nuts (4)

V-Bolts (2)

Pipe

- 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.

Mounting Bracket

Screws (2)

Post

3

Step	Procedure
2	Slide the antenna bolts through the holes in the mounting bracket, then attach the antenna to the bracket, using the provided three nuts and three lockwashers.

Antenna
(±5° of vertical)
090-72010-97

Antenna
Bolts (3)

Mounting
Bracket

Lockwashers (3)

Nuts (3)

Step	Procedure
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. *Note:* A junction box must have inside dimensions of 7 cm by 7 cm by 4 cm to hold the mounting plate and attached components.

3

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 3.8 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 3100 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) round 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.

Procedure B. Antenna Mounting and Cable Connection (cont'd)

Step	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

3

Shelf

Output Module Installation

Warning: **The circuitry on the plug-in circuit board is subject to electrostatic discharge (ESD) damage. Be sure to wear an ESD wrist strap when making connections to the connector panel. Failure to observe this warning may result in equipment damage.**

If an 8 E1 output module, an 8 mixed El/T1 output module, a 4 IRIG-B output module, or a 2 ESCIU port module is 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 11).

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 11. Options I/O Connector
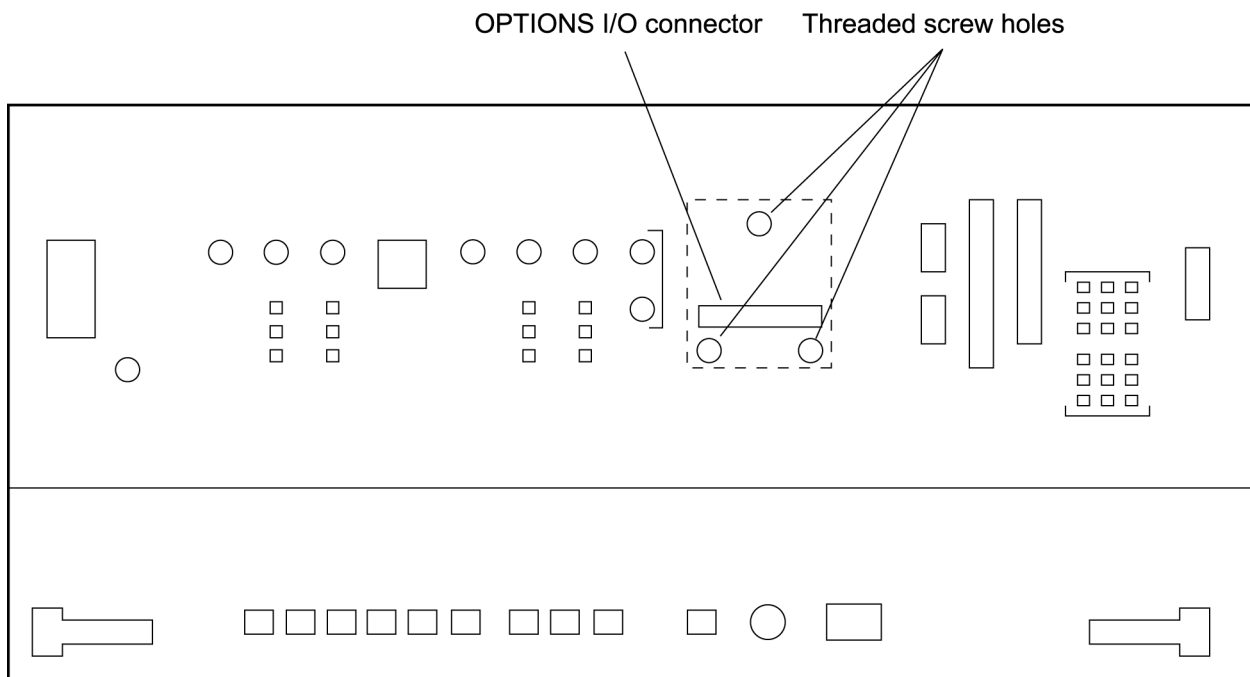
Rack Mounting

The shelf is shipped with the ears positioned for ETSI 53.5 cm mounting (Figure 12A). For 48 cm racks, the shelf can be positioned to the rear of the rack rail for flush mounting (Figure 12B) or to the front of the rack rail for 12.7 cm offset mounting (Figure 12C).

Position the mounting ears, as shown in Figure 12. Mount the shelf in the rack according to standard company practices.

Figure 12. Rack Mounting Options

A. ETSI - 53.5 cm rack

B. Flush mounting - 48 cm rack

C. 12.7 cm offset - 48 cm rack

3
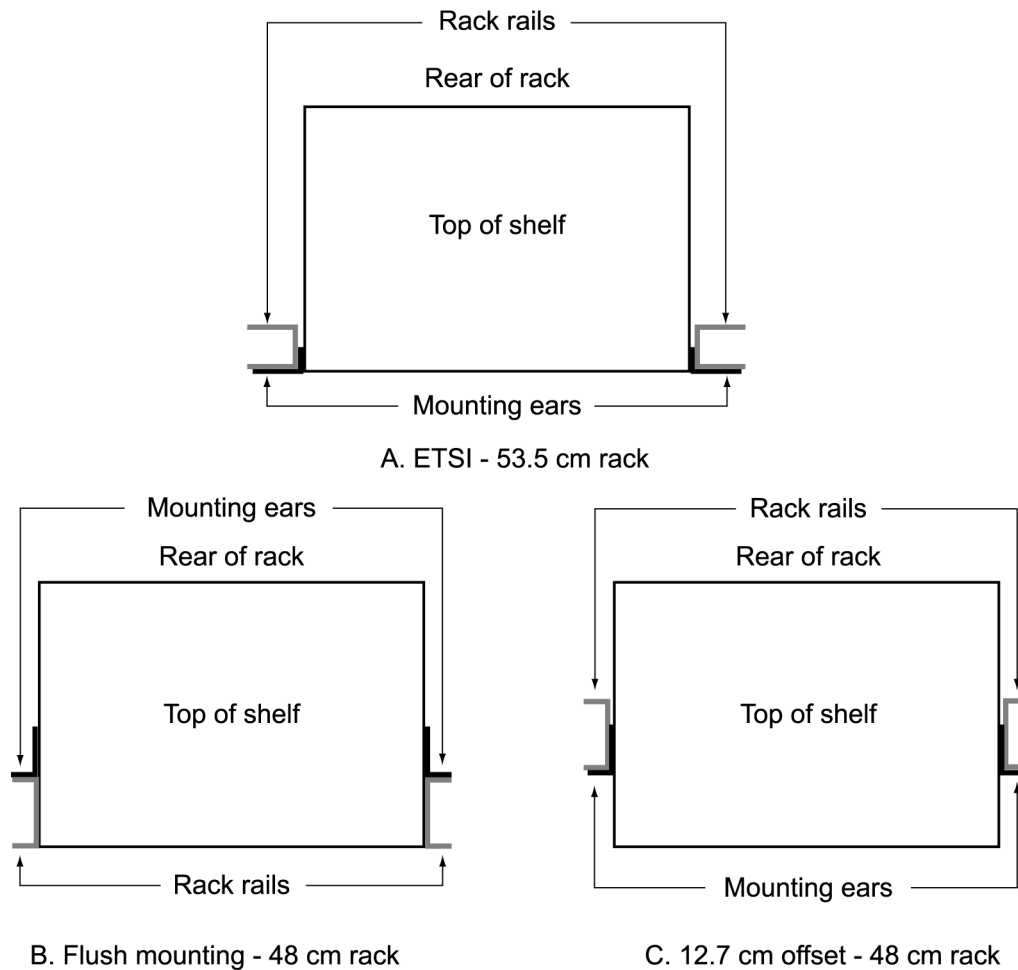
Cabling

Warning: **The circuitry on the plug-in circuit board is subject to electrostatic discharge (ESD) damage. Be sure to wear an ESD wrist strap when making connections to the connector panel. Failure to observe this warning may result in equipment damage.**

Warning: **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. Do not pierce, peel, or otherwise violate the integrity of the overlay. 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 13 shows the connectors on the front panel and connector panel. All connectors can be located using these illustrations.

3

Figure 13. Connector Panel and Front Panel Connectors

10 MHz output

E1 outputs A & B (BNC)

1 pps output

E1 inputs A & B (BNC)

Com port 1

Time of day

Alarms

Com port 2

Battery A & frame ground (TB1)

Battery B & frame ground (TB2)

GPS antenna input

E1 outputs A & B (wire-wrap)

Expansion Bus (Reserved for future use)

E1 inputs A & B (wire-wrap)

Craft

Ethernet

Output Module:
8 E1 outputs (BNC or wire-wrap) or
4 IRIG-B TOD outputs (BNC) or
2 ESCIU ports (BNC or wire-wrap) or
8 mixed E1/T1 outputs (wire-wrap)

3

Frame Ground

Frame ground enters through the four-position power terminal blocks labeled TB1 and TB2. Figure 13 shows the location of the terminal blocks, and Figure 14 shows the terminal block connections.

Figure 14. Connector Panel Terminal Block Connections

TB (1 or 2)

BATT (A or B)

RTN

FRM

N/C

3
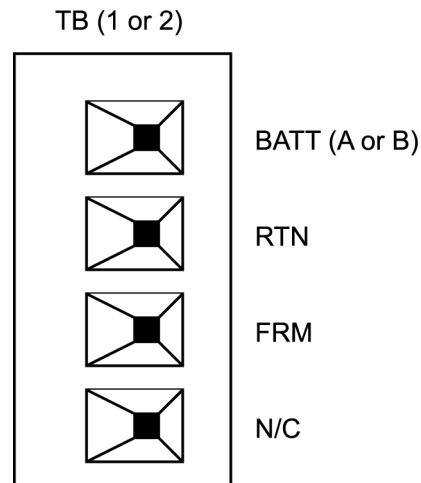
Ensure the frame ground wires are long enough to reach from the shelf connector panel to the frame ground connection. Use one 1.47 mm (16 AWG) green insulated wire to connect the FRM terminal of power terminal block TB1 to the frame ground, and use another 1.47 mm (16 AWG) green insulated wire to connect the FRM 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 connection to the 4.115 mm (6 AWG) frame ground rod that is run vertically on each side of the rack, if provided. Two methods are acceptable:

- Crimp an appropriate-size spade lug to the 1.47 mm (16 AWG) wire, bend the lug around the frame ground rod, and solder.

- Strip enough insulation from the 1.47 mm (16 AWG) wire to permit three complete turns around the frame ground rod, and solder.

Note: When soldering, use a 25 watt soldering iron to ensure the frame ground rod is heated sufficiently to prevent a cold solder connection.

Without ground rod:

Crimp an appropriate spade lug to the ground wire from each terminal block, 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.

Power

Warning: **This equipment is intended for installation in a restricted access location. Power source protective fusing must be provided as part of the installation.**

Caution: Do not apply power to the TimeSource 3100 Shelf before instructed in this procedure. Before connecting the power cables to the TimeSource 3100, 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 3100.

The –48 volt dc battery enters through the four-position power terminal blocks labeled TB1 and TB2. Figure 13 shows the location of the terminal blocks, and Figure 14 shows the terminal block connections.

Ensure the power wires are long enough to reach from the shelf connector panel to the office battery source connection. Use two 1.47mm (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 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 (battery A and battery 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

Connect the coaxial cable from the lightning suppressor to the TNC connector labeled GPS ANT. See Figure 13 for the connector location.

10 MHz Output

Connect an RG-58 coaxial cable from the connector labeled 10 MHz to the equipment that will use the 10 MHz output signal. See Figure 13 for the connector location.

E1 or Analog Synchronization Outputs

Connect the E1 or analog synchronization outputs at the wire-wrap pins or BNC connectors labeled El OUT A and El 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 13 for the location of the connectors and pins, and Figure 15 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.

Warning: **Because the El output circuits do not provide lightning protection, do not connect the El output line directly to a point outside the building. Failure to observe this warning may result in equipment damage.**

Figure 15. E1 or Analog Output Wire-Wrap Connections
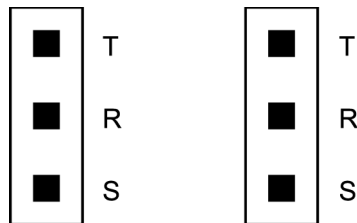
1 PPS Output

Connect an 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 13 for the connector location.

E1 or Analog Reference Inputs

E l or analog reference inputs, traceable to an independent Stratum 1 source, can be used in the output ensemble. Also, the performance of one or two references can be monitored. 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 3100) to the pin labeled S. See Figure 13 for the location of the connectors and pins, and Figure 16 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 <u>not</u> 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.

Warning: **Because the El input circuits do not provide lightning protection, do not connect the El input line directly to a point outside the building. Failure to observe this warning may result in equipment damage.**

Figure 16. E1 or Analog Input Wire-Wrap Connections
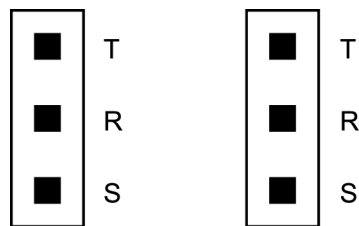
Remote Oscillator Inputs

If using the remote oscillator outputs, follow the instructions below.

Refer to the Engineering and Ordering chapter to determine if an isolator kit is required.

For the connection between the Time Source 3100 Shelf and the isolation module, use the provided two 1.83 meter lengths of 50 ohm coax cables. If the TimeSource 3100 Shelf is not collocated with the DCD Shelf, and longer cables are required, these must not exceed 15 meters, and are to be user-supplied.

Note: The isolation module must be mounted on the rack, in close proximity to the DCD Shelf, whether or not the TimeSource 3100 is installed in a collocated or non-collocated location from the DCD Shelf. Attaching the isolation module (to the rack) grounds the module to rack frame ground. Grounding the module to rack frame ground is required if the TimeSource 3100 is located at a distance less than 1.83 meters from the DCD Shelf.

DCD Shelf with Isolation Module

To install the isolation module, perform Procedure C.

3

Procedure C. Isolation Module Installation

Step	Procedure
1	On the rear of the DCD rack, check either side of the DCD Shelf, directly above or below the shelf, for a location to mount the isolation module. Mount to the rack, using the two provided screws.
	Note: Due to distance constraints, the module must be placed no more than 0.61 meter from the following connectors:
	• OSC A/B OUT connectors on the rear of the DCD-519 and DCD-523 (Rev. D or earlier) master shelves
	• 5 MHZ OUTPUT A/B connectors on the DCD-ST2 master shelf
	• J35 and J36 connectors on the DCD-419 master shelf (Rev. D or later)
2	Use the provided 0.61 meter coax cable to connect from the appropriate A connector on the DCD Shelf backplane to the TO DCD SHELF end of the isolation module (refer to Table B and Figure 17).
3	Use the 1.83 meters coax cable, and connect from the REM OSC A connector on the TimeSource 3100 Shelf to the TO LPR end of the isolation module (refer to Figure 17).

