



TimeSource 3000

GPS Primary Reference Source



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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 (1.75 in.) |
| 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 3000 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 H, 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 of the TimeSource 3000.

Overview

1

The TimeSource 3000 is a Primary Reference Source (PRS) that receives and processes signals from GPS satellites, and outputs Stratum 1 synchronization signals traceable to UTC. TimeSource 3000 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 3000 creates timing outputs by ensembling signals from several sources. The sources include GPS signals, an onboard local oscillator, and optional T1 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, T1 format, a 10 MHz signal, a 1 pps signal, composite clock signals (optional), and time of day (TOD) signals.

The TimeSource 3000 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 3000 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 12,550 statute miles, 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 3000 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.

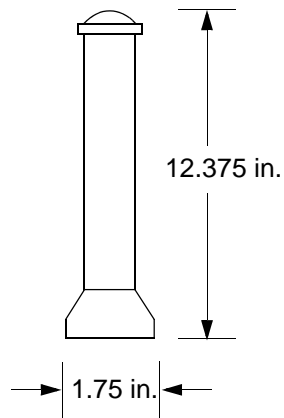
Physical Description

The TimeSource 3000 consists of a shelf, a plug-in card, an antenna, cables, hardware, and software. An optional factory-installed daughter card may be included to provide eight additional T1 outputs, eight additional composite clock outputs, two additional IRIG-B TOD timing outputs, or eight mixed EI/T1 outputs.

The shelf occupies two rack mounting units (RU), and can be mounted in a 19 inch rack or a 23 inch rack. One RU (1.75 in.) of air space above the TimeSource 3000 is required for proper ventilation. Other than a communications connector on the front panel, all connectors are at the rear of the shelf.

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

Figure 1. Antenna



Functional Description

Overview

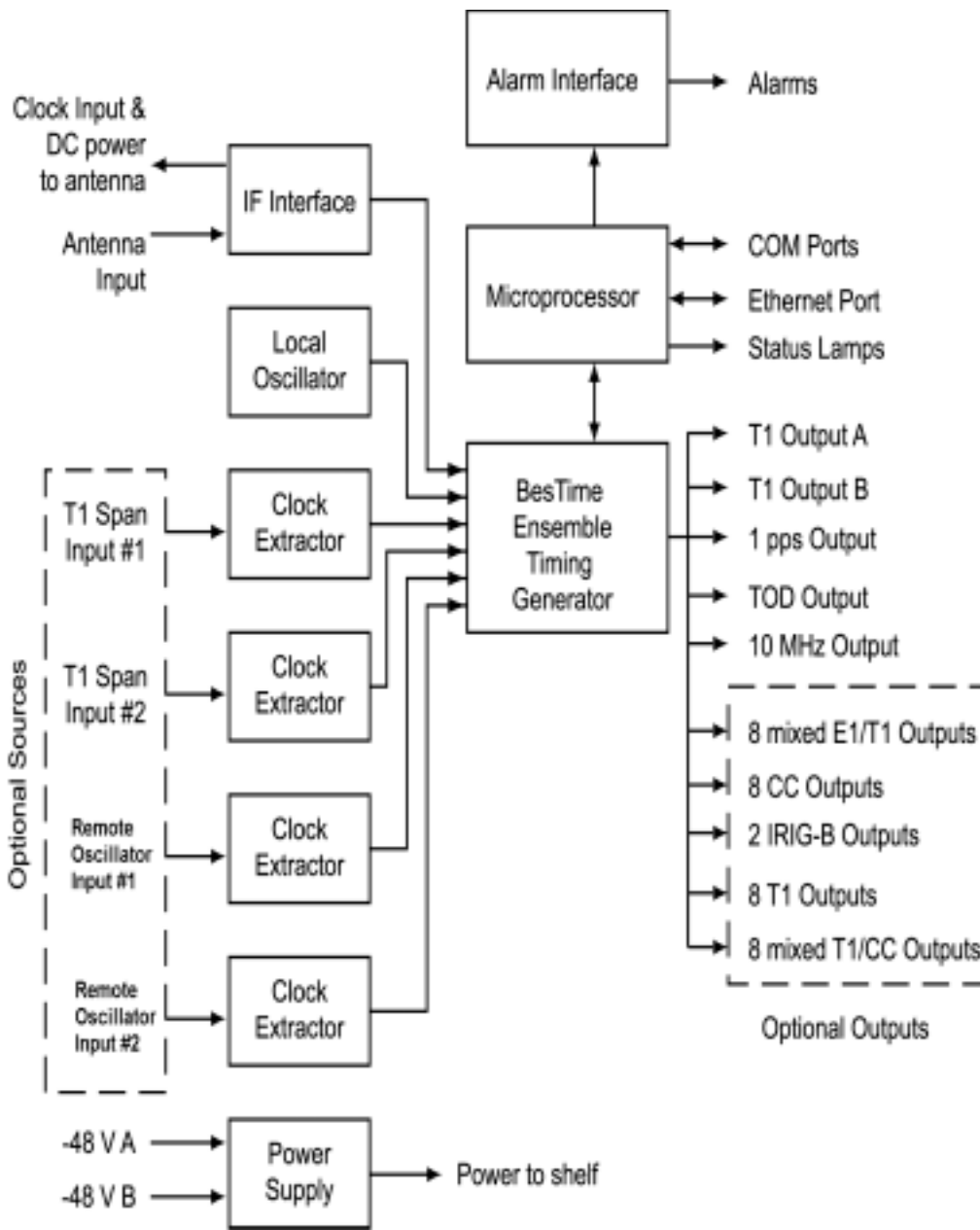
Figure 2 shows the main functions of the TimeSource 3000. The center of the TimeSource 3000 is the Ensemble Timing Generator, which uses the BesTime algorithm to analyze the phase and frequency relationships, individually and collectively, of the timing sources. Each type of timing source has a particular 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 |
| T1 Line | Intermediate term stability |
| External Oscillator | Intermediate term stability |
| GPS Signal | Long term stability |

Figure 2. 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

T1 signals (optional) enter on the SPAN IN #1 and #2 wire-wrap pins, and remote oscillator signals (optional) enter on the A and B REM OSC connectors. From each external signal, a clock extractor circuit extracts a timing signal, which 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 1 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 IF Interface, the local oscillator, the two T1 span lines, and the two 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.

T1 Outputs

The BesTime Ensemble Timing Generator provides the timing for the T1 timing signal available at the T1 OUT A and B connectors in a framed, all-ones format, which can be set to ESF or D4 framing.

Eight Additional T1 Outputs (990-72010-02 Systems Only)

This option provides eight additional T1 outputs at the OPTIONS I/O wire-wrap pins. These outputs function the same as the standard T1 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 (990-72010-05 Systems Only)

This option provides two additional TOD outputs in IRIG-B format at the BNC connectors on the IRIG-B BNC adapter (secured to the shelf rear 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.

Eight Mixed E1/T1 Outputs (990-72010-06 Systems Only)

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

Eight Mixed T1/CCK Outputs (990-72010-07 Systems Only)

This feature enables a user to mix any combination of T1 and CCK outputs. For T1, D4 or ESF framing can be used per ANSI T 1.101. Support for SSM is per TR-33 for T1.

Composite Clock Outputs (990-72010-03 Systems Only)

This option provides eight composite clock signals available at the OPTIONS I/O wire-wrap pins.

Alarm Interface

The microprocessor delivers alarms to normally open dry-contact type connections. Alarms are also indicated by the front-panel status lamps, and TL1 messages reported via the communication ports.

Ethernet

TimeSource 3000 has one physical Ethernet port with six virtual ports to carry TL1 commands, responses, and autonomous messages between the TimeSource 3000 and an external terminal, or an Element Manager, or both. The user can configure the IP address, subnet mask, and gateway address for the Ethernet ports.

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

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

Communications Ports

Three RS-232 serial communications ports carry TL1 commands, responses, and autonomous messages between the TimeSource 3000 and an external terminal.

Passthrough

The Passthrough feature of the TimeSource 3000 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:

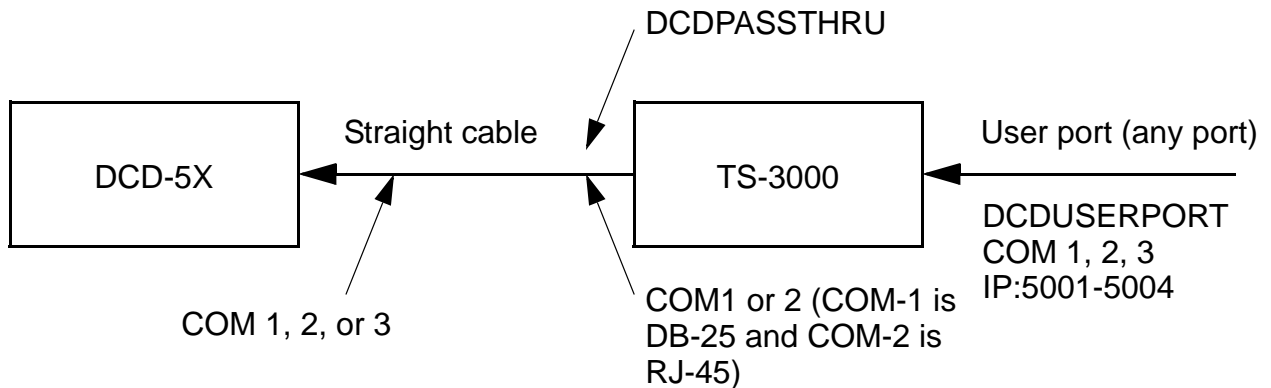
- Provide a no download exclusion for the Passthrough port
- COM 1 or COM2 is connected to the DCD product
- The user port can be any unused port, including the Ethernet port
- Messages can pass from a user to the DCD product and from the DCD product to a user through the TimeSource 3000
- The TID (SID for DCD) is used to identify commands that go to the DCD product. The TimeSource 3000 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.
- The Passthrough feature is communicated via TL1 only (ie. no GUI interface).

Figure 3. shows a TimeSource 3000 Passthrough setup.

Figure 3. TimeSource 3000 Passthrough Function



Alarm Programmability

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

The TS3000 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 Warmup" event is generated. This is also an informational message that lasts till the time it takes the system to acquire the satellites, warm up the oscillator, and start giving out valid outputs. It may take up to 2 hours for the message to clear, but typically takes approximately 40 minutes. During the "BT3 Warmup" time, the outputs will generally be squelched. If the outputs are enabled using the TL1 command (ED-EQPT::TS3000: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 3000, 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 3000, 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 3000 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 PRS mask by the BesTime engine.

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

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

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

The system also allows the user to set a parameter to define how outputs should behave in an alarm condition. 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

Engineering & Ordering

This chapter provides antenna installation guidelines, shelf mounting configurations, a parts list, and a list of user-supplied tools required for installation.

Site Survey

A site survey should be performed before ordering the system, as described in Procedure A.

Procedure A. Site Survey

| Step | Action |
|------|--|
| 1 | Determine the location of the grounding point for the lightning suppressor. The lightning suppressor must be located within 15 ft. of this point. If the grounding point is inside the building, the grounding point must be within 50 cable feet of where the antenna cable enters the building. Valid lightning suppressor grounding points are as follows: <ul style="list-style-type: none">• Valid roof ring ground system• Cad weld to building structure steel• Central Office ground plate |
| 2 | Determine the best location for mounting the antenna. The ideal location is where the antenna has an unobstructed view of the sky, from the horizon to zenith, for 360° around the horizon. |
| 3 | Determine the shelf location. |
| 4 | Determine the cable length between the antenna, and the lightning suppressor location determined in Steps 1 and 2. |
| 5 | Determine the cable length between the lightning suppressor and the shelf location determined in Steps 1 and 3. |
| 6 | Determine the -48 V power source for the shelf. |
| 7 | Determine if 5 MHz signals from a Symmetricom Digital Clock Distributor (DCD) Shelf will be used as remote oscillator inputs (optional). |

End of Procedure

Lightning Suppressor Guidelines

- Mount the lightning suppressor within 15 feet 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 50 feet 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.

Antenna Location Guidelines

DANGER: Do not select an antenna location that could be an electrical or physical hazard to work persons or equipment. Avoid proximity to all high-voltage sources. Mount in an easily maintainable location.

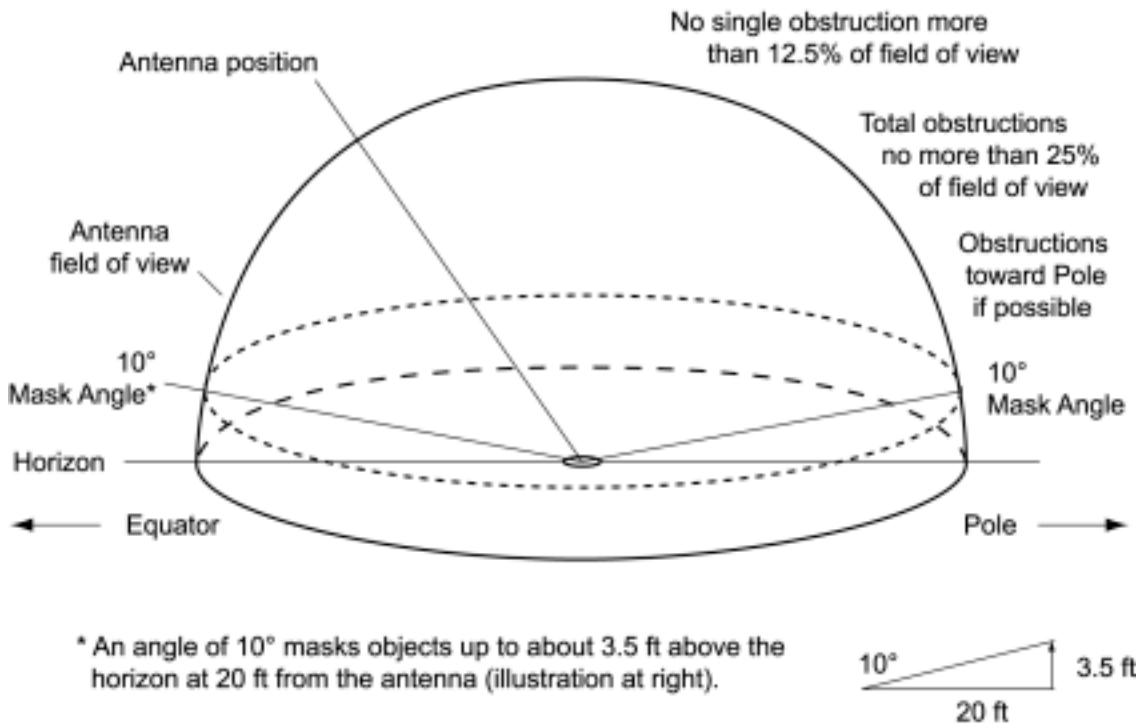
The ideal antenna location provides a clear, unobstructed view of the sky from the zenith to the horizon line, and 360 degrees around the horizon.

A compromise often must be made between location and satellite field of view. The smaller the field of view, the fewer the number of satellites that can be used in the timing solution for GPS derived time. With fewer satellites, the TimeSource 3000 may experience GPS events (temporary loss of contact with four or more GPS signals).

Signals closer to the horizon are often subject to multipath effects, which degrade the timing solution. The TimeSource 3000 can be set to ignore, or mask, all signals from the horizon to a chosen angle of elevation (mask angle). (See Figure 4.)

Note: 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.

Figure 4 Antenna Field of View



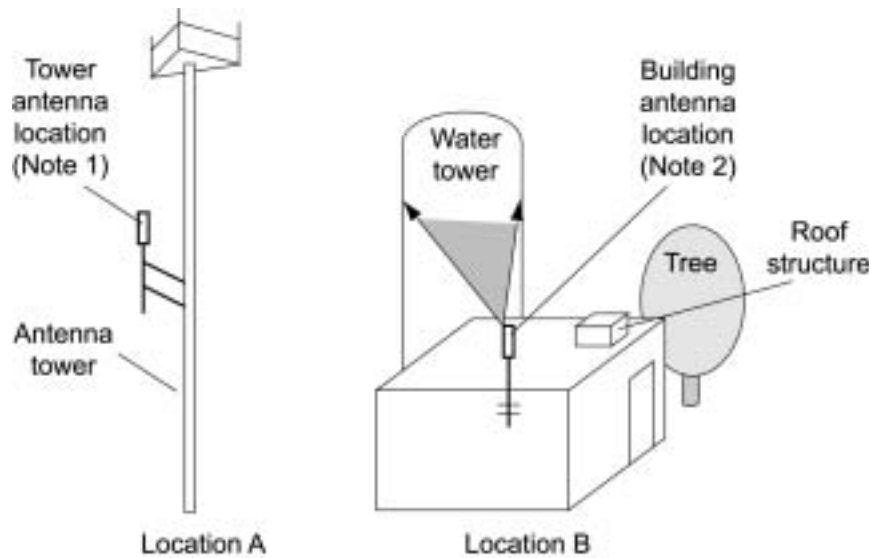
Observe the following guidelines during the placement and installation of the antenna:

- Total of obstructions above the mask angle must not obscure more than 25 percent of the total field of view (90 degrees of azimuth) (Figure 5).
- No single obstruction may block more than 12.5 percent of the view (45 degrees of azimuth).

Notes:

1. Place the antenna high enough on the tower that obstructions are below the mask angle; mount the antenna more than 3 feet 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 more than 12.5 percent of the sky.

Figure 5 Antenna Location Examples

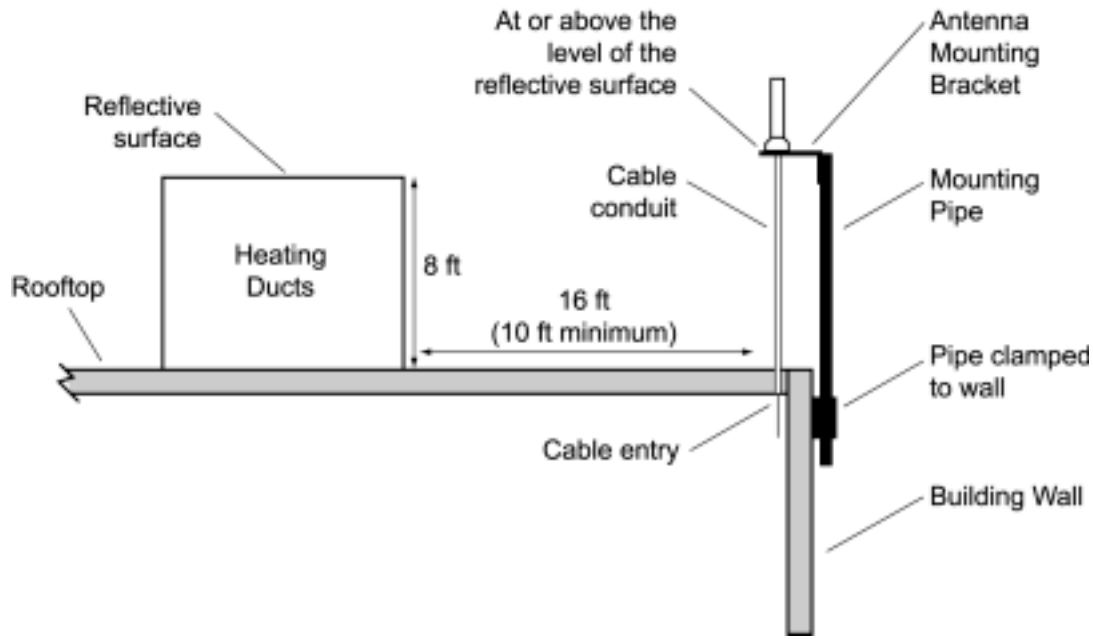


Note: The most important objects are within 1/4 mile (400 yards) of the antenna. Obstructions may include, but are not limited to, towers, buildings, other construction, trees, and high-voltage power lines.

