

TimeProvider 100 GPS Timing and Frequency Source Device

User's Guide
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How to Use This Guide

This section describes the structure and conventions used in the TimeProvider 100 GPS Timing and Frequency Source Device User Guide. Related TimeProvider 100 documents, contact information for TimeProvider 100 training, and updates made to the user guide can also be found in this section.

In This Preface

- [Purpose of This Guide](#)
- [Structure of This Guide](#)
- [Conventions Used in This Guide](#)
- [Warnings, Cautions, Recommendations, and Notes](#)
- [Related Documents and Information](#)
- [Where to Find Answers to Product and Document Questions](#)
- [What's New In This Guide](#)
- [User's Guide Updates](#)

Purpose of This Guide

The *TimeProvider 100 User Guide* provides detailed information about Symmetricom's TimeProvider 100 features, functionality, operations, specifications, and default settings. Also included are guidelines for installing and configuring the unit, a description of the Command Line Interface (CLI) command set, guidelines for maintenance and troubleshooting, and how to contact technical support.

Structure of This Guide

This user guide contains the following chapters and appendixes:

Chapter, Title	Description
Chapter 1, Overview	Describes the features and functionality of TimeProvider 100.
Chapter 2, Installation and Configuration	Describes the installation and configuration procedures before using the TimeProvider 100
Chapter 3, Part Numbers and Return Information	Lists the part numbers and provides return procedures.
Chapter 4, Operations	Describes TimeProvider 100 alarms and events, logs, user sessions, firmware upgrade, and system configurations.
Chapter 5, CLI Commands	Describes the CLI command set.

Chapter, Title	Description
Chapter 6, Maintenance and Troubleshooting	Contains preventative maintenance and safety consideration information, where to return a unit if necessary, and how to get technical assistance.
Chapter A, System Messages	Provides suggested corrective action for system messages that display in response to an event or alarm.
Chapter B, Specifications and Factory Defaults	Lists the specifications and default settings for TimeProvider 100.

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:
<i>Symmetricom Product Document</i>	The title of a document.
CRITICAL	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.
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.
<i>qualified personnel</i>	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

See your Symmetricom representative or sales office for a complete list of available documentation.



Note: Symmetricom offers training courses designed to enhance your knowledge of the TimeProvider 100. 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 Guide

This is the first release of the TimeProvider 100 User's Guide.

User's Guide Updates

When this manual is updated the updated version will be available for downloading from Symmetricom's Web site. After downloading, you can view the manual on a computer or print it using Adobe Acrobat Reader.

Manual updates are available by logging in to Telecom Solutions Support at: <http://www.symmetricom.com/support/online-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 1 Overview

This chapter provides introductory information for the TimeProvider 100.

In This Chapter

- [Overview](#)
- [Functional Description](#)

Overview

TimeProvider 100 shown in [Figure 1-1](#) is a low-cost Global Positioning System (GPS)-disciplined timing and frequency source stand-alone, one Rack Unit (RU) device. The system receives GPS satellite signals to control an onboard oscillator and to provide 10MHz and 1 PPS output signals and four channels of E1. With superior clock holdover performance and its compact size, the TimeProvider 100 enables rapid deployment for remote offices, street cabinets, and wireless base stations. It is designed to provide precise time and synchronization for locations where cost and space are a limitation.

TimeProvider 100 features a configurable output signal to support a variety of framer signals. This provides the flexibility to integrate into specific application environments easily. This device is fully manageable by local and remote management using RS232 and its Ethernet port.



Figure 1-1. TimeProvider 100

With password-protected management capability, users and administrators can easily and securely configure and monitor the performance of the device using CLI, Simple Network Management Protocol (SNMP), and Telnet. TimeProvider 100 supports remote configuration of system settings, automating saving and restoration, and installation of new software when needed.

With password-protected management capability, TimeProvider 100 can be configured and monitored using the Command-Line Interface (CLI) accessible locally with the RS232 connection or remotely via a Telnet connection to enable rapid migration from Time-Division Multiplexing (TDM)-based to packet-based timing and synchronization solutions. TimeProvider 100 supports remote configuration of system settings, automating saving and restoration, and installation of new software when needed.

Functional Overview

The primary function of TimeProvider 100 is to provide the following GPS disciplined frequency and timing signals:

- 10 MHz sine wave
- 1 PPS (pulse per second)
- 2.048 MHz square wave
- 2.048 Mbps E1 (framed and unframed)

In addition, TimeProvider 100 provides the following functions:

- Command line interface (CLI)
- SNMP traps reporting
- SNMP management interface (future)
- Logging of alarms and events
- Logging all user commands
- Monitoring of DC power voltages, GPS cable connection, GPS engine states, and PLL states.

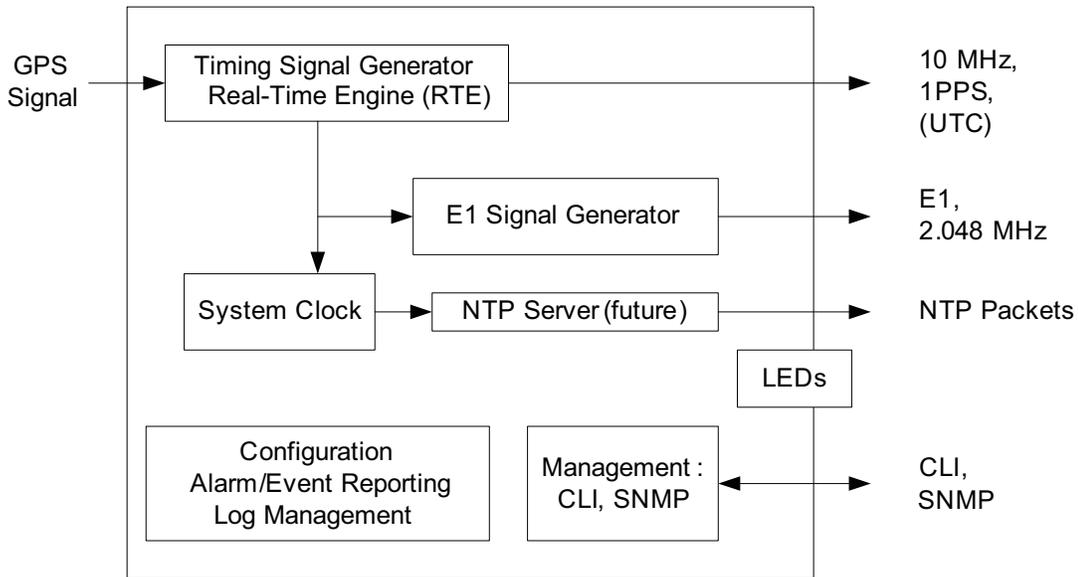


Figure 1-2. TimeProvider 100 Functional Block Diagram

TimeProvider 100 accepts the Radio Frequency (RF) signal from a GPS antenna. In the Real Time Engine (RTE) circuit, the 1 PPS signal is extracted from the GPS signal and is used to discipline the 10 MHz oven-controlled crystal oscillator (OCXO). Both the 1 pulse per second (PPS) and 10 MHz signals are provided as outputs from BNC connectors.



Note: When using the CLI commands, the RTE (Real Time Engine) is referred to as “TimeMAX.”

The 10 MHz reference signal and the 1 PPS signal from the RTE circuit are used to generate 2.048 MHz frequency signals and E1 synchronization signals. TimeProvider 100 provides multiple E1 frame formats. There are four outputs; each is independently programmable to output either a framed or unframed synchronization signal or a square wave clock signal as shown in [Figure 1-3](#).

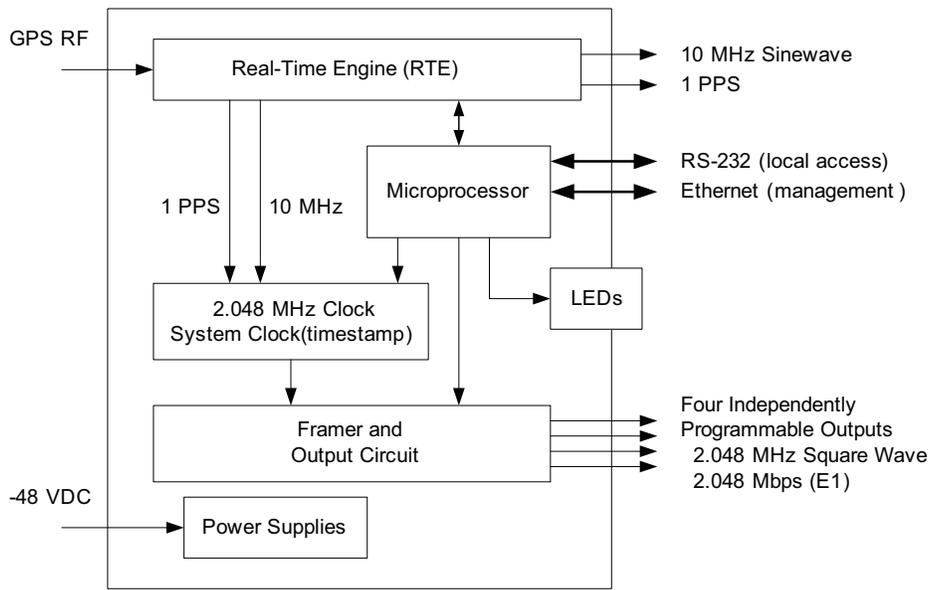


Figure 1-3. TimeProvider 100 Hardware Functional Block Diagram

Functional Description

Figure 1-4 is a front view of the TimeProvider 100. All user connections are on the panel.

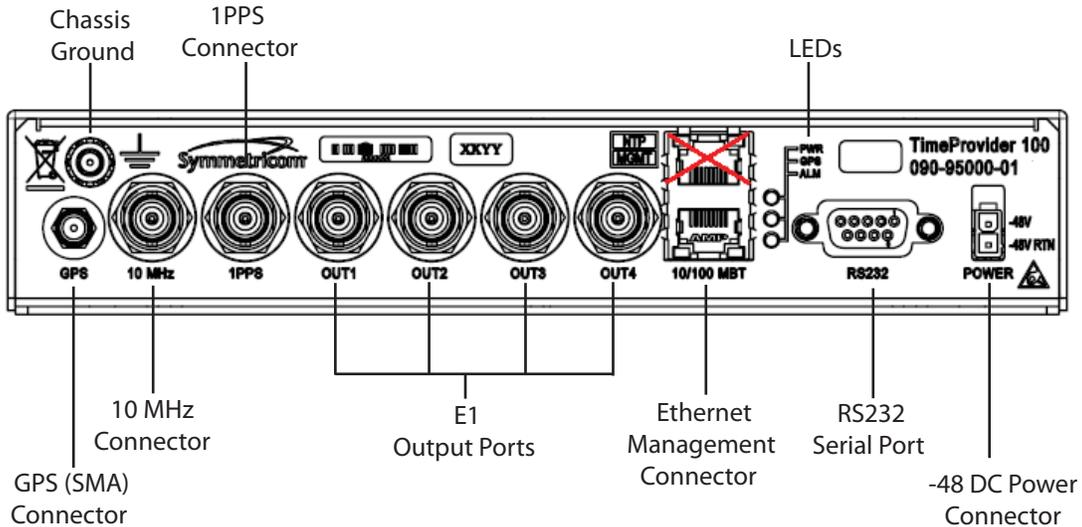


Figure 1-4. TimeProvider 100 Front Panel

Power Connector

A Molex-style connector labeled **Power** is used to provide -48/-60 nominal volts DC (labeled **Power**). When the unit is successfully powered, the PWR LED near the center of the panel will illuminate green. If the power connection is reversed, the unit will not be damaged, it simply will not power-up. Startup power will be < 17 watts and steady-state power is (nominal 25 °C) < 9.5 watts.

The TimeProvider 100 uses -48/-60 nominal VDC power and is not equipped with a power switch. Power to the unit must be controlled by a Branch Circuit Over-Current Protection Device to the DC power main.



Warning: To avoid serious personal injury or death, exercise caution when working near high voltage lines and follow local building electrical codes for grounding the shelf.

RS232 Serial Port

The DE9 connector labeled **RS232** provides a local serial connection to TimeProvider 100. Through this connection, a Command Line Interface (CLI) provides configuration and status monitoring capability. The RS-232 serial port connection is made through a DE9S female connector. This port allows you to connect to a computer using terminal emulation software for remote monitoring and control. When connecting to this port, use a shielded direct connect cable. See [Establish Serial Communication](#), on page 31 for default settings. [Table 1-1](#) describes the EIA-232 connector pin assignments for the serial port.

Table 1-1. Serial Port Connector Pin Assignments

Pin Number	Signal
2	TX
3	RX
5	Ground

LEDs

The TimeProvider 100 has three LEDs on the front panel of the unit and are

described in [Table 1-2](#). Current alarm status can be checked using the `show active alarm` command. For more information, see the CLI command, [show active_alarm](#), on page 61.

Table 1-2. TimeProvider 100 LED Descriptions

Label	Indicator	Description
PWD	Power	Solid Green – -48V power is on Off – -48V power is off
GPS	GPS tracking status	Solid Green – GPS is locked Flashing Green – At least one satellite is tracked Amber – No satellite is tracking
ALM	Alarm	Flashing Green – System is booting Amber – Minor alarm Red – Major alarm Off – No alarm

Ethernet Management

The RJ-45 connector labeled **MGMT** is the connection supporting communication into the network over TCP/IP protocol. This same connection is also used for remote management. Configuration and status monitoring are accomplished using the **MGMT** connector.



Note: The NTP feature in the NTP port is currently not implemented.

E1 Frequency Output Connectors

TimeProvider 100 provides four configurable outputs at E1 (2.048MHz) frequencies. The four independent, separately driven outputs are labeled **OUT1**, **OUT2**, **OUT3**, and **OUT4**. Specific signal types are detailed in the CLI command, [set output](#), on page 79.

1PPS Connector

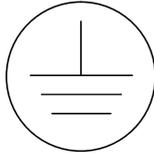
The BNC connector labeled **1PPS** provides one pulse per second (1PPS) signal synchronized to GPS with 50 Ω impedance and LVTTTL signal level.

10 MHz Connector

The BNC connector labeled **10 MHz** provides 10 MHz sine wave signal synchronized to GPS with 50 Ω impedance.

Chassis Ground

Above the GPS (SMA connector) is a connection to chassis ground. A 4mm Grounding Terminal Stud is located on the TimeProvider 100's front panel. The grounding terminal is marked with the universal ground symbol.



GPS (SMA) Connector

The SMA female connector labeled **GPS** is the GPS antenna connection and used as GPS input.

Chapter 2 Installation and Configuration

In This Chapter

- [Installation](#)
- [Configuration Setup](#)
- [Installation and Configuration Checklist](#)

This section provides preliminary installation and configuration procedures for the TimeProvider 100. Use the [Installation and Configuration Checklist](#), on page 39 to verify that you have completed the required installation and configuration before using the TimeProvider 100.

Before you begin to install the TimeProvider 100, review all the information in this section. If difficulties are encountered during the installation process, contact Symmetricom Global Services (SGS). Refer to the [Contacting Technical Support](#), on page 91 for contact information. SGS provides you with technical product expertise and support, and Customer Service provides support about orders, Return Material Authorization (RMA)s, and other customer service-related information.

Installation

This section describes guidelines for surveying a site before installing, unpacking the unit, rack mounting, and grounding the shelf.

Site Survey

Before you begin installation, determine the shelf location, ensure the appropriate power source is available (-48/-60 nominal VDC), and ensure that the equipment rack is properly grounded. Refer to [Part Numbers and Return Information](#), on page 41 for more information about ordering kits for rack mounting of the TimeProvider 100.

The TimeProvider 100 is designed to mount in a 19-inch (48 cm) rack, occupies 1.66 in (40.64 mm, 1 RU) of vertical rack space, and has a depth of 8.0 in (203.2 mm).



Note: 21-inch and 23-inch rack mounting adapters are available as separately ordered items.