End of Procedure

Table B. DCD Connections to the TimeSource 3100

| DCD Shelf Type | From DCD Shelf | | To TimeSource 3100 Connector |
	Connector	Label	
DCD-ST2	J24	5 MHZ OUTPUT A	REM OSC A
	J25	5 MHZ OUTPUT B	REM OSC B
DCD-419	J35	NOT LABELED	REM OSC A
	J36	NOT LABELED	REM OSC B
DCD-523	J61	OSC A OUT	REM OSC A
	J62	OSC B OUT	REM OSC B
DCD-519	J44	OSC A OUT	REM OSC A
	J45	OSC B OUT	REM OSC B

3

Figure 17. DCD Shelf, Isolation Module, and TimeSource 3100 Connections

From REM OSC A or B
on TimeSource 3100 Shelf

From REM OSC A or B
on TimeSource 3100 Shelf

1.83 meter cable to
TimeSource 3100

TO LPR

1.83 meter cable to
TimeSource 3100

Isolation
Module

To connectors
on DCD Shelf
(Refer to Table B)

TO DCD SHELF

To connectors
on DCD-419 Shelf
(Refer to Table B)

A. To all DCD-ST2, DCD-519, and
DCD-523 (Rev. D and earlier)

B. To DCD-419
(Rev. D or later only)
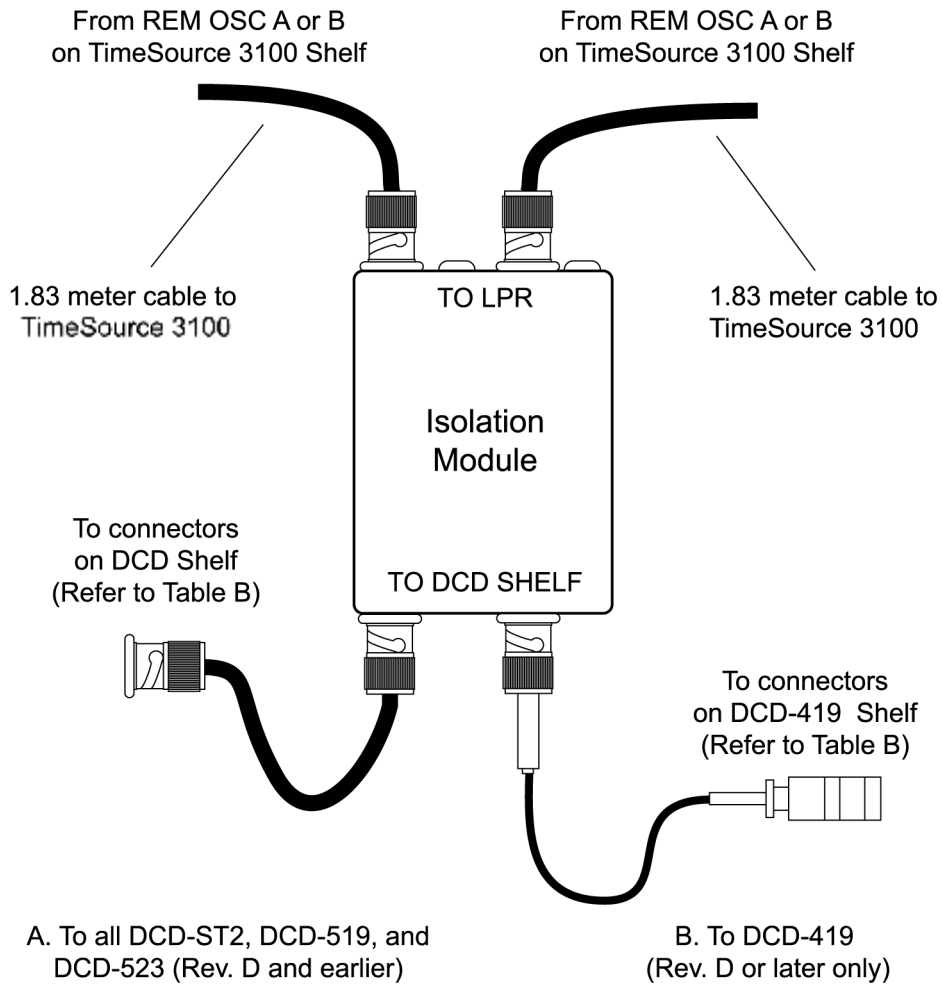
DCD Shelf without Isolation Module

If an isolation module is not required, use two 50 ohm coax cables to make the connections to the DCD Shelf. Cables must not exceed 15 meters, and must be purchased separately or are to be user-supplied.

Source Other than DCD Shelf

If an isolator kit is not required, connect an RG-59/U coaxial cable from a 5 MHz or 10 MHz remote oscillator to the connector labeled REM OSC A. Connect another RG-59/U coaxial cable from a remote oscillator of the same frequency to the connector labeled REM OSC B. Both remote oscillators must be the same frequency, and a minimum of Stratum 2 (rubidium oscillator) quality. See Figure 13. for the connector locations.

Module for Additional E1 or Analog Outputs

Connect the optional eight E1 or analog outputs with the wire-wrap or BNC output module. See Figure 13 for the connector location, and Figure 18 for the connections.

Figure 18. Eight E1 or Analog Output Connections
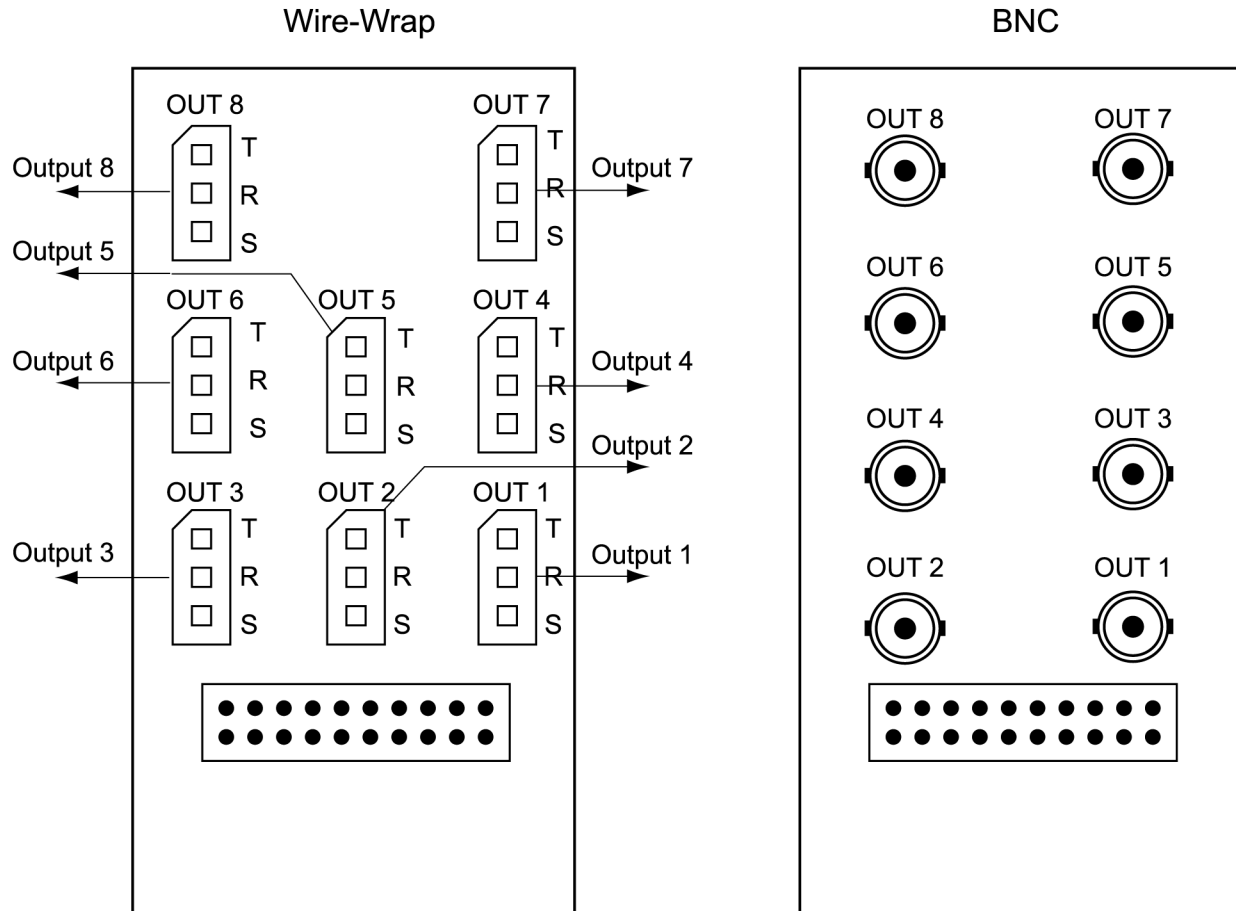
Module for Mixed E1/T1 Outputs

Connect the optional eight mixed El/T1 outputs with the wire-wrap output module. See Figure 13 for the connector location, and Figure 19 for the connections.

Figure 19. Eight Mixed E1/T1 Output Connections

Wire-Wrap
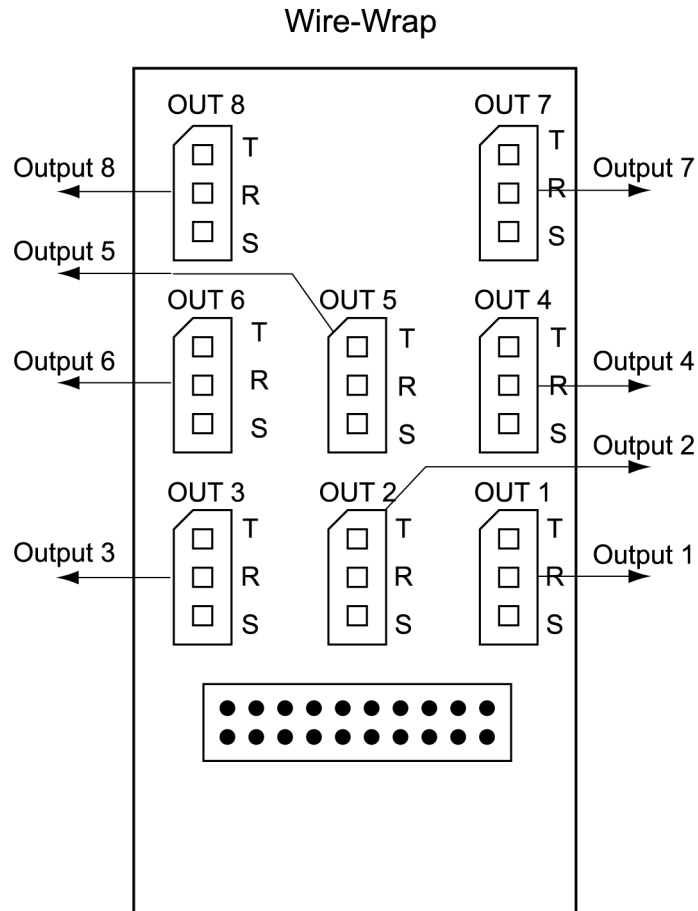
Module for IRIG-B TOD Outputs

Connect the four optional IRIG-B TOD outputs with the IRIG-B output module. See Figure 13 for the connector location, and Figure 20 for the connections.

Figure 20. IRIG-B TOD Output Connections
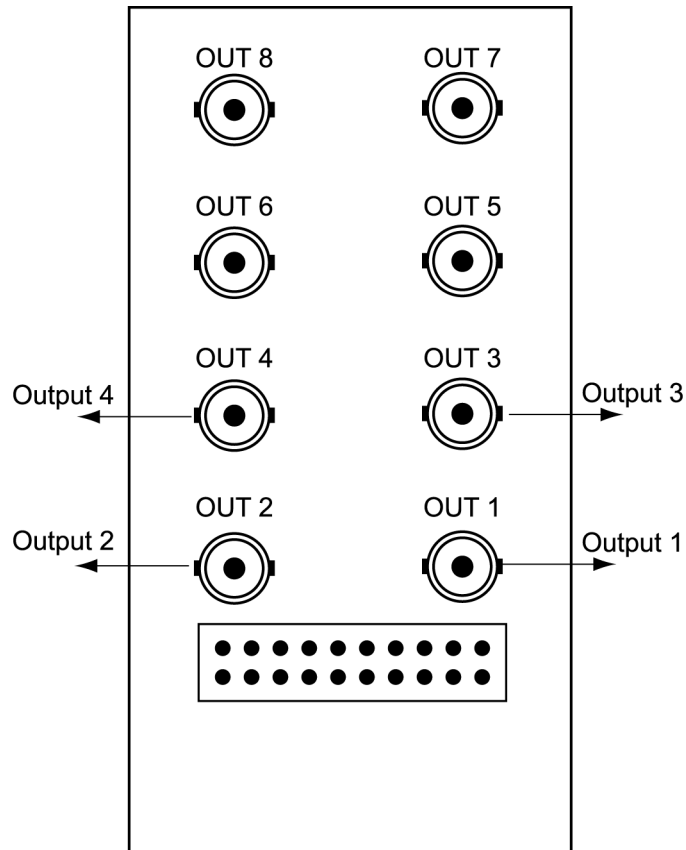
Note: Outputs 5, 6, 7, and 8 are not used

Module for ESCIU Ports

The ESCIU ports (Figure 21) have a different function than the synchronization outputs. Synchronization outputs provide external reference clock signals for network elements. ESCIU ports carry El traffic, and directly synchronize the El bitstream.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 El signals that conform to CCITT G.703 paragraph 6 specifications.

A bypass relay directs the E1 traffic around the ESCIU circuits to maintain continuity on the spans if a fault occurs.

Figure 21. Connector Layout of ESCIU Modules

BNC

Wire-Wrap
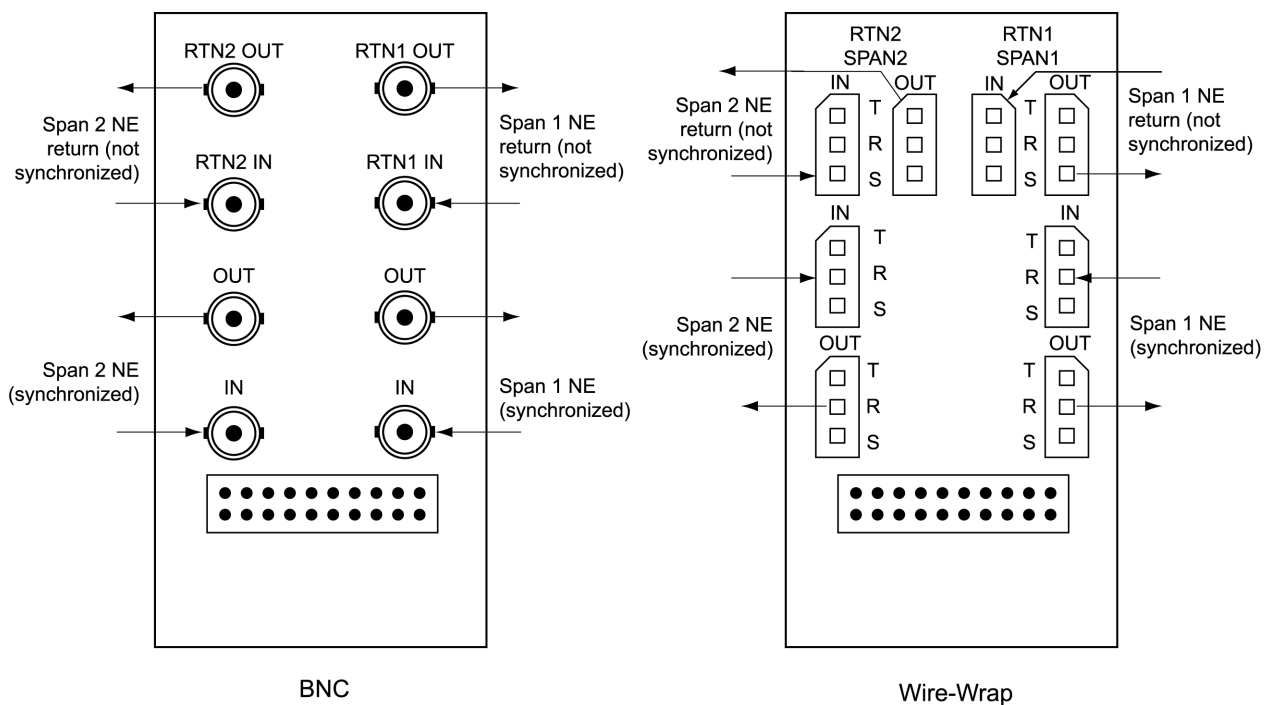
Cutover Procedures for Out-of-Service Equipment

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 re-timed is connected to the ESCIU module correctly. Refer to Figure 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.

