SRG-4500 User Guide

ROSS

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Our mission is to:

1. Provide a Superior Customer Experience
    *   offer the best product quality and support
2. Make Cool Practical Technology
    *   develop great products that customers love

Ross has become well known for the Ross Video Code of Ethics. It guides our interactions and empowers our employees. I hope you enjoy reading it below.

If anything at all with your Ross experience does not live up to your expectations be sure to reach out to us at *solutions@rossvideo.com*.

David Ross
CEO, Ross Video
dross@rossvideo.com

Ross Video Code of Ethics

Any company is the sum total of the people that make things happen. At Ross, our employees are a special group. Our employees truly care about doing a great job and delivering a high quality customer experience every day. This code of ethics hangs on the wall of all Ross Video locations to guide our behavior:

1. We will always act in our customers' best interest.
2. We will do our best to understand our customers' requirements.
3. We will not ship crap.
4. We will be great to work with.
5. We will do something extra for our customers, as an apology, when something big goes wrong and it's our fault.
6. We will keep our promises.
7. We will treat the competition with respect.
8. We will cooperate with and help other friendly companies.
9. We will go above and beyond in times of crisis. *If there's no one to authorize the required action in times of company or customer crisis - do what you know in your heart is right. (You may rent helicopters if necessary.)*

SRG-4500 · User Guide

- Ross Part Number: **4500DR-104-09**
- Release Date: November 8, 2021.

The information contained in this Guide is subject to change without notice or obligation.

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Patents

Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

Notice

The material in this manual is furnished for informational use only. It is subject to change without notice and should not be construed as commitment by Ross Video Limited. Ross Video Limited assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

Safety Notices

Refer to the "**Important Regulatory and Safety Notices**" document that accompanied your product.

Maintenance/User Serviceable Parts

Routine maintenance to this Ross Video product is not required. This product contains no user serviceable parts. If the product does not appear to be working properly, please contact Technical Support using the numbers listed under the "**Contact Us**" section of this manual. This product is covered by a generous 1-year warranty and will be repaired without charge for materials or labor within this period. See the "**Warranty and Repair Policy**" section in this guide for details.

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.

If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Ross Video for more information on the environmental performances of our products.

Company Address

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Introduction

This guide covers the installation, configuration, and use of the SRG-4500 Master Reference and Test Signal Generator. The following chapters are included:

- "**Introduction**" summarizes the guide and provides important terms, and conventions.
- "**Before You Begin**" provides a brief product overview and installation requirements for the SRG-4500.
- "**Network Requirements**" provides guidelines for installing the SRG-4500 in your facility network.
- "**Hardware Overview**" describes the SRG-4500 hardware components.
- "**Physical Installation**" provides instructions for the basic physical installation of the SRG-4500.
- "**Functional Check Procedures**" guides you through the steps required to check the operation of the SRG-4500.
- "**Getting Started**" outlines how to launch DashBoard, and how to access the SRG-4500 interfaces in DashBoard.
- "**Front Panel Menu System**"summarizes the menu system available via the front panel LCD.
- "**Troubleshooting**" provides troubleshooting guidance for the SRG-4500, instructions on how to upgrade the software on the SRG-4500, and how to replace a failed power supply unit.
- "**Technical Specifications**" provides the specifications for the SRG-4500.
- "**Connector Pinouts**" lists the pinouts of various multi-way connectors available on the rear panel of the SRG-4500.
- "**Characters for Use in Idents**" lists the characters in idents come from an intersection list of the first 256 characters from Unicode and the allowable characters in XML 1.1
- "**Test Patterns**" provides an overview of the test patterns available for the SRG-4500.
- "**Installing the Breakout PCB**" summarizes how to physically install the Breakout PCB for the SRG-4500.
- "**4K UHD BNC Connections**" briefly summarizes the SDI outputs designations when using 4K UHD signals.
- "**NTP Option**" provides a general overview of how to set up the NTP option.
- "**GPS-4500-ANT-HW Option**" provides a general overview of how to set up the GPS-4500-ANT-HW option.
- "**GPS-4500-#M Options**" provides a general overview of how to set up the GPS-4500-8M, GPS-4500-35M, GPS-4500-100M, and GPS-4500-200M options.
- "**PTP Option**" provides an overview of a PTP work-flow.
- "**Certifications and Compliances**" provides information about the standards the SRG-4500 conforms to.
- "**Service Information**" provides information on the warranty and repair policy for your SRG-4500.
- "**Glossary**"provides a list of terms used throughout this guide.

Related Publications

It is recommended to consult the following Ross documentation before installing and configuring your SRG-4500:

- *ACO-4500 Quick Start Guide*, Ross Part Number: 4500DR-202
- *ACO-4500 User Guide*, Ross Part Number: 4500DR-204

- ***DashBoard User Manual***, Ross Part Number: 8351DR-004
- ***GPS-4500 Quick Start Guide***, Ross Part Number: 4500DR-106
- ***SRG-4500 Quick Start Guide***, Ross Part Number: 4500DR-102

Documentation Conventions

Special text formats are used in this guide to identify parts of the user interface, text that a user must enter, or a sequence of menus and sub-menus that must be followed to reach a particular command.

Interface Elements

Bold text is used to identify a user interface element such as a dialog box, menu item, or button. For example:

In the **Edit** dialog, click **Insert Above**.

User Entered Text

Courier text is used to identify text that a user must enter. For example:

In the **Language** box, enter `English.`

Referenced Guides

Italic text is used to identify the titles of referenced guides, manuals, or documents. For example:

For more information, refer to the ***DashBoard User Manual***.

Menu Sequences

Menu arrows are used in procedures to identify a sequence of menu items that you must follow. For example, if a step reads "**File** > **Save As**," you would select the **File** menu and then select **Save As**.

The term `[Confirm]` indicates that you should press the Rotary Control, and `[Back]` indicates that you should press the blue push-button.

Important Instructions

Star icons are used to identify important instructions or features. For example:

✷ Contact your IT department before connecting to your facility network to ensure that there are no conflicts. They will provide you with an appropriate value for the IP Address, Subnet Mask, and Gateway for your SRG-4500.

Contacting Technical Support

At Ross Video, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24-hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross Video personnel. During business hours (Eastern Time), technical support personnel are available by telephone. After hours and on weekends, a direct emergency technical support phone line is available. If the technical support person who is on call does not answer this line immediately, a voice message can be left

and the call will be returned shortly. This team of highly trained staff is available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

- **Technical Support**: (+1) 613-652-4886
- **After Hours Emergency**: (+1) 613-349-0006
- **E-mail**: techsupport@rossvideo.com
- **Website**: http://www.rossvideo.com

Before You Begin

The SRG-4500 is designed for high stability Master Sync and time reference operation. The product provides a comprehensive range of accurate video, audio and time reference and test signals including: Analog Composite Video, Analog Composite Black-Burst, Tri-Level Sync, Serial Digital (SDI) Test & Black (SD, HD, 3G, and 4K (Quad and 2SI), analog audio, AES/EBU Audio, DARS, Word Clock, and time reference signals including, Timecode (LTC and VITC), and NTP plus inputs for an external frequency reference and a GPS reference.

Overview

The SRG-4500, in its base configuration, is supplied as a Composite SPG with multiple Color Black and SD-SDI outputs. The Color Black outputs are configured to be capable of providing Tri-level Syncs. Interfaces for AES/EBU Digital Audio outputs, Analog Audio outputs, LTC outputs, a GPS input, and an external frequency reference input are also standard features with the SRG-4500. Dual N+1 power supplies are also standard.

Option Keys

Additional options above the base configuration are enabled using special Option Keys. These options are:

- GPS-4500
- NTP-4500
- PTP-4500
- UHD-4500

The connectors and associated hardware for these options will already be present - the Option Keys simply extend the range of signal options on the associated video outputs (see diagrams below), or enable the option in the case of GPS, PTP, and NTP.

Applications

Use the SRG-4500 in the following applications:

- SPG and time reference generator for broadcast, studio, outside broadcast, SNG and post-production facilities
- Master or slave (Genlock) operation
- Link testing, Fly-Away packs and others

Features

The SRG-4500 includes the following:

- High Stability Internal Reference
- Genlock to the NTSC/PAL Black-Burst signals, time to remote NTP server, or optionally to GPS
- Frequency Lock to 10MHz
- 2 Composite Analog Video signal outputs + 2 Composite Analog Black-Burst signal outputs
- 4 independent serial digital video outputs + 4 SDI black outputs
- 5 Independent Pattern Generators
- 5 Independent Monochrome ID text and Monochrome Logo Generators supporting international characters

- 3 Independent and Timeable Black-Burst or Tri-Sync Generators
- 11 Independent channels of Timecode: 4 Longitudinal Timecode (LTC) outputs (Balanced), 2 Serial Digital VITC / ATC, and 5 Analog Video VITC
- 82 channels of Audio: 16 channels of Embedded Audio in each of 4 SDI outputs, 16 channels of Audio in 8 AES/EBU Serial Digital Audio outputs (8 Balanced and 2 BNC), 1 Stereo Analog Audio output (Balanced)
- 2 AES/EBU DARS Serial Digital Audio outputs (1 Balanced and 1 BNC)
- 48 kHz and 44.1 kHz Word Clock output
- 1Hz, 6Hz and 10MHz Reference output
- Ethernet (100 BASE-T) Interface for connection to the DashBoard Control System
- N+1 power redundancy
- Tight integration with the ACO-4500 Channel Changeover unit

Functional Block Diagrams

This section summarizes the functionality of the SRG-4500.

Central Timing Generator
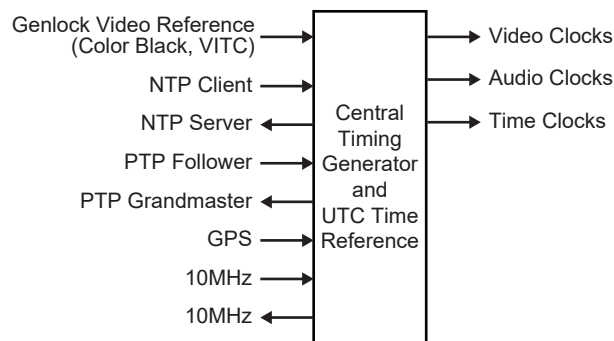
Figure 1 SRG-4500 — Central Timing Generator

Audio Generator
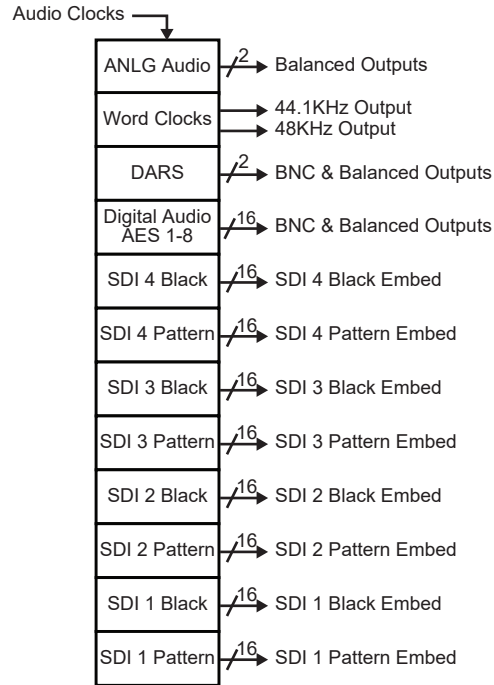
Figure 2 SRG-4500 — Audio Generator

Standard SDI Outputs
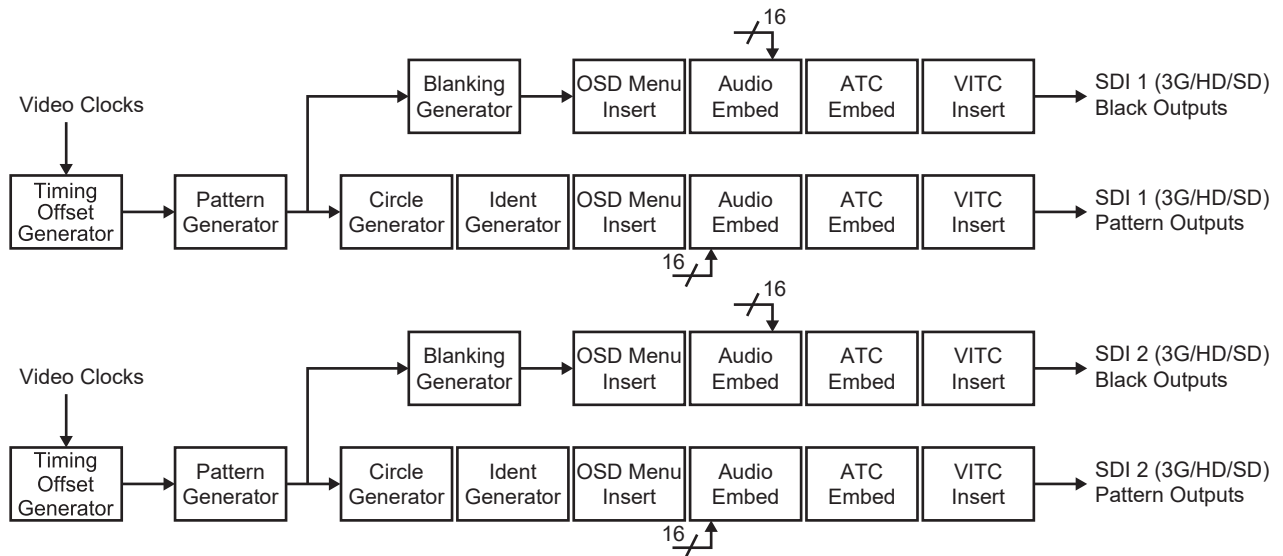
Figure 3 SRG-4500 — SDI Outputs

Optional SDI Outputs
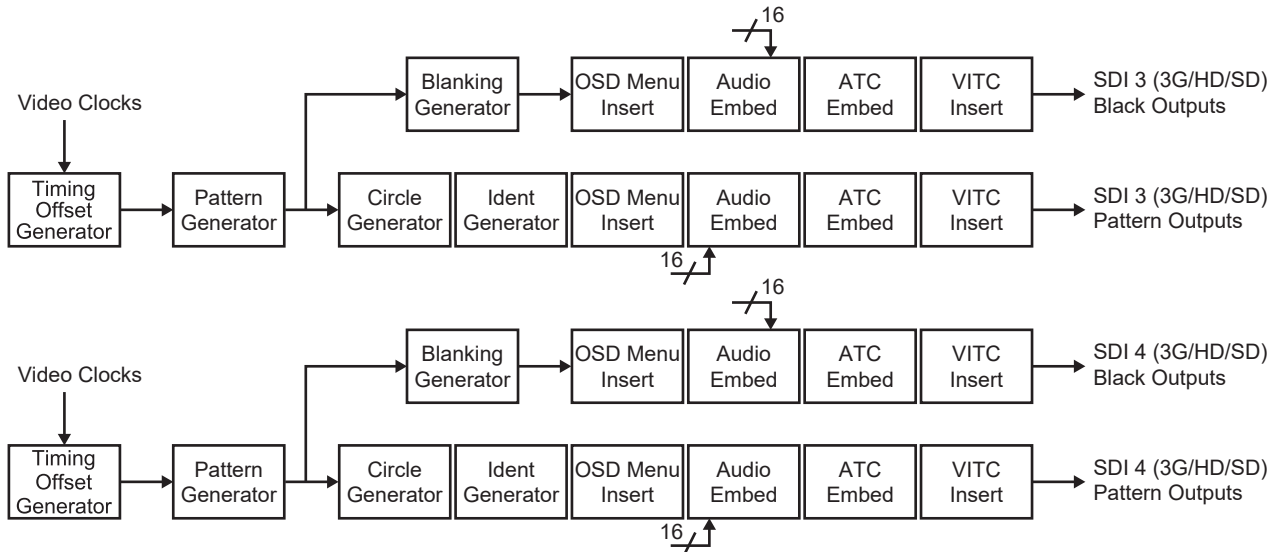
Figure 4 SRG-4500 — Optional SDI Outputs

Composite Pattern and Tri-Sync/Composite Black Outputs
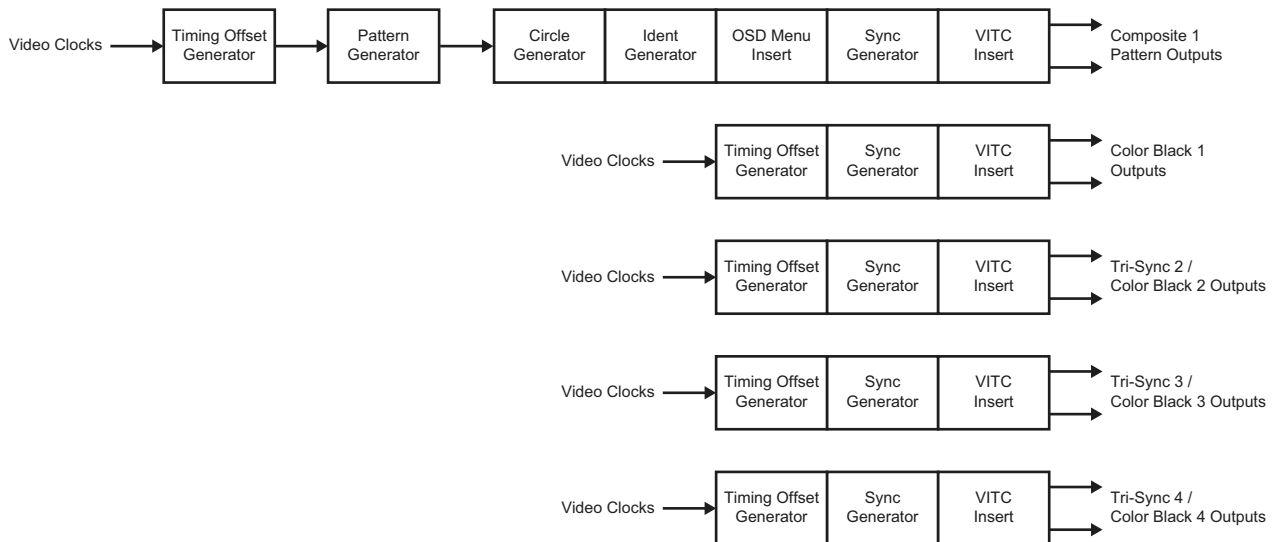
Figure 5 SRG-4500 — Composite Pattern and Tri-Sync/Composite Black Outputs

Timecode

SPG Time = UTC ± SPG Offset
i.e. Toronto, ON Canada is UTC - 05:00

Timecode Outputs

LTC 1 = SPG Time ± LTC 1 Offset + Daylight Saving
LTC 2 = SPG Time ± LTC 2 Offset + Daylight Saving
LCT 3 = SPG Time ± LTC 3 Offset + Daylight Saving
LTC 4 = SPG Time ± LTC 4 Offset + Daylight Saving
Black 1 = SPG Time ± Black 1 Offset + Daylight Saving
Black 2 = SPG Time ± Black 2 Offset + Daylight Saving
Black 3 = SPG Time ± Black 3 Offset + Daylight Saving
Black 4 = SPG Time ± Black 4 Offset + Daylight Saving
Composite = SPG Time ± Composite Offset + Daylight Saving
SDI 1 = SPG Time ± SDI 1 Offset + Daylight Saving
SDI 2 = SPG Time ± SDI 2 Offset + Daylight Saving

Offsets are user defined.
Daylight saving can be automatically added some countries.

Figure 6 SRG-4500 — Timecode

Signal Processing Modules
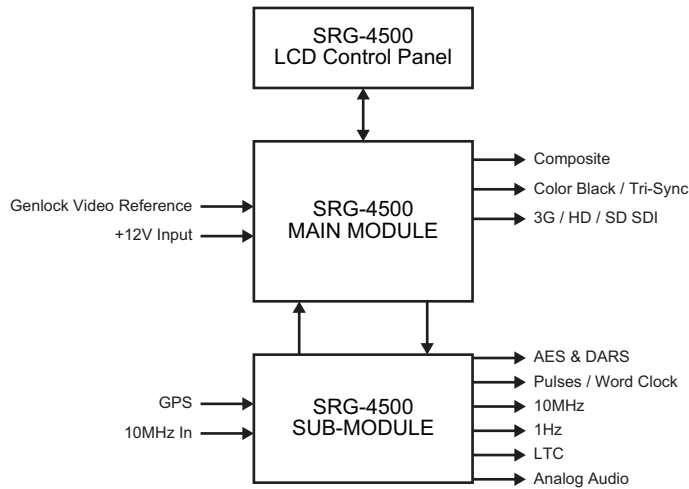
Figure 7 SRG-4500 — Signal Processing

Network Requirements

This chapter provides guidelines for installing the SRG-4500 in your facility network.

Network Setup Workflow Overview

Figure 8 outlines the steps required for adding the SRG-4500 to your facility network.

```
                    ┌─────────────────────┐
                    │   Configure the IP   │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │   Ensure the Network │
                    │    Ports are Open    │
                    └─────────────────────┘
                              │
                              ▼
                           ◇ Is the
                      unit connected
                      to an L2 or L3
                           switch? ◇
                         ┌────┴────┐
                         ▼         ▼
                      ┌────┐    ┌────┐
                      │ L2 │    │ L3 │
                      └────┘    └────┘
                         │         │
                         ▼         ▼
              ┌──────────────┐ ┌──────────────────┐
              │Configure Switch Port│ │Configure Router Port│
              └──────────────┘ └──────────────────┘
                         │         │
                         ▼         ▼
                    ┌─────────────────────┐
                    │      Use on a       │
                    │ Well Disciplined Network │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │    Ping the System   │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │  Check the Network   │
                    │    Configuration     │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │   Add to DashBoard   │
                    │      Tree View       │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │  Set up DashBoard    │
                    │     Proxy Server     │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │  Configure Logging   │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │ Configure SNMP Traps │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │ Disable Network Scans│
                    │      and Probes      │
                    └─────────────────────┘
```
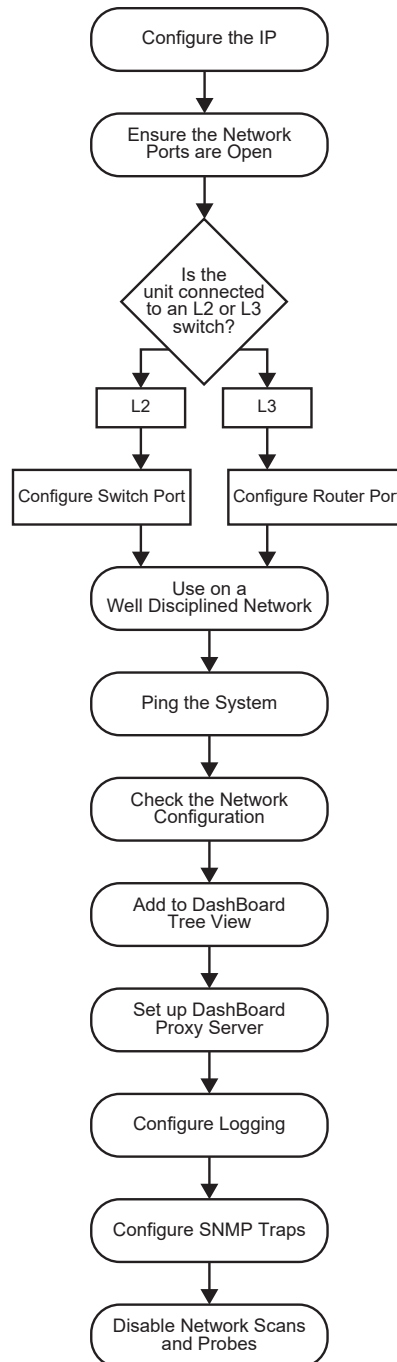
Figure 8 Network Setup Workflow

The following sections provide more information on each step in the workflow.

Configure the IP

Assign an IP address to the SRG-4500 as outlined in the **SRG-4500 Quick Start Guide**.

Ensure the Network Switch Ports are Open

Ensure your network switch and firewall(s) are configured to pass on the ports outlined in **Table 1**.

Table 1 SRG-4500 Open Ports and Functions

Port	Function
9987	System Upgrade Utility
9988	Primary/Backup Polling Port
1991	ACO/SRG Communication Port
1992	Default Logging Port
161	SNMP Managers/Agents
162	SNMP Traps
123	NTP (only needed if NTP is active)
5253	Main DashBoard Port
6666	Alternative DashBoard Port

Connection to an L2 or L3 Switch

The next step depends on the type of network switch the SRG-4500 is connected to.

Configure the Switch Port (L2)

If you are connecting to an L2 or better switch, enable the Storm Control configuration of your network switch for the port connected to the SRG-4500. A limit of zero broadcast, unknown-unicast, and multicast messages is recommended. If this is unavailable, select <10 messages/second.

Configure the Router Port (L3)

If you are connecting to an L3 or better switch, it is strongly recommended to close unused ports on the network switch connected to the control port.

The only open ports should be: 9987, 9988, 1991, 1992, 161, 162, 123, 5253, and 6666. All other ports should be disabled.

Use on a Well Disciplined Network

Efforts to eliminate multicast, unknown unicast, and broadcast traffic should be implemented on the network. Do not place the management port on the media network.

Ping the System

From the computer running the DashBoard client, run a ping command to ensure a network route is available.

Check Network Configuration

Verify the Open Ports 9987, 9988, 1991, 1992, 161, 162, 123, 5253, and 6666.

Use an application on the DashBoard client machine to confirm the port is open and the network is configured (e.g. PortQryV2.exe from Microsoft® or a Telnet client). Note that Port 5253 is the default DashBoard port.

Add to the DashBoard Tree View

Manually add the SRG-4500 to the DashBoard tree view. Refer to "**Enabling a Connection in DashBoard**" for details.

Set up a DashBoard Proxy Server

A proxy server is required if there is a need for more than one simultaneous connection, or a need to access across different network segments. The proxy server also allows remote DashBoard clients to use a single IP address to access all devices shared by that proxy server. Refer to the *DashBoard User Guide* for details.

Configure Logging

The SRG-4500 supports remote logging via UDP on port 1992. It is highly recommended to enable logging at the time of commissioning (initial setup).

1. Set up a logging server (e.g. Visual Sys Log server) on the network.

2. In DashBoard:

    a. Select the **Slot16: Network** node for the SRG-4500.

    b. Select the **Debug Logging** tab.

3. Enter the IP address of the logging system from step 1.

4. Do not edit the logging fields/menus (leave these at the default values) unless directed by Ross Technical Support.

✶ The default settings enable the SRG-4500 to log basic information. When directed by Ross Technical Support, these options can be edited to provide more detailed logging as required for specific troubleshooting purposes.

Configure SNMP Traps

If required, basic alarms are sent via SNMP v2c traps.

1. In DashBoard:

    a. Select the **Slot16: Network** node for the SRG-4500.

    b. Select the **SNMP** tab.

2. Enter the IP address of the trap monitoring system.

Disable Network Scans and Probes

⚠ **Caution** — *Network scans and probes will result in the SRG-4500 requiring a power cycle.*

Ensure that any port scans, security scans or security probes are done during a service window. The units are not qualified for network and/or port scanners while in normal operation. After a scan, the unit will require a power cycle.

Hardware Overview

This chapter presents information on the SRG-4500 front and rear panels.

Front Panel Overview

This section summarizes the controls and indicators located on the SRG-4500 front panel.
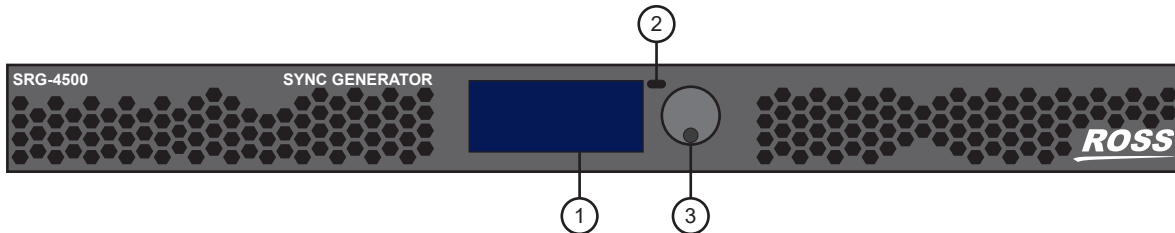
Figure 9 SRG-4500 — Front Panel Components

1. LCD Display

The dot-matrix LCD display is used to show system status, fault indications, and general in-use information, as well as being used to configure the menu system items.

2. Back Button

The Back push-button is used to exit the current menu screen, and to traverse back through the menus, ultimately to the stand-by screen.

Pressing the dedicated push-button once will exit the current menu level. When you have finished editing the menu options, you should use the dedicated push-button to exit the menu system completely. You need to press the button a suitable number of times to get back to the stand-by screen (the one with the Ross Video logo, one press back from the top level menu). This will save any changes that you have made to the non-volatile memory.

Pressing the Back button while pressing the Rotary/Push Control knob at the same time will lock the front panel controls. Pressing both again will unlock the front panel controls.

3. Rotary/Push Control Knob

The Rotary / Push control has two functions:

› the rotary function is used to navigate up or down items in a menu, or to cycle through a range of values relating to a menu item,

› the push function is used to confirm a menu item selection for editing, to exit menu item editing, or take you "forward" to the next menu item.

Selecting or editing menu items requires you to turn the Rotary Control in order to select or change the highlighted menu item / setting, then to press the Rotary Control to select or confirm that menu item / setting. Pressing the Rotary Control will select the highlighted menu item for editing, exit menu item editing, or take you to the next menu level. Note that there may be more menu lines available than can be displayed on the LCD screen; be sure to scroll down (or up) to find the required entry.

For some menu items, there may be many values to scroll though. In order to assist in quickly accessing the required value(s), software monitoring the signals from the rotary control applies a ballistic response to modify the rate at which the menu values change:

If the rotations/second occur at a reasonably constant rate, the speed at which menu values change will increase exponentially.

› If the rotations/second decreases, the ballistic response also decreases.

> › If the rotations/second stops for more than 1 second, then the ballistic response resets to normal action.
> › Switching the rotation direction will preserve the modified rate, assuming that the direction change occurred with minimal delay.

4. Removable Power Supplies (not shown)

There are two Removable Power Supply assemblies, installed and secured into the front of the SRG-4500, either side of the LCD display. These supplies can be removed or inserted while mains power is still present. Should it become necessary to replace one or both of the Removable Power Supply assemblies, the instrument does not have to be removed from the rack.

Rear Panel Overview

The rear panel provides connections to the power supplies, signal outputs, inputs, and ports for communication over Ethernet.
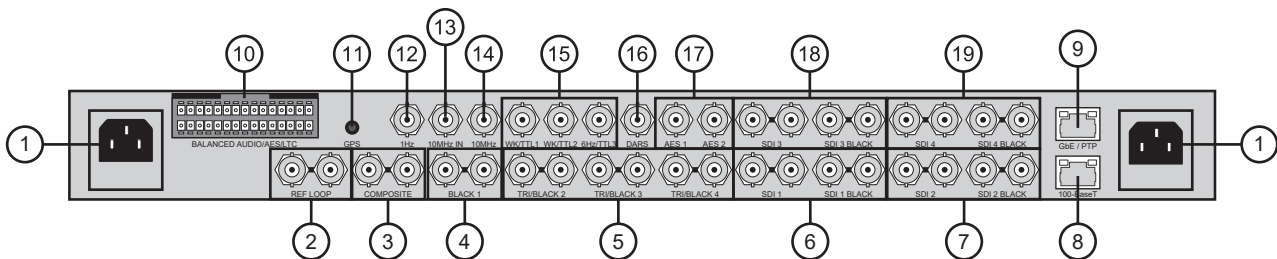
Figure 10 SRG-4500 — Rear Panel Components

1. Power Connectors

The SRG-4500 is designed to operate from a single-phase power source with the neutral conductor at or near earth ground. The line conductor is fused for over-current protection. A protective ground connection through the grounding conductor in the power cord is essential for safe operation. Safety earth studs are also provided for earth bonding the chassis if you so require.

> ⚠ **Warning** — **Do Not Operate Without Covers**. *Do not operate this product with covers or panels removed.*

The SRG-4500 operates from an AC line frequency of 48Hz to 63Hz, over the range of 85VAC to 250VAC, without the need for user configuration. Refer to the chapter "**Technical Specifications**" for additional information on power and environment requirements.

You need to provide two power connections (for the two Power Connectors). For full power security, these should be on separate, independent and secure power grids. However, you still gain the security of power supply failure redundancy if you use the same power grid for both connections.

2. REF LOOP

This pair of BNCs allow the input of a remote reference signal. This signal may be NTSC Black-Burst, or PAL B/G.

With the reference signal applied to one BNC, the other BNC must be terminated (or connected to another unit which is ultimately terminated).

If the SRG-4500 is to be used as a Master reference (i.e. not Genlocked), you do not have to supply a signal, and you may leave these BNCs unconnected. However, it is always wise to add a termination onto one BNC of an unused looping pair, in order to avoid having a "floating" input.

3. COMPOSITE Output

This pair of BNCs provides two outputs of the selected Analog Composite Video Pattern. The output format can be PAL, NTSC-M or NTSC-J.

4. BLACK 1 Output

This pair of BNCs provides two outputs of Analog Composite Video Black-Burst. The output format is always the same as that selected on the COMPOSITE output.

5. TRI/BLACK 2, 3, and 4 Outputs

These three pairs of BNCs provide two outputs each of either Analog Composite Video Black-Burst in PAL, NTSC-M or NTSC-J, or any one of the supported Tri-Level Sync formats. These three pairs of outputs are completely independent from each other.

6. SDI 1 and SDI 1 BLACK Outputs

These two pairs of BNCs provide two outputs each of the selected pattern and black in Standard Definition, High Definition or 3G Video, in any of the supported formats. The signal format of the black output follows that of the Pattern output.

7. SDI 2 and SDI 2 BLACK Outputs

These two pairs of BNCs provide two outputs each of the selected pattern and black in Standard Definition, High Definition or 3G Video, in any of the supported formats. The signal format of the black output follows that of the Pattern output.

8. Ethernet 100-Base T

This rear panel connector is a standard RJ45 Ethernet connector. This connection is required for DashBoard connectivity, NTP services, software upgrades, etc.

✦ The 100Base-T network port is used for status and control (DashBoard). In an environment where broadcast and/or multicast traffic is present, it is important to limit the number of broadcast and/or multicast messages that reach the 100Bast-T port to a very low number. This is normally configured in the *Storm Control* configuration of your network router. A limit of zero broadcast and/or multicast messages is recommended. If this is not available then choose < 10 broadcast and/or multicast messages per second.

9. GbE/PTP

This port is for the option PTP interface.

10. BALANCED AUDIO / AES / LTC Outputs

This 30-pin multi-way connector provides outputs of Analog Balanced Audio, AES Audio, and LTC. These are user configurable via DashBoard.

11. GPS Input with +5v DC Output to Power Antenna

This coaxial connector is used to connect a suitable GPS aerial in order to be able to Genlock the SRG-4500, and to provide accurate time and date information. The GPS-4500 option key is required.

12. 1Hz Output

This BNC provides an output of the 1Hz pulse.

13. 10MHz Input

This input accepts a standard 10MHz reference signal.

14. 10MHz Output

This BNC provides an output of 10MHz derived from either the extremely stable internal oscillator, or looped-through from the 10MHz IN. A relay controls which signal is routed to this output.

15.WK/TTL1, WK/TTL2, and 6Hz/TTL3 Outputs

These three BNCs each provide independent outputs of either Word Clock or 6Hz, or any one of a selection of traditional pulses, e.g. Mixed Sync, Mixed Blanking, etc.

16.DARS Output

This BNC provides an output of DARS (Digital Audio Reference Signal).

17.AES1 and AES2 Outputs

These two BNCs provide outputs of the associated AES audio channels in AES3id format.

18.SDI 3 and SDI 3 BLACK Outputs

These two pairs of BNCs provide two outputs each of the selected pattern and black in Standard Definition, High Definition or 3G Video, in any of the supported formats. The signal format of the black output follows that of the Pattern output.

19.SDI 4 and SDI 4 BLACK Outputs

These two pairs of BNCs provide two outputs each of the selected pattern and black in Standard Definition, High Definition or 3G Video, in any of the supported formats. The signal format of the black output follows that of the Pattern output.

Physical Installation

If you have questions pertaining to the installation of SRG-4500, please contact us at the numbers listed in the section "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

For More Information on...

• the technical specifications for the SRG-4500, refer to the chapter "**Technical Specifications**".

Before You Begin

Before installing the SRG-4500, refer to the document "**Important Regulatory and Safety Notices to Service Personnel**" that accompanied your unit for general safety information.

Static Discharge

Throughout this chapter, please heed the following cautionary note:

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Operating Environment Requirements

Keep the following in mind before installing the SRG-4500:

• Verify that the location of your installation has the proper operating environment. The SRG-4500 operates correctly in ambient temperatures from 0°C to +40°C and relative humidity from 20% to 80%.

• The SRG-4500 requires 50mm (2") of side clearance for counter top use. Also, ensure sufficient rear clearance, e.g. 75mm (3"), so that cables are not compromised.

• It is imperative that you ensure there is sufficient space all around the unit to allow the airflow to vent away any excess heat generated by the unit.

Caution — *The SRG-4500 could be damaged if it is powered on at temperatures or humidities outside the specified ranges.*

For More Information on...

• environmental operating specifications, refer to the chapter "**Technical Specifications**".

Unpacking

Unpack each SRG-4500 you received from the shipping container and ensure that all items are included. Initial Product Inspection

Perform the following when you receive your SRG-4500:

1. Inspect the shipping carton for external damage, which may indicate possible damage to the SRG-4500. If damage exists, document it, including photographs, to support any insurance claim.

2. Remove the instrument from the shipping carton.

3. Check that the SRG-4500 has not been damaged in transit. The exterior should not have any scratches or impact marks. Prior to shipment, the SRG-4500 is thoroughly inspected for mechanical defects.

4. Verify that the shipping carton contains the instrument, the standard accessories, and any optional accessories that you ordered.

✱ If any items are missing or damaged, contact your sales representative or Ross Video directly.

5. Save the shipping carton and packaging materials for SRG-4500 re-packaging in case return shipment becomes necessary.

6. Perform the Functional Check Procedures as outlined in the chapter "**Functional Check Procedures**" after installing the SRG-4500.

Accessories and Options

This section lists the standard accessories that ship with the SRG-4500 and the available software options that you can purchase.

Standard Accessories

The following accessories are shipped with the SRG-4500.

Power Cords

All SRG-4500 are shipped with one of the following power cord options:

• Power cords for use in the United Kingdom are BS1363 approved.
• Power cords for use in North America are UL listed and CSA certified.
• Power cords for use in Europe conform to CEE7, DIN49441 and VDE standards.
• Cords for use in other areas are approved by at least one authority acceptable in the country to which the product is shipped.

Additional Software Options

You can order the following software options for your SRG-4500:

• GPS-4500 — Enables GPS Time Synchronization
• NTP-4500 — Enables NTP Time Synchronization
• PTP-4500 — Enables the PTP feature
• UHD-4500 — Enables the UHD Pattern Generator feature

Rack Mount Installation

You can install the SRG-4500 into an equipment rack. It is recommended to use the rack mount kit and to loom the cables so that they do not introduce extra weight or twisting force on the front panel rack mountings or rear panel connectors. If installed in a mobile application, the rack mount kit is essential.

This section describes how to install the SRG-4500 into the rack.

⚠ **Warning** — *Do not use the rack handles to carry the unit. The rack handles are not primarily designed for this purpose, and property damage or personal injury may result.*

Installing the SRG-4500 into a Rack Unit

The SRG-4500 mounts in the rack cabinet by means of four screws through the front mounting flanges. This should normally be sufficient to carry the load, including weight of cables. Refer to the **SRG-4500 Quick Start Guide** for mounting details.

Installing the Rear Support Brackets

Warning — *Do not use the support brackets to carry the SRG-4500. The brackets are not primarily designed for this purpose, and property damage or personal injury may result.*

In some cases, (mobile trucks, etc.) it may be desirable to also support the rear of the SRG-4500. The rear support bars can be attached to the SRG-4500 in six possible positions. (**Figure 11**)
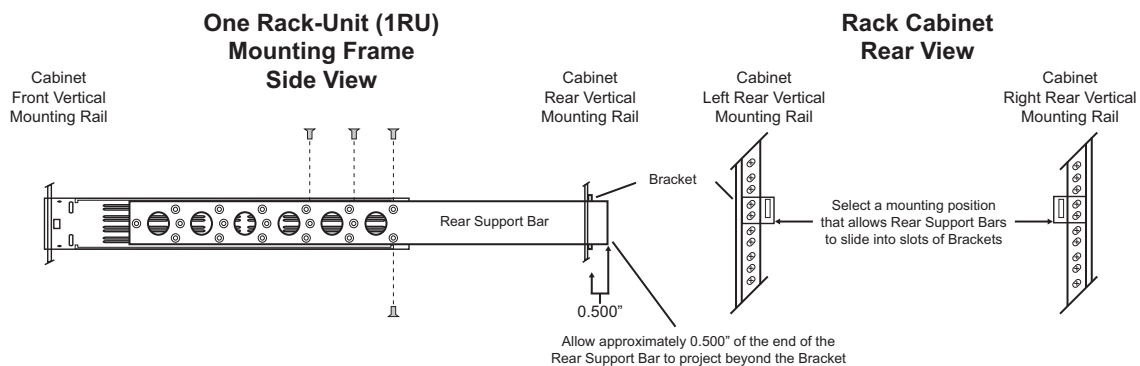
Figure 11 Installing the Support Brackets

To install the support brackets

1. Choose the position that suits the cabinet depth and will give approximately a 0.5" projection beyond the previously mounted bracket.

2. Using four screws per bracket, as shown in **Figure 11**, attach both bars.

3. Mount the frame to the front rails of the rack cabinet using rack screws.

4. At the rear of the cabinet, slide the bracket slots over the rear of the support bars and secure to the cabinet rear rails with rack screws. Refer to the **SRG-4500 Quick Start Guide** for more information.

5. Install the Breakout PCB as outlined in "**Installing the Breakout PCB**".

Connecting Power

Warning — *Disconnect both power cords. If two power entry connectors are present on the rear panel, the unit will still be powered until both power cords are removed.*

Caution — *The SRG-4500 does not have a power switch. Removing the Power Supply Cord(s) disconnects the device from the mains power. Ensure easily accessible socket outlets are available near the unit to power the device.*

The SRG-4500 operates from a single-phase power source with the neutral conductor at or near earth ground. The line conductor is fused for over-current protection. A protective ground connection through the grounding conductor in the power cord is essential for safe operation. Safety earth studs are also provided for earth bonding the chassis if you so require.

Your SRG-4500 includes the N+1 power option (PS-4500), you need to provide two power connections. For full power security, these should be on separate, independent and secure power grids. However, you still gain the security of power supply failure redundancy if you use the same power grid for both connections.

AC Power Requirement

Check that your location provides the proper electrical power requirements as listed in **Table 2**.

Table 2 AC Line Power Requirements

Parameters	Description
Line Voltage Range	120-230V
Line Frequency	50-60Hz
Maximum Power (Single PSU)	<130mA @ 230VAC <210mA @ 120 VAC
	31VA (≈14W - calculated)
Maximum Power (Dual PSU)	<130mA @ 230VAC <210mA @ 120 VAC
	46VA (21W - calculated)

Connecting the Power Cable

Connect the power cable to the instrument first, and then connect it to the AC power source.

✶ Connecting a live power cable causes the SRG-4500 to power on.

Functional Check Procedures

Perform the following procedures if you are operating the SRG-4500 for the first time (to verify that the SRG-4500 shipped without damage), or you suspect that the SRG-4500 is not working properly.

Required Equipment

The following equipment is required for the functional check:

- TV signal generator
- Multi-format waveform/picture monitors
- Serial digital video analyzer with embedded audio functionality
- Digital audio de-embedder
- AES/EBU digital audio analyzer
- Analog audio analyzer
- Oscilloscope
- 75ohm BNC cables
- 75ohm terminations
- Breakout cable/box for the rear panel 30-way multi-way connector (not supplied by Ross Video)

Before You Begin

This chapter will guide you through the steps required to check the operation of the SRG-4500. The most common scenarios will be explored to enable the user to familiarize themselves with the operation of the unit.

