

# Quick Reference Manual



## SPG600 & SPG300 Sync Pulse Generators

**071-1341-03**

This document supports firmware version 1.00  
and above.

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For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit [www.tektronix.com](http://www.tektronix.com) to find contacts in your area.

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# General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

*Only qualified personnel should perform service procedures.*

## To Avoid Fire or Personal Injury

**Use Proper Power Cord.** Use only the power cord specified for this product and certified for the country of use.

**Ground the Product.** This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

**Observe All Terminal Ratings.** To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

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

**Do Not Operate With Suspected Failures.** If you suspect there is damage to this product, have it inspected by qualified service personnel.

**Avoid Exposed Circuitry.** Do not touch exposed connections and components when power is present.

**Do Not Operate in Wet/Damp Conditions.**

**Do Not Operate in an Explosive Atmosphere.**

**Keep Product Surfaces Clean and Dry.**

**Provide Proper Ventilation.** Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

**No Power Switch.** Power supply cord is considered the disconnecting device, disconnect the main power by means of the power cord.

**Terms in this Manual**

These terms may appear in this manual:



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**WARNING.** *Warning statements identify conditions or practices that could result in injury or loss of life.*

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**CAUTION.** *Caution statements identify conditions or practices that could result in damage to this product or other property.*

---

**Symbols and Terms on the Product**

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

The following symbol(s) may appear on the product:





# Compliance Information

This section lists the EMC (electromagnetic compliance), safety, and environmental standards with which the instrument complies.

## EMC Compliance

### EC Declaration of Conformity - EMC

Meets intent of Directive 2004/108/EC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

**EN 55103:1996.** Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. <sup>1 2</sup>

- Environment E2 — commercial and light industrial
- Part 1 Emission
  - EN 55022:1987. Class B radiated and conducted emissions
  - EN 55103-1:1996 Annex A. Radiated magnetic field emissions
- Part 2 Immunity
  - IEC 61000-4-2:2001. Electrostatic discharge immunity
  - IEC 61000-4-3:2006. RF electromagnetic field immunity
  - IEC 61000-4-4:2004. Electrical fast transient / burst immunity
  - IEC 61000-4-5:2005. Power line surge immunity
  - IEC 61000-4-6:2003. Conducted RF Immunity
  - IEC 61000-4-11:2004. Voltage dips and interruptions immunity
  - EN 55103-2:1996 Annex A. Radiated magnetic field immunity

**EN 61000-3-2:2006.** AC power line harmonic emissions

**EN 61000-3-3:1995.** Voltage changes, fluctuations, and flicker

<sup>1</sup> To ensure compliance with the EMC standards listed here, high quality shielded interface cables should be used.

<sup>2</sup> Inrush Current: Up to 15 A peak.

**European Contact.**

Tektronix UK, Ltd.  
Western Peninsula  
Western Road  
Bracknell, RG12 1RF  
United Kingdom

**Australia / New Zealand  
Declaration of Conformity  
- EMC**

Complies with the EMC provision of the Radiocommunications Act per the following standard, in accordance with ACMA:

- EN 55022:1987. Radiated and conducted emissions, Class B, in accordance with EN 55103-1:1996.

**Australia/New Zealand Contact.**

Baker & McKenzie  
Level 27, AMP Centre  
50 Bridge Street  
Sydney NSW 2000, Australia

## Safety Compliance

**EC Declaration of  
Conformity - Low Voltage**

Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities:

Low Voltage Directive 2006/95/EC.

- EN 61010-1:2001. Safety requirements for electrical equipment for measurement control and laboratory use.

**U.S. Nationally  
Recognized Testing  
Laboratory Listing**

- UL 61010B-1:2003. Equipment for measurement use; Part 1: General requirements.

**Canadian Certification**

- CAN/CSA C22.2 No. 1010. 1-92. Safety Requirement for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements (Including Amendment 1).

**Additional Compliance**

- IEC 61010-1:2001. Safety requirements for electrical equipment for measurement, control, and laboratory use.

<b>Equipment Type</b>	Test and measuring equipment.
<b>Safety Class</b>	Class 1 - grounded product
<b>Pollution Degree Descriptions</b>	<p>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.</p> <ul style="list-style-type: none"> <li>■ Pollution Degree 1. No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.</li> <li>■ Pollution Degree 2. Normally only dry, nonconductive 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.</li> <li>■ Pollution Degree 3. Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.</li> <li>■ Pollution Degree 4. Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.</li> </ul>
<b>Pollution Degree</b>	Pollution Degree 2 (as defined in IEC 61010-1). Note: Rated for indoor use only.
<b>Installation (Overvoltage) Category Descriptions</b>	<p>Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:</p> <ul style="list-style-type: none"> <li>■ Measurement Category IV. For measurements performed at the source of low-voltage installation.</li> <li>■ Measurement Category III. For measurements performed in the building installation.</li> <li>■ Measurement Category II. For measurements performed on circuits directly connected to the low-voltage installation.</li> <li>■ Measurement Category I. For measurements performed on circuits not directly connected to MAINS.</li> </ul>
<b>Overvoltage Category</b>	Overvoltage Category II (as defined in IEC 61010-1)

## Environmental Considerations

This section provides information about the environmental impact of the product.

### Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

**Equipment Recycling.** Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



This symbol indicates that this product complies with the applicable European Union requirements according to Directives 2002/96/EC and 2006/66/EC on waste electrical and electronic equipment (WEEE) and batteries. For information about recycling options, check the Support/Service section of the Tektronix Web site ([www.tektronix.com](http://www.tektronix.com)).

**Perchlorate Materials.** This product contains one or more type CR lithium batteries. According to the state of California, CR lithium batteries are classified as perchlorate materials and require special handling. See [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate) for additional information.

### Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.

# Preface

This quick reference manual for the SPG600 and SPG300 Sync Pulse Generators provides the following information:

- Identifies front-panel buttons and indicators
- Identifies rear-panel connectors
- Lists and describes menus
- Rackmounting the instrument (SPG600 only)

For more detailed information on how to use the sync pulse generator, refer to the *SPG600 & SPG300 Sync Pulse Generators User Manual* included on the product CD-ROM.

## Related Manuals

The following related documents are also available:

- The *SPG600 & SPG300 Sync Pulse Generators User Manual* provides basic operating information about the SPG600 and SPG300. This manual is provided as an Adobe PDF document on the product CD-ROM. You can order the printed User Manual as an optional accessory (Tektronix part number 071-1340-XX).
- The *SPG600 & SPG300 Sync Pulse Generators Service Manual* (Tektronix part number 071-1342-XX) is an optional accessory that provides module-level service information, as well as a complete performance verification procedure.

## Contents of the Product CD-ROM

The *SPG600 & SPG300 Application Software* CD-ROM contains the following folders:

**Manual Folder.** This folder contains the following manuals in PDF file format:

- *SPG600 & SPG300 Sync Pulse Generators Quick Reference Manual*
- *SPG600 & SPG300 Sync Pulse Generators User Manual*
- *SPG600 & SPG300 Sync Pulse Generators Service Manual*

**Samples Folder.** This folder contains sample logo graphics that can be overlaid on an output test signal. You can download the logo graphics to the instrument using the remote interface. For information about using the remote interface, refer to the *SPG600 & SPG300 Sync Pulse Generators User Manual*.

**Signal Library Folder.** This folder contains two downloadable files (.dnl) of test signals for the sync pulse generator. Use these files if any test signal file was mistakenly damaged. You can download the files to the instrument using the remote interface. For information about using the remote interface, refer to the *SPG600 & SPG300 Sync Pulse Generators User Manual*.

**Tools Folder.** This folder contains the Logo Generator application that provides the capability to convert a Windows bitmap file to a Logo file. For information on how to install and use Logo Generator, refer to the *SPG600 & SPG300 Sync Pulse Generators User Manual*.

**Upgrade Folder.** This folder contains the latest version of the SPG600 & SPG300 firmware. For information on how to upgrade the firmware, refer to the Readme file in the folder.

# Front-Panel Buttons and Indicators

This section describes the sync pulse generator front-panel buttons and indicators.

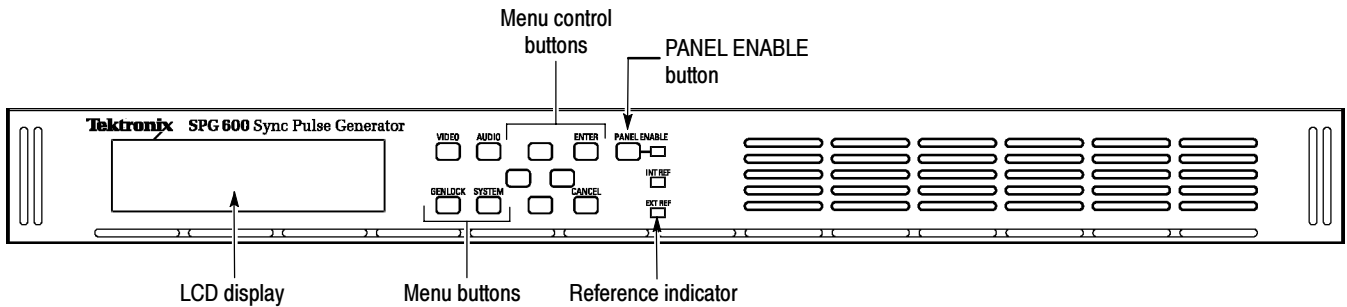


Figure 1: SPG600 front panel

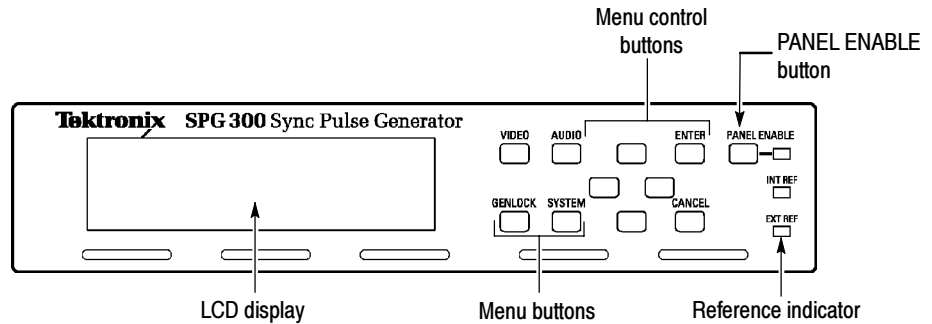


Figure 2: SPG300 front panel

**LCD Display** Use the two-line, 20-character per line LCD display to show instrument settings. You can adjust the contrast of the LCD display using the System menu.

**VIDEO Button** Use this button to access the Video menu. The Video menu lets you select output signal and set video parameters.

**AUDIO Button** Use this button to access the Audio menu. The Audio menu lets you set audio parameters such as amplitude and frequency.

**GENLOCK Button** Use this button to access the Genlock menu. The Genlock menu lets you set genlock parameters such as genlock source and genlock timing.

**SYSTEM Button** Use this button to access the System menu. The System menu lets you set system related parameters, such as output configuration and network parameters.

**Menu Control Buttons** Use these buttons to control the menu display.

**Arrow Buttons.** Use the arrow buttons to scroll through the available menu items.

**ENTER Button.** Use the ENTER button to enable the selected menu item.

**CANCEL Button.** Use the CANCEL button to disable the selected menu item and return to the previous menu item.

**PANEL ENABLE button** Use this button to enable or disable the front-panel buttons. When pressing this button for about one second while the front-panel buttons are enabled, all of the front-panel buttons are disabled. If you have selected a timeout period in the FRONT PANEL DISABLE item in the System menu, and that period passes without a button push, all of the front-panel buttons are also disabled.