Environmental Requirements

Please refer to the [Maintenance and Troubleshooting](#), on page 87 and [Specifications and Factory Defaults](#), on page 97 for more information.

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

- Operating Temperature: -23 °F to 131 °F (-5 °C to +55 °C)
- Operating Humidity: <5% TO 95% RH, condensing
- Use only shielded cable for the DE9 connector (**RS232**). Ground appropriately at both ends, or as required by local standards.



Warning: The shielded cables on the **RS232** port must be used to assure EMC compliance.

-
- Secure all cable screws to their corresponding connectors.



Caution: To avoid interference, you must consider the electromagnetic compatibility (EMC) of nearby equipment when you install the TimeProvider 100 electromagnetic interference can adversely affect the operation of nearby equipment.

Refer to [Electromagnetic Environment](#), on page 105 for more information.

User-Supplied Tools and Equipment

You will need the following tools and equipment to install the TimeProvider 100:

- Standard tool used for installation
- Cable ties, waxed string or acceptable cable clamps
- 1 mm² / 18 AWG (minimum) wire at 300 volt insulation for -48/-60 nominal VDC
- 4 mm² / 16 AWG wire to connect grounding lug to permanent earth ground. Use a UL listed ring lug for earthing ground.
- Shielded cabling of the appropriate impedance required by the specific signal type for signal wiring.
- Mating connectors for terminating signal wiring
- Fasteners for mounting the equipment in rack
- Digital multimeter or standard voltmeter for verifying power connections to the shelf.
- Laptop computer with serial communications software (e.g., Microsoft Hyperterminal and ProComm Plus) for setting system parameters.

Unpack the Unit

The TimeProvider 100 is packaged to protect it from normal shock, vibration, and handling damage.



Caution: To avoid electrostatic discharge (ESD) damage to parts that are packaged with the TimeProvider 100, observe the following procedures.

Unpack and inspect the unit as follows:

1. 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.
2. Open the container, being careful to cut only the packaging tape.
3. Locate and set aside the printed information and paperwork that is included in the container.
4. Remove the unit from the container and place it on an anti-static surface.
5. Locate and set aside small parts which may be packed in the container.
6. Remove the accessories from the container.
7. Remove the anti-static packaging from the unit and accessories.
8. Follow the instructions for assembling the rack mounts to the TimeProvider 100. See [Part Numbers and Return Information](#), on page 41 for more information.
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 unit. See [Figure 2-1](#) for the location of the label. Contact your Symmetricom distributor if the model or item number does not match the information on the shipping list.

For a complete listing of item numbers, see [Part Numbers and Return Information](#), on page 41.

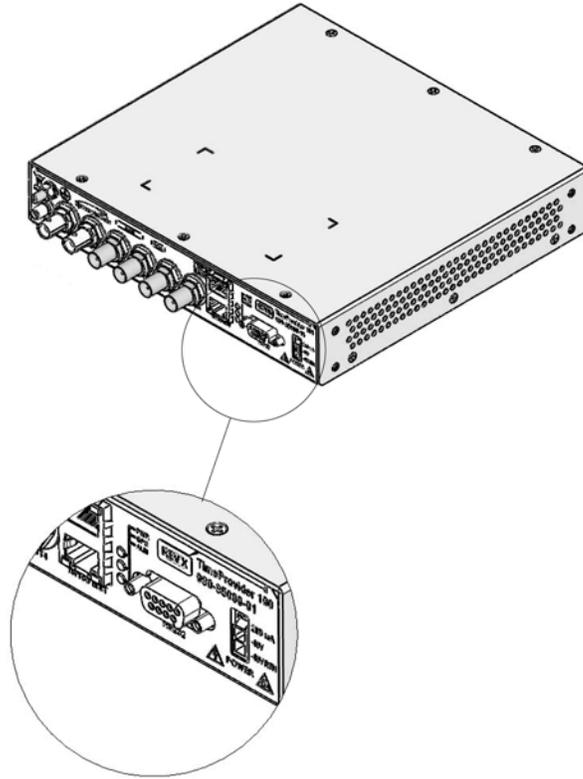


Figure 2-1. Location of TimeProvider 100 Product Label

Rack Mounting the TimeProvider 100

The installation procedure described in this section provides general guidelines for installing the TimeProvider 100. Refer to [Part Numbers and Return Information](#), on page 41 for information about available rack mount kits and mounting adapter bracket kits.

When installing the TimeProvider 100, always follow applicable local electrical standards. Use the following steps to mount the TimeProvider 100 in a rack.

1. Attach the rack mounting brackets to the TimeProvider 100 using 6-32 x 1/4-inch screws.



Note: Using screws other than 6-32 x 1/4 inch could cause damage to the unit. Always use the proper screws for the equipment rack.

2. Ensure that the mounting brackets on both sides are attached at equal distances from the front of the unit.
3. Mount the TimeProvider 100 to the front of the equipment rack rails with four screws and associated hardware.

Rack Mounting Safety Instructions

- *Elevated Operating Ambient* - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature of the TimeProvider 100, which is +55 °C.
- *Reduced Air Flow* - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- *Mechanical Loading* - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- *Circuit Overloading* - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- *Reliable Earthing* - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (for example, use of power strips).

Ground the Shelf

Ground the TimeProvider 100 using the 4mm Grounding Terminal Stud on the front of the TimeProvider 100. This Grounding Terminal is marked with the universal ground symbol, as shown in [Figure 2-2](#).

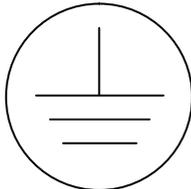


Figure 2-2. Universal Ground Symbol

To make ground connections, follow these steps:

1. Connect a 4 mm² / 16 AWG green/yellow striped insulated wire from the Grounding terminal on the TimeProvider 100 shelf to the Earth Ground on the rack or cabinet. Connect it to the Earth Ground in accordance with Local Electrical Codes. The surface of the Earth grounding terminal must be clean of contaminants and oxidation.
2. Remove 1/4 in. (6mm) of the insulation from both ends of the 4 mm² / 16 AWG green/yellow stripped wire and coat the conductor with an electrically conductive antioxidant compound such as Kopr-shield spray. Spray antioxidant compound on the exposed wire only.

3. Crimp a #10 (4mm) UL listed Ring Lug to one end of the 4 mm² / 16 AWG green/yellow stripped wire and connect it to the TimeProvider 100 Grounding Terminal using the 4mm kept nut supplied. Clamp the Ring Lug between the two flat washers.
4. Clean the connection point on the rack to a bright finish and coat it with an electrically conductive antioxidant compound such as Kopr-shield spray.
5. Crimp the other end of the green/ yellow stripped wire to a ¼" (6mm) UL listed Ring Lug and connect to the Earth Grounding terminals using an external star lock washer between the Ring Lug and rack or earthing point to be grounded.
6. Connect the Ring Lug to the rack or grounding rod by means in accordance with Local Electrical Codes. Do not connect multiple connectors to the same screw assembly.

Configuration Setup

Setting up the TimeProvider 100 to receive GPS satellite signals to provide 10MHz and 1 PPS output signals and four channels of E1 requires very few steps. The high-level steps needed are:

- Apply power to the TimeProvider 100.
- Configure the network address of the TimeProvider 100, and confirm successful connectivity.
- Configure TimeProvider 100 signal outputs.
- Configure GPS signaling.

After making configuration changes, always use the `set configuration save CLI` command to save the latest configuration. See [set configuration](#), on page 72 for more information.

The configuration actions performed in this section are stored in non-volatile memory and are retained when the unit is power-cycled.

Apply Power

The TimeProvider 100 should be connected to -48/-60 nominal VDC Mains through the Branch Circuit Over-Current Protection Device with a maximum 1 amp fuse. TimeProvider 100 is intended for installation in a Restricted Access Location in Accordance with Articles 110-26, 110-27 or the National Electric Code ANSI/NFPA70, or per the applicable code in the country of installation. To connect power leads to the shelf, follow these steps:

1. Remove the fuse from the front panel of the Branch Circuit Over-Current Protection Device. Replace the fuse at the end of the installation procedure.
2. Wire the provided Molex connector to 1 mm² / 18 AWG UL1007 wire with the crimp pins supplied. Insert Molex pins into the Molex connector provided. Wire the other end of the power wires to the Branch Circuit Over-Current Protection Device.
3. Plug the Molex connector into the TimeProvider 100 and replace the fuse in the Branch Circuit Over-Current Protection Device. The TimeProvider 100 -48/-60 nominal VDC power connector is keyed to only connect one way.
4. The connector has a latching mechanism. Push the connector in until it clicks into place. When power is successfully provided, the LED labeled “PWR” will illuminate green. Descriptions of LED indicators are shown in [Reading LED Conditions](#), on page 88.



Note: When disconnecting, the latch arm needs to be tilted away from the “catch” by pressing on the connector and then pulling.



Warning: To avoid serious personal injury or death, exercise caution when working near high voltage lines and follow local building electrical codes for grounding the shelf.

Establish Serial Communication

Serial communication with TimeProvider 100 is established so that configuration can be accomplished. To establish serial communication, follow these steps:

1. Connect a serial cable from the computer’s serial port with the TimeProvider 100’s 9-pin serial port connector labeled **RS232**.
2. Run your terminal emulation program, and configure the designated COM port on the computer using [Table 2-1](#).

Table 2-1. COM Port Properties

Settings	Value
Bits per second	9600
Data bits	8
Parity	None
Stop bits	1
Flow control	None

Log On to TimeProvider 100

Log on is required to configure or view TimeProvider 100 settings. To log on to the TimeProvider 100, follow these steps:

1. Wait for the system to boot.
2. At the login prompt, type **admin**, then press **Enter**.
3. At the password prompt, type **tp100**, then press **Enter**.

A successful connection will look like the following example. You will be asked to type in your user name and password after the system boots up. After typing in the correct user name **admin** and password **tp100**, it will show `tp100>` for you to type in command.

```
Symmetricom TP100

login: admin

Password: *****

tp100>
```



Note: If you fail to log in after three tries, the system will wait one to two minutes before you try again.

Log On Tips

- `admin` is the factory shipped user name and `tp100` is the factory shipped password. The `set user` command can be used to change the user name and password. See [TimeProvider 100 CLI Command Set](#), on page 56 for more information.
- Logon sessions can be initiated using the serial port or remotely using Telnet. If using Telnet, an appropriate TimeProvider 100 network address needs to be established before remote sessions can be successful.
- A serial session will automatically logout whenever 10 minutes elapse without any user entry. When a session expires, there will be a logon prompt.
- A remote (Telnet) session will automatically logout whenever 10 minutes elapse without any entry. When a session expires, there will be a logon prompt.
- The TimeProvider 100 simultaneously supports up to eight log on sessions. These eight simultaneous log on sessions can be on the serial port, Ethernet port, or a combination of both ports.

Check GPS Status

After logging in to the system, the `show gps` command can be used to check the GPS status. The command response is shown in the following example. The "Number of tracked satellite" information can be used to judge whether the GPS cable is connected correctly. When the `Number of tracked satellite` is larger than zero, the GPS connection is working properly.

```
tp100> show GPS

GPS information

GPS Position Mode           - Auto
GPS Mask                     - 5
GPS Antenna Delay           - 0.00E+00
GPS System Time              - week:1809, second:200730
Number of tracked satellite  - 8

GPS Latitude                 - N39:54:12.726
GPS Longitude                 - E116:26:45.318
GPS Height                   - 134.90
```

Check Inventory Information

The `show inventory` command is used to check the inventory information in the TimeProvider 100 as shown in the following example:

```
tp100> show inventory
-----
|Part number   |Serial   |HW Ver   |SW Ver   |FPGA     |Manufacture date |
|-----|-----|-----|-----|-----|-----|
|090-95000-01 |R03009  |2       |0.0.14  |0x17     |11/14/2008      |
-----
```

Configure the TimeProvider 100 IP Address

This step establishes the IP settings of the TimeProvider 100. The LAN connection labeled **MGMT & NTP** can be used for configuration of the TimeProvider 100.

The following two examples show how to configure Ethernet ports.

Setting IP DHCP Mode

In the following example, the **MGMT** port was used for configuration. After configuration is done, type `show ipconfig` to see a list of IP settings as shown.

1. Type the following CLI command and then press **Enter**.

```
tp100> set ipconfig MGMT mode dhcp
```

2. Type the following CLI command and then press **Enter**.

```
tp100> set ipconfig MGMT restart.
```

3. Type the following CLI command and then press **Enter**.

```
tp100> show ipconfig
```

```
-----  
|Port# | Mode   | State | IP Address | Gateway  | Netmask  |  
|-----|-----|-----|-----|-----|-----|  
|MGMT  | dhcp  | enable | N/A       | N/A     | N/A     |  
|-----|-----|-----|-----|-----|-----|  
|NTP   | static | enable | 192.168.2.10 | 192.168.2.1 | 255.255.255.0 |  
-----
```

Because the mode is DHCP, the dynamic IP address, gateway and subnet mask are shown as `N/A`. In order to find out the real negotiated IP address, use the CLI command, `show ipstatus` to check the current Ethernet status. In this case, the IP address is `192.168.5.69` and the IP subnet mask is `255.255.255.0`.



Caution: After making configuration changes, you must use the `set configuration save` CLI command to save the latest configuration. See [set configuration](#), on page 72 for more information.

```
tp100> show ipstatus
```

```
MGMT      Link encap:Ethernet  HWaddr 00:B0:AE:01:A4:AB
          inet addr:192.168.5.69  Bcast:192.168.5.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:519 errors:0 dropped:0 overruns:0 frame:0
          TX packets:7 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:41055 (40.0 KiB)  TX bytes:1938 (1.8 KiB)
          Base address:0xa000

NTP       Link encap:Ethernet  HWaddr 00:B0:AE:01:A4:AA
          inet addr:192.168.2.10  Bcast:192.168.2.255  Mask:255.255.255.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:84 (84.0 B)
          Base address:0xc000
```

Setting IP Static Mode

Use the NTP port for static mode. The NTP port can only be set to static mode. To set the IP settings with the following settings: IP address = 192.168.2.8, gateway = 192.168.2.1, and IP subnet mask = 255.255.255.0, follow these steps:

1. Type and the following CLI command and then press **Enter**.

```
tp100> set ipconfig NTP ipaddr 192.168.2.8 mask 255.255.255.0 gateway 192.168.2.1
```

2. To make the settings available, type the following CLI command and then press **Enter**:

```
tp100> set ipconfig NTP restart
```

Use values appropriate for your network environment.



Caution: After making configuration changes, you must use the `set configuration save` CLI command to save the latest configuration. See [set configuration](#), on page 72 for more information.

Confirm the setting and status by using the `show ipconfig` and `show status` commands. Use the `set ipconfig` CLI command to configure IP settings appropriate to your network. To confirm the IP address values, use the `show ipconfig` CLI command. Refer to [TimeProvider 100 CLI Command Set](#), on page 56 for more information.

Confirm TimeProvider 100 Network Communication

If not already done, a standard RJ45 Ethernet cable should be connected from the TimeProvider 100 port labeled **MGMT** into the network connection for 10/100 Base-T.

There are a number of ways to confirm that TimeProvider 100 is now available on the network. The following is a method available on any Windows[®] PC:

1. From a PC that is on the same network as the TimeProvider 100, select **Start > Run**.
2. In the Run dialog box, select **cmd**, then click **OK**. This will initiate a command session as shown in [Figure 2-3](#).
3. At the prompt, type `ping` followed by the TimeProvider 100 IP address, then press **Enter**. See [Figure 2-3](#). The example shows successful connection.

```
C:\Documents and Settings\symmuser> ping 192.168.5.1

Reply from 192.168.5.1: bytes =32 time=4ms TTL=64
Reply from 192.168.5.1: bytes =32 time=2ms TTL=64
Reply from 192.168.5.1: bytes =32 time=2ms TTL=64
Reply from 192.168.5.1: bytes =32 time=2ms TTL=64

Ping statistics for 192.168.5.1:
    Packets: Sent = 4, Received = 4, lost = 0 <0% loss>,
    Approximate round trip times in milli-seconds:
        Minimum = 2 ms, Maximum= 4 ms, Average= 2 ms
```

Figure 2-3. Pinging the TimeProvider 100

The response shown in [Figure 2-3](#) shows the TimeProvider 100 IP connection is working properly.

