Symmetricom

TimeSource 3100

GPS Primary Reference Source

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Acronyms and Abbreviations

pps	pulse per second
PRS	primary reference source
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.

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Chapter 1

Description

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

Overview

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

The TimeSource 3100 creates timing outputs by ensembling signals from several sources. The sources include GPS signals, an onboard local oscillator, and optional E1 or analog and remote oscillator signals. Timing outputs created from the ensemble are composed of the most stable and least noisy parts of each input. Synchronization outputs are delivered in a framed, all-ones, E1 or 2.048 MHz analog signal, a 10 MHz signal, a 1 pps signal, and time of day (TOD) signals.

The TimeSource 3100 minimizes timing impairments, such as jitter and wander, that are created by network and transmission systems. The synchronization timing is traceable to the GPS, which provides the highest level of synchronization for telephony networks. The TimeSource 3100 with its GPS input is a stand-alone office PRS. With the optional inputs ensembled, overall system performance is improved, and holdover is extended if GPS signals become disrupted.

Global Positioning System

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

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

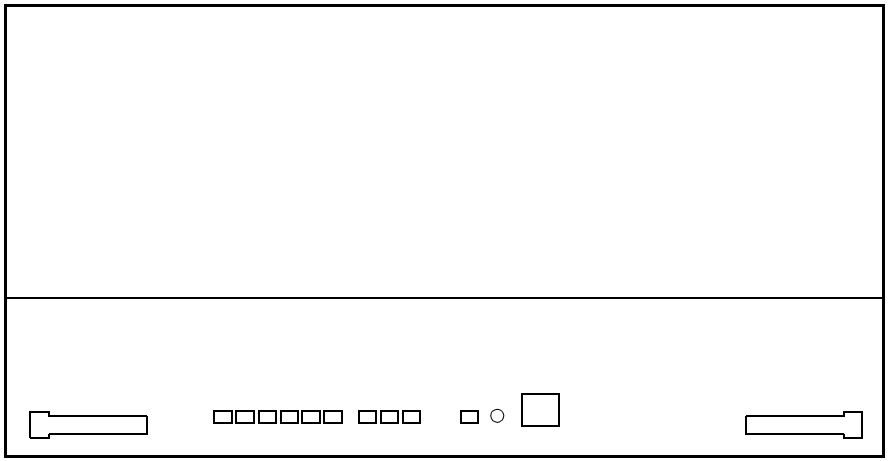
The TimeSource 3100 tracks all satellites within its field of view. The performance of each tracked satellite is observed and compared to the others, and available for use in the timing solution. A satellite with unacceptable performance data is dropped from the timing solution.

Physical Description

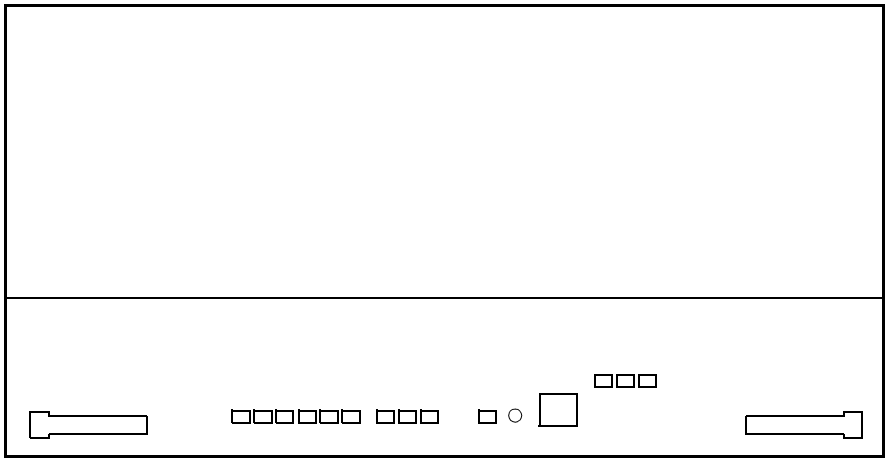
The TimeSource 3100 consists of a shelf, plug-in card, antenna, cables, hardware, and software. Optional system configurations include eight additional E1 or analog outputs, two E1 synchronous clock insertion unit (ESCIU) ports, or four IRIG-B TOD timing outputs.

The shelf (Figure 1) can be mounted in a 48 cm rack or an ETSI 53.5 cm rack. Other than a communications connector on the front panel, all connectors are at the connector panel.

Figure 1. Shelf



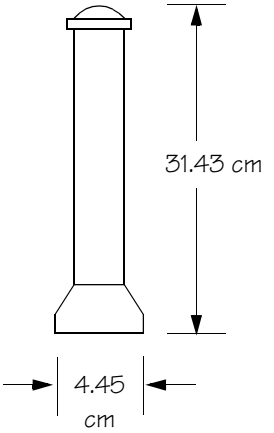
990-72020-01, -02, -05 Systems



990-72020-04 Systems

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

Figure 2. Antenna



Functional Description

1

Overview

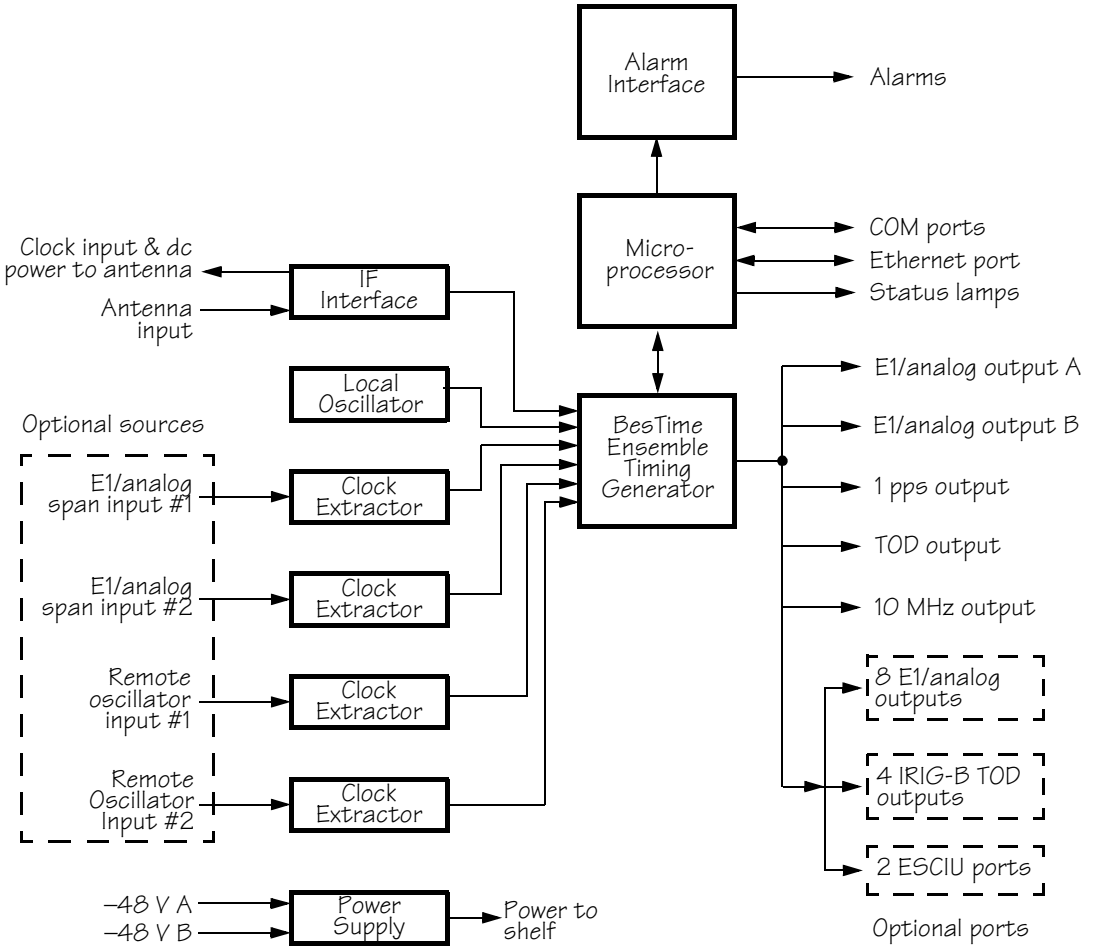
Figure 3 shows the main functions of the TimeSource 3100. The center of the TimeSource 3100 is the BesTime Ensemble Timing Generator, which uses the BesTime algorithm to analyze the phase and frequency relationships, individually and collectively, of the timing sources. Each type of timing source has a particular characteristic that gives it an advantage over other sources, as listed in Table A.

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

Table A. Timing Source Characteristics

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

Figure 3. Block Diagram



Antenna

The antenna housing includes a volute antenna, GPS receiver, amplifier, and intermediate-frequency (IF) downconverter.

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

The amplifier provides 23 dB of signal gain.

The downconverter converts the L-band GPS signal to IF for long-distance transport on the coaxial antenna cable. The antenna cable provides 125 mA 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 via the IF downconverter, and provides GPS clock information to the BesTime Ensemble Timing Generator.

Local Oscillator

A digitally controlled, oven-controlled crystal oscillator (OCXO) develops a highly stable local oscillator signal, independent of factors that exist outside the shelf. This signal is sent to the BesTime Ensemble Timing Generator.

Clock Extractors

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

Power Supply

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

BesTime Ensemble Timing Generator

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

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

E1 or Analog Outputs

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

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

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

TOD Output

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

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

This option provides a module for four additional TOD outputs in IRIG-B format. The module mounts in the OPTIONS I/O mountings on the connector panel. The BesTime Ensemble Timing Generator provides the timing for the TOD timing signal, which provides timing code to devices compatible with IRIG-B.

1 PPS Output

The BesTime Ensemble Timing Generator provides the timing for the 1 pulse-per-second timing signal available at the 1 PPS connector, which can be used for application-specific requirements.

10 MHz Output

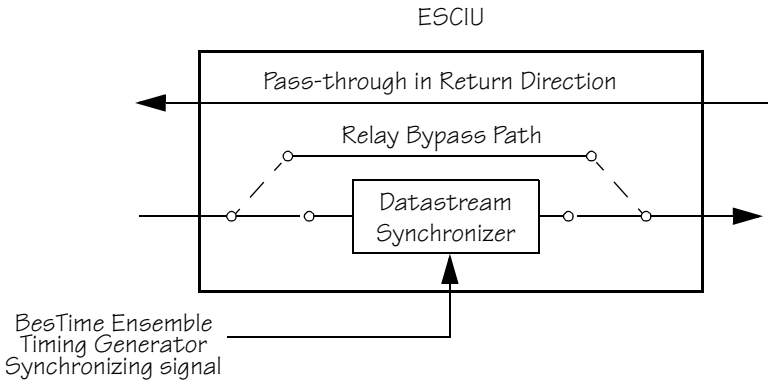
The BesTime Ensemble Timing Generator provides timing for the 10 MHz timing signal available at the 10 MHZ connector, which can be used for local cellular frequency or testing purposes.

Two ESCIU Ports (990-72020-04 Systems Only)

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

If an alarm condition or power failure occurs, relays allow the E1 signals to bypass the system. (See Figure 4.)

Figure 4. ESCIU Signals



Alarm Interface

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

Communication Ports

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

Ethernet

The TimeSource 3100 has six Ethernet ports to carry TL1 commands, responses, and autonomous messages between the TimeSource 3100 and an external terminal or an Element Manager. The user can configure the IP address, subnet mask, and gateway address for the Ethernet ports.

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

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

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Chapter 2

Engineering & Ordering

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

Antenna Guidelines

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

Procedure A. Site Survey

Step	Action
1	Determine the shelf location.
2	Determine the best location for mounting the antenna (less than 330 m of cable from the shelf). Use the guidelines and considerations in the Antenna Location Guidelines section.
3	If a roof-mounted antenna is installed, determine the location of the grounding point for the lightning suppressor, then determine the location of the lightning suppressor. The cable length between the lightning suppressor and the grounding point must be less than 4.6 m. If the grounding point is inside the building, the cable length between the grounding point and the cable entry must be less than 15 m. Valid lightning suppressor grounding points are: • Valid ring ground system (usually for roof-mounted lightning suppressors) • Structural steel of building (for interior-mounted or exterior-mounted lightning suppressors, attach with a cad weld) • Central Office ground plate (usually for interior-mounted lightning suppressors)
4	If a roof-mounted antenna is installed, two lengths of cable are required. Plan the cable route and measure the length of cable required between the antenna and the lightning suppressor, and between the lightning suppressor and the shelf.
5	If a window or wall-mounted antenna is installed, plan the cable route and measure the length of cable required between the antenna and the shelf.
6	Determine the two separate –48 V power sources for the shelf. If only one –48 V power source is available, it must be cabled to both TimeSource 3100 power inputs.

End of Procedure

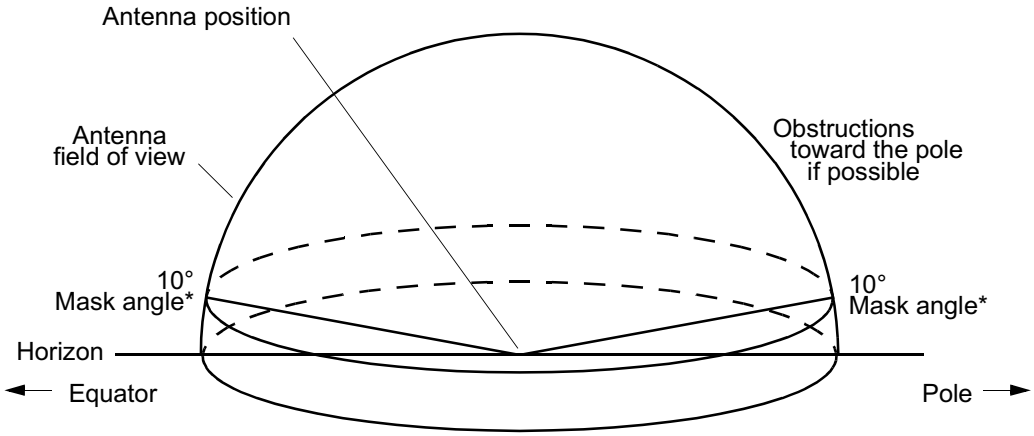
Antenna Location Guidelines

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

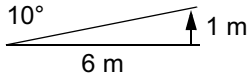
A compromise often must be made between location and satellite field of view. With a smaller the field of view, the TimeSource 3100 can use fewer satellites in the solution for GPS derived time. The TimeSource 3100 will operate with an average of one satellite in view for 40% of the time in a day.

Signals closer to the horizon are often subject to multipath effects, which degrade the timing solution. The TimeSource 3100 can be set to ignore, or mask, all signals from the horizon up to a chosen angle of elevation (mask angle). (See Figure 5.)

Figure 5. Antenna Field of View



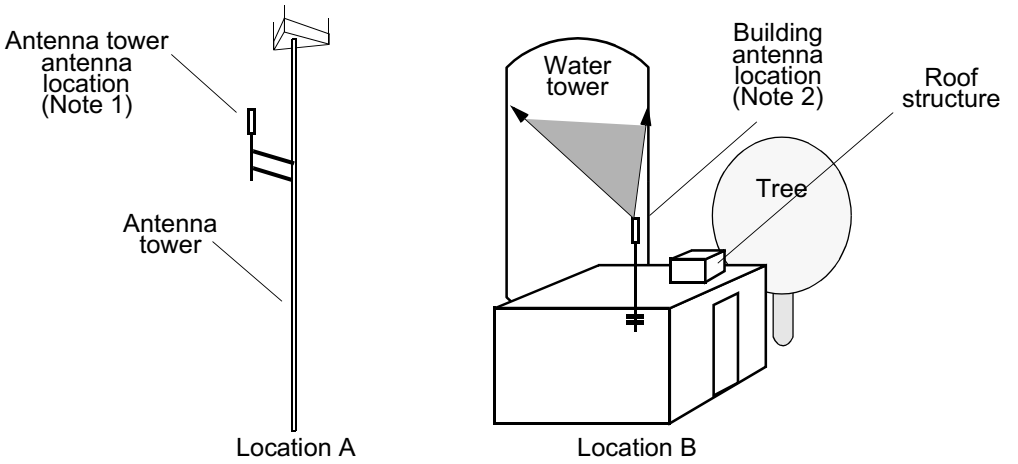
* An angle of 10° masks objects up to about 1 m above the horizon at 6 m from the antenna (illustration at right.)



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

The total of obstructions above the mask angle should not obscure more than 25 percent of the total field of view (90 degrees of azimuth) (Figure 6).

Figure 6. Antenna Location Examples



Notes:

1. Place the antenna high enough on the tower that obstructions are below the mask angle; mount the antenna more than 1 meter away from the tower, and far below the interference of the antennas at the top of the tower. Tower mounting is the least desirable location because of the potential for severe multipath, and difficulty in troubleshooting and maintenance.
2. Place the antenna high enough that the roof structure and tree are below the mask angle, and the water tower does not block a large portion of the sky.

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

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

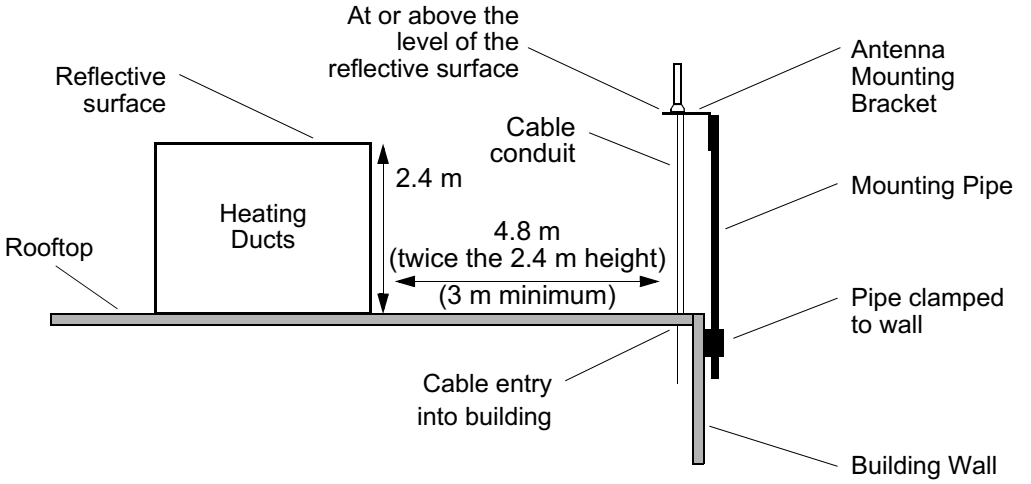
Attempt to avoid locating the antenna within 30 degrees azimuth of the transmission direction of any transmitting antenna in the area, even if the transmitting antenna operates at a different frequency. A transmitting antenna may cause the GPS antenna to become overloaded and reduce its reception capabilities.

