TimeSource 2700

CDMA Primary Reference Source

Symmetricom, Inc.

2300 Orchard Parkway
San Jose, CA 95131-1017

http://www.symmetricom.com

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Acronyms and Abbreviations

AIS	alarm indication signal
BTMONitor	BesTime Monitoring
CDMA	code division multiple access
DS1	digital signal, level 1 (1.544 Mb/s)
ESD	electrostatic discharge
ESF	extended superframe
GPS	Global Positioning System
LOS	loss of signal
MDEV	mean time deviation
MPU	microprocessor
ppb	parts per billion
ppm	parts per million
PRS	primary reference source
RO	remote oscillator
RU	rack unit (1.75 inches)
SSM	synchronization status messaging
T1	digital transmission (1.544 Mb/s)
TDEV	time deviation
TL1	Transaction Language 1
UTC	Universal Coordinated Time

FCC Regulatory Statement

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

Description

This chapter provides a physical and functional description of the TimeSource 2700.

Introduction

The TimeSource 2700 is a Primary Reference Source (PRS) that tracks and ensembles multiple CDMA pilot signals. The CDMA pilot signals originate from CDMA base stations equipped with GPS based timing sources traceable to UTC. A pilot channel is transmitted continuously by each CDMA base station. Pilot channels allow the handset to acquire timing, provide phase data for demodulation, and provide a signal strength comparison between base stations.

The TimeSource 2700 provides Stratum 1 outputs by using advanced BesTime technology. By using inputs from one to eight CDMA pilots and a rubidium local oscillator, the TimeSource 2700 meets Telecondia GR2830 network performance requirements. If the CDMA signals are disrupted, the BesTime algorithm continues to predict CDMA timing information, which enhances system holdover performance.

Since CDMA is one of the most widely-used digital wireless services in the United States, the TimeSource 2700 can be installed in most metropolitan areas. Because the antenna is located inside the building within a few feet of the shelf, the antenna installation problems sometimes encountered with GPS based systems are eliminated.

Physical Description

The TimeSource 2700 consists of a shelf, an antenna with a cable, mounting hardware, and software.

The shelf can be mounted on a wall or in an industry-standard 19 inch or 23 inch rack. In a rack, the shelf occupies two rack units (RU). Except for the antenna connector, all connectors and indicators are on the front of the shelf.

Two types of antennas are available: the magnetic-mount antenna and the high-gain antenna.

The magnetic-mount antenna (Figure 1) consists of a receiving element, a magnetic base, and 12 feet of coaxial cable with an SMA connector. Because the antenna has a magnetic base, the antenna can be located on any convenient metal structure, such as an equipment rack or cable tray.

Warning: **Keep the magnetic-mount antenna away from magnetic-sensitive media (e.g., floppy or hard disks).**

The high-gain antenna (Figure 2) consists of a high-gain antenna, 12 feet of LMR-240 cable with SMA and N connectors, and hardware for mounting the antenna to a cable runway.

Figure 1. Magnetic-Mount Antenna

Receiving
element

Magnetic
base

12 ft
cable

SMA connector
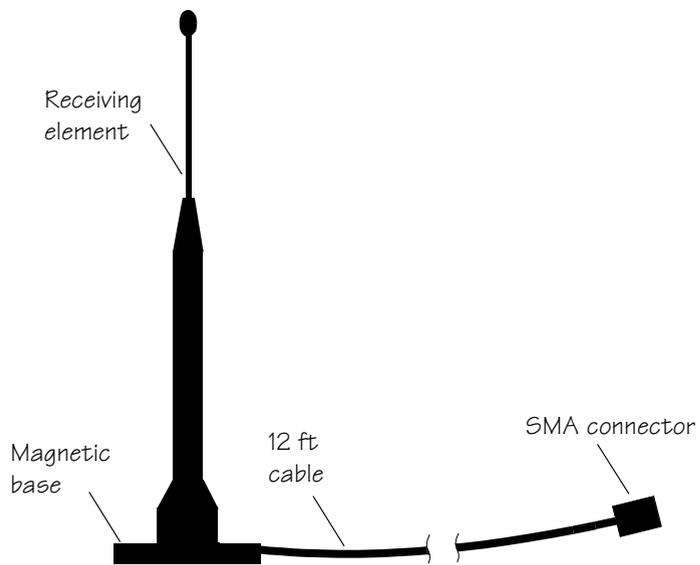
Figure 2. High-Gain Antenna

Antenna

N connector
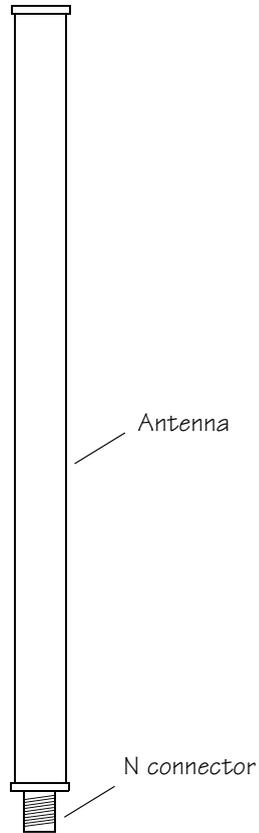
Functional Description

Overview

Figure 3 shows the main functions of the TimeSource 2700. The center of the TimeSource 2700 is the BesTime Ensemble Timing Generator. The Ensemble Timing Generator can receive multiple timing references, analyze their phase and frequency characteristics, and dynamically weight each input, to maximize the stability and accuracy of the timing outputs.

In the TimeSource 2700 application, the CDMA input normally receives full weight, and actively disciplines the timing outputs. Because of the exceptional stability of the local rubidium oscillator, the optional span line and 5 MHz remote oscillator inputs are not normally used in the ensembled timing output solution. If any of the optional inputs are provisioned for ensembling, the BesTime algorithm continuously determines the optimum input weighting mix, and may use one or all of these references, by dynamically placing increasingly greater weighting values on the most stable input or inputs. Greater weighting values are not normally placed on the optional inputs, but if this is the case, it would occur during extended CDMA outage periods.

Even if the optional inputs are not actively used in the output ensemble, the BesTime Ensemble Timing Generator continuously collects full timing statistics on each input, with respect to the output timing signal. These statistics can be used to detect timing problems on an incoming reference.

Figure 3. TimeSource 2700 Block Diagram
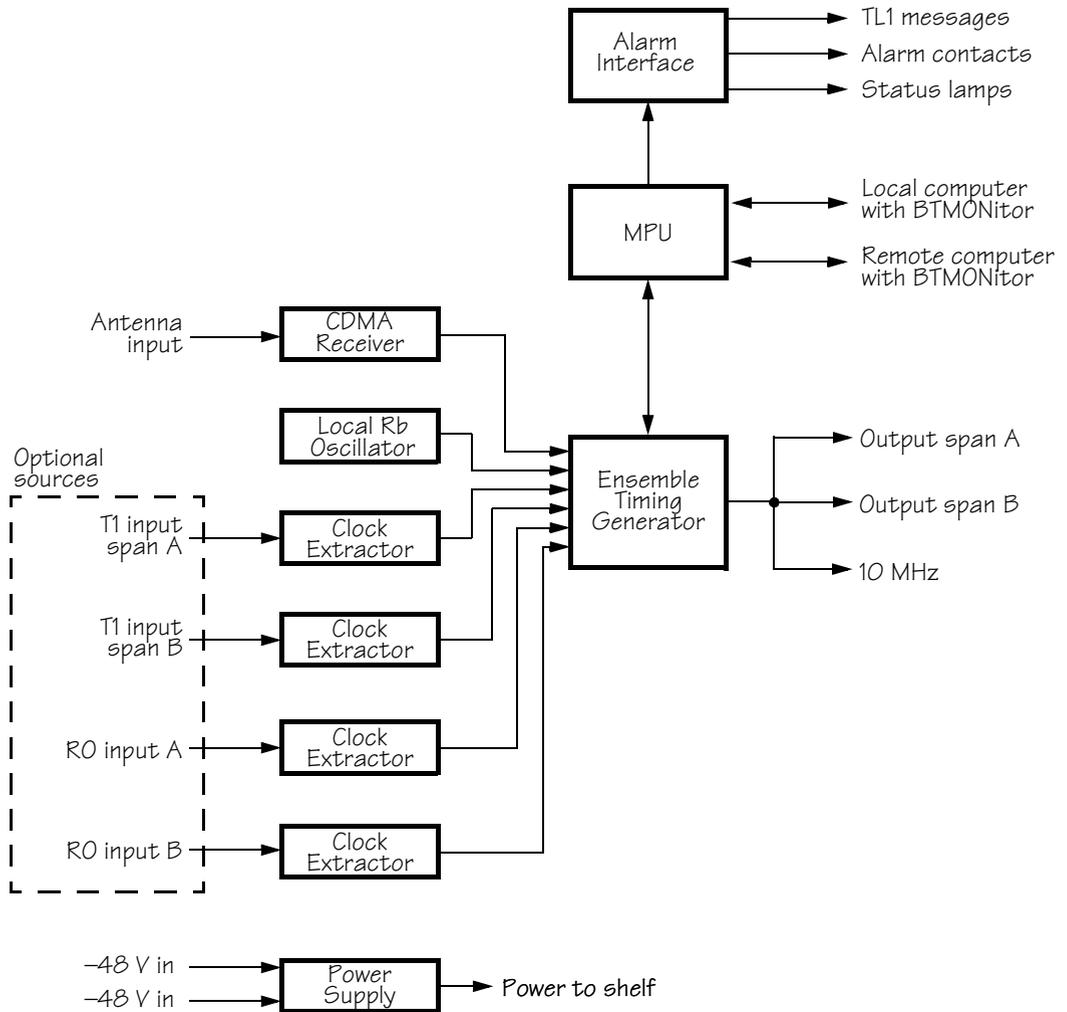
Antenna

The CDMA antenna mounts inside the building within 12 feet of the TimeSource 2700 Shelf. A single cable transports the CDMA pilot signals to the shelf.

CDMA Receiver

The CDMA Receiver automatically and continuously tracks multiple 1930 MHz-to-1990 MHz PCS band CDMA pilot signals.

Local Oscillator

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

Clock Extractors

T1 signals (bridged or terminated) and remote oscillator signals can enter on the Input Span A and B connectors. These optional inputs can be monitored, or used as back-up inputs to the system, in case of a long-term loss of the CDMA input. A Clock Extractor circuit extracts a clock from each of these signals, and sends the clocks to the Ensemble Timing Generator.

Ensemble Timing Generator

The clock signals from the CDMA Receiver, a local oscillator, T1 span lines (optional), and 5 MHz remote oscillators (optional) are used as sources by the BesTime algorithms in the Ensemble Timing Generator. The signals are analyzed for MDEV, TDEV, and other phase and frequency characteristics.

The BesTime Ensemble Timing Generator uses statistical clock models to analyze each clock, and to synthesize highly stable output timing signals.

T1 Output

The Ensemble Timing Generator provides the timing for the T1 timing signals available at the Output Span A and B connectors in a framed, all-ones format, which is selectable in either D4 or ESF framing. SSM is available with ESF framing.

10 MHz Output

The Ensemble Timing Generator provides the timing for the 10 MHz low-phase-noise timing signal, available at the 10 MHz Output connector, which can be used for local cellular frequency or testing purposes.

BTMONitor Software

BTMONitor (BesTime Monitoring) is a Windows 95/98/NT compatible craft software program, which provides system configuration, alarms, and diagnostics. BTMONitor resides on a user-provided PC, and interfaces to the TimeSource 2700 Shelf via the local (Craft) or remote (Remote) RS-232 communication port.

Alarm Interface

The MPU delivers major and minor alarms to dry-contact type connections at the Alarms connector. Alarms are also indicated by the front-panel status lamps, by the BTMONitor application, which provides extensive reports of alarm status, and by TL1 messages reported via the Craft COM port.

Power

A power converter filters and converts –48 volt dc power supplied to the shelf into the voltages required by the shelf. Dual power feeds are supplied through the Power A and B connectors.

Engineering & Ordering

This chapter describes mounting configurations for the TimeSource 2700 Shelf, lists computer requirements for operating the TimeSource 2700, and lists parts included in the TimeSource 2700 System.

Shelf Considerations

Rack Mounted

The TimeSource 2700 Shelf can be mounted in either a 19 inch or 23 inch rack. Supplied mounting ears can be positioned for flush or 5 inch offset mounting. Allow for two RUs (3-1/2 inches) of vertical space on the rack, per shelf.

To make power, input, output, and alarm connections from the rear of the rack, instead of the front of the shelf, a wire-wrap panel is available separately, as an option. The wire-wrap panel can be mounted below a rack-mounted shelf, in either a 19 inch or 23 inch rack. Mounting ears (supplied with the option) can be positioned for flush or 5 inch offset mounting. Allow for two RUs (3-1/2 inches) of vertical space on the rack, per wire-wrap panel.

Wall Mounted

The TimeSource 2700 can be attached to a wall or other surface by ordering the appropriate wall-mount configuration option.

Computer Requirements

A user-supplied computer is required to operate the TimeSource 2700 System. Minimum requirements are as follows:

- Operating system: Windows 95, Windows 98, or Windows NT 4.0

- CPU: x486 or equivalent, at 33 MHz

- RAM: 8 MB

- Serial communications port

- 3-1/2 in. floppy disk drive

- Recommended: spreadsheet application that can accept comma-delimited (.csv) data files, to process the logged files

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Systems

Table A lists the parts included in TimeSource 2700 Systems. There are four kits for TimeSource 2700 Systems:

- Rack-mount shelf with magnetic-mount antenna

- Wall-mount shelf with magnetic-mount antenna

- Rack-mount shelf with high-gain antenna

- Wall-mount shelf with high-gain antenna

Optional Wire-Wrap Panel

The wire-wrap panel (990-73000-11) is available separately, as an option, for the rack-mounted TimeSource 2700. It includes the panel and cables for connecting to the TimeSource 2700, and hardware for mounting in a 19 inch or 23 inch rack.

Table A. TimeSource 2700 Parts

Part Number	Description
Rack-Mount Shelf with Magnetic-Mount Antenna (990-73000-02)	
090-73000-02	TimeSource 2700 Shelf
093-73010-01	Magnetic-mount antenna with 12 ft cable
093-73000-02	Hardware kit (mounting brackets [2 RU] and hardware for mounting in a 19 in. or 23 in. rack)
992-73000-01	BTMONitor software
997-73000-02	Manual
060-00067-01	Cable for connecting to a PC
Wall-Mount Shelf with Magnetic-Mount Antenna (990-73000-03)	
090-73000-02	TimeSource 2700 Shelf
093-73010-01	Magnetic-mount antenna with 12 ft cable
093-71000-03	Hardware kit (2 angle brackets and bracket mounting screws [user must supply screws for mounting shelf to a wall])
992-73000-01	BTMONitor software
997-73000-02	Manual
060-00067-01	Cable for connecting to a PC

2

Part Number	Description
Rack-Mount Shelf with High-Gain Antenna (990-73000-04)	
090-73000-02	TimeSource 2700 Shelf
093-73010-02	High-gain antenna kit (includes 12 ft cable and mounting hardware)
093-73000-02	Hardware kit (mounting brackets [2 RU] and hardware for mounting in a 19 in. or 23 in. rack)
992-73000-01	BTMONitor software
997-73000-02	Manual
060-00067-01	Cable for connecting to a PC
Wall-Mount Shelf with High-Gain Antenna (990-73000-05)	
090-73000-02	TimeSource 2700 Shelf
093-73010-02	High-gain antenna kit (includes 12 ft cable and mounting hardware)
093-71000-03	Hardware kit (2 angle brackets and bracket mounting screws [user must supply screws for mounting shelf to a wall])
992-73000-01	BTMONitor software
997-73000-02	Manual
060-00067-01	Cable for connecting to a PC

Installation

Chapter 3

This chapter provides the steps required to install and power-up the TimeSource 2700.

Unpacking

Install the TimeSource 2700, using steps in the order given in this chapter. If any difficulties are encountered during the installation process, contact Symmetricom's Customer Technical Assistance Center (CTAC) at:

- 1 888 367 7966 (North America and other areas, where available)

- +1 408 428 7907 (U.S.A.)

- +44 1483 510300 (U.K.)

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 Installation

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

The antenna can be located anywhere a CDMA signal can be received. Locate the antenna high enough so that:

- Traffic (people or equipment) moving in the vicinity cannot touch the antenna and dislodge it.

- Traffic (people or equipment) moving in the vicinity cannot interfere with the CDMA signal.

Magnetic-Mount Antenna

For TimeSource 2700 Systems with magnetic-mount antennas, use this section, and skip the "High-Gain Antenna" section.

For TimeSource 2700 Systems with high-gain antennas, skip this section, and use the "High-Gain Antenna" section.

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The antenna has a magnetic base, therefore no installation hardware is required. Magnetically attach the antenna to any metallic structure, such as an equipment rack or overhead cable tray. The antenna can be in any orientation (pointing up, down, or horizontally).

Warning: **Keep the antenna away from magnetic-sensitive media (e.g., floppy or hard disks).**

Route the antenna cable to the rear of where the TimeSource 2700 Shelf will be located, and out of the way of traffic. Use tie-wraps or equivalent to dress the cable in accordance with office procedures.

Note: At the end of this Installation chapter, there is a power-up procedure. During that procedure, the strength of the CDMA signal will be measured. Based on that measurement, the location of the antenna may have to be changed to improve the signal strength.

High-Gain Antenna

For TimeSource 2700 Systems with high-gain antennas, follow Procedure A, and refer to Figure 4.

Note: Procedure A describes mounting the antenna to a cable runway, which is the recommended procedure. Follow local company procedures and the Installation Job Specification to mount the antenna.

For TimeSource 2700 Systems with magnetic-mount antennas, use the "Magnetic-Mount Antenna" section.

Procedure A. High-Gain Antenna Mounting

Step	Action
1	Assemble the antenna and mounting bracket as follows: a. Slide the N connector end of the antenna through the double D shaped hole in the bracket. b. Slide the washer over the N connector, and position against the bracket. c. Screw the nut over the N connector, onto the assembly.
2	Position the antenna bracket assembly against the front of the cable runway, with the double D shaped hole pointing away from the cable runway.
3	From the rear of the runway, position the clamp around the runway, and slide the clamp through the bracket slot and top hole.
4	Slide the two washers on the clamp, and position against the bracket.
5	Screw the two nuts on the clamp, and attach.
6	Attach the N end of the antenna cable to the antenna.
7	Route the antenna cable to the rear of where the TimeSource 2700 Shelf will be located, and out of the way of traffic. Use tie-wraps or equivalent to dress the cable in accordance with office procedures.