Although some steps are included which suggest cycling through menu options in order to check operation, this is not mandatory - a simple check for presence or absence of a signal will suffice.

For More Information on...

- the configurable menus and fields for the SRG-4500, refer to the chapter "**DashBoard Interface Overview**".

Initial Power-Up

The SRG-4500 menu system contains an appreciable number of pre-programmed and user selectable settings. All of these settings are programmed using the factory default procedure, and a select few are then adjusted during testing and alignment. This is especially true of the Calibration menu, where settings relating to the fundamental operation of each individual SRG-4500 are stored. If memory corruption occurs, some or all of the settings may need to be re-instated.

1. Ensure that the SRG-4500 is not powered on.

2. Connect any relevant video cables to the SRG-4500, with reference to the diagram in the section "**Rear Panel Overview**".

3. Apply power to the SRG-4500 by connecting it to the power source(s). The instrument runs its power-on initialization process.

4. Check that no error messages appear on the LCD display.

5. The Front Panel menu display can also be made to simultaneously appear on any of the video outputs - there is a menu entry for each output to enable this facility. By default, the menu is enabled on all video outputs.

6. Much of the functional check can be carried out immediately. However, some calibration settings are only guaranteed once functional temperature has stabilized (which should occur after 20 minutes). It is good practice to soak the instrument before proceeding.

7. Selecting or editing menu items requires you to turn the Rotary Control in order to select or change the highlighted menu item / setting, then to press the Rotary Control to select or confirm that menu item / setting.

   • Pressing the Rotary Control will either select the highlighted menu item for editing, exit menu item editing, or take you to the next menu level.
   • Note that there may be more menu lines available than can be displayed on the LCD screen or video outputs; be sure to scroll down (or up) to find the required entry.

8. Pressing the blue push-button once will exit the current menu level or item.

   • When you have finished editing the menu options, you should use the blue push-button to exit the menu system completely.
   • You need to press the button a suitable number of times to get back to the stand-by screen (the one with the Ross Video logo). This will save any changes that you have made to the non-volatile memory.

9. If preferred, user settings can be adjusted using DashBoard.

Initial Configuration

The SRG-4500 should arrive configured to a "factory default" condition, i.e. all video outputs will have a pattern selected that is relevant to the format of the output, all of the audio channels will be configured for "1kHz Tone and Silence", etc.

Additionally, any pre-ordered options (i.e. GPS or NTP) will have been enabled. This can be confirmed by viewing the Option Enable page in the menu; enabled options will have valid Option Keys entered for them.

The following procedures will systematically progress through all of the outputs available from the SRG-4500. The range of menu entries available for each procedure may relate to whether associated options have been enabled.

In all but the first of the procedures that follow, some intermediate instructions relating to cursor movements and control button presses may have been omitted for clarity.

Also, menu screens almost always contain more lines then can be displayed on the LCD or the OSD - be sure to scroll up/down to find the menu entry you require.

For More Information on...
• enabling option keys for your SRG-4500, refer to the section "**Option Enable Settings**".

Checking the Composite (Analog) Video Signal Outputs

✸ The term "[Confirm]" indicates that you should press the Rotary Control. The term "[Back]" indicates that you should press the blue push-button.

From the Top Level menu:

1. Highlight < -Video >.

2. [Confirm .

3. Highlight the top menu line.

4. [Confirm].

5. Select < Video Channel 05 = Composite 1 >.

6. [Confirm].

7. Connect the Composite Video output to a Waveform / Picture Monitor using a 75ohm BNC cable.

8. Set the Waveform / Picture Monitor to view the Composite signal.

9. Check that the Waveform / Picture Monitor displays the appropriate Composite signal.

10. Check that the Composite signal is as configured in the menu, and that selecting and editing entries in the menu by using the rotary/push control, the configuration of the Composite signal changes accordingly.

11. Return to the Top Level menu using the [Back] button.

Checking the Black 1 (Analog) Video Signal Outputs

The format of the Analog Black 1 output follows that of the Composite output; consequently, the format of this output cannot be changed from within the < Black 1 > menu.

From the Top Level menu:

1. Select < -Video >.

2. Select < Video Channel 07 = Black 1 >.

3. Connect the Black 1 video output to the Waveform / Picture Monitor using a 75ohm BNC cable.

4. Set the Waveform / Picture Monitor to view the Black 1 signal.

5. Check that the Waveform / Picture Monitor displays the appropriate Black 1 signal.

6. Check that the Black 1 signal is as configured in the menu, and that selecting and editing entries in the menu by using the rotary/push control, the configuration of the Black 1 signal changes accordingly.

7. Return to the Top Level menu using the [Back] button.

Checking the Tri-Black 2 / 3 / 4 Tri-Level Sync Outputs

The Tri-Black 2 / 3 / 4 outputs can be configured to produce either traditional "bi-level" Color Black (i.e. PAL / NTSC) or Tri-Level syncs.

✱ Bi-Level Color Black is always available. Tri-Level Syncs are only available if the associated Option Key has been entered; otherwise, the selection of output format is restricted.

From the Top Level menu:

1. Select < -Video >.

2. Select < Video Channel 08 = Tri Black 2 >.

3. Connect the Tri-Black 2 output to an oscilloscope or suitable Analyzer using a 75ohm BNC cable.

4. Set the oscilloscope / Analyzer to view the Tri-Black 2 signal.

5. Check that the oscilloscope / Analyzer displays the appropriate Tri-Black 2 signal.

6. Check that the Tri-Black 2 signal is as configured in the menu, and that selecting and editing entries in the menu by using the rotary/push control, the configuration of the Tri-Black 2 signal changes accordingly.

7. Return to step 2, set for < Video Channel 09 = Tri Black 3 >, and repeat steps to check the Tri-Black 3 outputs.

8. Return to step 2, set for < Video Channel 10 = Tri Black 4 >, and repeat steps to check the Tri-Black 4 outputs.

9. Return to the Top Level menu using the [Back] button.

Serial Digital Video Signal Outputs

The format of the SDI Black 1 (and 2) output(s) follows that of the associated SDI Pattern output; i.e. they operate as a pair of "linked" outputs.

Each SDI Video output channel can be configured to produce SD-SDI, HD-SDI or 3G-SDI.

From the Top Level menu:

1. Select < -Video >.

2. Select < Video Channel 01 = SDI+Black 1 >.

3. Connect the SDI1 Pattern output to the Serial Digital Video Analyzer using a 75ohm BNC cable.

4. Set the Serial Digital Video Analyzer to view the Serial Digital Video signal.

5. Check that the Serial Digital Video Analyzer displays the appropriate Serial Digital Video signal. If available, check the status of the Serial Digital Video signal on the Analyzer by setting it to display the relevant data.

6. Check that the Serial Digital Video signal is as configured in the menu, and that selecting and editing entries in the menu by using the rotary/push control, the configuration of the Serial Digital Video signal changes accordingly.

7. Move the 75ohm BNC cable to the SDI1 Black output.

8. Repeat steps 4 - 6 to confirm the configuration of the SDI1 Black output.

9. Return to step 2, set for < Video Channel 02 = SDI+Black 2 >, and repeat steps to check both of the SDI2 outputs.

10. Return to the Top Level menu using the [Back] button.

SDI Embedded Audio Settings

Audio channels on the SDI outputs are arranged as 8 stereo pairs on each video output:

• SDI 1 Pattern 01 ... 16
• SDI 1 Black 01 ... 16
• SDI 2 Pattern 01 ... 16
• SDI 2 Black 01 ... 16.

From the Top Level menu:

1. Select < -Audio >.

2. Select < SDI 1 Pattern Left = Audio 01 >.

3. Connect the SDI1 Pattern video output to the Serial Digital Video Analyzer or to a Digital Audio De-Embedder using a 75ohm BNC cable.

4. Set the Analyzer / De-Embedder to display the status of the audio data, and to receive a signal through the connected input.

5. Check that the Analyzer / De-Embedder does not report any data errors, etc.

6. Check that the Digital Audio signal is as configured in the menu, and that selecting and editing entries in the menu by using the rotary/push control, the configuration of the Digital Audio signal changes accordingly.

7. Repeat steps 3 - 6 for menu selection:

< SDI 1 Pattern Right = Audio 02 > on SDI1 Pattern video output.

8. Repeat steps 3 - 6 for menu selections:

    < SDI 1 Pattern Left / Right = Audio 03....16 > on SDI1 Pattern video output.

9. Repeat steps 3 - 6 for menu selections:

    < SDI 1 Black Left / Right = Audio 01....16 > on SDI1 Black output.

10. Repeat steps 3 - 6 for menu selections:

    < SDI 2 Pattern Left / Right = Audio 01....16 > on SDI2 Pattern video output.

11. Repeat steps 3 - 6 for menu selections:

    < SDI 2 Black Left / Right = Audio 01....16 > on SDI2 Black output.

12. Return to the Top Level menu using the [Back] button.

AES / EBU Audio Outputs

✦ AES/EBU Audio Outputs are only available when the multifunction sub-module is installed.

Audio channels on the AES outputs are arranged as stereo pairs on each output:

• AES 1 01 02
• AES 2 01 .... 02 etc, to
• AES 8 01 02

✦ Before proceeding, connect a suitable Breakout cable/box to the 30-pin Multi-way connector on the rear panel.

From the Top Level menu:

1. Select < -Audio >.

2. Select < Audio AES1 Left = Audio 01 >.

3. From the Breakout cable/box, connect AES Audio Channel 01 to your Digital Audio Analyzer input.

4. Set the Digital Audio Analyzer to display the status of the audio data, and to receive a signal through the connected input.

5. Check that the Analyzer does not report any data errors, etc.

6. Check that the Digital Audio signal is as configured in the menu, and that selecting and editing entries in the menu by using the rotary/push control, the configuration of the Digital Audio signal changes accordingly.

7. Repeat steps 3 - 6 for menu selection

    < Audio AES1 Right = Audio 02 > and breakout connection AES Audio Channel 02.

8. Repeat steps 3 - 6 for menu selections:

    < Audio AES 2....6 Left / Right = Audio 03....12 > and breakout connections AES Audio Channel 03 through 12.

9. AES7 and AES8 Audio outputs will only appear on the rear panel multi-way connector of the sub-module if the relevant menu items have been suitably configured. Refer to the section "**System Functions**" for more details on where these settings are.

10. Repeat steps 3 - 6 for menu selections:

    < Audio AES 7....8 Left / Right = Audio 13....16 > and breakout connections AES Audio Channel 13 through 16.

11. Return to the Top Level menu using the [Back] button.

Analog Audio Outputs

Analog Audio Outputs are only available when the multifunction sub-module is installed.Audio channels on the Analog Audio outputs are arranged as a stereo pair: Analog 01 ... 02

Before proceeding, connect a suitable Breakout cable/box to the 30-pin Multi-way connector on the rear panel.

From the Top Level menu:

1. Select < -Audio >.

2. Select < Audio Analog1 Left = Audio 01 > [2nd to last entry in the list].

3. From the Breakout cable/box, connect Analog Audio Channel 01 to your Analog Audio Analyzer input or to an oscilloscope.

4. Set the Analog Audio Analyzer / oscilloscope to display the audio signal, and to receive a signal through the connected input.

5. Check that the Analog Audio signal is as configured in the menu, and that selecting and editing entries in the menu by using the rotary/push control, the configuration of the Analog Audio signal changes accordingly.

6. Repeat steps 3 - 5 for menu selection:

   < Audio Analog1 Right = Audio 02 > [Last entry in the list] and breakout connections Analog Audio Channel 02.

7. Return to the Top Level menu using the [Back] button.

Time and Timecode Settings

Each video output has its own dedicated Timecode generator, which can be offset from the main SPG Time. Additionally, there are dedicated LTC outputs which can be similarly offset. There are also several Timecode system-related setup screens. This procedure will acquaint the user with the available options. Refer to **Figure 6** for a functional diagram of the Timecode system.

The following Timecode menu screens are available:

• SDI 1 & SDIBlack 1 Timecode
• SDI 2 & SDIBlack 2 Timecode
• Composite 1 VITC
• Black 1 VITC
• Tri-Sync Black 2 VITC
• Tri-Sync Black 3 VITC
• Tri-Sync Black 4 VITC
• LTC 1 Timecode
• LTC 2 Timecode
• LTC 3 Timecode
• LTC 4 Timecode
• SPG Time
• UTC DateTime
• GPS DateTime (UTC)
• NTP DateTime (UTC)
• Analog REF VITC (UTC)

- Digital REF TC (UTC)
- Summer DST Event (UTC)
- Winter DST Event (UTC)
- Leap Second Event (UTC)

Full details regarding the setting of UTC Time, SPG Time, Summer and Winter DST Events, and Leap seconds can be found in "**Timecode Menus**". A flow chart outlining the Time and Date Configuration sequence is shown in "**Timecode**".

From the Top Level menu:

1. Select < -Timecode >.

2. Select < SDI 1 & SDIBlack 1 Timecode >.

3. Line 2 of the menu confirms the format of the selected video output.

4. Line 3 of the menu displays the channel time - "Running Time".

5. Line 4 of the menu allows the user to input an offset from the current SPG Time to appear on the selected video output.

6. < Offset = SPGTime + hh.mm.ss.ff > (where hh.mm.ss.ff are hours. minutes.seconds. Frames - may have non-zero entries relating to an offset that has already been entered).

7. Repeat steps 3 - 6 for < SDI 2 & SDIBlack 2 Timecode >.

8. Repeat steps 3 - 6 for < Composite 1 VITC >.

9. Repeat steps 3 - 6 for < Black 1 VITC >.

10. Repeat steps 3 - 6 for < Tri-Sync Black 2-4 VITC >.

11. Repeat steps 3 - 6 for < LTC 1-4 Timecode >.

12. Return to the Top Level menu using the [Back] button.

Genlock Mode

From the Top Level menu:

1. Select < -Genlock >.

2. Select < Lock Mode >.

3. Select < Internal Lock > from the list.

4. Check that < -Lock Status > confirms the instrument is using the internal reference.

5. Check that < -Ref Status > confirms the instrument has not detected an external reference.

6. Using a 75ohm BNC cable, connect Color Black from the TV signal generator to the SRG-4500 REF-LOOP input BNC connector. Terminate the unused REF-LOOP connector with a 75ohm termination.

7. Check that < -Lock Status > confirms the instrument is locked. If a valid signal has been connected, < -Lock Status > will usually sequence through the states:
   - Internal Lock
   - Locking
   - Locked

8. Check that < -Ref Status > confirms the instrument has detected an external reference by indicating the format of the signal you have connected to the REF- LOOP input.

9. Select < Lock Mode >.

10. Select < Genlock 1 > from the list.

11. Check that < -Lock Status > confirms the instrument is locked to the external reference.

12. Once you have selected < Genlock 1 > the SPG will Genlock the video outputs to the external reference if it is a valid signal. This can be confirmed on an oscilloscope or a vector-scope.

13. Disconnect the external reference from the REF-LOOP connector.

14. < -Lock Status > should now indicate Internal Lock, and < -Ref Status > should now indicate No signal.

15. Return to the Top Level menu using the [Back] button.

System Functions

From the Top Level menu:

1. Select < -System Setup>.

2. Select < -Temp Report >. This screen displays the current temperatures of any installed sensors.

3. Return to the System Setup menu using the [Back] button.

4. Select < -Event Report >. This screen displays the latest reported system events.

5. Return to the System Setup menu using the [Back] button.

6. Select < -System Report >. This menu screen reports the various system version numbers.

7. Return to the System Setup menu using the [Back] button.

8. Select < -GPS Report >. This menu screen reports the status of the GPS receiver sub-system.

9. Return to the System Setup menu using the [Back] button.

10. Select < Configuration >.

11. Select < Changeover > to define whether the SRG-4500 is the Primary or the Backup unit in a changeover pair.

12. Select < LCD Brightness > to select the brightness of the LCD screen.

13. Select < AES1-8 + Analog > to select the reference source for the AES and Analogue audios.

14. Select < AES7 Output is > to select AES channel 7 or LTC channel 3 to appear on the relevant pin(s) of the multi-way connector on the multifunction sub-module.

15. Select < AES8 Output is > to select AES channel 8 or LTC channel 4 to appear on the relevant pin(s) of the multi-way connector on the multifunction sub-module.

16. Select < Pulse 1 > to select a pulse type to appear at the relevant rear panel BNC of the multifunction sub-module.

17. Repeat with < Pulse 2 > and < Pulse 3 >to select pulse types at the relevant rear panel BNCs of the multifunction sub-module.

18. Select < 10MHz Mode > to select the source of a 10MHz reference.

19. Return to the Top Level menu using the [Back] button.

Network Settings

The Network menu can be reached via the < -System Setup> menu option.

Many of the parameters that can be configured in this menu require the operator to obtain details from a Network Administrator. Once configured, they are unlikely to change.

Changes to this menu are likely to occur very rarely, and so no formal description will be outlined here. For the purposes of this functional check, simply scroll through the menu (and sub-menus) to check for any corrupted entry.

For More Information on...

• the System Setup menu, refer to the section "**System Setup Menus**".

Option Enable Settings

The Option Enable menu can be reached via the < -System Setup > menu option.

This menu screen lists the installed Option Keys for enabled options within the SRG-4500.

Changes to this menu are extremely unlikely to occur, and so no formal description will be outlined here. For the purposes of this functional check, simply scroll through the menu to check for any corrupted entry.

Calibration Settings

The Calibration menu can be reached via the < -System Setup > menu option. This menu screen lists the system calibration values for the SRG-4500.

Changes to this menu are extremely unlikely to occur, and so no formal description will be outlined here. For the purposes of this functional check, simply scroll through the menu to check for any corrupted entries.

Operational Configuration

There are several configuration factors that will influence the initial installation of your SRG-4500, namely:

• Mains Power

• Time, Date, DST etc.

• Video and Audio outputs

• References (Genlock, 10MHz, GPS, NTP, etc.)

• Network

• Connection to ACO-4500 Changeover unit

Refer to the various sections of this manual that explain each of these features, so that they may correctly configure the SRG-4500 to their requirements.

Getting Started

The SRG-4500 can be remotely controlled over an ethernet link by a DashBoard client.

This chapter provides instructions for launching DashBoard and accessing the tabs and menus in DashBoard for the SRG-4500.

General Usage

Keep the following in mind when using DashBoard to communicate with the SRG-4500:

* The SRG-4500 is always configured as a fixed IPv4 device using the menu system accessible on the front panel.
* The items to be configured are: IP Address, Subnet Mask, and Gateway. Contact your IT Department to help set these up.
* The controlling DashBoard client is expected to be on the same subnet as the SRG-4500.

Launching DashBoard

DashBoard must be run on a computer that has a physical wired ethernet connection.

For More Information on...

* downloading and installing the DashBoard client software, refer to the *DashBoard User Manual*.

To launch DashBoard

1. Ensure that you are running DashBoard software version 8.3.0 or higher.
2. Launch DashBoard by double-clicking its icon on your computer desktop.

Enabling a Connection in DashBoard

When you establish a connection with DashBoard, you can also re-name the SRG-4500 to easily identify it in the Tree View.

To enable DashBoard to communicate with the SRG-4500

1. Launch the DashBoard application on your computer.
2. From the Basic Tree View toolbar, select ✚.

   The **New Connection** dialog opens.
3. Select **TCP/IP openGear Frame** from the provided list.
4. Click **Next >**.
5. Type the IP address of the SRG-4500 in the **IP Address** field.
6. Type a unique name for the SRG-4500 in the **Display Name** field.
7. Click **Finish**.
8. Verify that the SRG-4500 is now listed in the Tree View.

Once a connection is established, a "ping" command can be issued on the computer running the DashBoard client. This is not required but is a useful diagnostic.

- If the ping fails, then the network route is not available. This indicates a basic network architecture failure. Contact your IT Department.
- If the ping is successful, then a DashBoard connection should be possible.

Accessing the SRG-4500 Interfaces in DashBoard

The interfaces are accessed by double-clicking the SRG-4500 node in the DashBoard Tree View.

To access the SRG-4500 interfaces in DashBoard

1. In the Basic Tree View of DashBoard, locate the SRG-4500 node.

2. Expand the SRG-4500 node.

3. Double-click a sub-node to display the SRG-4500 interface in the right pane of the DashBoard window.

    In the example below, the Slot 1 sub-node was selected.
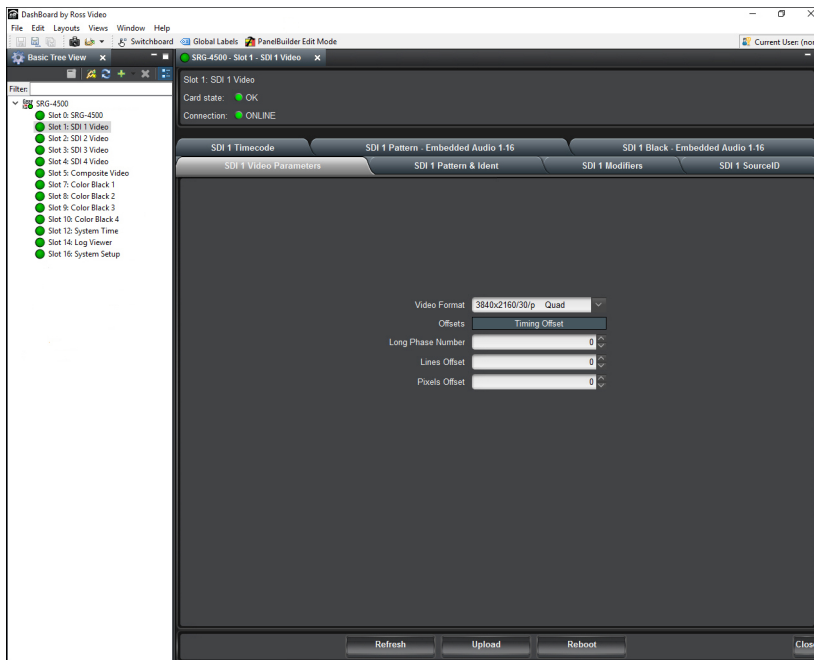
4. Select a tab to display its options in the right-side of the DashBoard window.

    In the example below, the user selected the SDI 1 Modifiers tab.
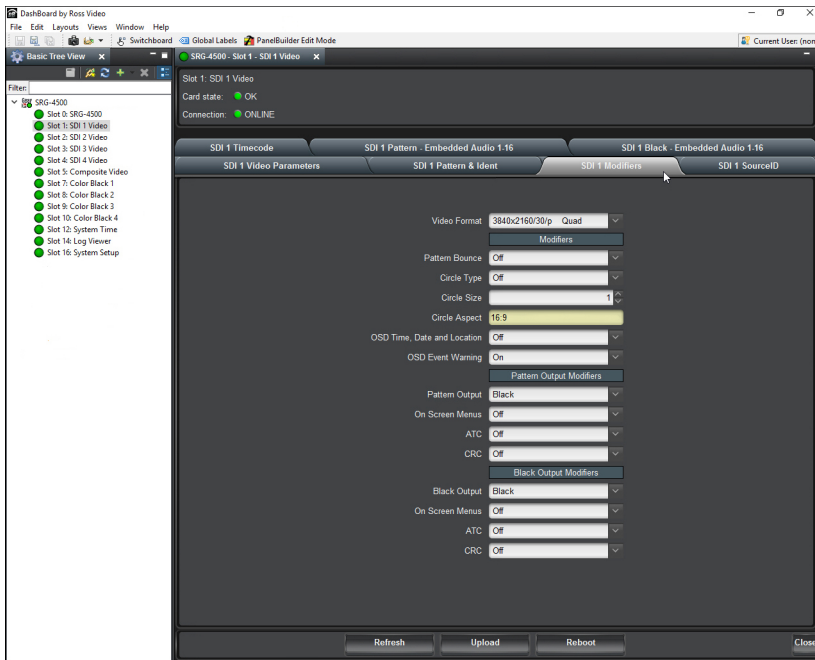
Operating Basics

The SRG-4500 produces a wide variety of video and audio references and test pattern signals suitable for distribution within a typical television engineering installation.

The SRG-4500 can be configured in a number of ways:

- Free Run, or Genlock / Time-Lock to a selection of sources
- Configurable Video Outputs (Format, Ident, Timecode, Audio, etc.)
- Ethernet connectivity for software updates

For More Information on...

- the configuration parameters within entire menu system, refer to the chapter "**Front Panel Menu System**".

Front Panel Menu System

The SRG-4500 provides the user with a menu interface on the chassis to control the functions and options of the unit. The menus can always be viewed on the front panel LCD display, and optionally "in-vision" in an "on-screen-display" (OSD) viewable on any pattern output. By default, the OSD is set On for each pattern output, but can be independently disabled if desired.

Navigating the Panel Menu System

The menus are accessed from the initial start-up (Time) screen by pressing the rotary control. To return to the Time screen, press the blue escape/back button. If you repeatedly press the blue button, the LCD display will cycle between the display of time and the display of the Ross logo.

In this display of time, the additional status information is:

• Device Name
• GPS/NTP Status
• Current Date
• Current Time
• SRG-4500 IP Address (when connected)
• Lock Status
• Software version number
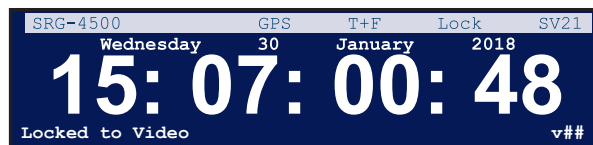
Figure 12 Example of the Time Display

In this display of the Ross logo, the additional information is:

• Time
• GPS/NTP Status
• Ross logo
• SRG-4500 IP Address (when connected)
• Lock Status
• Software version number

Figure 13 Example of the Ross Logo Display

For both of these screens, the top and bottom lines are animated, cycling between the information detailed above.

Immediately after re-connection of the Ethernet cable, or a video reference, the respective line may appear momentarily as: "Ethernet...negotiating" or "Genlocking............"

By pressing the rotary control from either of the above screens, you access the top level menu. This menu gives you access to the five key menus that are used to control and configure the SRG-4500:

---

1. Audio menu

2. Video menu

3. Timecode menu

4. Genlock menu

5. System Setup menu

When viewing the top-level menu screen on a picture monitor, flashing text in the top-right corner of the menu will indicate which video output you are actually connected to.

For More Information on...

• the front panel menu controls, refer to the section "**Front Panel Overview**".

Menu Map

Figure 14 provides a quick reference of the menu system.
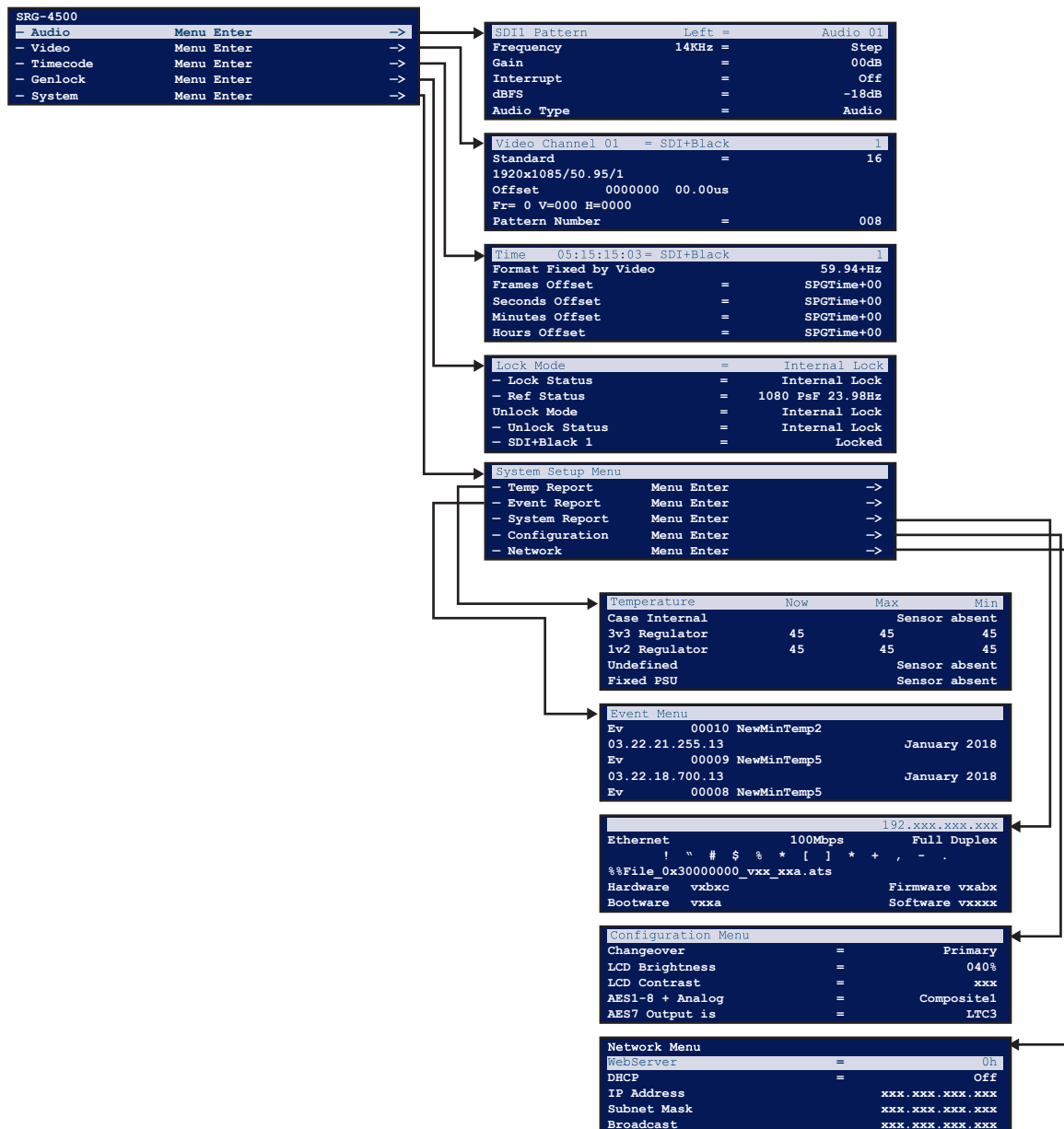
Figure 14 SRG-4500 — Menu Map (Pictorial)

Menu Tree

Figure 15 is a basic menu tree structure of the SRG-4500.

✶ There are 82 Audio Channel menus, 7 video channel menus, and 20 time menus.
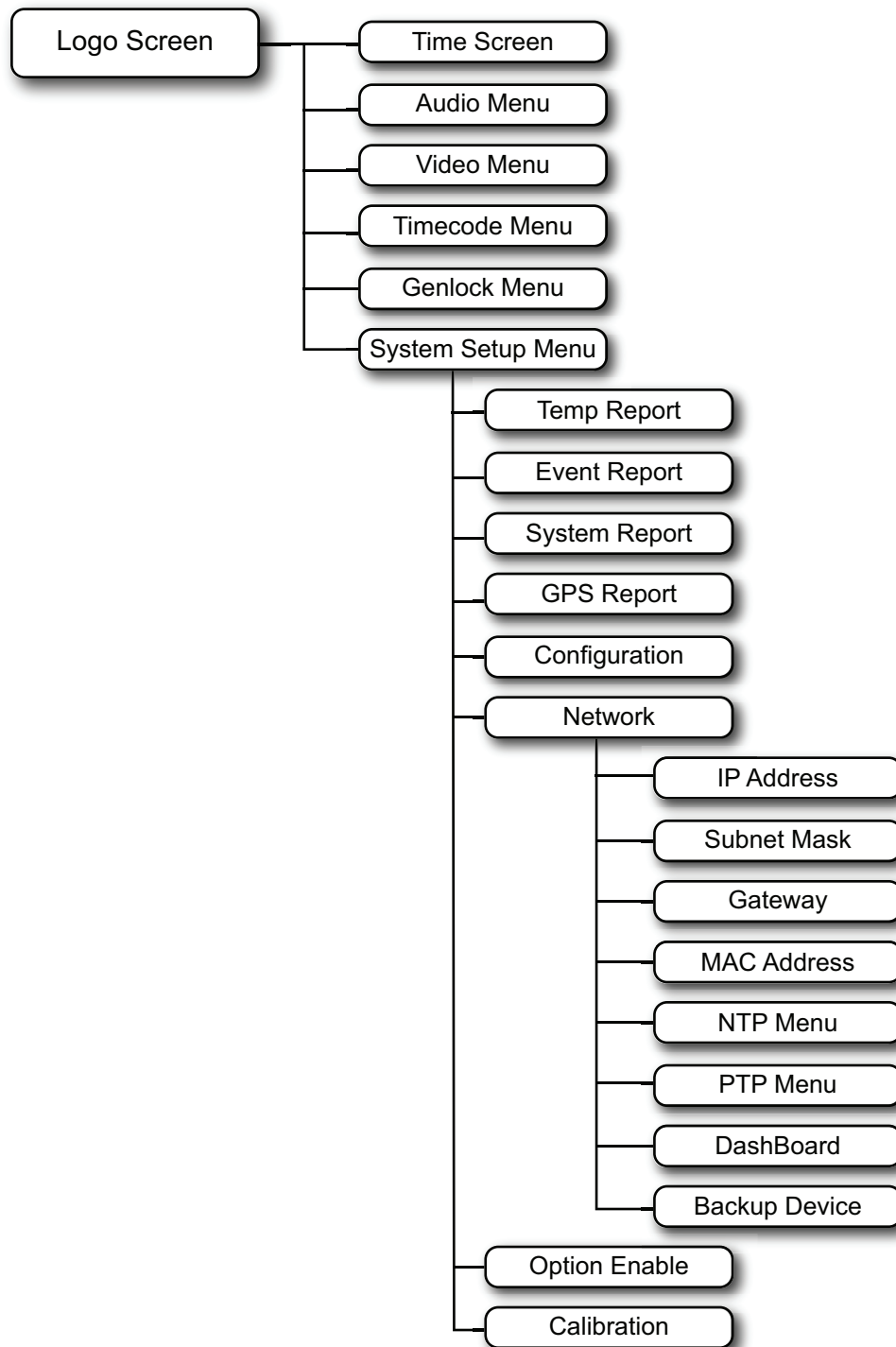
Figure 15 SRG-4500 — Menu Tree (Diagrammatic)

Audio Menus

Each video output has audio channels associated with it:

- SDI 1 has 16 embedded audio channels
- SDI Black 1 has 16 embedded audio channels,
- SDI 2 has 16 embedded audio channels
- SDI Black 2 has 16 embedded audio channels,
- Composite 1 has 16 audio channels in 8 AES pairs
- Analog Audio has 2 audio channels in a stereo pair.

This makes a total of 82 audio channels.

Each channel can be individually controlled for frequency, gain, interrupt and dBFS.

Odd numbered channels 1, 3, 5, 7, 9, 11, 13 and 15 are referred to as LEFT.

Even numbered channels 2, 4, 6, 8, 10, 12, 14 and 16 are referred to as RIGHT.

In some circumstances, channels are grouped in pairs, or larger formations. When this occurs, associated menu selections are unavailable and 'menu information' is substituted:

- Glits groups channels in pairs.
- Blits groups the first 6 channels.

Table 3 outlines the general form of the Audio menu appears below for the SDI1, SDI2 and AES channels.

```
AudioChannel                  =              Audio 01
Tone Type                     =                 400Hz
Spot Frequency       1KHz =                      Step
Gain                          =                 -60dB
Interrupt                     =                   Off
dBFS                          =               Silence
Audio Type                    =                 Audio
Sequence                      =                  Tone
```

Figure 16 Audio Menu Example

Audio Channel

This menu item allows the user to select which audio output they are operating on.

The **Audio Channel** field consists of three sub-fields. One item from each of the following columns will always appear in the three sub-fields, although not all combinations are valid.

Table 3 Audio Channel

Sub-field 1	Sub-field 2	Sub-field 3
SDI1	Pattern	Left
SDI2	Black	Right

Table 3 Audio Channel

Sub-field 1	Sub-field 2	Sub-field 3
Audio	AES1	Left Right
	AES2	
	AES3	
	AES4	
	AES5	
	AES6	
	AES7	
	AES8	
	Analog1	

SDI1 and SDI2 will only ever be followed by Pattern or Black, and Audio will only ever be followed by AES1 through AES8, or Analog1. All combinations will be followed by either Left or Right.

The options in the field are: 01 through 02 or 16 (depending on the selected Audio Channel).

Some examples from the complete list are shown below:

> SDI1 Pattern ➤ Left = Audio 01
>
> SDI1 Pattern ➤ Right = Audio 02
>
> :
>
> SDI1 Black ➤ Left = Audio 05
>
> SDI1 Black ➤ Right = Audio 06
>
> :
>
> Audio AES6 ➤ Left = Audio 11
>
> Audio AES6 ➤ Right = Audio 12
>
> :
>
> Audio Analog1 ➤ Left = Audio 01
>
> Audio Analog1 ➤ Right = Audio 02

Tone Type

The options in the field are:

• 400Hz	• 1KHz	• Step	• A-Maj Scale
• 800Hz	• Sweep	• A-Maj Chord	• Spot Frequency

Sweep ramps the frequency from 20Hz to 20KHz in 3 seconds.

Step includes spot tones of:

• 400Hz	• 3KHz	• 7KHz	• 11KHz	• 15KHz
• 800Hz	• 4KHz	• 8KHz	• 12KHz	• 16KHz

- 1KHz   • 5KHz   • 9KHz   • 13KHz

- 2KHz   • 6KHz   • 10KHz   • 14KHz

A-Maj Chord uses the first 8 channels and includes the frequencies (from the Equal Tempered Scale):

- 329.628Hz = E   • 554.276Hz = C#   • 880.000Hz = A   • 1318.512Hz = E

- 440.000Hz = A   • 659.256Hz = E   • 1108.552Hz = C#   • 1760.000Hz = A

A-Maj Scale is similar to Step but uses only the notes from the C-Major chord (from the Harmonic Scale):

- 1056Hz = C   • 1319Hz = E   • 1584Hz = G   • 1979Hz = B

- 1187Hz = D   • 1407Hz = F   • 1760Hz = A   • 2112Hz = C

Spot Frequency

Allows the user to select any frequency between 20Hz and 20KHz (in 1Hz steps).

Gain

The options in the field are: Silence, -60dB to +18dB (in 1dB steps). The upper limit is actually set by the dBFS menu (detailed below).

Interrupt

The options in the field are: Off, 1 sec, 3 sec, Glits, and Blits.

- Glits can only be selected on odd (left) channels. Glits also uses the associated even (right) channel in the pair to create a stereo audio identification sequence.
- Blits can only be selected on channel 01. Blits also uses the next five channels to create a 5.1 Surround Sound Audio Identification sequence.

dBFS

The options in the field are: Silence, -24dB to -18dB (in 2dB steps).

Audio Type

The options in the field are: Audio, Silence.

Sequence

The options in the field are: Tone.

Video Menus

This section outlines the options available in the Video menus for SDI1, SDI2, SDI3, SDI4, Composite 1, Black 1, and Tri-Black 2-4.

```
Video Channel 01              = SDI+Black        1
Standard                      =                 05
720x 525/59.94/i NTSC-M       =
Offset   0000000 00.00u 000.00°
V=000 H=0000
Pattern Number                =                  5
ID Memory                     =                  1
```

Figure 17 Video Menu Example

Table 4 Video Menus

| Parameter | SDI1, SDI2 | | Composite 1 | Black 1 | Tri-Black 2, 3, 4 | |
	SD-SDI	HD-SDI			PAL/NTSC	Tri Black
Video Channel nn	xx		xx	xx	xx	
Standard	nn		nn	Same as Composite1	nn	
Description	...		...	...	...	
Offset	0000000 00.00u	0000000 00.000000	0000000 00.00u 000.0°	0000000 00.00u 000.0°	0000000 00.00u 000.0°	0000000 00.000000
	V=0000 H=0000		Fr=0 V=0000 H=0000 Sc=0000	Fr=0 V=0000 H=0000 Sc=0000	Fr=0 V=0000 H=0000 Sc=0000	V=0000 H=0000
Pattern Number	nnn		nnn			
Description	...		...			
ID Memory	n		n			
Character	n/mm = yyy		n/mm = yyy			
Description	...		...			
ID Vertical Pos	nnnn		nnnn			
ID Char Size	n		n			
ID Visible Rows	n		n			
ID Black Edge	Off		Off			
ID Off/Opacity	nnn%		nnn%			
ID Row Motion	Static		Static			
ID Box Motion	Static		Static			
Pattern Bounce	Off		Off			
Pattern Output	Pattern					
Black Output	Black					
Circle Type	Off		Off			
Circle Size	nnn		nnn			
Circle Aspect	16:9		16:9			

Table 4 Video Menus

Parameter	SDI1, SDI2		Composite 1	Black 1	Tri-Black 2, 3, 4	
	SD-SDI	HD-SDI			PAL/NTSC	Tri Black
OSD Time and Date	xx					
Pattern OSD	On					
Black OSD	Off					
Number of OSD Rows	6		6			
OSDEvent Warning	Off		Off			
Pattern Embedder	Off					
Black Embedder	Off					
Pattern ToneSil	Tone					
Black ToneSil	Tone					
Pattern VITC[a]	Off					
Black VITC[a]	Off					
Pattern EDH[b]	On					
Black EDH[b]	On					
VITC			Off			
Pattern F1L7			On #			
S318M[c]			On			
Black VITC				Off	Off	Off[d]
Black F1L7				On #	On #	On #[d]
Black S318M[c]				On	On	On

a. ATC in HD formats.
b. CRC in HD formats.
c. This row only for NTSC.
d. This row only for NTSC or PAL.

Video Channel

This menu item allows the user to select the video output they are operating on. The options are:

• SDI+Black 1 for SDI 1 and SDI Black 1 outputs
• SDI+Black 2 for SDI 2 and SDI Black 2 outputs
• Composite 1 for Composite 1 output
• Black 1 for Black 1 output
• Tri Black 2 for Tri-Black 2 output
• Tri Black 3 for Tri-Black 3 output
• Tri Black 4 for Tri-Black 4 output

The options that appear in the next field follow the selection made above, and are:

- 01 for SDI 1 and SDI Black 1 outputs
- 02 for SDI 2 and SDI Black 2 outputs
- 05 for Composite 1 output
- 07 for Black 1 output
- 08 for Tri-Black 2 output
- 09 for Tri-Black 3 output
- 10 for Tri-Black 4 output

Standard, Description

This menu pair allows the user to select the video format for the video output they are operating on. The options in the field are:

- 05 through 36 for SDI 1 and SDI Black 1 outputs
- 05 through 36 for SDI 2 and SDI Black 2 outputs
- 04 through 06 for Composite 1 output
- Same as Composite 1 for Black 1 output
- 00 through 36 for Tri-Black 2, 3, and 4 outputs

Each of the 6 pattern generators is independent in format and pattern. For example, SDI 1 can be outputting 1080i 60Hz while SDI 2 is outputting 720p 24Hz and Composite 1 is outputting NTSC-M. Black 1 will also be outputting NTSC-M Color Black because it always mirrors the Composite 1 output format. Each of the three Tri-Black outputs can be simultaneously outputting formats differing again from those on the pattern outputs. So, the SRG-4500 could be configured to provide up to a total of 6 different output formats simultaneously.

Refer to the section "**4K UHD BNC Connections**" for additional notes regarding 4K (Quad or 2SI) selection.

The number selected (nn) is decoded into a description as outlined in **Table 5**.

Table 5 Decoded Descriptions

nn=	Description =	nn=	Description =
00		21	1920x1080/23.98/p
01	SLOW PAL 720x 625/48/i	22	1920x1080/60/i
02	NTSC Subcarrier 3.58MHz	23	1920x1080/59.94/i
03	PAL Subcarrier 4.43MHz	24	1920x1080/50/i
04	720x 525/59.94/i NTSC-J	25	1920x1080/48/i
05	720x 525/59.94/i NTSC-M	26	1920x1080/47.95/i
06	720x 625/50/i PAL	27	1920x1080/30/psf
07	1280x720/60/p	28	1920x1080/29.97/psf
08	1280x720/59.94/p	29	1920x1080/25/psf
09	1280x720/50/p	30	1920x1080/24/psf
10	1280x720/30/p	31	1920x1080/23.98/psf
11	1280x720/29.97/p	32	1920x1080/60/p
12	1280x720/25/p	33	1920x1080/59.94/p
13	1280x720/24/p	34	1920x1080/50/p

Table 5 Decoded Descriptions

nn=	Description =	nn=	Description =
14	`1280x720/23.98/p`	35	`1920x1080/48/p`
15	`1920x1035/60/i`	36	`1920x1080/47.95/p`
16	`1920x1035/59.94/i`	21	`1920x1080/23.98/p`
17	`1920x1080/30/p`	22	`1920x1080/60/i`
18	`1920x1080/29.97/p`	23	`1920x1080/59.94/i`
19	`1920x1080/25/p`	24	`1920x1080/50/i`
20	`1920x1080/24/p`		

Offset, Description

For SD SDI channels, the Offset is represented as: `0000000 00.00µ 000.00°, V = 0000, H =0000`.

