Symmetricom®

TimeProvider 1000 and 1100 Edge Clock

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How to Use This Guide

This section describes the format, layout, and purpose of this guide.

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Purpose of This Guide

The TimeProvider User's Guide describes the procedures for unpacking, installing, using, maintaining, and troubleshooting the Symmetricom TimeProvider. It also includes appendixes that describe default values and how to install the included software application SynCraft.

Who Should Read This Guide

Chapter 1, Overview of the TimeProvider, and Chapter 2, Engineering and Ordering Procedures, are written for non-technical audiences who need general information about the product. Chapter 3, Installing the TimeProvider and subsequent chapters contain technical information about the product. Other chapters and appendixes describe installation, maintenance, and configuration instructions or details primarily intended for qualified maintenance personnel.

Structure of This Guide

This guide contains the following sections and appendixes:

Chapter, Title	Description
Chapter 1, Overview of the TimeProvider	Provides an overview of the product, describes the major hardware and software features, and lists the system specifications.
Chapter 2, Engineering and Ordering Procedures	Lists the part number and ordering procedure for all TimeProvider parts and accessories.
Chapter 3, Installing the TimeProvider	Contains procedures for unpacking and installing the product.
Chapter 4, Provisioning the TimeProvider	Describes the TL1 commands required to provision the TimeProvider after installing the unit.
Chapter 5, Testing the TimeProvider	Provides checklist-based commissioning tests that should be performed after completing turn-up and software configuration to ensure the system is ready for normal operation.
Chapter 6, Maintaining and Troubleshooting the TimeProvider	Contains preventive and corrective maintenance, and troubleshooting procedures for the product.
Chapter 7, Specifications of the TimeProvider	Lists the specifications for the TimeProvider
Appendix A, Factory Default Values	Includes a list of the factory default values for hardware and software parameters.
Appendix B, CRAFT Software Reference	Describes how to use the CRAFT software interface with the TimeProvider.
Index	Provides references to individual topics within this guide.

Conventions Used in This Guide

This guide uses the following conventions:

- **Acronyms and Abbreviations** – Terms are spelled out the first time they appear in text. Thereafter, only the acronym or abbreviation is used.

- **Revision Control** – The title page lists the printing date and versions of the product this guide describes.

- **Typographical Conventions** – This guide uses the typographical conventions described in the table below.

When text appears this way...	... it means:
TimeProvider User's Guide	The title of a document.
SSU CRITICAL IOC1	An operating mode, alarm state, status, or chassis label.
Select **File**, **Open**...	Click the Open option on the File menu.
Press **Enter** Press **;**	A named keyboard key. The key name is shown as it appears on the keyboard. An explanation of the key's acronym or function immediately follows the first reference to the key, if required.
`TimeProvider` `Username:`	Text in a source file or a system prompt or other text that appears on a screen.
`PING` `STATUS`	A command you enter at a system prompt or text you enter in response to a program prompt. You must enter commands for case-sensitive operating systems exactly as shown.
A *re-timing* application	A word or term being emphasized.
Symmetricom ***does not*** recommend...	A word or term given special emphasis.

Warnings, Cautions, Recommendations, and Notes

Warnings, Cautions, Recommendations, and Notes attract attention to essential or critical information in this guide. The types of information included in each are explained in the following examples.

Warning: To avoid serious personal injury or death, *do not* disregard warnings. All warnings use this symbol. Warnings are installation, operation, or maintenance procedures, practices, or statements, that if not strictly observed, may result in serious personal injury or even death.

Caution: To avoid personal injury, *do not* disregard cautions. All cautions use this symbol. Cautions are installation, operation, or maintenance procedures, practices, conditions, or statements, that if not strictly observed, may result in damage to, or destruction of, the equipment. Cautions are also used to indicate a long-term health hazard.

ESD Caution: To avoid personal injury and electrostatic discharge (ESD) damage to equipment, *do not* disregard ESD cautions. All ESD cautions use this symbol. ESD cautions are installation, operation, or maintenance procedures, practices, conditions, or statements that if not strictly observed, may result in possible personal injury, electrostatic discharge damage to, or destruction of, static sensitive components of the equipment.

Electrical Shock Caution: To avoid electrical shock and possible personal injury, do not disregard electrical shock cautions. All electrical shock cautions use this symbol. Electrical shock cautions are practices, procedures, or statements, that if not strictly observed, may result in possible personal injury, electrical shock damage to, or destruction of components of the equipment.

Recommendation: All recommendations use this symbol. Recommendations indicate manufacturer-tested methods or known functionality. Recommendations contain installation, operation, or maintenance procedures, practices, conditions, or statements, that provide important information for optimum performance results.

Note: All notes use this symbol. Notes contain installation, operation, or maintenance procedures, practices, conditions, or statements, that alert you to important information, which may make your task easier or increase your understanding.

Related Documents and Information

Other helpful documents and software tools are listed below. See your Symmetricom representative or sales office for a complete list of available documentation.

- *SynCraft* management software – Help files within the application

- TimePictra management software – See the User's manual provided on the system CD

- *TimeProvider TL1 Reference Guide*, part number 097-58001-01

- Software Release Notice, part number 097-58001-20

> **Note:** Symmetricom offers a number of applicable training courses designed to enhance product usability. Contact your local representative or sales office for a complete list of courses and outlines.

Where to Find Answers to Product and Document Questions

For additional information about the products described in this guide, please contact your Symmetricom representative or your local sales office. You can also contact us on the web at www.symmetricom.com.

What's New in This Document

This guide includes the following new topic:

- Addition of the Retimer module. See New Capabilities, on page 20, for more information.

- Additional software feature that allows the user to label all input and output ports. See New Capabilities, on page 20, for more information.

- The software has been enhanced to manage event logs. See New Capabilities, on page 20, for more information.

Chapter 1 Overview of the TimeProvider

This chapter describes the TimeProvider product.

In This Chapter

- Overview
- Operating Modes
- Performance Monitoring
- Physical Description
- Functional Description
- System Power
- Communication Ports
- Reference Input Signals
- Clock Performance
- Output Signals
- Alarms
- Synchronization Status Messages (SSMs)
- SmartClock
- BesTime

Overview

The TimeProvider is Synchronization Supply Unit (SSU) designed specifically to meet the needs at the network edge. In small offices where core office synchronization solutions are critical, an edge clock like the TimeProvider is ideal because of its compact size and flexibility. Using the integrated GPS features, the TimeProvider can be used in a "small" Central Office to act as a Primary Reference Source (PRS).

The TimeProvider's unique design incorporates the input, output, and clock functions in a single card, available with either a Rubidium or quartz oscillator. This allows you to simplify the storage inventory required for future expansion needs. The TimeProvider shelf requires only three plug-in cards to operate with full redundancy: dual Input/Output/Clock cards (IOCs) and a single Information Management Card (IMC), which serves as a communications/alarm interface. The main shelf provides up to 32 redundant universal timing outputs; an optional Expansion Panel provides an additional 32 redundant outputs.

Using Symmetricom's SmartClock™ technology design, the oscillators within the IOCs are enhanced with improved performance and accuracy. Using intelligent firmware algorithms, SmartClock "learns" the effects of the ageing of the clock while it is locked to a reference signal and stores this information in its memory. If the reference signals are lost or disqualified, SmartClock uses the stored data to compensate for frequency changes while the TimeProvider continues to distribute highly stable synchronization signals.

The TimeProvider also uses Symmetricom's BesTime$^®$ algorithm when the GPS input is activated. By using other inputs as references, Bestime calculates and determines a weighting factor for each of the inputs and ensembles them in the overall timing scheme to provide very accurate timing outputs. In the event of GPS signal loss, BesTime continues to predict GPS timing information to provide reliable system timing outputs and holdover performance, ensuring that system reliability is maintained. See BesTime, on page 39 for more information.

New Capabilities

The operating software in the TimeProvider is improved to provide the following capabilities:

- Retiming – A new Output module is available to re-time, re-amplify, and re-shape an inbound (East) data-bearing signal. The TimeProvider provides a stable frequency source to re-transmit the data to the line-terminating Network Element. The return (West) path on the module provides re-amplify and re-shape only. See Retimer Module, on page 30, for more information.

- Input/output port labeling – The user can label TimeProvider input and output ports, including the input side on the Retimer module. The label, or circuit ID, can be up to 40 characters long.

■ Event log management – Event log retrieval has been enhanced to provide a more user-programmable lookup. In the new format, there are two additional methods to retrieve the event log. 1) The user can specify a beginning point (the "index") within the event log and display a number of events ("count" value) starting from the index. 2) The user can display events within a specified "start date" and "stop date."

When you use redundant IOC cards, Symmetricom recommends that you use the same revision of firmware for proper operation.

Shelves

The TimeProvider is available in two shelf models. Each shelf supports up to 32 redundant output channels.

■ The TimeProvider 1000 is a 175 mm tall ETSI shelf that meets the requirements of ETSI 300 119-4 January 1994. Figure 1-1 shows the TimeProvider 1000 shelf.

■ The TimeProvider 1100 is a 130 mm tall rear-access shelf; indicators are on the front panel and connections are available on the rear panel. Figure 1-2 shows the front panel of the TimeProvider 1100.

Figure 1-1.   TimeProvider 1000 ETSI-style Shelf

Figure 1-2.   TimeProvider 1100 Rear Access Shelf

Expansion Panel

The TimeProvider has an optional Expansion Panel that doubles (to 64) the number of output channels available. Figure 1-3 shows the rear-access version of the Expansion Panel. The Expansion Panel receives timing signals from the TimeProvider main shelf through an expansion cable.
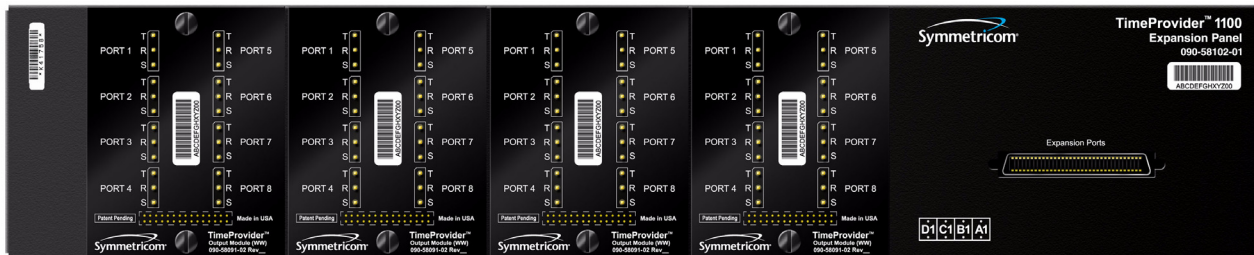
Figure 1-3.   TimeProvider 1100 Expansion Panel

Inputs

The TimeProvider accepts the following types of input signals:

- Primary Reference Signals: 1.544 MHz, 2.048 MHz, 5 MHz, 6.312 MHz, or 10 MHz

- Span input signals:

  - E1 (CCS programmable only), or 2.048 MHz analog
  - T1 D4, Extended Superframe (ESF)
  - Composite Clock, including Japan Composite Clock (JCC) and Japan Composite Clock with 400 Hz (JCC4) signals
  - 1.544 MHz analog
  - 6.312 MHz analog

- GPS input: GPS signal from the TimeProvider Interface Unit (TPIU)

The TimeProvider qualifies the input reference signals and detect the following errors: Loss of Signal (LOS), Alarm Indication Signal (AIS), Loss of Framing, and Synchronization Status Messages (SSM) where applicable. Reference Input Signals, on page 32, describes the inputs in more detail.

Outputs

The TimeProvider produces a variety of outputs to meet different signal standards. Output signal types include 8 kHz, 1.544 MHz, 2.048 MHz, 6.312 MHz, E1, T1, CC, JCC, and JCC4. A Retiming module is also available to re-time, re-shape, and re-amplify E1 and T1 signals. The E1 and T1 signals can be provisioned with standard framing that meets G.703 formats. These outputs are available through one of several different connector panels. The E1 Retiming module is available with either BNC or Siemens 1.6/5.6 connectors, and the T1 Retiming module has wirewrap connectors. See Output Signals, on page 36, for more information on output signals.

The TimeProvider outputs are arranged into four groups of eight outputs per group in the Main shelf and four groups of eight outputs per group in the optional Expansion panel. Each group is labeled A, B, C, and D, and can be configured independently.

Communication

Three communications ports provide access to the TimeProvider: Ethernet, local Craft serial port, and a Remote serial port. These ports are described in detail in Communication Ports, on page 31.

Clocks

The TimeProvider's clock design includes a highly stable ovenized Quartz crystal or Rubidium oscillator with Direct Digital Synthesis (DDS) to produce accurate synchronization outputs. In a dual-IOC configuration, the clock function is redundant to provide protection. Each IOC qualifies the input signal and filters jitter and wander noise elements that may exist. In the event that all input references are lost or disqualified, the TimeProvider's clock design, together with the SmartClock technology, goes into holdover mode with the oscillator providing the system reference.

The Rubidium IOC meets Stratum 2/Type II performance; the Quartz IOC meets Stratum 3E/Type I performance.

Operating Modes

You can configure the TimeProvider to operate in one of three modes: Synchronization Supply Unit (SSU), Subtending (SUB) as defined by Telcordia GR-378 Section 7, or Primary Reference Receiver (PRR) when the GPS input is available. Each mode is unique in its operation, and is defined in the following paragraphs.

SSU Mode

This is the TimeProvider's default operating mode. Valid signals on the PRS, INP1, INP2, or GPS connectors can be selected as the system reference. In this mode, the INP1 and INP2 inputs cannot be provisioned to receive Composite Clock (CC) signals, including JCC or JCC4. The method of selecting the system reference is described in Selecting the Input, on page 32.

SUB Mode

This mode allows the TimeProvider to operate as a Remote shelf where phase is critical. When you select the SUB mode, INP1 and INP2 are automatically set for CC inputs (including JCC and JCC4). Outputs provisioned for CC are phase-aligned with the selected CC input reference. Other output types comply with G.703 and GR-1244.

To configure the TimeProvider for Subtending mode, see Setting the System Mode, on page 96.

PRR Mode

In PRR mode, the GPS is automatically selected as the system reference input. This requires that you connect a GPS signal through the TPIU to the TimeProvider using the provided interconnect cable. This mode complies with ITU-T G.811 and Telcordia GR-2830 requirements for Primary Reference Receivers/Clocks. Valid signals on the PRS, INP1, or INP2 connectors are used in conjunction with BesTime to extend compliance with GR-2830/G.812 standards.

The PRR mode uses Symmetricom's BesTime servo control that allows the TimeProvider to continue providing outputs in case GPS tracking is lost, the GPS data loses integrity, or if the IMC is removed from the shelf. BesTime, on page 39 provides more information on the BesTime technology.

To configure the TimeProvider for PRR mode, see Setting the System Mode, on page 96.

Performance Monitoring

The TimeProvider can monitor and qualify all enabled input signals based on phase measurements. It measures the phase differences between the inputs and the output of the corrected clock. From these phase measurements, the TimeProvider computes frequency offset and wander of the input signals. Wander is reported in terms of Maximum Time Interval Error (MTIE) and Time Deviation (TDEV) and creates phase, MTIE, TDEV, and Fractional Frequency Offset (FFOFF) reports. Performance data is automatically gathered on all enabled or monitored inputs.

Using MTIE and FFOFF data, the TimeProvider qualifies inputs based on these metrics. User-specified thresholds can be set to disqualify inputs and generate corresponding alarms, causing the TimeProvider to switch references or enter the Holdover mode.

For more information on performance monitoring, see Using Performance Monitoring, on page 108. The *TimeProvider TL1 Reference Guide* contains a section describing the TL1 commands related to performance monitoring.

Phase Measurements

The IOC measures and transfers 1-second phase data with 100 ns resolution from each enabled input to the IMC every 10 seconds. This phase data is averaged to a 1 ns resolution, which is used to produce a 1-minute phase data sample. The 1 ns data sample is the basis for MTIE, TDEV, and FFOFF calculations. The phase data is not used to qualify an input reference source.

TL1 commands are available to display the 60 most recent phase data (at 100 pS resolution) measurements, the previous 86400 1 ns data averages, and the previous 10080 samples of 1-minute 1 ns-resolution data.

MTIE Calculations

MTIE is a measure of the relative noisiness of an input signal that relates to frequency offsets and phase transients. The TimeProvider automatically calculates MTIE for each enabled input from the 600 most recent 1-second phase updates. From this calculation, you can retrieve MTIE values for 1, 5, 10, 50, 100, and 500-second windows. You can set an alarm threshold for each of these windows; if the MTIE value exceeds this threshold and the alarm level is set to Minor or higher, the TimeProvider generates an alarm.

You can use the automatic MTIE calculations to qualify each input with user-defined qualification thresholds. If an input exceeds the threshold, then the input reference automatically switches to the next-best input.

You can also set thresholds using pre-defined masks according to ANSI T1.101 (for PRS inputs), ITU-T G.811 (for PRC inputs), or ITU-T G.812 (for Type I and Type II/III inputs). The TimeProvider performs a second MTIE calculation using the previous 24-hour period; this calculation is not used to qualify inputs.

TDEV Calculations

TDEV is a measure of the relative noisiness of an input signal that relates to its spectral content. The TDEV for each enabled input is automatically calculated from the previous 24-hour period. The TDEV value is used for monitoring only and is not used for qualifying an input signal.

You can retrieve the TDEV values for the following integration times: 1, 5, 10, 100, 500, 1000, 5000, and 7200 (84000/12) seconds.

FFOFF Calculations

FFOFF is a measure of the frequency deviation of the input signal against the system reference, expressed as a ratio. The TimeProvider automatically calculates FFOFF for each enabled input from the 600 most recent 1-second phase updates.

You can use the automatic FFOFF calculations to qualify each input with user-defined qualification thresholds. If an input exceeds the threshold and the alarm level is set to Minor or higher, then the input reference automatically switches to the next-best input.

The TimeProvider stores historical FFOFF measurements for each enabled input every 60 seconds. You can retrieve FFOFF data for the prior 24 hours, depending on the number of faults that have occurred.

Physical Description

The TimeProvider consists of a shelf, plug-in cards, connector adapter panels for the cards, cables, hardware, and software. The TimeProvider is available in two configurations: front access (Model 1000) and rear access (Model 1100), as shown in Figure 1-1 and Figure 1-2.

Figure 1-4 illustrates the location of the connectors, cards, and modules in the TimeProvider 1000.
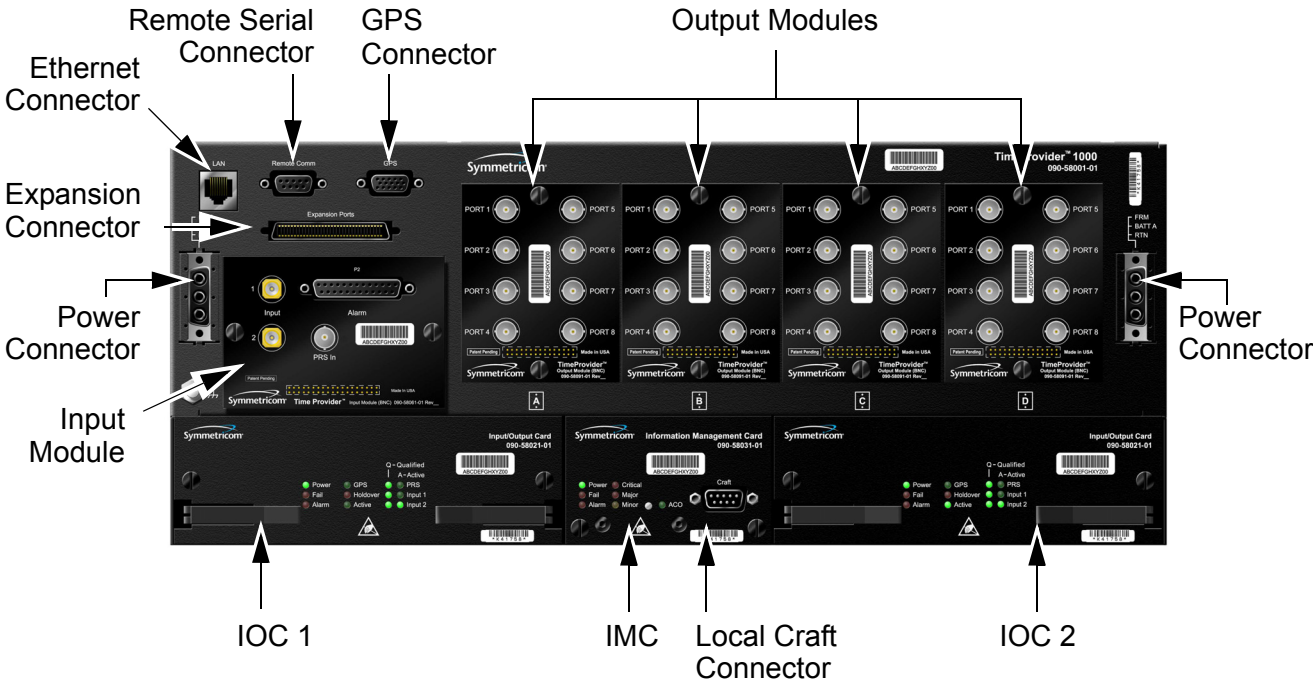
Figure 1-4.   TimeProvider 1000 - Front Panel

Figure 1-5 illustrates the location of the connectors, cards, and modules in the TimeProvider 1100.
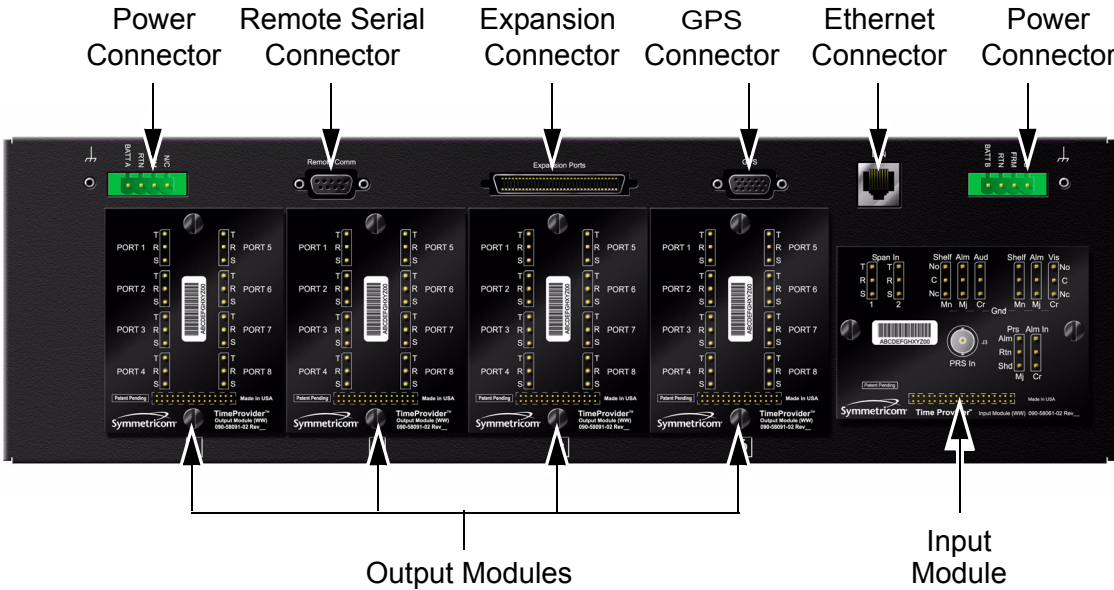
Figure 1-5.   TimeProvider 1100 - Rear Panel

Functional Description

The TimeProvider consists of a main shelf and slots for two IOCs and one IMC. One plug-in Input module and up to four plug-in Output modules complete the main shelf, which provides up to 32 outputs. The optional Expansion Panel can provide up to 32 additional outputs, to provide a total of 64 outputs.

This section describes the components and block diagram of the TimeProvider. The block diagram, shown in Figure 1-6, contains the following major blocks:

- Shelf

- Input module

- IMC

- IOC

- Output module

- Expansion Panel required for ports 33 through 64

- TimeProvider Interface Unit (TPIU)
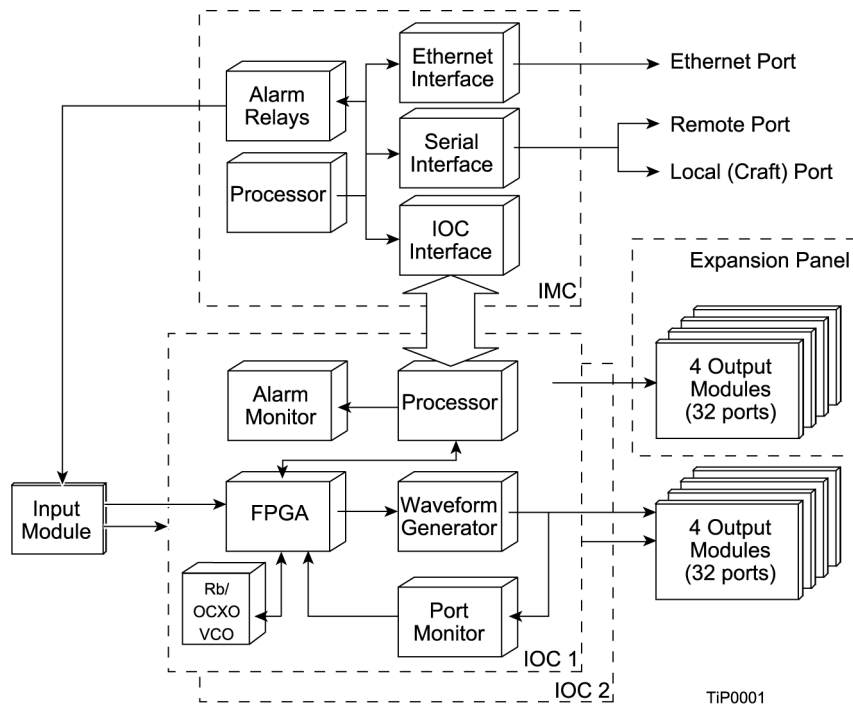
Figure 1-6.   Block Diagram of the TimeProvider

Shelf

Both the front-access and rear-access shelf provides a chassis for mounting the Input module, one IMC, two IOCs, and up to four Output modules. A backplane provides connections between the modules.

Input Module

The Input module receives the incoming reference signals and contains the alarm input/output connector. A variety of connector modules allows you to select the connector style and input impedance to match the wiring system at the installation site.

Information Management Card (IMC)

The Information Management Card, known as the IMC, contains a processor that manages communications between the two IOCs and the serial and Ethernet communications ports. It also provides communication to the GPS receiver in the antenna; if the IMC fails or is removed, GPS operations cease.

Input/Output and Clock Module (IOC)

The TimeProvider operates with one or two IOCs. A second IOC in the shelf provides protection should the primary IOC fail. The IOC accepts the incoming reference signal and decodes the SSM, if present.

With the system properly provisioned and a reference signal selected, the local oscillator in the IOC operates in one of the following states:

- Warm-up – For up to 20 minutes after applying power to the shelf, the IOC operates in warm-up mode.

- Fast-lock – After warm-up is complete, the IOC enters the fast-lock state, where it quickly frequency-locks the local oscillator to the reference input.

- Normal lock – After the IOC has completed the fast-lock cycle, it enters the normal lock mode, in which the TimeProvider uses the proper amount of filtering for the selected mode. When set to the SSU mode and locked to an active input traceable to a Primary Reference Source (PRS), the TimeProvider complies with the G.811 and GR-2830-CORE standards.

- Holdover – If the reference signal is lost, then the clock enters the holdover mode. The accuracy of the TimeProvider output is then dependent on the quality level of the oscillator in the IOC.

- Free-run – If the IOC starts without a system reference, the TimeProvider enters the free-run state after warm-up. If a reference is applied, then the TimeProvider enters the fast-lock and then the normal-lock states.

- Bridging – In the event that all input references are lost, the TimeProvider goes into the bridging mode where the outputs continue to provide accurate timing outputs for a limited amount of time. If the inputs have not been requalified before the bridging time has elapsed, then the TimeProvider enters the holdover mode.

After the IOC has been in the Normal lock mode for at least three days, SmartClock holdover mode becomes available. Compared to the normal holdover mode, this mode provides a superior output quality.

Output Module

The Output module provides the output connectors for the TimeProvider. You can install up to four Output modules on the main shelf. Like the Input module, each Output module uses one of a variety of connectors that match the wiring system at the installation site. Making Output Connections, on page 60, describes the Output Modules available for the TimeProvider and the Expansion Panel.

Retimer Module

The Retimer module allows you to reshape, reamplify, and retime up to two E1 or T1 signals applied to the module and then deliver the improved signal to a connected Network Element. You can install a Retimer module in any of the four slots used by Output modules, but not in the available Expansion Panel. The T1 Retimer supports line build-out (LBO) of up to 655 ft. Making Retimer Connections, on page 62, and Provisioning the Retimer Module, on page 112, provide more information on using the Retimer module.

Expansion Panel

The Expansion Panel provides up to 32 additional outputs that the TimeProvider can generate. See Expansion Panel, on page 22 and Rack Mounting the Shelf and Expansion Panel, on page 51 for more information.

TimeProvider Interface Unit

The TimeProvider Interface Unit (TPIU) provides power, communication, and a composite timing reference signal between the antenna and the TimeProvider main shelf. During antenna installation, you can use the LEDs on the TPIU to detail the status of the received power and antenna communication. See Making GPS Connections, on page 64 for more information.

System Power

The TimeProvider main shelf has redundant –48v DC inputs. The inputs are diode or'd; in the event that one supply fails, the other takes over. The –48v returns are isolated from the chassis and circuit grounds. A 5 A fuse on the IOC protects the TimeProvider; the shelf is protected from damage in case the connections are reversed.

The power supply range is from –36 to –72 V DC. The power requirements vary according to the type of IOC installed; Table 1-1 lists the power requirements.

Table 1-1. Typical Power Consumption

IOC Type	Max Power (W) per IOC	Typical Power (W) per IOC
Crystal	40	30
Rubidium	60	40 (70 with two Rb IOCs)

The procedure for installing power is described in Making Power Connections, on page 54.

Communication Ports

The TimeProvider contains three communications ports that allow you to provision, monitor, and troubleshoot the shelf. The Ethernet and Remote serial ports are located on the shelf, and the local Craft serial port is located on the IMC. You communicate with the TimeProvider using the TL1 protocol.

You can select one of four security levels for each user; each level has varying levels of access to provisioning parameters. See Defining the Security Parameters, on page 90.

Ethernet

An Ethernet connector provides connectivity to an Ethernet local area network. Each main shelf has a unique internet protocol (IP) address. Once the IP address is set and a connection is made to a LAN, you can access the TimeProvider on an intranet.

The Ethernet port supports up to 10 simultaneous connections to port 5000.

Local Craft Serial Port

This EIA-232 port supports local control; you can configure the TimeProvider with TL1 commands using a terminal or personal computer (PC) with terminal emulation software or Symmetricom's craft software, SynCraft. The connector is located on the front panel of the IMC. The default specifications are 9600-8-N-1. The Local port is configured as a DCE interface.

Remote Serial Port

The Remote serial connector can be used in the same manner as the local Craft serial port. The Remote port has additional control support to manage an external modem for remote access. The Remote port is configured as a DTE interface.

Reference Input Signals

The Input module accepts one or two E1, 2.048 MHz analog, 1.544 MHz or 6.312 MHz analog (Japan-specific), T1, and Composite Clock (including JCC and JCC4) inputs on ports INP1 and INP2. The CC inputs are used solely for Subtending mode; if you provision INP1 or INP2 to a CC type, then Subtending mode is automatically enabled. You can also connect a 2.048, 5, or 10 MHz or Japan-specific 1.544 MHz or 6.312 MHz input reference signal on the PRS port. The TimeProvider accepts full-level signals or bridged signals (–20 dB); the inputs are terminated per G.703. You can also connect a GPS antenna via the TimeProvider Interface Unit (TPIU) to the GPS Input port on the shelf.

Make the input connections using the procedures described in Making Input Connections, on page 57, then provision the inputs using the software commands described in Provisioning the Input Reference, on page 99.

Input State

You can provision each input to one of three states:

■ **Disabled** – the input is not used

■ **Monitor** – the system monitors the input for signal faults and performance data, but it cannot be selected as the system reference

■ **Enabled** – the system monitors the input for signal faults and performance data. The input can be selected as the system reference in SSU or SUB mode or as a backup reference in PRR mode.

Selecting the Input

Many considerations influence which system reference you choose:

■ SSM or User-assigned Quality Level

■ User-assigned Priority Level

■ Switching mode

■ User-assigned Input State

■ Active alarms on an input

You can provision the TimeProvider to automatically select the highest-quality input based on priority and performance qualification, or you can manually select the input signal you want to use. If that signal becomes disqualified for any reason, the local oscillator goes into the Holdover mode.

Revertive Switching

Telcordia GR-378 and GR-1244 define two reference selection modes: Revertive and Non-revertive. In the revertive mode, when an input used as the system reference is disqualified (for any reason), if that input returns, it reverts to the system reference when the disqualifying reason is removed. The system reference switches two times: once when the disqualifying event occurs, and again when the input is no longer disqualified. In the non-revertive mode, the system reference does not revert to the initial input when the reason for disqualification is removed. The system reference switches only once when the disqualifying event occurs.

Quality Level and Priority Level

When the REFMODE parameter is provisioned to AUTO, the system reference switches when the input signal is disqualified. When the input signal is re-qualified, the TimeProvider can either keep the current reference or switch back to the re-qualified signal. When the REFMODE parameter is set to FORCED, then the reference does not switch and remains locked to that reference and the local oscillator enters Holdover mode if the input is not re-qualified. You may also provision the REFMODE parameter to FORCED to select an input as the system reference regardless of the priority levels of other outputs. If this input is lost or is disqualified, then the REFMODE automatically changes to AUTO and the next available reference based on priority and QLEVEL becomes the system reference. If no other input references are available, the TimeProvider enter the Holdover mode.

The QLEVEL (Setting the Input Quality Level, on page 104) and the PRIORITY (Setting the Input Priority Level, on page 105) parameters work together with SSMs to determine the switching strategy for the inputs when the unit is in the SSU mode. If the active/primary input becomes unavailable, the switching strategy determines which input to use: the TimeProvider uses the input with the next highest QLEVEL. If all inputs have the same QLEVEL, then the TimeProvider uses the input with the highest PRIORITY.

To provision the TimeProvider as non-revertive, you must provision the user-assigned Priority Level on all inputs to the same value. To provision the TimeProvider as revertive, you provision any one of the inputs to a different Priority Level.

If the original primary input becomes available again, the REFMODE, QLEVEL and PRIORITY parameters determine whether the TimeProvider switches back to that input. If REFMODE is set to AUTO, then the reference switches according to the QLEVEL and PRIORITY settings. If the QLEVEL and/or PRIORITY parameter of the original input is higher than the current input, the TimeProvider *reverts* back to the original input. If the QLEVEL parameter is the same for all inputs, then the TimeProvider does not revert back to the original input.

SSMs and Quality Level

Synchronization Status Messages (SSMs) can be included in the bit stream of the incoming signal to indicate its quality level. You must provision the input to read the SSM, and you must provision the bit position of the incoming SSM.

If the incoming signal does not include SSMs, or if you disable them, then you can provision the Quality Level to an appropriate value. The QLEVEL value is used in the same manner as the incoming SSM to determine which input is used when the active input is disqualified. SSMs are described in more detail in Synchronization Status Messages (SSMs), on page 37.

SSU Mode

Table 1-2 illustrates which input is the active system reference under several different input conditions when the TimeProvider is in the SSU mode.

Table 1-2. SSU-Based Reference Selection Scenarios

Sequence	QLevel on PRS	QLevel on INP1	QLevel on INP2	Active Reference	
				Non-Revertive[1]	**Revertive[2]**
1	2	2	2	PRS	INP1
2	4	2	2	INP1	INP1
3	4	4	2	INP2	INP2
4	4	4	4	INP2	INP1
5	4	4	2	INP2	INP2
6	4	2	2	INP2	INP1
7	2	2	2	INP2	INP1
8	2	2	LOS	PRS	INP1
9	2	LOS	2	PRS	PRS
10	LOS	LOS	2	INP2	INP2
11	LOS	LOS	LOS	Holdover	Holdover
12	LOS	LOS	2	INP2	INP2
13	2	LOS	2	INP2	PRS
14	2	2	2	INP2	INP1

Note:
  [1]Non-revertive example. Priority Levels set to: PRS = 3, INP1 = 3, and INP2 = 3
  [2]Revertive example. Priority Levels set to: PRS = 2, INP1 = 1, and INP2 = 2

Subtending Mode

Table 1-3 illustrates which input is the active system reference under several different input conditions when the TimeProvider is in the Subtending mode.