Press and hold this button for about three seconds to enable the front-panel buttons. The timeout counter is restarted (if the timeout period is already set) and turns the indicator next to the button lights to show that the front-panel is enabled.

You can set the timeout period using the System menu.

**Reference Indicator** The reference indicators indicate whether the sync pulse generator is locked to its internal oscillator or an external reference signal.

**INT.REF.** This indicator lights when the sync pulse generator is using its internal reference oscillator.

**EXT.REF.** This indicator lights when the sync pulse generator is locked to an external reference signal. A blinking indicator means that the sync pulse generator is using the external reference signal but is unable to lock to the signal.



# Rear-Panel Connectors

This section describes the sync pulse generator rear-panel connectors.

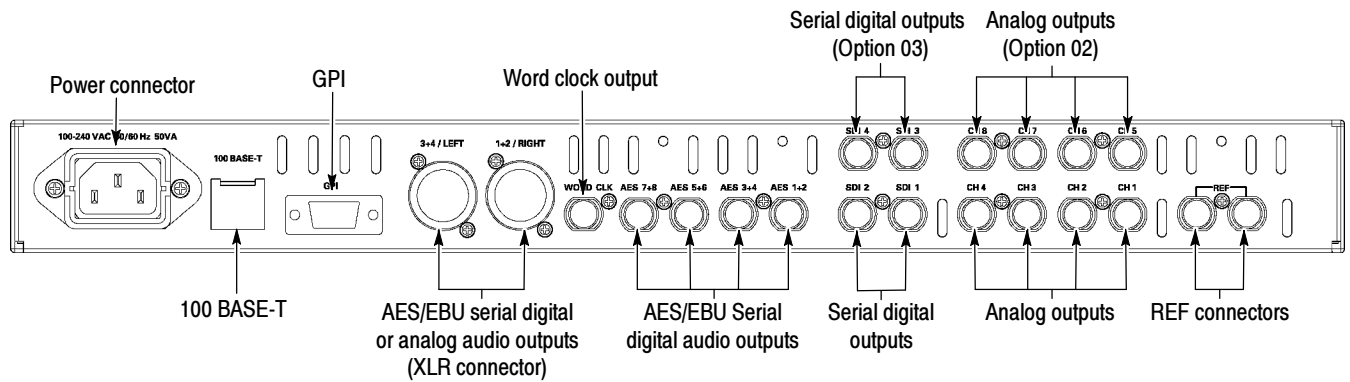


Figure 3: SPG600 rear panel (Option 0203)

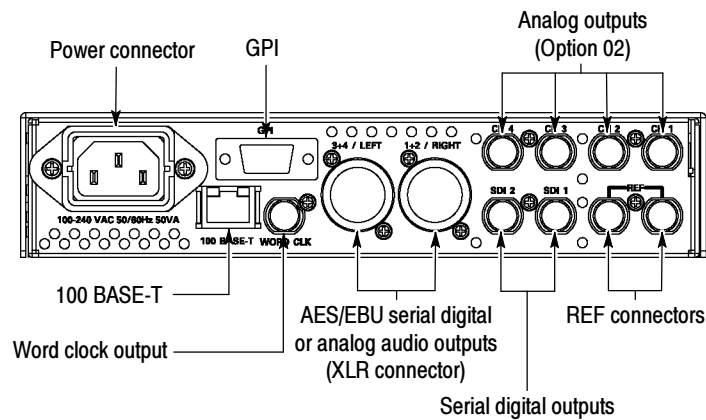


Figure 4: SPG300 rear panel

## Power Connector

The sync pulse generator is designed to operate from a single-phase power source with the neutral conductor at or near earth ground. Only 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.



**WARNING.** To avoid dangerous electric shock, do not connect power to the instrument when the top cover is off. Dangerous potentials are present on the Power circuit board.

The sync pulse generator operates from an AC line frequency of 48 to 63 Hz, over the range of 85 to 250VAC, without the need for configuration. Refer to the *SPG600 & SPG300 Sync Pulse Generators User Manual* for additional information on power and environment requirements.

<b>100 BASE-T</b>	Connects this port to connect to your local Ethernet network. You can control the sync pulse generator remotely through the port. You can also upload and download signal files, logo files and preset files through the port.
<b>GPI (General Purpose Interface)</b>	A 9-pin subminiature D-type connector used as a ground closure interface for recalling one of the seven preset, outputting an alarm signal, and displaying an alarm status on the LCD.
<b>REF</b>	Loophrough connectors for an external reference signal. These inputs accept the NTSC/PAL black burst signals and CW signals. Be sure to install a 75 $\Omega$ termination on the unused connector.
<b>CH1, CH2, CH3, and CH4</b>	Analog black or analog test signal outputs. By default, the CH1, CH2, and CH3 connectors output black burst signals, and the CH4 connector outputs an analog test signal. Use the System menu to change the output configuration.
<b>CH5, CH6, CH7, and CH8</b>	Analog black or analog test signal outputs (SPG600 Option 02 only). By default, the CH5, CH6, and CH7 connectors output black burst signals, and the CH8 connector outputs an analog test signal. Use the System menu to change the output configuration.
<b>SDI 1 and SDI 2</b>	Serial digital black or serial digital test signal outputs. By default, the SDI 1 connector outputs a serial digital black signal, and the SDI 2 connector outputs a serial digital test signal. Use the System menu to change the output configuration.
<b>SDI 3 and SDI 4</b>	Serial digital black or serial digital test signal outputs (SPG600 Option 03 only). By default, the SDI 3 connector outputs a serial digital black signal, and the SDI 4 connector outputs a serial digital test signal. Use the System menu to change the output configuration.
<b>AES 1+2, AES 3+4, AES 5+6, and AES 7+8</b>	AES/EBU serial digital audio outputs for channels 1 & 2, 3 & 4, 5 & 6, and 7 & 8 respectively (SPG600 only).
<b>1+2/RIGHT and 3+4/LEFT (XLR connector)</b>	AES/EBU serial digital audio or analog audio outputs for channels 1 & 2 and 3&4 respectively. By default, these connectors output an AES/EBS serial digital audio. Use the System menu to change the output configuration.
<b>WORD CLK</b>	48 kHz word clock signal output.

# Menus

This section describes all of the available sync pulse generator menus and submenus. The following menus are available from the front-panel menu buttons:

- Video menu
- Audio menu
- Genlock menu
- System menu

## Video Menu

Pressing the VIDEO button displays the Video menu. This menu lets you set output signals, timing of the output signals, overlay, and SDI parameters. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 5 shows the Video menu diagram. Use the left (◀) or right (▶) arrow button to select functions or submenus in each Video menu.

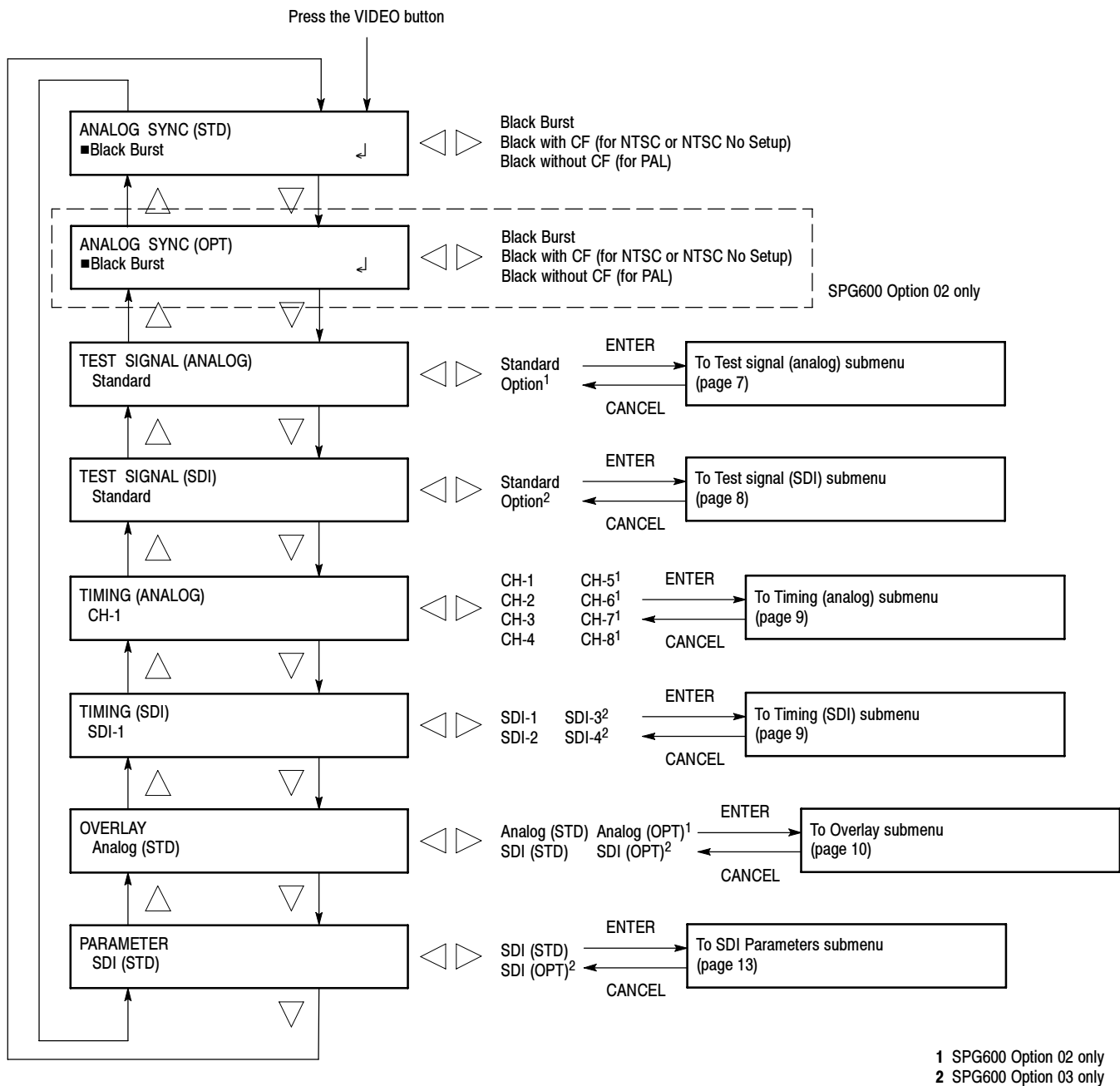
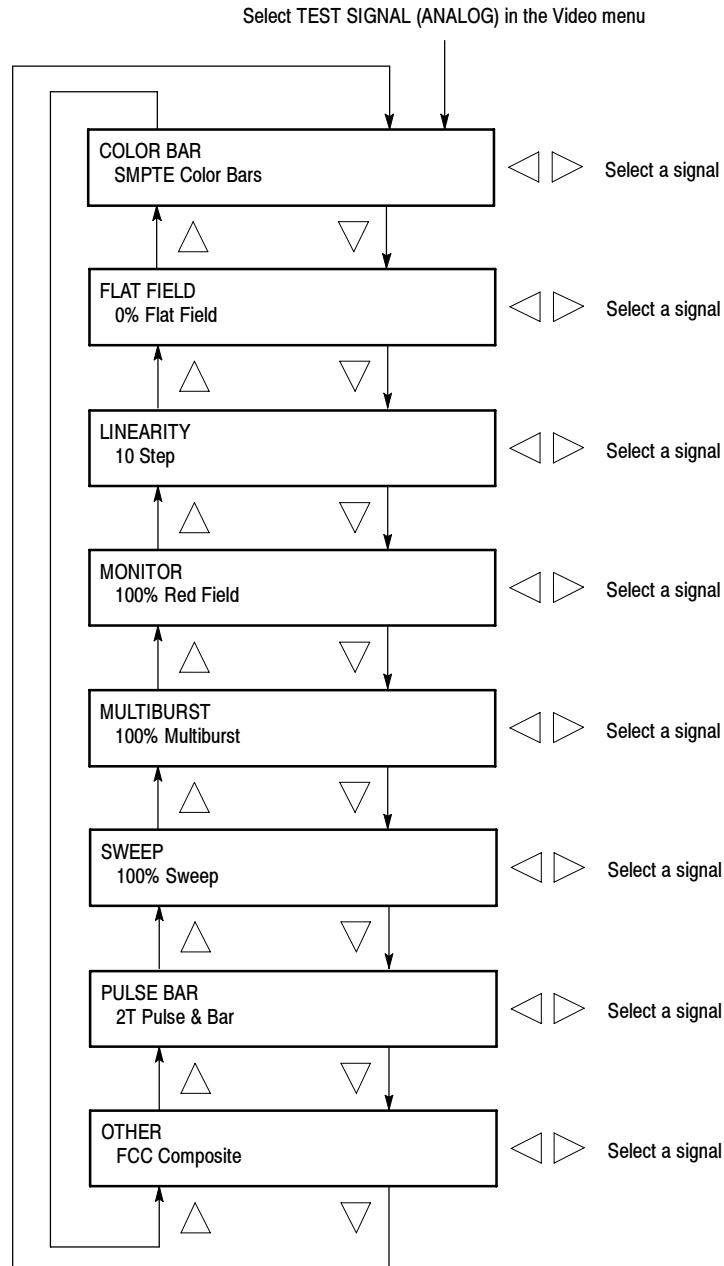