If ping was not successful, here are some considerations:

- First, ensure that a physical link has been established from the TimeProvider 100 to whatever it is connected to (likely a switch). The small green LED in the upper-right-hand corner of the **MGMT** connector on the TimeProvider 100 (see [Figure 1-4](#)) should be lit solid green. If it is not, there is likely a basic link problem.
- Once the physical link is established, ensure that the device linked to the TimeProvider 100 is capable of running 10/100 Base-T. The TimeProvider 100 will auto-negotiate the rate, but does not support speeds other than 10/100 Base-T.

Configure Frequency Outputs

The outputs from the **10 MHz** and **1PPS** BNC ports are fixed and cannot be configured. Each of the **OUT1** to **OUT4** BNC ports can be configured independently. Available output signal types are shown in [Table 2-2](#).

Table 2-2. Signal Types

Signal Type	Output Type
Disable	No Output
e1_ccs_no_ssm	E1, CCS, CRC Disabled, Sa bits set to all 1's
e1_ccs4	E1, CCS, CRC Enabled, SSM Enabled
e1_ccs4_no_ssm	E1, CCS, CRC Enabled, Sa bits set to all 1's
e1_cas_no_ssm	E1, CAS, CRC Disabled, Sa bits set to all 1's
e1_cas4	E1, CAS, CRC Enabled, SSM Enabled
e1_cas4_no_ssm	E1, CAS, CRC Enabled, Sa bits set to all 1's
e1_2048m	E1 2.048MHz
e1_ais	E1 AIS

The `show output` command identifies the current output signal type. The figure below shows an example of output configurations. "Port" indicates the port number, "State" indicates the "enable" or "disable" state of the port, "Frame type" indicates frame type of the output signal, "SSM Bit" indicates the position of the SSM bit, and "SSM Value" indicates the SSM value (clock accuracy). See [show output](#), on page 67 for more information.

```
tp100> show output
```

```
-----
|Port      |State      |Frame Type          |SSM Bit  |SSM Value |
|-----|-----|-----|-----|-----|
|1         |enable    |e1_cas4             |4        |st1       |
|-----|-----|-----|-----|-----|
|2         |enable    |e1_cas4             |4        |st1       |
|-----|-----|-----|-----|-----|
|3         |enable    |e1_cas4             |4        |st1       |
|-----|-----|-----|-----|-----|
|4         |enable    |e1_cas4             |4        |st1       |
|-----|-----|-----|-----|-----|
```

The output signal can be observed on an oscilloscope by connecting directly from the BNC output of TimeProvider 100 to the BNC port of the oscilloscope.

Set the signal type as desired using the `set output PORTn frametype <selection> SSM-BIT <selection> status <selection>` command. The <selection> choices are shown in [Table 2-3](#).

Table 2-3. Signal Type Selection Choices

Parameter	Selection
PORTn	Port1, Port2, Port3, Port4
Status	Enable, Disable
FRAMETYPE	e1_css_no_ssm, e1_ccs4, e1_ccs4_no_ssm, e1_cas_no_ssm, e1_cas4, e1_cas4_no_ssm, e1_2048m, e1_ais
SSM-BIT	4, 5, 6, 7, 8

For example, set port1 to e1_cas with crc and ssm bit set to 5, type and enter the following command:

```
tp100> set output port1 frametype e1_cas4  
  
tp100> set output port1 ssm-bit 5
```

The output LED provides high-level indication about output status as shown in [Reading LED Conditions](#), on page 88.



Caution: After making configuration changes, you must use the `set configuration save` CLI command to save the latest configuration. See [set configuration](#), on page 72 for more information.

Installation and Configuration Checklist

To make sure that you have properly installed and configured your TimeProvider 100, use [Table 2-4](#) to verify that you have completed the required operations. For further details about each of the operations, refer to the section shown in [Table 2-4](#).

Table 2-4. Installation and Configuring Checklist

Operation	More Information	Complete
TimeProvider 100 Site Survey	Site Survey , on page 25	
Unpack Unit	Unpack the Unit , on page 27	
Shelf Mounting (<i>optional</i>)	Rack Mounting the TimeProvider 100 , on page 28	
Shelf Grounding (<i>optional</i>)	Ground the Shelf , on page 29	
Apply Power	Apply Power , on page 30	
Establish Serial Communication	Establish Serial Communication , on page 31	
Log On to TimeProvider 100	Log On to TimeProvider 100 , on page 32	
Check GPS Status	Check GPS Status , on page 33	
Check Inventory Information	Check Inventory Information , on page 33	
Configure TimeProvider 100 IP Address	Configure the TimeProvider 100 IP Address , on page 33	
Confirm TimeProvider 100 Network Communication	Confirm TimeProvider 100 Network Communication , on page 36	
Configure Outputs	Configure Frequency Outputs , on page 37	

Now that you have completed the required steps to install and configure the TimeProvider 100 for operation, the Command Line Interface (CLI) can be used for additional configuration or status monitoring. Refer to [TimeProvider 100 CLI Command Set](#), on page 56 for further details.

Chapter 3 Part Numbers and Return Information

In This Chapter

- [TimeProvider 100 System and Accessory Part Numbers](#)
- [Returning the TimeProvider 100](#)

TimeProvider 100 System and Accessory Part Numbers

This section provides part numbers and accessories available for the TimeProvider 100.

Table 3-1. Component Part Numbers

Item	Part Number
TimeProvider 100Shelf & Installation Kit	990-95000-01
Accessories - Antenna Kit	
TimeProvider 100 GPS Antenna Kit	990-00075-000
Accessories - Optional	
TimeProvider 100 19" Single Rack Mount Kit	093-00090-000
TimeProvider 100 19" Dual Rack Mount Kit	093-00069-000
Mounting Adaptor Bracket Kit - 21" ETSI	093-00011-000
Mounting Adaptor Bracket Kit - 23"	093-00012-000

Returning the TimeProvider 100

You should return the equipment to Symmetricom only after you have exhausted the troubleshooting procedures described in this user guide, 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.

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
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.

Chapter 4 Operations

In This Chapter

- [Introduction](#)
- [Alarms & Events](#)
- [Alarm Levels](#)
- [Date & Time](#)
- [TimeProvider 100 Logs](#)
- [User Sessions](#)
- [System Configurations](#)

Introduction

Having completed the initial setup and checklist, the unit is now ready for operation. This section provides information about how to interpret TimeProvider 100 operational status and performance. See the [CLI Commands](#), on page 53 for a complete list of configuration and query commands with examples and responses from TimeProvider 100.

The operational status of TimeProvider 100 is dependent on the operational mode of the RTE clock module. The RTE clock module provides the clock signals (10 MHz and 1PPS) that TimeProvider 100 uses to generate the four telecom outputs.

The seven RTE clock modes as shown in [Figure 4-1](#) are:

1. **Power-up**—RTE is booting. 10 MHz and 1PPS outputs are not valid.
2. **Warm-up**—RTE is waiting for 10 MHz OCXO to warm up and stabilize.
3. **Never-locked**—RTE has not locked to GPS since power-up. 10 MHz and 1PPS outputs are available, but their quality is not guaranteed. If GPS is not connected, RTE will remain in this mode.
4. **Locked**—The OCXO is locked to 1PPS signal recovered from GPS. 10 MHz and 1PPS outputs are valid.
5. **Holdover**—RTE cannot track to any GPS satellite. 10 MHz and 1PPS outputs are valid, but in holdover mode.
6. **Recovery**—RTE has found a GPS satellite and is trying to lock of them. 10 MHz and 1PPS outputs are valid, but in holdover mode.

7. **Fail**—RTE has a hardware error. 10 MHz and 1PPS outputs are not guaranteed. When the error is cleared, RTE goes to Holdover mode.

RTE (Real Time Engine) Clock Modes

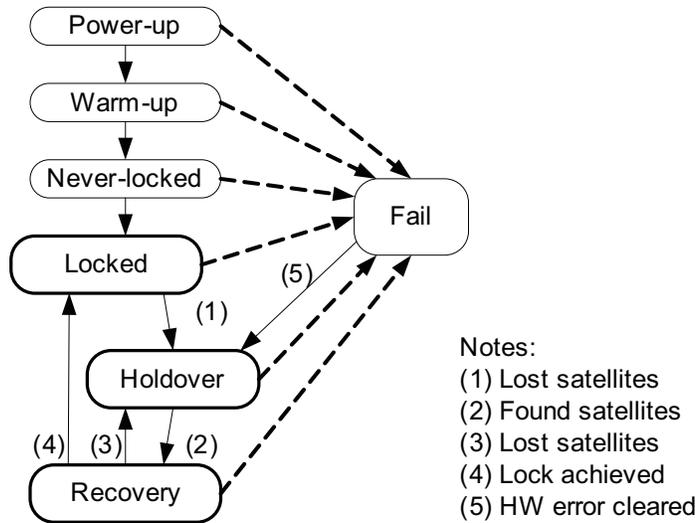


Figure 4-1. TimeProvider 100 Clock Modes

The RTE clock module puts out valid clock signals if it is in Locked, Holdover, or Recovery mode. The RTE clock module puts out invalid clock signals when it is in FAIL mode.

Table 4-1 describes the seven RTE clock mode conditions and Telecom outputs.

Table 4-1. RTE Clock Modes

RTE Mode	RTE Conditions	TimeProvider 100 Telecom Output
Power-up	RTE is booting up. 10 MHz and 1PPS outputs are not valid.	Clock quality = DUS (Do not Use for Sync).
Warm-up	RTE OCXO is warming up and has not stabilized. 10 MHz and 1PPS outputs are not valid.	Clock quality = DUS (Do not Use for Sync).
Never-locked	RTE has not locked to GPS since power-up. 10 MHz and 1PPS outputs are available, but their quality is not guaranteed.	(1) Clock quality = ST3 (Stratum 3) if TimeProvider 100 has no hardware faults that affect the telecom outputs. (2) Clock quality = DUS (Do not Use for Sync) if TimeProvider 100 has hardware faults that affect the telecom outputs.

Table 4-1. RTE Clock Modes (Continued)

RTE Mode	RTE Conditions	TimeProvider 100 Telecom Output
Locked	RTE OCXO is locked to a 1PPS signal recovered from GPS. 10 MHz and 1PPS outputs are valid.	(1) Clock quality = ST1 (Stratum 1) if TimeProvider 100 has no hardware faults that affect the telecom outputs. (2) Clock quality = DUS (Do not Use for Sync) if TimeProvider 100 has hardware faults that affect the telecom outputs.
Holdover	RTE has lost GPS satellite. 10 MHz and 1PPS outputs are valid but in holdover mode.	(1) Clock quality = ST3 (Stratum 3) if TimeProvider 100 has no hardware faults that affect the telecom outputs. (2) Clock quality = DUS if TimeProvider 100 has hardware faults that affect the telecom outputs.
Recovery	RTE has found a GPS satellite and is trying to lock with the GPS satellite. 10 MHz and 1PPS outputs are valid, but in holdover mode.	(1) Clock quality = ST3 (Stratum 3) if TimeProvider 100 has no hardware faults that affect the telecom outputs. (2) Clock quality = DUS (Do not Use for Sync) if TimeProvider 100 has hardware faults that affect the telecom outputs.
Fail	RTE has a hardware error. 10 MHz and 1PPS outputs are not valid	Clock quality = DUS (Do not Use for Sync).

Alarms & Events

TimeProvider 100 reports alarms and events related to hardware failures. Non-alarm events are changes in system configuration and operational mode. TimeProvider 100 records alarms and events in the Event Log. Up to a 1,000 entries can be logged, and the oldest entry is deleted first when the log is full. [Table 4-2](#) lists all alarms, events, and default settings. Event code number 20 (*Configuration Change*) includes all the changes to system configuration that are not listed in the table.

Level

Level identifies the severity of the alarm. It can be critical, major, minor, or event. If the level is event, it is not reported, but it is recorded and logged. The events defined in the table (code 20 and 24–29) cannot be changed to alarms. Alarm codes 0–19 can be changed to events and back to alarms. If an alarm happens, and its transient parameter is “no,” it will be reported as an active alarm. A SNMP trap will be generated, and the trap will be logged in the Event log.

State

State indicates whether a particular alarm or event should be ignored by the system. If an event or alarm is disabled, it will not be reported or logged.

Delay

If the delay value is nonzero, the alarm will be reported if it has been active for the length of time specified by the delay. The event time in the log will be the time when the alarm first happened and excludes the delay time. If the alarm is cleared before the delay time is up, the alarm is not reported and logged.



Note: The delay value for alarm TM_SELFTEST (alarm ID #8), TM_COMM (alarm ID #9) and FPGA_ERROR (alarm ID #12) are fixed to zero and cannot be changed.

Transient

If the transient parameter is set to “yes,” the alarm will not be reported as an active alarm and a SNMP trap will not be generated. The alarm is recorded in the Event log. Event code 20–29 have fixed transient status and cannot be changed.



Note: An event definition can be modified by both the **admin** and **config** user groups. See [Command Groups](#), on page 57 for information about the CLI command group permissions.

Table 4-2. TimeProvider 100 Alarms, Events, and Configuration

Code	Name	Description	Level	State	Delay	Transient
0	MB_5.5V	5.5V out of range	major	enable	0	no
1	MB_1.2V	1.2V out of range	major	enable	0	no
2	MB_3.3V	3.3V out of range	major	enable	0	no
3	MB_5V	5V out of range	major	enable	0	no
4	MB_1.8V	1.8V out of range	major	enable	0	no
5	10MHZ_LOS	10MHZ signal loss	major	enable	0	no
6	GPS_ENGINE	GPS engine communication failed or 1PPS missing	major	enable	0	no
7	TM_EFC	RTE PLL tuning saturated	major	enable	0	no
8	TM_SELFTEST	RTE self test failed	critical	enable	0	no

Table 4-2. TimeProvider 100 Alarms, Events, and Configuration (Continued)

Code	Name	Description	Level	State	Delay	Transient
9	TM_COMM	MB-TM communication failure	major	enable	0	no
10	MB_PLL_E1	E1 PLL unlocked	major	enable	0	no
11	MB_PLL_25MHz	25MHz PLL unlocked	major	enable	0	no
12	FPGA_ERROR	Mainboard FPGA error	major	enable	0	no
13	FLASH_ERROR	Mainboard flash memory fault	major	enable	0	no
14	GPS_CUR	GPS antenna current out of range	minor	enable	0	no
15	ANT_OPEN	GPS antenna open-circuit	minor	enable	0	no
16	GPS_VOL	GPS antenna voltage out of range	major	enable	0	no
17	ANT_SHORT	GPS antenna short-circuit	major	enable	0	no
18	TM_HOLDOVER	RTE in holdover mode	major	enable	0	no
19	TM_NEVERLOCKED	RTE in neverlocked mode	major	enable	0	no
20	CONFIG_CHANGE	Configuration change	event	enable	0	yes
21	WARMUP	RTE is in warm-up state	event	enable	0	no
22	LOCKED	RTE is in locked state	event	enable	0	no
23	RECOVERY	RTE is in recovery state	event	enable	0	no
24	MB_FW_DL_FAIL	MB firmware download failed	event	enable	0	yes
25	MB_FW_DL_SUCC	MB firmware download succeeded	event	enable	0	yes
26	SWITCH	Switched firmware image to 1 (2)	event	enable	0	yes
27	REBOOT	Rebooted system	event	enable	0	yes

Table 4-2. TimeProvider 100 Alarms, Events, and Configuration (Continued)

Code	Name	Description	Level	State	Delay	Transient
28	TM_FW_DL_FAIL	RTE firmware download failed	event	enable	0	yes
29	TM_FW_DL_SUCC	RTE firmware download succeeded	event	enable	0	yes

Alarm Levels

Each detected condition can have one of four severity levels: Event, Minor, Major, and Critical. Each condition has a default severity as shown in [Alarms and Event System Messages](#), on page 93. The CLI provides several types of configurable options for each condition. See the [set alarmconf](#), on page 71 for more information. The basic capabilities are:

- Change the severity level of the condition.
- Disable or enable any reporting of the condition.
- Define an amount of time after detection of the condition before it will actually be reported.