Note: **At the end of this chapter, there is a power-up procedure. During that procedure, the strength of the CDMA signal will be measured. Based on that measurement, the location of the antenna may have to be changed to improve the signal strength.**

Figure 4. High-Gain Antenna Mounting

Mounting bracket

Washer and nut

Cable runway

Clamp

Antenna

Washer and nut

N connector

Antenna cable

Washer and nut
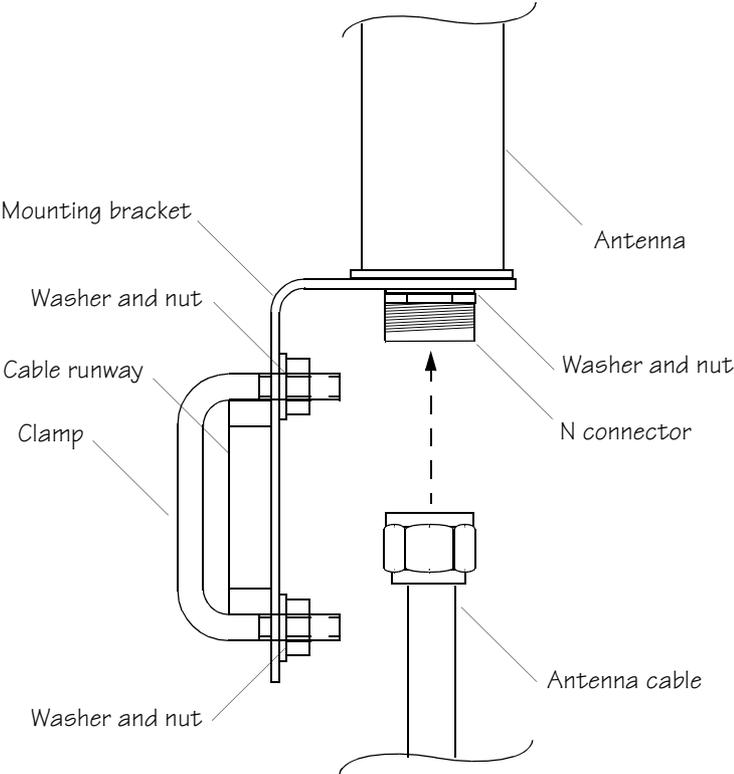
Shelf Installation

Rack Mounting

The mounting ears, as shown in Figure 5, can be positioned for flush or 5 inch offset mounting, in either a 19 inch rack (Figure 5A) or a 23 inch rack (Figure 5B). To mount the shelf, follow Procedure B.

Figure 5. Rack Mounting Options

Rear of rack

5 in. offset

Top of shelf

A. Rack mounting – 19 in. rack

Flush mount

Rear of rack

Top of shelf

B. Rack mounting – 23 in. rack

23 in. rack adapters

3
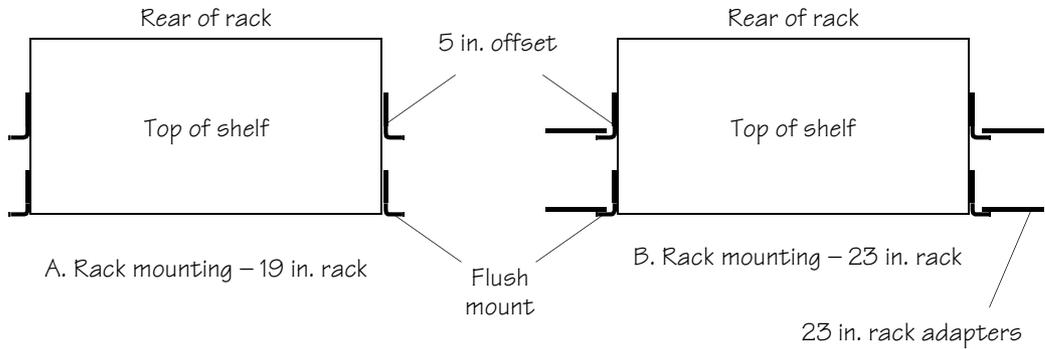
Procedure B. Rack Mounting

| Step	Action
1	Position the mounting ears on the shelf for flush mounting or 5 in. offset mounting, as required. If mounting in a 23 in. rack, attach the 23 in. rack adapters.
2	Mount the shelf in the rack.
3	If a wire-wrap panel is not used, this procedure is completed. If using a wire-wrap panel, mount the panel (Figur e6) to the rack just below the TimeSourc e2700.
4	Connect the cables (included in the wire-wrap panel kit) between the front panel connectors of the TimeSource 2700 and the connectors on the inside of the wire-wrap panel, as listed in Table B.

Figure 6. Rack Mounting with Wire-Wrap Panel

Shelf front panel

Rack

TimeSource 2700

Wire-wrap
pins

Cables from front
of shelf to
wire-wrap panel

Wire-wrap panel

A. Side view

TimeSource 2700

B. Front view

Wire-wrap panel

3
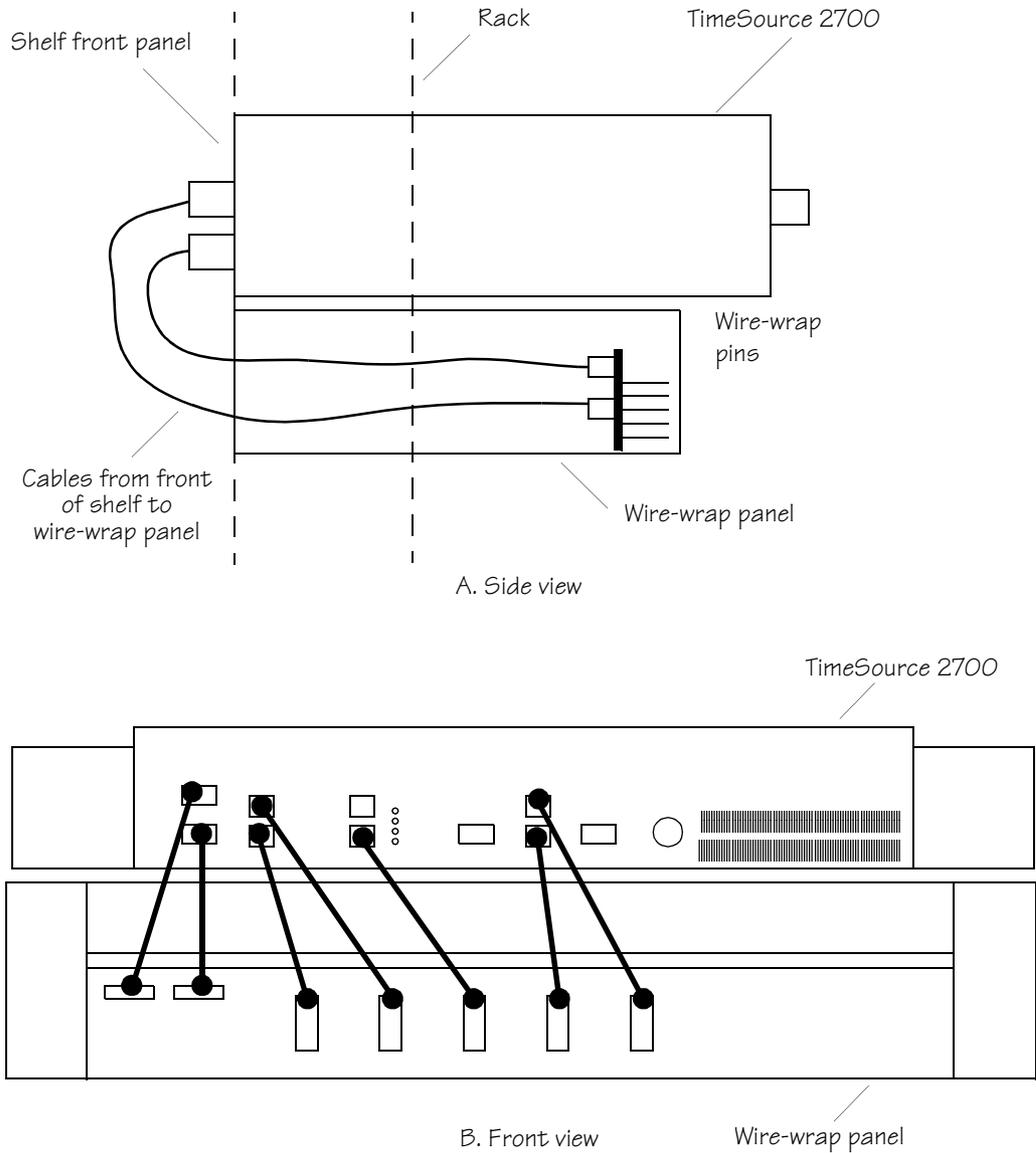
Table B. Cable Connections

TimeSource 2700	Wire-Wrap Panel	Cable Type
Power A	P1 PWR-A	DB9 – 3-pin Molex
Power B	P2 PWR-B	DB9 – 3-pin Molex
Output Span A	J3 OUTPUT A	RJ-45 – 5-pin Molex
Output Span B	J4 OUTPUT B	RJ-45 – 5-pin Molex
Alarms	J5 ALARM	RJ-45 – 5-pin Molex
Input Span A	J1 INPUT A	RJ-45 – 5-pin Molex
Input Span B	J2 INPUT B	RJ-45 – 5-pin Molex

Wall Mounting

The TimeSource 2700 can be attached to a wall or other surface. Attach the proper mounting ears, included with the TimeSource 2700, as shown in Figure 7, then use appropriate screws (not included) to attach to the chosen surface.

Figure 7. Wall Mounting

Rear

Top

A. Top view

Top

Front

B. Front view
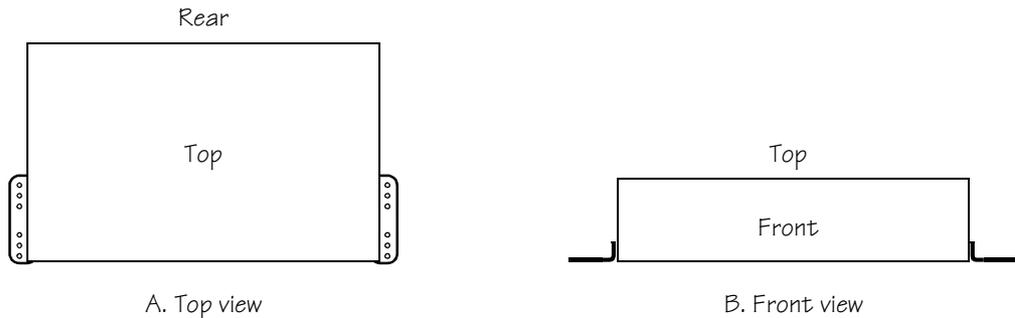
3

Cabling

The CDMA antenna connection is on the rear of the shelf. All other connections are made on the front of the shelf. When installing the TimeSource 2700 in a rack with a wire-wrap panel, connections are made at the rear of the wire-wrap panel. Figure 8 shows the locations of the connectors on the front of the shelf, and Figure 9 shows the locations of the connectors on the rear of the wire-wrap panel.

Figure 8. Shelf Front Panel Connectors

Power A,
Power B   Craft   RS-232   Not used

Output   Alarms   Input   10 MHz
span A, span B   span A, span B   output
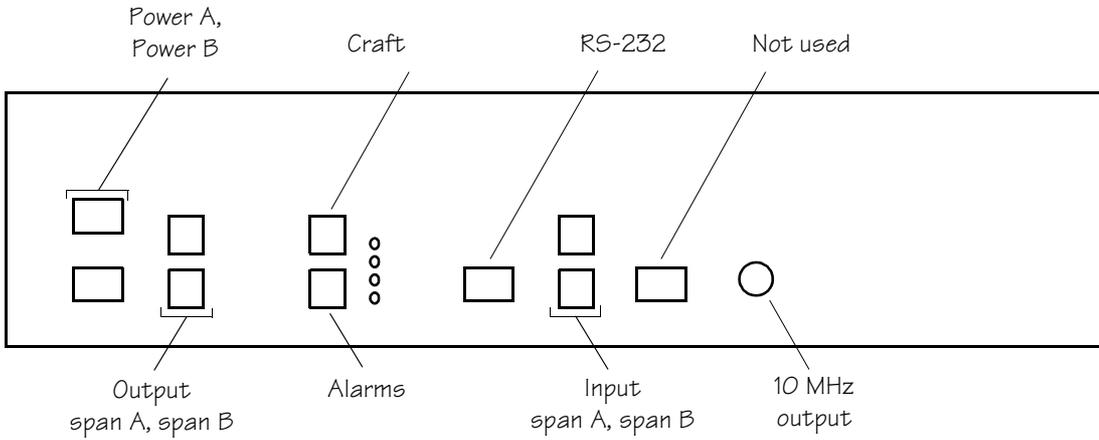
Figure 9. Optional Wire-Wrap Panel Rear Panel Connectors

Power A   5 MHz input   Power B

Input   Alarms   Output
span A, span B   span A, span B
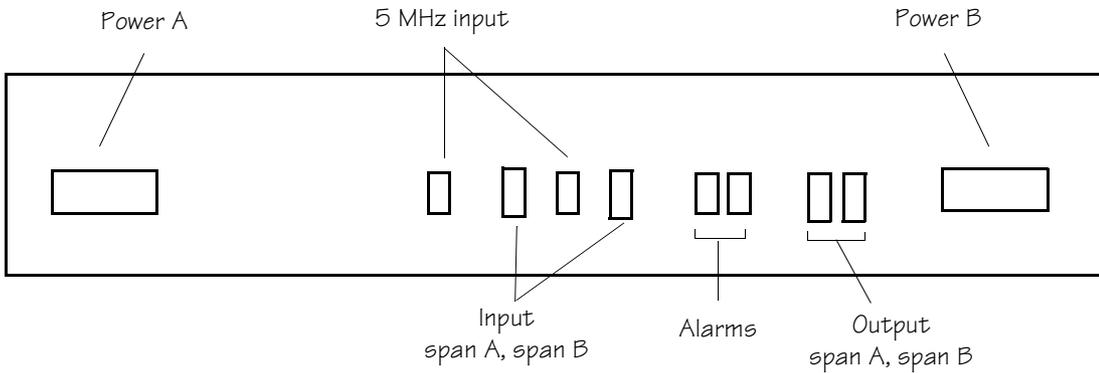
Power and Frame Ground

Caution: **Ensure the fuses in the fuse panel which will be used to power the TimeSource 2700 Shelf are removed before connecting power.**

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

Shelf Front Panel

The –48 volt dc battery and frame ground enter through the nine-pin male DB9 connectors labeled Power A and Power B. Figure 8 shows the location of the connectors, and Table C lists the connector pinouts.

Note: **If two office battery supplies (battery A and battery B) are not available, connect the single office battery to the Power A connector on the shelf front panel. This is not a recommended arrangement.**

Solder the power and frame ground wires to a customer-supplied female DB9 connector, following the pinouts listed in Table C, then mate to the Power A or Power B connector on the front panel.

Note: **Connect the power leads from pins 1 and 2 to the office battery source, but do not apply the office battery to the TimeSource 2700 at this time.**

3

Table C. Front Panel Battery Connector Pinouts

Pin	Signal
I	–48 V dc
2	Battery return
6	Frame ground

Note: Pins not listed are reserved for future use.

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 6 AWG frame ground rod run vertically on each side of the rack. Use one of the following methods for connecting the wire from pin 6 of the DB9 connector to the 6 AWG rod.

- Crimp an appropriate-size spade lug to the ground wire from the DB9 connector, bend the lug around the 6 AWG rod, and solder.

- Strip enough insulation from the ground wire from the DB9 connector to permit three complete turns around the 6 AWG rod, and solder.

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

Without ground rod:

Crimp an appropriate-sized spade lug to the wire from pin 6 of the DB9 connector, and secure the lug to a screw hole on the rack. Remove the paint, and sand the area around the screw hole, to ensure proper conductivity.

Wire-Wrap Rear Panel

The –48 volt dc battery and frame ground enter through the PWR-A and PWR-B terminal blocks. Figure 9 shows the location of the terminal blocks, and Table D lists the terminal block pins.

Note: If two office battery supplies (battery A and battery B) are not available, connect the single office battery to the PWR-A terminal block on the rear of the wire-wrap panel. This is not a recommended arrangement.

Connect the power and frame ground wires to the terminals listed in Table D, using appropriate sized spade lugs.

Note: Connect the leads from the – and + terminals to the office battery source, but do not apply the office battery to the Time-Source 2700 at this time.

3

Table D. Wire-Wrap Panel Battery Terminal Block Pinouts

Pin	Signal
–	–48 V dc
+	Battery return
F	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 6 AWG frame ground rod run vertically on each side of the rack. Use one of the following methods for connecting the wire from terminal F of the terminal block to the 6 AWG rod.

- Crimp an appropriate-size spade lug to the ground wire from the terminal block, bend the lug around the 6 AWG rod, and solder.

- Strip enough insulation from the ground wire from the terminal block to permit three complete turns around the 6 AWG rod, and solder.

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

Without ground rod:

Crimp an appropriate-sized spade lug to the wire from terminal F of the terminal block, and secure the lug to a screw hole on the rack. Remove the paint, and sand the area around the screw hole, to ensure proper conductivity.

Output Span (A, B)

Shelf Front Panel

Connect the T1 outputs to the two RJ45 connectors labeled Output Span A and Span B. Figure 8 shows the location of the connectors on the front panel, and Table E lists the pinouts of each connector (Output Span A and Span B).

Note: The shield is normally grounded only at the signal source. Grounding the shield at both ends is <u>not</u> recommended.

Table E. Front Panel T1 Output Connector Pinouts

Pin	Signal Name
4	Ring
5	Tip
7	Frame ground
8	Frame ground

Note: Pins not listed are reserved for future use. Use category 5 EIA/TIA 568 A or B compliant cable.

3

Wire-Wrap Rear Panel

Connect the T1 outputs to the two wire-wrap connectors labeled OUTPUT DS1-A and DS1-B. Table F shows the location of the connectors on the wire-wrap panel, and Table F lists the pins of each connector (OUTPUT DS1-A and DS1-B).