Figure 5: Video menu diagram

**Test Signal (Analog)  
Submenu**

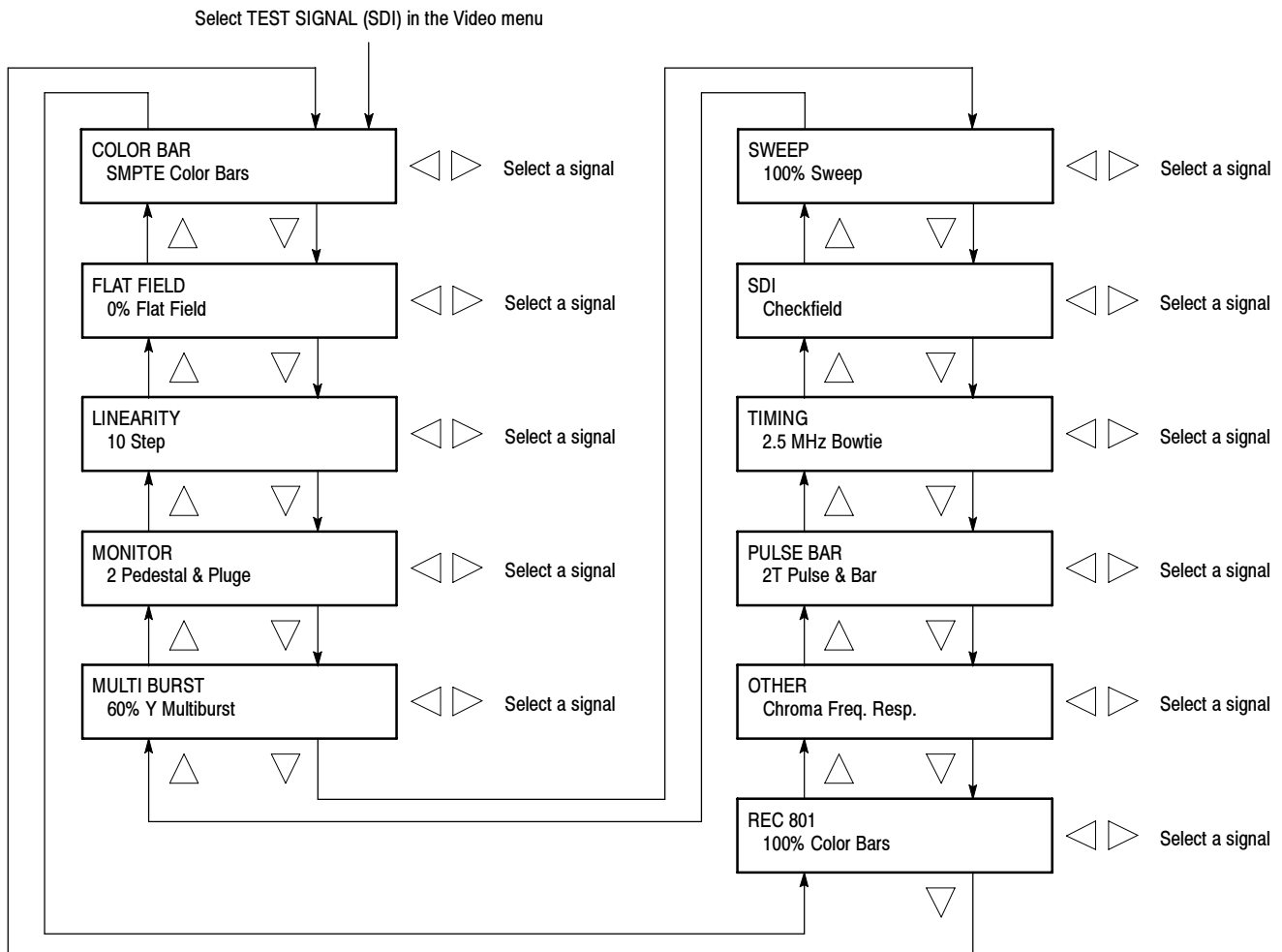
This menu allows you to select a test signal for analog output(s). Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 6 shows the Test signal (analog) submenu diagram. Use the left (◀) or right (▶) arrow button to select a signal.



**Figure 6: Test signal (analog) submenu diagram**

**Test Signal (SDI) Submenu**

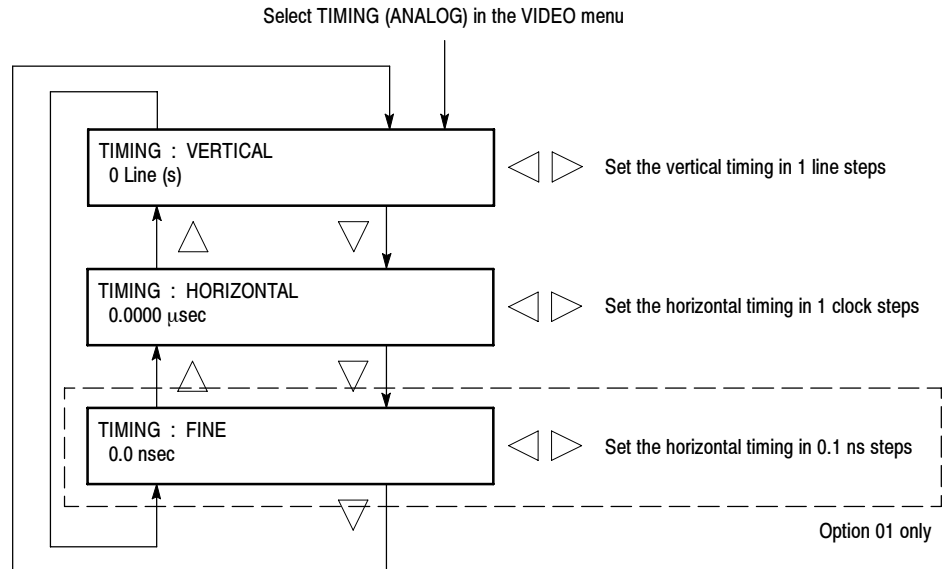
This menu allows you to select a serial digital test signal for the SDI output(s). Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 7 shows the Test signal (SDI) submenu diagram. Use the left (◀) or right (▶) arrow button to select a signal.



**Figure 7: Test signal (SDI) submenu diagram**

**Timing (Analog) Submenu**

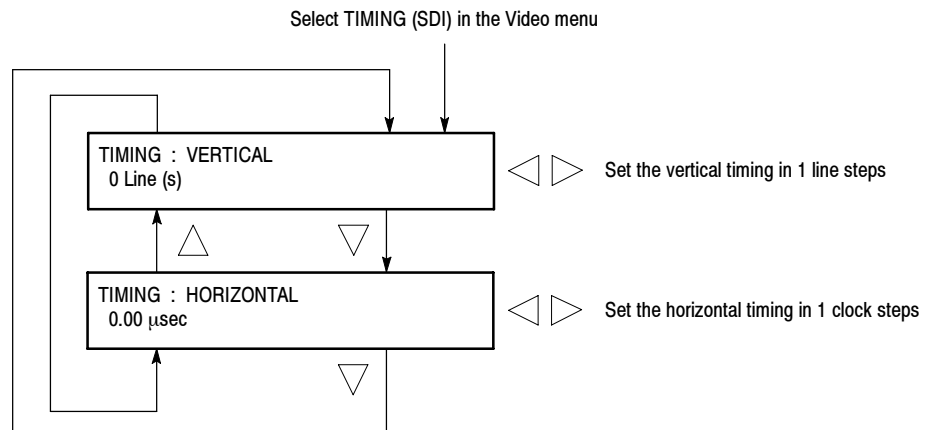
This menu allows you to adjust the selected analog output timing offset relative to the genlock signal or the internal reference signal. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 8 shows the Timing (analog) submenu diagram.



**Figure 8: Timing (analog) submenu diagram**

**Timing (SDI) Submenu**

This menu allows you to adjust the timing offset of the selected serial digital output relative to the genlock signal or the internal reference signal. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 9 shows the Timing (SDI) submenu diagram.



**Figure 9: Timing (SDI) submenu diagram**

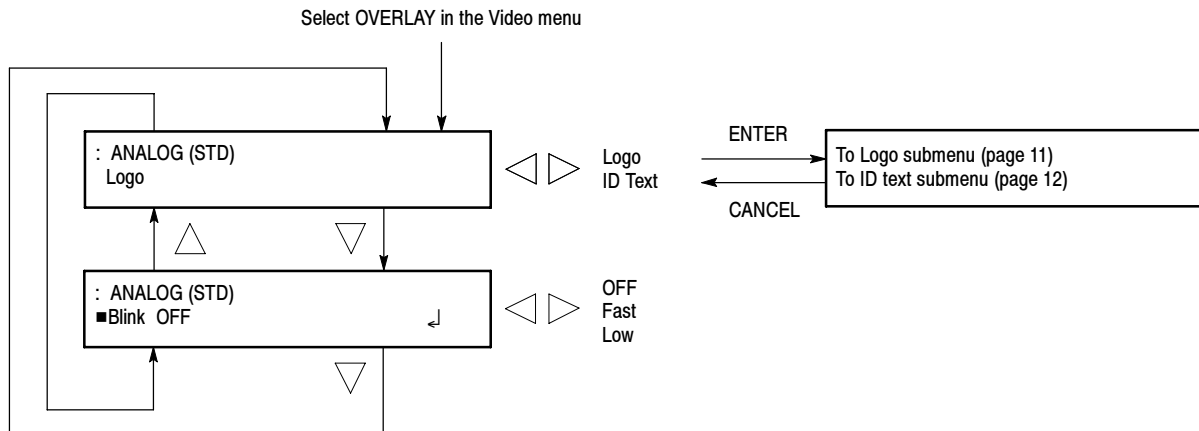
**Overlay Submenu**

This menu allows you to select an item (logo or ID text) that is overlaid on the output test signal. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 10 shows the Overlay submenu diagram.