`show alarm-config` queries the above settings for all of the conditions. See the CLI command [show alarmconf](#), on page 62 for more information. These conditions become manifest in the TimeProvider 100 in three areas:

1. An event log provides history of “entry into” and “exit from” any condition that has not been configured as disabled. Each entry in the log is timestamped. See [show event log](#), on page 66 for more information.
2. The `show active_alarm` query is used to display a list of all active alarms in the system. The list shows alarms that were activated, but not yet cleared. See [show active_alarm](#), on page 61 for more information.
3. The ALARM LED indicates the highest severity level of all conditions that are currently present. As with `show alarmconf`, the ALARM LED will not respond to

conditions that have been disabled (by user). [Table 4-3](#) shows the relationship between the highest active severity level and the ALARM LED indication.

Table 4-3. Alarm Levels

Active Alarms	Alarm LED Status	Description
Event	OFF	Recorded in the Event log.
Critical	Red	Any fault that causes the board to lose its ability to provide reliable 1PPS or 10MHz output signals.
		Holdover for more that 24 hours.
Major	Red	Although the board is providing reliable 1PPS or 10MHz output signals, a fault is causing the board to lose its ability to provide reliable E1 output signals.
Minor	Amber	Any other alarm event that does not qualify as a critical or major alarm.
		Up to two of the four E1 output ports cannot output signals.

When an alarm clears, the alarm condition is no longer present and the following occurs:

- An entry is placed into the alarm log showing that the alarm condition has cleared.
- If the alarm information is included in the `show alarm` response, it will be removed from that response.
- The Alarm LED logic will execute and may drive a change in the Alarm LED indication.

For more information, refer to [System Messages](#), on page 93 for alarm message details.

Date & Time

Use the `set time` command to set the time and date. The time and date is used for log entries and some responses.

There is no real-time clock in the TimeProvider 100, so if the TimeProvider 100 is power-cycled, the time line will be adjusted. The following rules apply and are intended to keep the time line in the logs from having negative time jumps:

- When the TimeProvider 100 powers up, the latest entry in the **event** and **command** logs are checked for date and time. The latest entry is the last one written into the respective log.
- The date and time of the latest entries are compared to see which one contains the most recent time and date. The most recent date and time will become the starting point for the internal date and time. In other words, while the unit is powered, the time line will proceed from that reference.
- As entries that will be logged occur, the entries will reflect the current time and date (based on reference described in the prior bullet). These entries become candidates for the “latest entry” discovery on the next power-up.
- When the CLI command `set clock` is used, the date and time are immediately updated. Since this places an entry in the logs, this provides a new timeline basis for the next power-up. See [set clock](#), on page 72 for more information.

TimeProvider 100 Logs

The TimeProvider 100 provides two types of non-volatile logs: Event and Command.

Event Log

Event log provides timestamped entries whenever any of the conditions associated with the events identified in [Table 4-2](#) are set or cleared. Additionally, other significant actions such as reboot, resetting time (see [set clock](#), on page 72) and changes to the PLL state also generate log entries. The event log can be viewed using `show log event`.

Command Log

Command log provides timestamped entries of user command history. Additionally, other significant actions such as session log on, session log off, reboot, and resetting time also generate log entries. The command log can be viewed using `show log command`.

User Sessions

TimeProvider 100 user sessions can occur in two ways:

1. Locally with a serial connection
2. Remotely with a Telnet connection.

Either way, a userID and password are required. All TimeProvider 100 sessions are enabled with the same userID and a single password. There can be up to eight simultaneous Telnet sessions. Remote sessions time out after 10 minutes with no entry. A serial session times out after 60 minutes with no entry.

Logon UserID

The factory default userID is `admin` and can be changed by an administrator with the `set user` command. See [set user](#), on page 83 for more information.

Password

The factory default password is `tp100` and can be changed by an administrator with the `set user` command. See [set user](#), on page 83 for more information.

To avoid a possible service call to gain access to the TimeProvider 100, Symmetricom recommends that you record any changes made to the password.

System Configurations

When TimeProvider 100 is first powered up, TimeProvider 100 will load a factory configuration. Users can modify the configuration parameters and save a backup copy at any time. The backup configuration in the backup copy can be restored at any time. During a system reboot, if the backup configuration is available, it will be used. Otherwise, the factory configuration will be used.

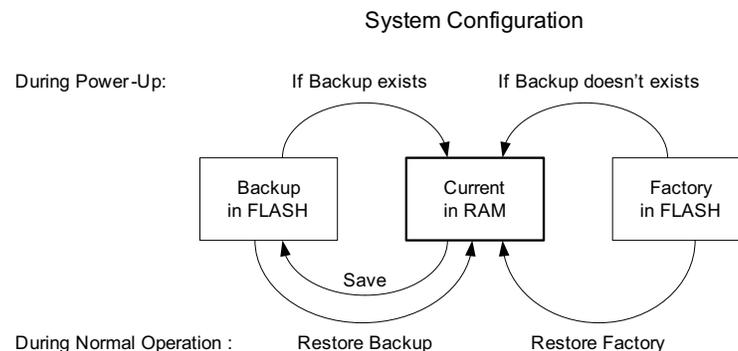


Figure 4-2. System Configuration

System configuration modification is done by using any of the CLI commands that start with `set`. See [CLI Commands](#), on page 53 for more information. Configuration restoration includes the following conditions:

- The “Restore Factory” configuration is a full restore of the factory configuration which includes the default IP configuration and default user data (user ID and password).
- The “Restore Backup” configuration restores configuration parameters set by the operation from the backup FLASH, except for the IP configuration and user data (user IDs and passwords).
- The manual RESET button restores only the factory IP configuration and default user data (user ID and password). The manual RESET button is located on the back of the TimeProvider 100 unit. Press the RESET button and hold it for 3 seconds to perform the RESET.

Chapter 5 CLI Commands

In This Chapter

- [Overview](#)
- [TimeProvider 100 CLI Command Set](#)
- [Command Groups](#)
- [Show Commands](#)
- [Set Commands](#)

Overview

The Command Line Interface (CLI) is used to display information or configure and manage the TimeProvider 100 from either a terminal connected to the EIA-232 serial port or the Ethernet port.

The section describes the CLI command conventions, CLI command keyboard usage, and command-line form. [Figure 5-1](#) shows the general structure of the CLI.

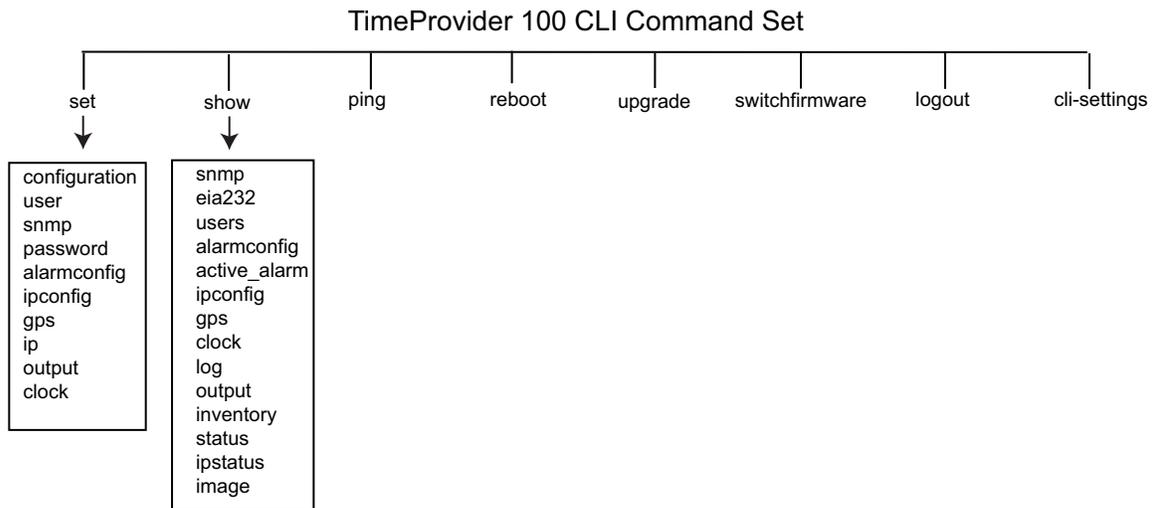


Figure 5-1. TimeProvider 100 CLI Command Set

TimeProvider 100 CLI Command Conventions

The following are conventions used for the TimeProvider 100 CLI command set.

- [] – Brackets provide information about the allowed range. The first value is the minimum, and the last value is the maximum.
- { } – Braces signify more than one parameter data option.

- | – Vertical bars separate options.
- *Italics* indicates variable data.
- All commands are completed by pressing the Enter key.

CLI Command Keyboard Usage

The interface has built-in features for navigating within the CLI command hierarchy and are as follows:

- Press the TAB key or type “?” at the prompt for a list of the available top-level commands.
- Press the TAB key at any time while typing a command. TimeProvider 100 will respond with the completion of the keyword or available completion choices based on the letters you type.
 - If typing of a keyword is partially complete, the completion will display if it is unique, otherwise, completion choices will be available.
 - If the keyword is complete after pressing the TAB key, the choices for the next syntax element will display.

For example, typing `s` at the prompt displays:

```
tp100> s
```

Then pressing the TAB key displays:

```
set          - Changes settings
show         - Displays settings
```

Continuing with the example, typing `se` and then pressing the TAB key, displays `set` because it is the only possible command. Next, typing `o` and then pressing the TAB key, displays `set output` as the only possible command completion. When typing `s` and then pressing the TAB key, `set output signaltype` displays. Finally, pressing the TAB key results in the `signaltype` options for `set output signaltype` displaying as shown in the following:

```
e1_ccs_no_ssm      - E1, CCS, CRC Disabled, Sa bits set to all 1's
e1_ccs4            - E1, CCS, CRC Enabled, SSM Enabled
e1_ccs4_no_ssm    - E1, CCS, CRC Enabled, Sa bits set to all 1's
e1_cas_no_ssm     - E1, CAS, CRC Disabled, Sa bits set to all 1's
e1_cas4           - E1, CAS, CRC Enabled, SSM Enabled
e1_cas4_no_ssm    - E1, CAS, CRC Enabled, Sa bits set to all 1's
e1_2048m          - E1, 2.048 MHz
e1_ais            - E1, AIS
```

- Previously typed commands can be recalled by using the UP ARROW key. You can recall up to five previously typed commands. Continually pressing the UP ARROW key will cycle you through the five previously typed commands. After pressing the UP ARROW key five times, you will go back to the last command you previously typed. Use the DOWN ARROW key to cycle the five prior typed commands in the opposite direction.
- You can use BACKSPACE to correct keystroke errors, or to reuse parts of a previously typed command. When using BACKSPACE, the removed characters will still appear on the screen, but they have been removed to the position shown by the cursor. When you start typing, the removed characters are overwritten.

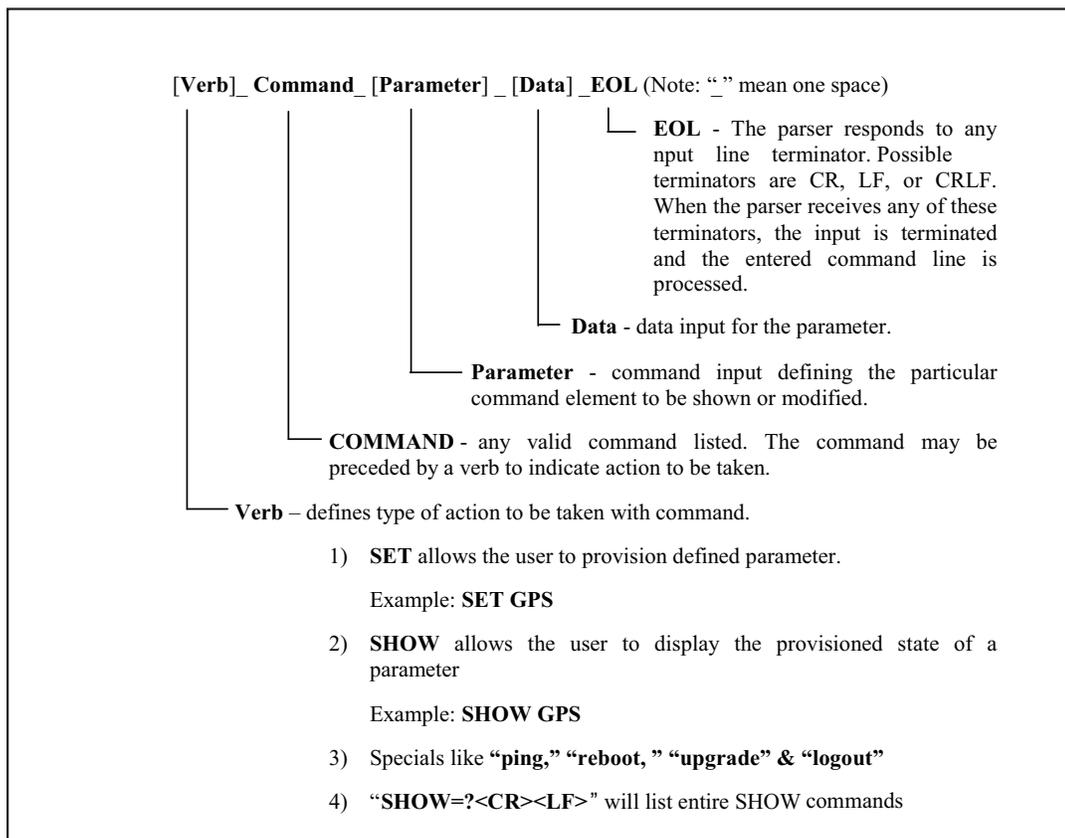


Note: Both the TAB key and "?" have the same function. Both can be used at any time while typing a command (including at the prompt) to provide continuation options.

Command Line Format

The command line format is as follows:

[Verb] Command [Parameter] [Data] EOL



Command Line Format Description

Verb – the type of action to be taken with the command.

Parameter – command input that defines the particular command element to be shown or modified.

Data–The data input for the parameter, if any

EOL– this parser responds to any input line terminator. Possible terminators are CR, LF, or CRLF. When the parser receives any of these terminators, the input is terminated, and the command line entry is processed. Pressing the Enter key also produces EOL.

Command Line Format Example

```
set output port2 frametype
```

- set = Verb
- output =Command
- port2 = Parameter
- frametype = Data

TimeProvider 100 CLI Command Set

This section provides details for each of the TimeProvider 100 commands. This section provides a description of the command followed by a series of inputs and responses to demonstrate the correct operations and use of the command. This series of inputs and responses for each command shows what a user can type at the command line and the response from TimeProvider 100 for each entry typed. The user has choices for various CLI commands. The intent of this section is to demonstrate how each CLI command functions and how the command can be used.



Note: When using the CLI commands, the RTE (Real Time Engine) is referred to as “TimeMAX.”

Command User Levels

The TimeProvider 100 provides a hierarchy of CLI command user levels that permit an increasing level of access to system parameters. This hierarchy allows the system administrator to add users who can view information only and *not* change system parameters as well as add users who can view *and* change system parameters.

The users assigned to each security level have the following access options:

1. **user** – user class with read-only permissions
2. **config** – power user class with read and write permissions
3. **admin** – administrator user class with read and write permissions and permission to configure user information

Command Groups

There are eight groups of CLI commands as shown by pressing the TAB key at the TP100 prompt. Typing a question mark (“?”) after the eight command groups display provides a description of each command group as show in the following example of TimeProvider 100 inputs and responses.

