097-55401-15
Issue 3: Mar 03

55400A

SYNCHRONIZATION SUPPLY UNIT

SYSTEM MANUAL

This manual describes a Symmetricom synchronization system for a telecommunications network. This system includes source clocks, receiver clocks, and network management software.

This manual is the primary document for the 55400A synchronization supply unit (SSU) and 55409A mini-SSU hardware. The other elements of the synchronization system are described here to a lesser degree. The SSU, the mini-SSU, the 55300A GPS telecom reference source, and the 5071A primary frequency source receive the most coverage.

This manual applies to the 55400A SSU system you have received unless update information is included with the equipment.

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Warning Symbols That May Be Used In This Book

Instruction manual symbol; the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual.

Indicates hazardous voltages.

Indicates earth (ground) terminal.

or

Indicates terminal is connected to chassis when such connection is not apparent.

Indicates Alternating current.

Indicates Direct current.

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In This Manual

This part of the system manual helps you identify system tasks and indicates where to go for more information. It includes information on the organization, tasks, and abbreviations used in this manual.

Although most of this system manual supports the 55400A synchronization system, it also describes the installation, configuration, and some initial troubleshooting information for two Symmetricom source clocks:

- 5071A primary frequency standard
- 55300A GPS telecom primary reference source

References to the manuals supplied with these products are made where more detailed information is available. Where this occurs, specific document titles are included.

Finding information fast

To quickly locate a topic, turn to one of the following areas:

Table of contents

Find it at the front of this manual. It is a listing of all the topics covered in this manual. Use it to examine the overall content of this manual.

System manual organization

It starts on the next page. The information here describes the structure of the system manual. Find the topic you want and go to the location in the document for more information about it.

List of tasks

This list comes after the manual organization pages. Some major objectives, such as putting an SSU into service, are divided into the individual tasks necessary to accomplish each objective.

Index

Use the index at the back of this manual when you need information about a specific topic.

55400A System Manual Organization

This manual is organized into six major sections. Each chapter expands on the major topic of the section.

Section A—Learn the System

Information on what it is and how it works.

Chapter A1 System Overview—Provides an overview of the Symmetricom synchronization system.

Chapter A2 System Description—Describes the SSU in more detail.

Chapter A3 System Specifications—Presents the technical specifications for the system.

Chapter A4 Event/Alarm System—Describes the event and alarm system for the SSU that provides status about the system.

Chapter A5 Local/Remote Management—Tells what communication alternatives are supported for the 55400A SSU, 55409A mini-SSU, 55300A GPS, and 5071A frequency standard.

Section B—Prepare for the System

Information on preparing the site and the tools required.

Chapter B1 Tools and Equipment—Lists the tools and equipment needed to install the system.

Chapter B2 Equipment Rack—Describes a rack cabinet, equipment placement, and cable routing.

Chapter B3 Equipment Requirements—Specifies the dimensions and power requirements for the system equipment.

Section C—Install the System

Information on how to install the SSU, GPS primary reference source, and primary frequency standard.

Chapter C1 Installation Guidelines—Presents guidelines for the installation.

Chapter C2 Install the 55400A SSU—How to install the 55400A SSU master subrack.

Chapter C3 Install Expansion Subracks—How to install the 55400A SSU expansion subrack.

Chapter C4 Install the 55300A Primary Reference—How to install the 55300A GPS.

Chapter C5 Install the 5071A Frequency Standard—How to install the 5071A cesium clock.

Chapter C6 Install the 55409A Mini-SSU—How to install the 55409A mini-SSU subrack.

Section D—Configure the SSU

Describes the plug-in cards for the SSU: theory of operation, switch settings, and basic operation.

Chapter D1 Configure ITH Clock Cards—Understand and configure the ITH cards.

Chapter D2 Configure Output Cards—Understand and configure the output cards.

Chapter D3 Configure Communication Cards—Understand and configure the AIC/IMC/NIMC cards.

Section E—Qualify the System

Ensure the system is ready to be put into service.

Chapter E1 Qualification Procedures—Perform qualification procedures on the SSU, GPS, and cesium clock.

Chapter E2 Equipment Tests—Perform equipment tests on the SSU, GPS, and cesium clock.

Section F—Repair the System

Determine cause of problems and return the system to service.

Chapter F1 Troubleshoot the System—Troubleshoot problems with the system.

Chapter F2 Troubleshoot the SSU—Repair the SSU.

Chapter F3 Replacement Parts—Replace parts in the SSU.

Objective — Put SSU master subrack into service

Tasks	Topics	Description	See Chapter
Prepare site for equipment	Summary of tools needed.	a list of tools used to install SSU	B1
	Information about racking equipment	see recommended positioning in rack	B2
	Size and power requirements	Dimensions and current usage	B3
Install master subrack	Unpack and inspect	guidelines	C1
	Subrack	install into rack	C2
	Power connections	how to fabricate and run cables	C2
	Alarm connection	relay information and connector pinout	C2
	Remote connection	user information and connector pinout	C2
	Inputs	types of connectors	C2
	Outputs	types of connectors	C2
	Local connection	user information and connector pinout	C2
Configure cards	ITH cards	set parameter switches	D1
	Output cards	set parameter switches	D2
	Communication card	set parameter switches	D3
Install cards	ITH cards	installation steps	C2
	Output cards	installation steps	C2
	Communication card	installation steps	C2
Qualify for operation	Initial settings	verify configuration, set date, time, and ID	E1
	Configure for network operation	set network parameters for LAN, TP4, or X.25 interface using 55450A local craft terminal software	See Chapter 10 in TL1 Reference Manual for parameter descriptions
Test	Final checks	check alarms and outputs	E2
The SSU is ready to operate			

Objective — Put SSU expansion subrack into service

Tasks	Topics	Description	See Chapter
Prepare site for equipment	Summary of tools needed.	a list of tools used to install SSU	B1
	Information about racking equipment	see recommended positioning in rack	B2
	Size and power requirements	Dimensions and current usage	B3
Install expansion subrack	Unpack and inspect	guidelines	C1
	Subrack	install into rack	C2
	Power connections	how to fabricate and run cables	C2
	Outputs	types of connectors	C2
	Subrack cabling	cabling requirements between subracks	C3
Configure cards	Expansion synchronization cards	set parameter switches	C3
	Expansion communications card	set parameter switches	C3
	Output cards	set parameter switches	D2
Connect subrack cables and install cards	Add first expansion subrack	installation steps	C3
	Add additional expansion subrack	installation steps	C3
	Replace expansion subrack	removal steps	C3
Qualify for operation	Communication	verify communication between subracks	C3
Test	Final checks	check outputs	E2
The SSU is ready to operate			

Objective — Put mini-SSU subrack into service

Tasks	Topics	Description	See Chapter
Prepare site for equipment	Summary of tools needed.	a list of tools used to install mini-SSU	B1
	Information about racking equipment	see recommended positioning in rack	B2
	Size and power requirements	Dimensions and current usage	B3
Install subrack	Unpack and inspect	guidelines	C1
	Subrack	install into rack	C2
	Power connections	how to fabricate and run cables	C2
	Alarm connection	relay information and connector pinout	C2
	Remote connection	user information and connector pinout	C2
	Inputs	types of connectors	C6
	Outputs	types of connectors	C6
	Local connection	user information and connector pinout	C2
Configure cards	ITH cards	set parameter switches	D1
	Output cards	set parameter switches	D2
	Communication card	set parameter switches	D3
Install cards	ITH cards	installation steps	C2
	Output cards	installation steps	C2
	Communication card	installation steps	C2
Qualify for operation	Initial settings	verify configuration, set date, time, and ID	E1
	Configure for network operation	set network parameters for LAN, TP4, or X.25 interface using 55450A local craft terminal software	See Chapter 10 in TL1 Reference Manual for parameter descriptions
Test	Final checks	check alarms and outputs	E2
The mini-SSU is ready to operate			

Objective — Put 55300A GPS Reference Source into service

Tasks	Topics	Description	See Chapter
Prepare site for equipment	Summary of tools needed.	a list of tools used to install GPS unit	B1
	Information about racking equipment	see recommended positioning in rack	B2
	Size and power requirements	Dimensions and current usage	B3
Install GPS reference source	Unpack and inspect	guidelines	C1
	Rack mount shelf	install into rack	C4
	GPS module	install into shelf	C4
	Power connections	how to fabricate and run cables	C4
	Port 1 connection	user information and connector pinout	C4
	Alarm connection	relay information and connector pinout	See Chapter 3 in User's Guide for GPS reference source
	Time of Day connection	user information and connector pinout	See above
	Remote Access Port connection	user information and connector pinout	See above
	Signal connectors	description	C4
Qualify for operation	SatStat application	install and run to verify general health of the GPS reference source	See Chapter 1 in User's Guide for GPS reference source
	Initial settings	set local time and verify holdover actions	E1
Test	Final checks	check outputs	E2
The GPS reference source is ready to operate			

Objective — Put 5071A Frequency Standard into service

Tasks	Topics	Description	See Chapter
Prepare site for equipment	Summary of tools needed.	a list of tools used to install GPS unit	B1
	Information about racking equipment	see recommended positioning in rack	B2
	Size and power requirements	Dimensions and current usage	B3
Install frequency standard	Unpack and inspect	guidelines	C1
	Rack mount unit	install into rack	C5
	Power connections	how to fabricate and run cables	C5
	Signal connectors	description	C5
Qualify for operation	Initial settings	set continuous operation, output ports, and local time	E1
Test	Final checks	check outputs	E2
The frequency standard is ready to operate			

Abbreviations used in this manual

The terms listed here are used throughout this system manual.

Table 1. List of Terms

Term	Definition
ACO	Alarm cutoff
AIC	Alarm interface card
AIS	Alarm indication signal
AMI	Alternate mark inversion
CAS	Channel associated signaling
CCS	Common channel signaling
CRC4	Cyclic redundancy check
DCE	Data communications equipment
DDFS	Direct digital frequency synthesis
DTE	Data terminal equipment
E1	European signal, 2048 kbps
EEPROM	Electrically erasable programmable read only memory
EIA	Electronics Industries Association
ETSI	European Telecommunications Standards Institute
FFOFF	Fractional frequency offset
GPS	Global positioning system
HDB3	High-density bipolar 3
IMC	Information management card
ITH	Input track and hold card
LED	Light emitting diode
LMRTIE	Latest maximum relative time interval error
LOS	Loss of signal
MRTIE	Maximum relative time interval error
NC	Normally closed
NIMC	Network information management card
NO	Normally open
NVRAM	Non-volatile random access memory
OOF	Out of frame
OSMF	Open synchronization management framework
PRC	Primary reference clock

Table 1. List of Terms (cont'd)

Term	Definition
SDH	Synchronous digital hierarchy
SSM	Synchronization status message
SSU	Synchronization supply unit
SWDL	Software download mode
TDEV	Time deviation
TL1	Transaction language 1
TRSC	Traffic re-synchronization card

E1

Qualification Procedures

Make final settings and verify operation

In This Chapter

This chapter addresses the issues involved with bringing up a sync system for the first time.

Assumptions

- All sync equipment is installed and power is applied

Tasks

55300A–

- Install SatStat to communicate with 55300A and display current GPS time
- Set 55300A to local time
- Verify Threshold 1, 2, and Holdover Action for 55300A
- Configure the 55300A for use with open synchronization management framework (OSMF) software (if needed)

5071A–

- Set 5071A to continuous operation
- Configure 5071A output ports
- Synchronize 5071A to 55300A
- Set the 5071A to display local time

55400A–

- Install 55450A local craft terminal to communicate with the SSU
- Run local craft terminal program
- Verify SSU configuration
- Set SSU date and time
- Set SSU system ID
- Configure SSU for use with open synchronization management framework (OSMF) software (if needed)

NOTE The 55400A tasks should also be performed on the 55409A mini-SSU.

Prepare 55300A for Operation

Before beginning this procedure, ensure that the GPS unit has achieved GPS Lock. An LED on the front panel will light to indicate that the GPS unit is properly tracking the reference signal from the GPS satellites.

NOTE

If more than 30 minutes have elapsed since power-up and there is no indication of GPS lock, refer to the troubleshooting information in the *55300A GPS User's Guide*.

Display the current GPS time using the SatStat application

Install the SatStat application to allow access to the GPS receiver status screen. Continuous updates of different aspects of the receiver operation are available. This software program is supplied with the 55300A.

1. Connect a computer to the 55300A Time of Day port.

   Refer to "Time of Day Port Connection for Installation and Troubleshooting" in chapter A5. This section describes how to connect a computer to the 55300A, load, and run the SatStat software.

2. Once the SatStat application is showing the receiver status screen, select **Function>Clock** from the menu bar.

   A clock display now shows the current GPS time as it continuously updates.

Set the 55300A to local time

In the previous procedure a connection was established between the GPS unit and the computer with the SatStat program. Refer to that procedure if SatStat is not already running.

1. Go to the **Control & Query** form in SatStat.

   This form should be visible somewhere on the application screen.

2. When it is selected, go to **Query>Timezone offset**.
3. Observe the current GPS time displayed by SatStat. Usually this is UTC time if no offset value has been introduced.
4. By default the command to return the current user-entered time offset from UTC time is already entered in the command box. Click on **"Send Cmd"** to see if any offset has been entered.
5. Enter the offset value that will cause the GPS clock to display local time. For example, observe GPS time and calculate the offset to be added to achieve current local time. If current time is behind displayed time by 8 hours, enter the following offset command to display local time:
   (the syntax is :PTIME:TZONE <hour offset>,<minute offset>)

   Type :PTIME:TZONE -8,0

6. Click on **"Send Cmd".**
7. Verify that the command executes without errors and the GPS time display shows the current time.
8. Select **File>Exit** to close the SatStat program.

Verify Holdover Actions

The 55300A has default parameter settings from the factory that dictate how the GPS receiver will treat the telecom outputs when in holdover. Verify that these settings are appropriate for your situation. If not, they can be changed.

Prepare to send TL1 commands

This procedure includes communication with the 55300A using TL1 commands. This can be accomplished using a computer running a terminal emulator program. The computer should be connected to Port 1 of the 55300A.

1. Connect a computer to the Port 1 connector of the 55300A.

   Refer to "Port 1 Connection" in chapter A5. This section describes how to connect a computer to the 55300A in order to use TL1 commands.

2. Run a terminal emulator program on the computer

NOTE

The actions described here apply only to the 2048 kbps telecom outputs only, not the 1 PPS, 5/10 MHz, or 2048 kHz outputs.

Holdover Action Keywords

- THRESHOLD1
- THRESHOLD2
- HOLDACT

THRESHOLD1

The first threshold has a range in seconds from 0 to 3,888,000. The default setting is 1800 seconds (30 minutes). After the GPS unit has been in holdover for 30 minutes, it will generate an event with a minor alarm level (default setting). The alarm severity can be modified.

To retrieve current Threshold 1 setting:

```
RTRV-EQPT::GPS:123:::PARAMETER=THRESHOLD1;
```

To modify Threshold 1 setting:

```
ED-EQPT::GPS:123:::THRESHOLD1=<seconds>;
```

Event generated when holdover extends past Threshold 1 setting:

EXCTH1 (Exceeding holdover duration threshold 1)

This event has a minor alarm level assigned by default. This alarm property can be changed to NONE, NONALM, MAJOR, or CRITICAL.

To change EXCTH1 alarm level setting to major:

```
ED-EQPT::GPS:123:::EXCTH1=ALM-MAJOR&LOG-Y;
```

THRESHOLD2

The second threshold has a range in seconds from 0 to 3,888,000. The default setting is 86400 (24 hours). After the GPS unit has been in holdover for 24 hours, it will generate an event with a major alarm level and then execute the defined Holdover Action (HOLDACT).