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**NOTE.** *The Overlay submenu contents are common for both analog and serial digital signals except for the menu title on the first line (ANALOG or SDI).*

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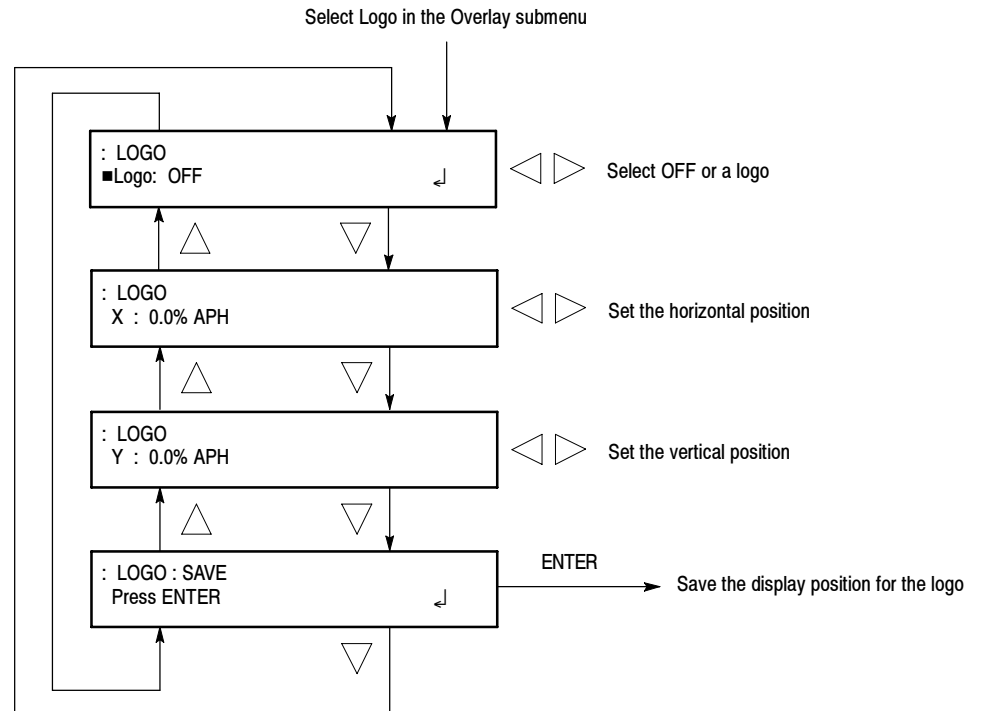


**Figure 10: Overlay submenu diagram**



**Logo Submenu**

This menu allows you to overlay and position a logo graphic on an output test signal. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 11 shows the Logo submenu diagram.

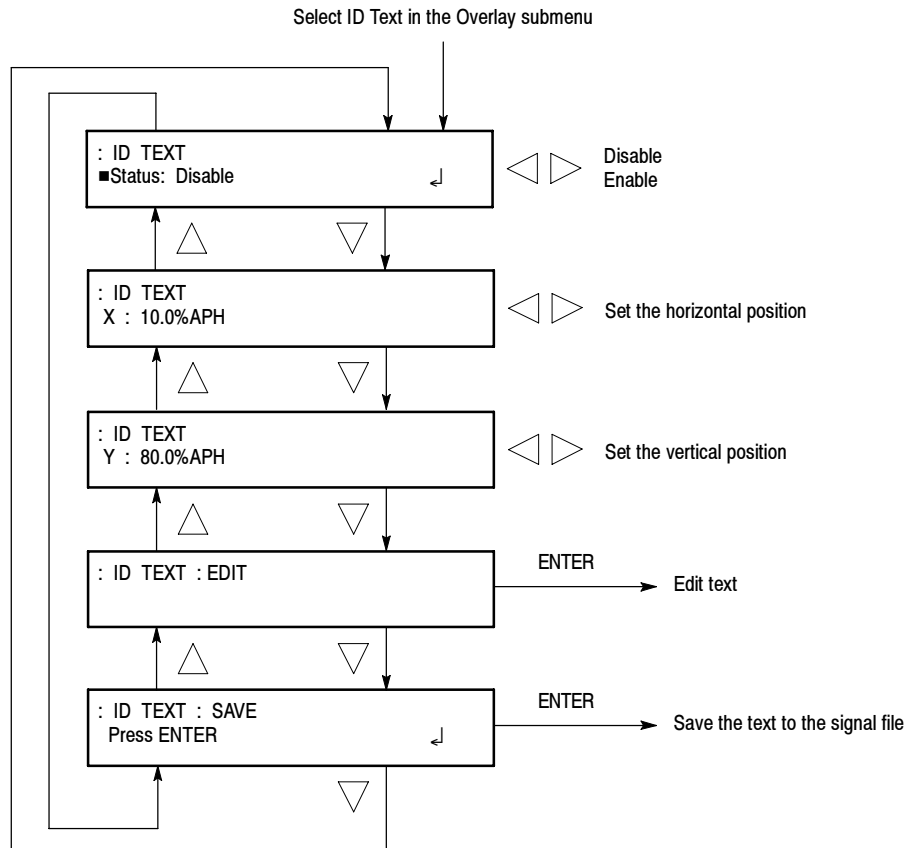


**Figure 11: Logo submenu diagram**

You can create a logo file using the Logo Generator application. Refer to the *SPG600 & SPG300 Sync Pulse Generators User Manual* included on the product CD-ROM for detailed information for using Logo Generator.

**ID Text Submenu**

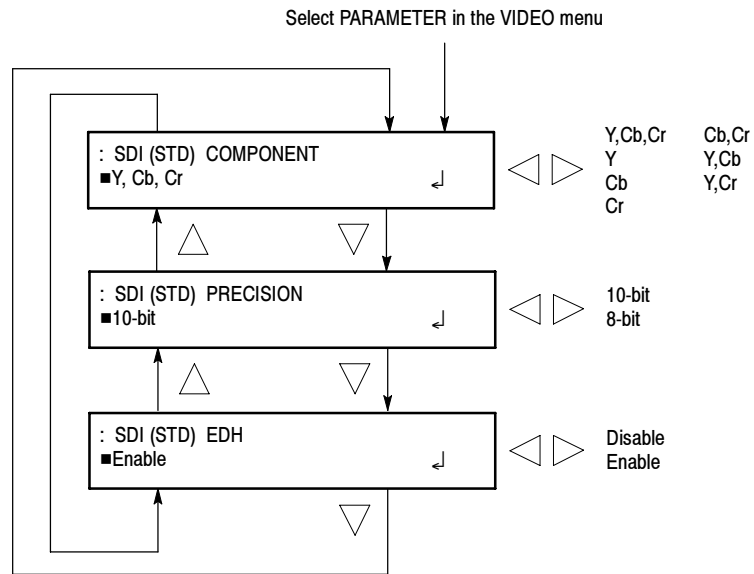
This menu allows you to edit and position a text string that is overlaid on the output test signal. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 12 shows the ID text submenu diagram.



**Figure 12: ID text submenu diagram**

**SDI Parameters Submenu**

This menu allows you to select which component(s) of the serial digital signal is (are) available, the serial digital signal resolution, and the insertion of the EDH (Error Detection and Handling) bits. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 13 shows the SDI parameters submenu diagram.



**Figure 13: SDI parameters submenu**

## Audio Menu

Pressing the AUDIO button displays the Audio menu. This menu lets you set the parameters of the AES/EBU audio and embedded audio in the serial digital signal. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 14 shows the Audio menu.

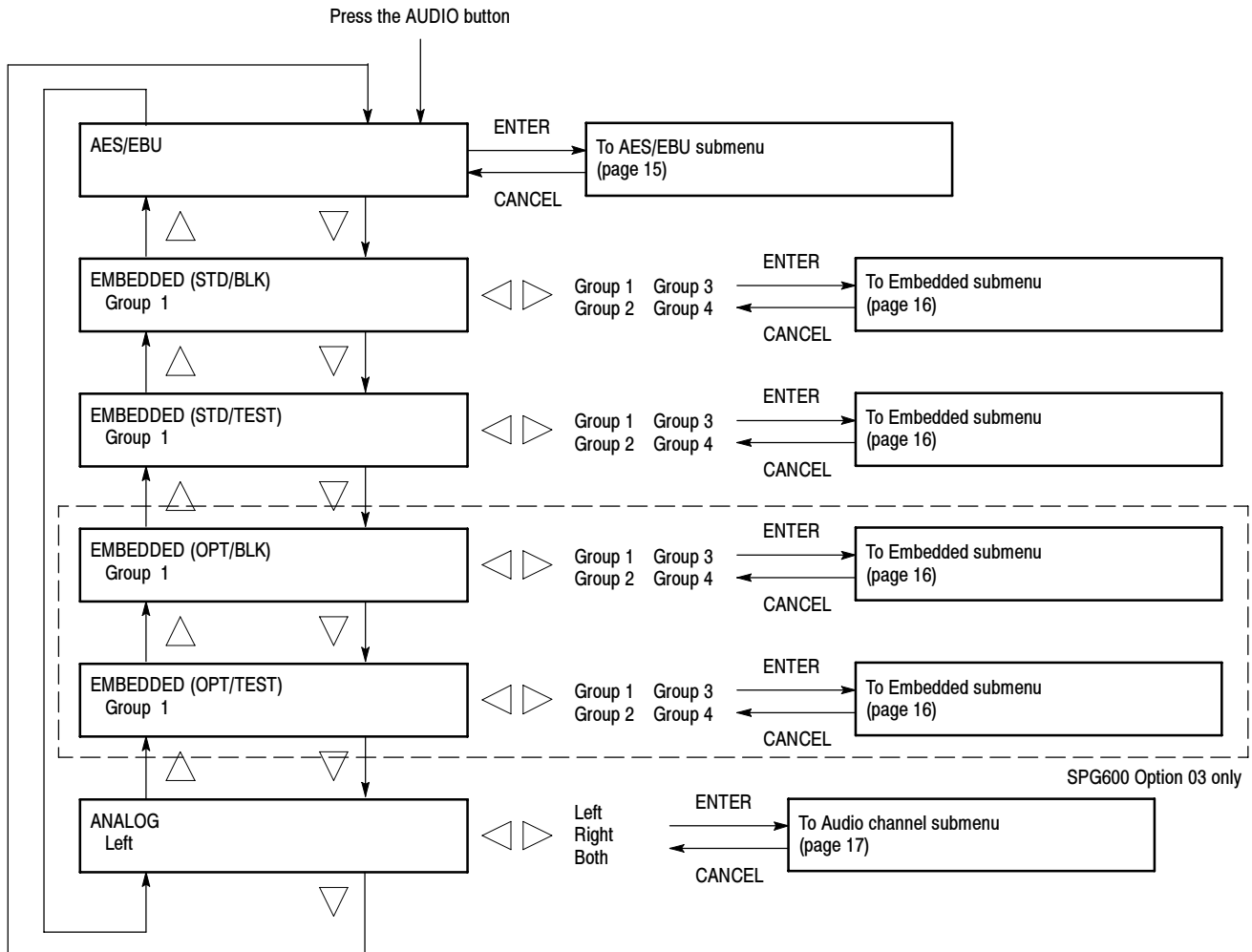
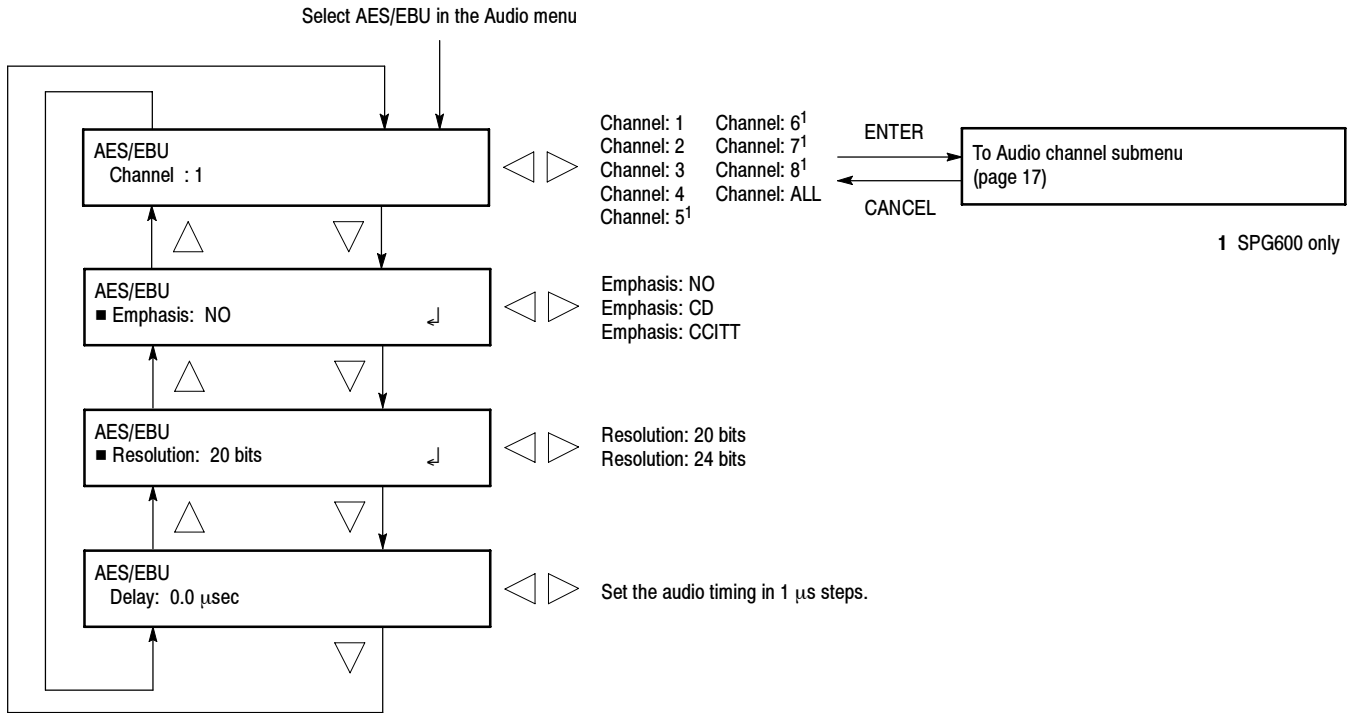