Table 1-3. Subtending-Based Reference Selection Scenarios

Sequence	QLevel on INP1	QLevel on INP2	Active Reference	
			Non-Revertive[1]	Revertive[2]
1	1	1	INP1	INP1
2	2	1	INP2	INP2
3	2	2	INP2	INP1
4	2	1	INP2	INP2
5	1	1	INP2	INP1
6	1	LOS	INP1	INP1
7	LOS	LOS	Holdover	Holdover
8	LOS	1	INP2	INP2
9	1	1	INP2	INP1

Note:
[1]Non-revertive example. Priority Levels set to: INP1 = 3, and INP2 = 3
[2]Revertive example. Priority Levels set to: INP1 = 1, and INP2 = 2

GPS Inputs

Symmetricom provides a complete GPS antenna system for the TimeProvider. This includes the Symmetricom GPS Antenna, the TimeProvider Interface Unit (TPIU), and associated cables. Figure 1-7 illustrates the TPIU. See Making GPS Connections, on page 64 for more information on installing the GPS Antenna and the TPIU.
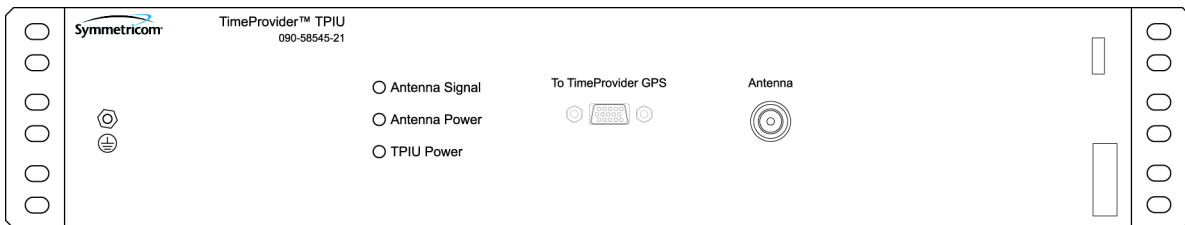
TiP0035

Figure 1-7.   The TimeProvider Interface Unit (TPIU)

Clock Performance

Two IOCs are available:

- A Rubidium-based version that meets ST2/Type II standards. This IOC meets or exceeds the ITU G.812 Type II specification.

- A Quartz-based version that meets ST3E/Type I standards. This IOC meets or exceeds the ST3E requirements in ANSI T1.101 and Telcordia GR-1244, as well as the ITU-T G.812 TYPE III specification and ITU-T G.812 Type I specification.

Output Signals

The main shelf has 32 output connections arranged in four groups of eight outputs; using the optional Expansion Panel, you can expand to 64 outputs. The outputs are "universal," and can supply E1, 2.048 MHz, T1, 8 kHz, CC, JCC, JCC4, 1.544 MHz, and 6.312 MHz signals. E1 and T1 signals can be provisioned with standard framing and G.703 formats. You provision the outputs in groups of eight outputs (or 16 outputs if the optional Expansion Panel is installed).

The TimeProvider use interchangeable Output modules, allowing you to select the connector and termination impedance. Output modules are available with the following connectors:

- BNC – 75 Ω

- DB9 – 120 Ω

- Metric (Siemens) 1.6/5.6 – 75 Ω

- Metric (Siemens) 1.0/2.3 – 75 Ω

- Wirewrap – 100 Ω

- BT43 – 75 Ω

Each Output module plugs into the shelf (and Expansion Panel) and provides connectors and terminations for eight outputs. Make the output connections using the procedures described in Making Output Connections, on page 60. You provision the output signal type using the software commands described in Provisioning the Outputs, on page 111.

Alarms

The TimeProvider uses alarms to notify you when certain conditions are deteriorating below user-specified levels. These alarms are indicated by shelf and card status lamps (LEDs) and by TL1 messages reported over the serial/EIA-232 or LAN communication ports. In addition, the input panel has a connector that provides contact closures to activate external alarms.

You can provision the alarm level for most alarms to one of the following levels: non-reportable (NR), non-alarm event (NA), minor (MN), major (MJ), or critical (CR). Alarms related to the inputs are special cases; you can only provision input alarms for minor, major, or critical. To help prevent spurious or transient input alarms, a delay timer (FLTDELAY) allows you to provision a waiting period that starts after the alarm condition occurs; the alarm is set at the end of the period. A similar timer (CLRDELAY) clears the alarm after the alarm condition is no longer present.

> **Recommendation:** To prevent Non-Service Affecting LOS alarms, Symmetricom recommends that you provision unused inputs to the Disabled state.

For more information on connecting alarms, see Making Alarm Connections, on page 63. For information on provisioning alarm levels, see Provisioning the Alarm Levels, on page 114.

Synchronization Status Messages (SSMs)

The TimeProvider supports input and output SSMs. SSMs provide a method for providing clock quality information to any equipment that uses synchronization inputs. Table 1-4 describes the ANSI SSM values and the traceability associated with each value. Table 1-5 describes the ITU SSM values and the traceability associated with each value.

Table 1-4. ANSI SSM Quality Level Definitions

Description	Quality Level	Abbreviation
Stratum 1 Traceable	1	PRS
Synchronized – traceability unknown	2	STU | UNK
Stratum 2 traceable	3	ST2 | TYPE II
Transit Node traceable	4	TNC | TYPE I
Stratum 3E traceable	5	ST3E | TYPE III
Stratum 3 traceable	6	ST3 | TYPE IV

Table 1-4. ANSI SSM Quality Level Definitions (Continued)

Description	Quality Level	Abbreviation
SONET Minimum Clock traceable (20 ppm clock)	7	SMC
Stratum 4 traceable (32 ppm clock)	8	ST4
Do Not Use for synchronization	9	DUS

Table 1-5. ITU SSM Quality Level Definitions

Description	Quality Level	Abbreviation
Primary Reference Clock	2	PRC
Transit Node	4	SSUT
Local Node	8	SSUL
Synchronization Equipment Clock	11	SEC
Do Not Use for synchronization	15	DNU

The TimeProvider handles SSMs in accordance with T1X1.3 TR33, T1.101-1999, GR-253, and 379-CORE.

Input SSMs

The TimeProvider extracts and decodes the SSM (if present) on the available inputs. Using this information, the TimeProvider can automatically select the input with the higher quality level.

You can manually provision the input quality level for those signals that do not have SSM information or you can provision INP1 and INP2 to read the SSM on the input; in either case the quality level of the reference input becomes the system's quality level, which is passed through to the outputs in the output SSM. If the IOC enters the Free-run or Holdover mode, the system's quality level is determined by the CLKTYPE parameter for the local oscillator on the selected IOC module. You can provision the CLKTYPE parameter to Type I, Type II, ST2, or ST3E.

Output SSMs

You must provision the TimeProvider's outputs according to the type of SSM operation you are using:

- For ANSI SSM operation, set the output type to Extended SuperFrame (ESF) for ANSI SSM operation

- For ITU SSM operation, set the output type to Channel Associated Signaling (CAS) with CRC4 framing (this setting is automatically set when you enable SSMs)

These output formats automatically generate SSMs. The system output quality level depends on the input quality level of the input signal or the local oscillator's quality level. During normal operation, when a qualified input is used as the active timing reference, the TimeProvider copies the input's quality level to all DS1 ESF outputs and E1 CAS4 outputs. T1 SSM messages are mapped to the corresponding equivalent E1 SSM message and vice versa.

If the IOC is operating in Holdover mode for any reason, the SSM quality is the internal level of the oscillator installed in the IOC.

SmartClock

The TimeProvider uses Symmetricom's SmartClock technology, which predicts frequency changes due to aging of the local oscillator in the IOC; this offsets this deterministic behavior by steering the output with a corrected deviation.

The TimeProvider begins the learning process as soon as you apply a valid external reference source. The SmartClock technology is enabled after 24 hours of continuous lock; the TimeProvider then issues an event message similar to this:

```
IOC1,EQPT,NA,SCAVAIL,NSA,04-12-14,12:13:14:\"SMARTCLOCK
ALGORITHM, ENABLED\"
```

If you reset the IOC or if the oscillator becomes less stable (for example, due to extreme temperature swings), the TimeProvider disables SmartClock and issues an event message similar to this:

```
IOC1,EQPT,NA,SCAVAIL,NSA,04-12-17,15:16:17:\"SMARTCLOCK
ALGORITHM, DISABLED\"
```

The TimeProvider automatically restarts SmartClock, which then begins to determine a new aging rate for the oscillator.

BesTime

The TimeProvider uses Symmetricom's BesTime algorithm when it is in the PRR mode to provide enhanced GR-2830-CORE performance during bridging or holdover situations. BesTime minimizes the effect of transients on the reference signal on the outputs of the TimeProvider by comparing them against the system reference to produce the most stable outputs from the TimeProvider.

The BesTime algorithm is based on Symmetricom's patented use of multiple-input phase-locked loops (MPLLs) to generate a correction signal for the local oscillator (LO) in the IOC. With GPS as the primary input signal in PRR mode, the signals on the PRS, INP1 and INP2 inputs may be enabled and used in the BesTime ensembling algorithm to generate output signals derived from the optimum weighting of each input.

Two weighting algorithms - tracking and holdover - determine which of the inputs are used as the ensembled reference. The tracking algorithm is used during normal operation. If the GPS becomes disqualified, BesTime uses the holdover weighting algorithm to determine what the GPS input would have been had it not been lost. You can use the RTRV-BESTIME-STATS command to view the current weighting for each input.

The BesTime control loops are designed so that the short-term (under 10 minutes) stability is controlled by the LO, medium-term (10 minutes to several hours) stability is controlled by the ensembled reference, and long-term stability and accuracy is determined by the GPS control input.

The control loops can use either measurement data or prediction data. The inputs are measured for phase, frequency, and drift transients. When the input to either loop is determined to be valid, then the measured data is used to generate the correction signal to the local oscillator. If BesTime detects a transient on the input, it switches to the prediction data before the transient can start to affect the correction signal.

Normal Tracking

During normal GPS tracking, the GPS input provides the source of long-term stability for all inputs to the ensembling algorithm. The ensembling improves the medium-term stability of the output signals.

GPS Holdover

If GPS signals are lost, then all inputs to the ensembling algorithm have lost their source of long-term traceability. BesTime substitutes the inputs with calibration predictions with respect to GPS. Each input is weighted according to the estimated prediction error over 24 hours.

Chapter 2 Engineering and Ordering Procedures

This chapter describes the items available with the TimeProvider, and lists the part number for each item.

In This Chapter

- Shelf
- Expansion Panel
- Input Modules
- Output Modules
- IMC and IOC Modules
- GPS Antenna
- Ordering and Parts List
- Accessories, Tools, and Equipment

Shelf

The TimeProvider is available in two configurations: Model 1000 Front Access and Model 1100 Rear Access.

Model 1000 Front Access

The ETSI-style shelf (990-58001-01) complies with ETSI 300-119 shelf projections. Each shelf accepts one IMC and one or two IOCs; the shelf also supports one Input module and from one to four Output modules. Each Output module terminates eight output timing signals. Alarms terminate on wire-wrap or DB-25 connectors, depending on the Input module used. The minimum configuration is one IMC and one IOC for non-protected operation. Using two IOC modules provides protection in case one of the IOC modules fail. See Table 2-5 for part numbers for front-access shelf systems.

Model 1100 Rear Access

The NEBS-style shelf (990-58101-01) accepts one IMC and one or two IOCs; the shelf also supports one Input module and from one to four Output modules. Each Output module terminates eight output timing signals. Alarms terminate on wire-wrap or DB-25 connectors, depending on the Input module used. The minimum configuration is one IMC and one IOC for non-protected operation. Using two IOC modules provides protection in case one of the IOC modules fail. See Table 2-5 for part numbers for rear-access shelf systems.

Expansion Panel

The available Expansion Panel provides additional outputs from the main shelf. Like the main shelf, it comes in two configurations: Model 1000 Front Access and Model 1100 Rear Access. The Expansion Panel supports up to 32 additional output channels. Both panel kits contain rack mounting ears and extenders for 19-inch and 23-inch racks.

Front Access

The front-access Expansion Panel (part number 990-58002-01) provides an additional 32 outputs, for a system total of 64 outputs. The ETSI-style Expansion Panel supports up to four additional Output Modules with various connector types; each Output Module provides up to eight output signals. See Table 2-2 for part numbers for Output modules.

Rear Access

The rear-access Expansion Panel (part number 990-58102-01) provides an additional 32 outputs, for a system total of 64 outputs. The NEBS-style Expansion Panel supports up to four additional Output Modules with various connector types; each Output Module provides up to eight output signals. See Table 2-2 for part numbers for Output modules.

Input Modules

Six Input modules are available to match the wiring scheme and termination impedance requirements at the installation site. Select one of these Input modules for use with your TimeProvider system. Table 2-1 lists the Input modules available for the TimeProvider.

Table 2-1. Input Modules Available for the TimeProvider

Part Number	Description
090-58061-01	BNC Input module
090-58061-02	Wire-wrap Input module
090-58061-03	DB9 Input module
090-58061-04	SMZ/BT43 Input module
090-58061-05	Metric (Siemens) 1.0/2.3 Input module
090-58061-06	Metric (Siemens) 1.6/5.6 Input module

Output Modules

Symmetricom has seven Output modules available for the TimeProvider that allow you to select the proper termination for your application. You can install any combination of up to four Output modules in the main shelf or in the available Expansion Panel. Table 2-2 lists the Output modules available for the TimeProvider.

Table 2-2. Output Modules Available for the TimeProvider

Part Number	Description
090-58091-01	BNC Output module
090-58091-02	Wire-wrap Output module
090-58091-03	DB9 Output module

Table 2-2. Output Modules Available for the TimeProvider (Continued)

Part Number	Description
090-58091-04	SMZ/BT43 Output module
090-58091-05	Metric (Siemens) 1.0/2.3 Output module
090-58091-06	Metric (Siemens) 1.6/5.6 Output module
090-58081-02	T1 Retimer Output module (wire-wrap)
090-58082-01	E1 Retimer Output module (BNC)
090-58082-06	E1 Retimer Output module (Siemens 1.6/5.6)
090-58091-99	Blank module (cover for any unused Output module locations)

IMC and IOC Modules

Symmetricom has several modules available for the TimeProvider that provide varying levels of clock stability. You can install any combination of IOC modules in the main shelf. Table 2-3 lists the IOC and IMC modules available for the TimeProvider.

Table 2-3. IOC and IMC Modules Available for the TimeProvider

Part Number	Description
090-58021-01	Quartz IOC, single-oven
090-58022-01	Rubidium IOC
090-58021-99	Blank Clock Module cover
090-58031-01	IMC

GPS Antenna

The following table identifies the parts available for the GPS antenna.

Table 2-4. GPS Parts and Accessories

Part Number	Description
990-58545-01	TimeProvider Integrated GPS Antenna Kit, Rear Access
990-58545-02	TimeProvider Integrated GPS Antenna Kit, Front Access
090-58545-01	TimeProvider GPS Antenna
090-58545-21	TPIU for Front or Rear Access shelf
060-58543-03 060-58543-10 060-58543-20 060-58543-50	Front Access TPIU Interconnect cable, 1 m (3 ft) Front Access TPIU Interconnect cable, 3 m (10 ft) Front Access TPIU Interconnect cable, 6 m (20 ft) Front Access TPIU Interconnect cable, 15 m (50 ft)
060-58544-03 060-58544-10 060-58544-20 060-58544-50	Rear Access TPIU Interconnect cable, 1 m (3 ft) Rear Access TPIU Interconnect cable, 3 m (10 ft) Rear Access TPIU Interconnect cable, 6 m (20 ft) Rear Access TPIU Interconnect cable, 15 m (50 ft)
060-58545-01[1] 060-58545-02[1] 060-58545-05 060-58545-10 060-58545-20 060-58545-30 060-58545-50 060-58545-60 060-58545-80 060-58545-99	RG-58 cable, 3 m (10 ft) RG-58 cable, 6 m (20 ft) RG-58 cable, 15 m (50 ft) RG-58 cable, 30 m (100 ft) RG-58 cable, 60 m (200 ft) RG-58 cable, 90 m (300 ft) RG-58 cable, 150 m (500 ft) RG-58 cable, 180 m (600 ft) RG-58 cable, 240 m (800 ft) RG-58 cable, 300 m (1000 ft)
154-00023-01	Crimp tool for RG-58 cable
371-001	TNC connectors for RG-58 cable

Note:
[1]These lengths are to be used only between the TimeProvider antenna and lightning suppressor.

Ordering and Parts List

All IOCs, IMCs, and Input and Output Connector modules are sold separately. Use Table 2-5 to identify the available TimeProvider shelf types.

Table 2-5. TimeProvider Shelves

Model	Outputs	Part Number
1000 Front Access Main Shelf	8 to 32 (1 to 4 Output Connector modules)	990-58001-01
1000 Front Access Expansion Shelf	8 to 64 (1 to 8 Output Connector modules)	990-58002-01
1100 Rear Access Main Shelf	8 to 32 (1 to 4 Output Connector modules)	990-58101-01
1100 Rear Access Expansion Shelf	8 to 64 (1 to 8 Output Connector modules)	990-58102-01

Accessories, Tools, and Equipment

You need to supply the following tools and materials for installing and testing the TimeProvider:

- Phillips-head screwdriver for installing the TimeProvider shelf in a rack

- ESD wrist strap for installing cards

- Digital multimeter (Fluke 77 or equivalent) for verifying power connections to the shelf

- Laptop computer with communications software such as HyperTerminal, ProComm Plus, etc. for provisioning the TimeProvider

- (Optional) Dual-channel oscilloscope with 100 MHz minimum bandwidth for verifying that clock input and output signal(s) are within the specified voltage range, and for checking output waveforms

- DB-9 M to DB-9 F cable for connecting to the local Craft port

- DB-25 M connector for alarms

- Soldering iron and solder and appropriate cable for building power and alarm connectors

Chapter 3 Installing the TimeProvider

This chapter describes the procedures for installing the TimeProvider shelf and the available Expansion Panel.

In This Chapter

- Getting Started
- Unpacking the Unit
- Rack Mounting the Shelf and Expansion Panel
- Making Connections
- Installation Check List
- Powering Up the Shelf
- Working With Cards

Getting Started

Before beginning the installation, complete the pre-installation check described in Pre-Installation Check, on page 48, perform the site survey in Performing a Site Survey, on page 48, and gather the necessary tools and materials described in Gathering the Tools, on page 49.

> ⚠ **Caution:** All telecom signal wiring (including I/O, clocks and Ethernet) must be installed with shielded cabling only and appropriately grounded.
>
> Cabling shall be installed in compliance with intra-building surge, lightning, and EMC requirements.

This section describes the preliminary activities you need to perform before you install the TimeProvider

Pre-Installation Check

Before installation, ensure that the following preparations are in place:

- Grounded equipment rack
- A fused power panel is present (–48 V DC at 5 Amp)

Performing a Site Survey

Physical Space

The TimeProvider is designed to mount in a 19-inch (48 cm) rack. Rack ears are available to mount the shelf in a 23-inch (58 cm) rack. The ETSI front-access shelf is 6.875 inches tall (177 mm), or 4 RU (Rack Units, where 1 RU = 1.75 in/44.45 mm). For ventilation, plan on leaving a 1 RU space below the shelf. The NEBS rear-access shelf is 5.25 inches tall (133 mm), or 3 RU. For ventilation, plan for a 1 RU space above and below the shelf.

The Expansion Panel also mounts in a 19-inch (48 cm) rack, and it is 3.5 inches (89 mm, or 2 RU) tall. The Expansion Panel does not require ventilation spaces above or below it.

You can mount the shelf so that it protrudes 2 inches (5 cm) or 5 inches (12.7 cm) from the front of the rack, or you can mount it flush with the front of the rack.

Environmental Requirements

To prevent the unit from interfering with other equipment, install and operate the unit according to the following guidelines:

- Use only shielded cable for all signal wiring, including I/O, clocks and Ethernet, and ground appropriately at both ends, or as required by local standards.

- Secure all cable screws to their corresponding connectors.

⚠️ **Caution:** To avoid interference to the TimeProvider, you must consider the electromagnetic compatibility (EMC) of nearby equipment when preparing to install the TimeProvider.

Electromagnetic interference can adversely affect the operation of nearby equipment.

Gathering the Tools

These standard tools and materials are not supplied, but may be required for installing the TimeProvider:

- Standard tool kit

- Cable ties, waxed string or acceptable cable clamps

- No. 16 AWG (minimum) wire (1.31 mm^2) for –48 V DC, return, and Frame Ground

- Telecom signal wiring (including I/O, clock, and Ethernet) uses shielded cabling of the appropriate impedance required by the specific signal type

- Mating connectors for terminating signal wiring

- For wire wrap connections only: No. 22 AWG (0.326 mm^2) shielded twisted pair wire-wrap cable of the appropriate impedance for the specific signal requirements

- Wire wrap tool (wire wrap modules only)

- Fasteners for mounting the equipment in rack

- Digital Voltmeter (DVM)

- Soldering iron and solder for the ETSI-version power connectors

Unpacking the Unit

The TimeProvider and accessories are packaged to protect from normal shock, vibration, and handling damage.

> **Caution:** To avoid electrostatic discharge (ESD) damage to parts that are packaged with the TimeProvider, observe the following procedures.

Unpack and inspect the unit as follows:

1. Wear a properly grounded protective wrist strap or other ESD device.

2. Inspect the container for signs of damage. If the container appears to be damaged, notify both the carrier and your Symmetricom distributor. Retain the shipping container and packing material for the carrier to inspect.

3. Open the container, being careful to cut only the packaging tape.

4. Locate and set aside the printed information and paperwork that is included in the container.

5. Remove the unit from the container and place it on an anti-static surface.

6. Locate and set aside small parts which may be packed in the container.

7. Remove the accessories from the container.

8. Remove the anti-static packaging from the unit and accessories.

9. Verify that the model and item number shown on the shipping list agrees with the model and item number on the equipment. The item number can be found on a label affixed to the TimeProvider. Contact your Symmetricom distributor if the model or item number *do not* match.

For a complete listing of TimeProvider item numbers and configuration options, contact your Symmetricom distributor.

Rack Mounting the Shelf and Expansion Panel

The installation procedure described in this section provides general guidelines for installing the shelf and the optional Expansion panel. Always follow applicable local electrical codes.

The main shelf (Model 1000 and 1100) mounts to either a 19-inch or 23-inch rack using reversible mounting ears. The Expansion panel uses a bracket to position the panel at the same depth as the shelf; expansion brackets are used for 23-inch racks.

1. Attach the rack mounting ears to the shelf using 8-32 x 3/8-inch screws. Ensure that the ears are attached at equal distances from the front of the unit, as shown in Figure 3-1 or Figure 3-2.

2. Mount the shelf to the front of the equipment rack rails with four screws and associated hardware. Use the proper screws for the equipment rack.

3. Mount the Expansion panel as shown in the following figures.
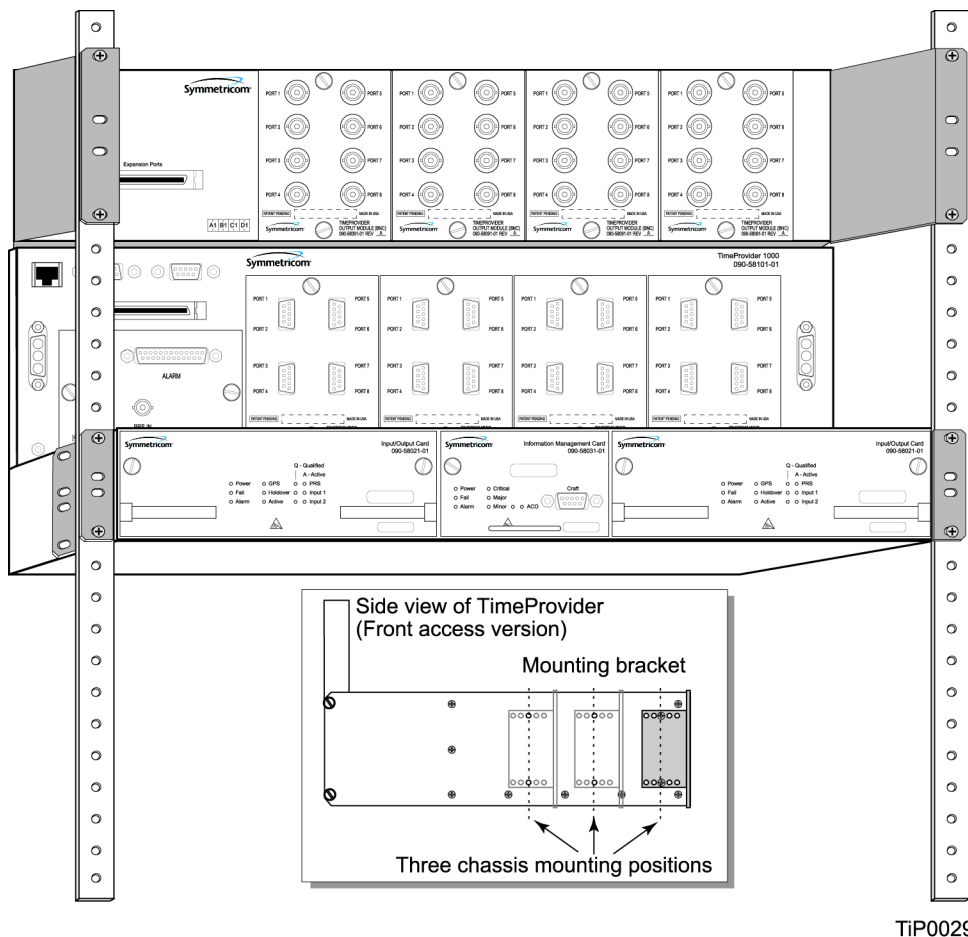
TiP0029

Figure 3-1.   Installing the Model 1000 Shelf and Expansion Panel - 19-inch Rack
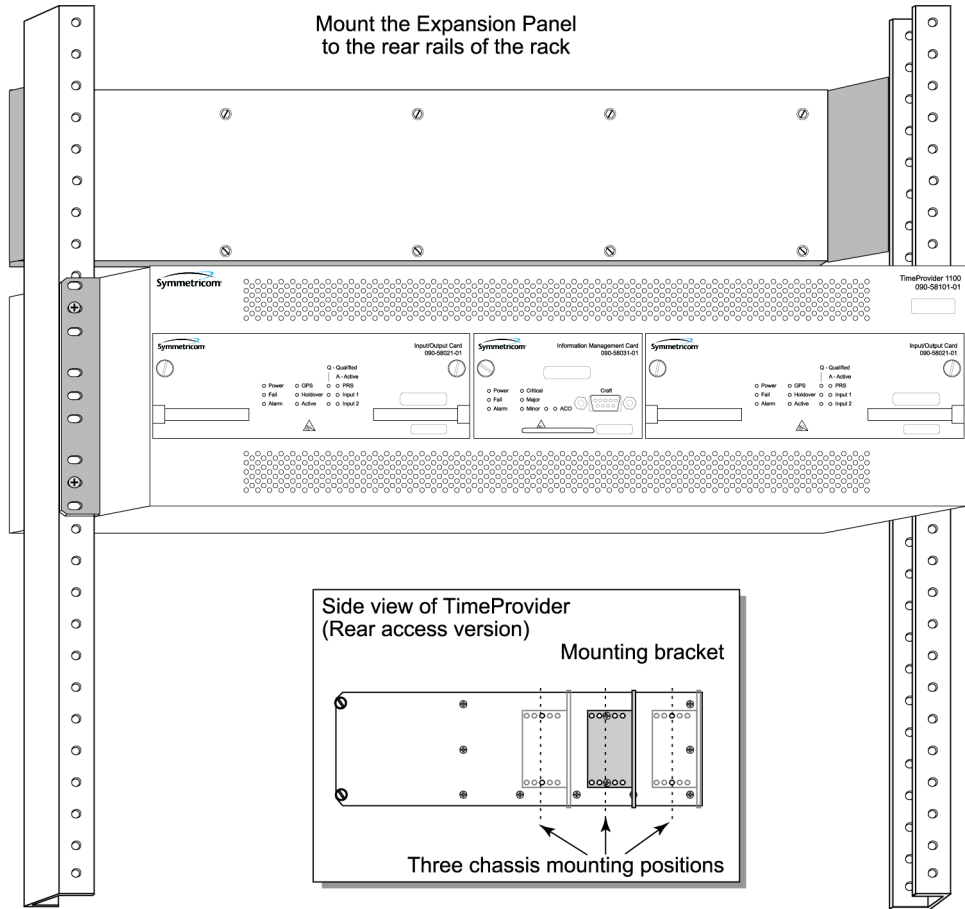
TiP0031

Figure 3-2.   Installing the Model 1100 Shelf and Expansion Panel - 19-inch Rack

TiP0030
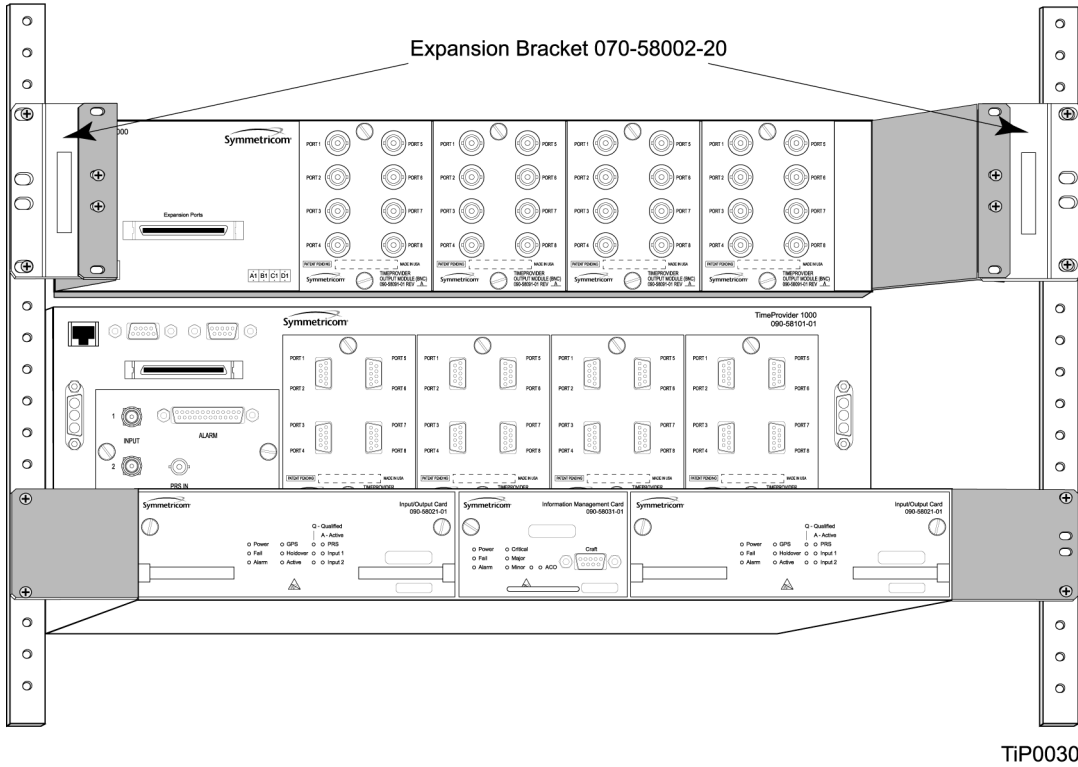
Figure 3-3.   Installing the Model 1000 Shelf and Expansion Panel - 23-inch Rack

TiP0032
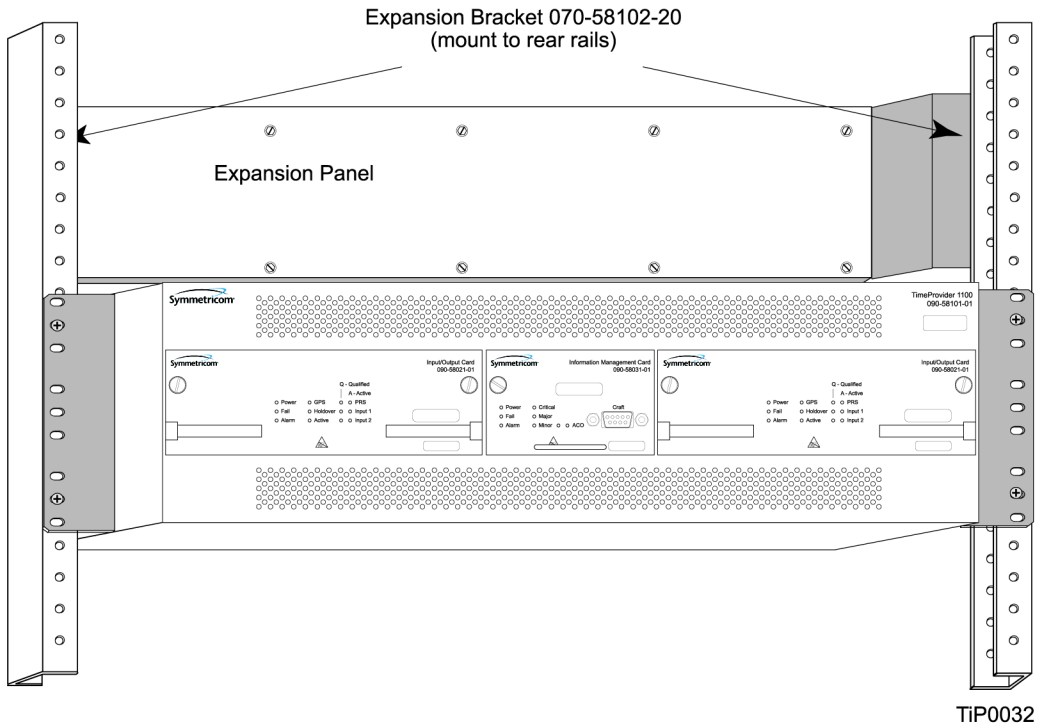
Figure 3-4.   Installing the Model 1100 Shelf and Expansion Panel - 23-inch Rack

Making Connections

Making Ground Connections

Use the procedure in this section for both the main shelf and the Expansion panel. After installing the TimeProvider shelf and/or the Expansion panel into the rack, make the grounding connections as follows.

> **Recommendation:** Although there are a number of methods for connecting the equipment to earth ground, Symmetricom recommends running a cable of the shortest possible length from the ground lug to earth ground.

Front Access Shelf

To connect Chassis Ground on the front access chassis, connect a cable from the frame ground lug on the left side of the front panel to the proper grounding zone or master ground bar.

Rear Access Shelf

To connect Chassis Ground on the rear access shelf, connect a cable from Pin 3 of the power connector to the proper grounding zone or master ground bar.

Expansion Panel

All connections to the Expansion Panel, including chassis ground, are made using the interconnection cable.

Making Power Connections

The TimeProvider front- and rear-access shelves use different types of power connectors. Each shelf is delivered with the appropriate connector and shell.

> **Electrical Shock Caution:** To avoid possible injury from shock, make sure that the fuses are removed from the fuse panel or power supply before connecting or applying power to the unit.

> **Warning:** For continued fire protection, replace power supply fuse(s) with the specified type and a 5 A rating. There are no user-serviceable fuses in the TimeProvider shelf.
>
> This unit must be grounded.
>
> Refer all servicing to qualified personnel.

To install the TimeProvider power connections:

1. Assemble a power connector appropriate for the type of shelf. Table 3-1 lists the pin-out for each type of connector.

   Rear-access shelf: Crimp a No. 16 AWG (minimum) wire (1.31 mm^2) to each pin, then slide the pin into the shell.

   Front-access shelf: Assemble the power connector as shown in Figure 3-6. Solder a No. 16 AWG (minimum) wire (1.31 mm^2) to each pin. Slip the appropriate grommet over the wires, and screw the shell together.

2. Attach the connector to the Power A and Power B connectors on the shelf.

Table 3-1. Power Connections

Model 1100 Rear Access (NEBS) Shelf		Model 1000 Front Access (ETSI) Shelf	
Signal	**Terminal**	**Signal**	**Terminal**
48 Volt Negative Lead	1	Frame Ground	1
48 Volt Positive Lead (return)	2	48 Volt Negative Lead	2
Frame Ground	3	48 Volt Positive Lead (return)	3
Unused	4	–	–

Rear Access Shelf

Pin 1: -48 V DC Battery
Pin 2: -48 V DC RTN
Pin 3: Frame ground
Pin 4: unused

TiP0005

Front Access Shelf

Pin 1: Frame ground
Pin 2: -48 V DC negative lead
Pin 3: Return

TiP0004
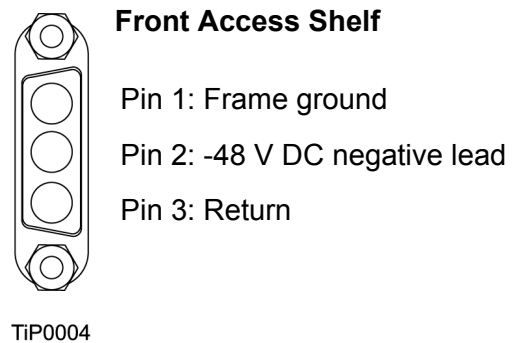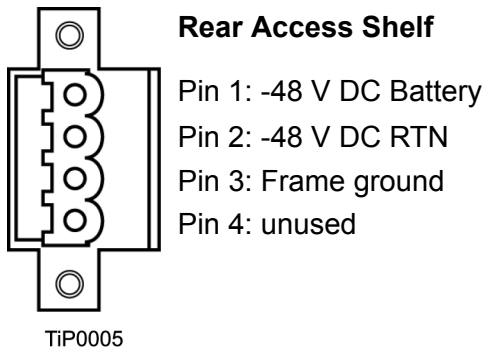
Figure 3-5.   Power Terminal Connectors
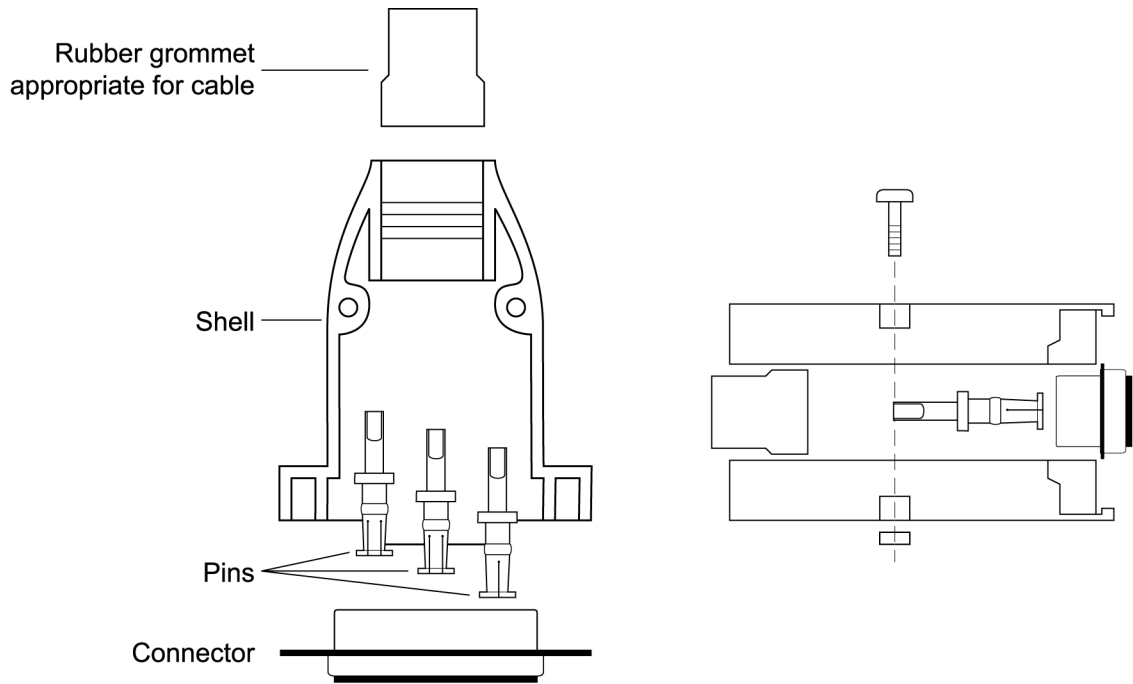
TiP0025

Figure 3-6.   Assembling the ETSI Power Connector

Expansion Panel

All connections to the Expansion Panel, including power, are made using the interconnection cable, part number 060-58002-03.