To retrieve current Threshold 2 setting:

```
RTRV-EQPT::GPS:123:::PARAMETER=THRESHOLD2;
```

To modify Threshold 2 setting:

```
ED-EQPT:GPS:123:::THRESHOLD2=<seconds>;
```

Event generated when holdover extends past Threshold 2 setting:

EXCTH2 (Exceeding holdover duration threshold 2)

This event has a major alarm level assigned by default. This alarm property can be changed to NONE, NONALM, MINOR, or CRITICAL.

To change EXCTH2 alarm level setting to critical:

```
ED-EQPT::GPS:123:::EXCTH2=ALM-CRITICAL&LOG-Y;
```

HOLDACT

The holdover action is initiated when the GPS unit is in holdover for longer than the length of time specified with the THRESHOLD2 parameter. The action taken on the 2048 kbps outputs can be set to one of the following:

- SQUELCH—Squelch the telecom outputs
- AIS—Send the AIS message on the telecom outputs (default setting)
- CONTINUE—Continue the telecom outputs

To retrieve current setting:

```
RTRV-EQPT::GPS:123:::PARAMETER=HOLDACT;
```

To modify setting:

```
ED-EQPT:GPS:123:::HOLDACT=<action>;
```

NOTE

Refer to the *55300A Programming Guide* for the description and syntax used for these commands, events, and alarm settings.

Configure the 55300A for Network Operation

The 55300A can be managed by the Symmetricom open synchronization management framework (OSMF) software over a network. The use of the Lantronix LRS1 Remote Access Server is recommended to interface the GPS reference source to a LAN via TCP/IP. Before you can establish communication between the GPS reference source and the OSMF software over a network, certain parameters must be configured in the remote server.

NOTE

The Lantronix LRS1 Remote Access Server is used to interface the GPS reference source to a LAN via TCP/IP. This will allow the GPS reference source to communicate with the OSMF network management system. This configuration allows OSMF to receive events and alarms from the GPS reference source and to manage it over a network. This procedure describes how to configure the Lantronix terminal server for use with the GPS reference source. Other terminal servers may be used but are not supported.

Configure the LRS1

1. Connect power to the LRS1 using the –48 Vdc to 6 Vdc converter box (55300A–H04).
2. Connect the LRS1 to a local terminal or PC via the RS-232 connector.

   The cable and adapter to make this connection are supplied with the 55300A. (Cable #5182-4794, Adapter #5181-6641)

3. Open a terminal session to the RS-232 port used with the LRS1. Configure the terminal session for:
   - Baud Rate = 9600
   - Data Bits = 8
   - Parity = None
   - Stop Bits = 1
   - Flow Control = None
4. A **Username>** prompt will be displayed. Enter username “system”. At the **Local>** prompt, enter the command “set priv”. Enter “system” as the password when prompted.

NOTE

The LRS1 comes with “EZCon” configuration software that runs under Windows 95 and Windows NT. This software can be used to configure the LRS1 instead of using a command line method. This procedure uses the command line method.

Set up the Network Information for the LRS1

1. Enter the following commands at the **Local>** prompt:

   Local> DEFINE SERVER IPADDRESS 15.1.153.222*

   * *Example IP address. Use the IP address assigned to the LRS1 by your network administrator.*

   Local> DEFINE IP SUBNET xxx.xxx.xxx.xxx

   Replace x's with the Subnet mask assigned by your network administrator.

   Local> DEFINE IP ROUTE DEFAULT NEXTROUTER xxx.xxx.xxx.xxx 1

   Replace x's with the Gateway address assigned by your network administrator.

   Local> DEFINE PORT 1 ACCESS REMOTE

   Local> DEFINE PORT 1 FLOW CONTROL NONE

2. Reboot the LRS1 by removing power and then applying power to the LRS1.

   The boot-up sequence will take about two minutes.

NOTE Telnet sessions will not be allowed to connect during the boot-up sequence.

Connect OSMF to the GPS Reference Source

1. The cable connection between the GPS reference source and the terminal server is via RS-232. Use a DTE-to-DTE interface cable to connect from the Remote Access Port (DB25) of the GPS reference source to the DB25 serial port of the LRS1.

   A straight through RS-232 cable with a null modem adapter provides the correct interface connection. For an illustration of the LAN connection, see page A5-15. Refer to the LRS1-T Remote Access Server Installation Guide and the 55300A GPS reference source User's Guide for detailed RS-232 information.

2. Attach the 10Base-T LAN connector (RJ45) to the Ethernet port of the LRS1.

Test the LRS1 Connection

1. Telnet to the LRS1 unit from the OSMF workstation:

   telnet xxx.xxx.xxx.xxx 2001

   Replace x's with the LRS1 IP address.

2. You should see the prompt from the GPS reference source.
3. Press the "CTRL" and "]" keys to break the telnet session. Type "quit" to exit the telnet prompt.

NOTE

A telnet session may also connect to the default telnet port (23) which is the configuration port. When connected to this port, the configuration of the LRS1 may be viewed or changed.

For UNIX only: Configure the OSMF service port for GPS Reference Source

1. On the OSMF workstation, edit the **/etc/services** file.
2. Change the line:

   "gpsUnit 2001/tcp # SV-UX GPS Unit"

   to

   "gpsUnit 3001/tcp # SV-UX GPS Unit"

NOTE

The port for the gpsUnit must use 3001 which supports raw data flow on the LRS1. If using the NT OSMF, this procedure is not required. Other terminal servers may use a different service port.

3. The GPS reference source may now be managed from the OSMF platform.

Prepare 5071A for Operation

Set 5071A to continuous operation

After the 5071A has been operating for approximately 15 minutes, the amber Attention LED on the front panel goes off, and the green Continuous Operation LED starts flashing.

NOTE

Normally, the purpose of this LED is to indicate by flashing that power was lost during operation. A reset operation is necessary to make the LED stay on without flashing. When the Continuous Operation LED is on and not flashing, this indicates the frequency standard has been functioning continuously since the last reset.

Reset Continuous Operation LED:

1. Open the front-panel door to access the controls by turning the knob to the left and pulling out.
2. Press the blue **Shift** key, then **5** (Utilities). The display shows **>Reset<**.
3. Press the **Enter** key.
4. This action resets the continuous operation circuit, causing the LED to be on continuously. Any fault that occurs later will cause the Continuous Operation LED to start flashing or turn off.
5. For more information, refer to the *5071A Operating and Programming Manual*.

Configure 5071A output ports

The 5071A has two output frequency ports. These can be configured to output either 5 or 10 MHz. Determine what the system requires and configure the ports by following this procedure.

1. Press the **Top** key.
2. Select **>Config<** using the cursor keys and press the **Enter** key.
3. Select **>Outputs<** and press the **Enter** key.
4. Choose **Port 1** and press **Inc** or **Dec** key to select frequency.
5. Choose **Port 2** and press **Inc** or **Dec** key to select frequency.
6. Press **Top** key to return to the top of the menus.

Synchronize 5071A to 55300A

This procedure assumes that the sync system includes both the Symmetricom frequency standard and the GPS reference. Ensure that the GPS unit has achieved GPS Lock. An LED on the front panel will light to indicate that the GPS unit is properly tracking the reference signal from the GPS satellites. If an 55300A is not part of this installation, skip this procedure.

NOTE

If more than 30 minutes have elapsed since power-up and there is no indication of GPS lock, refer to the troubleshooting information in the *55300A GPS User's Guide*.

1. Connect a BNC cable from the 55320A 1 PPS connector (use the 1 PPS connector between the IRIG-B and 10 MHz connectors) to the Sync Input on the front panel of the 5071A.
2. Press the **Top** key.
3. Select **>Clock<** and press **Enter**.
4. Select **>Sync<** and press **Enter**.
5. Select **>Arm Front<** and press **Enter**.
6. The 5071A will then synchronize to the next sync pulse and the display will show, "Caught a sync pulse."
7. Press **Top** key to return to the top of the menus.
8. Disconnect the BNC cable.

Set the 5071A to display local time

This procedure assumes:

- 55300A is part of the sync system installation
- You are displaying the current GPS time using SatStat as described on page E1-3.
- If an 55300A is not part of this installation, determine the local time from another reference source.

1. On the 5071A, press the blue **Shift** key, then **8** (Set Clock).
2. Using the numeric keys, enter the local time with the seconds value set in advance of current time so you can synchronize it with the seconds displayed by the GPS receiver (or another reference source).
3. Press the **Enter** key on the 5071A at the instant the GPS seconds value (or the value from another reference source) agrees with the entered seconds value.
4. Select **>Display<**.
5. Press the **Inc** key to set Display to On and press **Enter**.

Prepare 55400A for Operation

Before beginning this procedure ensure that the SSU is showing “all green” status. No alarm LEDs should be lit.

NOTE

If the SSU has an alarm condition, go to chapter F1 and begin troubleshooting the problem.

Display the current SSU status using the 55450A local craft terminal software

Install the 55450A application to allow access to the SSU status and parameters. This software program is available from Symmetricom. The software is supplied with a user’s manual.

1. Refer to the 55400A Local Port connection for installation and troubleshooting in chapter A5. This section describes how to connect a computer to the 55400A, load, and run the local craft terminal software.
2. Once the 55450A application is running and successfully connects to the SSU, the program will query the settings of the 55400A and display the input settings on the Configuration screen that is selected by the program at start-up.

Verify SSU Configuration

There are configuration switches on all 55400A plug-in cards. The switch settings specify such parameters as:

- Disabling or enabling of input channels
- Type of input signal, signal coding, etc.

Many of these parameters can also be set via the local craft terminal program. All switches are set to default conditions at the factory. The default settings should have already been modified as needed.

1. On the **Configuration** screen, click on the **Input** tab, if not already selected.
2. Verify that the parameters are set as desired for:
   - Enabled
   - Signal Type
   - Signaling and CRC4 (if 2048 kbps signal)
   - PRC frequency

3. Make any additional selections for:
   - Priority
   - Sync Mode
   - Revertive
4. Click on **Include in Spread** if you want to include that channel in the performance measurement called Spread.

   *All of the input features are described in the online help. The easiest way to access this information is to first verify that the **Input** tab is enclosed in a dotted-line box (click on the **Input** tab) and then press the **F1** key.*

5. Click on the **Output** tab.
6. Using the local craft terminal software you can selectively enable outputs, specify holdover action, set an SSM bit, and select output traffic bits.
7. For online help information, first verify that the **Output** tab is enclosed in a dotted-line box (click on the **Output** tab) and then press the **F1** key.

Set the SSU date and time

1. Using the menu bar, go to **Service>Set SSU Date and Time**.
2. Enter the local date and time in the format shown: YY-MM-DD,HH,MM,SS. Set the seconds value in advance of the current time and click on **OK** when synchronized with the 5071A or GPS time displays.

Set the SSU System ID

1. Using the menu bar, go to **Service>Set SSU System ID**.
2. Enter a name for the SSU. The system identifier can be up to 20 characters. For example, SSU_1, SSU_2, etc. The system name is shown with any communication there is with the SSU.
3. Disconnect from the SSU by going to the **Communication** screen and clicking on the **Connect** checkbox.

Configure the SSU for Network Operation

Before you can establish communication between the SSU and the Symmetricom open synchronization management framework (OSMF) software over a network, parameters and switch settings must be configured at the SSU.

NOTE

This procedure describes how to configure the SSU to communicate with the OSMF software over a TCP/IP protocol network. The configuration issues will be similar for the other supported network protocols. An illustration of the network connection is shown on page A5-7.

Prepare the 55442A NIMC LAN (TCP/IP) Card

1. If the NIMC is already installed in the subrack, loosen the two retaining screws and remove it.
2. Verify that the "Security" feature (switch S4–1) and "Force Enable Local Port" feature (Switch S4–3) are both set to the Off position.

   The NIMC switch locations are shown in chapter D3.

3. Install the NIMC into the SSU subrack. Verify that the power LED is lit.
4. Establish communication with the SSU through the Local Port of the NIMC using the 55450A local craft terminal software as described at the beginning of the 55400A procedures in this chapter.
5. Verify the date and time setting by checking the time stamp on the Communication screen. Set the date and time, if necessary, using the pull-down Service menu.

Configure the Network Parameters

1. Create a new user with the name "svsec" and a security level of SECURITY.

   Go to the Service menu and select "User Administration". Click on "Add User". Enter user name and select security level. Enter a password in both the "New Password" and "Confirm Password" boxes. This password will be used later when managing the SSU using the OSMF software.

NOTE

Passwords are case sensitive with up to ten characters, with at least one special character (such as a period, asterisk, ampersand, or percent) and at least one non-alphabetical character (such as a number). For example, "chess.1" is a valid password.

2. Verify that the Automatic Remote Output feature is configured correctly.

   On the Communications screen, type the following command:

   ```
   rtrv-eqpt:::1:::parameter=rmtao;
   ```

   The RMTAO parameter should be set to ALWAYS. This is the default value. If necessary, send the following command to change the value:

   ```
   ed-eqpt:::1:::rmtao=always;
   ```

3. Set the following network parameters to the values specified by the system administrator. To enter the values, use the Service menu and select "Configure NIMC TCP/IP". The following table summarizes the parameters requiring configuration.

Table E1-1. Primary TCP/IP Network Parameters

Parameter Keyword	Description	Range of Values	Comment
IPNE	IP address of the SSU.	0.0.0.0 to 255.255.255.255	
IPSUBNET	Subnetwork mask used for extracting the network identifier from the IP address.	0.0.0.0 to 255.255.255.xxx *	* The last byte can only be set to 0 or 128.
IPGATE	IP address of the default gateway.	0.0.0.0 to 255.255.255.255	
IPEM1	IP address of the primary element manager.	0.0.0.0 to 255.255.255.255	
AOMERGE	Merges automatic output messages and commands on command port.	Set to N	
SCRAMBLE	Scrambles communication between SSU and OSMF.	Set to Y	

4. The following table summarizes the network parameters that should not normally require any changes to their default values.

Table E1-2. Secondary TCP/IP Network Parameters

Parameter Keyword	Description	Range of Values	Comment
IPEM2	IP address of the alternate element manager.	0.0.0.0 to 255.255.255.255	Must be set to 0.0.0.0 unless the Replication Option is installed as part of OSMF.
IPLM1	IP address of the primary local manager.	0.0.0.0 to 255.255.255.255	
IPLM2	IP address of the alternate local manager.	0.0.0.0 to 255.255.255.255	
PORTCMDS	Used to specify the port number for the command/response reporting	5001 to 20000 Must use 7588 as the default for OSMF.	Do not set to the same address as the automatic output port.
PORTAO	Use to specify the port number for the event reporting.	5001 to 20000 Must use 7589 as the default for OSMF.	Do not set to the same address as the command port.
INACTTIME	Used to specify the length of time a connection will continue without the occurrence of an auto output message.	0 to 10000 in units of 0.1 s.	

5. Click on the Apply button and confirm the changes when prompted.
6. Wait 1 minute for the NIMC to reboot, then disconnect from the SSU by going to the **Communication** screen and clicking on the **Connect** checkbox. Disconnect the Local port cable.

Perform the Final Steps

1. Remove the NIMC again from the subrack.
2. Set the “Security” feature (switch S4–1) and “Force Enable Local Port” feature (Switch S4–3) to the On position.

   The NIMC switch locations are shown in chapter D3.

3. Install the NIMC into the SSU subrack and tighten the two retaining screws.
4. Attach the 10Base-T LAN connector. Verify that the Link LED is lit. The SSU is now configured to communicate with OSMF over the network.
5. When managing the SSU for the first time with OSMF, the IP address and password will need to be entered.

