



TimeCesium

Primary Reference Source



097-43200-01
Issue 2
July 2003

FCC Regulatory Notice (Optional)

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

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Product Overview

This chapter provides both a physical and functional description of the TimeCesium Primary Reference Source.

Introduction

1

This Operating Manual contains information about installing, configuring, and operating the TimeCesium Primary Reference Source. The TimeCesium is an accurate and stable frequency reference designed for telecommunications Stratum 1 applications.

Who Should Read This Operating Manual

This Operating Manual is designed for the following categories of users:

- Systems Engineers - Chapter 1 provides an overview of the product and its options. Cross references in this chapter direct readers to detailed configuration information in Chapter 3.
- Installation Engineers - Chapter 2 provides installation information and procedures. Chapters 3 and 4 provide specific configuration and operation information to ensure proper operation.

Certain sections, particularly Chapters 1 and 2, are intended for non-technical audiences. Others, such as Chapters 3, 4, and 5 contain instructions and information that is intended for engineers and other technical personnel.

About This Operating Manual

This Operating Manual is intended to be used as a reference for the TimeCesium Primary Reference Source. This Operating Manual has an introduction to the TimeCesium product, system and configuration specifications, and procedures for installation, power-up, and operation.

This Operating Manual contains the following chapters and appendixes:

- Chapter 1 - Product Overview: This chapter includes an overview of this Operating Manual, the intended audience, and the stylistic and typographical conventions used.
- Chapter 2 - Installation: This chapter includes environmental considerations of the TimeCesium unit, a guide to mounting, and electrical (cable) connection procedures for the TimeCesium unit.
- Chapter 3 - Configuration: This chapter includes information on connecting the TimeCesium unit to a laptop, PC, or terminal for installing software and setting the systems configuration options.
- Chapter 4 - Operation: This chapter provides Power-on and Power-off procedures, as well as normal operating indications.
- Chapter 5 - Specifications: This chapter provides system specifications information.
- Appendix: This section contains Symmetricom's limited warranty and a copyright notice.

Typographical and Other Conventions

This Operating Manual uses the following conventions:

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Acronyms and Abbreviations

Terms are spelled out the first time they appear in this User Guide. Thereafter, only the acronym or abbreviation is used.

Revision Control

The title page lists the part number, issue number, and printing date of this Operating Manual.

Warnings, Cautions, and Notes

Warnings, Cautions, and Notes attract attention to essential or critical information in this Operating Manual. The types of information included in each are explained as follows:

Warning: Warnings are installation, operation, or maintenance procedures, practices, or statements that if not strictly observed, may result in personal injury or loss of life.

Caution: Cautions are installation, operation, or maintenance procedures, practices, conditions, or statements that if not strictly observed, may result in damage to or destruction of equipment or may cause a long-term health hazard.

Note: Notes contain installation, operation, or maintenance procedures, practices, conditions, or statements that emphasize important information, which may make tasks easier or increase task understanding.

Where to Find Answers to Product and Document Questions

If this product is not performing as expected, or if there are comments about this Operating Manual, please contact the local Symmetricom representative or sales office.

Symmetricom appreciates suggestions on ways to improve this Operating Manual. Please mark or write these suggestions on a copy of the page and mail or fax it to ...

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E-mail: ctac@symmetricom.com
Internet: <http://www.symmetricom.com>

All suggestions are greatly appreciated.

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

Product Overview

1

The Symmetricom TimeCesium Primary Reference Source (PRS) is a low cost, accurate and stable frequency reference designed for telecommunications Stratum 1 applications.

Functional Description

The TimeCesium Primary Reference Source is a PRS with fully automatic operation by microprocessor control. The unit provides a Stratum 1 quality signal without the need of an external reference. The TimeCesium comes in three different models:

- The TimeCesium T1 developed to meet ANSI mounting and access requirements and applications
- The TimeCesium E1 developed to meet ETSI mounting and access requirements and applications
- The TimeCesium E1 developed to meet ANSI mounting and access requirements and applications

The TimeCesium T1 and E1 ANSI front and rear panel views are shown in Figure 1 and Figure 2. The TimeCesium E1 ETSI front and rear panel views are shown in Figure 3 and Figure 4. Refer to Table G in Chapter 5 for a list of the system's performance specifications.

The major function of the TimeCesium is to produce two accurate and stable DS1 (1.544 Mb/s) or E1 (2.048 Mb/s) signals for telecom network synchronization. To accomplish this, a cesium beam tube resonator is used to stabilize the output of a quartz crystal oscillator which provides the frequency source for the output generators.