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

To reduce multipath signal distortions, the minimum horizontal distance from vertical reflective structures (e.g., heating ducts, equipment housings, etc.) is twice the height of the structure, and no less than 3 meters (Figure 7).

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).

Figure 7. Sample Rooftop Antenna Mount



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

Earth Ground Location Guidelines

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

Antenna Cable Choices

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

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

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

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

Use the following items (must be ordered separately) to assemble other cable lengths:

- 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)

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

If using the IRIG-B TOD outputs (990-72020-05 TimeSource 3100 System), right-angle BNC connectors are provided to prevent small radius turns in the IRIG-B TOD cables. The right-angle BNC connectors may be attached to the IRIG-B BNC adapter (also provided) BNC connectors, to direct the cables from the shelf as desired.

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

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 300 cable meters of the TimeSource 3100 shelf, and within 17 cable meters of the device receiving the time code.

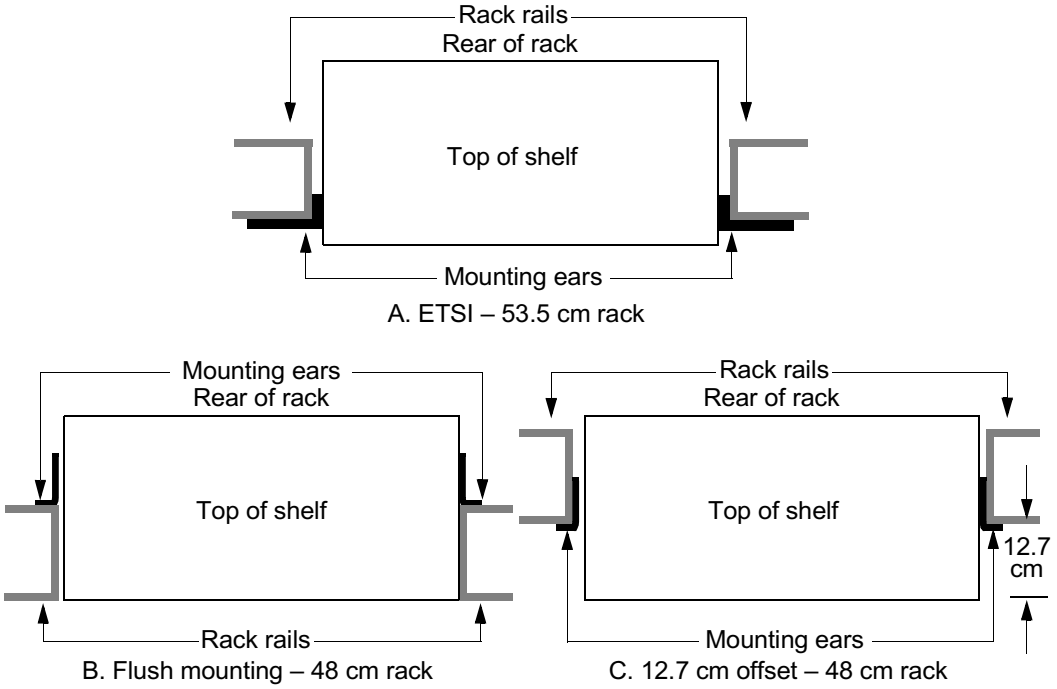
The user must supply two cables. One cable is a Category 5 four-pair RS-422 cable, 330 meter maximum, with RJ-45 connectors on each end. Route this cable between the TimeSource 3100 Shelf and the converter.

The other cable is an RS-232 data communications cable, 17 meters maximum, with a 25-pin male D-type connector and another connector determined by the device receiving the time code. Route this cable between the converter and the device receiving the time code.

Shelf Considerations

The TimeSource 3100 Shelf can be mounted in an ETSI 53.5 cm rack or a 48 cm rack. The shelf is shipped with supplied mounting ears positioned for flush mounting on an ETSI 53.5 cm rack. Attach the mounting ears (Figure 8) to the appropriate positions on the sides of the shelf for flush mounting or 12.7 cm offset mounting. Attach the short side of the mounting ear to the shelf for an ETSI 53.5 cm rack, and attach the long side of the mounting ears to the shelf for a 48 cm rack. Mount the shelf in the rack according to standard company practices.

Figure 8. Rack Mounting Options



Systems

The TimeSource 3100 Systems available are listed below.

Standard System (Two E1 or 2.048 MHz Outputs)

This system (990-72020-01) includes:

- TimeSource 3100 Shelf (090-72000-11)
- TimeSource 3100 card (090-72020-01)
- Antenna (090-72010-97)
- Hardware kit (093-72020-97) includes:
  - Lightning suppressor (143-00018-01)
  - Mounting bracket (070-00300-02)
  - Craft port-to-PC communication cable (060-00067-01)
- System software (992-72020-03)

With Eight Additional E1 or 2.048 MHz Outputs

This system (990-72020-02) includes:

- TimeSource 3100 Shelf (090-72000-11)
- TimeSource 3100 card with expansion E1 or 2.048 MHz outputs (090-72020-02)
- Antenna (090-72010-97)
- Hardware kit (093-72020-97) includes:
  - Lightning suppressor (143-00018-01)
  - Mounting bracket (070-00300-02)
  - Craft port-to-PC communication cable (060-00067-01)
- System software (992-72020-03)

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

- BNC output module (990-72100-01)
- Wire-wrap output module (990-72100-02)

With Two E1 Synchronization Insertion (ESCIU) Ports

This system (990-72020-04) includes:

- TimeSource 3100 Shelf (090-72000-11)
- TimeSource 3100 card with ESCIU ports (090-72020-04)
- Antenna (090-72010-97)
- Hardware kit (093-72020-97) includes:
  - Lightning suppressor (143-00018-01)
  - Mounting bracket (070-00300-02)
  - Craft port-to-PC communication cable (060-00067-01)
- System software (992-72020-03)

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

- 75 Ω BNC unbalanced connector module (090-72100-04)
- 120 Ω wire-wrap balanced connector module (090-72100-05)

With Four IRIG-B TOD Outputs

This system (990-72020-05) includes:

- TimeSource 3100 Shelf (090-72000-11)
- TimeSource 3100 card with IRIG-B TOD outputs (090-72020-05)
- Antenna (090-72010-97)
- Hardware kit (093-72020-97) includes:
  - Lightning suppressor (143-00018-01)
  - Mounting bracket (070-00300-02)
  - Craft port-to-PC communication cable (060-00067-01)
- System software (992-72020-03)

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

Antenna

The antenna (093-72010-97) includes:

- IF antenna assembly and mounting kit (090-72010-97)
- Antenna cable bracket kit (093-00001-01)
  - Attaching hardware
- Antenna hardware kit (093-72050-98) includes:
  - Mounting bracket for surge suppressor (070-00300-02)
  - Attaching hardware
  - Surge suppressor coaxial cable with female TNC connectors (125-22441-08)

User-Supplied Tools and Materials

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

For Antenna Installation

- 2.5 cm diameter galvanized metal pipe, used as a mast to mount the antenna. Mast should be long enough to position the antenna above any metal object on the roof
- Screws to attach the lightning suppressor mounting plate
- Plumb line or bubble level
- Nonmetallic junction box for lightning suppressor (optional if lightning suppressor mounted indoors)
- 2.5 cm diameter PVC pipe as conduit for outdoor cables
- PVC fittings appropriate to the installation and cable route
- Appropriate tools and materials for cutting, shaping, and connecting PVC pipe
- 4.115 mm (6 AWG) ground wire
- Spade lugs for 4.115 mm (6 AWG) ground wire
- Crimp tool for 4.115 mm (6 AWG) spade lugs
- Hardware to attach the ground wire to a valid earth ground
- Fire-stopping material to seal conduit hole in roof or wall
- Electrically conductive antioxidant compound (Kopr-Shield or equivalent) to coat exposed connections to prevent oxidation
- Tool to cut cable, if installation requires custom lengths of cable

For Shelf Installation

- A Phillips-head screwdriver for installing the TimeSource 3100 Shelf in a rack
- Four screws to mount the shelf in a rack

Outputs, Power, and Miscellaneous

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

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Installation

Chapter 3

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

Unpacking

Install the TimeSource 3100 using the procedures 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 CTAC 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

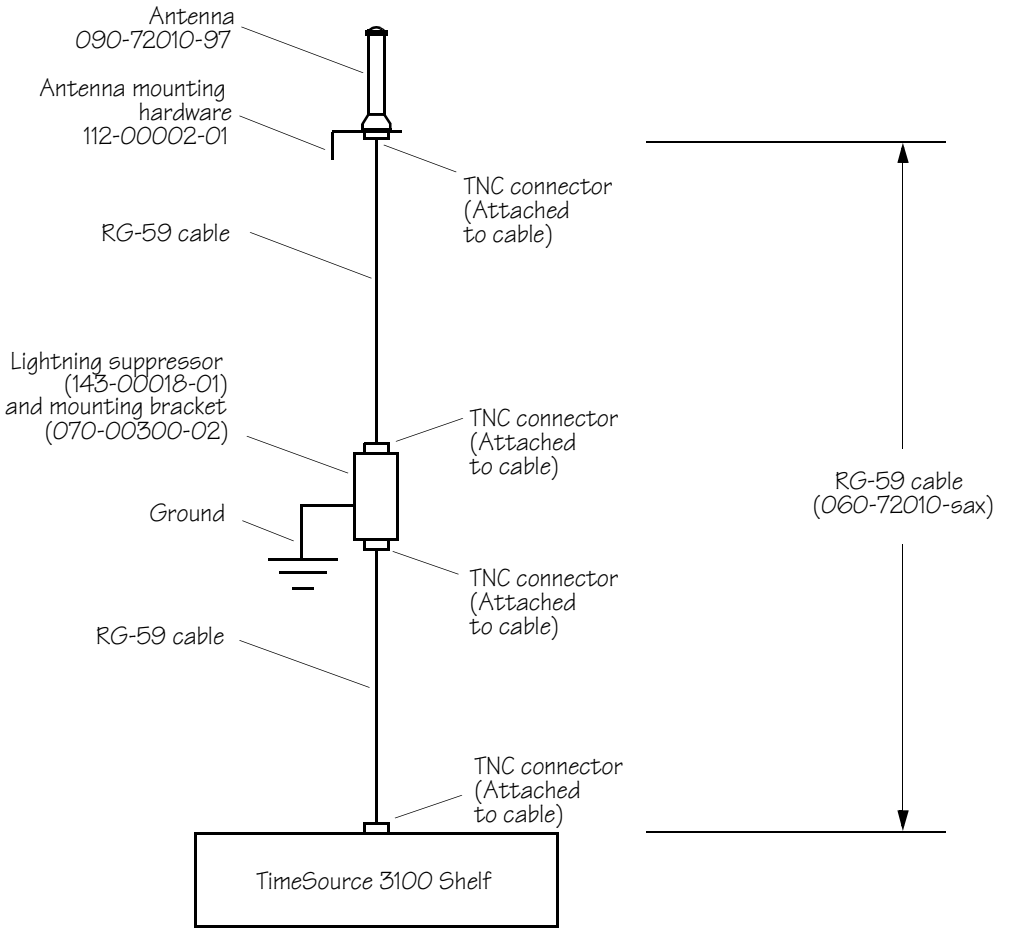
These installation procedures are to be used in support of local company procedures and the Installation Job Specification.

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

To install the antenna, refer to Figure 9, and perform Procedure B.

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

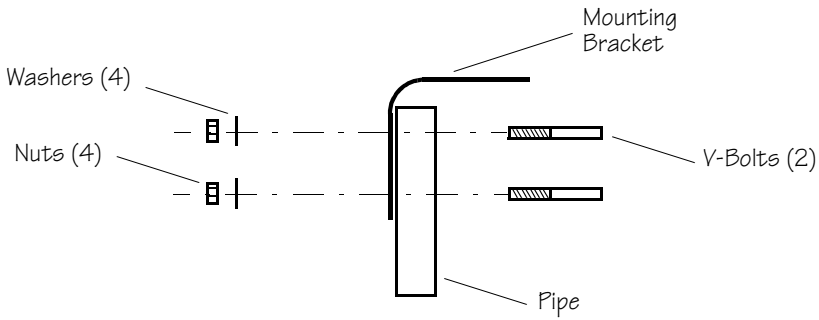
Figure 9. Antenna-to-Shelf Cabling



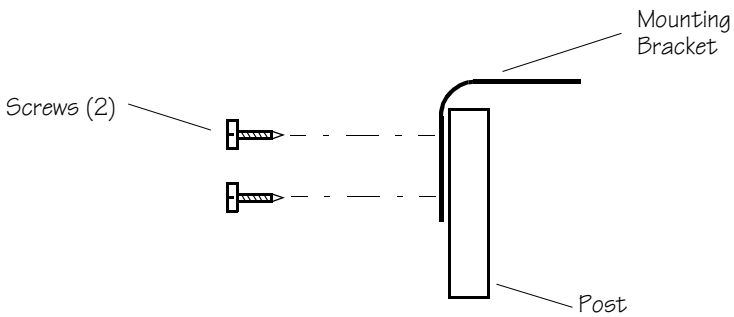
Procedure B. Antenna Installation

Step	Procedure
1	Attach the antenna mounting bracket to a pipe (2.5 cm diameter) or a wood post.

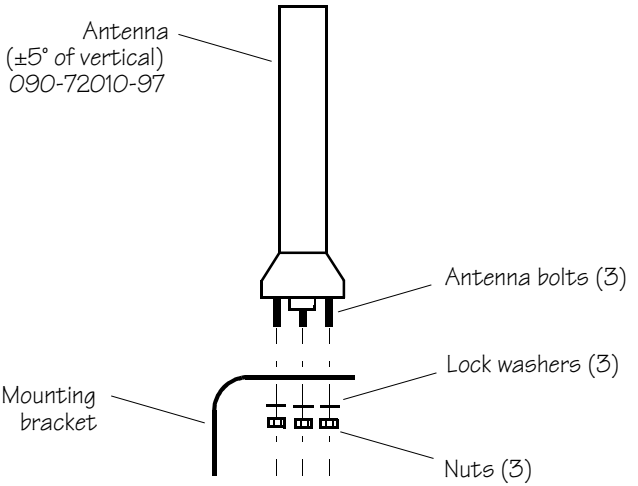
- If mounting the bracket to a pipe, slide the two V-bolts over the pipe, and through the mounting bracket slots; then place the provided four washers and four nuts over the V-bolts, against the mounting bracket. Leave the V-bolts loose enough to allow for final adjustments.



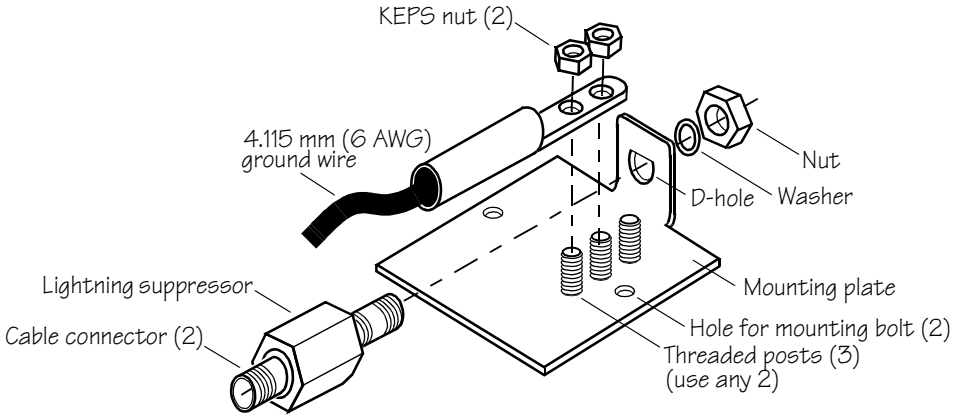
- If mounting the bracket to a wood post, use the provided two self-tapping screws in two diagonally positioned mounting bracket slots, and attach to the post.



Procedure B. Antenna Installation (cont'd)

Step	Procedure
2	Slide the antenna bolts through the holes in the mounting bracket, then attach the antenna to the bracket, using the provided three nuts and three lockwashers. 
3	Using a plumb line or bubble level, ensure the antenna is within 5° of vertical (perpendicular to the horizon), and tighten the mounting bracket bolts.
4	Bolt the lightning suppressor mounting plate to a flange that is attached to a valid earth ground. The roof ring ground system, a Central Office grounding plate, and building structural steel are examples of valid earth ground points. If the mounting plate cannot be bolted to a valid earth ground, bolt the mounting plate to a point within 4.6 m of the chosen valid earth ground. If the mounting plate is to be installed in a nonmetallic junction box, perform the installation, and bolt the assembly near the chosen valid earth ground. *Note:* A junction box must have inside dimensions of 7 cm by 7 cm by 4 cm to hold the mounting plate and attached components.

Procedure B. Antenna Installation (cont'd)

Step	Procedure
5	Slide the longer bolt of the lightning suppressor through the D-hole, and attach with the provided nut and washer. 
6	Install 3.8 cm nonmetallic conduit from the antenna to the lightning suppressor, and from the lightning suppressor to the cable entrance into the building.
7	Install a user-supplied bracket, preferably non-metallic, to support the vertical section of conduit to the antenna.
8	Connect a cable to the antenna, route the cable through the conduit, and connect the cable to the lightning suppressor.
9	Connect a cable to the lightning suppressor, route the cable through the conduit into the building, and route the cable through the building to the TimeSource 3100 Shelf location.

Procedure B. Antenna Installation (cont'd)

Step	Procedure
10	If the lightning suppressor was not mounted directly to a valid earth ground, crimp a length of 4.115 mm (6 AWG) ground cable to the two-hole terminal, slide the terminal over two of the three threaded posts on the lightning suppressor mounting plate, and attach the terminal to the mounting plate with two KEPS nuts. Use the two posts that allow the least bending of the 4.115 mm (6 AWG) ground cable.
11	Attach the other end of the cable to a valid earth ground.
12	Install fire-stopping material in all holes opened in the roof and/or walls during this procedure.
13	Check all connections for tightness to prevent arcing and intermittent operation.
14	Coat all exposed connectors with an electrically conductive antioxidant compound (e.g., Kopr-Shield spray).