NOTE

If the “OSMF client package” is running or will be installed, switch S6–8 *must* be set to Off. When this switch is set to Off, the SSU will accept communications from any IP address.

If your situation requires that the SSU accept communication *only* from the OSMF host workstation address (IPEM1) or the replication system address (IPEM2), switch S6–8 should be set to On. When this switch is set to On, communications from all other addresses will be ignored, *including* client workstations.

E2

Equipment Tests

Sync system element testing

In This Chapter

This chapter includes the final tests for the components of the 55400A system. For both the 55300A GPS and the 5071A frequency standard, only checks to verify operation are included with pointers to other documentation if final acceptance testing needs to be performed on that equipment.

Topics included in this chapter are:

- Tests to verify operation of certain 5071A output signals

  If it is necessary to perform complete acceptance tests for the frequency standard, refer to the 5071A Operating and Programming Manual.

- Tests to verify operation of certain 55300A output signals

  If it is necessary to perform complete acceptance tests for the GPS reference source, refer to the 55300A GPS User's Guide.

- Final 55400A alarm tests and output checks

  Testing results of the 55400A cards are included with the product. The results can be kept in the inside pocket of the system manual binder.

NOTE The 55400A tests should also be performed on the 55409A mini-SSU.

Perform 5071A Tests

The following tests for the 5071A frequency standard provide a verification of operation. This is a cursory check for the presence of signals. If you wish to perform a more complete test of the 5071A output signals, you can refer to the performance tests provided in Appendix A of the *5071A Operating and Programming Manual*. The telecom signals are described in the *5071A Telecommunications Options Supplemental Manual*.

This section tests for the following signals:

- 5 or 10 MHz outputs
- Telecom option 2048 kbps signal
- Telecom option 2048 kHz signal

Test Equipment Needed

- 54600-series oscilloscope or equivalent general-purpose oscilloscope
- Type-N connector to BNC adapter
- 75 Ω feed-thru terminator (11094B)
- 50 Ω feed-thru terminator (11048C)
- 50 Ω BNC cable
- 75 Ω BNC cable

Before you begin

Ensure that the 5071A is operating properly. Verify this by observing that the Attention LED is off and the green Continuous Operation LED is on.

5 or 10 MHz Output

Two outputs provide a 5 or 10 MHz sinewave signal of 1 Vrms into 50 Ω, (nominal) on the rear panel of the 5071A.

1. Connect the 50 W feed-thru terminator to the oscilloscope input.
2. Connect the Type-N connector to Port 1 of the 5071A.
3. Connect the oscilloscope to Port 1 using the 50 Ω BNC cable and, verify that a 5 or 10 MHz output signal is present.
4. Repeat for Port 2.

Telecom Outputs

The 5071A with the Option 272 provides an ITU-T 2048 kbps framed output and 2048 kHz signal on the rear panel of the 5071A.

1. Connect the 75 Ω feed-thru terminator to the oscilloscope input.
2. Using the 75 Ω BNC cable, connect an oscilloscope to the Framed Output connector and verify that the appropriate signal is present. See Figure E2-2 and Figure E2-3.
3. Using the 75 Ω BNC cable, connect an oscilloscope to the 75 Ω Sync Out connector and verify that the appropriate signal is present. See Figure E2-4 and Figure E2-5.
4. Repeat for Output B.

Perform 55300A GPS Tests

The following tests for the 55300A GPS reference source provide a verification of operation. This is a cursory check for the presence of signals. If you wish to perform a more complete test of the 55300A output signals, you can refer to the acceptance tests provided in chapter 2 of the *55300A User's Guide*.

This section tests for the following signals:

- Telecom signals at outputs A and B
- 2048 kHz outputs (Squelched and Continuous)
- 10 MHz output

Test Equipment Needed

- 54600-series oscilloscope or equivalent general-purpose oscilloscope
- 75 Ω feed-thru terminator (11094B)
- 50 Ω feed-thru terminator (11048C)
- 50 Ω BNC cable
- 75 Ω BNC cable

Before you begin

Ensure that the 55300A is showing GPS Lock.

Telecom Outputs

The 55300A with the ETSI option provides two 2048 kbps outputs.

1. Connect the 75 Ω feed-thru terminator to the oscilloscope input.
2. Using a 75 Ω BNC cable, connect an oscilloscope to Output A and verify that an appropriate signal is present as shown in Figure E2-2 and Figure E2-3.
3. Repeat for Output B.

2048 kHz Outputs

When the 55300A is locked to GPS, both outputs are active. The output labeled “Squelched” will stop operating whenever the unit loses GPS lock.

1. Using a 75 Ω BNC cable, connect the oscilloscope to the 2048 kHz Squelched output and verify that an appropriate signal is present as shown in Figure E2-4 and Figure E2-5.
2. Repeat for the 2048 kHz Continuous output.

10 MHz Output

This output provides a 10 MHz sine wave signal greater than 1 volt into 50 Ω load.

1. Connect the 50 Ω feed-thru terminator to the oscilloscope input.
2. Connect the oscilloscope to the 10 MHz output using the 50 Ω BNC cable and verify that the signal is present.

Perform 55400A SSU Tests

Test Equipment Needed

- 54600-series oscilloscope or equivalent general-purpose oscilloscope
- 75 Ω feed-thru terminator (11094B)
- 50 Ω feed-thru terminator (11048C)
- 50 Ω BNC cable (for testing 55484A)
- 75 Ω BNC cable

Alarm tests

These tests will verify that certain simulated failures will generate the appropriate alarms.

A. Reference Switching

This test assumes that multiple inputs have been connected and qualified for use by the system. The loss of one of the inputs will be tested.

1. Disconnect the input signal being tracked.

   The signal being tracked is indicated by the "Active" LED on the ITH card.

2. Observe LED response:

   Both ITH cards–

   - Qualified and Active LEDs for the reference signal removed turn off.
   - Active LED for the reference signal now being tracked turns on.
   - Alarm LED turns on.

   IMC/NIMC–

   - Minor alarm LED turns on.

3. Reconnect the input signal.

   The response described assumes that the tracking mode is set to revertive and the reconnected signal is requalified before verifying the LED response.

4. Observe LED response:

   Both ITH cards–

   - Qualified and Active LEDs for the requalified signal turn on.
   - Active LED for the reference signal no longer being tracked turns off.
   - Alarm LED turns off.

5. Press the Alarm Cutoff pushbutton to turn off IMC/NIMC alarm LED.

B. ITH Card Removal

This test verifies the alarm condition that would occur should the active ITH fail.

1. Remove the active ITH card.
2. Observe LED response:

   Remaining ITH card–

   - Standby LED turns off, active LED turns on.

   Output cards–

   - ITH-selection LEDs switch to the remaining ITH card (1 or 2).

   IMC/NIMC card–

   - Major alarm LED turns on.

3. If Office Alarms are connected to the SSU, ensure that Major office alarms are generated (visual and audible).
4. Reinstall the ITH card.

   This behavior assumes that it may be necessary to wait a period of time until the replaced ITH card is once again tracking an input signal. After reinstalling the ITH card, LEDs may cycle through "Warmup," "Freerun," and finally "Tracking."

   Reinstalled ITH card–

   - Standby LED turns on.
   - LED conditions will be the same as for the active ITH card.

5. Press the Alarm Cutoff pushbutton to turn off IMC/NIMC alarm LED.
6. Press the Force Active pushbutton on the reinstalled ITH card to make this ITH card the active card as it was at the beginning of this procedure.

C. Output Card Removal

This test verifies that the simulated failure of an output card (of a 1:1 protected card pair) will cause the appropriate alarm indication.

1. Remove a standby output card.
2. Observe LED response:

   IMC/NIMC card–

   - Major alarm LED turns on.
3. Reinstall the output card.
4. Observe LED response:

   Output card–

   - Power, ITH card, and standby LEDs turn on.
5. Press the Alarm Cutoff pushbutton to turn off IMC/NIMC alarm LED.
6. Remove an active output card from a protected pair of cards.
7. Observe LED response:

   Output card–

   - Remaining output card switches to active.

   IMC/NIMC–

   - Major alarm LED turns on.
8. Remove second card of the protected pair of cards.
9. Observe LED response:

   IMC/NIMC–

   - Critical alarm LED turns on.
10. Reinstall the two output cards.
11. Press the Alarm Cutoff pushbutton twice to turn off the alarm LEDs.

D. Securing the Card Assemblies

After completing the alarm tests, secure all the card assemblies to the subrack by tightening the mounting screws at the top and bottom of the front panels.

Output Checks

These tests verify that the outputs from the 55400A are operating according to specifications. At least one output from each card pair, or stand-alone card should be checked.

Equipment Setup

For each output tested, connect the output to the oscilloscope as shown in Figure E2-1.

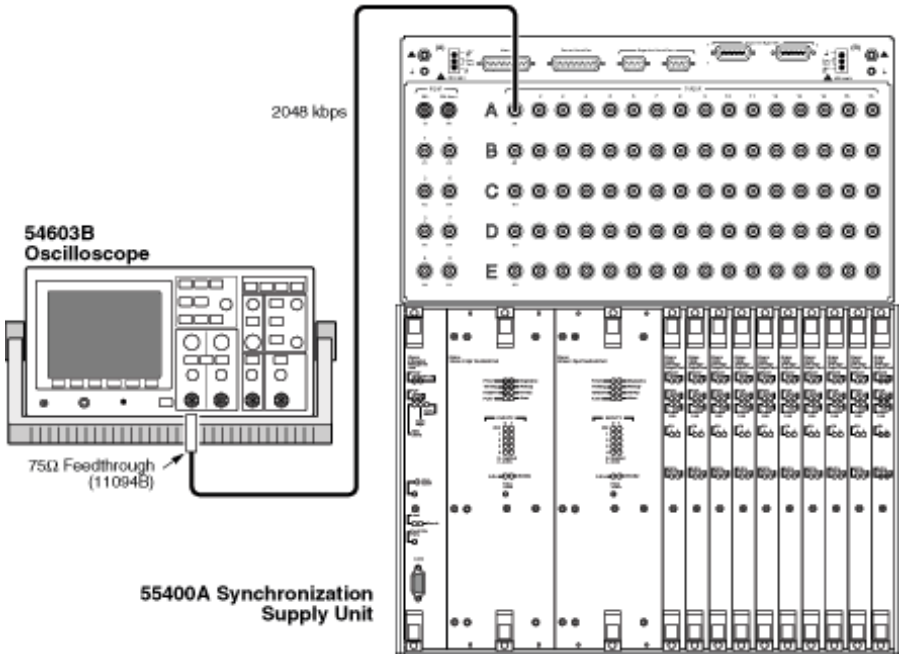


Figure E2-1. Output check equipment setup

55481A/B 2048 kbps Output Check

Use the 75 Ω feed-thru and the 75 Ω cable. Verify that the amplitude peak and pulse width of each output checked complies with the waveform shown in Figure E2-2 and Figure E2-3.

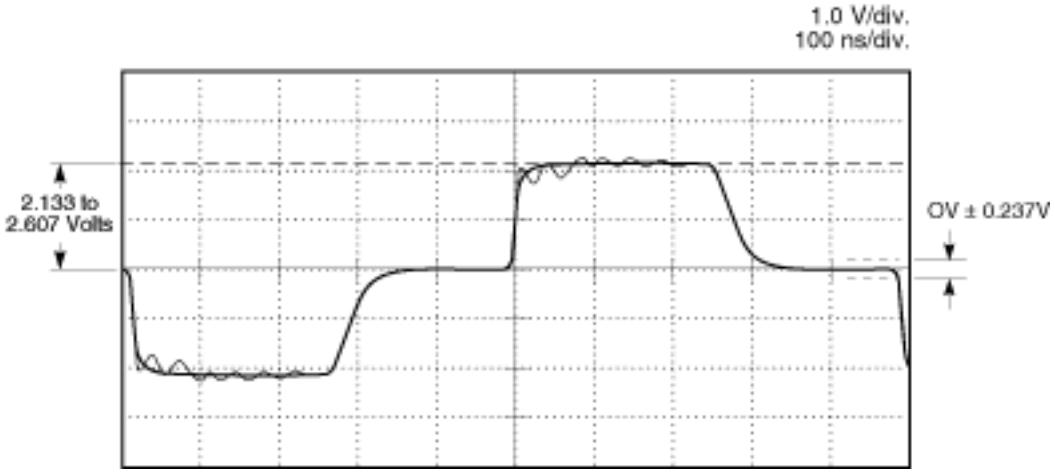


Figure E2-2. 2048 kbps Voltage Peak Test

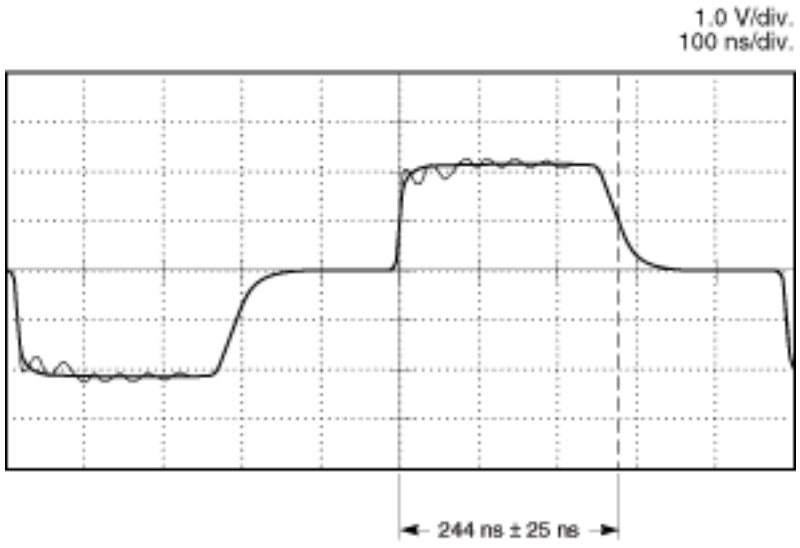


Figure E2-3. 2048 kbps Pulse Width Test

55482A 2048 kHz Output Check

Use the 75 Ω feed-thru and the 75 Ω cable. Verify that the amplitude peak and pulse width of each output checked complies with the waveform shown in Figure E2-4 and Figure E2-5.

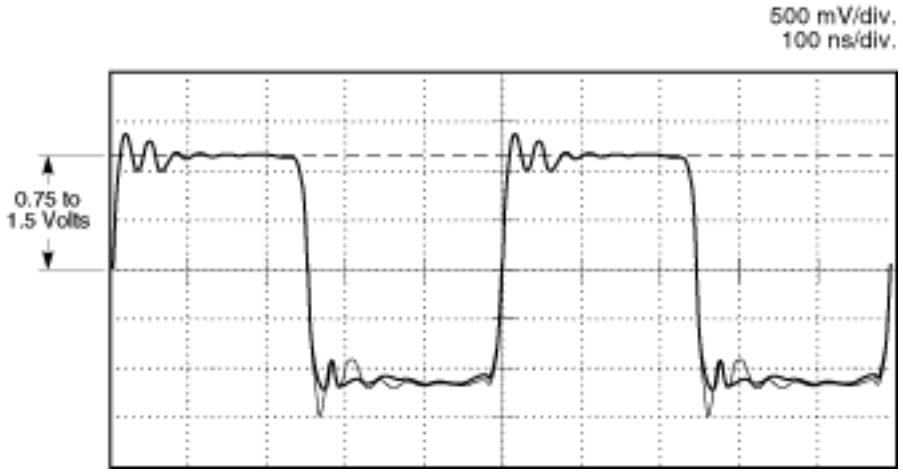


Figure E2-4. 2048 kHz Voltage Peak Test

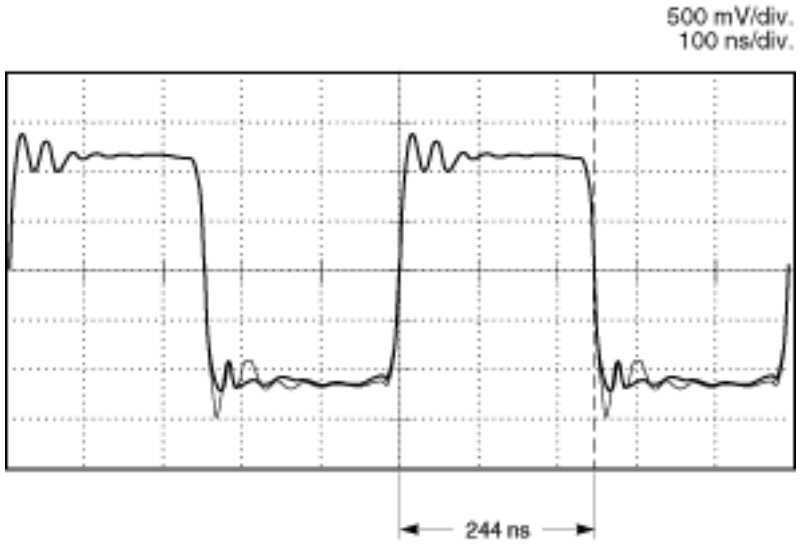


Figure E2-5. 2048 kHz Pulse Width Test

55483A 64/8 kHz Composite Clock Output Check

Use this test to verify that the outputs are within specified requirements. At least one output from each card pair, or stand-alone card, should be checked.