For Composite 1, Black 1, and Tri-Black channels, the Offset is represented as: `0000000 00.00µ 000.00°, Fr = 0, V = 0000, H = 0000, Sc = 000`.

This menu pair allows the user to select the timing offset from the SPG reference datum for the video output they are operating on. The timing offset is defined in two rows which are intimately linked. Either menu line can be edited - each menu line reflects changes in the other line. A brief description of the timing offset calculations is given here.

In the top line; the timing offset is a number of pixels delayed from the SPG reference datum. Where displayed, the offset is also decoded, for information only, as an H offset (in microseconds) and SC offset (in degrees).

In the top line, the timing offset is editable and is represented as a "large number":

e.g.	0-2474999	for Standard = 28	
		Description = `1920x1080/59.94/i`	
e.g.	0-726404095	for Standard = 05	
		Description = `720x525/59.94/i NTSC-M`	

This "large number" will vary depending on the selected format.

In the bottom line, the timing offset is decoded into picture offsets expressed as:

Frame offset	`Fr=0`
	where Fr=0-1 or 0-3 depending on the selected video format
Line offset	`V=0000`
	where V=0 up to the total number of video lines in the selected format
Pixel offset	`H=0000`
	where H=0 up to the total number of video pixels in each line of the selected format
Sub-carrier offset	`Sc=0000`
	where Sc=0 up to the total number of sub-pixels that equate to one cycle of sub-carrier in the selected format

Frame and Sub-carrier offsets only appear when PAL or NTSC is selected on Composite 1, Black 1 and the Tri-black outputs.

Each of these fields is editable. Together with the timing offset in the top row, these fields enable the user to apply offsets rapidly to individual video outputs.

Pattern Number

This menu pair allows the user to select the pattern for the video output they are operating on. The options in the field are 0 up to the maximum number of patterns allowed for the output being configured.

Patterns are selectable on: SDI 1 output, SDI 2 output, SDI 3 output, SDI 4 output, and Composite 1 output.

Additionally, patterns may also be selected to appear on the SDI Black outputs (same pattern as selected on the associated Pattern outputs).

All other outputs normally produce only Black.

Each pattern generator is independent in both format and pattern. So, for instance, SDI 1 can be outputting RP219 bars in 1080i 60Hz while SDI 2 is outputting Pathological Test in 720p 24Hz and Composite 1 is outputting SMPTE bars in NTSC-M.

The list of available patterns in each format can be different. Some patterns are format specific, and so do not appear in the list for other formats, e.g. the SDI specific Pathological test pattern does not appear in the list for an analogue NTSC output.

Pattern descriptions are as detailed as possible within the limitation of 30 characters.

The list of patterns is constantly changing as we add more patterns to the Pattern Library. These new patterns can be uploaded to your SRG-4500 over the Ethernet interface. You will need to find some maintenance time to do this as a power cycle may be required.

Refer to the section "**4K UHD BNC Connections**" for additional notes regarding 4K (Quad or 2SI) selection.

ID Memory, Character, Description

This menu triplet allows the user to select and edit the ID Text/Image for the video output they are operating on.

ID Text/Image is selectable on: SDI 1 output, SDI 2 output, SDI 3 output, SDI 4 output, and Composite 1 output. Each of the five outputs has a separate set of ID Text/Image memories. When the ID Memory is selected to be ordinary text, the options in the field are 1 through 3. These are ID text memories. Each memory is edited individually. This field selects which memory is 'active' and hence enabled and editable in the menu. When "n" is selected in the ID Memory line, "n" in the Character line follows.

The options in the next field are: 01 through 30. There is a maximum of 30 characters in each ID text memory. This field selects which character is 'active' and hence editable in the menu. In the selected Description line, as this field is changed, a cursor gives a visual indication of which character is active.

The options in the third field are: 000 through 255. There are 256 characters in the extended ASCII font. Each ID character is edited individually. This field is adjusted to display the required character in the selected ID Text memory.

Not all the characters 000 through 255 are allowed. The ones that are no allowed are automatically skipped.

Keep the following in mind:

- After adjusting the field "yyy", use the Escape/Back button to select the next character to edit, then press Select to edit the next character, etc.
- When using the available front panel controls, editing of the characters in ID text memories is performed in Overtype mode (e.g. it is not possible to Insert or Delete characters).
- When you edit the pre-programmed ID Text memories, start from character position 1, then overtype with spaces (char. #32) any extraneous characters at the end of the line.
- To quickly edit ID text memories, use the DashBoard interface. Refer to the section "**Accessing the SRG-4500 Interfaces in DashBoard**" for details.

```
ID Memory                         =              1
  - ID Image
  - Description...................................
```
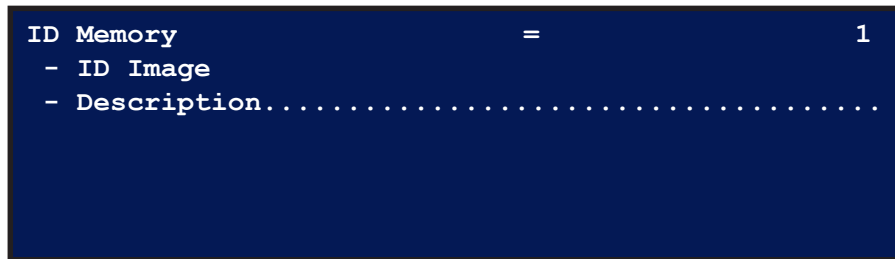
Figure 18 ID Memory is Selected

When the ID Memory is selected to be an ID Image, the options in the field are: 4 through 64. These are ID Image memories. Each memory is edited individually. This selects which memory is 'active' and hence enabled in the menu.

The options in the field "mmmm" are from 0000 up to a value less than the number of vertical lines in the currently selected video format.

The options in the field "nnnn" are from 0000 up to a value less than the number of horizontal pixels in the currently selected video format.

The fields "xxxx" and "yyyy" display numbers relating to the height and width of the imported image. These numbers are fixed during the import process and are not adjustable in this menu.

ID Vertical Position

This menu item allows the user to select the vertical position of the ID Text box for the video output they are operating on. This setting is valid for static ID Text boxes, and may be restricted for animated ID Text boxes.

The options in the field are: the TV line on which the top of the ID Text box sits. The field is a value less than the number of lines in the prevailing video format.

When adjusting this value, other parameters relating to the ID Text box may restrict this range, or may be re-calculated, in order to keep the ID Text box visible within the picture area.

ID Character Size

This menu item allows the user to select the size of the text in the ID Text box for the video output they are operating on.

The options in the field are: 1 through 7. This value is a representation of the size of the font in use.

When adjusting this value, other parameters relating to the ID Text box may restrict this range, or may be re-calculated, in order to keep the ID Text box visible within the picture area.

ID Visible Characters

This menu item allows the user to select the number of characters that are visible in all rows of the selected ID Text box for the video output they are operating on.

The options in the field are: 0 through 30, and Automatic.

The maximum number of characters allowed per row depends on the video format selected on the associated output. For example, the 1920x1080/50/i format is allowed 30 characters, while all the 1280x720p formats, plus PAL and NTSC formats are only allowed 26.

This can be set to create a 'text box' of any width cutting a hole in the video. The number of characters in the ID and the number of "ID Visible Chars" do not have to be the same. The displayed characters are always centered in the row on a pixel basis. When this field is adjusted, automatic re-centering occurs to best position the text within the ID Text box.

When set to Auto, the ID Text box width is handled automatically so as to include all of the characters of the longest ID line to be displayed (up to the maximum allowed for the selected format).

When adjusting this value, other parameters relating to the ID Text box may restrict this range, or may be re-calculated, in order to keep the ID Text box visible within the picture area.

✦ Test ID is not currently available on Pattern in 4K Quad Square formats.

ID Visible Rows

This menu item allows the user to select the rows of ID Text that are to be visible in the ID Text box for the video output they are operating on.

The options in the field are: 1, 2, 3, 1 and 2, 2 and 3, 3 and 1, 1 and 2 and 3.

This can be set to create a text box of any height, cutting a hole in the video. The number of user-programmed ID rows and the number of "ID Visible Rows" do not have to be the same.

When adjusting this value, other parameters relating to the ID Text box may restrict the options, or may be re-calculated, in order to keep the ID Text box visible within the picture area.

ID Black Edge

This menu item allows the user to control the border around the text box. This option is currently non-functional.

ID Off/Opacity

This menu item allows the user to control the opacity of the background of the ID Text box or the ID Image for the video output they are operating in.

The Opacity in the field can be selected to be: 0 (ID off completely) through 100 (white text on a black background) in 16 steps, Animated. The Animated mode can be useful to indicate the video is 'live'.

When Black is selected as the pattern on the video pattern output, the Animated mode is inhibited (e.g. to reduce APL effects).

✦ Test ID is not currently available on Pattern in 4K Quad Square formats.

ID Row Motion

This menu item allows the user to control the animation of the text rows within the ID text box for the video output they are operating on. These animated modes can be useful to indicate the video

is 'live'. When selecting these modes, other ID Text parameters may restrict what is visible within the ID Text box.

Table 6 ID Row Animation Modes

Mode	Description
Static	Text row(s) motionless
Flash	Text row(s) flash on and off
Sequence	Text row(s) appear in sequence when set for 1 or 2 visible rows
Roll	Text row(s) roll continuously from the bottom of the box to the top
Reveal	Text row(s) are revealed downwards using a "vertical wipe"
Zip	Text row(s) are revealed in row order, character-by-character

ID Box Motion

This menu item allows the user to control the animation of the entire ID Text box or ID image for the video output they are operating on. These animation modes can be useful to indicate the video is 'live'. The ID Box Motion extents in animation modes may be limited by one or more other menu or ID settings.

Several box animation modes are available:

Table 7 ID Box Animation Modes

Mode	Description
Static	Text/Image box is motionless
Horizontal	Text/Image box bounces from side-to-side
Vertical	Text/Image box bounces up and down
Elliptical	Text/Image box moves in an elliptical motion
Box	Text/Image box describes a rectangle
Cross	Text/Image box moves in a "bow-tie" motion
Pong	Text/Image box moves in a pseudo-random motion

✱ Test ID is not currently available on Pattern in 4K Quad Square formats.

Pattern Bounce

This menu item allows the user to control the Bounce animation on applicable patterns. Not all patterns bounce. Bounce is a useful test as it dynamically changes the average picture level (APL) of the pattern. This can be used to help diagnose errors in downstream video equipment.

For the Composite 1 output, the menu line appears as: Bounce = On.

The options in the field are:

- Off — The Bounce function is disabled for the selected video output.
- On — The Bounce function is enabled for the selected video output.

Pattern Output

This menu item allows the user to control the SDI Pattern output. The SDI Pattern output can be selected to be: Black, Pattern, DualA, and DualB.

The user may require more SDI Black outputs than SDI Pattern outputs.

If DualA or DualB is selected, the output is configured to be the first half of a SDI Dual Link interface together with the SDI Black output (see below).

Black Output

This menu item allows the user to control the SDI Black output. The SDI Black output can be selected to be: Black, and Pattern.

Circle Type

This menu item allows the user to enable the circle feature on the Pattern video output they are operating on.

For the Composite 1 output, the menu line appears as: Circle Type = Off.

The options in the field are: Off, Static, and Animated.

Animated circles are useful as a lip-sync test as the circle and audio are synchronized together. Animated circles are also useful for indicating the video is 'live'.

Circle Size

This menu item allows the user to control the size of the circle on the Pattern video output they are operating on.

For the Composite 1 output, the menu line appears as: Circle Size = nnn.

The options for the field are 0 up to a maximum of 540. The maximum number is related to the selected video format. The maximum circle size is approximately half the number of visible lines in that video format, e.g. for NTSC, the maximum size = 245, PAL = 282, 720p = 362, 1080i = 551, etc.

Circle Aspect

This menu item allows the user to control the aspect ratio of the circle on the Pattern video output they are operating on.

For the Composite 1 output, the menu line appears as: Circle Aspect = 16:9.

The options in the field are: 4:3 (for SD formats), 16:9 (for SD formats), Fixed (for HD formats only; fixed at 16:9).

OSD Time and Date

This menu item allows the user to control the behavior of the 'on screen display' (OSD) when it is not being used for menus.

The options in the field are: Off, Time, Date, Time-Date, and GPS.

When "on" and not in a menu, the selected information will appear cut into a text box on the relevant pattern output.

The Time being displayed is the timecode being output on the video channel you are looking at. Thus if you are looking at two screens to inspect SDI1 output and SDI2 output the time displays may be offset from each other.

There may be an extra character to the right of the frames-units number. This is a field/frame marker.

- In interlaced video formats, the top-left block appears in the first field, the bottom-right block appears in the second field.
- In progressive video formats at frame rates above 30Hz, the same timecode is output for each frame due to a limitation defined in **SMPTE-12M**. In these higher frame rates, the top-left block appears in the first frame of the pair, the bottom-right block appears in the second frame of the pair.
- In progressive video formats at frames rates at or below 30Hz, the field/frame marker is not displayed, as a unique timecode exists for each frame.

Pattern OSD, Black OSD

These menu items allow the user to enable the 'on screen display' (OSD) for the video output they are operating on.

For the Composite 1 video output, the menu line appears as: OSD = On.

The options in the field are:

- Off — The OSD does not appear on the selected video output.
- On — The OSD does appear on the selected video output.

Number of OSD Rows

This menu item allows the user to select the number of rows of text in the OSD menus. This is fixed at 6 rows.

Event Warnings

This menu item allows the user to control the behavior of the LCD when an event occurs. Events include: ethernet loss of cable, ethernet find cable, and maximum temperature limit reached.

The options in the field are:

- Off — No warning messages will pop-up on the LCD or on the video outputs.
- On — Warning messages will pop-up in the LCD and on the video outputs.

Pattern Embedder, Black Embedder

These menu items allow the user to control the channel allocation of the audio embedders on the SDI Pattern and SDI Black video output signals. The options are different in SD SDI and HD SDI.

The SD embedder can embed a maximum of 4 channels into the video signal. The options in the fields are: Off, Group 1, Group 2, Group 3, and Group 4.

The HD embedder can embed a maximum of 16 channels into the video signal. The options in the fields are: Off, Audio 1-4, Audio 1-8, Audio 1-12, and Audio 1-16.

Pattern ToneSil, Black ToneSil

These menu items allow the user to control the audio content of the audio embedders on the SDI Pattern and SDI Black video output signals. The options in the field are:

- Tone — Audio is embedded as configured in the associated Audio menus.
- Silence — Overrides any selections made in the associated Audio menus

Pattern VITC, Black VITC

These menu items allow the user to control the behavior of the timecode inserters on the SDI Pattern and SDI Black video output signals. The options are different in SD SDI and HD SDI.

The SD SDI inserter can insert VITC into appropriate lines in the SD SDI video. The options are different in NTSC and PAL (see *SMPTE 266M-2002*).

NTSC options in the field are: Off, On 14, On 14 and 16.

PAL options in the field are: Off, On 19, On 19 and 21.

The HD SDI inserter can embed ATC into the HD SDI video.

HD options in the field are: Off, LTC, and VITC.

Pattern EDH, Black EDH

These menu items allow the user to control whether EDH (Error Detection and Handling) data is included on the SD-SDI Pattern and SD-SDI Black video output signals.

The options in the field are:

• Off — No EDH data added to the SDI output.

• On — EDH data is added to the SDI output

Pattern CRC, Black CRC

These menu items allow the user to control whether CRC (Cyclic Redundancy Check) data is included on the HD-SDI Pattern and HD-SDI Black video output signals.

The options in the field are:

• Off — No CRC data added to the SDI output.

• On — CRC data is added to the SDI output.

VITC, Black VITC

These menu items allow the user to control the behavior of the timecode inserters on the Composite 1, Black 1 and Tri-Black video output signals.

The Composite, Black and Tri-Black inserters can insert VITC into appropriate lines in the video. The options are different in NTSC and PAL (refer to **SMPTE RP188-1999**).

NTSC options for the field are:

• Off

• 10 through 20 (one-line VITC)

• 10 and 12, 11 and 13, 12 and 14, through 18 and 20 (two-line VITC)

PAL options for the field are:

• Off

• 6 through 22 (one-line VITC)

• 6 and 8, 7 and 9, 8 and 10, through 20 and 22 (two-line VITC)

Pattern F1L7, Black F1L7

These menu items allow the user to control whether the F1L7 (Field 1 Line 7) or F1L10 (field 1 Line 10) ident signals appear on the Composite 1, Black 1 and Tri-Black video output signals. The F1L7 signal is defined for the PAL format, the F1L10 signal for NTSC.

The options in the field are:

- Off — F1L7 / F1L10 does not appear on the selected video output.
- On — F1L7 / F1L10 appears on the selected video output.

No S318M

This menu line appears on the Composite menu (NTSC version) to indicate that the S318M ident signal is not defined for this output.

Black S318M

This menu line allows the user to control whether the S318M ident signal appears on the Black 1 or Tri-Black video output signals.This signal is only defined for color black in the NTSC format (see **SMPTE 318M-1999**).
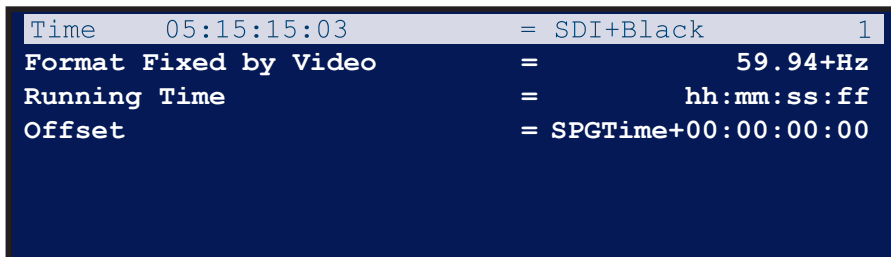
The options in the field are:

- Off — S318M does not appear on the selected video output.
- On — S318M appears on the selected video output.

Timecode Menus

Each Video output has a counting timecode channel associated with it:

- SDI and SDI Black 1 output
- SDI and SDI Black 2 output
- Composite 1 output
- Black 1 output
- Tri-Sync Black 2 output
- Tri-Sync Black 3 output
- Tri-Sync Black 4 output

```
Time      05:15:15:03          = SDI+Black          1
Format Fixed by Video          =              59.94+Hz
Running Time                   =           hh:mm:ss:ff
Offset                         = SPGTime+00:00:00:00
```

Figure 19 Time Menu Example — All Video Timecodes

There are 4 linear counting timecode (LTC) channels:

- LTC1
- LTC2
- LTC3
- LTC4

```
Time     05:15:15:03        = SDI+Black           1
Format                      =              59.94+Hz
Running Time                =          hh:mm:ss:ff
Offset                      = SPGTime+00:00:00:00
```

Figure 20 Time Menu Example — All LTC Timecodes

There are five more counting times that are important in the system. These are:

- SPG Time
- UTC Date Time
- GPS Date Time - extracted from the optional GPS receiver
- NTP Date Time - extracted from a suitable NTP timeserver via the Ethernet interface

```
                                         SPG Time

Running Time                =          hh:mm:ss:ff
Offset                      =      UTC+00:00:00:00
```

Figure 21 Time Menu Example — SPG Time

```
                                      UTC DateTime

Running Time                =          hh:mm:ss:ff
Nudge                       =          00:00:00:00
Weekday    Date       Month      Year
Leap Second                 =                   Off
Daylight Saving             =                   Off
```

Figure 22 Time Menu Example — All UTC Date & Time

```
                                  GPS DateTime (UTC)
GPS Solution found:
Running Time (UTC)          =          hh:mm:ss:ff
SVs in View = XX                       in Fix = xx

Weekday    Date       Month      Year
xLocked to GPS
```

Figure 23 Time Menu Example — GPS Date and Time (When Enabled)

There are three more non-counting times that are important in the system. These are:

- Summer DST Event
- Winter DST Event
- Leap Second Event

UTC Date Time is locked to one of Real Time Clock (RTC), GPS Date Time, NTP Date Time, or Analog Ref VITC.

SPG Time is locked to UTC Date Time. UTC Date Time is the datum from which SPG Time is offset. The central time to which all Video and LTC timecodes are locked is SPG Time. SPG Time is also the datum from which all Video and LTC timecodes are offset.

Summer DST Event, Winter DST Event and Leap Second Event each define times and dates at which TC-events occur.

The inter-relationships between the times and timecode is fixed. Only the offsets and TC-events affect the times for each timecode.

For More Information on…
- the timecode system workflow, refer to **Figure 1.5**.
- the procedure to initially set your local time and date parameters, refer to **Figure 26**.

Table 8 Timecode Menus

Parameter	Video	LTC	SPG Time	UTC Date & Time	GPS Date & Time	NTP Date & Time	Analog Ref VITC	Digital Ref TC	DST Event[a]
Description	...	...							
Format Fixed by Video	nnxx	nnxx							
Searching for GPS Solution					...				
NTP Client is Turned Off						...			
No NTP Time						...	...		
No AREF Time								...	
No DREF Time									
Action DateTime									
Running Time	hh:mm:ss:ff	hh:mm:ss:ff	hh:mm:ss:ff	hh:mm:ss:ff	hh:mm:ss:ff				hh:mm:ss:ff
Offset	SPGTime+00:00:00:00	SPGTime+00:00:00:00	UTC+00:00:00:00						
Running Time				hh:mm:ss:ff					
Nudge				00:00:00:00					
Weekday				Date Month Year	Date Month Year	Date Month Year			Date Month Year
Leap Second				Off					
Daylight Saving				Off					
Country Code				nnn					
Description				...					
StateCode				nn					
Description				...					

a. Includes the Summer DST Event, Winter DST Event, and Leap Second Event menus.

Notes on the Timecode Menus

- Video Timecodes count at the frame-rate defined by the video format of the selected video channel.
- LTC Timecodes count at the frame-rate defined by the format selected in the menu. SPG Time and UTC DateTime are both "FIXED", counting at 50Hz.
- Each LTC Timecode can be configured, in DashBoard, to report the **Date In User Bits**. Navigate to the Slot 12: System Time > LTC # Time tab for this menu.
- GPS DateTime and NTP DateTime are "FIXED", being displayed at 50Hz - they only count if a GPS or NTP reference is present.
- Summer DST Event, Winter DST Event and Leap Second Event do not count.
- The system has a battery backed real-time-clock. This runs independently of any other reference. It can maintain reasonably accurate time over a few days while the unit is powered down. It is NOT to be trusted as reliable where your application requires accurate time. As the GPS system is so inexpensive, we recommend its use in all vehicle installations where power may switch on and off regularly.
- Several menu lines are identical between menu screens. Where possible, to avoid obvious repetition, in the definitions outlined below, identical menu lines are grouped under one definition.

Description Field

The options that appear in this field are:

Table 9 Description Field Options

Option	Description
SDI1 & SDI2Black1 Timecode	For SDI and SDI Black 1 output
SDI2 & SDI2Black1 Timecode	For SDI and SDI Black 2 output
Composite 1 Timecode	For Composite 1 output
Black 1 Timecode	For Black 1 output
Tri-Sync Black2 Timecode	For Tri-Black2 output
Tri-Sync Black3 Timecode	For Tri-Black3 output
Tri-Sync Black4 Timecode	For Tri-Black4 output
LTC 1 Timecode	For LTC1 output
LTC 2 Timecode	For LTC2 output
LTC 3 Timecode	For LTC3 output
LTC 4 Timecode	For LTC4 output
SPG Time	For SPG time
UTC DateTime	For UTC date and time
GPS DateTime (UTC)	For GPS date and time
NTP DateTime (UTC)	For NTP date and time
Analog Ref VITC (UTC)	For analog reference VITC time

Table 9 Description Field Options

Option	Description
Digital Ref VITC (UTC)	For digital reference timecode time
Sumer DST Event (UTC)	For summer Daylight Saving Time event date and time
Winter DST Event (UTC)	For winter Daylight Saving Time event date and time
Leap Second Event (UTC)	For Leap second event date and time
Jam Event (SPG)	for Jam Event Time

The menu line `UTC DateTime (manual)` indicates that UTC Time and date parameters are manually adjustable. When either GPS or NTP are enabled and locked, this menu line changes to reflect the status of the external time reference source, and will appear as either: `UTC DateTime from GPS` or `UTC DateTime from NTP`.

Format Fixed by Video

The options in the field "nnx" for the Video channels are defined by the Video format of the selected Video channel. These options are for information only, and cannot be changed in this menu. Sub-field "nn" describes the frame rate, and "x" describes the scanning system. For example:

`Format Fixed by Video 50i`

`Format Fixed by Video 23.98p`

Format

This menu item allows the user to select the required format for the LTC output they are operating on.

The options in the field for the LTC channels are limited to: 30p, 29.97p, 25p, 24p and 23.98p where field describes the frame rate, and the scanning system.

Running Time

This menu item displays the current time on the selected Video Output or LTC Timecode channel, or the SPG Time or UTC DateTime menus. This time display includes any offset that has already been entered for that channel.

The field "hh:mm:ss:ff" displays hours, minutes, seconds and frames in the 24-hour format.

Where the Running Time relates to a Video Output or an LTC Timecode channel, the separators between the sub-fields change, depending on the format selection:

Separator	Format
";"	All 59.94, 47.95, and 29.97 frame rates
":"	All other frame rates

Offset = SPGTime + 00:00:00:00

This menu item allows the user to offset the time on the selected Video or LTC Timecode channel with respect to SPG Time.

The field "00:00:00:00" is used to add / subtract time to / from SPG Time in the selected Video or LTC Timecode channel. The sub-fields in the field "00:00:00:00" represent hours: minutes: seconds:

frames. When sub-fields are adjusted, the corresponding fields in "Running Time" reflect the changes.

Each sub-field is edited individually. A highlight cursor is displayed showing which sub-field is active and hence editable in the field.

These sub-fields always display any offset that has been entered by the user.

If the offset time is zero or positive, a plus sign is displayed (as above); if the offset time is negative, a minus sign is displayed.

Offset = UTC + 00:00:00:00

This menu item allows the user to offset SPG Time with respect to UTC Time.

This is where the user should enter their current time-zone offset from UTC. This offset should not include any daylight saving offset that may be in force - Daylight Saving adjustments are handled separately (see below).

The field "00:00:00:00" is used to add / subtract time to / from UTC Time in the SPG Time menu. The sub-fields in the field "00:00:00:00" represent hours: minutes: seconds: frames. When sub-fields are adjusted, the corresponding fields in "Running Time" reflect the changes.

Only the "hours" and "minutes" sub-fields are editable. A highlight cursor is displayed showing which sub-field is active and hence editable in the field. The "hours" sub-field is fully adjustable from -12 to +12. The "minutes" sub-field is only adjustable in 15 minute intervals - this is because the smallest defined increment in the list of global time-zones is 15 minutes.

These sub-fields always display any offset that has been entered by the user.

If the offset time is zero or positive, a plus sign is displayed (as above); if the offset time is negative, a minus sign is displayed.

Running Time (UTC)

This menu item displays the current time, as received by the GPS system, on the GPS Date Time (UTC) menu. This time only displays w hen a GPS solution h as been found, and the system is locked to the received data.

The field hh:mm:ss:ff displays hours, minutes, seconds and frames in the 24-hour format. Note that frames are always displayed as 00, because this information is not included in the GPS data stream.

Nudge

This menu item allows the user to manually adjust UTC Time (where the SPG is not synchronized to an external time source, such as GPS or NTP, i.e. when neither option is enabled in the Option Enable menu).

The field "00:00:00:00" is used to add / subtract time in the UTC DateTime menu. The sub- fields in the field "00:00:00:00" represent hours: minutes: seconds: frames. When sub- fields are adjusted, the corresponding fields in "Running Time" reflect the changes.

Each sub-field (except "frames") is edited individually. A highlight cursor is displayed showing which sub-field is active and hence editable in the field.

UTC time counts continuously. Note that each time the seconds field is nudged, the frames field is reset to zero. This provides an easy way to set the UTC time to be coincident with your temporary reference.

This field always displays zeros in each of the sub-fields.

When GPS or NTP are enabled, the Nudge feature is disabled, and this menu line appears as either:

Fixed by GPS = 00:00:00:00

or

Fixed by NTP = 00:00:00:00

Weekday Date Month Year

This menu item allows the user to set or adjust the date parameters for the UTC DateTime menu (where the SPG is not synchronized to an external time source, such as GPS or NTP, i.e. when neither option is enabled in the Option Enable menu), or for the Summer DST Event, Winter DST Event or Leap Second Event menus (when in User Defined mode).

The Weekday field is not adjustable. It is calculated using the settings in the Date, Month, and Year fields. The options in the Weekday field appear as: Monday through Sunday.

The options for the Date field are: 1 through 28, 29, 30 or 31 according to the setting of the "Month" field.

The options for the Month field are: January through December.

The options for the Year field are:

- 2000 through 2034 for the Summer DST, Winter DST and Leap Second menus
- 2007 through 2034 for the UTC DateTime menu

✶ These dates may already have been pre-set using the Daylight Saving and Leap Second menu options detailed below.

Leap Second

The options in this menu line are: Off, User Defined.

If set to "User Defined", then the time and date will automatically adjust at the time and date set in the Leap Second Event (UTC) menu.

If the menu line "Leap Second" is set to "Auto from GPS", the time and date of the event is automatically determined via the GPS connection.

Action DateTime

This menu item allows the user to set or adjust the time at which a Summer DST Event, a Winter DST Event, or a Leap Second Event occurs.

The field "hh:mm:ss:ff" is used to set the time at which the event happens. The sub-fields in the field "hh:mm:ss:ff" represent hours: minutes: seconds: frames. Sub-fields are adjusted directly, and automatically reflect any changes.

For these menus, only the "hours" sub-field is adjustable. A highlight cursor is displayed showing which sub-field is active and hence editable in the field.

✶ These times may already have been pre-set using the Daylight Saving and Leap Second menu options detailed below.

Daylight Saving

The Daylight Saving mode should be selected only after setting the required Country Code. The options in this field are:

- Off — No Daylight Saving services are provided by the SRG-4500.
- User Defined — A single spring and autumn daylight saving service is provided.
- Automatic — If the country code is set to Australia, Brazil, Canada, New Zealand, USA or any European country, then a full daylight saving service is provided over a sequence of years up to 2034. This option is only enabled when Country Code is set for a DST supported country.

If set to User Defined, then the Video and LTC menu times will automatically adjust at the times and dates set in the Summer DST Event and Winter DST Event menus. Once a spring event is completed, the year of the programmed event is changed to 2035 so that it will never repeat. Once the autumn event is completed, the year of the programmed event is changed to 2035 so that it will never repeat, and the Daylight Saving mode is also set to Off. To program the next pair of events, set the mode to User Defined, and then enter the next pair of times and dates in the Summer DST Event and Winter DST Event menus.

When this field is set to Automatic, the Summer DST Event and Winter DST Event menus are immediately updated to be ready for the next two events based on the current time and date, and the previously configured Country Code.

While set to Automatic, as each DST Event occurs, it is updated to be ready for the following year.

Countries not supported in Automatic mode should implement DST on a year by year basis using semi-automatic support, i.e. using the User Defined mode above.

The fully- and semi-automated DST support requires the operator to enter location information. A Country Code is mandatory to correctly index the required DST information. For Australia, Brazil, Canada and United States of America, you will also be required to enter a State Code, as different states may or may not implement DST.

✳ Whenever the Country Code field is adjusted, the Daylight Saving mode always defaults back to User Defined. The user then decides whether to implement daylight saving automatically, or to enter dates and times manually

Even if you don't implement DST, it is still useful to enter your country code, as this informs the SRG-4500 of its location in either the Northern or Southern hemisphere. The menus adjust to the location information. The Country Code and State Code definitions are detailed below.

Country Code, Description

This menu item allows the user to adjust the Country Code to suit the actual location of the SRG-4500. This should be adjusted before selecting the Daylight Saving mode.

The options for the Country Code are from **ISO 3166-1 Numeric Code**.

The description field displays the ISO 3166-1 English short name.

If you select Daylight Saving to Automatic after setting Country Code = nnn (where nnn is a country code that has automatic DST support), then the summer and winter times and dates will be automatically updated in the DST menus.

The SRG-4500 does NOT support this automatic filling of the times and dates for all country codes.

If the selected Country has multiple states that are defined to have differing Daylight Saving criteria, and the SRG-4500 has support for these countries, then the menu items in the following paragraph become available.

StateCode, Description

This menu pair allows the user to set the geographical State Code of the SRG-4500, but they only appear in the menu when the preceding menu option regarding Country Code is set for a country that has multiple states defined as having differing Daylight Saving criteria.

Some countries span more than one time zone, and in these countries, state codes are useful in defining summer daylight saving time behavior.

The options in the field for the state code are from **ISO 3166-2**.

The description field displays the ISO 3166-2 Subdivision name.

GPS DateTime (UTC)

The menu for GPS DateTime (UTC) is for information only - there are no editable fields. When a GPS solution has been found, the current time and date are displayed as received from GPS. G

If the GPS option is enabled, the menu reports whether a solution is being searched for.

When a GPS solution has been found, the last line changes to report that the GPS system is actively locking to the received satellites (e.g. the message `Acquiring GPS Lock` displays).

When a GPS solution has been found and locked, the current time and date are displayed as received from GPS. Also displayed are the number of detected satellite vehicles (SVs in View), and the number of satellites the GPS system has locked to (SVs in Fix). The last line reports the lock status of the GPS system. GPS periodically provides time synchronization with the SRG-4500, which maintains the count between the synchronization events by counting field or frame pulses.

```
                                        GPS DateTime (UTC)
GPS Solution found:
Running Time (UTC)            =          hh:mm:ss:ff
SVs in View = XX                         in Fix = xx

Weekday    Date        Month      Year
xLocked to GPS
```

Figure 24 GPS DateTime (UTC) Menu

If the SRG-4500 is set for a Genlock Mode other than one of the GPS options, the current time and date are displayed as received from GPS. The last line of the menu reports that the selected Genlock Mode is not associated with the GPS system.

NTP DateTime (UTC)

The menu for NTP DateTime (UTC) is for information only - there are no editable fields. If the NTP option is enabled, the status information that the menu reports will depend on the configuration settings made in the NTP sub-menu (-System Setup | Network), e.g., whether the NTP System is turned off or whether a solution is being searched for.

When an NTP solution has been found, the current time and date are displayed from the user-defined NTP server. NTP periodically provides time synchronization with the SRG-4500, which maintains the count between the synchronization events by counting field or frame pulses.

If the SRG-4500 is set for a Genlock Mode other than NTP, the current time and date are displayed as received from NTP. The last line of the menu reports that the selected Genlock Mode is not associated with the NTP system.

```
                                        NTP DateTime (UTC)
tLocked to NTP
Running Time                  =          hh:mm:ss:ff
  -NTP time Uncertainty       =              nnnnms
Weekday    Date        Month      Year
Locked to Video
```

Figure 25 NTP DateTime (UTC) Menu

If the menu line Daylight Saving in the UTC DateTime menu is set to User Defined, the time and date fields of these menus can be edited. If the menu line Daylight Saving is set to Off or Automatic, editing is disabled.

The menus for Summer DST Event and Winter DST Event indicate the time and date for the next change in daylight saving time. At the indicated time and date, an hour will be added to or subtracted from SPG Time. For some countries these dates are automated. The dates of a change to or from daylight saving time are dictated well in advance, and by using the Country Code in the UTC DateTime menu, these dates are automatically implemented. As an example: EU Daylight Saving.

PTP Menu

Very limited PTP configuration is possible from the front panel. Refer to "**PTP Option**" for more information.

✶ The PTP configuration will be set to the current SMPTE recommended settings. Any adjustment of these settings should only be made by a suitably qualified and authorized engineer.

This is a PTP   xxxxx

This menu line allows to user to control whether the SRG-4500 is configured to be a PTP GrandMaster, a Multicast PTP Follower, a Mixed Mode PTP Follower, or whether the PTP System is Off.

Definition for PTP Mode

The options in this menu line are:

• PTP System is Off
• PTP Follower is Multicast
• PTP Follower is Mixed Mode
• This is a PTP GrandMaster

PTP IP Address

Sets the required IP Address for the GbE PTP Ethernet port.

PTP Sub Mask

Sets the required Sub Mask for the GbE PTP port.

PTP Gateway

Sets the required Gateway address for the GbE PTP port.

PTP Restart

Select to choose to Restart PTP. Click and then rotate knob.

Domain

Sets the required PTP Domain (within the specified group of clocks in your network).

Priority 1

Set the required Priority 1 number (the first priority level during a Grandmaster election).

Priority 2

Set the required Priority 2 number (the secondary priority level during a Grandmaster election).

Alerts

Reports any alert messages.

Select Profile

Selects the required PTP Profile (timing standard) from: Default (IEE1588), SMPTE (SMPTE ST 2059-2), and AES67.

Advertising Rate

Sets required Advertising Rate.

Advertise Drop Frame

Select Yes or No.

Advertise Color Frame

Select Yes or No.

Additional Information for the Summer/Winter DST

If the menu line Daylight Saving in the UTC DateTime menu is set to User Defined, the time and date fields of this menu can be edited. If the menu line Daylight Saving is set to Off or Automatic, editing is disabled.

The menus for Summer DST Event and Winter DST Event indicate the time and date for the next change in daylight saving time. At the indicated time and date, an hour will be added to or subtracted from SPG Time. For some countries these dates are automated. The dates of a change to or from daylight saving time are dictated well in advance, and by using the "Country Code" in the UTC DateTime menu, these dates are automatically implemented. As an example:

✶ In the United Kingdom, Daylight Saving Time is referred to as British Summer Time (BST).

Summer Time Rule:

- Start: Last Sunday in March
- End: Last Sunday in October
- Time: 1.00 am (01:00) Greenwich Mean Time (GMT)

Equation used to calculate the beginning of European Summer Time: Sunday (31 - (5*y/4 + 4) mod 7) March at 01.00 UTC

Equation used to calculate the end of European Summer Time: Sunday (31 - (5*y/4 + 1) mod 7) October at 01.00 UTC

For countries where the SRG-4500 does not support automatic implementation of daylight saving time, the dates can be entered manually in advance of each event and the automatic procedure will occur for that one event. A more detailed description of implementing a manual update of these event dates is given in the "Daylight Saving" menu description above.

A full list of countries for which DST is automatically supported is shown below.

Table 10 Countries that DST is Automatically Supported

Country	Start	End	Action Time
Australia	First Sunday in October	First Sunday in April the following year	02:00 local standard time (AEST=UTC+11, ACST=UTC+10.5)
Brazil	Third Sunday in October	Third Sunday in February the following year	DST starts at 00:00 on the third Sunday in October and ends at 00:00 on the third Sunday in February - unless the latter falls during Carnaval, in which case, the end of DST is postponed by one week. The next six times in which the end of DST is scheduled to be postponed are 2012, 2015, 2023, 2026, 2034 and 2037. It is unknown whether this is 00:00 local time or local standard time, so local standard time has been chosen.
Canada	Second Sunday in March	First Sunday in November	Since 2007, all time changes take place at 02:00 local time
New Zealand	Last Sunday in September	First Sunday in April the following year	02:00 local standard time (NZST=UTC+12)
USA[a]	Second Sunday in March	First Sunday in November	Since 2007, all time changes take place at 02:00 local time
European Union	Last Sunday in March	Last Sunday in October	01:00 UTC

a. The Energy Policy Act of 2005 Rule.

Additional Information for the Leap Second Event (UTC)

If the menu line "Leap Second" in the UTC DateTime menu is set to User Defined, the time and date fields of this menu can be edited. If the menu line "Leap Second" is set to Off, editing is disabled.

The menu for Leap Second Event (UTC) indicates the time and date for the next addition or subtraction of a Leap Second. At the indicated time and date, a second will be added to or subtracted from UTC Time. See previous paragraphs regarding editing of the available menu lines.

Leap Second Event

The Leap Second event is not regular; indeed it is usually only decided a few months in advance when a Leap Second is to be added. For this reason it is not possible for all versions of the SRG-4500 software to have the time and date of the next event coded into the software. Historically the Earth's spin is slowing down but some scientists think that global warming may make the Earths spin increase. In this case, Leap Seconds would occasionally need to be subtracted.

When a positive leap second is added at 23:59:60:00 UTC, it delays the start of the following UTC day (at 00:00:00:00 UTC) by one second, effectively delaying the UTC clock.

Announcement of Leap Seconds

The International Earth Rotation and Reference Systems Service (IERS) announces the insertion of a Leap Second whenever the difference between UTC and UT1 approaches 0.6 s, to keep the

difference between UTC and UT1 from exceeding 0.9 s. IERS publishes announcements every six months, detailing whether Leap Seconds are to occur or not, in its "Bulletin C". Such announcements are typically published well in advance of each possible Leap Second date - usually in early January for June 30 and in early July for December 31. Because the Earth's rotation rate is unpredictable in the long term, it is not possible to predict the need for them more than six months in advance. Leap Seconds have been added since 1972:

Table 11 Leap Seconds

Year	June 30	December 31	Year	June 30	December 31	Year	June 30	December 31
1971	--	--	1986	0	0	2001	0	0
1972	+1	+1	1987	0	+1	2002	0	0
1973	0	+1	1988	0	0	2003	0	0
1974	0	+1	1989	0	+1	2004	0	0
1975	0	+1	1990	0	+1	2005	0	+1
1976	0	+1	1991	0	0	2006	0	0
1977	0	+1	1992	+1	0	2007	0	0
1978	0	+1	1993	+1	0	2008	0	+1
1979	0	+1	1994	+1	0	2009	0	0
1980	0	0	1995	0	+1	2010	0	0
1981	+1	0	1996	0	0	2011	0	0
1982	+1	0	1997	+1	0	2012	+1	0
1983	+1	0	1998	0	+1	2013	0	
1984	0	0	1999	0	0	2014	0	
1985	+1	0	2000	0	0	2015		

Semi automated support for Leap Seconds is built-in until 2034.

The operator programs in a UTC date and UTC time at which the Leap Second event is required. On this date, at this time, a Leap Second is automatically added. International convention is that Leap Seconds are added, so the time sequence is:

• 23: 59: 59 UTC
• 23: 59: 60 UTC
• 00: 00: 00 UTC
• 00: 00: 01 UTC

In a television station, 00:00:00 UTC might be in the middle of your busy schedule. If this is so, you can choose another UTC time at which to action the Leap Second; for instance at

02:00:00 UTC the following morning. Only the date and hour at which the Leap Second

occurs is programmable. These dates are input as UTC so you may have to take account of your time zone and daylight saving status.