Figure 1. TimeCesium T1 and E1 ANSI Front View

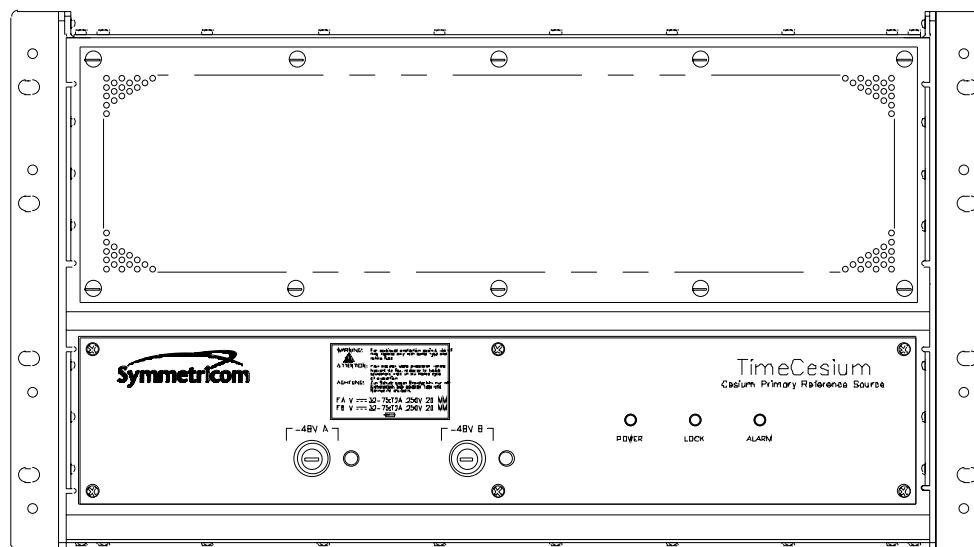


Figure 2. TimeCesium T1 and E1 ANSI Rear View

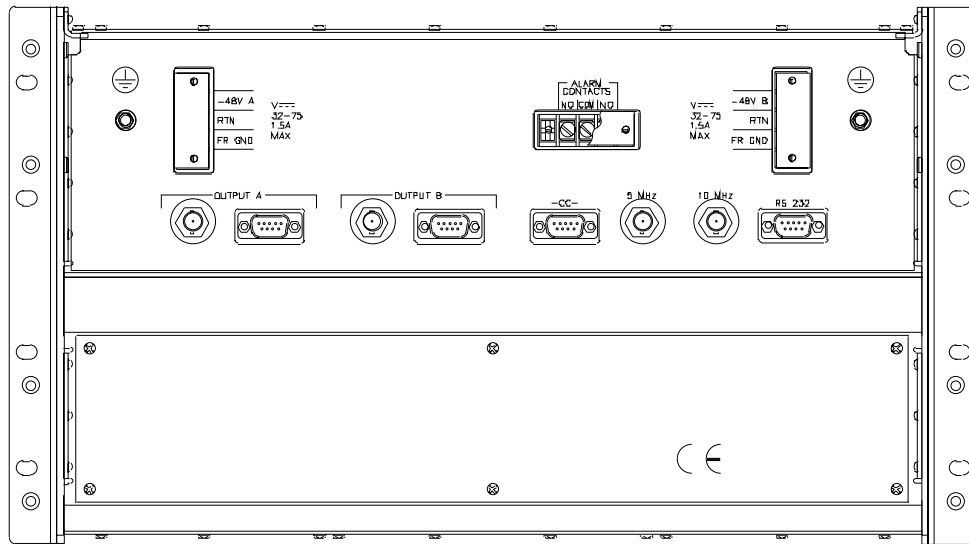


Figure 3. TimeCesium E1 ETSI Front View

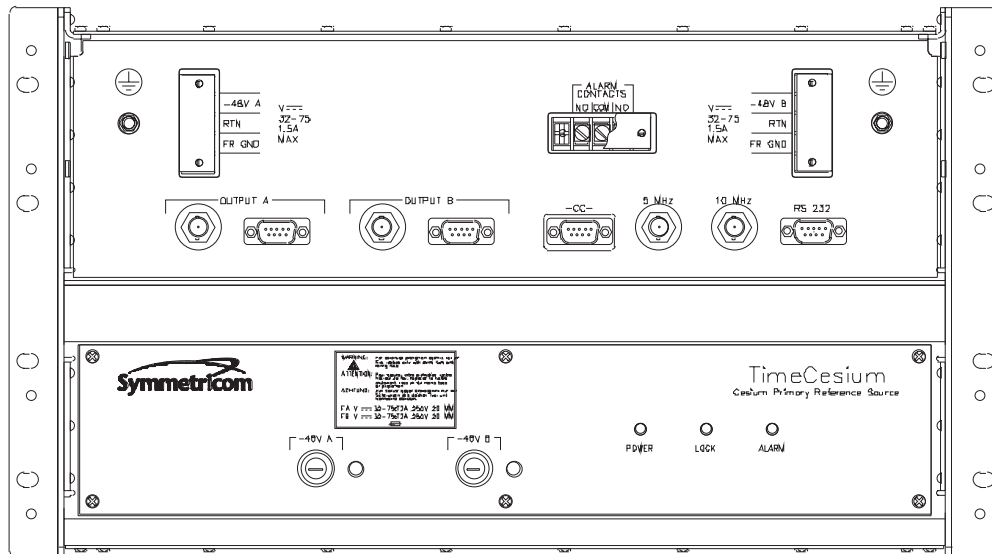
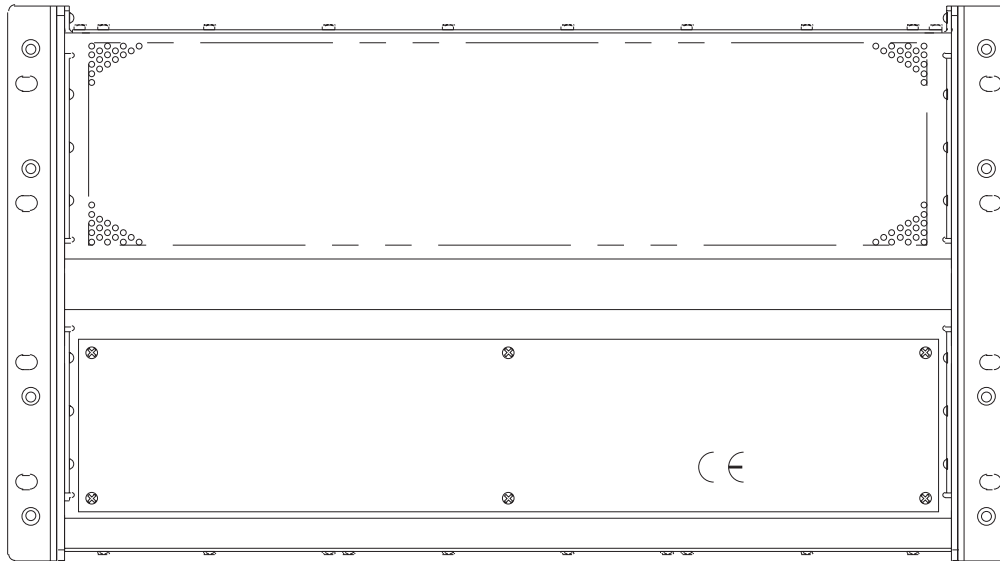


Figure 4. TimeCesium E1 ETSI Rear View



Microprocessor

A microprocessor performs the following tasks:

- Digital demodulation and integration of the servo loop signals
- Monitoring of system parameters
- Control of adaptive servos
- Diagnostic functions to aid in troubleshooting
- Communication for monitoring and control

Power

The TimeCesium is powered from a -48 Vdc source either by a single connector or two redundant connections. The input power contacts are labeled -48 V A and B, Return (RTN), and Frame Ground (FR GND). Grounding practices should comply with local grounding codes. RTN is the positive side of the voltage supply and is isolated from frame ground (FR GND). The TimeCesium uses an internal DC-DC converter to provide a wide input voltage range as well as electrical isolation between the DC input and chassis ground. Either side of the DC input may be located at chassis ground potential. The external DC inputs are protected against reverse polarity connection by series diodes.

Fuses

The DC fuses are located in the fuse connectors on the front panel. These fuses may be used as the disconnect device in an emergency. Normally, power is removed upstream from the hard-wired connections by either a switch panel or power panel.

Connectors

All permanent electrical connections are made at the following locations:

- The rear panel of the TimeCesium T1
- The rear panel of the TimeCesium E1 ANSI
- The front panel of the TimeCesium E1 ETSI.

Refer to Figure 2 and Figure 3 for the location and contact designation for the various connectors.

The RS-232 serial port may be used to control or monitor the TimeCesium through the use of a PC or laptop. The unit's outputs are labeled Output A and Output B. These outputs have both a DB9 connector for balanced signals (T1 at 100 ohms and E1 at 120 ohms), and a BNC connector for unbalanced signals (75 ohms). The BNC connector labeled 10 MHz is a reference sinusoidal signal output (X1 at 10 MHz, 0.5 Vrms at 50 ohms). The TimeCesium E1 is supplied with a DB9 to wire wrap connector adapter for wire wrap applications. The adapter pins are marked to identify tip, ring, and sleeve.

Alarms

The TimeCesium provides for an ALARM (operation has been or soon will be compromised). One set of form-C relay contacts, 1-Amp rating, is provided on the terminal block labeled ALARM. The alarm connection is available either as "normally open" or "normally closed" (see Figure 2 and Figure 3). The factory default for ALARM operation is warning mode (non-latching operation). If the alarm is activated, the ALARM indicator turns on. If the alarm condition has cleared, the alarm clears. The ALARM relay is then reset and the outputs are ready to use. The user may change the alarm operation from warning mode (attention required at operator's convenience) to critical mode (Stratum 1 synchronization has been or soon may be compromised) where the ALARM is latching. In this mode the alarm must be reset by the user through the RS-232 port, by issuing the RESET ALARM command (see Chapter 4).

Software

The TimeCesium has a number of software controllable features. The TimeCesium controller software is a proprietary program designed to help configure and monitor the TimeCesium. It requires a PC or laptop running Windows 95/98/2000/NT 4. The software comes standard and is quickly installed and easy to use. Refer to Chapter 2 for more information.

Factory Configurations

The TimeCesium can be ordered with three different configurations. Refer to Table A for configuration and part number reference information.

Table A: Factory Configuration Options

Configuration	Part Number
TimeCesium T1 (ANSI version)	990-43200-01
TimeCesium E1 (ETSI version)	990-43200-02
TimeCesium E1 (ANSI version)	990-43200-04

Factory Settings

The default factory settings for the three TimeCesium configurations are shown in Table B.

Table B: Default Factory Settings

Parameter	Setting
TimeCesium T1 (ANSI version)	
E1 Framing Pattern Generator	
Spec	CAS4
SSM Channel	4
Fault Strategy	Mute
T1 Framing Pattern Generator	
Spec	D4
Fault Strategy	Mute
Output A	
Settings Enabled (checked)	DS1, Mb/s, Balanced
Output B	
Settings Enabled (checked)	DS1, Mb/s, Balanced
TimeCesium E1 (ETSI version) and E1 (ANSI version)	
E1 Framing Pattern Generator	
Spec	CAS4
SSM Channel	4
Fault Strategy	Mute
T1 Framing Pattern Generator	
Spec	D4
Fault Strategy	Mute
Output A	
Settings Enabled (checked)	E1, Mb/s, Unbalanced
Output B	
Settings Enabled (checked)	E1, Mb/s, Unbalanced

T1–1.544 Mb/s Outputs (ANSI Version)

A TimeCesium T1 (ANSI version) provides T1 (1.544 Mb/s) telecom signals in either D4 or ESF format. The output format is user selectable through TimeCesium controller software settings. See Table G in Chapter 5 for specifications. The TimeCesium controller software will retrieve the current settings from the TimeCesium clock.

