

TimeSource 3000

GPS Primary Reference Source



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Acronyms and Abbreviations

AIS	alarm indication signal
ANSI	American National Standards Institute
DS1	digital signal, level 1 (1.544 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
TI	digital transmission (1.544 Mb/s)
TDEV	time deviation
TOD	time of day
UTC	Universal Coordinated Time

FCC Regulatory Notice

Warning: This equipment generates, uses, and can radiate radio frequency energy, and if not used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Description

This chapter provides an overview of the global positioning system, and a physical and functional description of the TimeSource 3000.

Overview

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.

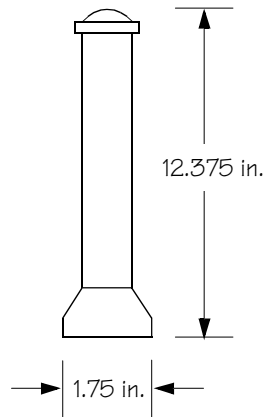
Physical Description

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

The shelf occupies two rack mounting units (RU), and can be mounted in a 19 inch rack or a 23 inch rack. 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 signals and power between the antenna and the shelf.

Figure 1. Antenna



Functional Description

Overview

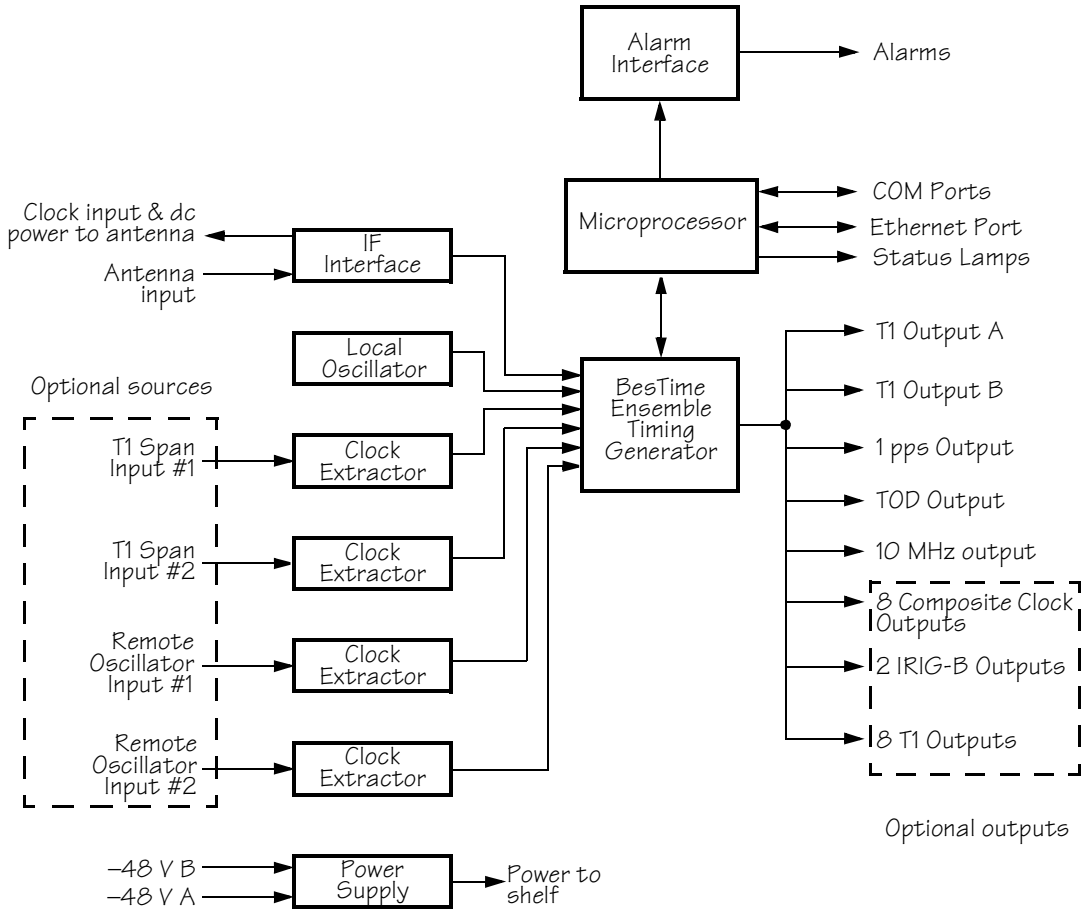
Figure 2 shows the main functions of the TimeSource 3000. The center of the TimeSource 3000 is the Ensemble Timing Generator, which uses the BesTime algorithm to analyze the phase and frequency relationships, individually and collectively, of the timing sources. Each type of timing source has a particular 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 A and B 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.

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 (Optional)

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 (Optional)

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.

Composite Clock Outputs (Optional)

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, OSMF, or similar software. An Element Manager establishes a connection with one port (5551) for TL1 commands and responses. Another port (5550) establishes a connection to an Element Manager, sends autonomous messages, and closes the connection when finished.

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 induced 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.

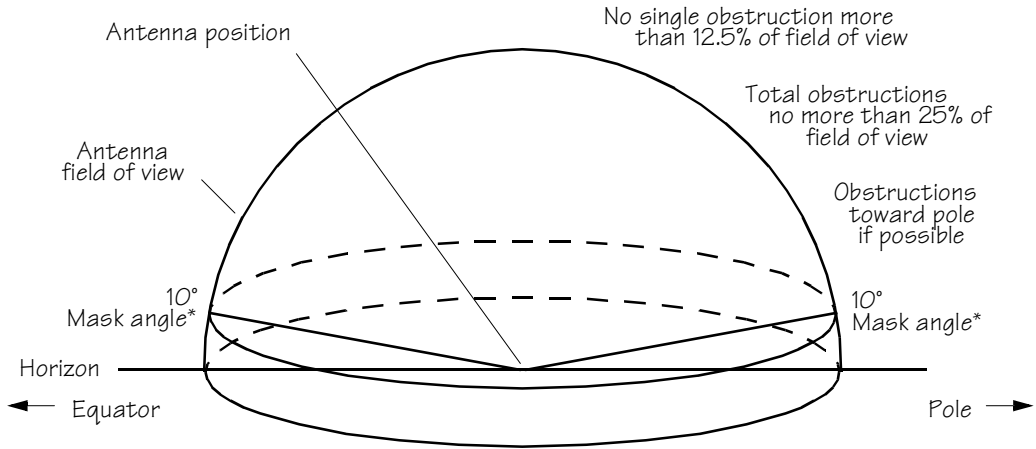
The ideal antenna location provides a clear, unobstructed view of the sky from the zenith to the horizon line, and 360 degrees around the horizon.

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).

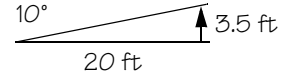
Signals closer to the horizon are often subject to multipath effects, which degrade the timing solution. The TimeSource 3000 can be set to ignore, or mask, all signals from the horizon to a chosen angle of elevation (mask angle). (See Figure 3.)

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 3. Antenna Field of View



* An angle of 10° masks objects up to about 3.5 ft above the horizon at 20 ft from the antenna (illustration at right.)



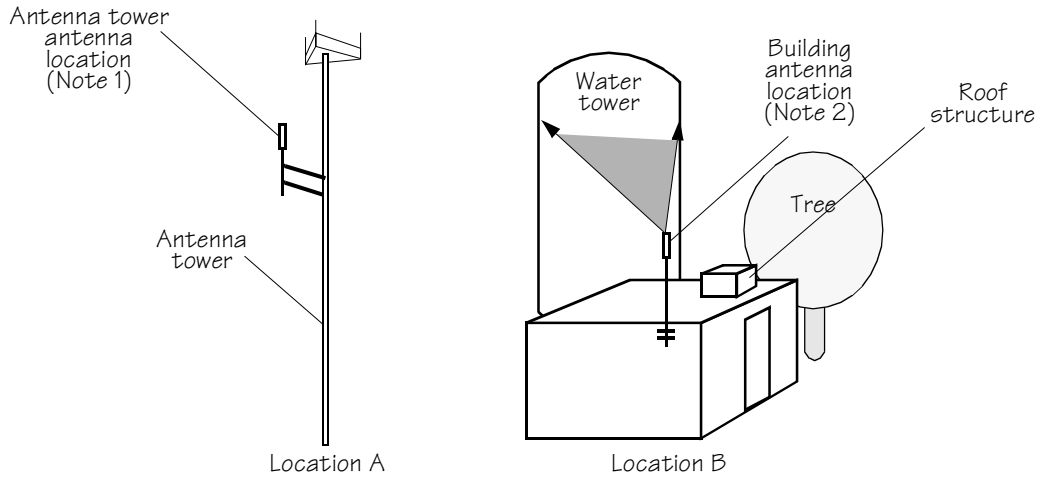
Observe the following guidelines during the placement and installation of the antenna:

- 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 4).
- 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 4. Antenna Location Examples

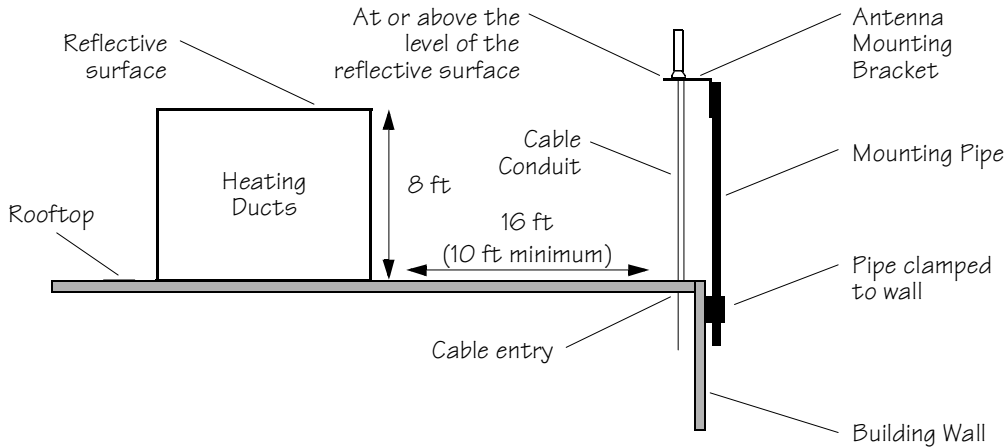


Note: The most important objects are within 1/4 mile (400 yards) of the antenna. Obstructions may include, but are not limited to, towers, buildings, other construction, trees, and high-voltage power lines.

- 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 5).

Figure 5. Sample Rooftop Antenna Mount



Note: This is an example only. Not all parts are available from Symmetricom.

