User Manual

Tektronix

WVR610A & WVR611A
Waveform Rasterizers

071-1199-00

www.tektronix.com

Tektronix, Inc., P.O. Box 500, Beaverton, OR 97077

WARRANTY

Tektronix warrants that the products that it manufactures and sells will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If a product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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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.

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

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 apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

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

Use Proper Fuse. Use only the fuse type and rating specified for this product.

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

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

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.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:

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

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

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.

Symbols on the Product. The following symbols may appear on the product:

Preface

The WVR610A & WVR611A rasterize serial digital video and composite video signals (depending on installed options) for display on XGA displays, providing a new standard of display quality and flexibility.

The WVR610A & WVR611A are single RU instruments, offering both SD component and composite inputs, as well as audio monitoring options. The waveform rasterizers offer full support for traditional waveform display, both overlaid and parade; vector display, both traditional and Lightning; gamut monitoring including Arrowhead, Diamond, and Split Diamond; support for AES, analog, and embedded audio, both level and phase relationship; as well as gain, sweep, and magnification controls.

Key WVR610A & WVR611A features include:

- Flexible, multiple-tiled display enabling you to monitor several aspects of the signal at the same time
- Digital processing for accuracy and measurement repeatability
- A friendly menu-driven user interface that requires fewer keystrokes for the most common operations
- User-definable presets
- High-quality XGA (1024 x 768) display output
- Dual SDI video and analog composite inputs
- Exclusive Tektronix measurements and displays that help solve problems faster
- Configurable alarms and error logging
- Automated gamut checking
- Ethernet port for network connectivity
- Audio Option for analog, digital AES/EBU, or both

About this Manual

This manual is divided into four sections:

Getting Started explains how to start using your waveform rasterizer.

Operating Basics shows you how to operate the waveform rasterizer.

Reference explains how to perform specific tests with the waveform rasterizer.

The Appendices contain reference information such as specifications, how to use the remote interface, an incoming inspection procedure, SNMP usage information and other information that you might need occasionally.

Additional Information

The WVR610A & WVR611A contain online help to enable you to quickly get explanations of how to use your waveform rasterizer. The online help provides descriptions of how to perform tasks with the waveform rasterizer along with descriptions of controls, displays, and instrument settings.

The *WVR610A & WVR611A Waveform Rasterizers Service Manual* is an optional accessory that provides module-level service information.

Contacting Tektronix

Phone	1-800-833-9200*
Address	Tektronix, Inc. Department or name (if known) 14200 SW Karl Braun Drive P.O. Box 500 Beaverton, OR 97077 USA
Web site	www.tektronix.com
Sales support	1-800-833-9200, select option 1*
Service support	1-800-833-9200, select option 2*
Technical support	Email: techsupport@tektronix.com 1-800-833-9200, select option 3* 6:00 a.m. – 5:00 p.m. Pacific time

*** This phone number is toll free in North America. After office hours, please leave a voice mail message.
Outside North America, contact a Tektronix sales office or distributor; see the Tektronix web site for a list of offices.**

Getting Started

Getting Started

This section contains a product description, list of accessories and installation procedure. For instrument specifications, refer to *Appendix A*. An incoming inspection procedure to verify the primary functions of the waveform rasterizer is located in *Appendix E*.

Product Description

The WVR610A & WVR611A use fully digital processing that ensures accurate, stable, and repeatable measurements. The WVR610A & WVR611A provide a powerful monitoring solution for broadcasting, production, and post-production environments. The combination of Tektronix exclusive gamut displays, session screens, alarms, and error logging help you speed and simplify the process of solving problems with your content.

The WVR610A supports only standard definition (SDI) inputs, while the WVR611A supports both standard definition and analog composite inputs. They are ideally suited to facilities transitioning from analog to digital environments. Both models offer audio options to allow multiple-channel audio monitoring.

The digital architecture of the WVR610A & WVR611A delivers important benefits to users. Digital instruments offer accuracy and stability that is unattainable in traditional analog designs. Analog components age and drift with fluctuations in ambient temperature, and systems based on these components require periodic calibration. The fully digital architecture of the WVR610A & WVR611A provides accuracy, repeatability, and stability that surpasses traditional analog designs.

The high-quality display of the WVR610A & WVR611A is well suited to meet the needs of production and post-production applications including camera shading and alignment, color balancing, film-to-tape and format conversion, and special effects work.

Sometimes you simply need to know that your signal is valid. You need to ensure that a signal will be compatible with compliant operational equipment such as when you combine content from many sources including live in-studio, tape, contribution feeds, and perhaps mobile feeds. Any of these sources might deliver content with errors that could affect the quality of your transmission. The tiled-display of the WVR610A & WVR611A enables you to quickly check the integrity of the signal by displaying up to four views of the signal simultaneously.

Options

The waveform rasterizer can be ordered with options to support analog audio, digital audio, or both analog and digital audio.

Audio Options

Three audio options are available:

- Option AN. Two groups of three pairs of analog inputs, one group of three pairs of analog outputs.
- Option DG. Four pairs of AES/EBU inputs and four pairs of bi-directional AES/EBU outputs selected from eight embedded pairs.
- Option DA. Both analog and digital capabilities installed.

Service Options

The following service options are available for the WVR610A & WVR611A:

- Option R3. Extends the instrument warranty to 3 years.
- Option R5. Extends the instrument warranty to 5 years.
- Option C3. Provides calibration services for 3 years.
- Option C5. Provides calibration services for 5 years.
- Option D3. Provides test data for 3 years.
- Option D5. Provides test data for 5 years.

Standard Accessories

The following accessories are shipped with each waveform monitor:

Documents

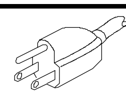
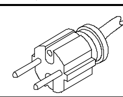
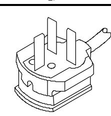
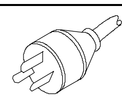
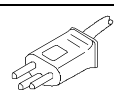
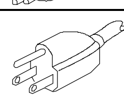
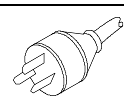
The following documents are standard accessories:

- *WVR610A & WVR611A Waveform Rasterizers User Manual*, Tektronix part number 071-1199-XX.
- *WVR610A & WVR611A Waveform Rasterizers Release Notes*, Tektronix part number 061-4260-XX.

Power Cords

All WVR610A & WVR611A Waveform Rasterizers are shipped with one of the following power cord options. Power cords for use in North America are UL listed and CSA certified. Cords for use in areas other than North America are approved by at least one authority acceptable in the country to which the product is shipped.

Table 1-1: Power cord identification

Plug configuration	Normal usage	Option number
	North America 120 V	Standard
	Universal Euro	A1
	United Kingdom	A2
	Australia	A3
	Switzerland	A5
	Japan	A6
	China	AC

Optional Accessories

The following items are optional accessories:

- *WVR610A & WVR611A Waveform Rasterizers Service Manual*, Tektronix part number 071-1243-XX.
- Analog/Audio Breakout Cable Assembly, Tektronix part number 012-1658-00.

Installation

This section provides instructions for installing the waveform rasterizer into a standard instrumentation rack. At installation time, save the shipping carton and packing materials (including the anti-static bag) in case you need to ship the instrument.

Rackmount Installation

The waveform rasterizer is shipped with the hardware for rackmounting. The instrument fits in a standard 19-inch rack. Spacing between the front rails of the rack must be at least 17-¾ inches to allow clearance for the slide-out tracks.

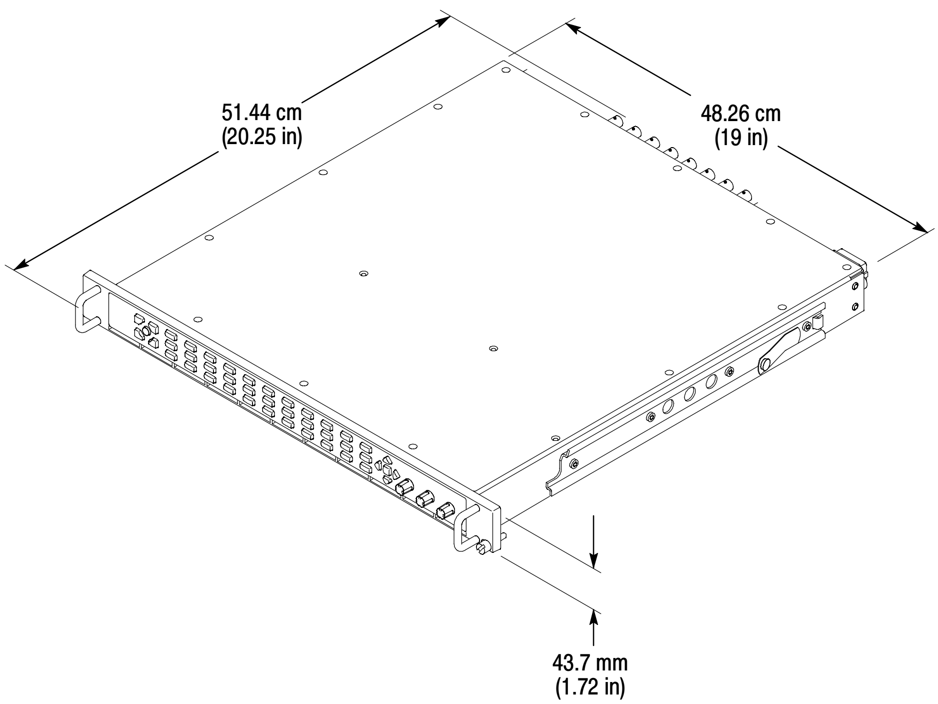


Figure 1-1: Dimensions of the waveform rasterizer

Rack slides conveniently mount in any rack that has a front-to-rear rail spacing between 15-½ and 28 inches. The waveform rasterizer requires six inches of clearance between the instrument rear panel and any rear cabinet panel for connector space and to provide adequate air circulation.

Mounting the Slide Tracks

Mount the rails using the enclosed hardware as shown in Figure 1–5. Figures 1–3 and 1–4 show the rear rail mounting details for both deep and shallow racks. Figure 1–2 shows the front mounting details. Make sure that the stationary sections are horizontally aligned, level, and parallel.