Table F. Wire-Wrap Panel T1 Output Connector Pinouts

Pin	Signal Name
R	Ring
T	Tip
S	Frame ground

Craft

Two communication ports are available. Both perform the same function and are electrically the same. However, each port has a different connector type.

Note: TL1 messages are available only via the Craft port.

Make a direct connection to the TimeSource 2700 communication port at the RJ45 connector labeled Craft. Figure 8 shows the location of the connector on the shelf front panel, and Table G lists the pinouts of the connector.

Table G. Craft Terminal Connector Pinouts

Pin	Signal	Abbreviation	Direction
2	Transmit data	TXD	From TimeSource 2700
3	Receive data	RXD	To TimeSource 2700
4	Data set ready	DSR	To TimeSource 2700
5	Signal ground	GND	—
6	Data terminal ready	DTR	From TimeSource 2700
7	Frame	—	—
8	Frame	—	—

Note: Pins not listed are reserved for future use.

3

Remote RS-232

Make connections to the data terminal equipment (DTE) port at the 9-pin female DB9 connector labeled Remote RS-232. Figure 8 shows the location of the connector on the shelf front panel, and Table H lists the pinouts of the connector.

Table H. Remote RS-232 Connector Pinouts

Pin	Signal	Abbreviation	Direction
1	Data carrier detect	DCD	To TimeSource 2700
2	Receive data	RXD	To TimeSource 2700
3	Transmit data	TXD	From TimeSource 2700
4	Data terminal ready	DTR	From TimeSource 2700
5	Return/signal ground	RTN	—
6	Data set ready	DSR	To TimeSource 2700
7	Request to send	RTS	From TimeSource 2700
8	Clear to send	CTS	To TimeSource 2700

Note: Pins not listed are reserved for future use.

Alarms

Shelf Front Panel

The RJ45 connector labeled Alarms provides dry-contact relay closure points. The relay contacts are normally open, and close when reporting an alarm. Figure 8 shows the location of the connector on the front panel. Connect between the Major pins for a major alarm, and between the Minor pins for a minor alarm. The pinouts of the connector are listed in Table I.

Table I. Alarms Connector Pinouts

Pin	Alarm	Contacts During No Alarm	Contacts During Alarm	Contacts During Power Off
1	Major	Open	Closed	Closed
5				
2	Minor	Open	Closed	Open
4				

Note: Pins not listed are reserved for future use.

Wire-Wrap Rear Panel

The two wire-wrap connectors labeled ALARM MAJ and MIN provide dry-contact relay closure points. The relay contacts are normally open, and close when reporting an alarm. Figure 9 shows the location of the connectors on the wire-wrap rear panel. Connect between the MAJ connector + and – pins for a major alarm, and between the MIN connector + and – pins for a minor alarm.

Input Span (A, B)

Shelf Front Panel

Connect the optional T1 inputs and the optional 5 MHz inputs to the two RJ45 connectors labeled Input Span A and Span B. Figure 8 shows the location of the connectors on the front panel, and Table J lists the pinouts of each connector.

Note: The T1 signal shield is normally grounded only at the signal source. Grounding the shield at both ends is <u>not</u> recommended.

Table J. Front Panel T1 and 5 MHz Connector Pinouts

Pin	Signal
1	Ring
2	Tip
3, 4	5 MHz (positive)
5, 6	5 MHz (negative)
7	Frame ground
8	Frame ground

Note: Pins not listed are reserved for future use.

Wire-Wrap Panel

Connect the optional T1 inputs to the two wire-wrap connectors labeled INPUT DS1-A and DS1-B. Figure 9 shows the location of the connectors on the wire-wrap panel, and Table K lists the pinouts of each connector.

Note: The T1 signal shield is normally grounded only at the signal source. Grounding the shield at both ends is <u>not</u> recommended.

Table K. Rear Wire-Wrap Panel DS1 Input Connector Pinouts

Pin	Signal
R	Ring
T	Tip
S	Frame ground

Connect the optional 5 MHz inputs to the two wire-wrap connectors labeled INPUT 5M A and 5M B. Figure 9 shows the location of the connectors on the wire-wrap panel, and Table L lists the pins of the connectors.

Table L. Rear Wire-Wrap Panel 5 MHz Input Connector Pinouts

Pin	Signal
+	5 MHz (positive)
−	5 MHz (negative)

10 MHz Output

Connect a BNC connector from the connector labeled 10 MHz Output to the equipment that will use the 10 MHz output signal. Figure 8 shows the connector location on the shelf front panel.

CDMA Antenna

Connect the cable from the CDMA antenna to the SMA connector labeled CDMA RF IN. Figure 10 shows the connector location on the shelf rear panel.

Figure 10. Shelf Rear Panel Connector

CDMA
antenna
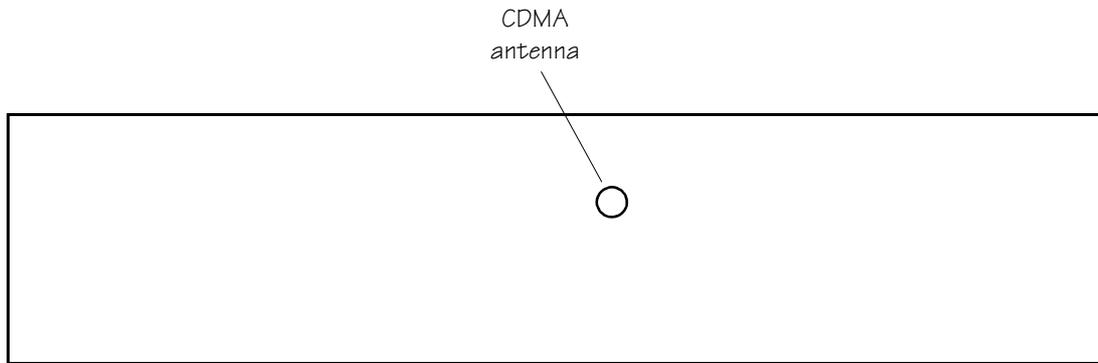
Power-Up

Use Procedure C to install BTMONitor at a site where the host computer is connected to the Craft connector of the TimeSource 2700 with a cable, and set up BTMONitor.

Procedure C. Power-Up

Step	Action
1	Locate a directory, or create a new directory, on your hard disk, to store the BTMONitor application.
2	Copy the files from the BTMONitor disk to the directory.
3	Create a Windows shortcut to BTMONitor, and place the shortcut on the Windows Desktop. One method to accomplish this is to open Windows Explorer in an unmaximized window with some of the Desktop visible around it. Then, navigate to the BTMONitor file and drag the file to the Desktop. Click OK if Windows asks to make a shortcut file.
4	Connect the supplied serial communications cable between the TimeSourc e2700 Craft connector and a serial communications port on the computer.
5	Install fuses in the fuse panel that powers the TimeSource 2700. On the front panel, when the Minor Alarm lamp is yellow, and the Locked lamp is blinking green, continue.

3

Step	Action
6	Open the BTMONitor application. The COMM Port Selection screen appears.

7	Choose a communications port by clicking one of the following:

- Select Last Used Port: COMx:. This selection will use the named serial communications port, which BTMONitor identifies as the one used in the previous session, when the OK button is clicked.

- Automatic Selection, Scan COM Ports. This selection will scan the serial communications ports on the host computer for the communications port connected to the TimeSource 2700, when the OK button is clicked.

- Manual Selection: Allows the user to enter or choose the host computer communication port that is connected to the TimeSource 2700.

Step	Action
8	Click OK. Verify a User Login screen appears (shown below).
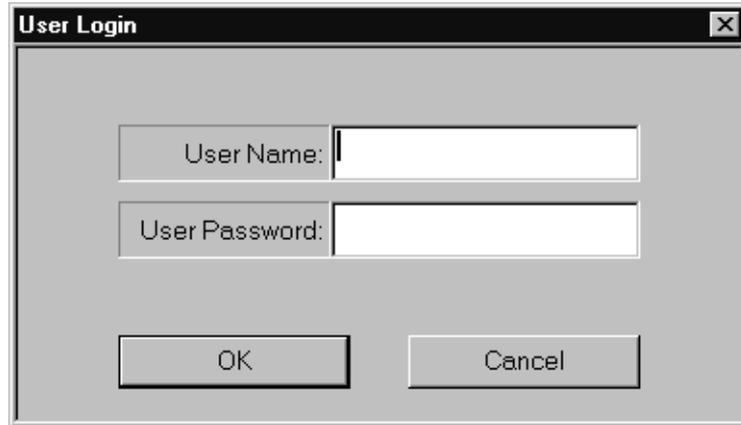
Note: If a dialog box appears stating, "Failed to Open COM Port" instead of the User Login screen, verify that the TimeSource 2700 is powered, and the serial communications are connected. Then click OK, and repeat Steps 7 and 8.

3

Step	Action
9	Enter the user name and password for this installation, then click the OK button. A screen appears showing the version number, copyright date, and the serial port that communicates with the TimeSource 2700 (shown below).

Notes:

1. The user name, "default1", is set at the factory, and the password, "TS2700:", is set at the factory. Be sure to enter the entire password, including the colon.

2. The user name and password are case-sensitive.

3. If an incorrect user name and password are entered three consecutive times, the BTMONitor application exits, and ends the attempted session. If this happens, re-open the application, and enter the correct user name and password.

BT3 MONitor Version 2.7.3

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Symmetricom

Port Used

TCP/IP

OK

Step	Action
10	Verify the correct version number and serial port, then click the OK button. The BTMONitor main screen appears (shown below).

3

Step	Action
11	Select Configuration from the main screen, then select Installation, as shown below.

Exit Status Configuration Performance Statistics Precision Sync Monitor System Admin. Help
Installation
Provision   ▶
Change Password

The Installation screen appears (shown below).

CDMA Installation   ✕

Location ID
TS27R2#3

OK

Cancel
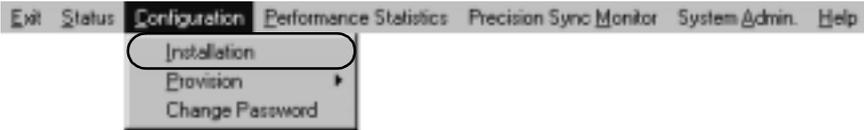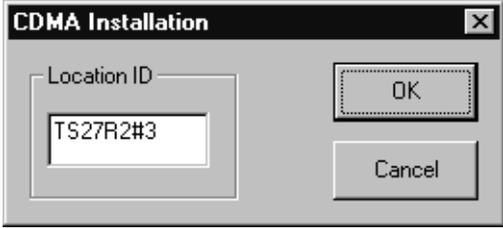
| 12 | In the Location ID area: Enter two to eight alphanumeric characters for the TimeSource 2700 identification. The identification name can be used to identify this particular TimeSource 2700 among multiple TimeSource 2700 systems. |

Caution: Use the factory-set name, or enter a name. Do not leave this field blank.

| 13 | Click the OK button to save the information on this screen to the TimeSourc e2700. A dialog box appears to confirm the action (see below). Click Yes to save the parameters to the TimeSource 2700. |

BTMon   ✕

⚠ Save Install Data to TimeSource, Are You Sure?

Yes   No
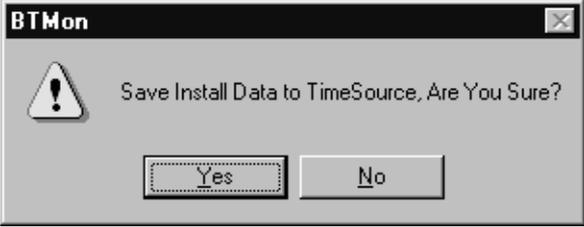
Procedure C. Power-Up (cont'd)

Step	Action
14	Select Performance Statistics from the main screen, then select CDMA Summary, as shown below.
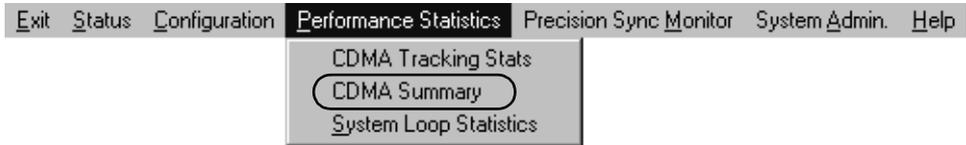
The CDMA Summary Report screen appears (shown below).

3

Step	Action
15	The system is factory-set to Auto Search for pilot channels on power up. Observe the Lock display for each pilot. Any number other than 0 indicates the TimeSource 2700 has detected, and locked onto, an acceptable pilot signal(s). Lock is required for only one pilot for the system to produce PRS outputs. If Lock is not achieved within 30 min, move the antenna to see if the system will detect an acceptable pilot signal.
	Alternatively, do one of the following two options:
	• Use a PCS CDMA phone with a signal strength indicator in the vicinity of the planned shelf installation site. Choose the location in which to install the antenna by observing the strongest signal strength on the phone. If the phone does not detect a signal, the TimeSource 2700 should not be installed at that location.
	• If the pilot signal channel for the PCS service provider is available, select the channel, using the Select Pilot Signal Channel task in the Operation chapter. Selecting the correct pilot signal channel allows the system to find and lock on the pilot signal(s) more quickly.

Remote Operation via a Modem (Optional)

Use Procedure D to set up communications between BTMONitor and the TimeSource 2700 via a modem (Hayes compatible).

Procedure D. Installing BTMONitor Using a Modem

Step	Action
1	Connect a straight-through serial communications cable (user supplied) between the TimeSource 2700 Remote connector and serial communications port on the modem, and verify all links between the modem and the host computer are connected.
2	From the BTMONitor main screen, click Exit.
3	Open the BTMONitor application. The COMM Port Selection screen appears.

Step	Action
4	On the Comm Port Selection screen, click the Use Profile option, on the left of the menu bar. A standard Windows Open File screen appears (shown below), set to open a file named profile.dat. If other profile files have already been created, they will appear in this window.

Note: The profile.dat file contains up to 10 communication profiles. A communication profile contains modem settings, including a phone number, for communicating with a TimeSource 2700 System. Instructions for creating a modem profile follow this paragraph. The profile.dat file can be copied, and renamed, using standard Windows procedures (do not change the dat file extension).

Open	? ✕
Look in: 📁 v272x ▼ 🔼 🗐 ⬛ ▥	
📁 data	
File name: *.dld	Open
Files of type: ▼	Cancel

Procedure D. Installing BTMONitor Using a Modem (cont'd)

Step	Action
5	Click the Open button. If the file has not yet been created, a dialog box appears (shown below) that asks to create the file profile.dat. If the file has been created, the Comm. Profile Edit screen appears (shown in Step 6).

Step	Action
6	Click the Yes button. The Comm. Profile Edit screen appears (shown below).

3

Step	Action
7	On the upper left side of the screen, highlight one of the 10 profiles in the Profile list box. The highlighted selection appears in the TS Name box, below the Profile list box. *Note:* If an accurate profile exists, go to Step 16.
8	In the TS Name box, change the name of the modem profile, if desired. The TS name should reflect the name of the TimeSource 2700 Shelf to which the profile connects.
9	Check that the Comm Port window displays the communication port that is connected to the modem, and that the Modem button is selected.
10	On the right side of the screen, be sure the Baud Rate is 9600, the Parity is None, the Number of Data Bits is 8, and the Number of Stop Bits is 1. *Caution:* Factory settings are displayed on the Comm. Profile Edit screen, and must be used.
11	Enter the phone number for the modem to dial in the Phone No. box.
12	Click the Save Profile button to save the changes made on this screen as the profile named in the TS Name box. A standard Windows Open File screen appears (see Step 4). A file named profile.dat is set to be opened.
13	Click Open. BTMONitor opens the profile.dat file, enters data from the Comm. Profile Edit screen, and closes the profile.dat file. A confirmation screen appears (shown below).
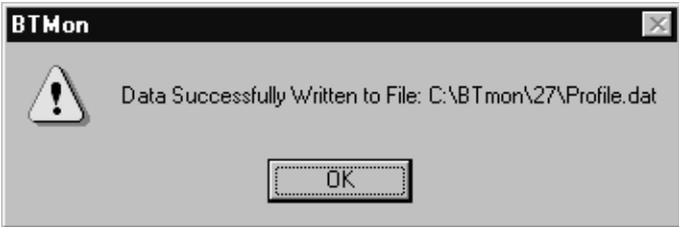
BTMon

⚠ Data Successfully Written to File: C:\BTmon\27\Profile.dat

OK

Step	Action
14	Click OK. BTMONitor is now set up to communicate with the TimeSource 2700 via the modem. The Comm. Profile Edit screen appears.
15	If desired, repeat Steps 7 through 14 to create another modem profile.
16	Highlight the appropriate profile, and click the Logon Using Profile button.
	Note: Wait approximately 1 min for the connection to be made. After approximately 1 min, either the Successfully Connected or Timed Out (not connected) pop-up screen appears. If the Timed Out pop-up screen appears, check that the modem configuration procedure was correctly followed, then connect again.

3

Remote Operation via a Terminal Server (Optional)

Use Procedure E to set up communications between BTMONitor and the TimeSource 2700 via a terminal server. This allows the user to select and/or edit the terminal server number and the terminal server port number, to allow the TimeSource 2700 to communicate with the host computer via an LAN network. Consult your system administrator and the manual supplied with your terminal server to determine the server and port numbers.

Note: The following procedure requires a terminal server and a TCP/IP address.