E1– 2.048 Mb/s Outputs (ETSI and ANSI Versions)

A TimeCesium E1 (ETSI version) provides E1 (2.048 Mb/s) telecom signals per ITU-T Reg. G.703. The outputs are framed in accordance with ITU-T Reg. G.704. The output signals contain a Sync Status Message that identifies the source as a PRS (Stratum 1) signal. These outputs are available in either 120-ohm balanced or 75-ohm unbalanced form. See Table G in Chapter 5 for output specifications. As with the factory configuration of T1 outputs, the TimeCesium controller software will retrieve the current settings from the TimeCesium clock.

Composite Clock

The TimeCesium provides a composite clock output at a frequency of 64 kHz (AMI pattern) with phase reversals (BPV; bipolar violation) every 125 microseconds, corresponding to a frequency of 8 kHz. Hence the signal name, composite clock, indicates that this signal has both 8 kHz and 64 kHz clock information.

Sinusoidal Signals

Two outputs (5 MHz and 10 MHz) of high spectral purity at a level of 1 V_{rms} are provided.

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Installation

This chapter provides TimeCesium installation information, including shelf installation and wiring.

Overview

This chapter provides unpacking instructions and installation procedures for the TimeCesium as well as warnings, cautions, notes, and recommendations that pertain to the procedures being performed. To prevent serious injury and/or equipment damage, do not ignore these safety, environmental, and operational messages.

Note: If problems are encountered during any of the following procedures, contact Customer Service by telephone at 1-888-367-7966 or +1-408-428-7907 or by e-mail at ctac@symmetricom.com.

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Unpacking Instructions

Caution: To avoid electrostatic discharge (ESD) damage to sensitive internal parts in the TimeCesium, observe proper ESD handling procedures.

1. Inspect the container for signs of damage. If the container appears to be damaged, notify both the carrier and the Symmetricom distributor. Retain the shipping container and packing material for the carrier to inspect.
2. Unpack all components in the shipping container.
3. Inventory, and set aside all items and paperwork that are included in the container.
4. 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 rear panel. Contact the Symmetricom distributor if the model or item numbers do not match.

Environmental Considerations

Caution: This instrument must be operated only as specified by the manufacturer. Use other than specified may compromise the safety precautions of the system.

When installing the instrument, consider the standard environmental factors (temperature, humidity, vibration, etc.) and the presence of magnetic fields that might affect the accuracy of the TimeCesium. Avoid installing or using the instrument near large motors, generators, transformers, or other equipment which radiates strong AC or DC fields of 2-gauss or more.

Pre-Installation Checklist

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

- The equipment rack is grounded and has power available
- The power supply fuses have been removed from the power input of the TimeCesium front panel
- The proper tools and materials are available as listed in the Tools and Materials section

Tools and Materials

The following is a list of recommended tools and materials NOT supplied by Symmetricom:

- Standard tool kit
- VOM meter
- Cable ties or acceptable cable clamps
- # 16 AWG wire for –48V, RTN, and Frame Ground (minimum)
- #18 AWG wire for connecting office alarms
- Laptop or PC with Windows 95/98/2000/NT 4 installed
- Null Modem cable (F-F)

Installing the TimeCesium

The TimeCesium is designed to be mounted in a standard telecom equipment rack. The front panel occupies a height of 10.5 in. (25.9 mm). The TimeCesium is 10.1 in. (25.7 mm) deep and weighs approximately 36 lbs (16.4 kg).

The TimeCesium comes equipped with removable rack mounting brackets. These brackets, which are reversible, may be positioned in different configurations to satisfy a variety of mounting requirements, including mounting in a standard 19-inch (48.2 mm) rack or 23-inch (58.4 mm) rack. See the shelf mounting diagram in Figure 5. The brackets may be mounted 0 in. or 3.625 in. (9.2 mm) behind the TimeCesium front panel.

***Caution:** To avoid damage to the TimeCesium, access covers must not be removed except by trained service personnel.*

***Warning:** For continued protection against risk of fire, ensure that only the specified fuse type and rating are used. Fuse specifications are contained in the Specifications chapter and on the instrument's front panel.*

Mounting and Installation

Refer to Figure 5 for TimeCesium ANSI versions (Figure 6 for a TimeCesium ETSI version), then perform the following procedures:

***Caution:** To prevent damage to the instrument during installation, ensure power is disconnected by removing both fuses from the front panel. The fuses are the emergency disconnect for the device – there is no ON/OFF switch.*

***Caution:** The TimeCesium is convection cooled. To prevent the instrument from overheating, allow for a one rack unit (1.75 in./4.44 cm) space above and below the unit for cooling.*

***Caution:** To avoid electrostatic discharge (ESD) damage to components in the TimeCesium, observe the appropriate ESD precautions and procedures.*

-
1. Install the rack mounting ears in the desired position on the unit with the eight (8-32) screws provided.
 2. Mount the TimeCesium in the desired location in the equipment rack using the eight #10 screws, washers, and lock washers provided.
 3. Do not remove the fuses from the fuse holders labeled -48V A and -48V B from the front panel.

Note: All permanent electrical connections are made on the rear panel of the TimeCesium T1 or E1 ANSI and on the front panel of the TimeCesium E1 ETSI. Refer to Figure 7 for the location and contact designation for the various connectors.

- Both power inputs A and B must be applied to satisfy the alarm criterion.
 - The screw terminal marked "FR GND" may be connected to the frame ground in accordance with local grounding regulations, but must be isolated from the DC returns.
 - The external DC inputs are protected against reverse polarity connection by series diodes.
4. Connect Frame ground to lug marked "FR GND" on -48V A and -48V B terminal blocks.
 5. Connect -48Vdc "Power A" from the fuse panel to lug marked "-48V A".
 6. Connect -48Vdc "Power B" from the fuse panel to lug marked "-48V B".
 7. Connect the return side (+) of -48Vdc "Power A" to terminal marked "RTN".
 8. Connect the return side (+) of -48Vdc "Power B" to terminal marked "RTN".
 9. Connect one end of the alarms cable to the "ALARM CONTACTS" terminals labeled "COM", and either "NO" or "NC" as required (see Figure 7). Connect the other end to the appropriate alarm monitoring device per local regulations.