Verifying Power and Grounding Connections

To verify power and grounding connections:

1. Using a DVM, measure the voltage between pins 1 and 2 on the rear access (NEBS) connector or between pins 2 and 3 of the front access (ETSI) connector.

2. Verify that voltage is –36 to –72 V DC. The inputs are protected against reverse polarity.

Making Input Connections

You connect the input signals to the TimeProvider using one of the Input modules listed in Table 3-2. Connect the Input module to the shelf before you attach cables.

Table 3-2. Input Connector Modules Available for the IOC

Item Number	Description	Alarm Connector	Reference
090-58061-01	BNC Input module	DB-25 (see Table 3-6)	Figure 3-7
090-58061-02	Wire-wrap Input module	Wire-wrap	Figure 3-8
090-58061-03	DB9 Input module	DB-25 (see Table 3-6)	Figure 3-9
090-58061-04	BT43 Input module	DB-25 (see Table 3-6)	Figure 3-10
090-58061-05	Metric (Siemens) 1.0/2.3 Input module	DB-25 (see Table 3-6)	Figure 3-11
090-58061-06	Metric (Siemens) 1.6/5.6 Input module	DB-25 (see Table 3-6)	Figure 3-11

Installing the Input Module
Attach the Input module to the shelf and secure it by tightening the screws on each side of the module.
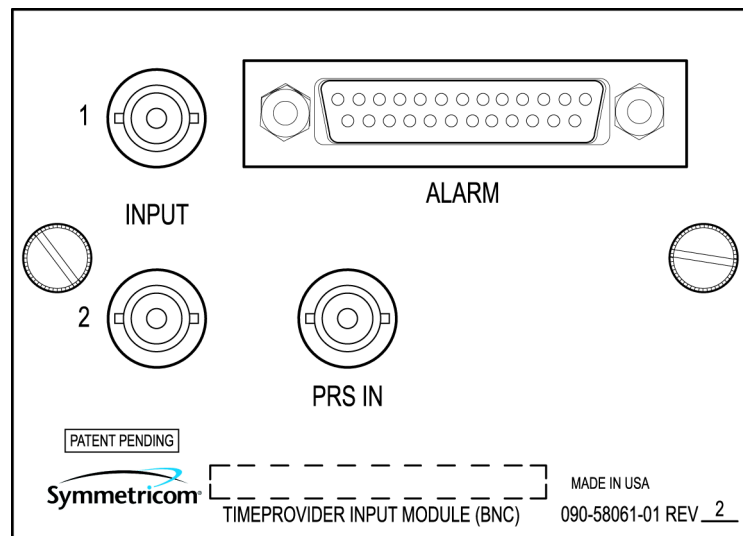
TiP0006

Figure 3-7.   BNC Input Module
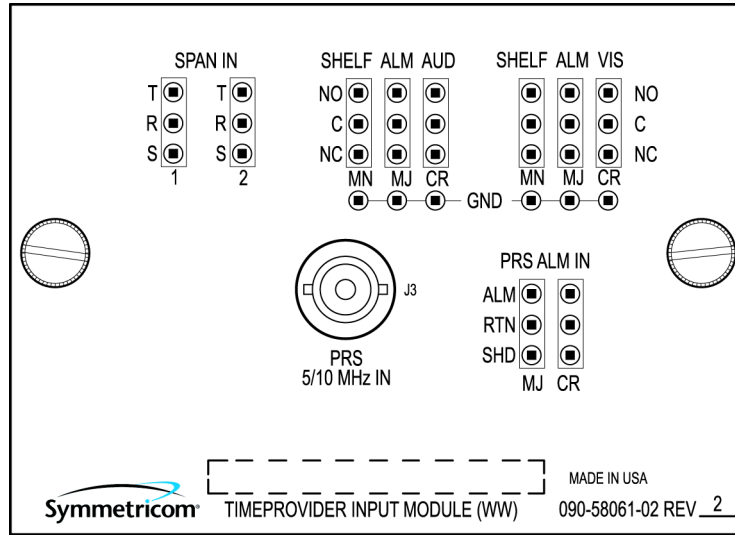
TiP0008

Figure 3-8.   Wire-Wrap Input Module
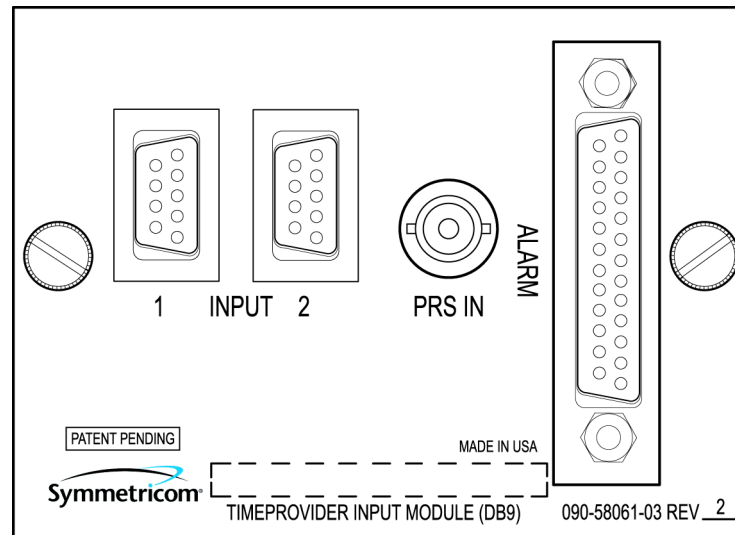
TiP0007

Figure 3-9.   DB9 Input Module

The pinout for the DB9 Input module is shown in Table 3-3.

Table 3-3. Pinout for the DB9 Input Module

Pin	Description
3	Chassis ground
4	Span Input Tip
8	Span Input Ring
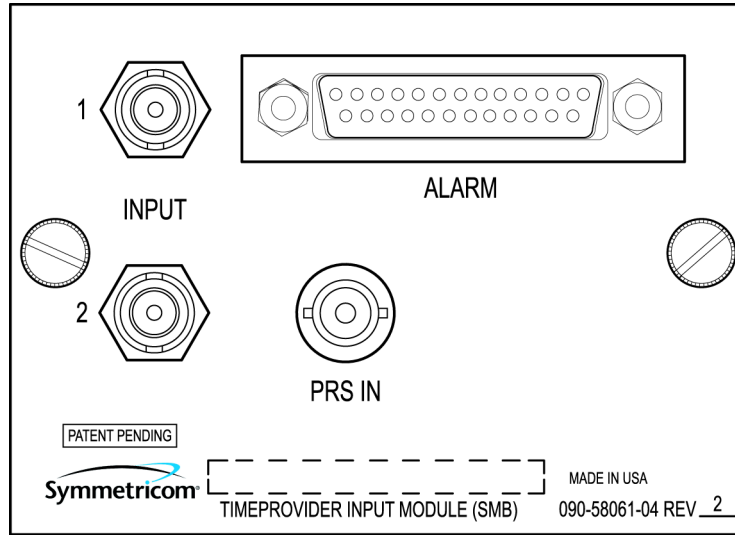
TiP0015

Figure 3-10.   BT43 Input Module
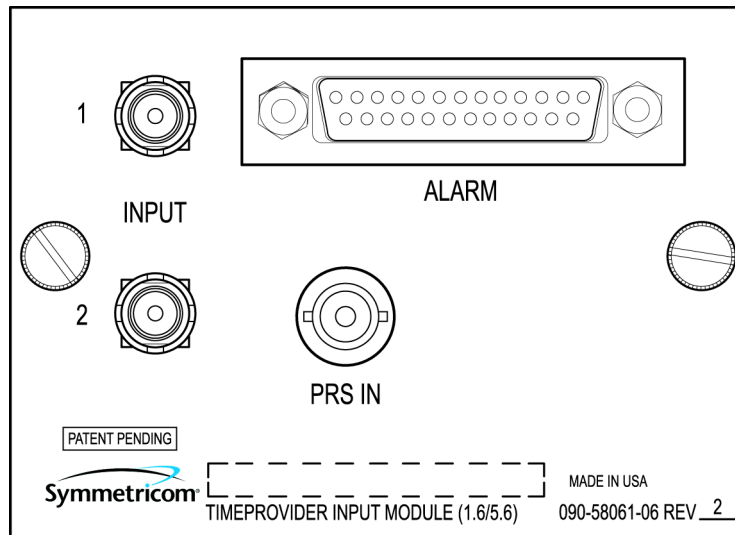
TiP0014

Figure 3-11.   Metric (Siemens) Input Module

Making Output Connections

You make the output signal connections using one of the Output modules listed in Table 3-4. Attach the module to the shelf before you connect cables.

Table 3-4. Output Connector Modules

Item Number	Description	Reference
090-58091-01	BNC Output module	Figure 3-12
090-58091-02	Wire-wrap Output module	Figure 3-12
090-58091-03	DB9 Output module	Figure 3-13
090-58091-04	SMZ/BT43 Output module	Figure 3-13
090-58091-05	Metric (Siemens) 1.0/2.3 Output module	Figure 3-14
090-58091-06	Metric (Siemens) 1.6/5.6 Output module	Figure 3-14
090-58081-02	T1 Retimer Output module (wire-wrap)	Figure 3-14
090-58082-01	E1 Retimer Output module (BNC)	Not shown
090-58082-06	E1 Retimer Output module (Siemens 1.6/5.6)	Not shown

Installing the Output Module
Attach the Output module to the shelf and secure it using the screws at the top and bottom of the module.

Table 3-5 lists the pinout for the DB9 Output module, which is shown in Figure 3-13.

Table 3-5. Pinout for the DB9 Output Module

Pin	Description
1	Port A Tip
2	Port A Ring
4, 5, and 6	Chassis Ground
8	Port B Tip
9	Port B Ring
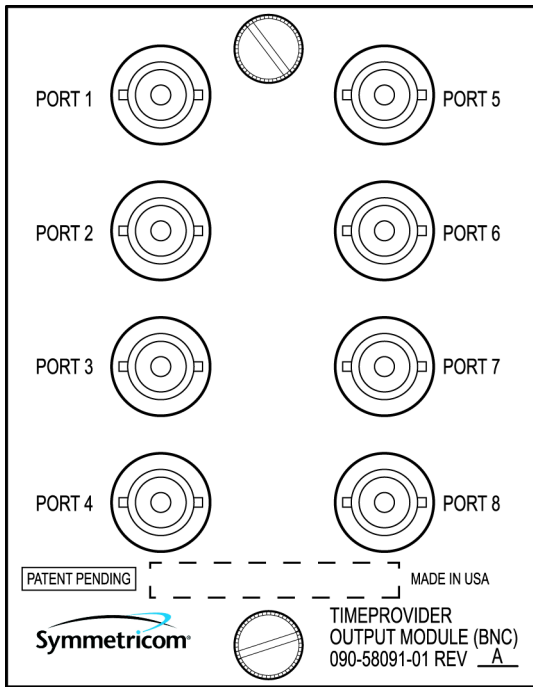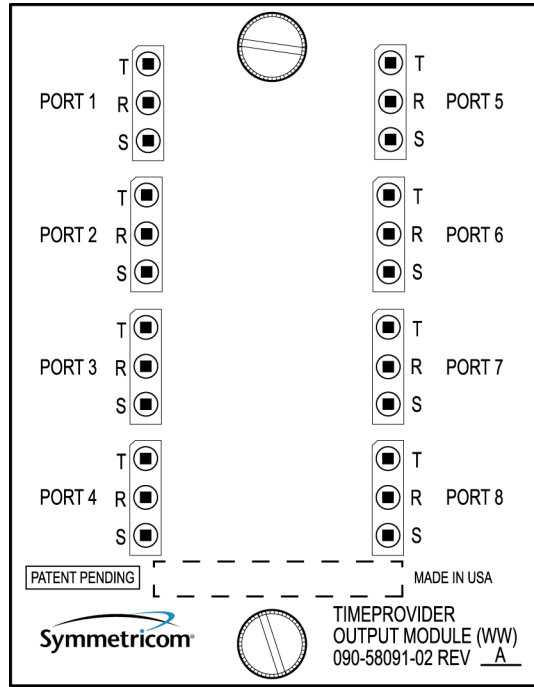
TiP0010   TiP0016

Figure 3-12.   BNC and Wire-Wrap Output Modules
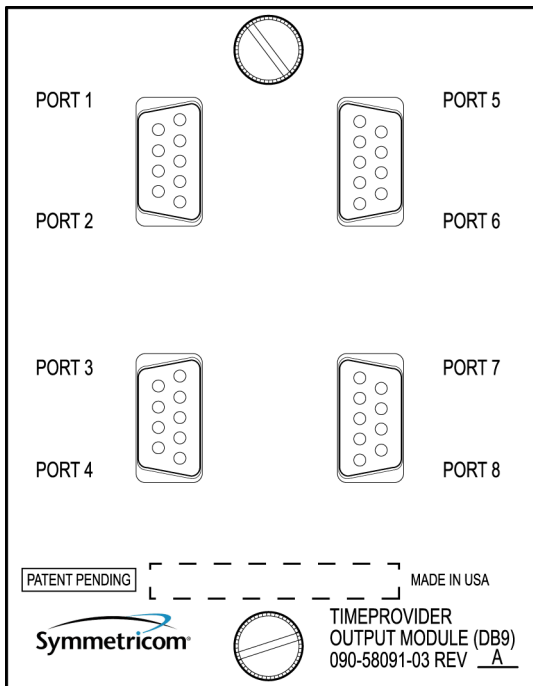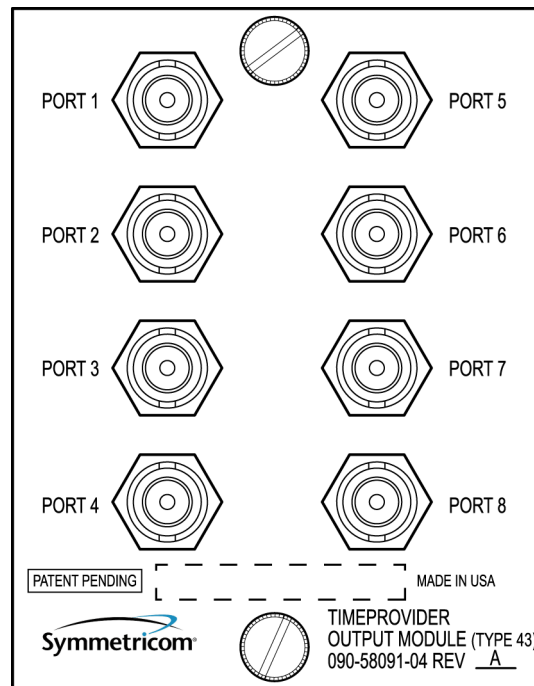
TiP0011   TiP0017

Figure 3-13.   DB9 and BT43 Output Modules

TiP0018   TiP0038
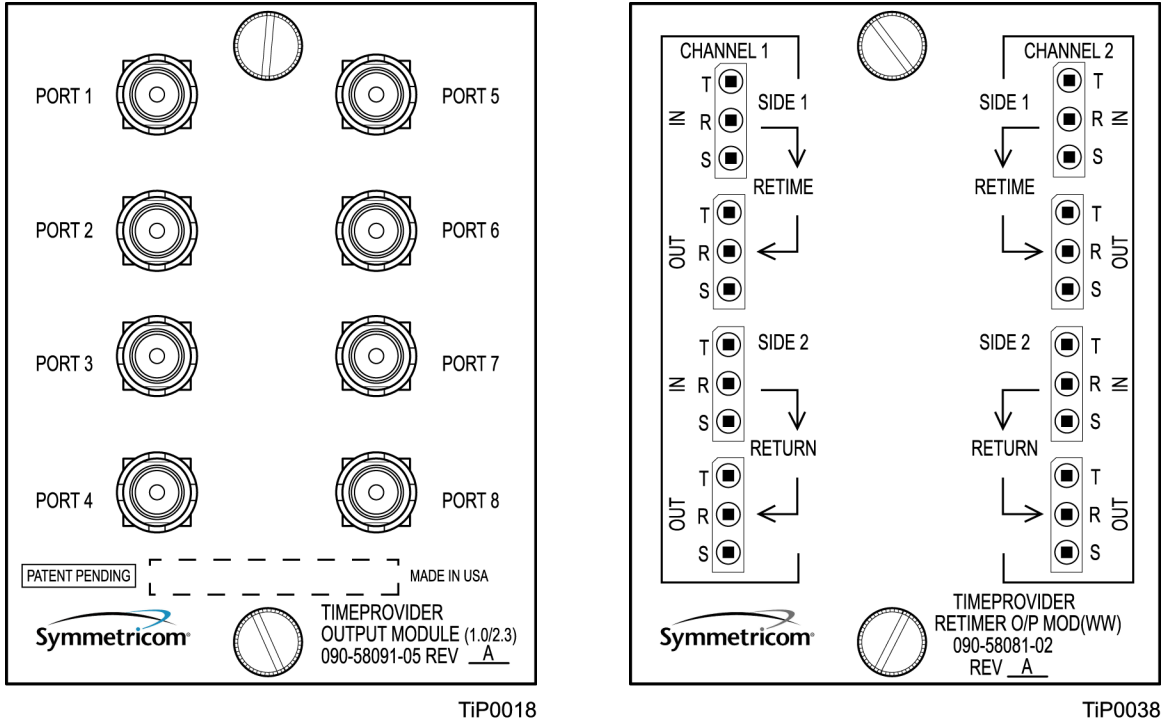
Figure 3-14.   Metric (Siemens) Output Module and T1 Retimer Wirewrap Output Module

Making Retimer Connections

The Retimer module (shown in Figure 3-14) performs reshaping, reamplifying, and retiming on a signal connected to the IN pins on Side 1 (East) and sends that signal to a Network Element (NE) connected to the OUT pins on Side 1. The signal returns from the NE on the IN pins of Side 2, where it is reshaped and reamplified and sent back to the network on the OUT pins of Side 2. Figure 3-15 illustrates how to make connections to Channel 1 of the Retimer module. See Provisioning the Retimer Module, on page 112, for the commands to set up the Retiming module.

You can install a Retimer module only in the TimeProvider main shelf in any of the four Output groups (A, B, C, or D). When you install a Retimer module in any Output group in a main shelf, the corresponding group on the Expansion Panel can be user-programmed to any of the output signal types supported by the TimeProvider. For example, if Group A on the main shelf has the T1 Retimer module installed, then Group A on the Expansion Panel could have a 2.048 MHz analog output. When an output group on the main shelf is used for output signals only (no Retimer module is installed), then the corresponding group on the Expansion Panel has the same output signal as on the main shelf. For example, if Group A on the main shelf has 2.048 MHz outputs then Group A on the Expansion Panel also has 2.048 MHz outputs.
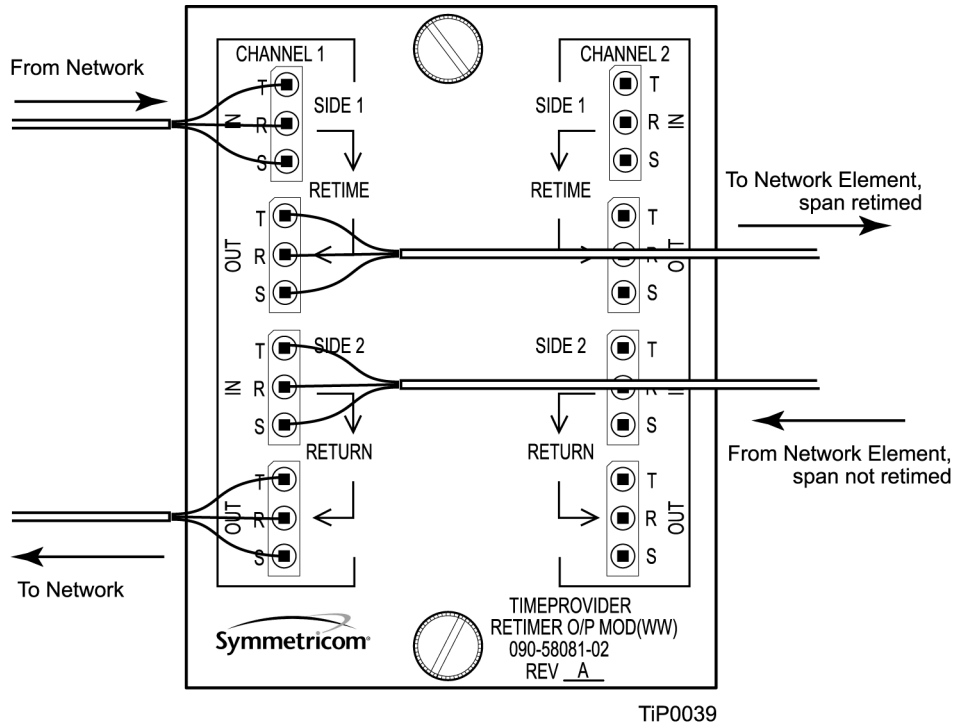
Figure 3-15. Making Retimer Connections

Making Alarm Connections

To install alarm connections on the Input Module, use a customer-supplied DB-25 connector to build an alarm connection to the TimeProvider. Table 3-6 lists the pinout for the DB-25 Alarm connector found on all the Input modules (except the wire wrap version).

Table 3-6. Alarm Connector Pinout

Pin	Description
1	No Connection
2	Minor Normally Closed (NC) Audible
3	Minor Common Audible
4	Minor NC Visual
5	Minor Common Visual
6	Major NC Audible
7	Major Common Audible
8	Major NC Visual
9	Major Common Visual

Table 3-6. Alarm Connector Pinout (Continued)

Pin	Description
10	Critical NC Audible
11	Critical Common Audible
12	Critical NC Visual
13	Critical Common Visual
14	Ground
15	Minor Normally Open (NO) Audible
16	Critical PRS Input NO
17	Minor NO Visual
18	Critical PRS Input Common
19	Major NO Audible
20	Major PRS Input NO
21	Major NO Visual
22	Major PRS Input Common
23	Critical NO Audible
24	No Connection
25	Critical NO Visible

Pin 1 → *Pin 25*
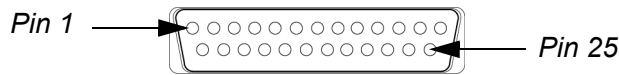
TiP0012

Figure 3-16.   DB-25 Alarm Connector (Front View)

Making GPS Connections

To connect a GPS signal to the TimeProvider, you must install a GPS antenna and the TimeProvider Interface Unit (TPIU) using the procedure in this section.

Installing the GPS Antenna

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

Prior to installing the antenna, the site, antenna location, lightning suppressor location, cable route, and all other details should be planned. Use Figure 3-17 as a guide to locating the antenna.
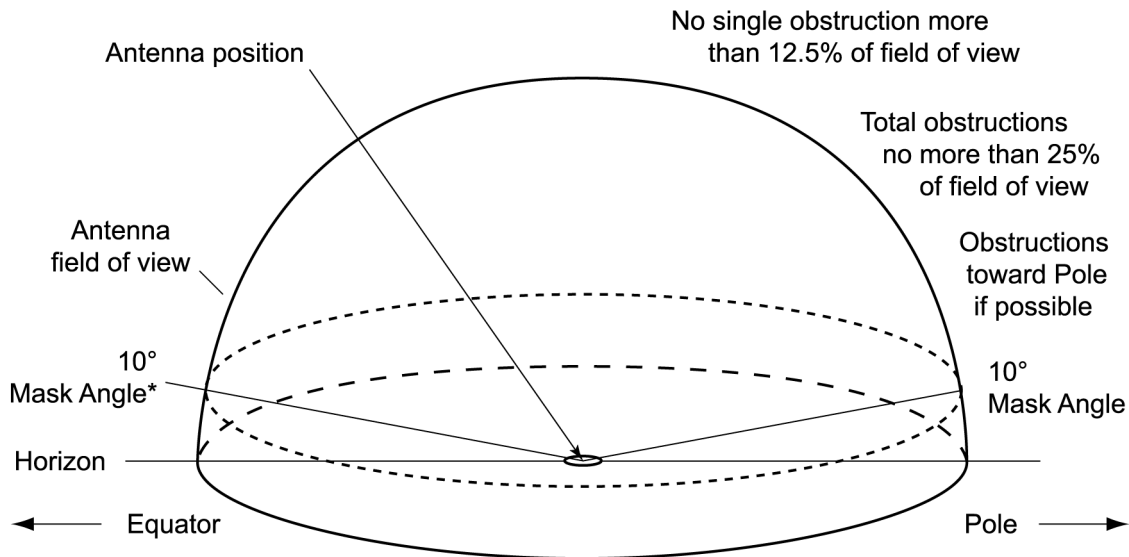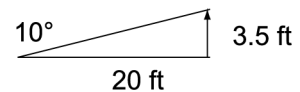
Figure 3-17.   *Locating the GPS Antenna*

To install the antenna, refer to Figure 3-18, and perform the procedure in this section. Ensure all user-supplied materials are available. The minimum distance between the antenna and the shelf is 20 feet (6 m); the maximum distance between the antenna and the shelf is 1000 feet (304 m).

⚠ **Warning:** To prevent arcing, ensure that the lightning suppressor is installed away from electrical devices and cabling.

Note: Use the following antenna installation instructions as a guideline only. Install the antenna using company-approved techniques, and follow all appropriate local building and electrical codes.

Recommendation: The TimeProvider uses an antenna that requires a minimum cable length of 20 feet (6 m) from the antenna to the TPIU. Symmetricom recommends that you adhere to this minimum length requirement to ensure proper antenna operation.

> **Recommendation:** Symmetricom recommends that you use one of the following grounding points:
>
> ■ Valid roof ring ground system.
> ■ Cad weld to building structural steel.
> ■ Central office ground plate within 15 m of antenna cable entrance into building.
>
> Order two cables, or a single cable run can be made from the antenna to the TimeProvider shelf. The cable can then be cut at the lightning suppressor location, and TNC connectors attached to the cut ends of the cable. The "xx" in the part number indicates the cable length.
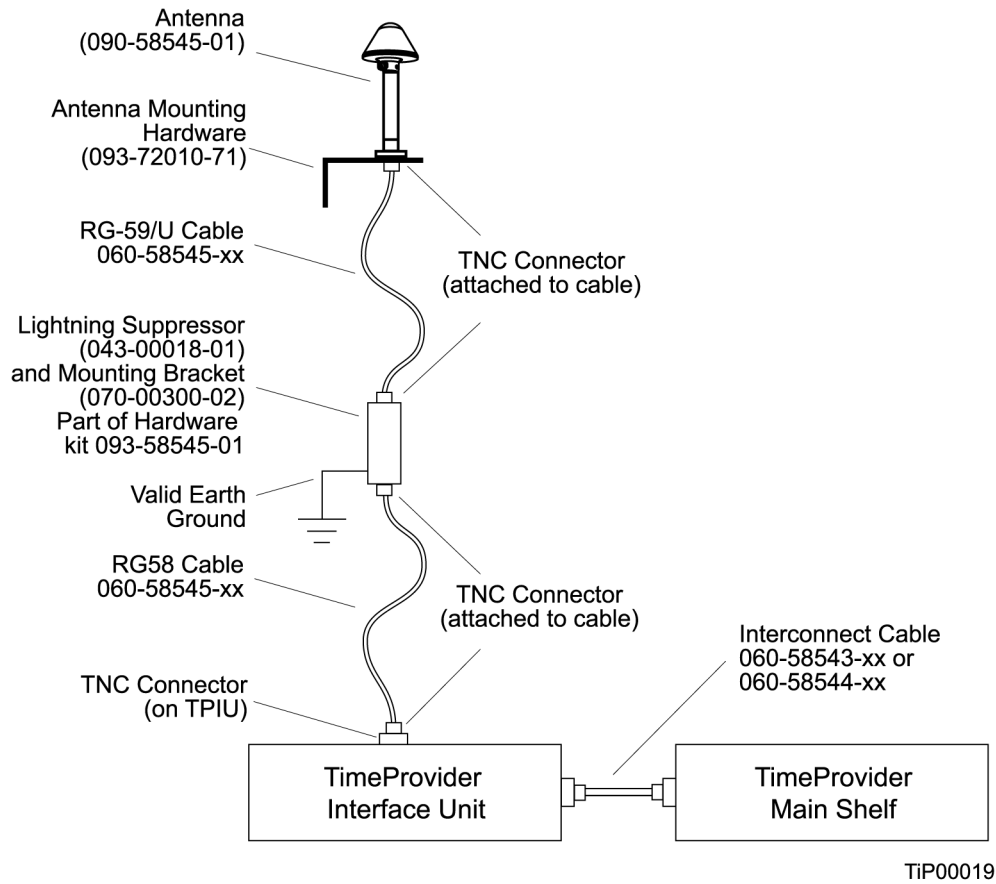
Figure 3-18.   Antenna-to-Shelf Cabling

To install the antenna:

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

    –   If you are mounting the bracket to a pipe, assemble as shown in Figure 3-19. Slide the two V-bolts over the pipe, and through the mounting bracket slots; then place the provided four washers and four nuts over the V-bolts, against the mounting bracket. Leave the V-bolts loose enough to allow for final adjustments.
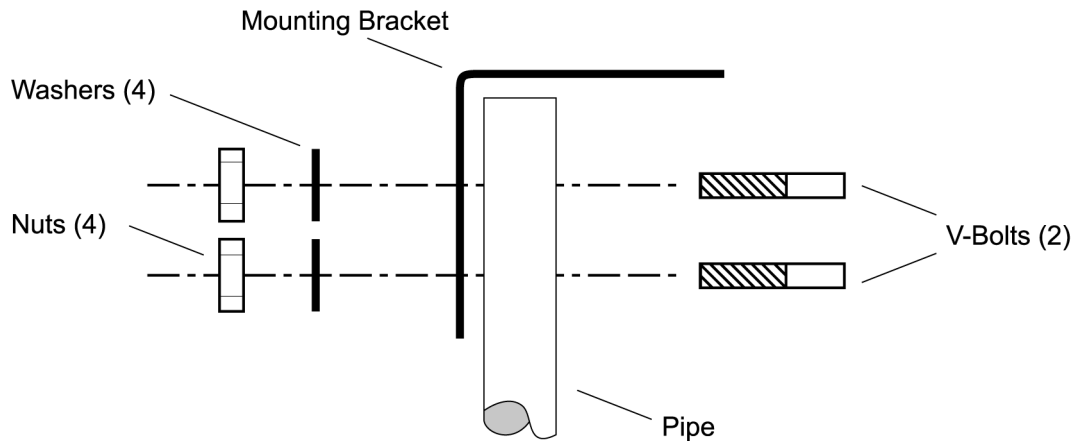
Figure 3-19.   Installing the Antenna Bracket on a Pipe

    –   If you are mounting the bracket to a wood post, assemble as shown in Figure 3-20. Install the provided two self-tapping screws in two diagonally positioned mounting bracket slots, and attach to the post.
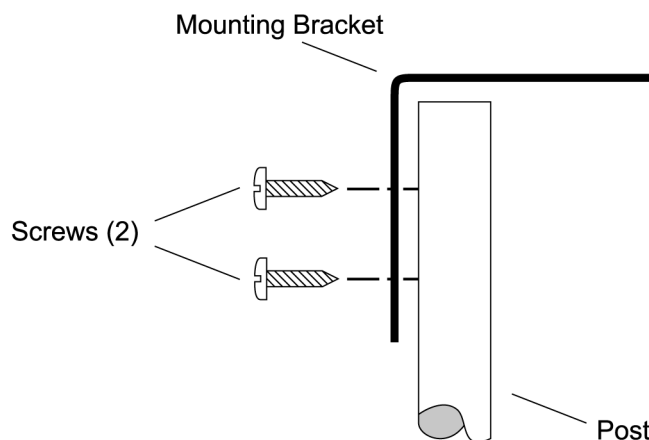
Figure 3-20.   Installing the Antenna Bracket on a Post

Mount the antenna and mast assembly to the "L" bracket.

2. Connect the mast to the flange using PVC glue.

3. Feed an RG58 (060-58545-xx) cable through the bottom of the mast as illustrated. See Table 2-4 for specific cable lengths.

4. Connect the cable to the antenna "pigtail" and pull the cable back through the mast.

5. Mount the antenna to the mast using the supplied shims.

6. Mount the antenna and mast assembly to the "L" bracket using the supplied nuts, bolts, and washers, as shown in Figure 3-21.
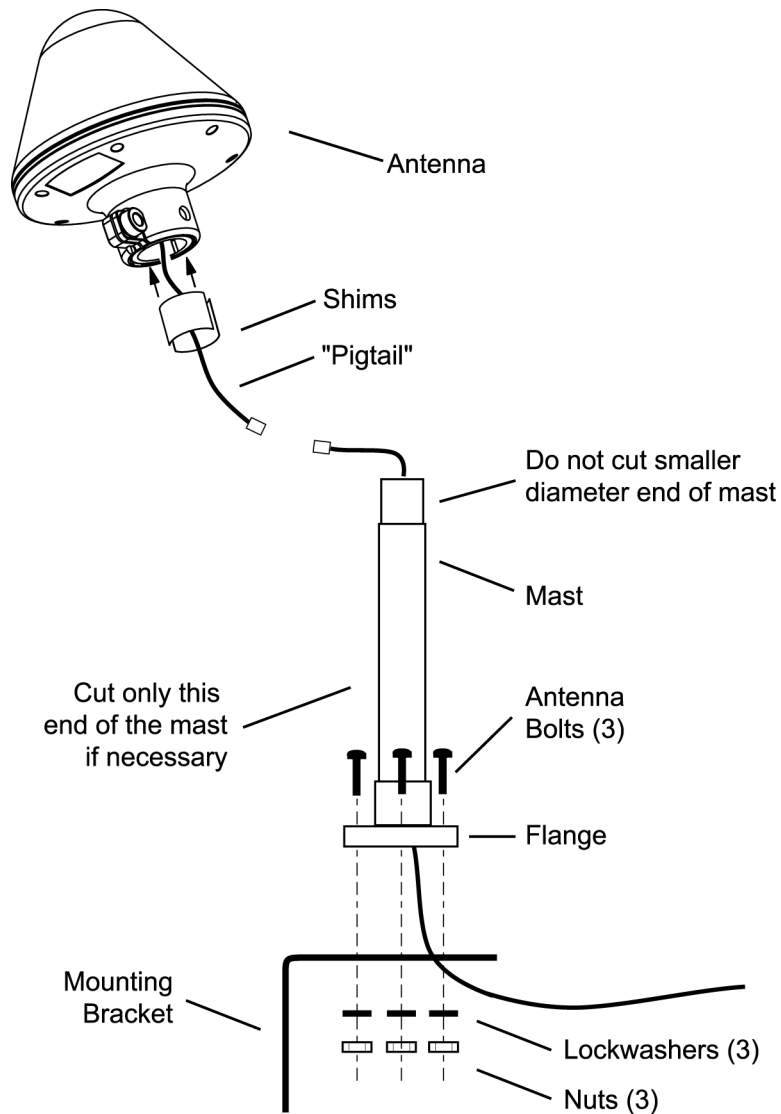
TiP00022

Figure 3-21.   Attaching the Antenna to the Bracket

7. Using a plumb line or bubble level, ensure the antenna is within 5° of vertical (perpendicular to the horizon), and tighten the mounting bracket bolts.

8. Bolt the lightning suppressor mounting plate to a flange that is attached to a valid earth ground. The roof ring ground system, a Central Office grounding plate, and building structural steel are examples of valid earth ground points. If the mounting plate cannot be bolted to a valid earth ground, bolt the mounting plate to a point within 15 feet (4.6 m) of the chosen valid earth ground. If the mounting plate is to be installed in a nonmetallic junction box, perform the installation and bolt the assembly near the chosen valid earth ground.