End of Procedure

Shelf

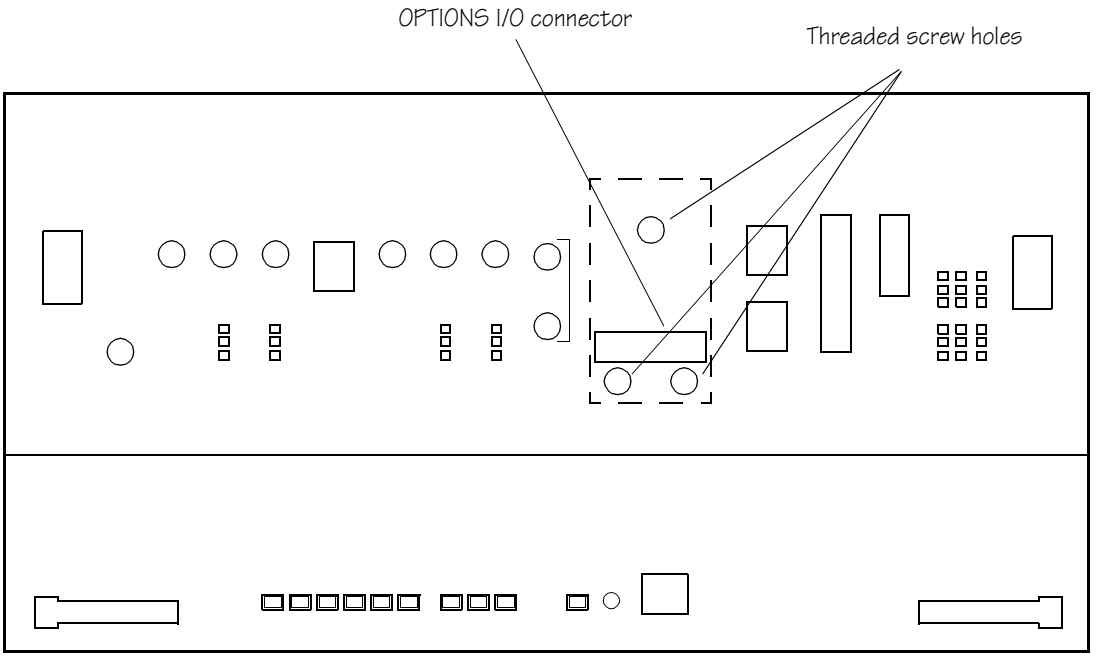
Output Module Installation

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

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

1. Remove the shelf cover to access the shelf connector panel.
2. Plug the module into the OPTIONS I/O connector on the connector panel (refer to Figure 10).
3. Align the three spring-loaded screws on the module with the threaded holes on the panel.
4. Use a medium flat-blade screwdriver to lock each screw in place. Torque the screws evenly to prevent skewing the module.

Figure 10. Options I/O Connector

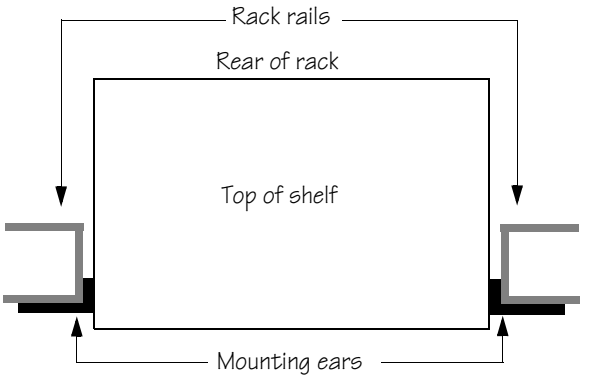


Rack Mounting

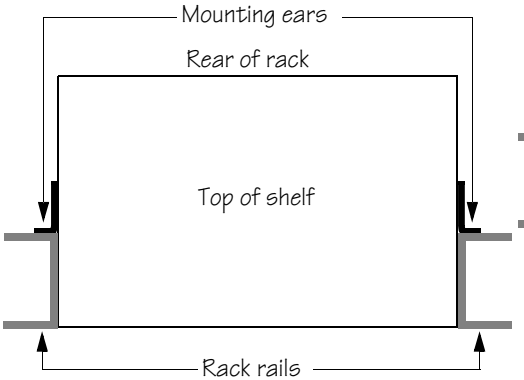
The shelf is shipped with the ears positioned for ETSI 53.5 cm mounting (Figure 11A). For 48 cm racks, the shelf can be positioned to the rear of the rack rail for flush mounting (Figure 11B) or to the front of the rack rail for 12.7 cm offset mounting (Figure 11C).

Position the mounting ears, as shown in Figure 11. Mount the shelf in the rack according to standard company practices.

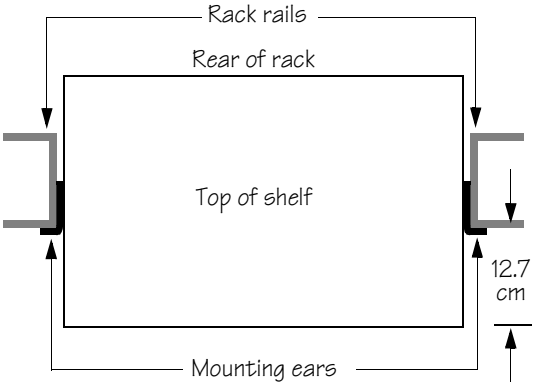
Figure 11. Rack Mounting Options



A. ETSI – 53.5 cm rack



B. Flush mounting – 48 cm rack



C. 12.7 cm offset – 48 cm rack

Cabling

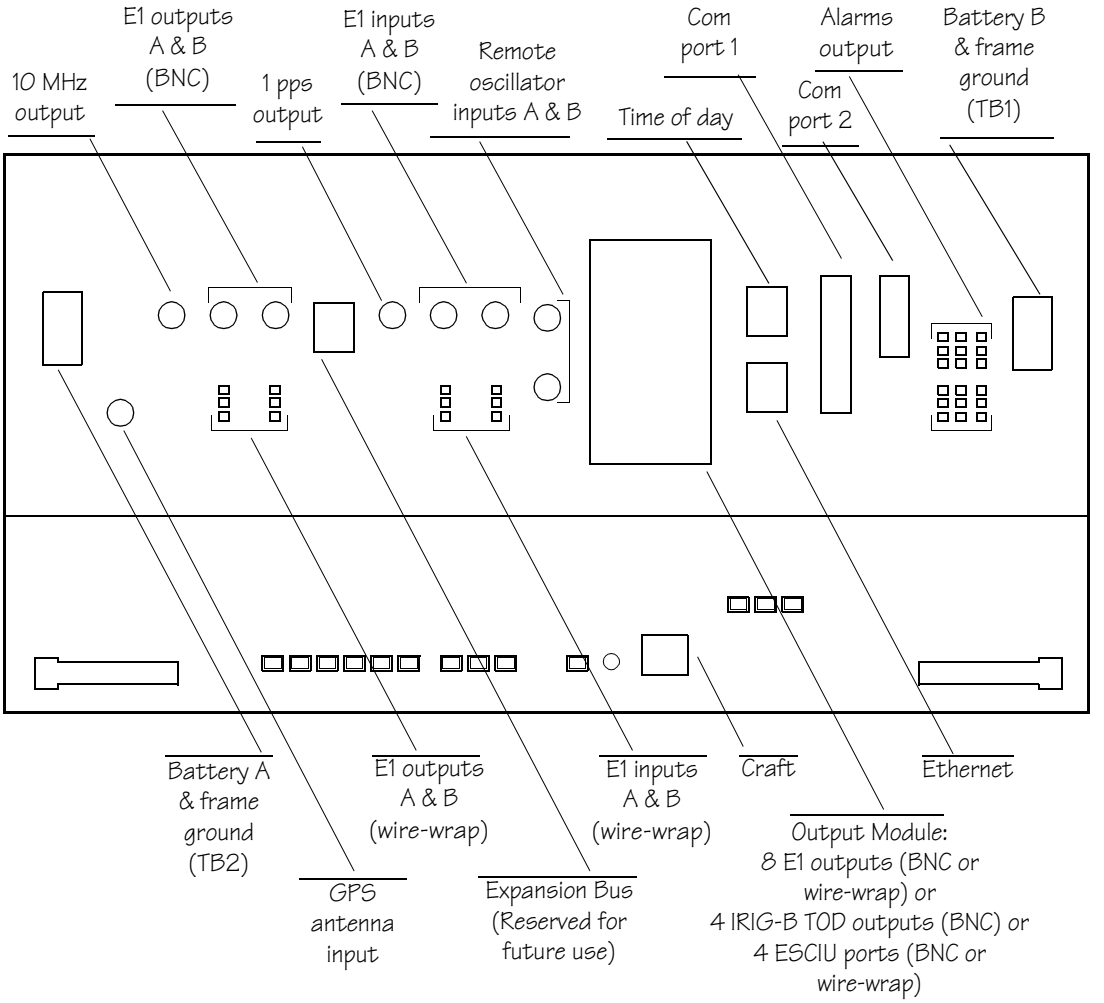
Warning: **The circuitry on the plug-in circuit board is subject to electrostatic discharge (ESD) damage. Be sure to wear an ESD wrist strap when making connections to the connector panel. Failure to observe this warning may result in equipment damage.**

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

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

Figure 12 shows the connectors on the front panel and connector panel. All connectors can be located using this illustration.

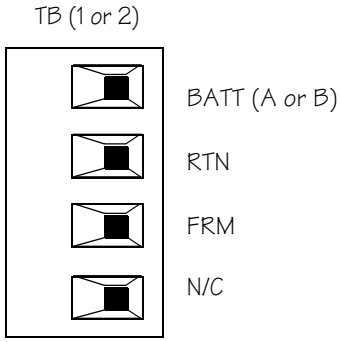
Figure 12. Connector Panel and Front Panel Connectors



Frame Ground

Frame ground enters through the four-position power terminal blocks labeled TB1 and TB2. Figure 12 shows the location of the terminal blocks, and Figure 13 shows the terminal block connections.

Figure 13. Connector Panel Terminal Block Connections



Remove the protective covers from the terminal blocks.

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

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

With ground rod:

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

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

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

Without ground rod:

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

Power

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

Caution: *Do not apply power to the TimeSource 3100 before instructed in this procedure. Before connecting the power cables to the TimeSource 3100, ensure the fuses are removed from the fuse panel that supplies power to the power cables.*

Note: Input power is reverse polarity protected; there are no user replaceable fuses in the TimeSource 3100.

The –48 volt dc battery enters through the four-position power terminal blocks labeled TB1 and TB2. Figure 12 shows the location of the terminal blocks, and Figure 13 shows the terminal block connections.

Ensure the power wires are long enough to reach from the shelf connector panel to the office battery source connection. Use two 1.47mm (16 AWG) stranded wires for the power connection, one with red insulation (BATT), and the other with black insulation (RTN).

Connect the power wires with red insulation to the BATT wire receptacles on TB1 and TB2. Connect the power wires with black insulation to the RTN wire receptacles on TB1 and TB2.

Replace the protective covers on the terminal blocks.

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

GPS Antenna

Connect the coaxial cable from the lightning suppressor to the TNC connector labeled GPS ANT. See Figure 12 for the connector location.

10 MHz Output

Connect an RG-58 coaxial cable from the connector labeled 10 MHz to the equipment that will use the 10 MHz output signal. See Figure 12 for the connector location.

E1 or Analog Synchronization Outputs

Connect the E1 or analog synchronization outputs at the wire-wrap pins or BNC connectors labeled E1 OUT A and E1 OUT B. If using the wire-wrap pins, connect the tip wire to the pins labeled T, the ring wire to the pins labeled R, and the shield to the pins labeled S. See Figure 12 for the location of the connectors and pins, and Figure 14 for the wire-wrap connections.

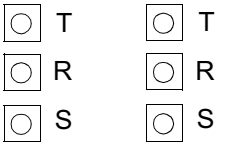
Notes:

1. For wire-wrap connections, the shield pin is provided to ground the cable shield at the shelf, if required. Normally, the shield is grounded at the source. Grounding the shield at both ends is not recommended.

2. A BNC connector can be used for one output, and a wire-wrap connector can be used for the other output, but do not use the BNC and wire-wrap connectors of the same output simultaneously. For example, a BNC connector can be used for output A and the wire-wrap pins for output B, but do not use the output A BNC connector with the output A wire-wrap connector.

Warning: **Because the E1 output circuits do not provide lightning protection, do not connect the E1 output line directly to a point outside the building. Failure to observe this warning may result in equipment damage.**

Figure 14. E1 or Analog Output Wire-Wrap Connections



Expansion Bus

Reserved for future use.

1 PPS Output

Connect an RG-58 coaxial cable from the connector labeled TTL PPS to the equipment that will use the 1 pulse-per-second TTL output signal. See Figure 12 for the connector location.

E1 or Analog Reference Inputs

E1 or analog reference inputs, traceable to an independent Stratum 1 source, can be used. The performance of one or two references can be monitored. In either case, connect reference inputs to the wire-wrap pins or BNC connectors labeled SPAN IN A and SPAN IN B. If using the wire-wrap pins, connect the tip wire to the pin labeled T, the ring wire to the pin labeled R, and the shield (if connected at the TimeSource 3100) to the pin labeled S. See Figure 12 for the location of the connectors and pins, and Figure 15 for the wire-wrap connections.

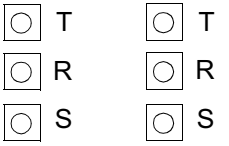
Notes:

1. The shield pin is capacitively coupled to ground. Normally, the shield is grounded at the source. Grounding the shield at both ends is not recommended.

2. A BNC connector can be used for one input, and a wire-wrap connector can be used for the other input, but do not use the BNC and wire-wrap connectors of the same input simultaneously. For example, a BNC connector can be used for input A and the wire-wrap pins for input B, but do not use the input A BNC connector with the input A wire-wrap connector.

Warning: **Because the E1 input circuits do not provide lightning protection, do not connect the E1 input line directly to a point outside the building. Failure to observe this warning may result in equipment damage.**

Figure 15. E1 or Analog Input Wire-Wrap Connections



Remote Oscillator Inputs

Connect an RG-59 coaxial cable from a 5 MHz or 10 MHz remote oscillator to the connector labeled REM OSC A. Connect another RG-59 coaxial cable from a remote oscillator of the same frequency to the connector labeled REM OSC B. Both remote oscillators must be the same frequency, and a minimum of Stratum 2 (rubidium oscillator) quality. See Figure 12 for the connector locations.

5 MHz Isolation Kit

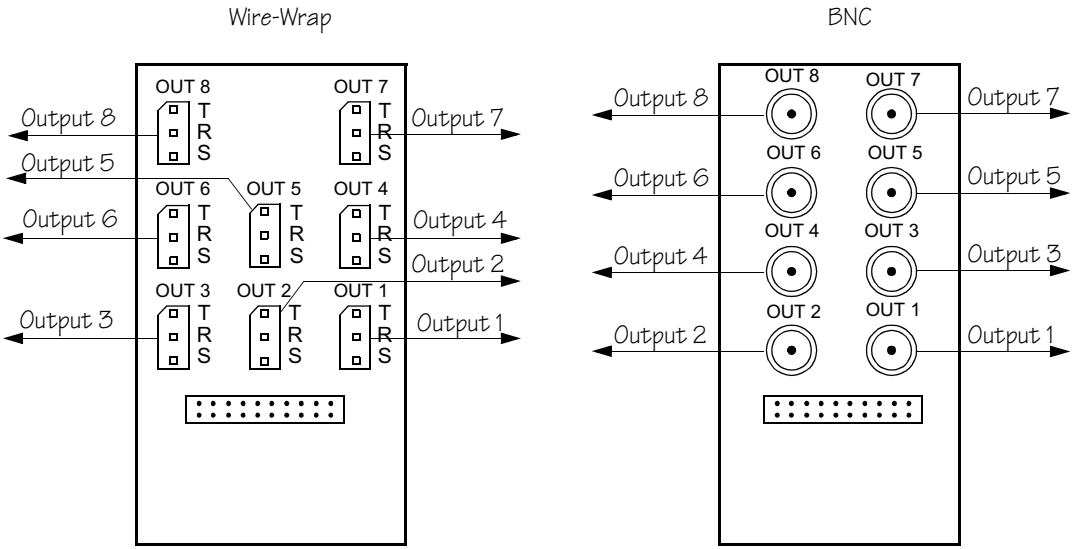
If 5 MHz signals from certain DCD Shelves are used as remote oscillator inputs, a 5 MHz Isolation Kit (093-45110-06) was mounted between the TimeSource 3100 Shelf and the DCD Shelf. See Chapter 2, Engineering and Ordering, for details.

Connect one of the two provided 70 cm, RG-59/U, 75 ohm coax cables between the TimeSource 3100 and the isolation module. Connect the other cable between the isolation module and the DCD Shelf.

Module for Additional E1 or Analog Outputs

Connect the optional eight E1 or analog outputs at the wire-wrap or BNC output module. See Figure 12 for the connector location, and Figure 16 for the connections.

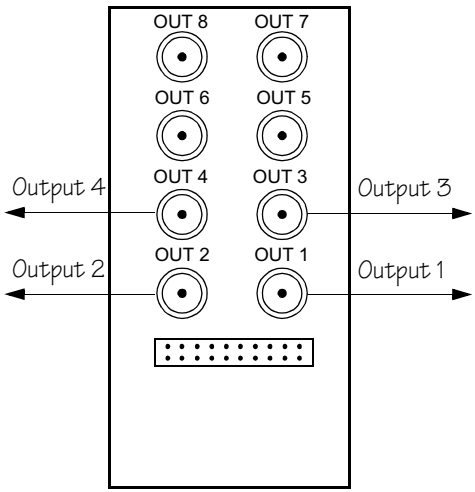
Figure 16. Eight E1 or Analog Outputs Connections



Module for IRIG-B TOD Outputs

Connect the four optional IRIG-B TOD outputs at the output module. See Figure 12 for the connector location, and Figure 17 for the connections.