Procedure E. Remote Operation via a Terminal Server

Step	Action
1	From the BTMONitor main screen, click Exit.
2	Open the BTMONitor application. The COMM Port Selection screen appears. **COMM Port Selection** ✕ Use Profile　TCP/IP ○ Select Last Used Port: COM1　　[OK] ○ Automatic Selection, Scan COM Ports ○ Manual Selection　[2 ▼]　　[Cancel] ◉ [Use TCP/IP]　[192.9.200.233]　[2103] BT3 MONitor Version 2.7.3
3	Click Use TCP/IP.
4	Click the TCP/IP option, on the left of the menu bar.
5	Select or edit a terminal server and TCP/IP address by clicking one of the following: • Select: Selects a terminal server and TCP/IP address • Edit: Edits a terminal server and TCP/IP address. If you click Select, continue to the next step. If you click Edit, skip to Step 7.
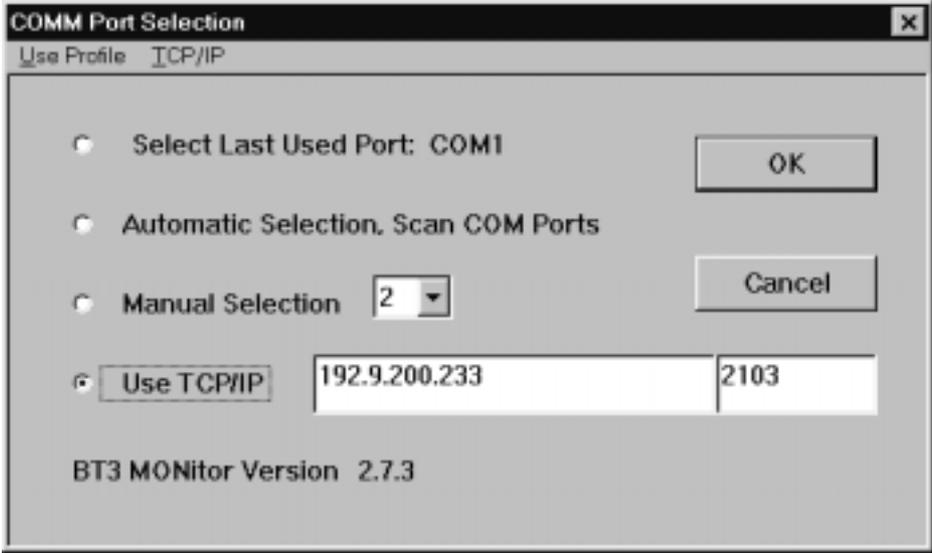
Step	Action
6	In the Address/Port area of the Select IP Address screen (see below), highlight the desired terminal server address and port, then click Use (the Use button will display the selected address and port). Skip to Step 11.

Step	Action
7	In the Address/Port area of the Edit IP Address screen (see below), highlight the terminal server address and port to be edited, then click Edit Address (the Edit Address button will change to Copy to List).
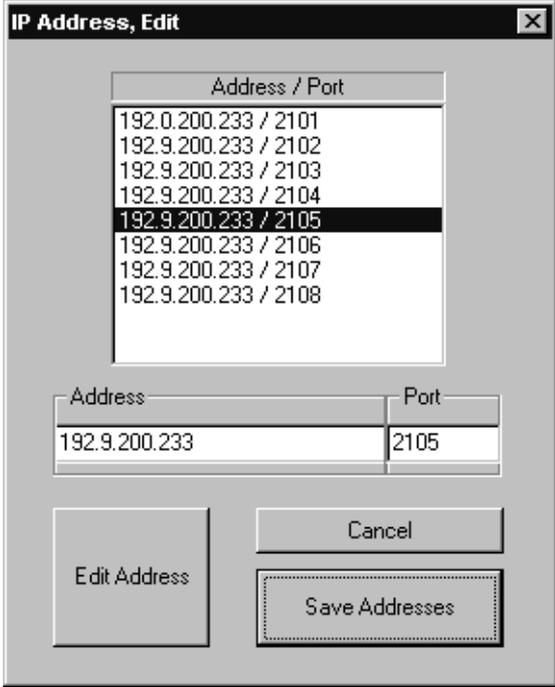
8	Type the address number, press the tab key, then type the port number.

Step	Action
9	Click Copy to List, then click Save Addresses (see below).

Note: To select the terminal server address and port just edited, perform the following:

a. Click the TCP/IP option, on the left of the Comm Port Select screen menu bar, then click Select.

b. Highlight the desired terminal server address and port, then click Use.

Step	Action
10	Click OK.
11	Enter the user name and password for this installation, then click OK.
12	Verify the correct version number and serial port, then click OK.

Operation

This chapter provides tasks which may be required to operate the TimeSource 2700.

Chapter 4

Introduction

The following pages have tasks which may be required to operate the TimeSource 2700. Items not called out in windows are for factory use only.

View Alarms and Alarm Thresholds

1. In the main menu, click Status.

2. Click Alarm Monitor.

3. View the LEDs to determine the status of the inputs.

On CDMA:

- Green indicates locked.

- Yellow indicates not locked.

- Red indicates warm-up.

On Span A, Span B, ROA, and ROB:

- Gray indicates not provisioned.

- Yellow indicates an alarm condition if the input is provisioned, but not ensembled.

- Green indicates OK.

- Red indicates an alarm condition.
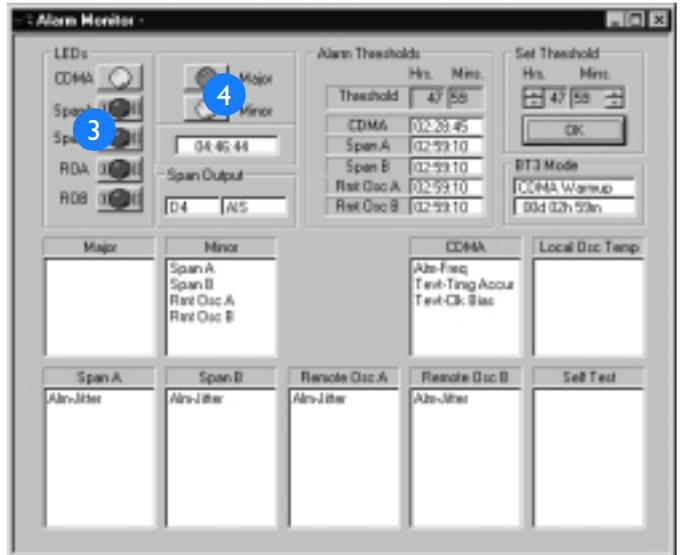
4. View the LEDs to determine the alarm status:

- Major: red indicates a major alarm; off indicates no alarm.

- Minor: yellow indicates a minor alarm; off indicates no alarm.

View Alarms and Alarm Thresholds (cont'd)

5. View the listing of the major and/or minor alarm messages.

6. View the listing of transient events and alarm messages for the optional inputs, CDMA, local oscillator temperature, and self-test.

See the Troubleshooting chapter for explanations of the messages.

7. View the alarm thresholds.

Threshold displays the amount of time a minor alarm exists before escalating to a major alarm. CDMA, Span A, Span B, Rmt Osc A, and Rmt Osc display the amount of time an item has been in minor alarm.
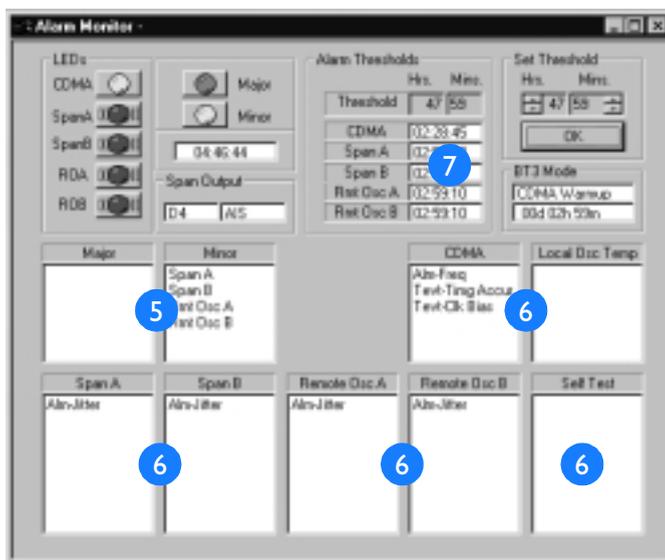
Change Alarm Thresholds

1. In the main menu, click Status.

2. Click Alarm Monitor.

3. Click the up and down arrows to set the alarm threshold.

This sets the amount of time a minor alarm exists before becoming a major alarm.

For CDMA inputs, this also sets the amount of time from the beginning of bridging mode to escalation to a minor alarm. The system stays in bridging mode for 25 percent of the programmed threshold. For example, if the threshold is 48 hours, and the CDMA input is lost, the system stays in bridging mode for 12 hours (25 percent of 48 hours), then escalates to a minor alarm. If CDMA input loss continues for 48 hours from the start of bridging mode, the system escalates to a major alarm.

Caution: *Do not set the threshold to less than 12 hours — spurious alarms may result.*

Notes:

a. The recommended setting is 48 hours (factory setting).

b. The threshold setting only affects span and remote oscillator inputs if they are both provisioned and ensembled.

4
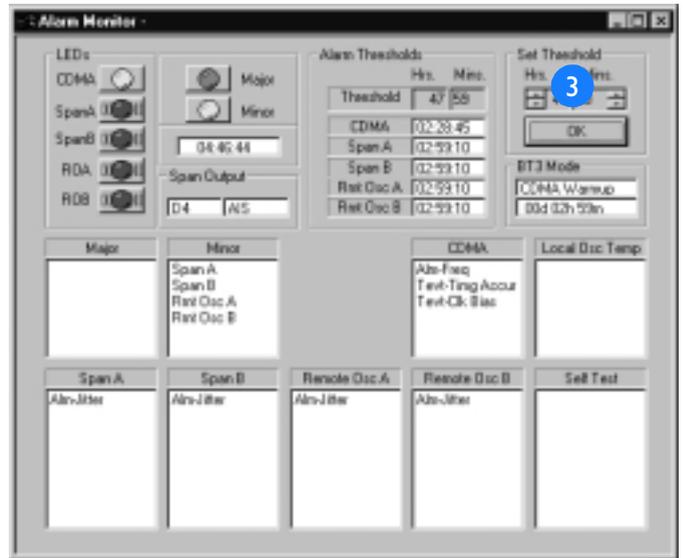
Change Alarm Thresholds (cont'd)

4. Click to save the alarm threshold settings.
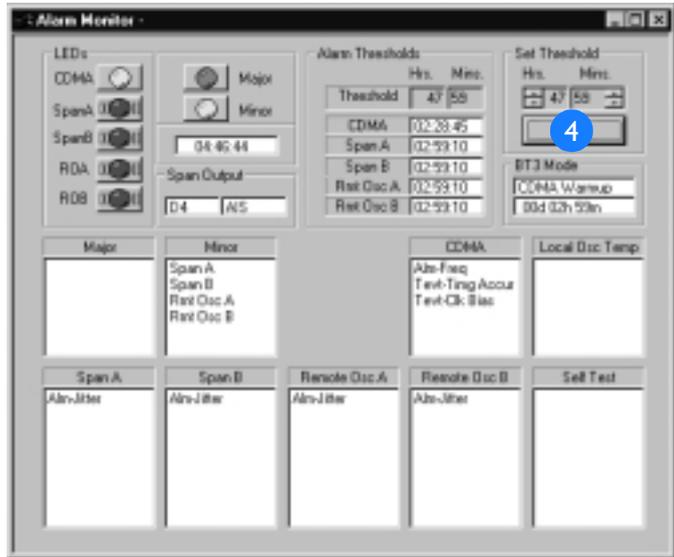
View Output Framing and Output During Alarms

1. In the main menu, click Status.

2. Click Alarm Monitor.

3. View the span line output, and trouble code sent during an alarm.

Note: Span Output displays the output settings only. It does <u>not</u> indicate real-time activity or the current state of the outputs.
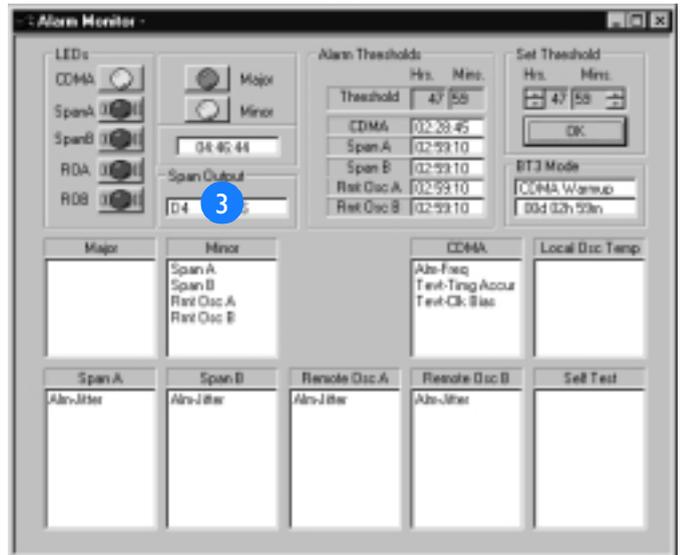
View BT3 (TimeSource 2700) Mode and Duration

1. In the main menu, click Status.

2. Click Alarm Monitor.

3. View the current BT3 (TimeSource 2700) mode, and the amount of time the unit has been in that mode.

The TimeSource 2700 will be in one of four modes: CDMA normal, bridging, holdover, or warm-up.

- CDMA normal indicates the system is operating without any CDMA events or alarm conditions.

- Bridging indicates the system is operating with a transient CDMA event. Bridging does not indicate a problem that requires any maintenance.

- Holdover occurs when a CDMA event has escalated because the event has not cleared; i.e., bridging has escalated to holdover because the CDMA event keeps occurring. Holdover also results in a minor alarm. Holdover does not indicate a loss of timing output quality until a major alarm is also declared.

- Warm-up indicates the system is in a power-up state. Timing outputs will not be generated until the system exits warm-up.
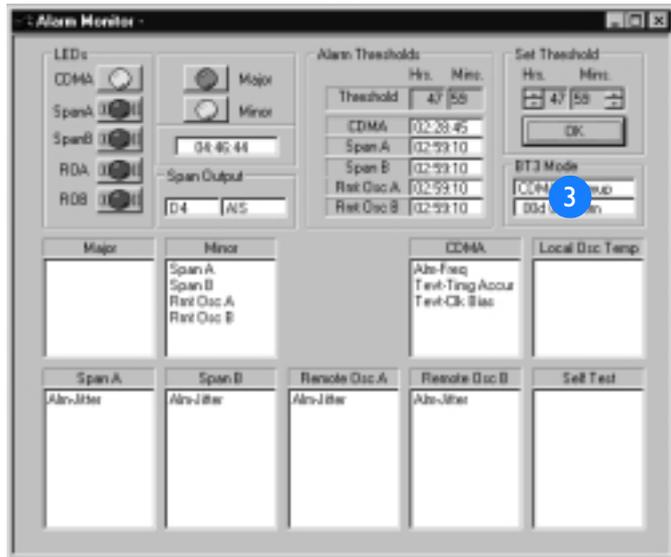
View Alarm Log

1. In the main menu, click Status.

2. Click Alarm Log Display.

3. View the most recent 512 alarms and events.

Refer to the Troubleshooting chapter for a list of all possible messages that may appear in the log.

4. Click to update the log information.

5. Click to start or stop the log file for this screen.
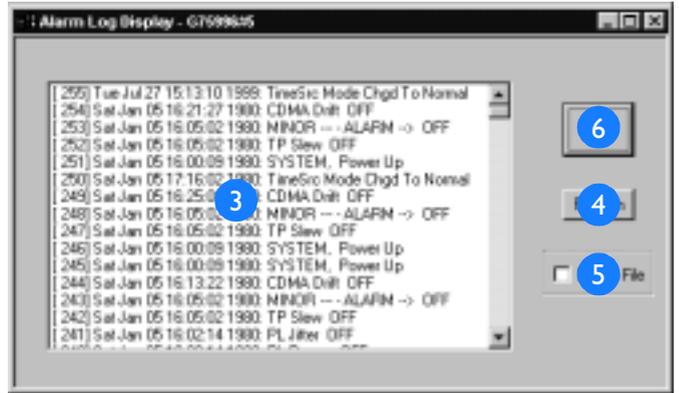
If checked, data from the screen is written to the file at every screen update. The log file may be opened and read during the logging process, however, the log file is read-only during the logging process. The log file is written in a comma-delimited (.csv) data format.

6. Click to exit.

Set Location ID

1. In the main menu, click
Configuration.

2. Click Installation.

3. Type in the TimeSource 2700
identification.

The identification must be from two
to eight alphanumeric characters.
The identification name can be used
to identify this particular
TimeSource 2700 System among
multiple TimeSource 2700 Systems.

4. Click OK to save the
information, or click Cancel to
ignore any changed information.

Exit Status Configuration Performance Statistics Precision Sync Monitor System Admin. Help

Installa
Provision
Change Password

CDMA Installation

Location ID

TS27   3
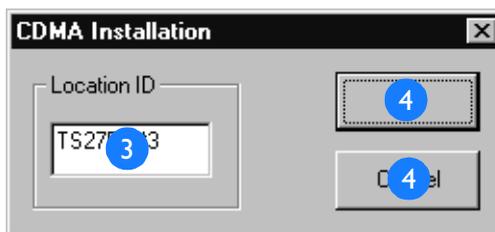
Enable Inputs

1. In the main menu, click Configuration.

2. Highlight Provision, and select Inputs.

3. Click any of the input source(s) to enable (provision) monitoring of an input.

Caution: *It is not required to select an input. If an input is not used, do not select; otherwise, spurious alarms will be generated.*

Note: An input must be provisioned before it can be ensembled.

4. Click to restore the factory settings.

5. Click OK to save the input selections, or click Cancel to ignore any changed information.
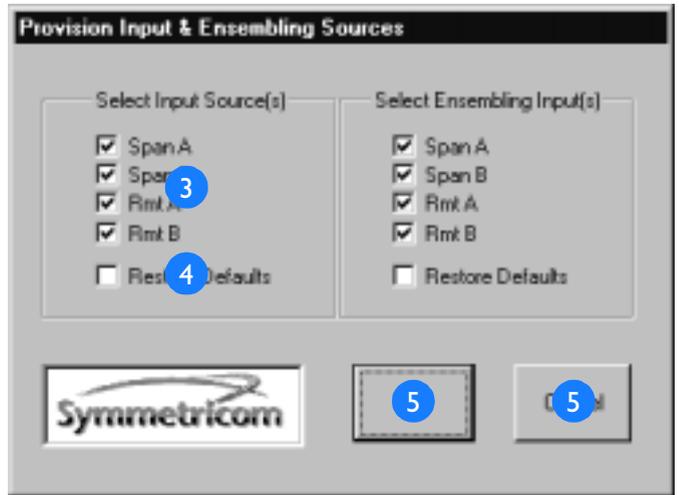
Ensemble Inputs

1. In the main menu, click Configuration.

2. Highlight Provision, and select Inputs.

3. Click any of the enabled (provisioned) inputs to include in the BesTime output ensemble.

Ensembling means the input(s) are used by the system to generate the timing outputs, and will impact the timing performance of the outputs.

Note: An input must be enabled (provisioned) before it can be ensembled.