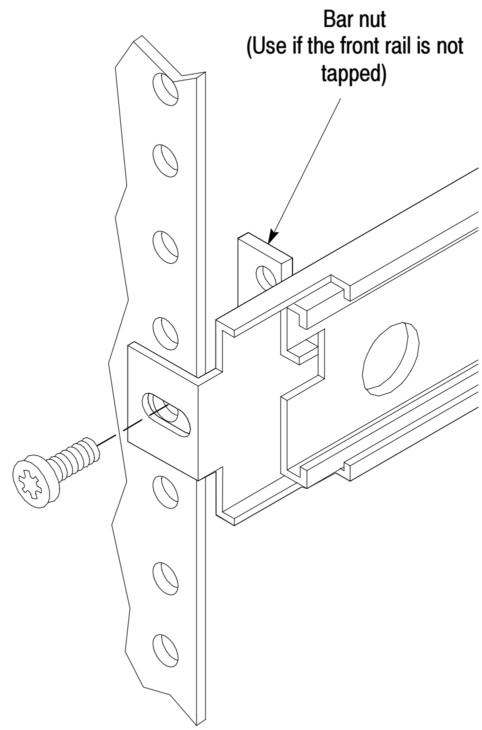


Figure 1–2: Front rail mount

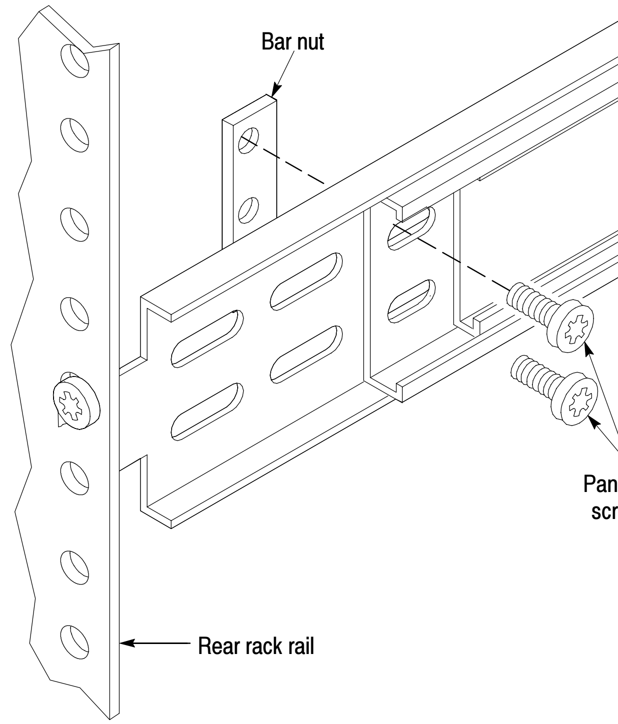


Figure 1-3: Deep rackmount

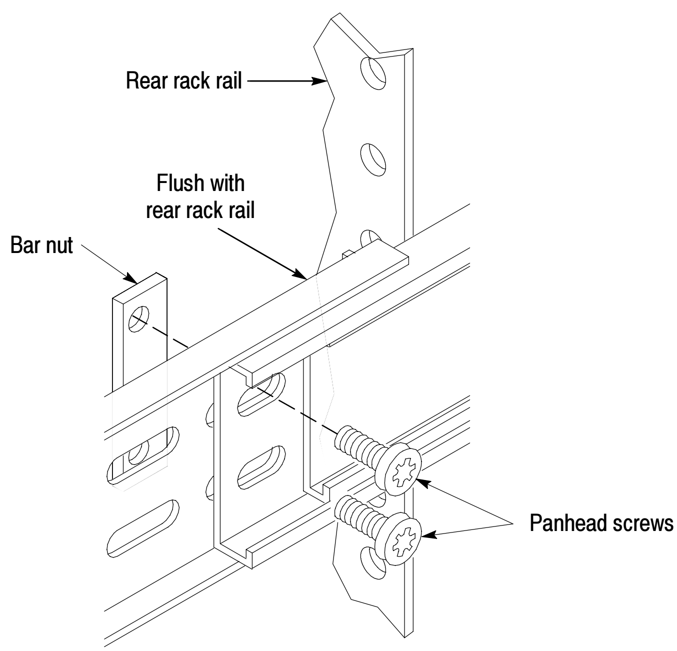


Figure 1-4: Shallow rackmount

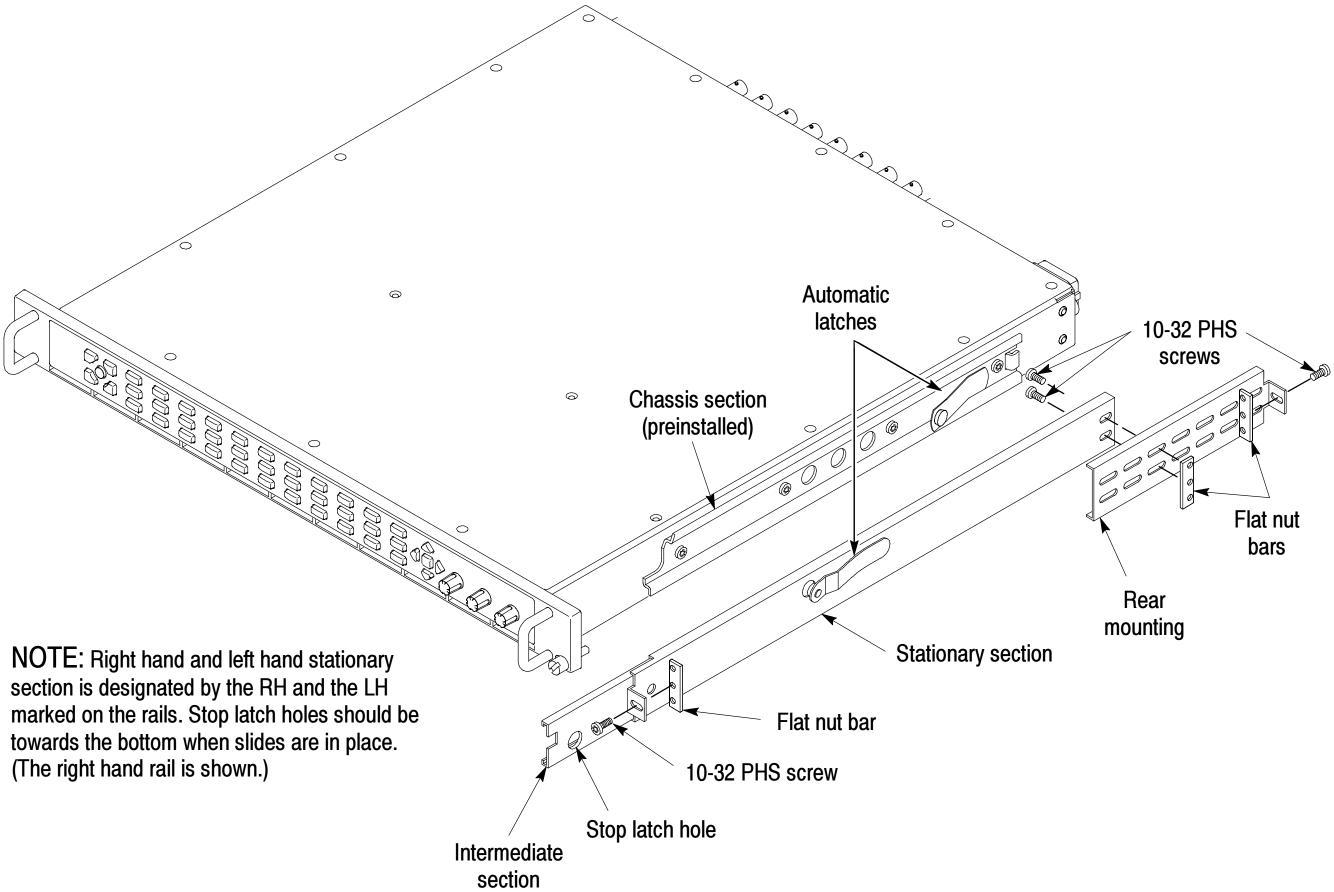


Figure 1-5: Assembly of rackmounting hardware

Installing the Instrument

Refer to Figure 1-6 to install the instrument into the rack.

1. Pull the slide-out track section to the fully extended position.
2. Insert the instrument chassis sections into the slide-out sections.
3. Press the stop latches and push the instrument toward the rack until the latches snap into their holes.
4. Again press the stop latches and push the instrument fully into the rack.
5. Tighten the front-panel retaining screws.

Removing the Instrument

Refer to Figure 1-6 to remove the instrument from the rack. To completely remove the instrument, be sure to disconnect all cabling.

1. Loosen retaining screw and pull instrument outward until the stop latches snap into the holes.

2. Press stop latches (visible in the stop-latch holes) and carefully slide the instrument free from the tracks.

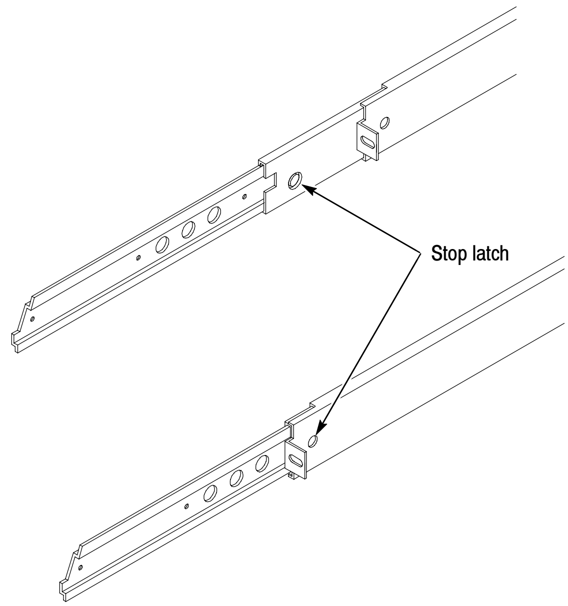


Figure 1-6: Installing or removing the instrument

Rack Adjustments

After installation, if not properly adjusted, the slide tracks may bind. To adjust the tracks, slide the instrument out about 10 inches, slightly loosen the screws holding the tracks to the front rails, and allow the tracks to seek an unbound position. Retighten the screws and check the tracks for smooth operation by sliding the instrument in and out of the rack several times.

Once the instrument is in place within the rack, tighten the knurled retaining screw to fasten it securely into the rack.

Rack Slide Maintenance

The slide-out tracks do not require lubrication. The dark gray finish on the tracks is a permanent, lubricated coating.

Removing the Instrument

First, loosen the front-panel knurled retaining screw. See Figure 1-6. Grasp the front handles and pull the instrument out until all three slide sections latch. The instrument is firmly held in this position.

You are now ready to connect power and signal cables to the instrument.

Connecting a Display

The WVR610A & WVR611A supports standard analog PC monitors, either CRT or LCD. The display resolution is 1024 X 768 (XGA). Connect the external display to the rear-panel XGA OUTPUT connector. The XGA OUTPUT connector is a standard 15-pin D-type connector with socket contacts.

Connecting Power

The waveform rasterizer 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.

AC Power Requirements

The waveform rasterizer operates from an AC line frequency of 50 or 60 Hz, over the range of 100–240 Volts, without the need for configuration, except the power cord. Refer to page 1–3 for the power cord options. The typical power draw is 50 W. Refer to *Appendix A: Specifications* for additional information on power and environmental requirements.

Connect the supplied power cord to the rear-panel power connector. There is no power switch on the waveform rasterizer, so the instrument will turn on as soon as you apply power.

Installing the Waveform Rasterizer in a Video System

The waveform rasterizer can operate almost anywhere in the distribution system due to its high impedance, bridging, and loop-through inputs. This section describes two types of connections and presents information on line termination. The following diagrams are for serial digital systems but similar connections are common for the analog composite inputs on the WVR611A.

Most serial equipment uses a receiver that regenerates an output signal, such as the receiver shown in Figure 1-7. Routing the incoming serial signal through one of the waveform rasterizer loop-though inputs and connecting the output of the serial receiver to the other loop-through input allows you to compare the incoming signal and the regenerated output signal.