Once the Leap Second event occurs, all the subsequent timecodes are recalculated so that they will also have moved by one second. Subsequent Leap Seconds can be added by the operator as they are announced.
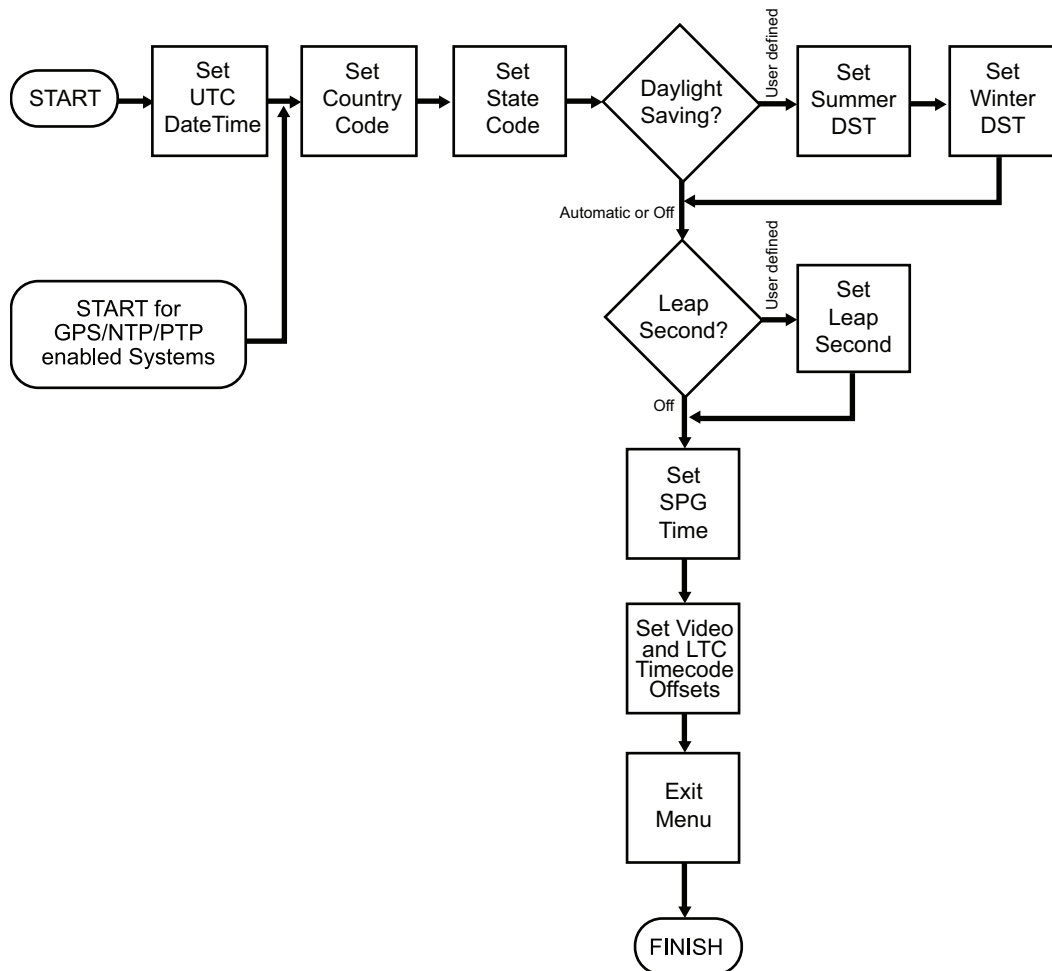
Figure 26 Time/Date Settings

Genlock Menus

The SRG-4500 has a very stable 10MHz internal oscillator. The SRG-4500 can free-run on this 10MHz reference and maintain long term stability.

Alternatively, the SRG-4500 can:

• Genlock to an NTSC, or PAL B/G video reference. In this mode, the long term stability is defined by the external reference.

• Frequency lock to a reference from an external oscillator. The long term stability is defined by the external oscillator.

• Genlock to a reference from GPS, with the 10MHz internal oscillator being disciplined by the GPS system.

When locked to a Composite video signal, the lock will be frequency and phase related. When locked to an external oscillator, the lock will be frequency related only.

When locking to GPS, the lock mode can be selected from the following options:

• Time lock

• Time and Frequency lock

• Time and Frequency and Phase lock

```
Lock Mode                    =        Internal Lock
Lock Mode                    =        Internal Lock
Unlock Mode                  =               Relock
— Lock Status                =               Locked
— Ref Signal                 =         1080 59.94p
— GPS Status                 =               Locked
— NTP Status                 =        Locked to NTP
— VITC Status                =           VITC Found
— MHz Status                 =
```

Figure 27 Genlock Menu Example

Genlocking to an External Video Reference

The SRG-4500 Genlock to an external video reference in the following manner. As soon as a video reference is applied, it is evaluated, usually within 2 seconds, and, if valid, the Genlock system performs an initial "quick-lock" to quickly achieve field and line lock. Then, a "slow-lock" is performed in order to achieve sub-carrier lock, and ultimately Sc-H lock. Both of these lock modes are designed to "glide" the SRG-4500 video output(s) smoothly towards the required lock point.

For situations where the reference and the SPG output are quite close to each other timing-wise, this Genlocking process may happen quite quickly, within a few seconds or so. At other times, especially when a PAL reference is four fields removed from the required lock point, the process to complete the full Genlock process may take as long as 15 seconds.
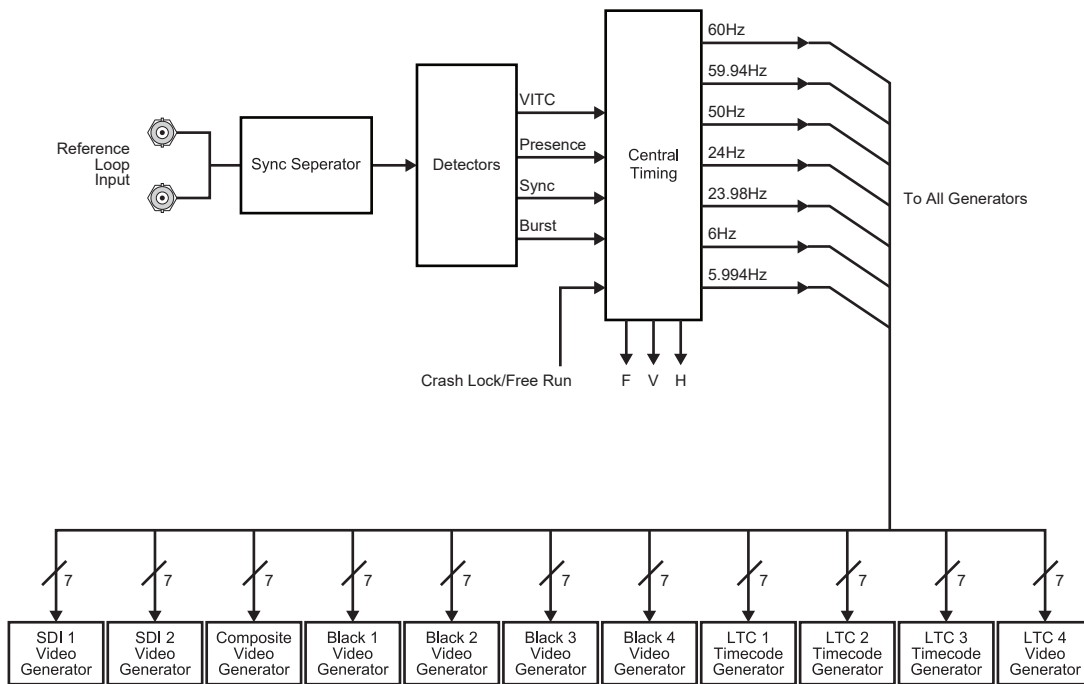
Figure 28 Genlock to External Video Reference

All but two of these menu lines report status information regarding the Genlock system. The remaining two items (Lock Mode and Unlock Mode) can be configured by the user.

Lock Mode

This menu line allows the user to select the required Genlock mode of the SRG-4500. The options in the field are:

- Internal Lock — Locks to the internal 10MHz oscillator
- Genlock — Lock to an external CVBS video signal
- Genlock+VITC — Locks to VITC on an external CVBS video signal
- MHz Lock — Locks to an external frequency reference signal
- GPS F+Phase Lock — Locks to a GPS signal from a connected antenna
- GPS Freq Lock — Locks to a GPS signal from a connected antenna

The "GPS" and "NTP" Lock options are only available when these options are enabled.

Unlock Mode

This menu line allows the user to select the required action when reference is restored in Genlock mode. The options in the field are:

- Internal Lock — Locks to the internal 10MHz oscillator
- Relock — Re-locks to an external reference

Lock Status

This menu line reports the status of the Genlock system. For video and frequency lock modes, the options in the field will appear as:

- Internal Lock — appears under two conditions: when the SRG-4500 is set for Lock Mode = Internal Lock, and when Lock Mode = Genlock(+VITC) and the external reference is absent.
- Lost Lock — appears when the SRG-4500 detects that the external Genlock video reference has changed, is missing, or of an unrecognized format.
- Locking — displays while the SRG-4500 is actively Genlocking to the external Genlock video reference.
- Locked — displays when the SRG-4500 has successfully Genlocked to the external Genlock video reference.
- Locked to 10MHz — displays when the SRG-4500 has locked to the external 10MHz frequency reference.

Additional options will appear in the field, mirroring a subset of the field options detailed in the following sections.

Ref Signal

If an external Genlock reference is present, details regarding the format of the reference are displayed in this menu line.

The options in the field will appear as:

- No signal
- 525 NTSC59.94i
- 625 PAL 50i

GPS Status

This menu line reports the status of the GPS system. The options in the field will appear as:

- Option is Off — appears when GPS Lock Mode has been selected, and the option is not enabled.
- Acquiring GPS — displayed when the SRG-4500 is actively searching for satellites and locking to the time information within the GPS signal.
- xLocked to GPS — (where x = t, i, a or p) is displayed when the SRG-4500 has successfully locked to the pre-selected mode of GPS Locking (the display progresses in sequence, as listed):
  - › tLocked to GPS GPS Time Locked
  - › iLocked to GPS Basic Frequency acquired
  - › aLocked to GPS Better Frequency acquired
  - › pLocked to GPS GPS Phase Locked

NTP Status

This menu line reports the status of the NTP system. The options in the field will appear as:

- Option is Off — displayed when the NTP Lock Mode has been selected, and the option is not enabled.
- NTP is Off — displayed when NTP Option has been enabled, but is set to be neither a Client nor a Server.
- Acquiring NTP — displayed when the SRG-4500 is actively searching for and locking to NTP information from a remote server.
- Locked to NTP — displayed when the SRG-4500 has successfully locked to a remote NTP Server.
- Server Mode — displayed when the SRG-4500 is configured to be an NTP Server.

VITC Status

This menu line reports the status of the VITC system. The options in the field are:

- Ignoring VITC — appears when the Lock Mode is not Genlock+VITC, and indicates that there is no VITC to search for or lock to.
- Start VITC loop — appears briefly as the Lock Mode is set to Genlock+VITC.
- Searching VITC — appears while the SRG-4500 is searching for a valid VITC signal.
- VITC found — appears briefly when the SRG-4500 has found a valid VITC signal.
- Locking to VITC — appears while the SRG-4500 is actively Genlocking to the VITC signal.
- tLocked to VITC — appears when the SRG-4500 has successfully Genlocked to the VITC signal.

If you have more than 1 valid Genlock reference source available or connected to lock to, the Lock Status setting will follow a hierarchy to lock to the most suitable reference. Additionally, the current Lock Status is reported on the bottom line of the Logo and Time stand-by screens on the Front Panel Display.

System Setup Menus

Figure 29 is an example of the System Setup menu.

```
System Setup Menu
—  Temp Report        Menu Enter              —>
—  Event Report       Menu Enter              —>
—  System Report      Menu Enter              —>
—  GPS Report         Menu Enter              —>
—  Configuration      Menu Enter              —>
—  Network            Menu Enter              —>
—  Option Enable      Menu Enter              —>
—  Calibration        Menu Enter              —>
—  LipSync Report     Menu Enter              —>
```

Figure 29 System Setup Menu Example

✸ When the GPS option is not installed/enabled, the "GPS Report" line appears as: -GPS........Option not enabled

The System Setup menu provides a gateway to the less frequently used options in the SRG-4500. These options include:

• Extended information in the form of reports

• Extended configuration options

• Access to factory settings that the user should never have to access or adjust, but may contain useful information to communicate to the factory during a service event.

✸ Report menus contain information only; there are no editable fields in these menus.

Temperature Report

Figure 30 provides an example of the Temperature Report menu.

```
Temperature            Now        Max          Min
+3v3 Regulatory        45         45           45
+1v2 Regulator         45         45           45
N+1 Interface          45         45           45
N+1 Left PSU           45         45           45
N+1 Right PSU          45         45           45
L PSU turned on                       nnnnn times
L PSU on for                     hhhhh.ddd hours
R PSU turned on                       nnnnn times
R PSU on for                     hhhhh.ddd hours
```

Figure 30 Temperature Report Menu Example

The Temperature Report provides information on the temperature sensors within the SRG-4500. A typical example might look like: +3v3 Regulator 42 45 41

Depending on the exact configuration and options in the SRG-4500, only those sensors that are detected will be displayed. If a sensor is installed but has failed, the description in the relevant line appears as: Fixed PSU   -Sensor absent

PSU Report

The menu lines: "L PSU turned on nnnnnn times ", "L PSU on for hhhhhh.ddd hours ", "R PSU turned on nnnnnn times "and "R PSU on for hhhhhh.ddd hours.

These menu lines report the power cycle counts and "in service" times for both of the PSUs installed in the Dual Redundant PSU SRG-4500.

When there is only one PSU, as in the single PSU variant of the frame, the SRG-4500, these menu lines appear as:

"PSU turned on nnnnnn times"

"PSU on for hhhhhh.ddd hours"

The sub-field "nnnnnn" is a numerical count of the number of times the respective PSU has been power cycled. The sub-field "hhhhhh.ddd" is a numerical count of the number of hours the respective PSU has been powered, where "hhhhhh" displays whole hours, and "ddd" displays fractions of an hour to 3 decimal places.

Because the temperature report includes not only the current, minimum and maximum temperatures detected by the installed temperature sensors, but also power supply "in-service" data, this information is useful if you are experiencing reliability problems in an extreme environment.

Event Report

Figure 31 provides an example of the Event Report menu.

```
Event Menu
Ev         00010  NewMaxTemp2
03.22.21.255.13                      12 April 2013
Ev         00009  EthernetLinkMade
03.22.18.700.13                      12 April 2013
Ev         00008  PowerOn
03.22.18.700.13                      12 April 2013
```

Figure 31 Event Report Menu Example

The Event Report provides access to the last 99 events recorded by the SRG-4500. These events may relate to normal expected functionality or to systemic errors. This information might be useful in monitoring and diagnosing a system problem outside the SRG-4500, or a reliability problem within the SRG-4500.

```
Ev nnnnn NewMinTempAlarm0
```

```
23.59.59.999 01 September 2012
```

This menu row pair provides details of the recorded event.

• The first row provides an event number and the description of the event.

• The second row provides the event time expressed as hours: minutes: seconds: milliseconds, and the event date.

The most recent event is always displayed at the top of the menu. A large number of different events can be recorded.

Table 12 Applicable Events

Event	Event
EventDefault	EventNewMaxTempAlarm1
Event Power On	EventNewMaxTempAlarm2
EventWatchdogReturn	EventNewMaxTempAlarm3
EventLVDReturn	EventNewMaxTempAlarm4
EventPowerOff	EventNewMaxTempAlarm5
EventLVDEvent	EventNewMaxTempAlarm6
EvetnSetUTCTimeFromGPS	EventNewMaxTempAlarm7

Table 12 Applicable Events

Event	Event
EventGPSTimeLost	EventNewMinTemp0
EventSetUTCTimeFromNTP	EventNewMinTemp1
EventNTPTimeLost	EventNewMinTemp2
EventLeftPSUfail	EventNewMinTemp3
EventLeftPSUreturn	EventNewMinTemp4
EventRightPSUfail	EventNewMinTemp5
EventRightPSUreturn	EventNewMinTemp6
EventPSULCDCancelManual	EventNewMinTemp7
EventPSULCDCancelAuto	EventNewMinTempAlarm0
EventPSULCDRepeatManual	EventNewMinTempAlarm1
EventPSULCDRepeatAuto	EventNewMinTempAlarm2
EventNewMaxTemp0	EventNewMinTempAlarm3
EventNewMaxTemp1	EventNewMinTempAlarm4
EventNewMaxTemp2	EventNewMinTempAlarm5
EventNewMaxTemp3	EventNewMinTempAlarm6
EventNewMaxTemp4	EventNewMinTempAlarm7
EventNewMaxTemp5	EventEthernetLinkMade
EventNewMaxTemp6	EventEthernetLinkLost
EventNewMaxTemp7	EventGPSSetTimecodeFromGPSFlag
EventNewMaxTempAlarm0	EventGPSUnSetTimecodeFromGPSFlag

System Report

Figure 32 provides an example of the System Report menu.

```
                                      192.xxx.xxx.xxx
Ethernet                100Mbps         Full Duplex
ArmFile_0x00200000_vxx_xxx.ata
XilFile_0x30000000_vxx_xxx.ata
PatFile_0x34000000_vxx_xxx.ata
LogFile---------- none present
BMPFile---------- none present
AudFile---------- none present
Bootware vxxxxxx Software vxxxxx
Hardware vxxxx   Firmware vxxxx
```

Figure 32 System Report Menu Example

The System Report provides complete version information for the hardware, firmware and software elements that make up the SRG-4500.

192.xxx.xxx.xxx

This field reports the user programmed Ethernet IP Address of the SRG-4500. The options in the sub-fields appear as: 0 through 255.

Ethernet

This field reports the detailed Ethernet link status of the SRG-4500. The options in the first sub-field appear as: <blank>, 10Mbps, or 100Mbps.

The options in the second sub-field appear as: No link, Full Duplex, or Half Duplex.

Additionally, the current Ethernet link status is reported on the bottom line of the Logo or Time stand-by menus on the Front Panel Display.

ArmFile

The Arm File menu link is in the form: "`ArmFile_0x00200000_vxx_xxx.ata`".

The sub-field "0x00200000" is the load address. The sub-field "vxx_xxx" is the version number.

Updates of this file may be uploaded via the Ethernet interface. Refer to the section "**Software Upgrades**" for details.

XilFile

The Xilinx File menu line is in the form: "`XilFile_0x30000000_v00_21x.ata`"

The sub-field "0x30000000" is the load address. The sub-field "v00_21x" is the version number.

Updates of this file may be uploaded via the Ethernet interface. Refer to the section "**Software Upgrades**" for details.

PatFile

The Pattern File menu line is in the form: "`PatFile_0x34000000_vxx_xxx.ata`".

The sub-field "0x34000000" is the load address. The sub-field "vxx_xxx" is the version number.

Updates of this file may be uploaded via the Ethernet interface. Refer to the section "**Software Upgrades**" for details.

Bootware and Software Fields

The Bootware vxxxxx field indicates the bootware version in use. This is not usually modified by field upgrades as it relates to the motherboard bootware components in the SRG-4500.

The Software vxxxxx field indicates the software version in use. This can be modified in the field when new versions of the software are uploaded via the Ethernet interface.

Hardware and Firmware Fields

The Hardware vxxxx field indicates the hardware version in use. This is not usually modified by field upgrades as it relates to the motherboard hardware components in the SRG-4500.

The Firmware vxxxx field indicates the firmware version in use. This is not usually modified by field upgrades as it relates to the motherboard firmware components in the SRG-4500.

GPS Report

Figure 33 provides an example of the GPS Report menu.

```
GPS Report
SV in Fix                       =                    nn
GPS SVs in view                 =                    nn
GLO SVs in view                 =                    nn
Leapsecond in pend              =                    No
Lxx SV                          =                    mm
Lxx SV                          =                    mm
```

Figure 33 GPS Report Menu Example

The GPS Report displays information regarding the current status of the GPS system. Access to this report will only be possible if the GPS option has been installed and enabled.

The information that appears in this report consists of a list of detected satellite vehicles (SV) and their signal-to-noise ratio (SNR). Additionally, a "map" is displayed on the Front Panel LCD, showing a graphical representation of the satellite locations in the sky

✶ SNR is not defined for the GLONASS satellite system.

GPS Report Fix

The sub-field in this menu line indicates the total number of satellites currently being detected, and appears as 00 through 24.

Pxx SV, Lxx SV

The menu lines starting with "P" and "L" represent which satellite system is being referred to:

• **P** — for the American G**P**S system
• **L** — for the Russian G**L**ONASS system

The first sub-field is used to chronologically index the list of detected satellites, and has the following value range: 01 through 12 for both systems.

The second sub-field indicates the assigned PRN of the satellite vehicle, and has the following value ranges:

• 01 through 32 for the American GPS system
• 65 through 88 for the Russian GLONASS system
• xx for a non-detected satellite

The third sub-field indicates the signal-to-noise ratio of the received signal from the satellite vehicle, and has the following value range:

• 00 through 58 for the American GPS systems
• xx for a non-detected satellite

Configuration Menu

Figure 34 is an example of the Configuration menu.

```
Configuration Menu
Changeover                  =              Primary
LCD Brightness              =                  40%
LCD Flash on Error          =                  xxx
LCD Animation               =                  xxx
LCD Time Code               =                  xxx
AES1-8 + Analog             =          Composite 1
Pulse 1                     =                xxxxx
Pulse 2                     =                xxxxx
Pulse 3                     =                xxxxx
10MHz Mode                  =                  xxx
Balanced Pins 3+ 4-         =                 xxxx
Balanced Pins 5+ 6-         =                 xxxx
Balanced Pins 7+ 8-         =                 xxxx
Balanced Pins 9+ 10-        =                 xxxx
Balanced Pins 11+ 12-       =                 xxxx
Balanced Pins 13+ 14-       =                 xxxx
Balanced Pins 15+ 16-       =                 xxxx
Balanced Pins 17+ 18-       =                 xxxx
Balanced Pins 19+ 20-       =                 AES2
Balanced Pins 21+ 22-       =                 AES1
Balanced Pins 23+ 24-       =                 DARS
```

Figure 34 Configuration Menu Example

The Configuration menu provides access to a range of features that determine the functionality of the SRG-4500 not otherwise covered by other menu settings.

✷ These options are typically set up during the system commissioning of the SRG-4500, and thereafter are unlikely to be changed.

Changeover

The options in the sub-field appear as: Primary, and Backup.

The SRG-4500 can be installed with a partner SRG-4500 and an ACO-4500. In this configuration, one of the SRG-4500 is defined as PRIMARY and the other as BACKUP. This menu row item allows the selection of PRIMARY or BACKUP. The polarity of the ONAIR tally is also controlled by this selection.

LCD Brightness

This menu row allows the user to select the best LCD display parameters for the ambient lighting conditions. The options are: 0% through 100% in 16 steps.

LCD Flash on Error

This menu row allows the user to select the LCD and Button to flash (or not) when an error is reported. The options are:

• Off — no flash

• On — LCD and the Select button flash when errors are reported

LCD Animation

This menu allows the user to select the animation mode on the LCD. When the Timecode screen is selected, the display will be either static, or will cycle alternately with the Logo screen. The options are:

- Off — no animation
- On — animation when display is left in Timecode screen

LCD Timecode

This menu allows the user to choose which time within the SRG-4500 is displayed on the LCD. When the Timecode is selected, the display will show the Time Selected. The options are: LTC1-4, Black1-4, SDI1-4, SPG Time, UTC Time, and GPS Time.

✶ All of LTC1-4, Black1-4 and SDI1-4 include DST when it is active.

If the Time is SPG Time, the digits are separated by ". . ." (e.g. `09.34.05.10`). Note that SPG time does not include DST changes.

If the selected time is drop frame, the digits are separated by "; ; ;" (e.g. `09;34;05.10`).

If the selected time is not drop frame, the digits are separated by ": : : :" (e.g. `09:34:05:10`).

AES1-8 + Analog

This menu item allows the user to select the appropriate video from which the AES and Analog Audio are referenced. The options are: SDI1, SDI2, and Composite1.

Pulse

This menu row triplet allows the user to select which pulse type appears on the rear panel BNCs of the multifunction option module.

✶ Options 1 through 7 produce pulses determined by the format of the CVBS output.

The options in the field are:

• Mixed Sync	• Line Drive	• 6Hz/29.97Hz	• LTC1
• Mixed Blanking	• Field Drive	• Word Clock 48KHz	• GPS raw
• Burst Gate	• F1/L7 or F1/L10	• Word Clock 44.1KHz	
• PAL Square	• 6Hz/30Hz	• 2.048MHz	

10MHz Mode

The SRG-4500 can lock to an external 10MHz reference. This reference can be sine, square or pseudo-sine.

The SRG-4500 generates its own 10MHz with pseudo-sine wave output.

There is a changeover relay within the SRG-4500 selecting either the SRG-4500 generated 10MHz or the external 10MHz. This is used to allow 10MHz to be passed to other external equipment if the SRG-4500 is powered down either purposefully or due to failure.

This menu item selects the operation mode of the 10MHz relay. The options are: External, Internal, and Automatic.

Programmable Balanced Outputs

This menu row allows the user to select which balanced signal types appear on the rear panel when using the Breakout option. Any of the following signal types may be selected on any programmable balanced pin output pair (i.e. all 8 programmable outputs may be the same signal, or may be all different, etc.).

Note that some pin pairs are fixed (and are not configurable) as follows:

- Pin 19+, Pin 20- are set to AES2
- Pin 21+, Pin 22- are set to AES 1
- Pin 23+, Pin 24- are set to DARS
- Pin 25+, Pin 26- are set to Left Analog Audio
- Pin 27+, Pin 28- are set to Right Analog Audio

Network Menu

Figure 35 provides an example of the Network menu.

```
Network  Menu
IP Address              =     000.000.000.000
Subnet Mask             =     000.000.000.000
Gateway                 =     000.000.000.000
- MAC Address           =     000.000.000.000
- NTP                         Menu Enter ->
- DashBoard                   Menu Enter ->
- Backup Device               Menu Enter ->
```

Figure 35 Network Menu Example

When the NTP option is not enabled, the line appears as: -NTP........Option not enabled

The Network menu, and the associated sub-menus, allows the user to configure and control the behavior of the Ethernet system within the SRG-4500.

✸ Before proceeding, the user must contact their Network Administrator, and obtain suitable IP addresses, etc., that will need to be programmed within this menu.

IP Address

This menu line allows the user to enter the IP address of the SRG-4500. The options in the sub-fields "000" are: 000 through 255 where 000" is the default "no action" setting.

To change the settings

1. Press the rotary control to advance through each sub-field.
2. Turn the rotary control to change the value of the currently selected sub-field.

SubNet Mask

This menu line allows the user to enter the SubNet Mask address of the SRG-4500.

The options in the sub-fields are: 000 through 255. The default is "000" (no action).

To change the settings

1. Press the rotary control to advance through each sub-field
2. Turn the rotary control to change the value of the currently selected sub-field.

Gateway

This menu line allows the user to enter the Gateway address of the SRG-4500. Typically, this might be the IP address of a network hub to which the SRG-4500 is connected.

The options in the sub-fields are: 000 through 255 where "000" is the default "no action" setting.

To change the settings

1. Press the rotary control to advance through each sub-field

2. Turn the rotary control to change the value of the currently selected sub-field.

MAC Address

This menu line displays the MAC Address (Media Access Control), a unique, read-only identifier assigned to network interfaces for communications on the physical network segment.

This menu item cannot be changed - the MAC address is stored in a hardware device and is unique to each SRG-4500, and is also used to provide unique update keys when enabling options within the unit.

Other Menus

These menu lines provides access to subsequent menu levels, as indicated. These are defined in the following sections.

"-NTP   Menu Enter ->"

"-DashBoard   Menu Enter ->"

"-Backup device Menu Enter ->"

NTP Menus

✶ Access to the NTP menu is only possible if the NTP option is enabled.

The NTP menu allows the user to configure the Ethernet port to provide (Server Mode) or request (Client Mode) time information using Network Time Protocol. Access to this menu will only be possible if the NTP option has been enabled.

The menu line reports the current NTP time. The field "hh:mm:ss:ff: displays hours, minutes, seconds, and frames in the 24-hour format.

If the NTP Client system has yet to receive a valid time, the menu line appears as: NTP Menu No NTP time.

NTP System is Off

This menu line allows the user to control whether the SRG-4500 is configured to be an NTP Client or NTP Server, or whether the NTP System is off.

```
NTP Menu                                    hh:mm:ss:ff
The NTP Server is.............................off
```
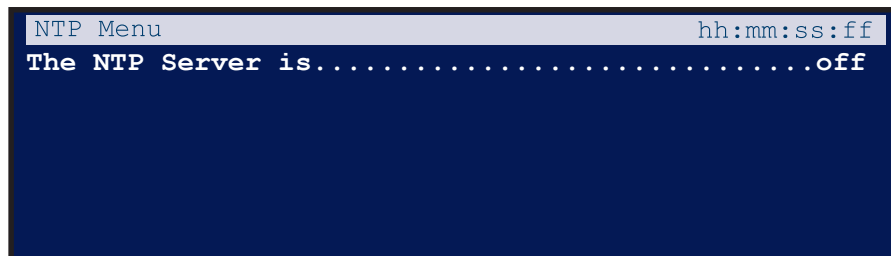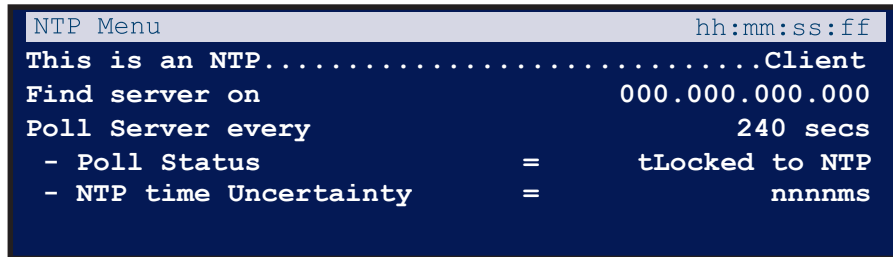
Figure 36 NTP Menu Example — Off

The options in this menu line appear as:

- The NTP System is off
- This is an NTP Client
- This is an NTP Server

NTP Client Mode

Access to the NTP menu is only possible if the NTP option is enabled.

```
NTP Menu                                   hh:mm:ss:ff
This is an NTP...........................Client
Find server on                      000.000.000.000
Poll Server every                          240 secs
 - Poll Status              =       tLocked to NTP
 - NTP time Uncertainty     =               nnnnms

```

Figure 37 NTP Client Menu Example

Find Server on

This menu line allows the user to define the IP address of a re mote web-based NTP Server from which the SRG-4500 will periodically request time information. The address can be changed to one preferred by the user.

The options in the sub-fields are: 000 through 255. The value of 000 is the default "no action" setting.

To change the settings

1. Press the rotary control to advance through each sub-field

2. Turn the rotary control to change the value of the currently selected sub-field.

Poll Server

This menu line allows the user to set the interval (in seconds) at which the SRG-4500 requests NTP time information from the specified time server.

The options in the Poll Interval field are:

- Never
- 60 secs
- 2/5/10/30/60 minutes
- 2/4/8 hours

One initial power-up, the SRG-4500 will poll the NTP Server every 10 seconds until a reply is received, and then drop back to the user-selected value as programmed in this menu sub-field.

Poll Status

This menu line reports the current poll status of the designated NTP Server address.

Initially, the sub field will report that the SRG-4500 is currently waiting for replies from the designated NTP Server: `Poll Status = Acquiring NTP`.

When replies from the designated NTP Server produce consistently accurate time stamps, the sub-field will change to: `Poll Status = tLocked to NTP`.
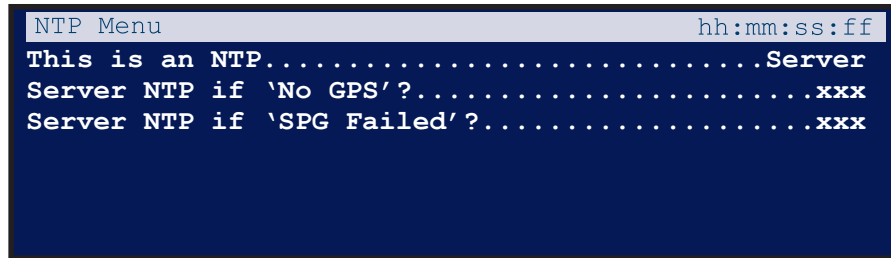
During NTP acquisition, the following menu line appears below the Poll Status line: `Unlocked Poll every 010 secs`.

This menu line reports the polling interval when the NTP Server is being actively polled during initial acquisition. The interval of 10 seconds should ensure that at least one reply will be found very quickly, After a reply has been received, the polling interval drops back to the user setting made in the menu entry `Poll Server every 240 secs` above, and the following menu line appears.

The menu line `NTP time Uncertainty = nnnnms` reports the average variation in successive NTP replies.

Server Mode

An example of NTP Server Mode menu is below.

```
NTP Menu                                      hh:mm:ss:ff
This is an NTP.............................Server
Server NTP if 'No GPS'?.......................xxx
Server NTP if 'SPG Failed'?...................xxx



```

Figure 38 NTP Server Menu Example

Serve NTP if 'No GPS'

This menu line determines whether the SRG-4500 will serve NTP requests when the GPS option is not enabled.

The options in the sub-field are:

• No — NTP Server will not reply to NTP requests while GPS is disabled.

• Yes — NTP Server will reply to NTP requests while GPS is disabled.

When set for "Yes", NTP time will be used to serve time requests for a limited time after which NTP time requests will be ignored.

Serve NTP if 'SPG failed

This menu line determines whether the SRG-4500 will serve NTP requests while an accompanying Changeover unit has detected an error on the unit.

The options in the sub-field are:

• No — NTP Server will not reply to NTP requests while the SRG-4500 has 'failed'.

• Yes — NTP Server will reply to NTP requests while the SRG-4500 has 'failed'.

DashBoard Menu

Figure 39 is an example of the DashBoard menu.

```
DashBoard Menu
Port                          =               nnnn
Enable Automatic Discovery    =                 No
Connection URM                =      Not supported
Character                     =            mm = yyy
DashBoard Password            =            Alpha----
```
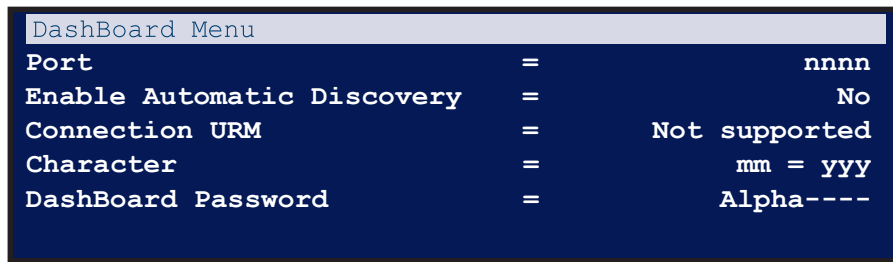
Figure 39 DashBoard Menu Example

The DashBoard menu displays information relating to communications between the SRG-4500 and the external PC-based Remote Control Program.

Port

This menu line allows the user to set the Ethernet Port through which the SRG-4500 communicates with the external PC-based Remote Control Program.

The options in the sub-field are: 5253 (default), and 6666.

Enable Automatic Discovery

This menu is not implemented.

Connection URM

This menu is not implemented.

Character and DashBoard Password

These menu lines only appear when the Connection URM menu is to "Managed". This menu doublet allows the user to select and edit the Dashboard password.

- The options in the field "mm" are: 01 through 09. There are a maximum of 9 characters in the password. "mm" selects which character is 'active' and hence editable in the menu.
- In the selected DashBoard Password line, as "mm" is changed, a cursor gives a visual indication of which character is active.
- The options in the field "yyy" are any valid alpha-numeric character from the following:
  › <space>
  › Numeric: 0123456789
  › Uppercase: ABCDEFGHIJKLMNOPQRSTUVWXYZ
  › Lowercase: abcdefghijklmnopqrstuvwxyz

  The first non-alpha-numeric character terminates the password. The only character available to do this is the space character, which is accessed by rotating the control fully anti-clockwise. The edited password is applied as the menu is exited.

Keep the following in mind:

- After adjusting the field "yyy", use the Escape/Back button to select the next character to edit, then press Select to edit the next character, etc.
- When using the available front panel controls, editing of the characters in the Dashboard Password is performed in "Overtype" mode, i.e., it is not possible to "Insert" or "Delete" characters.
- When you edit a pre-programmed Dashboard Password, start from character position 1; do not use spaces between the characters (see above); overtype with spaces (char.#32) any extraneous characters at the end of the password.

Backup Device Menu

Figure 40 shows an example of the Backup Device menu.

```
Backup Device Menu
Poll the Primary SPG on...........................
IP Address                   =      000.000.000.000
Subnet Mask                  =      000.000.000.000
Include Genlok Modes......................Yes/No
Include NTP Mode..........................Yes/No

Use repeating poll........................Yes/No
Poll (Pending) every.....................xxx secs
 - Completed Backup Polls     =              xxx
Correctly connected to Primary
Poll..................................Active xx

This is PRIMARY....................so never poll
```

Figure 40 Backup Device Menu Example

The Backup Device menu is only used when the SRG-4500 is set to be the Backup unit in a Changeover pair.

Poll the Primary SPG on...

This menu line informs the user that these menu items relate to the Primary SRG-4500 of the Changeover pair.

IP Address, SubNet Mask

These menu lines allow the user to set the IP and SubNet Mask addresses for the Primary SRG-4500 of the Changeover pair.

The options in all menu sub-fields "000" are: 000 through 255. The default is "000" (no action).

To change the settings

1.   Press the rotary control to advance through each sub-field.

2.   Rotate the rotary control to change the value of the currently selected sub-field.

Use repeating poll

This menu line allows the user to choose between automatic and manual polling of the primary SRG-4500 of the Changeover pair.

When enabled (Yes is selected), automatic polling occurs every 10 seconds (by default) or a user set value (up to a maximum of 240 seconds).

When No is selected, the user can effect a manual poll by moving the cursor to the line "Poll Now?" then press the Rotary button once and rotate one click to effect the manual poll. Manually polling is useful:

•   if you wish to maximize the isolation between the Primary and Backup SRG-4500s

•   investigate menu settings and not impact the Primary SRG-4500

The Completed Backup Polls field is then incremented by one to indicate that the manual poll has been effected.

Poll is disabled

This menu line displays if the SRG-4500 is set as the Primary unit in a Changeover pair. It informs the user that the SRG-4500 is the Primary unit of a Changeover pair, and consequently, polling (of the remote device) is disabled.

When the SRG-4500 is set as the Backup unit in a Changeover pair, and "Use repeating poll...Yes", this menu line appears as: Poll every........nnn secs. This menu line enables the user to set the Polling Interval (in seconds). The options in the field are: 010 through 240, or Never.

This is PRIMARY, so never poll

This menu line appears if the SRG-4500 is set as the Primary unit in a Changeover pair. It informs the user that the SRG-4500 is the Primary unit of a Changeover pair, and consequently, polling (of the remote device) is disabled.

When the SRG-4500 is set as the Backup unit in a Changeover pair, this menu line appears as one of the following:

- -Completed Backup Polls = nnn — Where the field "nnn" will increment in conjunction with the number of successful polls of the Primary unit.

- -Completed Polls = <blank> — The field is blank if the previous line regarding the Polling Interval is set for "Never".

SNMP Menu

The SNMP Menu appears below:

Figure 41 SNMP Menu Example

The MiB is available in the software upgrade package. To load the MiB into a browser, ensure that the following openGear MiB files are also included:

- OPEN-GEAR-FRAME-MIB
- OPEN-GEAR-CARD-MIB
- OPEN-GEAR-MIB.

These MiBs can be downloaded from the Ross Video website.

Option Enable Menu

The Option menu appears below:

```
Option Enable Menu
Key                             0000-0000-0000
GPS Update?              No      0000:0000:0000
NTP Update?             No      0000:0000:0000
```

Figure 42 Option Enabled Menu Example

The Option menu allows the user to enable options designed into the SRG-4500. Authorized users enter Option Update Keys, supplied only after consultation with Ross Video.

✱ Option Update Keys are in the form of a 12-character string. Each key is completely unique to a specified option in a particular SRG-4500. Keys will not work for other options on the same SRG-4500, nor on any other SRG-4500. Remember to store these keys in a safe place - you may need to re-enter them if a system error necessitates a system re-configuration.

Key

Every time the SRG-4500 is powered on, this entry displays a pseudo-randomly generated 13-character key. This menu item cannot be changed by the user. This key is unique to each SRG-4500 and should be quoted when requesting any additional Option Enable Keys.

GPS Update, NTP Update

These menu lines allow the user to input the supplied Option Update Key(s) in order to enable the related option(s). Updates can be performed "live" - there is no requirement to re-boot or re-power the unit after key entry.

These menu lines will contain non-zero entries. These will be factory default values, and will be confirmed by the ":" between the character groups. For valid keys, the character groups will be separated by "-".

The Timeable Black (TB) Option is always enabled, is not changeable, and will always contain character groups separated by "-".

These menu options are always set to "No" upon entry - it requires a conscious action on the part of the user to set the option to "Yes" and thereby enable Option Update Key editing.
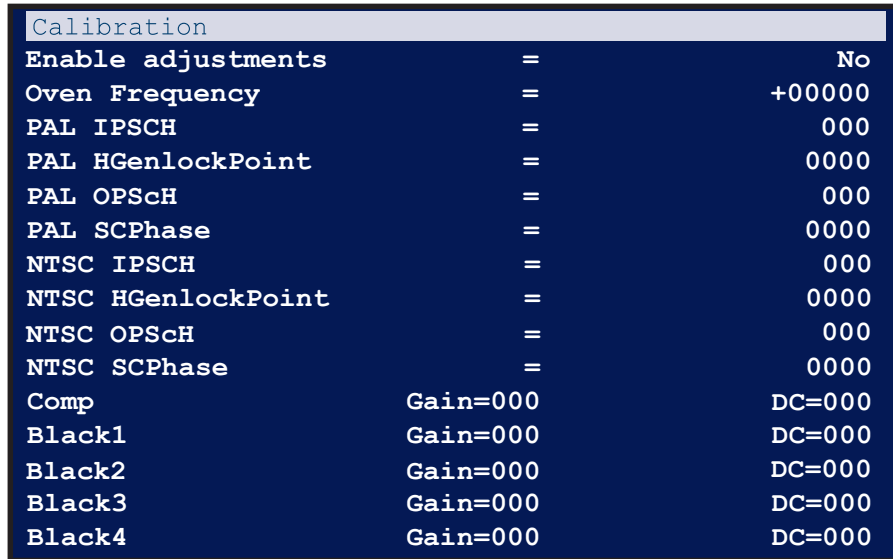
To enter an Option Update Key

1. Highlight the line for which you have a key

2. Press the rotary control. The cursor moves to the word "No".

3. Rotate the rotary control to select "Yes",

4. Press the rotary control. The cursor highlights the first character pair of the key.

5. Rotate the rotary control to select the desired character pair.

6. Confirm your selection by pressing the rotary control. The cursor moves to the next character pair.

7. Repeat through all 6 character pairs until you get back to the highlighted line.

8. When completed correctly, the separators between the character groups change from ":" to "-" to indicate that a valid key has been entered.

9. Exit properly from the menu system to permanently save your new settings. Your enabled option(s) should now be operational.

✸ For the GPS and NTP systems, a power cycle may be required to fully complete the Option Update process

Calibration Menu

Figure 43 shows an example of a Calibration menu.

```
Calibration
Enable adjustments          =                  No
Oven Frequency              =              +00000
PAL IPSCH                   =                 000
PAL HGenlockPoint           =                0000
PAL OPScH                   =                 000
PAL SCPhase                 =                0000
NTSC IPSCH                  =                 000
NTSC HGenlockPoint          =                0000
NTSC OPScH                  =                 000
NTSC SCPhase                =                0000
Comp             Gain=000              DC=000
Black1           Gain=000              DC=000
Black2           Gain=000              DC=000
Black3           Gain=000              DC=000
Black4           Gain=000              DC=000
```

Figure 43 Calibration Menu Example

✸ The Calibration menu contains fundamental settings relating to the functionality and accuracy of the SRG-4500. These settings are programmed during initial testing, configuration and alignment. Under normal circumstances, it should not be necessary to adjust any of these settings after the unit has been installed. It is a good idea to make a manual record of these settings in case they become corrupted or are inadvertently changed. A convenient way to achieve this is to print this page, record the stored values alongside the respective menu lines, then store the list in a safe place.

Enable Adjustments

This menu line enables the user to change any of the calibration settings in the remainder of this menu.This menu option is always set to "No" upon entry - it requires a conscious action on the part of the user to set the option to "Yes" and thereby enable calibration value adjustments.

The options are:

• No — Calibration is disabled (Default). The user may view the menu values at any time.

• Yes — Calibration is enabled. The user is able to change any of the preset values.

Oven Frequency

This menu line allows the user to adjust the frequency of the internal 10MHz oscillator.

When the SRG-4500 is configured for Internal Lock (refer to the section"**Genlock Menus**"), the video outputs on the SRG-4500 will "free run" compared to an external video signal from a known reference.