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

9. Assemble the lightning suppressor as shown in Figure 3-22.
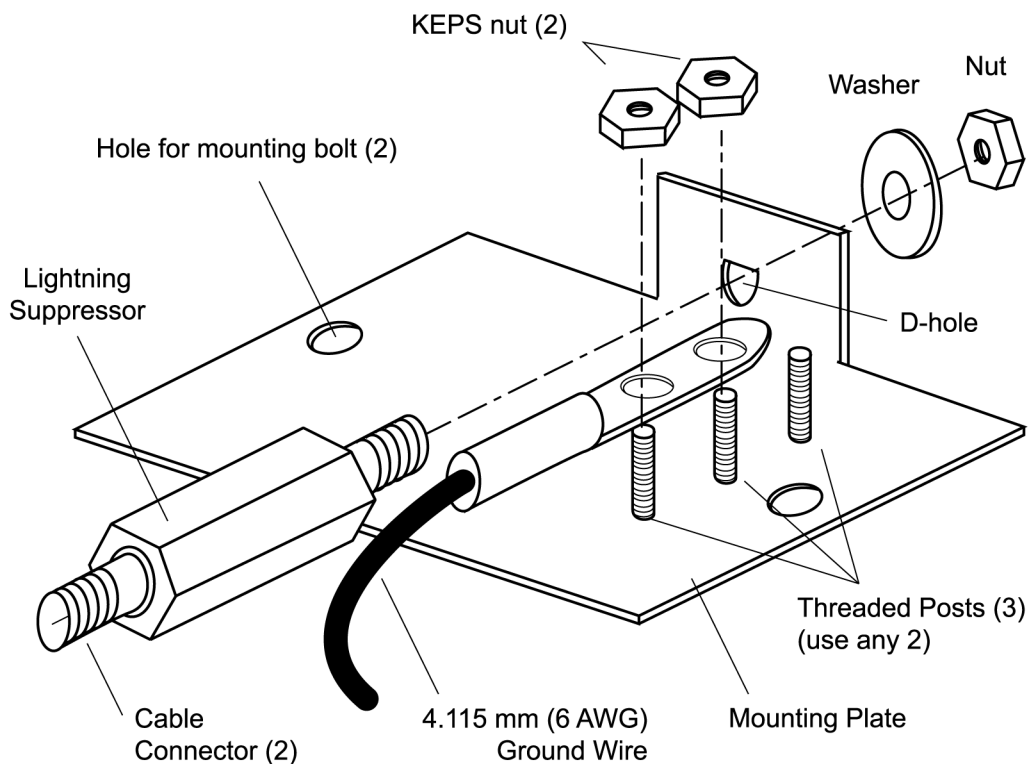
Figure 3-22.   Assembling the Lightning Suppressor

10. Install 1.5 inch (3.8 cm) nonmetallic conduit from the antenna to the lightning suppressor, and from the lightning suppressor to the cable entrance into the building.

11. Install a user-supplied bracket, preferably non-metallic, to support the vertical section of conduit to the antenna.

12. Route the antenna cable through the conduit, and connect the cable to the lightning suppressor. See Table 2-4 for specific cable lengths.

13. If the lightning suppressor is not mounted directly to a valid earth ground, crimp a length of 4.115 mm (6 AWG) ground cable to the two-hole terminal, slide the terminal over two of the three threaded posts on the lightning suppressor mounting plate, and attach the terminal to the mounting plate with two KEPS nuts. Use the two posts that allow the least bending of the cable.

14. Connect an RG58 (060-58545-xx) cable between the lightning suppressor and the TPIU. See Table 2-4 for specific cable lengths.

15. Install fire-stopping material in all holes opened in the roof and/or walls during this procedure.

16. Check all connections for tightness to prevent arcing and intermittent operation.

17. Coat all exposed connectors with an electrically conductive antioxidant compound (e.g. Kopr-Shield spray).

Installing the TPIU

You mount the TPIU on a rack near the TimeProvider main shelf. Symmetricom supplies the connecting cable (060-58543-xx or 060-58544-xx) in several lengths, as listed in Table 2-4. The Integrated GPS Antenna kit (990-58545-01 or 990-58545-02). Mount the TPIU to the rear rails of the rack using the provided rack ears. Install the TPIU so that the front panel is on the same side as the Output modules. Figure 3-23 and Figure 3-24 illustrate alternate mounting schemes.

To connect the TPIU to the shelf, attach the DB15 interconnect cable (060-58543-03 or 060-58544-03) to the connector labeled "GPS" on the TimeProvider shelf. This connector is on the front panel of the Model 1000 and on the rear panel of the Model 1100. Connect the other end of the cable to the DB15 connector on the TPIU.

To use the GPS signal, set the TimeProvider to the PRR mode, as described in Provisioning the IOC, on page 96, or enable the GPS input when in SSU mode.
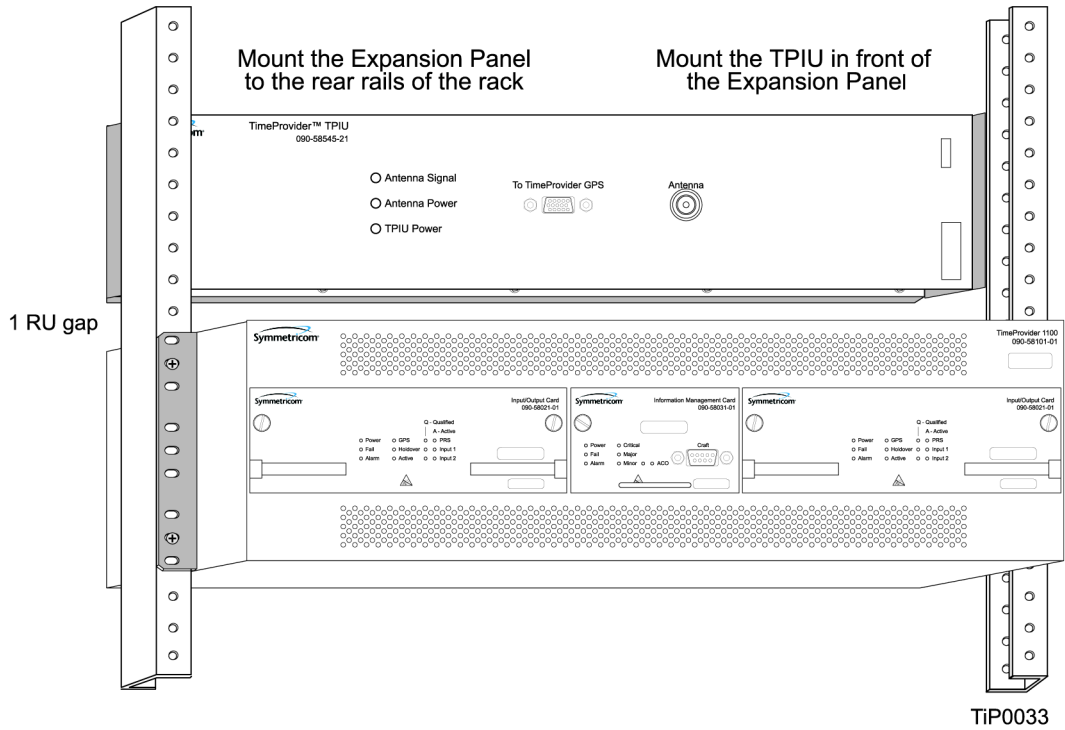
Figure 3-23.   Mounting the TPIU and Expansion Panel on the Same Rack Ears
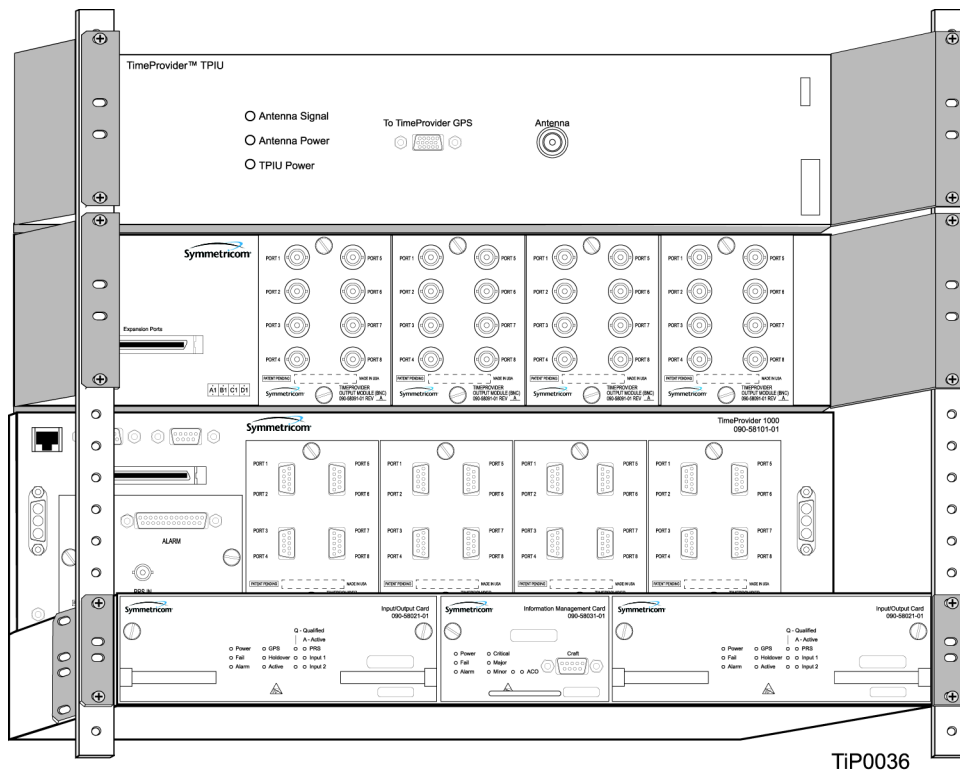
Figure 3-24.   Mounting the TPIU with a Model 1000 ETSI-Style Shelf

Making Communications Connections

The Time Provider has one Ethernet and two serial ports available. The Ethernet connector is on the front panel of the Front Access shelf and on the rear panel of the Rear Access shelf; the local Craft serial port is on the faceplate of the IMC, and the Remote port is on the shelf.

The local Craft serial port is used for control and monitoring of the unit, and is configured as a DCE device. The Remote port can be used for remote dial-in connection to the unit, and is configured as a DTE device.

Connecting to the Local Craft and Remote Serial Ports

To connect a device to the local Craft or the Remote serial port, perform the following steps:

1. Connect a 9-pin serial cable to the desired port.

2. Connect the other end of the cable to the serial port of the PC or terminal device. Use the procedure described in Starting the TimeProvider for the First Time, on page 82, to connect to the TimeProvider.

The default settings for the local Craft serial port are DCE, 9600 Baud, 8 bits, no parity, 1 stop bit, echo on, and handshaking disabled. Table 3-7 lists the signal connections for the serial ports.

Table 3-7. Connector Pinouts for the Serial Ports

Local Craft Connector		Remote Connector	
Signal	**Pin**	**Signal**	**Pin**
Local CD	1	CD	1
Local RD (Received Data)	2	RD	3
Local TD (Transmitted Data)	3	TD	2
Local DTR (Data Terminal Ready)	4	DTR	6
Ground	5	GND	5
Local DSR (Data Set Ready)	6	DCE	4
Local RTS (Request to Send)	7	RTS	8
Local CTS (Clear to Send)	8	CTS	7
Local RT	9	RT	9

The default settings for the Remote serial port are DTE, 9600 Baud, 8 bits, 1 stop bit, no parity (also known as 8-1-N), echo on, and handshaking disabled. The local port settings revert to factory default values when you reset the IMC.

Changing Communications Settings

To change the communication settings for the local or remote serial ports:

1. Connect a PC or laptop with terminal emulation software, such as Windows[®] Hilgraeve HyperTerminal[©] or ProComm Plus[™] to the port and log in. For a complete description of this procedure, see Setting Communications Parameters, on page 86.

2. Use the ED-EQPT command to change the communications settings for the port as required. See Setting Communications Parameters, on page 86, and also refer to the *TimeProvider TL1 Reference Guide* for a description of TL1 commands.

Installing Connections to the Ethernet Port

You can connect a PC or terminal to the TimeProvider using the LAN connector for local monitoring or control, or you can connect the TimeProvider to a network for monitoring and control from a remote site.

> **Note:** The TimeProvider can be controlled through a TCP/IP network connection, but before you can use it, you must configure the Ethernet settings using a serial connection. Refer to Setting Ethernet Parameters, on page 88.

Direct Ethernet Connection

You use a direct Ethernet connection when a service technician is on-site. You must configure the Ethernet settings using TL1 commands over a serial connection before you can use the Ethernet connection. Use the direct connection to troubleshoot a LAN connection.

To connect the TimeProvider to a PC or terminal, perform the following steps:

1. Connect an RJ-45 Ethernet cable to the LAN connector on the shelf.

2. Connect the other end of the cable to the PC or terminal.

3. Start a terminal emulation program such as HyperTerminal or ProComm Plus. Configure the program for a telnet session and enter the IP address of the TimeProvider. Use Port 5000 to connect.

4. Type ; (semicolon). If the TimeProvider responds with a Deny response, you have established communications. If you do not receive the Deny response, check the connections, the cable, and the program settings.

Network Connection

You can use a network connection for routine monitoring and control of the TimeProvider from a remote site. Perform the following steps to connect the TimeProvider to a network.

1. Connect one end of an RJ45 cable to the LAN outlet. Connect the other end of the cable to the LAN connector on the TimeProvider.

2. To connect the PC or laptop to the LAN, connect one end of the RJ-45 cable to the Ethernet port of the PC or laptop. Connect the other end of the cable to the LAN outlet.

3. Use a remote monitoring software application such as SynCraft or TimePictra to connect to and monitor the TimeProvider. See Appendix B, CRAFT Software Reference, for more information on installing and using SynCraft.

Table 3-8 lists the Ethernet communications port signal connections.

Table 3-8. Ethernet Communications Port Signal Connections

Name	Pin
TX+ (Positive Side of Transmitted Data)	1
TX- (Negative Side of Transmitted Data)	2
RX+ (Positive Side of Received Data)	3
Not Used	4
Not Used	5
RX- (Negative Side of Received Data)	6
Not Used	7
Not Used	8

Installation Check List

To verify that the installation of the TimeProvider is complete, perform the following checks and procedures in Table 3-9.

Table 3-9. Installation Completeness Checklist

Operation/Indication	Complete
Verify that all power and ground wires are installed correctly and securely.	
Verify that all communications cables are properly installed.	
Verify that all input and output cables are properly installed.	

Powering Up the Shelf

There is no power switch on the TimeProvider. When you apply power to the unit, it enters the warm-up state. See Starting the TimeProvider for the First Time, on page 82, for more information on powering up the shelf.

Working With Cards

This section describes how to install, remove, and handle the cards associated with the TimeProvider.

Properly Handling Cards

When handling any of the cards, observe the following precautions:

1. Use proper static control precautions when handling cards! Protect the equipment against ESD (electrostatic discharge) by using a grounded protective wrist strap and normal equipment grounding.

2. Avoid touching component leads and edge connectors.

3. Avoid placing the card on an ungrounded surface.

4. Avoid allowing the card to come in contact with insulated surfaces.

Inserting Cards

This procedure is common for all cards.

> **Note:** Cards can be removed and inserted while system power is supplied without damaging modules; however, system performance may be affected.

> **Caution:** For continued EMC compliance, replace all deformed module gaskets with the same type. Clean gaskets and mating surfaces. Secure all cards with captive screws.

To insert a card into the shelf:

1. Align the card edges within the guides of the selected slot.

2. Slide the card into the chassis and press firmly until it seats fully into its backplane edge connector.

3. Tighten the captive screws located on each side of the panel.

> **Caution:** To avoid possible damage or intermittent failures, ensure that you have completely inserted the card into the chassis and that you have securely tightened the captive screws.

Removing Cards

To remove an IOC, lift the tabs on the front panel and slide it out of the shelf. Be sure to place the card on a static-free surface.

To remove the IMC, Input, or Output modules, loosen and then pull out on the captive screws.

Firmware Features

Table 3-10 describes the features provided in recent releases of the operating firmware for the IOC and IMC.

Table 3-10. Firmware Feature Matrix

IMC Release	IOC Release	Features Added
1.01.04	1.01.02	■ E1/T1/2.048 MHz signals ■ Quartz IOC ■ SSMs
1.02.01	1.02.12	■ GPS ■ Rubidium IOC ■ Japanese input/output signals ■ Composite Clock signals
1.03.03	1.03.04	■ T1 Retimer ■ Input/output port labeling ■ Enhanced event log management

Each higher firmware revision includes support of the features from prior releases.

Chapter 4 Provisioning the TimeProvider

This chapter describes the procedures for provisioning the TimeProvider and the available Expansion Panel. Use the procedures in this chapter after you have installed the TimeProvider (see Chapter 3, Installing the TimeProvider).

For detailed information on the syntax and format for each available TL1 command, refer to the *TimeProvider TL1 Reference Guide*, part number 097-58001-01.

In This Chapter

- TL1 Overview
- Starting the TimeProvider for the First Time
- Setting Communications Parameters
- Defining the Security Parameters
- Managing the User List
- Provisioning the IOC
- Provisioning the Input Reference
- Provisioning the Outputs
- Provisioning Alarms
- System Commands
- Saving Provisioning Data

TL1 Overview

The TimeProvider uses the TL1 syntax; this chapter and the *TimeProvider TL1 Reference Guide* describes command lines and responses. For a complete description of the TL1 syntax, refer to Telcordia (Bellcore) Technical Reference TR-NWT-00831 and TR-NWT-00833.

TL1 Command Structure

The TL1 commands you issue to the TimeProvider use the following structure:

```
verb-modifier:|tid|:|aid|:[<ctag>]::|<keyword>|=<value||;
```

where:
: (colon) is a block separator
, (comma) is a parameter field separator
; (semicolon) is the terminating character for commands and responses
[ ] (square brackets) indicate optional parameters

Adjacent colons indicate unused fields. If an unused field is the last parameter in the list, for example the general block or the parameter block, you can omit the colon and simply type the semicolon.

If you enter a space in the command string, the TimeProvider ignores it.

TL1 commands are not case-sensitive.

Table 4-1 describes the syntax used in this manual.

Table 4-1. TL1 Syntax Conventions

Symbol	Description
^	Space character (ASCII 0x20)
<cr>	Carriage return (ASCII 0x0D)
<lf>	Line feed (ASCII 0x0A)
[...]	Optional command parameter or data
< ... >	ASCII characters sent in commands or returned in response
(...)	Numeric data that can be positive or negative

TL1 Response Format

Normal Response

For each TL1 command described in this chapter there is a normal response, an in-process response, or an error response. The TimeProvider response is always upper-case. The format of a normal response is:

```
<cr><lf><lf>
^^^sid^date^time<cr><lf>
M ^ctag^COMPLD<cr><lf>
;
```

The time and date is in the Telcordia GR-833 format. A sample normal response is:

```
    TIMEPROVIDER 03-08-28 11:23:54
M 1 COMPLD
;
```

In-Process Response

The TimeProvider sends an in-process response only if it cannot respond to the command within two seconds. The response terminates with a less-than character (<) with no semicolon until after the TimeProvider sends the requested output response message. The format of the in-process message is:

```
<cr><lf><lf>
^^^sid^date^time<cr><lf>
IP^ctag<cr><lf>
<
```

A sample in-process response is:

```
    TIMEPROVIDER 03-08-28 11:24:15
IP^2
<
```

Error Response

If you mis-type a command or issue an invalid command, the TimeProvider sends an error message. The format of the error response is:

```
<cr><lf><lf>
^^^sid^date^time<cr><lf>
M ^ctag^DENY<cr><lf>
^^^<errcde><cr><lf>
;
```

A sample error message is shown below:

```
    TIMEPROVIDER 08-28-03 11:32:12
M 3 DENY
    ICNV
;
```

The TL1 command may generate an event message specific to the command. This event message accompanies the command description in this chapter.

Autonomous Messages

In addition to the TL1 response messages described in the above sections, the TimeProvider returns Autonomous Messages to report alarms, configuration changes, or condition changes. Frequently, an Autonomous Message is returned at approximately the same time as the TL1 response message that is associated with a command, because the command happens to change the unit's state. Autonomous Messages are not directly correlated with commands, and therefore they do not contain a correlation tag (ctag).

The TimeProvider can generate an Autonomous Message at any time, whether to report that a user-initiated change has occurred, to report that an active alarm condition exists, or to report that an alarm has been cleared. The format of the Autonomous message is as follows; note that the text REPT identifies the response as a Autonomous Message.

```
<cr><lf><lf>
   sid date time <cr><lf>
almcde atag REPT reptype aidtype<cr><lf>
  aid,aditype:ntfcncde,condtype,srveff,ocrdat,ocrtim:condscr
"<cr><lf>
;
```

Refer to the *TimeProvider TL1 Reference Guide* for more information on Autonomous Messages.

Starting the TimeProvider for the First Time

The TimeProvider is delivered with a copy of SynCraft, Symmetricom's network management application. Before you can use SynCraft or other network management software, you *must* provision the following parameters, as described in this section and in Setting Communications Parameters, on page 86:

- Security-level user
- Source ID (sid)
- Date and time
- Serial communications parameters
- Ethernet parameters

Appendix B, CRAFT Software Reference, provides procedures and instructions to get started using the SynCraft application.

Powering Up the TimeProvider

To power up the TimeProvider, perform one of the following tasks, as appropriate:

- Connect the power leads from the power supply (see Making Power Connections, on page 54)

- Install the fuse in the fuse panel

- Turn on the power supply

LED Indications on Power-up

The LEDs on the IMC, IOC, and TPIU (if present) illuminate in the following sequence:

The LEDs on the TPIU remain off until the Master shelf has completed its power-on testing and the GPS input has been enabled. The TPIU and Antenna Power LEDs light green and the Antenna Signal LED lights red. When the Master shelf completes its power-on testing, the Antenna Signal LED lights green, indicating that the TPIU is receiving a valid signal from the antenna.

Logging In for the First Time

To log in to the TimeProvider for the first time:

1. Connect a straight-through serial cable to the local Craft port. Connect the other end of the cable to a computer.

2. Start a terminal emulation program such as HyperTerminal or ProComm Plus. Configure the program for 9600 baud, 8 data bits, No parity, and 1 stop bit.

3. Type ; (semicolon). If the TimeProvider responds with a Deny response, you have established communications. If you do not receive the Deny response, check the connections, the cable, and the program settings.

Defining a User at the Security Access Level

Recommendation: To avoid a possible service call to unlock the TimeProvider, Symmetricom recommends that you enable the security feature by defining a user at the Security access level.

TimeProvider Access Levels

The security measures built into the TimeProvider are based on a list of users authorized to access the unit. Each user has their own password and is assigned to one of the following access levels: NONE, USER, ADMIN, or SECURITY. Users can issue the TL1 commands available at their access level. Managing the User List, on page 90, describes how to manage the user list.

If you do not define a Security-level user, the security features are not enabled and an unauthorized user could gain access to the TimeProvider and compromise the security of your network.

If you define a user at a level other than Security *before* you define a Security-level user, you cannot execute Security-level commands. You will need to contact Symmetricom Global Services to correct this problem.

Recommendation: Symmetricom recommends that you record and store the Security-level user's name and password in a secure location.

Adding a User at the Security Access Level

To define a user at the Security access level, issue the following TL1 command:

> ### *Sample Command*
> ```
> ENT-USER-SECU::DEPTHEAD:TS1000::"TP01!",SECURITY;
> ```

This sample command creates a user with the name DEPTHEAD and a password of TP01!; this user is at the Security access level. See Adding a User, on page 92, for more information on the ENT-USER-SECU command.

> ### *Autonomous Message*
> ```
>     TP-SSU 03-05-15 09:59:09
> A 1166 REPT EVT
>     "IMC:NA,USRADD,NSA,03-05-15,09-59-09:\"USER HAS BEEN
> ADDED\""
> ;
> ```

Logging In

You can now log in using the ACT-USER command and the new user name and password to continue with the provisioning process.

> ### *Sample Command*
> ```
> ACT-USER::DEPTHEAD:TS1000::TP01!;
> ```

> ### *Normal Response*
> ```
>     TP-SSU 03-05-15 09:59:15
> M  TS1000 COMPLD
> ;
> ```

Users with the Security access level can issue any of the TL1 commands described in this chapter and in the *TimeProvider TL1 Reference Guide*.

Setting the Source ID <sid>

Use the SET-SID command to set the name of the TimeProvider. This name appears in normal and error response messages sent by the unit.

```
SET-SID:[<tid>]::[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<keyword>	<value>	Description	Default value
SIDCHG	Up to 20 alphanumeric characters. Do not use the " character.	Sets the Source Identifier	N/A

Sample Command

```
SET-SID:::TS1000::SIDCHG=TP-SSU;
```

This sample command sets the <sid> to TP-SSU. All response messages are identified by this name. Symmetricom recommends that you use unique names for each TimeProvider in the network. Record the name you chose for the TimeProvider in Table 4-3.

If you include the _ character in the <value>, then the TimeProvider returns the SID in quote marks.

Autonomous Message

```
   TP-SSU 03-05-15,10:02:03
A 1167 REPT EVT
   "IMC,EQPT:NA,SIDCHG,NSA,03-05-15,10-02-03:\"SYSTEM'S
SOURCE ID HAS CHANGED,TP-SSU\""
   ;
```

Setting the Date and Time

Use the following TL1 command to set the date and time in the IMC.

```
ED-DAT:[<tid>]:[<aid>]:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description
SYS	DATCHG <yy-mm-dd>	yy = <year> mm = 01 to 12 dd = 01 to 31	2-digit year Month Day
	TIMCHG (hh-mm-ss)	hh = 00 to 23 mm = 00 to 59 ss = 00 to 59	Hour of Day Minutes Seconds
	LOCTIM (±hh-mm)	±hh = 00 to 12 mm = 00 to 59	Time in hours and minutes that local time is offset from UTC.

Sample Command

```
ED-DAT::SYS:TS1000::DATCHG=03-10-24;
```

Autonomous Message

```
    TP-SSU 03-10-24 10:08:28
A 1168 REPT EVT
    SYS,EQPT:NA,DATCHG,NSA,03-10-24,10-08-28:\"SYSTEM DATE
HAS CHANGED,2003-10-24\""
;
```

Setting Communications Parameters

If you want to change the communications parameter values, use the ED-EQPT command. The following sections describe the commands for performing each individual task. For detailed information on the ED-EQPT command, see the *TimeProvider TL1 Reference Guide*. Record the values you provision in Table 4-3.

Setting RS-232 Parameters

This section describes how to set the baud rate, the handshaking mode, and echo modes on the local and remote ports.

Setting the Baud Rate

Use the ED-EQPT command to provision the baud rate on the Local or Remote port.

```
    ED-EQPT:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
COMp p = L | R			Communications ports L = Local R = Remote	
	BAUD	2400 | 9600 | 19200 | 28800 | 38400 | 57600	Baud rate	9600

Sample Command

```
    ED-EQPT::COML:TS1000::BAUD=9600;
```

This command sets the local Craft communications port to 9600 baud.

Normal Response

```
    TIMEPROVIDER 03-10-24 10:10:25
M   TS1000 COMPLD
;
```

Setting the Handshaking (Flow) Mode

Use the ED-EQPT command to provision the handshaking mode on the local Craft or Remote port to None, Hardware, Software, or Hardware/Software.

```
ED-EQPT:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
COMp p = L | R			Communications ports	
	FLOW	NONE | SW | HW | SWHW	Flow control	NONE

Sample Command
```
ED-EQPT::COML:TS1000::FLOW=HW;
```

Normal Response
```
   TIMEPROVIDER 03-10-24 10:12:33
M  TS1000 COMPLD
;
```

Setting the Echo Mode

Use the ED-EQPT command to provision the echo mode on the local Craft or Remote port to On or Off. When set to ENABLE, characters you type at the keyboard also appear on the monitor. If one keystroke generates two characters on the monitor, set this parameter to DISABLE.

You can also use this command to echo the <tid> in the response from the TimeProvider.

```
ED-EQPT:[<tid>]:<aid>:[<ctag>]::<keyword>[=<value>];
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
COMp p = L | R			Communications ports	
	ECHO	ENABLE | DISABLE	Input echo	DISABLE
	TIDQUIET	ENABLE | DISABLE	Enables or disables the echo of the <tid>. This is a session setting.	DISABLE

Sample Command
```
ED-EQPT::COML:TS1000::ECHO=ENABLE;
```

Normal Response
```
    TIMEPROVIDER 03-10-24 10:15:04
M   TS1000 COMPLD
;
```

Setting Ethernet Parameters

Before you can begin using the Ethernet port, you *must* provision the addresses using the local Craft or Remote serial port.

If you are not planning to use the Ethernet port, you do not have to provision the parameters in this section.

Setting the IP Addresses

Use the ED-EQPT command to provision the following IP addresses for the TimeProvider:

- IP Gate address

- IP address

- IP Subnet address

You can also use this command to echo the <tid> in the response from the TimeProvider.

```
    ED-EQPT:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default
COMI			Comms ports	
	IPGATE	1.0.0.1 254.255.255.254	IP address of the default gateway	127.0.0.1
	IPADDR	1.0.0.1 254.255.255.254	IP address of the Network Element	127.0.0.1
	IPSUBNET	1.0.0.1 255.255.255.254	IP address of the Network Element	255.255. 255.0
	TIDQUIET	ENABLE | DISABLE	Enables or disables the echo of the <tid>. This is a session setting.	DISABLE

Sample Command
```
    ED-EQPT::COMI:TS1000::IPGATE=127.0.0.1;
```

This command sets the IP Gate address to 127.0.0.1. Use an appropriate gateway address for your network, and record the address in Table 4-3.

Autonomous Message
```
    TP-SSU 03-10-24 10:15:04
A 1169 REPT EVT
    "COMI:NA,IPGATE,NSA,03-10-24 10-15-04:\"IP GATE ADDRESS
HAS CHANGED\""
;
```

Checking Communication Links

Two commands allow you to check the communication links from a computer or network to the TimeProvider: PING and RTRV-HDR.

Ping

Use the PING command to check an Ethernet connection to the TimeProvider.

```
PING:[<tid>]::[<ctag>]::<ipaddr>;
```

This command has a default access level of USER.

<ipaddr>	Value	Description
IP address of host to be pinged	1.0.0.1 – 254.254.254.254	Pings the host system

Sample Command
```
PING:::TS1000::192.168.12.10;
```

Normal Response
```
    TP-SSU 03-05-15 09:59:09
M  TS1000 COMPLD
"Host 192.168.12.10 is alive. Roundtrip time was 165 ms"
;
```

Retrieve Header

Use the RTRV-HDR command to display the response header, which includes the system identification <sid>, date, and time. You can also use this command to verify that the communication link to the TimeProvider is working properly.

This command has a default access level of NONE.

Sample Command
```
RTRV-HDR:::TS1000;
```

Normal Response
```
    TP-SSU 03-05-15 09:59:25
M  TS1000 COMPLD
;
```

Defining the Security Parameters

The TimeProvider supports users at the following four access levels:

- **None** – Anyone with access to a serial or Ethernet port on the TimeProvider can issue commands set to this access level. If no Security-level users are defined, then anyone connected to the TimeProvider can issue every command available

- **User** – Users entered into the user list at the User level can issue commands set at the User access level

- **Admin** – Users entered into the user list at the Admin level can issue commands set at the Admin access level

- **Security** – Users at this access level can issue every command available

You can edit the commands available at each access level using the ED-CMD-SECU command. You can display the current access level for each command by issuing the RTRV-CMD-SECU command. See the *TimeProvider TL1 Reference Guide* for details on these commands. Record the values you provision in Table 4-3.

The first person to log into the TimeProvider is automatically assigned the Security access level (described in Defining a User at the Security Access Level, on page 83); this person normally performs the initial provisioning and defines users and their appropriate access levels.

Managing the User List

Use the procedures in this section to manage the users that are authorized to access the TimeProvider.

Logging In

Use the following TL1 command to log existing users into the system.

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

This command has a default access level of NONE.

Parameter	<uid>	Value	Description
<uid>	<username>	Up to 20 case-insensitive characters	Assigned user name
<pid>	password	Up to 20 case-sensitive characters. Must include at least two non-alphabetic and one special character (any printing character other than a letter, number, comma, colon, or semicolon. For case-sensitive passwords, enclose the <pid> in quotes, for example "sYmm!23"	Assigned password

Sample Command

```
ACT-USER::TECHNICIAN:TS1000::TECH01!;
```

This command logs in the user named Technician.

Autonomous Message

```
    TP-SSU 03-10-24 10-18-24
A 1170 REPT EVT
    "IMC:NA,LOGIN,NSA,03-10-24 10-18-24:\"USER LOGGED IN,
TECHNICIAN\""
;
```

Error Response

```
    TP-SSU 03-10-24 10-18-24
M 04 DENY
    <errcode>
    "UNAUTHORIZED ACCESS TO THIS SYSTEM IS PROHIBITED."
;
```

Logging Out

Use the following TL1 command to terminate a session and log out of the system. Security-level users can terminate any other user. The username is not case-sensitive, but it must be spelled exactly as assigned.

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

This command has a default access level of USER.

<uid>	Value	Description
null		Terminates the current user's session and logs the user off the system
<uid>	Up to 20 case-insensitive characters	Allows a user at the ADMIN or SECURITY level to terminate another user's session

Sample Command

```
CANC-USER::TECHNICIAN:TS1000;
```

This command logs out the user named Technician.

Autonomous Message

```
    TP-SSU 03-10-24 10:25:31
A 1171 REPT EVT
    "IMC,EQPT:NA,LOGOUT,NSA,03-10-24 10-25-31:\"USER LOGGED
OUT,TECHNICIAN\""
;
```

Adding a User

You can store up to 20 users in the TimeProvider's user list. Each user has a name of up to 20 case-insensitive alphanumeric characters, a password of up to 10 case-sensitive characters, and one of the four defined access levels.

Use the following TL1 command to add a user to the user list. If more than 20 users are defined in the user list, the DENY response is sent. Only a Security-level user can add to the user list.

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

This command always has a access level of SECURITY.

Parameter	Value	Description
<uid>	<username>	Up to 20 case-insensitive alphanumeric characters
<pid>	<user password>	Up to 20 case-sensitive characters. You must include at least two non-alphabetic and one special character (other than a letter, number, comma, colon, or semicolon). For case-sensitive passwords, enclose the <pid> in quotes.
<uap>	NONE | USER | ADMIN | SECURITY	The access level for the user specified by the <uid>

Sample Command

```
ENT-USER-SECU::TECHNICIAN:TS1000::TECH01!,USER;
```

This command creates a user named TECHNICIAN with a password of TECH01! at the User access level.

Autonomous Message

```
    TP-SSU 03-10-24 10:28:24
A 1172 REPT EVT
    "IMC:NA,USRADD,NSA,03-10-24 10-28-24:\"USER HAS BEEN
ADDED\""
;
```

Changing the Current User's Password

The ED-PID command changes the specified user's password.

```
ED-PID:[<tid>]:[<uid>]:[<ctag>]::<oldpid>,<newpid>;
```

This command has a default access level of USER.

Keyword	Value	Description
<uid>	<username>	Up to 20 case-insensitive alphanumeric characters
<oldpid>	Must match existing value or DENY is issued for the command	Old password for the specified user
<newpid>	Up to 20 case-sensitive characters	New password for the specified user

Sample Command

```
ED-PID::TECHNICIAN:TS1000::TECH01!,#Tech02;
```

This command changes the current user's password from TECH01! to #Tech02.

Autonomous Message

```
    TP-SSU 03-10-24 10:30:01
A 1173 REPT EVT
    "IMC:NA,PIDCHG,NSA,03-10-24 10-30-01:\"USER PASSWORD HAS
CHANGED\""
    ;
```

Displaying a User's Access Level

Use the following TL1 command to display the access level for a specified user or for all users.

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

This command always has a access level of SECURITY.

Parameter	Description
<uid>	Assigned user name. Displays the access level of the specified user.
null	Displays the access level for all assigned user names.

The response format is:

```
<cr><lf><lf>
^^^sid^date^time<cr><lf>
M ^ctag^COMPLD<cr><lf>
^^^"username,access"<cr><lf>
^^^"username,access"<cr><lf>
      .
      .
      .
^^^"username,access"<cr><lf>
;
```

Response	Value	Description
<username>	Up to 20 case- insensitive characters	Assigned user name
<access>	NONE | USER | ADMIN | SECURITY	Access level

Sample Command

```
RTRV-USER-SECU::TS1000;
```

Normal Response

```
   TP-SSU 03-10-24 10:31:31
M TS1000 COMPLD
   "TECHNICIAN,USER"
   "DEPTHEAD,SECURITY"
   "DAVID,ADMIN"
;
```

Editing a User's Access Level

Use the following TL1 command to change the access level for a specified user.

```
ED-USER-SECU:[<tid>]:<uid>:[<ctag>]::<keyword>=<value>;
```

This command always has a access level of SECURITY.

Parameter	<keyword>	<value>	Description
<uid>		Up to 20 case-insensitive characters	Assigned user name
	ACCLVL	NONE | USER | ADMIN | SECURITY	New access level for the specified user

Sample Command

```
ED-USER-SECU::TECHNICIAN:TS1000::ACCLVL=ADMIN;
```

This command changes the access level for the TECHNICIAN user to ADMIN.

Autonomous Message
```
    TP-SSU 03-10-24 10:33:04
A 1174 REPT EVT
    "IMC,EQPT:NA,ACCLVL,NSA,03-10-24 10-33-04:\"USER ACCESS
LEVEL HAS CHANGED\""
;
```

Deleting A User

Use the following TL1 command to delete a specified user from the user list.