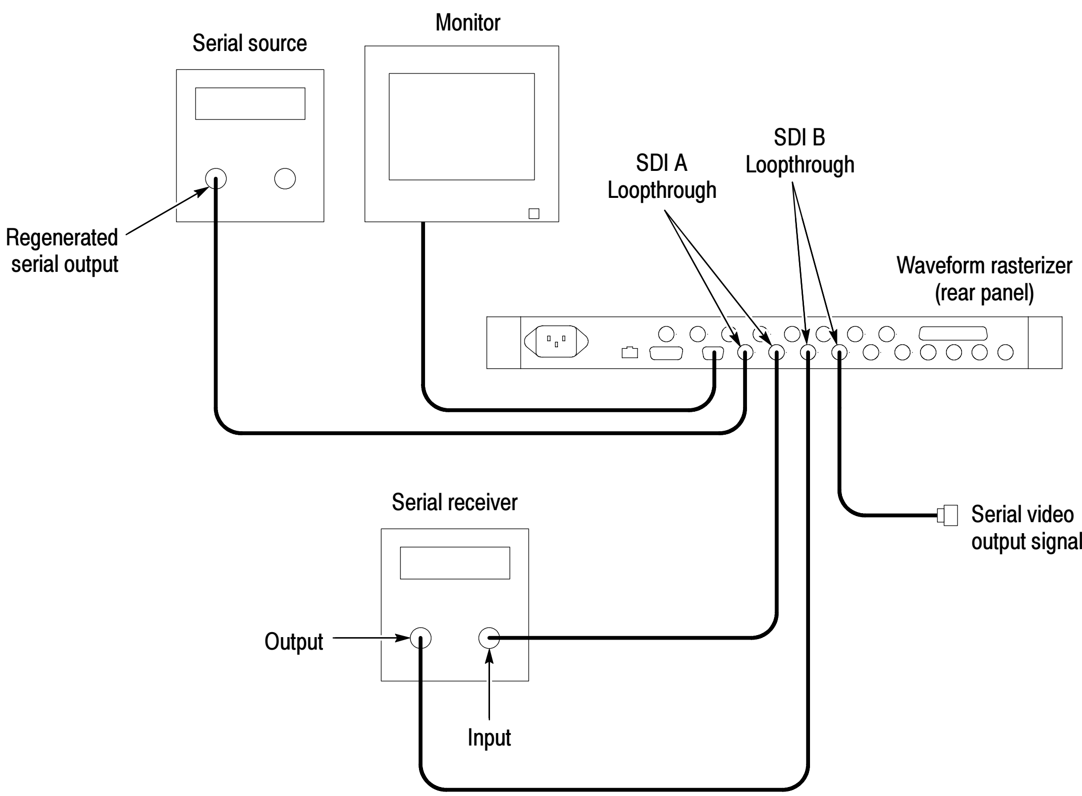


Figure 1-7: Monitoring the video bit stream of a serial receiver

You can use the waveform rasterizer to check serial digital signals around a routing switcher. It is possible to look at all the inputs to the switcher with the use of a patch panel and the waveform rasterizer as shown in Figure 1-8.

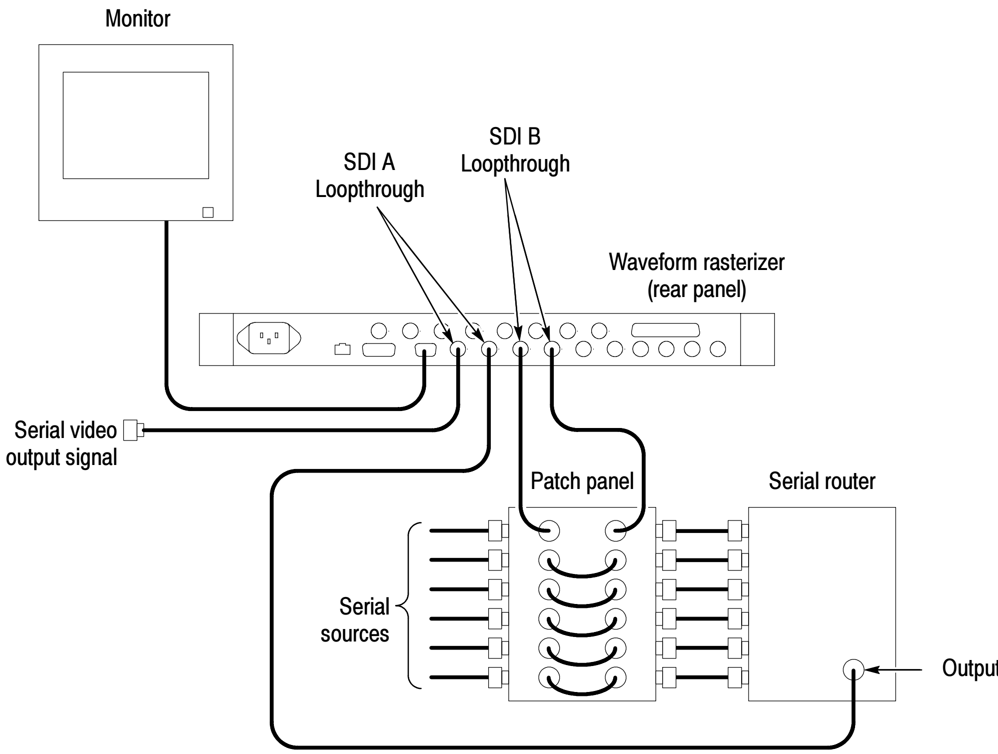


Figure 1-8: Monitoring serial digital signals around a routing switcher

Line Termination

The waveform rasterizer uses passive loop-through serial and analog inputs. Accordingly, the loop-through must be terminated externally. It is important that this external termination meet accuracy and return loss requirements.

If the waveform rasterizer is installed to monitor an operating link, the destination receiver and the connecting cable serve as the termination. This monitoring connection is best because it checks the performance of the entire serial path. The return loss of the waveform rasterizer is sufficiently high that, in most cases, the destination receiver sets the system return loss.

In cases where the waveform monitor is placed at the end of a link, a BNC termination must be installed on one side of the loop-through connector. The termination must be 75 Ω and DC coupled (good return loss extends to DC). Return loss should exceed 25 dB from 10 kHz to 270 MHz for SDI. Return loss should exceed 40 dB from DC to 6 MHz for composite. An appropriate termination would be Tektronix part number 011-0163-00. It is a 75 Ω ±0.2%, BNC, 26 dB return loss to 300 MHz, End of Line termination.

Compatibility of BNC Center Pins. Most video equipment BNC connectors, whether 50 or 75 Ω, use a 50 Ω standard center pin. Some laboratory 75 Ω BNC connectors use a smaller diameter center pin. The BNC connectors on the waveform rasterizer are designed to work with the 50 Ω standard (large diameter) center pins.

Do not use connectors or terminators with the smaller center pins. They could cause intermittent connections.

Operating Basics

Operating Basics

This chapter provides basic operating information for the WVR610A & WVR611A Waveform Rasterizers.

Overview

The WVR610A & WVR611A use a flexible, tiled display. The waveform rasterizer can display four tiles at one time. Each tile can display a different measurement, effectively creating four independent instruments. See Figure 2-1. To enable the tiles to function independently, most of the controls only affect one tile at a time. The tile that is currently being controlled is considered the *active* tile and it is indicated on the display by a light-blue outline around the tile. The active tile is indicated on the front panel by the lit display select button on the left side of the front panel.

Figure 2-1: A display with all four tiles visible

The waveform rasterizer can also display one tile at a time. If, for example, you want to display just the Waveform tile to make a rise time measurement, you can press the FULL button to display a tile in full-screen mode. See Figure 2-2.

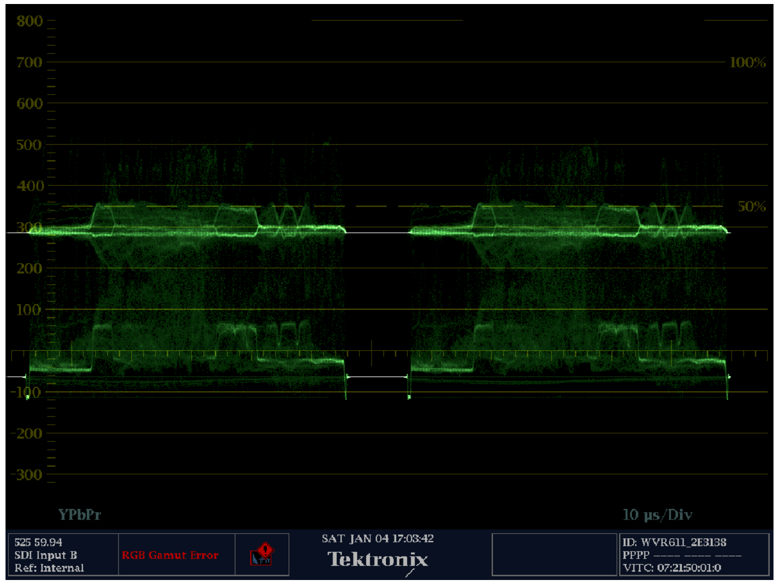


Figure 2-2: A tile in full-screen mode

The waveform rasterizer can display measurements in multiple tiles simultaneously. See Figures 2–3 and 2–4. For example, you can display all four Status screens at one time. The only measurement that cannot be displayed in more than one tile is the Audio measurement. It can be displayed in only one tile at a time.

Figure 2-3: A display with multiple Status screens

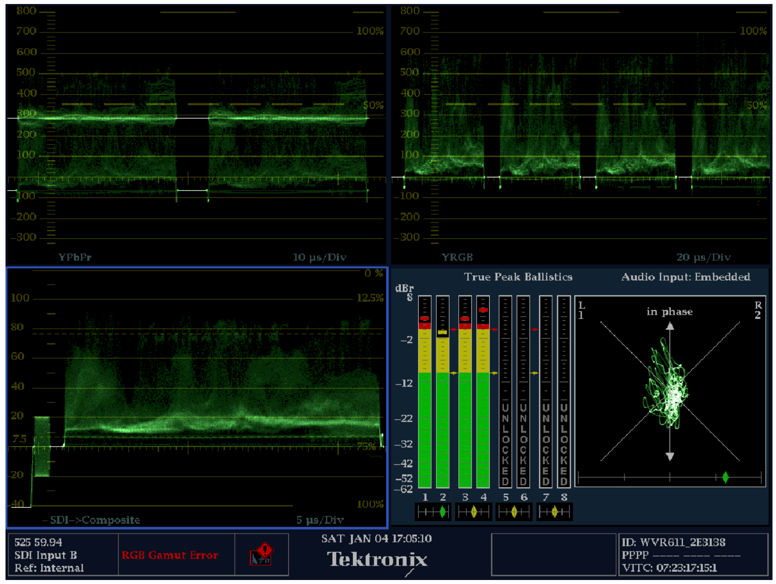


Figure 2-4: A display with multiple WFM displays

Three Levels of Control

You control the waveform rasterizer on three levels:

- Frequently-changed settings
- Tile-specific settings
- Instrument-wide settings

Frequently changed settings. The front-panel buttons control the most commonly changed parameters, such as which measurement appears in each tile. The knobs are used to adjust levels and make selections.

Tile-specific settings. Pop-up menus control parameters that are specific to the tile in which they are displayed. The pop-up menus control less frequently changed parameters such as the waveform display mode (for example, changing the waveform display mode from RGB to YPbPr).

Instrument-wide settings. The parameters in the Configuration menu are instrument-wide settings. The configuration menu controls settings that are changed only occasionally, such as changing waveform color or setting the network address.

Range of Controls

Some controls are global and affect all tiles, while other controls only affect the active tile. Generally speaking, if a control is configured by front-panel buttons or by a pop-up menu, then it is tile specific. Configuration selections are usually global. Exceptions are the Input buttons, and all audio features, both of which are global.

Front-Panel Controls

The following sections describe the front panel controls of the WVR610A & WVR611A.

Tile Settings

Each tile maintains its own settings independent of the other tiles, including GAIN and SWEEP, and display type among others. For instance, when you switch a tile to a different measurement, the GAIN and SWEEP settings will be changed to what they were the last time the selected measurement was displayed in the tile.