Figure 14: Audio menu diagram

**NOTE.** The ANALOG menu item is only available when you select Analog Audio in the CONFIGURATION: XLR OUTPUT menu.

**AES/EBU Submenu**

This menu allows you to select an audio channel, the state of the audio emphasis bits, the resolution of the serial digital audio signal data, and the audio timing. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 15 shows the AES/EBU submenu diagram.

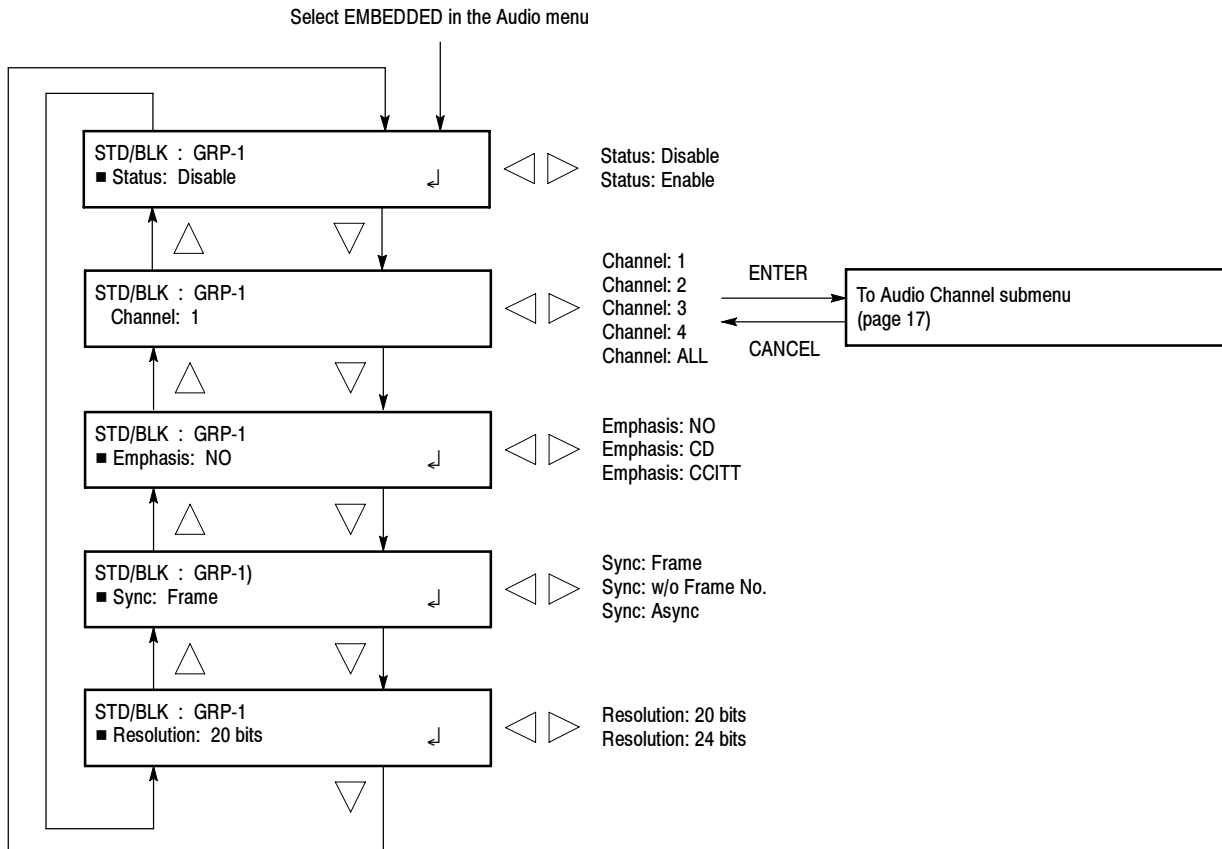


**Figure 15: AES/EBU submenu diagram**

**Embedded Submenu**

This menu allows you to enable or disable the generation of embedded audio, select an audio channel, set the state of the audio emphasis bits, and set the resolution of the serial digital audio signal data. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 16 shows the Embedded submenu diagram.

**NOTE.** The Embedded submenu contents are common for the serial digital black signals and the serial digital test signals except for the menu title on the first line.

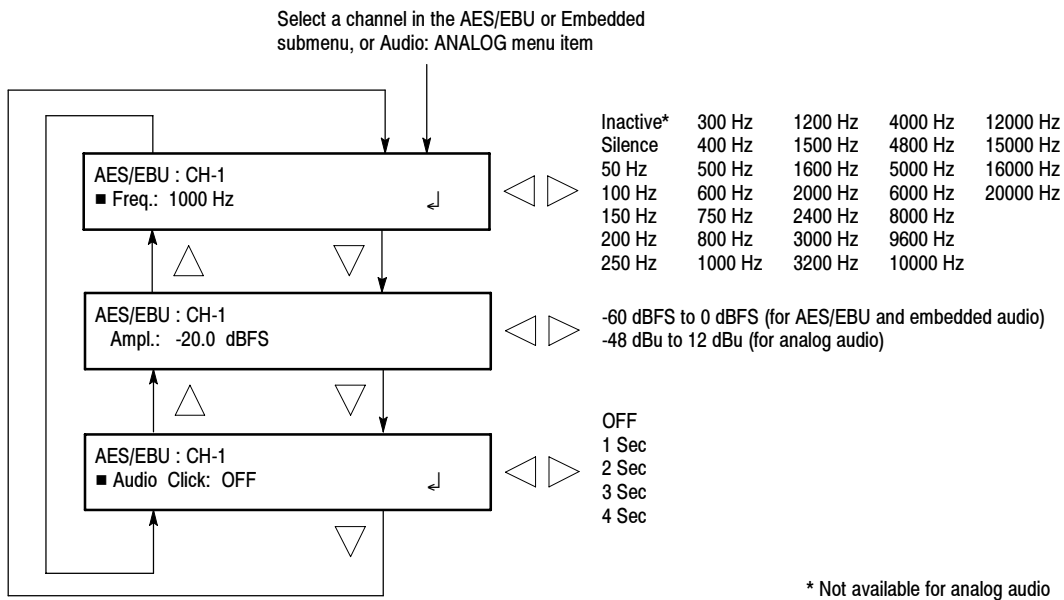


**Figure 16: Embedded submenu diagram**

**Audio Channel Submenu**

This menu allows you to set the frequency, amplitude, and audio click of the selected audio channel. Use the up (▲) or down (▼) arrow button to scroll through the menu items. Figure 17 shows the Audio channel submenu diagram.

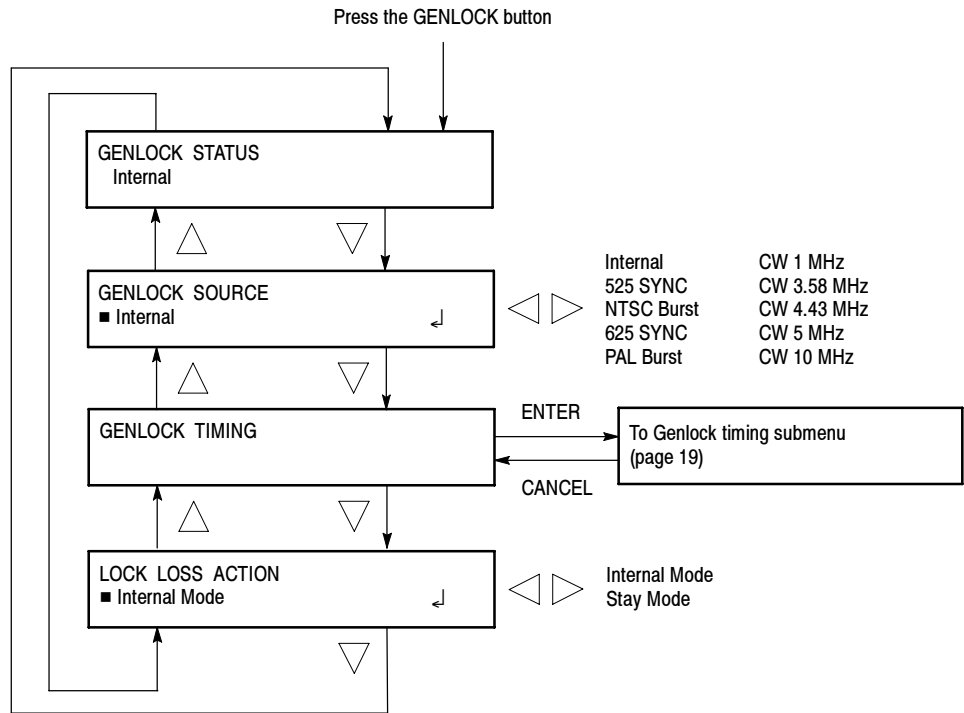
**NOTE.** The Audio channel submenu contents are common for AES/EBU audio, Embedded audio, and Analog audio except for the menu title on the first line and some parameter settings.