- Be aware of transmitting antennas in the area. The direction of transmission, power level, and frequency may cause interference.
- The minimum horizontal distance from other receiving antennas is 3 feet.

- The minimum horizontal distance from vertical reflective structures (e.g., heating ducts, equipment housings, etc.) is twice the height of the structure or 10 feet (Figure 6).

Figure 6 Sample Rooftop Antenna Mount



- The minimum vertical distance above parapets, obstructions, or horizontal metallic reflective surfaces is 4 feet.
- Do not locate the antenna within 30 degrees azimuth of the transmission direction of any transmitting antenna (to avoid overpowering the GPS reception, even though the transmitting antenna may operate at a different frequency).
- Do not locate the antenna underneath high power lines. If this cannot be avoided, ensure the antenna is placed at least twice as far from the power line as the power line is high (to avoid danger to personnel and multipath effects).
- Mount the antenna in a location with easy and safe access for future maintenance purposes.
- Mount the antenna on a mast of 1 inch diameter galvanized metal pipe (recommended). Do not use metal as a cable conduit.

Cabling Considerations for Standard Configurations

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.

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

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

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

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

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



Antenna Cable Choices

The coaxial cable (060-72010-xx) for antenna-to-lightning suppressor and lightning suppressor-to-shelf cabling includes RG-59/U cable (20 AWG, 75 ohm coaxial) with male TNC connectors attached, and are available in the following lengths:

- 10 foot cable (060-72010-01)
- 20 foot cable (060-72010-02)
- 50 foot cable (060-72010-05)
- 100 foot cable (060-72010-10)
- 200 foot cable (060-72010-20)
- 300 foot cable (060-72010-30)
- 500 foot cable (060-72010-50)
- 600 foot cable (060-72010-60)
- 800 foot cable (060-72010-80)
- 1000 foot cable (060-72010-99)

Two cables are required: one to connect the antenna to the lightning suppressor and another to connect the lightning suppressor to the TimeSource 3000 Shelf.

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

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

- TNC connector kit (093-72010-98) includes:
 - TNC connectors for RG-59/U cables (8)
 - Rubber boots (8)
 - TNC adapter connectors (2)
- TNC crimp tool (154-00023-01)

Cabling Considerations for Optional Configurations

IRIG-B TOD (990-72010-05 Systems Only)

If using the IRIG-B TOD outputs (990-72010-05 TimeSource 3000 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.

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 3000 Shelf. Refer to Field Service Bulletin FSB 098-40620-19R2 for details.

| <u>Shelf</u> | <u>Isolator Kit part #</u> |
|---|----------------------------|
| 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 2 foot long RG-59/U, 75 ohm coax cables, and two 6 foot lengths of 50 ohm cables. Two foot 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.

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The isolation module is used to reduce potential noise coupling, and match impedances in the cables between the DCD master shelf and TimeSource 3000. It also converts the 5 MHz output from a square wave to a sine wave.

The isolation module is installed between the TimeSource 3000 Shelf and the DCD master shelf. To connect between the module and the DCD Shelf, two 2 foot 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)

RJ-45-to-DB-25 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-45-to-RS-232 TOD Converter Kit is required (ordered separately, part number 093-72000-98).

The RJ-45-to-DB-25 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 1,000 cable feet of the TimeSource 3000 shelf, and within 50 cable feet of the device receiving the time code.

The user must supply two cables. One cable is a Category 5 four-pair RS-422 cable, 1,000 feet maximum, with RJ-45 connectors on each end. Route this cable between the TimeSource 3000 Shelf and the converter.

The other cable is an RS-232 data communications cable, 50 feet 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.

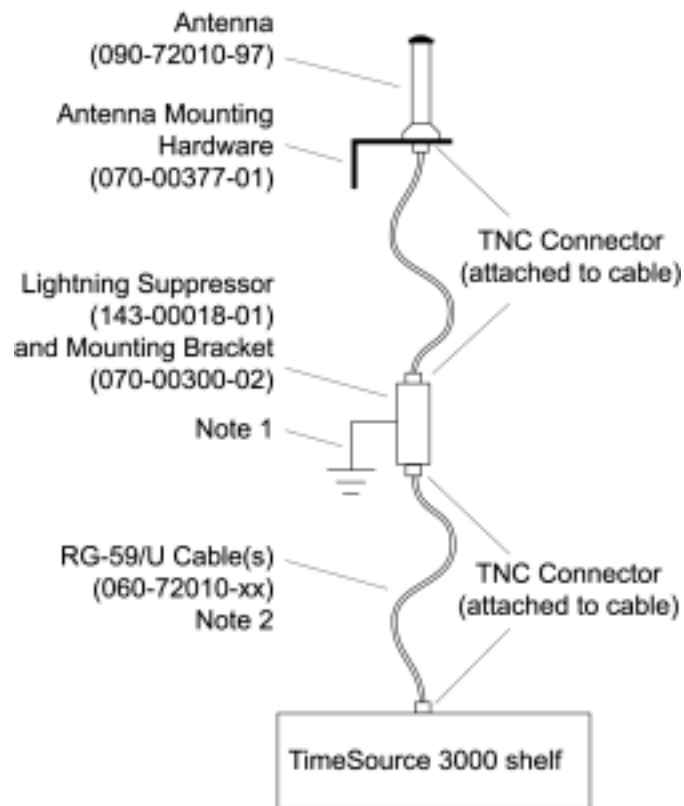
Antenna-to-Shelf Cabling

Figure 7 shows the antenna-to-shelf cabling.

Notes:

1. Recommended grounding points:
 - a. Valid roof ring ground system.
 - b. Cad weld to building structural steel.
 - c. Central office ground plate within 50 feet of antenna cable entrance into building.
2. If desired, a single cable run can be made from the antenna to the TimeSource 3000 Shelf. The cable can then be cut at the lightning suppressor location, and TNC connectors attached to the cut ends of the cable. (The "xx" in the part number indicates the cable length - see Cabling Considerations for Standard Configurations on page 34.)

Figure 7 Antenna-to-Shelf Cabling



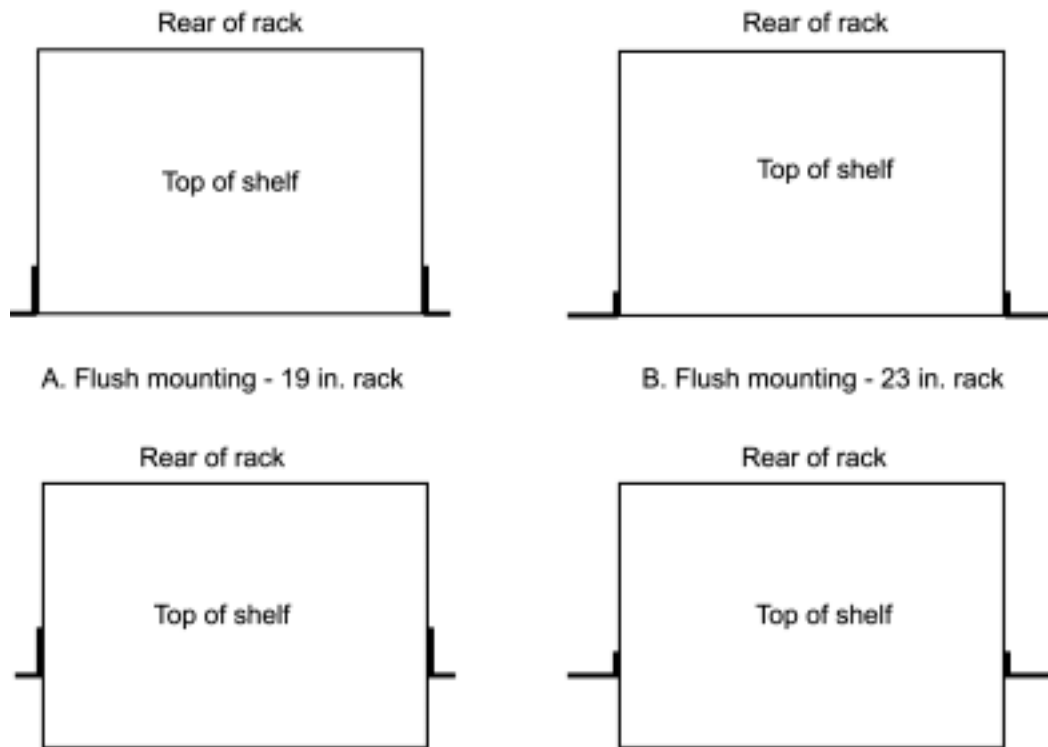
Shelf Considerations

Rack Mounting

Position the mounting ears, as shown in Figure 8, for flush mounting or 5 inch offset mounting in a 19 inch rack (Figure 8A, and Figure 8C), or for flush mounting or 5 inch offset mounting in a 23 inch rack (Figure 8B and Figure 8D). Leave one RU (1.75 inches) of air space above the TimeSource 3000 Shelf for proper ventilation. Mount the shelf in the rack according to standard company practices.

Note: Two screws can be used in both mounting ears if the holes in the rack are spaced 1.75 inches apart.

Figure 8 Rack Mounting Options



Systems

The TimeSource 3000 Systems available are listed below.

With Two T1 Outputs

This system (990-72010-01) includes:

- TimeSource 3000 Shelf (090-72000-01)
- TimeSource 3000 card (090-72010-01)
- IF antenna assembly (090-72010-97)
- Antenna mounting kit (093-00001-01)
- Hardware kit (093-72010-97) includes:
 - Lightning suppressor (143-00018-01)
 - Mounting bracket for lightning suppressor (070-00300-02)
 - PC-to-Craft port cable (060-00067-01)
 - Right-angle TNC connector adapter (121-00569-01)
- System software (992-72010-05 or later)

With Ten T1 Outputs

This system (990-72010-02) includes:

- TimeSource 3000 Shelf (090-72000-01)
- TimeSource 3000 card with expansion T 1 outputs (090-72010-02)
- IF antenna assembly (090-72010-97)
- Antenna mounting kit (093-00001-01)
- Hardware kit (093-72010-97) includes:
 - Lightning suppressor (143-00018-01)
 - Mounting bracket for lightning suppressor (070-00300-02)
 - PC-to-Craft port cable (060-00067-01)
 - Right-angle TNC connector adapter (121-00569-01)
- System software (992-72010-05 or later)

With Two T1 and Eight Composite Clock Outputs

This system (990-72010-03) includes:

- TimeSource 3000 Shelf (090-72000-01)
- TimeSource 3000 card with expansion composite clock outputs (090-72010-03)
- IF antenna assembly (090-72010-97)
- Antenna mounting kit (093-00001-01)
- Hardware kit (093-72010-97) includes:
 - Lightning suppressor (143-00018-01)
 - Mounting bracket for lightning suppressor (070-00300-02)
 - PC-to-Craft port cable (060-00067-01)
 - Right-angle TNC connector adapter (121-00569-01)
- System software (992-72010-05 or later)

With Two T1 and Two IRIG-B TOD Outputs

This system (990-72010-05) includes:

- TimeSource 3000 Shelf (090-72000-01)
- TimeSource 3000 card with IRIG-B TOD outputs (090-72010-05)
- IRIG-B BNC adapter (090-72100-06)
- Two right-angle BNC connectors (121-00530-01)
- IF antenna assembly (090-72010-97)
- Antenna mounting kit (093-00001-01)
- Hardware kit (093-72010-97) includes:
 - Lightning suppressor (143-00018-01)
 - Mounting bracket for lightning suppressor (070-00300-02)
 - PC-to-Craft port cable (060-00067-01)
 - Right-angle TNC connector adapter (121-00569-01)
- System software (992-72010-05 or later)

With Two T1 and Eight Mixed E1/T1 Outputs

This system (990-72010-06) includes:

- TimeSource 3000 Shelf (090-72000-01)
- TimeSource 3000 card with expansion mixed E1/T1 outputs (090-72010-06)
- Antenna (090-72010-97)
- Antenna mounting kit (093-00001-01)
- Hardware kit (093-72010-97) includes:
 - Lightning suppressor (143-00018-01)
 - Lightning suppressor mounting bracket (070-00300-02)
 - Craft port-to-PC communication cable (060-00067-01)
- System software (992-72010-05 or later)

With Two T1 and Eight Mixed T1/CCK Outputs

This system (990-72010-07) includes:

- TimeSource 3000 Shelf (090-72000-01)
- TimeSource 3000 card with expansion mixed T1/CCK outputs (090-72010-07)
- Antenna (090-72010-97)
- Antenna mounting kit (093-00001-01)
- Hardware kit (093-72010-97) includes:
 - Lightning suppressor (143-00018-01)
 - Lightning suppressor mounting bracket (070-00300-02)
 - Craft port-to-PC communication cable (060-00067-01)
- System software (992-72010-05 or later)

User-Supplied Tools and Materials

For Antenna Installation

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

- 1 inch 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).
- 1 inch 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.
- 6 AWG ground wire.
- Spade lugs for 6 AWG ground wire.
- Crimp tool for 6 AWG spade lugs.
- Hardware to attach the ground wire to a valid earth ground.
- Fire-stopping material to seal conduit hole in roof or wall.
- Electrically conductive antioxidant compound (Kopr-Shield or equivalent) to coat exposed connections to prevent oxidation.
- Tool to cut cable, if installation requires custom lengths of cable.

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)
- 6 AWG ground wire
- 16 AWG green insulated ground wire
- 16 AWG red insulated wire
- 16 AWG black insulated wire
- T1 cables

For Shelf Installation

Ensure that a Phillips-head screwdriver is on hand for installing the TimeSource 3000 Shelf in a rack.

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2

Installation

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

Chapter 3

Unpacking

Install the TimeSource 3000, 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.

Antenna

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

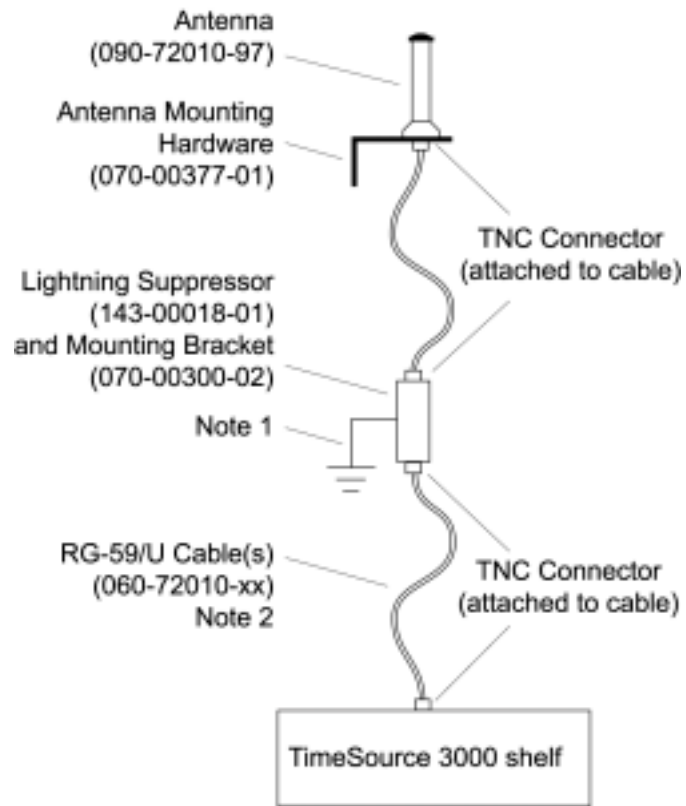
Procure the user supplied tools and materials listed in the engineering and ordering chapter.

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 Figures 6 and 9, and perform Procedure B.

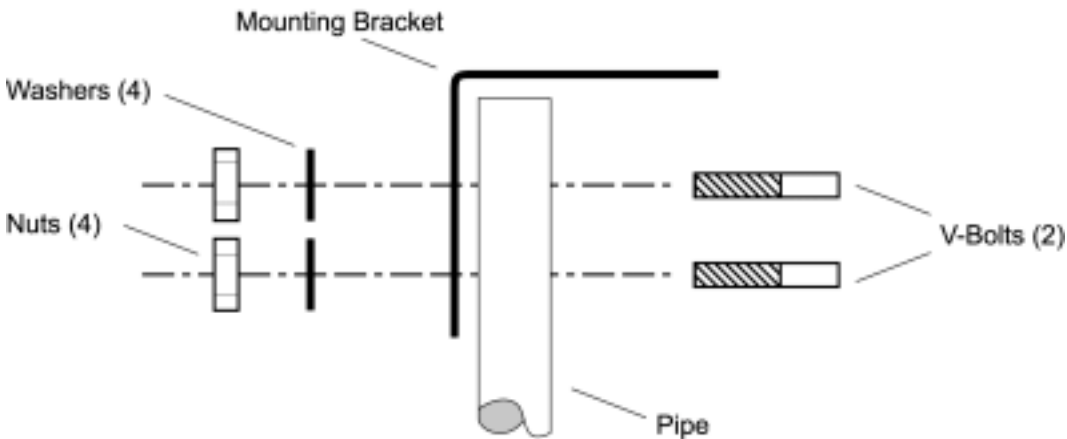
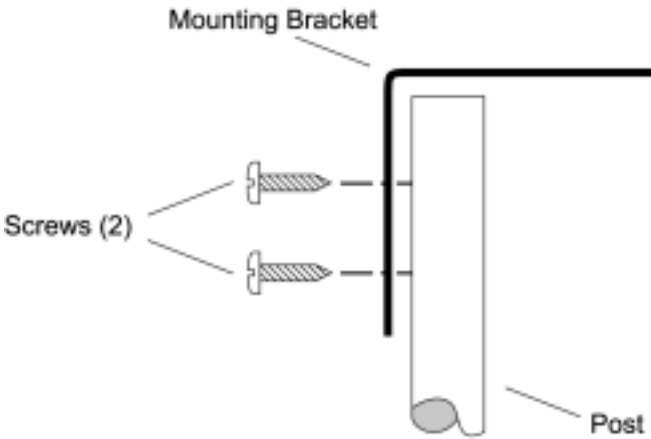
***Warning:* Ensure that the lightning suppressor is placed away from electrical devices or cabling that may induce arcing.**

Figure 9 Antenna-to-Shelf Cabling



3

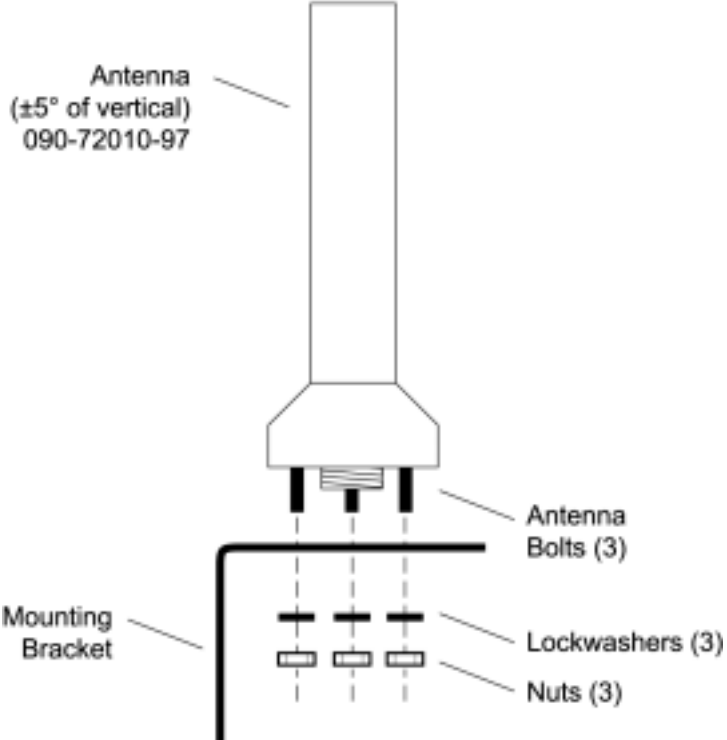
Procedure B. Antenna Mounting and Cable Connection

| Step | Procedure |
|------|--|
| 1 | <p data-bbox="297 348 1308 384">Attach the antenna mounting bracket to a pipe (1 in. diameter) or a wood post.</p> <ul data-bbox="297 401 1461 535" style="list-style-type: none"><li data-bbox="297 401 1461 535">• 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.  <p data-bbox="354 562 1414 997">The diagram illustrates the assembly for mounting the bracket to a pipe. A vertical pipe is shown with a mounting bracket attached to its side. Two V-bolts are inserted through the pipe and the bracket's slots. Four washers and four nuts are placed over the V-bolts on the bracket side. Labels include: Mounting Bracket, Washers (4), Nuts (4), V-Bolts (2), and Pipe.</p> <ul data-bbox="297 1045 1461 1113" style="list-style-type: none"><li data-bbox="297 1045 1461 1113">• 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.  <p data-bbox="560 1129 1206 1564">The diagram illustrates the assembly for mounting the bracket to a wood post. A vertical wood post is shown with a mounting bracket attached to its side. Two self-tapping screws are inserted through the post and the bracket's slots. Labels include: Mounting Bracket, Screws (2), and Post.</p> |