-
- 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

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.**

Standard Configuration

Antenna, Lightning Suppressor, Shelf

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 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)

Optional Configuration

IRIG-B TOD

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.

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-422-to-RS-232 TOD Converter

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

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

Install the converter anywhere (for example, on unused space on a rack) within 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.

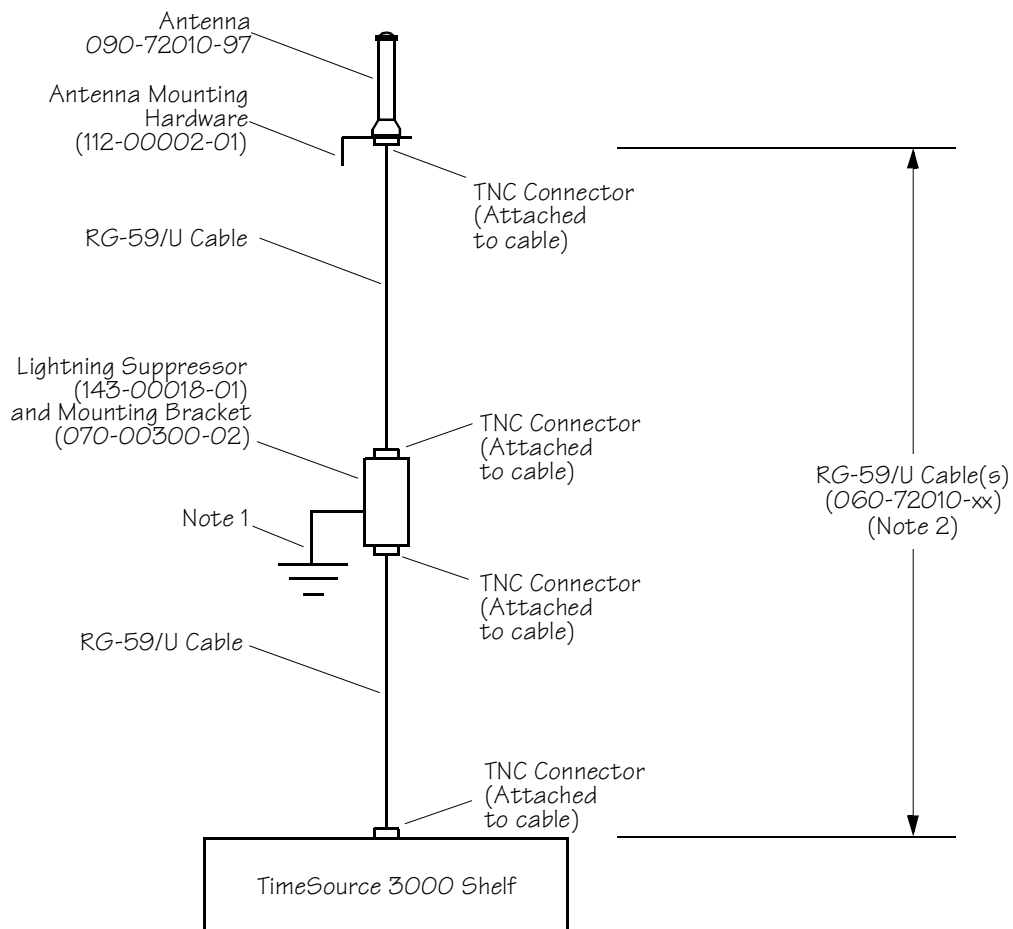
Antenna-to-Shelf Cabling

Figure 6 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 on page 32.)

Figure 6. Antenna-to-Shelf Cabling



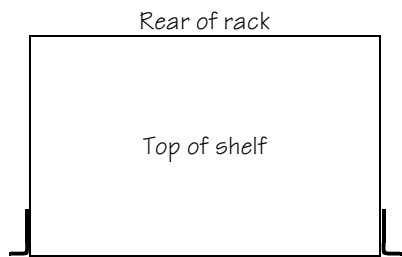
Shelf Considerations

Rack Mounting

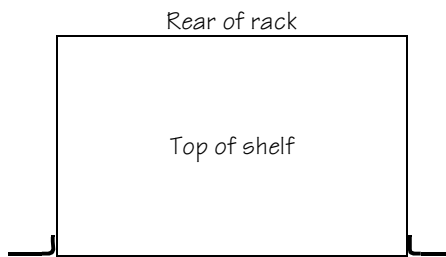
Position the mounting ears, as shown in Figure 7, for flush mounting or 5 inch offset mounting in a 19 inch rack (Figure 7A, and Figure 7C), or for flush mounting or 5 inch offset mounting in a 23 inch rack (Figure 7B and Figure 7D). Leave one RU (1.75 inches) of air space above the TimeSource 3000 Shelf 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.

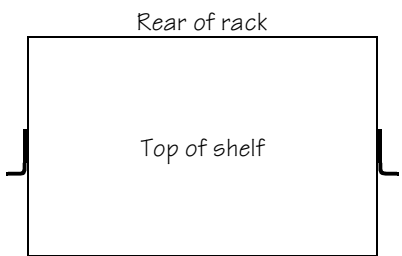
Figure 7. Rack Mounting Options



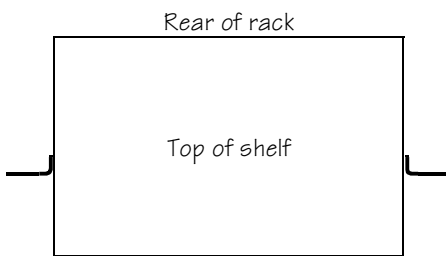
A. Flush mounting – 19 in. rack



B. Flush mounting – 23 in. rack



C. 5 in. offset – 19 in. rack



D. 5 in. offset – 23 in. rack

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 (992-72010-04)

With Ten T1 Outputs

This system (990-72010-02) includes:

- TimeSource 3000 Shelf (090-72000-01)
- TimeSource 3000 card with expansion T1 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 (992-72010-04)

With Two TI and Eight Composite Clock Outputs

This system (990-72010-03) includes:

- TimeSource 3000 Shelf (090-72000-01)
- TimeSource 3000 card with 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 (992-72010-04)

With Two TI 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 (992-72050-04)

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.

Installation

Chapter 3

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

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.

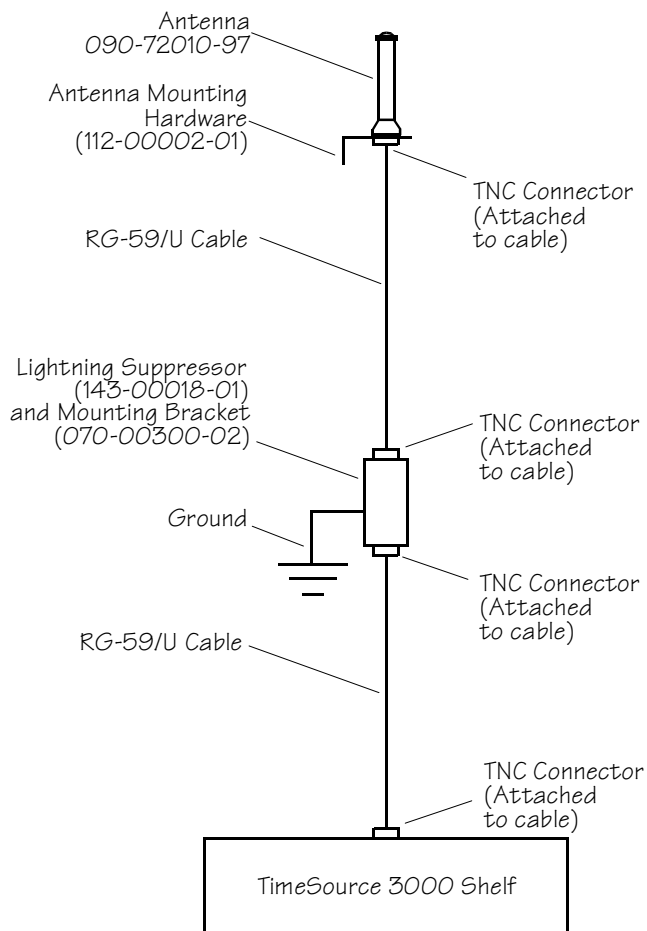
Procure the user supplied tools and materials listed in the engineering and ordering chapter.

Prior to installing the antenna, the site, antenna location, lightning suppressor location, cable route, and all other details should be planned.

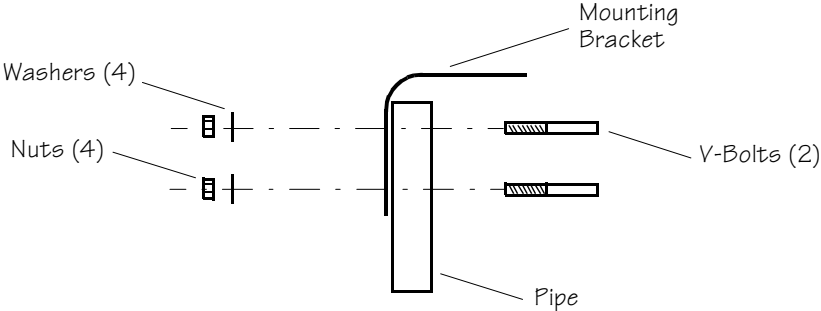
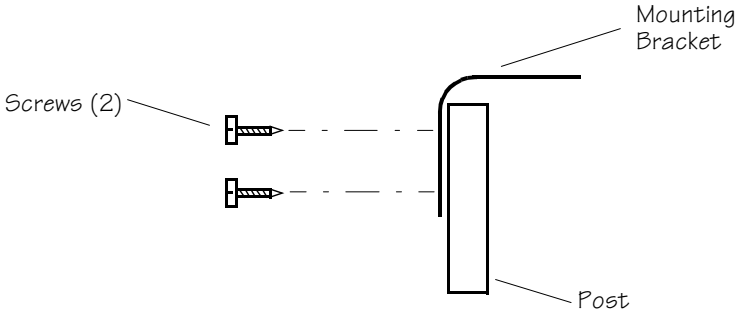
To install the antenna, refer to Figures 5 and 8, and perform Procedure B.