**Figure 17: Audio channel submenu diagram**

## Genlock Menu

Pressing the GENLOCK button displays the Genlock menu. This menu lets you select the genlock source, set the timing offset, and set the instrument actions when lock is lost. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 18 shows the Genlock menu diagram.

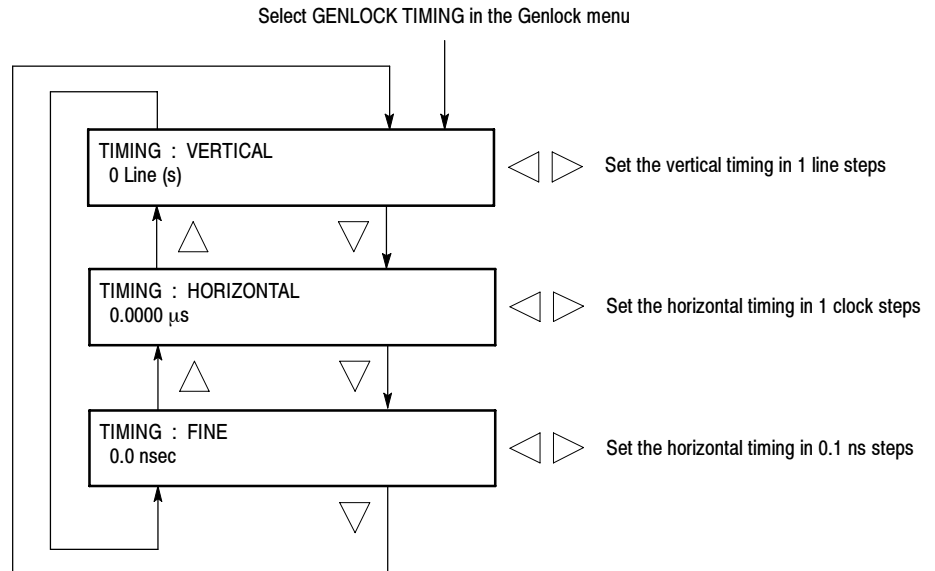


**Figure 18: Genlock menu diagram**



**Genlock Timing Submenu**

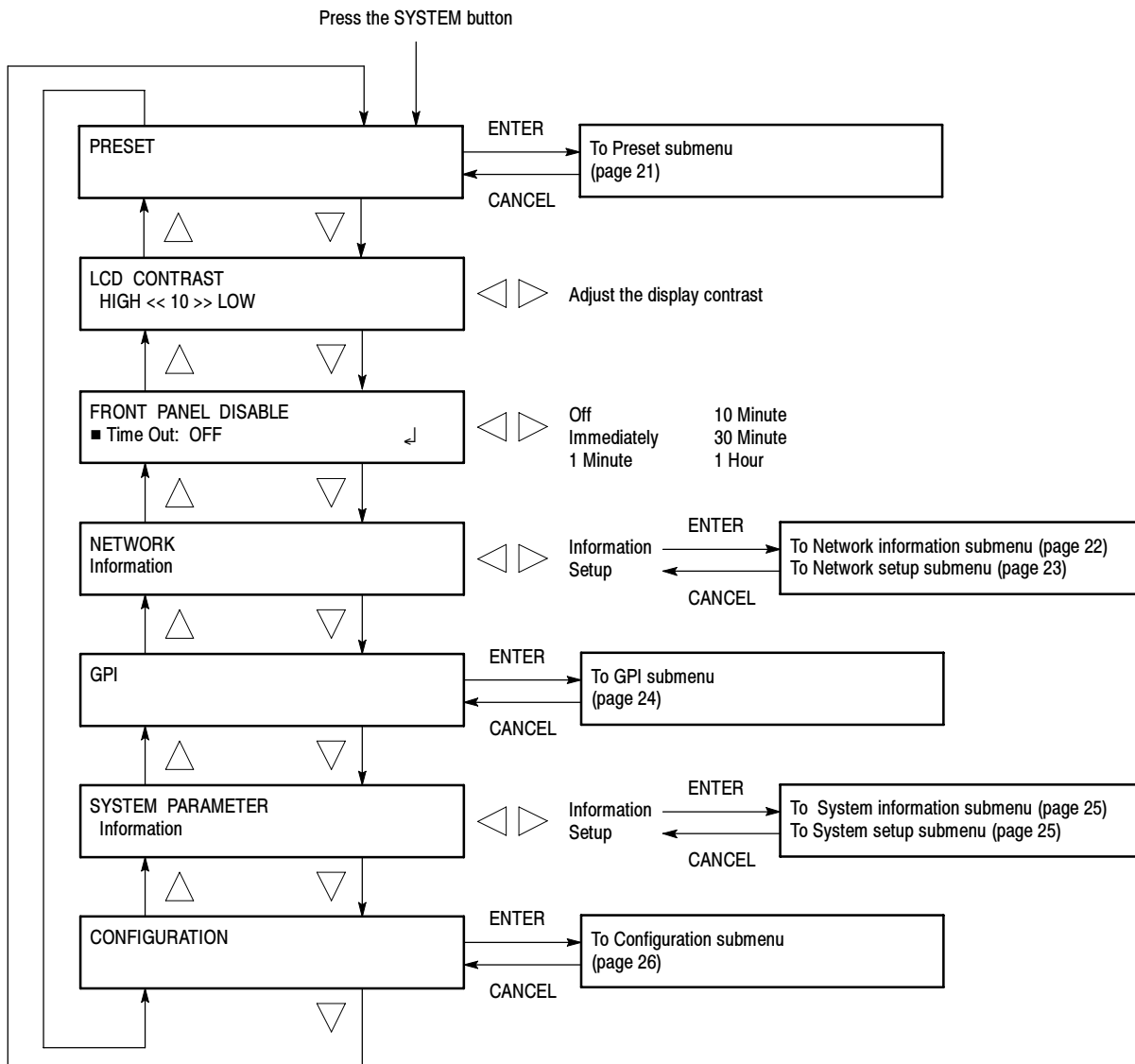
This menu allows you to adjust the timing offset of the input signal relative to the internal reference signal (frame reset signal). Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 19 shows the Genlock timing submenu diagram.



**Figure 19: Genlock timing submenu diagram**

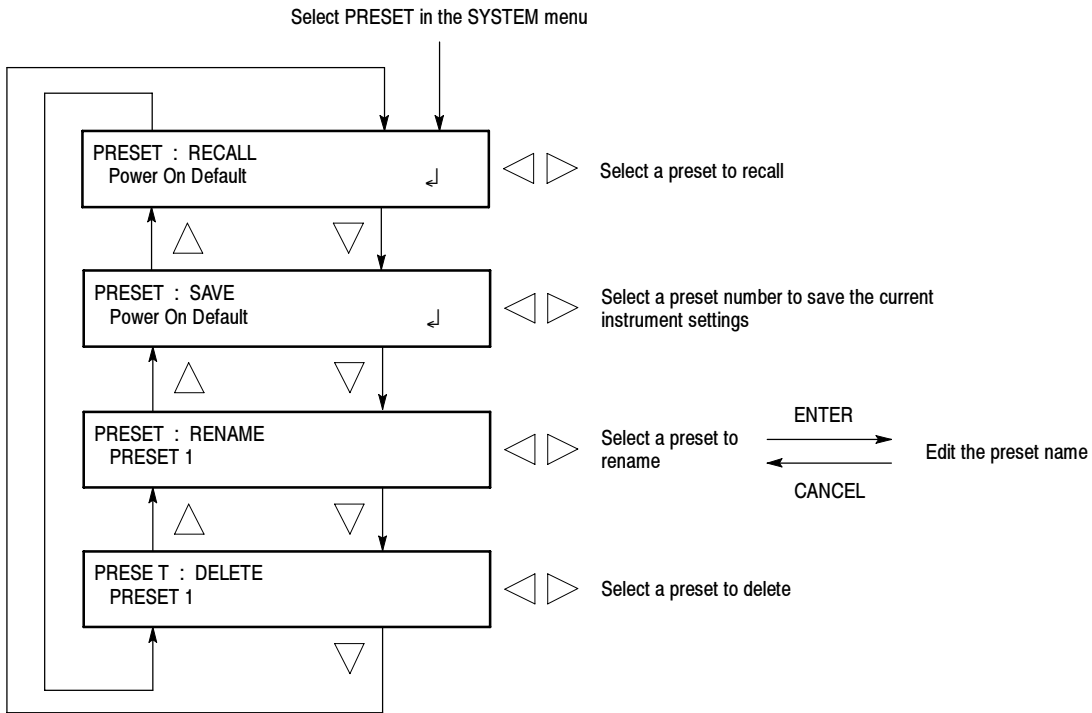
## System Menu

Pressing the SYSTEM button displays the System menu. This menu lets you set the system-related settings such as network parameters and output configuration. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 20 shows the System menu diagram.



**Figure 20: System menu diagram**

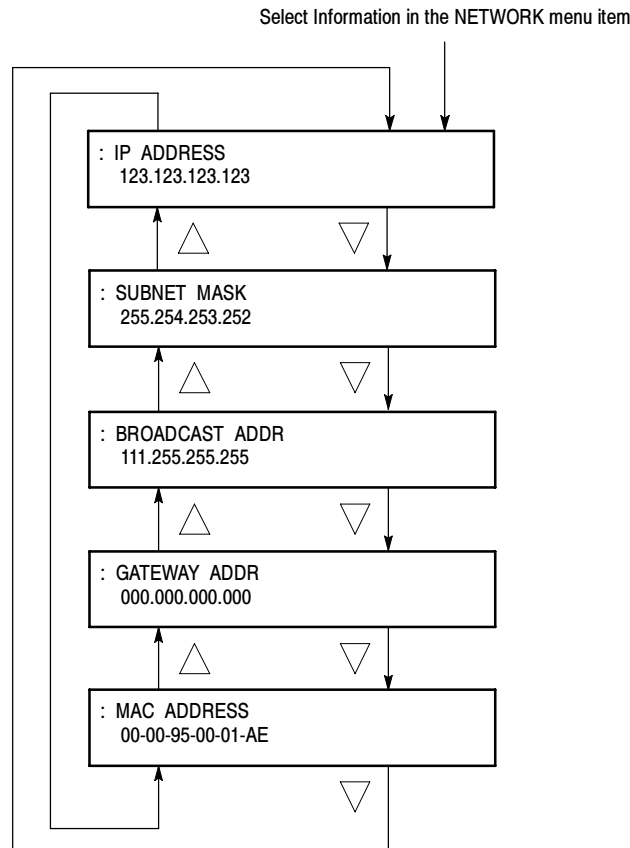
**Preset Submenu** This menu allows you to store and recall instrument configuration settings. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 21 shows the Preset submenu diagram.