Figure E2-6 shows a pinout for the patch panel and a wiring diagram for the connection to the oscilloscope.

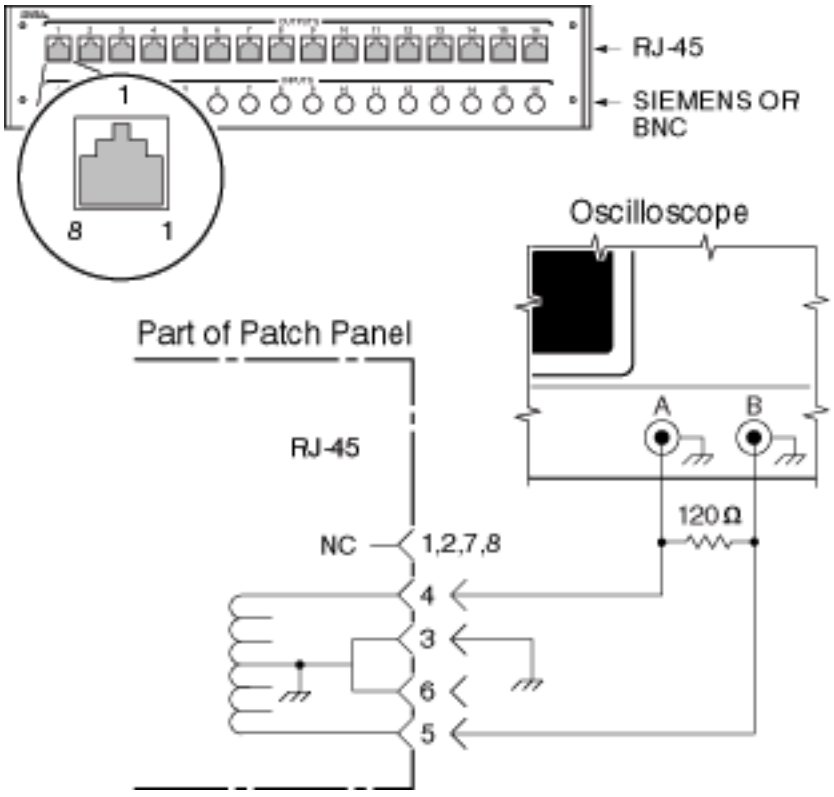


Figure E2-6. 64/8 kHz Composite Clock Test Setup

Testing the composite clock card

The composite clock card requires the use of the patch panel. It uses transformers to produce the balanced outputs. To measure the balanced signals from the patch panel, wire an RJ45 connector as follows (see Figure E2-6):

- Connect one wire from pin 4 at the patch panel to the center conductor of one oscilloscope input
- Connect one wire from pin 5 at the patch panel to the center conductor of another oscilloscope input

- Connect one wire from pin 3 or 6 (ground) at the patch panel to the outer conductor of both oscilloscope inputs
- Connect a 120 Ω resistor across the wires to the oscilloscope input center conductors
- Set the oscilloscope to A–B
- Use high impedance inputs (1 MΩ)

Balanced-output Testing

For each output checked, compare the output to Figure 5b and Figure 9/G.703 from ITU-T Recommendation G.703.

NOTE

The 55483A must be used with the patch panel in order to meet the requirements of ITU-T G.703.1 for balanced outputs.

55484A 1/5/10 MHz Output Check

Use this test to verify that the outputs are within specified requirements. At least one output from each card pair, or stand-alone card, should be checked.

NOTE

This card only provides eight outputs on subrack ports 9 through 16. Switch settings on the card select the output frequency. Refer to chapter D2 for details.

For each output tested, connect that output to an oscilloscope set as described for the configured output frequency. The three figures that follow show the waveform and mask for the three different output frequencies. Use the 50 Ω feed-thru and the 50 Ω cable.

The three waveforms shown on the following pages represent the 1:1 protected mode meaning that two 55484A cards are providing redundant operation for the eight outputs supported by this output card.

55484A 1 MHz Output

Verify that the signal at the output complies with the mask shown in Figure E2-7.

Set oscilloscope:

- Impedance = 50 Ω
- Sensitivity = 500 mV/div
- Timebase = 100 ns/div
- Holdoff = 40 ns

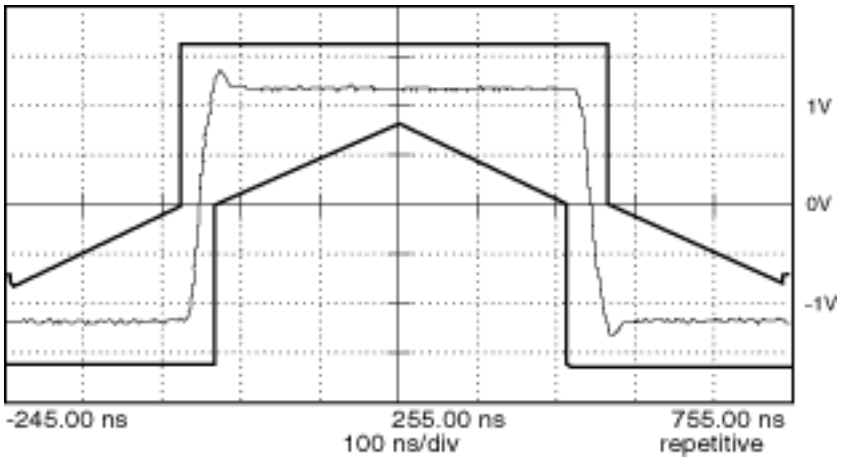


Figure E2-7. 1 MHz output

Verify amplitude and pulse width:

- Peak-to-peak value = 2.4 V ± 0.24 V
- Positive pulse width = 500 ns (nominal)

55484A 5 MHz Output

Verify that the signal at the output complies with the mask shown in Figure E2-8.

Set oscilloscope:

- Impedance = 50 Ω
- Sensitivity = 500 mV/div
- Timebase = 20 ns/div
- Holdoff = 40 ns

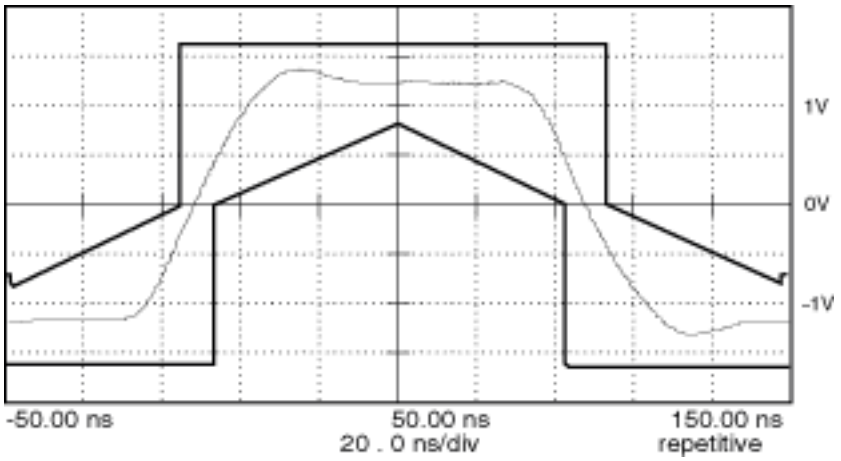


Figure E2-8. 5 MHz output

Verify amplitude and pulse width:

- Peak-to-peak value = 2.4 V ± 0.24 V
- Positive pulse width = 100 ns (nominal)

55484A 10 MHz Output

Verify that the signal at the output complies with the mask shown in Figure E2-9.

Set oscilloscope:

- Impedance = 50 Ω
- Sensitivity = 500 mV/div
- Timebase = 10 ns/div
- Holdoff = 40 ns

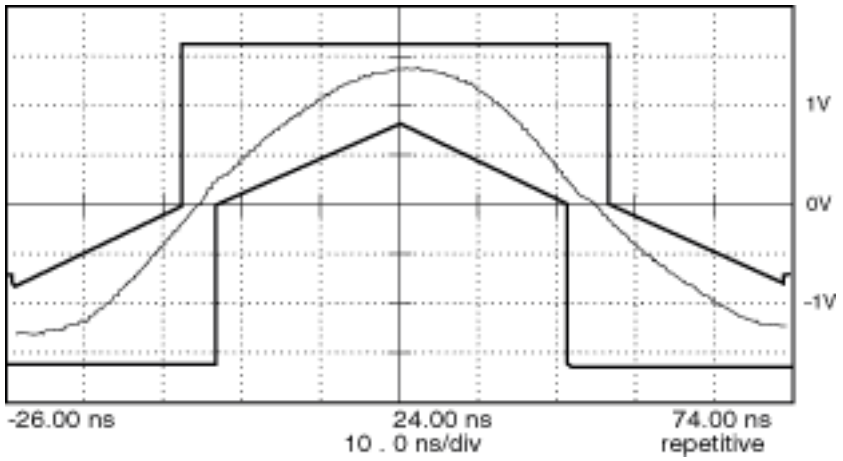


Figure E2-9. 10 MHz output

Verify amplitude and pulse width:

- Peak-to-peak value = 2.4 V ± 0.24 V
- Positive pulse width = 50 ns (nominal)

55485A/B 1544 kbps Output Check

Use this test to verify that the outputs are within specified requirements. At least one output from each card pair, or stand-alone card, should be checked.

NOTE

The 55485A provides only eight outputs on subrack ports 9 through 16. The 55485B provides 16 outputs.

For each output tested, connect that output to an oscilloscope set to high impedance (1 MΩ). Use a 75 Ω feed-thru as the test load impedance. Refer to Figure E2-10 and Figure E2-11 for the amplitude and pulse width expected.

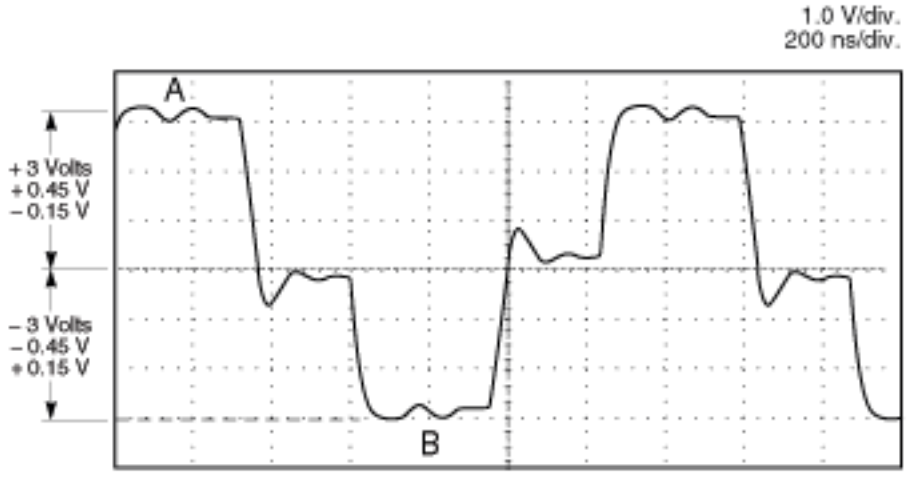


Figure E2-10. 1544 kbps Amplitude Test

Verify that the 1544 kbps signal has a positive amplitude (A) of 2.85 V to 3.45 V as shown in Figure E2-10.

Verify that the 1544 kbps has a negative amplitude (B) of –2.85 V to –3.45 V as shown in Figure E2-10.

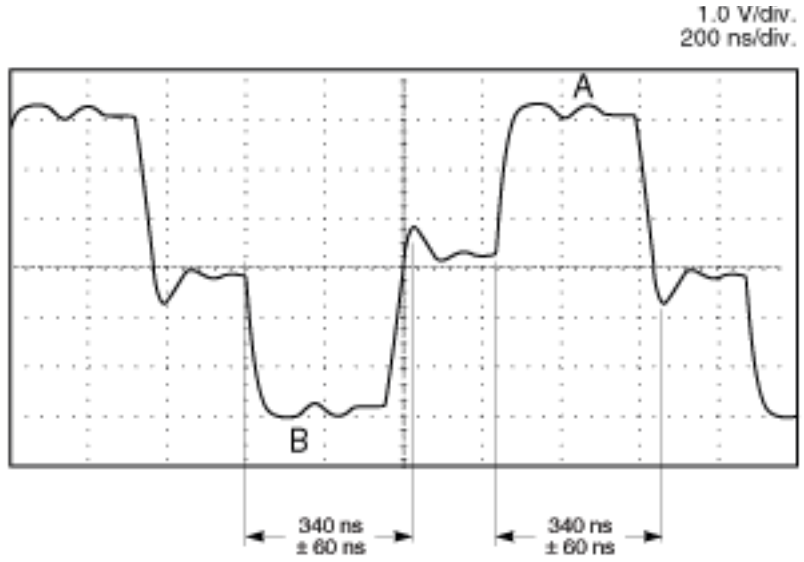


Figure E2-11. 1544 kbps Pulse Width Test

Verify that the 1544 kbps signal has a positive pulse width (A) of 280 ns to 400 ns as shown in Figure E2-11.

Verify that the 1544 kbps signal has a negative pulse width (B) of 280 ns to 400 ns as shown in Figure E2-11.

55488A 2048 kHz/2048 kbps Output Check

Since this card combines the functions of the 55482A and 55481B output cards, please refer to the test procedures in this chapter to verify the output signals. Use the 75 Ω feed-thru and the 75 Ω cable.

- For output ports 1 through 8 (2048 kHz), use test waveforms on page E2-12
- For output ports 9 through 16 (2048 kbps), use test waveforms on page E2-11

55471A Traffic Re-synchronization Output Check

SUMMARY This TRSC card accepts up to eight E1 input signals. Four signals can be re-timed by the card which removes jitter and wander, and four signals can be buffered. The buffer action makes the card useful as a repeater. No jitter or wander is removed, but the signal is restored to the proper amplitude levels, if attenuated.

NOTE This test requires an E1 input signal. If a 55481A/B output card is part of the system, use one of its outputs for this test. The output signal format should be set to CAS with CRC-4 enabled.

Normally, each row of the subrack's connectors are outputs only. However, in the case of the TRSC, the row of connectors corresponding to the location of the TRSC is made up of both inputs and outputs, as specified in the table below.