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

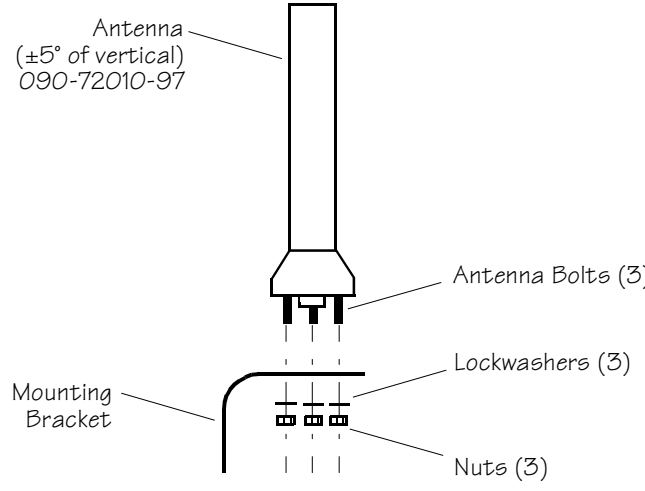
Figure 8. Antenna-to-Shelf Cabling



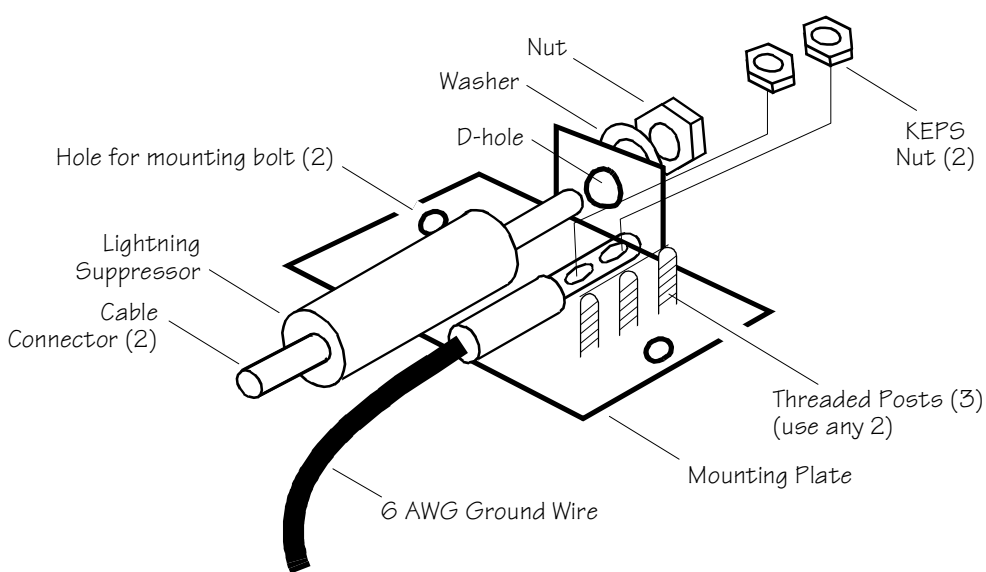
Procedure B. Antenna Mounting and Cable Connection

Step	Procedure
I	<p data-bbox="257 321 1181 347">Attach the antenna mounting bracket to a pipe (1 in. diameter) or a wood post.</p> <ul data-bbox="307 375 1208 493" style="list-style-type: none"><li data-bbox="307 375 1208 493">• 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="334 610 467 636">Washers (4)</p> <p data-bbox="341 688 436 714">Nuts (4)</p> <p data-bbox="911 553 1012 602">Mounting Bracket</p> <p data-bbox="1030 688 1157 714">V-Bolts (2)</p> <p data-bbox="865 834 911 862">Pipe</p> <ul data-bbox="307 915 1233 997" style="list-style-type: none"><li data-bbox="307 915 1233 997">• 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="378 1130 498 1156">Screws (2)</p> <p data-bbox="1012 1040 1116 1089">Mounting Bracket</p> <p data-bbox="954 1321 1007 1349">Post</p>

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

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>  <p>The diagram illustrates the assembly of the antenna to the mounting bracket. It shows a vertical antenna with a flared base. Three bolts pass through the base of the antenna into three corresponding holes in the mounting bracket. On the bracket side, each bolt is secured with a lockwasher and a nut. Labels with leader lines identify the 'Antenna (±5° of vertical) 090-72010-97', 'Antenna Bolts (3)', 'Lockwashers (3)', 'Nuts (3)', and 'Mounting Bracket'.</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 (cont'd)

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> 
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.

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

Step	Procedure
10	If the lightning suppressor was not mounted directly to a valid earth ground, crimp a length of 6 AWG ground cable to the two-hole terminal, slide the terminal over two of the three threaded posts on the lightning suppressor mounting plate, and attach the terminal to the mounting plate with two KEPS nuts. Use the two posts that allow the least bending of the 6 AWG ground cable.
11	Attach the other end of the cable to a valid earth ground.
12	Install fire-stopping material in all holes opened in the roof and/or walls during this procedure.
13	Check all connections for tightness to prevent arcing and intermittent operation.
14	Coat all exposed connectors with an electrically conductive antioxidant compound (e.g., Kopr-Shield spray).

End of Procedure

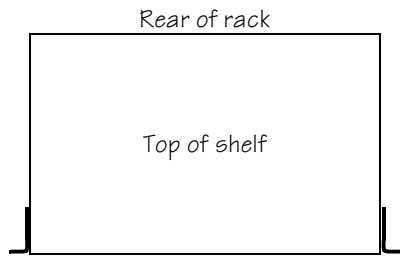
Shelf

Rack Mounting

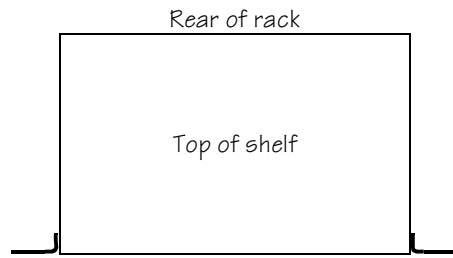
Position the mounting ears, as shown in Figure 9, for flush mounting or 5 inch offset mounting in a 19 inch rack (Figure 9A, and Figure 9C), or for flush mounting or 5 inch offset mounting in a 23 inch rack (Figure 9B and Figure 9D). Leave 1 RU (1.75 inches) of air space above the TimeSource 3000 Shelf 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.

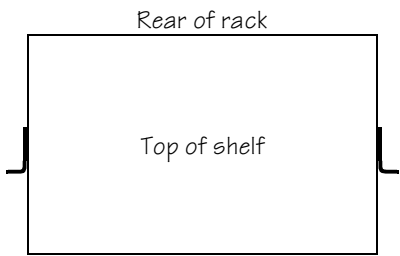
Figure 9. Rack Mounting Options



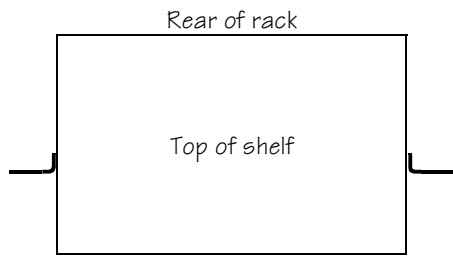
A. Flush mounting – 19 in. rack



B. Flush mounting – 23 in. rack



C. 5 in. offset – 19 in. rack



D. 5 in. offset – 23 in. rack

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.

Warning: Warning: shows the rear panel connectors. Figure 10 shows the front panel connector. All connectors can be located using these illustrations.

Warning: . Rear Panel Connectors

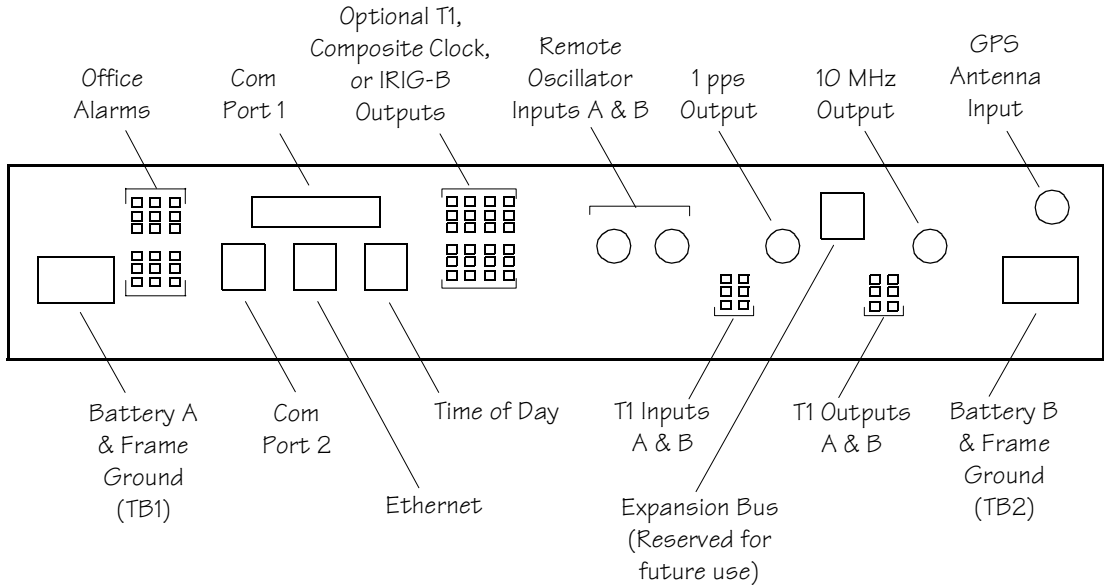
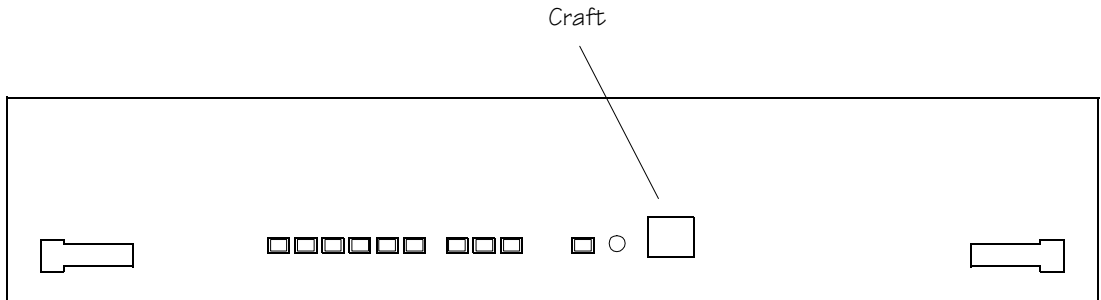


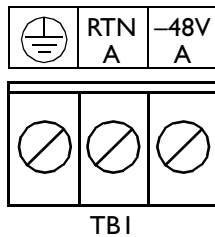
Figure 10. Front Panel Connector



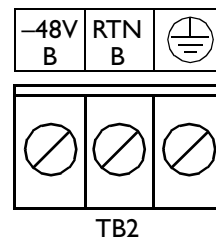
Frame Ground

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

Figure 11. Battery Connections



A. TB1 Connections
(Office Battery A)



B. TB2 Connections
(Office Battery B)

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 11).