To set the 10MHz oscillator

1. View both the Composite output and the known reference on a vector scope.

2. On the vector scope, ensure that the known reference is also looped through to the EXT REF input, and that the EXT REF function is enabled.

3. Adjust the "Oven Frequency" menu value so that the Composite video output signal rotates at less than 1 cycle/second compared to the known reference.

When the SRG-4500 has a GPS receiver installed and enabled, this value is automatically adjusted by the SRG-4500, using embedded clock data in the GPS signal.

This setting varies from unit to unit.

PAL IPSCH, NTSC IPSCH

These menu lines allow the user to adjust the Sc-H settings relating to the Genlock video signal present at the REF-LOOP BNCs on the rear panel. This setting ensures that the 4-frame (PAL) or 2-frame (NTSC) SC-to-H relationship of the incoming signal will be reliably determined.

To set either of these values, access to test points on the main module is required. Therefore, no specific adjustment details will be outlined here.

These settings vary from unit to unit.

PAL HGenlockPoint, NTSC HGenlockPoint

These menu lines allow the user to set the value of the window used to align the H-timing system with the REF LOOP signal, and thereby control Sc-H locking.

To set either of these values, access to test points on the main module is required, as well as access to a special engineering sub-menu. Therefore, no specific adjustment details will be outlined here.

These settings are unlikely to change significantly from unit to unit. The default value for both PAL and NTSC is 0063.

PAL OPScH, NTSC OPScH

These menu lines allow the user to adjust the SC Phase of the video output relative to the reference input. This setting is used to provide "co-timed" video outputs when they are set for a video timing offset of 0°.

Specialized equipment is required in order for these settings to be determined. Therefore, no specific adjustment details will be outlined here. These settings vary from unit to unit.

PAL SCPhase, NTSC SCPhase

These menu lines allow the user to adjust the Sc-H settings relating to the video outputs. Specialized equipment is required in order for these settings to be determined. Therefore, no specific adjustment details will be outlined here. These settings vary from unit to unit.

CompGain, Black#

These menu lines allow the user to adjust the Gain and DC settings of the respective video outputs.

Each menu line displays the calibration values relating to the gain and d.c. settings of the relevant video channel DAC. Gain values are typically in the range 0-30; d.c. values are typically in the range 382-390.

Disclaimer

Most of these settings are determined during initial testing, configuration and alignment. They should not normally require adjustment or re-configuration during service. In some cases, specific test equipment or even custom apparatus is required to perform calibration and configuration.

On no account should the user attempt to alter any of these settings without proper authorization from Ross Video.

If problems are encountered, these settings can be re-instated. Contact Ross Video for further instructions.

Re-installing one or more calibration settings

For the case where calibration values are simply being re-instated, simply advance the menu highlight to each parameter in turn, and rotate the rotary control to select the required value. Be careful not to rotate the rotary control for any setting that does not need to be changed. Be sure to exit from the menu to permanently save your settings.

✸ During this calibration procedure, the video output being adjusted does not produce a video output. Make sure that you are viewing the menu on another video output from the one you are adjusting, or alternatively, use the front panel LCD.

Troubleshooting

Generally speaking, the SRG-4500 is reliable under normal steady-state operating conditions. If you are having problems, select the symptom from this chapter that closely relates to your particular problem and perform the checks/actions listed.

> **Notice** — *Observe all cautions and warnings listed in the document "**Important Regulatory and Safety Notices to Service Personnel**" that accompanied your unit.*

Troubleshooting Checklist

Table 13 provides troubleshooting guidance for the SRG-4500.

Table 13 Possible Symptoms and Solutions

Symptom	Cause(s)	Action
LCD not operational Video/Audio outputs missing	• Mains Power Missing • Power Supply fault • Bad power connection(s)	• Check Mains Power • Check Mains lead integrity • Check rear panel Mains fuse • Check power supply fuse • Possible low volts at DC-IN on the power supply
Intermittent Operation	Bad power connection(s)	Check Mains Power connections
Corrupted output(s)	Corrupted data	1. Remove Power 2. Wait 10 seconds 3. Re-power the SRG-4500
"Limited" range of video formats/ standards	Option is not enabled	Contact Ross Video to obtain additional Option Key(s)
GPS/NTP not operational	Option is not enabled	• Ensure Option Key has been entered for applicable option • Contact Ross Video to obtain additional Option Key(s)

Replacing a Power Supply

Replacing a failed PS-4500 in a SRG-4500 requires the following steps:

1. If applicable, move the handle on the new PS-4500 to the correct side.
2. Remove the front faceplate from the main chassis.
3. Remove the failed PS-4500 from the main chassis.
4. Install the new PS-4500 into the main chassis.
5. Re-install the faceplate on the main chassis.

Moving the Handle on the PS-4500

Each new PS-4500 ships with its handle installed on the right. The handle must be installed on the side closest to the rack unit ears to ensure the front faceplate is securely affixed to the main chassis.

- If you are replacing the PS-4500 in the right slot, proceed to "**Removing the Failed PS-4500**".
- If you are replacing the PS-4500 in the left slot, proceed to "**To move the handle of the PS-4500**".

To move the handle of the PS-4500

1. Use a Phillips #1 screwdriver to remove the four screws that affix the PSU faceplate to the PS-4500 module.
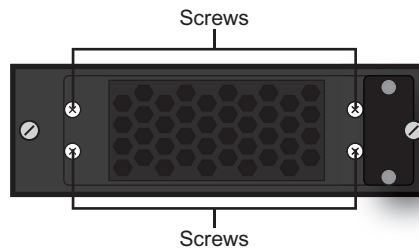
Figure 44 Removing the PS-4500 Faceplate Screws

2. Set the screws aside.
3. Remove the PSU faceplate from the PS-4500 module.
4. Rotate the PSU faceplate 180° and position the PSU faceplate so that the:
    - handle is now on the left side of the PS-4500 module and
    - the four screw holes on the PSU faceplate align with the four screw holes on the PS-4500 module.
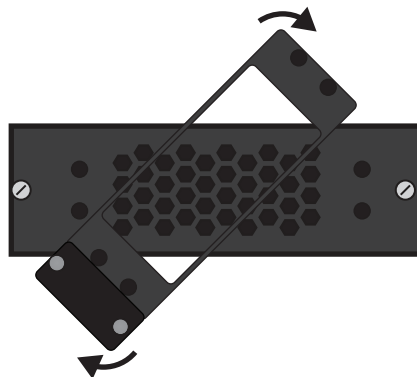
Figure 45 Rotating the PS-4500 PSU Faceplate

5. Affix the PSU faceplate to the PS-4500 module using the screws from step 1.

Removing the Front Faceplate

The faceplate is affixed to the main chassis via the rare-earth magnet mounted on the PS-4500 handle closest to the rack unit ears.

To remove the front faceplate from the main chassis

1. Remove the front faceplate by gently pulling it towards you and away from the main chassis.
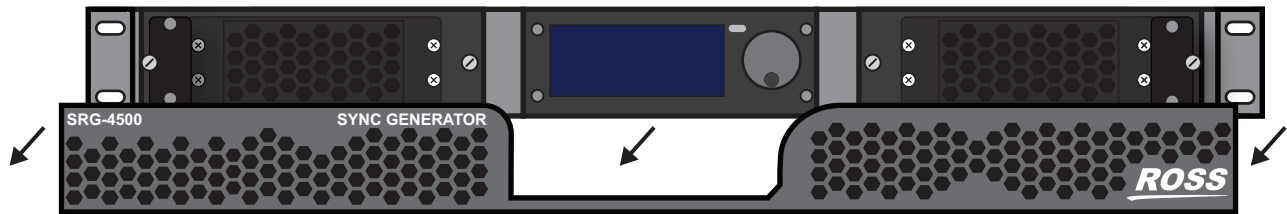
Figure 46 Removing the Front Faceplate

2. Set the faceplate aside on a clean, static-free surface.

Removing the Failed PS-4500

A failed PS-4500 can be hot-swapped with a new PS-4500 without powering down the main chassis.

To remove a failed PS-4500

1. Use a 3/16" slotted screwdriver to disengage the captive screws that affix the PS-4500 to the main chassis.

2. Use the handles on the front of the failed PS-4500 to remove the PS-4500 by gently pulling it towards you and away from the chassis.

3. Set the failed PS-4500 aside.

Installing the New PS-4500

The PS-4500 slides into the available slot and connects to the chassis midplane via the blue connector at its rear.

To install a new PS-4500

1. Align the new PS-4500 with its slot in the main chassis.

2. Slide the new PS-4500 into the available slot. You will feel the PS-4500 engage with the midplane.

3. Use a 3/16" slotted screwdriver to tighten the captive screws and affix the PS-4500 to the main chassis.

Re-install the Front Faceplate

You must re-install the front faceplate to the main chassis to complete the install.

To re-install the front faceplate on the main chassis

1. Position the faceplate over the power supplies.

2. Secure the faceplate on the main chassis.

Software Upgrades

This upgrade procedure applies to SRG-4500 systems where an Ethernet connection is installed. It outlines the steps necessary to upgrade the software programmed on the main module.

✶ Performing a software upgrade to the SRG-4500 requires the unit to be rebooted, and may be off-line for several minutes. Ensure that your system is not in use.

Before You Begin

Before starting, ensure that you comply with the following requirements:

- Connect the SRG-4500 via an Ethernet cable to your local network.
- A PC, also connected via Ethernet to your local network, with the supplied update program(s) and associated data file(s) available. Ideally, data file(s) should be located in the same folder as the associated update program.

✶ Do not re-name any of the files.

- A power-cycle is required as part of a data file update.
- Ensure that you have the **RossSystemUpdate_Vx.x.x.x.exe** program. Contact Ross Technical Support for this program.
- **Table 14** lists the applicable files for your SRG-4500.

Table 14 SRG-4500 Files

File Type		Description
Bootware	Bootloader	At present, can only be uploaded at the factory.
Patfile	Pattern Files PatFile_0x34****.ata	Can be uploaded while the SRG-4500 is in operation. When complete, a power cycle is required.
Xilfile	FPGA File A XilFile_0x300****.ata	Requires that the SRG-4500 is in Bootloader mode. When complete, a power cycle is required.
	FPGA File B XilFile_0x302****.ata	Requires that the SRG-4500 is in Bootloader mode. When complete, a power cycle is required.
ArmFile	SRG-4500 Software ArmFile0x002***.ata	Requires that the SRG-4500 is in Bootloader mode. When complete, a power cycle is required.
PTPFile	SRG-4500 Software CD409****.sh	Requires that the SRG-4500 is in Application mode. A power re-boot is required to start the process. When complete, a further power re-boot is required.

Uploading the Software Files

✶ Only newer files need to be loaded.

To prepare for the upgrade

1. Connect the SRG-4500 via an Ethernet cable to your local network.
2. Connect a Windows PC to the network, such that the SRG-4500 is visible.
3. Verify that the Ross System Update Tool and data files are in the same folder on the PC.

To upload software files to the SRG-4500

1. On your PC, launch the "`RossSystemUpdate_v#.#.#.#.exe`" program.

   The **Ross System Update** dialog opens.

2. Set the IP Address and IP Mask fields to the values for the SRG-4500 you want to upgrade. Note that all octets must be entered as 3-digits. For example, 255.0.0.0 should be entered as 255.000.000.000.

3. Click **Get Device Mode**.

   The status field, located above the Ross logo, displays: "`The device is in Application mode`.".

4. If the SRG-4500 is "`not found`":

   a. Check again that all connections have been made.

   b. Verify that the IP Address and IP Mask values were entered correctly in 2

   c. Power off the SRG-4500.

   d. Repeat steps 1 to 3.

5. If the SRG-4500 still cannot be found, contact Ross Video for further assistance.

6. There are 3 files that consist of a full upgrade. Only newer files than those on the unit need be installed. The order they should be installed is as follows:

   a. Pattern File (PatFile_xxxxx.ata)

   b. FPGA File (XilFile_xxxx.ata)

   c. Software File (ArmFile_xxxx.ata)

7. For each file:

   a. Click **Open File** to display the **Open File** dialog.

   b. Select the relevant "*.ata" file.

   c. Click **OK** to load the file into the Ross System Update Tool and close the **Open File** dialog.

   d. Click **Send to Device**.

   e. If this is the first file to be uploaded, you will be asked to confirm the upload.

8. Monitor the upload:

   a. The software will put the SRG-4500 into Bootload mode.

   b. The Ross System Update Tool erases the old SRG-4500 file.

   c. The Ross System Update Tool uploads the new file to the SRG-4500.

✱ Upload of a file takes approximately 1 minute.

   d. The status messages field in the **Ross System Update** dialog confirms that the upload was completed successfully.

   e. If the upload was not successful, click **Send to Device** again and monitor the process.

9. Once all files have been uploaded successfully, power-cycle the SRG-4500.

10. Verify the software version of the SRG-4500 in DashBoard as follows:

a. Launch the DashBoard client software on your PC.

b. Locate the SRG-4500 in the Basic Tree View in DashBoard.

c. Expand the **SRG-4500** main node in the tree view.

d. Double-click the **Slot 0: SRG-4500** sub-node.

e. Select the **System Report** tab.

f. Verify the values in the provided fields match the file(s) you uploaded.

Your SRG-4500 is now upgraded and ready for use.

PTP Upgrades

✶ Only licensed units requiring a newer PTP code version require this upgrade procedure.

To prepare for the upgrade

1. Ensure that the SRG-4500 **GbE/PTP** port is connected to a network.

2. Connect a Windows® PC to the network.

3. Verify that the PC can ping the SRG-4500 PTP port.

4. Verify that the **Ross System Update Tool** and data files are in the same folder on the PC.

To upload software files to the SRG-4500

1. On your PC, launch the `RossSystemUpdate_v#.#.#.#.exe` program.

    The **Ross System Update** dialog opens.

2. Set the **IP Address** and **IP Mask** fields to the values for the SRG-4500 you want to upgrade. Note that all octets must be entered as 3-digits. For example, 255.0.0.0 should be entered as 255.000.000.000.

3. Click **Get Device Mode**.

    The status field, located above the Ross logo, displays: "`The device is in Application mode.`".

4. If the SRG-4500 is "`not found`":

    a. Check again that all connections have been made.

    b. Verify that the IP Address and IP Mask values were entered correctly in 2

    c. Power off the SRG-4500.

    d. Repeat steps 1 to 3.

✶ There is one file for a PTP upgrade. Only a newer code version needs to be installed.

5. To Load:

    a. Click **Open File** to display the **Open File** dialog.

    b. Select the relevant `*CD409*****.sh` file.

    c. Click **OK** to load the file into the **Ross System Update Tool** and close the Open File dialog.

    d. Click **Send to Device**.

 8. Monitor the upload:

    a. The **Ross System Update Tool** erases the old SRG-4500 PTP file.

    b. The **Ross System Update Tool** uploads the new file to the SRG-4500 PTP file.

    c. The upload of a file takes approximately 1 minute.

d. The status messages field in the **Ross System Update** dialog confirms that the upload was completed successfully.

6. If the upload was not successful, click **Send to Device** again and monitor the process.

Repackaging for Shipment

If you need to return the SRG-4500 for service or repair, if possible use the original packaging materials. If the original packaging is unfit for use, or is not available, you will need to repackage the instrument with suitable materials. For both scenarios, use any applicable steps in the following guidelines:

1. Obtain a corrugated cardboard shipping carton having inside dimensions at least 6" greater than the SRG-4500 dimensions and having a carton test strength of at least 125kg (275lb).

2. If the SRG-4500 is being shipped for repair or calibration, attach a tag or document to the instrument showing the following information:

    • The owner of the SRG-4500 (i.e. full company address / telephone number / e-mail).
    • The name of a person at your company who may be contacted if additional information is needed.
    • The complete SRG-4500 type and serial number.
    • A description of the service required.
    • The return delivery address (if different from above).
    • When applicable, include a Purchase Order document (not just a number).

3. Wrap the SRG-4500 with polyethylene sheeting (or equivalent) to protect the outside finish and prevent entry of packing materials into the instrument.

4. Cushion the SRG-4500 on all sides by tightly packing suitable material or urethane foam between the carton and the SRG-4500, allowing for 3"(7.62cm) of padding on each side (including top and bottom).

✶ For re-used packaging, add extra foam or bubble-wrap in the spaces to further protect against handling damage.

5. Seal the carton with shipping tape or with an industrial stapler.

✶ Ross Video may refuse delivery of any package that consists of improper or inadequate packaging materials, or is not accompanied by suitably accurate documentation. If the SRG-4500 has been damaged in transit, Ross Video will determine whether the unit is economically repairable, and contact the sender accordingly.

Technical Specifications

This chapter provides technical information for SRG-4500. Note that specifications are subject to change without notice.

General Characteristics

All listed specifications are guaranteed unless labeled with "Typical". Typical specifications are provided for your convenience, but are not guaranteed.

Performance Conditions

The electrical characteristics listed on the following pages are valid under the following conditions:

• The SRG-4500 must be in an environment where the temperature, altitude, humidity, and vibration conditions are within the operating limits described in the section "**Frequency Reference Inputs**".

• The SRG-4500 must have a warm-up period of at least 20 minutes.

• The SRG-4500 must have been calibrated and adjusted at an ambient temperature between +20°C and +30°C at an altitude of less than 2000m.

• The following label is used to indicated the altitude limitation.

Video Reference Inputs

Table 15 Technical Specifications — Video Reference Inputs

Category	Performance Requirement		Notes
Input Connector Type	2 x 75ohm BNC (loop through)		
Input Return Loss	>30dB to 10MHz		
Inputs	NTSC Black Burst, 525 Sync, PAL Black Burst, 625 Sync		
Input Requirements	Amplitude	-6dB to +6dB	
	S/N Ratio	>40dB	
	ScH Phase	±20°	
Pull-in Range	±50ppm		
Jitter	Burst	<0.5°	
	Sync	<1ns	
Genlock Time Offset Range	Range	Full color range	
	Resolution	<0.5 degree of sub-carrier	

Frequency Reference Inputs

Table 16 Technical Specifications — Frequency Reference Inputs

Category	Performance Requirement		Notes
Input Connector Type	1 x 50ohm BNC (terminating)		
Input Return Loss	>30dB to 10MHz		
Inputs	10MHz continuous wave		
Input Requirements	Amplitude	1Vp-p (nominal) 2.5Vp-p (maximum)	For 1 Vp-p input, Signal Detector has a 0 to -18dB range.
	S/N Ratio	>40dB	

GPS Receiver Antenna Input

Table 17 Technical Specifications — GPS Receiver Antenna Input

Category	Performance Requirement	Notes
Input Connector Type	1 x 50ohm SMB Jack (terminating)	
Input Return Loss	>8dB @ 1575MHz	
Antenna Voltage	+5.0V ±5%	Sourced by the SRG-4500
Antenna Current	Internally limited to 50mA	Sourced by the SRG-4500
Type	GPS, L1 Frequency, (1575.42MHz), C/A Code	12 channels
Time stamp accuracy	<=150ns to GPS/UTC	

Frequency Reference Outputs

Table 18 Technical Specifications — Frequency Reference Outputs (Free Run Mode)

Category	Performance Requirement	Notes
Output Connector Type	1 x BNC	
Output Impedance and Required Termination	50ohm	
Signal Amplitude	1.0V ± 10%	
Rise and Fall Time	5ns > Rise/Fall <44ns	10% to 90%
Jitter	8ns	Typically 2ns
Outputs	10MHz continuous wave	

1Hz Frequency Reference Output

Table 19 Technical Specifications — 1Hz Frequency Reference Output (Free Run Mode)

Category	Performance Requirement	Notes
Output Connector Type	1 x BNC	
Output Impedance and Required Termination	75ohm	
Signal Amplitude	3.3V ±10%	TTL CMOS compatible
Rise and Fall Time	5ns > Rise/Fall <44ns	10% to 90%
Jitter	8ns	Typically 2ns
Output	1Hz ±5ppm	

Analog Video Outputs

Table 20 Technical Specifications — Analog Video Outputs (Free Run Mode)

Category	Performance Requirement	Notes
Output Connector Type	75ohm BNC	
Number of Outputs	2 BNCs — Composite Pattern Output	10 BNCs in total
	2 BNCs — Composite Black Burst Output	
	2 BNCs — Tri-Black 2 Output	
	2 BNCs — Tri-Black 3 Output	
	2 BNCs — Tri-Black 4 Output	
Output Impedance	75ohm	
Return Loss	>30dB to 5MHz	
Formats	NTSC-M (with Setup), SMPTE-170M	Refer to **Table 21**
	NTSC-J (no Setup), SMPTE-170M	
	PAL, CCIR-656, ITU-R BT 1700-1 (PAL-B)	
	Tri-sync, SMPTE-274M	Tri-sync available only on Tri-Black 2, Tri-Black 3, and Tri-Black 4 outputs
Burst Amplitude Accuracy	±5%	Typically ±2%
Burst Frequency Accuracy	±1Hz	Typically ±0.25Hz
Burst Frequency Long Term	<1ppm/year	
Sync Amplitude Accuracy	±3%	Typically ±1%

Table 20 Technical Specifications — Analog Video Outputs (Free Run Mode)

Category	Performance Requirement		Notes
SCH Phase Accuracy	±5°		
Blanking Level	±50mV		Typically ±10mV
Timing Offset	Range	Full color frame	
	Resolution NTSC and PAL	<0.5 degree of sub-carrier	
	Resolution Tri-Sync	<1/54MHz	

Field Blanking

Table 21 Technical Specifications — Field Blanking

Type	Notes
Composite Output	
NTSM-M, NTSC-J	Field 1 lines 1 - 20 inclusive are blanked i.e. there is no pattern information but there may be VITC etc.
	Field 2 lines 263 - 283 inclusive are blanked i.e. there is no pattern information but there may be VITC etc.
	Line 263 and Line 283 are specified as active half lines in SMPTE RS170M but they are fully blanked in the SRG-4500.
PAL	Field 1 lines 623 - 23 inclusive are blanked i.e. there is no pattern information but there may be VITC etc.
	Line 623 and Line 23 are specified as active half lines in CCIR-624 but they are fully blanked in this SRG-4500.
	Field 2 lines 311 - 336 inclusive are blanked i.e. there is no pattern information but there may be VITC etc.
SDI Output	
NTSC-M, NTSC-J	SMPTE 125M says 1 - 20 inclusive and 264 - 282 inclusive are blanked.
	CCIR 656-4 says 1 - 20 inclusive and 264 - 282 inclusive are blanked.
PAL	EBU tech3267 says 624 - 22 inclusive and 311 - 335 inclusive are blanked.
	CCIR 656-4 says 624 - 22 inclusive and 311 - 335 inclusive are blanked.

Serial Digital Interface

Table 22 Technical Specifications — Serial Digital Interface (Free Run Mode)

Category	Performance Requirement	Notes
Output Connector Type	75ohm BNC	

Table 22 Technical Specifications — Serial Digital Interface (Free Run Mode)

Category	Performance Requirement			Notes
Number of Outputs	2 BNCs — SDI 1 Pattern Output			
	2 BNCs — SDI 1 Black Output			
	2 BNCs — SDI 2 Pattern Output			
	2 BNCs — SDI 2 Black Output			
Output Impedance	75ohm			
Return Loss	>15dB to 270MHz			
	>15dB to 1.5GHz			
	>10dB to 3GHz			
Formats[a]	525i/625i (270Mbps)			
	720p (1.5Gbps)			
	1035i (1.5Gbps)			
	1080i (1.5Gbps)			
	1080p (3Gbps)			
Signal Amplitude	800mV ±10%			
Rise and Fall Time	270Mbps	<=600ps ±15ps		<1000ps ±500ps
	1.5Gbps	<=130ps ±20ps		<270ps ±50ps
	3Gbps	<=120ps ±15ps		<135ps ±25ps
Jitter	270Mbps	Timing: <=0.16UI		<0.2UI @ 10Hz
		Alignment: <=0.10UI		<0.2UI @ 1KHz
	1.5Gbps	Timing: <=0.30UI		<1.0UI @ 10Hz
		Alignment: <=0.07UI		<0.2UI @ 100KHz
	3Gbps	Timing: <=0.65UI		<2.0UI @ 10Hz
		Alignment: <=0.15UI		<0.3UI @ 100KHz
Timing Offset	Range	Full color frame		
	Resolution 270Mbps	<1/54.00MHz		
	Resolution 1.5Gbps	<1/74.25MHz		
	Resolution 3Gbps	<1/148.50HMz		

Table 22 Technical Specifications — Serial Digital Interface (Free Run Mode)

Category	Performance Requirement		Notes
Embedded Audio	270Mbps	Number of channels: 4 / SDI	20bit audio
	1.5Gbps	Number of channels: 16 / SDI	24bit audio
	3Gbps	Number of channels: 16 / SDI	24bit audio
	Frequency	1Hz-20KHz	1Hz resolution
	Amplitude	Silence and -78dBFS to 0dBFS	1dB resolution
	Pre-emphasis	None	
	Interruption	Programmable	1 second, 3 second, EBU Tech 3304, Glits, Blits
Quantized Resolution	270Mbps	16 or 20bits	User selectable
	1.5Gbps, 3Gbps	16, 20, or 24bits	

a.270Mbps SDI (SMPTE 259M), 1.5Gbps SDI (SMPTE 292M), 3Gbps (SMPTE 424M)

AES/EBU Audio Unbalanced Outputs

Table 23 Technical Specifications — AES/EBU Audio Unbalanced Outputs (Free Run Mode)

Category	Performance Requirement	Notes
Output Connector Type	3 x BNC	
Number of Outputs	2 x unbalanced Audio on BNC	AES-3 AES-3id
	1 x unbalanced DARS on BNC	AES-11, DARS is indicated as "non-PCM audio" and "20bit" and "Grade 1 reference signal"
Output Impedance and Required Termination	75ohm	
Signal Amplitude	1V ±10%	
Rise and Fall Time	5ns > Rise/Fall < 44ns	10% to 90%
Jitter	8ns	Typically 2ns

Table 23 Technical Specifications — AES/EBU Audio Unbalanced Outputs (Free Run Mode)

Category	Performance Requirement		Notes
Audio Parameters	Frequency	1Hz-20KHz	Steps of <1Hz
	Amplitude	Silence and -78dBFS to 0dBFS	1dB resolution
	Pre-emphasis	None	
	Interruption	Programmable	1 second, 3 second, EBU TECH 3304, Glits, Blits
Quantized Resolution	24bits		

AES/EBU Audio Balanced Outputs

Table 24 Technical Specifications — AES/EBU Audio Balanced Outputs (Free Run Mode)

Category	Performance Requirement		Notes
Output Connector Type	Molex® MicroClasp™ 2mm, 30-pin		Shared with Analog Audio and LTC
Number of Outputs	Up to 8 Balanced AES Outputs		AES-3
	1 x DARS		AES-11, DARS is indicated as "non-PCM audio" and "20bit" and "Grade 1 reference signal"
Output Impedance and Required Termination	Differential Balanced Line Driver Output. The signal must be terminated at the receiver.		Use terminating resistor
Signal Amplitude	5V ±10% Balanced		
Rise and Fall Time	5ns > Rise/Fall <44ns		10% to 90%
Jitter	8ns		Typically 2ns
Audio Parameters	Frequency	1Hz to 20KHz	Steps of < 1Hz
	Amplitude	-60dBFS to 0dBFS	1dB resolution
	Pre-emphasis	None	
	Interruption	Programmable	1 second, 3 second, EBU TECH 3304, Glits, Blits
Quantized Resolution	24bits		

Analog Audio Outputs

Table 25 Technical Specifications — Analog Audio Outputs

Category	Performance Requirement		Notes
Output Connector Type	Molex® MicroClasp™ 2mm, 30-pin		Shared with AES/EBU Audio and LTC
Number of Outputs	2 x Balanced		1 x stereo balanced pair
Output Impedance	50ohm ±5%		
Termination Impedance	600ohm ±5%		Calibrated with 600ohm ±1%
Audio Parameters	Frequency	1Hz to 20KHz	Steps of <1Hz
	Amplitude	Silence and -60dBm to +18dBm	1dB resolution
	Interruption	Programmable	1 second, 3 second, EBU TECH 3304, Glits, Blits
	Harmonic Distortion	<-50dB	Measured at 1KHz
DAC Resolution	18bits		

LTC Outputs

Table 26 Technical Specifications — LTC Outputs

Category	Performance Requirement	Notes
Output Connector Type	Molex® MicroClasp™ 2mm, 30-pin	Shared with Analog Audio and AES/EBU Audio
Number of Outputs	Up to 4 Balanced LTC Outputs	
Output Impedance and Required Termination	Differential Balanced Line Driver Output The signal must be terminated at the receiver.	Use terminating resistor
Signal Amplitude	5V ±10% Balanced	
Rise and Fall Time	5ns > Rise/Fall < 44ns	10% to 90%
Type	LTC, SMPTE-12M	

Programmable Pulse Unbalanced Outputs

Table 27 Technical Specifications — Programmable Pulse Unbalanced Outputs

Category	Performance Requirement	Notes
Output Connector Type	3 x BNC	
Output Impedance and Required Termination	75ohm	

Table 27 Technical Specifications — Programmable Pulse Unbalanced Outputs

Category	Performance Requirement	Notes
Signal Amplitude	3.3V ±10%	CMOS compatible
Rise and Fall Time	5ns > Rise/Fall <44ns	10% to 90%
Jitter	8ns	Typically 2ns
Pulse Type[a]	Mixed Sync	Video pulses are derived from the Black 1 output.
	Mixed Blanking	Audio is derived from the Composite video AES 1-8 generator and conforms to AES-3 and AES-11.
	Burst Gate	
	PAL Square	
	Line Drive	Wordclock conforms to AES-11 Annex B
	Field Drive	
	F1 / L7 or F1 / L10	
	6Hz / 30Hz	
	6Hz / 29.97Hz	
	Word Clock 48KHz, AES-11 Annex B	
	Word Clock 44.1KHz, AES-11 Annex B	

a. Individually programmable on each BNC.

100BASE-T Port (Remote Control Interface)

✷ The 100Base-T network port is used for status and control (DashBoard). In an environment where broadcast and/or multicast traffic is present, it is important to limit the number of broadcast and/or multicast messages that reach the 100Bast-T port to a very low number. This is normally configured in the *Storm Control* configuration of your network router. A limit of zero broadcast and/or multicast messages is recommended. If this is not available then choose < 10 broadcast and/or multicast messages per second.

Table 28 Technical Specifications — 100BASE-T

Category	Performance Requirement	Notes
Connector Type	1 x RJ45 - 8P8C	
IEEE Standards Compliance	IEEE 802.31-1990	10BASE-T
	IEEE 802.3u-1995	100BASE-TX
IEEE RFC Compliance	791	IP
	793	TCP
	1027	Proxy ARP
	1377	PPP
	1531	DHCP
	2030	SNTP

GbE/PTP Ethernet Interface

Table 29 Technical Specifications — GbE/PTP IEEE1588 PTP Ethernet interface

Category	Performance Requirement	Notes
Connector Type	1 x x RJ458P8C	
IEEE Standards Compliance	IEEE 802.3i-1990	10BASE-T
	IEEE 802.3u-1995	100BASE-TX
	IEEE 802.3bc-2009 IEEE 1588-2008	1000 BASE-T
IEEE RFC Compliance	791	IP
	793	TCP
	894	IP over Ethernet
	1027	Proxy ARP
	1157	SNMP
	1377	PPP
	1531	DHCP
	1812	IPv4
	1901	SNMPv2c
	2030	SNTP
Internet Protocol Version	IPv4	
Profiles Supported	ST2059-2, AES67, IEEE1588 Version 2 (PTP Version 1 is not supported)	
Operating Modes	1 x PTP master or PTP Follower	
Maximum Message Rates	Maximum message rate is 8ms SMPTE recommends 125ms (8 messages per second Supports up to 126 end points in Multicast at 8 messages per second	

AC Power Source

Table 30 Technical Specifications — AC Power Source

Category	Performance Requirement	Notes
Operational Voltage Range	120 to 230VAC, 50-60Hz	
Absolute Limits Voltage Range	90 to 264VAC, 47-63Hz	
Fuse	5mmx20mm, Anti-surge 2A 250V, Fuse identification marking T2A H250V	IEC 60127-2

Table 30 Technical Specifications — AC Power Source

Category	Performance Requirement		Notes
Operational AC Current	Each PSU	<130mA @ 230VAC	
		<210mA @ 120VAC	
Surge AC Current	Each PSU	<40A @ 230VAC	
		<20A @ 120VAC	
Power Consumption	Dual PSU	46VA	≈ 21 Watts - calculated
Switched Mode Power Supply	Single output, AC-DC, 65W 12VDC / 5.4A output		XP Power ECS65US12

Clearance Requirements

Table 31 Technical Specifications — Clearance

Category	Performance Requirement		Notes
Clearance	Side	50mm (2.00")	
	Rear	75mm (3.00")	

Mechanical Characteristics

Table 32 Technical Specifications — Mechanical

Category	Performance Requirement		Notes
Dimensions	Height	43.5mm (1.71")	
	Width	482.5mm (19.00")	
	Depth	405mm (15.96")	
	Net Weight	5.85kg (12.9lb)	

Environment Characteristics

Table 33 Technical Specifications — Environment

Category	Performance Requirement	
Temperature	Operating	0°C to +40°C
	Non-operating	-20°C to +60°C
Relative Humidity (non-condensing)	Operating	20% to 80% relative humidity (%RH) at up to +40°C
	Non-operating	5% to 90% relative humidity (%RH) at up to +60°C
Altitude	Operating	To 2,000m (6,561ft)
	Non-operating	To 12,192m (40,000ft)
Vibration	Operating	2.65m/s2 (0.27Grms), 5Hz to 500Hz 10 minutes per axis, three axes
	Non-operating	22.3m/s2 (2.28Grms), 5Hz to 500Hz 10 minutes per axes, three axes
Shock	Non-operating	294m/s2 (30G), half-sine, 11ms duration

Connector Pinouts

This chapter lists the pinouts of various multi-way connectors available on the rear panel of the SRG-4500. Note that specifications are subject to change without notice.

Balanced Audio/AES/LTC Connector

Table 34 provides the balanced pinouts (Molex® 2mm MicroClasp™ series plug (male)) for the Audio/AES/LTC connector. Looking at the rear of the unit, the bottom row includes the Odd numbered pins (e.g. LTC2+) and the top row includes the even numbered pins (e.g. LTC2-).

For More Information on...

• these ports, refer to the chapter "**Technical Specifications**".

Table 34 Balanced Audio/AES/LTC Pinouts

Pin	Signal/Function
1	Ground
2	Ground
3	LTC2+
4	LTC2-
5	LTC1+
6	LTC1-
7	LTC4+ / AES8+
8	LTC4- / AES8-
9	LTC3+ / AES7+
10	LTC3- / AES7-
11	AES6+
12	AES6-
13	AES5+
14	AES5-
15	AES4+
16	AES4-
17	AES3+
18	AES3-
19	AES2+
20	AES2-
21	AES1+
22	AES1-
23	DARS+
24	DARS-
25	AUD1+ Left

Table 34 Balanced Audio/AES/LTC Pinouts

Pin	Signal/Function
26	AUD1- Left
27	AUD2+ Right
28	AUD2- Right
29	Ground
30	Ground

Pin Views of Connectors

Connectors are Molex™ Micro Clasp 2mm series.
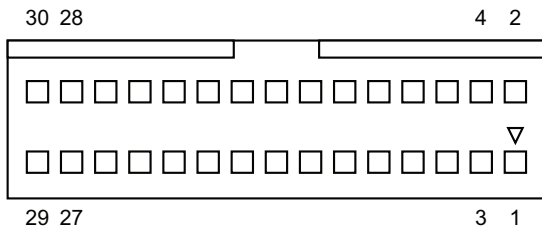
Figure 47 Chassis Connectors (Molex #55959-3030)
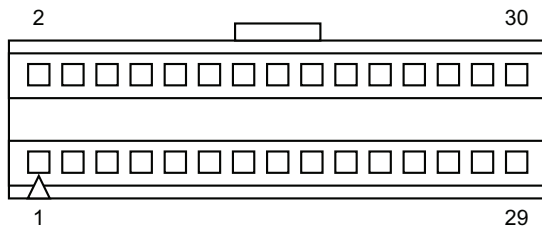
Figure 48 Mating Connectors (Molex #51353-3000)

Characters for Use in Idents

Characters in Idents come from an intersection list of the first 256 characters from Unicode and the allowable characters in XML 1.1.

Notes about Compatibility Characters

Keep the following in mind:

• Document authors are encouraged to avoid "compatibility characters", as defined in Unicode.

• The characters defined in the following ranges are also discouraged. They are either control characters or permanently undefined Unicode characters.

   [#x1-#x8], [#xB-#xC], [#xE-#x1F], [#x7F-#x84], [#x86-#x9F],
   [#xFDD0-#xFDDF],
   [#x1FFFE-#x1FFFF], [#x2FFFE-#x2FFFF], [#x3FFFE-#x3FFFF],
   [#x4FFFE-#x4FFFF], [#x5FFFE-#x5FFFF], [#x6FFFE-#x6FFFF],
   [#x7FFFE-#x7FFFF], [#x8FFFE-#x8FFFF], [#x9FFFE-#x9FFFF],
   [#xAFFFE-#xAFFFF], [#xBFFFE-#xBFFFF], [#xCFFFE-#xCFFFF],
   [#xDFFFE-#xDFFFF], [#xEFFFE-#xEFFFF], [#xFFFFE-#xFFFFF],
   [#x10FFFE-#x10FFFF]

• XML 1.1 explicitly excludes the following characters:

   [0x01-0x08], [0x0b-0x0c], [0x0E-0x1F], [0x7f-0x84], [0x86-0x9f]

Characters Available for Idents 000-00F

Table 35 lists the supported characters. Unsupported characters are set in gray. Generally, if an unsupported character is detected, it will be replaced with the 'space' character 0x20.

Table 35 Available Characters for Idents 000-007

	000	001	002	003	004	005	006	007	008	009	00A	00B	00C	00D	00E	00F
0	NUL	DLE	SP	0	@	P	'	p	XXX	DCS	NBSP	°	À	Ð	à	ð
1	SOH	DC1	!	1	A	Q	a	q	XXX	PU1	¡	±	Á	Ñ	á	ñ
2	STX	DC2	"	2	B	R	b	r	BPH	PU2	¢	²	Â	Ò	â	ò
3	ETX	DC3	#	3	C	S	c	s	NBH	STS	£	³	Ã	Ó	ã	ó
4	EOT	DC4	$	4	D	T	d	t	IND	CCH	¤	´	Ä	Ô	ä	ô
5	ENQ	NAK	%	5	E	U	e	u	NEL	MW	¥	µ	Å	Õ	å	õ
6	ACK	SYN	&	6	F	V	f	v	SSA	SPA	¦	¶	Æ	Ö	æ	ö

Table 35 Available Characters for Idents 000-007

	000	001	002	003	004	005	006	007	008	009	00A	00B	00C	00D	00E	00F
7	BEL	ETB	'	7	G	W	g	w	ESA	EPA	§	·	Ç	×	ç	÷
8	BS	CAN	(	8	H	X	h	x	HTS	SOS	¨	¸	È	Ø	è	ø
9	HT	EM	)	9	I	Y	i	y	HTJ	XXX	©	¹	É	Ù	é	ù
A	LF	SUB	*	:	J	Z	j	z	VTS	SCI	ª	º	Ê	Ú	ê	ú
B	VT	ESC	+	;	K	[	k	{	PLO	CSI	«	»	Ë	Û	ë	û
C	FF	FS	,	<	L	\	l	|	PLU	ST	¬	¼	Ì	Ü	ì	ü
D	CR	GS	-	=	M	]	m	}	RI	OSC	SHY	½	Í	Ý	í	ý
E	SO	RS	.	>	N	^	n	~	SS2	PM	®	¾	Î	Þ	î	þ
F	SI	US	/	?	O	_	o	DEL	SS3	APC	‾	¿	Ï	ß	ï	ÿ

Test Patterns

This chapter provides an overview of the test patterns available for the SRG-4500. The patterns are stored in a pattern file in FLASH memory. The pattern file can be updated via the Ethernet interface. A slightly different set of test patterns is available for each signal format.