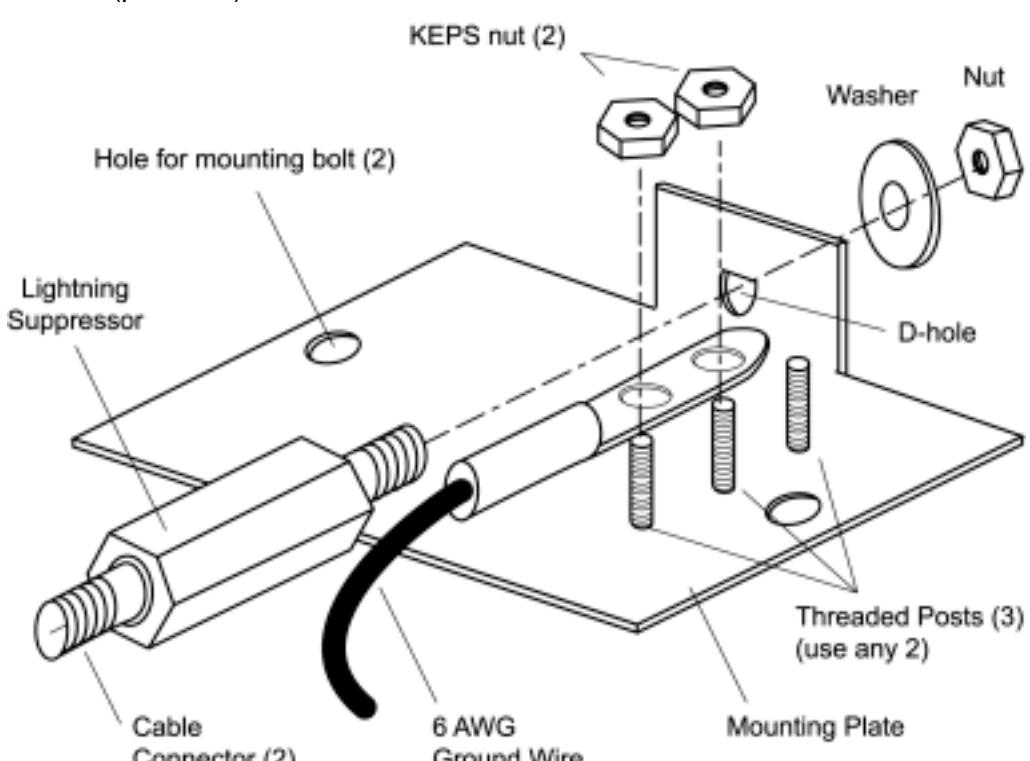
3

Procedure B. Antenna Mounting and Cable Connection (continued)

3

| Step | Procedure |
|------|--|
| 2 | <p>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.</p>  |
| 3 | <p>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.</p> |
| 4 | <p>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 15 ft. 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.</p> |

Procedure B. Antenna Mounting and Cable Connection (continued)

| Step | Procedure |
|------|--|
| 5 | <p>Slide the longer bolt of the lightning suppressor through the D-hole, and attach with a nut and a washer (provided).</p>  <p>The diagram illustrates the assembly of a lightning suppressor to a mounting plate. The lightning suppressor is connected to a cable connector and a 6 AWG ground wire. The mounting plate has two holes for mounting bolts, a D-hole, and three threaded posts. Hardware includes two KEPS nuts, a washer, a nut, and three threaded posts (two are used).</p> |
| 6 | Install 1 in. 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 3000 Shelf location. |
| 10 | If the lightning suppressor was not mounted directly to a valid earth ground, crimp a length of 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 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 (continued)

| 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

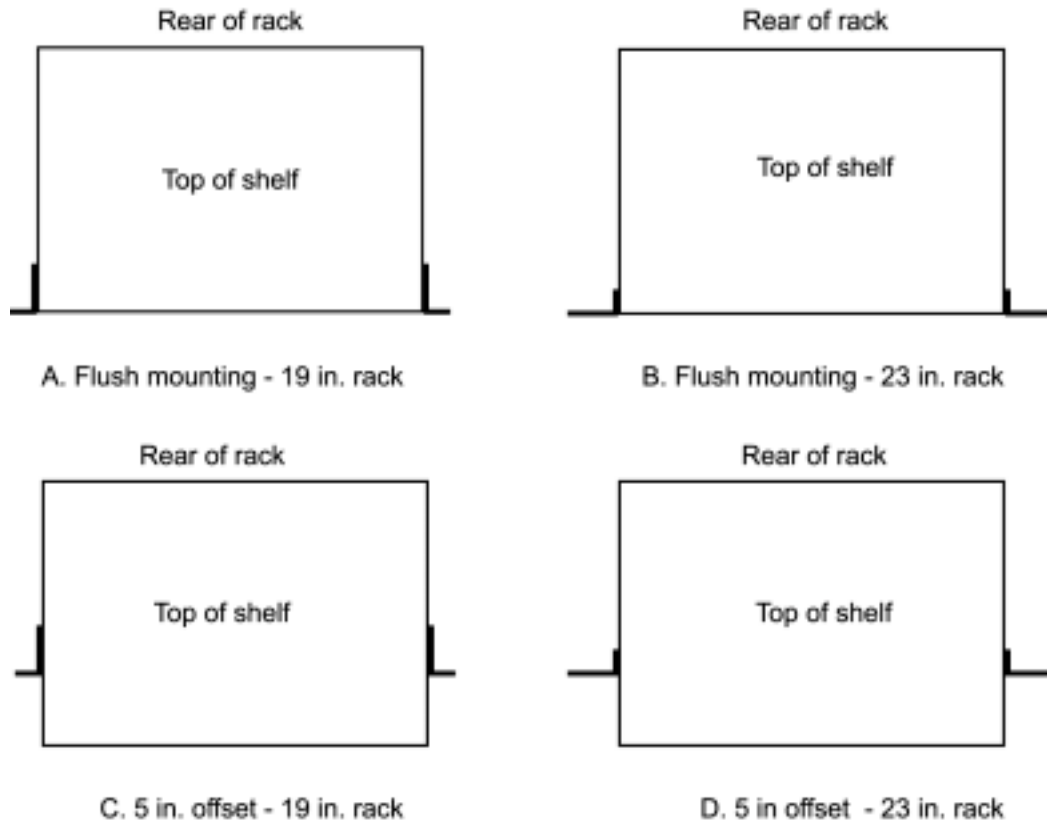
Shelf

Rack Mounting

Position the mounting ears, as shown in Figure 10, for flush mounting or 5 inch offset mounting in a 19 inch rack (Figure 10A, and Figure 10C), or for flush mounting or 5 inch offset mounting in a 23 inch rack (Figure 10B and Figure 10D). Leave 1 RU (1.75 inches) of air space above the TimeSource 3000 Shelf for proper ventilation. Mount the shelf in the rack according to standard company practices.

Note: Two screws can be used in both mounting ears if the holes in the rack are spaced 1.75 inches apart.

Figure 10 Rack Mounting Options



Power and Signal Cabling

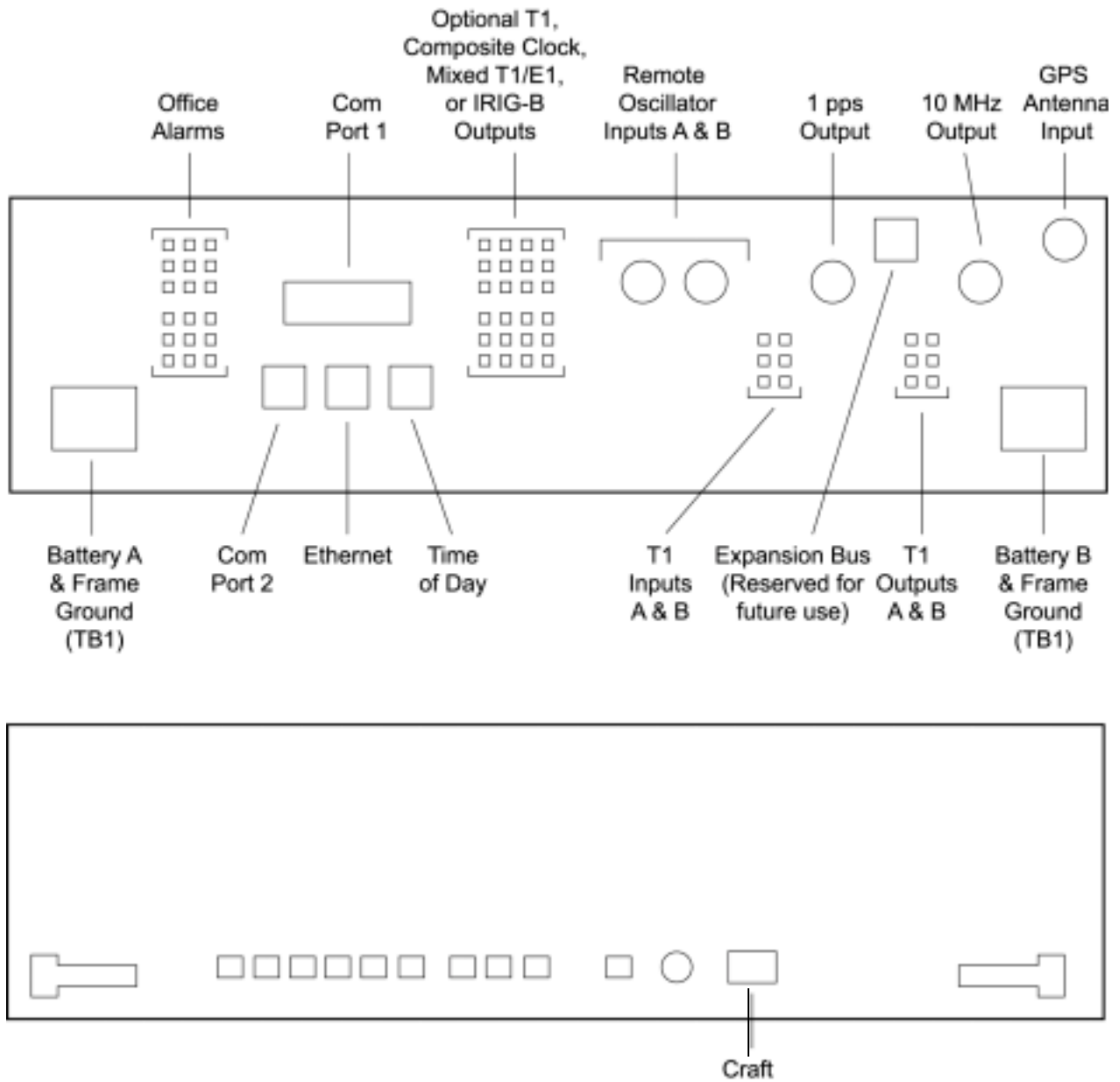
Warning: The circuitry on the plug-in circuit board is subject to electrostatic discharge (ESD) damage. Be sure to wear an ESD wrist strap when making connections to the rear panel. Failure to observe this warning may result in equipment damage.

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 rear panel.

Figure 11 shows the rear and front panel connectors. All connectors can be located using these illustrations.

Figure 11 Rear and Front Panel Connectors

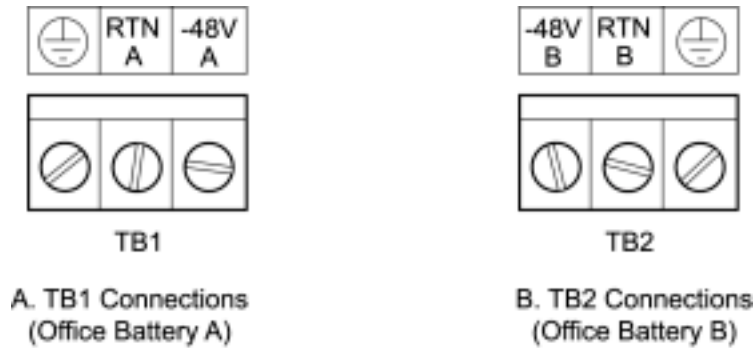


3



Frame Ground

Frame ground connections are made on power terminal blocks TB1 and TB2. Refer to Figure 11 for the location of the terminals on the rear of the shelf, and refer to Figure 12 for the terminal connections.

Figure 12 Battery Connections



Remove the protective covers from the terminal blocks.

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

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

With ground rod:

Solder the connection to the 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 16 AWG wire, bend the lug around the 6 AWG rod, and solder.
- Strip enough insulation from the 16 AWG wire to permit three complete turns around the 6 AWG rod and solder.

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

Without ground rod:

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

Crimp the supplied spade lug to the other end of the 16 AWG wire, and connect it to the FRM terminals on TB1 and TB2 (Figure 12).

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: Ensure the fuses in the fuse panel which will be used to power the TimeSource 3000 Shelf are removed before connecting power.

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

Power connections are made on power terminal blocks TB1 and TB2. Refer to Figure 11 for the location of the terminals on the rear of the shelf, and refer to Figure 12 for the terminal connections.

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

Use 18 AWG stranded wire to connect -48 volts from office battery A to the -48V A terminal on TB1. Connect office battery A return to the RTN A terminal on TB1.

Use 18 AWG stranded wire to connect -48 volts from office battery B to the -48V B terminal on TB2. Connect office battery B return to the RTN B terminal on TB2.

Replace the protective covers on the terminal blocks.

Caution: Do not apply the office battery to the TimeSource 3000 at this time.

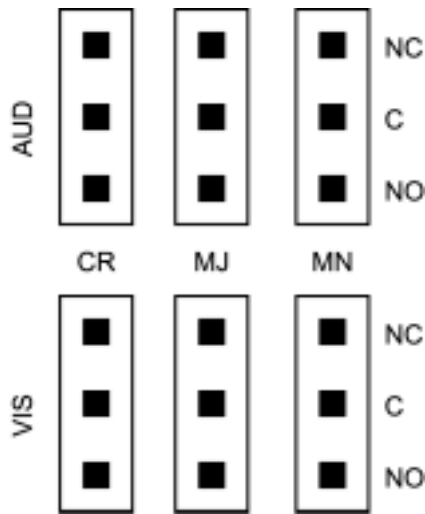
Note: Two separate office battery supplies (battery A and battery B) are recommended. If separate office battery supplies are not available, connect a single office battery to both inputs (TB1 and TB2) to avoid a standing battery-failure alarm.

Alarms Output

If using the alarms output, connect the office alarms to the critical (CR), major (MJ), and minor (MN) wire-wrap pins. See Figure 11 for the location of the alarm pins, and Figure 13 for the connections.

Connect at the upper group of pins (AUD) for audible alarms and to 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. If required, use the lower group of pins (VIS) to connect to the remote telemetry equipment.

Figure 13 Alarm Connections



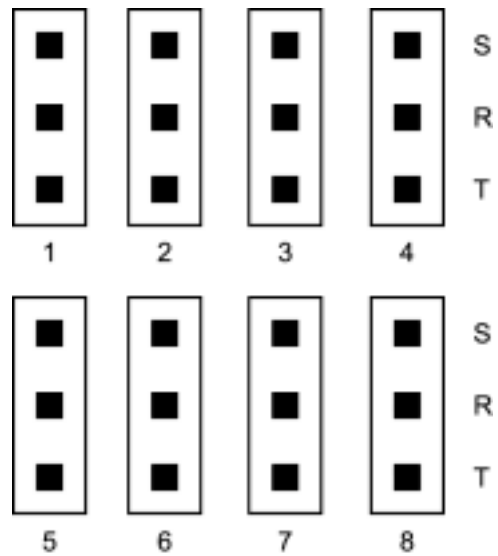
GPS Antenna

Use the supplied 90 degree adapter to connect the coaxial cable from the lightning suppressor to the TNC connector labeled GPS ANT. Refer to Figure 11 for the connector location.

Additional T1 Outputs

If using the additional T1 outputs, connect the optional eight T1 outputs at the I/O Options wire-wrap pins. See Figure 11 for the connector location, and Figure 14 for the connections. The additional T1 outputs option is indicated by the 72010-02 part number on the shelf front panel.

Figure 14 Eight T1, Mixed E1/T1, Mixed T1/CCK, and Composite Clock Connections



Composite Clock (CCK) Outputs

If using the optional composite clock outputs, connect the composite clock outputs from the I/O Options wire-wrap pins to network elements requiring composite clock timing. Refer to Figure 11 for the connector location and Figure 14 for the connections. The CCK outputs option is indicated by the 72010-03 part number on the shelf front panel.

Mixed E1/T1 Outputs

If using the additional E1/T1 outputs, connect the optional eight E1/T1 outputs at the I/O Options wire-wrap pins. See Figure 11 for the connector location, and Figure 14 for the connections. The additional E1/T1 outputs option is indicated by the 72010-06 part number on the shelf front panel.

Mixed T1/CCK Outputs

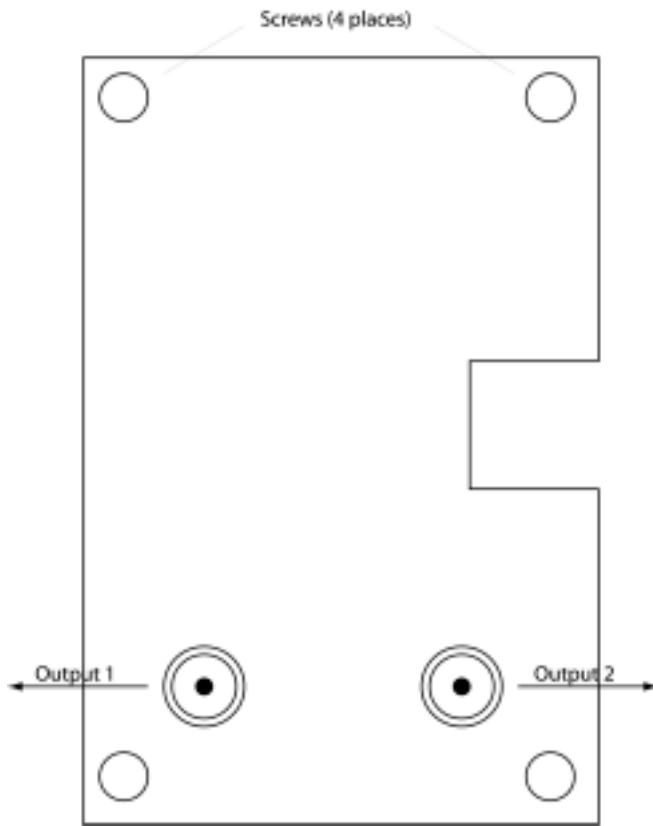
If using the additional T1/CCK outputs, connect the optional eight T1/CCK outputs at the I/O Options wire-wrap pins. See Figure 11 for the connector location, and Figure 14 for the connections. The additional T1/CCK outputs option is indicated by the 72010-07 part number on the shelf front panel.