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 Warning: for the location of the terminals on the rear of the shelf, and refer to Figure 11 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.

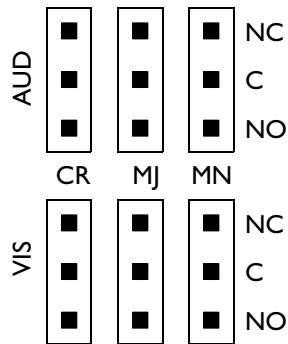
Note: Two separate office battery supplies (battery A and battery B) are recommended. If separate office battery supplies are not available, connect a single office battery to both inputs (TB1 and TB2) to avoid a standing battery-failure alarm.

Alarms Output

If using the alarms output, connect the office alarms to the critical (CR), major (MJ), and minor (MN) wire-wrap pins. See Warning: for the location of the alarm pins, and Figure 12 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 12. Alarm Connections



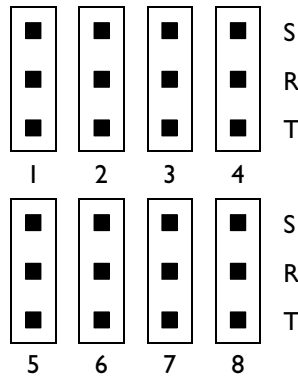
GPS Antenna

Use the supplied 90 degree adapter to connect the coaxial cable from the lightning suppressor to the TNC connector labeled GPS ANT. Refer to Warning: 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 **Warning:** for the connector location, and Figure 13 for the connections. The additional T1 outputs option is indicated by the 72010-02 part number on the shelf front panel.

Figure 13. Eight T1 and Composite Clock Connections



Composite Clock Outputs

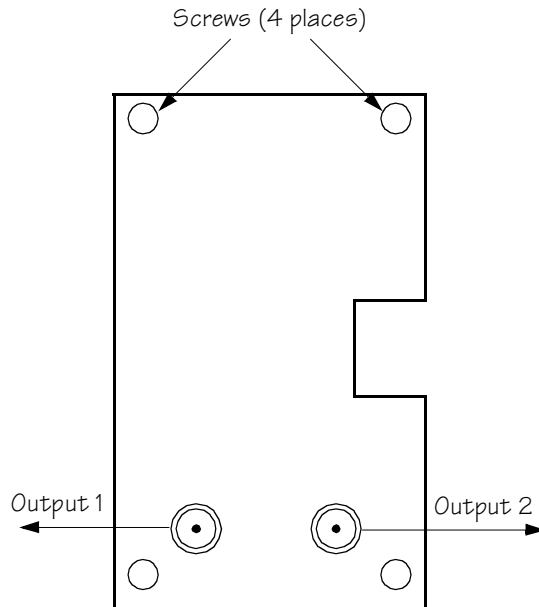
If using the optional composite clock outputs, connect the composite clock outputs from the I/O Options wire-wrap pins to network elements requiring composite clock timing. Refer to **Warning:** for the connector location and Figure 13 for the connections. The composite clock outputs option is indicated by the 72010-03 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 **Warning:** for the connector locations, and Figure 14 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 14. IRIG-B TOD BNC Output Connections



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 14).
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

Expansion Bus

Reserved for future use.

Remote Oscillator Inputs

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

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

For the connection between the 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

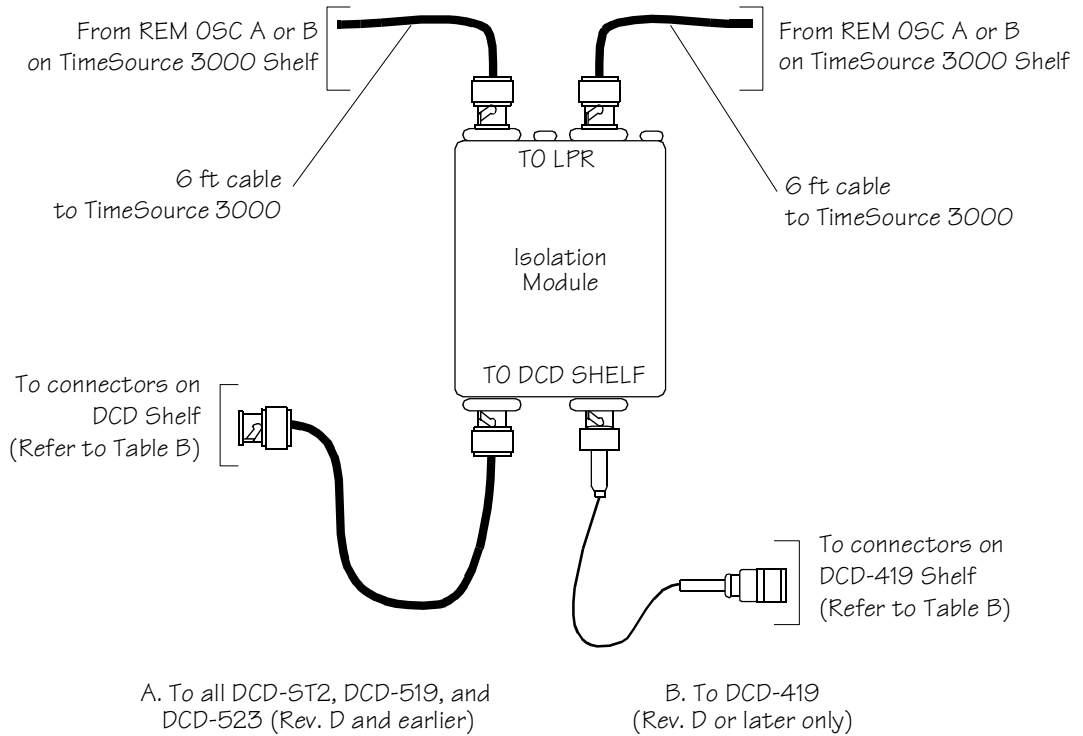
Step	Procedure
1	<p>On the rear of the DCD rack, check either side of the DCD Shelf, directly above or below the shelf, for a location to mount the isolation module. Mount to the rack, using the two provided screws.</p> <p><i>Note:</i> Due to distance constraints, the module must be placed no more than 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 15).</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 15).</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 15. DCD Shelf, Isolation Module, and TimeSource 3000 Connections



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 **Warning:** 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 **Warning:** 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 **Warning:** for the connector location.

Ethernet

Connect a user-supplied Ethernet cable from the network to the 10base-T Ethernet connector labeled ETHER. See **Figure Warning:** 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 Warning: 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 PI2V	—
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 16).</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 17).</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 17). See Table E for the DB-25 connector pinouts.</p>

End of Procedure

Figure 16. RS-422-to-RS-232 TOD Converter Mounting Plate

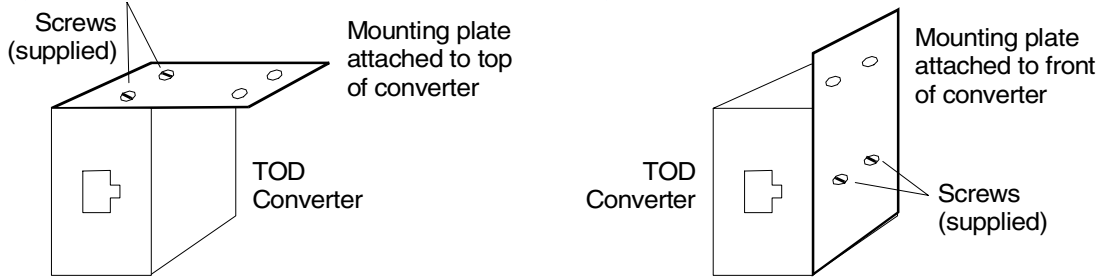


Figure 17. RJ-45-to-DB-25 TOD Converter Connections

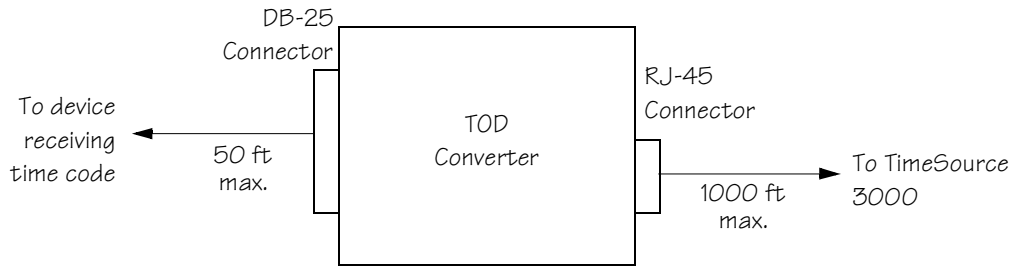


Table E. Converter DB-25 Connector Pinouts

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.

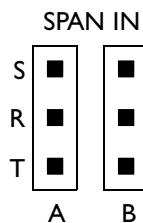
T1 Reference Inputs (Optional)

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 3500. 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 3500) to the pin labeled S. See Warning: for the location of the connectors and pins, and Figure 18 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 3500 end for additional longitudinal noise protection.

Figure 18. T1 Input Connections



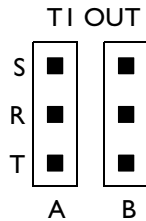
T1 Synchronization Outputs

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 Warning: for the location of the pins, and Figure 19 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 19. T1 Output Connections



Communication Port 1

To provide an RS-232 link for TL1 command access to the TimeSource 3500, connect to port 1 at the female 25-pin D connector labeled COM1. See **Warning:** for the location of the connector. See Table F for the connector pinouts.

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

Table 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 3500, connect to port 2 at the female RJ-45 connector labeled COM2. See **Warning:** 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 3500, 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 3500 for making this connection. See Figure 10 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 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
<p>Test Equipment:</p> <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 TimeSource 3000.
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.

Procedure F. Power-Up (cont'd)

Step	Procedure																		
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" data-bbox="233 454 699 649"> <thead> <tr> <th><u>Test Point</u></th> <th><u>Test Point</u></th> <th><u>Result</u></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: </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: </td> <td>0 V</td> </tr> </tbody> </table>	<u>Test Point</u>	<u>Test Point</u>	<u>Result</u>	-48V A lead	-48V B lead	0 V	-48V A lead	TB1: RTN A	0 V	-48V A lead	TB1: 	0 V	-48V B lead	TB2: RTN B	0 V	-48V B lead	TB2: 	0 V
<u>Test Point</u>	<u>Test Point</u>	<u>Result</u>																	
-48V A lead	-48V B lead	0 V																	
-48V A lead	TB1: RTN A	0 V																	
-48V A lead	TB1: 	0 V																	
-48V B lead	TB2: RTN B	0 V																	
-48V B lead	TB2: 	0 V																	
8	Attach a grounding wrist strap to the wrist, and plug the other end into the ground jack at the upper-right corner of the front of the plug-in card.																		
9	Pull out the latching levers at each end of the front panel 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.																		
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.																		