Figure 17. IRIG-B TOD Output Connections



Note: Note: Outputs 5, 6, 7 and 8 are not used

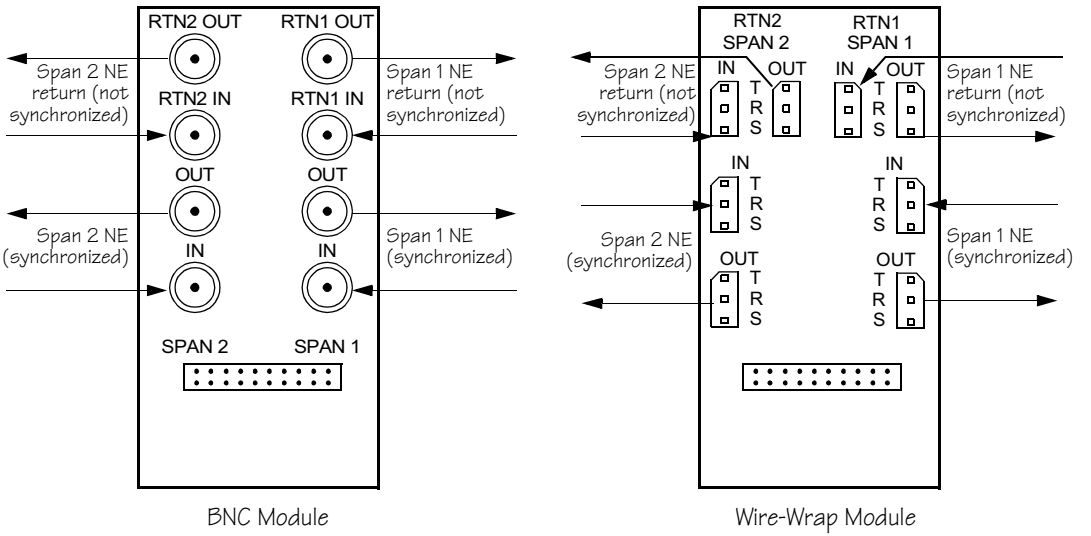
Module for ESCIU Ports

The ESCIU ports (Figure 18) have a different function than the synchronization outputs. Synchronization outputs provide external reference clock signals for network elements. ESCIU ports carry E1 traffic, and directly synchronize the E1 bitstream.The ESCIU module can synchronize 2 spans in one direction. The return direction passes through as it is.

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

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

Figure 18. Connector Layout of ESCIU Modules



Cutover Procedures for Out-of-Service Equipment

If DDF access jack sets *are not* cabled to the ESCIU module, the following out-of-service cutover procedure must be used. Consult the local company Installation Job Specifications to ensure that the network element to be retimed is connected to the ESCIU module correctly. Refer to Figure 19 for the following procedure:

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

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

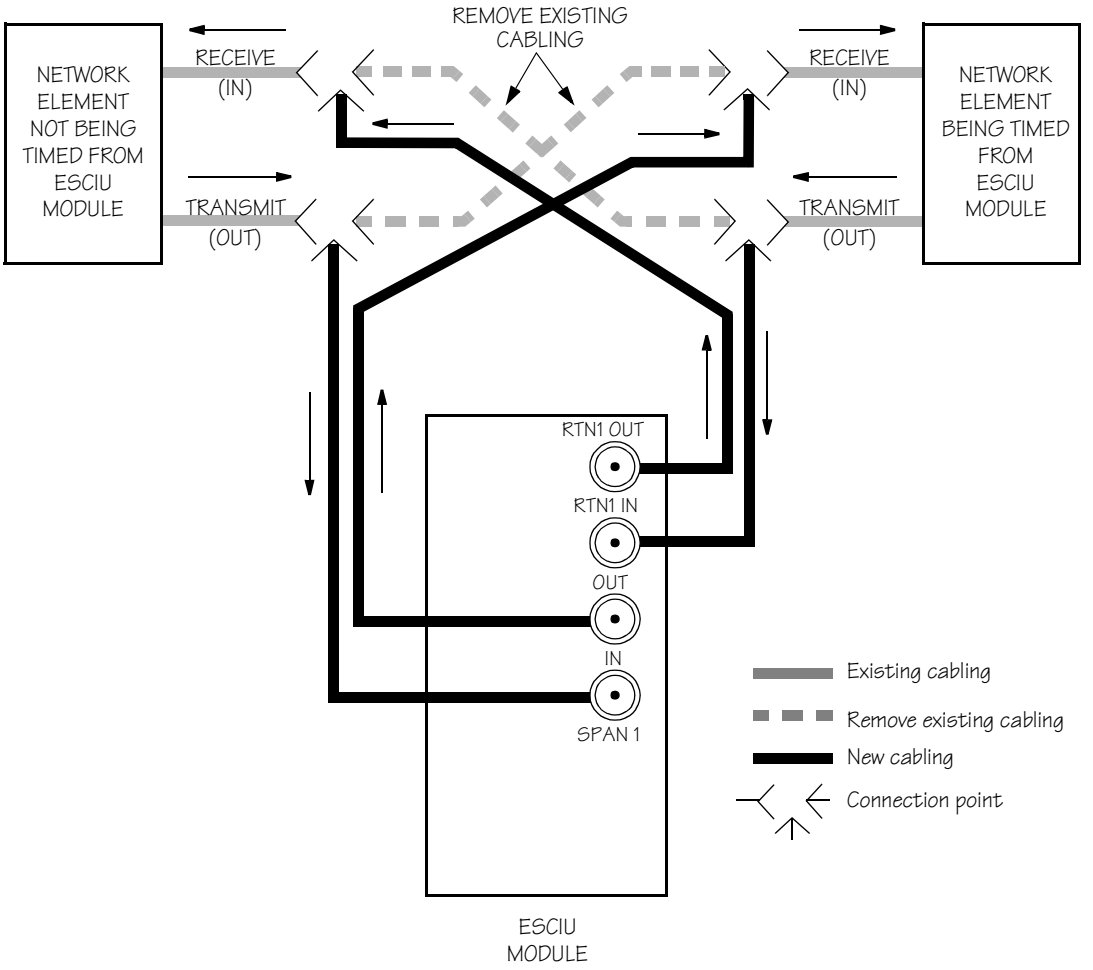
3. In the direction not to be synchronized by the ESCIU module, connect new cables from the ESCIU module RTNx IN connector to the NE transmit (OUT) terminal, and connect from the ESCIU module RTNx OUT connector to the NE receive (IN) terminal.

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

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

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

Figure 19. ESCIU Cutover without Jacks (Out-of-Service)



Cutover Procedures for In-Service Equipment

If standard digital signal level access jack sets, such as DDF or DSX-1 jacks, were cabled to the ESCIU module, the following in-service cutover procedure must be used. Consult the local company Installation Job Specifications to ensure that the network element to be retimed from the ESCIU module will be connected to the ESCIU module A OUT terminals. Refer to Figure 20 for the following procedure:

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

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

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

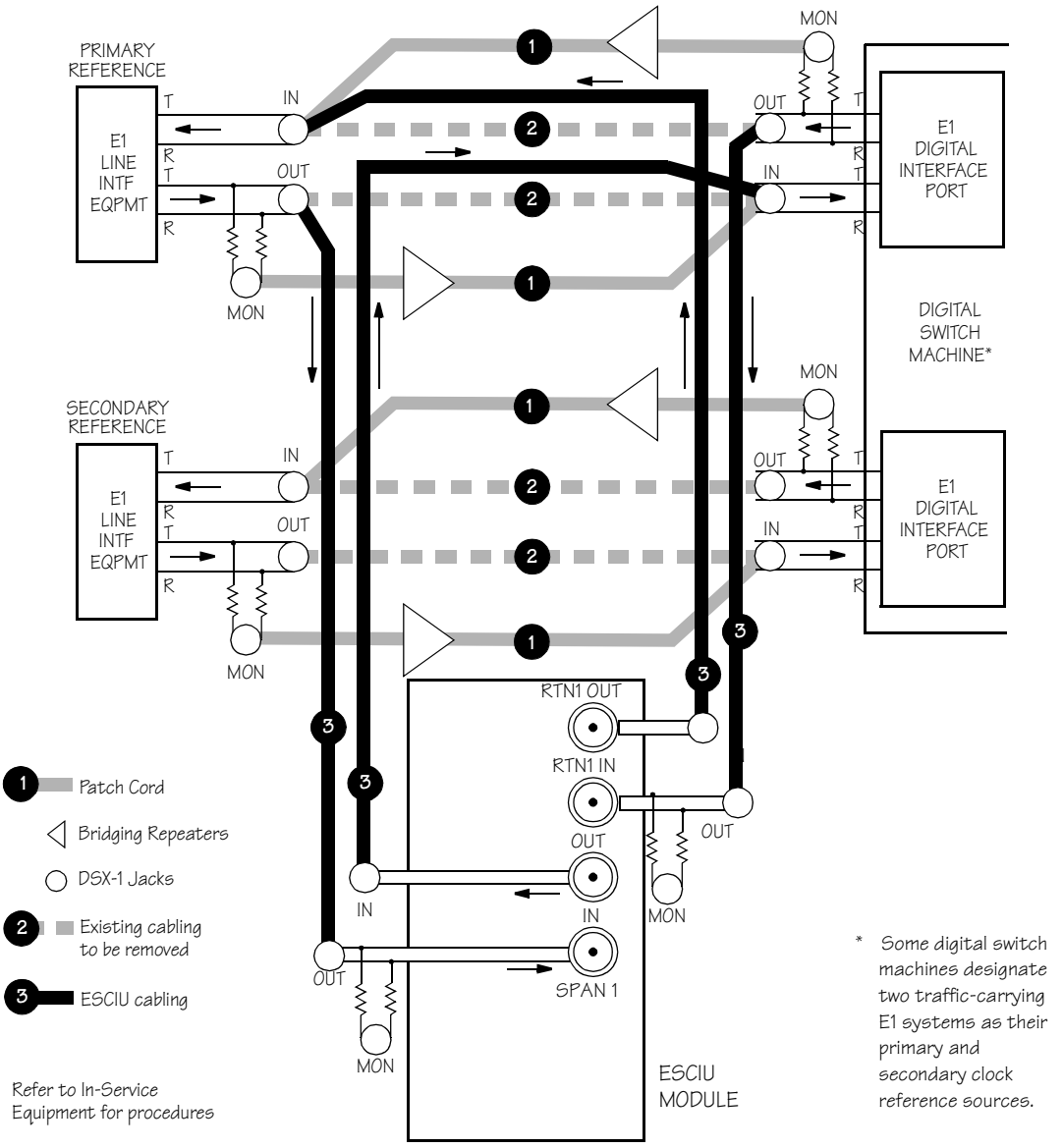
4. In the direction to be synchronized by the ESCIU module, connect new cables from the ESCIU module IN connector to the NE transmit (OUT) terminal, and connect from the ESCIU module OUT connector to the NE receive (IN) terminal.

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

6. Verify that there are no alarms on the NEs on the E1 system. If there are alarms, reinsert patch cords in the IN jack and the termination plugs in the OUT jack. Recheck the cross-connect wiring just installed, and repeat Step 5.

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

Figure 20. ESCIU Cutover without Jacks (Out-of-Service)



Time of Day Output

Connect the time of day (TOD) output at the female RJ-45 connector labeled TOD. See Figure 12 for the connector location, and Table B for the connector pinouts.

Table B. TOD Connector Pinouts

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

Note: Pins not listed are reserved for future use.

Ethernet

Connect the Ethernet cable from the network to the 10base-T Ethernet connector labeled E-NET. See Figure 12 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 3100
2	Transmit data –	TXD –	From TimeSource 3100
3	Receive data +	RXD +	To TimeSource 3100
4	—	—	—
5	—	—	—
6	Receive data –	RXD –	To TimeSource 3100
7	—	—	—
8	—	—	—

Communication Port 1

To provide an RS-232 link for TL1 command access to the TimeSource 3100, connect to port 1 at the female 25-pin D connector labeled COM1. See Figure 12 for the location of the connector. See Table D for the connector pinouts.

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

Table D. COM1 Connector Pinouts

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

Note: Pins not listed are reserved for future use.

Communication Port 2

To provide an RS-232 link for TL1 command access to the TimeSource 3100, connect to port 2 at the female 9-pin D connector labeled COM2. See Figure 12 for the location of the connector, and Table E for the connector pinouts.

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

Table E. COM2 Connector Pinouts

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

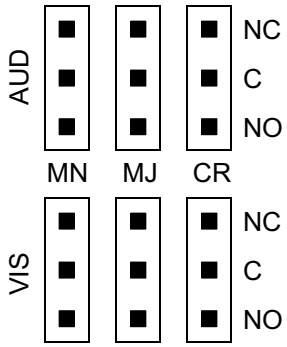
Note: Pins not listed are reserved for future use.

Alarms Output

Connect the TimeSource 3100 alarms to the office alarm panel at the critical (CR), major (MJ), and minor (MN) wire-wrap pins. See Figure 12 for the location of the alarm pins, and Figure 21 for the connections.

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

Figure 21. Alarm Connections



Craft Port

To provide an RS-232 link for TL1 command access to the TimeSource 3100, connect to the craft port at the RJ-45 connector labeled Craft on the front panel. See Figure 12 for the location of the connector, and Table F for the connector pinouts.

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

Table F. Craft Terminal Connector Pinouts

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

Note: Pins not listed are reserved for future use.

Power-Up

To power the TimeSource 3100, follow the steps in Procedure C. Before starting this procedure, be sure the antenna, shelf, and all connections appropriate for this installation have been installed, and that the host computer is set to communicate with the TimeSource 3100.

Procedure C. Power Up

Step	Procedure
Test Equipment: • Grounding wrist strap • Digital multimeter (Fluke 77 or equivalent) • Laptop computer with communications software (e.g., Windows Hyperterminal, ProComm Plus, CrossTalk)	
1	On the computer connected to the TimeSource 3100, start a VT100 terminal mode session via communication software that supports the Y-modem protocol (such as Hyperterminal, or a commercial package such as PROCOMM PLUS or CrossTalk).
2	On the computer connected to the TimeSource 3100, set the communication software to communicate with the port that is connected to the TimeSource 3100.
3	On the computer connected to the TimeSource 3100, set the RS-232 communication parameters to 8 data bits, no parity bit, 1 stop bit, and 9600 baud.
4	On the computer connected to the TimeSource 3100, connect the computer communication port to the COM1, COM2, or Craft port on the TimeSource 3100. A craft port-to-PC communication cable is provided in the hardware kit for this purpose.
5	Ensure that the TimeSource 3100 plug-in card is not installed in the shelf.
6	Ensure that all fuses that supply power to the TimeSource 3100 Shelf are removed from the fuse panel.

Procedure C. Power Up (cont'd)

Step	Procedure
7	At the shelf end of the battery leads, use the multimeter to measure the voltage between the following: Test Point — Test Point — Result Battery A lead — Battery B lead — 0 V Battery A lead — TB1: RTN A — 0 V Battery A lead — TB1: FRM — 0 V Battery B lead — TB2: RTN B — 0 V Battery B lead — TB2: FRM — 0 V
8	Attach a grounding wrist strap to the wrist, and plug the other end into the ground jack at the upper-right corner of the front of the plug-in card.
9	Pull out the latching levers at each end of the front panel 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	Replace the connector panel cover.
14	Unplug and remove the grounding wrist strap.

Procedure C. Power Up (cont'd)

Step	Procedure
15	Install the battery source fuse(s) in the rack fuse bay that supplies power to the TimeSource 3100. The TimeSource 3100 enters its warm-up mode after approximately 60 s when power is applied. During the warm-up period, the following conditions exist: • Status GPS lamp is green • Status SYS lamp is off • E1 outputs are squelched, sending AIS (factory setting), or sending an SSM message, as specified in the ED-EQPT command • Additional eight E1 outputs (if equipped) are squelched, sending AIS (factory setting), or sending an SSM message, as specified in the ED-EQPT command • Four IRIG-B outputs (if equipped) are squelched • 10 MHz and 1 pps outputs are on (unreliable while Status SYS lamp is off) • TOD output is not enabled (factory setting) • ESCIU ports (if equipped) are on (unreliable while Status SYS lamp is off) *Notes:* 1. The CRIT lamp and other alarm indication lamps may light. The host computer may display transient and standing alarm condition messages. Ignore alarms while the Status SYS lamp is off during warm-up, unless alarms apply to inputs and outputs that were previously entered. 2. TL1 commands may be entered during warm-up to enable inputs and outputs, and to set system parameters.
16	Use the Activate User command to log onto the system. `ACT-USER::TELECOM:<ctag>::TS3000!!;`

Procedure C. Power Up (cont'd)

Step	Procedure

17	*Note:* The TimeSource 3100 requires several minutes, depending on the number of satellites in view, to find the latitude, longitude, and altitude of the antenna. Entering the attitude and longitude can save this time.
	
	If desired, use the Edit Equipment command to enter the attitude, longitude, and altitude of the antenna.
	
	`ENT-EQPT::GPS:<ctag>:::ANTMODE=MANUAL,MANLAT=a-b-c-d,`
	`MANLONG=e-f-g-h,MANELEVALT=i;`
	
	a = north (a = N) or south (a = S) of the equator
	b = degrees of attitude (b = 0 to 60)
	c = minutes of the degree (c = 0 to 60)
	d = decimal fraction of the minute (d = 000 to 999)
	e = east (a = E) or west (a = W) of the Greenwich Meridian
	f = degrees of longitude (b = 0 to 180)
	g = minutes of the degree (c = 0 to 60)
	h = decimal fraction of the minute (d = 000 to 999)
	i = elevation, or altitude, of the antenna
	
	Example command to set the attitude, longitude, and altitude of the antenna:
	
	`ENT-EQPT::GPS:<ctag>:::ANTMODE=MANUAL,MANLAT=N-37-19-016,`
	`MANLONG=W-121-59-246,MANELEVALT=12;`

Procedure C. Power Up (cont'd)

Step	Procedure

18	If UTC time is desired, skip to Step 19. Use the Edit Date command to set the local date and time.
	
	`ED-DAT:::<ctag>::yyyy-mm-dd,hh-mm-ss:MODE=LOCAL;`
	
	yyyy = year (yyyy = 1998 to 2096)
	mm = month (mm = 01 to 12)
	dd = day (dd = 01 to 31)
	hh = hours (hh = 00 to 23)
	mm = minutes (mm = 00 to 59)
	ss = seconds (ss = 00 to 59)
	
	Example command to set local time:
	
	`ED-DAT:::123::2000-06-15,14-25-00:MODE=LOCAL;`

19	If UTC time is not desired, skip to Step 20. Use the Edit Date command to set the system for UTC time.
	
	`ED-DAT:::<ctag>::yyyy-mm-dd:MODE=UTC;`
	
	yyyy = year (yyyy = 1998 to 2096)
	mm = month (mm = 01 to 12)
	dd = day (dd = 01 to 31)
	
	Example command to set UTC time:
	
	`ED-DAT:::123::2000-06-15:MODE=UTC;`

20	Use the Retrieve Equipment command to identify whether and how the inputs have been provisioned. `RTRV-EQPT::ALL:<ctag>;` *Note:* Observe those results with an <aid> of RO-a and SPAN-a. If MONITOR=ALW appears for an input, that input has previously been entered. If ENSEMBLER=ALW appears for an input, that input has been set to be ensembled.