Table E2-1. Traffic Re-synchronization Card Port Assignments

Retimed Channels	Subrack Input Port	Subrack Output Port	Buffered Channels	Subrack Input Port	Subrack Output Port
Channel 1	1	2	Channel 5	3	4
Channel 2	5	6	Channel 6	7	8
Channel 3	9	10	Channel 7	11	12
Channel 4	13	14	Channel 8	15	16

Use a 75 Ω Termination on Inputs

All TRSC inputs must be externally terminated with a 75 Ω termination:

Connect a feed-thru 75 Ω termination between the input signal cable and the TRSC input port.

These 75 Ω terminators are available from Symmetricom. Refer to chapter F3, "Replacement Parts."

NOTE If using the TRSC in the mini-SSU subrack, the output modules have on-board 75 Ω terminations that can be selected with jumpers to eliminate the need for external terminators on the TRSC inputs.

Output tests

Prepare the Cards

1. If using an E1 output from the 55481A/B card, remove the card, or pair of cards if operating in a protected pair, from the subrack.
2. Record the switch settings for S1-2 and 3.
3. Set output card switches S1-2 and 3 to On for this test. This sets the E1 outputs to CAS with CRC-4.
4. Set TRSC switches S1-1 through S1-8 to On. This sets all four re-timed channels to CAS with CRC-4 enabled.
5. Set TRSC switch SS-2 to On. This sets the card to squelch any re-timed channel that loses and input signal.
6. Perform the following tests for each TRSC card, one channel at a time.

Output Mask Check

1. Connect an E1 output signal to a TRSC input using an external 75 Ω termination. Use the port assignments table to identify inputs and outputs on the subrack.
2. If it is a re-timed channel, check that all the LEDs for that channel (LOS, OOF, SLIP, and MSLIP) are off.
3. Check the output signal from the TRSC against the waveforms shown in Figure E2-2 and Figure E2-3.
4. Remove the signal from the TRSC input and verify that the output is squelched.
5. If it is a re-timed channel, observe that the Alarm and LOS LEDs are lit.
6. If it is a buffered channel, only the Alarm LED will be lit.
7. Repeat tests for all eight input channels.
8. Press the Force Active push-button on the standby TRSC and repeat this output check procedure.

AIS check

1. Disconnect any input signal to the TRSC.
2. Remove the TRSC cards and set switch S3-2 to Off for both cards. Re-install cards. This setting change will cause the TRSC to generate an AIS condition (unframed all ones) when no input signal is connected. Verify this by observing that an AIS signal is present on each output.
3. Press the Force Active push-button on the standby TRSC card and verify that an AIS signal is present on each output.

Disable all channels

1. Send the following TL1 command to disable channels 1-8.

   ```
   ED-SYNC::Sn-OUTx-1&&8:1:::SQUELCH=Y
   ```

   where n=number of the subrack and x= letter of the slot where the TRSC cards are located.

2. Confirm with the oscilloscope that channels 1-8 have been squelched.
3. Press the Force Active push-button on the standby TRSC card and verify that all outputs have been squelched.
4. Send the following TL1 command to enable channels 1-8.

   ```
   ED-SYNC::Sn-OUTx-1&&8:1:::SQUELCH=N
   ```

5. Remove the TRSC cards and configure the switch settings as appropriate for the site installation. Disable and enable channels as appropriate. Return the switches on the 55481A/B cards to their original settings, if they were modified for the tests.

NOTE

Refer to chapter D2 for switch and configuration details for all output cards.

Connect Output Cables

After checking the outputs, you can connect the output signals to the downstream network elements requiring synchronization. See Figure B2-5 or Figure B2-6 for the recommended method of routing cables from the subrack.

Unused Outputs

NOTE

The default condition for the output cards is for all outputs to be enabled.

If you want to disable unused outputs, use the local craft terminal software (Configuration>Output) or the TL1 keyword SQUELCH.

Security

If access to the SSU needs to be restricted, enable the security feature. Security is set with a combination of a switch setting and parameters using TL1 commands or the local craft terminal software. See the getting started information in the *55400A TL1 Programming Reference Manual*.

F1

Troubleshoot the System

Isolate the problem and determine how to repair

In This Chapter

- Considerations and needs in order to troubleshoot the system
- A procedure to isolate the failed system components

Before You Begin

This process assumes you are familiar with the components of the Symmetricom sync system and understand the tasks performed by each element.

If unfamiliar with the sync system, you should review chapter A1, “System Overview” before beginning. Additional details about how the SSU works are found in chapter A2, “System Description.”

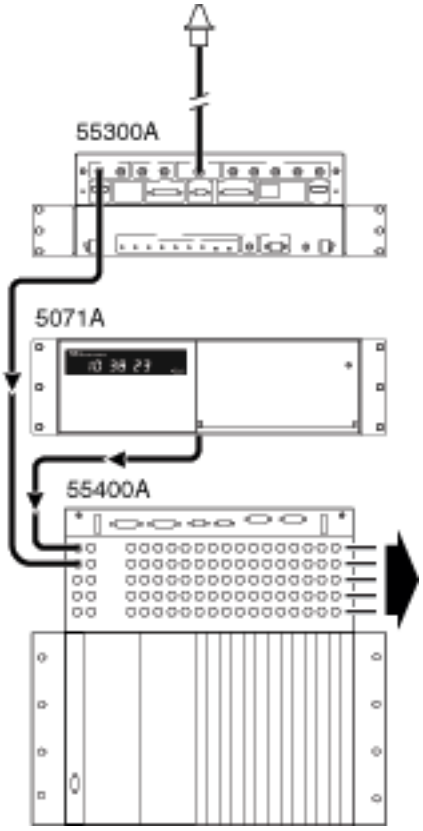


Figure F1-1. Symmetricom Sync System Components

Repair strategy for the sync equipment

- 55400A—plug-in module replacement, described in this manual
- 55300A—antenna system component or plug-in module replacement, described in *55300A Operating and Programming Manual*
- 5071A—repair strategy described in *5071A Operating and Programming Manual*

This chapter describes a troubleshooting process for the 55400A and 55300A. The 5071A documentation should be consulted if that unit has a problem.

This troubleshooting process assumes an IMC or NIMC card is part of the SSU system. The alternative Alarm Indication Card does not provide the capability to retrieve the system status that greatly improves the ability to isolate a problem with the system.

Summary of Troubleshooting Process

The troubleshooting process describes how to approach a system with a problem.

Guidelines for troubleshooting

NOTE Before taking any action—take some time to observe the failure symptoms.

- Visually inspect the sync system
- Come to some initial conclusions
- Interrogate the status of the 55400A SSU and 55300A
- Review the event log
- Isolate the problem
- If you determine the problem is with the 55400A SSU, you will then refer to the next chapter in order to correct the problem and resume full service.
- If the problem is with the 55300A GPS, information for a first-level attempt at fixing the GPS unit is provided in this chapter. If this does not solve the problem, refer to the documentation for that product.
- If problem is with the 5071A cesium clock, refer to the documentation for that product.

NOTE The 55400A troubleshooting information also applies to the 55409A mini-SSU.

REQUIRED TROUBLESHOOTING EQUIPMENT

In order to identify and understand problems with the Symmetricom sync system, the following items are required:

Computer

- Computer with RS-232 interface

Used for troubleshooting both the 55400A and 55300A.

55400A communication card

Two communication cards for the SSU have a connector (the Local Port) for connecting a computer that will simplify troubleshooting.

- 55441A Information Management Card (IMC)
- 55442A Network Information Management Card (NIMC)

Used for troubleshooting the 55400A.

Cable and Adapter

- RS-232 serial interface cable, 9-pin (female-female) (supplied with 55300A)
  Available from Symmetricom as part number 5182-4794.

Used for connecting a computer to the 55300A or 55400A.

- Adapter, 9-pin (male-male) (supplied with 55300A)
  Available from Symmetricom as part number 5181-6639.

Used for adapting the interface cable to the 55400A Local Port or the 55300A Port 1.

NOTE

The Symmetricom cable and adapter used with the 55400A can be replaced by an RS-232 serial interface cable, 9-pin (male-female).

Application Software

- 55450A local craft terminal software

Used to retrieve status information from the 55400A.

- SatStat program (supplied with 55300A)
  Available from Symmetricom as part number 59551-13401.

Used to retrieve status information from the 55300A.

Troubleshooting Tool

- GPS handheld receiver
  Available from Symmetricom as part number 59991A-T45.

NOTE

The GPS handheld must have a detachable antenna and provide +5V at its antenna connector.

Used to help isolate a problem with the 55300A.

Troubleshooting Process

The approach here is to try and reduce the number of failure possibilities before taking any steps that might further affect the supplying of timing service:

ASSUMPTION The sync system has been in service for some time so installation mistakes are not considered here as the possible cause of problems. If there are problems after installation, first review the installation procedures.

1. This process has you begin by observing the equipment to try and isolate the problem to a single piece of sync equipment.
2. Once the offending equipment is identified, the equipment can usually provide some information about its condition.
3. Then once the extent of the problem is better understood, appropriate action can be taken to repair the offending equipment.

The goal of this process is to help isolate the problem to a single piece of equipment and then point to more information on how to further troubleshoot that equipment.

CAUTION

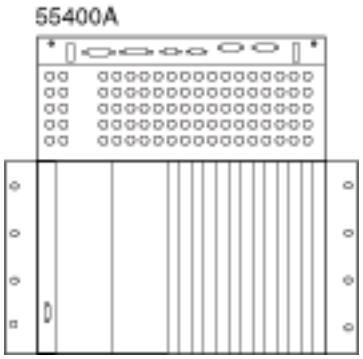
The 55400A provides signals vital to proper operation of communications networks. Improper service techniques can defeat the built-in redundancy, which can escalate a minor problem into one causing failure of the communications network.

Troubleshooting and servicing must only be performed by trained personnel with an understanding of the 55400 operation and in strict conformance to the procedures in this manual.

Overview of Main Sync System Elements

The sync system consists of timing references and a timing signal generator that accepts the references, evaluates and selects the reference to use, tracks and filters the reference before distributing it to multiple downstream network elements.

SSU Guidelines



The SSU is the most critical element in the sync system. It can continue to operate should it lose a reference. For example, if one of the references is lost, the SSU will automatically switch to using one of the remaining qualified references. Of course, this assumes that there are multiple reference signals supplied to the SSU from entirely separate sources. If all references are lost, the SSU will go into holdover mode.

CAUTION

Multiple references taken from a single 55300A GPS receiver or 5071A frequency standard do not satisfy the need for signals from independent sources. In this case, a failure of one unit could cause the loss of multiple input signals to the SSU resulting in holdover status.

The SSU is also the most complex and dynamic element in the sync system. It is continuously monitoring and judging the quality of input signals, its own internal conditions, as well as the state of its output signals. It is at the center of the sync system and usually is the first element in the system to realize a problem has occurred.

Input Guidelines

The input references to the SSU can originate from local clock sources, such as GPS or cesium, as well as from live traffic signals. There are two major components to the GPS unit: the antenna system and the receiver. With the aid of a handheld GPS receiver it is possible to isolate the problem to one or the other component. The cesium clock is a stand-alone reference. Information about other input references should be requested from the network administrator.

Output Guidelines

The SSU monitors its output cards for failures, but it cannot determine absolute signal quality of each output signal. In some cases, the downstream equipment may be detect a timing problem before the SSU.

1. Observe the sync equipment

The sync equipment can include the 55400A SSU, 55300A GPS, and the 5071A cesium clock.

OBSERVE Try to isolate the problem by observing which component of the sync system is in alarm.

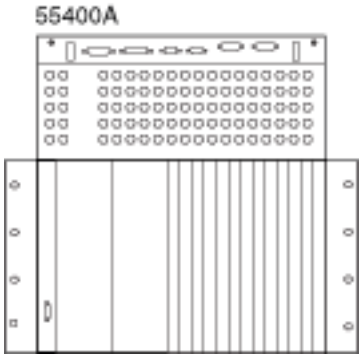
A red LED turns on to indicate an alarm condition in the 55400A and 55300A. An alarm condition in the 5071A is indicated with a yellow LED on its front panel display (Attention LED). Note which equipment is in alarm.

2. Silence the audible office alarms

Office alarms can be generated by any of the sync system equipment:

- 55400A SSU can communicate problems through its alarm connector on the master subrack
- 55300A GPS can communicate problems through its alarm connector on the GPS shelf
- 5071A frequency standard can communicate problems to the SSU through the PRC Status line and the 55442A Network IMC card when it is included in the master subrack. (This card includes a Rack Alarms connector that can be wired to pass alarms from equipment outside the SSU through the SSU to the office alarms.)
- SSU with Network IMC has rack alarm input which are used by other equipment to generate alarms in the SSU.

If 55400A SSU is in alarm



SILENCE ALARM If there is an audible alarm sounding, identify the equipment in the alarm state. If it is the SSU, press the Alarm Cutoff push button (ACO) on the 55400A communication card to silence the audible alarm.

RESULT Once the ACO push button is pressed, the audible alarm relay contacts return to the non-alarmed state. The Alarm Cutoff LED remains lit until the alarm condition is corrected.

If SSU alarm condition is cleared

If the alarm LED turns off, this indicates the condition that caused the alarm no longer exists. When this happens you should interrogate the SSU to determine and record what initially caused the alarm to occur.

CONNECT PC Connect a PC to the SSU Local Port (located on the IMC and NIMC card) and run the 55450A local craft terminal software.

NOTE Refer to chapter A5, "Local/Remote Management," for instructions on how to connect and configure the computer, and run the software.

Although only a terminal emulator program is needed to perform this procedure, it is recommended that you use the 55450A local craft terminal software to take advantage of the point-and-click interface.

PREPARE TO SEND COMMAND Once the application is running, establish a connection to the SSU. (A successful connection is indicated by the "Retrieving data..." message at the top of the application window.) Once connected, go to the **Communication** screen. Click the cursor inside the screen area.

NOTE If security is set on the SSU, you will need access to a valid user ID and password in order to complete the login to the SSU.

SEND COMMAND Type the following command string to retrieve the event log from the SSU. Include the number of the active ITH card, 1 or 2, to retrieve the most relevant events. The ';' at the end of the line causes the command to execute:

```
rtrv-log::ith1:1::evttop;
```

RESULT The SSU will respond with the ten most recent events from the log and display them on the screen. This log is a chronological record of alarm events and cleared alarms. The events are retrieved in the order of last in, first out.

Information is displayed in the following sequence:

- Affected card—type and position
- Notification code—condition status
- Event—see chapter A4 for explanation
- Service Effect—SA (service affecting) or NSA (non-service affecting
- Date and time of event
- Brief event description

IF NEEDED To retrieve the next ten messages, type the following command string.

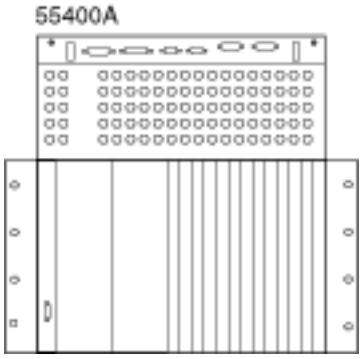
```
rtrv-log::ith1:1::evtcont;
```

RECORD FAULT Repeat this command as necessary. Record the occurrence of any recent failures that have been cleared.

If possible, copy and save the log data to a file for later reference. If it becomes necessary to return a plug-in card to Symmetricom for repair, this information should be included.

NEXT If no other problems exist, stop troubleshooting. Otherwise, continue.

Retrieve alarm and system status from 55400A SSU



OBSERVE The LEDs on the front panel of the plug-in module cards: Green LEDs indicate normal operation.