Figure 5. TimeCesium T1 and E1 ANSI Shelf Rack Mounting Diagram

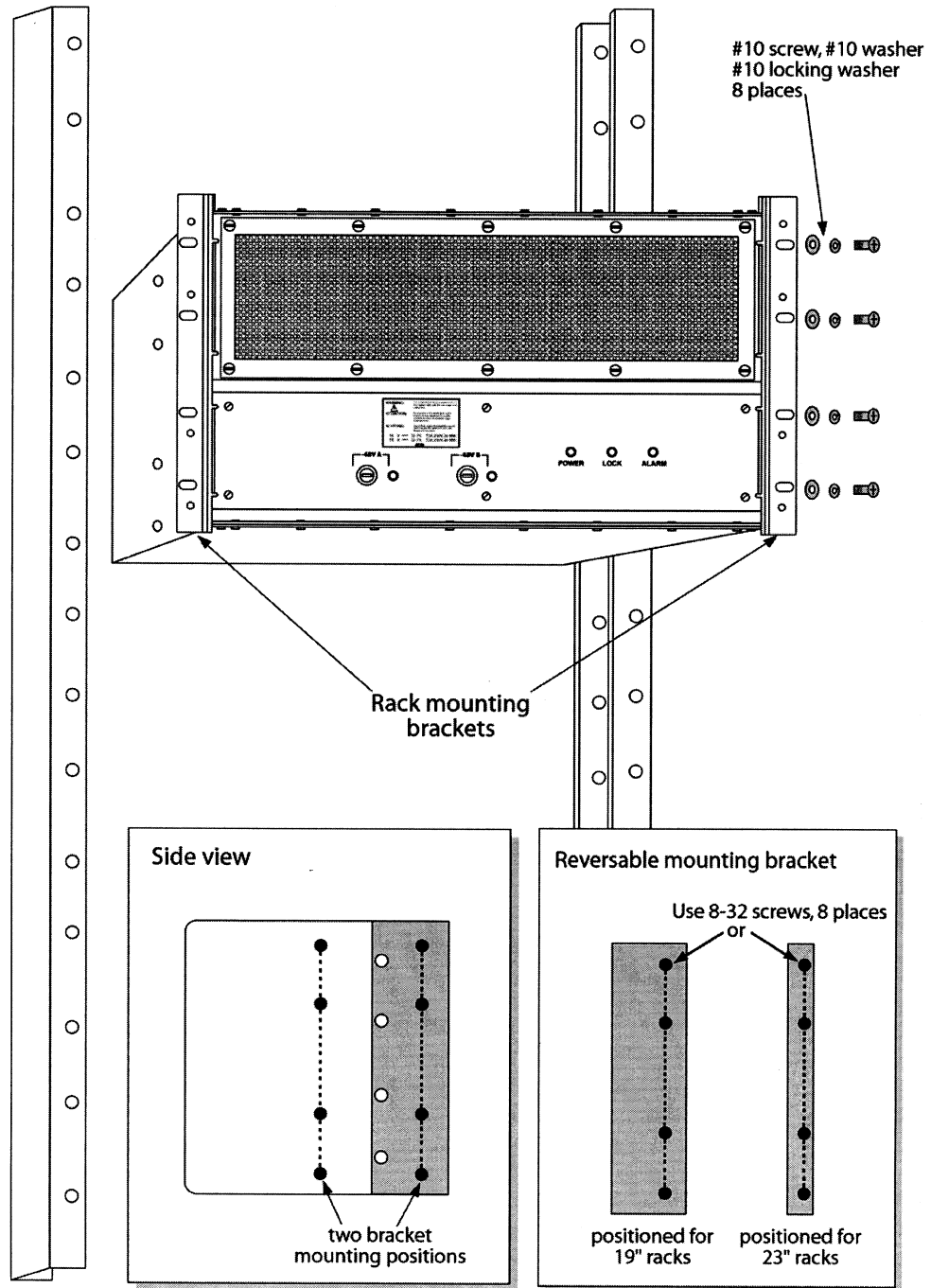


Figure 6. TimeCesium E1 ETSI Shelf Rack Mounting Diagram

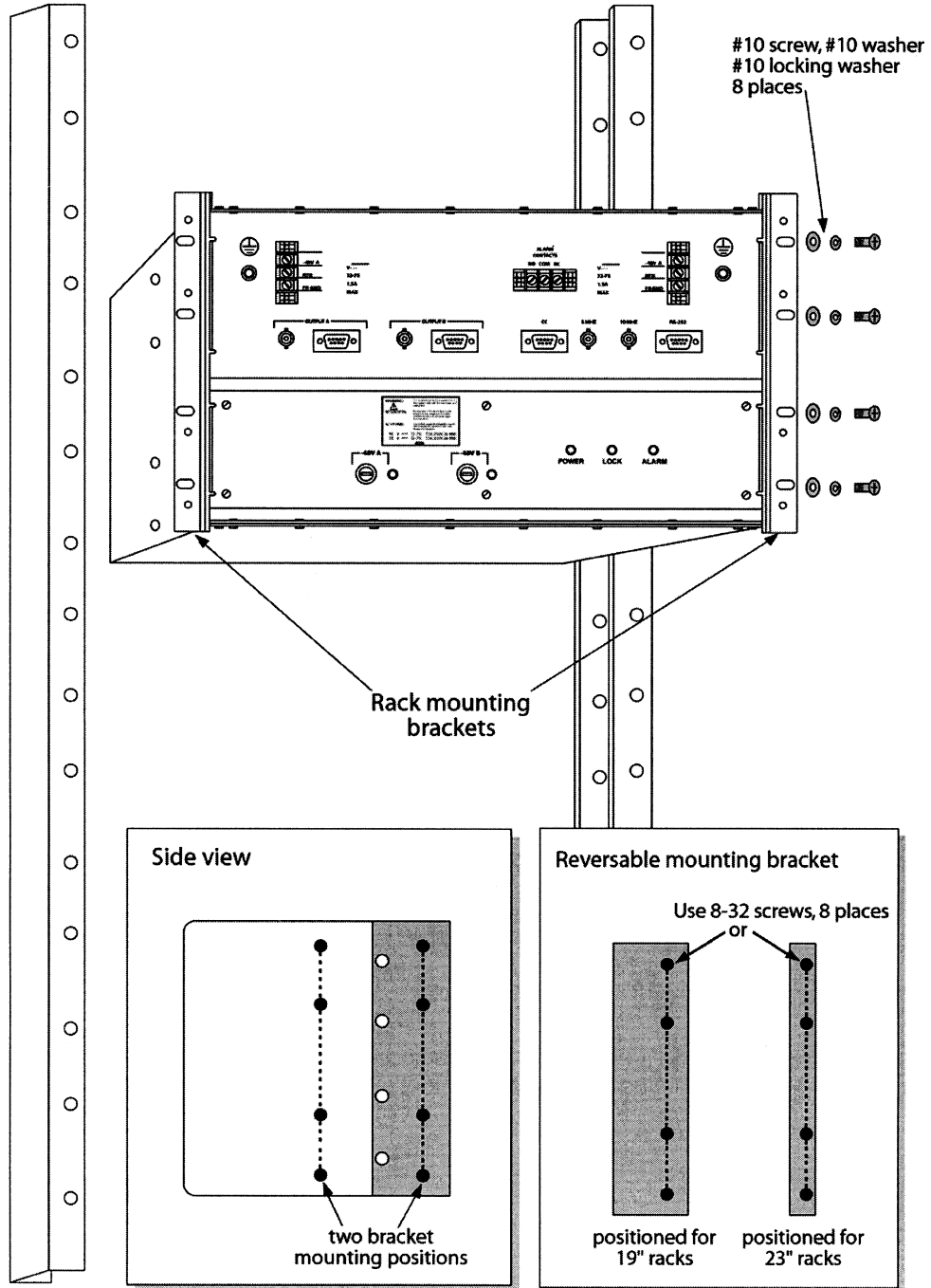
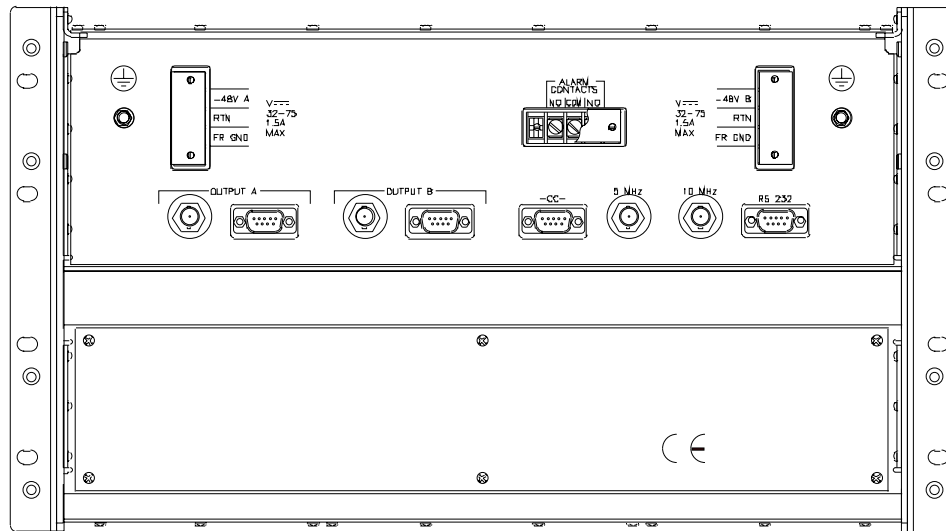


Figure 7. TimeCesium Connector Locations



10. Route, connect, and dress the output cable from "OUTPUT A" to the selected network element. Select either BNC, DB9, or wire-wrap connection (see Table C) for pinout information if using the DB9 connector. If using the wire-wrap adapter the pins are clearly marked.
11. Route, connect, and dress the output cable from "OUTPUT B" to the selected network element. Select either BNC, DB9, or wire-wrap connection (see Table C) for pinout information if using the DB9 connector. If using the wire-wrap adapter the pins are clearly marked.