IRIG-B TOD Outputs

If using the optional IRIG-B TOD outputs, connections are made at the IRIG-B BNC adapter which is secured to the rear of the shelf. See Figure 11 for the connector locations, and Figure 15 for the connections. The IRIG-B TOD outputs option is indicated by the 72010-05 part number on the shelf front panel.

Follow Procedure C to install the IRIG-B BNC adapter, and make the IRIG-B TOD connections.

Figure 15 IRIG-B TOD BNC Output Connections



3

Procedure C. IRIG-B TOD Output Installation

| Step | Procedure |
|------|--|
| 1 | Position the IRIG-B adapter onto the rear of the shelf so that the OPTIONS I/O wire-wrap pins project through holes in the adapter card. |
| 2 | Secure the adapter onto the shelf, using the four screws integral to the adapter (see Figure 15). |
| 3 | To prevent small radius turns in the IRIG-B TOD output cables, secure the provided right-angle BNC connectors to the adapter BNC connectors, to direct the cables from the shelf as desired. |
| 4 | Connect the IRIG-B TOD outputs from the BNC connectors on the IRIG-B adapter to network elements requiring IRIG-B TOD timing. |

End of Procedure

Remote Oscillator Inputs

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

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

For the connection between the TimeSource 3000 Shelf and the isolation module, use the provided two 6 foot lengths of 50 ohm coax cables. If the TimeSource 3000 Shelf is not collocated with the DCD Shelf, and longer cables are required, these must not exceed 50 feet, 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 3000 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 3000 is located at a distance less than 6 feet from the DCD Shelf.

DCD Shelf with Isolation Module

To install the isolation module, perform Procedure D.

Procedure D. Isolation Module Installation

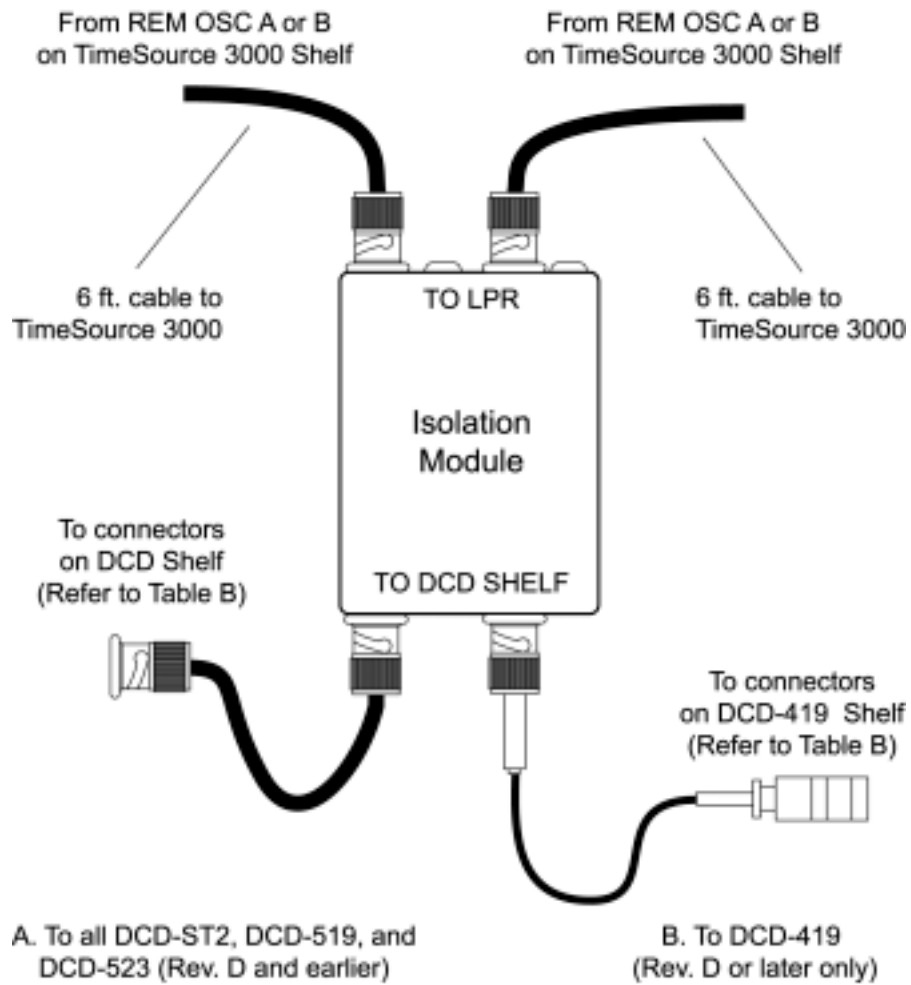
| Step | Procedure |
|------|---|
| 1 | <p>On the rear of the DCD rack, check either side of the DCD Shelf, directly above or below the shelf, for a location to mount the isolation module. Mount to the rack, using the two provided screws.</p> <p><i>Note:</i> Due to distance constraints, the module must be placed no more than 2 ft. from the following connectors:</p> <ul style="list-style-type: none">• 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 | <p>Use the provided 2 ft. 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 16).</p> |
| 3 | <p>Use the 6 ft. coax cable, and connect from the REM OSC A connector on the TimeSource 3000 Shelf to the TO LPR end of the isolation module (refer to Figure 16).</p> <p><i>Note:</i> To provide support and minimize cable clutter, route cable to the right or left, and secure to the cable support bar, using tie wraps.</p> |

End of Procedure

Table B. DCD Connections to the TimeSource 3000

| DCD Shelf Type | From DCD Shelf | | To TimeSource 3000 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 |

Figure 16 DCD Shelf, Isolation Module, and TimeSource 3000 Connections



3

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. If longer cables are required, these must not exceed 50 feet, and 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 11 for the connector locations.

1 PPS Output

If using 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 11 for the connector location.

10 MHz Output

If using 10 MHz output, connect an RG-58 coaxial cable from the connector labeled 10MHz to the equipment that will use the 10 MHz output signal. See Figure 11 for the connector location.

Ethernet

Connect a user-supplied Ethernet cable from the network to the 10base-T Ethernet connector labeled E-NET. See Figure 11 for the connector location, and Table C for the connector pinouts.

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

| Pin | Signal | Abbreviation | Direction |
|-----|-----------------|--------------|----------------------|
| 1 | Transmit data + | TXD + | From TimeSource 3000 |
| 2 | Transmit data – | TXD – | From TimeSource 3000 |
| 3 | Receive data + | RXD + | To TimeSource 3000 |
| 4 | — | — | — |
| 5 | — | — | — |
| 6 | Receive data – | RXD – | To TimeSource 3000 |
| 7 | — | — | — |
| 8 | — | — | — |

Time of Day Output

If using time of day (TOD) output, connect the TOD output at the RJ-45 connector labeled TOD. See Figure 11 for the connector location, and Table D for the connector pinouts.

Table D. TOD Connector Pinouts

| Pin | Signal | Abbreviation | Direction |
|-----|-------------------|--------------|----------------------|
| 1 | 1 pps A | TOD PPS + | From TimeSource 3000 |
| 2 | 1 pps B | TOD PPS – | From TimeSource 3000 |
| 3 | 12 V power source | TOD P12V | — |
| 4 | Receive data B | TOD RXD – | To TimeSource 3000 |
| 5 | Receive data A | TOD RXD + | To TimeSource 3000 |
| 6 | Circuit ground | TOD GND | — |
| 7 | Transmit data A | TOD TXD + | From TimeSource 3000 |
| 8 | Transmit data B | TOD TXD – | From TimeSource 3000 |

Note: Pins not listed are reserved for future use

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

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

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

| Step | Procedure |
|------|---|
| 1 | <p>Secure the provided mounting plate to the RJ-45-to-DB-25 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 17).</p> <p><i>Notes:</i></p> <ol style="list-style-type: none">1. Due to distance constraints, the converter must be placed no more than 1000 ft. from the TimeSource 3000 Shelf, and no more than 50 ft. from the device receiving the time code.2. The converter dimensions are 3 in. by 2.5 in by 1 in.3. The mounting plate dimensions are 3 in. by 2 in. |
| 2 | <p>Secure the converter to the desired surface, using the slots in the plate and customer-supplied bolts.</p> |
| 3 | <p>Install a Category 5 four-pair RS-422 cable, with RJ-45 connectors on each end, between the TimeSource 3000 Shelf and the converter (see Figure 18).</p> |
| 4 | <p>Install an RS-232 cable, with DB-25 connectors on each end, between the converter and the device receiving the time code (see Figure 18). See Table E for the DB-25 connector pinouts.</p> |

End of Procedure

Figure 17 RS-422 to RS-232 TOD Converter Mounting Plate

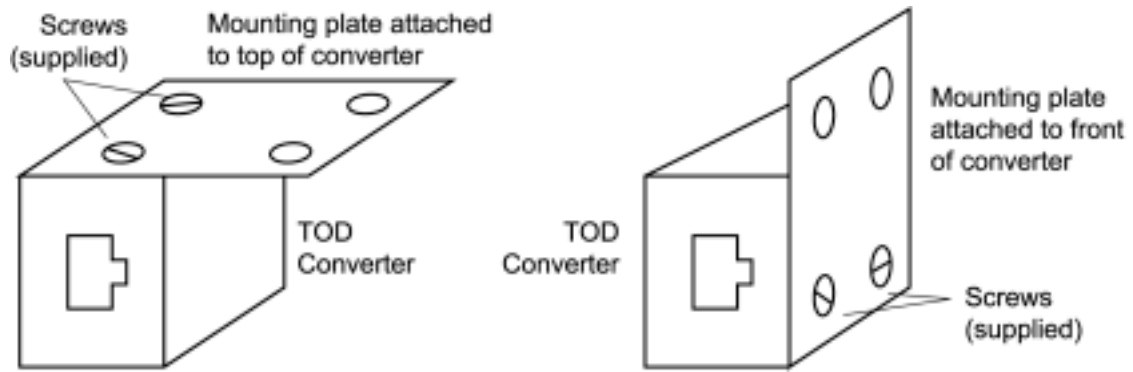


Figure 18 RJ-45 to DB-25 TOD Converter Connections

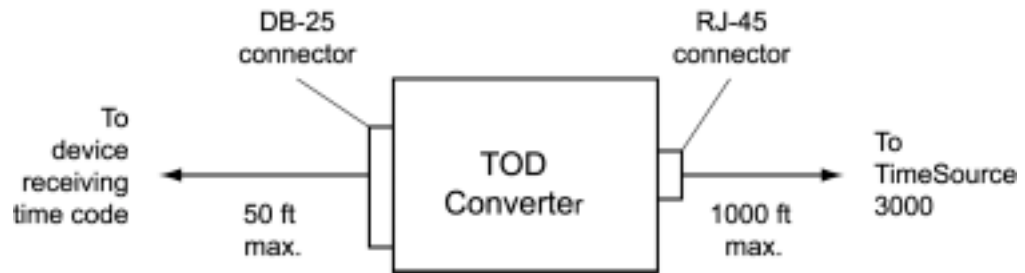


Table E. Converter DB-25 Connector Pinouts

| 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.

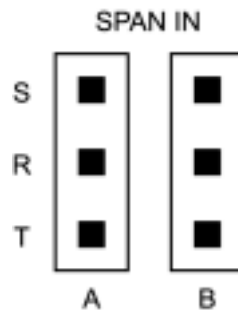
T1 Reference Inputs (Optional)

Warning: Because the T1 input circuits do not provide lightning protection, do not connect the T1 input line directly to an outside facility. Failure to observe this warning may result in equipment damage.

T1 reference sources, traceable to an independent Stratum 1 source, can be connected to further increase holdover stability, or to be monitored by the TimeSource 3000. In either case, connect the cables to the wire-wrap pins labeled SPAN IN A and SPAN IN B. 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 3000) to the pin labeled S. See Figure 11 for the location of the connectors and pins, and Figure 19 for the wire-wrap connections.

Note: The shield pin is capacitively coupled to ground, therefore, the shield must be connected at the source end. The shield may also be connected at the TimeSource 3000 end for additional longitudinal noise protection.

Figure 19 T1 Input Connections



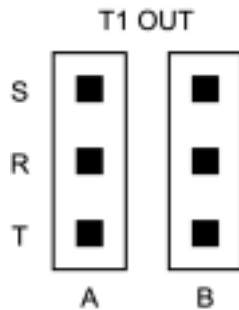
T1 Synchronization Outputs

Warning: Because the T1 output circuits do not provide lightning protection, do not connect the T1 output line directly to an outside facility. Failure to observe this warning may result in equipment damage.

Connect the T1 synchronization outputs at the wire-wrap pins labeled T1 OUT A and T1 OUT B. 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 11 for the location of the pins, and Figure 20 for the 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.

Figure 20 T1 Output Connections



Communication Port 1

To provide an RS-232 link for TL1 command access to the TimeSource 3000, connect to port 1 at the female 25-pin D connector labeled COM 1. See Figure 11 for the location of the connector. See Table F for the connector pinouts.

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 3000 |
| 3 | Receive data | RXD | To TimeSource 3000 |
| 4 | Request to send | RTS | From TimeSource 3000 |
| 5 | Clear to send | CTS | To TimeSource 3000 |
| 6 | Data set ready | DSR | To TimeSource 3000 |
| 7 | Signal ground | GND | — |
| 20 | Data terminal ready | DTR | From TimeSource 3000 |

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 3000, connect to port 2 at the female RJ-45 connector labeled COM2. See Figure 11 for the location of the connector, and Table G for the connector pinouts.

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 3000 |
| 3 | Receive data | RXD | To TimeSource 3000 |
| 5 | Signal ground | GND | — |
| 6 | Data terminal ready | DTR | From TimeSource 3000 |
| 7 | Clear to send | CTS | To TimeSource 3000 |
| 8 | Request to send | RTS | From TimeSource 3000 |

Note: Pins not listed are reserved for future use.

Craft Port

To provide an RS-232 link for TL1 command access to the TimeSource 3000, 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 3000 for making this connection. See Figure 11 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 3000 |
| 3 | Receive data | RXD | To TimeSource 3000 |
| 5 | Signal ground | GND | — |
| 6 | Data terminal ready | DTR | From TimeSource 3000 |

Note: Pins not listed are reserved for future use.

Power-Up

To power the TimeSource 3000, follow the steps in Procedure F. 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 3000.

Procedure F. Power-Up

| Step | Procedure | | | | | | | | | | | | | | | | | | |
|--|---|------------|------------|--------|-------------|-------------|-----|-------------|------------|-----|-------------|----------|-----|-------------|------------|-----|-------------|----------|-----|
| Test Equipment: <ul style="list-style-type: none"> • 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 3000, 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 3000, set the communication software to communicate with the port that is connected to the TimeSource3000. | | | | | | | | | | | | | | | | | | |
| 3 | On the computer connected to the TimeSource 3000, 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 3000, connect the computer communication port to the COM1, COM2, or Craft port on the TimeSource 3000. A craft port-to-PC communication cable is provided in the hardware kit for this purpose. | | | | | | | | | | | | | | | | | | |
| 5 | Ensure that the TimeSource 3000 plug-in card is not installed in the shelf. | | | | | | | | | | | | | | | | | | |
| 6 | Ensure that all fuses that supply power to the TimeSource 3000 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: <table border="1" style="margin-left: 40px; width: 60%;"> <thead> <tr> <th style="text-align: left;">Test Point</th> <th style="text-align: left;">Test Point</th> <th style="text-align: left;">Result</th> </tr> </thead> <tbody> <tr> <td>-48V A lead</td> <td>-48V B lead</td> <td>0 V</td> </tr> <tr> <td>-48V A lead</td> <td>TB1: RTN A</td> <td>0 V</td> </tr> <tr> <td>-48V A lead</td> <td>TB1: FRM</td> <td>0 V</td> </tr> <tr> <td>-48V B lead</td> <td>TB2: RTN B</td> <td>0 V</td> </tr> <tr> <td>-48V B lead</td> <td>TB2: FRM</td> <td>0 V</td> </tr> </tbody> </table> | Test Point | Test Point | Result | -48V A lead | -48V B lead | 0 V | -48V A lead | TB1: RTN A | 0 V | -48V A lead | TB1: FRM | 0 V | -48V B lead | TB2: RTN B | 0 V | -48V B lead | TB2: FRM | 0 V |
| Test Point | Test Point | Result | | | | | | | | | | | | | | | | | |
| -48V A lead | -48V B lead | 0 V | | | | | | | | | | | | | | | | | |
| -48V A lead | TB1: RTN A | 0 V | | | | | | | | | | | | | | | | | |
| -48V A lead | TB1: FRM | 0 V | | | | | | | | | | | | | | | | | |
| -48V B lead | TB2: RTN B | 0 V | | | | | | | | | | | | | | | | | |
| -48V B lead | TB2: FRM | 0 V | | | | | | | | | | | | | | | | | |
| 8 | Attach a grounding wrist strap to the wrist, and plug the other end into the ground jack at the upper-right corner of the front of the plug-in card. | | | | | | | | | | | | | | | | | | |
| 9 | Pull out the latching levers at each end of the front panel of the TimeSource 3000 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. | | | | | | | | | | | | | | | | | | |

Procedure F. Power-Up (continued)

| 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 | Unplug and remove the grounding wrist strap. |
| 14 | <p>Install the battery source fuse in the rack fuse bay that supplies power to the TimeSource 3000. The TimeSource 3000 enters its warm-up mode when power is applied. During the warm-up period, the following conditions exist:</p> <ul style="list-style-type: none"> • Status GPS lamp is green • Status SYS lamp is off • T1 outputs are squelched, sending AIS (factory setting), or sending an SSM message, as specified in the ED-EQPT command • Optional composite clock outputs (if equipped) are squelched • 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 two 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) <p><i>Notes:</i></p> <ol style="list-style-type: none"> 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. |
| 15 | <p>Use the Activate User command to log onto the system.</p> <pre>ACT-USER: : TELECOM: <ctag>: : TS3000! ! ;</pre> |
| 16 | <p>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.</p> <pre>ED-DAT: : : <ctag>: : yyyy-mm-dd, hh-mm-ss: MODE=LOCAL;</pre> <p>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)</p> <p>Example command to set local time: ED-DAT: : : 123: : 2000-06-15, 14-25-00: MODE=LOCAL;</p> |



.....