525i Test Patterns

```
"black                             ",   //0        "barebu_9                          ",   //32
"white100                          ",   //1        "barebu_9_red075                   ",   //33
"yellow100                         ",   //2        "barebu_8                          ",   //34
"cyan100                           ",   //3        "barebu_8_red075                   ",   //35
"green100                          ",   //4        "barsmpte                          ",   //36
"magenta100                        ",   //5        "pathalogical_type1                ",   //37
"red100                            ",   //6        "pathalogical_type2                ",   //38
"blue100                           ",   //7        "multiburst_full_mono              ",   //39
"rp219_000_p2white100_p3Black      ",   //8        "multiburst_half_mono              ",   //40
"rp219_001_p2white075_p3Black      ",   //9        "multiburst_Half_Luma_Full_Chro    ",   //41
"rp219_002_p2nI_p3Black            ",   //10       "multiburst_half_color             ",   //42
"rp219_003_p2pI_p3pQ               ",   //11       "sweep_full_mono                   ",   //43
"16x12hardgrille_blacksquare       ",   //12       "sweep_half_mono                   ",   //44
"16x12softgrille_blacksquare       ",   //13       "sweep_Half_Luma_Full_Chroma       ",   //45
"16x12hardgrille_white050square    ",   //14       "sweep_half_color                  ",   //46
"16x12softgrille_white050square    ",   //15       "100%_valid_ramps_1                ",   //47
"16x9hardgrille_blacksquare        ",   //16       "EBU3305                           ",   //48
"16x9softgrille_blacksquare        ",   //17       "Pulses                            ",   //49
"16x9hardgrille_white050square     ",   //18       "full_frame_picture_type1          ",   //50
"16x9softgrille_white050square     ",   //19       "full_frame_picture_type2          ",   //51
"bar100_9                          ",   //20
"bar100_9_red100                   ",   //21
"bar100_8                          ",   //22
"bar100_8_red100                   ",   //23
"bar095_9                          ",   //24
"bar095_9_red095                   ",   //25
"bar095_8                          ",   //26
"bar095_8_red095                   ",   //27
"bar075_9                          ",   //28
"bar075_9_red075                   ",   //29
"bar075_8                          ",   //30
"bar075_8_red075                   ",   //31
```

625i Test Patterns

"black	",	//0	"pathalogical_type2	", //38
"white100	",	//1	"multiburst_full_mono	", //39
"yellow100	",	//2	"multiburst_half_mono	", //40
"cyan100	",	//3	"multiburst_Half_Luma_Full_Chro	", //41
"green100	",	//4	"multiburst_half_color	", //42
"magenta100	",	//5	"sweep_full_mono	", //43
"red100	",	//6	"sweep_half_mono	", //44
"blue100	",	//7	"sweep_Half_Luma_Full_Chroma	", //45
"rp219_000_p2white100_p3Black	",	//8	"sweep_half_color	", //46
"rp219_001_p2white075_p3Black	",	//9	"100%_valid_ramps_1	", //47
"rp219_002_p2nI_p3Black	",	//10	"EBU3305	", //48
"rp219_003_p2pI_p3pQ	",	//11	"Pulses	", //49
"16x12hardgrille_blacksquare	",	//12	"full_frame_picture_type1	", //50
"16x12softgrille_blacksquare	",	//13	"full_frame_picture_type2	", //51
"16x12hardgrille_white050square	",	//14		
"16x12softgrille_white050square	",	//15		
"16x9hardgrille_blacksquare	",	//16		
"16x9softgrille_blacksquare	",	//17		
"16x9hardgrille_white050square	",	//18		
"16x9softgrille_white050square	",	//19		
"bar100_9	",	//20		
"bar100_9_red100	",	//21		
"bar100_8	",	//22		
"bar100_8_red100	",	//23		
"bar095_9	",	//24		
"bar095_9_red095	",	//25		
"bar095_8	",	//26		
"bar095_8_red095	",	//27		
"bar075_9	",	//28		
"bar075_9_red075	",	//29		
"bar075_8	",	//30		
"bar075_8_red075	",	//31		
"barebu_9	",	//32		
"barebu_9_red075	",	//33		
"barebu_8	",	//34		
"barebu_8_red075	",	//35		
"barsmpte	",	//36		
"pathalogical_type1	",	//37		

720p Test Patterns

"black	",	//0	"sweep_full_mono	", //38
"white100	",	//1	"sweep_half_mono	", //39
"yellow100	",	//2	"sweep_Half_Luma_Full_Chroma	", //40
"cyan100	",	//3	"sweep_half_color	", //41
"green100	",	//4	"100%_valid_ramps_1	", //42
"magenta100	",	//5	"100%_valid_ramps_2	", //43
"red100	",	//6	"7_T_Pulses	", //44
"blue100	",	//7		
"rp219_000_p2white100_p3Black	",	//8		
"rp219_001_p2white075_p3Black	",	//9		
"rp219_002_p2nI_p3Black	",	//10		
"rp219_003_p2pI_p3pQ	",	//11		
"16x9hardgrille_blacksquare	",	//12		
"16x9softgrille_blacksquare	",	//13		
"16x9hardgrille_white050square	",	//14		
"16x9softgrille_white050square	",	//15		
"bar100_9	",	//16		
"bar100_9_red100	",	//17		
"bar100_8	",	//18		
"bar100_8_red100	",	//19		
"bar095_9	",	//20		
"bar095_9_red095	",	//21		
"bar095_8	",	//22		
"bar095_8_red095	",	//23		
"bar075_9	",	//24		
"bar075_9_red075	",	//25		
"bar075_8	",	//26		
"bar075_8_red075	",	//27		
"barebu_9	",	//28		
"barebu_9_red075	",	//29		
"barebu_8	",	//30		
"barebu_8_red075	",	//31		
"pathalogical_frame0	",	//32		
"pathalogical_frame1	",	//33		
"multiburst_full_mono	",	//34		
"multiburst_half_mono	",	//35		
"multiburst_Half_Luma_Full_Chro	",	//36		
"multiburst_half_color	",	//37		

1035i Test Patterns

```
"black                          ",   //0        "sweep_full_mono                ",   //38
"white100                       ",   //1        "sweep_half_mono                ",   //39
"yellow100                      ",   //2        "sweep_Half_Luma_Full_Chroma    ",   //40
"cyan100                        ",   //3        "sweep_half_color               ",   //41
"green100                       ",   //4        "100%_valid_ramps_1             ",   //42
"magenta100                     ",   //5        "100%_valid_ramps_2             ",   //43
"red100                         ",   //6        "7_T_Pulses                     ",   //44
"blue100                        ",   //7
"rp219_000_p2white100_p3Black   ",   //8
"rp219_001_p2white075_p3Black   ",   //9
"rp219_002_p2nI_p3Black         ",   //10
"rp219_003_p2pI_p3pQ            ",   //11
"16x9hardgrille_blacksquare     ",   //12
"16x9softgrille_blacksquare     ",   //13
"16x9hardgrille_white050square  ",   //14
"16x9softgrille_white050square  ",   //15
"bar100_9                       ",   //16
"bar100_9_red100                ",   //17
"bar100_8                       ",   //18
"bar100_8_red100                ",   //19
"bar095_9                       ",   //20
"bar095_9_red095                ",   //21
"bar095_8                       ",   //22
"bar095_8_red095                ",   //23
"bar075_9                       ",   //24
"bar075_9_red075                ",   //25
"bar075_8                       ",   //26
"bar075_8_red075                ",   //27
"barebu_9                       ",   //28
"barebu_9_red075                ",   //29
"barebu_8                       ",   //30
"barebu_8_red075                ",   //31
"pathalogical_frame0            ",   //32
"pathalogical_frame1            ",   //33
"multiburst_full_mono           ",   //34
"multiburst_half_mono           ",   //35
"multiburst_Half_Luma_Full_Chro ",   //36
"multiburst_half_color          ",   //37
```

1080i and 1080PsF Test Patterns

"black	",	//0	"sweep_full_mono	", //38
"white100	",	//1	"sweep_half_mono	", //39
"yellow100	",	//2	"sweep_Half_Luma_Full_Chroma	", //40
"cyan100	",	//3	"sweep_half_color	", //41
"green100	",	//4	"100%_valid_ramps_1	", //42
"magenta100	",	//5	"100%_valid_ramps_2	", //43
"red100	",	//6	"7_T_Pulses	", //44
"blue100	",	//7	"full_frame_picture_type1	", //45
"rp219_000_p2white100_p3Black	",	//8	"full_frame_picture_type2	", //46
"rp219_001_p2white075_p3Black	",	//9		
"rp219_002_p2nI_p3Black	",	//10		
"rp219_003_p2pI_p3pQ	",	//11		
"16x9hardgrille_blacksquare	",	//12		
"16x9softgrille_blacksquare	",	//13		
"16x9hardgrille_white050square	",	//14		
"16x9softgrille_white050square	",	//15		
"bar100_9	",	//16		
"bar100_9_red100	",	//17		
"bar100_8	",	//18		
"bar100_8_red100	",	//19		
"bar095_9	",	//20		
"bar095_9_red095	",	//21		
"bar095_8	",	//22		
"bar095_8_red095	",	//23		
"bar075_9	",	//24		
"bar075_9_red075	",	//25		
"bar075_8	",	//26		
"bar075_8_red075	",	//27		
"barebu_9	",	//28		
"barebu_9_red075	",	//29		
"barebu_8	",	//30		
"barebu_8_red075	",	//31		
"pathalogical_frame0	",	//32		
"pathalogical_frame1	",	//33		
"multiburst_full_mono	",	//34		
"multiburst_half_mono	",	//35		
"multiburst_Half_Luma_Full_Chro	",	//36		
"multiburst_half_color	",	//37		

1080p Test Patterns

```
"black                        ",   //0        "sweep_full_mono               ",   //38
"white100                     ",   //1        "sweep_half_mono               ",   //39
"yellow100                    ",   //2        "sweep_Half_Luma_Full_Chroma   ",   //40
"cyan100                      ",   //3        "sweep_half_color              ",   //41
"green100                     ",   //4        "100%_valid_ramps_1            ",   //42
"magenta100                   ",   //5        "100%_valid_ramps_2            ",   //43
"red100                       ",   //6        "7_T_Pulses                    ",   //44
"blue100                      ",   //7        "full_frame_picture_type1      ",   //45
"rp219_000_p2white100_p3Black ",   //8        "full_frame_picture_type2      ",   //46
"rp219_001_p2white075_p3Black ",   //9
"rp219_002_p2nI_p3Black       ",   //10
"rp219_003_p2pI_p3pQ          ",   //11
"16x9hardgrille_blacksquare   ",   //12
"16x9softgrille_blacksquare   ",   //13
"16x9hardgrille_white050square",   //14
"16x9softgrille_white050square",   //15
"bar100_9                     ",   //16
"bar100_9_red100              ",   //17
"bar100_8                     ",   //18
"bar100_8_red100              ",   //19
"bar095_9                     ",   //20
"bar095_9_red095              ",   //21
"bar095_8                     ",   //22
"bar095_8_red095              ",   //23
"bar075_9                     ",   //24
"bar075_9_red075              ",   //25
"bar075_8                     ",   //26
"bar075_8_red075              ",   //27
"barebu_9                     ",   //28
"barebu_9_red075              ",   //29
"barebu_8                     ",   //30
"barebu_8_red075              ",   //31
"pathalogical_frame0          ",   //32
"pathalogical_frame1          ",   //33
"multiburst_full_mono         ",   //34
"multiburst_half_mono         ",   //35
"multiburst_Half_Luma_Full_Chro",  //36
"multiburst_half_color        ",   //37
```

2160p 2SI 4K UHD Test Patterns

```
"black                             ",   //0
"white100                          ",   //1
"yellow100                         ",   //2
"cyan100                           ",   //3
"green100                          ",   //4
"magenta100                        ",   //5
"red100                            ",   //6
"blue100                           ",   //7
"rp219_000_p2white100_p3Black      ",   //8
"rp219_001_p2white075_p3Black      ",   //9
"rp219_002_p2nI_p3Black            ",   //10
"rp219_003_p2pI_p3pQ               ",   //11
"16x9hardgrille_blacksquare        ",   //13
"16x9hardgrille_white050square     ",   //14
"bar100_9                          ",   //15
"bar100_8                          ",   //16
"bar095_9                          ",   //17
"bar095_8                          ",   //18
"bar075_9                          ",   //19
"bar075_8                          ",   //20
"barebu_9                          ",   //21
"barebu_8                          ",   //22
"Pluge                             ",   //23
"multi-burst_full_mono             ",   //24
"multiburst_half_mono              ",   //25
"multiburst_Half_Luma_Full Chro    ",   //26
"multiburst_Half_Luma_Half Chro    ",   //27
"sweep_full_mono                   ",   //28
"sweep_half_mono                   ",   //29
"sweep_Half_Luma_Full_Chroma       ",   //30
"sweep_Half_Luma Half Chroma       ",   //31
"100%_valid_ramps_1                ",   //32
"Luma ramp full width_1            ",   //33
"Cb_ramp_full_width_1              ",   //34
"Cr_ramp_full_width_1              ",   //35
"All_ramps_Full_Width_1            ",   //36
"7T_Pulses                         ",   //37
```

2160p 2SI Quad 4K UHD Test Patterns

```
"black                             ",   //0
"white100                          ",   //1
"yellow100                         ",   //2
"cyan100                           ",   //3
"green100                          ",   //4
"magenta100                        ",   //5
"red100                            ",   //6
"bar100_9                          ",   //7
"bar100_8                          ",   //8
"bar095_9                          ",   //9
"bar095_8                          ",   //10
"bar075_9                          ",   //11
"bar075_8                          ",   //12
"barebu_9                          ",   //13
"barebu_8                          ",   //14
"multi-burst_full_mono             ",   //15
"multiburst_half_mono              ",   //16
"multiburst_Half_Luma_Full Chro    ",   //17
"multiburst_Half_Luma_Half Chro    ",   //18
"sweep_full_mono                   ",   //19
"sweep_full_mono                   ",   //20
"sweep_half_mono                   ",   //21
"sweep_Half_Luma_Full_Chroma       ",   //22
"sweep_Half_Luma Half Chroma       ",   //23
"100%_valid_ramps_1                ",   //24
"Luma ramp full width_1            ",   //25
"Cb_ramp_full_width_1              ",   //26
"Cr_ramp_full_width_1              ",   //27
"7T_Pulses                         ",   //28
```

Installing the Breakout PCB

The Breakout PCB for the SRG-4500 enables you to cable a Primary SRG-4500 and a Backup SRG-4500 to an ACO-4500 but still retain access to the AES, DARS, and Analog Audio connections on balanced 3-pin connectors.

Installing the Breakout PCB requires:

1. Installing the Breakout PCB on the Rack Tray
2. Installing the Breakout PCB into the Rack Frame
3. Connecting the Breakout PCB to the SRG-4500
4. Cabling the Connectors on the Breakout PCB

Before You Begin

Before installing the Breakout PCB, refer to the document "**Important Regulatory and Safety Notices to Service Personnel**" that accompanied your unit for general safety information.

Static Discharge

Throughout this manual, please heed the following cautionary note

> **ESD Susceptibility** — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Unpacking

Unpack each SRG-4500 Install Kit you received from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative or Ross Video directly.

Required Equipment

Table 36 summarizes the items that are required

Table 36 SRG-4500 Install Kit Items

Part Number	Description	Quantity
70-00994	Rack frame tray for the Breakout PCB	1
8399AR-032	Breakout PCB	1
4101-3004-RC	M3 5mm screws for the rear brackets and tray	8
88-00995	M3 10mm screws with lock washers	4
4500CR-100	30-pin Molex cable (red and violet wires)	1

Installing the Breakout PCB on the Rack Tray

You will need a Phillips screwdriver to affix the Breakout PCB to the rack tray using the four M3 10mm screws that were included in the SRG-4500 Install Kit.

For More Information on...

- installing the rear support brackets into the rack frame, refer to the section "**Rack Mount Installation**".

To install the Breakout PCB on the rack tray

1.   Position the Breakout PCB atop the screw posts on the tray. Refer to **Figure 49**.
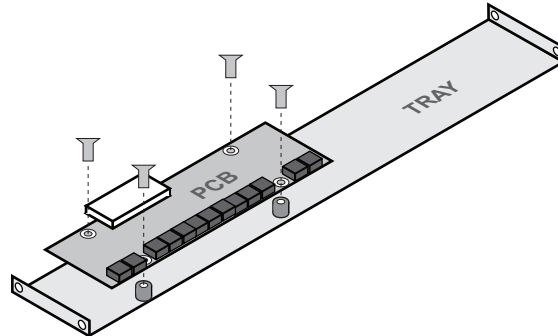
Figure 49 Installing the Breakout PCB on the Rack Tray

2.   Affix the Breakout PCB using the provided four M310mm screws with lock washers (88-0095).

Installing the Breakout PCB into the Rack Frame

The Tray installs between the rear support brackets so that the 30-pin connector is aligned with the **BALANCED** 30-pin connector on the SRG-4500 rear panel. This section outlines how to affix the tray to the rear support brackets.

To install the Breakout PCB in the rack frame

1.   Position the Breakout PCB and Tray behind the SRG-4500 in the rack frame (**Figure 50**) while ensuring to:

- position the Breakout PCB so that its white 30-pin connector is aligned with the SRG-4500 rear panel 30pin connectors;
- leave enough space between the SRG-4500 rear panel and the Breakout PCB to properly cable the connectors.
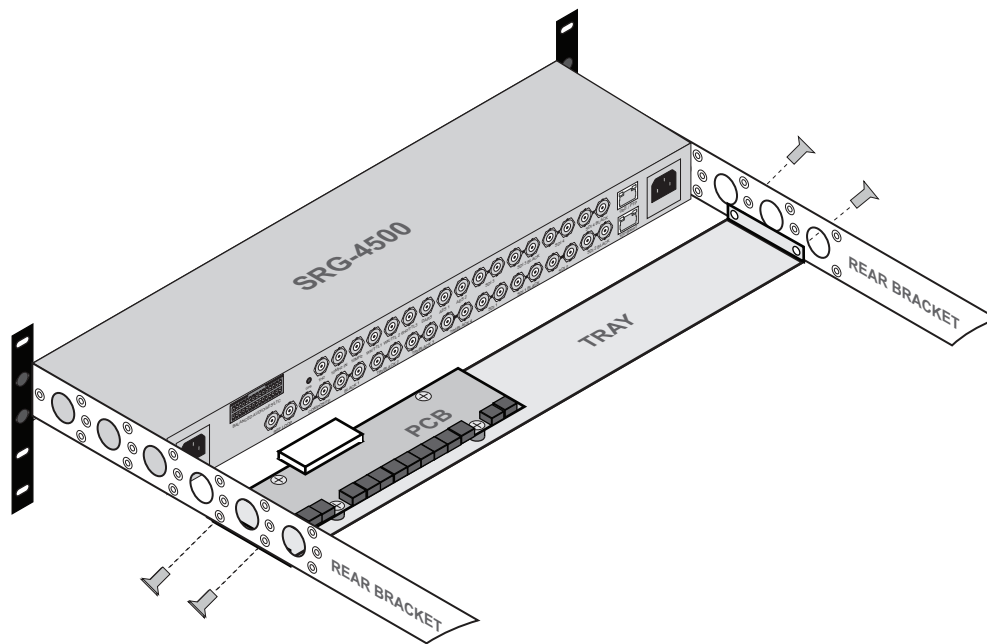
Figure 50 Installing the Breakout PCB and Tray to the Rear Brackets

2. Use the 4 provided M3 5mm screws to affix the Breakout PCB and Tray to the Rear Brackets of the SRG-4500. Refer to **Figure 50**.

Connecting the Breakout PCB to the SRG-4500

The Breakout PCB connects to the SRG-4500 rear panel via the provided Interface Cable (4500CR-100). This cable type has red and violet wires, and two 30-pin Connectors.

For More Information on...

• using the Breakout PCB in a redundant system with an ACO-4500, refer to the ***ACO-4500 User Manual***.

To connect the Breakout PCB to the SRG-4500

1. Connect one end of the Interface Cable to the connector on the Breakout PCB.
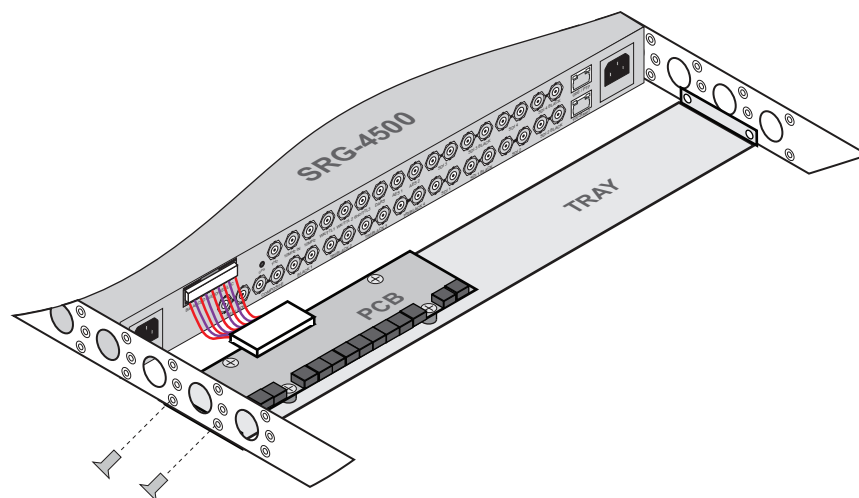
Figure 51 Connecting the Breakout PCB to the SRG-4500 Rear Panel

2. Connect the other end of the same Interface Cable to the **BALANCED** Connector on the SRG-4500 rear panel. Refer to **Figure 51**.

Cabling the Connectors on the Breakout PCB

The Breakout PCB provides a series of 3-pin terminal blocks with removable connectors that provides access to the AES, DARS, and Analog Audio connections.This section outlines the pinout designations and how to wire the 3-pin connectors.

Figure 52 illustrates the pinout assignment of the Breakout PCB 3-pin connectors. Each connector has locations for the positive, negative, and grounded wires. This information is also included in the PCB silk-screen.

✱ The functions of Pins 3-18 are assigned in the software. Refer to the chapter "**Connector Pinouts**" for details.
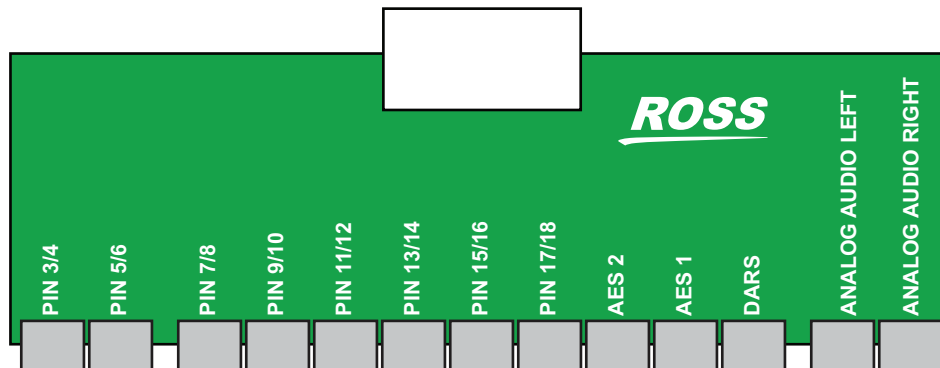
Figure 52 Breakout PCB — Top View of Connectors

To wire a 3-pin connector

1. Insert a wire to the designated polarity slot on the connector of the rear panel. (**Figure 53**)
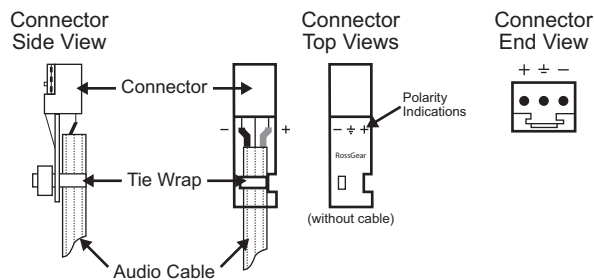
Figure 53 Connector Wiring for the Breakout PCB 3-pin Connectors

2. Use a tweaker screwdriver to tighten the corresponding capture screw.

3. Repeat steps 1 and 2 for each wire on each connector.

4. Once the cables are wired to the connectors, install the connectors on the terminal blocks of the Breakout PCB.

4K UHD BNC Connections

The SRG-4500 has 4 independent pairs of SDI outputs. The format of these outputs can be user configured to be SD SDI, HD, 3G or 4K UHD (if option enabled). In the standard configuration they are available as SDI Test and SDI Black.

When SD, HD or 3G formats are chosen for the outputs, the connections are single link and obvious - single BNC to relevant required output.

It is possible to select up to two 4K UHD (Quad or 2SI) outputs where the 4K UHD signals are quad link signals and have 4 outputs for each signal. On the SRG-4500 we designate these outputs as Q1, Q2, Q3 and Q4 for each pattern generator.

For More Information on…

• format and pattern selection, refer to the section "**Video Menus**".

Before You Begin

Keep the following in mind:

• When selecting a 4K format (Quad or 2SI) on SDI OUT 1, the format selected is then automatically selected on SDI OUT 2 so there is no need to select a format for each quadrant.

• The same applies for SDI OUT 3 and 4.

Physical Connections

Figure 54 shows the location of each Quadrant (Q) BNC for the two possible 4K UHD outputs.

✱ The order of the outputs is not sequential.
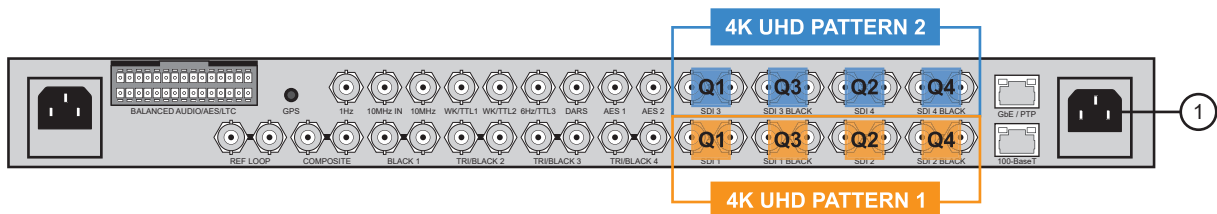
Figure 54 SRG-4500 Rear Panel — 4K UHD Connections

NTP Option

The SRG-4500 always contains the hardware and associated circuitry necessary to allow operation of the NTP Option. This chapter provides information on the NTP option for your SRG-4500.

✱ An Option Key is required to enable the NTP Option. No additional externally connected hardware is required as part of the installation. A power cycle may be required to complete the update process.

SRG-4500 SNTP Best Practices

The SRG-4500 implements an optional Simple Network Time Protocol (SNTP) service, operating as either a client or as a primary server. SNTP is a subset of NTP, per **RFC5905**. SNTP allows operation as a primary master (locked to a single reference clock) or as a client (with the unit locking to a single upstream server). (**Figure 55**) NTP operates in a hierarchical system.
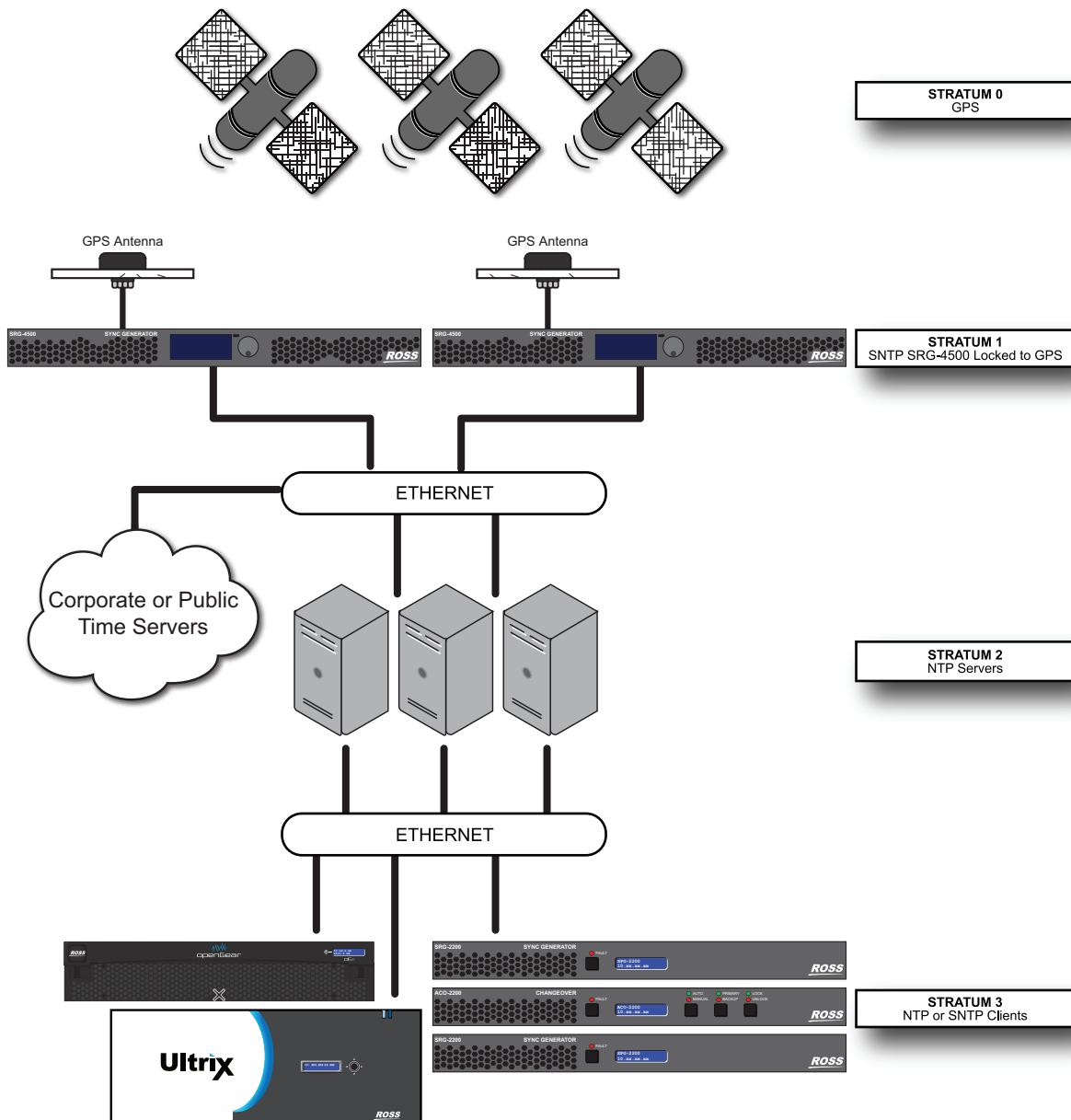
Figure 55 Example of an SNTP Setup with the SRG-4500

The top level (**Stratum 0**) is used by Stratum 1 servers to establish their time. **Stratum 1** servers are polled by **Stratum 2** servers, which in turn feed **Stratum 3** servers, and so on. The number of layers is dictated by the system design requirements.

Best practices stipulate that the Stratum 1 servers should only be polled by Stratum 2 servers. These Stratum 2 servers can then be polled by end devices or have an addition hierarchical level(s) as required by system design.

The Stratum 2 servers may be standalone computers or servers. Stratum 2 servers may be embedded in facility grade network routers. If using routers, be sure to consult vendor information to ensure the service will operate properly. Care must be taken if setting up NTP servers on virtual machines, as running NTP in slew mode on virtual machines (VM) can cause large drifts.

Other common best practices for NTP should be observed (e.g. NTP.org suggests locking to at least 5 upstream time servers).

NTP has an ultimate precision of approximately 200ps. In practice, expected system client accuracy is in the hundreds of μs to hundreds of ms.

The SRG-4500, when locked to GPS, is a primary server with a single reference clock. As a SNTP master, the SRG-4500 operates in unicast mode, making it suitable to be polled by a number of Stratum 2 servers. Optionally the SRG-4500 can be set to client mode, allowing the unit to get its clock time from a single upstream server.

For More Information on...

- SNTP and NTP, refer to **RFC5905**.
- SNTP and NTP best practices, refer to the NTP.org website
- NTP best network practices, refer to the NTP.org website

Configuring the SRG-4500 Overview

The SRG-4500 NTP system can be configured in two ways:

As an NTP Server

The SRG-4500 acts as the device from which other NTP clients request time. When configured as an NTP Server, the SRG-4500 responds to requests from "Clients" and replies with a "time-stamp". It is up to the Client to decide on the validity and accuracy of this time. An NTP system may be able to resolve time in the region of hundreds of milliseconds. Do not expect anything better!

As an NTP Client

The SRG-4500 requests time from a NTP server. As the SRG-4500 is powered, the NTP Client begins requesting time from the designated remote NTP server. The NTP Client will keep searching for a time until it gets one.

The NTP operational parameters can be monitored in the LCD menu, and on the Dashboard remote control program.

Default Settings

The default settings of the NTP system are as follows:

- SPG IP address 192.168.001.044
- SPG IP mask 255.255.255.000
- SPG IP Gateway 192.168.001.254
- NTP Server IP address 139.143.005.030

Time Locking

Time lock is achieved by reading the NTP time from the NTP Server and calculating an appropriate time-code. NTP locks the SRG-4500 central timing system. Keep the following mind:

• The time-code needs to be checked and updated each time the NTP Server is detected.

• However in marginal networks the "question-response" message times may be so variable the time-code update should be suppressed until it has been valid for a number of seconds.

• Once the time-code has been set by the NTP Client, the SRG-4500 should not need to re-check the NTP time unless a crash lock has been forced by the phase locking arrangement.

Simplified NTP Flowcharts

✱ No frequency or phase can be accurately inferred from the NTP system.
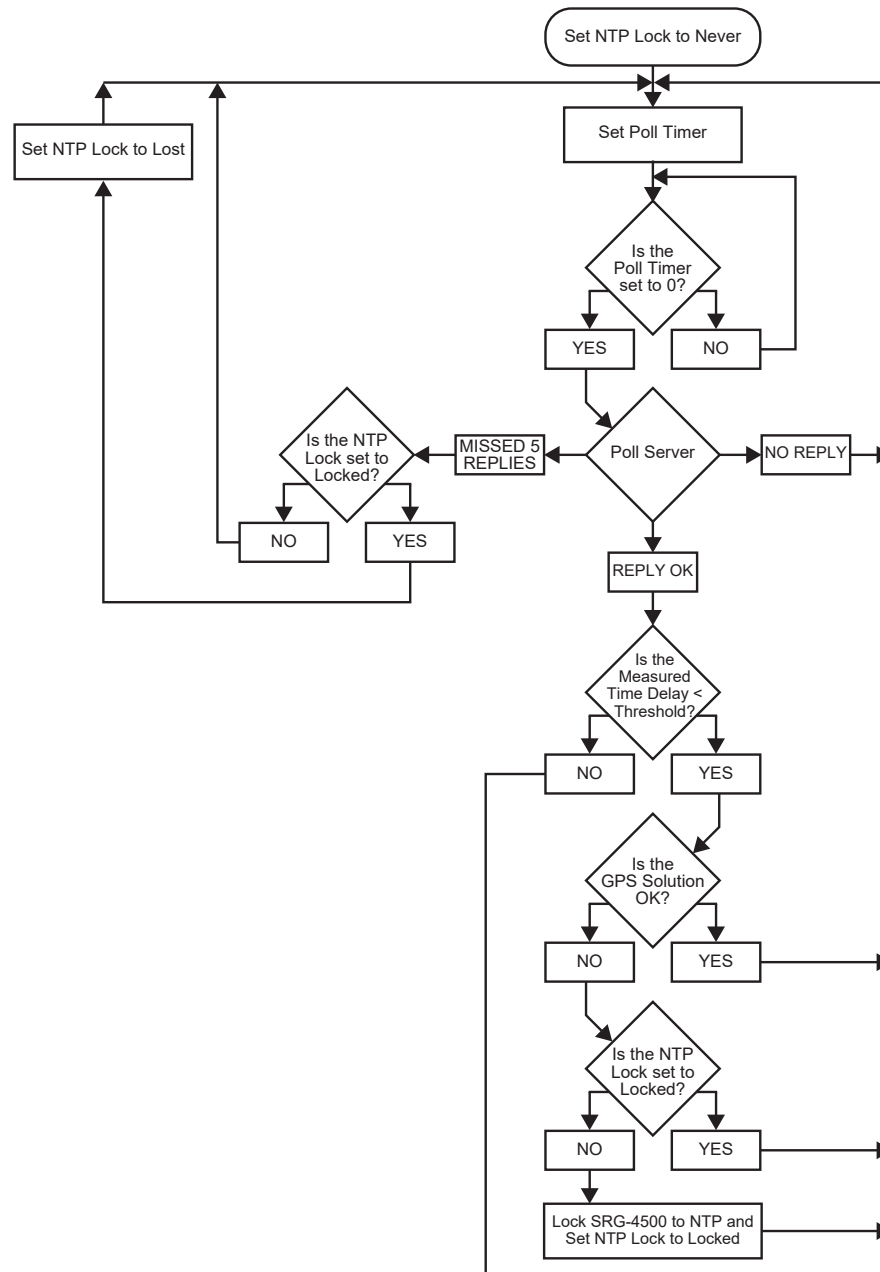
Figure 56 NTP Client Flowchart

Figure 57 NTP Server Time Stratum Determination

Required Time Corrections

From an NTP Server, the SRG-4500 Master Clock can derive UTC and also add the appropriate time offset and provide corrected local time. **Table 37** contains a list of the various corrections which need to be made by the SRG-4500.

Table 37 Required Time Corrections

		Offset	SRG-4500 Update
1	Earth Speed, Drift in one day	1ms	Leap second corrections are made approximately every 18 months as determined by International Earth Rotation Service (IERS).

Table 37 Required Time Corrections

		Offset	SRG-4500 Update
2	Local Time	User defined	The user usually defines the offset from UTC at time of installation
3	Daylight Saving	1 hour	Twice per year

GPS-4500-ANT-HW Option

This chapter provides information on installing the GPS-4500-ANT-HW option for your SRG-4500.

For More Information on...

• installing the GPS-4500-M options, refer to "**GPS-4500-#M Options**".

Surge Protection

Surge protection may be required if rooftop antennas are being connected, in order to meet the regulations and standards for lightning protection in the countries where the end-product will be installed.

Lightning protection means actually a protection of people and buildings. If the antenna is hit by a direct lightning strike, your least worry should be damage of the GPS receiver. You should worry about the lightning energy, which can enter the building and directly strike a person or cause fire. A lightning protection shall be mounted at the place where the antenna cable enters the building. The primary lightning protection must be capable of conducting all potentially dangerous electrical energy to PE (Protective Earth). In case of a rooftop antenna, a coax-cable insert is needed. Ross Video doesn't sell these, but there are many companies, which do.

Rooftop antenna should be installed by experienced electricians, who are familiar with the local regulations and standards. Make sure to choose a lightning protector with DC-pass and suitable for the GPS frequency range (1.575GHz) with low attenuation.

Notes on Installing an Antenna

Keep the following in mind before installing your antenna and connecting it to your SRG-4500:

• The SRG-4500 requires an Option Key to enable the GPS sub-system. Ensure the Option Key for the GPS feature is enabled on the SRG-4500. Refer to the section "**Option Enable Menu**" for details.

• The antenna must be positioned away from any buildings or surfaces that could cause reflections to be received by the antenna.

• If you are mounting the antenna on a wall bracket, this assembly must be placed at the top of the wall, so as to gain a clear view of the sky above.

• The GPS-4500-ANT-HW antenna cannot be mounted indoors; not even against a window, even one without an anti-glare coating.

• Because the coaxial cable has different connectors at each end, be sure to install it in the correct direction.

• When routing the coaxial cable, be sure to avoid tight corners, where the cable could become kinked. If the low-loss coaxial cable is being installed, this has a much larger diameter and is of a stiffer construction than the standard cable, and will therefore be very difficult to route around tight corners.

• Provide adequate cable strain relief at the SRG-4500.

• The use of a single antenna with splitter for multiple units is not recommended. If a splitter is used, a DC blocker is required to prevent multiple devices driving +5V on the RF link.

System Requirements

The system works best with a GPS signal level between -125dBm and -117dBm at the SMB plug at the rear of the unit. It can achieve cold start with a -147dBm signal.

The aim is to get between +10dB and +35dB overall gain at the SRG-4500, ideally between +15dB to +30dB. Operation with low gains (+5dB to +15dB) will increase acquisition time. Operation with high gains (+35dB) risk overloading the input with spurious signals and harmonics that might affect anti-jamming etc. The GPS-4500-ANT-HW antenna (P/N 70-01336) provides a typical gain of 26dB.

GPS-4500-ANT-HW Contents

The GPS-4500-ANT-HW ships automatically with:

- a Mounting Kit
- a GPS Antennae
- 8m of coax cable with a TNC plug connector on each end
- an Adapter Cable
- Aluminum Ground Plane

Table 38 summarizes the recommended cable types for the GPS-4500-ANT-HW.

Table 38 Recommended Cables

Cable	Signal Attenuation	Outer Diameter	DC Resistance	Bending Radius	Operating Temperature
RG58 Black PVC or LBC/LMR195	0.66dB/m @ 1.6GHz	5mm	0.05ohms/ m	25mm	-40 to +80°C
LBC/LMR400 Black polyethylene	0.18dB/m @ 1.6GHz	10.25mm	0.01ohms/ m	50mm	-40 to +80°C

Installing the GPS Antenna

The GPS antenna must be mounted in an outdoor location, and be positioned such that it has an uninterrupted view of the sky, i.e. with as much of the hemisphere of sky above it in plain view.

With the GPS Option enabled, the SRG-4500 provides a 5 volt DC voltage that is impressed upon the RF signal line. The current is internally limited to 50mA. The Ross supplied antenna requires typically 13mA.

To install the GPS antenna, refer to the **Quick Start Guide** that was included with the GPS-4500-ANT-HW.

Connecting the SRG-4500 to the GPS Antenna

Refer to **Figure 58** to connect the SRG-4500 to the GPS-4500-ANT-HW.

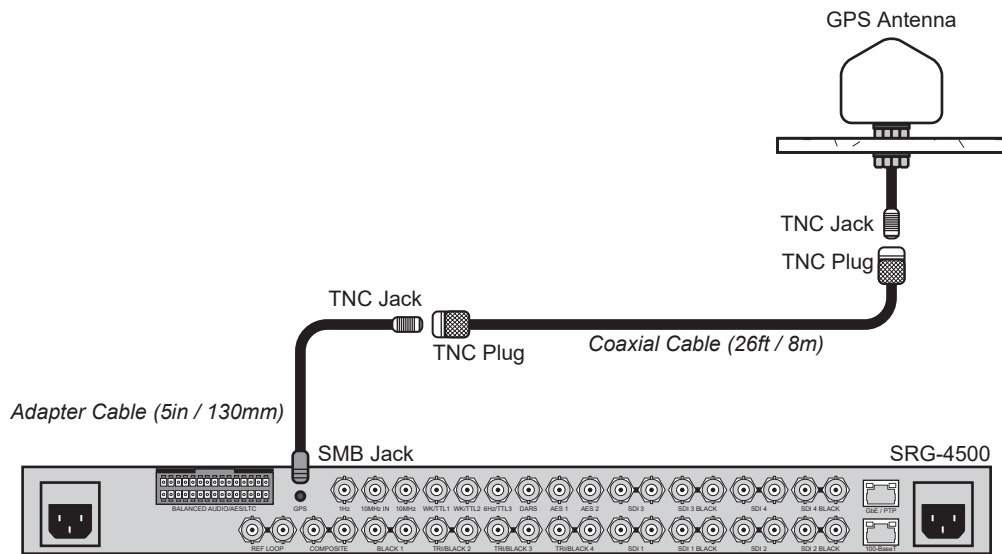✸ Note that the information presented in this section may differ from the requirements of your facility.

Figure 58 GPS-4500-ANT-HW — Connection to the SRG-4500

Connecting to the Network

The **ETHERNET** port on the SRG-4500 rear panel is used for status and control. Refer to **Figure 59** when connecting the SRG-4500 to your network router.
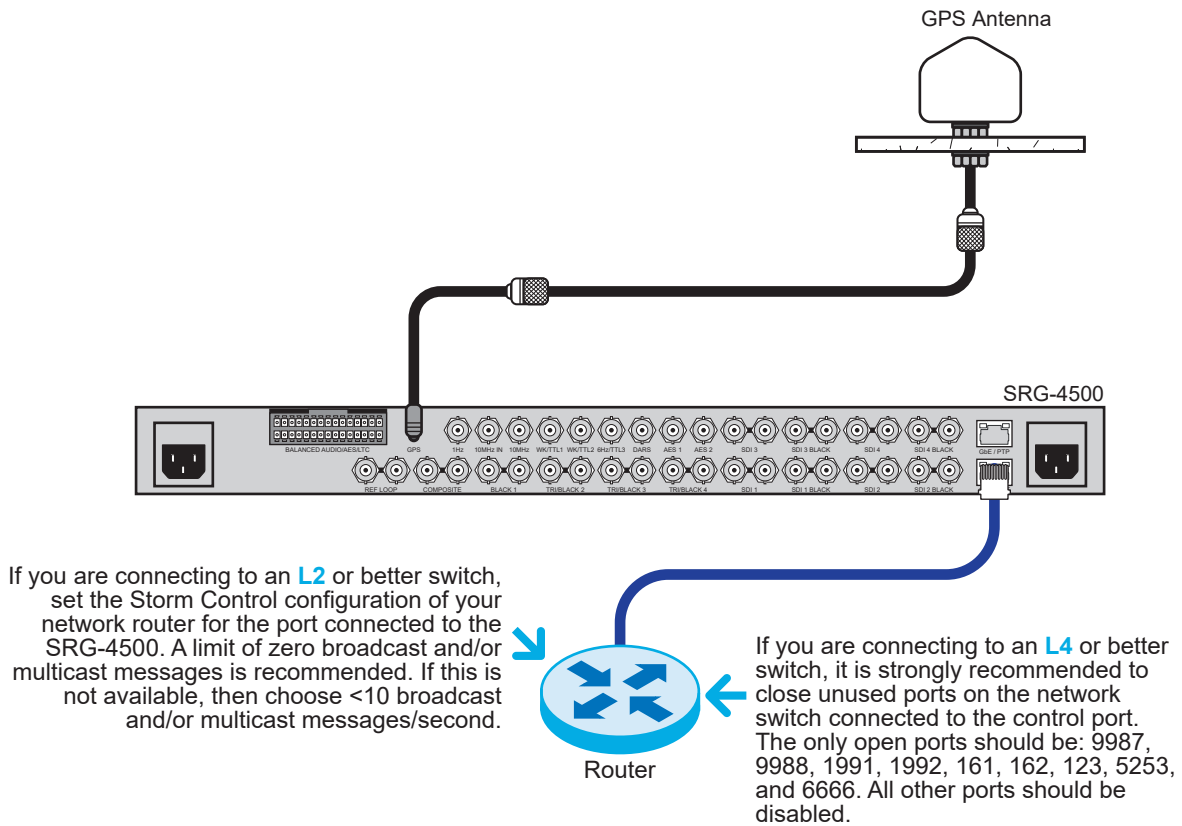

If you are connecting to an **L2** or better switch, set the Storm Control configuration of your network router for the port connected to the SRG-4500. A limit of zero broadcast and/or multicast messages is recommended. If this is not available, then choose <10 broadcast and/or multicast messages/second.

If you are connecting to an **L4** or better switch, it is strongly recommended to close unused ports on the network switch connected to the control port. The only open ports should be: 9987, 9988, 1991, 1992, 161, 162, 123, 5253, and 6666. All other ports should be disabled.

Figure 59 Example of SRG-4500 Connected to a Network Router

Simplified GPS Flowchart

Power On

Search for GPS Time

Found GPS Time?

YES → Set TLock

NO

Set TLock

Search for GPS Frequency

Is the Error <1ppm?

NO

YES → Set TiLock

Is the Error <0.1ppm?

NO

YES → Set TaLock

FrameCount = 25Hz Phase Lock Point?

NO

YES → Set 25Hz Lock

FrameCount = 29.97Hz Phase Lock Point?

NO

YES → Set 29.97Hz Lock

FrameCount = 30Hz Phase Lock Point?