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

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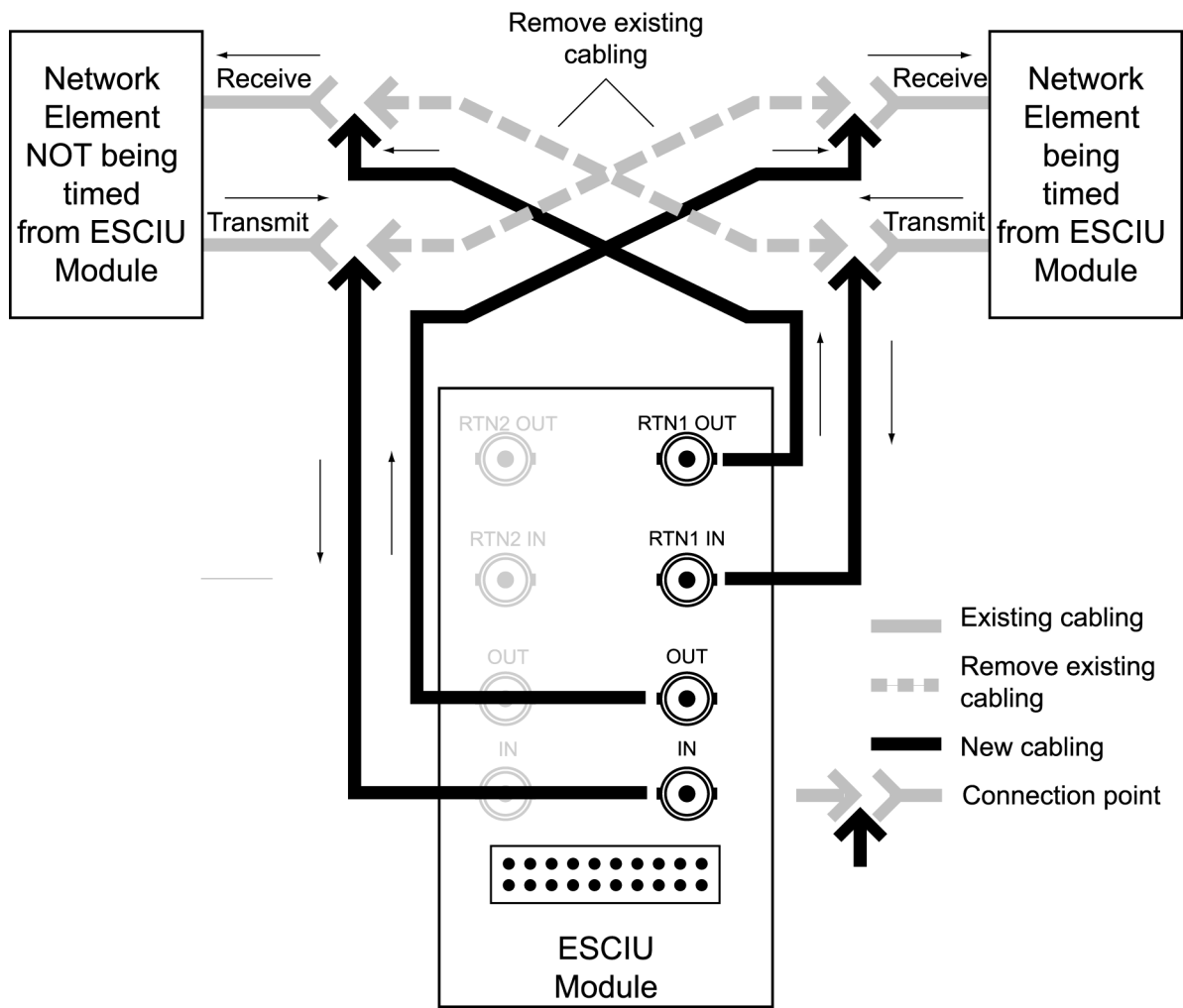
3

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 re-timed from the ESCIU module will be connected to the ESCIU module A OUT terminals. Refer to Figure 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 bitstream 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, reinsert patch cords in the IN jack and the termination plugs in the OUT jack. Recheck the cross-connect wiring just installed, and repeat Step 5.

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

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

1 ▬▬ Patch Cord

2 ▪ ▪ Existing cabling

3 ▬▬ ESCIU cabling

▷ Bridging repeaters

○ DSX-1 jacks

Primary Reference

E1 Line Interface Eqpt

T
R
T
R

MON

Secondary Reference

E1 Line Interface Eqpt

T
R
T
R

MON

MON

E1 Digital Interface Port

T
R
T
R

Digital Switch Machine*

MON

E1 Digital Interface Port

T
R
T
R

* Some digital switch machines designate two traffic-carrying E1 systems as their primary and secondary clock reference sources.

RTN2 OUT
RTN1 OUT
RTN2 IN
RTN1 IN
OUT
OUT
IN
IN

MON

ESCIU Module

MON

Refer to In-Service Equipment for procedures

Time of Day Output

If using Time of Day Output, connect the time of day (TOD) output at the female RJ-45 connector labeled TOD. See Figure 13 for the connector location, and Table C for the connector pinouts.

Table C. TOD Connector Pinouts

Pin	Signal	Abbreviation	Direction
1	1 pps A	TOD PPS +	From TimeSource 3100
2	1 pps B	TOD PPS –	From TimeSource 3100
3	12 V power source	TOD P12V	—
4	Receive data B	TOD RXD –	To TimeSource 3100
5	Receive data A	TOD RXD +	To TimeSource 3100
6	Circuit ground	TOD GND	—
7	Transmit data A	TOD TXD +	From TimeSource 3100
8	Transmit data B	TOD TXD –	From TimeSource 3100

Note: Pins not listed are reserved for future use.

If the device receiving the time code (for example, a Cisco router) accepts an RS-232 cable instead of an RS-422 cable, follow Procedure D to install the RJ-45-to-DB-25 TOD converter.

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

3

Procedure D. RJ-45-to-DB-25 TOD Converter Installation

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 24). Notes: 1. Due to distance constraints, the converter must be placed no more than 305 m from the TimeSource 3100 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 3100 Shelf and the converter (see Figure 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 25). See Table D for the DB-25 connector pinouts.

End of Procedure

Figure 24. RS-422 to RS-232 TOD Converter Mounting Plate
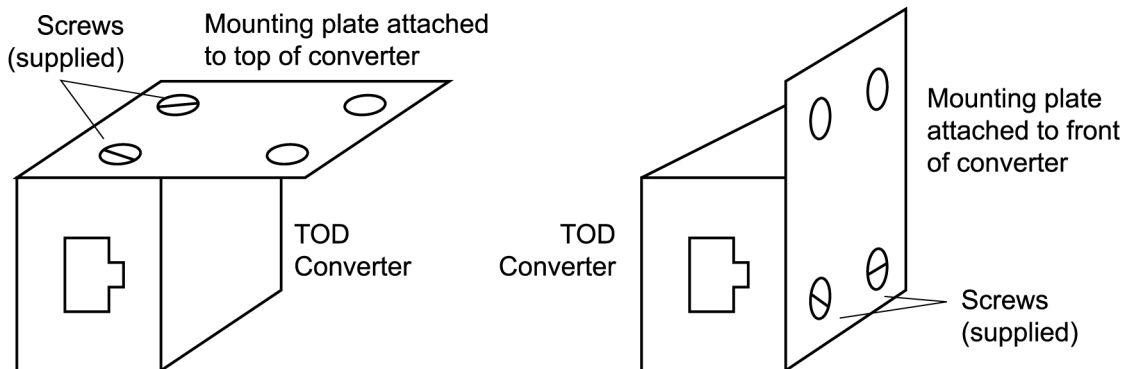
Figure 25. RJ-45 to DB-25 TOD Converter Connections
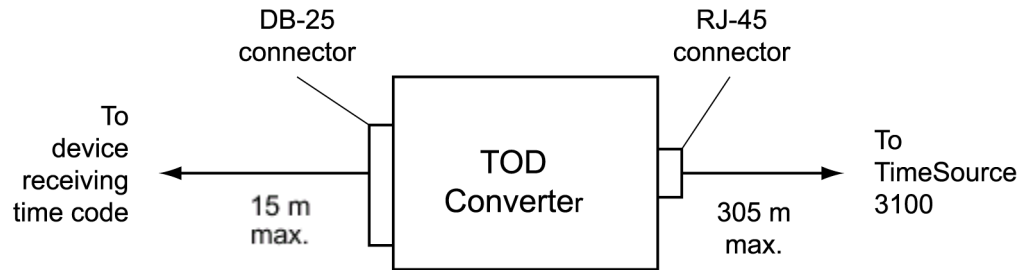
Table D. Converter DB-25 Connector Pinouts

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.

3

Ethernet

Connect the Ethernet cable from the network to the 10base-T Ethernet connector labeled E-NET. See Figure 13 for the connector location, and Table E for the connector pinouts.

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

Pin	Signal	Abbreviation	Direction
1	Transmit data +	TXD +	From TimeSource 3100
2	Transmit data –	TXD –	From TimeSource 3100
3	Receive data +	RXD +	To TimeSource 3100
4	—	—	—
5	—	—	—
6	Receive data –	RXD –	To TimeSource 3100
7	—	—	—
8	—	—	—

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Communication Port 1

To provide an RS-232 link for TL1 command access to the TimeSource 3100, connect to port 1 at the female 25-pin D connector labeled COM 1. See Figure 13 for the location of the connector. See Table F for the connector pinouts.

Note: The COM 1 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 F. COM1 Pinouts

Pin	Signal	Abbreviation	Direction
2	Transmit data	TXD	From TimeSource 3100
3	Receive data	RXD	To TimeSource 3100
4	Request to send	RTS	From TimeSource 3100
5	Clear to send	CTS	To TimeSource 3100
6	Data set ready	DSR	To TimeSource 3100
7	Signal ground	GND	—
20	Data terminal ready	DTR	From TimeSource 3100

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 3100, connect to port 2 at the female 9-pin D connector labeled COM2. See Figure 13 for the location of the connector, and Table G 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 G. COM2 Pinouts

Pin	Signal	Abbreviation	Direction
2	Transmit data	TXD	From TimeSource 3100
3	Receive data	RXD	To TimeSource 3100
5	Signal Ground	GND	—
6	Data terminal ready	DTR	From TimeSource 3100
7	Clear to send	CTS	To TimeSource 3100
8	Request to send	RTS	From TimeSource 3100

Note: Pins not listed are reserved for future use.

Alarms Output

Connect the TimeSource 3100 alarms to the office alarm panel at the critical (CR), major (MJ), and minor (MN) wire-wrap pins. See Figure 13 for the location of the alarm pins, and Figure 26 for the connections.

Connect at the upper group of pins (AUD) for audible alarms and at 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 26. Alarm Connections
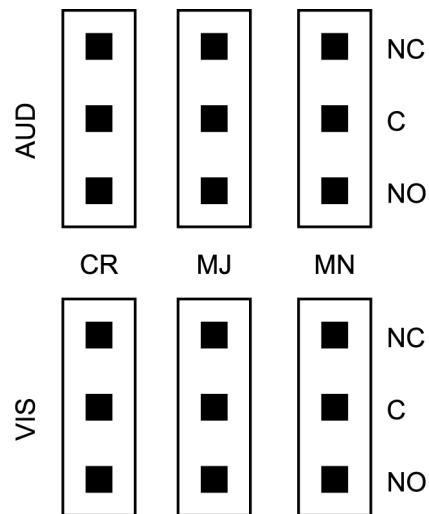
Craft Port

To provide an RS-232 link for TL1 command access to the TimeSource 3100, 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 3100 for making this connection. See Figure 13 for the location of the connector, and Table H for the connector pinouts.

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 H. Craft Pinouts

Pin	Signal	Abbreviation	Direction
2	Transmit data	TXD	From TimeSource 3100
3	Receive data	RXD	To TimeSource 3100
5	Signal ground	GND	—
6	Data terminal ready	DTR	From TimeSource 3100

Note: Pins not listed are reserved for future use.

Power-Up

To power the TimeSource 3100, follow the steps in Procedure E. 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 3100.

Procedure E. 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 3100, 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 3100, set the communication software to communicate with the port that is connected to the TimeSource 3100.
3	On the computer connected to the TimeSource 3100, 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 3100, connect the computer communication port to the COM1, COM2, or Craft port on the TimeSource 3100. A craft port-to-PC communication cable is provided in the hardware kit for this purpose.
5	Ensure that the TimeSource 3100 plug-in card is not installed in the shelf.
6	Ensure that all fuses that supply power to the TimeSource 3100 Shelf are removed from the fuse panel.
7	At the shelf end of the battery leads, use the multimeter to measure the voltage between the following: **Test Point Test PointResult** –48V A lead–48V B lead0 V –48V A leadTB1: RTN A0 V –48V A lead TB1: GND0 V –48V B leadTB2: RTN B0 V –48V B leadTB2: GND0 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 of the TimeSource 3100 card 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.