4. Click to restore the factory settings.

5. Click OK to save the ensembling selections, or click Cancel to ignore any changed information.
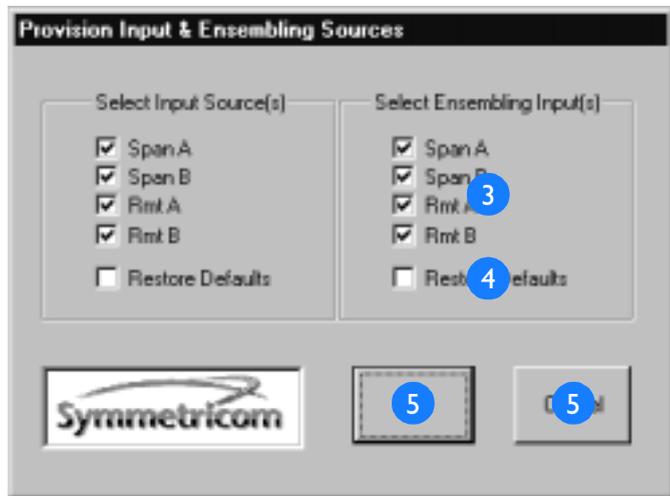
View Input Weighting and Gear

1. In the main menu, click Performance Statistics.

2. Click System Loop Statistics.

3. View the weight given to each input for BesTime ensembling computation.

4. View the stage (gear) in the time calculation process.

Gears 1, 2, and 3 are warm-up processes after power-up. Gears 4, 5, and 6 indicate a settling period when the TimeSource 2700 outputs Stratum 1 signals. Gear 7 indicates steady-state operation.

View Input Performance Statistics

1. In the main menu, click Precision Sync Monitor.

2. View the accumulation period for the data.

3. View the statistics data, which is the report of the measurement difference between the provisioned inputs and the TimeSource 2700 output.

This data can be plotted and compared against any one of several timing performance masks, to gauge the quality of the timing being received on the input(s). Timing performance mask(s) and spreadsheet software are not available from Symmetricom, and must be obtained from third party vendors.

4. View the phase data, which is the phase offset, in ns, for each input used in the BesTime calculation.

5. Set the log file to contain statistics data.
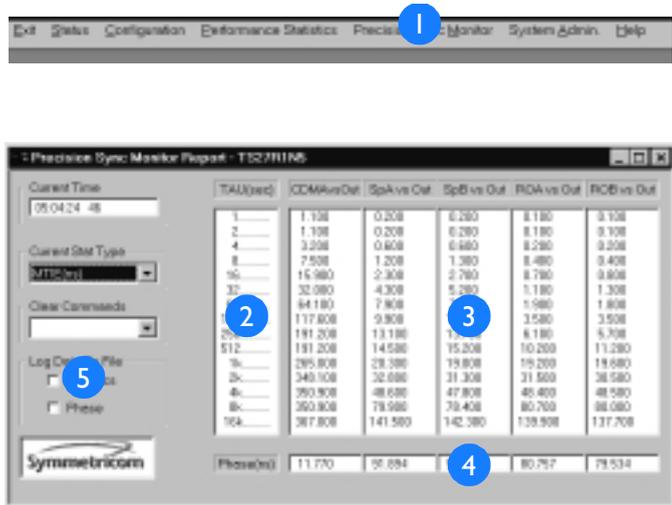
View Input Performance Statistics (cont'd)

6. Set the log file to contain phase data.

Data from the screen is written to the file at every screen update. The log file may be opened and read during the logging process, however, the log file is read-only during the logging process. The log file is written in a comma-delimited (.csv) data format.

7. Click the pull-down arrow, and select the type of measurement to display in the statistics data columns.

8. Click the pull-down arrow, and select the data to be cleared in the statistics data columns: all columns or a specific column.
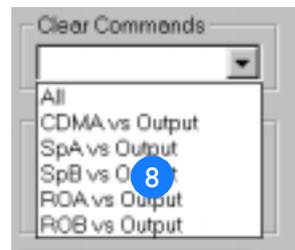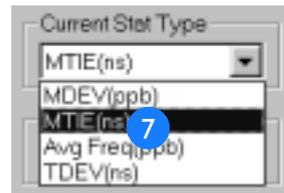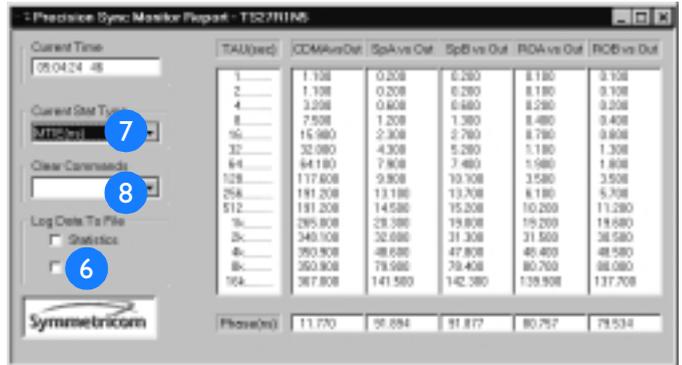
Set Output Format and Output During Alarm

Note: The setting you choose for output during alarm will occur when the system goes into major alarm.
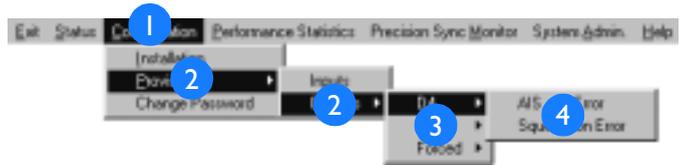
1. In the main menu, click Configuration.

2. Click Provision, and highlight Outputs.

3. Highlight the desired output format: D4, ESF, or Forced.
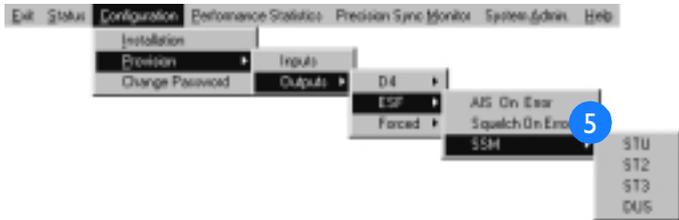
4. For D4 output format, select either AIS on Error or Squelch on Error, for the alarm method.

5. For ESF output format, select one of the following alarm methods: AIS on Error, Squelch on Error, or SSM.

Note: If SSM is selected, select one of the following: STU, ST2, ST3, or DUS. The recommended setting is either STU or ST2.

Set Output Format and Output During Alarm (cont'd)

6. For Forced output format, select one of the following alarm methods: AIS Output, Squelch Output, D4, or ESF.

Any of the selections under Forced forces the Span A and B outputs into a particular mode. Forced mode may be useful for testing and troubleshooting. Forced mode may also be useful in applications where the outputs generated by the TimeSource 2700, even in major alarm, may be better than the alternative (e.g., offices without additional holdover clocks in a distribution shelf).

Note: If ESF is selected, select a quality level for SSM.

SSM messages communicate to downstream network elements the timing performance received on an incoming signal. SSM message options are as follows:

- Primary reference source (PRS)
- Synchronization traceability unknown (STU)
- Stratum 2 (ST2)
- Stratum 3 (ST3)
- Do not use for synchronization (DUS)
- Stratum 4 (ST4)
- SONET internal clock (SIC)/ 20 ppm

4

View CDMA Tracking Statistics

1. In the main menu, click Performance Statistics.

2. Click CDMA Tracking Stats.

3. View the number of minutes the receiver has been locked during each hour of the last 24 hours.

Note: On power-up, 60 minutes is displayed for every hour. Actual data for each hour will appear, as the system cycles through the first 24 hours of operation after power-up.

4. View the number of minutes the TimeSource 2700 has been locked during the last 24 hours.

5. View the percentage of the last 24 hours that the TimeSource 2700 was locked to at least one CDMA pilot.

The daily success rate must be greater than 40 percent. If not, refer to the Troubleshooting chapter.

6. Click to update the information.

7. Click to exit.
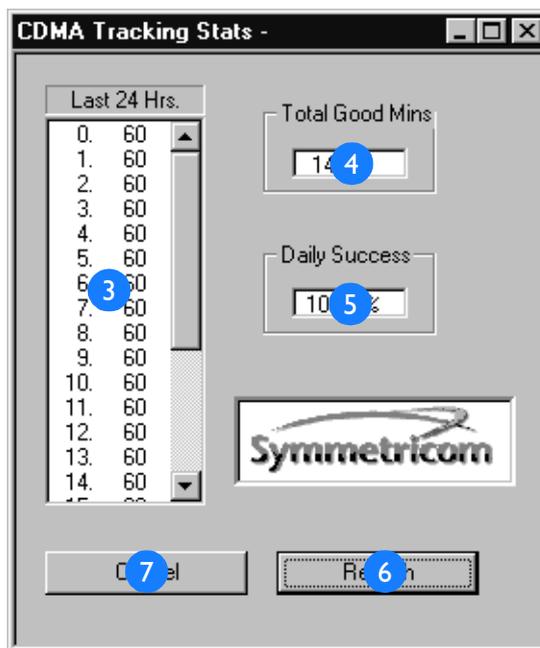
View CDMA Pilot Information

1. In the main menu, click Performance Statistics.

2. Click CDMA Summary.

3. View information about each CDMA pilot signal currently being tracked.

- Pilot: TimeSource 2700 channel pilot number. The TimeSource 2700 may display data for multiple channels for each pilot signal received. The actual number of pilot signals being received is displayed in the Independent Pilot Count box (described in item 4).

- C/No(dB): Carrier-to-noise ratio. Measurement of the strength of the pilot channel relative to noise.

- Freq Avg(ppb): Deviation of each pilot signal, in parts per billion, from the CDMA pilot to the TimeSource 2700 output.

- Freq StdDev(ppb): Standard deviation of each pilot channel, in parts per billion, from the CDMA pilot to the TimeSource 2700 output. The smaller the number, the better the signal, with 0.01 indicating the best signal, and 0.3 indicating an unacceptable signal.

4

- FRAIM: (Frequency Receiver Autonomous Integrity Monitor). Quality of each pilot channel. Zero indicates the signal is acceptable; anything above zero indicates the signal is unacceptable. On power-up, 3 is the default which will be displayed for all pilot channels until the system locks onto a pilot signal.

- Weight: Quality of the pilot channels relative to each other. The higher the percentage, the better the signal. For example, if pilot #8 displayed 80 percent, and pilot #2 displayed 20 percent, pilot #8 would be the better signal. If multiple pilots are acceptable, the TimeSource 2700 ensembles the pilots into a single composite signal by weighting the highest quality pilot with the greatest weighting value. Weighting assignments are dynamically adjusted for changes in pilot signal quality.

- Lock: Number of seconds since the TimeSource 2700 acquired lock on the pilot channel (count stops at 10,000). Zero indicates the system is not locked to the pilot channel.

View CDMA Pilot Information (cont'd)

4. View the number of pilot signals currently being tracked.

5. Click to start or stop the log file for this screen.

Data from the screen is written to the file every 60 seconds while the box is checked. The log file may be opened and read during the logging process; however, the log file is read-only during the logging process. The log file is written to the host computer disk in a comma-delimited (.csv) data format.

6. View the pilot band letter and channel number in use. The word "Auto" appearing before the pilot band letter and channel number indicates the system locked onto the displayed pilot via the auto search method.

Select Pilot Signal Channel

1. In the main menu, click Performance Statistics.

2. Click CDMA Summary.

3. Click the pull-down menu.

4. Select one of the bands or Auto Search.

Caution: *If unsure of the proper band and frequency for the area where the TimeSource 2700 is located, select Auto Search.*

5. If a band was selected, select a channel.

Note: After 20 minutes, if the TimeSource 2700 cannot find a CDMA pilot on the selected channel, it will revert to Auto Search.
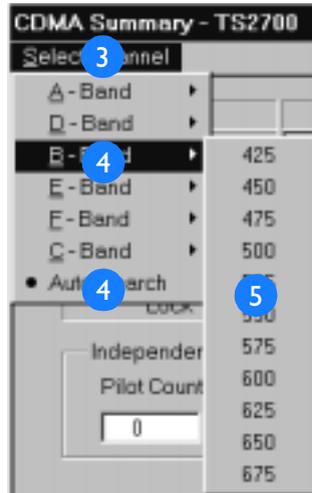
View Daily Holdover Information

Note: The System Admin drop-down menu and its selections are only available to the Administrator level of security.

1. In the main menu, click System Admin.

2. Highlight Holdover Information, and select Daily.

3. Click Select.

4. Highlight Display, then select the desired input, to see the data for selected input.

5. View the data of the 4 hour time period.

The time is indicated as hours of a 24 hour clock.

6. View the average measured frequency offset during the 4 hour period, in parts per billion (ppb).

7. View the predicted frequency offset during the 4 hour period, in parts per billion (ppb).
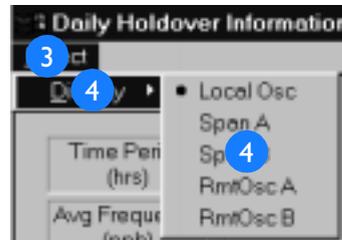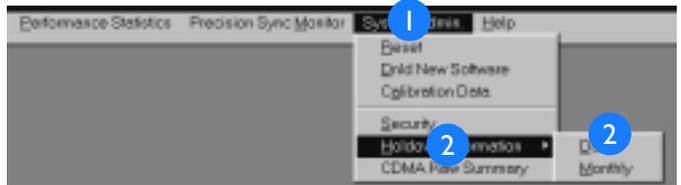
View Daily Holdover Information (cont'd)

8. Click to start or stop the log file for this screen.

Data from the screen is written to the file at every screen update while the box is checked. The log file may be opened and read during the logging process; however, the log file is read-only during the logging process. The log file is written in a comma-delimited (.csv) data format.
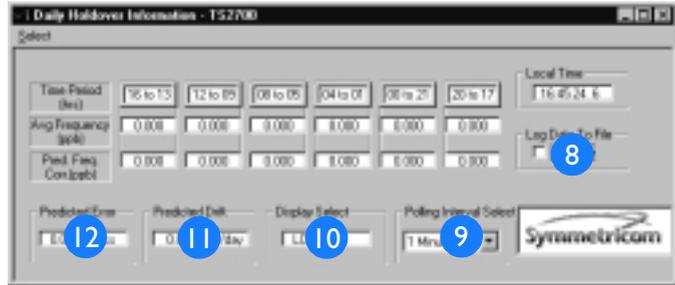
9. Click the pull-down arrow to select the number of minutes between screen updates.

10. View which input is being measured.

11. View the drift, in parts per billion per day, predicted for this input during the current 24 hour period.

12. View the predicted error in ns.

This error can be held for up to 24 hours if the TimeSource 2700 goes into holdover.

View Monthly Holdover Information

1. In the main menu, click System Admin.

2. Highlight Holdover Information, and select Monthly.

3. Click Select.

4. Highlight Display, then select the desired input, to see the data for the selected input.
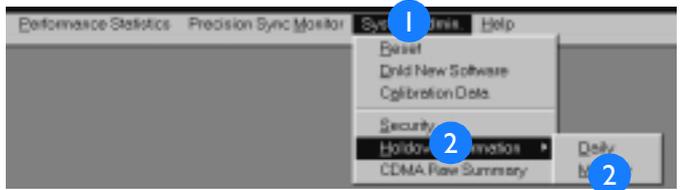
5. View the data of the 4 day time period.

The time is indicated as days of a 30 day month.

6. View the average measured frequency offset during the 4 day period, in parts per billion (ppb).

7. View the average predicted time error during the 4 day period, in nanoseconds (ns).

4
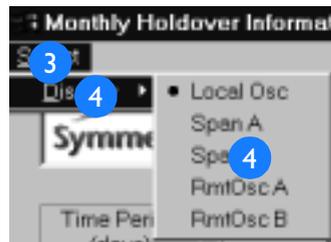
View Monthly Holdover Information (cont'd)

8. View which input is being measured.

9. Click to start or stop the log file for this screen.

Data from the screen is written to the file at every screen update while the box is checked. The log file may be opened and read during the logging process; however, the log file is read-only during the logging process. The log file is written in a comma-delimited (.csv) data format.

Reset CDMA Receiver and System

1. In the main menu, click System Admin.

2. Click Reset.

3. Click to reset the CDMA receiver processor, and restart the pilot signal search.

4. Click to reset the system processor.

Caution: *Selecting Reset CDMA, Restart BesTime, and clicking* RESET, *will cause a disruption in service.*

5. Click RESET to reset the reset the selected item, or click Cancel to ignore any information.

Exit   Status   Configuration   Performance Statistics   Precision Sync Monitor   ①   System   Help

②

Dnld New Software
Calibration Data

Security
Holdover Information ►
CDMA Raw Summary

Reset - TS27R1#2   ? ✕

☐ ③ et CDMA Receiver

☐ ④ et CDMA, Restart BesTime

⑤ R___T   ⑤ C___el

4
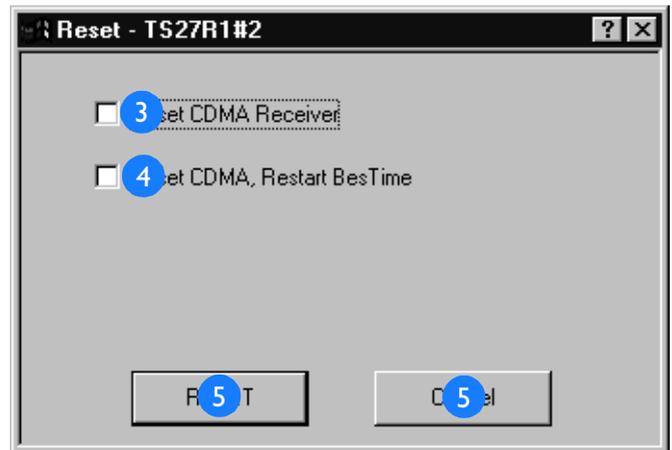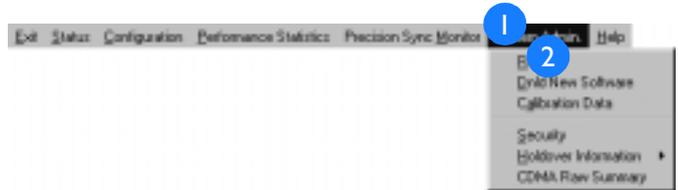
Download New Software

1. In the main menu, click System Admin.

2. Click Dnld New Software.

Notes:

a. New software should not be downloaded over a modem connection. Use a direct connection only.

b. The TimeSource 2700 does not lose data during a software download/upgrade.

c. The TimeSource 2700 enters bridging mode during the software loading process, and exits bridging mode when it receives its first good CDMA measurements.