CONNECT PC If any alarm LEDs are on, connect a PC to the SSU Local Port (located on the IMC and NIMC card) and run the 55450A local craft terminal software.

NOTE Refer to chapter A5, "Local/Remote Management," for instructions on how to connect and configure the computer, and run the software.

PREPARE TO SEND COMMAND Once the application is running, establish a connection to the SSU. (A successful connection is indicated by the "Retrieving data..." message at the top of the application window.) Once connected, go to the **Communication** screen. Click the cursor inside the screen area.

NOTE If security is set on the SSU, you will need access to a valid user ID and password in order to complete the login to the SSU.

SEND COMMAND Type the following command string. The ';' at the end of the line causes the command to execute:

```
rtrv-cond:::1;
```

The SSU will respond with information about input signals, the ITH clock cards, and the output cards.

REVIEW RESPONSE Review the contents of the status report. Each event is described using its abbreviation and then a short phrase to specify more detail. Chapter A4 presents a typical cause for each event and suggestions for how to correct the problem causing the event, where appropriate.

What the SSU can indicate about its inputs

The SSU is continuously monitoring a variety of inputs, including reference signals, status input, and more. Table F1-1 summarizes the possible inputs and what the SSU checks.

Table F1-1. SSU-Monitored Input Conditions

Inputs to SSU	Conditions Monitored
5 or 10 MHz	minimum amplitude level, signal continuity, stability, and measurement performance
Status line	change of state indicating a problem with the PRC
2048 kHz	minimum amplitude level, signal continuity, stability, and measurement performance
2048 kbps	minimum amplitude level, signal continuity, stability, measurement performance, framing errors, and alarm indication signal
Power	Voltage level within operating range of SSU
Rack alarms	See rack alarms description below

Inputs from 55300A could include:

- 10 MHz
- 2048 kHz
- 2048 kbps

Inputs from 5071A could include:

- 5 or 10 MHz
- PRC status line
- 2048 kHz
- 2048 kbps

Inputs from other sources, such as traffic signals, could include:

- 2048 kHz
- 2048 kbps

Rack Alarms

If a Network Information Management Card (55442A) is the communication card contained in the SSU, the SSU can carry alarm information from equipment outside the SSU via the rack alarms connector.

Some of the messages the alarm lines carry have already been defined. Others just indicate an alarm number that can be assigned by the system administrator as needed.

All alarm lines have an assigned alarm severity level. Since it can be difficult to know exactly how this connector is being used, consult with the system administrator when rack alarms are used.

Rack Alarm Message Descriptions

The alarm descriptions listed in Table F1-2 will be retrieved from the SSU when the rack alarms are active. (For a pinout of the Rack Alarms connector, see chapter D3.)

Table F1-2. NIMC Rack Alarms Descriptions

Rack Alarm Description	Intended Use
Ext. Rack Power Alarm	Monitor power to the equipment rack
Ext. Cesium 2 Alarm	Monitor PRC status line from a second 5071A
Ext. GPS Reports Critical Alm	Monitor for critical alarm from GPS
Ext. GPS Reports Major Alm	Monitor for major alarm from GPS
External Rack Alarm 5	Monitor for a major alarm from specified equipment
External Rack Alarm 6	Monitor for a major alarm from specified equipment
External Rack Alarm 7	Monitor for a major alarm from specified equipment
External Rack Alarm 8	Monitor for a minor alarm from specified equipment

What the SSU can indicate about itself

The SSU is continuously monitoring itself for hardware faults, changes to operating conditions, changes to SSU card inventory, problems with communication within a subrack and between subracks, and the input being tracked.

What the SSU can indicate about SSU expansion subracks

The SSU will monitor for hardware faults and communications problems within subracks and between subracks.

What the SSU can indicate about the output signals

The SSU will monitor for hardware faults in the output cards, including failed outputs.

What the SSU cannot indicate about the output signals

When output ports are disabled, there is no alarm indication. If downstream equipment reports a loss of input signal, check if an output has been inadvertently disabled.

The easiest way to check output card port status is using the 55450A local craft terminal software.

Go to *Configuration>Output* in the application software.

When the SSU enters holdover mode, depending on how the outputs are configured, the output cards will continue to supply a signal, go into AIS, or Squelch. Check the holdover action for each output card.

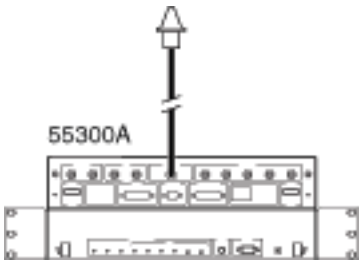
The easiest way to check output card port status is using the 55450A local craft terminal software.

Go to *Configuration>Output* in the application software.

Excessive noise on the output signals cannot be detected by the SSU. If such is suspected, use an oscilloscope to observe the signals at the SSU output.

If you have isolated the failure to the SSU, go to the next chapter to continue the troubleshooting.

If 55300A GPS is in alarm



SILENCE ALARM If an audible alarm is sounding, identify the equipment in the alarm state. If it is the GPS unit, press the Alarm Cutoff push button (ACO) on the GPS shelf to silence the audible alarm.

RESULT Once the ACO push button is pressed, the audible alarm relay contacts return to the non-alarmed state. The ACO Active LED remains lit until the alarm condition is corrected and the ACO Reset push button is pressed.

OBSERVE The LEDs on the front panel of the shelf: Green LEDs for **Power** and **GPS Lock** indicate normal operation.

CONNECT PC If any alarm LEDs are on, it is recommended that you connect a PC to the **Time of Day** port and run the SatStat software program to determine:

- the status of hardware components
- the state of the GPS synchronization

NOTE Refer to chapter A5, "Local/Remote Management," for instructions on how to connect and configure the computer, and run the software.

Isolate problem with 55300A GPS

CHECK ANTENNA SYSTEM If this GPS receiver is not tracking any satellites, according to the synchronization and acquisition portion of the SatStat screen, substitute the GPS handheld receiver in place of the 55300A by connecting the GPS antenna cable to the handheld receiver.

NOTE The GPS antenna requires +5V from the 55300A to operate. The handheld receiver must be capable of providing +5V to the antenna.

ISOLATE GPS If the handheld receiver is able to track satellites, this indicates a problem with the 55300A. Determine if the power supply or the main board is defective as instructed in the *55300A GPS Primary Reference Source User's Guide*.

On the other hand, if the handheld receiver cannot track satellites, the main board assembly is probably good and the problem is with the antenna, or some component of the cable assembly between the antenna and the receiver.

CHECK ANTENNA If the handheld receiver cannot track satellites, connect the receiver directly to the antenna. If the handheld receiver can then track satellites, investigate the cable assembly. If the handheld receiver still cannot track satellites, replace the antenna and verify operation.

More extensive troubleshooting information can be found in the user's guide supplied with the 55300A.

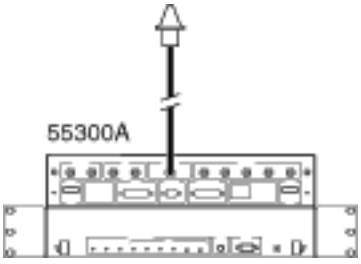
If GPS alarm condition is cleared

If the alarm LED turns off, this indicates the condition that caused the alarm no longer exists. When this happens you should interrogate the GPS unit to determine and record what initially caused the alarm to occur.

CONNECT PC Connect a PC to the GPS Port 1.

NOTE Refer to chapter A5, "Local/Remote Management," for instructions on how to connect and configure the GPS and the computer. Only a terminal emulator program running on the computer is needed to perform this procedure.

Retrieve alarm status from 55300A GPS



SEND COMMAND Type the following command string to retrieve the event log from the SSU. The ';' at the end of the line causes the command to execute:

```
rtrv-log:::123::evttop;
```

RESULT The GPS will respond with the ten most recent events from the log and display them on the screen. This log is a chronological record of alarm events and cleared alarms. The events are retrieved in the order of last in, first out.

IF NEEDED To retrieve the next ten messages, type the following command string.

```
rtrv-log:::123::evtcont;
```

RECORD FAULT Repeat this command as necessary. Record the occurrence of any recent failures that have been cleared.

If possible, copy and save the log data to a file for later reference. If it becomes necessary to return this product to Symmetricom for repair, this information should be included.

NEXT If no other problems exist, stop troubleshooting.

If 5071A Cesium Clock is in alarm

OBSERVE The two LEDs to the right of the time display on the front panel: The **Attention** LED is off and the **Continuous Operation** LED is on to indicate normal operation.

NEXT If the **Attention** LED is on or is flashing, refer to the operating and programming manual supplied with the 5071A equipment for more information. The cesium clock has a fault.

More extensive troubleshooting information can be found in the operating and programming manual supplied with the 5071A.

3. Retrieve status from the sync equipment in alarm

At this point, the audible alarms have been silenced and alarm conditions still exist.

If the 55400A SSU shows any active alarms, retrieve its conditions first. Many times, the SSU status can help isolate problems from other equipment. The next step is to retrieve the event conditions from the SSU.

NOTE

Several of the troubleshooting steps here require use of a PC running application software in order to interrogate the equipment. Follow instructions in chapter A5 to connect the computer, verify communication settings, and run the software referenced here.

Summary

At this point, the problem should have been isolated to one of the three elements of the Symmetricom sync system. If the equipment at fault was either the GPS or cesium frequency standard, the instructions were to consult the documentation included with that product.

If an element of the SSU has failed, refer to the next chapter. It is likely that the failed module has been identified by following the troubleshooting process in this chapter. The next chapter presents information on replacing the failed module.

F2

Troubleshoot the SSU

Determine cause of problem and fix it

In This Chapter

- SSU repair strategy
- LEDs help troubleshoot hardware failures in cards
- How to replace the plug-in cards

Before You Begin

If the problem with the SSU has not yet been isolated to a particular plug-in card, it is recommended that you first perform the SSU troubleshooting procedures in the previous chapter.

NOTE

If the SSU is remotely managed, notify the network management center before beginning any field service.

Before taking any actions to remove cards from the SSU, STOP and analyze the situation. Because of the redundant nature of the SSU, failures can exist and the system can still provide network timing signals.

CAUTION

Although the SSU cards are fully redundant when used in protected pairs, the following field service guidelines must be followed during card replacement. Failure to follow these guidelines can result in severe phase hits, large frequency errors, or complete loss of SSU output signals. The guidelines are summarized here:
> Never remove an unprotected ITH card
> Never remove an unprotected output card
> Never force an ITH card into the active mode when it is in freerun mode
> Never remove an active ITH card
> Never remove an active output card
> Never remove or insert cards without wearing an ESD wrist strap

Central Element—the SSU

The heart of the Symmetricom sync system is the SSU. It accepts input reference signals from equipment and provides output timing signals to downstream network elements.

NOTE

This chapter assumes that you have already performed the SSU troubleshooting procedures in chapter F1. This chapter also applies to the 55409A mini-SSU.

Repair Strategy for the SSU

The 55400A consists of modular circuit board assemblies designed for replacement in the event of failure. Depending on the specific type of card being replaced (ITH, Output, IMC/NIMC), the replacement procedure can be simple or slightly more complicated. This chapter describes those procedures.

TIP Remember:

- The ITH card or output card should be in standby mode before removal.
- Replace a card with one of the same type.
- If replacing a Network IMC, the network parameters must be configured on the replacement card.

If you plan to return a card to Symmetricom for repair, remember to include as much information as possible about the failure condition observed. This should include the specific LEDs that were lit by the failure and a printout of the SSU event log and conditions retrieved, as instructed in the previous chapter. Review the information requested for the failed assembly at the end of this chapter.

Understand the Architecture of the SSU

The 55400A SSU is a modular, fully-redundant timing distribution unit for 2048 kbps telecommunications networks. The SSU tracks up to nine incoming reference signals, qualifies these inputs, filters them, and distributes up to 400 precise timing signals. Incoming reference signals may come from cesium standards, GPS receivers, non-traffic E1 signals, or live traffic signals.

The SSU modules can be divided into three major categories: Input Track and Hold cards, output cards, and alarm management cards.

Within an SSU subrack, ITH cards are typically grouped in redundant pairs. Only one ITH card is active at any time with the second ITH card in standby mode. If the active ITH card should fail, the standby ITH card will automatically become active and the failed card will be placed in standby mode. The ITH cards contain an internal oscillator for holdover operation when all incoming references are lost.

Output cards are also usually grouped in protected pairs. Alarm management cards operate without backup because they are not required for input tracking or output signal generation.

Architecture summary

- ITH cards—rely on the backplane of the subrack in order to receive the input signals and power. The ITH cards operate independently of the output cards and the alarm management card.
- Output cards—rely on the ITH cards for all reference and timing signals. The backplane supplies all power.
- Alarm management card—receives status information from all the other cards. Its power is taken from the backplane.

TIP If all output cards are in alarm, suspect the ITH cards. If both ITH cards are in alarm, suspect the input signals.

TIP Fix any problems with ITH cards before troubleshooting output cards. The output cards receive reference and timing signals needed for proper operation from the ITH cards. ITH card failures can cause output card failures.

Safety Considerations

The 55400A system has been designed in accordance with international safety standards. This manual contains information, notes, cautions, and warnings which must be followed to ensure safe installation and operation. Installation and maintenance procedures requiring access to equipment input, output, and power connections are for use by service trained personnel only.

Electrostatic Discharge (ESD) Considerations

- Use a tested ESD wrist strap connected to one of the banana-plug jacks on the front panel when handling cards.
- Store cards in static-safe packaging supplied with the products.

Good Practices when Replacing SSU Cards

1. Before installing any card, set switches on the replacement card the same as the card being replaced.
2. If you are replacing an ITH card, carefully follow the replacement procedure in this chapter.
3. Never remove an active ITH card. Always set the other ITH card to the active mode first and then remove the standby card.
4. Never remove an active output card because a phase error on the outputs will occur.
5. When replacing a Network Information Management Card, you must reconfigure the network parameters via the Local Port. Refer to chapter D3 for details.
6. Be aware of possible operating differences or limitations when replacing a card with another that has a different letter designation. For example, the 55481B can be configured to carry a data traffic pattern that includes one zero. Replacing a 55481B with a 55481A (this card can only carry all ONES) can (depending on the firmware revision in the ITH cards) either force the traffic pattern of the 55481B to all ONES (firmware version prior to 3744H) or cause the 55481A to go off-line and generate an alarm condition (firmware version 3744H and later). Review the chapters on individual output cards for any incompatibilities between “A” and “B” cards.

Tools and Equipment Required

- screwdrivers
- oscilloscope and 75 Ω cable terminator
- digital multimeter
- 55450A local craft terminal software

Firmware Recommendations

It is recommended that all firmware in the different SSU cards be the same revision. The firmware version currently running in the SSU can be determined by sending the appropriate command as explained in the next section, “Check SSU Communication.” Contact Symmetricom regarding both released firmware versions and newer versions.

Local installation: Instructions for installing the firmware using the local craft terminal software are part of that application’s online help.

Remote installation: Contact Symmetricom regarding instructions for installing the firmware using OSMF.

Fuse Replacement

Each SSU plug-in card uses unique fuses which feature a “blown fuse” indicator position and a fuse alarm LED on its front panel. When the fuse opens due to excessive current, a spring-loaded arm is released which then completes an electrical circuit to illuminate the front-panel fuse LED.

If the fuse LED is on, remove the card and replace the fuse with the same type and amperage-rating color code. If the fuse opens a second time, replace the card.

NVRAM Replacement

See chapter F3.

Check SSU Communication

NOTE

This procedure assumes that the communication card in the master subrack is an IMC or NIMC.

Sometimes it is useful to know that all the cards in the system can communicate properly.

CONNECT PC

Connect a PC to the SSU Local Port (located on the IMC and NIMC card) and run the 55450A local craft terminal software.