3

Procedure E. Power-Up (cont'd)

Step	Procedure
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	Replace the connector panel cover.
14	Unplug and remove the grounding wrist strap.
15	Install the battery source fuse in the rack fuse bay that supplies power to the TimeSource 3100. The TimeSource 3100 enters its warm-up mode 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 • Optional eight T1 outputs (if equipped) are squelched, sending AIS (factory setting), or sending an SSM message, as specified in the ED-EQPT command • Optional four IRIG-B outputs (if equipped) are squelched • 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 to enable inputs and outputs, and to set system parameters.
16	Use the Activate User command to log onto the system. ACT-USER::TELECOM:<ctag>::TS3000!!;
17	If UTC time is desired, skip to Step 18. If local time is desired, use the Edit Date command to set the date and time. ED-DAT:::<ctag>::yyyy-mm-dd,hh-mm-ss:MODE=LOCAL; yyyy= year (1998 to 2096) mm= month (mm = 01 to 12) dd=day in (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;

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Procedure E. Power-Up (cont'd)

Step	Procedure
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 = 1998 to 2096) 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 are provisioned. RTRV-EQPT::ALL:<ctag>; *Note:* Observe those results with an <aid> of RO-a and 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.
20	If the results of Step 19 indicate the remote oscillator inputs are set as desired, skip to Step 22. Use the Enter Equipment command to monitor and/or ensemble each remote oscillator input. ENT-EQPT::RO-a:<ctag>:::ENSEMBLER=b; a = remote oscillator input (a = A or B) b = allow the input to be ensembled or inhibit the input from being ensembled (y = ALW causes the input to be monitored and ensembled; y = INH causes the input to be monitored, but not ensembled)
21	Use the Edit Equipment command to set the frequency of the remote oscillator inputs. ED-EQPT::TS3100:<ctag>:::ROFREQ=a; a = remote oscillator frequency in MHz (a = 5 or 10)
22	If the results of Step 19 indicate the E1 span inputs are set as desired, skip to Step 25. Use the Enter Equipment command to monitor each available E1 span input, and to specify whether those inputs are to be ensembled. ENT-EQPT::SPAN-a:<ctag>:::ENSEMBLER=b; a = E1 span input (a = A or B) b = allow the input to be ensembled or inhibit the input from being ensembled (b = ALW or INH) (b = ALW causes the input to be monitored and ensembled; b= INH causes the input to be monitored, but not ensembled)
23	Use the Edit Equipment command to set the output signal framing format for each E1 output, 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)

3

Procedure E. Power-Up (cont'd)

Step	Procedure
24	If not using performance monitoring, skip to Step 25. Use the Initialize Register command to reset the performance monitoring data to zero for all input spans. INIT-REG-EQPT::SPAN-a:<ctag>::ALL; a = SPAN input (a = A, B, or ALL) ALL = resets all performance monitoring data
25	If not using Ethernet, go to Step 29. 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 3100 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::TS3100:<ctag>:::IPNE=a,IPSUBNET=a,IPGATE=a; IPNE=aThis unit's IP address in the form a.a.a.a (each a is an independent value of 0 to 255) IPSUBNET=aSubnet mask in the form a.a.a.a (each a is an independent value of 0 to 255) IPGATE=aGateway IP address in the form a.a.a.a (each a is an independent value of 0 to 255)

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Step	Procedure
26	Ports 5001, 5002, 5003 and 5004 on the TimeSource 3100 are used as though they were serial TL1 communication ports. The following values are set at the factory and appear at reset: COMPRI=ALW1 (normal communication, including autonomous messages) 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) AUTOLOGOFF=20 (does not log off the user during inactivity) SWCONTROL=INH (uses no flow control) If these values require change, use the Edit Communication 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)

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Procedure E. Power-Up (cont'd)

Step	Procedure
27	If not using an Element Manager, skip to Step 29. If not using a separate port to send autonomous messages to an Element Manager, skip to Step 28. 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 3100 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::TS3100:<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)

3

Procedure E. Power-Up (cont'd)

Step	Procedure
28	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: COMPRI=ALW1 (normal communication, including autonomous messages) 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=b Echoes characters so they appear on the user's screen as typed (b=ALW) or inhibits echo (b=INH) AUTOLOGOFF=20 (does not log off the user during inactivity) SWCONTROL=INH (uses no flow control) If these values require change, use the Edit Communication 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)
29	If not using ESCIU ports, skip to Step 31. Use the Edit Equipment command to specify how the ESCIU performs during holdover: ED-EQPT::TS3100:<ctag>:::BYPASS=a; a=E1 traffic bypasses the ESCIU circuitry (a=ALW) or continues to be synchronized during holdover (a=INH)
30	Use the Edit Equipment command to specify how the ESCIU performs with a Loss-of-Signal (LOS) alarm on the incoming span: ED-EQPT::OPT-a:<ctag>::ALMOUT=b; a= Directs this command to ESCIU span 1 (a=1) or span 2 (a=2) b= If LOS is detected on the incoming span, the ESCIU passes AIS downstream (b=AIS) or passes the LOS downstream (b=PASSTHRU)

3

Procedure E. Power-Up (cont'd)

Step	Procedure
31	If the results of Step 19 indicate the antenna cable delay and elevation mask set are as desired, skip to Step 33. Use the Edit Equipment command to set the length of cable between the antenna and the TimeSource 3100 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=x,ANTELEVMASK=y; x = antenna cable delay in meters (x = 0 to 330) y = antenna elevation mask angle in degrees (y = 0 to 45) (see note below) *Note:* The antenna elevation mask is that portion of the sky from which the TimeSource 3100 masks out satellite signals, measured from the horizon to the desired angle of elevation. For example, if the sky is obstructed below 20° elevation, signals received from below that elevation may have reflections or other anomalies. Masking those signals may allow the receiver to acquire GPS signals more quickly and accurately. Factory setting is 10.
32	If not using the TOD output, skip to Step 33. Use the Edit Equipment command to set the TOD output. ED-EQPT::TS3100:<ctag>:::TOD=y; y = TOD format (y = Cisco or NTP4)
33	Use the Edit Equipment command to allow or inhibit alarm conditioning on the outputs. Inhibiting the alarm conditioning forces the TimeSource 3100 to continue to output valid timing signals while in alarm. This may be useful when testing, troubleshooting, or in installations where the outputs generated by the TimeSource 3100 may be better than the alternative (for example, offices without additional holdover clocks in a distribution shelf). ED-EQPT::TS3100:<ctag>:::ALMCOND=y; y = alarm conditioning of the outputs (y = ALW or INH)
34	Use the Copy Memory command to copy the database from volatile to nonvolatile memory within the TimeSource 3100. CPY-MEM:[tid]:TS3100:<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.

End of Procedure

TimeWizard

The TimeWizard Software Installation application was created to facilitate installing software upgrades for the TimeSource 3100. Procedure F shows how to install the TimeWizard application and how to use TimeWizard to download software upgrades.

Procedure F. TimeWizard Installation and Operation

Step	Procedure
	Use this procedure to install the firmware in the TimeSource 3100 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 3100 CD labeled 992-72020-06 Rev. A, Version 1.06.04.
	Hardware Installation
1	Connect the TimeSource 3100 to the PC with a serial cable.
	Install the TimeWizard Software
2	Insert the TimeSource 3100 CD labeled 992-72020-06 Rev. A, Version 1.06.04 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.

3

Step	Procedure
5	From the Windows desktop, click Start $\Rightarrow$ Programs $\Rightarrow$ TimeWizard to start the TimeWizard application. When TimeWizard starts, the "TimeWizard" main screen appears:
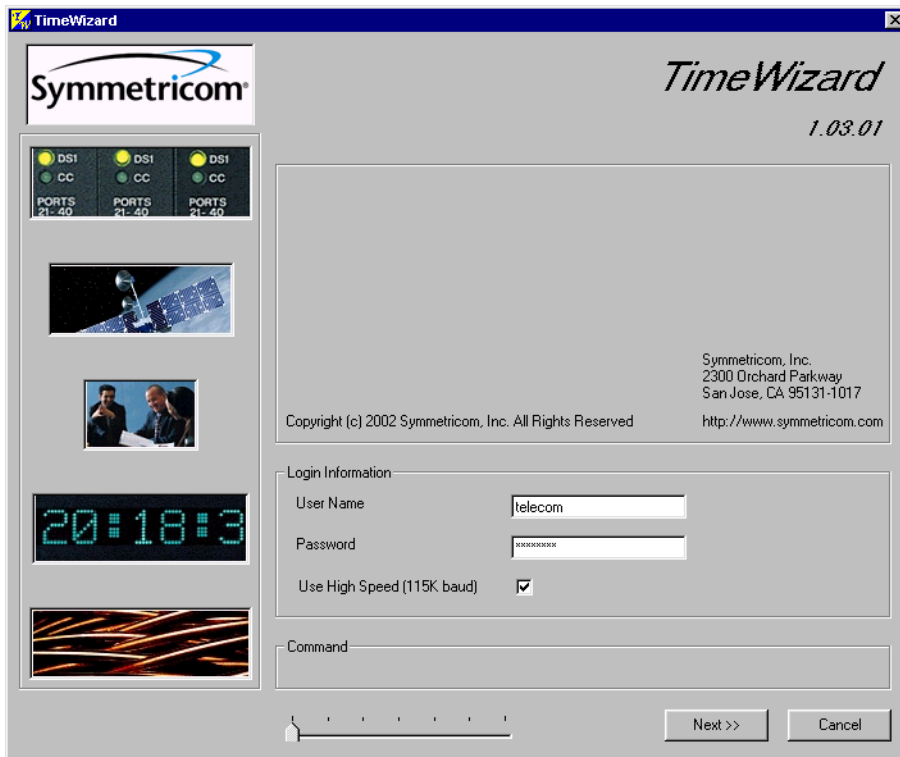
The version of TimeWizard that is installed is indicated at the top right of the screen. The progress indicator at the bottom of the screen shows which of the seven screens you are currently viewing.

Note that the factory default TimeSource username of "telecom" and password of "TS3000!!" appear in the Login Information area of the screen.

Step	Procedure
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.

3

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Step	Procedure
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 the Next>> button 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 the Next>> button.
	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.

3

Procedure F. TimeWizard Installation and Operation (cont'd)

Step	Procedure

Download the GPS.hex Firmware

Note: If you are not downloading GPS.hex firmware, click the Next>> button again to advance to the "Download TS3000.hex" screen, then skip to Step 13.
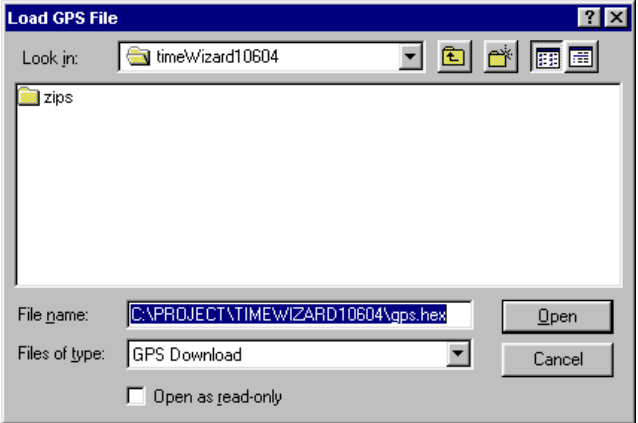
8	After the Next>> button is clicked in the previous step, the "Download GPS.hex" screen appears:

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.

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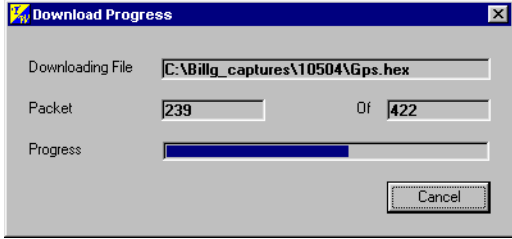
Procedure F. TimeWizard Installation and Operation (cont'd)

Step	Procedure
9	Click the ver Unknown button to open the Load GPS File dialog box:
10	In the Load GPS File dialog box, navigate to the GPS.hex firmware file to be downloaded, then click the Open button. After the Open button is clicked, 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 the Next>> button to start the firmware download operation.

3

Procedure F. TimeWizard Installation and Operation (cont'd)

Step	Procedure
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.

Step	Procedure
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 the Next>> button again, then skip to Step 18.

Step	Procedure
13	The "Download TS3000.hex" screen appears very similar to the "Download GPS.hex" screen shown in Step 8, and contains the same information.

Procedure F. TimeWizard Installation and Operation (cont'd)

Step	Procedure
14	Click the ver Unknown button to open the Load TS3000 File dialog box, which appears very similar to the dialog box shown in Step 9.
15	In the Load TS3000 File dialog box, navigate to the TS3000.hex firmware file to be downloaded, then click the Open button. After the Open button is clicked, 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 the Next>> button to start the firmware download operation.
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.

3

Step	Procedure
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.
	After the screen automatically advances, continue with the next step.

3

Step	Procedure
	Verify the Firmware Versions
18	The "Status Information" screen appears as follows:
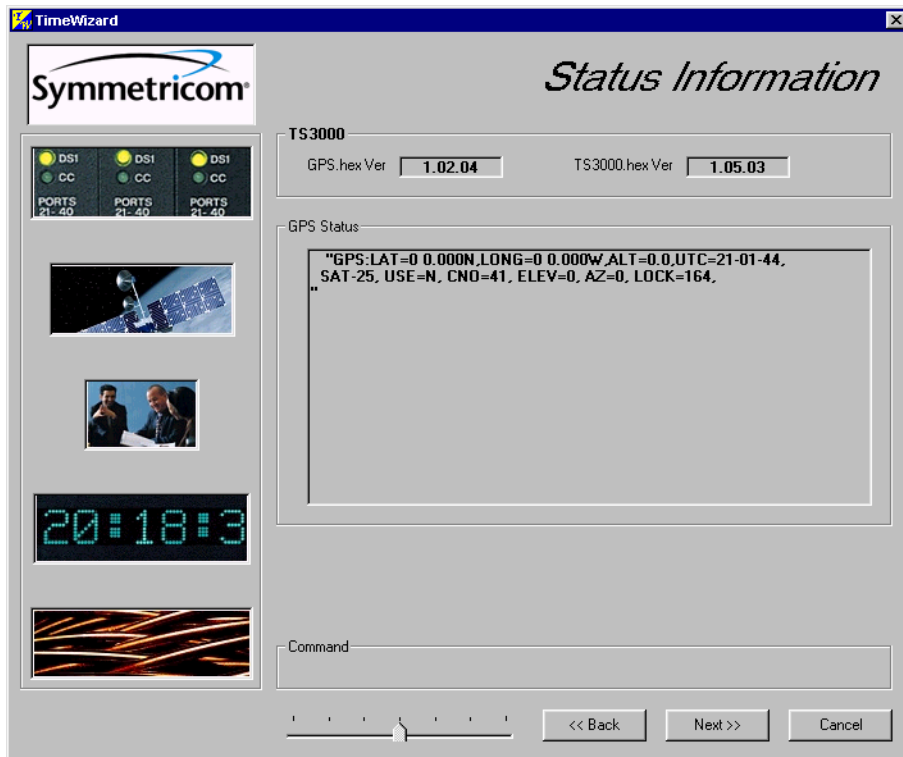
Verify that GPS.hex Ver and TS3000.hex Ver fields show that the correct versions of the GPS.hex and TS3000.hex firmware are now installed, then click the Next>> button.

3

Procedure F. TimeWizard Installation and Operation (cont'd)

Step	Procedure
	Setup the Alarm Parameters
19	When the Next>> button is clicked, 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 the Next>> button and continue with Step 21. Otherwise, continue with the next step.

3

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Procedure F. TimeWizard Installation and Operation (cont'd)

Step	Procedure
20	Choose the alarm parameters as desired. A description of each setting follows: Setting 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. When you are finished modifying the alarm parameters, click the Next>> button.