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

This command has a default access level of SECURITY.

Parameter	Value	Description
<uid>	Up to 20 case-insensitive characters	Assigned user name

Sample Command
```
DLT-USER-SECU::TECHNICIAN:TS1000;
```

This command deletes the TECHNICIAN user from the user list.

Autonomous Message
```
    TP-SSU 03-10-24 10:35:54
A 1175 REPT EVT
    "IMC:EQPT:NA,USRDEL,NSA,03-10-24 10-35-54:\"USER HAS BEEN
DELETED\""
;
```

Retrieving Current Users

Use the RTRV-USER command to display a list of all currently connected users.
The TimeProvider supports up to 10 TCP simultaneous connections, as well as one
local and one remote serial connection. If a user is logged on, the username
appears in the response.

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

This command has a default access level of USER.

Sample Command
```
RTRV-USER;
```

Normal Response
```
    TP-SSU 03-10-24 10:37:14
M ^04^COMPLD
    TECHNICIAN
;
```

Provisioning the IOC

This section describes how to provision the IOC.

Setting the System Mode

The SET-SYS-MODE command allows you to provision the operating mode of the TimeProvider to one of the following:

■ SSU – Synchronization Supply Unit: provides filtering compliant with G.812 and GR-1244

■ SUB – Subtending mode: provides composite clock input tracking compliant with GR-378

■ PRR – Primary Reference Receiver mode: provides ITU-T G.811 and Telcordia GR-2830 requirements for Primary Reference Receivers/Clocks

In the SSU mode, you can select the system reference from signals on the PRS, INP1, or INP2 connectors.

In the SUB mode, the PRS input is set to Monitor only; you can select the system reference from signals on the INP1 or INP2 connectors. You can provision these inputs to Composite Clock signal types only when the TimeProvider is in SUB mode.

In the PRR mode, the antenna provides GPS signals as the primary reference. You can use qualified and enabled signals on INP1 and INP2 to enhance the stability of the output signals based on the BesTime algorithm.

Setting the System Mode
Use the SET-SYS-MODE command to provision the TimeProvider's operating mode. See Operating Modes, on page 24, for more information on how the operating mode affects the TimeProvider's inputs and outputs.

```
SET-SYS-MODE:[<tid>]::[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<keyword>	<value>	Description	Default value
SYSMODE	SSU	Set the TimeProvider to SSU operating mode ■ PRS – Priority 1 and Enabled ■ INP1 – Priority 2 and Enabled ■ INP2 – Priority 3 and Enabled ■ GPS – Disabled	SSU
	SUB	Set the TimeProvider to Subtending operating mode ■ PRS – Monitor only and Disabled, cannot be Enabled ■ INP1 – Priority 1 and Enabled ■ INP2 – Priority 2 and Enabled ■ GPS – Monitor only and Disabled, cannot be Enabled	
	PRR	Set the TimeProvider to Primary Reference Receiver mode ■ PRS – Enabled as Backup Reference, can be set to Monitor or Disabled ■ INP1 – Enabled as Backup Reference, can be set to Monitor or Disabled ■ INP2 – Enabled as Backup Reference, can be set to Monitor or Disabled ■ GPS – Enabled and Priority 1	

Sample Command

```
SET-SYS-MODE:::TS1000::SYSMODE=SUB;
```

Sets the system mode to Subtending (SUB). The inputs are set as described in the table above. Record the mode in Table 4-3.

Autonomous Message

```
   TP-SSU 03-10-24 10:40:10
A 1176 REPT EVT
   "SYS,EQPT:NA,SYSMODE,NSA,03-10-24 10-40-10:\"SYSTEM MODE
OF OPERATION HAS CHANGED,SUB\""
   ;
```

Retrieving the Current System Mode

Use the following TL1 command to retrieve the current system mode.

```
RTRV-SYS-MODE:[<tid>]::[<ctag>];
```

This command has a default access level of USER.

Response	Description
<value>	SSU | SUB | PRR

Sample Command

```
RTRV-SYS-MODE:::TS1000;
```

Normal Response

```
    TP-SSU 03-10-24 10:37:54
M  TS1000 COMPLD
    SSU
;
```

Setting the IOC Parameters

Use the ED-EQPT command to provision each IOC. This command allows you to select which IOC is Active and which is Standby; to switch the Active and Standby IOCs; to place a IOC "In Service" or "Out of Service"; and to define the oscillator type to Type I or ST3E for a quartz-based IOC or to Type II or ST2 for a Rubidium IOC.

```
ED-EQPT:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

\<aid\>	\<keyword\>	\<value\>	Description	Default value
IOCm m = 1 | 2			IOC module	
	IOCMODE	ACTIVE | STANDBY	Sets the mode of the specified IOC. For redundant systems, changing the state of one IOC forces the other IOC to the alternate state	ACTIVE
	IOCACTV	n/a	Sets the Standby IOC to Active	n/a
	IOCSTATE	INSRV	Places an "Out of Service" IOC in the "In Service" mode (restarts)	INSERV
		OOSRV	Places an "In Service" IOC in the "Out of Service" mode. An Out of Service IOC cannot generate outputs or monitor inputs and does not generate alarms	
	CLKTYPE	ST2/TYPEII | ST3/TYPEI	Defines the Local Oscillator type. Selects the type of clock used to generate SSMs in Holdover mode	TYPEI

Sample Command

```
ED-EQPT::IOC1:TS1000::IOCSTATE=INSERV;
```

This command places IOC 1 in the "In Service" mode. Use this command when you have taken an IOC out of service and are now ready to put it back in service.

Autonomous Message

```
    TP-SSU 03-10-24 10:42:40
A 1177 REPT EVT
    "IOC1,EQPT:NA,IOCSTATE,NSA,03-10-24 10-42-40:\"IOC STATE
HAS CHANGED,INSRV\"
;
```

Provisioning the Input Reference

You need to know the following information about the input reference signal before you can provision the Input Reference signals:

- Input selection mode
- Interface type
- Frame type/frequency
- Quality level
- Priority level
- SSMs and bit position
- CRC

Setting the Input State

Use the ED-EQPT command to provision the inputs to the TimeProvider. You can enable, disable, or place an input in Monitor mode (where the input is monitored, but cannot be selected as the system reference).

```
ED-EQPT:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
PRS INPp (p = 1 | 2) GPS			System inputs	
	INSTATE	ENABLE	Enables the specified input	ENABLE GPS = DISABLE
		MONITOR	Places the specified input in Monitor Only mode.	
		DISABLE	Disables the specified input	

Sample Command
```
ED-EQPT::INP1:TS1000::INSTATE=MONITOR;
```

This command places Input 1 in the Monitor mode.

Autonomous Message
```
    TP-SSU 03-10-24 10:44:21
A 1178 REPT EVT
    "INP1,T1:NA,INSTATE,NSA,03-10-24 10-44-21:\"INPUT STATE
HAS CHANGED,MONITOR\""
;
```

Setting the GPS Parameters

After you install the GPS antenna, you must provision the parameters using the ED-EQPT command.

```
    ED-EQPT:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
GPS			GPS input, except clock input signals	
	MODE	AUTO	The antenna position (latitude, longitude, and elevation) is automatically computed or recomputed and set	AUTO
		MANUAL	The position (latitude, longitude, and elevation) is set manually using the POS keyword	
	POS **Note:** The position can only be set when Mode is MANUAL	LAT	dd-mm-ss.ssN or dd-mm-ss.ssS	n/a
		LONG	dd-mm-ss.ssE or dd-mm-ss.ssW	
		ELEV	hhhh.hh height in m	
	ELEVMASK	5 to 45	The elevation mask, below which the TimeProvider will not track or acquire a satellite	10

Sample Command
```
    ED-EQPT::GPS:TS1000::MODE=AUTO;
```

This command sets the GPS location mode to Automatic. The location of the GPS antenna is determined from multiple satellite fixes.

Autonomous Message
```
    TP-SSU 03-10-24 10:45:15
A 1179 REPT EVT
    "GPS,EQPT:NA,FRMTYPE,NSA,03-10-24 10-45-15:\"GPS MODE HAS
CHANGED,AUTO\""
;
```

To manually set the location of the receiver, you must enter the latitude, the longitude, and the altitude (in m) in the same command, using commas to separate the parameters.

Sample Command
```
ED-EQPT::GPS:TS1000::POS=30-28-34.0N,97-50-16.0W,333.0;
```

Autonomous Message
```
    TP-SSU 03-10-24 10:45:15
A 1179 REPT EVT
    "GPS,EQPT:NA,FRMTYPE,NSA,03-10-24 10-45-15:\"GPS LOCATION
HAS CHANGED,MANUAL\""
;
```

Setting the Input Frequency

Use the ED-SYNC command to provision the input PRS frequency.

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
PRS			PRS input provisioning	
	FRMTYPE	1.544 M | 2M (2.048 MHz) | 5M | 6.312 M | 10M	Provisions the input frequency of the PRS input	2M

Sample Command
```
ED-SYNC::PRS:TS1000::FRMTYPE=5M;
```

Autonomous Message
```
    TP-SSU 03-10-24 10:46:01
A 1179 REPT EVT
    "PRS,EQPT:NA,FRMTYPE,NSA,03-10-24 10-46-01:\"INPUT
FRAMING TYPE HAS CHANGED,5M\""
;
```

Setting the Input Frame Type

Use the ED-SYNC command to provision the type of framing present on the input signal.

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

If you provision the TimeProvider to the Subtending mode (see Setting the System Mode, on page 96), then the input frame type is automatically set to Composite Clock type signals. You can set the FRMTYPE to CC, JCC, or JCC4 when the TimeProvider is in the Subtending mode.

When using E1 signals in the SSU mode, you can only enter CCS in the FRMTYPE keyword. The TimeProvider accepts both CCS and CAS inputs without a fault (if the input is fault-free).

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
INPp p = 1 | 2			System input	
	FRMTYPE	2M (2.048 MHz) | CCS | D4 | ESF | 1.544 MHz | 6.312 MHz | CC | JCC | JCC4	Provisions the frame signal type used by the input.	2M (E1) ESF (T1)

Sample Command
```
ED-SYNC::INP1:TS1000::FRMTYPE=ESF;
```

Autonomous Message
```
   TP-SSU 03-10-24 10:50:05
A 1181 REPT EVT
   "INP1,T1:NA,FRMTYPE,NSA,03-10-24 10-50-05:\"INPUT FRAMING
TYPE HAS CHANGED,ESF\""
;
```

Controlling Automatic Reference Switching

The TimeProvider can determine which input reference signal has the highest quality. When the active reference signal falls below a preset quality level, the TimeProvider can automatically switch to the next highest input reference signal. To use this feature, you must enable Automatic switching.

You can also use the performance monitoring features to automatically switch the input reference signal when user-defined performance thresholds are crossed. See Setting MTIE and FFOFF Thresholds, on page 108 for more information on setting and using performance monitoring commands.

Automatic Return to a Higher Priority Reference

When the REFMODE parameter is provisioned to AUTO, the system reference switches when the input signal is disqualified. When the input signal is re-qualified, the TimeProvider can either keep the current reference or switch back to the re-qualified signal. The first case, keeping the current reference, is also known as "non-revertive" mode; the second case, switching back to the re-qualified input, is known as revertive mode.

The QLEVEL (Setting the Input Quality Level, on page 104) and the PRIORITY (Setting the Input Priority Level, on page 105) parameters work together with SSMs to determine the switching strategy for the inputs when the unit is in the SSU mode. If the active/primary input becomes unavailable, the switching strategy determines which input to use: the TimeProvider uses the input with the next highest QLEVEL. If all inputs have the same QLEVEL, then the TimeProvider uses the input with the highest PRIORITY.

To provision the TimeProvider as non-revertive, you must provision the user-assigned Priority Level on all inputs to the same value (1, 2, 3, or 4). To provision the TimeProvider as revertive, you provision any one of the inputs to a higher or lower Priority Level, with 1 being the highest priority.

If the original primary input becomes available again, the REFMODE, QLEVEL and PRIORITY parameters determine whether the TimeProvider switches back to that input. If the QLEVEL and/or PRIORITY parameter of the original input is higher than the current input, the TimeProvider *reverts* back to the original input. If the QLEVEL parameter is the same for all inputs, then the TimeProvider does not revert back to the original input.

Enabling Automatic Switching

Use the ED-SYNC command to set the reference selection to Automatic or Forced. When set to Automatic, then the QLEVEL and PRIORITY parameters determine the switching strategy to be revertive or non-revertive. When set to Forced, then the TimeProvider uses the input selected with the INPREF keyword (see Manually Selecting the Reference, on page 105).

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
SYS			System inputs	
	REFMODE	AUTO | FORCED	Sets the reference selection mode	AUTO

Sample Command
```
ED-SYNC::SYS:TS1000::REFMODE=AUTO;
```

Autonomous Message

```
    TP-SSU 03-10-24 10-52-25
A 1182 REPT EVT
    "SYS,EQPT:NA,REFMODE,NSA,03-10-24 10-52-25:\"SYSTEM
REFERENCE MODE HAS CHANGED,AUTO\""
    ;
```

Setting the Input Quality Level

Use the ED-SYNC command to set the quality level (QLEVEL) of the specified input. You set the QLEVEL when using inputs that do not have an associated SSM, or when you want to set an alarm threshold for inputs that have SSMs. The QLEVEL determines the TimeProvider's output SSM.

If you provision QLEVEL below the quality level of the local oscillator in the IOC, then the TimeProvider disqualifies the input with the INPQL alarm. An INPQL alarm also occurs if the incoming SSM indicates that the input signal is below the quality level of the local oscillator or if the incoming SSM is below the provisioned level.

Normally, you provision the QLEVEL for each input to be either unique or all the same. If you set all QLEVEL for inputs to unique values, then you have set up a revertive switching strategy. If you set all inputs to the same value, then you have set up a non-revertive switching strategy.

```
        ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
PRS INPp (p = 1 | 2) GPS			Input ports	
	QLEVEL	1 = PRS 2 = UNK/STU 3 = TYPE II/ST2 4 = TYPE I 5 = TYPE V/TNC 6 = TYPE III/ST3E 7 = TYPE IV/ST3 8 = G.813OPT3/SMC 9 = DUS	Sets the Quality Level for the specified input	GPS = 1 PRS = 2 INPp = 2

Sample Commands

```
ED-SYNC::PRS:::QLEVEL=1;
ED-SYNC::INP1:::QLEVEL=1;
ED-SYNC::INP2:::QLEVEL=1;
```

This series of commands sets the QLEVEL for all inputs to the same level; if you also provision the PRIORITY level to the same value, then you have set up a non-revertive switching strategy.

Autonomous Message

```
    TP-SSU 03-10-24 10:54:44
A 1183 REPT EVT
    "PRS,EQPT:NA,QLEVEL,NSA,003-10-24 10-54-44:\"USER
ASSIGNED QUALITY LEVEL HAS CHANGED,1\""
;
```

Setting the Input Priority Level

The PRIORITY level works together with the QLEVEL parameter (described in Setting the Input Quality Level, on page 104) to determine the switching strategy. The PRIORITY level is the second factor the TimeProvider uses to determine which input to use when the original primary input becomes unavailable.

Use the ED-SYNC command to set the PRIORITY level of the selected reference.

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

\<aid\>	**\<keyword\>**	**\<value\>**	**Description**	**Default value**
PRS INPp (p = 1 | 2) GPS			Input ports	
	PRIORITY	2 | 3 | 4	Sets the priority for the selected input	1

Sample Command
```
ED-SYNC::PRS:TS1000::PRIORITY=2;
ED-SYNC::INP1:TS1000::PRIORITY=2;
ED-SYNC::INP2:TS1000::PRIORITY=2;
```

These commands set the PRIORITY for each input to the same value; if you also provision the QLEVEL to the same value, then you set up a non-revertive switching strategy.

Autonomous Message
```
    TP-SSU 03-10-24 10:56:00
A 1184 REPT EVT
    "PRS,EQPT:NA,PRIORITY,NSA,03-10-24 10-56-00:\"PRIORITY
HAS CHANGED,2\""
;
```

Manually Selecting the Reference

Use the ED-SYNC command to manually select the reference. To select the reference, you must first set the REFMODE keyword to FORCED, as described in Controlling Automatic Reference Switching, on page 102.

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
SYS			System inputs	
	INPREF	GPS | PRS | INP1 | INP2	Sets the specified input to be the system reference	PRS

Sample Command

```
ED-SYNC::SYS:TS1000::INPREF=PRS;
```

This command forces the signal on the PRS input to be the reference signal. The REFMODE keyword must be set to FORCED for this command to take effect.

Autonomous Message

```
   TP-SSU 03-10-24 10:58:30
A 1185 REPT EVT
   "SYS,EQPT:NA,INPREF,NSA,03-10-24 10-58-30:\"SYSTEM
REFERENCE INPUT HAS CHANGED, PRS\""
   ;
```

Provisioning the SSM

Before you can read Synchronization Status Messages (SSMs) on certain input signals, you need to provision the TimeProvider to read the incoming SSM and identify the bit position of the SSM. SSMs are on the following types of input signals:

- E1, CCS4

- T1, ESF

Reading SSMs

To enable the use of SSMs, you must first provision the TimeProvider to read SSMs on the input. Use the ED-SYNC command to enable the specified input to read SSMs.

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
INPp p = 1 | 2			System inputs	
	SSMENA	ENABLE | DISABLE	Provisions the T1 ESF or E1 (CCS) input to read the received SSM	ENABLE

Sample Command

```
ED-SYNC::INP1:TS1000::SSMENA=ENABLE;
```

Autonomous Message

```
   TP-SSU 03-10-24 11:02:28
A 1186 REPT EVT
   "INP1,T1:NA,SSMENA,NSA,03-10-24 11-02-28:\"INPUT READING
OF SSM HAS CHANGED,ENABLE\""
   ;
```

Defining the SSM Bit Position

After you enable an E1 (CCS) input to read SSMs, you must then define the bit containing the SSM.

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
INPp p = 1 | 2			System inputs	
	SSMBIT	4 | 5 | 6 | 7 | 8	Provisions the E1 (CCS) SSM bit position.	8

Sample Command

```
ED-SYNC::INP1:TS1000::SSMBIT=4;
```

This command sets the SSM bit to position 4 in the E1 input string on Input 1.

Autonomous Message

```
   TP-SSU 03-10-24 11:05:18
A 1187 REPT EVT
   "INP1,T1:NA,SSMBIT,NSA,03-10-24 11-05-18:\"E1 SSM BIT HAS
CHANGED,4\""
   ;
```

Enabling CRC4

Use the ED-SYNC command to enable or disable the use of CRC4 on E1 inputs.

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
INPp p = 1 | 2			System inputs	
	CRCENA	ENABLE | DISABLE	Provisions the use of CRC4 on E1 inputs	DISABLE

Sample Command
```
ED-SYNC::INP1:TS1000::CRCENA=ENABLE;
```

Normal Response
```
   TP-SSU 03-10-24 11:06:57
A 1188 REPT EVT
   "INP1,T1:NA,CRCENA,NSA,03-10-24 11-06-57:\"INPUT CRC HAS
CHANGED,ENABLE\""
   ;
```

Using Performance Monitoring

You can set thresholds for alarms and for qualifying inputs using MTIE and FFOFF data. For more information on performance monitoring, see Performance Monitoring, on page 25.

Setting MTIE and FFOFF Thresholds
Use the SET-TH command to set the alarm thresholds for each input and each MTIE window.

```
SET-TH:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description
GPS, PRS, INP1, INP2			System level
	MASK	DEFAULT GPS-R PRS DS1 OCN PRC TYPEI TYPEII	Set the MTIE-x and FFOFF-60 thresholds to predefined settings. Table 4-2 describes the values for each setting.
	MTIE-1	1 to 5 000 000	1-second MTIE observation threshold in ns
	MTIE-5	1 to 5 000 000	5-second MTIE observation threshold in ns
	MTIE-10	1 to 5 000 000	10-second MTIE observation threshold in ns
	MTIE-50	1 to 5 000 000	50-second MTIE observation threshold in ns
	MTIE-100	1 to 5 000 000	100-second MTIE observation threshold in ns
	MTIE-500	1 to 5 000 000	500-second MTIE observation threshold in ns
	FFOFF-60	100 to 10 000 000	Set FFOFF threshold for 60-second calculation period, in ps/s

Table 4-2. Default Mask Parameters

	MTIE-1	MTIE-5	MTIE-10	MTIE-50	MTIE-100	MTIE-500	FFOFF-60
Default	10 000	50 000	100 000	500 000	1 000 000	5 000 000	10 000 000
GPS-R	150	150	150	150	150	155	50 000
PRS	10	10	12	25	39	155	1000
DS1	302	312	325	325	550	1002	12 000
OCN	600	1000	1000	1000	1000	1002	370 000
PRC	25	25	25	25	39	155	1000
TYPE I	750	750	1000	2000	2000	2000	2900
TYPE II	302	312	325	425	1000	1000	1000

Sample Command

```
SET-TH::GPS:TS1000::MASK=GPS-R;
```

This command sets the GPS input performance monitoring threshold to a mask value of GPS-R.

Autonomous Message
```
    TP-SSU 03-10-24 11:09:12
A 1189 REPT EVT
    "GPS,EQPT:THRCHG,THRCHG,03-04-05 15-17-57,,,,:\"PM
THRESHOLD HAS CHANGED,MASK,GPS-R \""
;
```

Setting Alarm Levels for Performance Monitoring Faults

Once you set a threshold for performance monitoring faults, you can set the alarm level to indicate that a fault has occurred. Use the SET-ATTR command to set the alarm level.

```
    SET-ATTR:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description
GPS, PRS, INP1, INP2			Input
	MTIE	NR | NA | MN | MJ | CR	The alarm level when the specified input has exceeded at least one of the MTIE thresholds
	FFOFF	NR | NA | MN | MJ | CR	The alarm level when the specified input has exceeded the FFOFF threshold

Sample Command
```
SET-ATTR::GPS:TS1000::MTIE=MJ;
```

This command sets the GPS input to report a Major alarm when the MTIE performance threshold is exceeded.

Autonomous Message
```
    TP-SSU 03-05-15 09:59:09
A 1189 REPT EVT
    "GPS,EQPT:ALMCHG,ALMCHG,03-04-05 15-17-57,,,,:\"ALARM
PARAMETER HAS CHANGED,GPS,MJ\""
;
```

Provisioning the Outputs

This section describes the commands you use to provision the outputs of the TimeProvider.

Enabling and Disabling the Outputs

Use the ED-EQPT command to enable or disable the output signal. This command affects the specified group of eight output channels, or sixteen output channels if the Expansion panel is also used; individual channels cannot be enabled or disabled.

```
ED-EQPT:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
OUTg g = A | B | C | D			Select the output group	
	OUTSTATE	ENABLE	Enable the specified output group	ENABLE
		DISABLE	Disable the specified output group	

Sample Command
```
ED-EQPT::OUTA:TS1000::OUTSTATE=DISABLE;
```

This command disables output group A and turns off all eight channels, or sixteen channels if the Expansion panel is also used.

Autonomous Message
```
    TP-SSU 03-10-24 11-09-12
A 1189 REPT EVT
    "OUTA,EQPT:NA,OUTSTATE,NSA,03-10-24 11-09-12:\"OUTPUT
GROUP STATE HAS CHANGED,DISABLE\""
    ;
```

Provisioning the Output Framing Type

Use the ED-SYNC command to provision the output framing type.

CAS is the only available option for E1 output framing because the BITS/SSU clock in the TimeProvider generates the highest density ones signal available. Downstream Network Elements (NEs) configured to receive CAS or CCS will accept the CAS output generated by the TimeProvider without errors.

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
OUTg g = A | B | C | D			System inputs	
	FRMTYPE	2M | CAS | D4 | ESF | CC | JCC | JCC4 | 8K | ISOLATED_1 | 1.544 MHz | 6.312 MHz	Provisions the output framing	2M

Sample Command

```
ED-SYNC::OUTA:TS1000::FRMTYPE=CAS;
```

This command provisions output group A to an E1, CAS framing format.

Autonomous Message

```
    TP-SSU 03-10-24 11:11:18
A 1190 REPT EVT
    "OUTA,EQPT:NA,FRMTYPE,NSA,03-10-24 11-11-18:\"OUTPUT
FRAMING TYPE HAS CHANGED,CAS\""
;
```

Provisioning the Retimer Module

Use the ED-EQPT command to enable or disable the Retimer module or port when it is installed in one of the output slots on the Main shelf.

```
ED-EQPT:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
RTMg[-p] g = A | B | C | D p = 1 | 2			Retimer group or port	
	RTMSTATE	ENABLE | DISABLE	Enables or disables the specified module or port	Enable

Sample Command

```
ED-EQPT::RTMA:TS1000::RTMSTATE=ENABLE;
```

This command enables the Retiming module installed in Group A.

Autonomous Message

```
    TP-SSU 03-10-24 11:11:18
A 1190 REPT EVT
    "OUTA,EQPT:NA,FRMTYPE,NSA,03-10-24 11-11-18:\"RTMSTATE
HAS CHANGED,ENABLE\""
;
```

Use the ED-SYNC command to provision the Retiming module or port.

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
RTMg[-p] g = A | B | C | D p = 1 | 2	RTMLBO	0 = 0 to 133 ft 1 = 133 to 266 ft 2 = 266 to 399 ft 3 = 399 to 533 ft 4 = 533 to 650 ft	Sets the Line Build-out length for the designated module or port	0
	FREEFLT	CUTTHRU	No retiming is performed when the LO enters Free-run mode	RETIME
		RETIME	Retiming is performed when the LO enters Free-run mode	
	HOLDFLT	CUTTHRU	No retiming is performed when the LO enters Holdover mode	RETIME
		RETIME	Retiming is performed when the LO enters Holdover mode	

Sample Command

```
ED-SYNC::RTMA-1:TP1000::RTMLBO=1;
```

Autonomous Message

```
    "TP-SSU" 05-02-10 13:35:56
A 2556 REPT EVT
    "RTMA,T1:LBO,TC,05-02-10,13-35-56,,,,:\"PORT LBO HAS
CHANGED,1\""
;
```

Provisioning Alarms

This section describes how you provision and manage alarms in the TimeProvider. There are TL1 commands that allow you to:

- Provision individual alarm levels

- Provision system-wide alarm levels

- Display current alarm settings

- Display current alarms

- Display alarm status

Alarms are displayed on the IMC LEDs; they also appear on the relay contact closures on the Input module.

Provisioning the Alarm Levels

Use the SET-ATTR command to set the alarms associated with the IMC and IOC. You can use this command to reset all alarm levels to the factory default values, and to allow the TimeProvider to escalate alarms.

```
SET-ATTR:[<tid>]:<aid>:[<ctag>]::<keyword>[=<value>];
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description
SYS			System level
	ELEVTIME	ENABLE | DISABLE (default)	Allow alarms to escalate from Minor to Major and from Major to Critical
	FACTORY		Set the alarm levels to factory default values

<aid>	<keyword>	<value>	Description
SYS IMC IOC PRS INPp (p = 1 | 2)	Alarm ID	NR = Not Reported NA = A non-alarm event MN = Minor alarm MJ = Major alarm CR = Critical alarm CLEAR = Clears an active alarm; if the condition persists, then the alarm is reissued	See the definitions for the Alarm ID in the following table

Alarm ID	Description of Alarm Condition	Possible Alarm Levels	Error Delay Default	Error Delay Editable?	Default Level SSU Mode	Default Level SUB Mode
<aid> = SYS						
COMPAT	System components, such as IOC software and hardware are incompatible		IMMED	No	MJ	MJ
EXTALM1	External alarm generated by external equipment	NR | NA | MN | MJ | CR	IMMED	No	MN	MN
EXTALM2	External alarm generated by external equipment	NR | NA | MN | MJ | CR	IMMED	No	CR	CR
PWRA	Loss of A power	MN | MJ | CR	IMMED	No	MJ	MJ
PWRB	Loss of B power	MN | MJ | CR	IMMED	No	MJ	MJ
IOC1EQPT	The IOC1 has been physically inserted or removed		IMMED	No	MJ	MJ
IOC2EQPT	The IOC2 has been physically inserted or removed		IMMED	No	MJ	MJ
EXPNEQPT	The Expansion Panel has been physically inserted or removed		IMMED	No	MJ	MJ
OUTA EQPT	Output module in slot A has been physically inserted or removed		IMMED	No	MJ	
OUTB EQPT	Output module in slot B has been physically inserted or removed		IMMED	No	MJ	
OUTC EQPT	Output module in slot C has been physically inserted or removed		IMMED	No	MJ	
OUTD EQPT	Output module in slot D has been physically inserted or removed		IMMED	No	MJ	

Alarm ID	Description of Alarm Condition	Possible Alarm Levels	Error Delay Default	Error Delay Editable?	Default Level	
					SSU Mode	SUB Mode
RTMA EQPT	Re-timing module in slot A has been physically inserted or removed		IMMED	No	MN	
RTMB EQPT	Re-timing module in slot B has been physically inserted or removed		IMMED	No	MN	
RTMC EQPT	Re-timing module in slot C has been physically inserted or removed		IMMED	No	MN	
RTMD EQPT	Re-timing module in slot D has been physically inserted or removed		IMMED	No	MN	
<aid> = IMC						
IOC1 COMM	Comm alarm with IOC 1	NR | NA | MN | MJ | CR	IMMED	No	MN	MN
IOC2 COMM	Comm alarm with IOC 2	NR | NA | MN | MJ | CR	IMMED	No	MN	MN
IMCFAIL	Summary alarm of IMC self-test fault		IMMED	No	MJ	MJ
<aid> = IOC						
IOC1 COMM	Comm alarm from IMC module to IOC1 module	NR | NA | MN | MJ | CR	IMMED	No	MN	MN
IOC2 COMM	Comm alarm from IMC module to IOC1 module	NR | NA | MN | MJ | CR	IMMED	No	MN	MN
IOC1TO2 COMM	Comm alarm from IOC1 to IOC2	NR | NA | MN | MJ | CR	IMMED	No	MN	MN
IOC2TO1 COMM	Comm alarm from IOC2 to IOC1	NR | NA | MN | MJ | CR	IMMED	No	MN	MN

Alarm ID	Description of Alarm Condition	Possible Alarm Levels	Error Delay Default	Error Delay Editable?	Default Level	
					SSU Mode	SUB Mode
BTBACK UP	All BesTime backup sources are unusable to the BesTime engine		IMMED	No	NA	NA
IOCFAIL	Summary alarm of IOC failures; for example, calibration was unsuccessful	MN | MJ | CR	IMMED	No	MJ	MJ
CLKWARM	Local oscillator on the specified IOC is in Warm-up mode	MN | MJ	IMMED	No	MN	MN
CLKFREE	Local oscillator on specified IOC is in Free-run mode	MN | MJ | CR	IMMED	No	MJ	MJ
CLKBRDG	Local oscillator on specified IOC is in Bridging mode	MN | MJ | CR	IMMED	No	MJ	MJ
CLKHOLD	Local oscillator on specified IOC is in Holdover mode	MN | MJ | CR	IMMED	No	MJ	MJ
SYNTHEOR	The synthesizer has reached the defined End of Range for the oscillator type in the IOC		IMMED	No	MJ	MJ
<aid> = GPS						
ANTCOMM	Loss of communications to the antenna		IMMED	No	MN	MN
GPSPOS	Position of the antenna is unknown		IMMED	Yes	NA	NA
GPSPWR	Power to the TPIU is too high or too low		IMMED	No	MN	MN
GPSSYS	Error with startup test, TRAIM, and/or UTC/ Ephemeris data		IMMED	Yes	MN	MN
GPSTRK	GPS engine is not tracking satellites		IMMED	Yes	MN	MN
INPDISQ	Specified input has been disqualified or qualified as a possible system reference.	MN | MJ | CR	FLT DELAY	Yes	MN	MN

Alarm ID	Description of Alarm Condition	Possible Alarm Levels	Error Delay Default	Error Delay Editable?	Default Level	
					SSU Mode	SUB Mode
INPLOS	Specified input has Loss Of Signal.[1]	MN | MJ | CR	IMMED	No	MN	MN
INPPHASE	Specified input port's phase measurement exceeds usable value.	NR | NA | MN | MJ | CR	IMMED	No	MN	MN
EXDSC	Input has had excessive discontinuities, indicated by more than 3 signal faults of the same type within a 5-minute period. The alarm clears when the 5-minute window contains less than 3 alarms of the same type.	NR | NA | MN | MJ | CR	IMMED	No	MN	MN
FFOFF	Input has exceeded FFOFF threshold		IMMED	No	MN	MN
MTIE	Input has exceeded at least 1 of the MTIE alarm thresholds		IMMED	No	MN	MN
TPIUSIG	Composite timing signal interface is not functionin		IMMED	No	MN	MN
<aid> = PRS						
INPDISQ	Specified input has been disqualified or qualified as a possible system reference.	MN | MJ | CR	FLT DELAY	Yes	MN	MN
INPLOS	Specified input has Loss Of Signal.[2]	MN | MJ | CR	IMMED	No	MN	MN
INPFRQ	Specified input has calculated received frequency that exceeds the pull-in range of the LO. This alarm condition disqualifies the input as a possible reference.[3]	NR | NA | MN | MJ | CR	IMMED	No	MN	NR
INPPHASE	Specified input port's phase measurement exceeds usable value.	NR | NA | MN | MJ | CR	IMMED	No	MN	MN

Alarm ID	Description of Alarm Condition	Possible Alarm Levels	Error Delay Default	Error Delay Editable?	Default Level	
					SSU Mode	SUB Mode
EXDSC	Input has had excessive discontinuities, indicated by more than 3 signal faults of the same type within a 5-minute period. The alarm clears when the 5-minute window contains less than 3 alarms of the same type.	NR | NA | MN | MJ | CR	IMMED	No	MN	MN
FFOFF	Input has exceeded FFOFF threshold		IMMED	No	MN	MN
MTIE	Input has exceeded at least 1 of the MTIE alarm thresholds		IMMED	No	MN	MN
<aid> = INP1 or INP2						
INPDISQ	Specified input has been disqualified or qualified as a possible system reference.	MN | MJ | CR	FLT DELAY	Yes	MN	MN
INPAIS	The specified input is receiving an Alarm Indication Signal.[1]	MN | MJ | CR	IMMED	No	MN	MN
INPLOS	The specified input has Loss of Signal.[1]	MN | MJ | CR	IMMED	No	MN	MN
INPOOF	The specified input is receiving an Out of Frame signal.[1]	MN | MJ | CR	IMMED	No	MN	MN
INPFRQ	Specified input port's calculated received frequency exceeds the pull-in range of the LO.This alarm condition disqualifies the input as a possible reference.[2]	NR | NA | MN | MJ | CR	IMMED	No	MN	NR
INPPHASE	Specified input port's phase measurement exceeds usable value.	NR | NA | MN | MJ | CR	IMMED	No	MN	MN

Alarm ID	Description of Alarm Condition	Possible Alarm Levels	Error Delay Default	Error Delay Editable?	Default Level	
					SSU Mode	SUB Mode
INPQL	The received SSM is of lesser quality than the provisioned QLEVEL for a specified input. This alarm occurs when you provision the input's QLEVEL below the quality level of the LO.	NR | NA | MN | MJ | CR	IMMED	No	MN	MN
EXDSC	Input has had excessive discontinuities, indicated by more than 3 signal faults of the same type within a 5-minute period. The alarm clears when the 5-minute window contains less than 3 alarms of the same type.	NR | NA | MN | MJ | CR	IMMED	No	MN	MN

<aid> = RTM

Alarm ID	Description of Alarm Condition	Possible Alarm Levels	Error Delay Default	Error Delay Editable?	SSU Mode	SUB Mode
S1LOS	Side 1 LOS fault	MN | MJ | CR	IMMED	No	MN	MN
S2LOS	Side 2 LOS fault	MN | MJ | CR	IMMED	No	NA	NA
EXSLIP	Input has excessive slip rate.	NR | NA | MN | MJ | CR	IMMED	No	NA	NA
RTMFAULT	IOC cannot determine if the Retimer is functioning properly.	NR | NA | MN | MJ | CR	IMMED	Yes	NA	NA

Note:

[1] When the fault is detected, the input is immediately removed from the possible reference list. The fault must be continuously present for the period specified by FLTDELAY before the alarm is set. After the alarm is set, it clears once the input signal is fault-free for the period specified by CLRDELAY.

[2] When the fault is detected, the input is immediately removed from the possible reference list. The fault must be continuously present for the period specified by FLTDELAY before the alarm is set. After the alarm is set, it clears once the input signal is fault-free for the period specified by CLRDELAY.

[3] Once INPFREQ is set, the alarm clears when the input frequency is within the defined pull-in range

Sample Command

```
SET-ATTR::SYS:TS1000::ELEVTIME=ENABLE;
```

This command allows alarms to automatically escalate to the next higher alarm level after the time period specified in the FLTDELAY keyword has elapsed (see Provisioning System-Level Alarms, on page 121, for more details).

Sample Command

```
SET-ATTR::SYS:TS1000::EXPFAIL=NA;
```

This command disables the Expansion Fail alarm that occurs if you are not using an Expansion Panel with the TimeProvider.

Provisioning System-Level Alarms

You use the ED-SYNC command to provision system-level alarms. The CLRDELAY and FLTDELAY parameters are system-wide; the parameters cannot be set for individual alarms.

```
ED-SYNC:[<tid>]:<aid>:[<ctag>]::<keyword>=<value>;
```

This command has a default access level of ADMIN.