Procedure C. Power Up (cont'd)

Step	Procedure
21	If the results of Step 20 indicate the remote oscillator inputs are set as desired or not used, skip to Step 23. Use the Enter Equipment command to monitor and/or ensemble each remote oscillator input. `ENT-EQPT::RO-a:<ctag>:::ENSEMBLER=b;` a = remote oscillator input (a = A or B) b = allow the input to be ensembled or inhibit the input from being ensembled (b = ALW or INH)
22	Use the Edit Equipment command to set the frequency of the remote oscillator inputs. `ED-EQPT::TS3100:<ctag>:::ROFREQ=a;` a = remote oscillator frequency in MHz (a = 5 or 10)
23	If the results of Step 20 indicate the E1 span inputs are set as desired, skip to Step 26. Use the Enter Equipment command to monitor each available E1 span input, and to specify whether those inputs are to be ensembled. `ENT-EQPT::SPAN-a:<ctag>:::ENSEMBLER=b;` a = E1 span input (a = A or B) b = whether this input is ensembled (b = ALW ensembles the input; b = INH inhibits the input from being ensembled)
24	Use the Edit Equipment command to set the output signal framing format for each E1 output, and set each E1 output for the output during an alarm. `ED-EQPT::E1-a:<ctag>:::FRAMING=b,ALMOUT=c;` a = E1 output (a = A or B) b = framing format (b = CAS, CAS4, CCS, or CCS4, or NONE for analog) c = E1 output during alarm (c = AIS, SQUELCH, or SSM) (for SSM, framing format must be CAS4 or CCS4)

Procedure C. Power Up (cont'd)

Step	Procedure
25	If not using performance monitoring, skip to Step 26. Use the Initialize Register command to reset the performance monitoring data to zero for one or all input E1 spans. `INIT-REG-EQPT::SPAN-a:<ctag>::ALL;` a = SPAN input (a = A, B, or ALL) ALL = resets all performance monitoring data

26	If not using Ethernet, go to Step 30. Use the Edit Equipment command while connected to COM1, COM2, or the CRAFT port to set the IP address, subnetwork mask, and gateway address for the current TimeSource 3100 unit, as required for proper operation in the managed element network. (These parameters affect all Ethernet ports. The Ethernet port should be closed and all users logged off before issuing this command.)
	
	`ED-EQPT::TS3100:<ctag>:::IPNE=a,IPSUBNET=a,`
	`IPGATE=a;`
	
	IPNE=a = This unit's IP address in the form a.a.a.a (each a is an independent value of 0 to 255)
	IPSUBNET=a = Subnet mask in the form a.a.a.a (each a is an independent value of 0 to 255)
	IPGATE=a = Gateway IP address in the form a.a.a.a (each a is an independent value of 0 to 255)

Procedure C. Power Up (cont'd)

Step	Procedure

27	Ports 5001, 5002, 5003 and 5004 on the TimeSource 3100 are used as though they were serial TL1 communication ports. The following values are set at the factory and appear at reset:
	
	COMPRI=ALW1 (normal communication, including autonomous messages)
	MONMSG=INH (monitors only the current port for messages)
	KEEPALIVE=0 (does not send a COMPLD message to keep connection open)
	ENDOFTEXT=0 (does not include an end-of-text code with a TL1 message)
	ECHO=ALW (echoes characters back to the sending terminal)
	AUTOLOGOFF=0 (does not log off the user during inactivity)
	SWCONTROL=INH (uses no flow control)
	
	If these values require change, use the Edit Communications command to set communications parameters for TL1 communications.
	
	`ED-COM::COM-a:<ctag>:::[MONMSG=b[,]][KEEPALIVE=c[,]]`
	`[ENDOFTEXT=d[,]][ECHO=b[,]][COMPRI=e[,]][AUTOLOGOFF=c[,]]`
	`[SWCONTROL=b];`
	
	COM-a = User IP port (a = 5001, 5002, 5003 or 5004)
	MONMSG=b = Monitors messages on all ports (b = ALW), or current port (b = INH)
	KEEPALIVE=c = Inactive minutes until the unit sends a COMPLD message to keep the connection from being closed (c = 0 to 255)
	ENDOFTEXT=d = Hex code added to responses before semicolon (d = 0 (disabled) to 9F)
	ECHO=b = Echoes characters received so they appear on the user's screen as typed (b = ALW), or inhibits echo (b = INH)
	COMPRI=e = Sets the communication port capabilities as follows:
	ALW0=normal communication, no autonomous messages
	ALW1=normal communication, autonomous messages
	ALW2=autonomous messages received, logged on or not
	INH =closes connection and keeps port from use (command must go to another port) (if the port is in use, this command also logs off the user)
	AUTOLOGOFF=c = Inactive minutes until the unit logs off the user, keeping the connection open (c = 0 to 255)
	SWCONTROL=b = uses software (XON/XOFF) flow control (b = ALW), or no flow control (b = INH)

Procedure C. Power Up (cont'd)

Step	Procedure
28	If not using an Element Manager, skip to Step 30. If not using a separate port to send autonomous messages to an Element Manager, skip to Step 29. Use the Edit Equipment command to set the IP address and port address of the Element Manager where port 5550 connects to send TL1 autonomous messages (when the autonomous message has been sent, the TimeSource 3100 closes the connection). An alternate Element Manager may be set up, in case the TimeSource 3100 cannot make a connection to the primary Element Manager. `ED-EQPT::TS3100:<ctag>:::Ipem1=a,Ipem1port=b[,Ipem2=a][,Ipem2port=b][,IPINACT=c];` IPEM1=a = Primary Element Manager's IP address in the form a.a.a.a (each a is an independent value of 0 to 255) IPEMPORT1=b = Primary Element Manager's Ethernet port address (b = 0 to 65535) IPEM2=a = Alternate Element Manager's IP address in the form a.a.a.a (each a is an independent value of 0 to 255) IPEMPORT2=b = Alternate Element Manager's Ethernet port address (b = 0 to 65535) IPINACT=c = Disconnects from the Element Manager without an autonomous message after this number of 100-ms units of inactivity (0 to 10,000, where 0 deactivates the timer)

Step	Procedure
29	An Element Manager connects to port 5551 on the TimeSource 3100 for communicating TL1 command and response messages. The following values for port 5551 are set at the factory and appear at reset: COMPRI=ALW0 (normal communication, no autonomous messages) MONMSG=INH (monitors only the current port for messages) KEEPALIVE=0 (does not send a message to keep to connection open) ENDOFTEXT=0 (does not include an end-of-text code with a TL1 message) ECHO=INH (does not echo characters received) AUTOLOGOFF=0 (does not log off the user during inactivity) SWCONTROL=INH (uses no flow control) If these values require change, use the Edit Communications command to set communications parameters for TL1 communications. `ED-COM::COM-5550:<ctag>:::[MONMSG=b[,]][KEEPALIVE=c[,]] [ENDOFTEXT=d[,]][ECHO=b[,]][COMPRI=e[,]][AUTOLOGOFF=c[,]] [SWCONTROL=b];` MONMSG=b = Monitors messages on all ports (b = ALW), or current port (b = INH) KEEPALIVE=c = Inactive minutes until the unit sends a COMPLD message to keep the connection from being closed (c = 0 to 255) ENDOFTEXT=d = Hex code added to responses before semicolon (d = 0 (disabled) to 9F) ECHO=b = Echoes characters received so they appear on the user's screen as typed (b = ALW), or inhibits echo (b = INH) COMPRI=e = Sets the communication port capabilities as follows: ALW0=normal communication, no autonomous messages ALW1=normal communication, autonomous messages ALW2=autonomous messages received, logged on or not INH =closes connection and keeps port from use (command must go to another port) (if the port is in use, this command also logs off the user) AUTOLOGOFF=c = Inactive minutes until the unit logs off the user, keeping the connection open (c = 0 to 255) SWCONTROL=b = uses software (XON/XOFF) flow control (b = ALW), or no flow control (b = INH)

Procedure C. Power Up (cont'd)

Step	Procedure
30	If not using ESCIU ports, skip to Step 32. Use the Edit Equipment command to specify how the ESCIU performs during holdover: `ED-EQPT::TS3100:<ctag>:::BYPASS=a;` a = E1 traffic bypasses the ESCIU circuitry (a = ALW) or continues to be synchronized during holdover (a = INH).
31	Use the Edit Equipment command to specify how the ESCIU performs with a loss-of-signal (LOS) alarm on the incoming span: `ED-EQPT::OPT-a:<ctag>:::ALMOUT=b;` a = Directs this command to ESCIU span 1 (a = 1) or 2 (a = 2) b = If LOS is detected on the incoming span, the ESCIU passes AIS downstream (b = AIS), or passes the LOS downstream (b = PASSTHRU).
32	If the results of Step 20 indicate the antenna cable delay and elevation mask set are as desired, skip to Step 34. Use the Edit Equipment command to set the length of cable between the antenna and the TimeSource 3100 Shelf. This number should have been recorded during installation. Use the same command to set the antenna elevation mask angle. `ED-EQPT::GPS:<ctag>:::ANTCBLDLY=a,ANTELEVMASK=b;` a = antenna cable delay in meters (a = 0 to 330) b = antenna elevation mask angle in degrees (b = 0 to 45) (see note below) *Note:* The antenna elevation mask is that portion of the sky from which the TimeSource 3100 masks out satellite signals, measured as an angle of elevation from the horizon. Reflections or other anomalies may disturb signals received from an area of the sky that has obstructions, usually the area near the ground. Masking that part of the sky may allow the receiver to acquire GPS signals more quickly and accurately. Factory setting is 0.

Procedure C. Power Up (cont'd)

Step	Procedure
33	If not using the TOD output, skip to Step 34. Use the Edit Equipment command to set the TOD output. `ED-EQPT::TS3100:<ctag>:::TOD=b;` b = TOD format (b = Cisco or NTP4)
34	When the GPS signals have been acquired and the outputs are stable enough to output PRS, the TimeSource enters its normal operation mode. During normal operation, the following conditions exist: • 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 (E1 only), and is usable for ensembles. • E1 outputs are functioning according to specifications • Optional eight E1 outputs are functioning according to specifications • Optional four IRIG-B TOD outputs are functioning according to specifications • 10 MHz outputs are functioning according to specifications • 1 pps outputs are functioning according to specifications *Notes:* 1. The nominal time to reach normal operation (output a PRS signal) is 20 min If normal operation has not been reached after 40 min, refer to the Troubleshooting chapter. 2. TimeSource 3100 develops and sends timing within the PRS specification during normal operation and during any event or minor alarm, but not during a major or critical alarm.

End of Procedure

TL1 Reference

This chapter provides information for using the TL1 language.

Chapter 4

Conventions

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

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

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

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

Command Format

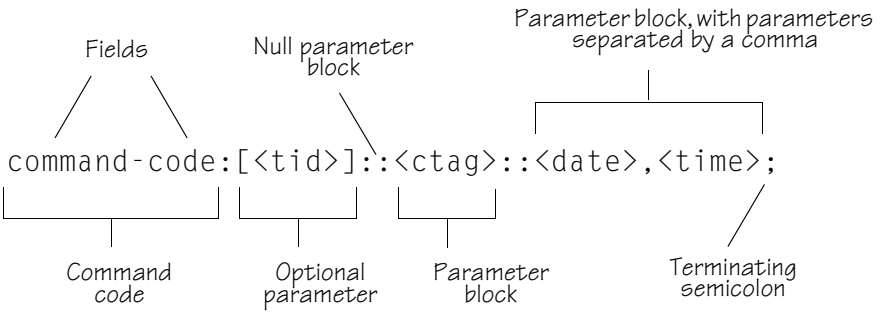
A command consists of a command code of up to three fields separated by hyphens, followed by parameter blocks separated by colons. Figure 22 shows the command format. Parameter blocks consist of one or more parameters separated by commas.

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 22. 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 23 shows the completed response format. COMPLD indicates that the command was completed without error.

Figure 24 shows the denied response format. DENY indicates that the command was denied due to an error. The <errcde> parameter indicates the corresponding error type, or cause of the error.

Figure 23. 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 24. 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 G. 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 G. 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 G. 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>	Four-character mnemonic error code, which is one of the following: EFON = equipment feature option not provided ENEQ = not equipped ICNV = command not valid IDNV = invalid data in command IDRG = invalid data range in command IIAC = invalid aid in command IICT = invalid correlation tag IIDT = invalid data parameter in command IISP = invalid syntax or punctuation IITA = invalid tid PIUI = invalid or duplicate uid or pid (privileged users only) RALB = All units of requested type are busy RCBY = circuit is busy SCSN = invalid command sequence SDBE = internal database error SNIS = not in service SNVS = not in a valid state SRCN = requested condition currently exists SRQN = request invalid SWFA = working unit failed
<error message>	Error code text message.
<link>	Communication link identifier.
<modifier>	Equipment initiating the alarm or event message, which is one of the following: TS3100 = system software GPS = GPS receiver software RO-x = remote oscillator input SPAN-x = T1 span input

Table G. Parameter Definitions (cont'd)

Parameter	Definition
<mondat>	Date of the performance monitoring data.
<montm>	Time of the performance monitoring data.
<montype>	Data type of the performance monitoring data.
<monval>	Value of the performance monitoring data.
<ntfcncde>	Notification code showing the alarm severity, which is one of the following: CR = critical MJ = major MN = minor
<ocrdat>	Occurrence date in the 8-digit form: yyyy-mm-dd (command) or yyyy:mm:dd (response or message), where yyyy is the year, mm is the month (01-12), 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 3100, and are never transmitted from the shelf. The pid contains a case-insensitive string of 8 to 10 ASCII characters, and must include at least one letter, one numeral, and one special character from the following: ! " $ % & ' ( ) * + - . / < > ? @
<sid>	Source identifier which is the name of the equipment sending the message. The sid may be an identifier or text string, and may begin with a letter. A maximum of 20 characters (limited to letters, digits, and hyphens) are allowed. The sid is recommended to be the equipment's CLLI code.
<spec_block>	Replaced by a number of parameters within the command. Parameters are in the format <name>=<value>, may be entered in any order, and must be separated by a comma.

Table G. Parameter Definitions (cont'd)

Parameter	Definition
<srveff>	Identifies whether the alarm condition is service affecting: SA = service affecting NSA = not service affecting
<tid>	Target identifier which identifies the equipment (TimeSource 3100) to which the command is directed. The tid must be a valid TL1 identifier of a maximum of 20 characters (limited to letters, digits, and hyphens) beginning with a letter. The <tid> is recommended to be the target's CLLI code, but it can be null if the OS directly interfaces to the target. The <tid> can be omitted only if connection is made directly to a single TimeSource 3100 Shelf.
<time>	Current time in the six-digit form: hh-mm-ss (command) or hh:mm:ss (response or message), where hh is hours (00 to 23), mm is minutes (00 to 59), and ss is seconds (00 to 59). For example, 5:11:49 a.m. is 05:11:49.
<uap>	User access level, used by a system administrator to assign a given level of access to system users. User access level ranges from 1 to 5, with 1 being the lowest access level, and 5 being the highest access level.
<uid>	User identifier, factory-set to TELECOM. The <uid> contains alphanumeric, case-insensitive strings of 6 to 10 characters provisioned as valid login IDs.
<uout>	User inactivity password which indicates the number of days a system user has not logged on to the system. The user inactivity timeout range is 0 to 180 days, with 0 indicating no timeout.
<vldty>	Validity of the performance monitoring data.

Autonomous Messages

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

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

Autonomous messages are listed in detail 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 G 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 3100 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 G for parameter definitions.

Factory-Set Values

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

Table H. Parameter Factory Settings

<aid>	Parameter Setting
TS3100	FREQ=5MHz TOD=NONE ALMCOND=ALW BYPASS=ALW (990-72020-04 systems only)
GPS	ANTCBLDLY=0 ANTELEVMASK=10 ANTMODE=AUTO
RO-A, RO-B	ENSEMBLER=INH MONITOR=INH
SPAN-A, SPAN-B	ENSEMBLER=INH MONITOR=INH SSM=INH SIGNAL=DIGITAL SSMCHANNEL=4
E1-A, E1-B	FRAMING=CAS4 ALMOUT=AIS

Table H. Parameter Factory Settings (cont'd)

<aid>	Parameter Setting
COM-1, COM-2, COM-3	BAUD=9600 MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=ALW COMPRI=ALW1 AUTOLOGOFF=0 HWCONTROL=INH SWCONTROL=INH PARITY=NONE STOP=1
COM-5001, COM-5002, COM-5003, COM-5004	MONMSG=INH KEEPALIVE=0 ENDOF TEXT=00 ECHO=ALW COMPRI=INH AUTOLOGOFF=0 SWCONTROL=INH
COM-5551	MONMSG=INH KEEPALIVE=0 ENDOFTEXT=00 ECHO=INH COMPRI=ALW1 AUTOLOGOFF=0 SWCONTROL=INH

Table H. Parameter Factory Settings (cont'd)

<aid>	Parameter Setting
OPT-1, OPT-2, OPT-3, OPT-4, OPT-5, OPT-6, OPT-7, OPT-8 (990-72020-02 systems only)	FRAMING=CAS4 ALMOUT=AIS
OPT-1, OPT-2 (990-72020-04 systems only)	ALMOUT=AIS

Tasks/Commands

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

Table I. Commands for Tasks

Task	Command	Page
Log user onto system	Activate User	108
Log user off of system	Cancel User	109
Copy software program or database	Copy Memory	110
Delete equipment from the database	Delete Equipment	113
Delete a user from system	Delete User Security	114
Change communication port parameters	Edit Communication	115
Change the system date and time	Edit Date	119
Change equipment parameters	Edit Equipment	121
Enter equipment into the database and allow the equipment to be used for monitoring	Enter Equipment	128
Enter a new user and configure the new user's user name, password, and access level	Enter User Security	130
Reset to zero all performance monitoring parameters associated with a given aid	Initialize Register	131

Table I. Commands for Tasks (cont'd)

Task	Command	Page
Reset the system processor or GPS receiver processor	Initialize System	132
Deactivate the audible office alarm	Operate Alarm Cutoff All	133
Display current system alarms	Retrieve Alarm All	134
Display current alarms for specific equipment	Retrieve Alarm Equipment	135
Display current communication port parameter settings	Retrieve Communication	137
Display current system alarms and events	Retrieve Condition All	141
Display current alarms and events for specific equipment	Retrieve Condition Equipment	142
Display parameter settings of equipment	Retrieve Equipment	144
Display GPS status information	Retrieve GPS Status	151
Display information about equipment	Retrieve Inventory	153
Display performance monitoring data	Retrieve Performance Monitoring	155
Display security parameters for a single user or for all users	Retrieve User Security	171
Set the name of the equipment	Set Source Identifier	172

Commands

The commands used with the TimeSource 3100 are listed on the following pages. After the command name, a definition of the command is given. The definition is followed by the actual command, followed by the variables that can be used with the command.