3

Procedure F. TimeWizard Installation and Operation (cont'd)

Step	Procedure
21	When the Next>> button is clicked, the "View the Alarm Parameters" screen appears:
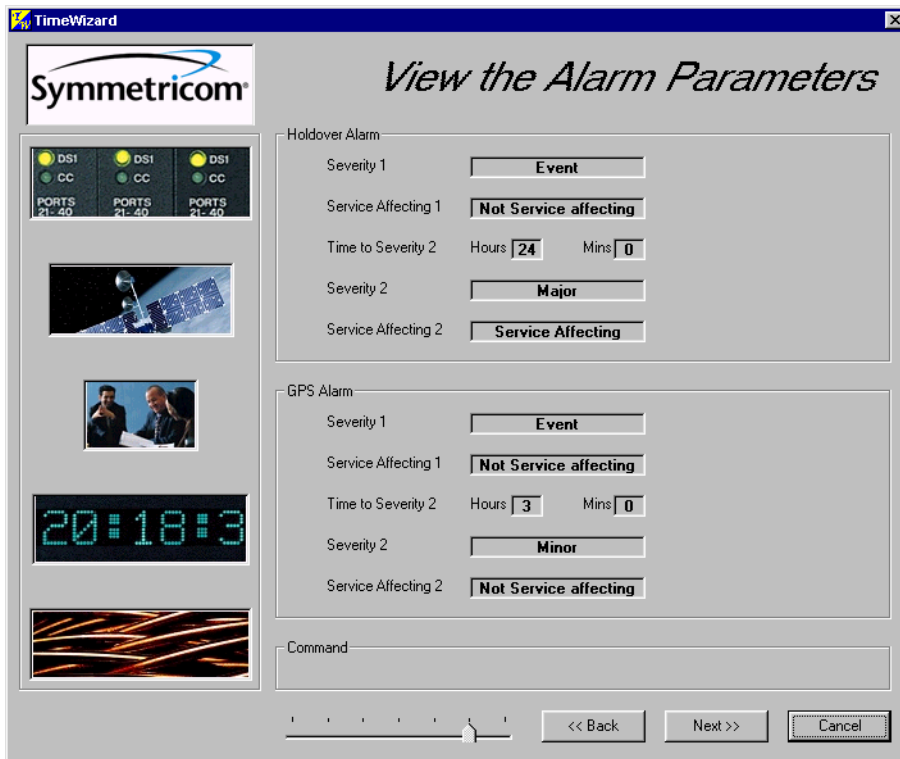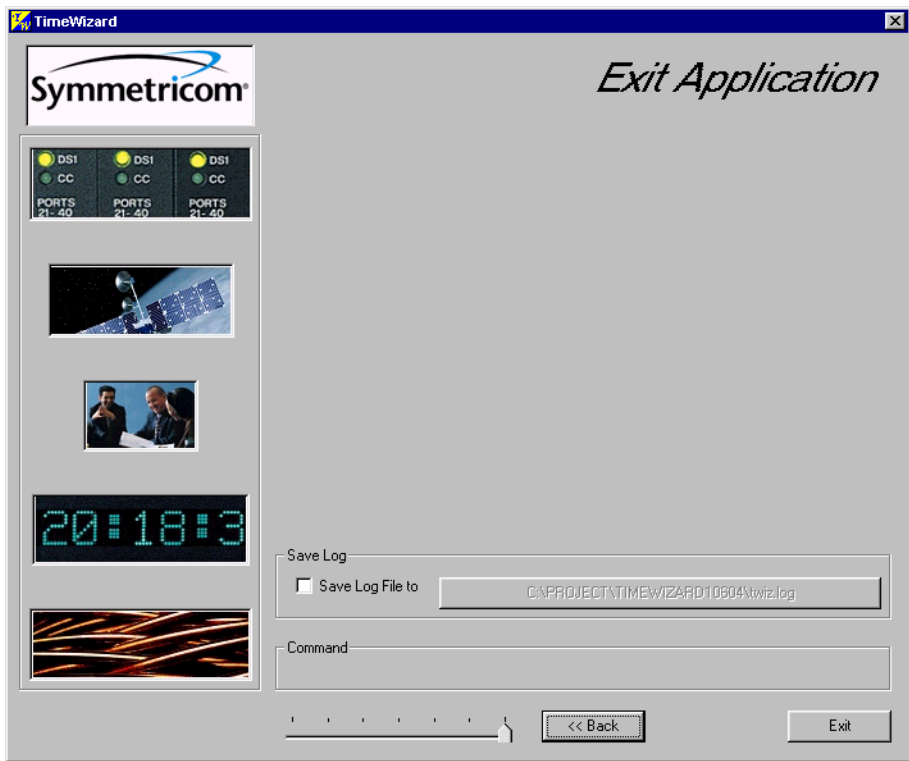
This screen confirms the alarm parameter settings from the previous screen.

If the settings are correct, click the Next>> button to continue. If the settings are not correct, click the <<Back button to return to the "Set the Alarm Parameters" screen, and correct the settings.
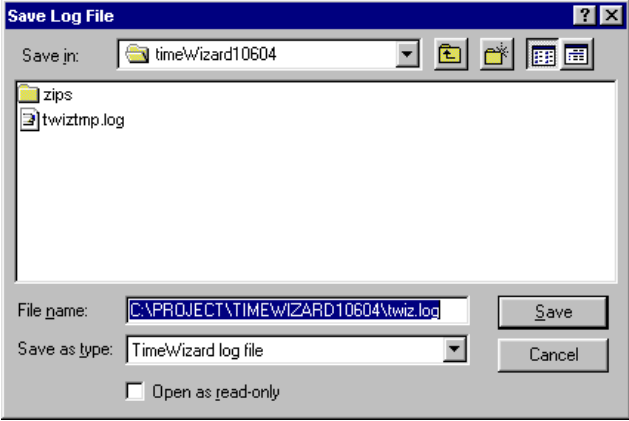
Procedure F. TimeWizard Installation and Operation (cont'd)

Step	Procedure
	Save the Log File, if Desired

| 22 | When the Next>> button is clicked, 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 the Exit button to complete the TimeWizard firmware installation procedure. To save the log file, continue with the next step.

3

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: **Save Log File** Save in: timeWizard10604 zips twiztmp.log File name: C:\PROJECT\TIMEWIZARD10604\twiz.log Save Save as type: TimeWizard log file Cancel ☐ Open as read-only
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 the Save button to save the log file.
25	Click the Exit button to complete the TimeWizard firmware installation procedure.

End of Procedure

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Factory-Set Values

The parameter values initially set at the factory are shown in Table I.

Table I. Parameter Factory Settings

<aid>	Parameter Setting
TS3100	FREQ=5MHz 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 DCDPASSTHRU=INH DCDUSERPORT=2 BYPASS=ALW (990-72020-04 systems only)
TS3100 HOLDOVER ALARM	TIME=24-0 SEV1=EV SEV2=MJ SAFF1=NSA SAFF2=SA
TS3100 GPS ALARM	TIME=3-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA
GPS	ANTCBLDLY=0 ANTELEVMASK=10
RO-A, RO-B	ENSEMBLER=INH MONITOR=INH
SPAN-A, SPAN-B	ENSEMBLER=INH MONITOR=INHSSM=INH SSM=INH SIGNAL=DIGITAL SSMCHANNEL=4

3

Table I. Parameter Factory Settings (cont'd)

<aid>	Parameter Setting
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 LOS 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
RO-A, RO-B LOS ALARM	TIME=24-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA
RO-A, RO-B ERROR ALARM	TIME=24-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA
E1-A, E1-B	FRAMING=CAS4 ALMOUT=AIS

3

Table I. Parameter Factory Settings (cont'd)

<aid>	Parameter Setting
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
COM-5001, COM-5002, COM-5003, COM-5004	MONMSG=INH KEEPALIVE=0 ENDOWTEXT=00 ECHO=ALW COMPRI=INH AUTOLOGOFF=20 SWCONTROL=INH
COM-5551	MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=INH COMPRI=INH AUTOLOGOFF=20 SWCONTROL=INH

3

3

TL1 Reference

This chapter provides information for using the TL1 language.

Chapter 4

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. The Parameters section of this chapter 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 27 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 27. Command Format


```
command-code:[<tid>]::<ctag>::<date>,<time>;
```

Fields

Null parameter block

Parameter block, with parameters separated by a comma

Command code

Optional parameter

Parameter block

Terminating semicolon

4
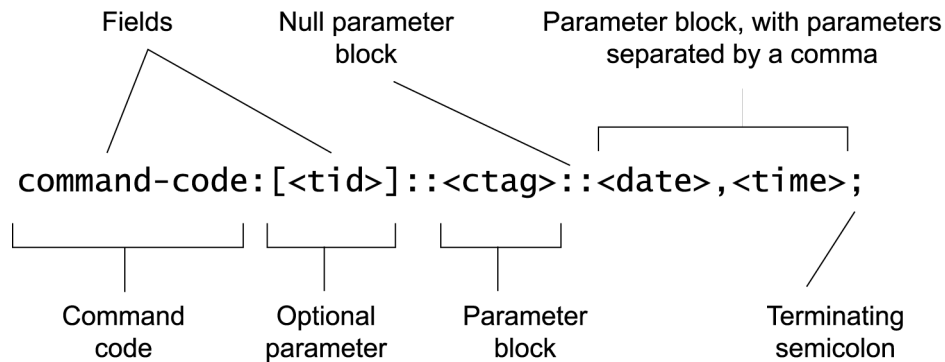
Response Format

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 28 shows the completed response format. COMPLD indicates that the command was completed without error.

Figure 29 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.

Figure 28. Completed Response Format

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

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

Figure 29. Deny Response Format

```
^^^<sid>^<date>^<time>
M^^<ctag>^DENY
^^<errcode>
^^^/* <error message> */
^^^/*LINK:,link>,CMD:<command>*/
;
```

Parameters

The parameters that may be used in commands, responses, and messages are defined in Table J. 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 J. 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.
<alt>	Antenna location altitude in meters, specified to the thousandth of a meter, referenced to mean sea level, in the format mm.mmm.
<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 backslash and a double quotation mark (\"). Refer to the Troubleshooting chapter of this manual 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>	Current 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 (01-12), and dd is the day of the month (01-31). For example, May 3, 2000 is 2000-05-03.

4

Table J. Parameter Definitions (cont'd)

<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: TS3100 = system software GPS = GPS receiver software RO-x = remote oscillator input SPAN-x = E1 span input
<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 (01-12), and dd is the day of the month (01-31). For example, May 3, 2000 is 2000-05-03.
<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 is14:34:00.

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Table J. Parameter Definitions (cont'd)

<pid>	Private identifier, factory-set to "TS3000!!". It is the initial password for the TELECOM <uid>. Passwords are encrypted when stored in the TimeSource 3100, 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 which is the name of the equipment sending the message. The sid may be an identifier or text string, and may begin with a letter. A maximum of 20 characters (limited to letters, digits, and hyphens) are allowed. 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 which identifies the equipment (TimeSource 3100) 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, but it 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 3100 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 time-out range is 0 to 180 days, with 0 indicating no time-out.
<vldty>	Validity of the performance monitoring data.

4

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.

4

Report Alarm

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

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

Note: Refer to Table J for parameter definitions.

4

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 3100 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 J for parameter definitions.

Tasks/Commands

To perform each task, use the command listed beside that task in Table K.

Table K. Commands for Tasks

Task	Command	Page
Log user onto system	Activate User	122
Log user off of system	Cancel User	123
Copy software program or database	Copy Memory	124
Delete equipment from the database	Delete Equipment	126
Delete a user from system	Delete User Security	127
Change communication port parameters	Edit Communication	128
Change the system date and time	Edit Date	131
Change equipment parameters	Edit Equipment	134
Enter equipment into the database and allow the equipment to be used for monitoring	Enter Equipment	141
Enter a new user and configure the new user's user name, password, and access level	Enter User Security	143
Reset the alarm log	Initialize Log	144
Reset to zero all performance monitoring parameters associated with a given aid	Initialize Register	145
Reset the system processor or GPS receiver processor	Initialize System	146
Deactivate the audible office alarm	Operate Alarm Cutoff All	147
Display current system alarms	Retrieve Alarm All	148
Display current alarms for specific equipment	Retrieve Alarm Equipment	149
Display current communication port parameter settings	Retrieve Communication	151
Display current system alarms and events	Retrieve Condition All	154
Display current alarms and events for specific equipment	Retrieve Condition Equipment	155
Display parameter settings of equipment	Retrieve Equipment	157
Display GPS status information	Retrieve GPS Status	164

4

Table K. Commands for Tasks (cont'd)

Display header information	Retrieve Header	177
Display information about equipment	Retrieve Inventory	177
Display alarm log data	Retrieve Log	180
Display performance monitoring data	Retrieve Performance Monitoring	181
Display security parameters for a single user or for all users	Retrieve User Security	183
Set the name of the equipment	Set Source Identifier	184

4

Commands

The commands used with the TimeSource 3100 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.

4

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>*/
;
```

4

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>*/
;
```

4

Copy Memory

This command copies a software program from an external computer to the TimeSource 3100, or copies the system database to nonvolatile memory.

Notes:

1. Clear any existing alarms before using this command.

2. The database is automatically copied to nonvolatile memory once per hour. However, if power to the TimeSource 3100 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 3100, the command format is:

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

Aid	Item Addressed
TS3100	System software
GPS	GPS receiver software
DEV2	TimeSource 3100 without module (990-72020-01 systems)
DEV4	TimeSource 3100 with module for TOD IRIG-B outputs (990-72020-05 systems)
DEV6	TimeSource 3100 with module for additional E1 or 2.048 MHz outputs (990-72020-02 systems)
DEV8	TimeSource 3100 with module for ESCIU ports (990-72020-04 systems)
DEV10	TimeSource 3100 with mixed E1/T1 cards (990-72020-06 systems)

Copy Memory (cont'd)

Command Example:

```
CPY-MEM::TS3100:<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 3100, the command format is:

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

Aid	Item Addressed
TS3100	System Database

Command Example:

```
CPY-MEM::TS3100:<ctag>::WKG,,AUX:DATA;
```

Response Format:

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

4

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
RO-a	a=A	Remote oscillator A input
	a=B	Remote oscillator B input
SPAN-a	a=A	E1 span A input
	a=B	E1 span B input
OPT-y	y = 1 to 2	ESCIU port option (990-72020-04 systems only)

Command Example:

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

Response Format:

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

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Delete User Security

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

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

Aid	Item Addressed
<uid>	Assigned user name

Command Example:

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

Response Format:

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

4

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)

Notes:

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.

Edit Communication (cont'd)

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 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 2)	b = ALW	XON/XOFF flow control is enabled
		b = INH	XON/XOFF flow control is not enabled

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Aid	Parameter	Value	Description
COM-a (cont'd)	BAUD = b (See Note 1)	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 1)	b = EVEN	Even parity is enabled on serial port
		b = ODD	Odd parity is enabled on serial port
	STOP = b (See Note 1)	b = 1	1 stop bit on serial port
		b = 2	2 stop bits on serial port

Notes:

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

2. Flow control is not implemented on communication port 3 (Craft port). XON/XOFF flow control is simulated for Ethernet ports.

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 be set by TL1 command)
	a = LOCAL	Uses local time for hours, UTC for minutes and seconds

Notes:

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.

4

Edit Date (cont'd)

The date/time stamp 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. A few examples will help to clarify.

    > 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:

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

Response Format:

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

4

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
TS3100	–	System-wide configuration
GPS	–	GPS configuration
RO-a	a=A	Remote oscillator A input
	a=B	Remote oscillator B input
SPAN-a	a=A	E1 span A input
	a=B	E1 span B input
E1-a	a=A	E1 A output
	a=B	E1 B output
OPT-a	a=1 to 8	E1 option outputs: 1 through 8 (990-72020-02, 990-72020-06 systems only)
	a=1 to 2	ESCIU option ports: 1 or 2 (990-72020-04 systems only)

4

Edit Equipment (cont'd)

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 of "a" from the "Value" column. When entering multiple parameters, separate the parameters with commas.

Aid	Parameter	Value	Description
TS3100	ROFREQ=a	a=5 or 10	Frequency for both remote oscillator inputs in MHz
	TOD=a	a=CISCO	Serial TOD message sent in CISCO format
		a=NTP4	Serial TOD message sent in NTP4 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
	IPNE=a.b.c.d (See Note 1)	a = 0 to 255	IP address of this TimeSource 3100 (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 3100 (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	
	IPGATE=a.b.c.d (See Note 1)	a = 0 to 255	Default gateway IP address for this TimeSource 3100 (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	

4

TS3100 (cont'd)	IPEM1=a.b.c.d (See Note 1)	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	
	IPEM1PORT=a (See Notes 1, 2, 3)	a = 0 to 65535	Port address of primary element manager (port for IPEM1 address)
	IPEM2=a.b.c.d (See Note 1)	a = 0 to 255	IP address of alternate 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	
	IPEM2PORT=a (See Notes 1, 2, 3)	a = 0 to 65535	Port address of alternate element manager (port for IPEM2 address)
	IPINACT=a (See Note 1)	1 = 0 to 10000	Port 5550 closes the connection to the Element Manager if no autonomous message are sent during this number of 100-ms units (0 to 10000, where 0 deactivates the timer; for example, 100 = 10 s)
	ALARM=x	x=HOLD-OVER	HOLDOVER alarm
		x=GPS	GPS alarm
SPAN A & B	ALARM=x	x = LOS	LOS alarm
		x = AIS	AIS alarm
		x = ERROR	ERROR alarm
RO A & B	ALARM=x	x = LOS	LOS alarm
		x = ERROR	ERROR alarm
TS3100, SPAN A&B, RO A&B	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 4)	x = CR	Severity of initial alarm prior to escalation
		x = MJ	
		x = MN	
		x = EV	
		x = NA	

4

TS3100, SPAN A&B, RO A&B (cont'd)	SEVERITY2=x (See Note 4)	x = CR	Severity of ESCALATED alarm
		x = MJ	
		x = MN	
		x = EV	
		x = NA	
	SERAFF1=x (See Note 4)	x = SA	Service affecting state of initial alarm prior to escalation
		x = NSA	
	SERAFF2=x (See Note 4)	x = SA	Service affecting state of escalated alarm
		x = NSA	
TS3100	NTPPWD=x (See Note 5)	x = 6 ASCII characters	NTP Password (contact factory)
GPS	ANTCBLDLY=a	a=0 to 330	Antenna cable length (meters)
	ANTELEVMASK=a	a=0 to 45	Antenna elevation mask angle (degrees)
RO-a	ENSEMBLER=b (See Note 6)	b = ALW	Remote oscillator is ensembled
		b = INH	Remote oscillator is not ensembled
SPAN-a	ENSEMBLER=b (See Notes 7, 8)	b = ALW	Span is ensembled
		b = INH	Span is not ensembled
	SSM=b (See Note 8)	b = ALW	SSM qualifies span input
		b = INH	SSM does not qualify span input
	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

4

E1-a	ALMOUT=b	b = AIS	Output is AIS during alarm
		b = SQUELCH	Output is squelched during alarm
		b = SSM	Outputs are at "SSUT" quality level during holdover alarm (SSM requires 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	Output framing is NONE (analog) (If ALMOUT is SQUELCH, then signal turns off during Holdover alarm. Any other ALMOUT option does not affect output during alarm)
OPT-a (Additional E1 outputs on 990-72020-02 systems only)	ALMOUT=b	b = AIS	Output is AIS during alarm
		b = SQUELCH	Output is squelched during alarm
		b = SSM	Outputs are at "SSUT" quality level during holdover alarm (SSM requires 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	Output framing is NONE (analog) (If ALMOUT is SQUELCH, then signal turns off during Holdover alarm. Any other ALMOUT option does not affect output during alarm)
OPT-a (990-72020-04 systems only)	ALMOUT=b	b = AIS	When the ESCIU detects an LOS on an input span, AIS is output to the NE (the E1 option does not affect output during alarm)
		b = PASSTHRU	When the ESCIU detects an LOS on an input span, the E1 alignment sequence is passed through to the NE with the original input alarm

OPT-a (990-72020-06 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" level for CAS4 and CCS4 framing during holdover alarm (SSM requires CAS4, CCS4, or ESF 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=ESF	Output framing is ESF
		b=NONE	Output framing is NONE (analog) (If ALMOUT is SQUELCH, then signal turns off during Holdover alarm. Any other ALMOUT option does not affect output during alarm)
TS3100	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 9)	x = 1	COM1
		x = 2	COM2
		x = 3 or 5001, 5002, 5003, 5004	COM3 or IP port 5001 to 5004

Notes:

1. This parameter affects all Ethernet ports. Close the Ethernet ports and log off all users before issuing a command with this parameter.

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

Edit Equipment (cont'd)

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::TS3100: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, TS3100 will generate a major alarm with an SA flag. These parameters can then be verified using the RTRV-EQPT command.

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

6. A remote oscillator must have been put into service before using the ENT-EQPT command before setting the ENSEMBLER parameter.

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

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

9. All commands on DCDUSERPORT having TID which equal 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>*/
;
```

4

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
RO-a	a = A	Remote oscillator A input monitor
	a = B	Remote oscillator B input monitor
SPAN-a	a = A	E1 span A input monitor
	a = B	E1 span B input monitor
OPT-y (990-72020-04 systems only)	y = 1	ESCIU port 1
	y = 2	ESCIU port 2

4

Enter Equipment (cont'd)

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
RO-a	ENSEMBLER=b	b=ALW	Remote oscillator is monitored and ensembled
		b=INH	Remote oscillator is monitored, but not ensembled
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>]:RO-A:<ctag>;
```

Example to set an input to be monitored and ensembled:

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

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

4

Enter User Security

This command allows a system administrator to enter a new user, including the 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>*/
;
```

4

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>::<montype>;
```

Aid	Value	Item Addressed
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
<montype>	x	ALL
ALL		E1 span A and span B inputs

Response Format:

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

4

Initialize System

This command resets the specified processor.

Caution: *Using this command with an <aid> of TS3100 will cause a loss of outputs for approximately 20 minutes 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
TS3100	System software
GPS	GPS receiver software

Response Format:

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

4

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>*/
;
```

4

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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>*/
;
```

Note: Refer to the Troubleshooting chapter for a list of all <conddescr> messages, and the recommended action.

4

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
TS3100	–	System (all TS3100 alarms)
SPAN-x	x = A	E1 span A input
	x = B	E1 span B input
RO-x	x = A	Remote oscillator A input
	x = B	Remote oscillator B input
GPS	–	GPS receiver

4

Retrieve Alarm Equipment (cont'd)

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>*/
;
```

Note: Refer to the Troubleshooting chapter 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 communications ports

Response Format:

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

4

Retrieve Communication (cont'd)

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
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)

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Parameter	Value	Parameter Description
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
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

4

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>*/
;
```

Note: Refer to the Troubleshooting chapter for a list of all <conddescr> messages, and the recommended action.

4

Retrieve Condition Equipment

This command displays current alarms and events for the specified equipment.

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

Aid	x Value	Item Addressed
TS3100	–	System
SPAN-x	x = A	E1 span A input
	x =	E1 span B input
RO-x	x = A	Remote oscillator A input
	x=B	Remote oscillator B input
GPS	–	GPS receiver

Command Example:

```
RTRV-COND-EQPT::TS3100:<ctag>;
```

4

Retrieve Condition Equipment (cont'd)

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>*/
;
```

Note: Refer to the Troubleshooting chapter for a list of all <conddescr> messages, and the recommended action.

4

Retrieve Equipment

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

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

Aid	x Value	Item Addressed
ALL	—	All aids for this command
TS3100	—	System
GPS	—	GPS receiver
RO-x	x=A	Remote oscillator A input
	x=B	Remote oscillator B input
SPAN-x	x=A	Span A input
	x=B	Span B input
E1-a	x=A	E1 A output
	x=B	E1 B output
OPT-a	x=1 to 8	Additional E1 outputs (990-72020-02 systems only) Mixed E1/T1 outputs (990-72020-06 systems only)
	x=1 to 2	ESCIU ports: 1 or 2 (990-72020-04 systems only)

Command Example:

```
RTRV-EQPT::TS3100:<ctag>;
```

4

Retrieve Equipment (cont'd)

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	Parameter Description
ALL	MONITOR=a	a = ALW	Monitor is used for alarm purposes
		a = INH	Monitor is not used for alarm purposes
TS3100	BYPASS=a (990-72020-04 Systems only)	a = ALW or INH	During holdover, the traffic-bearing E1 spans on the ESCIU module pass through the TimeSource 3100 without being re-timed (ALW) or the E1 spans continue to be re-timed (INH)
	FREQ=a	a=5	Frequency for both remote oscillator inputs is 5 MHz
		a=10	Frequency for both remote oscillator inputs is 10 MHz
	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

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TS3100 (cont'd)	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	
	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 output 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 output port address
	IPINACT	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 10000, where 0 deactivates the timer; for example, 100 = 10s)
	IPNTP=a	a=ALW	NTP feature activated
	DCDPASSTHRU	INH	DCD port communication is inhibited
		ALW1	COM1 is the DCD interface port
		ALW2	COM2 is the DCD interface port

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TS3100 (cont'd)	DCCUSERPORT=a (See Note 1)	a=1	COM1
		a=2	COM2
		a=3, 5001, 5002, 5003, 5004	COM3 or IP port 5001 to 5004
GPS	ANTCBLDLY=a	a = 0 to 330	Antenna cable length (meters)
	ANTELEVMASK=a	a = 0 to 45	Antenna elevation mask angle (degrees)
RO-a	ENSEMBLER=b	b = ALW	Remote oscillator is ensembled
		b = INH	Remote oscillator is not ensembled
	MONITOR=b	b = ALW	Remote oscillator is monitored
		b = INH	Remote oscillator is not monitored
SPAN-a	ENSEMBLER=b	a = ALW	E1 span is ensembled
		a = INH	E1 span is not ensembled
	MONITOR=b	a = ALW	E1 span is monitored
		a = INH	E1 span is not monitored
	SSM=b	a = ALW	SSM message is used to qualify port
		a = INH	SSM message is not used to qualify port
	SIGNAL=b	b=ANALOG	Span input signal is 2.048 MHz
		b=DIGITAL	Span input signal is 2.048 Mb/s
	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

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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). (If ALMOUT is SQUELCH, the signal will turn off during holdover alarm. No other ALMOUT option affects output during alarm.)
	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 (Additional eight E1 outputs for 990-72020-02 systems only)	ALMOUT=b	b = AIS	Output during holdover alarm is AIS
		b = SQUELCH	No output during holdover alarm
		b = SSM	Outputs is "SSUT" quality level message during holdover alarm (SSM requires 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	Output framing is NONE (if an analog signal) (If ALMOUT is SQUELCH, the signal turns off during holdover alarm. No other ALMOUT option affects output during alarm.)
OPT-a (ESCIU for 990-72020-04 systems only)	MONITOR=b	b = ALW	Monitor is used for alarm purposes
		b = INH	Monitor is not used (INH) for alarm purposes
	ALMOUT=b	b = AIS	When the ESCIU detects an LOS on one of its input spans, AIS is output to the NE (the E1 alignment sequence is blocked)
		b = 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

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OPT-a (990-72020-06 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 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) (If ALMOUT is SQUELCH, the signal turns off during holdover alarm. Any other ALMOUT option does not affect output during alarm.)
TS3100	ALARM=x	x=HOLD-OVER	HOLDOVER alarm
		x=GPS	GPS alarm
SPAN A & B	ALARM=x	x = LOS	LOS alarm
		x = AIS	AIS alarm
		x = ERROR	ERROR alarm
RO A & B	ALARM=x	x = LOS	LOS alarm
		x = ERROR	ERROR alarm

TS3100, SPAN A & B, RO A & B	TIME=x	x = HH-MM	Hour (00-000) 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	
	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	

Notes:

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 DCDUSER-PORT.

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::TS3100: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, TS3100 will generate a major alarm with an SA flag. These parameters can then be verified using the RTRV-EQPT command.

4

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
   "GPS:LAT=x,LONG=x,<alt>,<utc>"
   "GPS:SAT-x,USE=X,CNO=x,ELEV=x,AZ=x,LOCK=x"
   ...
   /*LINK:<link>,CMD:<command>*/
;
```

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Retrieve GPS Status (cont'd)

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.ffW	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)
SAT=a	a = 1 to 25	Satellite identification number
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

4

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.

```
RTRV-INVENTORY:[<tid>]:TS3100:<ctag>;
```

Response Format:

```
   <sid> <date> <time>
M <ctag> COMPLD
   "TS3100::::<CARD=TS3100>,
   MACID=a,
   TYPE=a,
   PART=a,
   SERIAL=a,
   SOFTVER_TS3100=a,
   SOFTVER_GPS=a,
   SOFTVER_DEV=a"
   /*LINK: x, CMD:<command>*/
;
```

Response Format example (additional E1 outputs):

```
   TS3100 1970-01-01 01:03:05<time>
M C COMPLD
   "TS3100::::CARD=TS3100,
   MACID=00:B0:AE:00:13:83,
   TYPE=E1,E1 option board
   PART=090-72020-02,
   SERIAL=E25144,
   SOFTVER_TS3100=1.05.02,
   SOFTVER_GPS=1.02.04,
   SOFTVER_DEV=1.03.02-1.01.01"
   /*LINK: 1, CMD:RTRV-INVENTORY::TS3100:C*/
;
```

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Parameter	Value	Description
CARD=TS3100	–	System
MACID=a.b.c.d.e.f	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	
	f = 00 to FF in hexadecimal format	
TYPE=E1, a	a = NO OPTION BOARD	990-72020-01 system
	a = E1 OPTION BOARD	990-72020-02 system
	a = ESCIU OPTION BOARD	990-72020-04 system
	a = IRIG-B OPTION BOARD	990-72020-05 system
	a = MIXED E1/T1 OPTION BOARD	990-72020-06 system
PART=a	–	a = Part number
SERIAL=a	–	a = Serial number
SOFTVER_TS3100=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

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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	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

4

Retrieve Performance Monitoring

This command retrieves the performance monitoring data from the TimeSource 3100. This data includes MTIE, TDEV, PHASE 1S, and PHASE 1 M. For current 24 hour data, MTIE, TDEV, and PHASE 1 S 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>];
```

Retrieve Performance Monitoring Value (cont'd)

Parameter	Value	Description
SPAN-x	x = A	E1 span A input
	x = B	E1 span B input
<montype>=x	x = MTIE	Performance monitoring data type
	x = TDEV	
	x = PHASE1S	
	x = PHASE1M	
<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, hours 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>*/
;
```

Note: 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.

4

Retrieve Performance Monitoring (cont'd)

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 24h 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

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Retrieve Performance Monitoring (cont'd)

MTIE Response Example:

```
TS3100-2009 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"
,,,,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*/
;
```

4

Retrieve Performance Monitoring (cont'd)

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>*
;
```

Note: 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.