Procedure F. Power-Up (cont'd)

Step	Procedure
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. TLI 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>

Procedure F. Power-Up (cont'd)

Step	Procedure
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 (yyyy = 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:</p> <pre>ED-DAT:::123::2000-06-15,14-25-00:MODE=LOCAL;</pre>
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 (cont'd)

Step	Procedure																																																										
18	<p>Use the Retrieve Equipment command to identify how the inputs are provisioned.</p> <pre>RTRV-EQPT::ALL:<ctag>;</pre>																																																										
	<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="0"> <thead> <tr> <th data-bbox="253 495 521 527"><u>Parameter</u></th> <th data-bbox="576 495 692 527"><u>Definition</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="253 544 521 576">FREQ=5</td> <td data-bbox="576 544 1207 576">Frequency for both remote oscillator inputs is 5 MHz</td> </tr> <tr> <td data-bbox="253 576 521 609">FREQ=10</td> <td data-bbox="576 576 1207 609">Frequency for both remote oscillator inputs is 10 MHz</td> </tr> <tr> <td data-bbox="253 609 521 641">TOD=CISCO</td> <td data-bbox="576 609 987 641">Time of day output is set to CISCO</td> </tr> <tr> <td data-bbox="253 641 521 673">TOD=NTP4</td> <td data-bbox="576 641 974 673">Time of day output is set to NTP4</td> </tr> <tr> <td data-bbox="253 673 521 706">TOD=NONE</td> <td data-bbox="576 673 1015 706">Time of day output is not provisioned</td> </tr> <tr> <td data-bbox="253 706 521 738">ALMCOND=ALW</td> <td data-bbox="576 706 1227 755">Alarm condition for outputs is enabled (major alarms will cause system to condition the T1 outputs)</td> </tr> <tr> <td data-bbox="253 755 521 787">ALMCOND=INH</td> <td data-bbox="576 755 1227 803">Alarm conditioning for outputs is disabled (system will continue to output valid sync signal while in major alarm)</td> </tr> <tr> <td data-bbox="253 803 521 836">IPNE=a, b, c, d</td> <td data-bbox="576 803 795 836">This sets IP address</td> </tr> <tr> <td data-bbox="253 836 521 868">IPSUBNET=a, b, c, d</td> <td data-bbox="576 836 727 868">Subnet mask</td> </tr> <tr> <td data-bbox="253 868 521 901">IPGATE=a, b, c, d</td> <td data-bbox="576 868 884 901">Default gateway IP address</td> </tr> <tr> <td data-bbox="253 901 521 933">IPEM1=a, b, c, d</td> <td data-bbox="576 901 1001 933">Primary element manager IP address</td> </tr> <tr> <td data-bbox="253 933 521 966">IPEM1PORT=a</td> <td data-bbox="576 933 1118 966">Primary element manager output port address</td> </tr> <tr> <td data-bbox="253 966 521 998">IPEM2=a, b, c, d</td> <td data-bbox="576 966 1022 998">Alternate element manager IP address</td> </tr> <tr> <td data-bbox="253 998 521 1031">IPEM2PORT=a</td> <td data-bbox="576 998 1056 1031">Alternate element manager port number</td> </tr> <tr> <td data-bbox="253 1031 521 1063">IPEMACT=a</td> <td data-bbox="576 1031 1227 1079">Port 5550 closes connection if no autonomous messages are sent during this number of 100ms</td> </tr> <tr> <td data-bbox="253 1079 521 1112">ANTCBLDLY=x</td> <td data-bbox="576 1079 1029 1112">Antenna cable length is x nanoseconds</td> </tr> <tr> <td data-bbox="253 1112 521 1144">ANTELEVMASK=x</td> <td data-bbox="576 1112 1063 1144">Antenna elevation mask angle is x degrees</td> </tr> <tr> <td data-bbox="253 1144 521 1177">ENSEMBLER=ALW</td> <td data-bbox="576 1144 850 1177">This input is ensembled</td> </tr> <tr> <td data-bbox="253 1177 521 1209">ENSEMBLER=INH</td> <td data-bbox="576 1177 898 1209">This input is not ensembled</td> </tr> <tr> <td data-bbox="253 1209 521 1242">MONITOR=ALW</td> <td data-bbox="576 1209 843 1242">This input is monitored</td> </tr> <tr> <td data-bbox="253 1242 521 1274">MONITOR=INH</td> <td data-bbox="576 1242 891 1274">This input is not monitored</td> </tr> <tr> <td data-bbox="253 1274 521 1307">SSM=ALW</td> <td data-bbox="576 1274 1063 1307">SSM message is used to qualify span input</td> </tr> <tr> <td data-bbox="253 1307 521 1339">SSM=INH</td> <td data-bbox="576 1307 1104 1339">SSM message is not used to qualify span input</td> </tr> <tr> <td data-bbox="253 1339 521 1372">FRAMING=ESF</td> <td data-bbox="576 1339 878 1372">This output framing is ESF</td> </tr> <tr> <td data-bbox="253 1372 521 1404">FRAMING=D4</td> <td data-bbox="576 1372 871 1404">This output framing is D4</td> </tr> <tr> <td data-bbox="253 1404 521 1437">ALMOUT=AIS</td> <td data-bbox="576 1404 932 1437">This output is AIS during alarm</td> </tr> <tr> <td data-bbox="253 1437 521 1469">ALMOUT=SQUELCH</td> <td data-bbox="576 1437 1008 1469">This output is squelched during alarm</td> </tr> <tr> <td data-bbox="253 1469 521 1502">ALMOUT=SSM</td> <td data-bbox="576 1469 1022 1502">This output includes SSM during alarm</td> </tr> </tbody> </table>	<u>Parameter</u>	<u>Definition</u>	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
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Procedure F. Power-Up (cont'd)

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> <pre>ENT-EQPT::R0-x:<ctag>:::ENSEMBLER=y;</pre> <p>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> <pre>ED-EQPT::TS3000:<ctag>:::R0FREQ=x;</pre> <p>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> <pre>ENT-EQPT::SPAN-x:<ctag>:::ENSEMBLER=y;</pre> <p>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> <pre>ED-EQPT::T1-x:<ctag>:::FRAMING=y,ALMOUT=z;</pre> <p>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>

Procedure F. Power-Up (cont'd)

Step	Procedure
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> <pre data-bbox="312 410 998 440">ED-EQPT::OPT-a:<ctag>::FRAMING=b,ALMOUT=c;</pre> <p data-bbox="312 467 1232 581"> 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 28. Use the Initialize Register command to reset the performance monitoring data to zero for all input spans.</p> <pre data-bbox="312 695 806 724">INIT-REG-EQPT::ALL:<ctag>::ALL;</pre>
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 data-bbox="312 922 1081 951">ED-EQPT::GPS:<ctag>::ANTCBLDLY=x,ANTELEVMASK=y;</pre> <p data-bbox="312 979 1201 1068"> 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 data-bbox="257 1097 1232 1276"> Note: 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>

Procedure F. Power-Up (cont'd)

Step	Procedure
26	<p>If not using the TOD output, skip to Step 27. Use the Edit Equipment command to set the TOD output.</p> <pre data-bbox="266 380 760 412">ED-EQPT::TS3000:<ctag>:::TOD=y;</pre> <p data-bbox="266 435 806 467">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 data-bbox="266 695 823 727">ED-EQPT::TS3000:<ctag>:::ALMCOND=y;</pre> <p data-bbox="266 750 1026 782">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 data-bbox="266 1010 1094 1042">ED-EQPT::TS3000:<ctag>:::IPNE=a,IPSUBNET=a,IPGATE=a;</pre> <p data-bbox="266 1065 1059 1123">IPNE=a = This unit's IP address in the form a.a.a (each a is an independent value of 0 to 255)</p> <p data-bbox="266 1123 1182 1182">IPSUBNET=a = Subnet mask in the form a.a.a (each a is an independent value of 0 to 255)</p> <p data-bbox="266 1182 1182 1240">IPGATE=a = Gateway IP address in the form a.a.a (each a is an independent value of 0 to 255)</p>

Procedure F. Power-Up (cont'd)

Step	Procedure
29	<p>Ports 5001, 5002, 5003 and 5004 on the TimeSource 3000 are used as though they were serial TLI 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) KEEPALIVE=0 (does not send a COMPLD message to keep connection open) ENDOFTEXT=0 (does not include an end-of-text code with a TLI message) ECHO=ALW (echoes characters back to the sending terminal) COMPRI=ALW1 (normal communication, including autonomous messages) AUTOLOGOFF=0 (does not log off the user during inactivity) SWCONTROL=INH (uses no flow control)</p> <p>If these values require change, use the Edit Communications command to set communications parameters for TLI 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) MONMSG=b = Monitors messages on all ports (b = ALW), or current port (b = INH) KEEPALIVE=c = Inactive minutes until the unit sends a COMPLD message to keep the connection from being closed (c = 0 to 255) ENDOFTEXT=d = Hex code added to responses before semicolon (d = 0 (disabled) to 9F) ECHO=b = Echoes characters received so they appear on the user's screen as typed (b = ALW), or inhibits echo (b = INH) COMPRI=e = Sets the communication port capabilities as follows: ALW0=normal communication, no autonomous messages ALW1=normal communication, autonomous messages ALW2=autonomous messages received, logged on or not INH = closes connection and keeps port from use (command must go to another port) (if the port is in use, this command also logs off the user) AUTOLOGOFF=c = Inactive minutes until the unit logs off the user, keeping the connection open (c = 0 to 255) SWCONTROL=b = uses software (XON/XOFF) flow control (b = ALW), or no flow control (b = INH)</p>

Procedure F. Power-Up (cont'd)

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 TLI 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="267 529 1130 581">ED-EQPT::TS3000:<ctag>:::IPEM1=a , IPEM1PORT=b[, IPEM2=a] [, IPEM2PORT=b][, IPINACT=c];</pre> <p data-bbox="267 613 1181 667">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 data-bbox="267 669 1044 722">IPEM1PORT=b =Primary Element Manager's Ethernet port address (b = 0 to 65535)</p> <p data-bbox="267 724 1140 777">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 data-bbox="267 779 1064 833">IPEM2PORT=b =Alternate Element Manager's Ethernet port address (b = 0 to 65535)</p> <p data-bbox="267 834 1181 919">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 (cont'd)

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 TLI 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 TLI message) ECHO=INH (does not echo characters received) COMPRI=ALW1 (normal communication, including autonomous messages) AUTOLOGOFF=0 (does not log off the user during i-ivity) SWCONTROL=INH (uses no flow control)</p> <p>If these values require change, use the Edit Communications command to set communications parameters for TLI 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=c = Inactive minutes until the unit sends a COMPLD message to keep the connection from being closed (c = 0 to 255) ENDOFTEXT=d = Hex code added to responses before semicolon (d = 0 (disabled) to 9F) ECHO=b = Echoes characters received so they appear on the user's screen as typed (b = ALW), or inhibits echo (b = INH) COMPRI=e = Sets the communication port capabilities as follows: ALW0 = normal communication, no autonomous messages ALW1 = normal communication, autonomous messages ALW2 = autonomous messages received, logged on or not INH = closes connection and keeps port from use (command must go to another port) (if the port is in use, this command also logs off the user) AUTOLOGOFF=c = Inactive minutes until the unit logs off the user, keeping the connection open (c = 0 to 255) SWCONTROL=b = uses software (XON/XOFF) flow control (b = ALW), or no flow control (b = INH)</p>

Procedure F. Power-Up (cont'd)

Step	Procedure
32	<p>Use the Copy Memory command to copy the database from volatile to nonvolatile memory within the TimeSource 3000.</p> <pre data-bbox="266 380 952 410">CPY-MEM:[tid]: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>
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 data-bbox="234 672 1153 878" 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 TLI autonomous “settling period” event message exists. <p><i>Notes:</i></p> <ol data-bbox="211 938 1181 1166" 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.