NOTE

Refer to chapter A5, "Local/Remote Management," for instructions on how to connect and configure the computer, and run the software.

Although only a terminal emulator program is needed to perform this procedure, it is recommended that you use the 55450A local craft terminal software to take advantage of the point-and-click interface.

PREPARE TO SEND COMMAND

Once the application is running, establish a connection to the SSU. (A successful connection is indicated by the "Retrieving data..." message at the top of the application window.) Once connected, go to the **Communication** screen. Click the cursor inside the screen area.

NOTE

If security is set on the SSU, you will need access to a valid user ID and password in order to complete the login to the SSU.

SEND COMMAND Type the following command string to retrieve the basic equipment information from the SSU. The ";" at the end of the line causes the command to execute:

```
rtrv-netype-all:::1;
```

RESULT This command string retrieves inventory information from the SSU. Each installed plug-in card will be identified by model number and firmware version (if the card carries firmware). This command also verifies the ability of the SSU to communicate with each card in the master subrack, as well as those cards in any expansion subracks. Include this information with any SSU system card returned for repair.

NOTE It is recommended that the firmware in all the SSU cards be the same revision.

SEND COMMAND Type the following command string. The ';' at the end of the line causes the command to execute:

```
rtrv-cond:::1;
```

The SSU will respond with information about the status of the input signals, the ITH clock cards, and the output cards.

Diagnosing Alarms

SSU events and alarms are closely related, yet there is a significant difference. Events are conditions that occur in the 55400A or are detected by the 55400A. Alarms are a subset of these events which have been configured using TL1 commands or the local craft terminal software to generate an alarm indication.

Although the SSU is capable of generating many alarm conditions, only a handful of SSU alarms can be cleared by replacing a card. Most SSU alarms are due to operating conditions and are not necessarily indications of equipment failures.

Alarms are divided into three severity levels: Minor, Major, and Critical. The default alarm setting for each event is listed in Table A4-1 on page A4-8. Most events can be configured to generate either a Minor, Major, or Critical alarm. These alarm severity levels are defined as follows:

- A minor alarm indicates that an event has occurred that does not yet affect the SSU quality of service. No immediate action is required.
- A major alarm indicates that an event has occurred that may affect the SSU quality of service. A major alarm is often used to indicate that the active equipment has failed and the standby equipment is now operating. The failed equipment should be replaced promptly to prevent the service from being affected.
- A critical alarm indicates that an event has occurred that has affected the SSU synchronization service. Immediate action is required to restore service.

Front-panel Indicators

Each card has its own Alarm LED. When a card detects an alarm, it will illuminate its Alarm LED. Since the card may be detecting the failure of other equipment, further troubleshooting is required to determine the cause of the alarm. **Do not replace a card just because its Alarm LED is on.**

For example, the Input loss of signal (INPLOS) event can be configured to generate a minor alarm if a reference source is not connected to an enabled SSU input channel. The proper corrective action would be to either connect a suitable reference source to the input channel or to disable the unused input. It would be incorrect to replace the ITH card for this alarm.

ITH Cards

SUMMARY Each ITH card receives the input reference signals, determines their quality for use by the system, and selects the most appropriate input signal to use as the active reference. In normal operation, the on-card oscillator will "track" the active input signal, and the ITH card will produce a precise frequency for the output cards based on the reference. If that reference is disqualified, the ITH card will select a remaining qualified input signal as the reference until that signal is disqualified or the system is forced to use another input signal. In the event that all input references fail, the ITH card goes into holdover mode using its own oscillator as the system reference.

For more information on the ITH cards, refer to chapter D1.

ITH Modes of Operation

ITH cards have four modes of operation: Warmup, Freerun, Tracking, and Holdover. When an ITH card is first powered on, it will be in Warmup mode for five to ten minutes. During Warmup mode, the oscillator oven is heated to the operational temperature. The ITH card does not track inputs nor supply synchronization when it is in the Warmup mode.

After Warmup mode completes, the ITH card enters Freerun mode for one to ten minutes until the ITH card can qualify the input reference signals. Before this, the ITH card does not have sufficient input tracking history to go into Holdover mode. During Freerun mode, a free-running local oscillator on the active ITH card provides the reference for the system. So the ITH does provides a synchronization output, but it is not locked to any of the reference inputs when in the Freerun mode.

After Freerun mode completes, the ITH card enters Tracking mode. This mode is the normal operating mode. During Tracking mode, the ITH card qualifies one or more inputs and locks to the highest priority input.

If all inputs become disqualified, the ITH card will enter Holdover mode. The ITH card will continue to supply synchronization, but this output is subject to the drift characteristics of the internal oscillator. Holdover mode is only available if an input has been tracked for at least ten minutes. Prior to this, the ITH card will enter Freerun mode if all inputs become disqualified.

ITH Troubleshooting Procedure

Identify any lit alarm LEDs on the front of the ITH cards. Red LEDs indicate a card has an alarm condition. The ITH card provides two levels of troubleshooting:

- Card failure conditions corrected by replacing a fuse or a card
- Failure modes used by a service technician to repair a card

Both troubleshooting levels are described here, although it is intended that troubleshooting in the field should be limited to only replacing a fuse or a failed card.

OBSERVE Indicator LEDs on the ITH plug-in card modules

Check front panel of ITH card for alarm indication and find that alarm condition in Table F2-1.

NOTE

If both the active and standby LEDs for an ITH card are off, this indicates that the ITH card has gone offline. This indicates a serious problem with the ITH card. Do not press the Force Active push button when an ITH card is offline. A loss of synchronization outputs can result.

ITH Card LED Conditions

The following table gives a description of the LED indicators.

Table F2-1. ITH Card LED Indicators

Indicator	Mode	Meaning
Power (Green LED)	Normal	Power is present
Tracking (Green LED)	Normal	ITH card is tracking a qualified input
Holdover (Red LED)	Alarm	ITH oscillator, using recent tracking data from a qualified reference, is providing the output frequency. No qualified references are available.
Fuse (Red LED)	Alarm	Card fuse is open
Diagnostics (Yellow LED) On continuously or blinking	Diagnostic	Used to indicate specific failure conditions for the service technician. See following tables for specific ITH card failures.
Warmup (Yellow LED)	Warmup	The oscillator oven is warming to operating temperature and the card is not active yet.
Freerun (Red LED)	Alarm	The card is generating an output, but without the use of any tracking information from a reference.
Alarm (Red LED)	Alarm	A failure has occurred on the card.
Inputs: Q=Qualified (Green LED)	Normal	The associated reference input is qualified and available for tracking.
Inputs: A=Active (Green LED)	Normal	The associated reference input is in use for tracking.
Active (Green LED)	Normal	This card is the synchronization signal source for all output cards.
Standby (Green LED)	Normal	This card is generating an output that is phase-locked to the output of the other (active) ITH card. The standby card will immediately become active upon command, or when the active ITH card fails.

Repair Indications

Follow the directions here based on the LED alarm showing.

HOLDOVER LED If Holdover LED is lit, verify that both ITH cards are in holdover.

If both cards are in holdover, investigate the input signal quality. If only one card is in holdover:

1. Ensure that the ITH card still qualifying input signals is the active card.
2. If the ITH card entered holdover mode because the performance measurements disqualified the inputs, use the INIT-REG command to clear the performance measurements for each disqualified input. The ITH card should requalify the inputs, provided the input signals meet the specified measurement criteria. Refer to the 55400A TL1 Programming Reference Manual for the INIT-REG command details.
3. Monitor the performance of the SSU.

FREERUN LED If both cards are in freerun, investigate the input signal quality. If only one card is in freerun:

1. Ensure that the ITH card still qualifying input signals is the active card.
2. If the ITH card entered freerun mode because the performance measurements disqualified the inputs, use the INIT-REG command to clear the performance measurements for each disqualified input. The ITH card should requalify the inputs, provided the input signals meet the specified measurement criteria. Refer to the 55400A TL1 Programming Reference Manual for the INIT-REG command details.
3. Monitor the performance of the SSU.

FUSE LED Remove card and replace fuse. Some transient condition may have caused the fuse to open. If a replacement fuse should fail, replace this ITH card.

The fuse is located near the rear edge of the card. Unplug the failed fuse and replace with one of the same type and value.

ALARM LED This LED indicates that some failure condition has occurred. This LED along with one, or more, of the others will help isolate the cause of the failure.

DIAGNOSTIC LED

The diagnostic LED, along with one or more of the other ITH LEDs can indicate specific hardware failures to the service technician. Refer to the following table for the failure modes indicated by a combination of illuminated LEDs on the card.

ITH CARDS WITH DIFFERENT VERSIONS OF FIRMWARE

Behavior: Istate transfer takes approximately ten minutes to complete, instead of less than one minute. Whenever an ITH card with unmatched firmware is inserted into the subrack, it can take an additional ten minutes before the ITH card will qualify any inputs. During this time, there will be an alarm indicated on the active ITH card. This alarm occurs because the Istate is not identical in both ITH cards. Do not remove either ITH card. Do not press the Force Active push button during this period.

ITH CARDS DISAGREE

Because the two ITH cards operate independently and come to separate conclusions about the quality of each input signal, there can be instances when the two ITH cards disagree. This condition will raise an alarm.

Reasons why the ITH cards may disagree:

- One of the monitored characteristics is on the edge of acceptability
- A difference in local oscillator operating points causes the input signal to be outside the pull-in range of one card and within the pull-in range of the other
- Different firmware versions in the ITH cards
- A hardware problem exists with one ITH card

Actions to take:

- Retrieve the alarm conditions from each ITH card and compare the results

rtrv-cond::s0-ith1:1;

rtrv-cond::s0-ith2:1;

One ITH card will show a disqualified input that the other does not show. Look for other events that do not appear for both cards.

If the alarm event is INPOOF (Input loss of framing) or INPAIS (Input AIS), the problem could be with the signal level of the input signal.

- Check the amplitude of the questionable input signal

If the alarm event is INPLOS (Input loss of signal), the cause could be the input level or a hardware problem.

- Check the amplitude of the questionable input signal

If an input is disqualified as the result of a measurement,

- Verify that the threshold is set correctly
- Compare the measurements from the two ITH cards
- Send the INIT-REG command to restart the measurements

If ITH card needs replacement

Follow the directions under, “Replace an ITH Card.”

Service Technician Failure Modes

The only field repair work recommended by Symmetricom for the SSU is replacement of fuses and faulty cards. The two tables in this section localize failures to specific components for the Symmetricom repair technician.

ITH Card Start-up Failure Modes

The table below summarizes the failures that can occur on power-up.

Table F2-2. ITH Card Start-up Failure Modes

When	Condition	Cause
At start-up	Diagnostic LED on continuously	Diagnostic testing in progress
	Diagnostic LED is blinking, all other LEDs are off	ITH switch settings have been copied to NVRAM of ITH cards in subrack. **Action**: Remove ITH card with blinking LED, set S5–7 to On, and reinsert card.
	Diagnostic LED is blinking and alternating with:	
	Tracking LED Holdover LED Freerun LED	+ 5 Vdc supply out of limits + 12 Vdc supply out of limits – 12 Vdc supply out of limits
	Diagnostic LED is blinking at a 1-second rate and:	
	PRC Qualified LED on PRC Active LED on	CPU test failed DUART test failed
	Input 1 Qualified LED on Input 1 Active LED on	SRAM data test failed SRAM address test failed
	Input 2 Qualified LED on Input 2 Active LED on	NVRAM data test failed NVRAM address test failed
	Input 3 Qualified LED on	E1 framer chip test failed on main board
	Input 3 Active LED on	E1 framer chip test failed on auxiliary board/10.2 MHz cable test failed
	Input 4 Qualified LED on Input 4 Active LED on	phase monitor FPGA load test failed DDFS FPGA load test failed

ITH Card Operating Failure Modes

The table below summarizes hardware operating failures.

Table F2-3. ITH Card Operating Failure Modes

When	Condition	Cause
During operation	Diagnostic LED on continuously and:	
	PRC Qualified LED on PRC Active LED on	+ 5 Vdc supply failure + 12 Vdc or – 12 Vdc supply failure
	Input 1 Qualified LED on Input 1 Active LED on	VCXO adjustment at minimum limit VCXO adjustment at maximum limit
	Input 2 Qualified LED on Input 2 Active LED on	Oscillator oven failure FPGA failure
	Input 3 Qualified LED on Input 3 Active LED on	Stack overflow EXTSYNC error
	Input 4 Qualified LED on Input 4 Active LED on	Reserved Reserved

Replace an ITH Card

The ITH cards are those that most directly affect the ability of the SSU to supply timing signals. Any time one needs to be replaced, extra care should be taken to ensure that timing signals from the SSU are not interrupted.

Once you have isolated the failure to the ITH card, ensure you have an appropriate replacement. In most cases, this means using an ITH card of the same model number containing the same firmware version as the card being replaced. The mixing of two different types of ITH cards is supported for certain combinations of cards as described in chapter D1, “Configure ITH Clock Cards.”

The procedure that follows describes how to replace an ITH card that has failed.

NOTE

Although the easiest way to make changes to operating SSU cards is with the 55450A local craft terminal software. The changes here deal with setting switches which ensure that the two cards are in agreement. This lessens the chance that the two cards ever get into a situation where one card accidentally writes its switch settings to the other card, this being contrary to what was intended.

1. Remove the failed ITH card

NOTE

When replacing an ITH card in a system that is in service, be sure that the card being replaced is in the standby mode (DO NOT remove the active card).

a. Always wear a properly-grounded ESD wrist strap when removing or inserting SSU cards.

b. Using the Phillips-head screwdriver, loosen the six screws holding the card in place. If a screw is lost, review the Replaceable Parts chapter for information on how to order more.

c. Remove the ITH card assembly from the subrack.

2. Set switches

a. Set the switches on the replacement card to be the same as the card it is replacing.

b. Check that switch S5–7 is set to "On." This setting ensures that the parameter settings from the active ITH card will automatically be copied into the memory of the replacement card when it is installed.

c. Transfer the serial number plate on the side of the ITH card assembly from the old card to the new card.

3. Plug in replacement card

a. Carefully insert the ITH card into the subrack.

b. Ensure that the card assembly is in proper alignment with its mating backplane connector.

c. Push the card assembly into place until it is fully seated into the backplane connectors without any binding or jamming.

d. Wait five seconds.

e. Remove the ITH card so it slides away from the backplane connector. (This step is necessary to clear an "NVRAM failed" alarm.)

f. Carefully re-insert the ITH card into the SSU.

g. Tighten the six screws used to secure the card in the subrack.

4. Observe

a. The self-test routine will execute.

b. Wait until the ITH card completes the warm-up period and successfully completes the qualification of inputs. This can take from 2–20 minutes.

c. Verify that any alarm conditions are cleared after pressing the alarm cutoff push button on the communication card several times. The SSU should be in an all-green LED mode.

Output Cards

SUMMARY The 55400A can hold up to ten output cards. When configured in the recommended 1:1 protected mode, the cards work in pairs. Each pair of cards can provide up to 16 outputs of timing signals for network elements.

For information on the output cards, refer to chapter D2.

Output Card Troubleshooting Procedure

Repair ITH cards before beginning this procedure. Identify any lit alarm LEDs on the front of the output cards. Red LEDs indicate a card has an alarm condition. If the fuse LED is lit, remove the card and inspect the fuse. Replace the fuse with the same type and value. If the replacement fuse should fail, replace the card.

Output Card LED Conditions

The following table provides a description of the LED indicators.