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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 24h 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

4

Retrieve Performance Monitoring (cont'd)

TDEV Response Example:

```
  TS3100-2009 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*/
;
```

4

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>,<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>,<vldty>
,,,,<mondat>,<montm>"
;
```

4

Retrieve Performance Monitoring (cont'd)

Note: PHASE1S Data types:

- One 15 minute bin from the last 24 hours of data is displayed 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.

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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 time, month of the year
	b = 1 to 31	Monitor time, 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

4

Retrieve Performance Monitoring (cont'd)

PHASE1S Response Example:

```
TS3100-2009 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,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,COMPL,,,,2000-10-13,12-45-00
"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,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,
0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,-1,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,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,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,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,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
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,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,NA,,,,2000-10-13,12-56-40"
```

4

PHASE1S Response Example (cont'd):

```
"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,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>*/
;
```

Note: PHASE1M Data types:

- The TimeSource 3100 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.

4

Retrieve Performance Monitoring (cont'd)

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:

```
  TS3100-2009 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,COMPL,,,,,2000-05-25,100-00"
  /*LINK:5002,CMD:RTRV-PM-EQPT::
    SPAN-A:G::PHASE1M*/
;
```

4

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

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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>*/
;
```

4

Troubleshooting

This chapter 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 5

Troubleshooting with Front Panel Items

All front panel items are shown in Figure 30. The items are described in Table L. Use Table L to troubleshoot the system based on the front-panel lamps.

Figure 30. Controls and Indicators

990-72020-01, -02, -05, -06 Systems

990-72020-04 Systems

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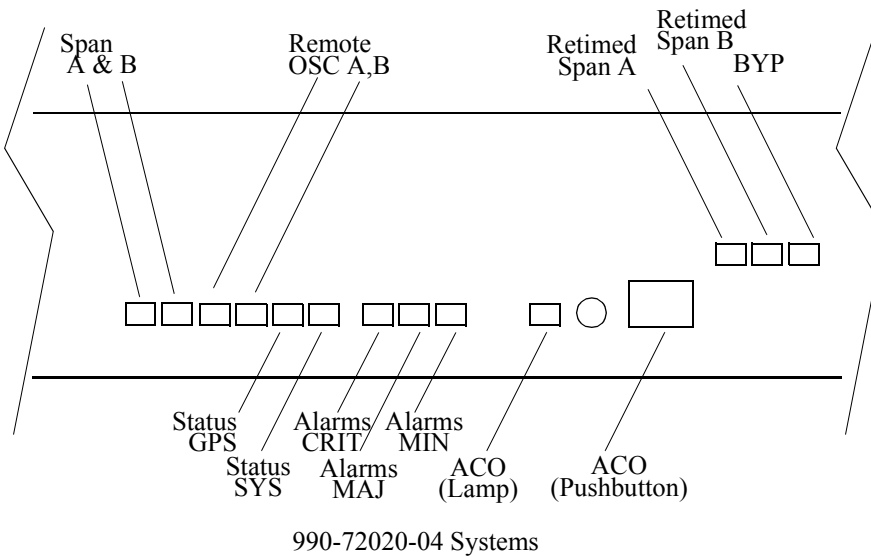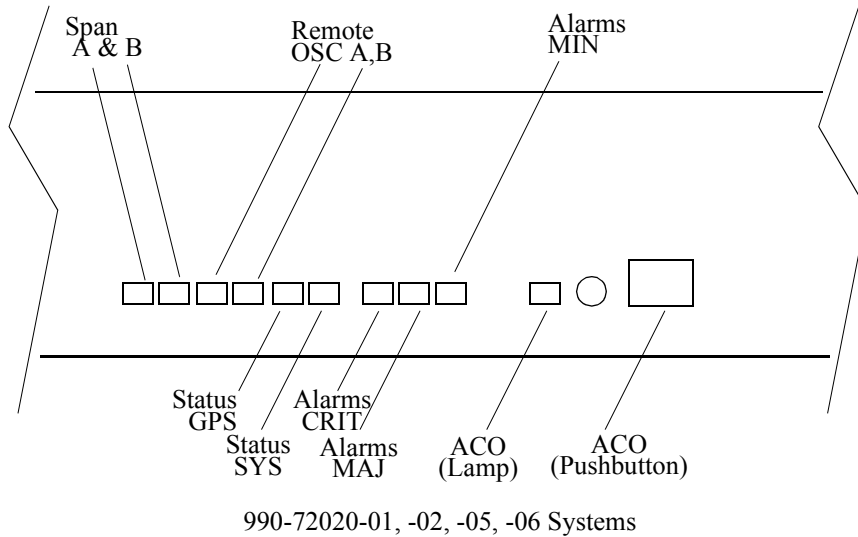
Table L. Front Panel Items

Name	Lamp	Description	Action
Span A or Span B	Off	This input has not been entered via the Enter Equipment command.	None required. If desired, enter this input via the Enter Equipment command.
	Green	This input has been entered via the Enter Equipment command, and qualified as a valid reference.	None required.
	Yellow	An event (timing error, loss of signal, alarm indication signal [AIS], SSM enabled and not PRS quality) has occurred on this input.	Check the span input signal, source, cable, and connections.
	Red	An event (timing error, loss of signal, AIS, SSM enabled and not PRS quality), which has existed on this input user alarm setting, has escalated to a minor alarm.	Check the span input signal, source, cable, and connections.
Remote Oscillator A or Remote Oscillator B	Off	This input has not been entered via the Enter Equipment command.	None required. If desired, enter this input via the Enter Equipment command.
	Green	This input has been entered via the Enter Equipment command, and qualified as a valid reference.	None required.
	Yellow	An event (timing error or loss of signal) has occurred on this input.	Check the remote oscillator input signal, source, cable, and connections. Verify the input frequency matches the equipment configuration.
	Red	An event (timing error or loss of signal), which has existed on this user alarm setting, has escalated to a minor alarm.	Check the remote oscillator input signal, source, cable, and connections. Verify the input frequency matches the equipment configuration.

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Table L. Front Panel Items (cont'd)

Name	Lamp	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	An event (GPS error) has occurred.	None required
	Red	A GPS event, which has existed on this user alarm setting, has escalated to a minor alarm.	Refer to Table M 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 on this user alarm setting, or there is a hardware fault.	Troubleshoot the red Status GPS lamp.
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 G.
Alarms MAJ	Off	There is no major alarm.	None required
	Red	The system has been in holdover on this user alarm setting.	Refer to Table M to determine which type and combination of alarms exist, and the recommended action.

5

Table L. Front Panel Items (cont'd)

Name	Lamp	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 M to determine which software needs to be downloaded and the recommended action.
		A minor alarm has occurred because an event (GPS error, temperature error, span input problem, or remote oscillator input problem) has escalated to a minor alarm.	Refer to Table M to determine which event occurred and the recommended action.
		A minor alarm has occurred because the antenna failed.	Refer to Table M to determine whether the minor alarm is due to antenna failure. If so, replace the antenna.
ACO (Lamp)	Off	The alarm cutoff function has not been activated.	None required. Press the ACO push button to silence all audible alarms.
	Green	The alarm cutoff function has been activated.	None required.
Re-timed Span A or B (990-72020-04 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.	None required.
	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.
BYP (990-72020-04 systems only)	Off	Traffic-carrying E1 data stream is being re-timed by the TimeSource 3100 System.	None required.
	Red	Traffic-carrying E1 data stream is bypassing the TimeSource 3100 System and not being retimed because the system is in holdover.	Refer to Table M to troubleshoot the GPS, SPAN x, and ROx error messages.

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Troubleshooting with Error Messages

Use the information in Table M 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 3100 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 M. Message Troubleshooting

Message	Meaning	Recommended 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, span inputs, and remote oscillator inputs) are lost or unacceptable, and the system is now using the internal oscillator.	Troubleshoot the GPS, SPAN x, and RO x error messages (check the cable, source, etc.)
MINOR ALARMS		
BATTERY x FAIL	The specified –48 V battery input has failed.	Troubleshoot, and repair, the specified –48 V battery input.
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.

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Message	Meaning	Recommended Action
GPS ERROR	The GPS receiver is reporting an error.	If accompanied by the LOW CURRENT FAULT or HIGH CURRENT FAULT alarm, follow the recommended action for LOW CURRENT FAULT or HIGH CURRENT FAULT.
		If not accompanied by the LOW CURRENT FAULT or HIGH CURRENT FAULT alarm:
		1. Remove the antenna cable from the connector panel on the shelf.
		2. Measure the dc voltage from the antenna connector center pin to the connector housing on the shelf TNC antenna connector.
		3. If the voltage is not 18 Vdc ±2 Vdc, replace the TimeSource 3100 card using Procedure F.
		4. If the voltage is 18 Vdc ±2 Vdc, measure the current between the antenna connector center pin and the connector housing on the shelf TNC antenna connector.
		5. If the current is less than 5 mA or more than 500 mA, replace the TimeSource 3100 card, using Procedure F. If not (nominal current is 125 mA, reconnect the antenna cable to 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 18 Vdc 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, check the view of the sky for obstructions.
		9. If the error repeats, replace the antenna.

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Message	Meaning	Recommended Action
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.
HIGH CURRENT FAULT	Current to antenna is outside specification.	If not accompanied by the GPS ERROR alarm, none required.
LOW CURRENT FAULT		If accompanied by the GPS ERROR alarm:
		1. Check the cable connections between the TimeSource 3100 Shelf and the antenna.
		2. If the error repeats, remove the antenna cable from the connector panel of the shelf and measure the dc voltage from the antenna connector center pin to the connector housing on the shelf TNC antenna connector.
		3. If the voltage is not 18 Vdc ±2 Vdc, replace the TimeSource 3100 card using Procedure F.
		4. If the voltage is 18 Vdc ±2 Vdc, measure the current between the antenna connector center pin and the connector housing on the shelf TNC antenna connector.
		5. If the current is less than 5 mA or more than 500 mA, replace the TimeSource 3100 card, using Procedure F. If not (nominal current is 125 mA, reconnect the antenna cable to 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 18 Vdc 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, check the view of the sky for obstructions.
		9. If the error repeats, replace the antenna.

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Table M. Message Troubleshooting (cont'd)

Message	Meaning	Recommended Action
RO x ERROR	An error has been detected on the specified remote oscillator input signal.	Troubleshoot the specified remote oscillator input (check the signal frequency). Verify the input frequency matches the equipment configuration.
RO x LOSS OF SIGNAL	The specified remote oscillator input signal has been lost.	Troubleshoot the specified remote oscillator input (check the cable, connections, source).
SPAN x AIS	An AIS has been received on the specified input span.	Troubleshoot the specified input span signal (check the source).
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 occurs during steady-state operation: 1. Check that the ambient air temperature is within the TimeSource 3100 environmental specifications. If not, correct the ambient temperature with heating or air conditioning. 2. If the ambient air temperature is within the TimeSource 3100 environmental specifications, replace the plug-in card.
TS3100 DOWNLOAD REQUIRED	The system software is corrupt or missing.	Download and install the system (TimeSource 3100) 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 40 min.).
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.

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Table M. Message Troubleshooting (cont'd)

Message	Meaning	Recommended Action
HOLDOVER	All inputs (GPS signal, span inputs, and remote oscillator inputs) are lost or unacceptable, and the system is now using the internal oscillator.	None required.
CRITICAL ACO EVENT	The ACO push button 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 (Note 1)	The GPS receiver is reporting an error.	None required.
MAJOR ACO EVENT	The ACO push button has been pressed to deactivate a major audible alarm.	None required.
MINOR ACO EVENT	The ACO push button has been pressed to deactivate a minor audible alarm.	None required.
POWER UP RESTART	The system processor has just started up.	None required.
RO x ERROR (Note 1)	An error has been detected on the specified remote oscillator input signal.	Troubleshoot the specified remote oscillator input (check the signal frequency). Verify the input frequency matches the equipment configuration.
RO x LOSS OF SIGNAL (Note 1)	The specified remote oscillator input signal has been lost.	Troubleshoot the specified remote oscillator input (check the cable, connections, source).
ESCIU x LOSS OF SIGNAL (Note 1)	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.
ESCIU x SLIP	The specified ESCIU port has a frame slip.	Troubleshoot the traffic-carrying span input signal source.

5

Table M. Message Troubleshooting (cont'd)

Message	Meaning	Recommended Action
SETTLING PERIOD	The system is between the power-up state and steady-state operation, and may be outputting slightly degraded signals.	None required.
SOFTWARE DOWNLOADING ON LINK	Software is being downloaded at specified communication port.	None required.
SPAN x AIS (Note 1)	An AIS has been received on the specified input span.	Troubleshoot the specified input span (check the source).
SPAN x ERROR (Note 1)	An error has been detected on the specified input span.	Troubleshoot the specified input span (check the source).
SPAN x LOSS OF SIGNAL (Note 1)	The signal on the specified span input has been lost.	Troubleshoot the specified input span (check the source).
SPAN x SSM QUALITY SEC (Note 1)	The signal on the specified span input has degraded to an SSM quality level of SEC.	Troubleshoot the specified input span (check the source).
SPAN x SSM QUALITY SSUL (Note 1)	The signal on the specified span input has degraded to an SSM quality level of SSUL.	Troubleshoot the specified input span (check the source).
SPAN x SSM QUALITY SSUT (Note 1)	The signal on the specified span input has degraded to an SSM quality level of SSUT.	Troubleshoot the specified input span (check the source).
TEMPERATURE ERROR	A temperature error has been detected on the internal oscillator.	1. Wait until this escalates to a minor alarm, or check that the ambient air temperature is within the TimeSource 3100 environmental specifications. If not, correct the ambient temperature with heating or air conditioning. 2. If the ambient air temperature is within the TimeSource 3100 environmental specifications, replace the plug-in card.

Note: This event will escalate to a minor alarm per the user alarm setting.

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Card Replacement

To replace the plug-in card, follow the steps in Procedure F, and refer to Figure 31.