End of Procedure

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
GPS	ANTCBLDLY=0 ANTELEVMASK=10
RO-A, RO-B	ENSEMBLER=INH MONITOR=INH
SPAN-A, SPAN-B	ENSEMBLER=INH MONITOR=INH SSM=INH
TI-A, TI-B	FRAMING=ESF ALMOUT=AIS

Table I. Parameter Factory Settings (cont'd)

<aid>	Parameter Setting
COM-1, COM-2, COM-3	BAUD=9600 MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=ALW COMPRI=ALW I AUTOLOGOFF=0 HWCONTROL=INH SWCONTROL=INH PARITY=NONE STOP= I
COM-5001, COM-5002, COM-5003, COM-5004	MONMSG=INH KEEPALIVE=0 ENDOF TEXT=00 ECHO=ALW COMPRI=ALW I AUTOLOGOFF=0 SWCONTROL=INH
COM-555 I	MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=INH COMPRI=ALW I AUTOLOGOFF=0 SWCONTROL=INH
OPT-1, OPT-2, OPT-3, OPT-4, OPT-5, OPT-6, OPT-7, OPT-8 (990-72010-02 only)	FRAMING=ESF ALMOUT= AIS

TLI Reference

This chapter provides information for using the TLI language.

Chapter 4

Conventions

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

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

- [] encloses an optional parameter
- { } encloses a group of parameters, at least one of which must be entered
- | separates alternatives in a group of parameters, at least one of which must be entered

- ^ indicates a space (used in the description of the response format, but not used in the command responses)
- separates command code fields
- : separates parameter blocks
- , separates parameters within a block
- ; terminates a command, and causes execution
- " " encloses text to be parsed by a machine
- /* */ encloses comments for humans
- < > encloses a TL1 named variable
- \ " \ " encloses a description of a condition
- ... indicates the previous line in a response may be repeated as required

Command Format

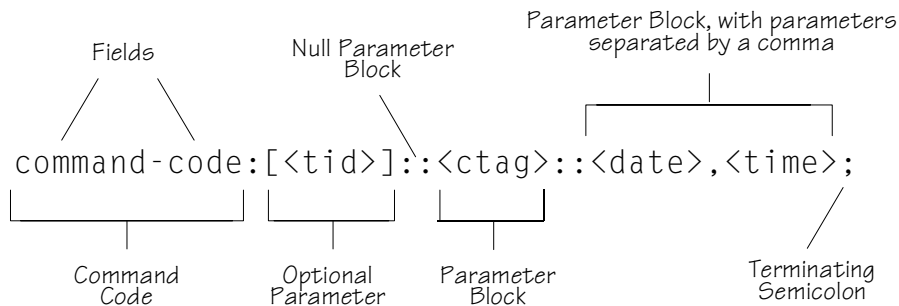
A command consists of a command code of up to three fields separated by hyphens, followed by parameter blocks separated by colons. Figure 20 shows the command format. Parameter blocks consist of one or more parameters separated by commas.

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 20. 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 21 shows the completed response format. COMPLD indicates that the command was completed without error.

Figure 22 shows the denied response format. DENY indicates that the command was denied due to an error. The <errcode> parameter indicates the corresponding error type, or cause of the error.

Figure 21. Completed Response Format

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

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

Figure 22. Deny Response Format

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

Parameters

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

Table J. Parameter Definitions

Parameter	Definition
<aid>	Access identifier for the object of the command or message. It may have more than one part.
<almcde>	Alarm code. Identifies the severity of the alarm based on its priority of action. If multiple alarms are reported, almcde is the highest severity of those reported.
<alt>	Antenna location altitude in meters, specified to the thousandth of a meter, referenced to mean sea level, in the format mm.mmm.
<atag>	Automatic message tag. It is incremented by one for each autonomous message. The <atag> value is a whole number from 001 through 999, which is reset to 001 at reset or when it rolls over.
<command>	Echo of the entered command.
<conddescr>	Text description of the condition. The <conddescr> value is limited to 64 characters starting and ending with a backslash and a double quotation mark ("). Refer to the Troubleshooting chapter of this manual for the list of values.
<condeff>	Effect on the condition of the equipment.
<condtype>	Type of alarm condition.
<ctag>	Correlation tag used to correlate input and response messages. The ctag contains 1 to 6 characters. It must be included in a command, and the same ctag is returned in the response.

Table J. Parameter Definitions (cont'd)

Parameter	Definition
<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.
<errcde>	<p>Four-character mnemonic error code, which is one of the following:</p> <ul style="list-style-type: none"> EFON = equipment feature option not provided ENEQ = not equipped ICNV = command not valid IDNV = invalid data in command IDRG = invalid data range in command IIAC = invalid aid in command IICT = invalid correlation tag IIDT = invalid data parameter in command IISP = invalid syntax or punctuation IITA = invalid tid PIUI = invalid or duplicate uid or pid (privileged users only) RALB = All units of requested type are busy RCBY = circuit is busy SCSN = invalid command sequence SDBE = internal database error SNIS = not in service SNVS = not in a valid state SRCN = requested condition currently exists SRQN = request invalid SWFA = working unit failed
<error message>	Error code text message.
<link>	Communication link identifier.
<modifier>	<p>Equipment initiating the alarm or event message, which is one of the following:</p> <ul style="list-style-type: none"> TS3000 = system software GPS = GPS receiver software RO-x = remote oscillator input SPAN-x = TI span input

Table J. Parameter Definitions (cont'd)

Parameter	Definition
<ntfcncde>	Notification code showing the alarm severity, which is one of the following: CR = critical MJ = major MN = minor
<ocrdat>	Occurrence date in the 8-digit form: yyyy-mm-dd (command) or yyyy:mm:dd (response or message), where yyyy is the year, mm is the month (01-12), and dd is the day of the month (01-31). For example, May 3, 2000 is 2000-05-03.
<ocrtm>	Occurrence time in the 6-digit form: hh-mm-ss (command) or hh:mm:ss (response or message), where hh is hours (00 to 23), mm is minutes (00 to 59), and ss is seconds (00 to 59). For example, 2:34 pm is 14:34:00.
<pid>	Private identifier, factory-set to "TS3000!!". It is the initial password for the TELECOM <uid>. Passwords are encrypted when stored in the TimeSource 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, and hyphens) 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

Table J. Parameter Definitions (cont'd)

Parameter	Definition
<tid>	Target identifier which identifies the equipment (TimeSource 3000) to which the command is directed. The tid must be a valid TLI 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 <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 <modifier>
  "<aid>:<condtype>,<condeff>,<ocrdat>,<ocrtm>
    ,,,:\ "<conddescr>\ "[:<dgntype>]"
```

Note: Refer to Table J for parameter definitions.

Factory-Set Values

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

Table K. 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
GPS	ANTCBLDLY=0 ANTELEVMASK=10
RO-A, RO-B	ENSEMBLER=INH MONITOR=INH
SPAN-A, SPAN-B	ENSEMBLER=INH MONITOR=INH SSM=INH
TI-A, TI-B	FRAMING=ESF ALMOUT=AIS

Table K. Parameter Factory Settings (cont'd)

<aid>	Parameter Setting
COM-1, COM-2, COM-3	BAUD=9600 MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=ALW COMPRI=ALW I AUTOLOGOFF=0 HWCONTROL=INH SWCONTROL=INH PARITY=NONE STOP= I
COM-5001, COM-5002, COM-5003, COM-5004	MONMSG=INH KEEPALIVE=0 ENDOF TEXT=00 ECHO=ALW COMPRI=ALW I AUTOLOGOFF=0 SWCONTROL=INH
COM-555 I	MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=INH COMPRI=ALW I AUTOLOGOFF=0 SWCONTROL=INH
OPT-1, OPT-2, OPT-3, OPT-4, OPT-5, OPT-6, OPT-7, OPT-8 (990-72010-02 only)	FRAMING=ESF ALMOUT=AIS

Tasks/Commands

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

Table L. Commands for Tasks

Task	Command	Page
Log user onto system	Activate User	113
Log user off of system	Cancel User	114
Copy software program or database	Copy Memory	115
Delete equipment from the database	Delete Equipment	117
Delete a user from system	Delete User Security	118
Change communication port parameters	Edit Communication	119
Change the system date and time	Edit Date	123
Change equipment parameters	Edit Equipment	125
Enter equipment into the database and allow the equipment to be used for monitoring	Enter Equipment	130
Enter a new user and configure the new user's user name, password, and access level	Enter User Security	132
Reset to zero all performance monitoring parameters associated with a given aid	Initialize Register	133

Table L. Commands for Tasks (cont'd)

Task	Command	Page
Reset the system processor or GPS receiver processor	Initialize System	134
Deactivate the audible office alarm	Operate Alarm Cutoff All	135
Display current system alarms	Retrieve Alarm All	136
Display current alarms for specific equipment	Retrieve Alarm Equipment	137
Display current communication port parameter settings	Retrieve Communication	139
Display current system alarms and events	Retrieve Condition All	142
Display current alarms and events for specific equipment	Retrieve Condition Equipment	143
Display parameter settings of equipment	Retrieve Equipment	145
Display GPS status information	Retrieve GPS Status	150
Display information about equipment	Retrieve Inventory	152
Display performance monitoring data	Retrieve Performance Monitoring	154
Display security parameters for a single user or for all users	Retrieve User Security	170
Set the name of the equipment	Set Source Identifier	171

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	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 user off the system, and ends a session. The user name is not case sensitive, but must otherwise be entered exactly as assigned. The command format is:

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

Parameter	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)
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)

Copy Memory (cont'd)

Command Example:

```
CPY-MEM::
```

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 software

Command Example:

```
CPY-MEM::
```

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	a Value	Item Addressed
RO-a	a=A	Remote oscillator A input
	a=B	Remote oscillator B input
SPAN-a	a=A	TI span A input
	a=B	TI 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>;
```

Parameter	Parameter Description
<uid>	Assigned user name

Command Example:

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

Response Format:

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

Edit Communication

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

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

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

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 (cont'd)	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	TLI commands and responses, no autonomous messages sent
		b = ALW1	TLI commands and responses, autonomous messages
		b = ALW2	TLI 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)

Edit Communication (cont'd)

Aid	Parameter	Value	Description
COM-a (cont'd)	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
	SWCONTROL=b (See Note 4)	b = ALW	XON/XOFF flow control is enabled
		b = INH	XON/XOFF flow control is not enabled
BAUD=b (See Note 3)		b = 115	Serial port baud rate is 115 kbaud
		b = 57.6	Serial port baud rate is 57.6 kbaud
		b = 38.4	Serial port baud rate is 38.4 kbaud
		b = 19.2	Serial port baud rate is 19.2 kbaud
		b = 9600	Serial port baud rate is 9600 baud
		b = 4800	Serial port baud rate is 4800 baud
		b = 2400	Serial port baud rate is 2400 baud
		b = 1200	Serial port baud rate is 1200 baud
PARITY=b (See Note 3)		b = EVEN	Even parity is enabled on serial port
		b = ODD	Odd parity is enabled on serial port
		b = NONE	No parity is enabled on serial port
STOP=b (See Note 3)		b = 1	1 stop bit on serial port
		b = 2	2 stop bits on serial port

Edit Communication (cont'd)

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	Parameter Description
date in the format a-b-c	a = <year>	4-digit year
	b = 01 to 12	Month
	c = 01 to 31	Day
time in the format a-b-c (Note 1)	a = 00 to 23	Hour of the day
	b = 00 to 59	Minutes
	c = 00 to 59	Seconds
MODE=a	a = UTC (Note 2)	Uses Universal Coordinated Time from GPS (cannot set time by TLI 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 the hours. Minutes and seconds continue to conform with UTC.
2. If a command includes MODE=UTC, and the GPS signal is not present, the command is denied.

Edit Date (cont'd)

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	a 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	TI span A input
	a=B	TI span B input
TI=a	a=A	TI A output
	a=B	TI B output
OPT=a	1 to 8	Output port number (990-72010-02 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.

Aid	Parameter	a 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=VALW	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			

Aid	Parameter	a Value	Description
TS3000 (cont'd)	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	
	IPEM1=a.b.c.d (See Notes 1, 2, 3)	a = 0 to 255	IP address of primary element manager (port 5550 connects to this element manager to send autonomous messages, disconnects when transmit is complete)
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	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 Notes 1, 2, 3)	a = 0 to 255	IP address of alternate element manager (if used) (port 5550 connects to this element manager if connection cannot be made to the primary element manager)
		b = 0 to 255	
		c = 0 to 255	
d = 0 to 255			
IPEM2PORT=a (See Notes 1, 2, 3)	a = 0 to 65535	Port address of alternate element manager (port for IPEM2 address)	
IPINACT=a (See Note 1)	a = 0 to 10000	Port 5550 closes the connection to the Element Manager if no autonomous messages are sent during this number of 100-ms units (0 to 10,000, where 0 deactivates the timer; for example, 100 = 10 s)	
GPS	ANTCBLDLY=y	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

Edit Equipment (cont'd)

Aid	Parameter	a Value	Description
SPAN-x (see Note 5)	ENSEMBLER=a	a=ALW	Span is ensembled
		a=INH	Span is not ensembled
	SSM=a (see Note 6)	a=ALW	SSM qualifies span input
		a=INH	SSM does not qualify span input
T1-x	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	Output includes SSM during alarm (SSM requires ESF output framing)
OPT-x (990-72010-02 only)	ALMOUT=a	a=AIS	Output is AIS during alarm
		a=SQUELCH	Output is squelched during alarm
		a=SSM	Output includes SSM during alarm (SSM requires ESF output framing)
	FRAMING=a	a=ESF	Output framing is ESF
		a=D4	Output framing is D4

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

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	a Value	Item Addressed
RO-a	a=A	Remote oscillator A input
	a=B	Remote oscillator B input
SPAN-a	a=A	TI span A input
	a=B	TI span B input

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	b 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 – can be up to 10 alphanumeric characters, must include at least two non-alphabetic characters, and must contain at least one of the following special characters: ! " \$ % & ' () * + , - . / < > ? @
<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 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	TI span A input
	a = B	TI span B input
ALL	—	TI 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	x Value	Item Addressed
TS3000	—	System (all TS3000 alarms)
SPAN-x	x=A	TI span A input
	x=B	TI 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
ALL	—	All communication 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	TLI commands and responses, no autonomous messages sent
	a = ALW1	TLI commands and responses, sends autonomous messages
	a = ALW2	TLI 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	TI span A input
	x=	TI span B input
RO-x	x=	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
TI-x	x=A	TI A output
	x=B	TI B output
OPT-x	x=1 to 8	TI 1 through 8 outputs (990-72010-02 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.

Retrieve Equipment (cont'd)

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
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	

Retrieve Equipment (cont'd)

Aid	Parameter	Value	Parameter Description
TS3000 (cont'd)	IPGATE=a.b.c.d	a = 0 to 255	Default gateway IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPEM1=a.b.c.d	a = 0 to 255	Primary element manager IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPEM1PORT=a	a = 0 to 65535	Primary element manager output port address
	IPEM2=a.b.c.d	a = 0 to 255	Alternate element manager IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPEM2PORT=a	a = 0 to 65535	Alternate element manager port number
	IPINACT=a	a = 0 to 10000	Port 5550 closes the connection to the Element Manager if no autonomous messages are sent during this number of 100-ms units (0 to 10,000, where 0 deactivates the timer; for example, 100 = 10 s)
	GPS	ANTCBLDLY=a	a=0 to 330
ANTELEV MASK=a		a=0 to 45	Antenna elevation mask angle (degrees)

Retrieve Equipment (cont'd)

Aid	Parameter	Value	Parameter Description
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	TI span is ensembled
		a=INH	TI span is not ensembled
	MONITOR=a	a=ALW	TI span is monitored
		a=INH	TI span is not monitored
	SSM=a	a=ALW	SSM message is used to qualify input
		a=INH	SSM message is not used to qualify input
TI-x	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	Output includes SSM during alarm (SSM requires ESF framing)
	OPT-x (990-72010-02 systems only)	ALMOUT=a	a=AIS
a=SQUELCH			Output is squelched during alarm
a=SSM			Output includes SSM during alarm (SSM requires ESF framing)
FRAMING=a		a=ESF	Output framing is ESF
		a=D4	Output framing is D4

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 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)
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 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 Phase 1M. 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.

Phase 1M data includes 60 minutes of phase values.

The command format is:

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

Retrieve Performance Monitoring (cont'd)

Parameter	Value	Description
SPAN-a	a = A	EI span A input
	a = B	EI span B input
<montype>	MTIE	MTIE data reported
	TDEV	TDEV data reported
	PHASEIS	I-second phase data reported
	PHASEIM	I-minute phase data reported
<mondatt>	yyyy-mm-dd	Date of monitored data
<montm>	hh-mm	Time of monitored data

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>*/
;

```

Retrieve Performance Monitoring (cont'd)

Note: MTIE Data types:

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

Retrieve Performance Monitoring (cont'd)

Parameter	Value	Description
SPAN-a	a = A	EI span A input
	a = B	EI span B input
MTIE-a	a = 1S, 2S, 4S, 10S, 40S, 100S, 300S, 900S, 1800S, 3600S, 7200S, 14400S, 28800S, or 86400S	MTIE monitored type, where a is time intervals in seconds
<monval>	One 15 min bin from the last 24 h of data	Monitored value
<vldty>	COMPL	Data is valid
	NA	Data is not valid
<mondatt>	yyyy-mm-dd	Date of monitored data
<montm>	hh-mm-ss	Time of monitored data

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"
"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>
    ,,,,<mondatt>,<montm>"
    .           .           .
    .           .           .
    .           .           .
  "SPAN-a:TDEV-a,<monval>,<vldty>
    ,,,,<mondatt>,<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 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.
- Entering the date or time is optional. Type a semicolon after montype to display the most recent statistics for the specified montype.

Retrieve Performance Monitoring (cont'd)

Parameter	Value	Item Addressed
SPAN-a	a = A	EI span A input
	a = B	EI span B input
TDEV=a	a = 1S, 2S, 4S, 8S, 16S, 32S, 64S, 128S, 256S, 512S, or 1024S	TDEV monitored type, where a is time intervals in seconds
<monval>	One 15 min bin from the last 24 h of data	Monitored value
<vldty>	COMPL	Data is valid
	NA	Data is not valid
<mondatt>	yyyy-mm-dd	Date of monitored data
<montm>	hh-mm-ss	Time of monitored data

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: PHASE 1S Data types:

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

Retrieve Performance Monitoring (cont'd)

Parameter	Value	Item Addressed
SPAN-a	a = A	EI span A input
	a = B	EI span B input
PHASEIS	—	Phase IS 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
< Δ >	The difference (Δ) from the preceding 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
<mondatt>	yyyy-mm-dd	Date of monitored data
<montm>	hh-mm-ss	Time of monitored data

Retrieve Performance Monitoring (cont'd)

PHASE1M Response Format:

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

Retrieve Performance Monitoring (cont'd)

Note: PHASE 1M Data types:

- The TimeSource 3000 collects a full 7 days of 1 minute phase data.
- The 1 minute phase data is displayed in 1 hour groups. Each request for 1 minute phase is synchronized to the hour.
- Any mondat/montm combination outside of the past 7 day window is denied. Any time increment may be entered. The system rounds the value to the nearest hour, i.e., the minute and second field of the montm is ignored.
- The first value (monval) is the oldest value in the range selected. For example, if montm = 8:45:32, the first monval will exceed time 8:00:00 followed by the value at 8:01:00, etc.
- Entering the date or time is optional. Type a semicolon after montype to display the most recent statistics for the specified montype.

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	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	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>*/  
;
```

.....