Table C: Outputs A and B DB9 Connector Pinout

Function	Pin
Tip	2
Ring	6
Sleeve	1

12. Install the proper fuses into the fuse holders labeled -48V A and -48V B on the front panel. (Refer to Table G and the label on the instrument's front panel.)

Note: Applying DC power initiates the warm-up and automatic lock acquisition sequence. During this time, the ALARM relay is activated and the signal outputs are ready for use.

13. Observe that the POWER and ALARM indicators are illuminated.
14. Ensure that neither of the -48 VDC Power Fault indicators are illuminated.
15. Wait for the unit to stabilize the frequency control loop. This may take up to 30 minutes. When stabilized, the ALARM indicator turns off and the LOCK indicator illuminates. The

ALARM relay is also reset. At this time the signal outputs are ready for use.

Refer to Table D for a description of all the front panel indicators.

Table D: Front Panel Indicators

Indicator Name	Description
POWER	Turns green when DC power is present.
LOCK	Turns green when the frequency control loop is stable. Indicates normal operation. Outputs are active.
ALARM	Turns red when the unit is initialized and when a minor or critical alarm is present (alarm relay is activated).
-48 VDC Power A Fault	Turns red when fuse is blown.
-48 VDC Power B Fault	Turns red when fuse is blown.

Installing the TimeCesium Controller Software

The TimeCesium has a number of software controllable features. The TimeCesium controller software is a utility program that will help configure the Cesium instrument. It requires a PC or laptop operating with Windows 95/98/2000/NT 4.

Connecting the Serial Cable

Connect one end of an RS-232 cable to the serial communications port on your computer and the other end to the connector labeled RS 232 on the TimeCesium. Use a NULL Modem cable with pins connected as shown in Table E and Table F.

If there is a DB25 connector on the computer refer to Table E for connector pinout information.

Table E: RS-232 Port DB9 to DB25 Connector Pinout

DB9-F	DB25-F	Function
3	3	RX (Receive Data)
2	2	TX (Transmit Data)
5	7	GND (Signal Ground)

Table F: RS-232 Port DB9 to DB9 Connector Pinout

DB9-F	DB9-F	Function
3	2	RX (Receive Data)
2	3	TX (Transmit Data)
5	5	GND (Signal Ground)

Loading the TimeCesium Controller Software

1. Locate the TimeCesium controller software CD-ROM provided in the shipping container. If unable to locate the disk, contact Customer Service at 1-888-367-7966 (USA) or +1-408-428-7907 (international). Contact can also be made by fax at +1-408-428-7998 or by e-mail at ctac@symmetricom.com.
2. Install the CD-ROM into the computer.
3. Run the program `setup.exe` located on the disk by clicking the Start button. Select Run. At the command line, type `D:\setup.exe` and press Enter. Follow the instructions.
4. This installs the TimeCesium controller application files onto the hard disk. A folder is added to the Start menu containing icons for the software and its documentation. An uninstall icon is also added so that the program can be easily removed in the future. All the necessary files will be copied to the Program Files directory.

Establishing Communication

The TimeCesium controller software will initially attempt to communicate with the TimeCesium. This procedure is described as follows:

1. Click the Start button, select Programs, TimeCesium, and the TimeCesium program icon. The TimeCesium interface appears as shown in Figure 8.
2. Select the communication port where the TimeCesium is connected. The TimeCesium controller software automatically detects the COM ports available on the PC. See Figure 9.

Note: Valid COM ports can be 1 through 8; however, only the available COM ports are displayed in the option list. Used or uninstalled ports are not shown.

3. Verify that the TimeCesium is operational and responding. To do this, enter the COM port number on the PC where the TimeCesium is connected and click the READ button.

Figure 8. TimeCesium Initial Start-up Screen

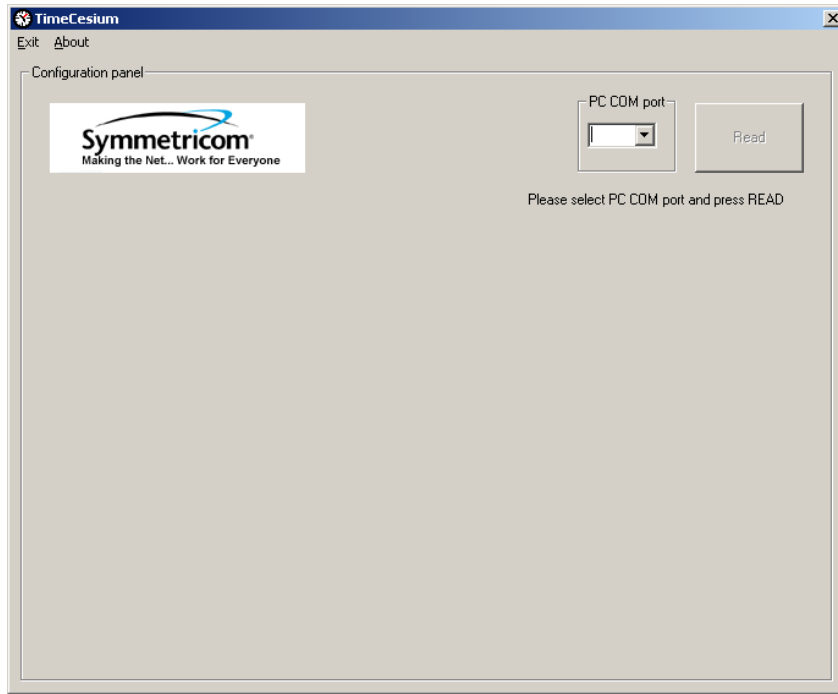


Figure 9. TimeCesium COM Port Selection Screen

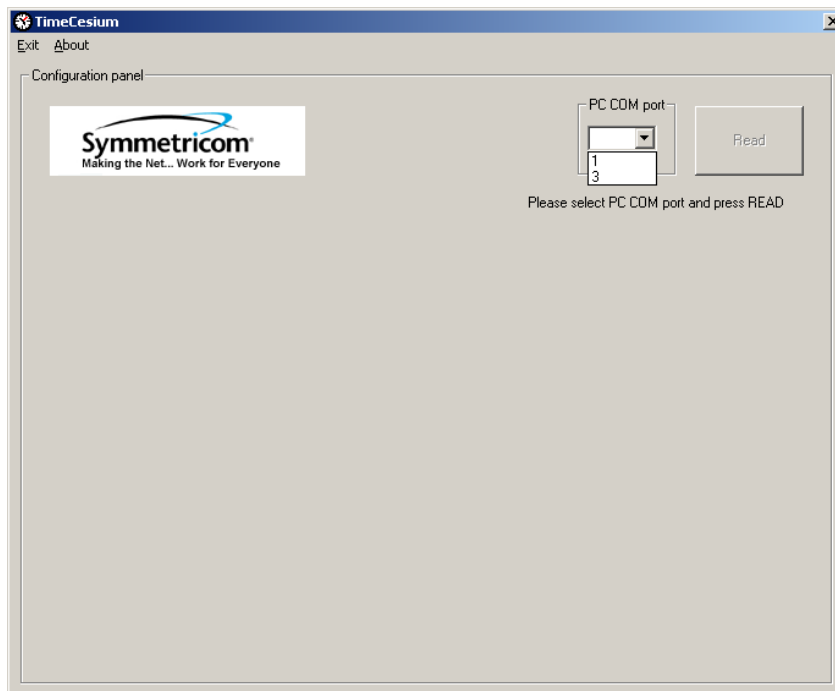
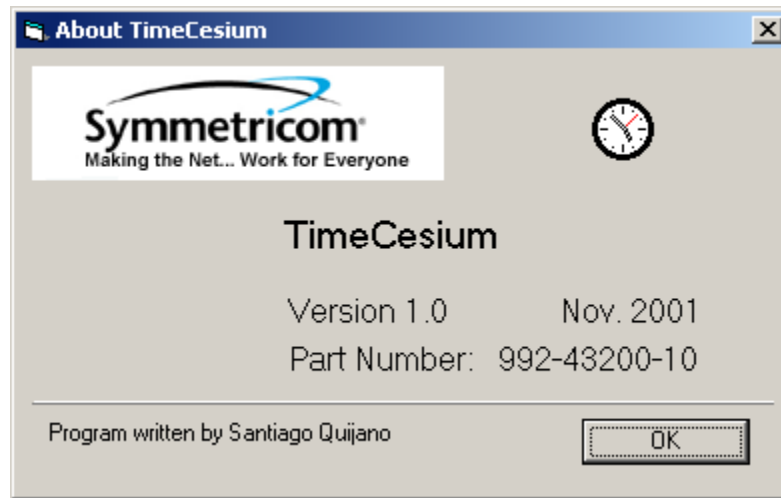


Figure 10. TimeCesium About Window



4. If the program retrieves the current settings from the TimeCesium clock, the unit is operational.
5. Close the program by clicking the Exit button in the upper right-hand corner. To configure the TimeCesium, refer to Chapter 3, Configuration.
6. To see information related to the software such as product name, version number, date, and part number, click on the "About" button (Figure 10).