**Figure 21: Preset submenu diagram**

**Network Information Submenu**

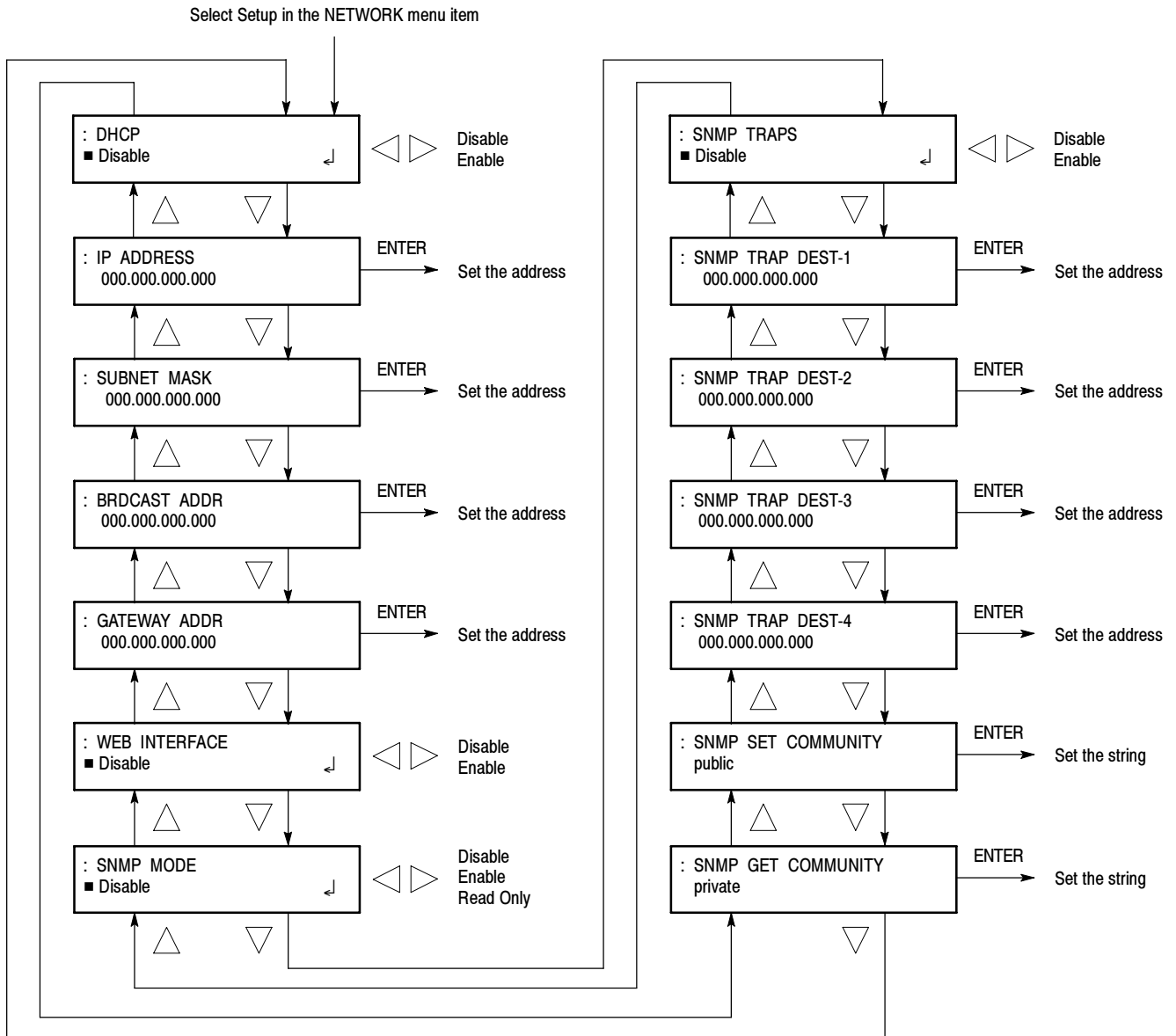
This menu allows you to display all of the current network parameters. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 22 shows the Network information submenu diagram.



**Figure 22: Network information submenu diagram**

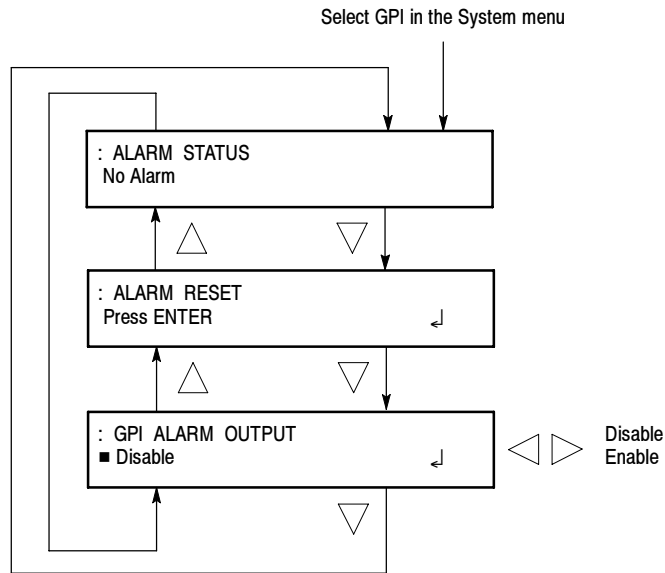
**Network Setup Submenu**

This menu allows you to set the sync pulse generator network parameters when connecting to a 100BASE-T Ethernet. Use the up (▲) or down (▼) arrow button to scroll through the menu items. Figure 23 shows the Network setup submenu diagram.



**Figure 23: Network setup submenu diagram**

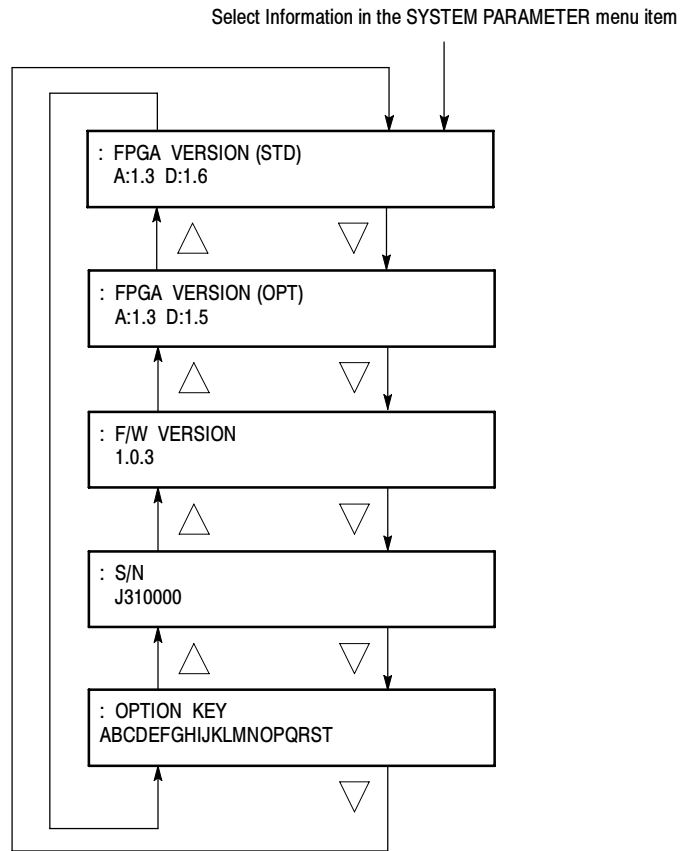
**GPI Submenu** This menu allows you to enable or disable the alarm signal output, reset alarm signal output, and display the alarm status. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 24 shows the GPI submenu diagram.



**Figure 24: GPI submenu diagram**

**System Information Submenu**

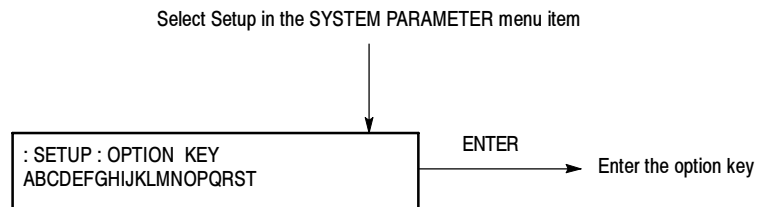
This menu allows you to display the system information. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 25 shows the System information submenu diagram.



**Figure 25: System information submenu diagram**

**System Setup Submenu**

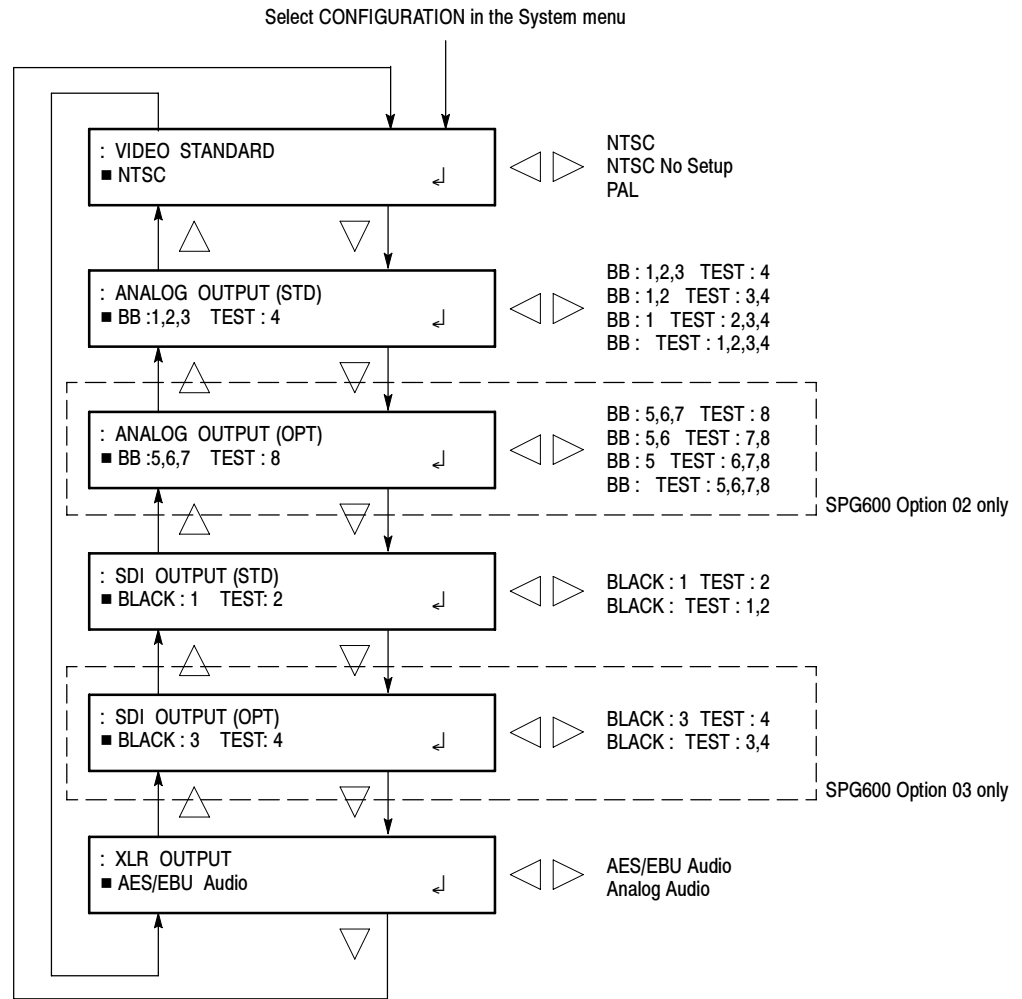
This menu allows you to enter the option key that enables the fine timing adjustment feature (Option 01). Figure 26 shows the System setup submenu diagram.