Display type is also independent for each tile. You could set Tile 1 to display the Video Session STATUS screen and set Tile 2 to display the Error Log STATUS screen. Suppose you then change Tile 1 to a WFM display and Tile 2 to a GAMUT display. If you then change Tile 1 back to a STATUS display, it will display the Video Session screen, which is what it was set to before you changed it to the WFM display. Likewise, if you change Tile 2 back to STATUS, it will display the Error Log screen.

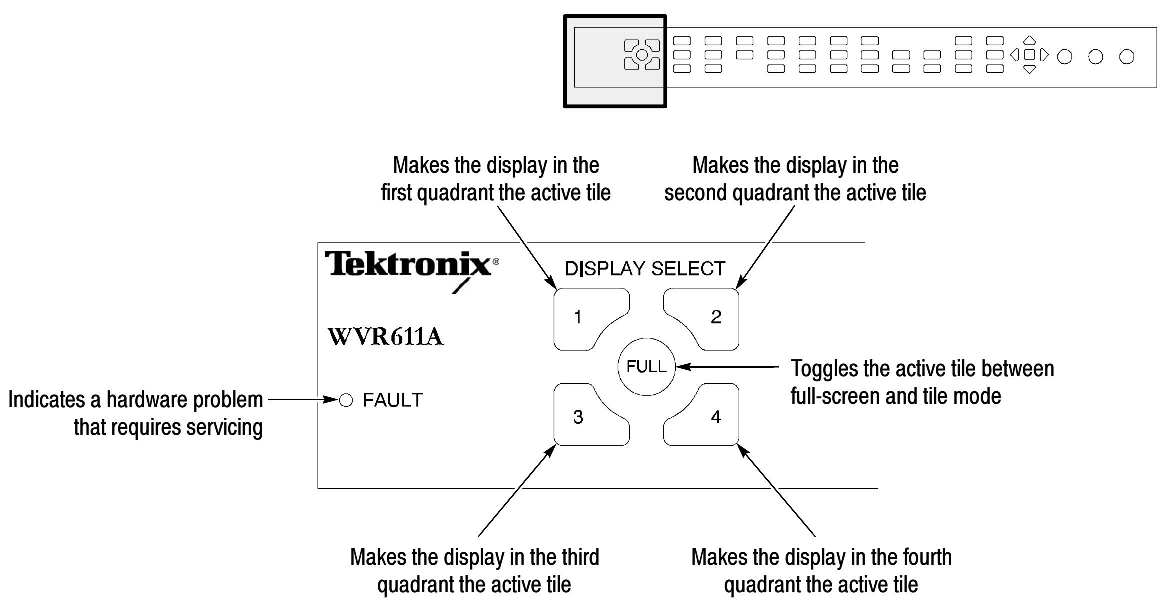


Figure 2-5: Display select buttons and fault indicator

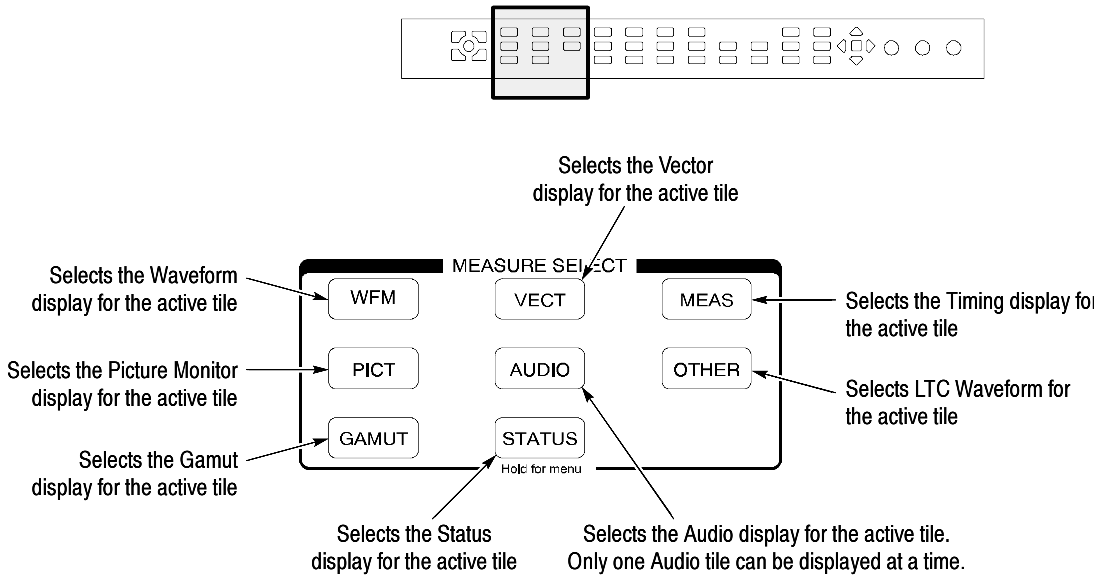


Figure 2-6: Measure select buttons

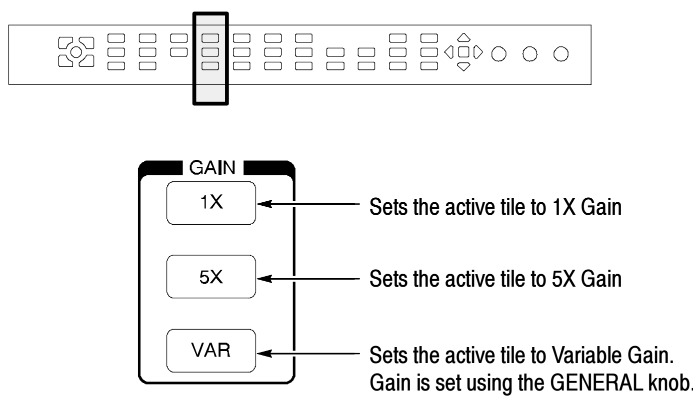


Figure 2-7: Gain buttons

NOTE. *The Gain controls are not enabled for all measurements.*

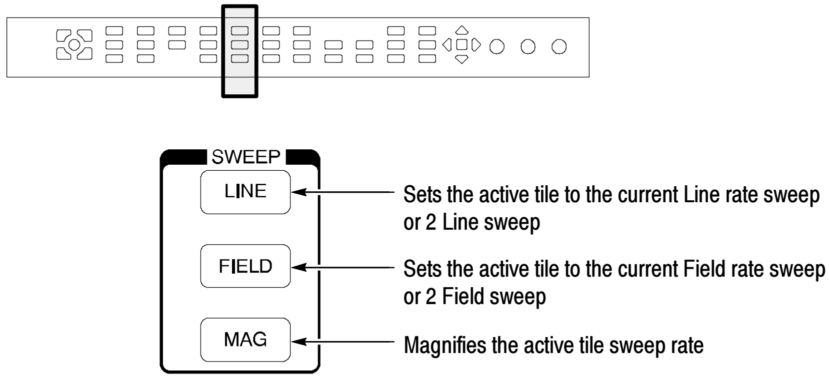


Figure 2-8: Sweep buttons

***NOTE**. The Sweep controls are not enabled for all measurements.*

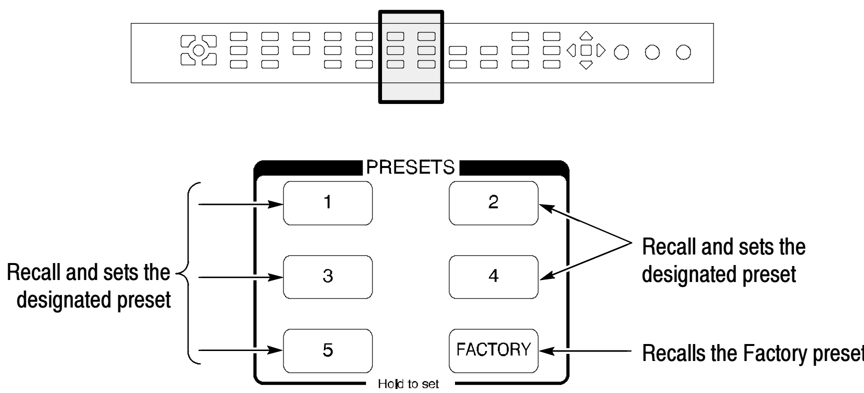


Figure 2-9: Presets buttons

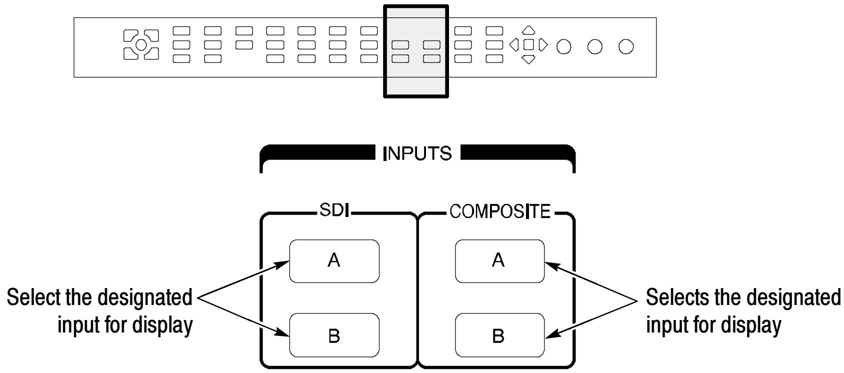


Figure 2-10: Input select buttons

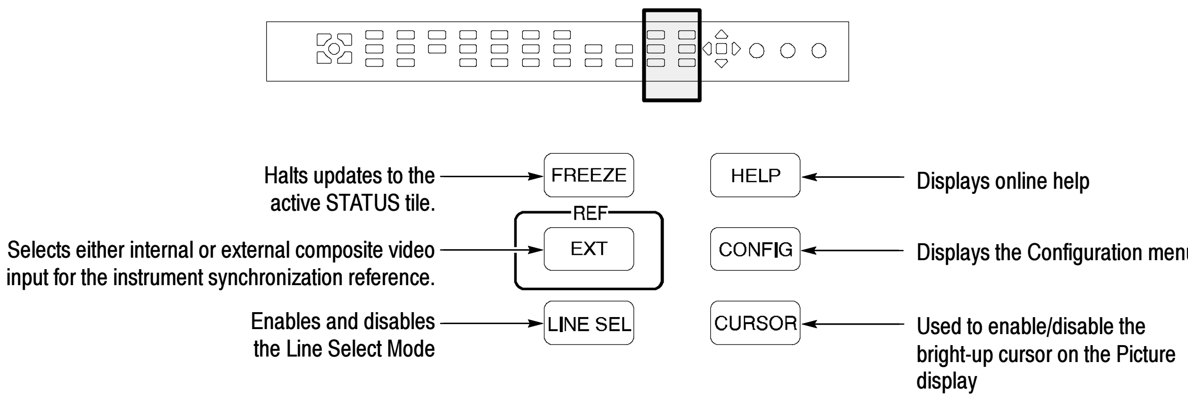


Figure 2-11: General function buttons

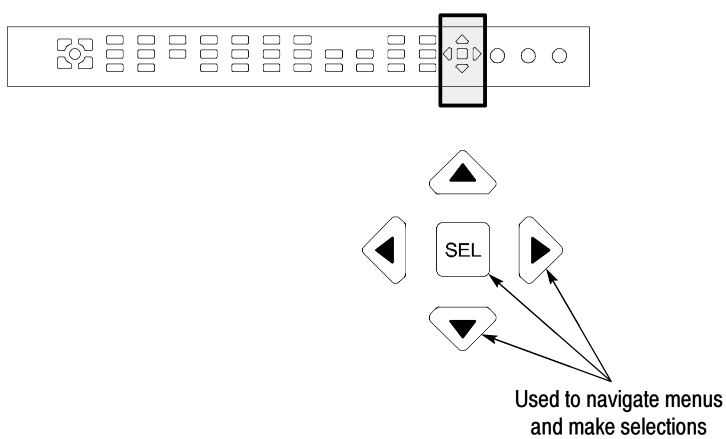


Figure 2-12: Arrow keys and SEL button

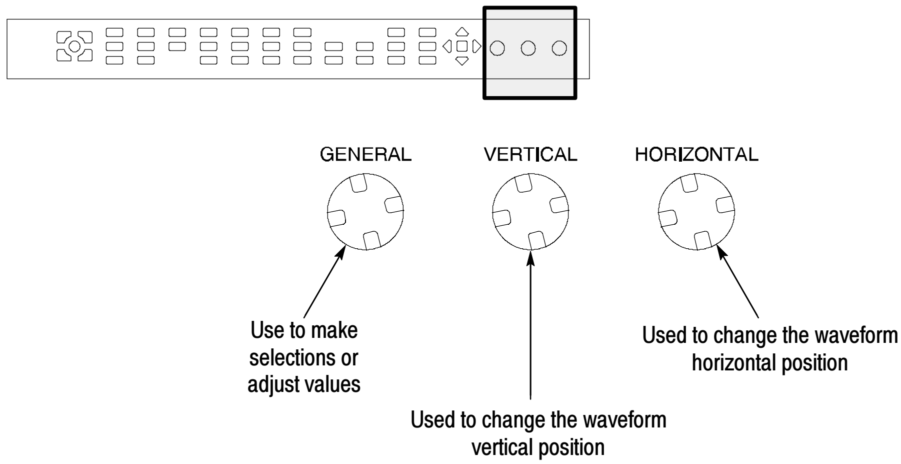


Figure 2-13: Control knobs

Pop-Up Menus

Pop-up menus appear in the active tile. In general, they control only settings specific to the active tile. For example, the pop-up menu for the Waveform display enables you to specify the Display Mode. See Figure 2–14.

To display a pop-up menu:

- Press and hold the desired **MEASURE SELECT** or **DISPLAY SELECT** button for about a second.

The pop-up menu will appear, unless it is not appropriate for the current setting of the waveform rasterizer (for example, trying to display the Gamut menu when viewing a composite input signal).

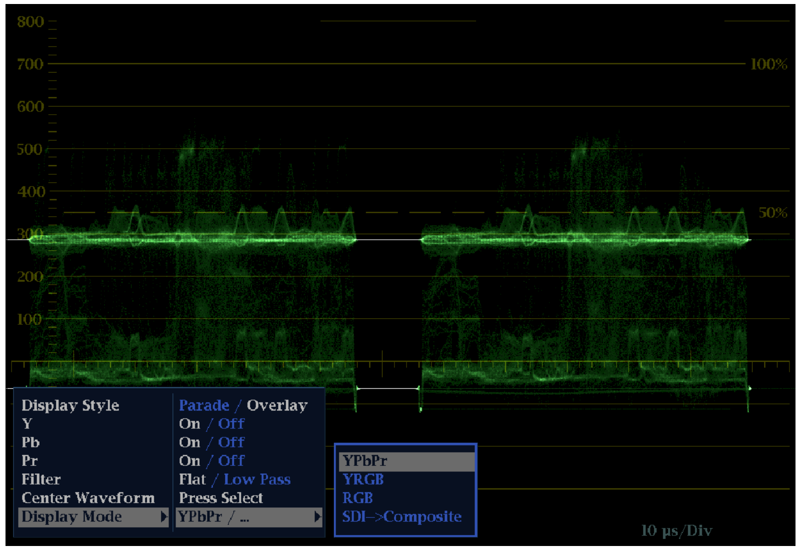


Figure 2-14: The WFM pop-up menu with display mode set to YPbPr

The selections in a pop-up menu can change depending on settings. For example, in Figure 2-14 Y, Pb, and Pr are in the menu when the display mode is set to YPbPr. But the menu changes when the display mode is set to RGB. See Figure 2-15.

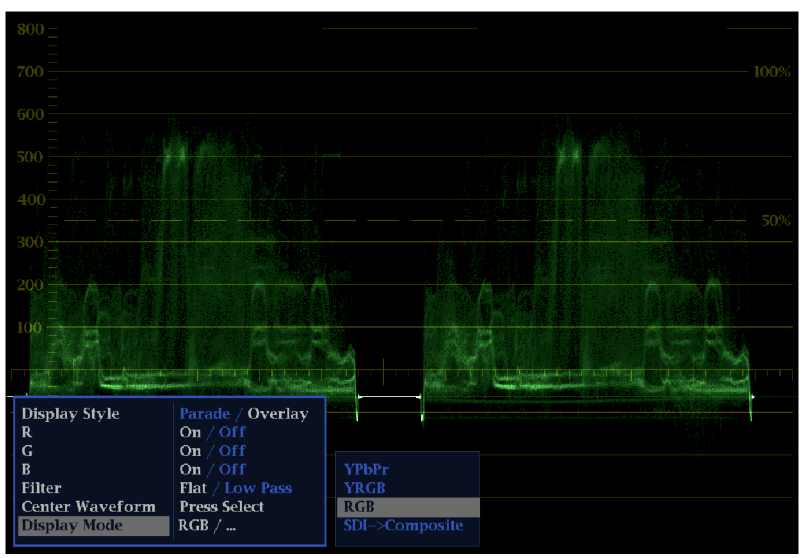


Figure 2-15: The WFM pop-up menu display mode set to RGB

Configuration Menu

The Configuration menu is used to change the settings of the waveform rasterizer that are changed only occasionally or settings that are not specific to a tile, such as printer settings.

To display the Configuration menu:

- Press the **CONFIG** button.

The Configuration menu is displayed on the top or bottom half of the screen opposite the active tile. See Figure 2–16.