Table F2-4. Output Card LED Indicators

Indicator	Mode	Meaning
Power (Green LED)	Normal	Power is present
Diagnostics	N/A	Not supported by card
Fuse (Red LED)	Alarm	Card fuse is open
Alarm (Red LED)	Alarm	A failure has occurred on the card
Output Loss (Red LED)	Alarm	An active output has failed
OOL=Out of Lock (Red LED)	Alarm	The on-card phase-lock loop is unlocked
ITH 1 (Green LED)	Normal	The output card is tracking ITH 1 card
ITH 2 (Green LED)	Normal	The output card is tracking ITH 2 card
Active (Green LED)	Normal	The output card is providing outputs signals
Standby (Green LED)	Normal	The output card is ready to take over should the active output card fail

Other Output Card LED Error Conditions

All output cards include the LED indicators described in the previous table. But one of output cards contains additional LEDs to inform the customer of conditions detected with the special functions provided by this card. The 55471A traffic re-synchronization card (TRSC) is different from the other output cards because it alone accepts input signals directly to the card. Be aware that there are improper configuration settings that can cause an alarm condition without any kind of actual failure.

Refer to chapter D2 for more information on the TRSC card.

55471A Alarm Events

When troubleshooting this card, it is important to understand how the card operates. Read about this card in chapter D2.

Any activity on the LOS, OOF, SLIP, or MSLIP indicators on this card refers to the input and output channels that make up this card. Investigate the input signals to the card and the switch configuration before replacing the card to fix a problem.

Example of configuration causing alarm condition: The alarm LED will remain lighted until signals are connected to all input channels that are enabled. The default condition for the TRSC is all channels enabled. Disable unused channels.

Replace an Output Card

Once you have isolated the failure to the output card, ensure you have an appropriate replacement. In most cases, this means an output card of the same model number as the remaining card in the system.

The procedure that follows describes how to replace an output card that has failed.

1. Remove the failed output card

NOTE

When replacing an output card in a system that is in service, be sure that the card being replaced is in the standby mode. DO NOT remove the active card. Phase hits on the SSU outputs will occur.

a. Always wear a properly-grounded ESD wrist strap when removing or inserting SSU cards.

b. Using the Phillips-head screwdriver, loosen the two screws holding the card in place. If a screw is lost, review the Replaceable Parts chapter for information on how to order more.

c. Remove the output card assembly from the subrack.

d. If the card is under warranty, send card to Symmetricom or call Symmetricom. Follow the directions for returning a card at the end of this chapter.

2. Set switches

a. Set the switches on the replacement card to be the same as the card it is replacing.

b. If the replacement card has no front panel, transfer the front panel from the old card to the new card.

3. Plug in replacement card

a. Carefully insert the output card into the subrack.

b. Ensure that the card assembly is in proper alignment with its mating backplane connector.

c. Push the card assembly into place until it is fully seated into the backplane connectors without any binding or jamming.

d. Tighten the two screws used to secure the card in the subrack.

4. Observe

a. The self-test routine will execute.

b. Verify that alarm condition is cleared after pressing the alarm cutoff push button on the output card.

IMC/NIMC Cards

SUMMARY The SSU supports two cards for providing information about the SSU to the external environment. Both of the communication cards can report system alarms at the front panel, but then the two cards can also support computer and/or network connections for much more extensive management capabilities.

Communication Card Types

- 55441A—Information Management Card (IMC)—handles alarm information plus provides for computer communication via local and remote serial ports for data reporting and control
- 55442A—Network Information Management Card (NIMC)—handles alarm information plus provides a local communication port and a network connection.

One of these two cards is installed in the master subrack. It is the left-most card as you face the subrack.

For information of the communication cards, refer to chapter D3.

Communication Card Troubleshooting Procedure

Identify any lit alarm LEDs on the front of the communication cards. Red LEDs indicate a card has an alarm condition. If the fuse LED is lit, remove the card and inspect the fuse. Replace the fuse with the same type and value. If the replacement fuse should fail again, replace the card.

NOTE The Alarm LED indicates a failure on this card. The three alarm levels (Critical, Major, Minor) indicate the level of alarm in the subrack as a whole.

The following tables give a description of the LED indicators on the communication cards. The first table is for the AIC; the next one covers the IMC and NIMC. In addition, there is a table that can be used by a Symmetricom repair technician to help isolate a hardware failure.

IMC/NIMC LED Conditions

The following table gives a description of the LED indicators.

Table F2-5. IMC/NIMC Card LED Indicators

Indicator	Mode	Meaning
Power (Green LED)	Normal	Power is present
Diagnostics (Yellow LED) Blinking	Diagnostic	Used to indicate specific failure conditions. See tables below for failure modes.
–48 V Fail A (Red LED)	Alarm	–48 Vdc (A) input is below normal voltage level
–48 V Fail B (Red LED)	Alarm	–48 Vdc (B) input is below normal voltage level
Fuse (Red LED)	Alarm	Card fuse is open
Alarm (Red LED)	Alarm	A failure has occurred on the card.
Alarm Critical (Red LED)	Alarm	A critical alarm state exists in the master or expansion subracks.
Alarm Major (Red LED)	Alarm	A major alarm state exists in the master or expansion subracks.
Alarm Minor (Red LED)	Alarm	A minor alarm state exists in the master or expansion subracks.
Alarm Cutoff (Red LED)	Alarm	Audible or visual alarm was present. Audible alarm has been silenced; alarm state persists.
Local/Remote (Green LED)	Normal	A user is logged on
Link (Green LED)	Normal	Link shows that network connection is active. (NIMC only)
Data Xmit (Green LED)	Normal	Data Xmit shows data transfer (NIMC only)

Service Technician Failure Modes

The only field repair work recommended by Symmetricom for the SSU is replacement of fuses and faulty cards. The following table helps isolate failures of specific components for the Symmetricom repair technician.

Table F2-6. IMC/NIMC Card Start-up Failure Modes

When	Condition	Cause
At start-up	Diagnostic LED on continuously	Diagnostic testing in progress
	Diagnostic LED is blinking and:	
	Local LED on	CPU, SRAM, or NVRAM test failed
	Remote LED on	DUART test failed

Replace a Communication Card

The communication cards have no direct impact on the ability of the SSU to supply timing signals. As a result, you should first repair the ITH cards and the output cards before you deal with the communication card.

Once you have isolated the failure to the communication card, ensure you have an appropriate replacement. In most cases, this means a communication card of the same model number and option number with the same version of firmware.

NOTE

Remember that an NIMC has most likely previously been installed on a network. Part of the replacement procedure will be to configure the network parameters in the new card to the same values as the card being replaced. This requires a knowledge of the original settings established for the card.

1. Remove the failed communication card

NOTE

Depending on the failure condition of the card, it may be possible using the 55450A local craft terminal software to retrieve the network parameter settings when replacing an NIMC. Otherwise the system administrator will need to provide this information.

a. Always wear a properly-grounded ESD wrist strap when removing or inserting SSU cards.

b. Remove any cables connected to the communication card.

c. Using the Phillips-head screwdriver, loosen the four screws holding the card in place. If a screw is lost, review the replacement parts chapter for information on how to order more.

d. Remove the communication card assembly from the subrack.

2. Set switches

a. Set the switches on the replacement card to be the same as the card it is replacing.

b. If the replacement card has no front panel, transfer the front panel from the old card to the new card.

3. Plug in replacement card

a. Carefully insert the communication card into the subrack.

b. Ensure that the card assembly is in proper alignment with its mating backplane connector.

c. Push the card assembly into place until it is fully seated into the backplane connectors without any binding or jamming.

d. Wait five seconds.

e. Remove the communication card so it slides away from the backplane connector. (This step is necessary to clear an "NVRAM failed" alarm.)

f. Carefully re-insert the communication card into the SSU.

4. If replacing a Network IMC do this step, otherwise go to 5.

a. Connect PC to Local Port. Refer to chapter A5 for more information.

b. Configure card for network operation using the local craft terminal software. Refer to chapter D3 for more information. If it is not possible to determine the network parameters, carefully remove U50 (NVRAM) from the failed card and insert it into the replacement card. This will transfer the existing network parameters to the new card.

c. Tighten the four screws used to secure the card in the subrack.

5. Observe

a. The self-test routine will execute. Wait approximately two minutes.

b. Verify that any alarm conditions are cleared after pressing the alarm cutoff push button on this card several times.

6. Last Step

a. Reconnect any cables to the communication card.

b. For a Network IMC, verify that the network connection operates properly. The Link LED should be on.

c. The SSU should be in an all-green LED mode.

Replacing Expansion Subrack Cards

The expansion subrack cards include the following:

- Expansion Synchronization Card
- Expansion Communications Card

This procedure describes how to replace the expansion sync or comm card that has failed.

1. **Remove the failed card**
   a. Always wear a properly-grounded ESD wrist strap when removing or inserting SSU cards.
   b. Using the Phillips-head screwdriver, loosen the screws holding the card in place. If a screw is lost, review the replacement parts chapter for information on how to order more.
   c. Remove the failed card assembly from the subrack.
   d. If the card is under warranty, send card to Symmetricom or call Symmetricom. Follow the directions for returning a card at the end of this chapter.
2. **Set switches**
   a. Set the switches on the replacement card to be the same as the card it is replacing.
   b. If the replacement card has no front panel, transfer the front panel from the old card to the new card.
3. **Plug in replacement card**
   a. Carefully insert the card into the subrack.
   b. Ensure that the card assembly is in proper alignment with its mating backplane connector.
   c. Push the card assembly into place until it is fully seated into the backplane connectors without any binding or jamming.
   d. Tighten the two screws used to secure the card in the subrack.
4. **Observe**
   a. The self-test routine will execute.
   b. Verify that any alarm conditions are cleared after pressing the alarm cutoff push button on the card several times.

Return Procedure for Cards

Contact your Symmetricom sales or service representative when you need to return a faulty 55400A plug-in card.

When returning a card for repair. Include as much information as possible about the failure condition. This should include the specific LEDs that were lit, a printout of the SSU event log and conditions retrieved, as instructed in the previous chapter.

When returning a defective assembly to Symmetricom, please include the following information to ensure a proper repair:

- Date
- Company name
- Submitter's name
- Contact phone or e-mail address
- Product serial number
- Whether the unit is from a recently installed system that has not yet been put into service or an existing system that has been in service
- A printout of the SSU event log and conditions retrieved, as captured in the previous chapter

NOTE

Replacement cards include a Failure Detail Form. Fill out this form while troubleshooting the failed card and send it back with the defective card

The next chapter covers the replacement parts for the SSU plug-in cards.

F3

Replacement Parts

SSU and mini-SSU replacement parts

In This Chapter

This chapter contains replacement part information for the 55400A SSU and mini-SSU. Consult the documentation supplied with the 55300A GPS reference source or the 5071A frequency standard for part information about those products.

The 55400A SSU consists of many individual products each carrying its own part number. The parts listed here are the recommended replacement parts for your SSU.

Contact Information for Parts Ordering

Contact your Symmetricom sales or service representative when you need to order a replacement part.

Firmware

The following SSU system elements contain firmware:

- IMC and NIMC communication cards
- ITH cards
- Expansion Comm cards
- Expansion Sync cards

NOTE

Although newer versions of firmware are backwards-compatible with older versions, it is strongly recommended that you use the same firmware version in all cards, especially the two ITH cards. This configuration is tested at the factory.

NVRAM Replacement

A number of the SSU and mini-SSU cards contain a non-volatile memory used to store such items as parameter settings, event log, and network addresses. The device retains data for a minimum of 10 years in the absence of external power. The NVRAM component on the card is installed in a socket to allow easy replacement.

Table F3-1. NVRAM Replacement Part for SSU and mini-SSU

Assembly	Description	Part Number
all except output cards	NVRAM	1818-4441

NOTE

If the NVRAM failure is on a network IMC, the network parameters will need to be configured again (see chapter E1).

55400A SSU Replacement Parts

ITH Cards

Table F3-2. 55400A ITH Card "A" Model Replacement Parts

Assembly	Description	Part Number
55411A Std.	stratum-2	55411-69100
55411A Opt. 001	stratum-2	55411-69101
55412A Std.	transit node	55412-69100
55412A Opt. 001	transit node	55412-69101
55413A Std.	local node	55413-69100
55413A Opt. 001	local node	55413-69101
55414A Std.	enhanced stratum-2	55414-69100
55414A Opt. 001	enhanced stratum-2	55414-69101
All	2A fuse	2110-1125
All	termination jumper	1258-0141

Table F3-3. 55400A ITH Card "B" Model Replacement Parts

Assembly	Description	Part Number
55411B Std.	stratum-2	55411-69110
55411B Opt. 001	stratum-2	55411-69111
55412B Std.	transit node	55412-69110
55412B Opt. 001	transit node	55412-69111
55413B Std.	local node	55413-69110
55413B Opt. 001	local node	55413-69111
55414B Std.	enhanced stratum-2	55414-69110
55414B Opt. 001	enhanced stratum-2	55414-69111
55415B Std.	enhanced transit node	55415-69110
55415B Opt. 001	enhanced transit node	55415-69111
55429B	Mini-SSU local node	55429-69110
All	3A fuse	2110-1000
All	termination jumper	1258-0141

Output Cards

Table F3-4. 55400A Output Cards Model Replacement Parts

Assembly	Description	Part Number
55471A (2A fuse)	traffic re-sync	55471-69001
75 Ω feed-thru termination for 55471A inputs	Siemens 1.6/5.6 connectors	Call factory
75 Ω feed-thru termination for 55471A inputs	BNC connectors	1250-2002
55481A	2048 kbps	55481-69001
55481B (1A fuse)	2048 kbps	55481-69003
55482A (1A fuse)	2048 kHz	55482-69003
55483A (2A fuse)	64/8 kHz composite clock	55483-69001
55484A (8 outputs, 2A fuse)	1/5/10 MHz	55484-69001
55485A (8 outputs, 2A fuse)	1544 kbps	55485-69001
55485B (16 outputs, 1A fuse)	1544 kbps	55485-69002
55488A (1A fuse)	2048 kHz/2048 kbps	55488-69003
	1A fuse	2110-1129
	2A fuse	2110-1125

Communication Cards

Table F3-5. 55400A Communication Cards Replacement Parts

Assembly	Description	Part Number
55431A	alarm card	55431-69001
55441A	information management card	55441-69001
55442A Standard	LAN network information card	55442-69001
55442A Option 002	X.25 network information card	55442-69002
55442A Option 003	TP4 network information card	55442-69004
All	1A fuse	2110-1129

Expansion Subrack Cards

The expansion subracks use a sync card and comm card.

Table F3-6. 55400A Expansion Subrack Cards Replacement Parts

Assembly	Description	Part Number
55419A	sync card	55419-69001
55443A	communication card	55443-69001
All	1A fuse	2110-1129

BALUNs

Baluns are needed on the SSU inputs and outputs for 120 Ω balanced operation.

Table F3-7.

SSU Connector Type	Balun Part Number
BNC	11250-2735
Siemens 1.6/5.6	1250-2739

55409A Mini-SSU Replacement Parts

ITH Card

The following table contains the replacement ITH cards available for the 55409A mini-SSU.

Table F3-8. 55409A ITH Card Replacement Parts

Assembly	Description	Part Number
55429B	local node	55429-69110
	3A fuse	2110-1000
	termination jumper	1258-0141

NOTE

The 55429B has the same performance as the 55413B and is only intended for use with the 55409A mini-SSU. The only functional difference is that the 55429B supports a total of three input references, including the PRC input.

Input/Output Modules

The following table contains the replacement I/O modules available for the 55409A mini-SSU.

Table F3-9. 55409A ITH Card Replacement Parts

Assembly	Description	Part Number
55497A with BNCs	output module	55497-60001
55497A with micro Siemens	output module	55497-60002
55498A with BNCs	input/output module	55498-60001
55498A with micro Siemens	input/output module	55498-60002

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