Input:

```
tp100> <tab>
```

Response:

```
cli-settings ping set switchfirmware  
logout reboot show upgrade
```

Input:

```
tp100> ?
```

Response:

```
set          - Configure TP100 settings  
show        - Display TP100 information or settings  
ping        - Determine whether a host is up and display ping statistics  
reboot      - Reboot this TP100  
upgrade     - Download firmware to TP100  
switchfirmware - Switch between two firmware images  
logout      - Log out from the current session  
cli-settings - Configure CLI setting  
tp100>
```

cli-settings

This command is currently used to enable or disable the display `more` function which displays more file or log content than what appears on the display. When the `more` function is enabled for the `cli-settings` command, and when using one of the `show` CLI commands to display a file or log content, the following applies:

- Use the SPACE bar to display the next page.
- Use the UP and DOWN arrow keys to scroll up or down one line at a time.
- Use the Enter key to show the next line.
- Use the letter “Q” on the keyboard to stop or quit displaying further information.

Input:

```
tp100> cli-settings more <tab>
```

Response:

```
Disable enable
```

```
tp100> cli-settings more
```

Input:

```
tp100> cli-settings more ?
```

Response:

```
enable - enable MORE support
```

```
disable - disable MORE support
```

```
tp100> cli-settings more
```

Input:

```
tp100> cli-settings more enable
```

Response:

```
tp100>
```

Input:

```
tp100> cli-settings more disable
```

Response:

```
tp100>
```

ping

This command sends one ping to an IP address and waits for up to 5 seconds.

Input:

```
tp100> ping 192.169.1.10
```

Response:

```
Host is alive
```

```
tp100>
```

Response:

```
Host is not reachable
```

```
tp100>
```

switchfirmware

This command is used to switch between two firmware images in the FLASH memory.

Input:

```
tp100> switchfirmware
```

Response:

```
Firmware switched to the other image. Reboot to activate selected firmware.
```

```
tp100>
```

logout

This command is used by a user to log out from their session.

Input:

```
tp100> logout
```

Response:

```
Symmetricom TP100
```

```
login:
```

reboot

This command is used to restart the system without disconnecting power.

Input:

```
tp100> reboot
```

Response:

A long sequence of startup messages will display. The process takes approximately three minutes. When reboot is complete, the TimeProvider 100 prompt `tp100>` displays.

upgrade

This command is used to download firmware to TimeProvider 100.

Input:

```
tp100> upgrade firmware tp100_upd_1.0.8.bz2,ftp:192.168.1.55,admin
```

Response:

```
tp100> password:
```

Response:

```
Upgrade is in progress...
#####
#####
#####
#####
Upgrade is successfully completed
tp100>
```

Show Commands

This is a group of commands that are used to display various system parameters.

Input:

```
tp100> show <tab>
```

Response:

```
active_alarm    eia232    inventory  log        status
alarmconf       gps       ipconfig   output     users
clock           image     ipstatus   snmp
```

Input:

```
tp100> show ?
```

Response:

```
snmp           -Display SNMP configuration
eia232         -Display EIA-232 port parameters
users          -Display user list
alarmconf      -Display alarm configurations
active_alarm   -Display active alarms
ipconfig       -Display IP ports configuration
gps            -Display GPS information
clock          -Display UTC date and time
log            -Display entries of selected log
output         -Display output configuration
inventory      -Display manufacturing information
status         -Display system status information
ipstatus       -Display IP ports status
image          -Display firmware image information
```

```
tp100> show
```

show active_alarm

This command is used to display a list of all active alarms in the system. These are alarms that were activated and not yet cleared.

Input:

```
tp100> show active_alarm
```

Response (Example):

```
2008-11-18, 01:43:06, #16, MAJOR, ANT_OPEN
```

```
tp100>
```

show alarmconf

This command is used to display the entire alarm and event configuration.

Input:

```
tp100> show alarmconf
```

Response:

See [Table 4-2](#) for all alarms, events, default value, and configuration.

show clock

This command is used to display the system date and time in Universal Time Coordinated (UTC).

Input:

```
tp100> show clock
```

Response:

```
Date and time (UTC) - 2008-11-18, 08:16:15
```

```
tp100>
```

show eia232

This command is used to display the RS-232 serial port parameters. Serial port parameters are set at the factory and cannot be changed.

Input:

```
tp100> show eia232
```

Response:

```
-----  
|Baudrate   |Parity   |Stop bit  |Data length|  
|-----|-----|-----|-----|  
|9600      |none    |1        |8         |  
-----
```

```
tp100>
```

show gps

This command is used to display data related to GPS operations. It shows GPS antenna angle mask, antenna cable delay, GPS time, and the position of the GPS antenna.

Input:

```
tp100> show gps
```

Response:

```
GPS Information
GPS position mode          - Survey (or Position Hold)
GPS elevation mask (degrees) - 5
GPS antenna delay          - 0.00000
GPS system time           - (in week, second format)
Number of tracked satellite- 8
GPS latitude               - N39:54:12.786
GPS longitude              - E116:26:45.276
GPS height (meters)       - 140.20
tp100>
```

show image

This command is used to show the two firmware images and which one is currently running.

Input:

```
tp100> show image
```

Response:

```
Active image - 1, version 1.0.14
Backup image - 2, version 1.0.16
Next boot image - 2
tp100>
```

show inventory

This command is used to display product manufacturing data.

Input:

```
tp100> show inventory
```

Response:

Part number	Serial	HW Ver	SW Ver	FPGA	Manufacture date
090-95000-01	R03009	2	0.0.14	0x17	11/14/2008

```
tp100>
```

show ipconfig

This command is used to display the configuration parameters of the Ethernet ports. Note that these parameters are what the operator set, not necessary the current status of the parameters.

Input:

```
tp100> show ipconfig
```

Response:

```
-----  
|Port#   |Mode   |State  |IP Address   |Gateway     |Netmask     |  
|-----|-----|-----|-----|-----|-----|  
|MGMT   |static|enable |192.169.1.10|192.169.1.1|255.255.0.0|  
|.....|.....|.....|.....|.....|.....|  
|NTP    |static|enable |192.168.2.10|192.168.2.1|255.255.255.0|  
-----
```

```
tp100>
```

show ipstatus

This command is used to display the current status of the Ethernet ports.

Input:

```
tp100> show ipstatus
```

Response:

```
MGMT      Link encap:Ethernet  HWaddr 00:B0:AE:95:00:AA
          inet addr:192.169.1.10  Bcast:192.169.255.255  Mask:255.255.0.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:84 (84.0 B)
          Base address:0xa000

NTP      Link encap:Ethernet  HWaddr 00:B0:AE:95:00:BB
          inet addr:192.168.2.10  Bcast:192.168.2.255  Mask:255.255.255.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:84 (84.0 B)
          Base address:0xc000

          tp100>
```

show log

This is a group of commands that are used to display the contents of the event log, alarm log, and the user command history log.

Input:

```
tp100> show log <tab>
```

Response:

```
command  event
```

```
tp100> show log
```

Input:

```
tp100> show log ?
```

Response:

```
event      - Show event log entries, lines 1 to 1000  
command   - Show command log entries, lines 1 to 1000  
tp100> show log
```

show event log

This command is used to display the event log and alarm log entries.

Input:

```
tp100> show log event <tab>
```

Response:

```
start      end  
tp100> show log event
```

Input:

```
tp100> show log event ?
```

Response:

```
start      - Start line of the log to display, line 1 to 1000  
end        - End line of the log to display, line 1 to 1000  
<enter>   - Execute command  
tp100> show log event
```

Input:

```
tp100> show log event start 7 end 9
```

Response:

```
- Line 7, 2008-12-16, 05:59:58, #26, EVENT, SWITCH: switched firmware image to 1  
- Line 8, 2008-12-16, 06:03:02, #15, MINOR, ANT_OPEN: GPS antenna open-circuit  
- Line 9, 2008-12-16, 06:03:02, #14, MINOR, GPS_CUR: GPS antenna current out of range  
tp100>
```

show command log

This command is used to display the entries of the user command history log. All commands entered by users are logged.

Input:

```
tp100> show log command <tab>
```

Response:

```
start      end
tp100> show log command
```

Input:

```
tp100> show log command ?
```

Response:

```
start      - Start line of the log to display, line 1 to 1000
end        - End line of the log to display, line 1 to 1000
<enter>    - Execute command
tp100> show log command
```

Input:

```
tp100> show log command start 7 end 10
```

Response:

```
Line 7, 2008-02-17, 00:02:13, [user: admin]: set clock datetime 2008-10-10,10:10:10
Line 8, 2008-10-10, 10:10:13, [user: admin]: show clock
Line 9, 2008-10-10, 10:10:17, [user: admin]: show gps
Line 10, 2008-10-10, 10:10:29, [user: admin]: show status
tp100>
```

show output

This command is used to display the configuration of the four output ports for the E1/T1/2048/1544 signals. The 10 MHz and 1PPS output signals are not configurable and are not included. The SSM value of the TimeProvider 100 output depends on the following conditions:

- When 10 MHz is stabilized and the GPS is in Locked mode, the TimeProvider 100 output is in `st1` clock mode, and the SSM value = 2.
- When 10 MHz is stabilized and the GPS is in Unlocked mode, the TimeProvider 100 output is in `st3` clock mode, and the SSM value = 8.
- When 10 MHz is not stabilized during warm up RTE mode (regardless of the GPS status), the TimeProvider 100 output is in DUS (Do not Use for Sync) mode, and the SSM value = F.

Input:

```
tp100> show output
```

Response:

```
-----  
|Port      |State      |Frame Type      |SSM Bit  |SSM Value |  
|-----|-----|-----|-----|-----|  
|1         |enable    |e1_cas4        |4        |st1       |  
|-----|-----|-----|-----|-----|  
|2         |enable    |e1_cas4        |4        |st1       |  
|-----|-----|-----|-----|-----|  
|3         |enable    |e1_cas4        |4        |st1       |  
|-----|-----|-----|-----|-----|  
|4         |enable    |e1_cas4        |4        |st1       |  
-----
```

```
tp100>
```

show snmp

This command is used to display SNMP manager information.

Input

```
tp100> show snmp manager
```

Response:

```
-----  
|Index  |Manager          |Trap port |  
|-----|-----|-----|  
|0      |192.168.81.67   |162       |  
-----
```

```
tp100>
```

show status

This command is used to display several key operational parameters of the system.

Input

```
tp100> show status
```

Response:

```
System name           - TP100
Uptime                - 8 hours 40 minutes
System date and time in UTC - 2008-11-18, 11:47:11
Number of active alarms - 1
Current TOD source    - GPS
TP100 clock status    - locked
LEDS                  - Power:green, GPS:green,
ALM:red
tp100>
```

show users

This command is used to show the user information.

Input:

```
tp100> show users
```

Response:

```
-----
|User name      |Access level   |Timeout(seconds)|
|-----|-----|-----|
|admin         |admin         |600             |
|.....|.....|.....|
|config       |config       |600             |
|.....|.....|.....|
|user        |user        |600             |
```

```
|.....|.....|.....|  
|gg      |admin      |600      |  
-----  
tp100>
```

Set Commands

This is a set of commands that are used to configure various system parameters.

Input:

```
tp100> set <tab>
```

Response:

```
alarmconf      configuration  ipconfig      passworduser  
clock          gps           outputsnmpp  
tp100> set
```

Input:

```
tp100> set ?
```

Response:

```
configuration - Set system configuration  
user          - User configuration  
snmp         - SNMP configuration  
password     - Change password  
alarmconf    - Configure Alarm  
ipconfig     - Configure Ethernet IP  
gps         - Configuration GPS  
output      - Configure output port  
clock      - Set system clock manually
```

```
tp100> set
```



Caution: After making configuration changes, you must use the `set configuration save` CLI command to save the latest configuration. See [set configuration](#), on page 72 for more information.

set alarmconf

This command is used to configure alarms. Events are hard coded and not configurable.

Input:

```
tp100> set alarmconf code <tab>
```

Response:

```
<alarmcode Integer 0 - 19> - alarm unique ID
```

```
tp100> set alarmconf code
```

Input:

```
tp100> set alarmconf code 0 <tab>
```

Response:

```
delay      level      state      transient
```

```
tp100> set alarmconf code 0
```

Input:

```
tp100> set alarmconf code 0 ?
```

Response:

```
level      - Alarm level: critical, major, minor or event
```

```
state      - Alarm state: disable or enable
```

```
delay      - Alarm delay value: 0-1000 seconds
```

```
transient  - Is alarm transient: yes or no
```

```
tp100> set alarmconf code 0
```

set clock

This command is used to set the system date and time in Universal Time Coordinated (UTC).

Input:

```
tp100> set clock datetime ?
```

Response:

```
<datetime String 1 - 19> - format: yyyy-mm-dd,hh:mm:ss
```

Input:

```
tp100> set clock datetime 2008-11-19,20:52:00
```

Response:

```
Not allowed to set. GPS has been locked
```

```
tp100>
```

set configuration

This command is used to restore or save system configuration.

Input:

```
tp100> set configuration <tab>
```

Response:

```
restore save
```

Input:

```
tp100> set configuration ?
```

Response:

```
restore - Set system configuration to backup or factory  
configuration
```

```
save - Save system configuration to FLASH
```

```
tp100> set configuration
```

Input:

```
tp100> set configuration restore <tab>
```

Response:

```
backup    factory
tp100> set configuration restore
```

Input:

```
tp100> set configuration restore ?
```

Response:

```
factory  Use factory configuration
backup   Use backup configuration
tp100> set configuration restore
```

Input:

```
tp100> set configuration restore backup
```

Response:

```
Note:
Connection may be lost after this operation!
System configuration is restored to backup configuration
tp100>
```

Input:

```
tp100> set configuration restore factory
```

Response:

```
Note:
Connection may be lost after this operation!
System configuration is restored to factory configuration
tp100>
```



Note: (1) “Restore Factory” is the full restoration of factory configuration, including default IP configuration and default user data. (2) “Restore Backup” restores all configuration parameters set by the user from the backup FLASH, except IP configuration and user data (user IDs and passwords). (3) The manual RESET button restores only the factory IP port configuration and default user data (user ID and password). The manual RESET button is located on the back of the TimeProvider 100 unit. Press the button down and hold it for three seconds to perform the RESET.

Input:

```
tp100> set configuration save
```

Response:

```
Configuration has been saved
```

```
tp100>
```

set gps

This command is used to configure GPS engine parameters (antenna cable length, antenna angle mask, and whether search is automatic or manually seeded.)

Input:

```
tp100> set gps <tab>
```

Response:

```
cable-delay  mask          mode
```

Input:

```
tp100> set gps mode?
```

Response:

```
auto          - Automatic mode
```

```
manual        - Manual mode
```

Input:

```
tp100> set gps cable-delay ?
```

Response:

```
<cabledelay String 1 - 16> - Enter cable delay, 0 to 0.0009 second
```

Input:

```
tp100> set gps cable-delay 0.0001
```

Response:

```
tp100>
```

Input:

```
tp100> set gps mask ?
```

Response:

```
<mask Integer 5 - 89> - Enter mask in degree
```

Input:

```
tp100> set gps mask 15
```

Response:

```
tp100>
```

```
Input:
```

```
tp100> set gps mode <tab>
```

Response:

```
auto manual
```

Input:

```
tp100> set gps mode auto
```

Response:

```
tp100>
```

Input:

```
tp100> set gps mode manual latitude ?
```

Response:

```
<latitude String 6 - 12> - GPS Position Latitude, format: Ndd:mm:ss.ss or  
Sdd:mm:ss.ss
```

Input:

```
tp100> set gps mode manual latitude N89:56:10 longitude ?
```

Response:

<longitude String 6 - 13> - GPS Position Longitude, format: Eddd:mm:ss.ss or Wddd:mm:ss.ss

Input:

```
tp100> set gps mode manual latitude N89:56:10 longitude E130:00:00 height ?
```

Response:

<height String 1 - 7> - GPS position height in meter, format: hhhh.h



Note: TimeProvider 100 only accepts positive height. Negative heights are not accepted.