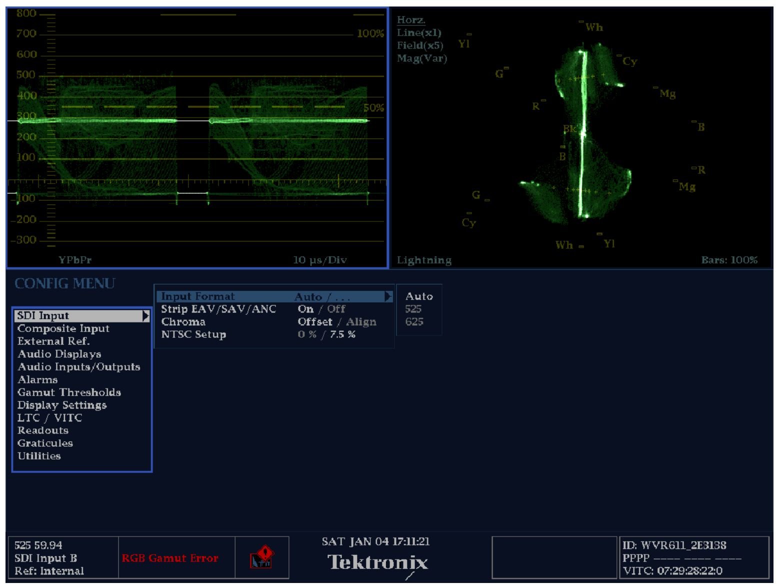


Figure 2-16: The configuration menu

Status Bar

The Status Bar appears at the bottom of the waveform rasterizer display. The Status Bar provides a number of text and icon elements to give you an easily viewed guide to the status of the instrument and the monitored signal. Table 2–1 describes the elements of the Status Bar and Table 2-2 describes the icons that can appear in the Status Bar.

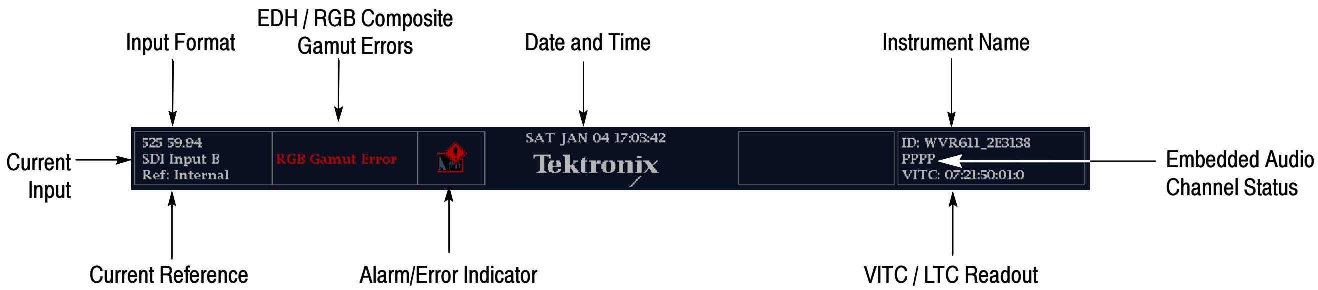
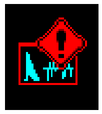
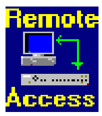


Figure 2-17: Elements of the status bar

Table 2-1: Status bar element descriptions

Display element	Description
Input Format	Text indicating the format of the signal on the selected input, or whether signal is missing or unlocked
EDH Error	A one-line area that is visible if EDH errors are present.
RGB Gamut Error	A one-line area that is visible if RGB gamut errors are present.
Composite Gamut Error	A one-line area that is visible if Composite gamut (Arrowhead) errors are present.
Date and Time	Readout of the date and time (set in CONFIG > Utilities).
Instrument Name	Name assigned to the waveform rasterizer in the CONFIG > Utilities menu.
Audio Channel Status	A 16-character string indicating embedded audio channel status. Each character shows the status of a specific channel: **-** for not present and **P** for present
VITC/LTC readout	A readout showing the selected time format.
Alarm/Error Indicator	An icon visible when alarms when are occurring.
Current Reference	Text indicating the source of the current reference. Possible references are: Ext., Internal. Also indicates format and whether the reference is missing or unlocked.
Current Input	Text indicating the selected input. Possible inputs are: SDI A, SDI B, Cmpst A, Cmpst B (depending on installed options).

Table 2-2: Status bar icons

Icon	Description
	Warning - Appears when an alarm or error has been triggered.
	Alarms Muted - Appears when the alarms have been muted from the STATUS pop-up menu.
	Remote Access - Appears when the waveform rasterizer is accessed from the network. For example, when the sending commands to the waveform rasterizer from the remote interface.
	Alarms Disabled - This text appears in the Status Bar when Alarms have been disabled from the Configuration menu.

Waveform Display

The Waveform display the familiar waveform monitor display used to view a waveform. You can view the input signal in line or field sweep. You can choose which SDI signal elements are displayed (RGB, YRGB, or YPbPr), and you can apply filters to the signal. You can also display an SDI input as though it were a composite signal.