**Figure 26: System setup submenu diagram**

**Configuration Submenu**

This menu allows you to select the video standard for the output signals and configure the output connectors. Use the up (▲) or down (▼) arrow button to scroll through the menu. Figure 27 shows the Configuration submenu diagram.



**Figure 27: Configuration submenu diagram**



## Rackmounting the Instrument (SPG600 Only)

This section provides instructions for installing the SPG600 into a standard 19-inch equipment rack.

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**NOTE.** For information on how to install the SPG300 into a standard 19-inch equipment rack, refer to the Instructions included in each of the rackmounting kits.

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### Minimum Tool and Equipment List

The following tools are required to install the rackmounting hardware into the equipment rack. All tools are standard tools that are readily available.

**Table 1: Tools required for rackmount installation**

Item no.	Name	Description
1	Screwdriver handle (magnetic)	Accepts 1/4 inch hex-head driver tips
2	No.2 Phillips tip	Phillips-driver tip for M3 size screw heads
3	No.2 Pozidriv tip	Pozidriv-driver tip for number 2 size screw heads



**WARNING.** To prevent the rackmounted instrument from tipping forward onto the operator, install the instrument so that the operator will be able to access all of its rear-panel connectors without pushing down on the instrument

Verify that the rack does not become unstable with the instrument fully extended. Do not leave the instrument extended when finished accessing the rear panel.

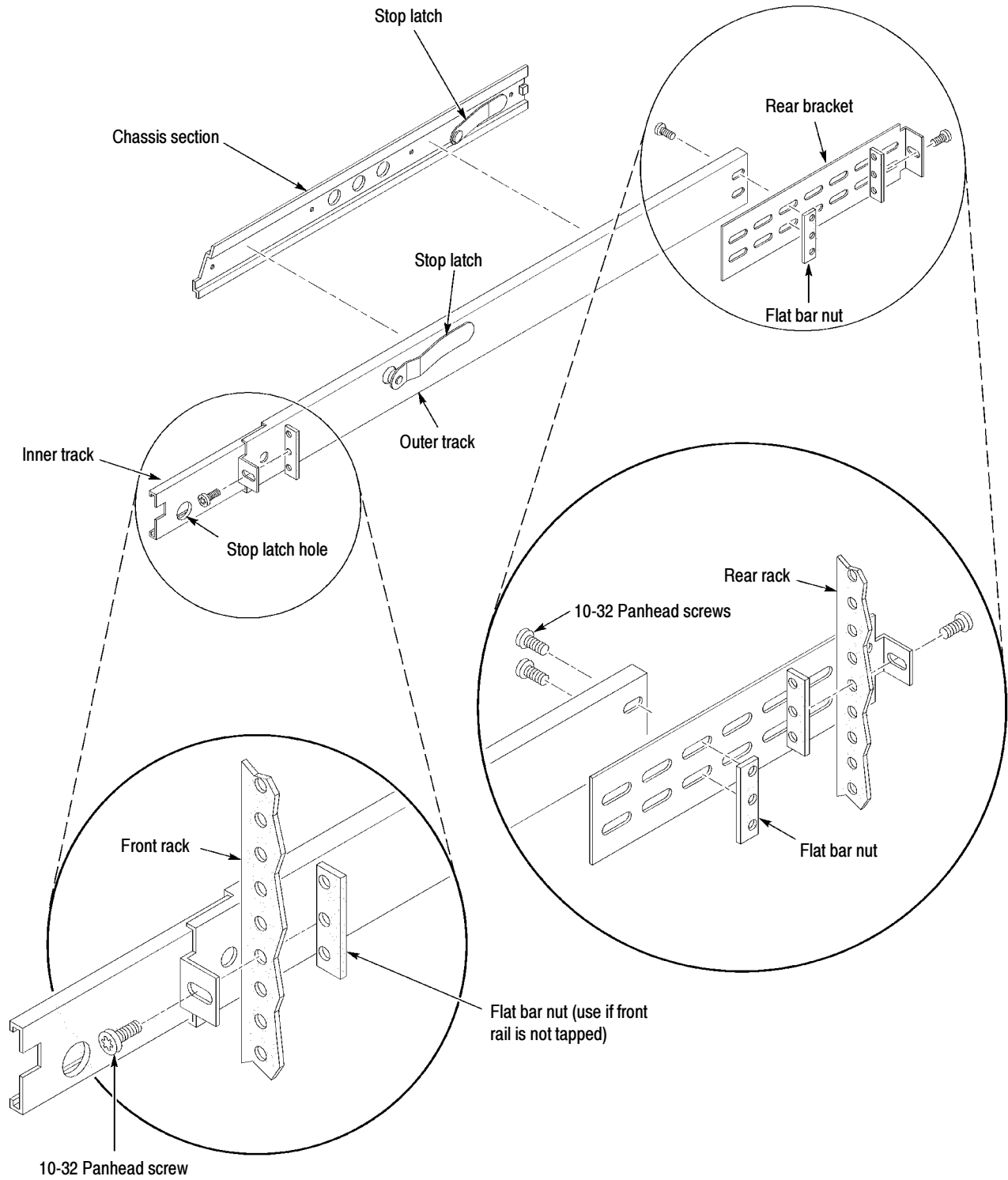
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## Installation Instructions

This procedure describes how to assemble and install the slide-out tracks in the equipment rack, and then how to install the instrument into the rack.

### **Assembling the Slide-out Tracks**

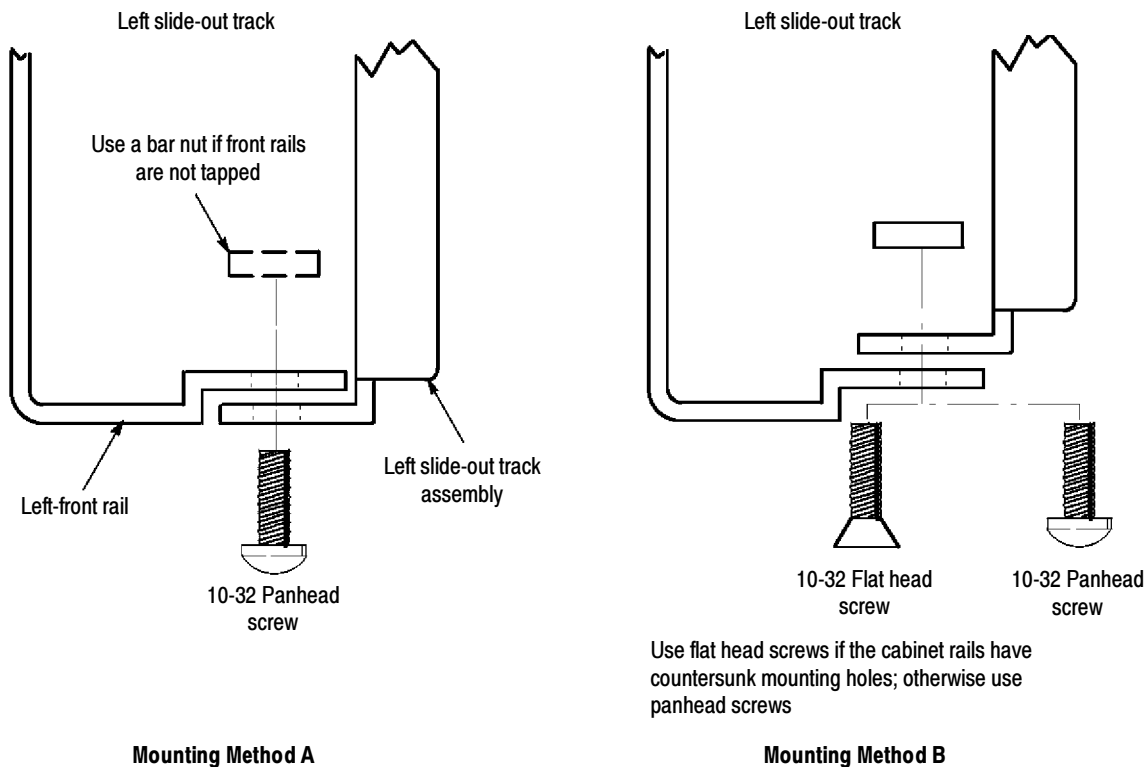
1. Identify the equipment rack right versus left slide-out track assemblies by finding the date code label on each assembly. The equipment rack left-side assembly has a date code that ends with “LH”, for left hand. The equipment rack right-side assembly has a date code ending with “RH”.
2. Measure the distance between the front and rear rail of the equipment rack.
3. Align the rear bracket to the right slide-out track as shown in Figure 28. Note that the rear bracket has multiple pairs of mount-through holes. When aligning the bracket and track, be sure to select a pair of holes that mount the rear bracket so that the flange-to-flange distance matches the front-rail to rear rail spacing of the rackmount rack just measured in step 2.
4. Using a screwdriver with a number two Pozidriv tip, secure the rear bracket to the right slide-out track using two 10-32 screws and a bar nut. Leave the screws loose so that you can adjust the overall length of the slide-out track assembly in the rack.
5. Repeat steps 3 and 4 to assemble the left slide-out track assembly.



**Figure 28: Assembly of slide-out track assemblies (right slide-out track)**

**Mounting the Slide-out Tracks**

1. Select a 1/2 inch spaced hole in the front rail.
2. Select the mounting method according to your rack type:
  - To mount the slide-out tracks with their front and rear flanges outside of the front and rear rails, use method A shown in Figure 29 when doing step 3. Add a bar nut to the installation only if the rails have untapped holes.
  - To mount with front and rear flanges inside of rack rails, use mounting method B shown in Figure 29. This mounting method assumes untapped holes.
3. Using the method and hardware determined from step 2, secure the right slide-out track assembly to the equipment rack front and rear rails. The screws should be fully, but lightly, seated so that you can adjust the rack later.
4. Tighten the screws, applying 28 inch-lbs of torque, left loose in step 4 in *Assembling the Slide-out Tracks* on page 28 to fix the front to rear flange spacing of the slide-out track assembly.
5. Repeat steps 1 through 4 to mount the left slide-out track assembly.



**Figure 29: Installation of slide-out track assemblies in rack (top view)**

## Installing the Instrument

1. Working from the front of the rack, pull the inner track of each slide-out track assembly until it extends out the front of the rack. Continue to pull them out until they lock.
2. Insert the instrument left and right tracks into the ends of the rack tracks just extended. Make sure to insert the instrument tracks inside of the inner rack tracks extended in step 1.
3. Push the instrument into the rack until it stops.
4. Push both stop latches, located on the outside of each track, and continue to slide the instrument all the way into the rack.
5. Tighten the two screws that were left loose at the rear of the rack when you did step 3 in *Mounting the Slide-out Tracks* on page 30, and then pull the instrument part way out of the rack.
6. Be sure the two screws that were left loose at the front of the rack are loose enough to allow the slide-out track assemblies to seek the appropriate positions.
7. Retighten the two screws and push the instrument all the way into the rack. If the tracks do not slide smoothly, readjust the rail assemblies using the method just detailed.
8. When adjusting is completed, tighten all rail assembly 10-32 screws using 28 inch-lbs of torque.
9. Using a number two Phillips screwdriver, install the 10-32 screw attached to your rack in one of the two mounting holes at the right side of the front panel. Repeat for the second mounting hole. Tighten both screws using 25 inch-lbs of torque.
10. Repeat step 9 to install the two screws in the left side of the front.