Input:

```
tp100> set gps mode manual latitude N9:6:1 longitude E130:00:00 height 130
```

Response:

```
tp100>
```

set ipconfig

This command is used to configure the IP parameters of the management port and future NTP port. The parameters are address, address acquisition mode, and whether the port is enabled.

Input:

```
tp100> set ipconfig <tab>
```

Response:

```
MGMT NTP
```

```
tp100> set ipconfig
```

Input:

```
tp100> set ipconfig ?
```

Response:

```
MGMT      - Management port
```

```
NTP       - NTP port
```

```
tp100> set ipconfig
```

Input:

```
tp100> set ipconfig mgmt <tab>
```

Response:

```
ipaddr  mode  restartstate
```

```
tp100> set ipconfig mgmt
```

Input:

```
tp100> set ipconfig mgmt ?
```

Response:

```
state    - Ethernet port state: enabled or disabled
```

```
restart  - Restart Ethernet port
```

```
mode     - DHCP or static
```

```
ipaddr   - ip address: xxx.xxx.xxx.xxx
```

```
tp100> set ipconfig mgmt
```

Input:

```
tp100> set ipconfig mgmt ipaddr ?
```

Response:

```
<ip address String 1 - 16> - ip address: xxx.xxx.xxx.xxx
```

```
tp100> set ipconfig mgmt ipaddr
```

Input:

```
tp100> set ipconfig mgmt mode <tab>
```

Response:

```
dhcp     static
```

```
tp100> set ipconfig mgmt mode
```

Input:

```
tp100> set ipconfig mgmt mode ?
```

Response:

```
dhcp     - Get IP address from DHCP server
```

static - Set IP address manually

```
tp100> set ipconfig mgmt mode
```

Input:

```
tp100> set ipconfig mgmt mode static
```

Response:

```
tp100>
```

Input:

```
tp100> set ipconfig mgmt mode dhcp
```

Response:

```
tp100>
```

Input:

```
tp100> set ipconfig mgmt state <tab>
```

Response:

disable enable

```
tp100> set ipconfig mgmt state
```

Input:

```
tp100> set ipconfig mgmt state ?
```

Response:

enable - Enable Ethernet port

disable - Disable Ethernet port

```
tp100> set ipconfig mgmt state
```

Input:

```
tp100> set ipconfig mgmt state disable
```

Response:

```
tp100>
```

Input:

```
tp100> set ipconfig mgmt restart
```

Response:

```
tp100>
```



Note: When an Ethernet port is in static mode, set `ipconfig mgmt restart` will activate a newly entered IP address. When the Ethernet port is in the DHCP mode, set `ipconfig mgmt restart` will try to acquire an IP address within 60 seconds. Use `ipstatus` to confirm the port configuration after using the `set ipconfig mgmt restart` command.

set output

This command is used to configure the four telecom output ports. Parameters are frame type, SSM bit position, and whether the port is enabled.

Input:

```
tp100> set output <tab>
```

Response:

```
port1 port2 port3 port4
```

```
tp100> set output
```

Input:

```
tp100> set output ?
```

Response:

```
port1 - Output port 1
```

```
port2 - Output port 2
```

```
port3 - Output port 3
```

```
port4 - Output port 4
```

```
tp100> set output
```

Input:

```
tp100> set output port2 <tab>
```

Response:

```
frametype ssm-bit state
```

```
tp100> set output port2
```

Input:

```
tp100> set output port2 ?
```

Response:

```
state      - Output port state: enable or disable
frametype  - Frame type
ssm-bit    - Specify SSM bit position, 4 through 8
tp100> set output port2
```

Input:

```
tp100> set output port2 frametype <tab>
```

Response:

```
e1_2048m          e1_ais
e1_cas4           e1_cas4_no_ssm
e1_cas_no_ssm    e1_ccs4
e1_ccs4_no_ssm   e1_ccs_no_ssm
tp100> set output port2 frametype
```

Input:

```
tp100> set output port2 frametype ?
```

Response:

```
e1_ccs_no_ssm      - E1, CCS, CRC Disabled, Sa bits set to all 1's
e1_ccs4           - E1, CCS, CRC Enabled, SSM Enabled
e1_ccs4_no_ssm    - E1, CCS, CRC Enabled, Sa bits set to all 1's
e1_cas_no_ssm     - E1, CAS, CRC Disabled, Sa bits set to all 1's
e1_cas4           - E1, CAS, CRC Enabled, SSM Enabled
e1_cas4_no_ssm    - E1, CAS, CRC Enabled, Sa bits set to all 1's
e1_2048m          - E1, 2.048 MHz
e1_ais            - E1, AIS
tp100> set output port2 frametype
```

Input:

```
tp100> set output port2 frametype e1_cas4
```

Response:

```
tp100>
```

Input:

```
tp100> set output port2 ssm-bit <tab>
```

Response:

```
4 5 6 7 8
```

Input:

```
tp100> set output port2 ssm-bit ?
```

Response:

```
4          - SSM bit position 4
5          - SSM bit position 5
6          - SSM bit position 6
7          - SSM bit position 7
8          - SSM bit position 8
```

```
tp100> set output port2 ssm-bit
```

Input:

```
tp100> set output port2 ssm-bit 6
```

Response:

```
tp100>
```

Input:

```
tp100> set output port2 state <tab>
```

Response:

```
disable enable
```

```
tp100> set output port2
```

Input:

```
tp100> set output port2 state ?
```

Response:

```
enable - Enable port  
disable - Disable port
```

```
tp100> set output port2 state
```

Input:

```
tp100> set output port2 state disable
```

Response:

```
tp100>
```

set password

The following password permissions apply to the three command-level users:

- **Admin** – can change anyone’s password
- **Config** – can only change their own password
- **User** – cannot change anyone’s password

Input: (admin or config user changes password)

```
tp100> set password
```

Response:

```
Password:  
Confirm Password:  
tp100>
```

Input: (admin changes user password)

```
tp100> set password user haifeng
```

Response:

```
Password:  
Confirm Password:  
tp100>
```

set snmp

This command is used to edit the SNMP manager information.

Input:

```
tp100> set snmp <tab>
```

Response:

```
Add      delete
```

```
tp100> set snmp
```

Input:

```
tp100> set snmp ?
```

Response:

```
add      - Add SNMP configuration
```

```
delete - Delete snmp properties
```

```
tp100> set snmp
```

Input:

```
tp100> set snmp add manager ?
```

Response:

```
<manager String 1 - 20> - SNMP manager IP address
```

```
tp100> set snmp add manager
```

Input:

```
Tp100> set snmp delete manager ?
```

Response:

```
<manager String 1 - 20> - SNMP manager IP address
```

```
tp100> set snmp delete manager
```

set user

This command is used to add delete or modify user access data.

- The user name character must be the following valid characters:
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
'-' or '_' (dash or underscore).
- The first character in a user name cannot be '-' or '_' (dash or underscore).
- The user password character must be the following valid character:
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789!()
- . ? _ ` ~

Input:

```
tp100> set user <tab>
```

Response:

```
add      delete  modify
```

```
tp100> set user
```

Input:

```
tp100> set user ?
```

Response:

```
add      - Add CLI user
modify   - Modify CLI user
delete   - Delete CLI user
tp100> set user
```

Input:

```
tp100> set user add name ?
```

Response:

```
<name String 1 - 20> - user name, 1 to 20 characters
tp100> set user add name
```

Input:

```
tp100> set user add name JKT access-level <tab>
```

Response:

```
admin    config  user
tp100> set user add name JKT access-level
```

Input:

```
tp100> set user add name JKT access-level <tab>
```

Response:

```
user      - Who can only use 'show' commands

config    - Who can use 'show' and 'set' commands except user
            configuration

admin     - Who can use all commands

tp100> set user add name JKT access-level
```

Input:

```
tp100> set user add name JKT access-level admin timeout ?
```

Response:

```
<timeout Integer 1 - 3600> - Timeout value(1-3600 seconds)
of the user's session, default is 600 seconds

tp100> set user add name JKT access-level admin timeout
```

Input:

```
tp100> set user add name JKT access-level admin timeout 650
```

Response:

```
Password: tp100tp100

Confirm Password: tp100tp100
```

Response:

```
tp100>
```


Chapter 6 Maintenance and Troubleshooting

This chapter describes maintenance and troubleshooting procedures for the TimeProvider 100.

In This Chapter

- [Preventive Maintenance](#)
- [Safety Considerations](#)
- [Reading LED Conditions](#)
- [Upgrading the Firmware](#)
- [Contacting Technical Support](#)

Preventive Maintenance

The TimeProvider 100 requires minimal preventive maintenance. Ensure the unit is not exposed to hazards such as direct sunlight, open windows, water, or extreme heat.



Caution: To avoid electromagnetic discharge damage to the circuitry, never attempt to vacuum the TimeProvider 100.



Caution: To avoid damage, under no circumstances should the interior chassis of the TimeProvider 100 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

Table 6-1. Preventive Maintenance (Continued)

Item	Inspection	Corrective Action	Interval
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 the cable, or the cable at the first opportunity.	Periodically

Safety Considerations

Follow your company's safety guidelines and policies when working on or around live equipment. Refer to the National Electric Code ANSI/NFPA70, or per the application code in the country of installation for more information.

Reading LED Conditions

In [Table 6-2](#), the function of each LED and its color illumination indicators are described.

Table 6-2. LED Conditions

Indicator	Label	Description
Power Indicator	PWR	Green - Power available Off - Power not available
GPS tracking status	GPS	Green - GPS is locked Amber - No satellite is tracked Flashing Green - At least one satellite is tracked
Alarm Indicator	ALARM	Off - No alarm is detected. Flashing Green - The system is booting Amber - A minor alarm. Red - A major or critical alarm.

Upgrading the Firmware

TimeProvider 100 firmware can be upgraded remotely from a SFTP or FTP server. When upgrading the system firmware, use the procedure in this section. See the CLI command [upgrade](#), on page 60 for more information.

When upgrading the system firmware, follow these procedures:

- Verify the current firmware version
- Verify the active backup firmware version
- Upgrade from a SFTP or FTP server
- Switch the boot-up image file
- Reboot the system

Verify Current Firmware Version

Use the `show inventory` command displays the software version that is currently running. See [show inventory](#), on page 64 for more information. The following example shows that TimeProvider 100 is running firmware version 0.0.14.

```
tp100> show inventory
```

Part number	Serial	HW Ver	SW Ver	FPGA	Manufacture date
090-95000-01	R03009	2	0.0.14	0x17	11/14/2008

Verify Active Backup Firmware Version

Two firmware images are maintained in flash memory to provide a backup in the event of file corruption. View these images using the CLI command, `show image`. For more information, see the CLI command, [show image](#), on page 63.

Use the `show image` CLI command to see which backup firmware version the system has stored, which firmware version is currently active, and which version will be used the next time the unit restarts.

```
tp100> show image
```

```
Active image      -1, version 1.0.5
Backup image      -2, version 1.0.3
Next boot image   -1
```

Next, you will use one of the upgrade procedures for system firmware upgrade.

Upgrade from SFTP Server

The image file is on the SFTP server, and the file is `/root/tp100_udp_1.0.5.bz2`. The server IP is `192.168.81.74`, login: `root`, password: `123456`. Since SFTP is the default server mode, it does not need to be specified. Use the following command:

```
tp100> upgrade firmware
/root/tp100_udp_1.0.5.bz2,192.168.81.74,root,123456
```

Upgrade from FTP Server

The image file is on the FTP server, and the file is `/root/tp100_udp_1.0.5.bz2`. Server IP is `192.168.81.75`, login: `root`, password: `ABCDEF`. Use the following command:

```
tp100> upgrade firmware
/root/tp100_udp_1.0.5.bz2,ftp:192.168.81.75,root,ABCDEF
```

The system will show the upgrade progress as shown in the following example:

```
tp100> upgrade is in progress...

#####
```

After the system is finished getting the firmware file, you will see the following system message:

```
tp100> upgrade is in progress...

#####
#####
#####

Upgrade is successfully completed

tp100>
```

The entire process takes approximately three to five minutes. TimeProvider 100 continues normal operation during the upgrade process.

Switch Boot-Up Image File and Reboot the System

After the firmware upgrade is completed, use the `switchware` CLI command to switch the boot-up image file to the newly upgraded image. See [switchfirmware](#), on page 59 for more information. To make the newly downloaded firmware active, restart the TimeProvider 100 system using the `reboot` command. See [reboot](#), on page 60.

```
tp100> switchfirmware

tp100> Reboot
```

Contacting Technical Support

If you encounter any difficulties installing or using the product, contact Symmetricom Global Services:

U.S.A. Call Center

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

Toll-free in North America: 888-367-7966
Telephone: 408-428-7907
Fax: 408-428-7998
E-mail: support@symmetricom.com
Internet: <http://www.symmetricom.com>

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

Symmetricom Global Services EMEA
Fichtenstr. 25
85649 Hofolding
Germany

Telephone: +49 700 3288 6435
Fax: +49 8104 662 433
E-mail: emeasupport@symmetricom.com
Internet: <http://www.symmetricom.com>

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Symmetricom Latin America
Ft Lauderdale, Florida, USA

Telephone: +1 305-895-4301
Telephone: +1 954 385 2416
Fax: +1 954 252 4031
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Symmetricom Hong Kong Ltd
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Fax: + 852 2405 5713
email: asia_sales@symmetricom.com

Appendix A System Messages

In This Appendix

- [System Messages](#)

System Messages

[Table A-1](#) provides information about the alarm and event messages that display in response to an occurrence of an event or an alarm. The CLI command, `set alarmconf` is used to alter delay, enable state, or define alarm severity and transient if desired. See [set alarmconf](#), on page 71 for more information.

Table A-1. Alarms and Event System Messages

Alarm Number	Name	Description	Severity Level	Corrective Action
0	MB_5.5V	5.5V out of range	Major	Reboot. If problem persists, return to factory.
1	MB_1.2V	1.2V out of range	Major	Reboot. If problem persists, return to factory.
2	MB_3.3V	3.3V out of range	Major	Reboot. If problem persists, return to factory.
3	MB_5V	5V out of range	Major	Reboot. If problem persists, return to factory.
4	MB_1.8V	1.8V out of range	Major	Reboot. If problem persists, return to factory.
5	10MHZ_LOS	10MHZ signal loss	Major	Reboot. If problem persists, return to factory.
6	GPS_ENGINE	GPS engine communication failed or 1PPS missing	Major	Reboot. If problem persists, return to factory.
7	TM_EFC	RTE PLL tuning saturated	Major	Check ambient temperature. Reboot. If problem persists, return to factory.
8	TM_SELFTEST	RTE self test failed	Critical	Reboot. If problem persists, return to factory.
9	TM_COMM	MB-TM communication failure	Major	Reboot. If problem persists, return to factory.

Table A-1. Alarms and Event System Messages (Continued)

Alarm Number	Name	Description	Severity Level	Corrective Action
10	MB_PLL_E1	E1 PLL unlocked	Major	Check ambient temperature. Reboot. If problem persists, return to factory.
11	MB_PLL_25MHz	25MHz PLL unlocked	Major	Check ambient temperature. Reboot. If problem persists, return to factory.
12	FPGA_ERROR	Mainboard FPGA error	Major	Reboot. If problem persists, return to factory.
13	FLASH_ERROR	Mainboard flash memory fault	Major	Reboot. If problem persists, return to factory.
14	GPS_CUR	GPS antenna current out of range	Minor	Check antenna, antenna cables, and antenna connections.
15	ANT_OPEN	GPS antenna open-circuit	Minor	Check antenna, antenna cables, and antenna connections.
16	GPS_VOL	GPS antenna voltage out of range	Major	Check antenna, antenna cables, and antenna connections.
17	ANT_SHORT	GPS antenna short-circuit	Major	Check antenna, antenna cables, and antenna connections.
18	TM_HOLDOVER	RTE in holdover mode	Major	TimeProvider 100 is no longer tracking GPS signals. Check antenna installation, antenna, antenna cables, and antenna connections.
19	TM_NEVERLOCKED	RTE in neverlocked mode	Major	TimeProvider 100 has never locked to GPS since the latest power up. Check antenna, antenna cables, and antenna connections.
20	CONFIG_CHANGE	Configuration change	Event	N/A
21	WARMUP	RTE is in warm-up state	Event	N/A

Table A-1. Alarms and Event System Messages (Continued)

Alarm Number	Name	Description	Severity Level	Corrective Action
22	LOCKED	RTE is in locked state	Event	N/A
23	RECOVERY	RTE is in recovery state	Event	N/A
24	MB_FW_DL_FAIL	MB firmware download failed	Event	N/A
25	MB_FW_DL_SUCC	MB firmware download succeeded	Event	N/A
26	SWITCH	Switched firmware image to 1 (2)	Event	N/A
27	REBOOT	Rebooted system	Event	N/A
28	TM_FW_DL_FAIL	RTE firmware download failed	Event	N/A
29	TM_FW_DL_SUCC	RTE firmware download succeeded	Event	N/A

Appendix B Specifications and Factory Defaults

This appendix provides mechanical and electrical specifications, factory defaults, electromagnetic environment categories and regulatory requirements for the TimeProvider 100.