3. Select the name of the file to download to the Timesource 2700.

4. Click OK when the desired file is displayed, or click Cancel to cancel the current operation.
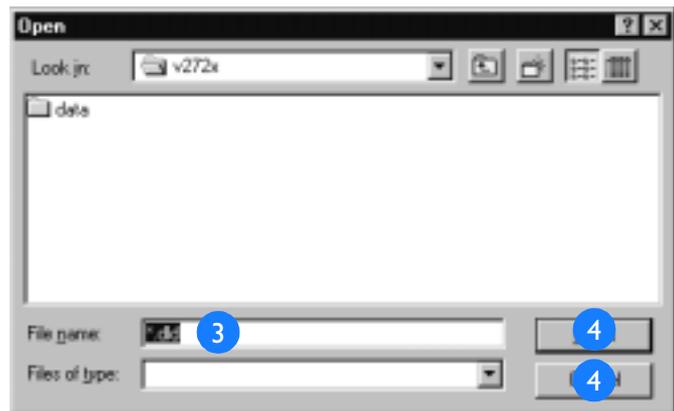
Download New Software (cont'd)

5. Verify the file name is correct.

6. Verify the baud rate is set to 19200.

7. Click to cancel the current operation (if desired).

8. Click Continue. A progress bar and messages track the download process.

9. Once the download is complete, a message appears. Click OK.

10. The TimeSource 2700 breaks, then reestablishes, communication with the host computer, and a message appears. Click OK.

11. When the BTMONitor main screen appears, click Exit to exit the application.

12. Restart BTMONitor to use the upgraded software.

Dnld New Software

File Selected Is: Ts25⑤3.dld ⑤

NAKs Rxd
0

Download Baud Rate
○ 48⑥ ● 19200 ⑥
○ 9600 ○ 38400

C⑦el ⑦   Co⑧ue ⑧

BTMon

⚠ Re-Program Su⑨sfully Completed.(1938 recs) ⑨

[⑨]

BTMon

⚠ Communicati⑩e-established on COM1 ⑩

[⑩]

⑪ Mon, COM Port 1[9600], Target ID =
  atus Configuration Performance Statistics Precision Sync Monitor System Admin. Help

4
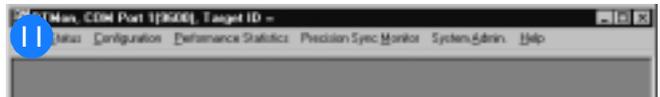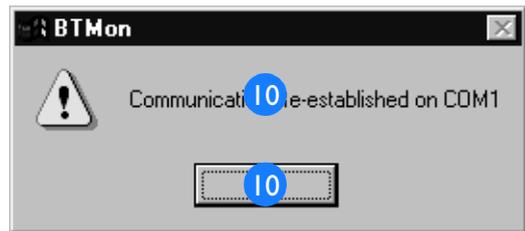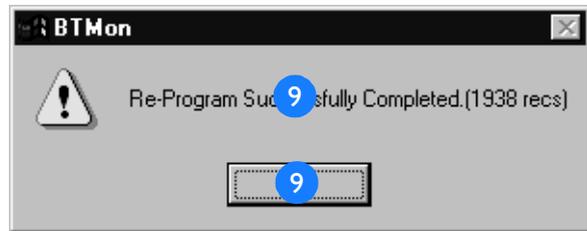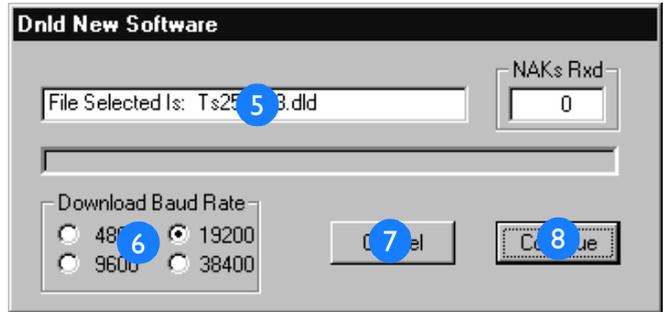
View User Accounts

1. In the main menu, click System Admin.

2. Click Security.

3. View the list of system users and their privilege levels.
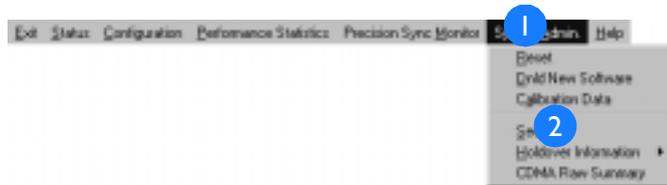
The privilege levels are Administration, Management, Reporting, and None.

4. Click OK or Exit to exit.
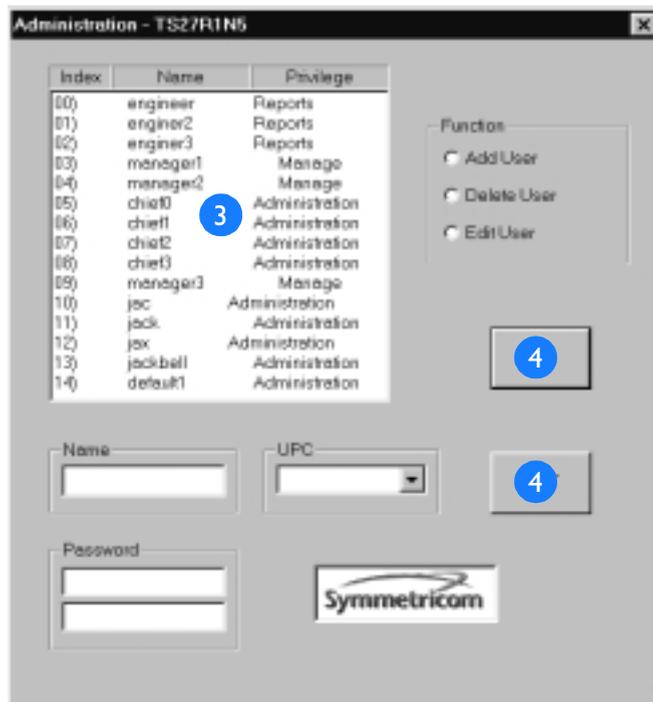
Add User Account

1. In the main menu, click System Admin.

2. Click Security.

3. Click Add User.

4. Type in a name for the new user account.

No two users can have the same name. The name must have three or more characters.
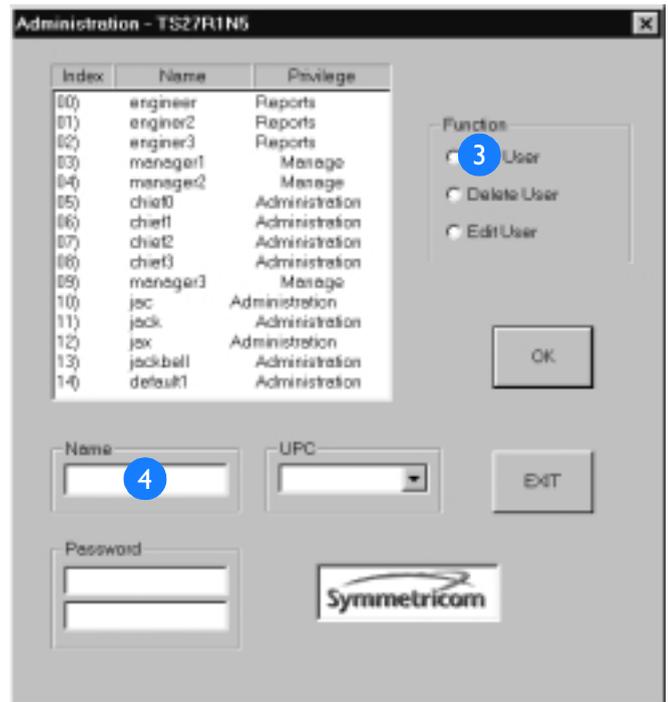
Add User Account (cont'd)

5. Click the pull-down arrow to select the privilege level for the new user account.

Levels are as follows:

- Administration: Allows a user to change any parameter or function.

- Management: Allows a user to display and change any parameter or function except: restart the system, download new firmware, and manage user security.

- Reporting: Allows a user to display, but not change, the operational parameters of the system.

- None: Disables all privileges of a user, while keeping the user information.

Add User Account (cont'd)

6. Type in the password for the new user account in both of the Password windows.

A user name cannot be in the user's password. The password must be from six to eight characters, must include at least one alphabetic and one numeric character, and must contain at least one of the following special characters: ! " # $ % & ' ( ) * + , – . / : ; < = > ? @

7. Click OK to save the information to the TimeSource 2700, or click Exit to ignore any changed information.

Delete User Account

1. In the main menu, click System Admin.

2. Click Security.

3. Click Delete User.

4. Select the user account to be deleted.

5. Click OK to save the information, or click Exit to ignore any changed information.
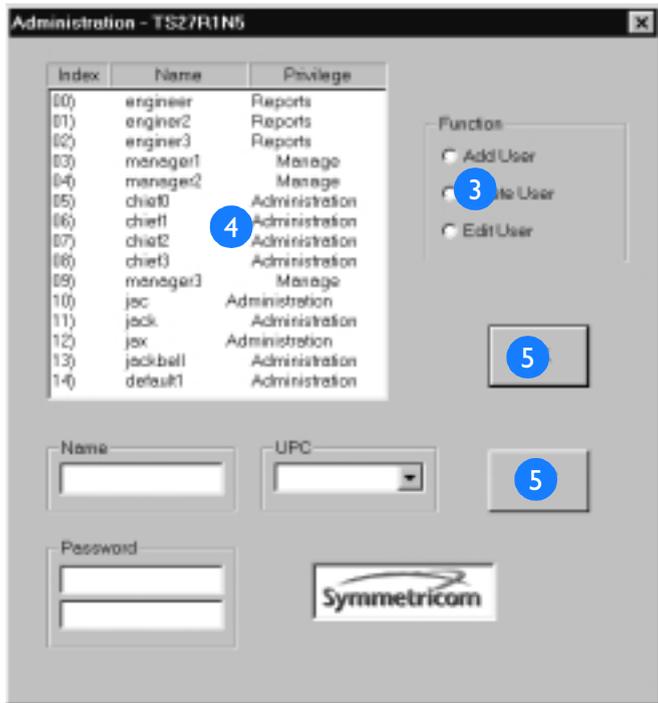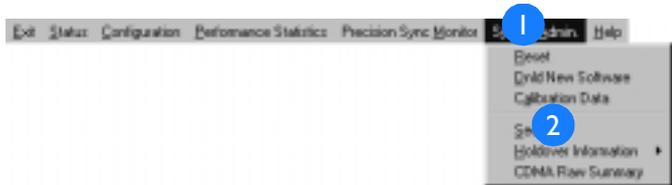
Edit User Account

1. In the main menu, click System Admin.

2. Click Security.

3. Click Edit User.

4. Select the user account to be edited.

5. Type in a new name for the user account.

No two users can have the same name. The name must have three or more characters.

6. Click the pull-down arrow to select the new privilege level for the user account.
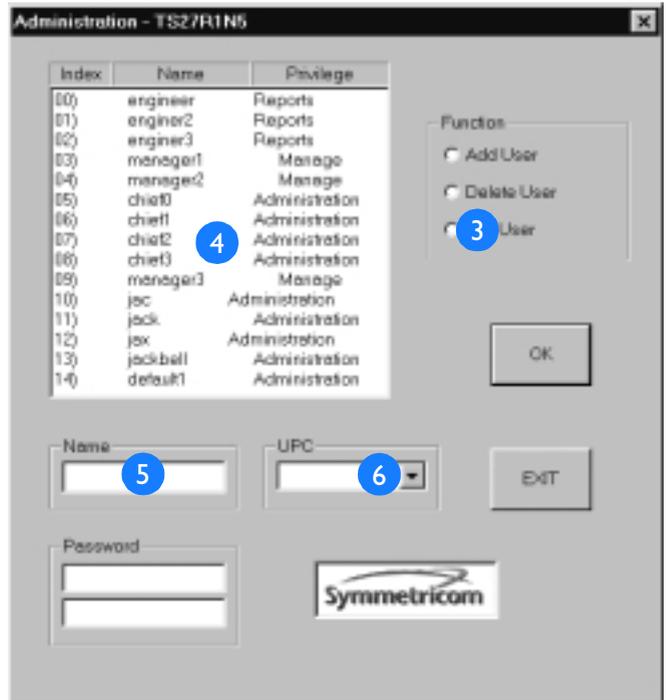
Edit User Account (cont'd)

7. Type in the new password for the user account in both of the Password windows.

A user name cannot be in the user's password. The password must be from six to eight characters, must include at least one alphabetic and one numeric character, and must contain at least one of the following special characters: ! " # $ % & ' ( ) * + , – . / : ; < = > ? @

8. Click OK to save the information, or click Exit to ignore any changed information.

Change Password

1. In the main menu, click Configuration.

2. Click Change Password.

3. Type in the user name for this system (factory-set to default1).

4. Type in the user password for this system (factory-set to TS2700:).

5. Type in the new password.

The password must be from six to eight characters, must include at least one alphabetic and one numeric character, and must contain at least one of the following special characters: ! '' # $ % & ' ( ) * + , − . / : ; < = > ? @

6. Type in the new password again.

7. Click OK to save the information, or click Cancel to ignore any changed information.
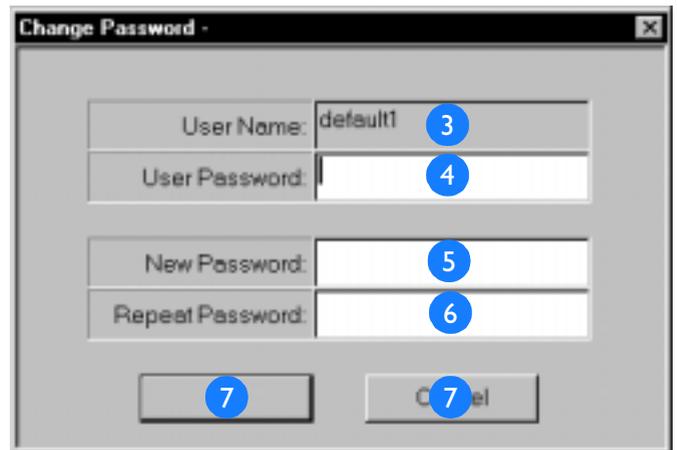
View BTMONitor Software Version

1. In the main menu, click Help.

2. Click About BTMon.

3. View the BTMONitor software version.

4. Click OK to exit.
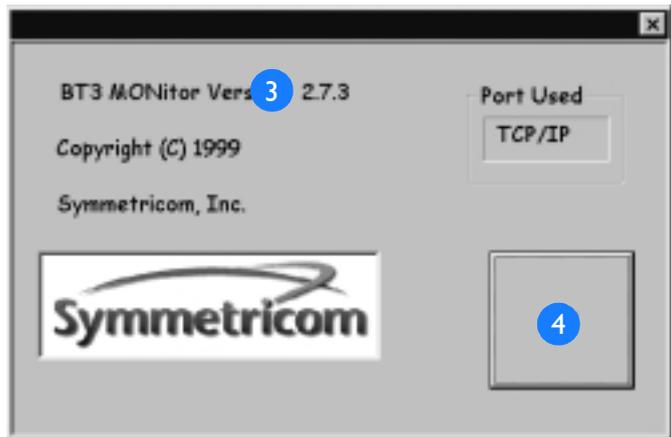
View Communication Information

1. In the main menu, click Help.

2. Click About BTMon.

3. View the active communication port.

4. Click OK to exit.
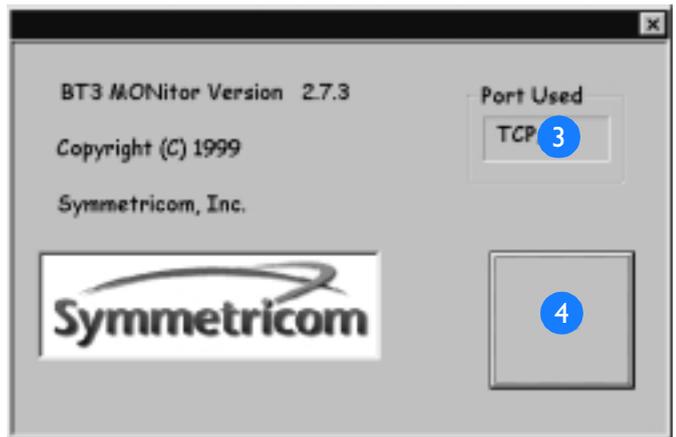
View System Firmware Information

1. In the main menu, click Help.

2. Click Firmware Build Information.

3. View the system firmware information.

4. Click to exit.
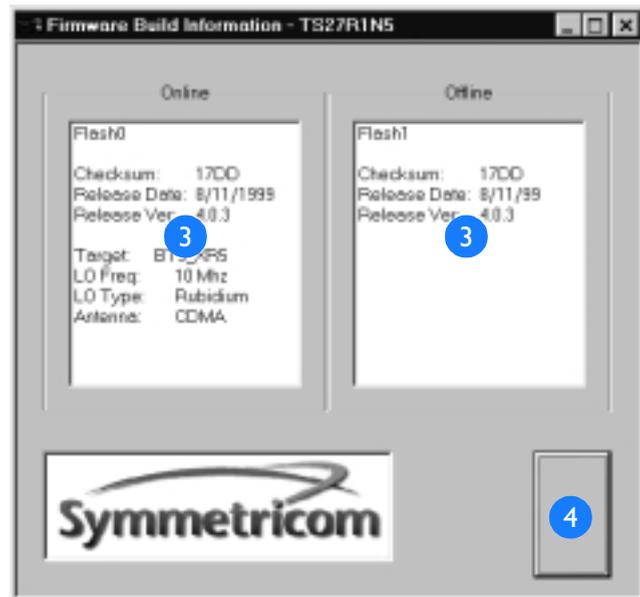
Troubleshooting

This chapter provides descriptions of the TimeSource 2700 front-panel lamps, alarms and events, and TL1 messages, and how to troubleshoot them. It also describes how to return equipment, get technical and/or sales assistance, and obtain manual updates.