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

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 3100, or copies the system database to nonvolatile memory.

Notes:

1. Clear any existing alarms before using this command.

2. The database is automatically copied to nonvolatile memory once per hour. However, if power to the TimeSource 3100 is interrupted before the automatic copying occurs, changes made since the last automatic copy will be lost. To avoid the possibility of losing database changes, the Copy Memory command may be used to copy database changes to nonvolatile memory after any changes are made.

To copy a program from an external computer to nonvolatile memory within the TimeSource 3100, the command format is:

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

Copy Memory (cont'd)

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

Copy Memory (cont'd)

Command Example:

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

Response Format:

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

To copy a database from volatile to nonvolatile memory within the TimeSource 3100, the command format is:

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

Aid	Item Addressed
TS3100	System software

Command Example:

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

Response Format:

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

Delete Equipment

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

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

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

Command Example:

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

Response Format:

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

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

Notes:

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

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

Edit Communication (cont'd)

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

Aid	Parameter	Value	Description
COM-a	MONMSG=b	b = ALW	View messages from all ports
		b = INH	View messages from this port only
	KEEPALIVE=b	b = 1 to 255	Inactive minutes until the unit sends a COMPLD message to keep the connection from being closed
		b = 0	No COMPLD message is output
	ENDOFTEXT=b	b = 1 to 9F	Hex code at end of all responses
		b = 0	No hex code at end of responses
	ECHO=b	b = ALW	Echoes characters received so they appear on the user's screen as typed
		b = INH	Local echo is disabled
	COMPRI=b	b = ALW0	TL1 commands and responses, no autonomous messages sent
		b = ALW1	TL1 commands and responses, sends autonomous messages
		b = ALW2	TL1 commands and responses, sends autonomous messages whether or not logged on
		b = INH	Closes connection, logs off a user (if logged on), and keeps port from use (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 2)	b = ALW	Serial port CTS/RTS flow control is enabled
		b = INH	Serial port CTS/RTS flow control is not enabled
	SWCONTROL=b (See Note 2)	b = ALW	XON/XOFF flow control is enabled
		b = INH	XON/XOFF flow control is not enabled
	BAUD=b (See Note 1)	b = 115	Serial port baud rate is 115 kbaud
		b = 57.6	Serial port baud rate is 57.6 kbaud
		b = 38.4	Serial port baud rate is 38.4 kbaud
		b = 19.2	Serial port baud rate is 19.2 kbaud
		b = 9600	Serial port baud rate is 9600 baud
		b = 4800	Serial port baud rate is 4800 baud
		b = 2400	Serial port baud rate is 2400 baud
		b = 1200	Serial port baud rate is 1200 baud
	PARITY=b (See Note 1)	b = EVEN	Even parity is enabled on serial port
		b = ODD	Odd parity is enabled on serial port
		b = NONE	No parity is enabled on serial port
	STOP=b (See Note 1)	b = 1	1 stop bit on serial port
		b = 2	2 stop bits on serial port

Edit Communication (cont'd)

Notes:

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

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

Command Example:

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

Response Format:

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

Edit Date

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

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

Parameter	Value	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 TL1 command)
	a = LOCAL	Uses local time for hours, UTC for minutes and seconds

Notes:

1. The <time> value can only be entered when MODE=LOCAL, or in the same command as MODE=LOCAL, otherwise the command is denied. A successful command with <time> changes the display of 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	Value	Item Addressed
TS3500	—	System-wide configuration
GPS	—	GPS configuration
RO-a	a = A	Remote oscillator A input
	a = B	Remote oscillator B input
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
E1-a	a = A	E1 A output
	a = B	E1 B output
OPT-a	a = 1 to 8	E1 option outputs: 1 through 8 (990-72020-02 systems only)
	a = 1 to 2	ESCIU option ports: 1 or 2 (990-72020-04 systems only)

Edit Equipment (cont'd)

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

Aid	Parameter	Value	Description
TS3100	ROFREQ=a	a = 5 or 10	Frequency for both remote oscillator inputs in MHz
	TOD=a	a = CISCO, NTP4, or NONE	Serial TOD message is sent in Cisco format (CISCO), NTP4 Type 4 format (NTP4), or not sent (NONE)
	ALMCOND =a	a = ALW or INH	Alarm conditioning for E1, TOD, and IRIG-B outputs is enabled (ALW) or disabled (INH)
	BYPASS=a (990-72020-04 systems only)	a = ALW or INH	During holdover, the traffic-bearing E1 spans on the ESCIU module pass through the TimeSource 3100 without being retimed (ALW), or the E1 spans continue to be retimed (INH)
	IPNE=a.b.c.d (See Note 1)	a = 0 to 255	IP address of this TimeSource 3100 (must be connected to COM1, COM2, or Craft port to set this parameter)
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPSUBNET=a.b.c.d (See Note 1)	a = 0 to 255	Subnet mask for this TimeSource 3100 (must be connected to COM1, COM2, or Craft port to set this parameter)
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	

Edit Equipment (cont'd)

Aid	Parameter	Value	Description
TS3100 (contd)	IPGATE=a.b.c.d (See Note 1)	a = 0 to 255	Default gateway IP address for this TimeSource 3100 (must be connected to 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 disconnects from the Element Manager if no communications occur during this number of 100-ms units (0 to 10,000, where 0 deactivates the timer, for example, 100 = 10 s)

Edit Equipment (cont'd)

Aid	Parameter	Value	Description
GPS	**Notes: For all parameters in the GPS <aid>:** 1. When the TimeSource 3100 contains a roof antenna, only the parameters ANTCBLDLY and ANTELEVMASK, and the mode ANTMODE=AUTO, are allowed. 2. The MANLAT, MANLONG, and MANELEV values are entered as the latitude, longitude, and elevation at the time ANTMODE=MANUAL becomes active. The BT3 software uses these figures as starting points for processing the antenna position. These parameters may be used with any of the wall or window antennas.		
	ANTCBLDLY=a	a = 0 to 330	Antenna cable length (meters)
	ANTELEVMASK=a	a = 0 to 45	Antenna elevation mask angle (degrees)
	ANTMODE=a	a = AUTO	Automatic antenna mode
		a = MANUAL	Manual antenna mode (do not use for roof antenna) (MANLAT, MANLONG, and MANELEV must be set with or before this mode)
	MANLAT=a-b-c-d	a = N	North latitude
		a = S	South latitude
		b = 1 to 180	Degrees of latitude
		c = 1 to 60	Minutes of latitude
		d = 1 to 1000	Decimal minutes of latitude
	MANLONG= a-b-c-d	a = E	East longitude
		a = W	West longitude
		b = 1 to 180	Degrees of longitude
		c = 1 to 60	Minutes of longitude
		d = 1 to 1000	Decimal minutes of longitude
	MANELEV=a	a = <integer>	Antenna elevation (meters)

Edit Equipment (cont'd)

Aid	Parameter	Value	Description
RO-a	ENSEMBLER=b	b = ALW	Remote oscillator is ensembled
		b = INH	Remote oscillator is not ensembled
SPAN-a	ENSEMBLER=b	b = ALW	Span is ensembled
		b = INH	Span is not ensembled
	SIGNAL=b	b = ANALOG	Span input signal is 2.048 MHz
		b = DIGITAL	Span input signal is 2.048 Mb/s
	SSM=b	b = ALW	SSM qualifies span input
		b = INH	SSM does not qualify span input
	SSMCHANNEL=b	b = 4	Uses Sa4 bit
		b = 5	Uses Sa5 bit
		b = 6	Uses Sa6 bit
		b = 7	Uses Sa7 bit
		b = 8	Uses Sa8 bit
E1-a	ALMOUT=b	b = AIS	Output is AIS during alarm
		b = SQUELCH	Output is squelched during alarm
		b = SSM	Output includes SSM during alarm (SSM requires either CAS4 or CCS4 output framing)
	FRAMING=b	b = CAS	Output framing is CAS
		b = CAS4	Output framing is CAS4
		b = CCS	Output framing is CCS
		b = CCS4	Output framing is CCS4
		b = NONE	Output framing is NONE (analog) (If ALMOUT is SQUELCH, the signal turns off during holdover alarm. Any other ALMOUT option does not affect output during alarm)

Edit Equipment (cont'd)

Aid	Parameter	Value	Description
OPT-a (Additional E1 outputs on 990-72020-02 systems only)	ALMOUT=b	b = AIS	Output is AIS during alarm
		b = SQUELCH	Output is squelched during alarm
		b = SSM	Output includes SSM during alarm (SSM requires either CAS4 or CCS4 output framing)
	FRAMING=b	b = CAS	Output framing is CAS
		b = CAS4	Output framing is CAS4
		b = CCS	Output framing is CCS
		b = CCS4	Output framing is CCS4
		b = NONE	Output framing is NONE (analog) (If ALMOUT is SQUELCH, the signal turns off during holdover alarm. Any other ALMOUT option does not affect output during alarm)
	ALMOUT=y	b = AIS	Output is AIS during alarm
		b = SQUELCH	Output is squelched during alarm
		b = SSM	Output includes SSM during alarm (SSM requires either CAS4 or CCS4 output framing)
	FRAMING=b	b = CAS	Output framing is CAS
OPT-a (990-72020-04 systems only)	ALMOUT=b	b = AIS	When the ESCIU detects an LOS on an input spans, AIS is output to the NE (the E1 alignment sequence is blocked)
		b = PASSTHRU	When the ESCIU detects an LOS on one of its input spans, the E1 alignment sequence is passed through to the NE with the original input alarm

Edit Equipment (cont'd)

Notes:

1. These parameters affect all Ethernet ports. Close the Ethernet ports and log off all users before issuing this command.

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 s TL1 commands and responses.

Response Format:

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

Enter Equipment

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

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

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

Enter Equipment (cont'd)

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

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

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

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

Example to set an input to be monitored and ensembled:

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

Response Format:

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

Enter User Security

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

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

Parameter	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	E1 span A input
	a = B	E1 span B input
ALL	—	E1 span A and span B inputs

Response Format:

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

Initialize System

This command resets the specified processor.

Caution: Using this command with an <aid> of TS3100 will cause a loss of outputs for approximately 20 minutes if ALMOUT is SQUELCH, or unstable outputs if ALMOUT is not SQUELCH.

The command format is:

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

Aid	Item Addressed
TS3100	System software
GPS	GPS receiver software

Response Format:

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

Operate Alarm Cutoff All

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

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

Response Format:

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

Retrieve Alarm All

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

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

If there are no alarms:

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

If there is at least one alarm:

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

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

Retrieve Alarm Equipment

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

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

Aid	Value	Item Addressed
TS3100	—	System (all TS3100 alarms)
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
RO-a	a = A	Remote oscillator A input
	a = 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
BAUD=b (See Note 1)	b = 115, 57.6, 38.4, 19.2, 9600, 4800, 2400, or 1200	Communication port baud rate, where 115, 57.6, 38.4, and 19.2 are kbaud; and 9600, 4800, 2400, and 1200 are baud
MONMSG=b	b = ALW or INH	View messages from all (ALW) or only one (INH) communication port
KEEPALIVE=b	b = 0 to 255	COMPLD message setting, where 0 is no COMPLD message is output and 1 to 255 are the minutes to send a COMPLD message
ENDOFTEXT=b	b = 00 to 9F	Hex code, where 00 is no code at end of all responses and 1 to 9F is the code at the end of all responses
ECHO=b	b = ALW or INH	Local echo is enabled (ALW) or disabled (INH)
COMPRI=b	b = ALW0, ALW1, ALW2. or INH	Port communication; where ALW0 is normal communication, autonomous messages not allowed; ALW1 is normal communication, autonomous messages allowed; ALW2 is normal communication, autonomous messages allowed, even if not logged on; and INH is no communication allowed

Retrieve Communication (cont'd)

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

Parameter	Value	Description
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 = 00	No hex code at end of responses
ECHO=b	b = ALW	Echoes characters received so they appear on the user's screen as typed
	b = INH	Local echo is disabled
COMPRI=b	b = ALW0	TL1 commands and responses, no autonomous messages sent
	b = ALW1	TL1 commands and responses, sends autonomous messages
	b = ALW2	TL1 commands and responses, sends autonomous messages whether or not logged on
	b = 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=b	b = 1 to 255	Inactive minutes until the unit logs off the user, keeping the connection open
	b = 0	Autologoff is disabled
SWCONTROL=b	b = ALW	XON/XOFF flow control is enabled
	b = INH	XON/XOFF flow control is not enabled
HWCONTROL=b	b = ALW	Serial port CTS/RTS flow control is enabled
	b = INH	Serial port CTS/RTS flow control is not enabled
BAUD=b	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
PARITY=b	b = EVEN	Even parity bit is enabled
	b = ODD	Odd parity bit is enabled
	b = NONE	Parity bit is disabled
STOP=b	b = 1	1 stop bit
	b = 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	Value	Item Addressed
TS3100	—	System
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
RO-a	a = A	Remote oscillator A input
	a = B	Remote oscillator B input
GPS	—	GPS receiver

Command Example:

```
RTRV-COND-EQPT::TS3100:<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	Value	Item Addressed
ALL	—	All aids for this command
TS3100	—	System
GPS	—	GPS receiver
RO-a	a = A	Remote oscillator A input
	a = B	Remote oscillator B input
SPAN-a	a = A	Span A input
	a = B	Span B input
E1-a	a = A	E1 A output
	a = B	E1 B output
OPT-a	a = 1 to 8	Additional E1 outputs: 1 through 8 (990-72020-02 systems only)
	a = 1 or 2	ESCIU ports: 1 or 2 (990-72020-04 systems only)

Command Example:

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

Retrieve Equipment (cont'd)

Response Format:

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

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

Aid	Parameter	Value	Parameter Description
ALL	MONITOR=a	a = ALW	Monitor is used for alarm purposes
		a = INH	Monitor is not used for alarm purposes
TS3100	BYPASS=a (990-72020-04 systems only)	a = ALW or INH	During holdover, the traffic-bearing E1 spans on the ESCIU module pass through the TimeSource 3100 without being retimed (ALW), or the E1 spans continue to be retimed (INH)
	FREQ=a	a = 5	Frequency for both remote oscillator inputs is 5 MHz
		a = 10	Frequency for both remote oscillator inputs is 10 MHz
	TOD=a	a = CISCO	Serial message sent is Cisco format
		a = NTP4	Serial message sent is NTP Type 4 format
		a = NONE	No serial message is sent
	ALMCOND=a	a = ALW	Alarm conditioning for outputs is enabled
		a = INH	Alarm conditioning for outputs is disabled

Retrieve Equipment (cont'd)

Aid	Parameter	Value	Parameter Description
TS3100 (cont'd)	IPNE=a.b.c.d	a = 0 to 255	This unit's IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPSUBNET=a.b.c.d	a = 0 to 255	Subnetwork mask
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPGATE=a.b.c.d	a = 0 to 255	Default gateway IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPEM1=a.b.c.d	a = 0 to 255	Primary element manager IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	
	IPEM1PORT=a	a = 0 to 65535	Primary element manager output port address
	IPEM2=a.b.c.d	a = 0 to 255	Alternate element manager IP address
		b = 0 to 255	
		c = 0 to 255	
		d = 0 to 255	

Retrieve Equipment (cont'd)

Aid	Parameter	Value	Parameter Description
TS3100 (contd)	IPEM2PORT=a	a = 0 to 65535	Alternate element manager port number
	IPINACT=a	a = 0 to 10000	The TimeSurce 3100 disconnects from the Element Manager if no communications occur 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	Antenna cable length (meters)
	ANTELEVMASK=a	a = 0 to 45	Antenna elevation mask angle (degrees)
	ANTMODE=a	a = AUTO	Automatic antenna mode
		a = MANUAL	Manual antenna mode (do not use for roof antenna) (MANLAT, MANLONG, and MANELEV must be set with or before this mode)
	MANLAT=a-b-c-d	a = N	North latitude
		a = S	South latitude
		b = 1 to 180	Degrees of latitude
		c = 1 to 60	Minutes of latitude
		d = 1 to 1000	Decimal minutes of latitude
	MANLONG= a-b-c-d	a = E	East longitude
		a = W	West longitude
		b = 1 to 180	Degrees of longitude
		c = 1 to 60	Minutes of longitude
		d = 1 to 1000	Decimal minutes of longitude
	MANELEV=a	a = mmmm	Antenna elevation in meters

Retrieve Equipment (cont'd)

Aid	Parameter	Value	Parameter Description
RO-a	ENSEMBLER=b	b = ALW	Remote oscillator is ensembled
		b = INH	Remote oscillator is not ensembled
	MONITOR=b	b = ALW	E1 span is monitored
		b = INH	E1 span is not monitored
SPAN-a	ENSEMBLER=b	b = ALW	E1 span is ensembled
		b = INH	E1 span is not ensembled
	MONITOR=b	b = ALW	E1 span is monitored
		b = INH	E1 span is not monitored
	SSM=b	b = ALW	SSM message is used to qualify input
		b = INH	SSM message is not used to qualify input
	SIGNAL=b	b = ANALOG	Span input signal is 2.048 MHz
		b = DIGITAL	Span input signal is 2.048 Mb/s
	SSMCHANNEL=b	b = 4	Uses Sa4 bit
		b = 5	Uses Sa5 bit
		b = 6	Uses Sa6 bit
		b = 7	Uses Sa7 bit
		b = 8	Uses Sa8 bit

Retrieve Equipment (cont'd)

Aid	Parameter	Value	Parameter Description
E1-a	FRAMING=b	b = CAS	Output framing is CAS
		b = CAS4	Output framing is CAS4
		b = CCS,	Output framing is CCS
		b = NONE	Output framing is NONE (if an analog signal). (If ALMOUT is SQUELCH, the signal will turn off during holdover alarm. No other ALMOUT option affects output during alarm)
	ALMOUT=b	b = AIS	Output during holdover alarm is AIS
		b = SQUELCH	No output during holdover alarm
		b = SSM	Output during holdover alarm is SSM (SSM requires output framing of CAS4 or CCS4)

Retrieve Equipment (cont'd)

Aid	Parameter	Value	Parameter Description
OPT-a (Additional eight E1 outputs for 990-72020-02 systems only)	ALMOUT=b	b = AIS	Output during holdover alarm is AIS
		b = SQUELCH	No output during holdover alarm
		b = SSM	Output during holdover alarm is SSM (SSM requires output framing of CAS4 or CCS4)
	FRAMING=b	b = CAS	Output framing is CAS
		b = CAS4	Output framing is CAS4
		b = CCS,	Output framing is CCS
		b = NONE	Output framing is NONE (if an analog signal). (If ALMOUT is SQUELCH, the signal will turn off during holdover alarm. No other ALMOUT option affects output during alarm)
OPT-a (ESCIU for 990-72020-04 systems only)	MONITOR=b	b = ALW	Monitor is used for alarm purposes
		b = INH	Monitor is not used (INH) for alarm purposes
	ALMOUT=b	b = AIS	When the ESCIU detects an LOS on one of its input spans, AIS is output to the NE (the E1 alignment sequence is blocked)
		b = PASSTHRU	When the ESCIU detects an LOS on one of its input spans, the E1 alignment sequence is passed through to the NE with the original input alarm

Retrieve GPS Status

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

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

Response Format:

```
    <sid> <date> <time>
M   <ctag> COMPLD
    "<aid>:LAT=a,LONG=a,ALT=a,UTC=a
    ANTMODE=a,MERIT=a,SUCCESS=a%
    SAT-a,USE=a,CNO=a,ELEV=a,AZ=a,
          LOCK=a..."
    /*LINK:<link>,CMD:<command>*/
;
```

Retrieve GPS Status (cont'd)

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

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

Response Format:

```
       <sid> <date> <time>
   M   <ctag> COMPLD
       "TS3100::::CARD=TS3100,
       MACID=a,
       TYPE=E1,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=TS3100	—	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=E1, a	a = NO OPTION BOARD	990-72020-01 system
	a = E1 OPTION BOARD	990-72020-02 system
	a = ESCIU OPTION BOARD	990-72020-04 system
	a = IRIG-B OPTION BOARD	990-72020-05 system
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 3100. 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=a
                    ,,,,,[MONDAT=a-b][MONTM=a-b-c];
```

Retrieve Performance Monitoring (contd)

Parameter	Value	Description
SPAN-a	a = A	E1 span A input
	a = B	E1 span B input
MONTYPE=a	a = MTIE	Performance monitoring data type
	a = TDEV	
	a = PHASE1S	
	a = PHASE1M	
MONDAT=a-b	a = 1 to 12	Monitor date, month of the year
	b = 1 to 31	Monitor date, day of the month
MONTM=a-b-c	a = 0 to 23	Monitor time, hours past midnight
	b = 0 to 59	Monitor time, minutes past the hour
	c = 0 to 59	Monitor time, seconds past the minute

MTIE Response Format:

```
    <sid> <date> <time>
M   <ctag>COMPLD
    "SPAN-a:MTIE-a,<monval>,<vldty>
                ,,,,MONDAT=a-b,MONTM=a-b-c"
          .           .           .
          .           .           .
          .           .           .
    "SPAN-a:MTIE-a,<monval>,<vldty>
                ,,,,MONDAT=a-b,MONTM=a-b-c"
    /*LINK:<link>,CMD:<command>*/
;
```

Retrieve Performance Monitoring (contd)

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 (contd)

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

Retrieve Performance Monitoring (contd)

MTIE Response Example:

```
    TS3100-2009 2000-05-25 11:01:58
M   G COMPLD
    "SPAN-A:MTIE-1S,1,COMPL
                ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-4S,1,COMPL
                ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-10S,1,COMPL
                ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-40S,1,COMPL
                ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-100S,1,COMPL
                ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-300S,1,COMPL
                ,,,,,2000-05-25,11-00-00"
    "SPAN-A:MTIE-900S,1,COMPL
                ,,,,,2000-05-25,11-00-00"
    "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 (contd)

TDEV Response Format:

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

Note: TDEV Data types:

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

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

Retrieve Performance Monitoring (contd)

TDEV Response Example:

```
      TS3100-2009 2000-05-25 11:01:58
   M  G COMPLD
      "SPAN-A:TDEV-1S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      "SPAN-A:TDEV-2S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      "SPAN-A:TDEV-4S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      "SPAN-A:TDEV-8S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      "SPAN-A:TDEV-16S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      "SPAN-A:TDEV-32S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      "SPAN-A:TDEV-64S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      "SPAN-A:TDEV-128S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      "SPAN-A:TDEV-256S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      "SPAN-A:TDEV-512S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      "SPAN-A:TDEV-1024S,0,COMPL
                  ,,,,,2000-05-25,11-00-00"
      /*LINK:5002,CMD:RTRV-PM-EQPT::
                  SPAN-A:G::TDEV*/
   ;
```

Retrieve Performance Monitoring (contd)

PHASE1S Response Format:

```
   <sid> <date> <time>
M  <ctag>COMPLD
   "SPAN-a:PHASE1S,<monval>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<vldty>,,,,
MONDAT=a-b,MONTM=a-b-c"
         .           .           .
         .           .           .
         .           .           .
   "SPAN-a:PHASE1S,<monval>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,
<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<Δ>,<vldty>,,,,
MONDAT=a-b,MONTM=a-b-c"
;
```

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Retrieve Performance Monitoring (contd)

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 (contd)

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

Retrieve Performance Monitoring (contd)

PHASE 1S Response Example:

```
    TS3100-2009 2000-05-25 11:01:58
M  G COMPLD
   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
               COMPL,,,,,2000-05-25,100-00"
   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
               COMPL,,,,,2000-05-25,100-40"
   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
               COMPL,,,,,2000-05-25,103-20"
   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
               COMPL,,,,,2000-05-25,105-00"
   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
               COMPL,,,,,2000-05-25,106-40"
```

PHASE 1S Response Example (contd):

```
   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
              COMPL,,,,,2000-05-25,108-20"
   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
              COMPL,,,,,2000-05-25,11-100"
   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
              COMPL,,,,,2000-05-25,11-140"
   "SPAN-A:PHASE1S,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
              COMPL,,,,,2000-05-25,11-120"
   /*LINK:5002,CMD:RTRV-PM-EQPT::
              SPAN-A:G::PHASE1S*/
;
```

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Retrieve Performance Monitoring (contd)

PHASE1M Response Format:

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

Retrieve Performance Monitoring (contd)

Note: PHASE 1M Data types:

- The TimeSource 3100 collects a full 7 days of 1 minute phase data.
- The 1 minute phase data is displayed in 1 hour groups. Each request for 1 minute phase is synchronized to the hour.
- Any mondat/montm combination outside of the past 7 day window is denied. Any time increment may be entered. The system rounds the value to the nearest hour, i.e., the minute and second field of the montm is ignored.
- The first value (monval) is the oldest value in the range selected. For example, if montm = 8:45:32, the first monval will exceed time 8:00:00 followed by the value at 8:01:00, etc.
- 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	E1 span A input
	a = B	E1 span B input
PHASE1M	—	Phase 1M monitored type, which shows 1 min phase data in 1 h groups of data
<monval>	Oldest value in the range selected from the <montm> value assigned in the command	Absolute monitored phase value
<vldty>	COMPL	Data is valid
	NA	Data is not valid
MONDAT=a-b	a = 1 to 12	Monitor date, month of the year
	b = 1 to 31	Monitor date, day of the month
MONTM=a-b-c	a = 0 to 23	Monitor time, hour of the day
	b = 0 to 59	Monitor time, minute of the hour
	c = 0 to 59	Monitor time, second of the minute

PHASE1M Response Example:

```
   TS3100-2009 2000-05-25 11:01:58
M  G COMPLD
   "SPAN-A:PHASE1M,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
         0,0,COMPL,,,,,2000-05-25,100-00"
   /*LINK:5002,CMD:RTRV-PM-EQPT::
              SPAN-A:G::PHASE1M*/
;
```