In This Appendix

- [Component Specifications](#)
- [Factory Defaults](#)
- [Electromagnetic Environment](#)
- [Regulatory Requirements](#)

Component Specifications

This section provides the specifications for the TimeProvider 100 components and input and output signals.

Mechanical

Table B-1. TimeProvider 100 Mechanical Specifications

Parameter	Description
Mounting	19 inch or 23 inch rack with mounting panel
Rack Mounting Position	Front mounting location, unit protrudes 0.75 in. / 4.445cm
Width	8.5 in. / 216 mm
Height	1.75 in. / 44 mm
Depth	8.0 in. / 203 mm
Weight	1.05 kg fully loaded

Environmental

Table B-2. TimeProvider 100 Environmental Specifications

Parameter	Description
Storage Environment	As specified in ETSI EN 300 019-2-1 class 1.2
Temperature	-25° to +70°C
Relative Humidity	<10% TO 100% RH, condensing
Shock and Vibration	Class 1.2

Transportation

Table B-3. TimeProvider 100 Transportation Specifications

Parameter	Requirements
Transportation Environment	As specified in ETSI EN 300 019-2-2 class 2.3
Temperature	-40° to +85°C
Relative Humidity	<10% TO 100% RH, condensing
Shock and Vibration	Class 2.3

Operations

Table B-4. TimeProvider 100 Operations Specifications

Parameter	Requirements
Operating Environment	As specified in ETSI EN 300 019-2-3 class 3.2
Temperature	-5° to +55°C
Relative Humidity	<5% TO 95% RH, condensing
Shock and Vibration	Class 3.2

Power

Table B-5. TimeProvider 100 Power Specifications

Parameter	Description
Input Voltage	-40 VDC to -72 VDC (nominal -48/-60 VDC)
Input Current	OCXO warm-up current 0.5 A for 30 minutes Steady state current less than 0.3 A No user-serviceable fuse inside the unit
Protection	Reverse voltage protection Isolated from case and signal ground

GPS Antenna Interface

Table B-6. GPS Antenna Specifications

Parameter	Description
Signal Type	L1 GPS
Connector Type	SMA, female
Connector Label	GPS
Impedance	50 Ω
Coupling	DC—Center pin provides DC power to the GPS antenna or on-line amplifier.
Antenna Power Supply Voltage	4.9 VDC to 5.5 VDC (5V nominal)
Antenna Power Supply Current	80 mA maximum
Protection	This port can withstand open or short circuit without damage or degradation.

Serial Port Interface

Table B-7. Serial Port Specifications

Parameter	Description
Transmission Format	Asynchronous
Physical Standard	RS-232
Connector Type	9-pin, female D connector
Connector Label	RS232
Interface	RS-232, data terminal equipment (DTE)
Data Rate	Non volatile
Baud Rate	9600 bps
Data Bits	8
Parity Bit	None
Start Bit	1
Stop Bit	1
Echo	None
Software Flow Control (XON/XOFF)	None
Hardware Flow Control (CTS/RTS)	Off

Ethernet Port

Table B-8. LAN Port Specifications

Parameter	Description
Connector Type	RJ-45
Speed	10/100 Base-T
Connector Label	MGMT
Interface	TCP/IP
Timeout	10 minutes (600 seconds)

10MHz Analog Output

Table B-9. 10MHz Analog Output Specifications

Parameter	Description
Output	The 10 MHz output is enabled whenever the unit is powered up, regardless of the GPS condition.
Connector Type	BNC, female
Connector Label	10 MHz
Impedance	50 Ω
Waveform	Sine wave (nominal)
Signal Level	3 to 7 dBm (0.89 Vpp to 1.42 Vpp)
Coupling	AC
Accuracy	<1 x 10E-12 (24-hour average) <2 x 10E-10 (5-minute average)
Phase Noise	-82 dBc/Hzat1 Hz offset -120 dBc/Hzat10 Hz -140 dBc/Hzat100 Hz -140 dBc/Hzat1 kHz -140 dBc/Hzat10 kHz -145 dBc/Hzat100 kHz
Spurious Noise	Non-harmonic: -75 dBc

1 PPS Output

Table B-10. 1 PPS Output Specifications

Parameter	Description
Connector Type	BNC, female
Connector Label	1 PPS
Impedance	50 Ω
Signal Level	TTL
Pulse Width	Positive pulses, 50 microseconds
Coupling	DC
Holdover Stability (Operation without GPS signals after 48 hours of proper GPS operation.	< 1 μ s offset over 2 hours with 1°C temperature change

E1 Outputs

Table B-11. E1 Output Specifications

Parameter	Specification
Type	G.703 Sec. 9
Connector Type	BNC
Connector Label	OUT1, OUT2, OUT3, OUT4
Impedance	75 Ω
Framing	Double-framed or multi-framed G.704 or unframed (AIS)
Bit Rate	2048 Kbps
Signaling	CAS or CCS
SSM, CRC	With or without, per G.704
Line Code Format	HDB3
Output Level	\pm 2.37V, nominal
Accuracy	\pm 1.0 x 10 ⁻¹¹ when locked to GPS
Jitter	Jitter 60S, \leq 0.05UI = 24.2ns, per G.823, G.812
Wander	Per G.812

2.048 MHz Signals

Table B-12. 2.048 MHz Specifications

Parameter	Specification
Type	G.703 (2001) Sec. 13
Connector Type	BNC
Connector Label	OUT1, OUT2, OUT3, OUT4
Impedance	75 Ω
Wave Shape	Square Wave
Level	2.37V, peak-to-peak nominal
Accuracy	$\pm 1.0 \times 10^{-11}$ when locked to GPS
Maximum Jitter	0.05 UI (60S, 24.2)
Wandering	See the Wander spec for E1 Interface
Return loss	15 dB
Coupling	Transformer coupled

Factory Defaults

Table B-13. General and Communication Parameters

Description	Default Value	Value Range
User Name	admin	20 ASCII characters
User Password	tp100	32 ASCII characters, a minimum of 8
EIA-232 Port	96 bps-8-N-1	Fixed
IP Mode	Static	Static DHCP
IP Address	192.168.1.15	Valid IPv4 address
Gateway Address	192.168.1.1	Valid IPv4 Address
Network Mask	255.255.255.0	Valid IPv4 Mask
Signal Type (E1)	2.048 MHz	[e1_ccs_no_ssm e1_ccs4 e1_ccs4_no_ssm e1_cas_no_ssm e1_cas e1_cas4_no_ssm e1_2048m e1_ais]
Alarm Delay	zero seconds	0 –1000 seconds
Alarm State	Enabled	Enable Disable



Note: When using the `set configuration restore factory` CLI command, the User Name and User Password does return to the default value in [Table B-13](#). When using the `set configuration restore backup` CLI command, User Name, User Password, IP Mode, IP Address, Gateway Address, Network Mask, does not return to the default value in [Table B-13](#).

Electromagnetic Environment

Categories that may be covered here include: Indirect and direct ESD immunity, Electrical fast transients, radiated immunity, conducted immunity, and surge protection.

- EN55022 1998 Class B
 - Radiated Emission Criteria
 - Conducted Emission Power Ports
 - Conducted Emission Telecom Ports
 - Signal Leads Current
 - Telecom Leads
- EN55024 1998 Class B
- EN61000-4-2
 - Electrostatic Discharge Immunity
- EN61000-4-3
 - Radiated Immunity
- EN61000-4-4
 - Electrical Fast Transient
- EN61000-4-5
 - Lightning Criteria for Equipment w/ Antenna
- EN61000-4-6
 - Conducted Immunity DC Power Ports
 - Conducted Immunity Telecom Port

Regulatory Requirements

Symmetricon is certified with the following safety compliant certificates:

- UL/cUL/CB Scheme
- 6 of 6 RoHs
- GS Mark
- CE Mark

Appendix C Installing the GPS Antenna

The GPS L1 Reference Antenna is one component of a complete line of GPS accessories for your GPS antenna system provided by Symmetricom. These accessories are designed to deliver precise GPS signals over a wide temperature range and in harsh environmental conditions.

In This Appendix

- [Antenna Kits and Accessories](#)
- [Installing the Antenna](#)
- [Technical Support](#)

Antenna Kits and Accessories

This section provides a list of antenna kits and accessories as well as descriptions and associated part numbers.

Selecting the Proper Gain Antenna

When installing the GPS radio receiver, it is important to select the proper gain antenna and coaxial cable that accounts for the insertion loss between the antenna and the radio receiver to avoid under-driving or over-driving the radio receiver antenna input. The gain required at 1575 MHz for a GPS radio receiver input is the manufacturer's specification for the radio receiver to acquire satellites, with some level of signal degradation allowed.

L1 Antenna gains are usually specified as the minimum effective gain. Such antenna gains can have 4.5 to 10 dB more signal strength at different satellite azimuths and elevations, depending on their reception pattern. The GPS engine requires a signal level at the antenna connector input of the chassis to be between 25 dB and 35 dB. This tolerance allows for the signal loss of the internal coaxial cable and connectors. The optimal signal level at the radio receiver input is 30 dB. All antenna kits include the GPS L1 antenna, mounting pipe, floor flange, transient eliminator, pre-assembled coaxial cable (for antenna to transient eliminator), roll of 3M 2150 weatherproof tape, and a right angle adapter. All chassis, antennas, transient eliminators, and in-line amplifiers have N-type connectors.

All antenna kits supplied use LMR-400, or equivalent, low-loss coaxial cable. Other types of coaxial cable are available for GPS antenna applications; however, it is imperative that you calculate the specific cable loss to ensure a signal level between 25 dB and 35 dB at the antenna connector input. The L1 signal loss of LMR-400 is 0.167 dB/meter. The L1 signal loss of a 90 V transient eliminator is typically 0.25 dB.

GPS Antenna

Symmetricon offers GPS antennas which are compatible with most commercial GPS receivers, receive, amplify, and filter the L1 (1575.42 MHz) signal from GPS satellites. The antenna is housed in a weatherproof package suitable for permanent installation in an exposed location. For additional transient eliminator protection requirements, you can install a 250B-90 Gas Tube transient eliminator in series with the antenna coaxial cable.

The cable between the antenna and the TimeProvider 100 cable should be kept to the shortest reasonable length. Before using additional cables, verify that the total antenna system gain is acceptable as described in the [Selecting the Proper Gain Antenna](#) section of Appendix C. The tables listed below provide information about the antenna:

- [Table C-1](#) lists the item number and provides a brief description of the antenna.
- [Table C-2](#) provides specification information for GPS antenna with internal LNA.
- [Table C-3](#) lists the item numbers and provides a brief description of the antenna accessories available for the GPS series antennas.

Table C-1. GPS Antennas with Internal LNA

Part Number	Description
990-00075-000	30 dB Antenna with transient eliminator

[Table C-2](#) provides specifications for GPS antennas.

Table C-2. Specifications for GPS Antennas

Characteristic	Specification
Mechanical	
Mounting	4 holes, 1.69 in x 1.69 in (4.3 cm x 4.3 cm) centers, 0.13 in (0.400 cm) mounting holes
Diameter	3.54 in (90 mm)
Height	17.83 in (453 mm), including pipe mount
Weight	< 1.5 lbs (0.7 kg)
Environmental	
Temperature	-40 °C to +85 °C
Relative Humidity	100% Non-Immersed
Altitude	200 ft. (60 m) below sea level to 13,000 ft. (3962 m) above sea level

Electrical

Table C-2. Specifications for GPS Antennas (Continued)

Characteristic	Specification
Power	4.5 to 5.5 VDC (5 VDC Nominal)
Element	Right Hand Circular
Carrier	L1 (1545.42 MHz)
Bandwidth	10 MHz
Noise Figure	< 2.2 dB
Output Impedance	50 Ω
Gain	>30 dBi (38 dBi typical @ elevation angle 90°)

Table C-3 lists the available accessories for GPS antennas with internal LNA

Table C-3. L1 GPS Antenna Accessory Kit

Part Number	Description
58521A-001	1 meter, LMR400 Interconnect Cable, connectorized
58521A-002	2 meter, LMR400 Interconnect Cable, connectorized
58521A-005	5 meter, LMR400 Interconnect Cable, connectorized
58521A-010	10 meter, LMR400 Interconnect Cable, connectorized
58521A-015	15 meter, LMR400 Interconnect Cable, connectorized
58521A-030	30 meter, LMR400 Interconnect Cable, connectorized
58521A-060	60 meter, LMR400 Interconnect Cable, connectorized
58521A-110	110 meter, LMR400 Interconnect Cable, connectorized
58521A-220	220 meter, LMR400 Interconnect Cable, connectorized
12813080-000-0	Crimper Kit, LMR-400 (crimp tool, 2150 tape, LMR preptool, 10 each crimp N-type connectors)

Transient Eliminators

Symmetricon offers the 58539A transient eliminator for installations that require antenna coaxial lead-in protection. The 58539A transient eliminator passes DC power and frequencies in the 1.5 GHz range with non-downconverter L1 GPS antennas. In most installations, the transient eliminator mounts near the point at which the antenna lead enters the facility. [Table C-4](#) provides the transient eliminator specifications.

Table C-4. FCC-250B-90-1.5NFNF Specifications

Characteristic	Specification
Type	Gas
Response Time	< 2 nanoseconds
Impedance	50 Ω
Insertion Loss	< 0.5dB @ 1,575 MHz
VSWR	< 1.2:1 @ 1,575 MHz
DC Breakdown Voltage	40 Volts
Dissipation Capacity	25,000 Amperes, impulse 8/20 μ sec
Connector Type	N-Type
Temperature	-55 $^{\circ}$ C to + 85 $^{\circ}$ C
Relative Humidity	100% Non-immersed
Altitude	200 ft. (60 m) below sea level to 13 000 ft. (3962 m) above sea level

GPS L1 Inline Amplifier

The GPS L1 Inline Amplifier (58529A) option boosts the signal from the antenna. Use this amplifier on LMR-400 cables that are longer than 650 feet; it receives power from the GPS radio receiver through the antenna coaxial cable connections. [Table C-5](#) provides mechanical and electrical specifications for the amplifier.

Table C-5. GPS L1 Inline Amplifier Specifications

Characteristic	Specification
Mechanical	
Connectors, (In/Out)	N-Type
Gain	20 dB \pm 2 dB

Table C-5. GPS L1 Inline Amplifier Specifications (Continued)

Characteristic	Specification
Dimensions, includes connectors	Length: 3.77 in (9.6 cm)
Electrical	
Power	+4 VDC to +13 VDC
Current	< 13 mA
Noise Factor	< 4.3 dB

Antenna Coaxial Cables

Symmetricon provides several low-loss cable types, as well as LMR-400 with N-type connectors on both ends. Before using additional cables, verify that the total antenna system gain is acceptable as described in the [Selecting the Proper Gain Antenna](#) section of Appendix C.