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Configuration

This chapter provides information on configuring the TimeCesium.

Chapter 3

Configuring the TimeCesium

Before beginning the configuration procedures outlined in this section, ensure that the installation procedures in Chapter 2 have been performed.

Note: If problems are encountered during any of the following procedures, contact Customer Service by telephone at 1-888-367-7966 or +1-408-428-7907 or by e-mail at ctac@symmetricom.com.

Preliminary Procedures

Caution: To avoid electrostatic discharge (ESD) damage to components in the TimeCesium, observe the appropriate ESD precautions and procedures.

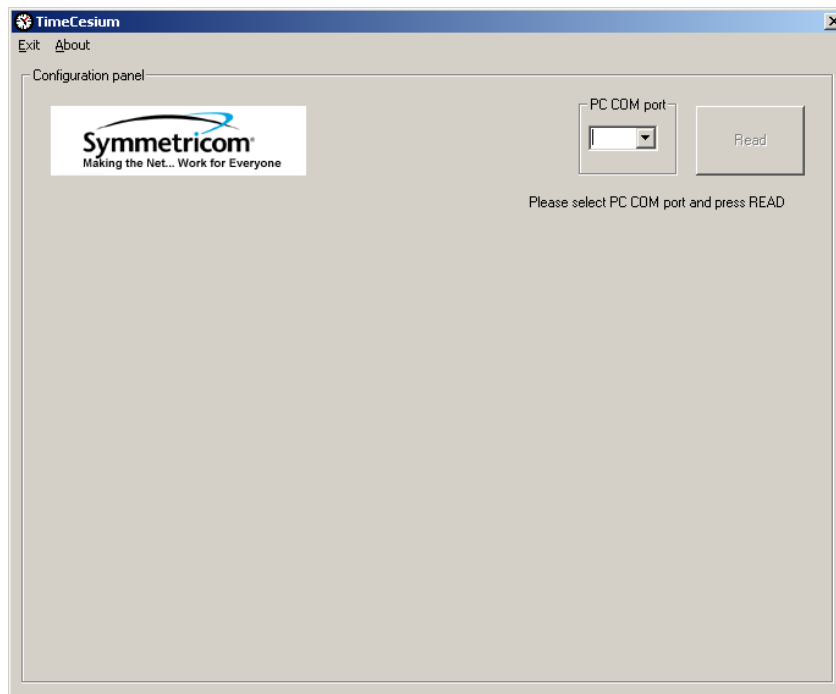
1. Connect a serial cable from the computer to the RS-232 serial port as described in Chapter 2.

Warning: For continued protection against risk of fire, ensure that only the specified fuse type and rating are used. Fuse specifications are contained in the Specifications chapter and on the instrument's front panel.

2. Insert the proper fuses into the two fuse slots (-48V A and -48V B) of the front panel to apply power to the TimeCesium. The green POWER LED should be illuminated. Disregard other LED indications at this time.
3. Start the TimeCesium interface program. Click the Start button, select Programs, TimeCesium, and click on the TimeCesium program icon. The TimeCesium interface should look similar to the one shown in Figure 11.

Note: The TimeCesium controller initially attempts to communicate with the TimeCesium. Refer to the Establishing Communication section in Chapter 2.

Figure 11. TimeCesium Interface Screen



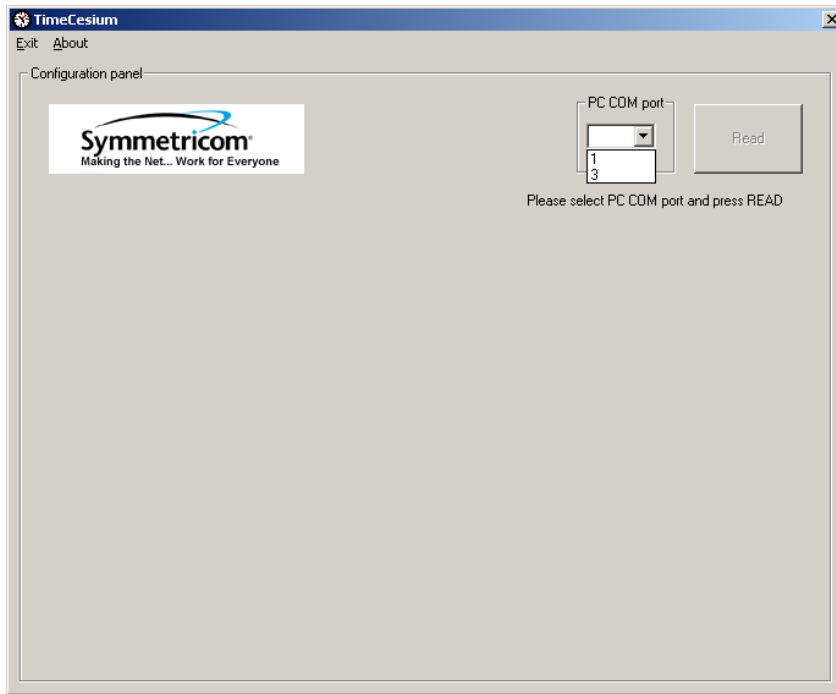
Configuring the Communication Port

1. Select the COM port on the PC where the TimeCesium is connected. See Figure 12.

Note: The TimeCesium controller software automatically detects the COM ports available on the PC. Valid ports can be 1 through 8; however, only the available COM ports are displayed in the option list. Used or uninstalled ports are not shown.

2. Once the COM port is selected, click the READ button to start communication.

Figure 12. Communication Port Configuration Screen



3. If communications cannot be established, check cabling, power to the TimeCesium instrument, and make sure that no other programs are running which use the selected communications port on the computer.