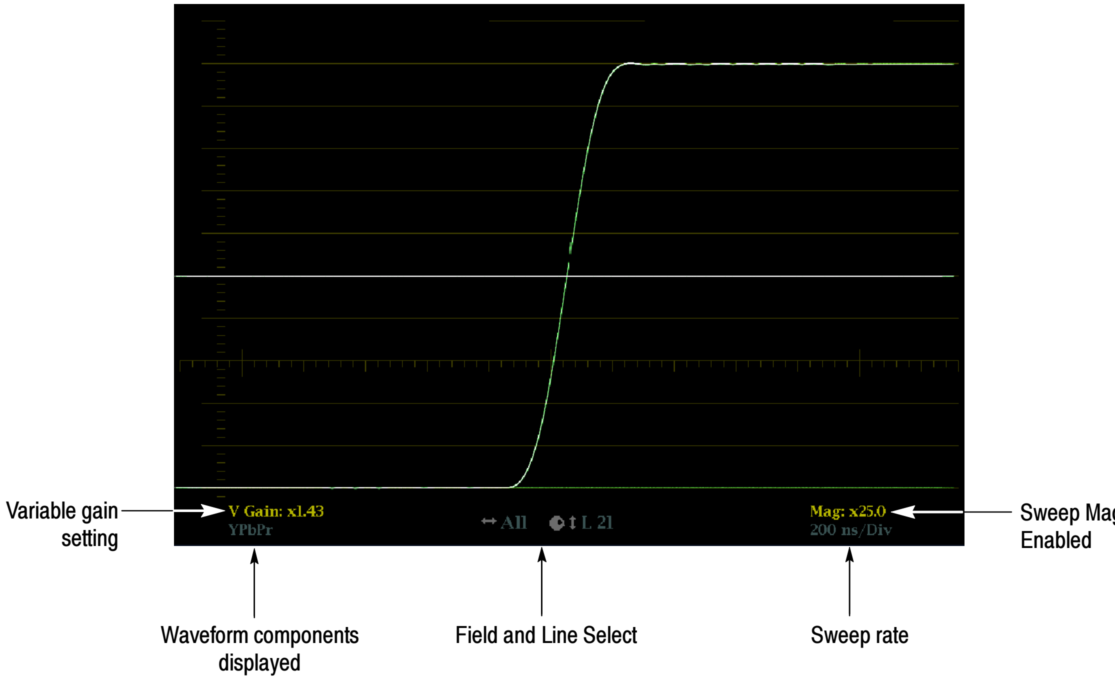


Figure 2-18: Waveform display elements

Table 2-3: Waveform display element descriptions

Display element	Description
Gain Setting	A text string indicating the gain setting. Possible readouts are **V Gain: x5**, and **V Gain: 1.50**. When the Gain is set to a value other than 1, it will appear in a bright yellow color. The gain setting is not displayed when it is X1.
Waveform components displayed	A text string showing the current waveform color space components displayed. Non-displayed components are indicated by dashes: --.
Field and Line Select	A readout displaying the currently selected field and line.
Sweep rate	A readout showing the current sweep rate in a tile.
Sweep rate, Mag	A readout showing when the Mag button is pressed; if pressed, **Mag** is displayed next to the sweep rate in yellow text.

Vector Display

The Vector display provides two display types: Vector and the Tektronix proprietary Lightning display (SDI signals only). The **Vector** display shows a plot of the R-Y signal on one axis and the B-Y signal on the other. It is useful for looking at hue and saturation of the colors, but does not show luminance information. The **Lightning** display shows the same color signals as in vector, but they are plotted versus luminance. One color difference signal in the top half and the other in the bottom. Lightning is useful for checking chroma and luma gain, and for checking chroma to luma delay via the timing marks that show errors in the green to magenta transition on a color bar signal.

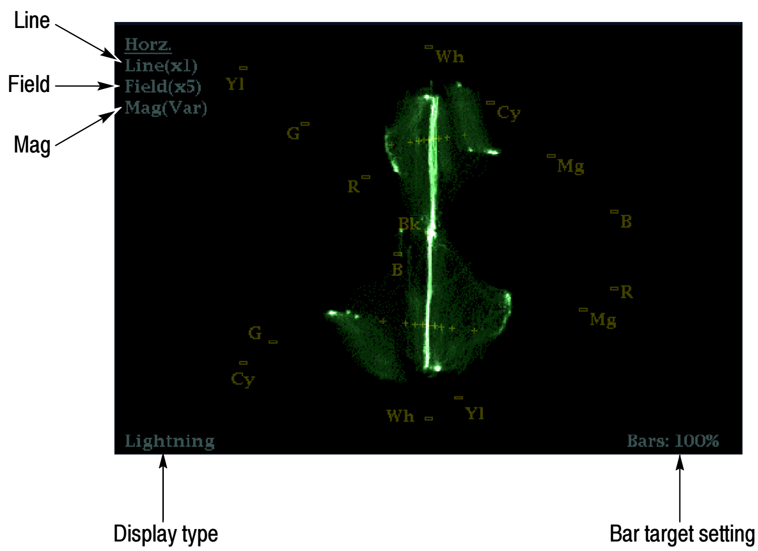


Figure 2-19: Vector display elements

Table 2-4: Vector/Lightning display element descriptions

Display element	Description
Line	Pressing the LINE button sets the horizontal gain to 1X.
Field	Pressing the FIELD button sets the horizontal gain to 5X.
Mag	Pressing the MAG buttons enables you to adjust the horizontal gain using the GENERAL knob.
Display type	The selected display, either Lightning or Vector.
Bar target setting	The bar target setting, either 75% or 100%.
Phase	Appears in Composite Vector display only.

Measure Display

Pressing the MEAS button displays a new Tektronix proprietary display that greatly simplifies measuring the timing difference between two signals as the timing is corrected. Using the Tektronix Timing display enables you to easily compare and correct the timing between two digital signals.

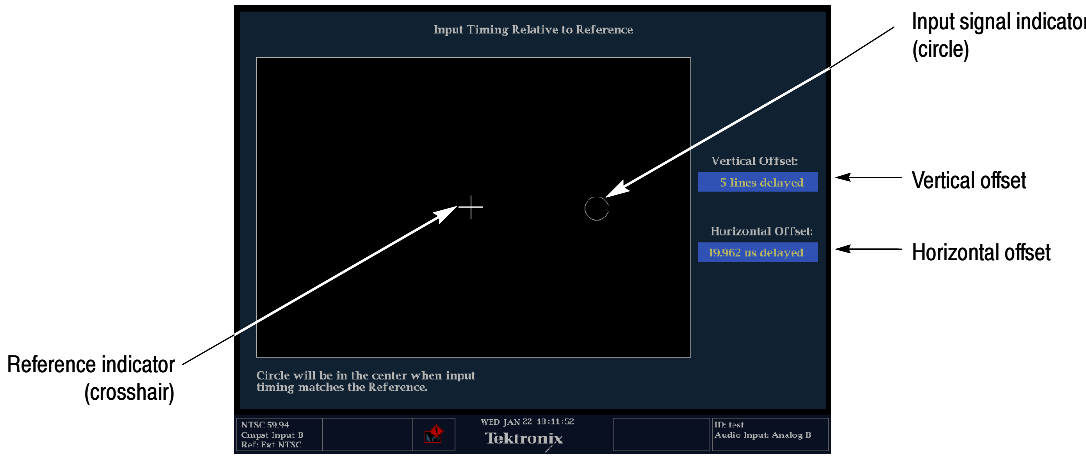


Figure 2-20: Timing display

Table 2-5: Timing display element descriptions

Display element	Description
Input signal indicator	A circle representing timing of input signal relative to the reference.
Reference indicator	A crosshair indicator representing the reference signal.
Vertical offset	The timing difference between the reference and input signal.
Horizontal offset	The timing difference between the reference and input signal.

Picture Display

The Picture display lets you see the picture generated by the video signal. You can choose to display the picture with or without a Picture Frame. See Figure 2-21. The Picture Frame function allows you to display or hide elements of the video signal outside the active video. With Picture Frame switched On, only the active video portion of the signal is displayed. With Picture Frame switched Off, elements of the signal outside the active video are visible. When the picture frame is off, you can see user data, embedded audio and elements in the vertical interval.

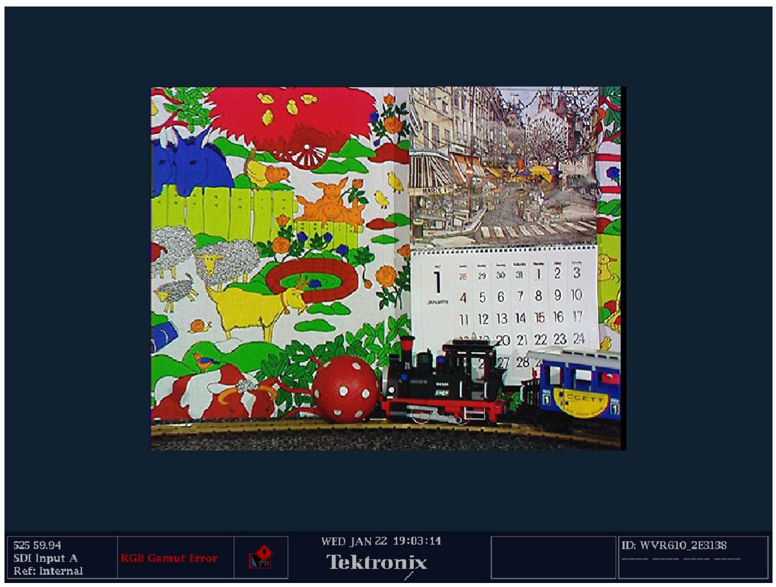


Figure 2-21: Picture display

Audio Display

The Audio display provides level meters and a phase display for monitoring audio signals. The Audio display always shows the level meters and correlation meters. When you choose to display the phase plot (also known as Lissajous), the left portion of the Audio tile displays the level meters and the right portion the Phase display. See Figure 2-22.

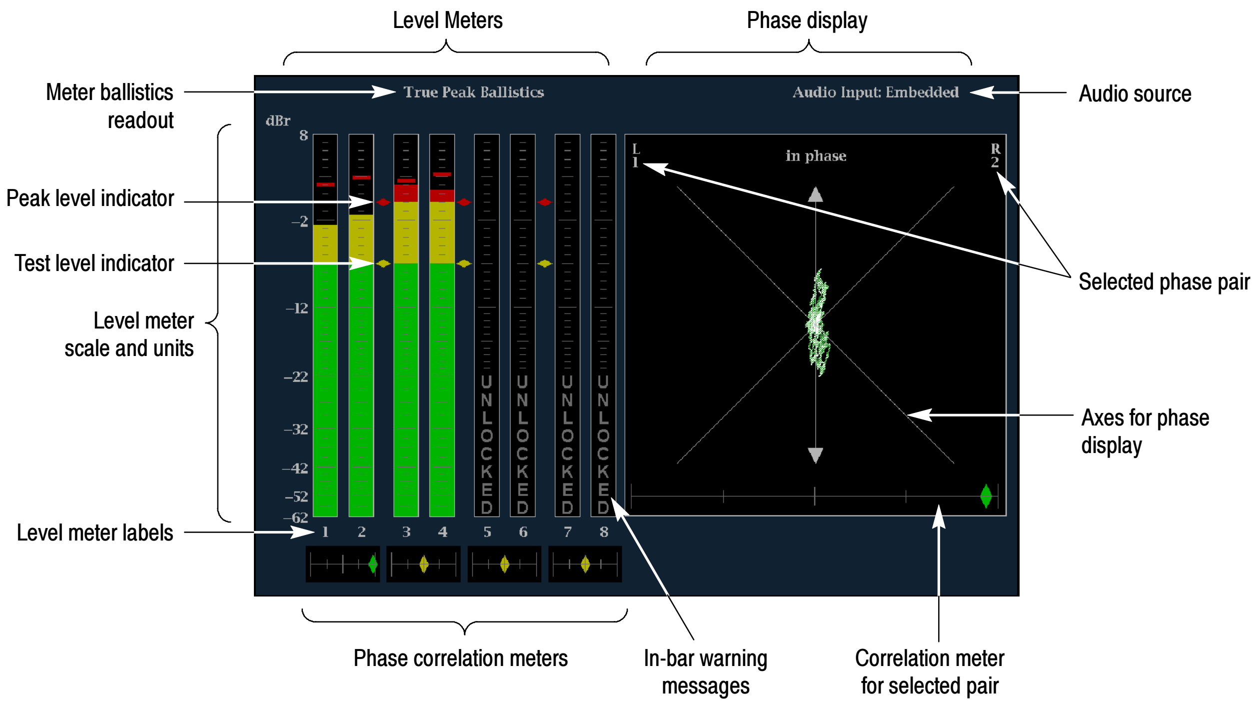


Figure 2-22: Audio display with phase display

Table 2-6: Audio display element descriptions

Display element	Description
Level meters	Indicate the amplitude of selected audio channels.
Phase display	Plot of one channel versus the other in a pair.
Audio source	The selected audio input.
Level meter labels	Identifies the signal in each meter bar.
Level meter ballistics readouts	Displays the selected dynamic response characteristic.
Axes for phase display	Shows the orientation of the two audio signals.
Phase correlation meters	Displays phase correlation between the two channels of each appropriate pair. Located under the bars for the same channels. Duplicated under the Phase display. Has configurable response time.
Test level and Peak Program Level Indicators	Diamond-shaped markers between the level bars that indicate the configurable limits set up for the display. Above the Test level the bar displays in a yellow color. Above the Peak level the bar displays in a Red color. Test level is also known as Reference level or Line-up level.
Level Meter Scale and units	By default, the zero dB mark is at digital full scale, and units are in dB relative to full scale (dBFS). You may also set the 0 dB mark to either the Peak Program level or the Test level.