Procedure F. Power-Up (continued)

| Step | Procedure |
|------|---|
| 17 | <p>If UTC time is not desired, skip to Step 18. Use the Edit Date command to set the system for UTC time.</p> <pre>ED-DAT: : : <ctag>: : yyyy-mm-dd: MODE=UTC;</pre> <p>yyyy= year (yyyy = 1998 to 2096) mm= month ((mm = 01 to 12) dd= day (dd = 01 to 31)</p> <p>Example command to set UTC time:</p> <pre>ED-DAT: : : 123: : 2000-06-15: MODE=UTC;</pre> |

Procedure F. Power-Up (continued)

| Step | Procedure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|--|-----------|------------|--------|--|---------|---|-----------|------------------------------------|----------|-----------------------------------|----------|---------------------------------------|-------------|---|-------------|--|-----------------|----------------------|---------------------|-------------|-------------------|----------------------------|------------------|------------------------------------|-------------|---|------------------|--------------------------------------|-------------|---------------------------------------|-----------|--|-------------|---------------------------------------|---------------|---|---------------|-------------------------|---------------|-----------------------------|-------------|-------------------------|-------------|-----------------------------|---------|---|---------|---|-------------|----------------------------|------------|---------------------------|------------|---------------------------------|----------------|---------------------------------------|------------|---------------------------------------|
| 18 | <p>Use the Retrieve Equipment command to identify how the inputs are provisioned.</p> <p>RTRV-EQPT: : ALL: <ctag>;</p> <p><i>Note:</i> Note the results of the Retrieve Equipment command to set the remaining parameters in this procedure. The possible parameter settings are shown below.</p> <table border="1"> <thead> <tr> <th data-bbox="289 474 597 506">Parameter</th> <th data-bbox="597 474 1497 506">Definition</th> </tr> </thead> <tbody> <tr> <td data-bbox="289 516 597 548">FREQ=5</td> <td data-bbox="597 516 1497 548">Frequency for both remote oscillator inputs is 5 MHz</td> </tr> <tr> <td data-bbox="289 552 597 583">FREQ=10</td> <td data-bbox="597 552 1497 583">Frequency for both remote oscillator inputs is 10 MHz</td> </tr> <tr> <td data-bbox="289 588 597 619">TOD=CISCO</td> <td data-bbox="597 588 1497 619">Time of day output is set to CISCO</td> </tr> <tr> <td data-bbox="289 623 597 655">TOD=NTP4</td> <td data-bbox="597 623 1497 655">Time of day output is set to NTP4</td> </tr> <tr> <td data-bbox="289 659 597 690">TOD=NONE</td> <td data-bbox="597 659 1497 690">Time of day output is not provisioned</td> </tr> <tr> <td data-bbox="289 695 597 758">ALMCOND=ALW</td> <td data-bbox="597 695 1497 758">Alarm condition for outputs is enabled (major alarms will cause system to condition the T1 outputs)</td> </tr> <tr> <td data-bbox="289 762 597 825">ALMCOND=INH</td> <td data-bbox="597 762 1497 825">Alarm conditioning for outputs is disabled (system will continue to output valid sync signal while in major alarm)</td> </tr> <tr> <td data-bbox="289 829 597 861">IPNE=a, b, c, d</td> <td data-bbox="597 829 1497 861">This sets IP address</td> </tr> <tr> <td data-bbox="289 865 597 896">IPSUBNET=a, b, c, d</td> <td data-bbox="597 865 1497 896">Subnet mask</td> </tr> <tr> <td data-bbox="289 900 597 932">IPGATE=a, b, c, d</td> <td data-bbox="597 900 1497 932">Default gateway IP address</td> </tr> <tr> <td data-bbox="289 936 597 968">IPEM1=a, b, c, d</td> <td data-bbox="597 936 1497 968">Primary element manager IP address</td> </tr> <tr> <td data-bbox="289 972 597 1003">IPEM1PORT=a</td> <td data-bbox="597 972 1497 1003">Primary element manager output port address</td> </tr> <tr> <td data-bbox="289 1008 597 1039">IPEM2=a, b, c, d</td> <td data-bbox="597 1008 1497 1039">Alternate element manager IP address</td> </tr> <tr> <td data-bbox="289 1043 597 1075">IPEM2PORT=a</td> <td data-bbox="597 1043 1497 1075">Alternate element manager port number</td> </tr> <tr> <td data-bbox="289 1079 597 1142">IPEMACT=a</td> <td data-bbox="597 1079 1497 1142">Port 5550 closes connection if no autonomous messages are sent during this number of 100ms</td> </tr> <tr> <td data-bbox="289 1146 597 1178">ANTCBLDLY=x</td> <td data-bbox="597 1146 1497 1178">Antenna cable length is x nanoseconds</td> </tr> <tr> <td data-bbox="289 1182 597 1213">ANTELEVMASK=x</td> <td data-bbox="597 1182 1497 1213">Antenna elevation mask angle is x degrees</td> </tr> <tr> <td data-bbox="289 1218 597 1249">ENSEMBLER=ALW</td> <td data-bbox="597 1218 1497 1249">This input is ensembled</td> </tr> <tr> <td data-bbox="289 1253 597 1285">ENSEMBLER=INH</td> <td data-bbox="597 1253 1497 1285">This input is not ensembled</td> </tr> <tr> <td data-bbox="289 1289 597 1320">MONITOR=ALW</td> <td data-bbox="597 1289 1497 1320">This input is monitored</td> </tr> <tr> <td data-bbox="289 1325 597 1356">MONITOR=INH</td> <td data-bbox="597 1325 1497 1356">This input is not monitored</td> </tr> <tr> <td data-bbox="289 1360 597 1392">SSM=ALW</td> <td data-bbox="597 1360 1497 1392">SSM message is used to qualify span input</td> </tr> <tr> <td data-bbox="289 1396 597 1428">SSM=INH</td> <td data-bbox="597 1396 1497 1428">SSM message is not used to qualify span input</td> </tr> <tr> <td data-bbox="289 1432 597 1463">FRAMING=ESF</td> <td data-bbox="597 1432 1497 1463">This output framing is ESF</td> </tr> <tr> <td data-bbox="289 1467 597 1499">FRAMING=D4</td> <td data-bbox="597 1467 1497 1499">This output framing is D4</td> </tr> <tr> <td data-bbox="289 1503 597 1535">ALMOUT=AIS</td> <td data-bbox="597 1503 1497 1535">This output is AIS during alarm</td> </tr> <tr> <td data-bbox="289 1539 597 1570">ALMOUT=SQUELCH</td> <td data-bbox="597 1539 1497 1570">This output is squelched during alarm</td> </tr> <tr> <td data-bbox="289 1575 597 1606">ALMOUT=SSM</td> <td data-bbox="597 1575 1497 1606">This output includes SSM during alarm</td> </tr> </tbody> </table> | Parameter | Definition | FREQ=5 | Frequency for both remote oscillator inputs is 5 MHz | FREQ=10 | Frequency for both remote oscillator inputs is 10 MHz | TOD=CISCO | Time of day output is set to CISCO | TOD=NTP4 | Time of day output is set to NTP4 | TOD=NONE | Time of day output is not provisioned | ALMCOND=ALW | Alarm condition for outputs is enabled (major alarms will cause system to condition the T1 outputs) | ALMCOND=INH | Alarm conditioning for outputs is disabled (system will continue to output valid sync signal while in major alarm) | IPNE=a, b, c, d | This sets IP address | IPSUBNET=a, b, c, d | Subnet mask | IPGATE=a, b, c, d | Default gateway IP address | IPEM1=a, b, c, d | Primary element manager IP address | IPEM1PORT=a | Primary element manager output port address | IPEM2=a, b, c, d | Alternate element manager IP address | IPEM2PORT=a | Alternate element manager port number | IPEMACT=a | Port 5550 closes connection if no autonomous messages are sent during this number of 100ms | ANTCBLDLY=x | Antenna cable length is x nanoseconds | ANTELEVMASK=x | Antenna elevation mask angle is x degrees | ENSEMBLER=ALW | This input is ensembled | ENSEMBLER=INH | This input is not ensembled | MONITOR=ALW | This input is monitored | MONITOR=INH | This input is not monitored | SSM=ALW | SSM message is used to qualify span input | SSM=INH | SSM message is not used to qualify span input | FRAMING=ESF | This output framing is ESF | FRAMING=D4 | This output framing is D4 | ALMOUT=AIS | This output is AIS during alarm | ALMOUT=SQUELCH | This output is squelched during alarm | ALMOUT=SSM | This output includes SSM during alarm |
| Parameter | Definition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FREQ=5 | Frequency for both remote oscillator inputs is 5 MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FREQ=10 | Frequency for both remote oscillator inputs is 10 MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOD=CISCO | Time of day output is set to CISCO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOD=NTP4 | Time of day output is set to NTP4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOD=NONE | Time of day output is not provisioned | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ALMCOND=ALW | Alarm condition for outputs is enabled (major alarms will cause system to condition the T1 outputs) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ALMCOND=INH | Alarm conditioning for outputs is disabled (system will continue to output valid sync signal while in major alarm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPNE=a, b, c, d | This sets IP address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPSUBNET=a, b, c, d | Subnet mask | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPGATE=a, b, c, d | Default gateway IP address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPEM1=a, b, c, d | Primary element manager IP address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPEM1PORT=a | Primary element manager output port address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPEM2=a, b, c, d | Alternate element manager IP address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPEM2PORT=a | Alternate element manager port number | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPEMACT=a | Port 5550 closes connection if no autonomous messages are sent during this number of 100ms | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANTCBLDLY=x | Antenna cable length is x nanoseconds | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANTELEVMASK=x | Antenna elevation mask angle is x degrees | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ENSEMBLER=ALW | This input is ensembled | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ENSEMBLER=INH | This input is not ensembled | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MONITOR=ALW | This input is monitored | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MONITOR=INH | This input is not monitored | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SSM=ALW | SSM message is used to qualify span input | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SSM=INH | SSM message is not used to qualify span input | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRAMING=ESF | This output framing is ESF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRAMING=D4 | This output framing is D4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ALMOUT=AIS | This output is AIS during alarm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ALMOUT=SQUELCH | This output is squelched during alarm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ALMOUT=SSM | This output includes SSM during alarm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Procedure F. Power-Up (continued)

| Step | Procedure |
|------|---|
| 19 | <p>If the results of Step 18 indicate the remote oscillator inputs are set as desired, skip to Step 21. Use the Enter Equipment command to monitor and/or ensemble each remote oscillator input.</p> <p>ENT-EQPT: : RO-x: <ctag>: : : ENSEMBLER=y; x = remote oscillator input (x = A or B) y = 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)</p> |
| 20 | <p>Use the Edit Equipment command to set the frequency of the remote oscillator inputs.</p> <p>ED-EQPT: : TS3000: <ctag>: : : ROFREQ=x; x = remote oscillator frequency in MHz (x = 5 or 10)</p> |
| 21 | <p>If the results of Step 18 indicate the T1 span inputs are set as desired, skip to Step 25. Use the Enter Equipment command to monitor each available T1 span input, and to specify whether those inputs are to be ensembled.</p> <p>ENT-EQPT: : SPAN-x: <ctag>: : : ENSEMBLER=y; x = T1 span input (x = A or B) y = allow the input to be ensembled or inhibit the input from being ensembled (y = ALW or INH)</p> |
| 22 | <p>Use the Edit Equipment command to set the output signal framing format for each T1 output, and set the mode for each T1 output during an alarm.</p> <p>ED-EQPT: : T1-x: <ctag>: : : FRAMING=y, ALMOUT=z; x = T1 output (x = A or B) y = framing format (y = ESF or D4) z = T1 output during alarm (z = AIS, SQUELCH, or SSM) (for SSM, framing format must be ESF)</p> |
| 23 | <p>If not using a 990-72010-02 system, skip this step. Use the Edit Equipment command to set the output signal framing format for each additional T1 output, and set the mode for each T1 output during an alarm.</p> <p>ED-EQPT: : OPT-a: <ctag>: : : FRAMING=b, ALMOUT=c; a = T1 output module port (a = 1 to 8) b = framing format (b = ESF or D4) c = T1 output during alarm (c = AIS, SQUELCH, or SSM) (for SSM, framing format must be ESF)</p> |
| 24 | <p>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.</p> <p>INIT-REG-EQPT: : ALL: <ctag>: : ALL;</p> |

Procedure F. Power-Up (continued)

| Step | Procedure |
|------|--|
| 25 | <p>If the results of Step 18 indicate the antenna cable delay and elevation mask set are as desired, skip to Step 26. Use the Edit Equipment command to set the length of cable between the antenna and the TimeSource 3000 Shelf. This number should have been recorded during installation. Use the same command to set the antenna elevation mask angle.</p> <pre>ED-EQPT: : GPS: <ctag>: : : ANTCBLDLY=x, ANTELEVMAK=y;</pre> <p>x = antenna cable delay in meters (x = 0 to 330) y = antenna elevation mask angle in degrees (y = 0 to 45) (see note below)</p> <p><i>Note:</i> The antenna elevation mask is that portion of the sky from which the TimeSource 3000 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 0.</p> |
| 26 | <p>If not using the TOD output, skip to Step 27. Use the Edit Equipment command to set the TOD output.</p> <pre>ED-EQPT: : TS3000: <ctag>: : : TOD=y;</pre> <p>y = TOD format (y = Cisco or NTP4)</p> |
| 27 | <p>Use the Edit Equipment command to allow or inhibit alarm conditioning on the outputs. Inhibiting the alarm conditioning forces the TimeSource 3000 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 3000 may be better than the alternative (for example, offices without additional holdover clocks in a distribution shelf).</p> <pre>ED-EQPT: : TS3000: <ctag>: : : ALMCOND=y;</pre> <p>y = alarm conditioning of the outputs (y = ALW or INH)</p> |
| 28 | <p>If not using Ethernet, go to Step 32. 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 3000 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.)</p> <pre>ED-EQPT: : TS3000: <ctag>: : : IPNE=a, IPSUBNET=a, IPGATE=a;</pre> <p>IPNE=a This unit's IP address in the form a.a.a.a (each a is an independent value of 0 to 255)</p> <p>IPSUBNET=a Subnet mask in the form a.a.a.a (each a is an independent value of 0 to 255)</p> <p>IPGATE=a Gateway IP address in the form a.a.a.a (each a is an independent value of 0 to 255)</p> |



Procedure F. Power-Up (continued)

| Step | Procedure |
|------|--|
| 29 | <p>Ports 5001, 5002, 5003 and 5004 on the TimeSource 3000 are used as though they were serial TL1 communication ports. The following values are set at the factory and appear at reset:</p> <p>MONMSG=INH (monitors only the current port for messages)</p> <p>KEEPALIVE=0 (does not send a COMPLD message to keep connection open)</p> <p>ENDOFTEXT=0 (does not include an end-of-text code with a TL1 message)</p> <p>ECHO=ALW (echoes characters back to the sending terminal)</p> <p>COMPRI=ALW1 (normal communication, including autonomous messages)</p> <p>AUTOLOGOFF=20 (does not log off the user during inactivity)</p> <p>SWCONTROL=INH (uses no flow control)</p> <p>If these values require change, use the Edit Communication command to set communications parameters for TL1 communications.</p> <pre>ED-COM: : COM-a: <ctag>: : [MONMSG=b[,]][KEEPALIVE=c[,]][ENDOFTEXT=d[,]][ECHO=b[,]][COMPRI=e[,]][AUTOLOGOFF=c[,]][SWCONTROL=b];</pre> <p>COM-a User IP port (a = 5001, 5002, 5003 or 5004)</p> <p>MONMSG=b Monitors messages on all ports (b = ALW), or current port (b = INH)</p> <p>KEEPALIVE=c Inactive minutes until the unit sends a COMPLD message to keep the connection from being closed (c = 0 to 255)</p> <p>ENDOFTEXT=d Hex code added to responses before semicolon (d = 0 (disabled) to 9F)</p> <p>ECHO=b Echoes characters received so they appear on the user's screen as typed (b = ALW), or inhibits echo (b = INH)</p> <p>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</p> <p>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)</p> <p>AUTOLOGOFF=c Inactive minutes until the unit logs off the user, keeping the connection open (c = 0 to 255)</p> <p>SWCONTROL=b uses software (XON/XOFF) flow control (b = ALW), or no flow control (b = INH)</p> |



Procedure F. Power-Up (continued)

| Step | Procedure |
|------|--|
| 30 | <p>If not using an Element Manager, skip to Step 32. If not using a separate port to send autonomous messages to an Element Manager, skip to Step 31. 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 3000 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.</p> <pre data-bbox="293 527 1260 596">ED-EQPT: : TS3000: <ctag>: : : IPEM1=a, IPEM1PORT=b[, IPEM2=a] [, IPEM2PORT=b] [, IPI NACT=c];</pre> <p>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)</p> <p>IPEM1PORT= Primary Element Manager's Ethernet port address (b = 0 to 65535)</p> <p>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)</p> <p>IPEM2PORT=b Alternate Element Manager's Ethernet port address (b = 0 to 65535)</p> <p>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)</p> |



Procedure F. Power-Up (continued)

| Step | Procedure |
|------|--|
| 31 | <p>Use the Edit Communications command to set the communications parameters of port 5551. An Element Manager connects to port 5551 for TL1 command and response messages. The following values for port 5551 are set at the factory and appear at reset:</p> <p>MONMSG=INH (monitors only the current port for messages) KEEPALIVE=0 (does not send a COMPLD message to keep connection open) ENDOFTEXT=0 (does not include an end-of-text code with a TL1 message) ECHO=INH (does not echo characters received) COMPRI=ALW1 (normal communication, including autonomous messages) AUTOLOGOFF=20 (does not log off the user during inactivity) SWCONTROL=INH (uses no flow control)</p> <p>If these values require change, use the Edit Communication command to set communications parameters for TL1 communications.</p> <pre>ED-COM: : COM-5551: <ctag>: : [MONMSG=b[,]][KEEPALIVE=c[,]][ENDOFTEXT=d[,]][ECHO=b[,]][COMPRI=e[,]][AUTOLOGOFF=c[,]][SWCONTROL=b];</pre> <p>MONMSG=b Monitors messages on all ports (b = ALW), or current port (b = INH) KEEPALIVE= 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)</p> |
| 32 | <p>Use the Copy Memory command to copy the database from volatile to nonvolatile memory within the TimeSource 3000.</p> <pre>CPY-MEM: [ti d]: TS3000: <ctag>: : WKG, , AUX: DATA;</pre> <p><i>Note:</i> 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.</p> |



Procedure F. Power-Up (continued)

| Step | Procedure |
|------|--|
| 33 | <p>When the GPS signals have been acquired and the outputs are stable enough to output a signal, the TimeSource enters a settling period. During the settling period, the following conditions exist:</p> <ul style="list-style-type: none">• Status GPS lamp is green• Status SYS lamp is green• Any Span or Remote Oscillator lamp is green when its input is connected, entered, contains valid framing, and is usable for ensembling.• All outputs are functioning according to specifications or in a slightly degraded mode.• A TL1 autonomous “settling period” event message exists. <p><i>Notes:</i></p> <ol style="list-style-type: none">1. The nominal time to reach the beginning of the settling period is 20 min. If this state has not been reached after 40 min., refer to the Troubleshooting chapter.2. The settling period is the condition where this clock is beyond the warm-up state but not yet in steady state operation. Steady state operation is indicated by the clearing of the “settling period” event.3. The TimeSource 3000 develops and sends timing within the PRS specification during steady state operation and during any event (other than settling period) or minor alarm, but not during a major or critical alarm. <p style="text-align: center;">End of Procedure</p> |



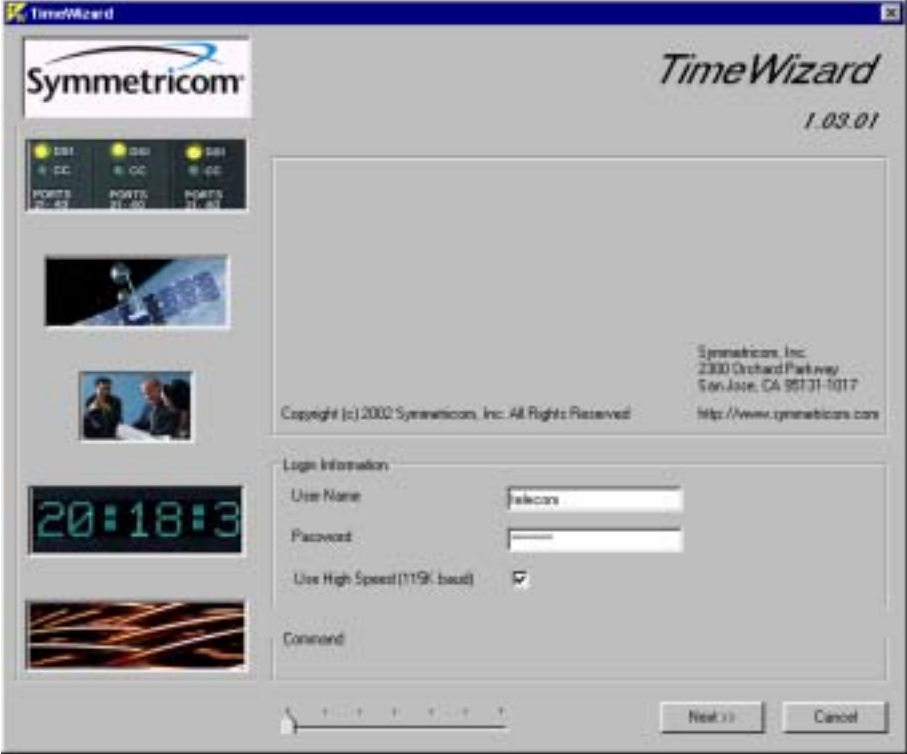
TimeWizard

The TimeWizard Software Installation application was created to facilitate installing software upgrades for the TimeSource 3000. Procedure G shows how to install the TimeWizard application and how to use TimeWizard to download software upgrades.