Establishing Communications

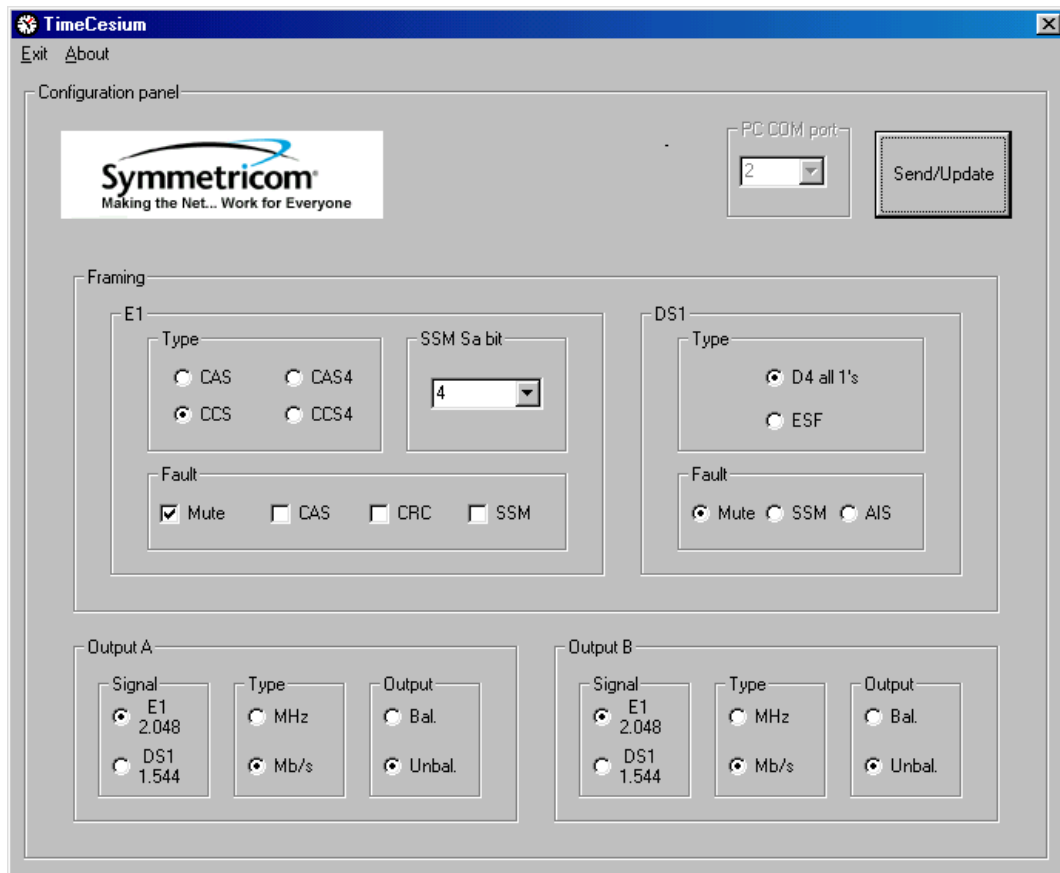
1. The TimeCesium application will retrieve the current settings from the TimeCesium clock.

Note: If the TimeCesium clock is not responding or is not properly connected to the PC (i.e., the clock is disconnected or the wrong cable is being used to connect the clock to the PC), the application will continually retry to reconnect to the clock.

Note: To suspend the application if it cannot reconnect to the clock, either click the Exit button on the top menu to close the application or close the application window.

2. Once the application establishes communication, the screen will reflect the current status of the TimeCesium clock as shown in Figure 13.

Figure 13. TimeCesium Clock Status

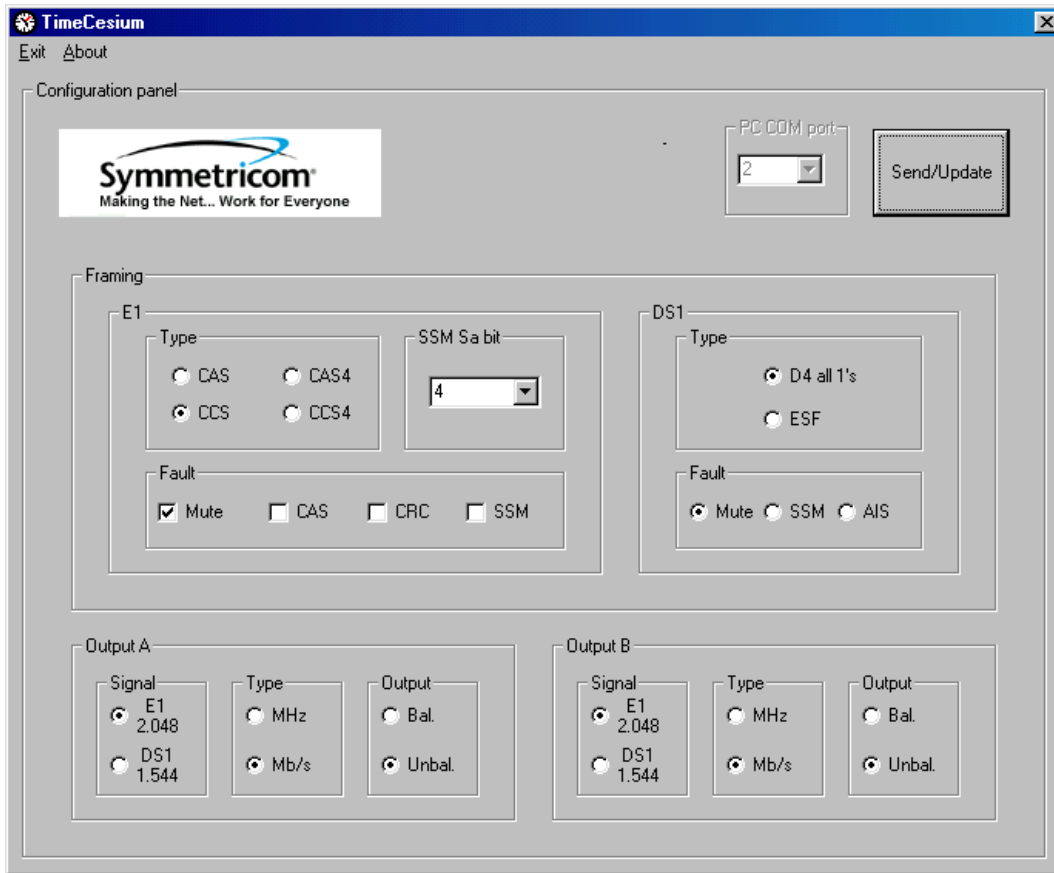


3

Changing TimeCesium Clock Parameters

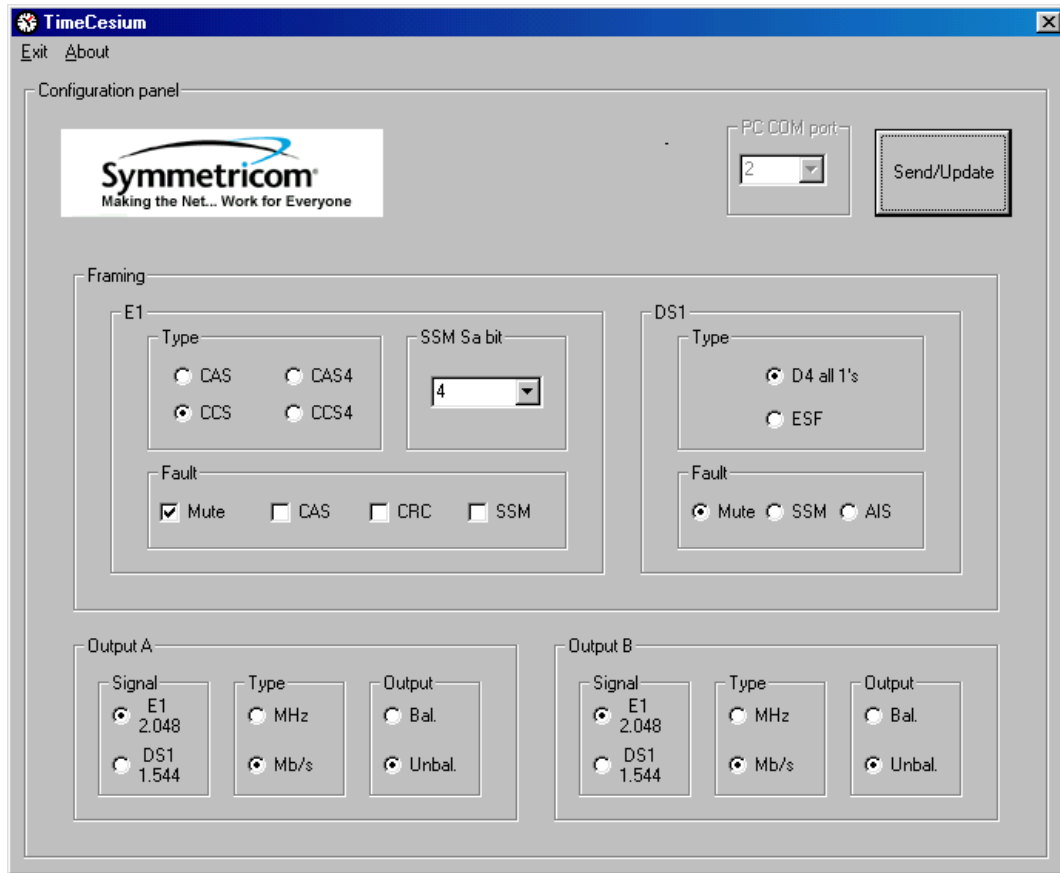
1. To change any parameter, select or modify the corresponding parameters on the TimeCesium Clock Status screen and click the Send/Update button. See Figure 14.