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>*/
;
```

Troubleshooting

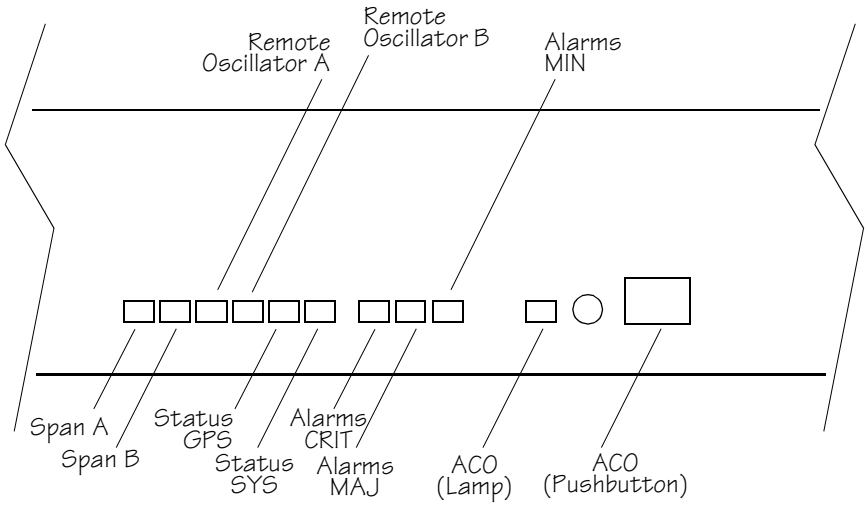
This chapter provides troubleshooting information using front-panel lamps and error messages. It also describes how to replace a card, return equipment, get technical and/or sales assistance, and obtain manual updates.

Chapter 5

Troubleshooting with Front Panel Items

All front panel items are shown in Figure 25. The items are described in Table J. Use Table J to troubleshoot the system based on the front-panel lamps.

Figure 25. Controls and Indicators



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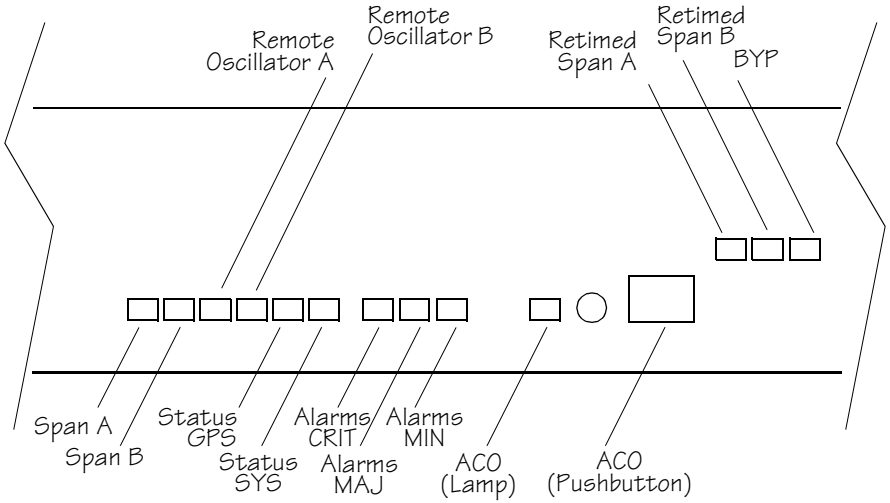

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Table J. Front Panel Lamps

Name	State	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 PRC 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 PRC 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 J. Front Panel Lamps (cont'd)

Name	State	Description	Action
Status GPS	Off	System is not powered.	If in warm-up, none required. If there is no power, apply power.
	Green	GPS is successfully tracking satellites, or is in warm-up.	None required.
	Yellow	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 K 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 red Status GPS lamp.
Alarms CRIT	Off	There is no critical alarm.	Refer to Table K to determine which type and combination of antenna alarms exist, and the recommended action.
	Red	A critical alarm has occurred because of a hardware failure.	Replace the plug-in card, using Procedure D.
Alarms MAJ	Off	There is no major alarm.	None required.
	Red	The system has been in holdover for more than 24 h.	Refer to Table K to determine which type and combination of antenna alarms exist, and the recommended action.

Table J. Front Panel Lamps (cont'd)

Name	State	Description	Action
Alarms MIN	Off	There is no minor alarm.	None required.
	Yellow	A minor alarm has occurred because Battery A or B has failed.	Troubleshoot and repair the specified –48 V battery input.
		A minor alarm has occurred because a software download is required.	Refer to Table K 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 K to determine which event occurred and the recommended action.
		A minor alarm has occurred because the antenna failed.	Refer to Table K to determine whether the minor alarm is due to antenna failure. If so, replace the antenna.
ACO (Lamp)	Off	The alarm cutoff function has not been activated.	None required. Press the ACO pushbutton to silence all audible alarms.
	Green	The alarm cutoff function has been activated.	None required.

Table J. Front Panel Lamps (cont'd)

Name	State	Description	Action
Retimed Span A or B (990-72020-04 systems only)	Off	This port has not been entered via the Enter Equipment command.	None required. If desired, enter this port via the Enter Equipment command.
	Green	This port has been entered via the Enter Equipment command, and no alarms are present.	None required.
	Red	An event (loss of signal) has occurred on this port.	Troubleshoot the traffic-carrying span input signal source; check the ESCIU port cable and connections.
BYP (990-72020-04 systems only)	Off	Traffic-carrying E1 data stream is being retimed by the TimeSource 3100 System.	None required.
	Red	Traffic-carrying E1 data stream is bypassing the TimeSource 3100 System and not being retimed because the system is in holdover.	Refer to Table K to troubleshoot the GPS, SPAN x, and RO x error messages.

Troubleshooting with Error Messages

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

Note: If only the character "C" is displayed on the terminal every few seconds, the TimeSource 3100 system has restarted with corrupt software. Download and install the system software again, using the procedure in the Software Release Document that came with the software.

Table K. Message Troubleshooting

Message	Meaning	Recommended Action
CRITICAL ALARMS		
HARDWARE FAULT	A failure has been detected on the shelf hardware.	Replace the plug-in card.
MAJOR ALARMS		
HOLDOVER	All inputs (GPS signal, span inputs, and remote oscillator inputs) are lost or unacceptable, and the system is now using the internal oscillator.	Troubleshoot the GPS, SPAN x, and RO x error messages.

Table K. Message Troubleshooting (cont'd)

Message	Meaning	Recommended Action
MINOR ALARMS		
BATTERY x FAIL	The specified –48 V battery input has failed.	Troubleshoot, and repair, the specified –48 V battery input.
DEVICE DOWNLOAD REQUIRED	The hardware device software is corrupt or missing.	Download and install the appropriate hardware device (DEV) software, using the procedure in the Software Release Document that came with the software.
GPS ERROR	The GPS receiver is reporting an error.	If accompanied by the LOW CURRENT FAULT or HIGH CURRENT FAULT alarm, follow the recommended action for LOW CURRENT FAULT or HIGH CURRENT FAULT. If not accompanied by the LOW CURRENT FAULT or HIGH CURRENT FAULT alarm: 1. Remove the antenna cable from the 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. 3. If the voltage is not 18 V dc ±2 V dc, replace the TimeSource 3100 card, using Procedure D. 4. If the voltage is 18 V dc ±2 V dc, measure the current between the antenna connector center pin and the connector housing on the shelf TNC antenna connector.

Table K. Message Troubleshooting (cont'd)

Message	Meaning	Recommended Action
GPS ERROR (contd)	The GPS receiver is reporting an error.	5. If the current is less than 5 mA or more than 500 mA, replace the TimeSource 3100 card, using Procedure D. If not (nominal current is 125 mA), re-connect the antenna cable to the rear of the shelf. 6. Remove the antenna cable from the antenna, and measure dc voltage and current from the connector center pin to the connector housing on the cable connector. 7. If the readings are 18 V dc and 125 mA, replace the antenna. If not, verify the cable path. Replace cables, lightning suppressor, or IF converter as necessary. 8. If the error repeats, replace the antenna.
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 LOW CURRENT FAULT	Current to antenna is outside specification.	If not accompanied by the GPS ERROR alarm, none required. If accompanied by the GPS ERROR alarm: 1. Check the cable connections between the TimeSource 3100 Shelf and the antenna. 2. If the error repeats, remove the antenna cable from the rear of the shelf, and measure the dc voltage from the connector center pin to the connector housing on the shelf TNC antenna connector. 3. If the voltage is not 18 V dc ±2 V dc, replace the TimeSource 3100 card, using Procedure D.

Table K. Message Troubleshooting (cont'd)

Message	Meaning	Recommended Action
HIGH CURRENT FAULT (contd) LOW CURRENT FAULT (contd)	Current to antenna is outside specification.	4. If the voltage is 18 V dc ±2 V dc, measure the current between the antenna connector center pin and the connector housing on the shelf TNC antenna connector. 5. If the current is less than 5 mA or more than 500 mA, replace the TimeSource 3100 card, using Procedure D. If not (nominal current is 125 mA), re-connect the antenna cable to the rear of the shelf. 6. Remove the antenna cable from the antenna, and measure dc voltage and current from the connector center pin to the connector housing on the cable connector. 7. If the readings are 18 V dc and 125 mA, replace the antenna. If not, verify the cable path. Replace cables, lightning suppressor, or IF converter as necessary. 8. If the error repeats, replace the antenna.
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 cable, connections, source).
SPAN x AIS	An AIS has been received on the specified input span.	Troubleshoot the specified input span signal (check 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).

Table K. Message Troubleshooting (cont'd)

Message	Meaning	Recommended Action
SPAN x LOSS OF SIGNAL	The signal on the specified input span has been lost.	Troubleshoot the specified input span signal (check cable, connections, source).
TEMPERATURE ERROR	A temperature error has been detected on the internal oscillator.	If this occurs momentarily during power-up, none required. If this does not occur during power-up: 1. Check that the ambient air temperature is within the TimeSource 3100 environmental specifications. If not, correct the ambient temperature with heating or air conditioning. 2. If the ambient air temperature is within the TimeSource 3100 environmental specifications, replace the plug-in card.
TS3100 DOWNLOAD REQUIRED	The system software is corrupt or missing.	Download and install the system (TimeSource 3100) software again, using the procedure in the Software Release Document that came with the software.
EVENTS		
BT3 WARMUP	The system is in a power-up state.	Wait for the system to power up (20 min to 2 h, depending on antenna placement and view of the sky).
COM-x USER TIMEOUT LOGOFF	The user was auto logged off.	If COM-x is the port this message was received on, retry logging in. If not, none required.
DISCONNECTED USER LOGOFF	A user was logged off by the system administrator.	None required.

Table K. Message Troubleshooting (cont'd)

Message	Meaning	Recommended Action
HOLDOVER	All inputs (GPS signal, span inputs, and remote oscillator inputs) are lost or unacceptable, and the system is now using the internal oscillator.	None required.
CRITICAL ACO EVENT	The ACO 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 (Note 1)	The GPS receiver is reporting an error.	None required.
MAJOR ACO EVENT	The ACO pushbutton has been pressed to deactivate a major audible alarm.	None required.
MINOR ACO EVENT	The ACO pushbutton has been pressed to deactivate a minor audible alarm.	None required.
POWER UP RESTART	The system processor has just started up.	None required.
RO x ERROR (Note 2)	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.

Table K. Message Troubleshooting (cont'd)

Message	Meaning	Recommended Action
RO x LOSS OF SIGNAL (Note 2)	The specified remote oscillator input signal has been lost.	Troubleshoot the specified remote oscillator input (check cable, connections, source).
SCIU x LOSS OF SIGNAL	The signal on the specified ESCIU port has been lost.	Troubleshoot the traffic-carrying span input signal source, ESCIU port cable, and ESCIU port connections.
SCIU x SLIP	The specified ESCIU port has a frame slip.	Troubleshoot the traffic-carrying span input signal source.
SETTLING PERIOD	The system is between the power-up state and steady-state operation, and is outputting Stratum 1 signals.	None required.
SOFTWARE DOWNLOADING ON LINK	Software is being downloaded at specified communication port.	None required.
SPAN x AIS (Note 2)	An AIS has been received on the specified input span.	Troubleshoot the specified input span (check source).
SPAN x ERROR (Note 2)	An error has been detected on the specified input span.	Troubleshoot the specified input span (check source).
SPAN x LOSS OF SIGNAL (Note 2)	The signal on the specified span input has been lost.	Troubleshoot the specified input span (check source).
SPAN x SSM QUALITY SEC (Note 2)	The signal on the specified span input has degraded to an SSM quality level of SEC.	Troubleshoot the specified input span (check source).
SPAN x SSM QUALITY SSUL (Note 2)	The signal on the specified span input has degraded to an SSM quality level of SSUL.	Troubleshoot the specified input span (check source).

Table K. Message Troubleshooting (cont'd)

Message	Meaning	Recommended Action
SPAN x SSM QUALITY SSUT (Note 2)	The signal on the specified span input has degraded to an SSM quality level of SSUT.	Troubleshoot the specified input span (check source).
TEMPERATURE ERROR (Note 2)	A temperature error has been detected on the internal oscillator.	1. Wait until this escalates to a minor alarm, or check that the ambient air temperature is within the TimeSource 3100 environmental specifications. If not, correct the ambient temperature with heating or air conditioning. 2. If the ambient air temperature is within the TimeSource 3100 environmental specifications, replace the plug-in card.

Notes:

1. This event will escalate to a minor alarm after 3 h.
2. This event will escalate to a minor alarm after 24 h.

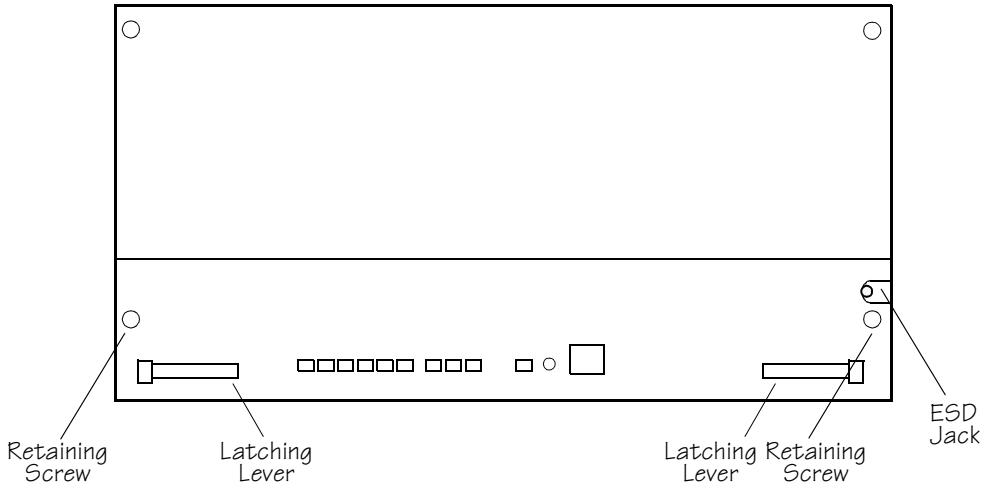
Card Replacement

To replace the plug-in card, follow the steps in Procedure D, and refer to Figure 26.

Procedure D. 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 26. Front of Shelf



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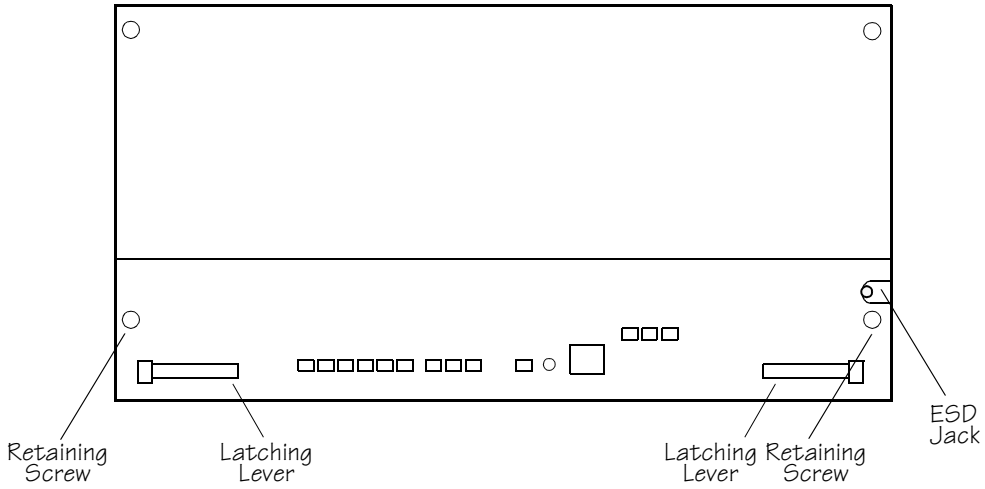

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Repair and Return

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

- A complete description of the trouble (alarms, equipment behavior, etc.), part number, serial number, issue/revision level, and warranty expiration date.
- If the warranty has expired, a purchase order with “bill to” information.
- A customer field technical contact including address, phone number and FAX number.
- Return shipping information.

To return defective or damaged equipment, use Procedure E.

Procedure E. Equipment Return

Step	Procedure
1	Call your local Symmetricom distributor or Symmetricom's Inside Sales (refer to the Sales subsection), and obtain a Return Material Authorization (RMA) number and shipping address. *Note:* Retain the RMA number for future reference. The RMA number is used by Symmetricom for internal tracking of the unit. Reference the RMA number in all communications with Symmetricom regarding the unit.
2	Pack the defective equipment, including a list containing all the information obtained above, in the original packing material. If the original packing material is not available, inform Symmetricom, and the appropriate shipping material will be provided. *Note:* Equipment must be returned in the original packaging, or approved replacement packaging for the warranty to be honored.
3	Mark the RMA number and the equipment serial number on the outside of the shipping carton.
4	Ship the equipment prepaid and insured to one of the addresses below, as directed by the Customer Assistance Center: Symmetricom Attn: Customer Service 2300 Orchard Parkway San Jose, CA 95131 or Symmetricom Attn: Repair and Return Building 7 Aguada West Industrial Site Aguada, Puerto Rico 00602 *Note:* Repaired equipment is typically shipped within 30 days of receipt by Symmetricom, or per contract terms. Shipping costs to Symmetricom are paid by the customer; shipping costs back to the customer are paid by Symmetricom.

End of Procedure

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)
408-428-7907
Fax: 408-428-7998

Europe, Middle East, and Africa (EMEA) Call Center:
+44.7000.111.666
Fax: +44.7000.666.111

E-mail: ctac@symmetricom.com

Internet: http://www.symmetricom.com

Sales

For sales assistance, contact the following:

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

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

Europe, Middle East, and Africa (EMEA) Call Center:
+44.7000.111888
+44.1483.510300

Fax: 408-428-7998

E-mail: info@symmetricom.com

Internet: http://www.symmetricom.com

Manual Updates

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

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

Chapter 6

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:	Mini RG-59 (Belden 673948 or equivalent) or RG-59 (Belden 82108 or equivalent)
Cable Length:	Maximum 330 m from antenna to shelf
Dimensions: (excluding mount)	
Height:	28 cm
Diameter:	11 cm
Weight:	255 g
Operating Temperature:	–30 °C to +80 °C
Storage Temperature:	–40 °C to + 80 °C
Operating Humidity:	0% to 100% relative humidity

Communication Ports

Port 1

Connector Type:	25-pin, female D connector
Connector Label:	COM1
Connector Location:	Connector panel
Electrical Interface:	RS-232
Pin that transmits data:	2
Pin that receives data:	3
Baud Rate:	1200 b/s 2400 b/s 4800 b/s 9600 b/s 19.2 kb/s 38.4 kb/s 57.6 kb/s 115 kb/s
Data Bits:	8
Parity Bit:	None Even Odd
Stop Bits:	1 2
Flow Control:	None Software (XON/XOFF) Hardware (CTS/RTS)

Communication Ports (cont'd)

Port 2

Connector Type:	9-pin, female D connector
Connector Label:	COM2
Connector Location:	Connector panel
Electrical Interface:	RS-232
Pin that transmits data:	3
Pin that receives data:	2
Baud Rate:	1200 b/s 2400 b/s 4800 b/s 9600 b/s 19.2 kb/s 38.4 kb/s 57.6 kb/s 115 kb/s
Data Bits:	8
Parity Bit:	None Even Odd
Stop Bits:	1 2
Flow Control:	None Software (XON/XOFF) Hardware (CTS/RTS)

Communication Ports (cont'd)

Craft Port

Connector Type:	RJ-45
Connector Label:	Craft
Connector Location:	Front panel
Electrical Interface:	RS-232
Pin that transmits data:	2
Pin that receives data:	3
Baud Rate:	1200 b/s 2400 b/s 4800 b/s 9600 b/s 19.2 kb/s 38.4 kb/s 57.6 kb/s 115 kb/s
Data Bits:	8
Parity Bit:	None Even Odd
Stop Bits:	1 2
Flow Control:	XON/XOFF CTS/RTS

Ethernet Port

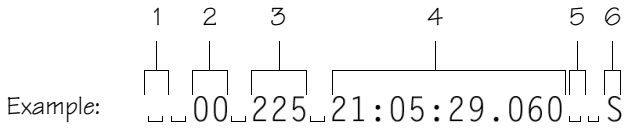
Connector Type:	RJ-45 (10Base-T)
Connector Label:	Ethernet
Connector Location:	Connector panel
Electrical Interface:	10base-T Ethernet
Data Rate:	10Mb/s
Protocol:	TCP/IP (interface)
Setup Language:	TL1 (application layer)

Time of Day Outputs

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

Connector Type:	RJ-45
Connector Label:	TOD
Connector Location:	Connector panel
Electrical Interface:	RS-485
Baud Rate:	9600 b/s
Data Format:	See Figure 27

Figure 27. 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 (the 225th day of the year in this example)
4 Hours:minutes:seconds.milliseconds
5 Leap second: blank space = no leap second; L = upcoming leap second
6 Daylight savings time indicator: S = standard time; D = daylight savings time

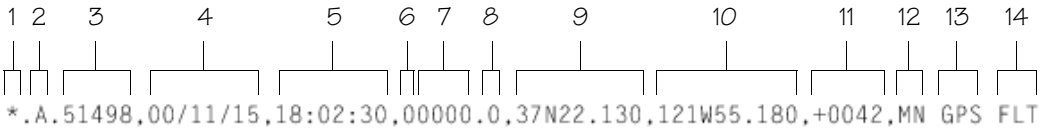
Time of Day Outputs (cont'd)

Cisco Systems Format

Connector Type:	RJ-45
Connector Label:	TOD
Connector Location:	Connector panel
Electrical Interface:	RS-485
Baud Rate:	9600 b/s
Bit Configuration:	8 data bits, No parity, 1 stop bit
Data Format:	See Figure 28

Figure 28. Cisco Systems Data Format

Example:



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

Time of Day Outputs (cont'd)

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

Connector Type:	BNC	
Number of Outputs:	4	
Connector Labels:	OUT1 OUT2 OUT3 OUT4	
Connector Location:	Module on connector panel	
Impedance:	600 Ω	
Type of Output:	Amplitude modulated	
Amplitude:	6 V peak-to-peak maximum terminated with 600 Ω	
Time Format:		
Binary Coded Decimal (BCD):	Seconds:	0 – 59
	Minutes:	0 – 59
	Hours:	0 – 23
	Days:	0 – 364
	Years:	0 – 99
Non BCD:	Seconds of day:	0 – 86399

Remote Oscillator Inputs

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

E1 Inputs

Connector Type:	Wire-wrap pins for 120 Ω balanced terminations BNC for 75 Ω unbalanced terminations (Use only BNC or only wire-wrap connector, not both, for one input.)
Connector Label:	
BNC:	SPAN IN A SPAN IN B
Wire-Wrap (2 sets):	T R S
Connector Location:	Connector panel
Impedance:	120 Ω ±5% balanced or 75 Ω ±5% unbalanced
Bit Rate:	2.048 Mb/s
Format:	E1
Line Code:	HDB3
SSM:	
State:	Enable Disable
Framing:	CAS4 CCS4
Channels:	Sa4 Sa5 Sa6 Sa7 Sa8
Amplitude:	+3 dB to –33 dB
Framing:	CAS CAS4 CCS CCS4

Analog 2.048 MHz Inputs

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

1 PPS Output

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

E1 Outputs

Standard

Connector Type:	Wire-wrap pins for 120 Ω balanced terminations BNC for 75 Ω unbalanced terminations (Use only BNC or only wire-wrap connector, not both, for one output.)
Connector Label:	
BNC:	E1 OUT A E1 OUT B
Wire-Wrap (2 sets):	T R S
Connector Location:	Connector panel
Impedance:	120 Ω balanced or 75 Ω unbalanced
Bit Rate:	2.048 Mb/s
Frequency Accuracy:	1×10^{-12}
GPS Holdover Stability:	1×10^{-11} for 72 h (0 °C to +50 °C ± 5 °C) after one week of steady-state operation 1×10^{-10} for 30 days (0 °C to +50 °C ± 5 °C) after one week of steady-state operation
Format:	Framed all 1s
Line Code:	HDB3
Amplitude:	3.0 V nominal terminated with 120 Ω balanced 2.37 V nominal terminated with 75 Ω unbalanced

E1 Outputs (cont'd)

Standard (cont'd)

Framing:	CAS CAS4 CCS CCS4
Output During Alarms:	AIS Squelch SSM Forced

E1 Outputs (cont'd)

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

Connector Type:	Wire-wrap pins for 120 Ω balanced terminations BNC for 75 Ω unbalanced terminations
Connector Labels:	
Wire-Wrap (8 sets):	T R S
BNC:	OUT1 OUT2 OUT3 OUT4 OUT5 OUT6 OUT7 OUT8
Connector Location:	Connector panel output module
Impedance:	120 Ω balanced or 75 Ω unbalanced
Bit Rate:	2.048 Mb/s
Frequency Accuracy:	1×10^{-12}
GPS Holdover Stability:	1×10^{-11} for 72 h (0 °C to +50 °C ± 5 °C) after one week of steady-state operation 1×10^{-10} for 30 days (0 °C to +50 °C ± 5 °C) after one week of steady-state operation
Format:	Framed all 1s
Line Code:	HDB3

E1 Outputs (cont'd)

Additional E1 Outputs (cont'd) (990-72020-02 System Only)

Amplitude:	3.0 V nominal terminated with 120 Ω balanced 2.37 V nominal terminated with 75 Ω unbalanced
Framing:	CAS CAS4 CCS CCS4
Output During Alarms:	AIS Squelch SSM Forced

Analog 2.048 MHz Outputs

Standard

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

Analog 2.048 MHz Outputs (cont'd)

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

Connector Type:	Wire-wrap pins (120 Ω balanced terminations) BNC (75 Ω unbalanced terminations)
Connector Labels:	
Wire-Wrap (8 sets):	T R S
BNC:	OUT1 OUT2 OUT3 OUT4 OUT5 OUT6 OUT7 OUT8
Connector Location:	Connector panel output module
Impedance:	120 Ω balanced or 75 Ω unbalanced
Frequency:	2.048 MHz
Frequency Accuracy:	1×10^{-12}
GPS Holdover Stability:	1×10^{-11} for 72 h (0 °C to +50 °C ± 5 °C) after one week of steady-state operation 1×10^{-10} for 30 days (0 °C to +50 °C ± 5 °C) after one week of steady-state operation
Format:	Square wave
Amplitude (nominal):	1.5 V terminated with 120 Ω balanced 1.18 V terminated with 75 Ω unbalanced

10 MHz Output

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

ESCIU Ports (990-72020-04 System Only)

Connector Type:		75Ω BNC 120 Ω Wire-wrap
Connector Labels:		
Wire-wrap:	SPAN 1:	RTN1 (T, R, S) (2 sets of pins) IN (T, R, S) OUT (T, R, S)
	SPAN 2:	RTN2 (T, R, S) (2 sets of pins) IN (T, R, S) OUT (T, R, S)
BNC:	SPAN 1:	RTN1 OUT RTN1 IN OUT IN
	SPAN 2:	RTN2 OUT RTN2 IN OUT IN
Connector Location:		Connector panel output module
Electrical Interface:		E1 (ITU G.703 and G.704)
Ports:		Two bidirectional: (E1 signals are buffered and retimed in forward direction, passed through in reverse direction)
Maximum cable length:		150 m (either direction, to or from DDF)
CSU Functionality:		None
Output During LOS Alarm:		AIS LOS
Input jitter tolerance:		ITU G.823 (1993) requirements
Input wander tolerance:		±125 µs

Office Alarms

Connector Panel Contacts

Connection:	Wire-wrap pins
Type:	Dry contact
Contact Rating:	1 A @ 30 V dc 0.5 A @ 60 V dc 0.5 A @ 125 V ac
Severity:	Critical Major Minor
State:	Normally open and normally closed
Style:	Audible and visible

Front Panel Lamps

Label:	Alarms (CRIT, MAJ, MIN, ACO) Status (GPS, SYS) Span (A, B) Remote Oscillator (A, B)
990-72020-04 System only:	Retimed Spans: A, B, BYP
Type:	Light emitting diode

Office Alarms (cont'd)

Front Panel Control

Label:	ACO
Type:	Push button switch
Function:	Alarm cutoff (deactivates audible office alarms)

Power

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

Shelf Mechanical

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

Shelf Environmental

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