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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 23. The items are described in Table M. Use Table M to troubleshoot the system based on the front-panel lamps.

Figure 23. Controls and Indicators

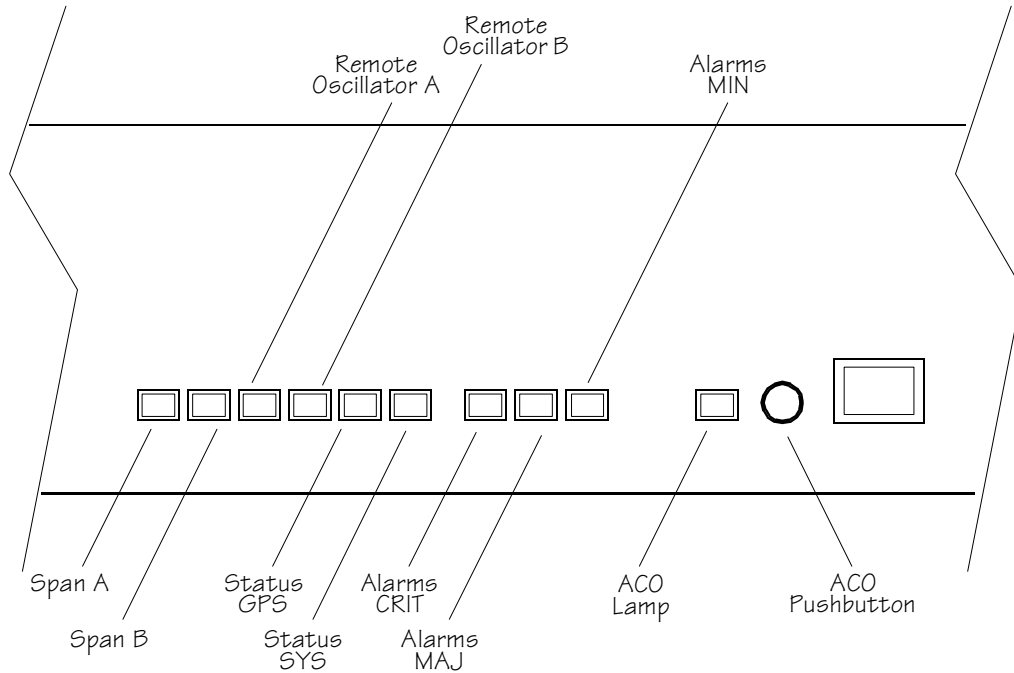


Table M. Front Panel Items

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 for more than 24 h, 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 input for more than 24 h, 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 M. 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. This event will escalate to a minor alarm after 3 h.
	Red	A GPS event, which has existed for more than 3 h, has escalated to a minor alarm.	Refer to Table N 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 for more than 24 h, 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 for more than 24 h.	Troubleshoot the red Status GPS lamp.

Table M. Front Panel Items (cont'd)

Name	Lamp	Description	Action
Alarms MIN	Off	There is no minor alarm.	None required.
	Yellow	A minor alarm has occurred because Battery A or B has failed.	Troubleshoot and repair the specified –48 V battery input.
		A minor alarm has occurred because a software download is required.	Refer to Table N 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 N to determine which event occurred and the recommended action.
		A minor alarm has occurred because the antenna failed.	Refer to Table N to determine whether the minor alarm is due to antenna failure. If so, replace the antenna.
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 N 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 N. 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.)

Table N. Message Troubleshooting (cont'd)

Message	Meaning	Action
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 N. 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.</p> <p>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 \pm2 vdc, replace the TimeSource 3000 card, using Procedure G. 3. If it indicates 18 vdc \pm2 vdc, measure the mA 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, re-connect 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. <p>Becomes minor alarm after 3h.</p>

Table N. Message Troubleshooting (cont'd)

Message	Meaning	Action
GPS DOWNLOAD REQUIRED	The GPS software is corrupt or missing.	Download, and install, the GPS receiver (GPS) software, using the procedure in the Software Release Document that came with the software.
HIGH CURRENT FAULT	Current to antenna is outside specification.	<p>If not accompanied by the GPS ERROR alarm, none required.</p> <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 \pm2 vdc, replace the TimeSource 3000 card, using Procedure G. 4. If it indicates 18 vdc \pm2 vdc, measure the mA 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, reconnect 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.
LOW CURRENT FAULT		

Table N. 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.	<p>If this occurs momentarily during power-up, none required.</p> <p>If this occurs during steady-state operation:</p> <ol style="list-style-type: none"> 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.

Table N. Message Troubleshooting (cont'd)

Message	Meaning	Action
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 USER TIMEOUT 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.
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. Becomes minor alarm after 10h.

Table N. Message Troubleshooting (cont'd)

Message	Meaning	Action
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. Becomes minor alarm after 24h.
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). Becomes minor alarm after 24h.
SOFTWARE DOWNLOADING ON LINK	Software is being downloaded at specified communication port.	None required. Becomes minor alarm after 24h.
SPAN x AIS	An AIS has been received on the specified input span.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24h.
SPAN x ERROR	An error has been detected on the specified input span.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24h.

Table N. Message Troubleshooting (cont'd)

Message	Meaning	Action
SPAN x LOSS OF SIGNAL	The signal on the specified span input has been lost.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24h.
SPAN x SSM QUALITY DUS	Do not use for synchronization.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24h.
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). Becomes minor alarm after 24h.
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). Becomes minor alarm after 24h.
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). Becomes minor alarm after 24h.
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). Becomes minor alarm after 24h.
SPAN x SSM QUALITY STU	Do not use for synchronization. The level of synchronization traceability is unknown.	Troubleshoot the specified input span (check the source). Becomes minor alarm after 24h.

Table N. Message Troubleshooting (cont'd)

Message	Meaning	Action
TEMPERATURE ERROR	A temperature error has been detected on the internal oscillator.	<ol style="list-style-type: none"> <li data-bbox="751 293 1186 480">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. <li data-bbox="751 480 1186 586">2. If the ambient air temperature is within the TimeSource 3000 environmental specifications, replace the plug-in card. <p data-bbox="779 610 1159 638">Becomes a minor alarm after 24 h.</p>

Card Replacement

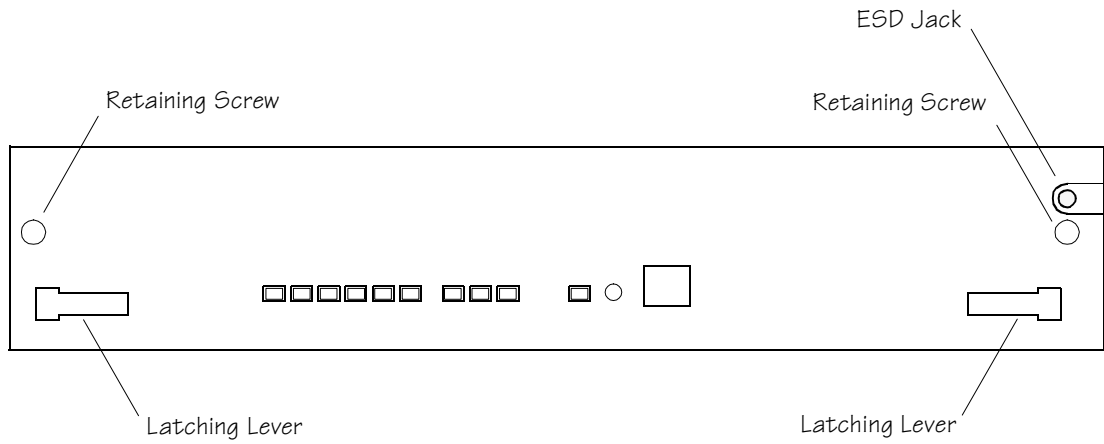
To replace the plug-in card, follow the steps in Procedure G, and refer to Figure 24.

Procedure G. Card Replacement

Step	Procedure
1	Put on an ESD wrist strap.
2	Plug the ESD wrist strap into the ESD jack on of the front panel of the shelf.
On the Faulty Card	
3	Loosen the two retaining screws that secure the plug-in card in the shelf.
4	Pull out on the two latching levers to disconnect the card from the shelf connectors.
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 24. 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 H. 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 Building 7 Aguada West Industrial Site Aguada, Puerto Rico 00602</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:
888-367-7966 (from inside U.S.A. only – toll-free)
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Manual Updates

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

Manual updates are available at: <http://www.symmetricom.com>.

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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:	11 in.
Diameter:	4.3 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 Bits:	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:	TLI (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

TI 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

I 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:	8.6 μ s per day over a 10 °C range between 0 °C and +50 °C 2.8 μ s with a span input meeting ANSI T1.101 network specification 99% probability 1.8 μ s over a 10 °C range between 0 °C and +50 °C with an ST2E remote oscillator input
Format:	1 μ s pulse
Amplitude:	Transistor-transistor logic (TTL) levels

TI Outputs

Connector Type:	Wire-wrap pins
Connector Label:	TI OUT A (T, R, S) TI 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 Stability:	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 Forced

Eight Additional T1 Outputs (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}

Eight Additional TI Outputs (Optional) (cont'd)

GPS Holdover Stability:	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 Forced

Composite Clock Outputs (Optional)

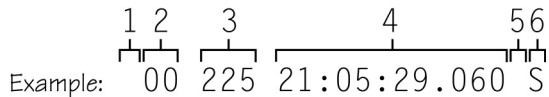
Connector Type:	Wire-wrap pins
Connector Label:	1 (T, R, S) 2 (T, R, S) 3 (T, R, S) 4 (T, R, S) 5 (T, R, S) 6 (T, R, S) 7 (T, R, S) 8 (T, R, S)
Connector Location:	Rear panel – OPTIONS I/O
Impedance:	135 Ω balanced
Bit Rate:	64 kb/s
Waveform:	2.7 V to 3.5 peak, 3 V nominal; bipolar RTZ; all ones with 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 25

Figure 25. NTP Type 4 Data Format



- 1 Alarm field: blank space = receiver has satellite availability; ? = no satellite available
- 2 Year (2000 in this example)
- 3 Day of year (225 of 360 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 26

Figure 26. Cisco Systems Data Format

Example:

1 2 3 4 5 6 7 8 9 10 11 12 13 14
| | | | | | | | | | | | | |
|_| |_| |_| |_| |_| |_| |_| |_| |_| |_| |_| |_| |_|
*.A.51498,00/11/15,18:02:30,00000.0,37N22.130,121W55.180,+0042,MN GPS FLT

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

IRIG-B (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)

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

Shelf 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% noncondensing
Electromagnetic	FCC Part 15, Sub-Part B, Class A