Procedure G. TimeWizard Installation and Operation

| Step | Procedure |
|---|--|
| Use this procedure to install the firmware in the TimeSource 3000 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 3000 CD labeled 992-72010-06 Rev. B, Version 1.06.04. | |
| <i>Hardware Installation</i> | |
| 1 | Connect the TimeSource 3000 to the PC with a serial cable. |
| <i>Install the TimeWizard Software</i> | |
| 2 | Insert the TimeSource 3000 CD labeled 992-72010-06 Rev. B 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. |

Procedure G. TimeWizard Installation and Operation (continued)

| Step | Procedure |
|------|---|
| 5 | <p data-bbox="305 300 1252 401">From the Windows desktop, click Start ⇒ Programs ⇒ TimeWizard to start the TimeWizard application. When TimeWizard starts, the “TimeWizard” main screen appears:</p> <div data-bbox="326 443 1227 1192"></div> <p data-bbox="305 1234 1203 1335">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.</p> <p data-bbox="305 1371 1252 1434">Note that the factory default TimeSource username of “telecom” and password of “TS3000!!” appear in the Login Information area of the screen.</p> |
| 6 | <p data-bbox="305 1463 1203 1526">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.</p> |

.....

Procedure G. TimeWizard Installation and Operation (continued)

| Step | Procedure |
|------|---|
| 7 | <p>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.</p> <p>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.</p> <p><i>Note:</i> 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.</p> |



Procedure G. TimeWizard Installation and Operation (continued)

| Step | Procedure |
|--|-----------|
| <i>Download the GPS.hex Firmware</i> | |
| <p><i>Note:</i> 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.</p> | |


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.



Procedure G. TimeWizard Installation and Operation (continued)

| Step | Procedure |
|------|---|
| 9 | <p>Click the ver Unknown button to open the Load GPS File dialog box:</p>  |
| 10 | <p>In the Load GPS File dialog box, navigate to the GPS.hex firmware file to be downloaded, then click the Open button.</p> <p>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.</p> <p>After TimeWizard verifies the firmware version, select the Download GPS.hex check-box, then click the Next>> button to start the firmware download operation.</p> |

3

Procedure G. TimeWizard Installation and Operation (continued)


| Step | Procedure |
|--|---|
| 11 | <p>When the firmware download operation starts, the Download Progress dialog box appears:</p> <div data-bbox="518 401 1029 640" data-label="Image"> </div> <p>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.</p> <p>After the Download Progress dialog box closes, continue with the next step.</p> <p><i>Notes:</i></p> <ol style="list-style-type: none"> 1. The firmware download operation can be aborted at any time by clicking the Cancel button in the Download Progress dialog box. 2. If the download fails for any reason, a screen appears with instructions to contact Symmetricom. If this happens, exit the application, check the cable connections, and restart TimeWizard. |
| 12 | <p>After the Download Progress dialog box closes, continue to monitor the messages reported in the Commands area of the screen.</p> <p>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.</p> <p>After the screen automatically advances, continue with the next step.</p> |
| <p><i>Download the TS3000.hex Firmware</i></p> | |
| <p><i>Note:</i> If you are not downloading TS3000.hex firmware, click the Next>> button again, then skip to Step 18.</p> | |
| 13 | <p>The “Download TS3000.hex” screen appears very similar to the “Download GPS.hex” screen shown in Step 8, and contains the same information.</p> |
| 14 | <p>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.</p> |

Procedure G. TimeWizard Installation and Operation (continued)

| Step | Procedure |
|------|--|
| 15 | <p>In the Load TS3000 File dialog box, navigate to the TS3000.hex firmware file to be downloaded, then click the Open button.</p> <p>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.</p> <p>After TimeWizard verifies the firmware version, select the Download TS3000.hex check-box, then click the Next>> button to start the firmware download operation.</p> |
| 16 | <p>When the firmware download operation starts, the Download Progress dialog box appears.</p> <p>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.</p> <p>After the Download Progress dialog box closes, continue with the next step.</p> <p><i>Notes:</i></p> <ol style="list-style-type: none"> 1. The firmware download operation can be aborted at any time by clicking the Cancel button in the Download Progress dialog box. 2. If the download fails for any reason, a screen appears with instructions to contact Symmetricom. If this happens, exit the application, check the cable connections, and restart TimeWizard. |
| 17 | <p>After the Download Progress dialog box closes, continue to monitor the messages reported in the Commands area of the screen.</p> <p>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.</p> <p><i>Note:</i> 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.</p> <p>After the screen automatically advances, continue with the next step.</p> |



Procedure G. TimeWizard Installation and Operation (continued)

| Step | Procedure |
|------|--|
| | <i>Verify the Firmware Versions</i> |
| 18 | <p>The “Status Information” screen appears as follows:</p>  <p>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.</p> |

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.

Procedure G. TimeWizard Installation and Operation (continued)

| Step | Procedure | | | | | | | | | | | | |
|---------------------|--|----------------|--------------------|------------|------------------------------------|---------------------|--|--------------------|--|------------|--|---------------------|---|
| 20 | <p>Choose the alarm parameters as desired. A description of each setting follows:</p> <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Setting</u></th> <th style="text-align: left;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>Severity 1</td> <td>The initial severity of the alarm.</td> </tr> <tr> <td>Service Affecting 1</td> <td>The initial service affecting status of the alarm condition.</td> </tr> <tr> <td>Time to Severity 2</td> <td>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.</td> </tr> <tr> <td>Severity 2</td> <td>The severity of the alarm after it has been escalated.</td> </tr> <tr> <td>Service Affecting 2</td> <td>The service affecting status of the alarm condition after the alarm has been escalated.</td> </tr> </tbody> </table> <p>When you are finished modifying the alarm parameters, click the Next>> button.</p> | <u>Setting</u> | <u>Description</u> | 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. |
| <u>Setting</u> | <u>Description</u> | | | | | | | | | | | | |
| 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. | | | | | | | | | | | | |



Procedure G. TimeWizard Installation and Operation (continued)

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.

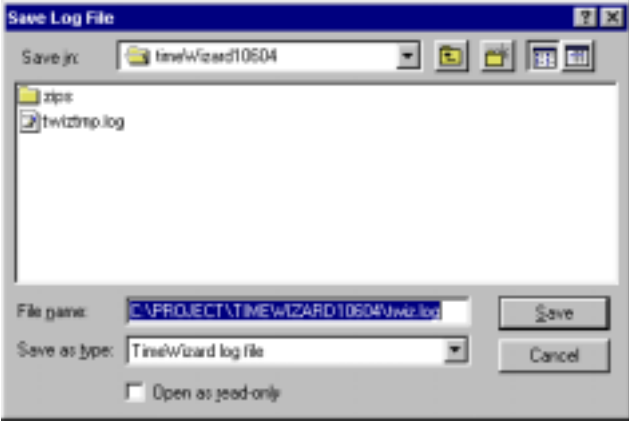
If the settings are correct, click the Next>> button to continue. If the settings are not correct, click the <<Back button to return to the “Set the Alarm Parameters” screen, and correct the settings.

3

Procedure G. TimeWizard Installation and Operation (continued)

| Step | Procedure |
|------|--|
| | <i>Save the Log File, if Desired</i> |
| 22 | <p>When the Next>> button is clicked, the “Exit Application” screen appears:</p>  <p>This screen allows you to save the log file from the download operation, or exit TimeWizard without saving the log file.</p> <p>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.</p> |

Procedure G. TimeWizard Installation and Operation (continued)

| Step | Procedure |
|------|--|
| 23 | <p>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:</p>  |
| 24 | <p>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.</p> |
| 25 | <p>Click the Exit button to complete the TimeWizard firmware installation procedure.</p> |

End of Procedure

3

Factory-Set Values

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

Table I. Parameter Factory Settings

| <aid> | Parameter Setting |
|--------------------------|---|
| TS3000 | 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 |
| TS3000 HOLDOVER ALARM | TIME=24-0 SEV1=EV SEV2=MJ SAFF1=NSA SAFF2=SA |
| TS3000 GPS ALARM | TIME=3-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA |
| GPS | ANTCBLDLY=0 ANTELEV MASK=10 |
| RO-A, RO-B | ENSEMBLER=INH MONITOR=INH |
| SPAN-A, SPAN-B | ENSEMBLER=INH MONITOR=INH SSM=INH |
| SPAN-A, SPAN-B LOS ALARM | TIME=24-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA |



Table I. Parameter Factory Settings

| <aid> | Parameter Setting |
|---|---|
| SPAN-A, SPAN-B AIS ALARM | TIME=24-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA |
| SPAN-A, SPAN-B ERROR ALARM | TIME=24-0 SEV1=EV SEV2=MN SAFF1=NSA SAFF2=NSA |
| RO-A, RO-B LOSALARM | 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 |
| T1-A, T1-B | FRAMING=ESF ALMOUT=AIS |
| COM-1, COM-2, COM-3 | BAUD=9600 MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=ALW COMPRI=ALW1 AUTOLOGOFF=20 HWCONTROL=INH SWCONTROL=INH PARITY=NONE STOP=1 |
| COM-5001, COM- 5002, COM-5003, COM-5004 | MONMSG=INH KEEPALIVE=0 ENDOWTEXT=00 ECHO=ALW COMPRI=ALW1 AUTOLOGOFF=20 SWCONTROL=INH |

Table I. Parameter Factory Settings

| <aid> | Parameter Setting |
|--|--|
| COM-5551 | MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=INH COMPRI=ALW1 AUTOLOGOFF=20 SWCONTROL=INH |
| OPT-1, OPT-2, OPT-3, OPT-4, OPT-5, OPT-6, OPT-7, OPT-8 (990-72010-02, -06, and -07 only) | FRAMING=ESF ALMOUT=AIS |

.....

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
- :
- ,
- ;
- " " 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

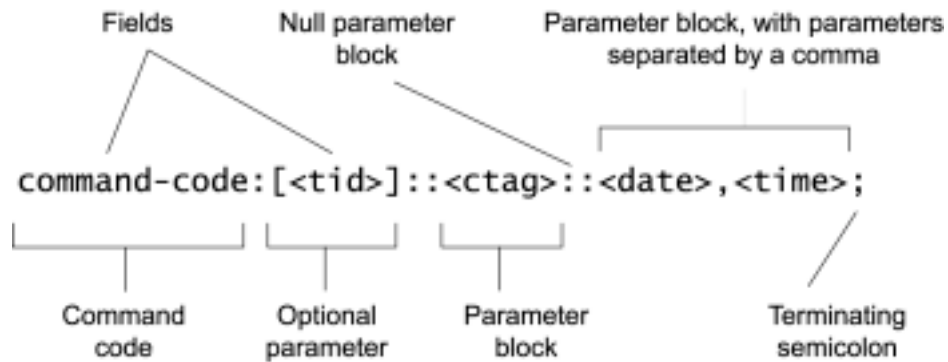
A command consists of a command code of up to three fields separated by hyphens, followed by parameter blocks separated by colons. Figure 21 shows the command format. Parameter blocks consist of one or more parameters separated by commas.

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 1 Command Format



Response Format

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

Figure 22 shows the completed response format. COMPLD indicates that the command was completed without error.

Figure 23 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 2 Completed Response Format

```
^^^<si d>^<date>^<ti me>
M^^<ctag>^COMPLD
^^^/*LI NK: , l i nk>, CMD: <command>*/
;
```

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

4

Figure 3 Deny Response Format

```
^^^<si d>^<date>^<ti me>
M^^<ctag>^DENY
^^<errcode>
^^^/* <error message> */
^^^/*LI NK: , l i nk>, 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, is to 001 it which reset at reset or when 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. |

Table J. Parameter Definitions

| | |
|----------------|--|
| <errcde> | <p>Four-character mnemonic error code, which is one of the following:</p> <p>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</p> |
| <errormessage> | Error code text message |
| <link> | Communication link identifier. |
| <modifier> | <p>Equipment initiating the alarm or event message, which is one of the following:</p> <p>TS3000 = system software GPS = GPS receiver software RO-x = remote oscillator input SPAN-x = T1 span input</p> |
| <ntfcncde> | <p>Notification code showing the alarm severity, which is one of the following:</p> <p>CR = critical MJ = major MN = minor</p> |
| <ocrdat> | <p>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.</p> |
| <ocrtm> | <p>Occurrence time in the 6-digit form: hh-mm-ss (command) or hh:mm:ss(response or message), where hh is hours (00 to 23), mm is minutes (00 to 59), and ss is seconds (00 to 59). For example, 2:34 pm is 14:34:00.</p> |

Table J. Parameter Definitions

| | |
|--------------|--|
| <pid> | Private identifier, factory-set to “TS3000!!”. It is the initial password for the TELECOM <uid>. Passwords are encrypted when stored in the TimeSource 3000, 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, andhyphens) are allowed. The sid is recommended to be the equipment's CLLI code. |
| <spec_block> | Holds a number of parameters within the command. |
| <srveff> | Identifies whether the alarm condition is service affecting: SA = service affecting NSA = not service affecting |
| <tid> | Target identifier which identifies the equipment (TimeSource 3000) 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 3000 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 timeout in days. The password expires on an account if the account is inactive (the user has not signed on) for this number of days. The timeout range is 0 to 180 days, with 0 indicating no timeout. |
| <utc> | Universal Coordinated Time (UTC) in the 6-digit form: hh-mm-ss, where hh is hours (00 to 23), mm is minutes (00 to 59), and ss is seconds (00 to 59). For example, 2:34 pm is 14-34-00. |

Autonomous Messages

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

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

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

Report Alarm

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

Message:

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

Note: Refer to Table J for parameter definitions.

Report Event

This autonomous message appears when an event is raised, and again when the event is cleared; also appears when a transient event occurs. An event is a state of the TimeSource 3000 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 | 108 |
| Log user off of system | Cancel User | 109 |
| Copy software program or database | Copy Memory | 110 |
| Delete equipment from the database | Delete Equipment | 112 |
| Delete a user from system | Delete User Security | 113 |
| Change communication port parameters | Edit Communication | 114 |
| Change the system date and time | Edit Date | 117 |
| Change equipment parameters | Edit Equipment | 120 |
| Enter equipment into the database and allow the equipment to be used for monitoring | Enter Equipment | 127 |
| Enter a new user and configure the new user's user name, password, and access level | Enter User Security | 129 |
| Reset the alarm log | Initialize Log | 130 |
| Reset to zero all performance monitoring parameters associated with a given aid | Initialize Register | 131 |
| Reset the system processor or GPS receiver processor | Initialize System | 132 |
| Deactivate the audible office alarm | Operate Alarm Cutoff All | 133 |
| Display current system alarms | Retrieve Alarm All | 134 |
| Display current alarms for specific equipment | Retrieve Alarm Equipment | 135 |
| Display current communication port parameter settings | Retrieve Communication | 137 |
| Display current system alarms and events | Retrieve Condition All | 140 |
| Display current alarms and events for specific equipment | Retrieve Condition Equipment | 141 |
| Display parameter settings of equipment | Retrieve Equipment | 143 |
| Display GPS status information | Retrieve GPS Status | 149 |
| Display header information | Retrieve Header | 153 |

Table K. Commands for Tasks (Cont'd)

| | | |
|--|---------------------------------|-----|
| Display information about equipment | Retrieve Inventory | 152 |
| Display alarm log data | Retrieve Log | 154 |
| Display performance monitoring data | Retrieve Performance Monitoring | 155 |
| Display security parameters for a single user or for all users | Retrieve User Security | 168 |
| Set the name of the equipment | Set Source Identifier | 169 |

Commands

The commands used with the TimeSource 3000 are listed on the following pages. After the command name, a definition of the command is given. The definition is followed by the actual command, followed by the variables that can be used with the command.

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

Activate User

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

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

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

Command Example:

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

Response Format:

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


Cancel User

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

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

The command format is:

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

| Parameter | Description |
|-----------|--------------------|
| <uid> | Assigned user name |

Command Example:

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

Response Format:

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

Copy Memory

This command copies a software program from an external computer to the TimeSource 3000, 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 3000 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 3000, the command format is:

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

| Aid | Item Addressed |
|--------|---|
| TS3000 | System software |
| GPS | GPS receiver software |
| DEV1 | TimeSource 3000 with two T1 outputs(990-72010-01) or TimeSource 3000 with two T1 outputs and eight composite clock outputs (990-72010-03) |
| DEV3 | TimeSource 3000 with two T1 and two TOD IRIG-B outputs (990-72010-05) |
| DEV5 | TimeSource 3000 with ten T1 outputs(990-72010-02) |
| DEV9 | TimeSource 3000 with eight mixed E1/T1 outputs(990-72010-06) |
| DEV11 | TimeSource 3000 with eight mixed T1/CCK outputs(990-72010-07) |

Copy Memory (cont'd)

Command Example:

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

Response Format:

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

To copy a database from volatile to nonvolatile memory within the TimeSource 3000, the command format is:

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

| Aid | Item Addressed |
|--------|-----------------|
| TS3000 | System Database |

Command Example:

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

Response Format:

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

Delete Equipment

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

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

| Aid | Value | Item Addressed |
|--------|-------|---------------------------|
| RO-a | a=A | Remote oscillator A input |
| | a=B | Remote oscillator B input |
| SPAN-a | a=A | T1 span A input |
| | a=B | T1 span B input |

Command Example:

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

Response Format:

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

Delete User Security

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

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

| 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>*/  
;
```

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) |

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 4) | b = ALW | Serial port CTS/RTS flow control is enabled |
| | | b = INH | Serial port CTS/RTS flow control is not enabled |
| | HWCONTROL = b (See Note 4) | b = ALW | XON/XOFF flow control is enabled |
| | | b = INH | XON/XOFF flow control is not enabled |

| Aid | Parameter | Value | Description |
|--------------------------|----------------------------|----------------------------|---------------------------------------|
| COM-a (cont'd) | BAUD = b (See Note 3) | b = 115 | Serial port baud rate is 115 kbaud |
| | | b = 57.6 | Serial port baud rate is 57.6 kbaud |
| | | b = 38.4 | Serial port baud rate is 38.4 kbaud |
| | | b = 19.2 | Serial port baud rate is 19.2 kbaud |
| | | b = 9600 | Serial port baud rate is 9600 baud |
| | | b = 4800 | Serial port baud rate is 4800 baud |
| | | b = 2400 | Serial port baud rate is 2400 baud |
| | | b = 1200 | Serial port baud rate is 1200 baud |
| | PARITY = b (See Note 3) | b = EVEN | Even parity is enabled on serial port |
| | | b = ODD | Odd parity is enabled on serial port |
| STOP = b (See Note 3) | b = 1 | 1 stop bit on serial port | |
| | b = 2 | 2 stop bits on serial port | |

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.
3. Baud rate, parity, and stop bits can only be configured on serial communication ports (1, 2 and 3).
4. Flow control is not implemented on communication port 3 (Craft port).
5. 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.