NO

YES → Set 30Hz Lock

Lost for >1 hour?

NO

YES → Clear 25Hz Lock, Clear 29.97Hz Lock, Clear 30Hz Lock
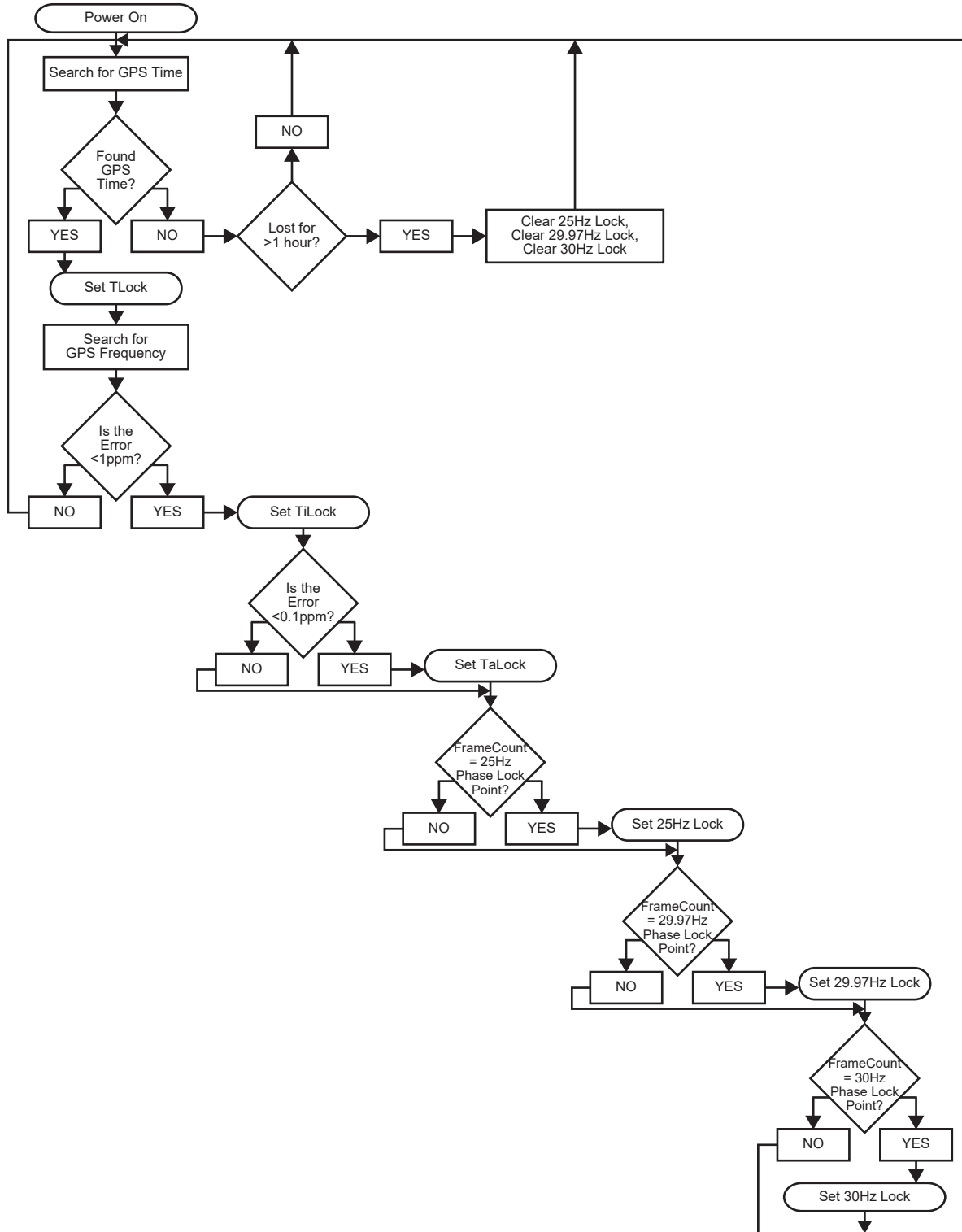
Figure 60 Phasing to GPS Flowchart

Operation

This section provides additional information for operating the SRG-4500 while using an active GPS antenna.

For More Information on…

- GPS signals, refer to **IS-GPS-200E**.
- GLONASS signals, refer to **ICD L1 L2 GLONASS Edition 5.1 2008**.

Locking the SRG-4500 to GPS

One of the best sources of reference for both frequency and time is the Global Positioning System (GPS).

The SRG-4500 uses a 32 channel GPS receiver. As the SRG-4500 is powered, the GPS receiver begins searching for satellites from which it can get time, frequency and phase information. In a good reception area, as many as 12 satellites may be visible. The SRG-4500 requires a minimum of 3 satellites to be located and fully decoded before it can start using the GPS data. The search for the first 3 satellites can take up to 3 minutes, but is often accomplished in 2. If less than 3 satellites are available, the SRG-4500 will not lock to GPS.

Once the minimum of 3 satellites have been located and their GPS data decoded, the SRG-4500 averages the number of counts from all of the detected satellites, and then continually adjusts the free-run oven frequency to generate a condition where the SRG-4500 is locked in frequency and phase to the GPS receiver.

In marginal reception areas, locking/unlocking of the GPS receiver will be tolerated as the short term effect on the free-running oven frequency of the SRG-4500 will be very small. When an unlocked condition is detected, the SRG-4500 software will smoothly revert to the stored free-running oven frequency.

The number of satellites can be monitored on the GPS Report sub-menu available in the System Setup menu. Refer to the section "**GPS Time Tab**" for details.

Time Locking

Time lock is achieved by reading the GPS time from the receiver and calculating an appropriate timecode. GPS locks the SRG-4500 central timing system.

Keep the following in mind:

- The timecode needs to be checked and updated each time the GPS receiver is detected.
- However, in marginal reception, the timecode update should be suppressed until it has been valid for a number of seconds.
- Once the time-code has been set by the GPS receiver, the SRG-4500 should not need to recheck the GPS time unless a crash lock has been forced by the phase locking arrangement.

Frequency Locking

Frequency lock can be established in a few seconds as the oven free-running frequency is within a few ppm of the GPS frequency at all times. The first time the SRG-4500 is powered with a GPS receiver, the SRG-4500 waits for 3 or more satellites to be "fixed", then the SRG-4500 acquires frequency lock. This first time may take up to 5 minutes from when the GPS lock was acquired.

Frequency lock is achieved when the short-term frequency error is less than 1ppm.

Phase Locking

Phase locking can be established a few minutes after frequency locking. Phase lock is achieved when the long-term frequency error is less than 0.1ppm.

Signal Requirements

The SRG-4500 with GPS Receiver can achieve Cold Start acquisition with a signal level of -147dBm at its input. This means the SRG-4500 can find the necessary satellites, download the necessary ephemeris data and compute the location within a 5 minute period.

The SRG-4500 will display a reported C/No of 40dB-Hz for a signal level of - 130dBm into the RF input.

• Each GPS and GLONASS satellite presents its own signal to the SRG-4500, and best performance is obtained when the signal levels are between -125dBm and -117dBm. These received signal levels are determined by:

• GPS and GLONASS satellite transmit power

• GPS and GLONASS satellite elevation and azimuth

• Free space path loss

• Extraneous path loss such as rain

• Partial or total path blockage such as foliage or building

• Multi-path caused by signal reflection

• GPS/GLONASS antenna

• Signal path after the GPS/GLONASS antenna

Even though for frequency and phase locking the SRG-4500 does not require a good 3D fix, it still requires three satellites in view to produce a fix.

Required Time Corrections

From a GPS Receiver, the SRG-4500 Master Clock can derive UTC and also add the appropriate time offset and provide corrected local time. **Table 39** contains a list of the various corrections which need to be made by the SRG-4500.

Table 39 Required Time Corrections

		Offset	SRG-4500 Update
1	Earth Speed Drift in one day	1ms	Leap second corrections are made approximately every 18 months as determined by International Earth Rotation Service (IERS).
2	Local Time	User defined	The user usually defines the offset from UTC at time of installation
3	Daylight Saving	1 hour	Twice per year

System Noise Floor

As mentioned earlier, the SRG-4500 will display a reported C/No of 40dB-Hz for an input signal level of -130dBm. The C/No number means the carrier (or signal) is 40dB greater than the noise floor measured in a 1Hz bandwidth. This is a standard method of measuring GPS receiver performance.

Thermal noise is -174dBm/Hz at room temperature. From this we can compute a system noise figure of 4dB for the SRG-4500. This noise figure consists of the loss of the preselect SAW filter, the noise figure of the LNA as well as implementation losses within the digital signal processing unit.

Troubleshooting

This section provides a flowchart (**Figure 61**) to troubleshoot some common issues that may be encountered during setup or operation of your SRG-4500. The sections after the flowchart provide additional tips and notes for steps in the troubleshooting process.
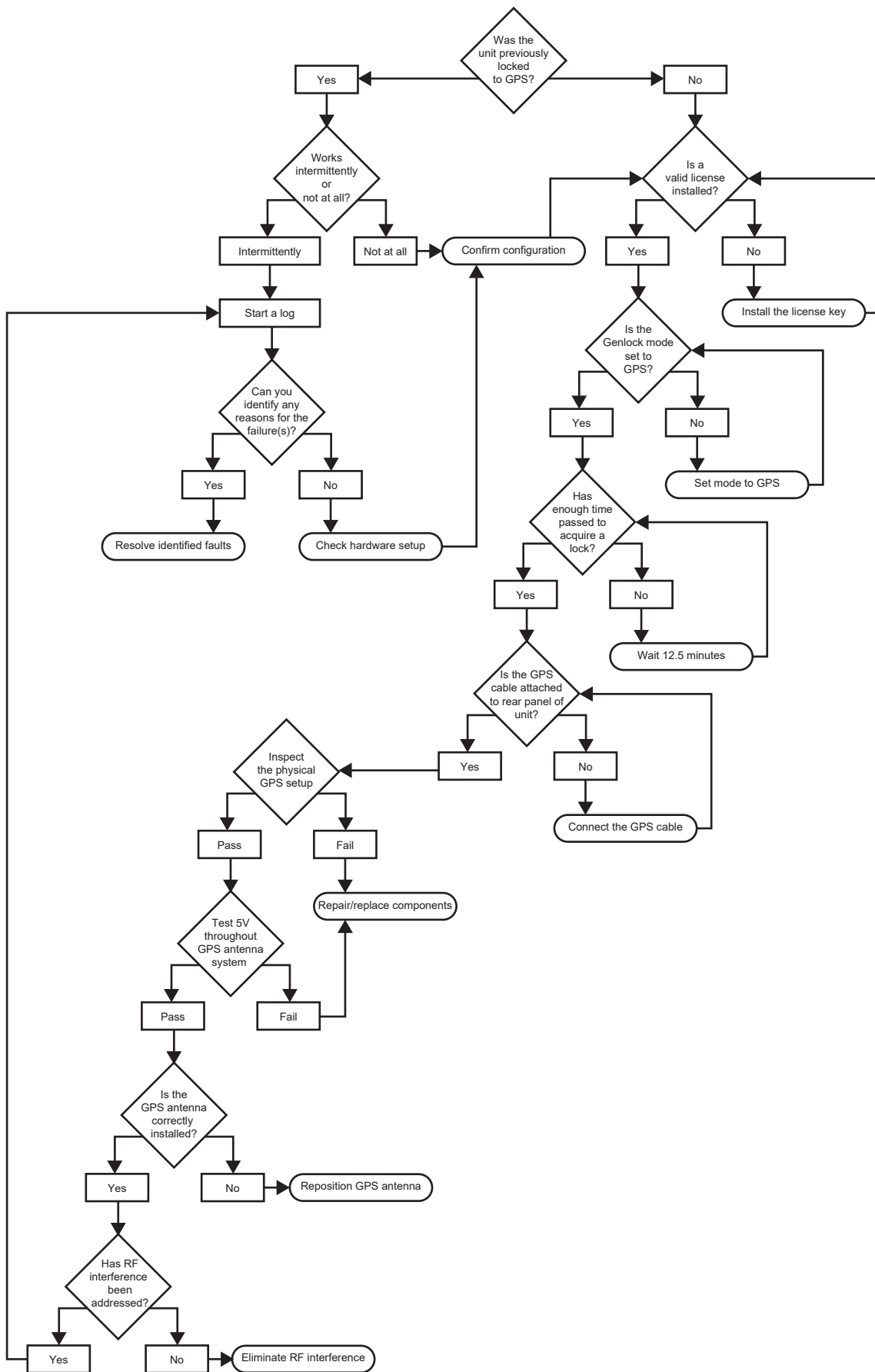
Figure 61 Troubleshooting Workflow

Validating the License

Refer to "**Option Enable Menu**" for details on installing and verifying the licensed options on the SRG-4500. Keep in mind that:

- A valid license key will have between each 4 character group, a "-". For example, option code `2930c49c5a99` will show as `2930-c49c-5a99`.
- If the option key is invalid, you will see the entered value with "." between the groups and "`-Invalid`" after the entry.

Locking to GPS

To verify that the SRG-4500 is locking to a GPS source:

1. Follow the steps in "**Locking the SRG-4500 to GPS**".
2. Does the SRG-4500 report any satellites in view?
   - This information is reported in the **Slot 12 System Time** > **GPS Time** tab. Also refer to "**GPS Status**".
3. Has enough time been allowed for the SRG-4500 to acquire and lock to GPS? Keep the following in mind:
   - The Global Navigation Satellite System (GNSS) only transmits a complete UTC-GNSS time message once every 12.5 minutes. When powering up the GNSS receiver it is best to wait 12.5 minutes before relying on the GNSS time.
   - The navigation message is transmitted by the satellite on the L1 data link at a rate of 50 bits per second. The message structure uses a basic format of a 1500 bit long frame (30 seconds) made up of five sub-frames with each sub-frame being 30 bits long. Sub-frames 4 and 5 are repeated 25 times each, so that a complete message will require the transmission of 25 full frames (12.5 minutes).
   - The UTC offset is only transmitted once per frame, so it is only transmitted once every 12.5 minutes. Depending where you were in the cycle when the GNSS receiver is first switched on, it can thus be up to 12.5 minutes until the UTC offset value is transmitted from a satellite.
4. Does clicking the **GPS Reboot** button (on the **Slot 0** > **Genlock** tab DashBoard) resolve the issue?
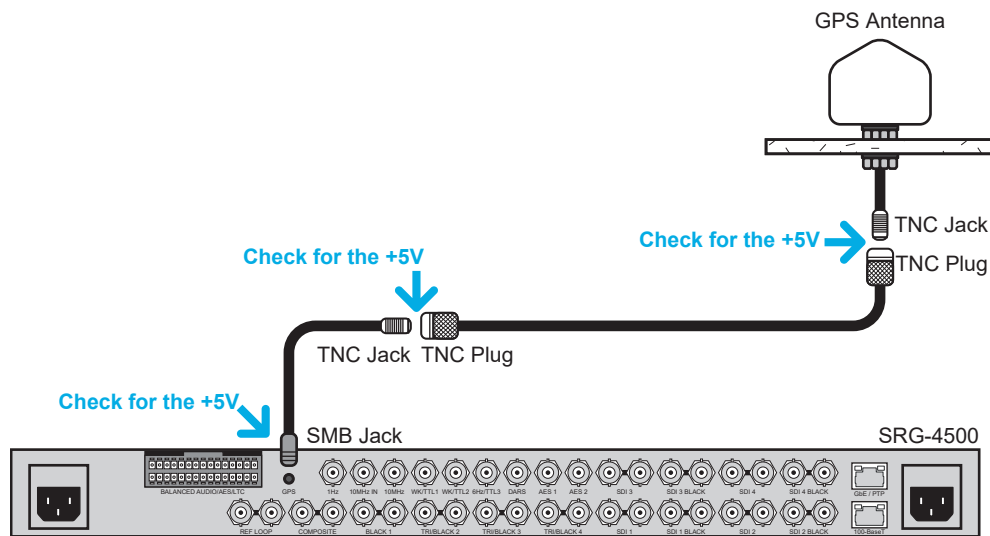
Cabling

To troubleshoot the physical connections in your GPS setup:

1. Is the SMB snap-fit connector properly seated on the end of the GPS cable?

2. Is the antenna cable installed without kinks/abrasions/violating bend radius? Keep the following in mind:

   a. Are all cables properly dressed and have appropriate strain relief?

   b. Check at connectors that they have not been abused or have excessive bend radius. Remember that acceptable LMR195 radius is at 2.0" (50.8mm) and LMR400 radius is at 4.0" (101.6mm).

   c. The number of points to be checked depends on the GPS antenna system installed. Some systems may have addition components such as lighting protection, in line amplifiers, etc.

3. Are the connectors in good shape? Keep the following in mind:

   a. Are all the connections in good shape - any corrosion or moisture inside?

   b. Is the outer jacket of the connector in good shape? Is there any fraying at the connector?

   c. Are all connectors seated properly?

4. Is the GPS antenna connectors in good shape?

   d. Are outside connectors protected from moisture ingest?

   e. Is the weather dome of the GPS antenna showing signs of cracking or other issues?

Check the +5V Current Flow

To troubleshoot the voltage throughout your GPS setup:

1. Disconnect the GPS cable from the SRG-4500 rear panel.

2. Use a voltmeter to measure GPS connector center pin to outer shell. Keep the following in mind:

   • If there is not +5V, this indicates that an over current event occurred in the antenna system. When an over current event occurs, it trips the circuit protection, which then requires a power cycle of the SRG-4500 to restore the +5V antenna supply. The SRG-4500 can supply +5V at 50mA.

   • If this happens on a regular basis, it indicates that there is a fault in the antenna system (moisture in cable, faulty antenna, issue with any in-line amplifier that may be present, etc.).

3. If a 5V is not present:

a. Leave the GPS cable disconnected.

   b. Power down the SRG-4500 for 30-60 seconds.

   c. Power up the SRG-4500.

   d. Check if the +5V is now present on the frame GPS connector.

   e. If so, problem is likely with the antenna system.

4. If 5V is present at the SRG-4500 rear panel, verify that +5V is also present at the GPS antenna:

   a. Remove the cable from the GPS antenna,

   b. Use a voltmeter to check the TNC plug from center pin to outer shell.

   c. If +5V is not present, the problem may be with the cable or other components of the antenna system.

   d. If +5V is present, the problem may be the GPS antenna.

Antenna Setup

Does the antenna have a good view of the sky?

• The GPS antenna must be mounted in an outdoor location, and be positioned such that it has an uninterrupted view of the sky, i.e. with as much of the hemisphere of sky above it in plain view.

• The antenna must be positioned away from any buildings or surfaces that could cause reflections to be received by the antenna.

• If you are mounting the antenna on a wall bracket, this assembly must be placed at the top of the wall, so as to gain a clear view of the sky above.

• The GPS antenna cannot be mounted indoors; not even against a window, even one without an anti-glare coating.

Check for Radio Frequency Interference

RF Interference into the GPS/GLONASS receiver tends to be the biggest problem when determining why the system performance is not meeting expectations. The GPS and GLONASS signals are at -130dBm and lower. If signals higher than this are presented to the receiver it can be overwhelmed. The SRG-4500 can reject CW in-band jamming signals, but would still be affected by non-CW signals. It is recommended to move the antenna away from any source of interference or shield the RF interference to prevent it from getting to the antenna.

The most common source of interference is digital noise. This is created by the fast rise and fall times and high clock speeds of modern digital circuitry. For example, a popular net book computer uses an Atom processor clocked at 1.6GHz. This is only 25MHz away from the GPS signal and virtually at the same frequency as the GLONASS signal. Because of the nature of the address and data lines, this would be broadband digital noise at a relatively high level. Such devices are required to adhere to a regulatory standard for emissions such as *FCC Part 15 Subpart J Class B* or *CISPR 22*.

It is recommended to move the antenna away from the source of interference or shield the digital interference to prevent it from getting to the antenna.

GPS-4500-#M Options

This chapter provides information on installing the following GPS options for your SRG-4500:

* GPS-4500-8M
* GPS-4500-35M
* GPS-4500-100M
* GPS-4500-200M

Surge Protection

Surge protection may be required if rooftop antennas are being connected, in order to meet the regulations and standards for lightning protection in the countries where the end-product will be installed.

Lightning protection means actually a protection of people and buildings. If the antenna is hit by a direct lightning strike, your least worry should be damage of the GPS receiver. You should worry about the lightning energy, which can enter the building and directly strike a person or cause fire. A lightning protection shall be mounted at the place where the antenna cable enters the building. The primary lightning protection must be capable of conducting all potentially dangerous electrical energy to PE (Protective Earth). In case of a rooftop antenna, a coax-cable insert is needed. Ross Video doesn't sell these, but there are many companies, which do.

Rooftop antenna should be installed by experienced electricians, who are familiar with the local regulations and standards. Make sure to choose a lightning protector with DC-pass and suitable for the GPS frequency range (1.575GHz) with low attenuation.

Notes on Installing an Antenna

Keep the following in mind before installing your antenna and connecting it to your SRG-4500:

* Ensure the Option Key for the GPS feature is enabled on the SRG-4500. Refer to the section "**Option Enable Menu**" for details.
* The antenna must be positioned away from any buildings or surfaces that could cause reflections to be received by the antenna.
* If you are mounting the antenna on a wall bracket, this assembly must be placed at the top of the wall, so as to gain a clear view of the sky above.
* The GPS antenna cannot be mounted indoors; not even against a window, even one without an anti-glare coating.
* Because the coaxial cable has different connectors at each end, be sure to install it in the correct direction.
* When routing the coaxial cable, be sure to avoid tight corners, where the cable could become kinked. If the low-loss coaxial cable is being installed, this has a much larger diameter and is of a stiffer construction than the standard cable, and will therefore be very difficult to route around tight corners.
* Provide adequate cable strain relief at the SRG-4500.

System Requirements

The SRG-4500 requires an Option Key to enable the GPS sub-system. Additional optional GPS components are available when the GPS Option is ordered as part of your system.

The system works best with a GPS signal level between -125dBm and -117dBm at the SMB plug at the rear of the unit. It can achieve cold start with a -147dBm signal.

Recommended Cables

Table 40 summarizes the cable types if you do not purchase one of our GPS options that include cables.

Table 40 Recommended Cables

Cable	Signal Attenuation	Outer Diameter	DC Resistance	Bending Radius	Operating Temperature
RG58 Black PVC or LBC/LMR195	0.66dB/m @ 1.6GHz	5mm	0.05ohms/m	25mm	-40 to +80°C
LBC/LMR400 Black polyethylene	0.18dB/m @ 1.6GHz	10.25mm	0.01ohms/m	50mm	-40 to +80°C

Cable, Antenna, and Amplifier Combinations

⚠️ **Warning** — *The cable supplied with the GPS-4500-8M and GPS-4500-35M is type LMR195FR or equivalent. In the GPS-4500-100M and GPS-4500-200M include the same cable as found in the GPS-4500-8M plus 100M (or 200M) of LMR400FR. These cables are not a plenum rated. Before installation, verify that the supplied cable(s) meet the local regulatory requirements for your facility.*

Table 41 summarizes the recommended cabling specifications. Refer also to **Figure 66** and **Figure 68**.

Table 41 Possible Combinations

	Antenna	Cable	Amplifier	Extension Cable	Expected DC Volts at Antenna
GPS-4500-8M	+28dB	8m of RG58	none	none	4.99
GPS-4500-35M	+28dB	35m of RG58	none	none	4.97
GPS-4500-100M	+28dB	8m of RG58	none	100m of LBC400	4.97
GPS-4500-200M	+28dB	8m of RG58	+28dB	200m of LBC400	4.93

Installing the GPS Antenna

The GPS antenna must be mounted in an outdoor location, and be positioned such that it has an uninterrupted view of the sky, i.e. with as much of the hemisphere of sky above it in plain view.

With the GPS Option enabled, the SRG-4500 provides a 5 volt DC voltage that is impressed upon the RF signal line. The current is internally limited to 50mA. The Ross supplied antenna and line amplifier (optional equipment) require less than 30mA combined.

✷ The use of a single antenna with splitter for multiple units is not recommended. If a splitter is used, a DC blocker is required to prevent multiple devices driving +5V on the RF link.

To install the GPS antenna

1. Remove the nut and washer from beneath the antenna cap.
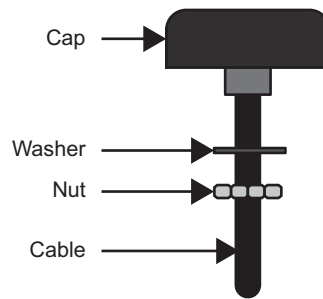

Figure 62 Antenna Cap — Location of Nut and Washer

2. Cut a hole in the surface that will allow the cable to be thread through the surface. The cap will rest above the surface. Refer to **Figure 63** for dimensions.
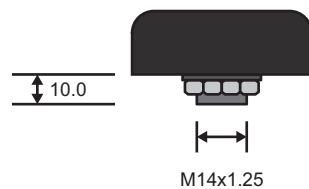

Figure 63 Antenna Cap — Dimensions

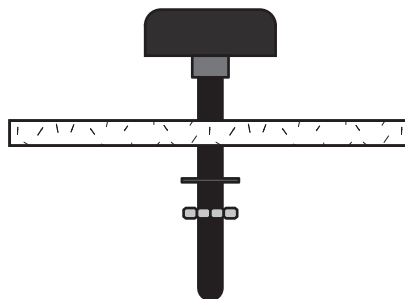3. Position the cap above the hole and ensure the cable is easily fed through the hole of the surface.

Figure 64 Positioning the Antenna Cap

4. Thread the cable through the washer and nut.

5. Use the washer and nut to affix the antenna cap to the surface.
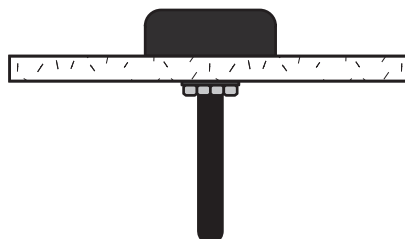
Figure 65 Securing the Antenna Cap

Connecting the SRG-4500 to the GPS Antenna

There are two methods of connecting the SRG-4500 with a GPS antenna: with an external line amplifier and without an external line amplifier. This section summarizes both methods.

✸ Note that the information presented in this section may differ from the requirements of your facility.

Connection without a Line Amplifier

An external Line Amplifier is not required in setups that do not use a long cable run between the GPS antenna and the SRG-4500.
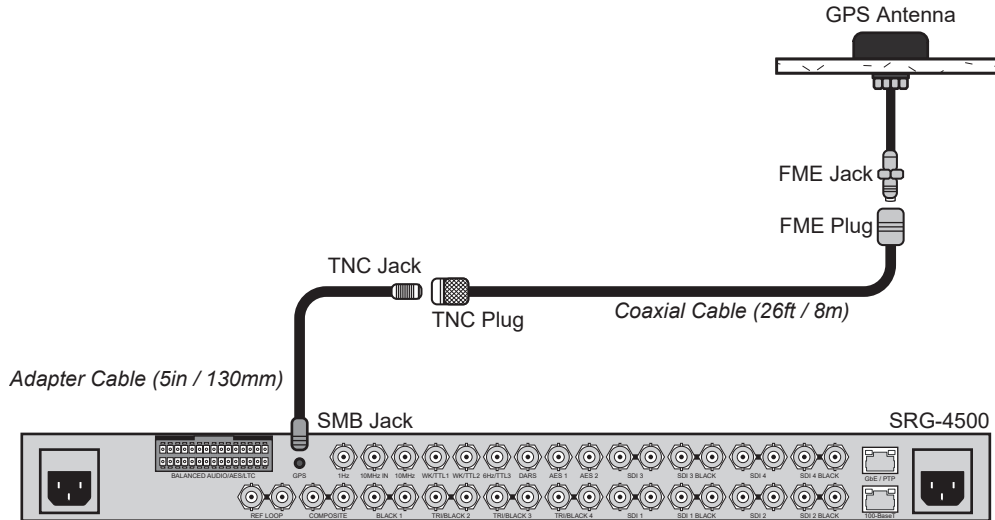

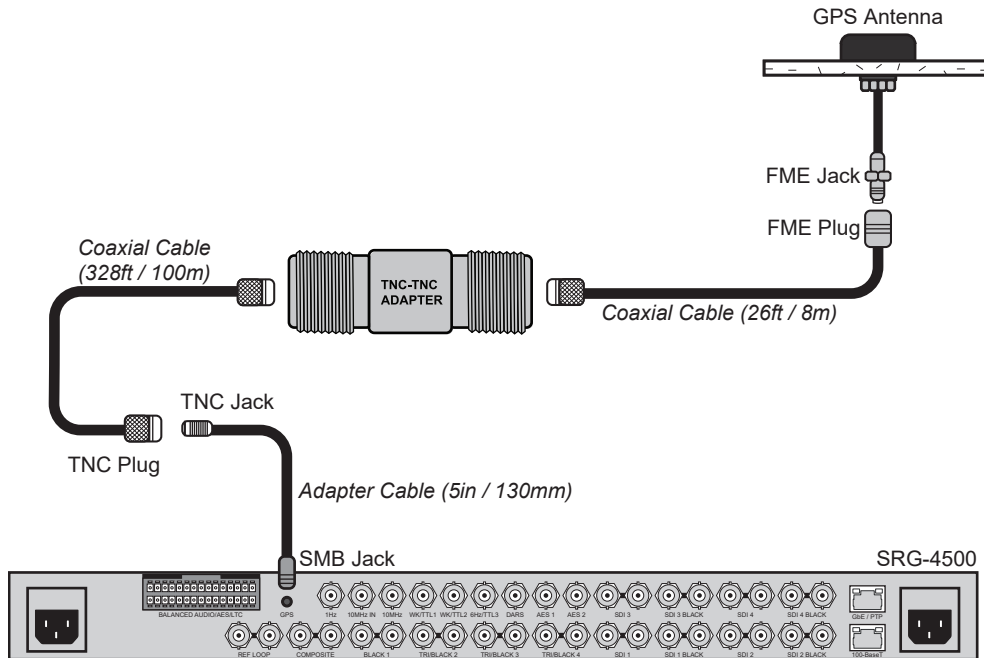*Figure 66 GPS-4500-8M, GPS-4500-35M — Connection without an External Line Amplifier*

Figure 67 GPS-4500-100M — Connection without an External Line Amplifier

Connection with a Line Amplifier

The SRG-4500 can be used with an external Line Amplifier when a long cable run is required. Because of the internal LNA, the overall gain (including signal losses past the external Line Amplifier) should not exceed 35dB. Levels higher than that can affect the jamming detection capability of the SRG-4500.

The external Line Amplifier should have a noise figure better than 1dB. This will give an overall system noise figure of around 2dB. The external Line Amplifier, if having no pre-select filter, needs to be able to handle other signals other than the GPS/GLONASS signal. These signals are typically at much higher levels. The amplifier needs to stay in the linear region when presented with these other signals. Again, the system designer needs to determine all of the unintended signals and their possible levels that can be presented and make sure the external Line Amplifier will not be driven into compression. If this were to happen, the GPS/GLONASS signal itself would start to be attenuated and the GPS/GLONASS performance would suffer.

The external Line Amplifier needs a source of power. It may get this from the 5 volt DC voltage on the antenna cable or an external PSU.
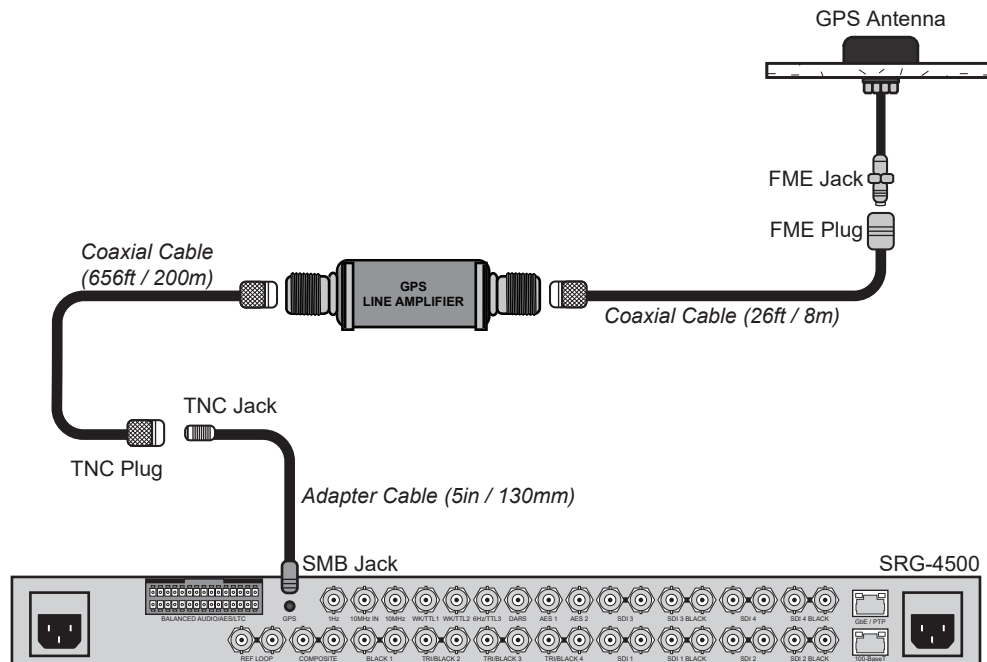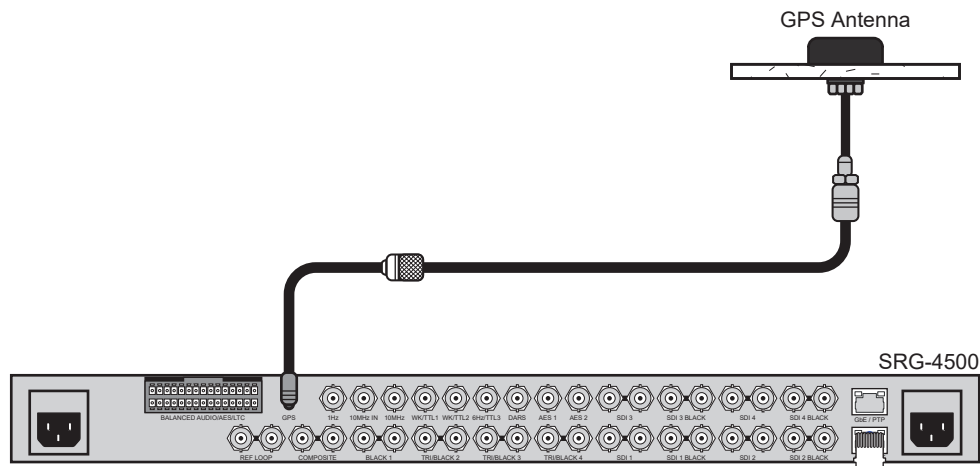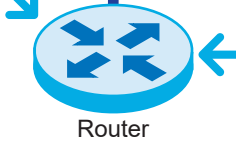

Figure 68 GPS-4500-200M — Connection with an External Line Amplifier

Connecting to the Network

The **ETHERNET** port on the SRG-4500 rear panel is used for status and control. Refer to **Figure 69** when connecting the SRG-4500 to your network router.

GPS Antenna

SRG-4500

BALANCED AUDIO/AES/LTC   GPS   1Hz 10MHz IN 10MHz WK/TTL1 WK/TTL2 6HzTTL3 DARS AES 1   AES 2   SDI 3   SDI 3 BLACK   SDI 4   SDI 4 BLACK   GbE / PTP

REF LOOP   COMPOSITE   BLACK 1   TRI/BLACK 2   TRI/BLACK 3   TRI/BLACK 4   SDI 1   SDI 1 BLACK   SDI 2   SDI 2 BLACK

If you are connecting to an **L2** or better switch, set the Storm Control configuration of your network router for the port connected to the SRG-4500. A limit of zero broadcast and/or multicast messages is recommended. If this is not available, then choose <10 broadcast and/or multicast messages/second.

If you are connecting to an **L4** or better switch, it is strongly recommended to close unused ports on the network switch connected to the control port. The only open ports should be: 9987, 9988, 1991, 1992, 161, 162, 123, 5253, and 6666. All other ports should be disabled.

Router

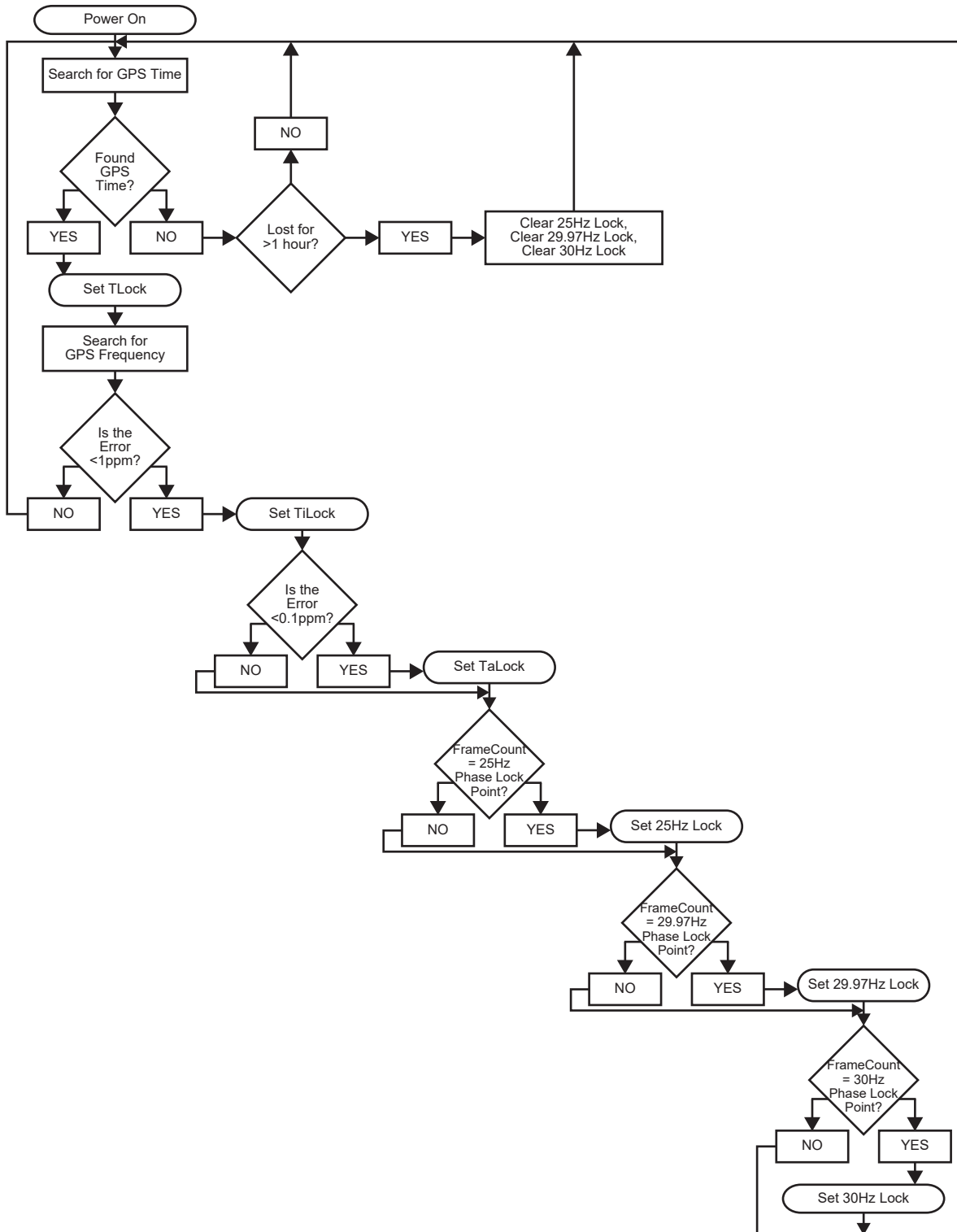*Figure 69 Example of SRG-4500 Connected to a Network Router*

Simplified GPS Flowchart

Power On

Search for GPS Time

Found GPS Time?
- YES → Set TLock
- NO → Lost for >1 hour?
  - NO
  - YES → Clear 25Hz Lock, Clear 29.97Hz Lock, Clear 30Hz Lock

Set TLock

Search for GPS Frequency

Is the Error <1ppm?
- NO
- YES → Set TiLock

Is the Error <0.1ppm?
- NO
- YES → Set TaLock

FrameCount = 25Hz Phase Lock Point?
- NO
- YES → Set 25Hz Lock

FrameCount = 29.97Hz Phase Lock Point?
- NO
- YES → Set 29.97Hz Lock

FrameCount = 30Hz Phase Lock Point?
- NO
- YES → Set 30Hz Lock

Figure 70 Phasing to GPS Flowchart

Operation

This section provides additional information for operating the SRG-4500 while using an active GPS antenna.

For More Information on...

- GPS signals, refer to ***IS-GPS-200E***.
- GLONASS signals, refer to ***ICD L1 L2 GLONASS Edition 5.1 2008***.

Locking the SRG-4500 to GPS

One of the best sources of reference for both frequency and time is the Global Positioning System (GPS).

The SRG-4500 uses a 32 channel GPS receiver. As the SRG-4500 is powered, the GPS receiver begins searching for satellites from which it can get time, frequency and phase information. In a good reception area, as many as 12 satellites may be visible. The SRG-4500 requires a minimum of 3 satellites to be located and fully decoded before it can start using the GPS data. The search for the first 3 satellites can take up to 3 minutes, but is often accomplished in 2. If less than 3 satellites are available, the SRG-4500 will not lock to GPS.

Once the minimum of 3 satellites have been located and their GPS data decoded, the SRG-4500 averages the number of counts from all of the detected satellites, and then continually adjusts the free-run oven frequency to generate a condition where the SRG-4500 is locked in frequency and phase to the GPS receiver.

In marginal reception areas, locking/unlocking of the GPS receiver will be tolerated as the short term effect on the free-running oven frequency of the SRG-4500 will be very small. When an unlocked condition is detected, the SRG-4500 software will smoothly revert to the stored free-running oven frequency.

The number of satellites can be monitored on the GPS Report sub-menu available in the System Setup menu. Refer to the section "**GPS Time Tab**" for details.

Time Locking

Time lock is achieved by reading the GPS time from the receiver and calculating an appropriate timecode. GPS locks the SRG-4500 central timing system.

Keep the following in mind:

- The timecode needs to be checked and updated each time the GPS receiver is detected.
- However, in marginal reception, the timecode update should be suppressed until it has been valid for a number of seconds.
- Once the time-code has been set by the GPS receiver, the SRG-4500 should not need to recheck the GPS time unless a crash lock has been forced by the phase locking arrangement.

Frequency Locking

Frequency lock can be established in a few seconds as the oven free-running frequency is within a few ppm of the GPS frequency at all times. The first time the SRG-4500 is powered with a GPS receiver, the SRG-4500 waits for 3 or more satellites to be "fixed", then the SRG-4500 acquires frequency lock. This first time may take up to 5 minutes from when the GPS lock was acquired.

Frequency lock is achieved when the short-term frequency error is less than 1ppm.

Phase Locking

Phase locking can be established a few minutes after frequency locking. Phase lock is achieved when the long-term frequency error is less than 0.1ppm.

Signal Requirements

The SRG-4500 with GPS Receiver can achieve Cold Start acquisition with a signal level of -147dBm at its input. This means the SRG-4500 can find the necessary satellites, download the necessary ephemeris data and compute the location within a 5 minute period.

The SRG-4500 will display a reported C/No of 40dB-Hz for a signal level of - 130dBm into the RF input.

- Each GPS and GLONASS satellite presents its own signal to the SRG-4500, and best performance is obtained when the signal levels are between -125dBm and -117dBm. These received signal levels are determined by:
- GPS and GLONASS satellite transmit power
- GPS and GLONASS satellite elevation and azimuth
- Free space path loss
- Extraneous path loss such as rain
- Partial or total path blockage such as foliage or building
- Multi-path caused by signal reflection
- GPS/GLONASS antenna
- Signal path after the GPS/GLONASS antenna

Even though for frequency and phase locking the SRG-4500 does not require a good 3D fix, it still requires three satellites in view to produce a fix.

Required Time Corrections

From a GPS Receiver, the SRG-4500 Master Clock can derive UTC and also add the appropriate time offset and provide corrected local time. **Table 42** contains a list of the various corrections which need to be made by the SRG-4500.