Chapter 5

Front Panel Lamps

All front panel lamps are shown in Figure 11. The lamps are described in Table M.

Figure 11. Front Panel Indicators

. . . .
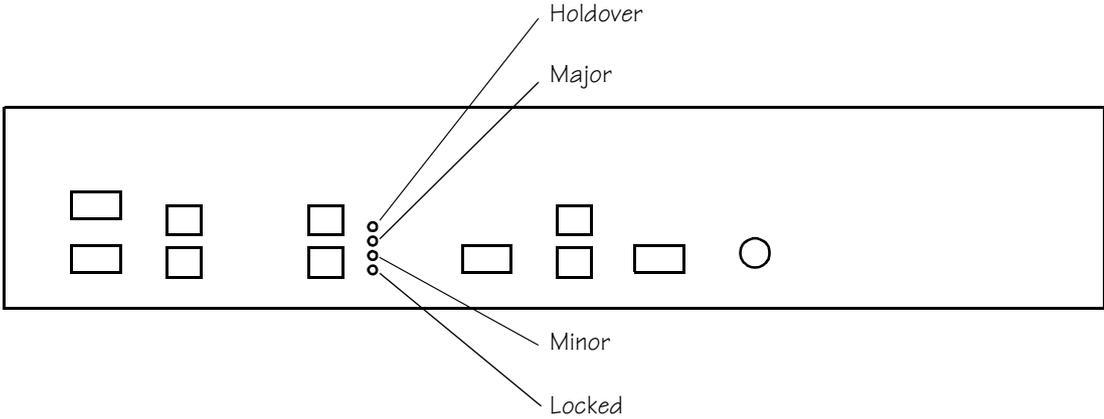
Table M. Lamp Descriptions

Lamp	Status	Description	Action
Holdover	Off	System is not in holdover	None
	Yellow	System is in holdover	Refer to the Alarm Monitor screen
Major	Off	System is not in major alarm	None
	Red	System is in major alarm	Refer to the Alarm Monitor screen
Minor	Off	System is not in minor alarm	None
	Yellow	System is in minor alarm	Refer to the Alarm Monitor screen
Locked	Off	System is not powered	Apply power, or check power source and connections
	Blinking Green	System is in warm-up	None, unless warm-up exists for more than 1 h (see note below)
	Green	System is providing Stratum 1 signals (if Major lamp is off)	None

Note: **If the system does not exit the warm-up state, CDMA signal reception may not be strong enough. Refer to the Installation chapter for details.**

5

Theory of Alarm Processing and Troubleshooting

The following pages describe the theory behind how events and alarms are processed, and how to troubleshoot the system, based on the event and alarm messages. Refer to Figur e12 for the Alarm Monitor screen, which may be referenced during the descriptions on the following pages.

Figure 12. Alarm Monitor Screen
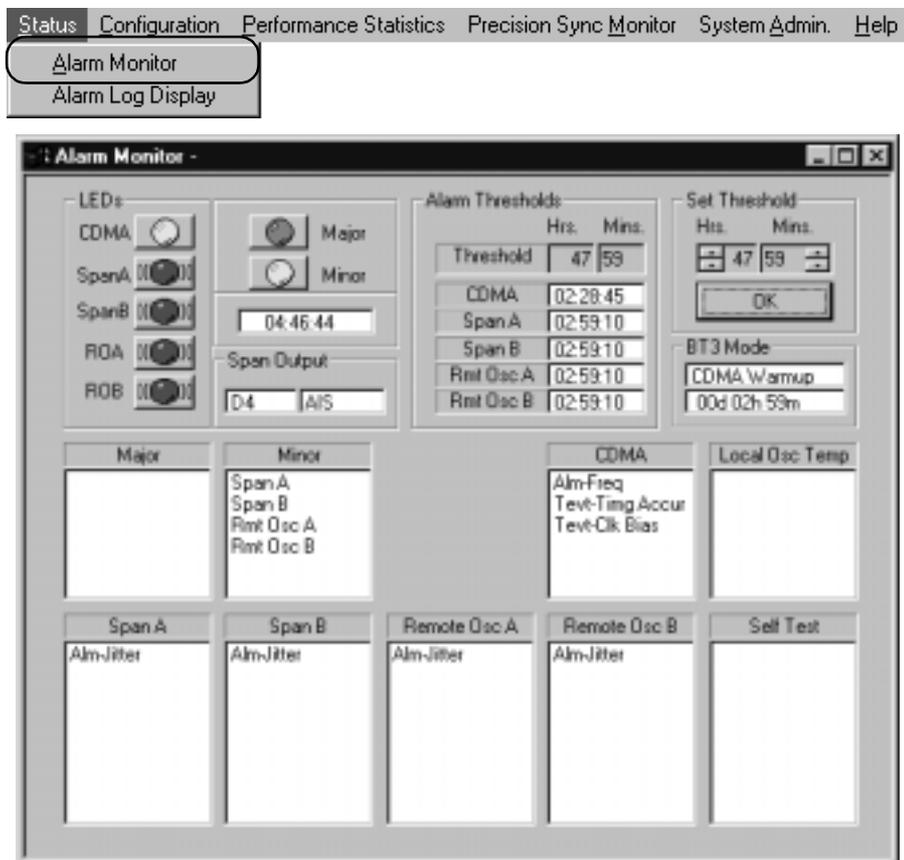
The TimeSource 2700 provides a rich content of information about system events and alarms, which is logged and reported to the user, via front panel lamps, alarm relays, the BTMONitor Alarm Monitor and Alarm Log Display screens, and TL1 messages. The Alarm Monitor screen displays all active events and alarms, for monitoring the functionality and operation of the system. The Alarm Log screen displays the past 512 events, and alarm history.

The TimeSource 2700 reports two types of events: transient events and events. A transient event is an intermittent or short-term non-service-affecting condition outside the normal operating conditions in an input or critical internal subsystem. An event is a standing or persistent non-service-affecting condition outside the normal operating conditions in an input or critical internal subsystem.

Each TimeSource 2700 input and critical internal subsystem may produce reportable transient events, events, and alarms. All transient events are processed through leaky buckets to correctly clear the transient event, or to escalate it to an event or alarm. Alarms are escalated through a user-adjustable threshold. For span and remote oscillator inputs, the default threshold for a standing minor alarm to escalate to a major alarm is 48 hours. For CDMA inputs, the default threshold for the amount of time from the beginning of bridging mode to the initiation of a major alarm is 48 hours. Service-impacting alarm conditions are reported directly as a major alarm.

Much of the transient event and event level information reported via the BTMONitor Alarm Monitor screen is normal activity, which does not impact the performance of the timing outputs, and is useful primarily as a system operation monitoring tool. For example, the TimeSource 2700 is designed to output PRS quality signals, without any CDMA signals, for as much as 14 hours on average per day. Therefore, it is common for the system to report CDMA signal drop-out activity, even though the activity will have no impact on the performance of the outputs.

In general, minor and major alarms should appear very infrequently, and troubleshooting activity is not required, unless the system is in alarm. Otherwise, it is likely the condition is transient, will clear on its own, and will have had no impact on the quality of the timing outputs.

The TimeSource 2700 reports transient events, events, and alarms for the critical subsystems and inputs listed below:

- CDMA

- Span Inputs

- Remote Oscillator Inputs

- Phase Lock Loop

- Local Oscillator Temperature

Table N lists alarm and event conditions for each of the five TimeSource 2700 input or critical internal subsystems, the actual appearance and location in the Alarm Monitor screen, and the cross-reference of the page number for the descriptions which follow.

5

Table N. Alarm and Event Conditions

Alarm	Screen Display	Screen Location	Description Page No.
CDMA Frequency Transient Event	Tevt-Freq	CDMA	121
CDMA Frequency Event	Evt-Freq	CDMA	121
CDMA Frequency Alarm	Alm-Freq	CDMA	121
CDMA Timing Accuracy Transient Event	Tevt-Timg Accur	CDMA	122
CDMA Clock Bias Transient Event	Tevt-Clk Bias	CDMA	122
CDMA Tracking Success Alarm	Alm-Trk Succs	CDMA	122
Span Frequency Transient Event	Tevt-Freq	Span A or Span B	123
Span Frequency Alarm	Alm Freq	Span A or Span B	124
Span Drift Transient Event	Tevt-Drift	Span A or Span B	124
Span Drift Alarm	Alm-Drift	Span A or Span B	125
Span Phase Transient Event	Tevt-Phase	Span A or Span B	125
Span Phase Alarm	Alm-Phase	Span A or Span B	126
Span Jitter Alarm	Alm-Jitter	Span A or Span B	126
RO Frequency Transient Event	Tevt-Freq	Remote Osc A or Remote Osc B	127
RO Frequency Alarm	Alm-Freq	Remote Osc A or Remote Osc B	128
RO Drift Transient Event	Tevt-Drift	Remote Osc A or Remote Osc B	128
RO Drift Alarm	Alm-Drift	Remote Osc A or Remote Osc B	129
RO Phase Transient Event	Tevt-Phase	Remote Osc A or Remote Osc B	129

Table N. Alarm and Event Conditions (cont'd)

Alarm	Screen Display	Screen Location	Description Page No.
RO Phase Alarm	Alm-Phase	Remote Osc A or Remote Osc B	130
RO Jitter Alarm	Alm-Jitter	Remote Osc A or Remote Osc B	130
PLL Step Event	Evt-Step	Self Test	131
PLL Step Alarm	Alm-Step	Self Test	132
PLL Range Event	Evt-Range	Self Test	132
PLL Range Alarm	Alm-Range	Self Test	133
PLL Jitter Alarm	Alm-Jitter	Self Test	133
TP Step Event	Evt-Step	Local Osc Temp	134
TP Step Alarm	Alm-Step	Local Osc Temp	134
TP Slew Event	Evt-Slew	Local Osc Temp	135
TP Slew Alarm	Alm-Slew	Local Osc Temp	135

Following are alarm and event condition descriptions for each of the five TimeSource 2700 input or critical internal subsystems, for monitoring and troubleshooting the operation of the TimeSource 2700 System.

5

CDMA Event and Alarm Summary

It is normal to expect frequent CDMA transient event activity, depending on the antenna location. When a transient event escalates to an event, the TimeSource 2700 enters bridging mode, and operates on its predictors, but will not report a minor or major alarm. In bridging mode, the TimeSource 2700 continues to provide Stratum 1 outputs. If the event condition persists, a minor alarm is generated. The TimeSource 2700 will not light the holdover lamp, unless a minor or major CDMA alarm condition exists. Table O shows the four CDMA operating modes.

Table O. CDMA Operating Modes

Mode	Description
Warm up	System has recently been reset or powered up, and is establishing or re-establishing normal time and frequency output.
Normal	System is operating with valid CDMA measurement data.
Bridging	System has temporarily lost CDMA measurement, and is utilizing the prediction algorithm.
Holdover	A CDMA loss has escalated to a minor/major alarm.

The transient event, event, and alarm messages on the following pages will appear in the window labeled CDMA on the Alarm Monitor screen (Figure 12).

CDMA Frequency Transient Event

The CDMA receiver performs a complete update of the current time (clock bias) every 2 seconds. The TimeSource 2700 compares the current frequency estimate of the corrected local oscillator, with respect to CDMA, and declares a CDMA Frequency Event, if the magnitude of the offset is greater than the threshold of 0.02 ppm.

Maintenance action required - None.

CDMA Frequency Event

The CDMA Frequency Transient Event data is processed through a leaky-bucket alarm manager to control escalation to an event. CDMA Clock Bias Transient Events and Time Accuracy Transient Events are included in this general frequency event category. A frequency event represents an error in the CDMA receiver output state, or a failed oscillator. The nominal time to escalate to an event condition is 2 minutes. The maximum time to retire an event is 5 minutes.

Maintenance action required - None.

CDMA Frequency Alarm

The CDMA Frequency Event data is processed through a leaky-bucket alarm manager, to control escalation to an alarm.

Maintenance action required - If a PLL alarm is also present, replace the shelf.

5

CDMA Time Accuracy Transient Event

The Frequency Receiver Autonomous Integrity Monitor (FRAIM) determined that all available pilots are unacceptable

Maintenance action required - None.

CDMA Clock Bias Transient Event

The clock bias transient event indicates the quality of the current timing solution data. The transient event is reported if there are no valid pilots to obtain a good timing solution, or if the current timing accuracy estimate exceeds the maximum threshold.

Maintenance action required - None.

CDMA Tracking Success Alarm

This alarm indicates that the CDMA receiver is not achieving an acceptable level of successful tracking. The system calculates a 24 hour average success rate every hour. This alarm is reported if the average daily success rate is less than 40 percent.

Maintenance action required - Check the antenna and antenna cable connections. If OK, move the antenna to a new location, and monitor for 24 hours to see if the success rate improves. If the alarm persists, replace the antenna.

Note: **If the TimeSource 2700 suddenly stops tracking pilots, and does not reacquire any pilots for 4 hours or more, reset the CDMA receiver (using the Reset screen, click Reset CDMA, then OK). If the condition persists, replace the shelf.**

Span Input Event and Alarm Summary

The TimeSource 2700 reports and escalates transient events, and events on any provisioned, but not ensembled, span line. Events on span lines not used in the BesTime output ensemble never escalate to an alarm, because the span line is not being used to generate the timing outputs. Span inputs used in the BesTime output ensemble report transient events which will escalate directly to an alarm, bypassing the event level, because of the potential of the span alarm activity to impact the quality of the timing outputs.

The following transient event, event, and alarm messages will appear in the window(s) labeled Span A and/or Span B on the Alarm Monitor screen.

Span Frequency Transient Event

The input span (carrier) frequency is measured with respect to the local oscillator frequency. This measurement includes the expected frequency error of the span line, and local oscillator, over a 15 second smoothing time constant. The threshold is set to 1.1 ppm, to accommodate the expected frequency range of the oscillator over the life of the product, to allow for Stratum 2 level traceability for the incoming span line, and to accommodate permitted network wander.

Maintenance action required - None.

5

Span Frequency Alarm

Span Frequency Transient event data is processed through a leaky-bucket alarm manager, to control escalation to an event, or directly to a minor alarm. The nominal time to escalate is 4 seconds, and the maximum time to retire is 75 seconds. Normal SONET pointer adjustments or network rearrangement transients will not produce an alarm. A span frequency alarm condition represents a significant frequency error on the incoming span line.

Maintenance action required - Timing on the incoming span line is out of network specification. Troubleshoot the source of the timing for the incoming span line, or contact the span line service provider.

Span Drift Transient Event

The TimeSource 2700 measures the relative difference between the input frequency of a span and the output frequency. The input frequency is smoothed, using a smoothing filter, which detects and removes transients above the normal operating range of a span line. The drift event will be triggered by SONET pointer adjustments, and other network rearrangement-related transient events. This permits these transients to be detected and removed before they impact the system. The TimeSource 2700 checks for drift events every 4 seconds.

Maintenance action required - None.

Span Drift Alarm

Span drift event data is processed through a leaky-bucket alarm manager, to control escalation to an event, or directly to a minor alarm. Since occasional drift events are typical, the leaky bucket is set to ignore isolated pointer and network rearrangement events. The nominal time to escalate to an alarm is 4 minutes, and the maximum time to retire the alarm is 2.5 minutes.

Maintenance action required - Occasional span drift alarm activity may occur as a result of network maintenance. Persistent drift alarm activity is not normal. Check the BTMONitor Alarm Log screen, and if there are multiple events per day, the span line input should be considered suspect. Timing on the incoming span line is not within specification. Troubleshoot the source of the timing for the incoming span line, or contact the span line service provider.

Span Phase Transient Event

The phase event category is used to detect "fast" phase transient events. A fast event is usually related to a timing transient in the previous network element, as opposed to a slower event played out through upstream intermediate clocks. In general, all phase events will produce drift events. A phase event is observed over a 250 ms interval after removing network jitter. The default threshold for a span phase transient event is greater than 250 ns.

Maintenance action required - None.

5

Span Phase Alarm

Span phase transient event data is processed through a leaky-bucket alarm manager, to control escalation to an event or alarm. The nominal time to assert is 7 seconds, and the maximum time to retire is 3 minutes.

Maintenance action required - Occasional span phase alarm activity may occur as a result of network maintenance. Persistent phase alarm activity is not normal. Check the BTMONitor Alarm Log screen, and if there are multiple events per day, the span line input should be considered suspect. This indicates that timing on the incoming span line is not within specification. Troubleshoot the source of the timing for the incoming span line, or contact the span line service provider.

Span Jitter Alarm

Jitter is measured on the incoming span line with a resolution of 50 ns. If the peak-to-peak delta phase error exceeds the GR2830 1.6 ms threshold for a period of 100 ms, an input jitter alarm is declared. This alarm is also activated if there is a loss of span line input signal for a period greater than 100 ms.

Maintenance action required - The input span line cable may have become disconnected; check and tighten all cable connections. If the alarm persists, timing on the incoming span line is not within specification. Troubleshoot the source of the timing for the incoming span line, or contact the span line service provider. If the alarm persists, replace the cable.

Remote Oscillator (RO) Input Event and Alarm Summary

The TimeSource 2700 reports and escalates transient events, and events on any remote oscillator input that is provisioned, but not ensembled. Events on remote oscillator inputs not used in the BesTime output ensemble never escalate to an alarm, because the remote oscillator inputs are not being used to generate the timing outputs. Remote oscillator inputs used in the BesTime output ensemble report transient events, which will escalate directly to an alarm, bypassing the event level, because of the potential of the remote oscillator input's alarm activity to impact the quality of the timing outputs.

The following transient event, event, and alarm messages will appear in the window(s) labeled Remote Osc A and/or Remote Osc B on the Alarm Monitor screen.

RO Frequency Transient Event

The input RO frequency is measured with respect to the local oscillator frequency. This measurement includes the expected frequency error of the RO, and the local oscillator, over a smoothing constant. The threshold is set to 2.0 ppm, to accommodate the expected frequency range of the local oscillator over the life of the product, and the free-running accuracy of the remote oscillator.

Maintenance action required - None.

RO Frequency Alarm

RO frequency event data is processed through a leaky-bucket alarm manager, to control escalation to an event or an alarm. The nominal time to report is 4 seconds, and the maximum time to retire is 75 seconds. An RO frequency alarm condition represents a significant issue, and should normally not occur.