Figure 14. TimeCesium Clock Parameters



2. The application will send the information on the screen to the clock and then retrieve the actual status of the clock. See Figure 15.

Figure 15. TimeCesium Clock Status



3

Configuring TimeCesium Parameters

The TimeCesium has several parameters that can be configured using the TimeCesium clock parameters screen shown in Figure 14. These are described as follows:

1. Configure the framing by selecting either E1 or DS1. For E1 framing, select the framing (CAS, CCS, CAS4, or CCS4), the SSM Sa bit number, and the fault (Mute, CAS, CRC, or SSM). For DS1 framing, select the framing (D4 all 1's or ESF) and the fault (Mute, SSM, or AIS).
2. Configure the TimeCesium either for Output A or Output B. For each output, select the signal (E1 2.048 or DS1 1.544), the type (MHz or Mb/s), and the output (Bal or Unbal).
3. When all configurations are selected, click the Send/Update button.

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Operation

This chapter provides information on operating the TimeCesium.

Operating the TimeCesium

This section describes the operational procedures for power-on, monitoring, and power-off of the TimeCesium Primary Reference Source.

Note: If problems are encountered during any of the following procedures, contact Customer Service by telephone at 1-888-367-7966 or +1-408-428-7907 or by e-mail at ctac@symmetricom.com.

Power-On

Except for the application of power, no specific user actions are required to turn on the TimeCesium and obtain the specified output signals. Application of DC power initiates the warm up and automatic lock acquisition sequence. However, if monitoring and communicating with the unit is necessary, all of the following steps must be performed.

Warning: For continued protection against risk of fire, ensure that only the specified fuse type and rating are used. Fuse specifications are contained in the Specifications chapter and on the instrument's front panel.

1. Connect one end of a NULL Modem RS-232 cable to the serial communications port on the computer and the other end to the connector labeled RS 232 on the PRS-45. (Perform this step only if it is necessary to monitor or communicate with the unit.)
2. Activate power to the TimeCesium by installing the correct fuses in the –48Vdc Power A and B slots on the front panel.
3. Observe that the POWER and ALARM indicators are illuminated and that neither of the –48 VDC Power Fault indicators are illuminated, see Table D.
4. Wait for the unit to stabilize the frequency control loop. This may take up to 30 minutes. When the unit stabilizes, the ALARM indicator turns off and the LOCK indicator illuminates. The ALARM relay is also reset. At this time the outputs are ready for use.
5. Click the Start button, then select Programs, TimeCesium, and the TimeCesium program icon. The TimeCesium interface appears. The TimeCesium application will retrieve the current settings from the TimeCesium clock. Once the application establishes communication, the application screen reflects the current status of the TimeCesium clock. The unit is now operational.

Note: The factory default alarm operation is “warning mode” (nonlatching operation). The user may change the operation to “critical mode” (latching operation). In critical mode the alarm is latching and must be reset by the user from the RS-232 port by issuing the Reset Unit Alarms command.

Power-Off and Restart

1. De-activate power to the TimeCesium by removing the fuses labeled –48V A and –48V B on the front panel.
2. To restart the instrument, re-connect the power to the TimeCesium by installing the fuses labeled –48V A and –48V B on the front panel and wait for the LOCK indicator to illuminate.

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Specifications

This chapter provides the specifications for the TimeCesium.

TimeCesium Specifications

Note: All specifications are performed at 25 °C unless otherwise specified.

Table G: System Specifications

Category	Specification
Performance	
Accuracy, Calibrated to	$\leq \pm 1 \times 10^{-12}$
Accuracy (25 °C \pm 5 °C)	$\leq \pm 2 \times 10^{-12}$
Accuracy (over environment)	$\leq \pm 3 \times 10^{-12}$
Retrace (reproducibility)	$\leq \pm 1.2 \times 10^{-12}$
Stability sg(t)	
Averaging Time	
1s	3.0×10^{-11}
10 s	1.3×10^{-11}
100 s	3.0×10^{-12}
1,000 s	9.5×10^{-13}
10,000 s	3.0×10^{-13}
Warm-up Time (typical)	30 minutes
Outputs	
Telecom Signals	Two channels: one input/output channel, either framed or clock , configurable by the TimeCesium software controller interface through the RS-232 port
Framed (AMI) - 1.544 Mbps Format	ANSI T1.102 DS1 selectable framing: D4 or ESF, with Stratum 1 Sync Status Message (SSM) Framed all ones, B8ZS
Framed (AMI) - 2.048 Mbps Format	ITU-I Rec. G.703/9 (E1) with G.704 framing and with Stratum 1 Sync Status Message (SSM) Framed all ones, HDB3
Clock - 1.544 MHz	Same as G.703/13
Clock - 2.048 MHz	G.703.13

Table G: System Specifications (Cont'd)

Category	Specification
Composite Clock	64KHz/8KHz BPV, AMI, Balanced 100 Ω
Connectors	DB9 for balanced signal T1 at 100 Ω E1 at 120 Ω BNC for unbalanced signals, 75 Ω
Sinusoidal Signals	x1 at 10 MHz, 1V rms/50 Ω , BNC x1 at 5 MHz, 1V rms/50 Ω , BNC
General	
Power Requirements	Dual redundant dc inputs
Operating Voltage	-48 V DC nominal (-36 to -62 V DC)
Power (operating)	40 W
Power (warm-up)	55 W
Interface Connections	
External DC inputs, A and B	#6 screw terminal block
RS-232	9 pin male connector (mate: DA9S, ITT Cannon or equal)
Chassis ground, A and B	#6 screw terminal block
Alarm - Critical and Minor	#6 screw terminal block
Fuses	
External DC Input	2 A, 250 V, slow acting (5 x 20 mm)
Dimensions	
Width	18.2 in (64.0 cm)
Depth	10.1 in (25.7 cm)
Height	10.5 in (26.67 cm)
Weight	36.5 lb (16.6 kg)
Mounting	Mounting ears provided for 19 in or 23 in racks
Environment	
Temperature, Operating	0 to 50 $^{\circ}\text{C}$
Temperature, Non-operating	-40 to +75 $^{\circ}\text{C}$
Humidity	95%, non-condensing
Magnetic field	0 to 2 gauss @ DC, 50, 60 or 400 Hz

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Appendix

This appendix contains limited warranty information and a copyright notice.



Limited Warranty

Symmetricom guarantees its products to be free from defects in material and workmanship as follows:

- For 1 year from the date of shipment on the product electronics.
- For 12 years from the date of shipment on the Cesium contained in the Cesium beam tube only.

Symmetricom shall, at its option, either repair or replace hardware products which prove to be defective.

Symmetricom software and firmware products designed to be used and installed in Symmetricom hardware products are warranted not to fail to execute their programming instructions due to defects in material or workmanship. If Symmetricom receives notice of such defects during the warranty period, Symmetricom will repair or replace software media and firmware which do not execute their programming instructions due to such defects. Symmetricom does not warrant that operation of the software, firmware or hardware shall be uninterrupted or error free.

All warranty service will be carried out at the Symmetricom Puerto Rico facility at La Montaña Industrial Park, Aguadilla, Puerto Rico 00603. The purchaser shall prepay shipping charges and shall pay all duties and taxes for products returned for warranty service. Symmetricom will pay for the return of products to the purchaser except for products returned from another country.

Limitation of Warranty: The above warranty does not apply to defects of, or resulting from the following:

1. End items included as part of a system or product selected by, but not designed by, Symmetricom are subject only to warranty as may be obtained from the original manufacturers. Such items include, but are not limited to, test equipment, accessories, batteries, computers, printers, software, etc.
2. Items manufactured by Symmetricom pursuant to detailed designs furnished by purchaser or specific components, accessories, support equipment and software specified by purchaser.
3. Improper or inadequate maintenance by purchaser.
4. Unauthorized modifications, misuse or mishandling.
5. Operation outside of the environmental specifications of the product.
6. Purchaser's supplied software or interfacing.

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