<aid>	<keyword>	<value>	Description	Default value
SYS			Access identifiers	
	CLRDELAY	0 to 1000 s	Sets the time delay to declare a valid input after an alarm condition clears	10 s
	FLTDELAY	1 to 15 s	Sets the time delay before a fault is declared due to LOS, AIS, or OOF alarms on the input	5 s
	FREEFLT	ON|SQUELCH | AIS	Determines the action when the LO enters the Free-Run mode	SQUELCH
	HOLDFLT	ON|SQUELCH | AIS	Determines the action when the LO enters the Holdover mode	ON

Sample Command

```
ED-SYNC::SYS:TS1000::CLRDELAY=5;
```

This command declares a faulted input to be valid five seconds after the alarm condition has cleared.

Autonomous Message

```
    TP-SSU 03-10-24 11:18:00
A 1192 REPT EVT
    "SYS,EQPT:NA,CLRDELAY,NSA,03-10-24 11-18-00:\"INPUT CLEAR
DELAY HAS CHANGED\""
;
```

Retrieving Current Alarm Settings

You can display the current settings for any alarm using the RTRV-ATTR command.

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

This command always has a access level of USER.

<aid>	<keyword>	Description
SYS		System Level
	ELEVTIME	ENABLE | DISABLE
SYS IMC IOC PRS INPp (p = 1 | 2)	Alarm ID	The Alarm ID is described in Provisioning the Alarm Levels, on page 114
ALL (or null)	ALL (or null)	Returns all of the alarm attributes

Response Format

```
<cr><lf><lf>
    sid date time<cr><lf>
M  ctag COMPLD<cr><lf>
    "<aid>:event id,alarm level"<cr><lf>
    "<aid>:event id,alarm level"<cr><lf>
      .
      .
    "<aid>:event id,alarm level"<cr><lf>
;
```

Field	Description
<aid>	The aid specified in the command

Field	Description
event id	The identifier of the alarm whose level is displayed
alarm level	The value indicates the alarm level that is generated by an alarm event: NR = Not Reported NA = A non-alarm event MN = Minor alarm MJ = Major alarm CR = Critical alarm

Sample Command

```
RTRV-ATTR::SYS:TS1000;
```

This command causes the TimeProvider to return the alarm levels associated with all system-level alarms.

Normal Response

```
    TP-SSU 03-10-24 11:21:20
M   TS1000 COMPLD
    "SYS:IOC1EQPT,NA"
    "SYS:IOC2EQPT,NA"
    "SYS:PWRA,MJ"
    "SYS:PWRB,MJ"
    "SYS:EXTALM1,MJ"
    "SYS:EXTALM2,CR"
    "SYS:EXPFAIL,MJ"
;
```

Retrieving Current Alarms

You can display the current active alarms using the RTRV-ALM command.

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

This command has a default access level of USER.

<aid>	Description
ALL (or null) SYS IMC IOCm (m = 1 | 2) PRS INPp (p = 1 | 2) OUTg (g = A | B | C | D)	Access identifiers

Normal Response Format

```
<cr><lf><lf>
^^^sid^date^time<cr><lf>
M^<ctag>^COMPLD
^^^"<aid>,aidtype:ntfcncde,condtype,srveff,ocrdat,ocrtim
<:condscr>"<cr><lf>*
;
```

where * indicates zero or more of the preceding element

Response	
Value	**Description**
<aid>	Access identifier
aidtype	Access identifier type EQPT – alarm associated with operation of the system T1 – alarm associated with inputs or outputs
ntfcncde	Notification code: MN – Minor alarm MJ – Major alarm CR – Critical alarm
condtype	Condition type – keyword associated with the command
srveff	Service effective indicator
ocrdat	Occurrence date of the alarm
ocrtim	Occurrence time of the alarm
condscr	Optional condition description – text string enclosed in quotation marks

Sample Command

```
RTRV-ALM:::TS1000;
```

This command causes the TimeProvider to return all current alarms.

Normal Response

```
   TP-SSU 03-10-24 11:22:11
M  TS1000 COMPLD
   "SYS,EQPT:MJ,PWRA,NSA,03-10-24 11-22-11:\"POWER A FAILED\""
   "SYS,EQPT:MJ,EXPFAIL,SA,03-10-24 11-22-11:\"EXPANSION CONNECTIVITY FAILED\""
   "IOC2,EQPT:MJ,CLKFREE,SA,03-10-24 11-25-15:\"CLOCK ENTERED FREE-RUN MODE\""
   "INP1,T1:MN,INPLOS,NSA,03-10-24 11-25-16:\"LOS FAULT\""
   "INP2,T1:MN,INPDISQ,NSA,03-10-24 11-25-17:\"INPUT DISQUALIFIED AS POSSIBLE
REFERENCE\""
   "INP2,T1:MN,INPLOS,NSA,03-10-24 11-25-17:\"LOS FAULT\""
;
```

Displaying Alarm Status

The RTRV-COND command displays information about the current summary alarm status of components within the TimeProvider. The active IOC reports alarms for the Input, Output, and Expansion Panel.

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

This command always has a access level of USER.

<aid>	Description
ALL (or null)	Access Identifiers

Normal Response Format
```
<cr><lf><lf>
^^^sid^date^time<cr><lf>
M ^ctag^COMPLD<cr><lf>
^^^"SYS:<pwra>,<pwrb>,<expstatus>,<extfault>,<ioc1eqpt>,
<ioc2eqpt>,<sysqlevel>,<lastdat>,<lasttim>"<cr><lf>
^^^"IMC:<ioc1comm>,<ioc2comm>"<cr><lf>
[^^^"IOC1:<iocstatus>,<ioccomm>,<imccomm>"<cr><lf>]
[^^^"IOC2:<iocstatus>,<ioccomm>,<imccomm>"<cr><lf>]
^^^"GPS:<gpsstatus>"<cr><lf>
^^^"PRS:<prsstatus>"<cr><lf>
^^^"INP1:<inpstatus>"<cr><lf>
^^^"INP2:<inpstatus>"<cr><lf>
```

```
^^^"OUTA:<outstatus>"<cr><lf>
^^^"OUTB:<outstatus>"<cr><lf>
^^^"OUTC:<outstatus>"<cr><lf>
^^^"OUTD:<outstatus>"<cr><lf>
;
```

Response	
<aid>	**Description**
SYS	Displays the connectivity status of the System, Expansion Panel, and any alarms associated with the Expansion Panel <pwra> – PWRA-OK | PWRA-FAIL <pwrb> – PWRB-OK | PWRB-FAIL <expfail> – EXP-OK | EXP-ALM <extalm1> – EXT1-OK | EXT1-ALM <extalm2> – EXT2-OK | EXT2-ALM <ioc1eqpt> – IOC1-EQPT | IOC1-UNEQPT <ioc2eqpt> – IOC2-EQPT | IOC2-UNEQPT <sysqlevel> – System (output) Quality Level 1|2|...|9 <lastdat> – Date of last instance the system was provisioned by a user; format is YY-MM-DD <lasttim> –Time of last instance the system was provisioned by a user; format is HH-MM-SS
IMC	Displays all conditions related to the Information Management module <ioc1comm> – IOC1COMM-OK | IOC1COMM-FAIL <ioc2comm> – IOC2COMM-OK | IOC2COMM-FAIL

IOCm
m = 1 | 2
	Displays the current setup and conditions related to the system-level function of the IOC module
	<iocstatus> – OK | ALM (IOCFAIL)
	<ioccomm> – IOC1TO2COMM-OK | IOC1TO2COMM-FAIL
	      IOC2TO1COMM-OK | IOC2TO1COMM-FAIL
	<imccomm> – IMC1COMM-OK | IMC1COMM-FAIL
	      IMC2COMM-OK | IMC2COMM-FAIL

GPS	Displays GPS Input state and any alarm events associated with GPS input. Unequipped indicates TPIUEQPT connectivity alarm. <gpsstatus> – OK | ALM | UNEQUIPPED
PRS	Displays PRS Input state and any alarm events associated with PRS input <prsstatus> – OK | ALM
INPp p = 1 | 2	Displays Input state and any alarm events associated with Inputs 1 or 2 <inpstatus> – OK | ALM

Response	
<aid>	**Description**
OUTg g = 1 | 2 | 3 | 4	Displays output status; this reflects the state of IOCFAIL of the active IOC. Unequipped indicates OUTgEQPT module removed. <outstatus> – OK | ALM | UNEQUIPPED
RTMg g = 1 | 2 | 3 | 4	Displays Retimer status and any alarm events associated with both ports 1 and 2 on the specified Retimer module. Unequipped indicated RTMgEQPT module removed <rtm1status> – OK | ALM | UNEQUIPPED <rtm2status> – OK | ALM | UNEQUIPPED

Sample Command

```
RTRV-COND::IOC:TS1000;
```

This command causes the TimeProvider to return the status of the power supplies and the optional Expansion Panel.

Normal Response

```
    TP-SSU 03-10-24 11:27:28
M  TS1000 COMPLD
    "SYS,PWRA-OK,PWRB-OK,OK,OK"
;
```

Clearing Alarms

Clearing the Office (Audible) Alarm

Use the following TL1 command to turn off (squelch) the audible office alarm. The office alarm reactivates when a new alarm occurs.

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

This command has a default access level of USER.

Sample Command

```
OPR-ACO-ALL:::TS1000;
```

Normal Response

```
    TP-SSU 03-10-24 11:26:47
M  TS1000 COMPLD
    "IMC,EQPT:NA,ACO,NSA,03-10-24 11-26-47:\"AUDIO ALARM IS
DEACTIVATED"
;
```

System Commands

This section describes the TL1 commands you use to perform the following routine operations with the TimeProvider:

- Displaying events

- Displaying the current configuration

- Restarting the TimeProvider

Displaying Events

The RTRV-LOG command displays all the events in the event log in chronological order (first in - first out). The event log contains the 500 most recent alarmed and non-alarmed events. Alarms with an alarm level of NONE are not stored in the log.

```
RTRV-LOG:[<tid>]:[<aid>]:[<ctag>][::<keyword>=<value>];
```

This command has a default access level of USER.

<aid>	<keyword>	Description
ALL (or null) IMC IOC IOCm (m = 1 | 2) GPS PRS INPp (p = 1 | 2) OUTg (g = A | B | C | D)		Access identifiers
	All (or null)	Displays both events and alarms stored in the log for the specified aid
	EVT	Displays events stored in the log for the specified event
	ALM	Displays alarms stored in the log for the specified event

Sample Command
```
RTRV-LOG::INP1:TS1000::ALM;
```

This command causes the TimeProvider to return all alarms stored in the log for Input 1.

Normal Response

```
    TP-SSU 03-10-24 11:28:02
M 2 COMPLD
    "INP1,T1:MJ,ALM,NSA,03-10-24 11-26-47"
;
```

Normal Response Format

```
<cr><lf><lf>
^^^sid^date^time<cr><lf>
M^<ctag>^COMPLD
^^^"<aid>,<aidtype>:ntfcncde,condtype,srveff,ocrdat,ocrtim
<:condscr>"<cr><lf>*
;
```

where * indicates zero or more of the preceding element

Displaying the Configuration of the TimeProvider

Use the following TL1 command to display the current equipment parameters. You can display the parameters for the following components: SYS, COM, IOC, GPS, PRS, INP, and OUT.

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

This command has a default access level of USER.

Response	Description
<aid>	The access identifier for the equipment component (SYS, COM, IMC, IOC, GPS, PRS, INP, or OUT)
<keyword>	The specific equipment parameter you requested See the *TimeProvider TL1 Reference Guide* for details on the available keywords.
<value>	The current setting of the requested equipment parameter.

Sample Command

```
RTRV-EQPT::IOC1:TS1000::IOCMODE;
```

This command causes the TimeProvider to return the current operating mode for IOC1.

Normal Response

```
    TP-SSU 03-10-24 11:30:42
M  TS1000 COMPLD
    "IOC1:IOCMODE,ACTIVE"
;
```

Normal Response Format

```
<cr><lf><lf>
^^^sid^date^time<cr><lf>
M ^ctag^COMPLD<cr><lf>
^^^"<aid>:<keyword>,<value>"<cr><lf>
;
```

Restarting the TimeProvider

Use the INIT-SYS command to reset the specified module or to clear all information stored in non-volatile memory. All users logged in to the TimeProvider are logged out and the user list is cleared.

> **Caution:** This command causes the local oscillator in the specified IOC to enter the Warm-up mode; the outputs remain in the holdover mode until the local oscillator locks on to the input reference signal.
>
> All SYS parameters are reset, including the entire user list. You must create a new security-level user after issuing this command with the SYS:FACTORY aid and keyword.

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

This command has a default access level of ADMIN.

<aid>	<keyword>	Description
SYS	FACTORY	Resets the SID, security, communication ports, and alarm settings to factory defaults (see Appendix A, Factory Default Values)
IMC IOCm m = 1 | 2	RESET	Performs a soft reset on the card and clears all alarms. Does not affect the SID, security, communication ports, and alarm settings

Sample Command

```
INIT-SYS::IOC1:::RESET;
```

Autonomous Message

```
   TP-SSU 03-10-24 11:31:52
A 1193 REPT EVT
   "IOC,EQPT:MN,RESET,NSA,03-10-24 11-30-42:\"MODULE HAS
BEEN RESET\""
;
```

Saving Provisioning Data

Symmetricom recommends that you keep an electronic version and/or a written version of the provisioning changes you make to the TimeProvider.

Electronically Backing up Provisioning Data

Copy the contents of the IOC into the IMC memory by issuing the CPY-MEM command as follows. See the *TimeProvider TL1 Reference Guide* for more information on the CPY-MEM command.

```
CPY-MEM:::TS1000::IOC,IMC,IOC;
```

Copy the contents of the IMC into the IOC memory by issuing the CPY-MEM command as follows:

```
CPY-MEM:::TS1000::IMC,IOC,IMC;
```

This command may take more than two seconds to execute; if it does, then the In-Process response is issued. This command also logs off all users connected to the TimeProvider.

If two IOCs are in the shelf, the Active IOC automatically saves its data in the Standby IOC.

Provisioning Worksheet

Use Table 4-3 to record the values you provisioned into the TimeProvider.

Table 4-3. Provisioning Record

Section	Parameter	User-Defined Value
Setting the Source ID <sid>, on page 84	Source ID (<sid>	
Setting RS-232 Parameters, on page 86	Baud rate	
	Handshaking mode	
	Echo mode	
Setting Ethernet Parameters, on page 88	IP Gate address	
	IP address	
	IP Subnet address	
	IP Host 1 address	
	IP Host 2 address	
	IP Host 3 address	
	IP Host 4 address	

Table 4-3. Provisioning Record (Continued)

Section	Parameter	User-Defined Value
Setting the System Mode, on page 96	System mode	
Setting the IOC Parameters, on page 98	Oscillator type, IOC1	
	Oscillator type, IOC2	
Setting the Input State, on page 99	Input mode, PRS	
	Input mode, INP1	
	Input mode, INP2	
	Input mode, GPS	
Setting the GPS Parameters, on page 100	GPS Mode	
	GPS Position	
	GPS Elevmask	
Setting the Input Frequency, on page 101	Frequency, PRS	
Setting the Input Frame Type, on page 102	Frame type, INP1	
	Frame type, INP2	
Controlling Automatic Reference Switching, on page 102	Reference mode	
Setting the Input Quality Level, on page 104	QLEVEL, PRS	
	QLEVEL, INP1	
	QLEVEL, INP2	
	QLEVEL, GPS	
Setting the Input Priority Level, on page 105	PRIORITY, PRS	
	PRIORITY, INP1	
	PRIORITY, INP2	
	PRIORITY, GPS	
Manually Selecting the Reference, on page 105	INPREF	
Provisioning the SSM, on page 106	SSMBIT, INP1	
	SSMBIT, INP2	
Enabling CRC4, on page 108	CRCENA, INP1	
	CRCENA, INP2	

Table 4-3. Provisioning Record (Continued)

Section	Parameter	User-Defined Value
Enabling and Disabling the Outputs, on page 111	OUTSTATE, OUTA	
	OUTSTATE, OUTB	
	OUTSTATE, OUTC	
	OUTSTATE, OUTD	
Provisioning the Output Framing Type, on page 111	FRMTYPE, OUTA	
	FRMTYPE, OUTB	
	FRMTYPE, OUTC	
	FRMTYPE, OUTD	
Provisioning the Alarm Levels, on page 114	ELEVTIME	
Provisioning System-Level Alarms, on page 121	CLRDELAY	
	FLTDELAY	
	FREEFLT	
	HOLDFLT	

Chapter 5 Testing the TimeProvider

This chapter describes a basic acceptance test for the TimeProvider product.

In This Chapter

Testing the TimeProvider

Perform the tests described in this chapter after you install (see Chapter 3, Installing the TimeProvider) and provision (see Chapter 4, Provisioning the TimeProvider) the TimeProvider. Record the results in the Test Record in Test Record, on page 143. These tests verify the operation of the TimeProvider and are not mandatory for operating the unit.

Test Overview

This chapter describes four tests that verify the operation of the TimeProvider:

- Verify normal operation
- Test alarm conditions
- Test communication ports
- Perform output checks

Test Equipment

To perform the tests in this chapter, you need the following equipment:

- Volt-ohmmeter
- Oscilloscope
- Communications analyzer

Verifying Normal Operation

The LEDs on the IMC and the IOC(s) indicate the status of the TimeProvider. Table 5-1 shows the condition of the LED indicators on the front panel of the IOC under normal operating conditions.

Table 5-1. LED Conditions for the IOC

LED Name	Condition	Description
Power	Green	Power is On
Fail	Off	No failure
Alarm	Off	No alarm
Active	Green Off	Card is active Card is in standby mode

Table 5-1. LED Conditions for the IOC (Continued)

LED Name	Condition	Description
Holdover	Off	Tracking at least one input
PRS	Q LED Green, A LED Green Q LED Green, A LED Off Q LED Red, A LED Off	Enabled, qualified, and active Enabled, qualified, and not active Enabled and not qualified
Input 1	Q LED Green, A LED Green Q LED Green, A LED Off Q LED Red, A LED Off	Enabled, qualified, and active Enabled, qualified, and not active Enabled and not qualified
Input 2	Q LED Green, A LED Green Q LED Green, A LED Off Q LED Red, A LED Off	Enabled, qualified, and active Enabled, qualified, and not active Enabled and not qualified
GPS	Off Green Amber Red	1 PPS signal is not present 1 PPS signal is active Bridging mode fault Loss of 1 PPS signal, TPIU fault, or antenna fault

Table 5-2 shows the condition of the LED indicators on the front panel of the IMC under normal operating conditions

Table 5-2. LED Conditions for the IMC

LED Name	Condition	Description
Power	Green	Power is On
Fail	Off	No failure
Alarm	Off	No alarm
Critical	Off	No Critical alarms
Major	Off	No Major alarms
Minor	Off	No Minor alarms
ACO	Off	Alarm cutoff disabled

Testing Alarm Conditions

Testing the IOC Operating Modes

Warm-up Mode

The IOC enters and remains in the Warm-up mode for approximately 30 minutes after you apply power to the shelf, or when you install the IOC into the shelf. The following actions occur when an IOC enters the Warm-up mode:

- The Power LED on the IOC flashes green

- An event is generated and stored in the event log

To verify that an IOC is in warm-up mode:

1. Apply an appropriate signal to the INP1, INP2, and/or PRS inputs.

2. Visually inspect the Power LED on the appropriate IOC. The LED is flashing green in the Warm-up mode.

3. Type `RTRV-ALM::IOC1;` (or `RTRV-ALM::IOC2;`). The TimeProvider responds with a complied message indicating that the designated IOC is in alarm.

Locked Mode

The IOC enters and remains in the locked mode after it has completed the warm-up cycle. The following actions occur when an IOC enters the Locked mode:

- The Power LED on the IOC is green

- An event is generated and stored in the event log

To verify that an IOC is in locked mode:

1. Visually inspect the Power LED on the appropriate IOC. The LED is continually green when the IOC is tracking at least one input.

2. Type `RTRV-LOG::IOC1:::EVT;` (or `RTRV-LOG::IOC2:::EVT;`). The TimeProvider responds with a list of events related to the specified IOC. Look for the entry with the text "Clock entered lock mode."

Testing the Reference Switching

To test the ability of the TimeProvider to switch references, you perform a two-step test:

- Connect appropriate reference inputs to the TimeProvider.
- Create a fault on the selected reference signal and observe that the TimeProvider changes to the appropriate secondary input.

To test the reference switching:

1. Connect a suitable reference signal to the PRS input and a second reference signal to the INP1 input. Wait for the Qualified LEDs for both inputs to turn green and for the Active LED to light on the PRS input.

2. Issue the `ED-EQPT::PRS:::INSTATE=DISABLE;` command to disable the PRS input and force the TimeProvider to switch to the INP1 reference.

3. Observe that the Active LED changes from the original input to the secondary input (PRS to INP1 or INP1 to PRS).

Testing the Non-Revertive Operating Mode

When the TimeProvider is in the non-revertive operating mode, the input reference signal does not revert to the original input after it recovers from an error condition.

The TimeProvider is in non-revertive mode when the QLEVEL parameter for INP1, INP2, and PRS inputs is set to the same value, and the PRIORITY parameters for the same inputs are set to the same level.

To test the non-revertive operating mode, perform the following steps:

1. Define the non-revertive mode by setting the QLEVEL and PRIORITY parameters to appropriate values. See Setting the Input Quality Level, on page 104, and Setting the Input Priority Level, on page 105, for further information.

2. Provision and connect appropriate reference inputs to the TimeProvider.

3. Create a fault on the selected reference signal and observe that the TimeProvider changes to the appropriate secondary input.

4. Remove the fault on the initial reference signal and observe that the TimeProvider does not revert to that initial reference input. The event log indicates that the reference signal is no longer in fault.

Testing the Revertive Operating Mode

When the TimeProvider is in the revertive operating mode, the input reference signal reverts to the original input after it recovers from an error condition.

The TimeProvider is in the revertive mode when the QLEVEL parameter for INP1, INP2, and PRS inputs are set to different values, and the PRIORITY parameters for the same inputs are also set to different values.

To test the revertive operating mode, perform the following steps:

1. Define the revertive mode by setting the QLEVEL and PRIORITY parameters to appropriate values. See Setting the Input Quality Level, on page 104, and Setting the Input Priority Level, on page 105, for further information.

2. Provision and connect appropriate reference inputs to the TimeProvider.

3. Create a fault on the selected reference signal and observe that the TimeProvider changes to the appropriate secondary input.

4. Remove the fault on the initial reference signal and observe that the TimeProvider reverts to the initial reference input. The event log and the LEDs indicate that the input is no longer in fault, and that the reference has changed.

Testing the Power Alarms

To test the ability of the TimeProvider to detect and report problems with the battery power, you perform a two-step test:

- Connect power to the TimeProvider on both Batt A and Batt B terminals
- Remove power from one terminal and observe that the TimeProvider issues the appropriate alarm

When power is lost from the Batt A or Batt B terminal, the factory default alarm is Major.

1. Connect the appropriate power supply to both the Batt A and Batt B connectors. The TimeProvider enters the Warm-up mode.

2. Remove power from either the Batt A or Batt B terminal. Observe that the Major LED on the IMC is red. Verify that a Major alarm is included in the event log.

Detecting Input Errors

You can provision the TimeProvider to perform a variety of functions when an input error occurs. Possible errors include:

- AIS - Alarm Indication Signal
- LOS - Loss of Signal
- OOF - Out of Frame
- Loss of Alignment
- Excessive wander
- Input is disqualified

The TimeProvider reports these and other errors on the front panel alarm LEDs, in an autonomous event message, and via devices connected to the alarm relays. You can provision each error to a specific alarm level (Minor, Major, or Critical).

Setting an Alarm Strategy

You can set up the input alarms to prevent spurious input errors from triggering an alarm. The FLTDELAY keyword parameter sets a period from 1 to 15 seconds that an input error must be present before the alarm is issued. You can provision the alarm to clear from 1 to 1000 seconds after the input error clears using the FREEFLT keyword parameter. Use the ED-SYNC command syntax described in Provisioning System-Level Alarms, on page 121 to provision the FLTDELAY and CLRDELAY keywords.

Testing the Communication Ports

The TimeProvider has three communication ports. This section describes how to test each port; if you do not plan to use a port, then you can skip the corresponding test.

- Local Craft serial port
- Remote serial port
- Ethernet port

Testing the Local Craft Serial Port

The local Craft serial port is on the faceplate of the IMC, and is configured as a DCE device. The default settings for the local Craft serial port are 9600 Baud, 8 bits, no parity, 1 stop bit, echo on, and handshaking disabled.

To connect a device to the local Craft port, perform the following steps:

1. Connect a straight-through serial cable to the local Craft port. Connect the other end of the cable to a computer.

2. Start a terminal emulation program such as HyperTerminal or ProComm Plus. Configure the program for 9600 baud, 8 data bits, No parity, and 1 stop bit.

3. Type ; (semicolon). If the TimeProvider responds with a Deny response, you have established communications. If you do not receive the Deny response, check the connections, the cable, and the program settings.

Testing the Remote Serial Port

The Remote port is for remote dial-in connection to the unit, and is configured as a DTE device. The default settings for the Remote serial port are 9600 Baud, 8 bits, no parity, 1 stop bit, echo on, and handshaking disabled.

To connect a device to the Remote port, perform the following steps:

1. Connect a null-modem serial cable to the Remote port. Connect the other end of the cable to a computer.

2. Start a terminal emulation program such as HyperTerminal or ProComm Plus. Configure the program for 9600 baud, 8 data bits, No parity, and 1 stop bit.

3. Type ; (semicolon). If the TimeProvider responds with a Deny response, you have established communications. If you do not receive the Deny response, check the connections, the cable, and the program settings.

Testing the Ethernet Port

You use a direct connection when a service technician is on-site. You must configure the Ethernet settings using a serial connection before using the Ethernet connection; the procedure is described in Setting Ethernet Parameters, on page 88.

To connect the TimeProvider to a PC or terminal using Ethernet, perform the following steps:

1. Connect an RJ-45 Ethernet cable to the LAN connector on the shelf.

2. Connect the other end of the cable to the PC or terminal.

3. Start a terminal emulation program such as HyperTerminal or ProComm Plus. Configure the program for a telnet session and enter the IP address with port 5000 of the TimeProvider.

4. Type ; (semicolon). If the TimeProvider responds with a Deny response, you have established communications. If you do not receive the Deny response, check the connections, the cable, and the program settings.

Testing the Outputs

The TimeProvider supports up to 32 output signals on four output groups. You can provision the output signal to the following types: 2M, CAS, D4, ESF, CC, JCC, JCC4, 1.544 MHz, 6.312 MHz, 8 kHz, or ISOLATED_1.

To test the outputs, connect the communications analyzer to the output under test and observe that the waveforms meet or exceed the specifications for that signal type.

Test Record

Use Table 5-3 to record the results of the tests performed on the TimeProvider.

Table 5-3. Record of Test Results

Test	Results (Pass/Fail)	Date	Initials
Verifying Normal Operation			
IOC Operating Modes			
Reference Switching			
Non-Revertive Mode			
Revertive Mode			
Power Alarms			
Input Errors			
Local Serial Port			
Remote Serial Port			
Ethernet Port			
Outputs			

Chapter 6 Maintaining and Troubleshooting the TimeProvider

This chapter describes maintenance and troubleshooting procedures for the TimeProvider.

In This Chapter

- Preventive Maintenance
- Safety Considerations
- ESD Considerations
- Diagnosing the IOC
- Diagnosing the IMC
- Diagnosing the TPIU
- Replacing Output Modules
- Replacing the Input Module
- Troubleshooting the TimeProvider
- Repairing the TimeProvider
- Obtaining Technical Assistance
- Upgrading the Firmware
- Returning the TimeProvider
- User Guide Updates

Preventive Maintenance

The TimeProvider shelf requires minimal preventive maintenance. Take care to ensure the unit is not exposed to hazards such as direct sunlight, open windows, water, or extreme heat. See Environmental Requirements in Pre-Installation Check, on page 48, for electromagnetic compatibility conditions that may cause damage.

Caution: To avoid electromagnetic discharge damage to the circuitry, never attempt to vacuum the TimeProvider main shelf or expansion shelf.

Caution: To avoid damage, under no circumstances should the interior chassis of the TimeProvider be allowed to come in contact with water.

Table 6-1 lists preventive maintenance measures to be performed periodically. Do not disassemble components just for the purpose of inspection.

Table 6-1. Preventive Maintenance

Item	Inspection	Corrective Action	Interval
Chassis	Inspect for dirt or foreign material	Clean the exterior of chassis with a soft dry cloth	Periodically
Cables	Inspect for pinched, worn or damaged cable	Replace pinched, worn or damaged cable at the first opportunity	Periodically
Connectors	Inspect for loose or damaged connector	Tighten loose connectors. If damaged, replace the connector and/or cable at the first opportunity	Periodically

Safety Considerations

Follow your company's safety guidelines and policies when working on or around live equipment.

ESD Considerations

Maintenance personnel should wear ESD wrist straps when installing or working on all TimeProvider equipment and cards. Plug the user-supplied wrist strap into the TimeProvider shelf. Place IMC and IOC cards as well as the Input and Output panels into static-free bags when not in use.

Diagnosing the IOC

Reading LED Conditions

Table 6-2 shows the function of the LED indicators on the front panel of the IOC.

Table 6-2. LED Conditions for the IOC

LED Name	Condition	Description
Power	Green Off Flashing Green	Power is On Power is Off Warming Up
Fail	Red Off	Card failure No failure
Alarm	Green Off	Card alarm No alarm
Active	Green Off	Card is active Card is in standby mode
Holdover	Off Red	Tracking at least one input Tracking no inputs
PRS	Q LED Off, A LED Off Q LED Green, A LED Green Q LED Green, A LED Off Q LED Red, A LED Off	Disabled Enabled, qualified, and active Enabled, qualified, and not active Enabled and not qualified
Input 1	Q LED Off, A LED Off Q LED Green, A LED Green Q LED Green, A LED Off Q LED Red, A LED Off	Disabled Enabled, qualified, and active Enabled, qualified, and not active Enabled and not qualified
Input 2	Q LED Off, A LED Off Q LED Green, A LED Green Q LED Green, A LED Off Q LED Red, A LED Off	Disabled Enabled, qualified, and active Enabled, qualified, and not active Enabled and not qualified
GPS	Off Green Amber Red	1 PPS signal is not present 1 PPS signal is active Bridging mode fault Loss of 1 PPS signal, TPIU fault, or antenna fault

Interpreting Error Messages

Error messages appear on the console as they occur, and include the time and date of occurrence. Refer to the event codes described in Table 6-5 and to the alarm codes described in Table 6-7.

Compatibility Alarm

If you receive a COMPAT alarm, then one or more of the installed hardware and/or software components is not compatible with other components. Refer to the Software Release Notice (097-58001-20) for a list of compatible components and firmware revision levels. If necessary, update the firmware in one or more components using the procedures in Upgrading the Firmware, on page 181.

Removing the IOC

You can remove either of two IOCs in a shelf without affecting outputs. If you need to remove the only IOC in a shelf, or remove both IOCs from a shelf, outputs are interrupted and will resume once one IOC has achieved lock on an input signal.

Removing the Only IOC

To remove the only IOC in a shelf, use the following procedure. Output signals will be interrupted; they will resume once the IOC has achieved lock on an input signal.

1. Save the contents of the IOC memory in the IMC by issuing the following command:

    ```
    CPY-MEM:::::IOC,IMC,IOC;
    ```

    This command may take more than two seconds to execute; if it does, then the In-Process response is issued. See the *TimeProvider TL1 Reference Guide* for more information on the CPY-MEM command.

2. Issue the following command to take the IOC out of service:

    ```
    ED-EQPT::IOCm:::IOCSTATE=OOSRV;
    ```

    where m is 1 or 2, and determines which IOC you take out of service.

3. Attach a wrist grounding strap and connect it to the TimeProvider chassis.

4. Loosen the captive retaining screws and pull out on them to unseat the IOC from the shelf.

Warning: To avoid possible electrostatic damage to the IOC, place it in a static-free bag or on a static-free surface.

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5. Place the IOC in a static-free bag or on a static-free surface.

6. Install a new IOC using the appropriate procedure in Replacing the IOC, on page 150.

Removing a Redundant IOC

To remove one IOC when two IOCs are in a shelf, use the following procedure.

> **Note:** To avoid generating unnecessary alarms, be sure to take the IOC out of service before removing it.

> **Caution:** To avoid a loss of output signals, do not take the only IOC in a shelf out of service.

1. Issue the following command to take the IOC out of service:

    ```
    ED-EQPT::IOCm:::IOCSTATE=OOSRV;
    ```

    where m is 1 or 2, and depends on the slot in which the IOC is installed (1 is the left slot and 2 is the right slot).

    An IOC that is out of service cannot be selected to generate or monitor outputs. An out-of-service IOC does not generate alarms.

2. Attach a wrist grounding strap and connect it to the TimeProvider chassis.

3. Loosen the captive retaining screws and pull out on them to unseat the IOC from the shelf.

> **Warning:** To avoid possible electrostatic damage to the IOC, place it in a static-free bag or on a static-free surface.

4. Place the IOC in a static-free bag or on a static-free surface.

5. Install a new IOC using the appropriate procedure in Replacing the IOC, on page 150.

Removing Two IOCs

To remove both IOCs in a shelf, use the following procedure.

1. Save the contents of the Active IOC memory in the IMC by issuing the following command.

    ```
    CPY-MEM:::::IOC,IMC,IOC;
    ```

    This command may take more than two seconds to execute; if it does, then the In-Process response is issued. See the *TimeProvider TL1 Reference Guide* for more information on the CPY-MEM command.

2. Issue the following TL1 command to take the Standby IOC out of service:

```
ED-EQPT::IOCm:::IOCSTATE=OOSRV;
```

where m is 1 or 2, and corresponds to the location of the Standby IOC (1 is the left slot and 2 is the right slot).

⚠️ **Caution:** Output signals are turned off when you place the second IOC out of service.

---

3. Attach a wrist grounding strap and connect it to the TimeProvider chassis.

4. Loosen the captive retaining screws and pull out on them to unseat the IOC from the shelf.

⚠️ **Warning:** To avoid possible electrostatic damage to the IOC, place it in a static-free bag or on a static-free surface.

---

5. Place the IOC in a static-free bag or on a static-free surface.

6. Repeat Steps 2, 3, and 4 for the Active IOC.

7. Install new IOCs using the appropriate procedure in Replacing the IOC, on page 150.

Replacing the IOC

This section contains procedures for replacing IOC in three circumstances;

- Replacing the only IOC in a shelf
- Replacing one of two IOCs in a shelf
- Replacing both IOCs in a shelf

Replacing the Only IOC

To replace the only IOC in a shelf, use the following procedure. Output signals will resume once the IOC has achieved lock on an input signal. This procedure assumes that you have stored the contents of the IOC memory in the IMC using the CPY-MEM command.

1. Attach a wrist grounding strap and connect it to the TimeProvider chassis.

2. Install the IOC into the shelf and tighten the captive retaining screws.

3. Copy the contents of the IOC memory stored in the IMC by issuing the following command.

```
CPY-MEM:::::IMC,IOC,IOC;
```

This command may take more than two seconds to execute; if it does, then the In-Process response is issued. See the *TimeProvider TL1 Reference Guide* for more information on the CPY-MEM command.

If you have not stored the contents of the IOC memory in the IMC, then provision the IOC using the procedures and commands described in Chapter 4, Provisioning the TimeProvider.

4. Wait for the IOC to reboot and qualify the reference inputs.

Replacing a Redundant IOC

To replace either of two IOCs in a shelf, use the following procedure. Output signals will not be affected by this procedure. You can also use this procedure to add an IOC to a shelf that has only one IOC.

1. Install the IOC into the shelf and tighten the captive retaining screws.

2. Wait for the IOC to reboot and qualify the reference inputs. During this time the Active IOC updates the new IOC's memory with current values.

Replacing Both IOCs

Use this procedure to replace both IOCs in a shelf. Output signals will resume when the Active IOC has warmed up and qualified the reference signals. This procedure assumes that you have stored the contents of the IOC memory in the IMC using the CPY-MEM command.

1. Attach a wrist grounding strap and connect it to the TimeProvider chassis.

2. Install the IOC into the left slot of the shelf and tighten the captive retaining screws. This IOC will become the Active IOC.

3. Wait for the IOC to reboot.

4. Retrieve the contents of the IOC memory stored in the IMC by issuing the following command.

```
CPY-MEM:::::IMC,IOC,IOC;
```

This command may take more than two seconds to execute; if it does, then the In-Process response is issued. See the *TimeProvider TL1 Reference Guide* for more information on the CPY-MEM command.

If you have not stored the contents of the IOC memory in the IMC, then provision the IOC using the procedures and commands described in Chapter 4, Provisioning the TimeProvider.

5. Issue the following TL1 command to place the IOC in service:

    ED-EQPT::IOC1:::IOCSTATE=INSRV;

6. Install the IOC into the right slot of the shelf and tighten the captive retaining screws. This IOC will become the Standby IOC.

7. Wait for the IOC to reboot and qualify the reference inputs. During this time the Active IOC updates the new IOC's memory with current values.

8. Issue the following TL1 command to place the Standby IOC in service:

    ED-EQPT::IOC2:::IOCSTATE=INSRV;

Diagnosing the IMC

Reading LED Conditions

Table 6-3 shows the function of the LED indicators on the front panel of the IMC.