- [Table 3-1](#) in Chapter 3 of this User's Guide lists the available GPS antenna kit.
- [Table C-6](#) provides antenna cable specifications

Table C-6. Antenna Cable Specifications

Cable Type	Measured Loss (@1.575 GHz dB per foot)	DC Resistance (Ω per foot)	Type Center Conductor	Flammability
RG213/U (Belden 8267)	0.093 dB	0.0030	Stranded 13 AWG	U/L CSA
RG213/U (Belden 8267)	0.093 dB	0.0030	Stranded 2.62 mm ²	U/L CSA
UHF/VHF (Belden 9913)	0.058 dB	0.0027	Solid 10 AWG	
UHF/VHF (Belden 9913)	0.058 dB	0.0027	5.26 mm ²	
UHF/VHF (Belden 89913)	0.089 dB	0.0027	Solid 10 AWG	Plenum U/L CSA
UHF/VHF (Belden 89913)	0.089 dB	0.0027	5.26 mm ²	Plenum U/L CSA

Table C-6. Antenna Cable Specifications (Continued)

Cable Type	Measured Loss (@1.575 GHz dB per foot)	DC Resistance (Ω per foot)	Type Center Conductor	Flammability
LMR-400	0.051 dB	Shield – 0.00165 Center – 0.00139	0.109 inch Solid	
LMR-400	0.051 dB	Shield – 0.00165 Center – 0.00139	0.27686 cm ² Solid	

Installing Antennas

This section provides a procedure for installing a GPS antenna. Before beginning the installation, review [Planning the Installation](#), on page 112, and gather the necessary tools and materials described in [Antenna Installation Tools and Materials](#), on page 115.

Antenna Connection Overview

The TimeProvider 100 chassis has one antenna connection located on the front panel. The antenna connection is made via a SMA connector, labeled GPS. The connectors are DC isolated and AC bypassed to frame ground. This connection is used for a radio receiver antenna connection only. Installation procedures for GPS antennas are outlined below.

Planning the Installation

Prior to installing the antenna, you should plan the site, antenna location, grounding scheme, cable route, and all other details.

Locating the Antenna

Use [Figure C-1](#) as a guide to locating the antenna.

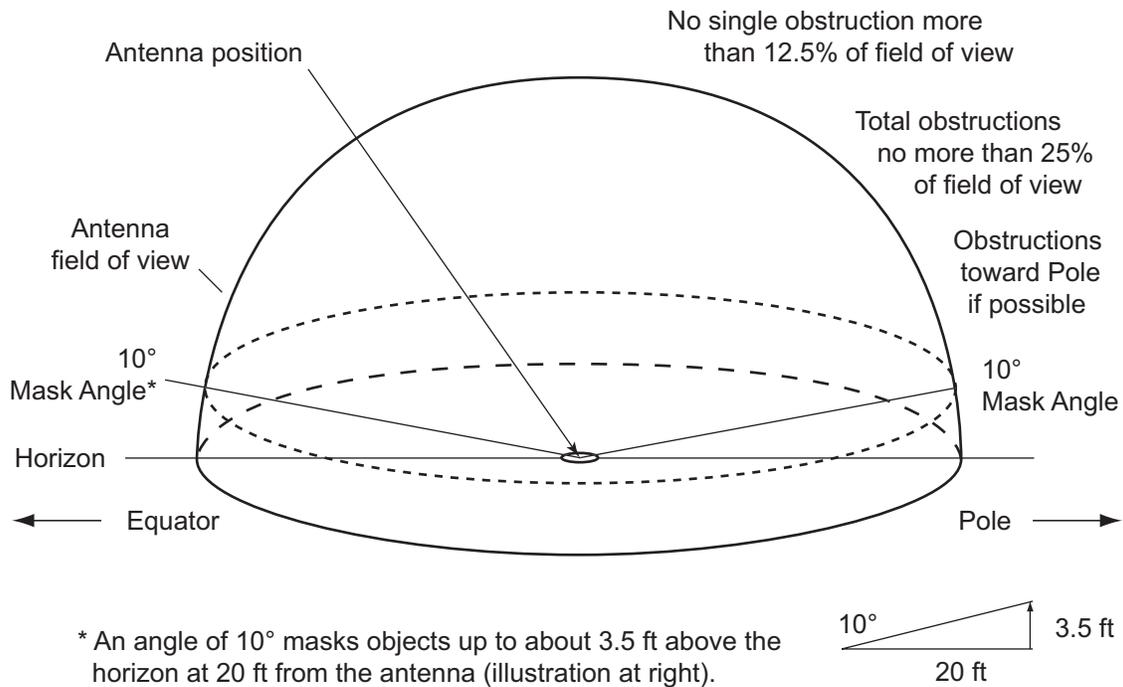


Figure C-1. Locating the GPS Antenna



Caution: To avoid damage to the GPS antenna, do not place the antenna where high-power radio signals are beamed directly at the unit. Such signals can damage the preamplifier of the GPS antenna.



Warning: To avoid serious injury to personnel or damage to equipment, exercise caution when working near high voltage lines. In particular:

- Use extreme caution when installing the GPS antenna near, under, or around high voltage lines.
- Follow local building electrical codes for grounding using the frame ground lug on the TimeProvider 100 chassis.
- The in-line amplifier receives 5 VDC power from the GPS radio receiver, and is supplied on the center conductor of the LMR-400 or equivalent coaxial cable. If the application requires an in-line amplifier, mount the amplifier/plate assembly where the transient eliminator would normally be mounted.
- Symmetricom does not recommend cutting the antenna cables provided in the GPS Antenna Kit.



Recommendation: Symmetricom recommends that you consider the following location and environment influences before installing the GPS antenna:

- If possible, provide the antenna with an unobstructed 360-degree view of the sky from the horizon.
- In general, do not allow obstructions that obscure the horizon (as viewed from the antenna) by more than 10 degrees, as shown in [Figure C-1](#).
- Locate the antenna well away from, and preferably in a plane above electrical equipment such as elevators, air conditioners, or other machinery.
- To reduce the risk of lightning damage, *do not* place the antenna at the highest point of the building.
- Locate the GPS antenna at least 12 feet from metallic objects, if possible.
- Locate the antenna high enough to avoid drifted snow.
- Locate the transient eliminator in a protected area to avoid contact with standing water.
- Locate the antenna within 30 feet of the point at which the antenna cable enters the building.
- Allow at least 10 feet of separation distance between GPS antennas.
- Surfaces above the plane of the unit that are between the antenna and the horizon can produce reflected (multi-path) signals, which can degrade the performance of the radio receiver.

Developing a Grounding Scheme

In addition to determining where to locate and mount the antenna and cabling, you should develop a grounding scheme. The purpose of the grounding scheme is to provide some protection against voltage surges and static discharge. If transient eliminators are used, they also need to be connected to the perimeter ground system or bulkhead entrance panel that is connected to the perimeter ground system.



Caution: To ensure proper grounding, observe these precautions when installing the antenna:

- Allow no sharp bends in the ground conductors.
- Ensure that no painted surface insulates the transient eliminator or grounding clamps.
- Ensure that ground conductors are bonded to the metal enclosure box (if used) and do not enter through an access hole.
- Do not use soldered connections for grounding purposes.
- Secure all grounding connections with mechanical clamp type connectors.

-
- In general, follow local building codes when selecting a grounding scheme, wire size, and installation.

Use #6 AWG (13.3 mm) copper ground wire or larger, depending on the distance to the earth ground electrode. Refer to your local electrical codes for specific details. In most cases, 1/0 AWG (55.0 mm) ground wire will maintain 1/10 the resistance of the coaxial shield.



Note: Larger ground conductors provide better transient elimination; that is, the larger the ground conductor, the less likely the chance of transients.

- Connect transient eliminators, if part of the grounding scheme, to earth ground through a conductor.

Symmetricon makes no recommendation as to whether to install transient eliminators. Symmetricon can provide suitable transient eliminators as an option.



Note: *Do not* connect the outside transient eliminator ground to the inside equipment rack ground. Doing so can defeat the protection afforded by the transient eliminator.

- Never connect antenna systems to the same earth ground connector as heating and cooling systems, elevator or pump motors, or other motors or machinery which can induce noise in the antenna system.

Antenna Installation Tools and Materials

These standard tools and materials are not supplied in the antenna kit, but may be required for installing the GPS antenna. For a list of antenna kit contents, see [Table C-1](#).

- Four each 0.25 in (6 mm) fasteners for installing the antenna floor flange
- Extra cable ties or acceptable cable clamps
- #6 AWG (minimum) copper ground wire
- Eight-foot (2.9 m) ground electrode
- Custom mounting plates, U-bolts, masonry bolt, and so forth, as needed for mounting to a tower, roof, or wall of a building
- A cable puller may be required for installing the antenna coaxial cable
- Digital voltmeter (DVM)



Caution: To prevent damage to connectors, use caution while pulling cable.



Caution: To avoid damage to the connectors, do not use the connectors to pull the cable. If at all possible, avoid bundling the coaxial cable with other cables (and possible noise sources). Use appropriate cable-pulling devices when pulling the coaxial cable through conduit or a weather head.

Cutting Antenna Cables

Symmetricon recommends that you coil excess cable to avoid gain mismatch between the GPS antenna and the radio receiver. Coiling the excess cable also allows you to use the factory-installed crimped connector.

Symmetricon *does not* recommend cutting the antenna cables provided in the GPS Antenna Kits. If you must cut the cables, please ensure that the following requirements are met.

Be aware of these cable and connector requirements before cutting antenna cables:

Cable Requirements – The total cable length from the radio receiver to the antenna must not be shorter than the minimum cable lengths indicated in the GPS Antenna Kits (see [Table C-1](#)).

Connector Requirements – The cables provided with the GPS Antenna Kit have factory installed crimped connectors. If you cut these cables, you must supply and add a connector. Symmetricon recommends that you use only crimp-style N-type connectors in the Crimper Kit for this application.

Installing the Antenna

This section provides installation procedures for installing the GPS antenna.



Note: Follow local building electrical codes when installing the GPS antenna.

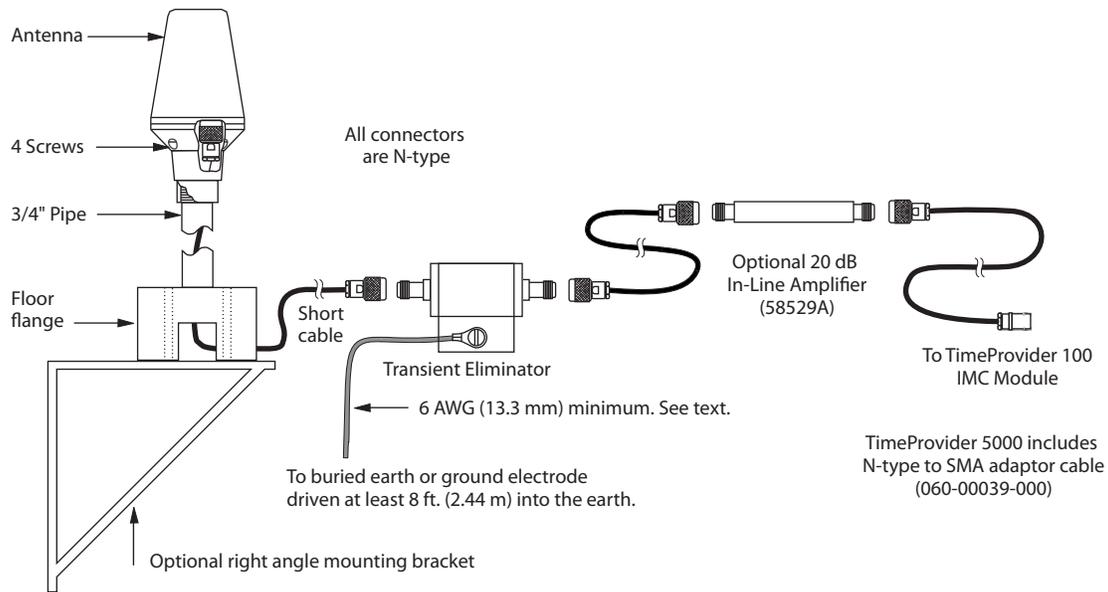


Figure C-2. GPS Antenna Installation

To mount the GPS antenna:

- To mount the antenna to any stable flat surface, use the floor flange supplied in the GPS Antenna Kit. The mounting surface and the local building codes determine the type and number of fasteners, screws, bolts, and so forth, that may be required.
- To secure the coaxial cable to the mast, use one or more 8-inch cable ties or appropriate cable clamps.

Connecting the Cable to the Antenna

To connect the coaxial cable to the mounted antenna (see [Figure C-2](#)):

1. Loosen the four screws securing the top of the antenna in place to gain access to the connector.
2. Route the shorter antenna coaxial cable from the antenna through the floor flange (in the lower half of the antenna base) to the unit.



Caution: To avoid damage to the connectors, do not use the connectors to pull the cable. If at all possible, avoid bundling the coaxial cable with other cables (and possible noise sources). Use appropriate cable-pulling devices when pulling the coaxial cable through conduit or a weather head.

3. Connect the cable to the antenna and run the cable from the antenna through the slot of the floor flange.



Caution: To avoid damage to internal solder connections, do not over-tighten the connector.

4. Replace the four screws to secure the top of the antenna in place with the cable connected.

Installing the Transient Eliminator

If you are installing a transient eliminator, follow these guidelines:

- Transient eliminators should be installed in accordance with your antenna system grounding scheme
- Mount the transient eliminator within 30 feet (9 m) of the GPS antenna
- If required, mount a second transient eliminator near the GPS antenna

To install the transient eliminator:



Note: Step 6 in the following procedure cannot be done if you cut the cable (as described in Step 1).

1. If necessary, cut the coaxial cable and install mating connectors (see [Cutting Antenna Cables](#), on page 116).
2. Using the DVM, measure the resistance between the center conductor and shield to verify that the center conductor and shield are not shorted together.
3. Connect the longer GPS antenna coaxial cable to the transient eliminator.
4. Connect the ground wire between the transient eliminator and the proper grounding zone (building ground, master ground bar, or other) for the mounting location.



Recommendation: Symmetricom does not recommend soldered connections for grounding purposes. All grounding connections should be secured with mechanical clamp connectors.

5. Wrap the connectors with weatherproof tape for added protection.
6. Verify that the antenna coaxial cable center conductor is not shorted to the shield of the cable.

Installing the Antenna Cable

You should install the antenna cable from the transient eliminator to the TimeProvider 100 using the shortest route possible. Follow all applicable building and electrical codes to ensure a water-tight and fire-resistant installation.



Caution: To avoid damage to the connectors, do not use the connectors to pull the cable. If at all possible, avoid bundling the cable with other cables (and possible noise sources). Use appropriate cable-pulling devices when pulling the cable through conduit or a weather head.

Connecting the GPS Antenna

Before connecting the GPS antenna to the TimeProvider 100, see [Antenna Connection Overview](#), on page 112. Then, follow the instructions below.

1. Before connecting the antenna coaxial cable to the TimeProvider 100, test the DC resistance between the center conductor and the shield using an ohmmeter. The reading should be approximately 260 Ω for an active GPS antenna.

If the actual reading is incorrect, you may have a shorted or open cable or transient eliminator (if installed). Therefore, apply the same measurements directly to the GPS antenna. This requires disconnecting the antenna cable at the antenna.



Note: The open-circuit range of an individual ohmmeter can cause readings to vary among meters.

2. Secure the free end of the antenna cable to the appropriate antenna connector on the rear panel of the TimeProvider 100 using the right angle adapter provided with the antenna cable.



Recommendation: Symmetricom recommends coiling excess cable to avoid gain mismatch between the GPS antenna and the TimeProvider 100. Coiling the excess cable also allows you to use the factory-installed crimped connector.

Antenna Installation Completeness Checklist

To verify that antenna installation is complete:

- Verify that all power and ground wires are installed correctly and securely fastened.
- Verify that all input and output cables are properly installed.
- Verify that all antenna connectors are secure, tight, and weatherproofed.

Technical Support

See [Contacting Technical Support](#), on page 91 for more information.

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