Procedure F. Card Replacement

Step	Procedure
1	Put on an ESD wrist strap.
2	Plug the ESD wrist strap into the ESD jack on 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.
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

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Figure 31. Front of Shelf

990-72020-01, -02, -05 -06 Systems

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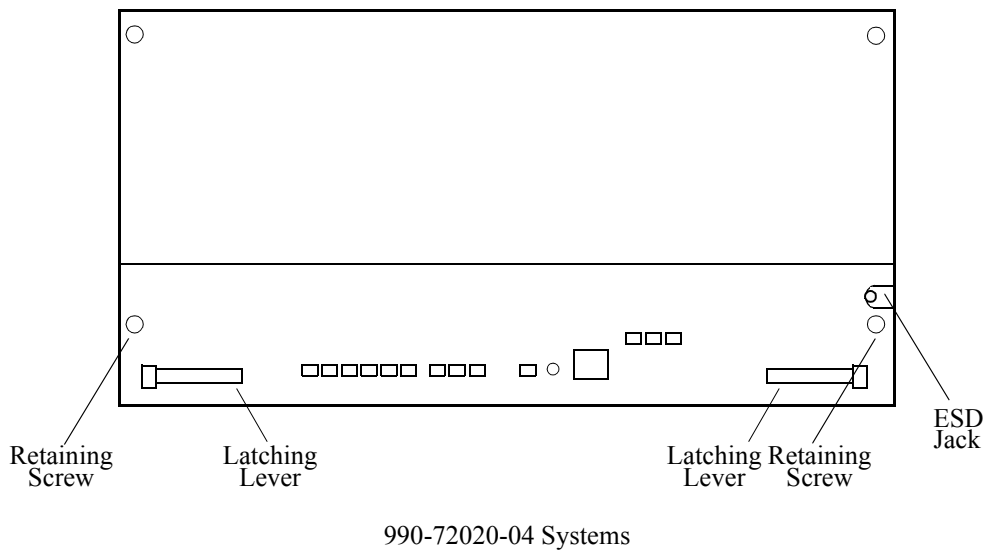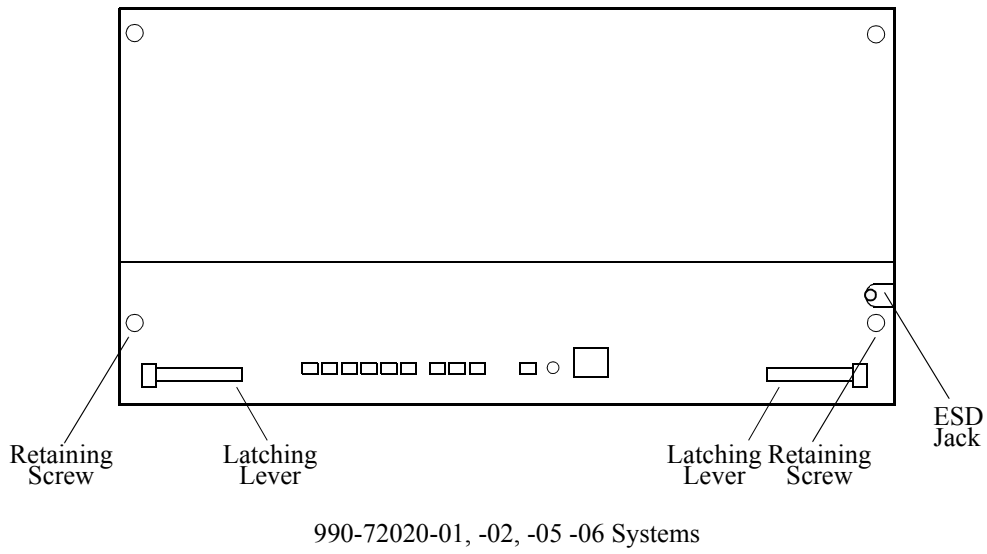
Repair and Return

When returning defective equipment for factory repair, obtain the following information prior to calling Symmetricom:

- A complete description of the trouble (alarms, equipment behavior, etc.), part number, serial number, issue/revision level, and warranty expiration date.

- If the warranty has expired, a purchase order with "bill to" information.

- A customer field technical contact including address, phone number and FAX number.

- Return shipping information.

To return defective or damaged equipment, use Procedure G.

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Procedure G. Equipment Return

Step	Procedure
1	Call your local Symmetricom distributor or Symmetricom's Inside Sales (refer to the Sales subsection), and obtain a Return Material Authorization (RMA) number and shipping address. *Note:* Retain the RMA number for future reference. The RMA number is used by Symmetricom for internal tracking of the unit. Reference the RMA number in all communications with Symmetricom regarding the unit.
2	Pack the defective equipment, including a list containing all the information obtained above, in the original packing material. If the original packing material is not available, inform Symmetricom, and the appropriate shipping material will be provided. *Note:* Equipment must be returned in the original packaging, or approved replacement packaging, for the warranty to be honored.
3	Mark the RMA number and the equipment serial number on the outside of the shipping carton.
4	Ship the equipment prepaid and insured to one of the addresses below, as directed by the Customer Assistance Center: Symmetricom Attn: Customer Service 2300 Orchard Parkway San Jose, CA 95131 or Symmetricom Attn: Repair and Return Montana Industrial Park Street B Lot 52 Aguadilla, Puerto Rico 00603 Repaired equipment is typically shipped within 30 days of receipt by Symmetricom, or per contract terms. Shipping costs to Symmetricom are paid by the customer; shipping costs back to the customer are paid by Symmetricom.

End of Procedure

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Technical Assistance

For technical assistance, contact the following:

Symmetricom, Inc.
2300 Orchard Parkway
San Jose, CA 95131-1017

U.S.A. Call Center:
    1-888-367-7966 (from inside U.S.A. only - toll-free)
    1-408-428-7907
    Fax: 1-408-428-7998

Europe, Middle East, and Africa (EMEA) Call Center:
    +44 (0) 1189 699 799
    Fax: +44 (0) 1189 277 520

E-mail: support@symmetricom.com

Internet: http://www.symmetricom.com

Sales

For sales assistance, contact the following:

Symmetricom, Inc.
2300 Orchard Parkway
San Jose, CA 95131-1017

U.S.A. Call Center:
    1-888-367-7966 (from inside U.S.A. only - toll-free)
    1-408-428-7907

Europe, Middle East, and Africa (EMEA) Call Center:
    +44 (0) 1189 699 799
    Fax: 1-408-428-7998

E-mail: info@symmetricom.com

Internet: http://www.symmetricom.com

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Manual Updates

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

Manual updates are available at:

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

Note: When going to the preceding Web address, it is necessary to register if you are a new user. If you are a currently registered user, enter your user name and password, and log in.

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5

Specifications

This chapter provides equipment specifications.

Antenna

Type: Active volute antenna, right-hand circular
polarized, with proprietary IF interface

Voltage (via signal cable): 12 V dc nominal

Current (via signal cable): 125 mA

Gain: 23 dB

Cable Type: RG-59/U (Belden 82108 or equivalent)

Cable Length: Maximum 305 m from antenna to shelf

Dimensions: (excluding mount)
   Height: 31.4 cm
   Diameter: 7.6 cm
   Weight: 255 g

Operating Temperature: –30° C to +80° C

Storage Temperature: –40° C to +80° C

Operating Humidity: 0% to 100% relative humidity

Communication 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 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
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 Software (XON/XOFF) Hardware (CTS/RTS)

Craft Port

Connector Type:	RJ-45
Connector Label:	Craft
Connector Location:	Front panel
Electrical Interface:	RS-232
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 Port

Connector Type:	RJ-45 (10Base-T)
Connector Label:	E-NET
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 32

Figure 32. NTP Type 4 Data Format

```
    1    2    3          4        5   6

  ␣␣00 ␣225 ␣ 21:05:29.060␣␣ S
```
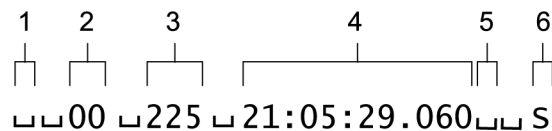
1. Alarm field: blank space = receiver has satellite availability;? = no satellite availability

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

Time of Day Outputs (cont'd)

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Cisco Systems Format

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 33

Figure 33. NTP Type 4 Data Format

```
 1 2    3       4         5     6 7  8     9           10        11   12  13   14

*.A.51498.00/11/15,18:02:30,00000.0,37N22.130,121W55.180.+0042,MN GPS FLT
```
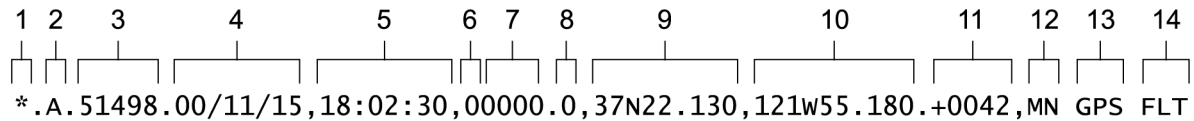
1. Satellite availability: * = valid, ! = not valid
2. Revision
3. Modified Julian date (number of days past midnight, Nov. 17, 1858)
4. Year/month/day
5. Hours:minutes:seconds
6. Indicator of time zone offset (+, -, or 0)
7. Time zone offset
8. Leap second indicator
9. Latitude
10. Longitude
11. Altitude 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

Time of Day Outputs (cont'd)

IRIG-B TOD Outputs (990-72020-05 System Only)

Connector Type:	BNC
Number of Outputs:	4
Connector Labels:	OUT1 OUT2 OUT3 OUT4
Connector Location:	Module on Connector panel
Impedance:	600 Ω
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

Remote Oscillator Inputs

Connector Type:	BNC
Connector Label:	REM OSC A REM OSC B
Connector Location:	Connector panel
Impedance:	75 Ω
Frequency:	5 MHz 10 MHz
Format:	Sine wave
Amplitude:	1 V rms minimum 3.5 V rms maximum

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

Line Code:	HDB3

SSM

State:	Enable Disable
Framing:	CAS4 CCS4
Channels:	Sa4 Sa5 Sa6 Sa7 Sa8

Amplitude:	+3 dB to −33 dB

Framing:	CAS CAS4 CCS CCS4

Analog 2.048 MHz Inputs

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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 MHz

Format:	Analog

1 PPS Output

Connector Type:	BNC
Connector Label:	TTL PPS
Connector Location:	Connector panel
Impedance:	50 Ω
Frequency:	1 pps
Time Accuracy:	100 ns with respect to Universal Coordinated Time (UTC) when locked to GPS signal
GPS Holdover Time Error: (After 1 week of steady-state operation)	8.6 µs per day (0 °C to +50 °C, ±5 °C) 2.8 µs with span input meeting ANSI T1.101 network specification 99% probability 1.8 µs per day with ST2E remote oscillator input (0 °C to +50 °C, ±5 °C)
Pulse width:	1 µs pulse
Rise time:	Less than 20 ns
Amplitude:	Transistor-transistor logic (TTL) levels

E1 Outputs

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Standard

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:	E1 OUT A E1 OUT 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
Frequency Accuracy:	1×10^{-12}

GPS Holdover Stability:
(after one week of
steady-state operation)
	1×10^{-10} per day (0 °C to +50 °C, ±5 °C)
	3.2×10^{-11} per day with a span input meeting
	  ANSI T1.101 network specification 99% probability
	1×10^{-10} per day for 30 days (0 °C to +50 °C, ±5 °C)
	  with an ST2E remote oscillator input

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

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Additional E1 Outputs (990-72020-02 System Only)

Connector Type:	Wire-wrap pins for 120 Ω balanced terminations
	BNC for 75 Ω unbalanced terminations
Connector Label:	
Wire-Wrap (8 sets)	T
	R
	S
BNC:	OUT 1
	OUT 2
	OUT 3
	OUT 4
	OUT 5
	OUT 6
	OUT 7
	OUT 8
Connector Location:	Connector panel output module
Impedance:	120 Ω ±5% balanced or
	75 Ω ±5% unbalanced
Bit Rate:	2.048 Mb/s
Frequency Accuracy:	1×10^{-12}
GPS Holdover Stability:	1×10^{-10} per day (0 °C to +50 °C, ±5 °C)
(after one week of	3.2×10^{-11} per day with a span input meeting
steady-state operation)	ANSI T1.101 network specification 99% probability
	1×10^{-10} per day for 30 days (0 °C to +50 °C, ±5 °C)
	with an ST2E remote oscillator input
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

Analog 2.048 MHz Outputs

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Standard

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:	E1 OUT A E1 OUT 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 MHz
Frequency Accuracy:	1×10^{-12}

GPS Holdover Stability:
(after one week of
steady-state operation)
	1×10^{-10} per day (0 °C to +50 °C, ±5 °C)
	3.2×10^{-11} per day with a span input meeting
	   ANSI T1.101 network specification 99% probability
	1×10^{-10} per day for 30 days (0 °C to +50 °C, ±5 °C)
	   with an ST2E remote oscillator input

Format:	Square wave
Amplitude:	1.5 V nominal terminated with 120 Ω balanced 1.18 V nominal terminated with 75 Ω unbalanced

Additional Analog Outputs (990-72020-02 System Only)

Connector Type:	Wire-wrap pins for 120 Ω balanced terminations BNC for 75 Ω unbalanced terminations
Connector Label: Wire-Wrap (8 sets)	T R S
BNC:	OUT 1 OUT 2 OUT 3 OUT 4 OUT 5 OUT 6 OUT 7 OUT 8
Connector Location:	Connector panel output module
Impedance:	120 Ω ±5% balanced or 75 Ω ±5% unbalanced
Bit Rate:	2.048 MHz
Frequency Accuracy:	1×10^{-12}

GPS Holdover Stability:
(after one week of
steady-state operation)
	1×10^{-10} per day (0 °C to +50 °C, ±5 °C)
	3.2×10^{-11} per day with a span input meeting
	  ANSI T1.101 network specification 99% probability
	1×10^{-10} per day for 30 days (0 °C to +50 °C, ±5 °C)
	  with an ST2E remote oscillator input

Format:	Square wave
Amplitude:	1.5 V nominal terminated with 120 Ω balanced 1.18 V nominal terminated with 75 Ω unbalanced

Mixed E1/T1 Outputs (990-72020-06 System Only)

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Note: For E1/T1 commonality, refer to the E1/T1 Common specifications. For E1, refer to the E1 Outputs specifications. For T1, refer to the T1 Outputs specifications.

E1/T1 Common

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

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, NONE
GPS Holdover Stability: (After 1 week of steady-state operation)	1×10^{-10} per day (0 °C to 50 °C ± 5°C)
	3.2×10^{-11} per day with a span input meeting ANSI T1.101 network specification 99% probability
	1×10^{-10} for 30 days (0 °C to 50 °C ± 5°C) with an ST2E remote oscillator input

Mixed E1/T1 Outputs (cont'd)

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

GPS Holdover Stability:
(After 1 week of
steady-state operation)

1×10^{-10} per day

3.2×10^{-11} per day with a span input meeting ANSI T1.101 network specification 99% probability (rubidium)

1×10^{-11} for 30 days 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 (990-72020-04 System Only)

Connector Type:		75 Ω BNC
		120 Ω Wire-wrap

Connector Label:

Wire-Wrap:	SPAN 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)
BNC:	SPAN 1	RTN 1 OUT
		RTN 1 IN
		OUT
		IN
	SPAN 2	RTN 2 OUT
		RTN 2 IN
		OUT
		IN

Connector Location:	Connector panel output module
Electrical Interface:	E1 (ITU G.703 andG.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
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) Span (A, B) Remote Oscillator (A, B)
990-72020-04 System only:	Retimed spans: A, B, BYP
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 µs

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 to 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 –60 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)
Width:	48.3 cm
Height:	22.2 cm maximum
Depth:	30.5 cm maximum
Weight:	5.9 kg

Shelf Environmental

Operating Temperature:	0 °C to +50 °C
Operating Humidity:	Up to 95% noncondensing
Electromagnetic	CE

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