Table 6-3. LED Conditions for the IMC

LED Name	Condition	Description
Power	Green Off	Power is On Power is Off
Fail	Red Off	Card failure No failure
Alarm	Red Off	Card alarm No alarm
Critical	Red Off	Critical system alarm No alarm
Major	Red Off	Major system alarm No alarm
Minor	Yellow Off	Minor system alarm No alarm
Alarm Cutoff (ACO)	Green Off	On Off

Interpreting Error Messages

Error messages appear on the console as they occur, and include the time and date of occurrence. Refer to the event codes described in Table 6-5 and to the alarm codes described in Table 6-7.

Replacing the IMC

You can remove the IMC from the shelf and replace it without affecting outputs.

1. Save the contents of the IMC memory in an IOC by issuing the following command:

   ```
   CPY-MEM:::::IMC,IOC,IMC;
   ```

   This command may take more than two seconds to execute; if it does, then the In-Process response is issued. See the *TimeProvider TL1 Reference Guide* for more information on the CPY-MEM command.

2. Attach a wrist grounding strap and connect it to the TimeProvider chassis.

3. Remove the IMC by loosening the captive screws and pulling the IMC from the shelf.

   Warning: To avoid possible electrostatic damage to the IMC, place it in a static-free bag or on a static-free surface.

4. Place the IMC in a static-free bag or on a static-free surface.

5. Insert another IMC into the shelf and tighten the captive screws.

6. Reload the IMC memory from the IOC by issuing the following command:

   ```
   CPY-MEM:::::IOC,IMC,IMC;
   ```

Diagnosing the TPIU

Table 6-4 shows the function of the LED indicators on the front panel of the IMC.

Table 6-4. LED Conditions for the TPIU

LED Name	Condition	Description
TPIU Power	Green Off	Interconnection cable is connected Interconnection cable is disconnected or GPS input is disabled
Antenna Power	Green Red	TPIU is communicating with Antenna TPIU has lost communication with Antenna
Antenna Signal	Green Red Off	Antenna is communicating with the TPIU Master shelf is powering up Antenna has lost communication with the TPIU

Replacing Output Modules

The TimeProvider supports up to four Output modules on the shelf, and up to four additional Output modules on the Expansion Panel. A variety of Output modules is available to support different wiring schemes (see Making Output Connections, on page 60, for a description of the available Output modules).

To remove an Output module:

1. Disable the outputs on the Output module by issuing the command:

```
ED-EQPT::OUTg:::OUTSTATE=DISABLE;
```

   where g is the output group you are disabling (A, B, C, or D)

2. Attach a wrist grounding strap and connect it to the TimeProvider chassis.

3. Remove the output connections.

4. Remove the Output module by loosening the captive screws and pulling the module off the shelf.

> **Warning:** To avoid possible electrostatic damage to the Output module, place it in a static-free bag or on a static-free surface.

5. Place the module in a static-free bag or on a static-free surface.

To install an Output module:

1. Install the Output module on the connector on the shelf and tighten the captive screws.

2. Install the output signal connections to the Output module. After you install the connections, you can remove the protective ground strap from your wrist.

3. Enable the outputs on the Output module by issuing the command:

        ED-EQPT::OUTg:::OUTSTATE=ENABLE;

where g is the output group you are enabling (A, B, C, or D)

Replacing the Input Module

The Input module contains connectors for the input signals and the alarm output connector.

To remove the Input module:

1. Disable the inputs by issuing the following commands, as appropriate:

        ED-EQPT::PRS:::INSTATE=DISABLE;

        ED-EQPT::INPp:::INSTATE=DISABLE;

   where p is 1 to disable INP1 or 2 to disable INP2

2. Wait for the TimeProvider to enter the Holdover state before proceeding.

3. Attach a wrist grounding strap and connect it to the TimeProvider chassis.

4. Remove the input connections.

5. Remove the alarm connections.

6. Remove the Input module by loosening the captive screws and pulling the module off the shelf.

Warning: To avoid possible electrostatic damage to the Input module, place it in a static-free bag or on a static-free surface.

To install the Input module:

1. Install the Input module on the connector on the shelf and tighten the captive screws.

2. Install the input signal connections.

3. Install the alarm connections. After you install the connections, you can remove the protective ground strap from your wrist.

4. Enable the inputs by issuing the following commands as appropriate:

```
ED-EQPT::PRS:::INSTATE=ENABLE;

ED-EQPT::INPp:::INSTATE=ENABLE;
```

where p is 1 to enable INP1 or 2 to enable INP2

Troubleshooting the TimeProvider

Using Events to Troubleshoot

You can provision most events to generate an alarm; alarm levels include Critical (CR), Major (MJ), Minor (MN), Event, (NA), and Not Reported (NR). Table 6-5 lists the event ID and the description of events for the IMC, IOC, and IOC Input.

Table 6-5. Event Codes

Event ID	Keyword Description	AID TYPE	Default Value/ Keyword	Description of Values
		IMC Event Codes		
ACCLVL	The user's system access level has changed in the database	EQPT	SECURITY (when no users have been assigned to the system)	NONE – User has access to all commands; no Security has been assigned USER – User can access User-level commands ADMIN – User can access Admin-level commands SECURITY – User can access all commands
ACO	Audio alarm has been deactivated	EQPT	N/A	N/A

Table 6-5. Event Codes (Continued)

Event ID	Keyword Description	AID TYPE	Default Value/ Keyword	Description of Values
ALMCHG	The IMC alarm parameters have changed	EQPT	N/A	Alarm keywords and values are listed in Table 6-7. When the user changes a value, the ALMCHG event is generated and contains the keyword and value
AOMERGE	Enable/Disable autonomous event generation for the current session	EQPT	ENABLE	ENABLE – Autonomous messages are displayed in the current session DISABLE – Autonomous messages are not displayed in the current session
BAUD	The IMC serial port baud rate has changed	EQPT	9600	2400 | 9600 | 19200 | 28800 | 38400 | 57600
CMDCHG	The command access level has changed	EQPT	ACCLVL-USER	NONE | USER | ADMIN | SECURITY
ECHO	The current sessions' echo setting has changed	EQPT	DISABLE	ENABLE – User's keystrokes are echoed DISABLE – User's keystrokes are not echoed
FLOW	The IMC serial port flow control has changed	EQPT	NONE	NONE – No flow control SW – Software flow control XON/XOFF HW – Hardware flow control CTS/RTS SWHW – Both hardware and software flow control used
FWFAIL	Firmware upgrade of IMC or IOC was not successful	EQPT	n/a	n/a
FWOK	Firmware upgrade of IMC or IOC was successful	EQPT	n/a	n/a

Table 6-5. Event Codes (Continued)

Event ID	Keyword Description	AID TYPE	Default Value/ Keyword	Description of Values
INACTTIME	The communication inactivity timeout has been set. If no activity within the specified time, the session closes	EQPT	0	0 – Disable timeout 100 to 10000 seconds
INITLOG	The event log has been initialized	EQPT	n/a	n/a
IPADDR	The IMC Ethernet address has been changed	EQPT	127.0.0.1	1.0.0.1 to 254.255.255.254
IPGATE	The IMC Ethernet gateway address has been changed	EQPT	127.0.0.1	1.0.0.1 to 254.255.255.254
IPSUB	The IMC Ethernet subnet mask has been changed	EQPT	255.255.255.0	n/a
ISDIFF	Indicates that the CRC of two Istate images stored on separate modules are different	EQPT	n/a	n/a
ISEQ	Indicates that the CRC of two Istate images stored on separate modules are equal	EQPT	n/a	n/a
LOGECHO	The system echoes the login or logout events	EQPT	ENABLE	ENABLE – The login/logout events are echoed DISABLE – The login/logout events are not echoed
LOGIN	A user has logged in to the system	EQPT	n/a	n/a
LOGOUT	A user has logged out of the system	EQPT	n/a	n/a
PIDCHG	A user's password has changed in the database	EQPT	pid	User Password – up to 20 alphanumeric characters

Table 6-5. Event Codes (Continued)

Event ID	Keyword Description	AID TYPE	Default Value/ Keyword	Description of Values
RESET	The IMC has been reset by user command	EQPT	n/a	n/a
SIDCHG	The source ID has changed in the database	EQPT	n/a	20-character name used to identify the network element
UIDCHG	A user's name has changed in the database	EQPT	uid	User Identification – up to 20 characters
USRADD	A user has been added to the database	EQPT	uid pid uap	uid – assigned user name pid – assigned user password uap – assigned user access level
USRDEL	A user has been deleted from the database	EQPT	uid	uid – username
XFERFAIL	Transfer of the IMC Istate to the IOC, transfer of the IOC Istate to the IMC, or transfer of the IOC Istate to the redundant IOC was not successful	EQPT	n/a	n/a
XFEROK	Transfer of the IMC Istate to the IOC, transfer of the IOC Istate to the IMC, or transfer of the IOC Istate to the redundant IOC was successful	EQPT	n/a	n/a
IOC Event Codes				
CLKTYPE	The specified IOC clock has been set to the specified value. This value is used to define the IOCs pull-in range and SSM generation in Holdover mode	EQPT	TYPEI	ST3E | TYPE I ST2 | TYPE II

Table 6-5. Event Codes (Continued)

Event ID	Keyword Description	AID TYPE	Default Value/ Keyword	Description of Values
INPREF	The specified input has been set as the system reference	EQPT	PRS	PRS | INP1 | INP2
IOCMODE	The specified IOC has become Active	EQPT	ACTIVE	ACTIVE | STANDBY
IOCSTATE	The specified IOC has been inserted into the system. The IOC is automatically placed In-Service	EQPT	INSRV	INSRV – In service
	The specified IOC has been taken out of service. The IOC can no longer generate alarms, be provisioned, or accept queries			OOSRV – Out of service
	Communication between the IMC and IOC has failed			COMMFLT – Communications fault
	The specified IOC has been removed from the system			UNEQUIPPED
RESET	The indicated IOC is being restarted after a user-requested reset. All alarms are cleared, if it was Active, it becomes Standby	EQPT	n/a	n/a
SYSMODE	The system mode of operation has been changed	EQPT	SSU	SSU – Sync Supply Unit mode SUB – Subtending mode PRR – Primary Reference Receiver mode
IOC Clock Events				
CLKFSTLK	The local oscillator in the specified IOC is in Fast-Lock mode	EQPT	n/a	n/a

Table 6-5. Event Codes (Continued)

Event ID	Keyword Description	AID TYPE	Default Value/ Keyword	Description of Values
CLKLOCK	The local oscillator in the specified IOC is in Lock mode	EQPT	n/a	n/a
SCAVAIL	The specified IOC is in SmartClock mode	EQPT	OFF	OFF – SmartClock is not available ON – SmartClock is available
IOC Input Events				
CRCENA	Indicates whether the E1 (CAS) inputs are using CRC4 checking. If the E1 input is provisioned to read SSMs, then this value is Enabled	T1	DISABLE	ENABLE | DISABLE
FRMTYPE	Indicates the type of input framing or the input frequency. Sets the output framing type	T1	Output = 2M	1.544M – 1.544 MHz 2M – 2048 kHz 6.312M – 6.312 MHz CCS – CCS Input ESF – Extended SuperFrame input CC – Composite Clock input ISOLATED_1 – Generates an isolated one test pattern for T1 outputs JCC – Japan Composite Clock JCC4 – Japan Composite Clock with 400 Hz
OUTSTATE	The specified output state has changed	T1	DISABLE	ENABLE – The output generates the defined signal type DISABLE – Disables the output and clears all active alarms associated with the input
RQLEVEL	The received quality level on the specified input has changed	T1	n/a	Displays the prior quality level followed by the new quality level

Table 6-5. Event Codes (Continued)

Event ID	Keyword Description	AID TYPE	Default Value/ Keyword	Description of Values
SYS Events				
CLRDELAY	Time, in seconds, before a faulted signal indicates it is valid as a system reference	EQPT	5 s	0 to 1000 s
ELEVTIME	Indicates that Alarm elevation time (1440 min.) is enabled or disabled	EQPT	DISABLE	ENABLE | DISABLE
FACTORY	Indicates that the unit has been reset to Factory default. All modules installed in the system are reset	EQPT	n/a	n/a
FLTDELAY	Time, in seconds, before faulted signal indicates it is not valid as a system reference	EQPT	10 s	1 to 15 s
FREEFLT	Indicates if the Output Fault is issued when the local oscillator enters Free-Run mode.	EQPT	SQUELCH	ON – In fault mode, generate outputs based on system SSM AIS – In fault mode, generate AIS outputs SQUELCH – In fault mode, outputs are turned off
HOLDFLT	Indicates if the Output Fault is issued when the local oscillator enters Holdover mode	EQPT	ON	ON – In fault mode, generate outputs based on system SSM AIS – In fault mode, generate AIS outputs SQUELCH – In fault mode, outputs are turned off
INPREF	Indicates if the system automatically selects another reference input. Operator has enabled the selected reference input (REFMODE must be set to FORCED)	T1	PRS	PRS – PRS input is selected as reference INP1 – INP1 is selected as reference INP2 – INP2 is selected as reference

Table 6-5. Event Codes (Continued)

Event ID	Keyword Description	AID TYPE	Default Value/ Keyword	Description of Values
LOCTIM	The local system time offset has changed	EQPT	(00)-00	(hh) – hours offset ±12 mm – minutes offset 00 to 59
REFMODE	Indicates if the system reference can be selected automatically or by the user	EQPT	AUTO	AUTO – System uses QLEVEL and Priority to select the system reference FORCED – User selects the system reference. If the selected reference fails, this value reverts to AUTO mode
TIMCHG	The system time has been changed	EQPT	hh-mm-ss	hh – hours (24-hour clock) mm – minutes ss – seconds
RTM Events				
CKTIDCHG	User modified the Circuit ID for the output.	T1	RTMg[-p]	The Circuit ID can be up to 40 characters in length
FREEFLT	Defines the Retimer mode when the system is in Free-run mode.	T1	SQUELCH	RETIME – In fault mode, retime signals on Retimer module CUTTHRU – In fault mode, Retimer module is in cutthrough mode and signals are not retimed
HOLDFLT	Defines the Retimer mode when the system is in Holdover mode.	T1	SQUELCH	RETIME – In fault mode, retime signals on Retimer module CUTTHRU – In fault mode, Retimer module is in cutthrough mode and signals are not retimed
RTMLBO	The specified Retimer port Line Build-Out has changed.	T1	0	0 = 0 to 133 ft 1 = 133 to 266 ft 2 = 266 to 399 ft 3 = 399 to 533 ft 4 = 533 to 650 ft

Table 6-5. Event Codes (Continued)

Event ID	Keyword Description	AID TYPE	Default Value/ Keyword	Description of Values
RTMSTATE	The specified Retimer port state has changed.	T1	ENABLE	ENABLE – Enables the Retimer port DISABLE – Disables the Retimer port and clears all active alarms associated with the port.
SLIPCHG	The Retimer slip threshold has changed.	T1	4	0 to 255
SLIPCLR	The Retimer slip counter has been cleared	T1	NA	NA

Table 6-6 describes the alarm codes and their set and clear conditions.

Table 6-6. Set and Clear Conditions for Alarms

Alarm ID	Set Alarm Conditional Description	Clear Alarm Conditional Description
SYS Codes		
COMPAT	System components are incompatible	System components are compatible
EXPFAIL	Expansion connectivity failed	Expansion connectivity restored
PWRA	Power A Failed	Power A Restored
PWRB	Power B Failed	Power B Restored
EXTALM1	External Alarm 1 set	External Alarm 1 cleared
EXTALM2	External Alarm 2 set	External Alarm 2 cleared
IOC1EQPT	IOC1 removed from the shelf	IOC1 reinstalled
IOC2EQPT	IOC2 removed from the shelf	IOC2 reinstalled
IMC Codes		
IOC1COMM	IMC to IOC1 communication failed	IMC to IOC1 communication established
IOC2COMM	IMC to IOC2 communication failed	IMC to IOC2 communication established
IMCFAIL	Summary alarm of BIST faults	
IOC1 Codes		
IOC1COMM	IOC1 to IMC communication failed	IOC1 to IMC communication established

Table 6-6. Set and Clear Conditions for Alarms

Alarm ID	Set Alarm Conditional Description	Clear Alarm Conditional Description
IOC1TO2COMM	IOC1 to IOC2 communication failed	IOC1 to IOC2 communication established
IOCFAIL	IOC hardware failure	IOC hardware restored
BTBCKUP	BesTime backup reference disqualified	BesTime backup sources qualified
CLKBRDG	Clock is in Bridging mode	Clock exited Bridging mode
CLKFREE	Clock entered Free-run mode	Clock exited Free-run mode
CLKHOLD	Clock entered Holdover mode	Clock exited Holdover mode
CLKWARM	Clock entered Warm-up mode	Clock exited Warm-up mode
SYNTHEOR	Output generator exceeded pull-in range	Output generator within pull-in range

IOC2 Codes

Alarm ID	Set Alarm Conditional Description	Clear Alarm Conditional Description
IOC2COMM	IOC2 to IMC communication failed	IOC2 to IMC communication established
IOC2TO1COMM	IOC2 to IOC1 communication failed	IOC2 to IOC1 communication established
IOCFAIL	IOC hardware failure	IOC hardware restored
BTBCKUP	BesTime backup reference disqualified	BesTime backup sources qualified
CLKBRDG	Clock entered Bridging mode	Clock exited Bridging mode
CLKFREE	Clock entered Free-run mode	Clock exited Free-run mode
CLKHOLD	Clock entered Holdover mode	Clock exited Holdover mode
CLKWARM	Clock entered Warm-up mode	Clock exited Warm-up mode
SYNTHEOR	Output generator exceeded pull-in range	Output generator within pull-in range

GPS Codes

Alarm ID	Set Alarm Conditional Description	Clear Alarm Conditional Description
ANTCOMM	GPS antenna communication fault	GPS antenna comm fault cleared
GPSPOS	GPS antenna position unknown	GPS antenna position known
GPSPWR	GPS power fault	GPS power fault cleared
GPSSYS	GPS system fault	GPS system OK
GPSTRK	GPS is not tracking satellites	GPS is tracking satellites
INPDISQ	GPS input is disqualified	GPS input is enabled
INPLOS	LOS fault	LOS fault cleared
INPFRQ	Frequency threshold exceeded	Frequency within threshold
INPPHASE	Phase error exceeded threshold	Phase error within threshold

Table 6-6. Set and Clear Conditions for Alarms

Alarm ID	Set Alarm Conditional Description	Clear Alarm Conditional Description
EXDSC	Excessive discontinuity fault	Excessive discontinuity cleared
FFOFF	FFOFF exceeded threshold	FFOFF within threshold
MTIE	MTIE exceeded threshold	MTIE within threshold
TPIUSIG	TPIU signal fault	TPIU signal fault cleared
PRS and INP[p] Codes		
INPDISQ	Input disqualified as possible reference	Input qualified as possible reference
INPAIS	AIS fault	AIS fault cleared
INPLOS	LOS fault	LOS fault cleared
INPOOF	OOF fault	OOF fault cleared
INPFRQ	Frequency threshold exceeded	Frequency within threshold
INPPHASE	Phase error exceeded threshold	Phase error within threshold
INPQL	Quality Level (SSM) exceeded threshold	Quality Level (SSM) within threshold
INPTRR	Tip/ring reversal on input	Tip/ring connection correct
EXDSC	Excessive discontinuity fault	Excessive discontinuity cleared
MTIE	MTIE exceeded threshold	MTIE within threshold
OUT[g] Codes		
OUTFAIL	Output fault	Output fault cleared
SYNTHEOR	Output generator exceeds pull-in range	Output generator within pull-in range
SYNTHFAIL	Output generator failed	Output generator restored
RTMg[-p] Alarm Conditions		
S1LOS	Side 1 LOS fault	Side 1 LOS fault cleared
S2LOS	Side 2 LOS fault	Side 2 LOS fault cleared
EXSLIP	Slip rate threshold exceeded	Slip rate within threshold
FRMFAULT	Retimer module has a fault	Retimer module fault has cleared

Using Alarm Codes to Troubleshoot

Table 6-7 lists the alarm codes generated by the TimeProvider. Unless specified, each alarm has a default Error Delay of Immediate, and you cannot edit the Error Delay.

Table 6-7. Alarms

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
<aid> = SYS								
COMPAT	System components (hardware and software) are not compatible	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
EXTALM1	The external alarm used to monitor alarms generated by external equipment.	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
EXTALM2	The external alarm used to monitor alarms generated by external equipment.	EQPT	NSA	IMMED	NO	CR	CR	CR
EXPNEQPT	The Expansion panel was physically inserted or removed from the system.	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
PWRA	The IMC has detected the loss of power on the A connection	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
PWRB	The IMC has detected the loss of power on the B connection.	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
IOC1EQPT	The IOC was physically inserted or removed from the system.	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
IOC2EQPT	The IOC was physically inserted or removed from the system.	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
OUTAEQPT	Output module A was physically inserted or removed from the system.	EQPT	NSA	IMMED	NO	MJ	MJ	MJ

Table 6-7. Alarms (Continued)

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
OUTBEQPT	Output module B was physically inserted or removed from the system	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
OUTCEQPT	Output module C was physically inserted or v	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
OUTDEQPT	Output module D was physically inserted or removed from the system	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
RTMAEQPT	Retimer module A was physically inserted or removed from the system	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
RTMBEQPT	Retimer module B was physically inserted or removed from the system	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
RTMCEQPT	Retimer module C was physically inserted or removed from the system	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
RTMDEQPT	Retimer module D was physically inserted or removed from the system	EQPT	NSA	IMMED	NO	MJ	MJ	MJ
<aid> = IMC								
IOC1COMM	A communication alarm with either of the IOC1 modules.	EQPT	NSA	IMMED	NO	MN	MN	MN
IOC2COMM	A communication alarm with either of the IOC2 modules.	EQPT	NSA	IMMED	NO	MN	MN	MN
IMCFAIL	A summary alarm of IMC BIST faults	EQPT	SA	IMMED	NO	MJ	MJ	MJ
<aid> = IOC1								
IMC1COMM	A communication alarm with the IMC module and IOC1 module.	EQPT	NSA	IMMED	NO	MN	MN	MN
IOC1TO2 COMM	A communication alarm from IOC1 module to IOC2 module.	EQPT	NSA	IMMED	NO	MN	MN	MN

Table 6-7. Alarms (Continued)

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
IOCFAIL	A summary alarm for failures of the IOC hardware that are not specified in other alarms.	EQPT	SA	IMMED	NO	MJ	MJ	MJ
BTBCKUP	All BesTime Backup sources, inputs are unusable to the BesTime engine.	EQPT	NSA	IMMED	NO	__	NA	__
CLKBRDG	The local oscillator on the specified IOC is in Bridging Mode.	EQPT	NSA	IMMED	NO	–	NA	–
CLKHOLD	The local oscillator on the specified IOC is in Holdover Mode.	EQPT	SA	IMMED	NO	MJ	MJ	MJ
CLKFREE	The local oscillator on the specified IOC is in Free-run mode.	EQPT	SA	IMMED	NO	MJ	MJ	MJ
CLKWARM	The local oscillator on the specified IOC is in Warm-up mode.	EQPT	SA	IMMED	NO	MN	MN	MN
SYNTHEOR	The synthesizer generating the modules stable output frequency has reached the defined End-of-Range for the type of oscillator used on the IOC.	EQPT	SA	IMMED	NO	MJ	MJ	MJ
<aid> = IOC2								
IMC2COMM	A communication alarm with the IMC module and IOC2 module.	EQPT	NSA	IMMED	NO	MN	MN	
IOC2TO 1COMM	A communication alarm from IOC2 to IOC1.	EQPT	NSA	IMMED	NO	MN	MN	MN
IOCFAIL	A summary alarm for IOC BIST faults.	EQPT	SA	IMMED	NO	MJ	MJ	MJ
BTBCKUP	All BesTime Backup sources, inputs are unusable to the BesTime engine.	EQPT	NSA	IMMED	NO	–	NA	–

Table 6-7. Alarms (Continued)

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
CLKBRDG	The local oscillator on the specified IOC is in Bridging Mode.	EQPT	NSA	FLT DELAY	NO	–	NA	–
CLKHOLD	The local oscillator on the specified IOC is in Holdover Mode.	EQPT	SA	IMMED	NO	MJ	MJ	MJ
CLKFREE	The local oscillator on the specified IOC is in Free-run mode.	EQPT	SA	IMMED	NO	MJ	MJ	MJ
CLKWARM	The local oscillator on the specified IOC is in Warm-up mode.	EQPT	SA	IMMED	NO	MN	MN	MN
SYNTHEOR	The synthesizer generating the modules stable output frequency has reached the defined End-of-Range for the type of oscillator used on the IOC.	EQPT	SA	IMMED	NO	MJ	MJ	MJ
<aid> = GPS								
ANTCOMM	Loss of communications to antenna	EQPT	NSA	IMMED	NO	MN	MN	MN
GPSPOS	The GPS Antenna's position is unknown	EQPT	NSA	FLT DELAY	YES	NA	NA	NA
GPSPWR	TimeProvider power to TPIU is either high or low.	T1	NSA	IMMED	NO	MN	MN	MN
GPSSYS	GPS System is indicating an error with BIST (at startup) TRAIM, and/or UTC/ephemeris data.	EQPT	NSA	FLT DELAY	YES	MN	MN	MN
GPSTRK	The GPS Engine is not tracking any satellites.	EQPT	NSA	FLT DELAY	YES	MN	MN	MN

Table 6-7. Alarms (Continued)

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
INPDISQ	The specified input was Disqualified or Qualified as a possible system reference. The fault condition must be continuously present for the Fault Delay Time (FLTDELAY) before disqualifying the input as a possible reference. After INPDISQ is set the alarm clears when the input signal is fault free for the Clear Delay Time (CLRDELAY).	T1	NSA	FLT DELAY	YES	MN	MN	MN
INPLOS	The 1PPS from GPS is LOS. The LOS must be continuously present for the Fault Delay Time (FLTDELAY) before disqualifying the input as a possible reference. After INPLOS is set, the alarm clears when the input signal is LOS free for the Clear Delay Time (CLRDELAY).	T1	NSA	IMMED	NO	MN	MN	MN
INPPHASE	The specified input port has a excessive phase measurement that is disqualifies it from being used.	T1	NSA	IMMED	NO	MN	MN	MN
EXDSC	Input has had excessive discontinuities. This is indicated when there are more than 3 signal faults of the same type within a 5 minute window. The alarm clears when the 5-minute window contains less than 3 alarms of the same type.	T1	NSA	IMMED	NO	MN	MN	MN
FFOFF	Input has exceeded the Fractional Frequency Offset threshold.	T1	NSA	IMMED	NO	MN	MN	MN

Table 6-7. Alarms (Continued)

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
MTIE	Input has exceeded at least one of the MTIE alarm thresholds.	T1	NSA	IMMED	NO	MN	MN	MN
TPIUSIG	TimeProvider Composite Timing Signal interface is not functioning.	T1	NSA	IMMED	NO	MN	MN	MN
<aid> = PRS								
INPDISQ	The specified input was Disqualified or Qualified as a possible system reference. The fault condition must be continuously present for the Fault Delay Time (FLTDELAY) before disqualifying the input as a possible reference. After INPDISQ is set, the alarm clears when the input signal is fault free for the Clear Delay Time (CLRDELAY).	T1	NSA	FLT DELAY	YES	MN	MN	MN
INPLOS	The specified input port has Loss Of Signal. When LOS is detected, the input is immediately removed from the possible reference list. The LOS must be continuously present for the Fault Delay Time (FLTDELAY) before disqualifying the input as a possible reference. After INPLOS is set, the alarm clears when the input signal is LOS free for the Clear Delay Time (CLRDELAY).	T1	NSA	IMMED	NO	MN	MN	MN

Table 6-7. Alarms (Continued)

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
INPFRQ	The specified input port's calculated received frequency is exceeding the pull-in range of the local oscillator. The received signal's calculated frequency alarmed condition disqualifies the input as a possible reference. After INPFRQ is set, the alarm clears when the input frequency is within the defined pull-in range limits.	T1	NSA	IMMED	NO	MN	MN	NR
INPPHASE	The specified input port has a excessive phase measurement that is disqualifies it from being used.	T1	NSA	IMMED	NO	MN	MN	MN
EXDSC	Input has had excessive discontinuities. This is indicated when there are more than three signal faults of the same type within a five minute window. The alarm clears when the five minute window contains less than three alarms of the same type.	T1	NSA	IMMED	NO	MN	MN	MN
FFOFF	Input has exceeded the Fractional Frequency Offset threshold.	T1	NSA	IMMED	NO	MN	MN	MN
MTIE	Input has exceeded at least one of the MTIE alarm thresholds.	T1	NSA	IMMED	NO	MN	MN	MN

Table 6-7. Alarms (Continued)

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
<aid> = INP1 or INP2								
INPDISQ	The specified input was Disqualified or Qualified as a possible system reference. The fault condition must be continuously present for the Fault Delay Time (FLTDELAY) before disqualifying the input as a possible reference. After INPDISQ is set, the alarm clears when the input signal is fault free for the Clear Delay Time (CLRDELAY).	T1	NSA	FLT DLY	YES	MN	MN	MN
INPAIS	The specified input port is receiving an Alarm Indication Signal. When AIS is detected, the input is immediately removed from the possible reference list. The AIS must be continuously present for the Fault Delay Time (FLTDELAY) before disqualifying the input as a possible reference. After INPAIS is set, the alarm clears when the input signal is AIS free for the Clear Delay Time (CLRDELAY).	T1	NSA	IMMED	NO	MN	MN	MN

Table 6-7. Alarms (Continued)

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
INPLOS	The specified input port has Loss Of Signal. When LOS is detected, the input is removed from the possible reference list. The LOS must be continuously present for the Fault Delay Time (FLTDELAY) before disqualifying the input as a possible reference. After INPLOS is set, the alarm clears when the input signal is LOS free for the Clear Delay Time (CLRDELAY).	T1	NSA	IMMED	NO	MN	MN	MN
INPOOF	The specified input port is receiving an Out Of Frame signal. When OOF is detected, the input is removed from the possible reference list. The OOF must be continuously present for the Fault Delay Time (FLTDELAY) before disqualifying the input as a possible reference. After INPOOF is set, the alarm clears when the input signal is OOF free for the Clear Delay Time (CLRDELAY).	T1	NSA	IMMED	NO	MN	MN	MN

Table 6-7. Alarms (Continued)

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
INPFRQ	The specified input port's calculated received frequency is exceeding the pull-in range of the local oscillator. The received signal's calculated frequency alarmed condition disqualifies the input as a possible reference. After INPFRQ is set, the alarm clears when the input frequency is within the defined pull-in range limits.	T1	NSA	IMMED	NO	MN	MN	NR
INPPHASE	The specified input port has a excessive phase measurement that is disqualifies it from being used.	T1	NSA	IMMED	NO	MN	MN	MN
INPQL	Alarm indicating the received SSM is of lesser quality than the Local Oscillator's QLEVEL for a specified input.	T1	NSA	IMMED	NO	MN	MN	MN
INPTRR	The specified input port has a Tip/Ring reversal on it's connection to the system.	T1	NSA	IMMED	NO	MN	MN	MN
EXDSC	Input has had excessive discontinuities. This is indicated when there are more than 3 signal faults of the same type within a 5 minute window. The alarm clears when the 5-minute window contains less than 3 alarms of the same type.	T1	NSA	IMMED	NO	MN	MN	MN
MTIE	Input has exceeded at least one of the MTIE alarm thresholds.	T1	NSA	IMMED	NO	MN	MN	MN

Table 6-7. Alarms (Continued)

Alarm ID Or CONDTYPE	Alarm Condition Description	AID TYPE	Service Affecting	Error Delay Default	Error Delay Editable	Alarm Default Level		
						SSU	PRS	SUB
<aid> = RTMg[-p]								
S1LOS	LOS on Side 1	T1	NSA	IMMED	NO	MN	MN	MN
S2LOS	LOS on Side 2	T1	NSA	IMMED	NO	NA	NA	NA
EXSLIP	Excessive slip rate	T1	NSA	IMMED	NO	NA	NA	NA
RTMFAULT	The IOC cannot determine if the Retimer is functioning properly.	T1	NSA	IMMED	NO	NA	NA	NA

Table 6-8 lists each event and describes the conditions that generate the associated event.

Table 6-8. Event Code Conditional Descriptions

Event ID	Event Conditional Description
IMC Event Conditions	
ACCLVL	User access level has changed
ACO	Audio alarm is deactivated
ACCLVL	User access level has changed
ACO	Audio alarm is deactivated
ALMCHG	Alarm parameter has changed, <keyword>,<alarm>
AOMERGE	Autonomous event reporting has changed, <state>
BAUD	Serial baud rate has changed, <value>
CMDCHG	Command access level has changed, <command>
ECHO	Serial port echo mode has changed, <state>
FLOW	Serial flow control has changed, <state>
FWFAIL	Firmware upgrade unsuccessful
FWOK	Firmware upgrade successful
FWLOAD	Beginning firmware upgrade
IMCBIST	Built-in self test, <value>
INITLOG	Event log has been cleared
IPADDR	IP address has changed, <value>

Table 6-8. Event Code Conditional Descriptions (Continued)

Event ID	Event Conditional Description
IPGATE	Gateway IP address has changed, <value>
IPHOST1	Host IP has changed, <value>
IPHOST2	Host IP has changed, <value>
IPHOST3	Host IP has changed, <value>
IPHOST4	Host IP has changed, <value>
IPSUB	Subnet mask IP address has changed, <value>
ISDIFF	Configuration images are different
ISEQ	Configuration images are the same
LOGIN	User logged in, <username>
LOGOUT	User logged out, <username>
PIDCHG	User password has changed
RESET	Module has been reset
SIDCHG	System Source ID has changed, <value>
USRADD	User has been added
USRDEL	No users defined
USRDEL	User has been deleted
XFERFAIL	Configuration transfer failed, <fromdev>,<todev>
XFEROK	Configuration transfer successful, <fromdev>,<todev>
GPS Event Conditions	
CKTIDCHG	GPS Circuit ID has changed, <cktid>
ELEVMASK	GPS elevation mask, <value>
MODE	GPS antenna mode, <mode>
POS	GPS antenna position, <pos>
IOC Event Conditions	
CCALIGN	Composite Clock alignment
CLKTYPE	Clock type has changed, <state>
FWFAIL	Firmware upgrade unsuccessful
FWOK	Firmware upgrade successful
FWLOAD	Beginning firmware upgrade

Table 6-8. Event Code Conditional Descriptions (Continued)

Event ID	Event Conditional Description
IOCMODE	IOC mode is. <mode>
IOCSTATE	IOC state has changed, <state>
RESET	Module has been reset
IOC Clock Event Conditions	
CLKFSTLK	Clock entered fast-lock mode
CLKLOCK	Clock entered lock mode
SCAVAIL	SmartClock algorithm, <value>
IOC Input Event Conditions	
CKTIDCHG	Input Circuit ID has changed, <cktid>
CRCENA	Input CRC has changed, <value>
FRMTYPE	Input framing type has changed, <value>
INSTATE	Input state has changed, <value>
PRIORITY	Priority has changed, <value>
RQLEVEL	Received Quality Level has changed, <old quality value>, <new quality value>
QLEVEL	User assigned Quality Level has changed, <value>
SPANTYPE	Input span type has changed, <value>
SSMBIT	E1 SSM bit has changed, <bit position>
SSMENA	Input reading of SSM has changed, <value>
THRCHG	PM threshold has changed, <PM type>, <value>
IOC Output Event Conditions	
CKTIDCHG	Output Circuit ID has changed, <cktid>
FREEFLT	Free-run output fault strategy has changed, <state>
FRMTYPE	Output framing type has changed, <value>
HOLDFLT	Holdover output fault strategy has changed, <state>
OUTSTATE	Output group state has changed, < value >
OUTMODE	Output fault mode has changed, < value >
SYS Event Conditions	
BRDGTIM	Bridging time has changed, <value>

Table 6-8. Event Code Conditional Descriptions (Continued)

Event ID	Event Conditional Description
CLRDELAY	Input clear delay has changed, <value>
DATCHG	System date has changed, <date>
ELEVTIME	Alarm elevation time has changed, <state>
FACTORY	Provisioned to factory defaults
FLTDELAY	Input fault delay has changed, <value>
INACTTIME	Communication timeout has changed, <value>
INPREF	System reference input has changed, <selected reference>
LOCTIM	System's local time offset has changed, <time offset>
LOGECHO	Record login event,<value>
REFMODE	System Reference mode has changed, <mode>
TIMCHG	System time has changed, <time>
SYSMODE	System mode of operation has changed, <state>
UTC	GPS has set System time to UTC, <UTC date, UTC time>

RTM Event Keywords

CKTIDCHG	Retimer Circuit ID has changed, <cktid>
FREEFLT	Free-run Retimer fault strategy has changed, <state>
HOLDFLT	Holdover Retimer fault strategy has changed, <state>
RTMLBO	Port LBO has changed, <value>
RTMSTATE	Port state has changed, <value>
SLIPCHG	Slip threshold has changed, <value>
SLIPCLR	Slip counter has been cleared

Repairing the TimeProvider

Repairing the TimeProvider is limited to replacing cards. Refer to Working With Cards, on page 75, for information on how to properly handle cards and modules to prevent electrostatic or physical damage.

To remove an IOC, loosen the captive screws and lift the removal tabs on each side of the card, then slide the module out of the shelf. To remove the IMC, loosen the captive screws and pull the module out of the shelf using the U-shaped handle on the front panel. Place the module on an anti-static surface or in an anti-static bag.

To remove an Input or Output module, loosen the captive screws and then pull the module using the captive screw. Place the module on an anti-static surface or in an anti-static bag.

> **Warning:** To avoid possible electrostatic damage to the module or panel, place it in a static-free bag or on a static-free surface.