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:

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

Response Format:

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

Edit Equipment

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

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

| Aid | Value | Item Addressed |
|--------|--------|--|
| TS3000 | – | System-wide configuration |
| GPS | – | GPS configuration |
| RO-a | a=A | Remote oscillator A input |
| | a=B | Remote oscillator B input |
| SPAN-a | a=A | T1 span A input |
| | a=B | T1 span B input |
| T1-a | a=A | T1 A output |
| | a=B | T1 B output |
| OPT-a | 1 to 8 | Output port number (990-72010-02, 990-72010-06, and 990-72010-07 systems only) |

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

Table L. Edit Equipment Parameters

| Aid | Parameter | Value | Description |
|--------------------------------|----------------------------------|--|--|
| TS3000 | ROFREQ=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 in CISCO format |
| | | a=NTP4 | Serial message sent in NTP4 format |
| | | a=NONE | No serial message sent |
| | ALMCOND=a | a=ALW | Alarm conditioning for T1, TOD, IRIG-B, and composite clock outputs is enabled |
| | | a=INH | Alarm conditioning for T1, TOD, IRIG-B, and composite clock outputs is disabled |
| | IPNE=a.b.c.d (See Note 1) | a = 0 to 255 | IP address of this TimeSource 3000 (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 3000 (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 3000 (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 | | |

Table L. Edit Equipment Parameters (Cont'd)

| | | | |
|------------------------------------|------------------------------------|--|---|
| TS3000 (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=HOLDOVER | 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 |
| TS3000, SPAN A&B, RO A&B | TIME=x | x = HHMM | Hour (00-999) and minute (00-59) time to escalate alarm |
| | | x = 0 | No alarm escalation |
| | SEVERITY1=x (See Note 6) | x = CR | Severity of initial alarm prior to escalation |
| | | x = MJ | |
| | | x = MN | |
| | | x = EV | |
| | | x = NA | |

Table L. Edit Equipment Parameters (Cont'd)

| | | | |
|--|-----------------------------|--|---|
| TS3000, SPAN A&B, RO A&B (cont'd) | SEVERITY2=x (See Note 6) | x = CR | Severity of ESCALATED alarm |
| | | x = MJ | |
| | | x = MN | |
| | | x = EV | |
| | | x = NA | |
| | SERAFF1=x (See Note 6) | x = SA | Service affecting state of initial alarm prior to escalation |
| | | x = NSA | |
| SERAFF2=x (See Note 6) | x = SA | Service affecting state of escalated alarm | |
| | x = NSA | | |
| TS3000 | NTPPWD=x (See Note 7) | x = 6 ASCII characters | NTP Password (contact factory) |
| GPS | ANTCBLDLY=a | a=0 to 330 | Antenna cable length (meters) |
| | ANTELEV MASK=a | a=0 to 45 | Antenna elevation mask angle (degrees) |
| RO-x (See Note 4) | ENSEMBLER=a | a = ALW | Remote oscillator is ensembled |
| | | a = INH | Remote oscillator is not ensembled |
| SPAN-x (See Note 5) | ENSEMBLER=a | a = ALW | Span is ensembled |
| | | a = INH | Span is not ensembled |
| | SSM=a (See Note 8) | a = ALW | SSM qualifies span input |
| | | a = INH | SSM does not qualify span input |
| T1-a | FRAMING=a | a = ESF | Output framing is ESF |
| | | a = D4 | Output framing is D4 |
| | ALMOUT=a | a = AIS | Output is AIS during alarm |
| | | a = SQUELCH | Output is squelched during alarm |
| | | a = SSM | Outputs are at "STU" quality level during holdover alarm (SSM requires ESF framing) |

Table L. Edit Equipment Parameters (Cont'd)

| | | | |
|--------------------------------------|-----------|-------------|---|
| OPT-a (990-72010-02 systems only) | ALMOUT=a | a = AIS | Output is AIS during alarm |
| | | a = SQUELCH | Output is squelched during alarm |
| | | a = SSM | Outputs are at "STU" quality level during holdover alarm (SSM requires ESF framing) |
| | FRAMING=a | a = ESF | Output framing is ESF |
| | | a = D4 | Output framing is D4 |
| OPT-a (990-72010-06 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 during 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 = 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.) |

Table L. Edit Equipment Parameters (Cont'd)

| | | | |
|--------------------------------------|-------------------------------|-------------------------------|--|
| OPT-a (990-72010-07 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 during ESF framing during holdover alarm (SSM requires ESF framing) |
| | FRAMING=b | b = D4 | Output framing is D4 |
| | | b = ESF | Output framing is ESF |
| | | b = CCK | Output is Composite Clock. (ALMOUT is SQUELCH by default and need not be programmed. ALMOUT cannot be set to AIS or SSM. The signal turns off during holdover alarm. |
| TS3000 | DCDPASSTHRU | INH | DCD port communications is inhibited |
| | | ALW1 | COM1 is the DCD port interface |
| | | ALW2 | COM2 is the DCD port interface |
| | DCDUSERPORT=x (see Note 9) | x = 1 | COM1 |
| | | x = 2 | COM2 |
| | | x = 3, 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. A remote oscillator must have been put into service before using the ENT-EQPT command before setting the ENSEMBLER parameter.
5. A span must have been put into service using the ENT-EQPT command before setting the ENSEMBLER and SSM parameters.

Edit Equipment (cont'd)

6. 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::TS3000: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, TS3000 will generate a major alarm with an SA flag. These parameters can then be verified using the RTRV-EQPT command.
7. If the dbinit jumper is changed, the NTP password has to be re-entered.
8. The span must be put into service using the ENT-EQPT command before using this parameter.
9. All commands having a DCDUSERPORT TID which equals the 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>*/  
;
```

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 | T1 span A input monitor |
| | a=B | T1 span B input monitor |

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 of "b" from the "b 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>*/  
;
```

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

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

Command Example:

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

Response Format:

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

Initialize Log

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

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

Response Format:

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

Initialize Register

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

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

| Aid | Value | Item Addressed |
|--------|-------|-----------------------------|
| SPAN-a | a = A | T1 span A input |
| | a = B | T1 span B input |
| ALL | | T1 span A and span B inputs |

Response Format:

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

Initialize System

This command resets the specified processor.

Caution: Using this command with an <aid> of TS3000 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 |
|--------|-----------------------|
| TS3000 | System software |
| GPS | GPS receiver software |

Response Format:

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

Operate Alarm Cutoff All

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

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

Response Format:

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

Retrieve Alarm All

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

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

If there are no alarms:

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

If there is at least one alarm:

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

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

Retrieve Alarm Equipment

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

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

| Aid | Value | Item Addressed |
|--------|-------|----------------------------|
| TS3000 | – | System (all TS3000 alarms) |
| SPAN-x | x = A | T1 span A input |
| | x = B | T1 span B input |
| RO-x | x = A | Remote oscillator A input |
| | x = B | Remote oscillator B input |
| GPS | – | GPS receiver |

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 |
| GPS | - | All communications ports |

Response Format:

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

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) |

Retrieve Communication (cont'd)

| 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 |

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.

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 |
|--------|---------|---------------------------|
| TS3000 | – | System |
| SPAN-x | x = A | T1 span A input |
| | x = | T1 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::TS3000:<ctag>;
```

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.

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 |
| TS3000 | — | 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 |
| T1-a | x=A | T1 A output |
| | x=B | T1 B output |
| OPT-a | x=1 to 8 | T1 1 through 8 outputs (990-72010-02 system only) E1 or T1 outputs (990-72010-06 system only) T1 or CCK outputs (990-72010-07 system only) |

Command Example:

```
RTRV-EQPT::TS3000:<ctag>;
```

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 | — | — | Display all settings |
| TS3000 | 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 |
| TS3000 | 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 | |

| | | | |
|--------------------|----------------|--|---|
| TS3000 (cont'd) | IPEM1=a.b.c.d | a = 0 to 255 | Primary element manager IP address |
| | | b = 0 to 255 | |
| | | c = 0 to 255 | |
| | | d = 0 to 255 | |
| | IPEM1PORT=a | a = 0 to 65535 | Primary element manager 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) | |
| GPS | ANTCBLDLY=a | a = 0 to 330 | Antenna cable length (meters) |
| | ANTELEVMSK=a | a = 0 to 45 | Antenna elevation mask angle (degrees) |
| RO-x | ENSEMBLER=a | a = ALW | Remote oscillator is ensembled |
| | | a = INH | Remote oscillator is not ensembled |
| | MONITOR=a | a = ALW | Remote oscillator is monitored |
| | | a = INH | Remote oscillator is not monitored |
| SPAN-x | ENSEMBLER=a | a = ALW | T1 span is ensembled |
| | | a = INH | T1 span is not ensembled |
| | MONITOR=a | a = ALW | T1 span is monitored |
| | | a = INH | T1 span is not monitored |
| | SSM=a | a = ALW | SSM message is used to qualify port |
| | | a = INH | SSM message is not used to qualify port |

| | | | |
|--------------------------------------|-----------|-------------|--|
| T1-a | FRAMING=a | a = ESF | Output framing is ESF |
| | | a = D4 | Output framing is D4 |
| | ALMOUT=a | a = AIS | Output is AIS during alarm |
| | | a = SQUELCH | Output is squelched during alarm |
| | | a = SSM | Outputs are at "STU" quality level during holdover alarm (SSM requires ESF framing) |
| OPT-a (990-72010-02 systems only) | ALMOUT=a | a = AIS | Output is AIS during alarm |
| | | a = SQUELCH | Output is squelched during alarm |
| | | a = SSM | Outputs are at "STU" quality level during holdover alarm (SSM requires ESF framing) |
| | FRAMING=a | a = ESF | Output framing is ESF |
| | | a = D4 | Output framing is D4 |
| OPT-a (990-72010-06 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 2.048 MHz) (If ALMOUT is SQUELCH, the signal turns off during holdover alarm. Any other ALMOUT option does not affect output during alarm.) |

| | | | |
|--------------------------------------|----------------------------|-------------------------------|--|
| OPT-a (990-72010-07 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 during holdover alarm (SSM requires ESF framing) |
| | FRAMING=b | b = D4 | Output framing is D4 |
| | | b = ESF | Output framing is ESF |
| | | b = CCK | Output is Composite Clock. (ALMOUT is SQUELCH by default and need not be programmed. ALMOUT cannot be set to AIS or SSM. The signal turns off during holdover alarm. |
| TS3000 | 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 1) | x = 1 | COM1 |
| | | x = 2 | COM2 |
| | | x = 3, 5001, 5002, 5003, 5004 | COM3 or IP port 5001 to 5004 |
| | ALARM=x | x = HOLDOVER | HOLDOVER alarm |
| | | x = GPS | GPS alarm |
| IPNTP=x | x = ALW | NTP feature activated | |
| 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 |

| | | | |
|---------------------------------------|------------------------|--|---|
| TS3000, 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 |
| | 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 DCDUSERPORT.
2. When setting alarm integration time (SEVERITY or SERAFF), the type of alarm (HOLDOVER, GPS, LOS, AIS, or ERROR) has to be specified. For example, ED-EQPT::TS3000: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, TS3000 will generate a major alarm with an SA flag. These parameters can then be verified using the RTRV-EQPT command.

Retrieve GPS Status

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

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

Response Format:

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

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.fffW | Current longitude west in degrees, minutes, and decimal-fractions of a minute |
| ALT=a | a = mm.mmm | Altitude in meters to the thousandth of a meter, referenced to mean sea level |
| UTC=a | a = hh-mm-ss | Universal Coordinated Time (UTC), where hh is hours (00 to 23), mm is minutes (00 to 59), and ss is seconds(00 to 59) |
| 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 |

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>]:TS3000:<ctag>;
```

Response Format:

```
<sid> <date> <time>  
M <ctag> COMPLD  
"TS3000::::<CARD=TS3000>,  
MACID=a,  
TYPE=a,  
PART=a,  
SERIAL=a,  
SOFTVER_TS3000=a,  
SOFTVER_GPS=a,  
SOFTVER_DEV=a"  
/*LINK: x, CMD:<command>*/  
;
```

Retrieve Inventory (cont'd)

| Parameter | Value | Description |
|----------------------|--------------------------------------|--|
| CARD=TS3000 | – | System |
| MACID=a.b.c.d.e | a = 00 to FF in hexadecimal format | MAC address |
| | b = 00 to FF in hexadecimal format | |
| | c = 00 to FF in hexadecimal format | |
| | d = 00 to FF in hexadecimal format | |
| | e = 00 to FF in hexadecimal format | |
| TYPE=a | a = NO OPTION BOARD | TimeSource 3000 (standard) (990-72010-01 systems) |
| | a = T1 OPTION BOARD | TimeSource 3000 with eight additional T1 outputs (990-72010-02 systems) |
| | a = CCK OPTION BOARD | TimeSource 3000 with eight composite clock outputs (990-72010-03 systems) |
| | a = IRIG OPTION BOARD | TimeSource 3000 with two TOD IRIG-B outputs (990-72010-05 systems) |
| | a = MIXED E1/T1 OPTION BOARD | TimeSource 3000 with eight mixed E1/T1 outputs (990-72010-06 systems) |
| | a = MIXED T1/CCK OPTION BOARD | TimeSource 3000 with eight mixed T1/CCK outputs (990-72010-07 systems) |
| PART=a | – | a = Part number |
| SERIAL=a | – | a = Serial number |
| SOFTVER_TS3000 =a | a = bb.cc.dd | System software version |
| SOFTVER_GPS=a | a = bb.cc.dd | GPS receiver software version |
| SOFTVER_DEV=a | a = bb.cc.dd or bb.cc.dd-ee.ff.gg | Device software version |

Retrieve Log

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

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

Response Format:

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

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

Retrieve Performance Monitoring

This command retrieves the performance monitoring data from the TimeSource 3000. This data includes MTIE, TDEV, PHASE 1S, and PHASE 1M. For current 24 hour data, MTIE, TDEV, and PHASE 1S 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.

PHASE 1S 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-a | a = A | T1 span A input |
| | a = B | T1 span B input |
| <montype>=a | a = MTIE | Performance monitoring data type |
| | a = TDEV | |
| | a = PHASE1S | |
| | a = PHASE1M | |
| <mondatt>=a | a = 1 to 12 | Monitor date, month of the year |
| | a = 1 to 31 | Monitor date, day of the month |
| <montm>=a | a = 0 to 23 | Monitor time, hours past midnight |
| | a = 0 to 59 | Monitor time, minutes past the hour |

MTIE Response Format:

```

<sid> <date> <time>
M <ctag>COMPLD
"SPAN-a:MTIE-a,<monval>,<vldty>
, , , , <mondatt> , <montm> "
      .      .      .
      .      .      .
      .      .      .
"SPAN-a:MTIE-a,<monval>,<vldty> , , , , <mondatt> , <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 mondatt and montm. Any mondatt/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 mondatt, but do not enter montm. Any mondatt not in the previous 7 day window is denied.

Retrieve Performance Monitoring (cont'd)

| Parameter | Value | Description |
|------------|--|---|
| SPAN-a | a = A | T1 span A input |
| | a = B | T1 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 |

Retrieve Performance Monitoring (cont'd)

MTIE Response Example:

```
TS3000-2009 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*/
;
```

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.

Retrieve Performance Monitoring (cont'd)

| Parameter | Value | Item Addressed |
|------------|---|---|
| SPAN-a | a = A | T1 span A input |
| | a = B | T1 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 |

Retrieve Performance Monitoring (cont'd)

TDEV Response Example:

```
TS3000-2009 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*/
;
```

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.

Retrieve Performance Monitoring (cont'd)

| Parameter | Value | Item Addressed |
|------------|---|--|
| SPAN-a | a = A | T1 span A input |
| | a = B | T1 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 |

Retrieve User Security

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

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

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

Response Format:

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

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

Set Source Identifier

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

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

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

Response Format:

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

.....

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.

Troubleshooting with Front Panel Items

All front panel items are shown in Figure 24. The items are described in Table L. Use Table L to troubleshoot the system based on the front-panel lamps.

Figure 24. Controls and Indicators

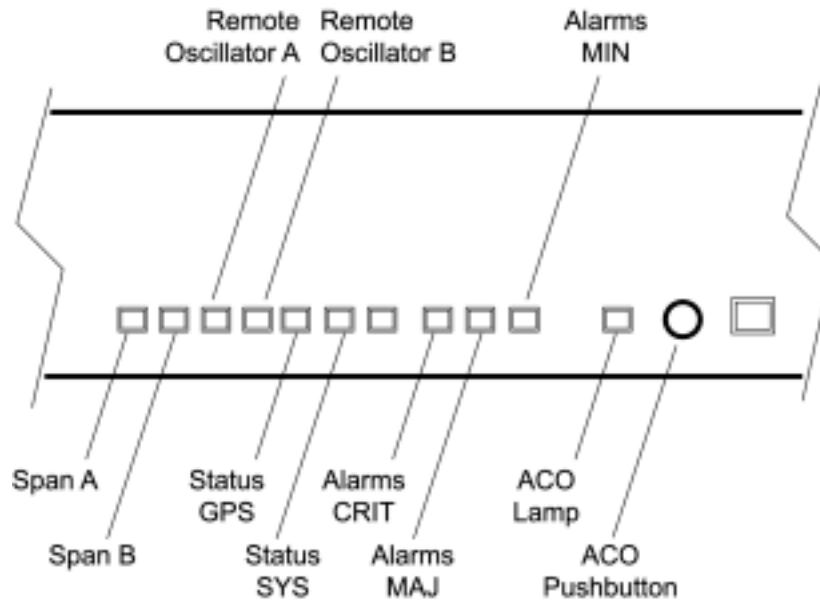


Table L. Front Panel Items

| 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. |

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. | Troubleshoot the red Status GPS lamp. |
| 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. | |

Table L. Front Panel Items (cont'd)

| Name | Lamp | Description | Action |
|---------------------|-------|---|--|
| ACO | Off | The alarm cutoff function has not been activated. | None required. Press the ACO pushbutton to silence all audible alarms. |
| | Green | The alarm cutoff function has been activated. | None required. |
| ACO (Pushbutton) | | Silences all audible alarms when pressed. | None required. |

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 3000 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 | 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. |
| BT3 WARMUP | The system is in a power-up state when it should not be. | Perform the same action as shown in GPS ERROR message. |
| DEVICE DOWNLOAD REQUIRED | The hardware device software is corrupt or missing. | Download and install the appropriate hardware device (DEV) software, using the procedure in the Software Release Document that came with the software. |

Table M. Message Troubleshooting (cont'd)

| Message | Meaning | Action |
|-----------------------|---|---|
| GPS ERROR | The GPS receiver is reporting an error. | <p>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:</p> <ol style="list-style-type: none"> 1. Remove the antenna cable from the rear of the shelf. 2. Measure the dc voltage from the antenna connector center pin to the connector housing on the shelf TNC antenna connector. If it does not indicate 18 vdc ± 2 vdc, replace the TimeSource 3000 card, using Procedure G. 3. If it indicates 18 vdc ± 2 vdc, measure the mA current between the antenna connector center pin and the connector housing on the shelf TNC antenna connector. 4. If it indicates less than 5 mA or more than 500 mA, replace the TimeSource 3000 card, using Procedure G. If it indicates 125 mA, reconnect the antenna cable. 5. Remove the antenna cable from the antenna, and make vdc and mA measurements into the cable connector. 6. If it indicates 18 vdc and 125 mA, replace the antenna. If not, replace the lightning suppressor. 7. If the error repeats, check the view of the sky for obstructions. 8. If the error repeats, raise the antenna elevation mask setting, using the Edit Equipment command. 9. If the error repeats, check the cable connections between the TimeSource 3000 Shelf and the antenna. 10. If the error repeats, replace the antenna. |
| GPS DOWNLOAD REQUIRED | The GPS software is corrupt or missing. | Download, and install, the GPS receiver (GPS) software, using the procedure in the Software Release Document that came with the software. |

Table M. Message Troubleshooting (cont'd)

| Message | Meaning | Action |
|--------------------|--|---|
| HIGH CURRENT FAULT | Current to antenna is outside specification. | If not accompanied by the GPS ERROR alarm, none required. |
| LOW CURRENT FAULT | | <p>If accompanied by the GPS ERROR alarm:</p> <ol style="list-style-type: none"> 1. Check the cable connections between the TimeSource 3000 Shelf and the antenna. 2. If the error repeats, remove the antenna cable from the rear of the shelf. 3. Measure the dc voltage from the antenna connector center pin to the connector housing on the shelf TNC antenna connector. If it does not indicate 18 vdc ± 2 vdc, replace the TimeSource 3000 card, using Procedure G. 4. If it indicates 18 vdc ± 2 vdc, measure the mA current between the antenna connector center pin and the connector housing on the shelf TNC antenna connector. 5. If it indicates less than 5 mA or more than 500 mA, replace the TimeSource 3000 card, using Procedure G. If it indicates 125 mA, re-connect the antenna cable. 6. Remove the antenna cable from the antenna, and make vdc and mA measurements into the cable connector. 7. If it indicates 18 vdc and 125 mA, replace the antenna. If not, replace the lightning suppressor. 8. If the error repeats, check the view of the sky for obstructions. 9. If the error repeats, raise the antenna elevation mask setting, using the Edit Equipment command 10. If the error repeats, check the cable connections between the TimeSource 3000 Shelf and the antenna. 11. If the error repeats, replace the antenna. |

Table M. Message Troubleshooting (cont'd)

| Message | Meaning | 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 3000 environmental specifications. If not, correct the ambient temperature with heating or air conditioning. 2. If the ambient air temperature is within the TimeSource 3000 environmental specifications, replace the plug-in card. |
| TS3000 DOWNLOAD REQUIRED | The system software is corrupt or missing. | Download and install the system (TimeSource 3000) 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 USERTIMEOUT LOGOFF | The user was auto logged off. | If desired, log in again. |
| DISCONNECTED USER LOGOFF | A user was logged off by the system administrator. | None required. |



Table M. Message Troubleshooting (cont'd)

| Message | Meaning | 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 pushbutton has been pressed to deactivate a critical audible alarm. | None required. |
| DOWNLOAD FAILED | The software download has failed. | Retry the software download. |
| DOWNLOAD IN PROGRESS | Software is being downloaded. | Wait until the download has been completed. |
| DOWNLOAD SUCCESSFUL | The software has been downloaded successfully. | None required. |
| GPS ERROR | The GPS receiver is reporting an error. | None required. |
| MAJOR ACO EVENT | The ACO pushbutton has been pressed to deactivate a major audible alarm. | None required. |
| MINOR ACO EVENT | The ACO pushbutton has been pressed to deactivate a minor audible alarm. | None required. |
| POWER UP RESTART | The system processor has just started up. | None required. |
| SETTLING PERIOD | The system is between the power-up state and steady-state operation, and signals may be degraded. | None required. |
| 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). |
| SOFTWARE DOWNLOADING ON LINK | Software is being downloaded at specified communication port. | None required. |

Table M. Message Troubleshooting (cont'd)

| Message | Meaning | Action |
|-------------------------|--|---|
| SPAN x AIS | An AIS has been received on the specified input span. | Troubleshoot the specified input span (check the source). |
| SPAN x ERROR | An error has been detected on the specified input span. | Troubleshoot the specified input span (check the source). |
| SPAN x LOSS OF SIGNAL | The signal on the specified span input has been lost. | Troubleshoot the specified input span (check the source). |
| SPAN x SSM QUALITY DUS | Do not use for synchronization. | Troubleshoot the specified input span (check the source). |
| SPAN x SSM QUALITY ST2 | The signal on the specified span input has degraded to an SSM quality level of ST2. | Troubleshoot the specified input span (check the source). |
| SPAN x SSM QUALITY ST3E | The signal on the specified span input has degraded to an SSM quality level of ST3E. | Troubleshoot the specified input span (check the source). |
| SPAN x SSM QUALITY ST3 | The signal on the specified span input has degraded to an SSM quality level of ST3. | Troubleshoot the specified input span (check the source). |
| SPAN x SSM QUALITY ST4 | The signal on the specified span input has degraded to an SSM quality level of ST4. | Troubleshoot the specified input span (check the source). |
| SPAN x SSM QUALITY STU | The SSM quality level of synchronization traceability is unknown. | Troubleshoot the specified input span (check the source). |
| TEMPERATURE ERROR | A temperature error has been detected on the internal oscillator. | <ol style="list-style-type: none"> 1. Wait until this escalates to a minor alarm, or check that the ambient air temperature is within the TimeSource 3000 environmental specifications. If not, correct the ambient temperature with heating or air conditioning. 2. If the ambient air temperature is within the TimeSource 3000 environmental specifications, replace the plug-in card. |

Card Replacement

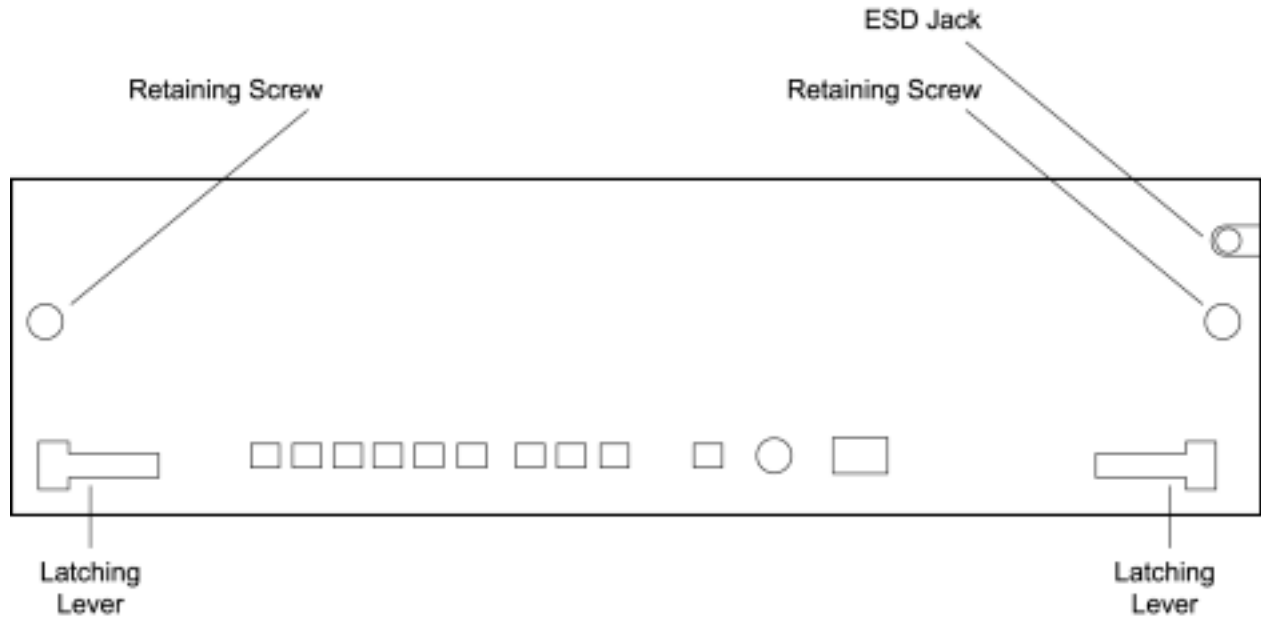
To replace the plug-in card, follow the steps in Procedure G, and refer to Figure 25.

Procedure G. 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

Figure 25. Front of Shelf



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 H.

Procedure GH. Equipment Return

| Step | Procedure |
|------|--|
| 1 | <p>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.</p> <p><i>Note:</i> 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.</p> |
| 2 | <p>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.</p> <p><i>Note:</i> Equipment must be returned in the original packaging, or approved replacement packaging, for the warranty to be honored.</p> |
| 3 | <p>Mark the RMA number and the equipment serial number on the outside of the shipping carton.</p> |
| 4 | <p>Ship the equipment prepaid and insured to one of the addresses below, as directed by the Customer Assistance Center:</p> <p>Symmetricom Attn: Customer Service 2300 Orchard Parkway San Jose, CA 95131</p> <p>or</p> <p>Symmetricom Attn: Repair and Return Montana Industrial Park Street B Lot 52 Aguadilla, Puerto Rico 00603</p> <p>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.</p> |

End of Procedure

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: 408-428-7998

E-mail: info@symmetricom.com

Internet: <http://www.symmetricom.com>

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.

.....

.....



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) with TNC connectors |
| Cable Length: | Maximum 1000 ft. from antenna to shelf |
| Dimensions: (excluding mount) | |
| Height: | 12.375 in. |
| Diameter: | 1.75 in. |
| Weight: | 9 oz. |
| Operating Temperature: | -30° C to +80° C |
| Storage Temperature: | -40° C to +80° C |
| Operating Humidity: | 0% to 100% relative humidity |

Communication Port 1

| | |
|-----------------------|---|
| Connector Type: | 25-pin, female D connector |
| Connector Label: | COM1 |
| Connector Location: | Rear panel |
| Electrical Interface: | RS-232 |
| Baud Rate: | 1200 bps 2400 bps 4800 bps 9600 bps 19.2 kbps 38.4 kbps 57.6 kbps 115 kbps |
| Data Bits: | 8 |
| Parity Bit: | None Even Odd |
| Stop Bit: | 1 2 |
| Flow Control: | None Software Hardware |

Communication Port 2

| | |
|-----------------------|---|
| Connector Type: | RJ-45 |
| Connector Label: | COM2 |
| Connector Location: | Rear panel |
| Electrical Interface: | RS-232 |
| Baud Rate: | 1200 bps 2400 bps 4800 bps 9600 bps 19.2 kbps 38.4 kbps 57.6 kbps 115 kbps |
| Data Bits: | 8 |
| Parity Bit: | None Even Odd |
| Stop Bits: | 1 2 |
| Flow Control: | None Software Hardware |

Craft Communication Port

| | |
|-----------------------|---|
| Connector Type: | RJ-45 |
| Connector Label: | Craft |
| Connector Location: | Front panel |
| Electrical Interface: | RS-232 |
| Baud Rate: | 1200 bps 2400 bps 4800 bps 9600 bps 19.2 kbps 38.4 kbps 57.6 kbps 115 kbps |
| Data Bits: | 8 |
| Parity Bit: | None Even Odd |
| Stop Bits: | 1 2 |
| Flow Control: | None |

Ethernet Communication Port

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

Remote Oscillator Inputs

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

T1 Inputs

| | |
|---------------------|--|
| Connector Type: | Wire-wrap pins |
| Connector Label: | SPAN IN A (T, R, S) SPAN IN B (T, R, S) |
| Connector Location: | Rear panel |
| Impedance: | 100 Ω \pm 5% |
| Bit Rate: | 1.544 Mb/s |
| Format: | DS1 |
| Line Code: | Alternate mark inversion (AMI) with or without B8ZS |
| SSM State: | Enable Disable |
| Amplitude: | 0 to -26 dB DSX |
| Framing: | ESF D4 |

1 PPS Output

| | |
|--|--|
| Connector Type: | BNC |
| Connector Label: | TTL PPS |
| Connector Location: | Rear panel |
| Impedance: | 50 Ω |
| Frequency: | 1 pps |
| Time Accuracy: | 100 ns with respect to Universal Coordinated Time (UTC) 95% probability when locked to GPS signal |
| GPS Holdover Time Error: (After 1 week of steady-state operation) | 8.6 μ s per day over a 10 $^{\circ}$ C range between 0 $^{\circ}$ C and +50 $^{\circ}$ C 2.8 μ s with a span input meeting ANSI T1.101 network specification 99% probability 1.8 μ s over a 10 $^{\circ}$ C range between 0 $^{\circ}$ C and +50 $^{\circ}$ C with an ST2E remote oscillator input |
| Format: | 1 μ s pulse |
| Amplitude: | Transistor-transistor logic (TTL) levels |

T1 Outputs

| | |
|---|--|
| Connector Type: | Wire-wrap pins |
| Connector Label: | T1 OUT A (T, R, S) T1 OUT B (T, R, S) |
| Connector Location: | Rear panel |
| Impedance: | 100 Ω |
| Bit Rate: | 1.544 Mb/s |
| Frequency Accuracy: | 1×10^{-12} |
| GPS Holdover Time Error: (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 1×10^{-11} per day over a 10 °C range between 0 °C and 50 °C with an ST2E remote oscillator input |
| 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 |
| Output During Alarms: | AIS Squelch SSM |

Eight Additional T1 Outputs (990-72010-02 Systems Only) (Optional)

| | |
|--|--|
| Connector Type: | Wire-wrap pins |
| Connector Label: | 1 (T, R, S) 2 (T, R, S) 3 (T, R, S) 4 (T, R, S) 5 (T, R, S) 6 (T, R, S) 7 (T, R, S) 8 (T, R, S) |
| Connector Location: | Rear panel – OPTIONS I/O |
| Impedance: | 100 Ω |
| Bit Rate: | 1.544 Mb/s |
| Frequency Accuracy: | 1×10^{-12} |
| 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 1×10^{-11} per day over a 10 °C range between 0 °C and 50 °C with an ST2E remote oscillator input |
| 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 |
| Output During Alarms: | AIS Squelch SSM |

Eight Additional Mixed E1/T1 Outputs (990-72010-06 Systems Only) (Optional)

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: | Rear panel – Options I/O |
| 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 \pm 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 \pm 5°C) with an ST2E remote oscillator input |

Eight Additional Mixed E1/T1 Outputs (Optional) (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 (0 °C to 50 °C \pm 5°C) 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 (0 °C to 50 °C \pm 5°C) with an ST2E remote oscillator input (quartz) |

Eight Additional Mixed T1/CCK Outputs (990-72010-07 Systems Only) (Optional)

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

T1/CCK Common

| | |
|---------------------|---|
| Connector Type: | Wire-wrap |
| Connector Label: | T, R, S |
| Connector Location: | OPTION I/O wire-wrap pins on rear panel |

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} per day over a 10 °C range between 0 °C and 50 °C with an ST2E remote oscillator input (quartz) |

CCK Outputs

| | |
|-------------|--|
| Impedance: | 135 Ω balanced |
| Bit Rate: | 64 kb/s |
| Waveform: | 2.7 V to 3.5 peak, 3 V nominal; bipolar RTZ; all ones with BPV every eighth pulse |
| Wave Shape: | Rectangular, rise time <500 ns, pulse width 9.8 μ s \pm 5%, pulse interval 15.6 μ s \pm 5% |

Duty Cycle:

62.5%

Eight Additional Composite Clock Outputs (990-72010-03 Systems Only) (Optional)

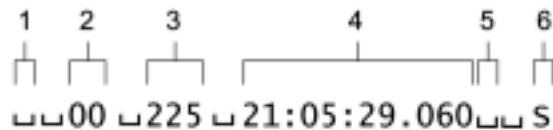
| | |
|---------------------|--|
| Connector Type: | Wire-wrap pins |
| Connector Label: | 1 (T, R, S) 2 (T, R, S) 3 (T, R, S) 4 (T, R, S) 5 (T, R, S) 6 (T, R, S) 7 (T, R, S) 8 (T, R, S) |
| Connector Location: | Rear panel – OPTIONS I/O |
| Impedance: | 135 Ω balanced |
| Bit Rate: | 64 kb/s |
| Waveform: | 2.7 V to 3.5 peak, 3 V nominal; bipolar RTZ; all ones with BPV every eight pulse |
| Wave Shape: | Rectangular, rise time <500 ns, pulse width 9.8 μ s \pm 5%, pulse interval 15.6 μ s \pm 5% |
| Duty Cycle: | 62.5% |

Time of Day Output

Network Time Protocol (NTP), Type 4, Format 2 Driver

| | |
|-----------------------|----------------|
| Connector Type: | RJ-45 |
| Connector Label: | TOD |
| Connector Location: | Rear panel |
| Electrical Interface: | RS-422 |
| Baud Rate: | 9600 bps |
| Data Bits: | 8 |
| Parity Bit: | None |
| Stop Bit: | 1 |
| Data Format: | See Figure 26. |

Figure 26.NTP Type 4 Data Format

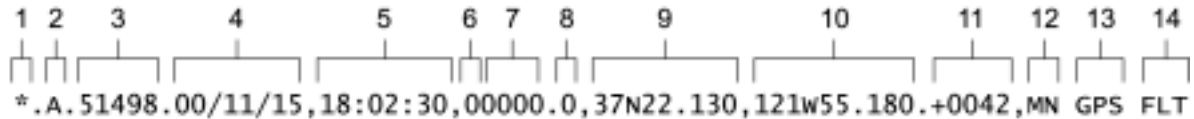


1. Alarm field: blank space = receiver has satellite availability; ? = no satellite availability
2. Year (2000 in this example)
3. Day of year (the 225th day of the year in this example)
4. Hours:minutes:seconds.milliseconds
5. Leap second: blank space = no leap second; L = upcoming leap second
6. Daylight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

Cisco Systems

| | |
|-----------------------|---------------|
| Connector Type: | RJ-45 |
| Connector Label: | TOD |
| Connector Location: | Rear panel |
| Electrical Interface: | RS-422 |
| Baud Rate: | 9600 bps |
| Data Bits: | 8 |
| Parity Bit: | None |
| Stop Bit: | 1 |
| Data Format: | See Figure 27 |

Figure 27. Cisco Systems Data Format



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

IRIG-B (990-72010-05 Systems Only) (Optional)

| | |
|-----------------------------|--|
| Connector Type: | BNC |
| Connector Labels: | OUT1 OUT2 |
| Connector Location: | IRIG-B adapter secured to OPTIONS I/O wire-wrap pins on shelf rear panel (requires IRIG-B BNC Adapter Kit, part number 990-72100-06) |
| Impedance: | 600 Ω |
| Number of Outputs: | 2 |
| 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 |

10 MHz Output

| | |
|----------------------|--|
| Connector Type: | BNC |
| Connector Label: | 10 MHz |
| Connector Location: | Rear panel |
| Impedance: | 50 Ω |
| Frequency: | 10 MHz |
| Stability: | 5×10^{-12} Root Allen Variance (RAV) at 10 s |
| Phase Noise: | -120 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 terminated with 50 Ω 3.7 V peak-to-peak typical terminated with 50 Ω |

Office Alarms

Rear 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) |
| Type: | Light emitting diode |

Front Panel Control

| | |
|-----------|--|
| Label: | ACO |
| Type: | Pushbutton switch |
| Function: | Alarm cutoff (deactivates audible office alarms) |

Simple Network Time Protocol

| | |
|-------------------------|---|
| Protocol Type: | SNTP (Simple Network Time Protocol) compliant with RFC-1769 for unicast applications |
| SNTP Accuracy: | SNTP timestamp derived from UTC time via integrated GPS receiver within –300 microseconds |
| SNTP Alarm Indications: | <ol style="list-style-type: none">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 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 A Terminal block B |
| Connector Labels: | TB1 TB2 |
| Voltage: | -40 V dc to -60 V dc (A & B feed) |
| Current: | 750 mA maximum |
| Recommended Fuse for Battery Feed: | 3 A |

Mechanical

| | |
|---------------------|---|
| Rack Mounting: | NEBS 19 in. rack NEBS 23 in. rack |
| Mounting Positions: | Flush 5 in. offset |
| Width: | 19 in. |
| Height: | 3.5 in. maximum (2 rack mounting units) |
| Depth: | 12 in. maximum |
| Weight: | 7.4 lb. |

Shelf Environmental

| | |
|------------------------|----------------------------------|
| Operating Temperature: | 0 °C to +50 °C |
| Operating Humidity: | Up to 95% non condensing |
| Electromagnetic | FCC Part 15, Sub-Part B, Class A |

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