Maintenance action required - The remote oscillator input is outside the normal operating frequency range. Verify the cable connections are secure. Verify the input signal is RS-422 compatible, nominally ±1 volt differential into 1 0 0ohms, with less than 7 volts common mode. If the signal looks good, troubleshoot the remote oscillator.

RO Drift Transient Event

The relative difference is measured between the input frequency and the current output frequency of the TimeSource 2700. The input frequency is smoothed, using an input smoothing filter. The threshold for this category is selected to detect and remove transients above the normal operating range of a remote oscillator. The threshold is 0.02 ppm. This permits these transients to be detected and removed before the system is impacted. The TimeSource 2700 checks for drift events every 15 seconds.

Maintenance action required - None.

RO Drift Alarm

RO drift transient event data is processed through a leaky-bucket alarm manager, to control escalation to an event or an alarm. Normally, drift alarms should not occur on remote oscillator inputs. The nominal time to report is 45 seconds, and the maximum time to retire is 7.5 minutes.

Maintenance action required - The remote oscillator input is experiencing abnormal jumps in frequency. Verify the cable connections are secure. Verify the input signal is RS-422 compatible, nominally ±1 volt differential into 1 0 0ohms, with less than 7 volts common mode. If the signal looks good, troubleshoot the remote oscillator.

RO Phase Transient Event

The phase transient event category is used to detect "fast" phase transient events, as opposed to slower events. The threshold for a phase transient is greater than 250 ns.

Maintenance action required - None.

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RO Phase Alarm

RO phase transient event data is processed through a leaky-bucket alarm manager, to control escalation to an event or alarm. The nominal time to assert an alarm is 7 seconds, and the maximum time to retire an alarm is 3 minutes.

Maintenance action required - The remote oscillator input is experiencing abnormal jumps in frequency. Verify the cable connections are secure. Verify the input signal is RS-422 compatible, nominally ±1 volt differential into 1 0 0ohms, with less than 7 volts common mode. If the signal looks good, troubleshoot the remote oscillator.

RO Jitter Alarm

The TimeSource 2700 measures jitter on the Remote Oscillator input with a resolution of 470 ps. If the peak-to-peak delta phase error exceeds the 12 ns threshold for a period of 100 ms, an input jitter alarm is declared. This alarm is also activated if there is a loss of remote oscillator input signal for a period greater than 100 ms.

Maintenance action required - The remote oscillator input cable may have become disconnected; check and tighten all cable connections. If the alarm still persists, the timing being received from the remote oscillator is not within specification. Troubleshoot the remote oscillator. If the alarm persists, replace the cable.

Phase Lock Loop (PLL) Event and Alarm Summary

The PLL events and alarms report activity associated with the 60 MHz synthesizer PLL subsystem. In general, PLL alarms indicate a potential critical hardware fault in the system. Any alarm is immediately treated as a minor alarm. If a PLL alarm occurs with simultaneous alarm activity on all provisioned inputs, a major alarm is reported.

The following transient event, event, and alarm messages will appear in the window labeled Self Test on the Alarm Monitor screen.

PLL Step Event

The step event category is used to capture abnormal phase or frequency transient "pops" in the synthesizer PLL.   A step event is the magnitude of the delta between successive 250 ms samples exceeding the threshold. The threshold is 0.5 percent of the total VCXO pull-in range (70 ppm minimal).

Maintenance action required - None.

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PLL Step Alarm

A step event should not occur in a normal system after the first minute from a cold power-up. The PLL step event is processed through a leaky-bucket alarm manager, to control escalation to a minor alarm. The manager is set so that a single isolated event will not escalate to an alarm. The nominal time to escalate to an alarm is 750 ms. The maximum time to retire an alarm is 40 seconds.

Maintenance action required - If the system is not in warm-up, replace the shelf.

PLL Range Event

The range event category is used to report individual 250 ms samples that exceed the normal varactor range limits. The limits are at 90 percent of the total control range.

Maintenance action required - None.

PLL Range Alarm

A range event should not occur in a normally operating system after the first minute from a cold power-up. The PLL range event is processed through a leaky-bucket alarm manager, to control escalation to a minor alarm. The leaky-bucket manager is set so that a single isolated event will not escalate to an alarm. The nominal time to escalate to an alarm is 750 ms. The maximum time to retire an alarm is 40 seconds.

Maintenance action required - If the system is in warm-up, no action is required. If a PLL range alarm occurs without simultaneous input alarm activity, the VCXO may be at the end of its pull-in range, and the shelf requires immediate replacement. If the range PLL alarm occurs with some inputs operating alarm free, there is no immediate problem, but the shelf will soon require replacement.

PLL Jitter Alarm

If the jitter level exceeds 10 counts at 10 bits for nominally 100 ms, a PLL jitter alarm is reported.

Maintenance action required - Replace the shelf.

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Temperature (TP) Event and Alarm Summary

Temperature event and alarm data reports temperature changes of the local oscillator oven. Step and jitter alarms are likely indications of a hardware fault. A problem with outside air (room) temperature is indicated by a standing slew alarm, if no other alarms are present.

The following transient event, event, and alarm messages will appear in the window labeled Local Osc Temp on the Alarm Monitor screen.

TP Step Event

The step event category is used to capture abnormal step changes in the oven current of the oscillator.

Maintenance action required - None.

TP Step Alarm

A step event should not occur in a normally operating system after the first minute from a cold power-up. The oven current step event is processed through a leaky-bucket alarm manager, to control escalation to a minor alarm. The manager is set so that a single event will not escalate to an alarm. The nominal time to escalate to an alarm is 900 ms. The maximum time to retire an alarm is 20 seconds.

Maintenance action required - If the system is not in warm-up, replace the shelf.

TP Slew Event

The slew event category detects abnormal slew rate changes in the oven current. A large slew in oven current is normal only during a power-up condition.

Maintenance action required - None.

TP Slew Alarm

Persistent oven current slew usually indicates an abnormal temperature environment. The TP Slew event is processed through a leaky-bucket alarm manager, to control escalation to a minor alarm. The manager is set so that a single event will not escalate to an alarm. The nominal time to escalate to an alarm is 7 minutes. The maximum time to retire an alarm is 10 minutes.

Maintenance action required:

1. Determine if the TimeSource 2700 Shelf is being exposed to an unusual amount of air flow variation (for example, the shelf is located next to a heating vent). If yes, reposition the shelf.

2. Check the room temperature, repair the heating/air conditioning system. If the room temperature is within the specified operating range for the unit (0 degrees Celsius to 50 degrees Celsius), and the alarm persists, replace the shelf.

TLI Messages

The TimeSource 2700 sends out two types of TL1 messages via the Craft communication port: alarms and events. The format of each of these are described below.

Formats

Alarms

Alarms are sent out as Report Alarm messages in the following format:

```
<cr> <lf> <lf>
<sid> <date> <time>
<almcode> <atag> REPT ALM <modifer>
"<aid>:<ntfcncde>,<condtype>,<srveff>,<ocrdat>,
<ocrtm>,,,:\"<conddescr>\""
<;>
```

Events

Events are sent out as Report Event messages in the following format:

```
<cr> <lf> <lf>
<sid> <date> <time>
<atag> REPT EVT <modifer>
"<aid>:<condtype>,<condeff>,<ocrdat>,
<ocrtm>,,,:\"<conddescr>\""
<;>
```

Parameters

The parameters used in the alarm and event messages are defined in Table P.

Table P. Parameter Definitions

Parameter	Definitions
aid	This parameter is the access identifier which is the equipment reporting the condition.
almcode	This parameter is the alarm code which identifies the severity of the alarm. If multiple alarms are reported, the value for almcde is the highest severity of those reported. Valid values are: ** = major alarm * = minor alarm A = event
atag	This parameter is the automatic message tag which is a decimal number with a maximum of 3 characters (001 through 999, after which numbering restarts at 001). It is assigned by the system to sequence and correlate automatic messages.
conddescr	This parameter is the condition description which is a text description of the condition reported by the system, enclosed within /* and */. The system returns one conddescr per message. Valid values are listed in Table Q.
condeff	This parameter indicates the effect of the condition on the equipment. A transient condition does not change the basic state of the equipment. Valid values are: SC = standing condition raised CL = standing condition cleared TC = transient condition

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Parameter	Definitions
condtype	This parameter is the condition type. It indicates the type of condition being reported. Valid values are: MODE = the equipment is powering up or software downloading ERROR = there is an error in one of the signals being ensembled LOS = there is a loss of one of the signals being ensembled AIS = there is an alarm indication signal being received on one of the external span inputs STATE = there is a problem with the CDMA signal
date	This parameter is the current date in the 8-digit form yyyy-mm-dd, where yyyy is year, mm is month (01–12), and dd is day (01–31).
modifier	Same as aid.
ntfcncde	This parameter is the notification code which indicates the severity of the condition. Valid values are: CL = cleared NA = not alarmed MJ = major alarm NR = not reported MN = minor alarm
ocrdat	This parameter is the date an event occurred.
ocrtm	This parameter is the time an event occurred.
sid	This parameter is the source identifier (site ID). It identifies the system sending the message and is the equipment's CLLI code. The sid is the same as the location on the Installation screen.

Parameter	Definitions
srveff	This parameter identifies how the condition affects service. Valid values are: SA = service affecting NSA = not service affecting
time	This parameter is the current time in the 6-digit form hh-mm-ss where hh is hours (0–23), mm is minutes (0–59), and ss is seconds (0–59). The factory setting is GMT for local time.

Message Troubleshooting

To troubleshoot alarm and event messages, refer to Table Q. Table Q lists the messages, what the messages mean, and what action to take to troubleshoot the problem.

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Table Q. Message Troubleshooting

Message (conddescr)	Meaning	Recommended Action
ALARMS		
HARDWARE FAILURE	A failure has been detected on the system hardware.	Replace the system.
HOLDOVER	All inputs (CDMA signals, span inputs, and remote oscillator inputs) are lost or unacceptable, and the system is now using the internal oscillator.	Troubleshoot the CDMA, SPA Nx, and RO x error messages (check the cable, source, etc.).
CDMA ERROR	The CDMA receiver is reporting an error.	1. Check the cable connections between TimeSource 2700 Shelf and antenna. 2. If the error repeats, replace antenna.
RO x ERROR	An error has been detected on the specified remote oscillator input signal.	Troubleshoot the specified remote oscillator input (check signal frequency).
RO x LOSS OF SIGNAL	The specified remote oscillator input signal has been lost.	Troubleshoot the specified remote oscillator input (check the cable, connections, source).
SPAN x AIS	An alarm indication signal (AIS) has been received on the specified T1 input span.	Troubleshoot the specified T1 input span signal (check the source).
SPAN x ERROR	An error has been detected on the specified T1 input span.	Troubleshoot the specified T1 input span signal (include checks for signal frequency and jitter).
SPAN x LOSS OF SIGNAL	The signal on the specified span input has been lost.	Troubleshoot the specified T1 input span signal (check the cable, connections, source).

Table Q. Message Troubleshooting (cont'd)

Message (conddescr)	Meaning	Recommended Action
TEMPERATURE ERROR	A temperature error has been detected on the internal oscillator.	1. Check that the ambient air temperature is within the TimeSource 2700 environmental specifications. If not, correct the ambient temperature with heating or air conditioning. 2. If the ambient air temperature is within the TimeSource 2700 environmental specifications, replace the system.
EVENTS		
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.
CDMA ERROR	The CDMA receiver is reporting an error.	None required.
POWER UP RESTART	The system processor has just started up.	None required.
RO x ERROR	An error has been detected on the specified remote oscillator input signal.	Wait until this becomes a minor alarm, or start troubleshooting the specified remote oscillator input now (check the signal frequency).
RO x LOSS OF SIGNAL	The specified remote oscillator input signal has been lost.	Wait until this becomes a minor alarm, or start troubleshooting the specified remote oscillator input now (check the cable, connections, source).
SPAN x AIS	An alarm indication signal (AIS) has been received on the specified T1 input span.	Wait until this becomes a minor alarm, or start troubleshooting the specified span input now (check the source).

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Table Q. Message Troubleshooting (cont'd)

Message (conddescr)	Meaning	Recommended Action
SPAN x ERROR	An error has been detected on the specified T1 input span.	Wait until this becomes a minor alarm, or start troubleshooting the specified span input now (include checks for signal frequency and jitter).
SPAN x LOSS OF SIGNAL	The signal on the specified span input has been lost.	Wait until this becomes a minor alarm, or start troubleshooting the specified span input now (check the cable, connections, source).
BRIDGING	All inputs (CDMA signals, span inputs, and remote oscillator inputs) are lost or unacceptable, and the system is using the internal oscillator.	None required.
TEMPERATURE ERROR	A temperature error has been detected on the internal oscillator.	Check that the ambient air temperature is within the TimeSource 2700 environmental specifications. If not, correct the ambient temperature with heating or air conditioning.

Returning Equipment

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, follow Procedure F.

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.

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Procedure F. Returning Equipment

Step	Action
1	Call Symmetricom's Customer Technical Assistance Center at one of the following numbers to obtain a Return Material Authorization (RMA) number and shipping address: From inside the U.S., call 888-367-7966 From outside the U.S., call 408-433-0910 *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 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 Technical 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

Technical Assistance

For technical assistance, call one of the following:

- From inside the U.S., call **888-367-7966**.

- From outside the U.S., call:

    Your local distributor

    or

    408-428-7907 (U.S.)

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Sales

For sales assistance, contact the following:

Symmetricom
2300 Orchard Parkway
San Jose, CA 95131-1017
Phone: 888-367-7966
Fax: 408-428-7998
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.

To register for access to the manual update site via the internet, send an e-mail to "manuals@symmetricom.com" with the following information:

- Name

- Title

- Company

- Address

An e-mail will be returned, which will include the internet address of the update site, and a name and password necessary to access the site.

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Specifications

This chapter provides the specifications of the TimeSource 2700.

Magnetic-Mount Antenna

Gain:	3.4 dBd/5.6 dBi
Frequency	1930 to 1990 MHz
Connector:	SMA male

Dimensions:
   Outer diameter:
   Height:
	
	2 in.
	8 in.

Weight:	1 lb
Cable Length:	12 ft

High-Gain Antenna

Gain:	6 dBil
Frequency	1850 to 1990 MHz
Connector:	N female

Dimensions:
   Outer diameter:
   Height:
	
	1.25 in.
	18.75 in.

Weight:	0.5 lb
Cable Length:	12 ft
Cable Type:	LMR-240 with SMA and N connectors

Remote Communication Port

Connector Type:	9-pin, female DB9 connector
Connector Label:	Remote RS-232
Connector Location:	Front panel
Electrical Interface:	RS-232
Baud Rate:	1200 bps 2400 bps 4800 bps 9600 bps 19.2 kbps 38.4 kbps

Craft Communication Port

Connector Type:	RJ-45
Connector Label:	Craft
Connector Location:	Front panel
Electrical Interface:	RS-232
Baud Rate:	1200 bps 2400 bps 4800 bps 9600 bps 19.2 kbps 38.4 kbps

T1 Inputs

Connector Type:	RJ-45
Connector Label:	Input (Span A and Span B)
Connector Location:	Front panel
Frequency:	1.544 MHz
Impedance:	100 Ω ±5 Ω
Format:	DS1
Line Code:	Alternate mark inversion (AMI)
Signal Level:	1.5 V to 4.5 V base to peak (terminated) 0.15 V to 0.45 V base to peak (bridged)
Framing:	D4 ESF (auto carrier detect) AIS and LOS conditions detected
Jitter Tolerance:	Meets Bellcore GR-1244 requirements

5 MHz Inputs

Connector Type:	RJ-45
Connector Label:	Input (Span A and Span B)
Connector Location:	Front panel
Impedance:	100 Ω
Frequency:	5 MHz
Format:	RS-422
Voltage:	Nominally ±1 V differential into 100 Ω

T1 Outputs

Connector Type:	RJ-45
Connector Label:	Output (Span A and Span B)
Connector Location:	Front panel
Frequency:	1.544 MHz
Impedance:	100 Ω
Format:	DS1
Payload:	All ones
Line Code:	Alternate mark inversion (AMI)
Pulse Amplitude:	2.4 V to 3.6 V terminated into 100 Ω base to peak
Framing:	D4 or ESF
Transmission During Alarms:	SSM (ESF only) AIS Squelch Forced

10 MHz Output

Connector Type: BNC

Connector Label: 10 MHz Output

Connector Location: Front panel

Frequency: 10 MHz

Impedance: 50 Ω

Format: Sine wave

Amplitude: 13 dBm ±2 dBm

Harmonic Spurious: Less than –60 dBc

Phase Noise:
 (referenced at 10 MHz)   –120 dBc @ 100 Hz
                                   –135 dBc @ 1 kHz
                                   –135 dBc @ 10 kHz
                                   –135 dBc @ 100 kHz
                                   –135 dBc @ 1 MHz

Alarms

Connector Type:	RJ-45
Contact Type:	Dry
Contact Rating:	1 A @ 30 V dc
	0.5 A @ 60 V dc
	0.5 A @ 125 V ac
Severity Levels:	Major and minor
Major:	Closed when not powered, closed when powered and in Major alarm, open when powered and not in Major alarm
Minor:	Open when not powered, open when powered and not in Minor alarm, closed when powered and in Minor alarm

Indicators

Labels:	Holdover
	Major
	Minor
	Locked
Type:	Light emitting diode (LED)

Power

Connectors:	Male DB9 (both)
Connector Labels:	Power A, Power B
Voltage:	−36 V dc to −60 V dc (each connector)
Current:	1.8 A cold start at −36 V 600 mA standard operation
Start Up Power:	<70 W
Steady State Power: (25 °C)	27 W
Fuse for Battery Feed: (Recommended)	3 A

Shelf Mechanical

Mounting:	Wall (990-73000-03) 19 in. or 23 in. rack (990-73000-02)
Rack Mounting Position:	Flush or 5 in. offset
Width:	15.1 in.
Height:	3.5 in. (occupies 2 RU)
Depth:	9 in.
Weight:	7.5 lb

Wire-Wrap Panel Mechanical

Mounting:	19 in. or 23 in. rack
Rack Mounting Position:	Flush or 5 in. offset
Width:	17.1 in.
Height:	3.5 in.
Depth:	6.75 in.
Weight:	1 lb

Environmental

Operating Temperature:	0 °C to + 50 °C
Operating Humidity:	5 % to 85 % RH
Electromagnetic Compliance:	FCC Part 15, Sub Part B, Class A