Above-bar Warning Messages

The WVR610A & WVR611A display warning messages above the level meter bars. The warning messages that can appear above the bars are shown below.

CLIP. The number of consecutive samples is at or exceeds the # Samples for Clip setting.

OVER. The signal level exceeds the specified Over level.

In-bar Warning Messages

The WVR610A & WVR611A display warning messages within the level meter bars. The warning messages that can appear are shown below in order of priority.

UNLOCKED. The instrument is not locked to an incoming signal on the indicated input channel. Data cannot be decoded and all data and other errors are ignored. This means that if an AES input is selected, nothing recognizable is present on the input, or if embedded audio is selected, the VIDEO input is unrecognizable.

AES PARITY. The incoming subframe does not have even parity as specified by the digital audio standards. The data sample is unreliable and is ignored. The level meters and Lissajous display treat the sample as a zero sample.

AES CRC ERROR. The CRC code in the AES channel status packet is incorrect. Sometimes the CRC code is set to zero, indicating that the signal is missing; when this is the case, this message is not displayed.

MUTE. The number of consecutive all-zero samples is at or exceed the # Samples for Mute setting.

SILENCE. The number of consecutive samples is at or below the specified Silence level.

DISABLED. Disabled can appear for three reasons:

- Analog audio is selected as the bar source, this causes bars 7 and 8 to say DISABLED since there are only 6 analog inputs.
- Embedded audio is selected as the bar source when Composite video is selected as the video input. Since there is no embedded audio in composite, all of the bars will say DISABLED.
- If the currently selected audio source's Bar to Input Map does not have all of the bars mapped to inputs, any bars that are unmapped will say DISABLED.

AES V BIT. Indicates that the Validity bit is set high for one or more data samples. In the AES/EBU standard, a set validity bit indicates that the sample is not suitable for conversion to audio. By default, the level meter bars and Lissajous display treat the affected samples as zero samples.

Other Display

The Other display is used to display an LTC waveform when one is present. This enables you to check the LTC amplitude, noise and the the timecode is locked to the video. The display has two vertical scales, one in Volts and the other in dBu.

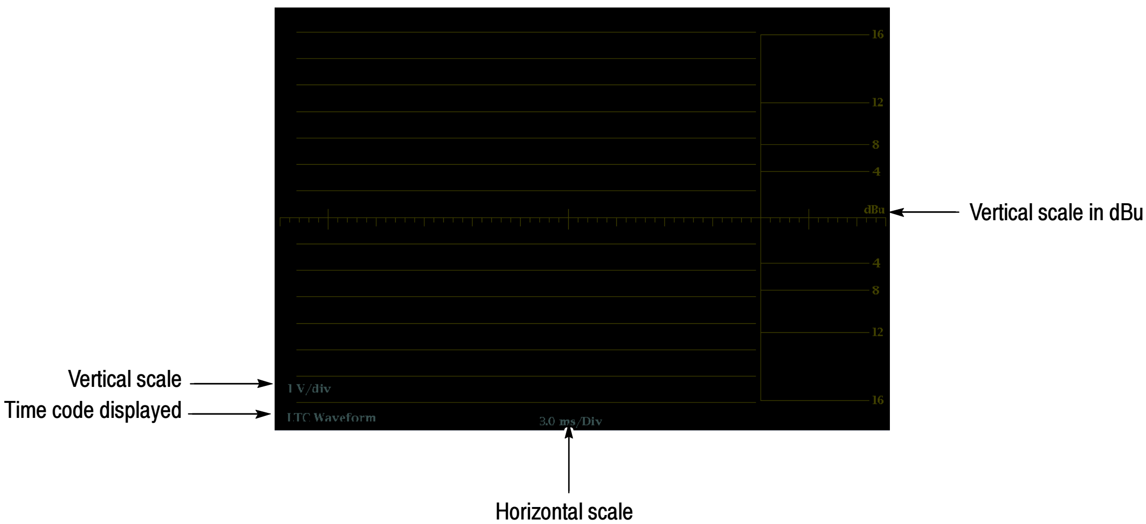


Figure 2-23: Other display elements

Table 2-7: Other display element descriptions

Display element	Description
Vertical scale	Text indicating vertical scale
Time code displayed	Indicates that the LTC is being displayed
Horizontal scale	Text indicating the horizontal scale
Vertical scale in dBu	Alternate graticule with vertical scale in dBu

Gamut Display

The Gamut display provides three proprietary Tektronix displays to enable you to easily and quickly check the gamut of an SDI signal. You can choose from the

Arrowhead, Diamond and Split Diamond displays. The Arrowhead display provides NTSC and PAL composite gamut information directly from the SDI signal. The Diamond and Split Diamond display provide a reliable method of detecting invalid colors.

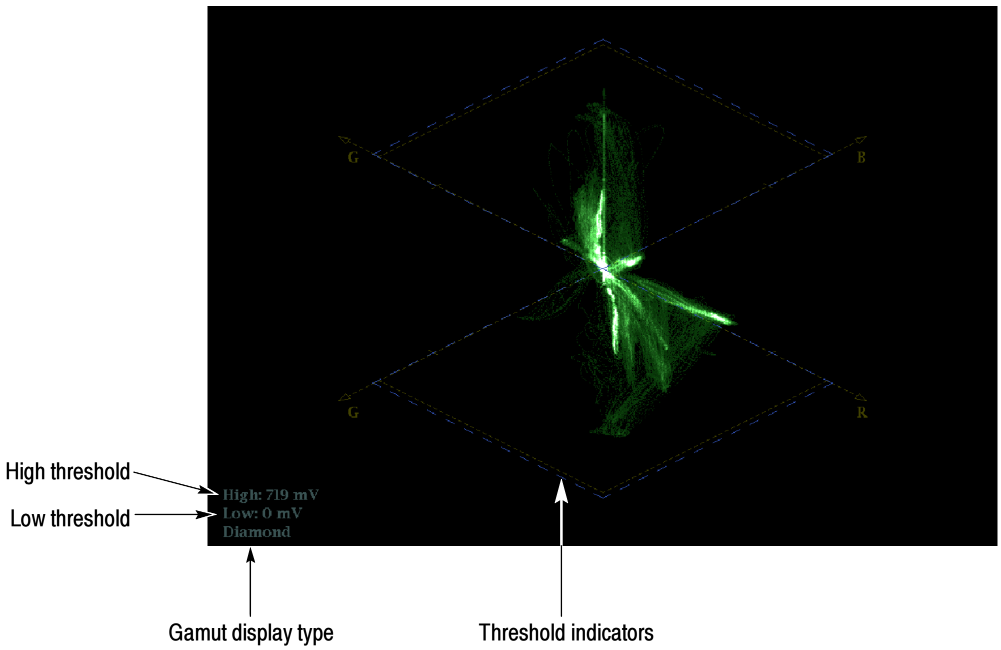


Figure 2-24: Gamut display elements

Table 2-8: Waveform display element descriptions

Display element	Description
High threshold	Text showing the currently specified high threshold (Diamond High or Arrowhead Max).
Low threshold	Text showing the currently specified low threshold (Diamond Low).
Gamut display type	The selected Gamut display type: Diamond, Split Diamond, or Arrowhead.
Threshold indicators	Blue dashed lines indicating the threshold settings.

Status Display

The Status display provides several views of signal status. Status displays are text displays that show signal status in a variety of ways. You can view current alarms and errors (those occurring now and within the last few seconds), a history of errors and alarms (up to 10,000 entries), video error statistics or audio error statistics. You can display a different Status display type in all four tiles at once. See Figure 2–25.

Figure 2-25: A STATUS display in all four tiles

For detailed information on the elements of the various Status displays, see *Configuring Alarms and Viewing Status* on page 3–33

Navigating Menus

Both the pop-up menus and the Configuration menu contain multiple panes of information. To change settings in a menu, you must navigate or traverse to the desired pane of the menu. See Figure 2–26.

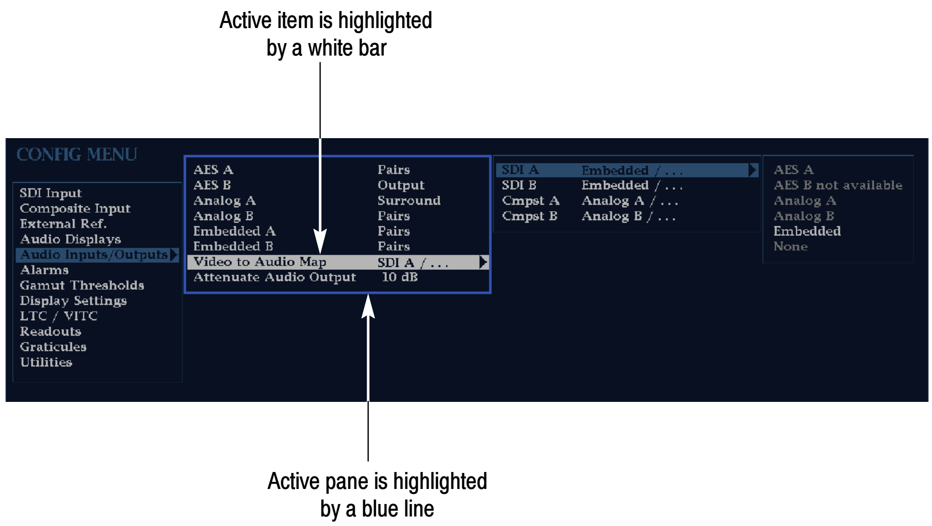


Figure 2-26: Panes in a menu

Only one pane of the menu is active at a time, this pane is indicated by a blue highlight ring. In Figure 2–26, the highlight appears around the middle pane.

To change a setting, you must highlight the desired setting. To move the highlight between panes in a menu, use the arrow keys or the **SEL** button.