Obtaining Technical Assistance

If you have technical questions about the TimeProvider, call Symmetricom Global Services (SGS) at 888-367-7966 (toll-free in USA only), 408-428-7907, or +49 700 3288 6435 in Europe, Middle East, or Africa. You can also email your technical questions to support@symmetricom.com or emeasupport@symmetricom.com.

Upgrading the Firmware

You can upgrade the firmware in the IMC or IOC using TL1 commands and software available from Symmetricom. Only users with Admin- or Security-level access can execute the command. The command places the management module in the firmware download mode and terminates all sessions except the session performing the upgrade. During the upgrade process, no new sessions are allowed. Refer to the *TL1 Reference Guide* for details on the upgrade process.

> **Caution:** To avoid a possible service call, do not issue a command to the TimeProvider, do not remove power from the TimeProvider, and do not remove an IOC or IMC from the shelf during the upgrade process. Doing so could corrupt the flash memory in a card, disabling the TimeProvider.

Use the following TL1 command to download the firmware.

```
ACT-SWDL:[<tid>]:<aid>:[<ctag>];
```

After you issue the command, you have 60 seconds to begin transferring the upgrade file using the Ymodem transfer protocol. If you do not start the transfer within 60 seconds, the command times out and you will have to issue the ACT-SWDL command again. You can use the SynCraft application to transfer the upgrade file.

The system downloads the firmware using the Ymodem protocol; if the IMC firmware is upgraded, the processor in the IMC is reset.

This command always has a security level of SECURITY.

<aid>	Description
IMC	Downloads a new firmware image to the IMC. If the IMC or IOC provisioning has changed in the newly upgraded firmware, you may need to issue the CPY-MEM command from an in-service IOC to the IMC before the IMC is fully functional. See the *TimeProvider TL1 Reference Guide* for more details.
IOC	Downloads a new firmware image to the IOC. Symmetricom recommends that redundant IOCs use the same firmware revision. The Active IOC enters Standby mode, putting the second IOC in Active mode. After acknowledging the changeover, the IMC starts the firmware transfer to the Standby IOC. After the download, the Standby IOC must achieve Lock (CLKLOCK) mode before changing again to Active mode. The Standby IOC is then upgraded. If the first IOC upgrade is not successful, the entire process is aborted and an SROF error message is generated. The IOC restarts with the existing firmware.
IOCm m = 1 | 2	Downloads the IOC firmware image from the Active IOC to the Standby IOC. This command does not require Ymodem or SynCraft to transfer an image file from the computer to the TimeProvider.

Sample Command

```
ACT-SWDL::IMC:TP1000;
```

If the image transfer takes more than 60 seconds to start, the error response is SROF and the IMC returns to normal operation. You will need to start the download process again to perform the upgrade.

If the header information in the referenced file is not correct, the error response is SROF, followed by a message that says the firmware upgrade was not successful.

If the file header is correct, the TimeProvider responds with a message stating that it is beginning the firmware upgrade, followed by a message stating the upgrade was successful.

Upgrading the IMC

To upgrade the software in the IMC, use the following procedure. You must have the upgrade software available on diskette or other media, as well as a Ymodem file-transfer program such as SynCraft available before you begin the procedure. Outputs are not affected during the IMC upgrade procedure.

1. Log in to the TimeProvider with an Admin- or Security-level user id and password.

2. Back up the contents of the IMC memory in an IOC by issuing the following command:

```
CPY-MEM:::::IMC,IOC,IMC;
```

3. To start the download, issue the command

```
ACT-SWDL::IMC:TP1000;
```

The TimeProvider issues an In-Process response, the TL1 connection closes, and the TimeProvider waits to receive the upgrade software using the Ymodem protocol.

4. Use a Ymodem file transfer program such as SynCraft to transfer the upgrade software to the TimeProvider. You must start the transfer within 60 seconds or the TimeProvider issues a Deny response.

   The TimeProvider validates the received file, updates the flash memory and reboots the IMC if the file is valid. If the file is not valid, the TimeProvider issues a Deny response.

5. The COMPLD message appears after a successful transfer.

Upgrading the IOC

This section contains procedures for upgrading a shelf with a single IOC and for upgrading a shelf with redundant IOCs.

Upgrading Single IOCs

To upgrade the software in a single IOC, use the procedure in this section. Outputs from the TimeProvider will be interrupted for up to 30 minutes until the upgraded IOC enters the Locked mode.

1. Log in to the TimeProvider with an Admin- or Security-level user id and password.

2. Save the contents of the IOC memory in the IMC by issuing the command:

```
CPY-MEM:::::IOC,IMC,IOC;
```

3. To start the download, issue the command

```
ACT-SWDL::IMC:TP1000;
```

The TimeProvider issues an In-Process response, the TL1 connection closes, and the TimeProvider waits to receive the upgrade software using the Ymodem protocol.

4. Use a Ymodem file transfer program such as SynCraft to transfer the upgrade software to the TimeProvider. You must start the transfer within 60 seconds or the TimeProvider issues a Deny response. The new software is loaded into the IOC, after which it is rebooted and enters the Warm-up mode for up to 30 minutes.

5. The COMPLD message appears after a successful transfer.

6. Restore the contents of the IOC memory from the IMC by issuing the command:

```
CPY-MEM:::::IMC,IOC,IOC;
```

Upgrading Redundant IOCs

To avoid output interruptions, the TimeProvider must be in the following state:

- Two installed and communicating IOCs

- Both IOCs are in the Locked mode

- Both IOCs are In Service

- Both IOCs are alarm-free

- One IOC is Active

If any of these conditions are not present, then the outputs are interrupted for up to 30 minutes until the upgraded IOC enters the Locked mode.

To upgrade the software in both IOCs, use the following procedure:

1. Log in to the TimeProvider with an Admin- or Security-level user id and password.

2. Back up the contents of the IOC memory in the IMC by issuing the command:

```
CPY-MEM:::::IOC,IMC,IOC;
```

3. Start the download by issuing the command:

```
ACT-SWDL::IMC;
```

The TimeProvider issues an In-Process response, the TL1 connection closes, and the TimeProvider waits to receive the upgrade software using the Ymodem protocol.

4. Use a Ymodem file transfer program such as SynCraft to transfer the upgrade software to the TimeProvider. You must start the transfer within 60 seconds or the TimeProvider issues a Deny response.

The active IOC (IOC1 for example) goes into Standby mode and the Standby IOC (IOC2, in this example) goes into Active mode. The new software is loaded into IOC1, after which it is rebooted and enters the Warm-up mode for up to 30 minutes.

When IOC1 enters the Locked mode, it becomes the Active IOC again (IOC2 goes into Standby). The new software is loaded into IOC2, after which it is rebooted and enters the Warm-up mode for up to 30 minutes.

5. The COMPLD message appears after a successful transfer.

Upgrading One IOC From the Other

To upgrade the software in one IOC to match the software in the other IOC, issue the command:

```
ACT-SWDL::IOCn:TP1000;
```

where n = 1 or 2, and identifies the IOC that receives the software from the other IOC

You cannot upgrade the software in the Active IOC.

Returning the TimeProvider

You should return the equipment to Symmetricom only after you have exhausted the troubleshooting procedures described earlier in this chapter, or if Symmetricom Global Services has advised you to return the unit.

> **Note:** Please retain the original packaging for re-shipping the product. If the original packaging is not available, contact Symmetricom Global Services (SGS) for assistance.

Repacking the Unit

Return all units in the original packaging. If the original packaging is not available, contact Symmetricom Global Services. Use standard packing procedures for products being returned for repair to protect the equipment during shipment. Connectors should be protected with connector covers or the equipment should be wrapped in plastic before packaging. Ensure that the display and connectivity panels are protected when packaged.

Equipment Return Procedure

To return equipment to Symmetricom for repair:

1. Call Symmetricom Global Services (SGS) at 888-367-7966 (toll-free in USA only), 408-428-7907, or +49 700 3288 6435 in Europe, Middle East, or Africa to obtain a return material authorization number (RMA) before returning the product for service.

   You can request an RMA on the internet at https://www.symmetricom.com/Support/req_repair.htm.

   Retain the assigned RMA number for future reference.

2. Provide a description of the problem, product item number, serial number, and warranty expiration date.

3. Provide the return shipping information (customer field contact, address, telephone number, and so forth.)

4. Ship the product to Symmetricom, transportation prepaid and insured, with the Return Material Authorization (RMA) number and item numbers or part numbers clearly marked on the outside of the container to the address given with the RMA.

   Repaired equipment is returned to you with shipping costs prepaid by Symmetricom.

User Guide Updates

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

Manual updates are available at:

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

Note: If you are downloading a manual for the first time, you will need to register with Symmetricom. If you are currently registered, login and download the manual update.

Chapter 7 Specifications of the TimeProvider

This chapter describes the specifications of the TimeProvider.

In This Chapter

- Communications Ports
- Clocks
- Inputs
- Outputs
- T1 Retimer
- Alarms
- Power
- Roof Antenna
- Mechanical
- Environmental

Communications Ports

Serial Ports

Two EIA-232 serial ports are available: the local Craft port and the Remote port. Specifications are listed in Table 7-1.

Table 7-1. Serial Port Specifications

Specification	Factory Default	Available
Local Craft Port		
Baud rate	9600	2400, 9600, 19200, 28800, 34800, 57600, 115200
Word length	8 bits	8 bits
Parity	None	None, Odd, Even
Stop bits	1	1
Echo	Off	Off, On
Software flow control XON/XOFF	Off	Off, On
Hardware flow control CTS/RTS	Off	Off, On
RS-232 configuration	DCE	DCE
Remote Port		
Baud rate	9600	2400, 9600, 19200, 28800, 34800, 57600, 115200
Word length	8 bits	8 bits
Parity	None	None, Odd, Even
Stop bits	1	1
Echo	Off	Off, On
Software flow control XON/XOFF	Off	Off, On
Hardware flow control CTS/RTS	Off	Off, On
Handshake DTR/DSR	On	On
RS-232 configuration	DTE	DTE

LAN Port

The Ethernet 10BaseT port supports 10 telnet sessions over TCP/IP. To minimize response delays, Symmetricom recommends that you keep four or fewer sessions open at any one time.

Clocks

The clocks in the TimeProvider are controlled with Direct Digital Synthesis technology for calibration-free operation and precise frequency control.

Type I Clock

The Type I clock in the TimeProvider is compliant with ITU-T G.812 (06/98) and EN300 462-4-1 (see ICS proforma Compliance Annex B).

Type II Clock

The Type II clock in the TimeProvider complies with G.812 (06/98).

Type III Clock

The Type III clock in the TimeProvider complies with G.812 (06/98).

Type ST2 Clock

The Stratum 2 clock in the TimeProvider complies with ETSI 300 462-4, ANSI T1.101-1999, and Telcordia GR-378/1244-CORE.

Type ST3E Clock

The Stratum 3E clock in the TimeProvider complies with ETSI 300 462-4, ANSI T1.101-1999, and Telcordia GR-378/1244-CORE.

SSM Compliance

The TimeProvider complies with the following SSM standards: ANSI T1.101-1999, GR-253 Core Issue 3, September 2000, ITU-T G.704 10.98, and T1X1.3 TR33.

Holdover

Table 7-2. Holdover Characteristics

Card Type	Holdover Performance PRR Mode	Holdover Performance SSU Mode
Single Oven 090-58021-01	GR-2830-CORE Issue 2 Office PRS	GR-1244-CORE Issue 2 ST3E or ITU-G.812 Type I (6/98)
Rubidium 090-58022-01	GR-2830-CORE Issue 2 Office PRS	GR-1244-CORE Issue 2 ST2 or ITU-G.812 (6/98) Type II

Inputs

Front Access and Rear Access shelves contain three card slots: two for IOC cards and one for an IMC card.

Each IOC supports four input ports: two span inputs, one PRS input, and an optional GPS input when used with the TimeProvider Roof Antenna system.

Input specifications: 2048 kbit/s G.703/9, 2048 kHz G.703/13, DS1, 1.544/5/10 MHz sine or square

Table 7-3. Input Signal Specifications

Parameter	Specification
PRS Inputs	
Frequency Japan Frequency	2.048 MHz, 5 MHz, 10 MHz 1.544 MHz, 6.312 MHz
Amplitude Japan Amplitude	1 V RMS $\pm$3 dB $-$16 dBm to +3 dBm
Termination Impedance	75 Ω
T1 Inputs	
Framing	D4/SF or ESF (User Selectable)
Bit Rate	1544 Kbit/s
Format	AMI or B8ZS (per (ANSI) T1.102 & ITU-T G.703 Sec. 5)
Amplitude Range	+3 to $-$24 dB DSX
Jitter and Wander Tolerance	Meets the requirements of Bellcore GR-1244-CORE, Section 4.
E1 Inputs	
Type	G.703 Sec. 9 Framed E1
Bit Rate	2048 kbit/s
Format	CCS (per ITU-TG.703 Sec. 2 & (ANSI) T1.102 DS1A CRC4 enabled/disabled AMI or HDB3)
Amplitude Range	+3 to $-$27 dB DSX
Jitter and Wander Tolerance	Meets the requirements of ITU-T G.823
Type	G.703 Sec. 9 Framed E1

Table 7-3. Input Signal Specifications (Continued)

Parameter	Specification
GPS Input	
Requirement	Proprietary Rooftop Antenna with TPIU (see Roof Antenna specification in Table 7-8)
Interface	DE15 connector

Outputs

The TimeProvider supports up to 32 outputs. The optional Expansion Panel provides an additional 32 outputs. You can provision the outputs in groups of eight on the main shelf, or groups of 16 with the Expansion Panel.

Sync Status Messages: Compliant with SSM specification ITU-T G.704, T1X1.3 TR33, ANSI T1.101-1999, and Telcordia GR-253-CORE

Table 7-4. Output Signal Specifications

Parameter	Specification
T1 Signals	
Framing (user selectable)	D4/Super Frame (SF) Extended Super Frame (ESF)
Signal Waveshape	Framed, all ones, Alternate Mark Inversion (AMI) per (ANSI) T1.102 and ITU Rec. G.703
Pulse Amplitude	2.4 to 3.6 volts peak into 100 Ω
Output Jitter	< 0.03 UI
Termination Impedance	100 Ω ± 5% balanced
E1 Signals	
Framing	CAS
Signal Waveshape	Framed, all ones, Alternate Mark Inversion (AMI) Per ITU Rec. G.703 Sec. 9
Pulse Amplitude	2.4 to 3.6 volts peak into 120 Ω 1.9 to 2.8 volts peak into 75 Ω
Output Jitter	< 0.03 UI
Termination Impedance	120 Ω ± 5% balanced, or 75 Ω ± 5% unbalanced

Table 7-4. Output Signal Specifications (Continued)

Parameter	Specification
CC Signals	
Amplitude	2.7 to 3.3 V_p
Termination Impedance	133 Ω ± 5% balanced
JCC Signals	
Amplitude	1.0 V_p ±0.1 V
Termination Impedance	110 Ω balanced
JCC4 Signals	
Amplitude	1.0 V_p ±0.1 V
Termination Impedance	110 Ω balanced
8k Signals	
Amplitude	4 V p-p ± 10%
Termination Impedance	100 Ω balanced
1.544 MHz Signals	
Amplitude	0 dBm ± 3 dB
Termination Impedance	75 Ω unbalanced
6.312 MHz Signals	
Amplitude	0 dBm ± 3 dB
Termination Impedance	75 Ω unbalanced

T1 Retimer

The T1 Retimer module has the following specifications:

Table 7-5. T1 Retimer Specifications

Parameter	Specification
Specifications	ANSI T1.101 and Telcordia GR-1244
Input Amplitude Range	+3 to –24 dB DSX
Termination Impedance	100 Ω ±5% balanced

Alarms

Input Alarms

The PRS input is inhibited when a contact closure (less than 1 Ω) is present across the PRS Alarm In connection.

Output Alarms

The output alarm connector is on the Input module, and can be either a DB25 connector or wire-wrap pins. See Making Alarm Connections, on page 63, for a pinout diagram of the DB-25 connector. Table 7-6 describes the contact closure for the alarm outputs.

Table 7-6. Output Alarm Specifications

Alarm	Description
Minor	Contact closure (NC or NO) 1 Amp Form C
Major	Contact closure (NC or NO) 1 Amp Form C
Critical	Contact closure (NC or NO) 1 Amp Form C

Power

Dual power supplies from –36 to –72 V DC. Table 7-7 lists the maximum and typical power consumption using crystal and Rubidium IOCs.

Table 7-7. Typical Power Consumption

IOC Type	Max Power (W) per IOC	Typical Power (W) per IOC
Crystal	40	30
Rubidium	60	40 (70 with two Rb IOCs)

Symmetricom recommends that you use a 5 A fuse for the power supply to the TimeProvider shelf.

Roof Antenna

The specifications for the antenna for GPS operation are described in Table 7-8.

Table 7-8. Antenna Specifications

Parameter	Specification
Type	Active, with proprietary 2-way time transfer technology
Cable length	Maximum 1000 ft (305 m) from antenna to shelf
Dimensions	Height: 6.5 in (16.5 cm) Diameter: 5.9 in (15 cm)
Weight	1.7 lb (0.77 kg)
Operating Temperature	–35 to 75°C
Storage Temperature	–40 to 80°C
Operating Humidity	0 to 100% relative humidity
Power	36 V nominal
Connector type	TNC
Gain	53 dB
Impedance	50 Ω / 75 Ω

Mechanical

TimeProvider 1000 Front-Access Shelf

Size: 431.8 mm wide x 175 mm high x 254 mm deep (17 in wide x 6.875 in high x 10 in deep)

Weight: 9.0 pounds (4.1 kg) with two IOC modules and four Output modules

TimeProvider 1100 Rear-Access Shelf

Size: 431.8 mm wide x 133 mm high x 254 mm deep (17 in wide x 5.25 in high x 10 in deep)

Weight: 9.0 pounds (4.1 kg) with two IOC modules and four Output modules

Environmental

Operating Temperature: –5 to 55 $^\circ$C

Storage Temperature: –25 to 55 $^\circ$C, duration < 12 months

Operating Humidity: 5% to 85% non-condensing

Storage Humidity: 5% to 100% non-condensing, duration < 12 months

Altitude: –60 to 4000 m (–196 ft. to 13132 ft.)

Clock operation: ETSI EN 300 019-1-3 V2.1.2 Class 3.1

Appendix A Factory Default Values

This Appendix describes the factory default values for user-settable parameters.

In This Appendix

- Default Command Access Levels
- Alarm Default Values
- Default Equipment Parameters
- Default Input Parameters
- Default Output Parameters

Default Command Access Levels

This section describes the default access level for the TL1 commands described in this guide. Table A-1 also describes whether you can edit the default command access level using the ED-CMD-SECU command (see the *TimeProvider TL1 Reference Guide* for details on this command). For a complete list of commands and their access levels, see the *TimeProvider TL1 Reference Guide.*

Table A-1. Default Access Levels for TL1 Commands

Command	Default Access Level	Editable?
RTRV-USER-SECU	Security	Yes
ENT-USR-SECU	Security	No
ED-USER-SECU	Security	No
ED-PID	Security	Yes
ENT-PID	User	Yes
DLT-SECU	Security	Yes
DLT-USR-SECU	Security	Yes
RTRV-CMD-SECU	Admin	Yes
ED-CMD-SECU	Admin	No
CPY-MEM	Admin	Yes
RTRV-DAT	User	Yes
ED-DAT	Admin	Yes
RTRV-EQPT	User	Yes
ED-EQPT	Admin	Yes
RTRV-SYNC	User	Yes
ED-SYNC	Admin	Yes
RTRV-ATTR	User	Yes
SET-ATTR	Admin	Yes
RTRV-LOG	User	Yes
INIT-LOG	Admin	Yes
INIT-SYS	Admin	Yes
RTRV-SYS-MODE	User	Yes
SET-SYS-MODE	Admin	Yes
OPR-ACO-ALL	User	Yes

Table A-1. Default Access Levels for TL1 Commands (Continued)

Command	Default Access Level	Editable?
SET-SID	Admin	Yes
RTRV-ALM	User	Yes
RTRV-COND	User	Yes
RTRV-CRAFT	User	Yes
RTRV-HDR	None	Yes
RTRV-INV	User	Yes
ACT-USER	None	No
RTRV-USER	User	Yes
CANC-USER	User	No
PING	User	Yes
GEN-EVT	User	Yes

Alarm Default Values

This section describes the default values for alarms in the TimeProvider. Table A-2 includes the default error delay, which is set using the FLTDELAY keyword in the ED-SYNC command (see Provisioning System-Level Alarms, on page 121).

Table A-2. Default Alarm Settings

Alarm ID	Default Error Delay	Error Delay Editable?	Default Alarm Level		
			SSU Mode	**PRR Mode**	**SUB Mode**
System-wide Alarms					
COMPAT	IMMED	No	MJ	MJ	MJ
EXTALM1	IMMED	No	MJ	MJ	MJ
EXTALM2	IMMED	No	CR	CR	CR
EXPFAIL	IMMED	No	MJ	MJ	MJ
PWRA	IMMED	No	MJ	MJ	MJ
PWRB	IMMED	No	MJ	MJ	MJ
IOC1EQPT	IMMED	No	MJ	MJ	MJ
IOC2EQPT	IMMED	No	MJ	MJ	MJ

Table A-2. Default Alarm Settings (Continued)

Alarm ID	Default Error Delay	Error Delay Editable?	Default Alarm Level		
			SSU Mode	PRR Mode	SUB Mode
IMC-related Alarms					
IOC1COMM	IMMED	No	MN	MN	MN
IOC2COMM	IMMED	No	MN	MN	MN
IMCFAIL	IMMED	No	MJ	MJ	MJ
IOC1-related Alarms					
IOC1COMM	IMMED	No	MN	MN	MN
IOC1TO2COMM	IMMED	No	MN	MN	MN
IOCFAIL	IMMED	No	MJ	MJ	MJ
BTBCKUP	IMMED	No	NA	NA	NA
CLKBRDG	IMMED	No	NA	NA	NA
CLKFREE	IMMED	No	MJ	MN	MJ
CLKHOLD	IMMED	No	MJ	MJ	MJ
CLKWARM	IMMED	No	MN	MN	MN
SYNTHEOR	IMMED	No	MJ	MJ	MJ
IOC2-related Alarms					
IOC2COMM	IMMED	No	MN	MN	MN
IOC2TO1COMM	IMMED	No	MN	MN	MN
IOCFAIL	IMMED	No	MJ	MJ	MJ
BTBCKUP	IMMED	No	NA	NA	NA
CLKBRDG	IMMED	No	NA	NA	NA
CLKFREE	IMMED	No	MJ	MN	MJ
CLKHOLD	IMMED	No	MJ	MJ	MJ
CLKWARM	IMMED	No	MN	MN	MN
SYNTHEOR	IMMED	No	MJ	MJ	MJ
GPS-related Alarms					
ANTCOMM	IMMED	No	MN	MN	MN
GPSPOS	FLTDELAY	Yes	NA	NA	NA
GPSPWR	IMMED	No	MN	MN	MN

Table A-2. Default Alarm Settings (Continued)

Alarm ID	Default Error Delay	Error Delay Editable?	Default Alarm Level		
			SSU Mode	PRR Mode	SUB Mode
GPSSYS	FLTDELAY	Yes	MN	MN	MN
GPSTRK	FLTDELAY	Yes	MN	MN	MN
INPDISQ	FLTDELAY	Yes	MN	MN	MN
INPLOS	IMMED	No	MN	MN	MN
INPFRQ	NA	NA	NA	NA	NA
INPPHASE	IMMED	No	MN	MN	MN
EXDSC	IMMED	No	MN	MN	MN
FFOFF	IMMED	No	MN	MN	MN
MTIE	IMMED	No	MN	MN	MN
TPIUSIG	IMMED	No	MN	MN	MN
PRS-related Alarms					
INPDISQ	FLTDELAY	Yes	MN	MN	MN
INPLOS	IMMED	No	MN	MN	MN
INPFRQ	IMMED	No	MN	MN	NR
INPPHASE	IMMED	No	MN	MN	MN
EXDSC	IMMED	No	MN	MN	MN
FFOFF	IMMED	No	MN	MN	MN
MTIE	IMMED	No	MN	MN	MN
INP1 or INP2-related Alarms					
INPDISQ	FLTDELAY	Yes	MN	MN	MN
INPAIS	IMMED	No	MN	MN	MN
INPLOS	IMMED	No	MN	MN	MN
INPOOF	IMMED	No	MN	MN	MN
INPFRQ	IMMED	No	MN	MN	NR
INPPHASE	IMMED	No	MN	MN	MN
INPQL	IMMED	No	MN	MN	MN
EXDSC	IMMED	No	MN	MN	MN
MTIE	IMMED	No	MN	MN	MN

Table A-2. Default Alarm Settings (Continued)

Alarm ID	Default Error Delay	Error Delay Editable?	Default Alarm Level		
			SSU Mode	PRR Mode	SUB Mode
RTM -related Alarms					
S1LOS	IMMED	NO	MN	MN	MN
S2LOS	IMMED	NO	NA	NA	NA
EXSLIP	IMMED	NO	NA	NA	NA
RTMFAULT	IMMED	NO	NA	NA	NA

Default Equipment Parameters

Table A-3. Default Equipment Parameters

Parameter	Default Value
System-Level Parameter (<aid>=SYS)	
INACTTIME	0 (no timeout)
LOGECHO	ENABLE
ELEVTIME	DISABLE
SYSMODE	SSU
Local/Remote Comm Port Parameters (<aid>=COMp)	
AOMERGE	ENABLE
BAUD	9600
ECHO	DISABLE
FLOW	NONE
TIDQUIET	DISABLE
Ethernet Parameters (<aid>=COMl)	
AOMERGE	ENABLE
IPGATE	127.0.0.1
IPADDR	127.0.0.1
IPSUBNET	255.255.255.0
ECHO	DISABLE

Table A-3. Default Equipment Parameters (Continued)

Parameter	Default Value
TIDQUIET	DISABLE
IOC Parameters (<aid>=IOCm)	
IOCMODE	ACTIVE
CLKTYPE	TYPEI
IOCSTATE	INSRV

Default Input Parameters

Table A-4. Default Input Parameters

Parameter	Default Value
Input Parameters (<aid>=SYS)	
CLRDELAY	10 seconds
FLTDELAY	5 seconds
REFMODE	AUTO
INPREF	PRS
FREEFLT	SQUELCH
HOLDFLT	ON
Input Parameters (<aid>=PRS)	
INSTATE	ENABLE
FRMTYPE	2M (2048 kHz)
Input Parameters (<aid>=INPp)	
INSTATE	ENABLE
SPANTYPE	E1
FRMTYPE	2M (for E1 span type) ESF (for T1 span type)
CRCENA	DISABLE
SSMENA	DISABLE
SSMBIT	8

Table A-4. Default Input Parameters (Continued)

Parameter	Default Value
Input Parameters (<aid>=PRS, INPp)	
QLEVEL	2
PRIORITY	PRS=1 INP1=1 INP2=1
Retimer Parameters (<aid>=RTMg[-p]	
RTMSTATE	ENABLE
RTMLBO	0
FREEFLT	RETIME
HOLDFLT	RETIME
SLIPCHG	4

Default Output Parameters

Table A-5. Default Output Parameters

Parameter	Default Value
Output Parameters (<aid>=OUTg)	
OUTSTATE	DISABLE
FRMTYPE	2M

Appendix B CRAFT Software Reference

This appendix describes the SynCraft software you use for provisioning the TimeProvider.

In This Appendix

-

Overview

SynCraft is a craft application for provisioning and managing the TimeProvider and other Network Elements via an Ethernet connection or a serial connection.

System Requirements

The following is the minimum computer configuration for a Windows NT 4.0 system:

- Pentium III 200 MHz platform
- 128 MB RAM
- 200 MB hard disk
- CD-ROM drive
- 1024 x 768 accelerated graphics
- 15" VGA monitor

Software
You can run the SynCraft application under the following operating systems:

- Windows XP
- Windows 2000 SP3 or later
- Windows NT 4 SP5 or later
- Windows ME5
- Windows 98 Second Edition
- Windows XP Professional Service Pack 1

You can download the following items from the Microsoft web site:

- Windows NT 4 Service Pack 5
- Windows 2000 Service Pack 3
- Windows XP Service Pack 1

Documentation
To access the help files and associated documentation for SynCraft, press F1 at any time while in the application.

Installing SynCraft

To install SynCraft on your computer, use the following procedure. You may need Administrator-level privileges on the computer to install this product.

1. Insert the SynCraft CD into the CD-ROM drive. If the Auto-Run feature is not enabled, then open the SynCraft folder on the CD and double-click the SynCraftSetup.exe icon. The Installation Wizard appears.

2. Follow the instructions that appear in the Installation Wizard.

Starting SynCraft

To start the SynCraft application, double click it's icon, or select **Start**, **Programs**, **Symmetricom**, **SynCraft**. The SynCraft window appears, as shown in Figure B-1..
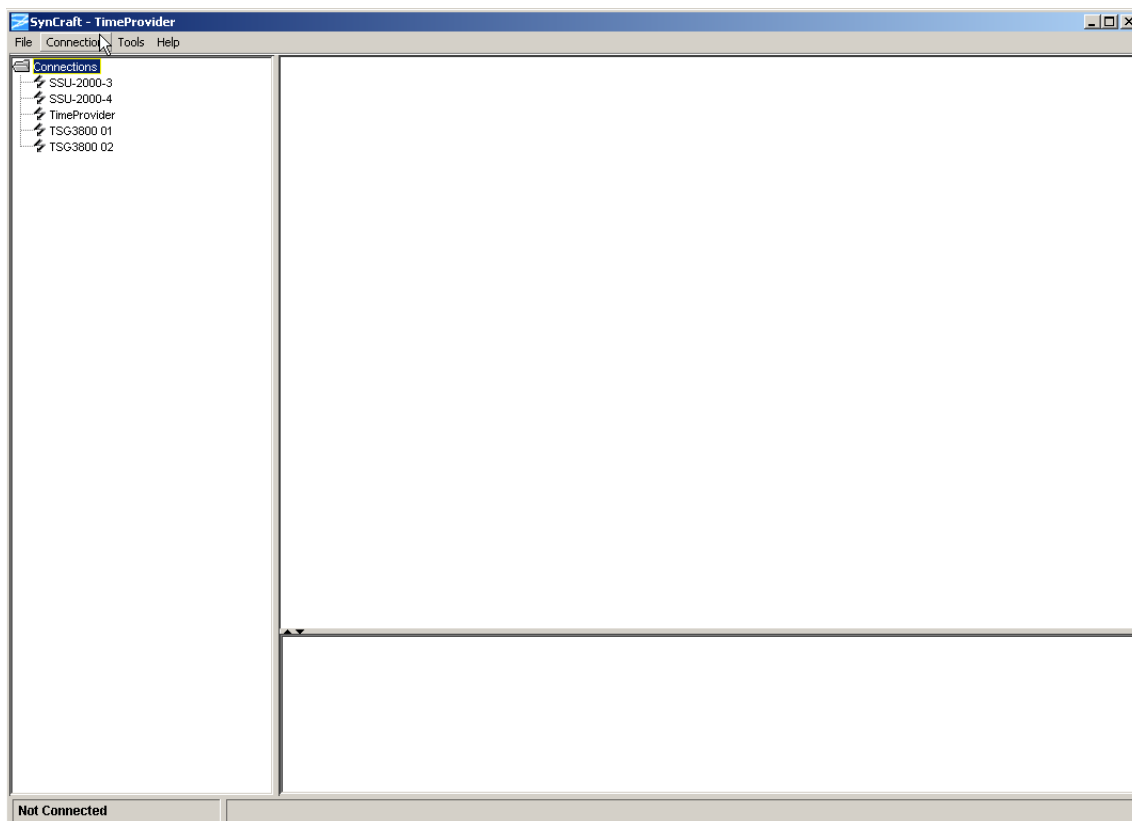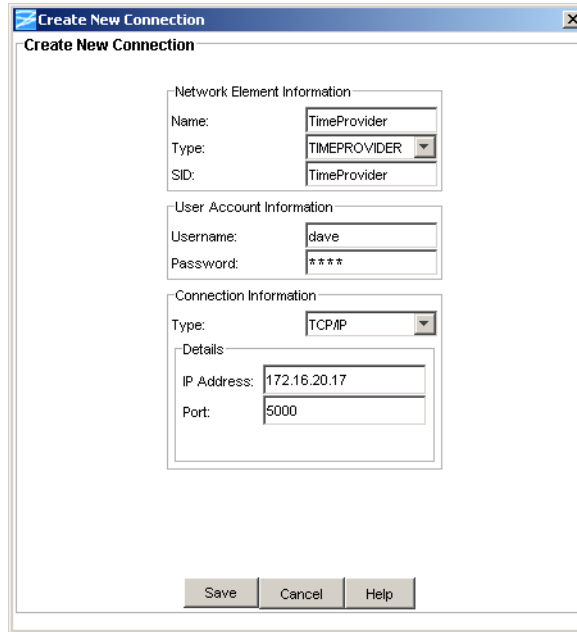
Figure B-1.   The SynCraft Window

Creating a Connection

To create a connection to the TimeProvider, select **Connection**, **New Connection**. The Create New Connection window appears, as shown in Figure B-2..

Figure B-2.   The Create New Connection Window

Fill in each field as appropriate for your installation, then click Save.

- Name – the name of the connection as used by SynCraft

- Type – select TimeProvider from the drop-down list

- SiD – enter the Source ID for the unit

- Username – enter a valid user name defined in the TimeProvider's userid list

- Password – enter the password for the user

- Type – select TCP-IP for use with an Ethernet connection

- IP address – enter the unit's IP address

- Port – enter 5000 for use with an Ethernet connection

Opening a Connection

To open a connection to the TimeProvider, right-click the name of the connection in the network element list in the left column of the SynCraft window. Select **Open Connection** from the drop-down list that appears; the Logical View appears in the main SynCraft window, as shown in Figure B-3..
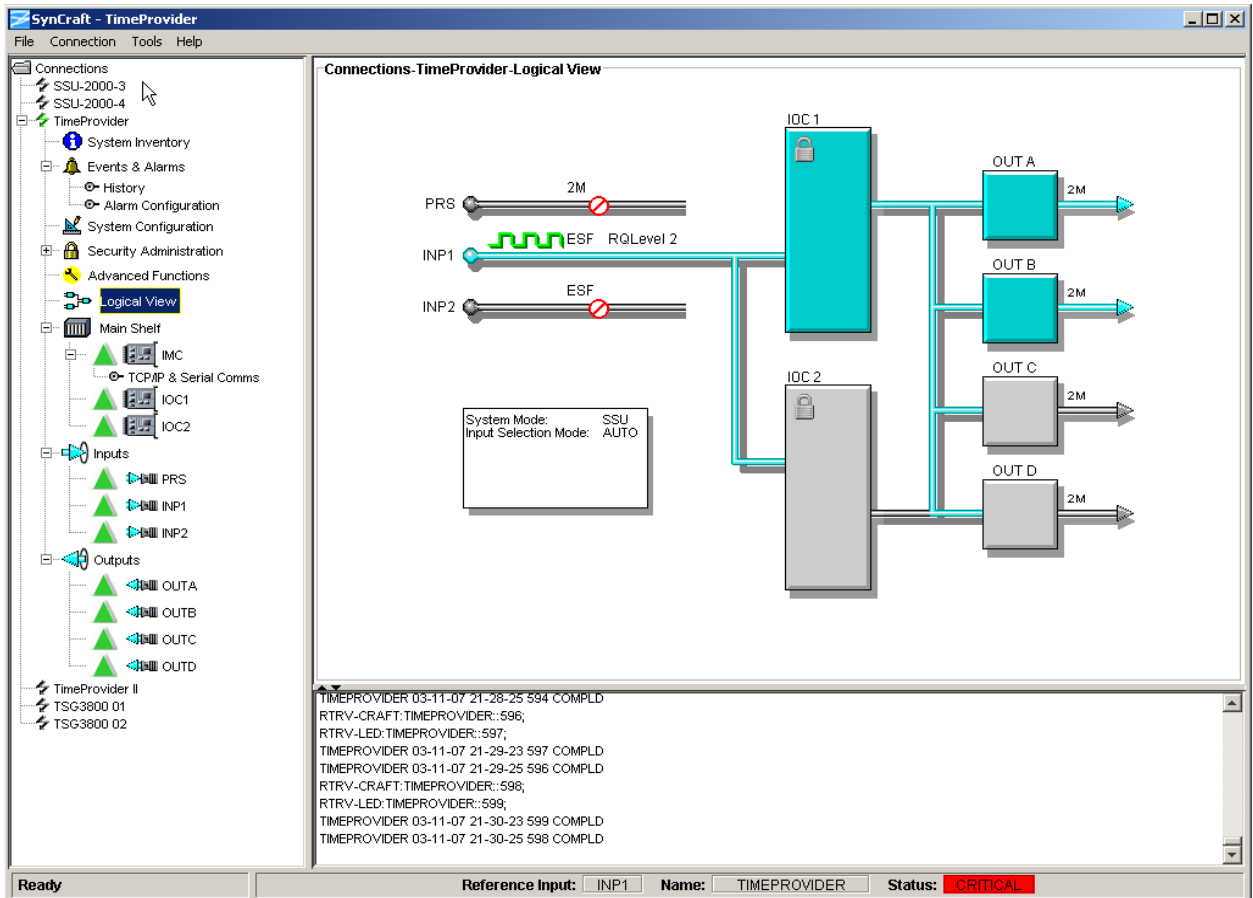
Figure B-3.   Logical View of the TimeProvider

Closing a Connection

To close the connection to the TimeProvider, right-click the name of the connection in the network element list and select **Close Connection** from the drop-down list.

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