Table 42 Required Time Corrections

		Offset	SRG-4500 Update
1	Earth Speed Drift in one day	1ms	Leap second corrections are made approximately every 18 months as determined by International Earth Rotation Service (IERS).
2	Local Time	User defined	The user usually defines the offset from UTC at time of installation
3	Daylight Saving	1 hour	Twice per year

System Noise Floor

As mentioned earlier, the SRG-4500 will display a reported C/No of 40dB-Hz for an input signal level of -130dBm. The C/No number means the carrier (or signal) is 40dB greater than the noise floor measured in a 1Hz bandwidth. This is a standard method of measuring GPS receiver performance.

Thermal noise is -174dBm/Hz at room temperature. From this we can compute a system noise figure of 4dB for the SRG-4500. This noise figure consists of the loss of the preselect SAW filter, the noise figure of the LNA as well as implementation losses within the digital signal processing unit.

Troubleshooting

This section provides a flowchart (**Figure 71**) to troubleshoot some common issues that may be encountered during setup or operation of your SRG-4500. The sections after the flowchart provide additional tips and notes for steps in the troubleshooting process.
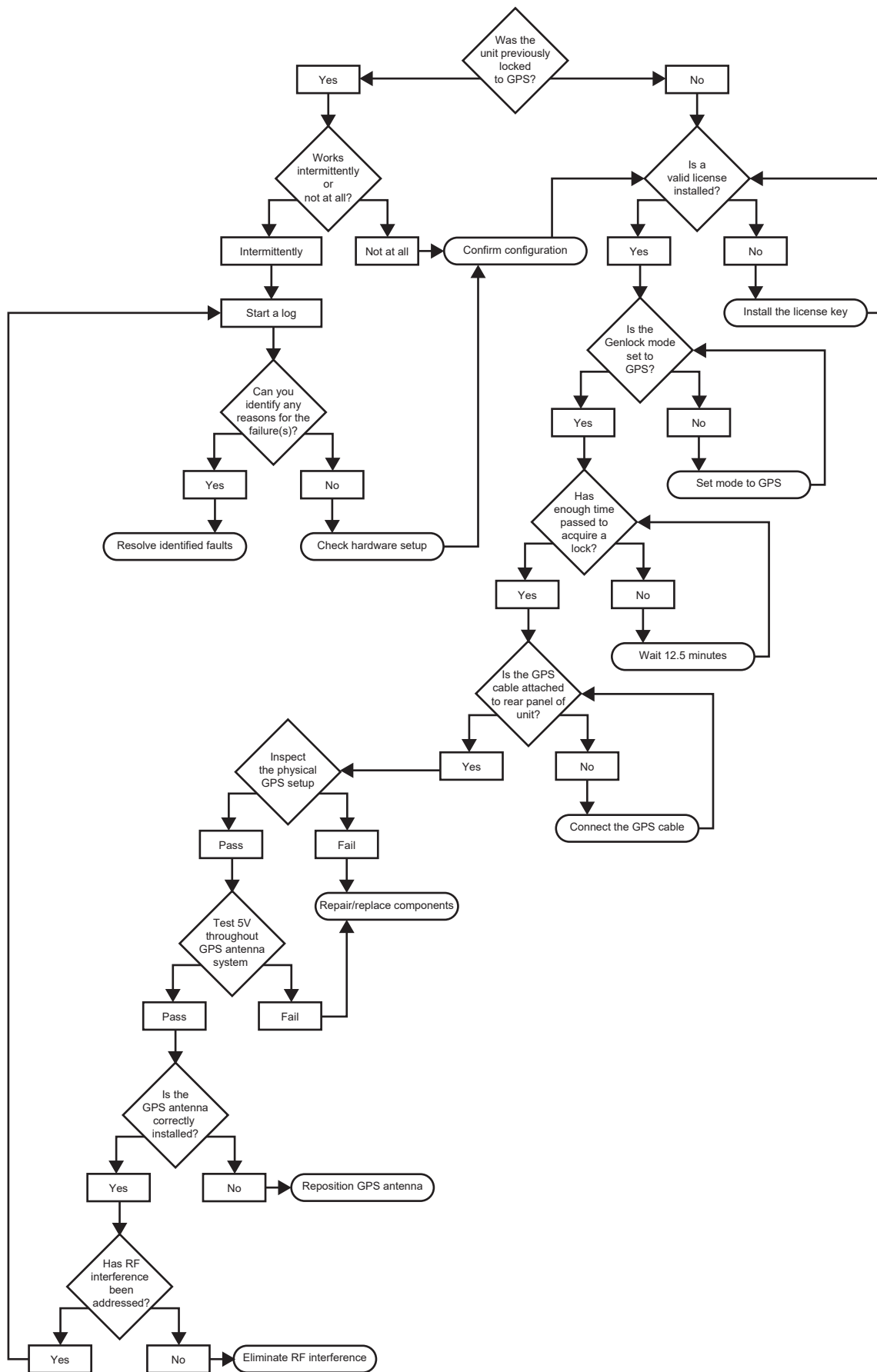
Figure 71 Troubleshooting Workflow

Validating the License

Refer to "**Option Enable Menu**" for details on installing and verifying the licensed options on the SRG-4500. Keep in mind that:

- A valid license key will have between each 4 character group, a "-". For example, option code `2930c49c5a99` will show as `2930-c49c-5a99.`

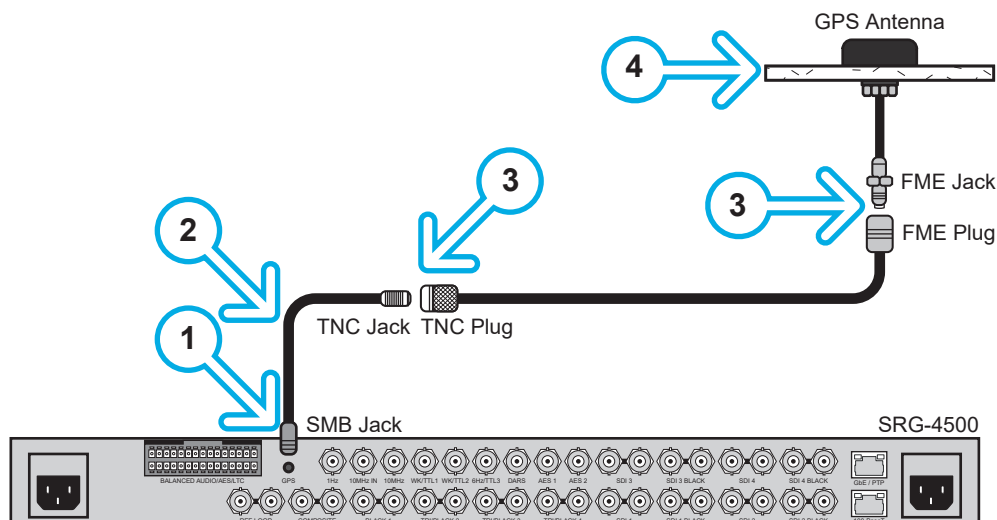- If the option key is invalid, you will see the entered value with "." between the groups and "–`Invalid`" after the entry.

Locking to GPS

To verify that the SRG-4500 is locking to a GPS source:

1. Follow the steps in "**Locking the SRG-4500 to GPS**".

2. Does the SRG-4500 report any satellites in view?

    - This information is reported in the **Slot 12 System Time** > **GPS Time** tab. Also refer to "**GPS Status**".

3. Has enough time been allowed for the SRG-4500 to acquire and lock to GPS? Keep the following in mind:

    - The Global Navigation Satellite System (GNSS) only transmits a complete UTC-GNSS time message once every 12.5 minutes. When powering up the GNSS receiver it is best to wait 12.5 minutes before relying on the GNSS time.

    - The navigation message is transmitted by the satellite on the L1 data link at a rate of 50 bits per second. The message structure uses a basic format of a 1500 bit long frame (30 seconds) made up of five sub-frames with each sub-frame being 30 bits long. Sub-frames 4 and 5 are repeated 25 times each, so that a complete message will require the transmission of 25 full frames (12.5 minutes).

    - The UTC offset is only transmitted once per frame, so it is only transmitted once every 12.5 minutes. Depending where you were in the cycle when the GNSS receiver is first switched on, it can thus be up to 12.5 minutes until the UTC offset value is transmitted from a satellite.

4. Does clicking the **GPS Reboot** button (on the **Slot 0** > **Genlock** tab DashBoard) resolve the issue?
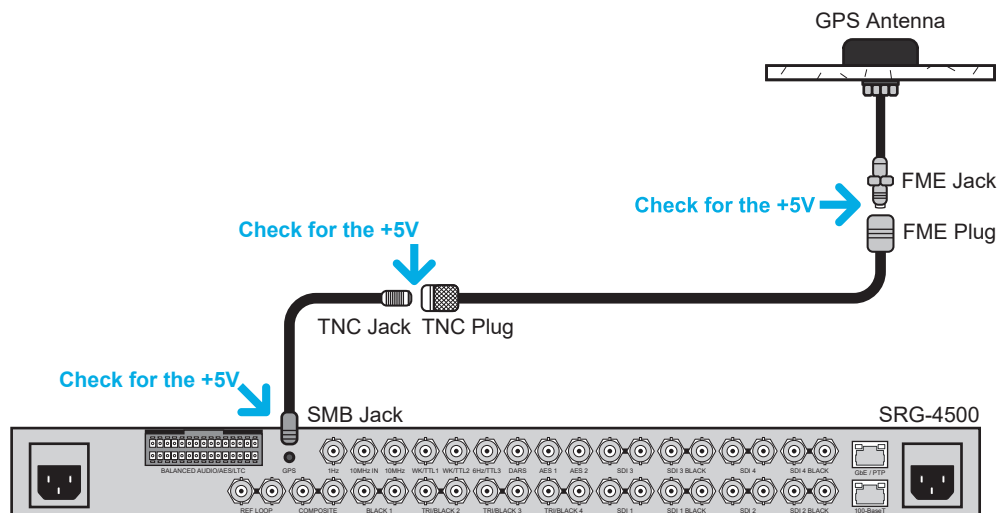
Cabling

To troubleshoot the physical connections in your GPS setup:

1. Is the SMB snap-fit connector properly seated on the end of the GPS cable?

2. Is the antenna cable installed without kinks/abrasions/violating bend radius? Keep the following in mind:

   a. Are all cables properly dressed and have appropriate strain relief?

   b. Check at connectors that they have not been abused or have excessive bend radius. Remember that acceptable LMR195 radius is at 2.0" (50.8mm) and LMR400 radius is at 4.0" (101.6mm).

   c. The number of points to be checked depends on the GPS antenna system installed. Some systems may have addition components such as lighting protection, in line amplifiers, etc.

3. Are the connectors in good shape? Keep the following in mind:

   a. Are all the connections in good shape - any corrosion or moisture inside?

   b. Is the outer jacket of the connector in good shape? Is there any fraying at the connector?

   c. Are all connectors seated properly?

4. Is the GPS antenna connectors in good shape?

   d. Are outside connectors protected from moisture ingest?

   e. Is the weather dome of the GPS antenna showing signs of cracking or other issues?

Check the +5V Current Flow

To troubleshoot the voltage throughout your GPS setup:

1. Disconnect the GPS cable from the SRG-4500 rear panel.

2. Use a voltmeter to measure GPS connector center pin to outer shell. Keep the following in mind:

   • If there is not +5V, this indicates that an over current event occurred in the antenna system. When an over current event occurs, it trips the circuit protection, which then requires a power cycle of the SRG-4500 to restore the +5V antenna supply. The SRG-4500 can supply +5V at 50mA.

   • If this happens on a regular basis, it indicates that there is a fault in the antenna system (moisture in cable, faulty antenna, issue with any in-line amplifier that may be present, etc.).

3. If a 5V is not present:

   a. Leave the GPS cable disconnected.

   b. Power down the SRG-4500 for 30-60 seconds.

c. Power up the SRG-4500 .

d. Check if the +5V is now present on the frame GPS connector.

e. If so, problem is likely with the antenna system.

4. If 5V is present at the SRG-4500 rear panel, verify that +5V is also present at the GPS antenna:

a. Remove the cable from the GPS antenna,

b. Use a voltmeter to check the FME plug from center pin to outer shell.

c. If +5V is not present, the problem may be with the cable or other components of the antenna system.

d. If +5V is present, the problem may be the GPS antenna.

Antenna Setup

Does the antenna have a good view of the sky?

• The GPS antenna must be mounted in an outdoor location, and be positioned such that it has an uninterrupted view of the sky, i.e. with as much of the hemisphere of sky above it in plain view.

• The antenna must be positioned away from any buildings or surfaces that could cause reflections to be received by the antenna.

• If you are mounting the antenna on a wall bracket, this assembly must be placed at the top of the wall, so as to gain a clear view of the sky above.

• The GPS antenna cannot be mounted indoors; not even against a window, even one without an anti-glare coating.

Check for Radio Frequency Interference

RF Interference into the GPS/GLONASS receiver tends to be the biggest problem when determining why the system performance is not meeting expectations. The GPS and GLONASS signals are at -130dBm and lower. If signals higher than this are presented to the receiver it can be overwhelmed. The SRG-4500 can reject CW in-band jamming signals, but would still be affected by non-CW signals. It is recommended to move the antenna away from any source of interference or shield the RF interference to prevent it from getting to the antenna.

The most common source of interference is digital noise. This is created by the fast rise and fall times and high clock speeds of modern digital circuitry. For example, a popular net book computer uses an Atom processor clocked at 1.6GHz. This is only 25MHz away from the GPS signal and virtually at the same frequency as the GLONASS signal. Because of the nature of the address and data lines, this would be broadband digital noise at a relatively high level. Such devices are required to adhere to a regulatory standard for emissions such as **FCC Part 15 Subpart J Class B** or **CISPR 22**.

It is recommended to move the antenna away from the source of interference or shield the digital interference to prevent it from getting to the antenna.

PTP Option

The SRG-4500 always contains the hardware, software and associated circuitry necessary to allow operation of the PTP Option. An Option Key is used to enable the PTP Option. No additional externally connected hardware is required as part of the installation.

✷ Ensure the SRG-4500 is GPS locked if the SRG-4500 will be used as a Grandmaster.

Installation

The PTP Option becomes operational after the relevant Option Key has been entered on the Option Enable menu. A power cycle may be required to complete the update process.

Physical Connections

In order to utilize the PTP Option, use an Ethernet cable to the **GbE/PTP** port and connect the SRG-4500 to your local network device (master router or local hub).
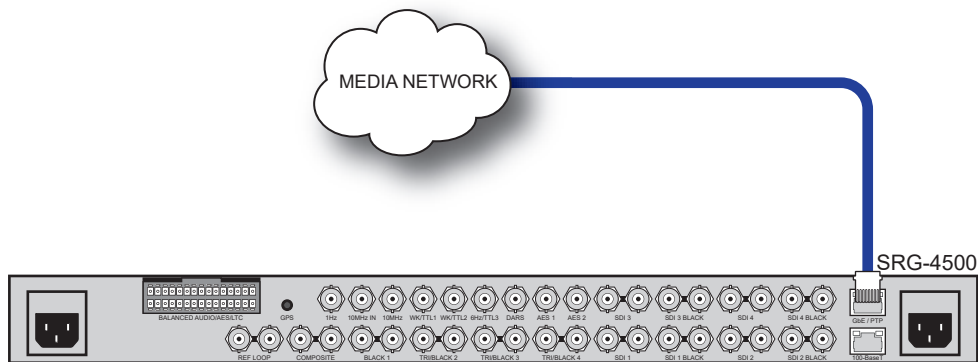

Figure 72 SRG-4500 Rear Panel — Cabling the PTP Option

Refer to the section "**PTP Menu**" for information on configuring the Network and PTP systems with your required parameters.

Before You Begin

The SRG-4500 has one Precision Time Protocol (PTP) engine. This PTP engine can be set as a PTP Grandmaster source or set as a PTP Follower to lock the SRG-4500 to a remote PTP Grandmaster.

The basic operating mode of the SRG-4500 is set in the **Genlock Select** menu. When PTP is also considered then the mode of PTP must be configured in conjunction with the Genlock mode of the SRG-4500. The Genlock mode selected determines the allowed function of the primary PTP engine as follows:

• The PTP engine must be configured as a **Grandmaster** when the SRG-4500 reference selection is set to one of the following options:

    › GPS Frequency and Phase lock (PTP serves TAI time)

    › Internal (Free run) (PTP serves TAI Time)

    › Genlock to Video (PTP serves TAI Time)

    › Genlock to Video + VITC (PTP serves TAI Time)

    › 10 MHz lock (PTP serves TAI Time)

✦ The PTP engine serves TAI time. If the Grandmaster is GPS or VITC locked, you cannot change the time PTP is serving. If the SRG-4500 is set to free run mode, it will serve TAI time based on the SRG-4500 UTC time. The UTC time can be adjusted by nudging it in the UTC Time tab (slot 12 System Time). The local SPG time can have a time zone offset added in the SPG Time tab (slot 12 System Time) to allow for the local time zone and DST, the corrections for which are *not* reflected on the served PTP TAI time.

• The PTP engine must be configured as a **Follower** if the SPG Genlock selection is set to lock to a remote PTP Grandmaster.

Configuration Overview

Comprehensive settings and reporting for the PTP Grandmaster option are available only via the DashBoard interface. It is only possible to properly configure the PTP system via the Slot 16 System Setup interface in DashBoard.

It is recommended that the user chooses the PTP profile to suit their application (Grandmaster or Follower) and the suitable variant under the Simple View on the PTP configuration interfaces. All of the SMPTE recommended values are set by default.

✦ It is possible to manually change a wide range of PTP parameters under the Detailed View on the PTP configuration screens. Before considering making changes to the SMPTE default values, please be aware that these default values were arrived at after much consideration and testing during numerous inter-ops and elsewhere. These should only be changed by those users who have a complete understanding and knowledge of PTP configuration within a network, and specifically in the broadcast context, and the implications of those changes.

PTP Grandmaster Selection

In a PTP network, all the masters on the network are evaluated by the Best Master Clock Algorithm (BMCA). The BMCA elects which device will act as the clock Master for a given PTP domain. To fully understand how this functions, we strongly recommend that the user familiarizes themselves fully with PTP and specifically PTP within a broadcast environment as specified in **SMPTE ST2059**. There is much published industry information on how PTP works and many tutorials on how to use and implement PTP within a broadcast environment.

The BMCA runs on all devices, and chooses a master based on a number of criteria. Priority 1 and Priority 2 values that are set by the user to influence the choice of a master.

Initial Grandmaster PTP Configuration

Priority 1 and 2 allow control of which devices will be elected as PTP Master. Lower numerical values represent a higher priority. Priority 1 is the first criteria used to determine the PTP Master; Priority 2 is used to differentiate between devices whose Priority 1 *and* other clock quality parameters are equal.

Setting the Priority 1 and Priority 2 values should be done in a systematic manner. The Priority 1 should be the same for all devices on the same stratum, with each node having a unique Priority 2 value. At the bottom media node layer, configuring the router ports to be Grandmaster only will help prevent any mis-configured devices from having adverse effects on the system.

Best practices indicate that the domain you choose for your facility should NOT be 0 nor 127. This is to help prevent a rouge clock from taking over the system if an unconfigured device is accidentally added to the system.
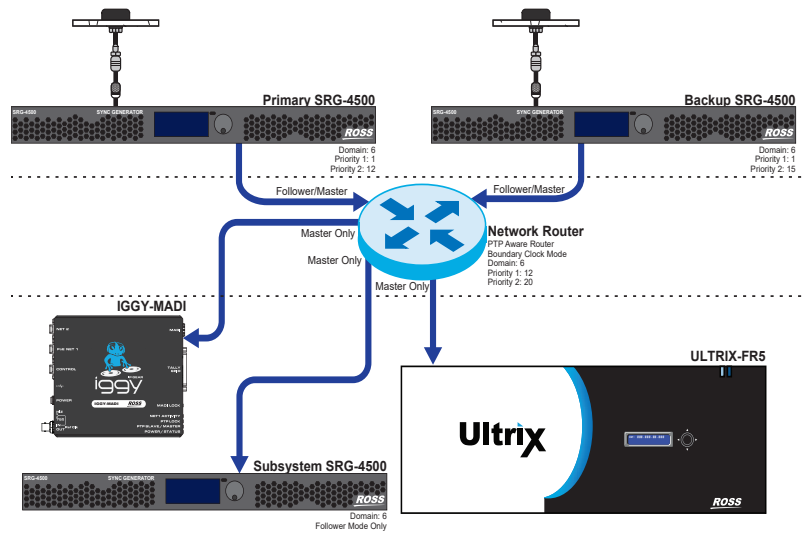
Figure 73 Example System

Configuring PTP Profiles

All devices in a system should be configured to the same PTP parameters. To simplify this, and to provide a common set of values, SMPTE and the AES have created profiles:

• the **SMPTE 2059:2015** profile is recommended for video networks

• the **AES67** profile was created for audio networks

To reduce the number of configurations, the AES created **AES56-R16:2016**, a set of recommended values that map between the AES and SMPTE profiles. To simplify setup of the SRG-4500, both SMPTE and AES67-R16 profiles can be selected to automatically set the parameters to these default values.

Table 43 lists the for SMPTE-2059:2105 values.

Table 43 SRG-4500 — SMPTE-2059:2015 Selected

	PTP GM SMPTE-2059:2015 spec	SRG-4500 Grandmaster Values when SMPTE-2059:2015 selected
Default Domain Number	Default value: 127 Configurable range: 0 to 127	Default is 127 Recommend NOT 127 nor 0 Domain is not reset via profile loading
Announce Interval	Default value: -2 (4Hz) Configurable range: -3 to +1	250ms - 4Hz
Announce Receipt Timeout	Default value: 3 Configurable range: 2 to 10	3 * Announce Interval
Sync Message Interval	Default value: -3 (8Hz) Configurable range: -7 to -1	125ms - 8Hz
Min P Delay Request Interval	Default value: equal to Sync Message Interval Configurable range: Sync Message Interval to Sync Message Interval+5	125ms - 8Hz

Table 44 lists the AES67-R16:2016 values.

Table 44 SRG-4500 — AES67-R16:2016 Selected

	PTP GM AES67-R16:2016	SRG-4500 Grandmaster Values when AES67-R16:2016 selected
Default Domain Number	0	Default is 127 Recommend NOT 127 nor 0 Domain is not reset via profile loading
Announce Interval	1 (2sec)	2 sec
Announce Receipt Timeout	3	3
Sync Message Interval	Default value: -3 (8Hz)	125ms - 8Hz
Min P Delay Request Interval	Default value: -3 (8Hz)	125ms - 8Hz

SMPTE Profile TLV

When using the **SMPTE SMPTE-2059:2015** profile, a SMPTE TLV (type, length, value) is generated. The user can configure four items in the TLV. This TLV message can be used by downstream equipment to determine video standards and assist with timing considerations.

If used, the user should configure the Advertise System Use Frame Rate for the nominal frame rate prevalent in their facility.

The Advertise System Use Drop Frame should be selected when the primary frame rate is non-integer (e.g. 59.94, 29.97, etc.).

The Advertise System Use Color Frame ID can be useful for downstream equipment re-generating standard definition reference signals.

PTP Grandmaster Configuration

By default, the options are displayed in the Simple View. In Simple View, basic information relating to the PTP port, the selected mode, and default settings are displayed. Essential settings are displayed only (details can be displayed when the Detail View box is selected). When a profile is selected, all settings associated with that profile are automatically set according to the SMPTE and AES recommendations.

To display the PTP Grandmaster options in DashBoard

1. Navigate to the **Slot 16 System Setup** interface.

2. Select the **Network** tab.

3. Select the **PTP** sub-tab (located at the bottom of the Network tab).

4. Locate the **PTP Grandmaster** area.

   By default, the **Detail View** box is cleared (unselected) and the PTP options are in Simple View.

5. Use the **PTP - IP address** of this SPG to set the IP Address of the **GbE PTP** port.

6. Use the **PTP - IP sub net mask** to set IP sub net mask of the **GbE PTP** port.

7. Use the **PTP – IP gateway address** to set IP gateway address of the **GbE PTP** port.

8. Use the **Mode** menu to specify the preferred PTP mode of operation. Choose from the following:

   - **Off** — The PTP engine is off. It does not participate in any PTP activity. It does not lock to any reference.
   - **PTP Multicast Follower** — The device is a PTP Follower. It uses multicast messages for all network messages.
   - **PTP Mixed Mode Follower** — The device is a PTP Follower. It uses multicast messages for most network messages. It uses Unicast messages for Delay Request and Delay Response messages.
   - **PTP Grandmaster (Active)** — The device is a PTP Grandmaster. It sends Announce, Sync and Follow Up messages irrespective of whether it sees a better (BMCA) Grandmaster on the network or not. Some PTP Followers and PTP management systems keep a pool of known Grandmasters to aid in redundancy and speed of switching between Grandmasters. In a SMPTE ST2022-7 topology, selecting this mode ensures the backup device will always be active, at least in the top node of the network.
   - **PTP Grandmaster** (Passive) — If not selected by BMCA, the device is a PTP Grandmaster. If it sees a better (BMCA) Grandmaster on the network, it suspends send all messages. If it later becomes the best (BMCA) Grandmaster, it resumes sending all messages.

9. Use the **Domain** menu to select value for the Domain (Range 0 – 127).

10. Use the **Priority 1** menu to select value for Priority 1 (Range 0 – 255).

11. Use the **Priority 2** menu to select value for Priority 2 (Range 0 – 255).

12. Use the **PTP Profile** menu to specify the required PPTP Profile. Choose from the following:

    - IEEE1588 (default)
    - SMPTE-2059: 2015
    - AES67-R16: 2016

13. Use the SMPTE Profile Parameters (Advertise System Frame Rate, Advertise Use Drop Frame, and Advertise Use Color Frame ID if required).

14. Click **Apply New PTP Network Settings** to apply the new PTP Network Settings.

15. Click **PTP Restart Confirm** to restart the PTP engine.

✦ This will restart the PTP engine on the SRG-4500 and there will be a disruption to the PTP service until it is relocked.

Status Fields

The following status fields report read-only information:

- UTC Time — Displays the current UTC Time.
- PTP – MAC address — Displays the PTP port MAC address.
- PTP Clock ID — Displays the PTP Clock ID.
- PTP Grandmaster Status — Displays the current profile status.
- PTP Alert — Displays any PTP alert message.
- PTP Status Alarm — Displays alarm status from Red (Locked), Yellow (Locking), and Green (Locked).

Detailed View Options

If the **Detailed View** box is selected, the following additional options are displayed in DashBoard:

- DSCP Qos — Choose from the following:

> › 46 – Expedited forwarding
>
> › 56 – Class Selector 7 (deprecated)

- TTL – Time to Live — Select a value for Time to Live (the range is 0 – 255).
- PTP Enable Customized Settings — By selecting this box, the user can then adjust parameters to deviate from the default values of the profile selected. This should not normally be necessary and should only be done by very qualified personnel.
- Sync Message Interval — Displays Sync Message Interval
- Completed Sync Messages — Displays completed Sync Messages
- Announce Message Interval — Displays Announce Message Timeout
- Completed Announce Messages — Displays Completed announce Messages
- Advertised Minimum Delay Request Interval — Displays Advertised Minimum Delay Request Interval

SMPTE Profile Parameters

- SMPTE Profile Message Interval — Displays SMPTE Profile Message Interval
- Completed SMPTE Profile Messages — Displays Completed SMPTE Profile Messages
- Advertise System Use Frame Rate — Choose value from the following:
  > › 23.97Hz – 24000/1001
  >
  > › 24Hz – 24000/1000
  >
  > › 25Hz – 25000/1000
  >
  > › 29.97Hz – 30000/1001
  >
  > › 30Hz – 30000/1000
  >
  > › 50Hz – 50000/1000
  >
  > › 59.94Hz – 60000/1001
  >
  > › 60Hz – 60000/1000
- Advertise Use Drop Frame — Check box ON/OFF
- Advertise Use Color Frame ID — Check box ON/OFF
- Current Local Offset — Displays Current Local Offset
- Current DS — Displays Current DST status
- DST at next discontinuity — Displays DST at next discontinuity status
- DST at previous JAM discontinuity — Displays DST at previous JAM discontinuity status
- Leap Second Approaching — Displays Leap second approaching status
- Discontinuity — Displays Discontinuity status

PTP Clock

- Clock Time Source — Displays Clock Time Source
- Clock Class — Displays Clock Class
- Clock Offset (Accuracy – Better than) — Displays Clock Offset
- Clock log Variance — Displays Clock log Variance

Connection Logs and Statistics Tables

The Connection Logs and Statistics tables report information on up to 128 follower devices connected to the Grandmaster. Details such as the IP address of the follower, mode, connection time, etc. are also provided.

- Clear PTP Connection Logs and Statistics Tables — Click to confirm.
- View Connections — Select a range from the following:
  - › 1 -16
  - › 17 – 32
  - › 33 – 48
  - › 49 – 64
  - › 5 – 80
  - › 81 – 96
  - › 97 – 112
  - › 113 – 128

Connection Logs and Statistics Tables

- Clear PTP Connection Logs and Statistics Tables — CONFIRM - Click to confirm
- View Connections — Choose from Groups of 16 (1 – 256).
- IP address of connected device — Connection Alive Duration (Lifetime)
- Displays IP address of connection — Displays lapsed time
- Delay Request Count (Lifetime) — Delay Requests per sec (Current)
- Displays number of delay requests — Displays number of delay requests per seconds

PTP Follower Configuration

This section provides information on the menus and options when the SRG-4500 is set to PTP Follower mode.

By default, the options are displayed in the Simple View. In Simple View, basic information relating to the PTP port, the selected mode, and default settings are displayed. Essential settings are displayed only (details can be displayed when the Detail View box is selected). When a profile is selected, all settings associated with that profile are automatically set according to the SMPTE and AES recommendations.

To display the PTP Follower options in DashBoard

1. Navigate to the **Slot 16 System Setup** interface.

2. Select the **Network** tab.

3. Select the **PTP** sub-tab (located at the bottom of the Network tab).

4. Locate the **PTP Follower** area.

   By default, the **Detail View** box is cleared (unselected) and the PTP options are in Simple View.

5. Use the **PTP - IP address of this SPG** field to set the IP Address of the **GbE/PTP** port.

6. Use the **PTP - IP sub net mask** field to set the IP sub net mask of the **GbE/PTP** port.

7. Use the **PTP – IP gateway address** field to set the IP gateway address of the **GbE/PTP** port.

8. Use the **Mode** menu to specify the preferred PTP mode of operation. Choose from the following:

   • Off
   • PTP Multicast Follower
   • PTP Mixed Mode Follower
   • PTP Grandmaster (Active)
   • PTP Grandmaster (Passive if not selected by BMCA))

9. Use the **Domain** field to select a value for Domain (0 – 127).

10. Use the **PTP Profile** field to select the required PPTP Profile. Choose from the following:

    • IEEE1588 (default)
    • SMPTE-2059: 2015
    • AES67-R16: 2016

11. Use the **Allowable Observed Network Jitter before alarm** (+/- ns) field to specify the allowable network jitter before an alarm is reported.

12. Click **Apply New PTP Network Settings** to apply the new PTP Network Settings.

13. Click **PTP Restart Confirm** to restart the PTP engine.

✦ This will restart the PTP engine on the SRG-4500 and there will be a disruption to the PTP service until it is relocked.

PTP Follower Status

• UTC Time — Displays current UTC Time.
• PTP Clock ID — Displays the PTP Clock ID.
• PTP Follower Status — Displays current profile status.
• Observed Network Jitter (+/- ns) — Displays the observed Network jitter in ns.
• PTP Alert — Displays any PTP Alert message.
• PTP Status Alarm — Displays alarm status from Red (Locked), Yellow (Locking), and Green (Locked).
• Completed Sync Messages — Displays number of completed Sync Messages.
• Completed Announce Messages — Displays number of completed Announce Messages.
• Observed jitter — Displays alarm status from Red (Serious), Yellow (Average), and Green (OK).

Detailed View Options

If the **Detailed View** box is selected, the following additional options are displayed in DashBoard:

• Domain — Select a value for Domain (0 – 127).
• Priority 1 — Displays the value for Priority 1 (0 – 255).
• Priority 2 — Displays the value for Priority 2 (0 – 255).
• Step Mode — Displays the current Step Mode.

PTP Profile Parameters

- PTP Enable Customized Settings — With the set to ON, the user can adjust parameters to deviate from the default values of the profile selected. This should not normally be necessary and should only be done by very qualified personnel.
- Sync Message Interval — Displays Sync Message Interval
- Completed Sync Messages — Displays completed Sync Messages
- Announce Message Interval — Displays Announce Message Interval
- Announce Message Timeout — Displays Announce Message Timeout
- Completed Announce Messages — Displays Completed announce Messages

Advertised Minimum Delay

- Request Interval — Displays Advertised Minimum Delay Request Interval
- Completed Delay Request Messages — Displays Completed Delay request Messages
- Completed Delay Response Messages — Displays Completed Delay Response Messages

SMPTE Profile Parameters

- Completed SMPTE Profile Messages — Displays Completed SMPTE Profile Messages
- Advertise System Use Frame Rate — 23.97Hz – 24000/1001
- Advertise Use Drop Frame — Customized setting
- Advertise Use Color Frame ID — Customized setting
- Current Local Offset — Displays Current Local Offset
- Current DST — Displays the Current DST status
- DST at next discontinuity — Displays DST at next discontinuity status
- DST at previous JAM discontinuity — Displays DST at previous JAM discontinuity status
- Leap Second Approaching — Displays Leap second approaching status
- Discontinuity — Displays Discontinuity status

PTP Clock Parameters

- Time Source — Displays Clock Time Source
- Clock Class — Displays Clock Class

Clock Offset

- Displays Clock Offset
- Clock log Variance — Displays Clock log variance
- Clock Offset from PTP reference — Clock offset from PTP reference

Troubleshooting

You can choose to create a log of PTP events and then download it to a readable file for troubleshooting purposes.

✱ The **Ethernet 100-Base T** port and the **GbE/PTP** port must be connected to the same sub-net, or a gateway is between the individual sub-nets.

To create and download a log of PTP events

1. Navigate to the **Slot 16 System Setup** interface.

2. Select the **Network** tab.

3. Select the **Debug Logging** sub-tab.

4. Locate the **PTP Linux Log** area.

5. Set the **Collect Linux Debug Messages for Download** menu to **Active**.

6. Wait 30 seconds.

7. Set the **Collect Linux Debug Messages for Download** menu to **Stopped**.

8. Navigate to the **Slot 14 PTP Log** interface.

9. From the **PTP Log** interface, select **System Summary** > **Download File**.

10. Click the **Download** link to download the PTP Log file.

Certifications and Compliances

Table 45 EC Declaration of Conformity - EMC

Category	Standards or Description	
EC Declaration of Conformity - EMC	Meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities.	
	EN55103	
	Environmental	E2-commercial and light industrial
	Part 1 Emission	EN55032 Class A radiated conducted emissions
		EN55103-1, Annex A Radiated magnetic field emissions
		EN55103-1, Annex B Inrush current; I peak=14.6 amps
	Part 2 Immunity	IEC61000-4-2 Electrostatic discharge immunity
		IEC61000-4-3 RF electromagnetic field immunity
		IEC61000-4-4 Electrical fast transient/burst immunity
		IEC61000-4-5 Power line surge immunity
		IEC61000-4-6 Conducted RF immunity
		IEC61000-4-11 Voltage dips and interruptions immunity
		EN55103-2, Annex A Radiated magnetic field immunity
	EN61000-3-2 — AC power line harmonic current emissions	
	EN61000-3-3 — Voltage changes, fluctuations, and flicker	
EC Declaration of Conformity - Safety	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Union: • IEC 60950-1/A1:2009 • IEC 62368-1:2014 • EN 62368-1:2014 + EN 62368-1:2014/A11:2017 - Audio/video, information and communication technology equipment - Part 1: Safety requirements	
Australia/New Zealand Declaration of Conformity - EMC	Complies with the EMC Framework, demonstrated per Emission Standard AS/NZS 2064 (Industrial, Scientific, and Medical Equipment).	

Table 45 EC Declaration of Conformity - EMC

Category	Standards or Description	
Safety	Complies with the following safety standards: • AS/NZS 62368.1:2018 • CAN/CSA C22.2 No. 1010.1 • CAN/CSA C22.2 No. 62368-1:2014 • IEC 60950-1/A1:2009 • UL 60950-1 • UL 62368-1:2014 •	
Installation (over voltage) Category	Terminals on this product may have different installation (over-voltage) category designations. The installation categories are: • CAT III — Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location. • CAT II — Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected. • CAT I — Secondary (signal level) or battery operated circuits of electronic equipment.	
Pollution Degree	A measure of the contaminates that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.	
	Pollution Degree 2	Normally only dry, non-conductive pollution occurs. Occasionally, a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.
Manufacturing	All assemblies manufactured in an ISO9001:2008 registered facility. Steel is 18swg (1.2mm) thickness CR4GP (Cold Reduced Mill Finish General Purpose) to BS 1449 Plating is zinc and clear passivated to BS EN 12329:2000 FE//ZN8//A (FE = Steel, ZN8 = 8 mic minimum zinc deposit, A = clear passivation).	
	All assemblies manufactured in accordance to IPC-A-610E class 2 suitability standard.	
	All assemblies manufactured in accordance to ISO14001:2004 environmental standard.	
IEC Characteristics	Equipment Type: Test and Measuring	• Installation Category II (Single-phase, receptacle-connected loads) • Pollution Degree 2 (Normally only non-conductive pollution occurs) • Safety Class I (Grounded product) • Temperature 5°C to 40°C

Service Information

This chapter contains procedures for cleaning and performing preventive maintenance on the SRG-4500, general servicing information, and the warranty policies.

User Maintenance

This section contains information for cleaning and performing preventive maintenance on the SRG-4500.

General Care

Protect the instrument from adverse conditions, i.e. high humidity, high temperatures, etc. The instrument is NOT waterproof.

When handling the unit or any of its controls, do so with clean hands.

Do not use excessive force to operate any of the controls on the unit.

Exterior Cleaning

Clean the instrument periodically to prevent the accumulation of dust or dirt. Accumulated dust in the instrument acts like an insulating blanket, preventing proper cooling, resulting in overheating and ultimately premature component breakdown. Under high humidity conditions, accumulated dust can also result in an electrically conductive path.

⚠ **Warning** — *To avoid personal injury, always remove the power cord before cleaning the instrument.*

A vacuum cleaner may be used to remove accumulated dust on the outside of the instrument. Ensure that the nozzle is fitted with a soft brush head (or similar) to avoid damaging the instrument.

⚠ **Caution** — *Avoid exposing the instrument to liquids, sprays or solvents, as this could damage the unit. Cleaning agents may also damage the instrument. Avoid solutions that contain harmful chemicals such as Acetone, Benzene, Toluene, Xylene, or similar.*

If the exterior surfaces or controls of the instrument require further cleaning, use a dry, lint- free cloth or a soft-bristle brush. If dirt remains, use a cloth or swab dampened with a 75% isopropyl alcohol solution. A swab is useful for cleaning in narrow spaces around the controls and connectors. Do not use excessive amounts of the approved cleaning solution when cleaning the instrument. Do not use abrasive compounds on any part of the instrument.

⚠ **Caution** — *Do not allow moisture or dust to enter the instrument during exterior cleaning. Only use enough solution to mildly dampen a cloth or similar. After cleaning, use de-ionized water on a clean cloth to "rinse" the instrument.*

Preventive Maintenance

Preventive Maintenance mainly consists of periodic cleaning. Periodic cleaning reduces instrument breakdown and increases reliability. Clean the instrument whenever needed (using the guidelines outlined above), based on the operating environment. Dirty conditions may require more frequent cleaning than a conventional "clean room" environment.

Servicing

The SRG-4500 should require little or no in-service maintenance to the installed electronics. Provided the measures outlined in the section "**Preventive Maintenance**" are adhered to, the product should perform for several years without any major user intervention.

Maintenance of components within the product is not usually required, except under exceptional circumstances. If a fault occurs, please follow the instructions listed in the chapter "**Troubleshooting**" before attempting to service the product. The servicing of any of the internal components requires the unit to be extracted from the bay and the top cover removed. If your problem cannot be resolved, contact Ross Video for further advice.

If you ordered a Service Option, then removing the unit from the bay and returning it to Ross Video for updating will provide the user with the opportunity to inspect the unit for any problems relating to the operating conditions/environment.

Service Safety Overview

Only qualified personnel should perform service procedures. Read this section before performing any service procedures.

- **Do Not Service Alone.** Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.
- **Disconnect Power.** To avoid electric shock, switch off the power to the instrument, then disconnect the power cord from the mains power.
- **Use Care When Servicing With Power On.** Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.
- **Observe Static Precautions.** Servicing of this product should be performed only in a static-safe environment, i.e. at a suitably configured ESD Workstation. Always use a Static Grounding Wrist-Strap connected to the ESD Workstation mat while servicing the product.
- To avoid electric shock, do not touch exposed connections.

Important Information Regarding the use of Switch Cleaners

Switch Cleaner products usually contain a lubricating additive (along with the "alcohol- based" propellant), intended to remain after spraying into relevant components.

Some equipment produced by Ross Video contains components that should not be cleaned using these types of cleaners, due to the compact nature of the components, their operating characteristics, or their inaccessibility. This is because push-buttons, for example, rely on clean, dry, conductive contact surfaces to operate correctly. Applying Switch Cleaner lubricant only serves to attract dust, or worse still could "wash-in" grease and dust, which could severely reduce the conductivity of the component parts.

Therefore, Ross Video does not recommend the use of these Switch Cleaner products on their equipment, and will not be held liable for any fault caused by inadvertent or unqualified use or application of such products.

Warranty and Repair Policy

The SRG-4500 is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of ONE (1) year from the date of shipment from our factory. In the event that your SRG-4500 proves to be defective in any way during this warranty period, Ross Video Limited reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

Should you find that this SRG-4500 has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the ONE (1) year warranty period.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profits) incurred by the use of this product. Implied warranties are expressly limited to the duration of this warranty.

This SRG-4500 User Manual provides all pertinent information for the safe installation and operation of your Ross Video Product. Ross Video policy dictates that all repairs to the SRG-4500 are to be conducted only by an authorized Ross Video Limited factory representative. Therefore, any unauthorized attempt to repair this product, by anyone other than an authorized Ross Video Limited factory representative, will automatically void the warranty. Please contact Ross Video Technical Support for more information.

In Case of Problems

Should any problem arise with your SRG-4500, contact the Ross Video Technical Support Department using the information provided in the section "**Contacting Technical Support**".

A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your SRG-4500. If required, a temporary replacement frame will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. All products shipped to you from Ross Video Limited will be shipped collect.

The Ross Video Technical Support Department will continue to provide advice on any product manufactured by Ross Video Limited, beyond the warranty period without charge, for the life of the equipment.

Glossary

The following terms are used throughout this guide:

- "**Almanac**" refers to a set of parameters included in the GPS satellite navigation message that a receiver uses to predict the approximate location of a satellite. The almanac contains information about all of the satellites in the constellation.

- "**CW signals**" refers to continuous wave signals.

- "**Ephemeris**" is a description of the path of a celestial body indexed by time. The navigation message from each GPS satellite includes a predicted ephemeris for the orbit of that satellite valid for the current hour. The ephemeris is repeated every 30 seconds and is in the form of a set of 16 Keplerian-like parameters with corrections that account for the perturbations to the orbit caused by the earth's gravitational field and other forces.

- "**Epoch**" is an instant of time (or a date) from which values of data are referenced. Note: an Era is the period of time between successive epochs.

- "**GLONASS**" refers to the Global Navigation Satellite System.

- "**GPS**" refers to global positioning system.

- "**Operator**" and "**User**" refer to the person who uses SRG-4500.

- "**RF interference**" refers to radio frequency interference

- "**System**" and "**Video system**" refer to the mix of interconnected production and terminal equipment in your environment.

- "**UTC**" refers to Co-ordinated Universal Time. The time scale based on the atomic second but occasionally corrected, by the insertion of leap seconds, to keep it approximately synchronized with Earth's rotation. The leap second adjustments keep UTC within 0.9 seconds UTl1.