To navigate in a menu:

1. Use the up/down-arrow keys or the **GENERAL** knob to select the desired item within a pane.
2. Press the right-arrow key to access the next pane. Repeat if necessary.
3. Use the right-arrow key or the **SEL** button to change the value of the selection.
4. If the knob icon appears next to a selection, you use the **GENERAL** knob to change that selection. See Figure 2–27. You can also use the up and down-arrow keys, but the knob is usually faster.

Figure 2-27: Knob icon

5. Press the left-arrow key to move the highlight back to a previous pane.

6. Press any other button to exit the menu.

Setting the Active Tile

Normally, there are four displays on the screen. Each display or quadrant is called a tile. The tiles are numbered 1, 2, 3, and 4, corresponding to the numbered Display Select front-panel buttons. See Figure 2-28.

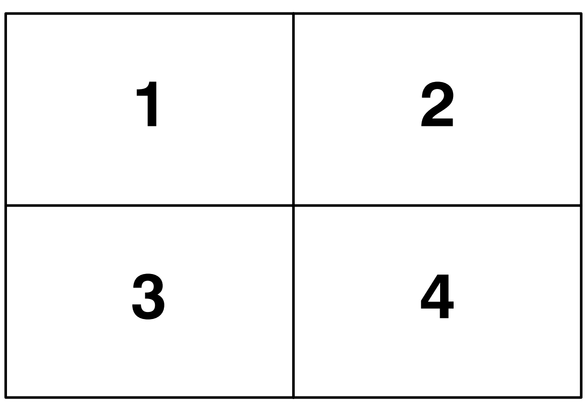


Figure 2-28: Tile positions in the display

One of the four tiles is defined as the *active tile*. The active tile is indicated by the lit Display Select button on the front panel and by the light blue highlight around the tile in the display (see Figure 2-29). Most changes to the instrument state affect the active tile. For example, changing a Vector display to an Audio display changes only the active tile.

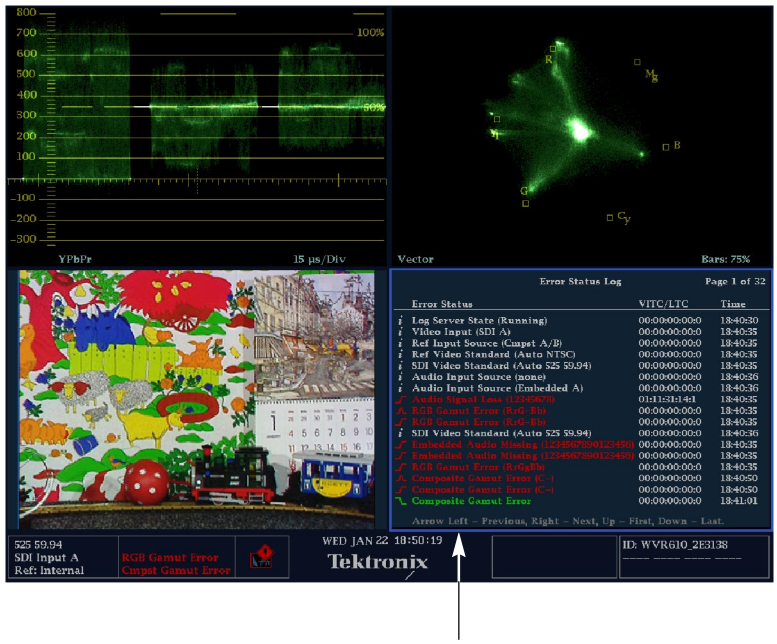


Figure 2-29: Identifying the active tile

To change the active tile:

- Press the numbered Display Select button of the tile you wish to make the active tile. See Figure 2-30.

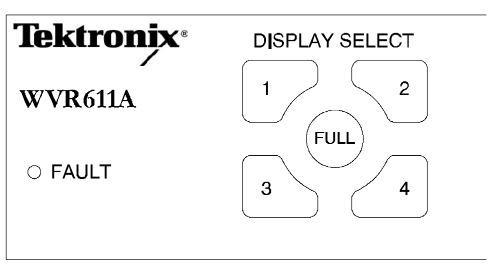


Figure 2-30: Press a numbered button to set the active tile

Displaying a Tile in Full-screen Mode

The waveform rasterizer can display four tiles at once or just one tile. When just one tile is displayed, it occupies the full screen. See Figure 2-31.

To display a tile in full-screen mode:

1. If necessary, press the numbered Display Select button for the tile you want displayed in full-screen mode to make it the active tile.

2. Press the **FULL** button.

When the display is in full-screen mode, press **FULL** again to return to Tile mode.

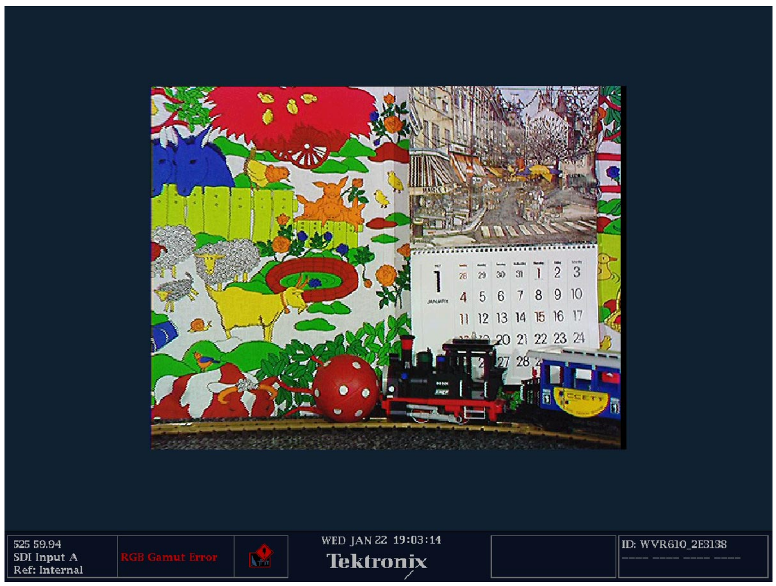


Figure 2-31: Full-screen mode

While in the full-screen mode, if you press another DISPLAY SELECT button, the waveform rasterizer will display the contents of the selected tile in full-screen mode.

Selecting a Measurement for the Active Tile

To select a measurement for the Active tile:

- Press the button for the measurement you want displayed in the active tile.

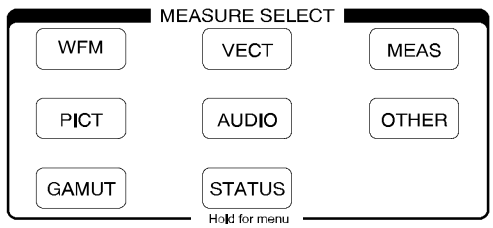


Figure 2-32: Measure select buttons

Most measurement selections can be displayed multiple times. For example, you can display a Waveform measurement in two tiles, one with 1X gain and one with 5X gain. Or you can display multiple STATUS screens all at the same time. The exception is the AUDIO measurement; only one instance of the AUDIO tile can be displayed at a time.

Using Online Help

The WVR610A & WVR611A online help is a quick reference to instrument operation. The online help is context sensitive, and the topic displayed depends on what is displayed in the active tile when the online help is selected. See Figure 2-33.

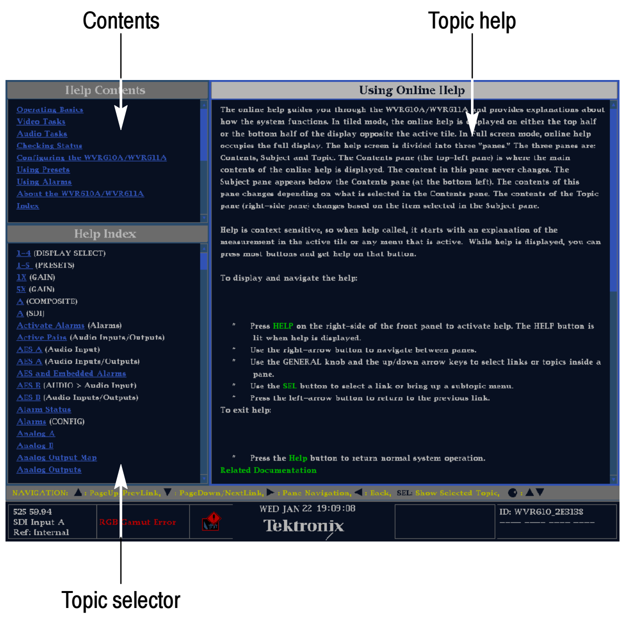


Figure 2-33: The three sections of the online help

The online help contains three panes: Contents, Topic Selector, and Topic Help. The Contents pane displays the major help topics available, including an index. The choices in the Contents pane are always the same.

The choices in the Topic Selector pane change depending on the major topic chosen in the Contents pane. The choices in the Topic Selector are subtopics related to the major help topic selected in Contents. When Index is selected in Contents, the Topic Selector pane lists all the index entries.

The Topic Help pane displays the help for the subtopic selected in the Topic Selector or for a button pressed while help is displayed. The Topic Help section can also contain links to other topics within help. See Figure 2-33.

The online help is context sensitive. For example, if you press a button when the online help is displayed, the online help will display the Topic Help for the button you press. Additionally, if you have a pop-up menu displayed and select a setting in the pop-up menu and press HELP, the online help displays the topic help for the item selected in the pop-up menu.

To display the online help:

- Press **HELP** on the right side of the front panel.

To navigate the online help:

- Press the right-arrow key to move the selection highlight to the next pane.
- Use the **GENERAL** knob and the up / down arrow keys to select a topic you wish to display.
- Press **SEL** to display a selected topic.
- To follow a link within topic help, highlight the link using the GENERAL knob or the up / down arrow keys, then press **SEL**.
- Press the left-arrow key to go back to the previous link.

To exit the online help:

- Press **HELP**.

Rear Panel Connections

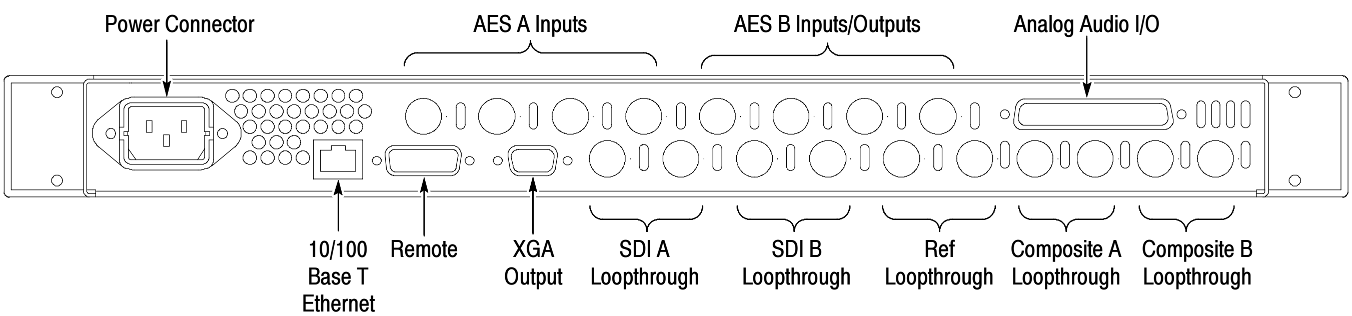


Figure 2-34: Rear-panel connectors

Power Connector

The waveform rasterizer is designed to operate from a single-phase power source with one current-carrying conductor at or near earth-ground (the neutral conductor). Only the line conductor is fused for over-current protection. The fuse is internal. Systems that have both current-carrying conductors live with respect to ground (such as phase-to-phase in multiphase systems) are not recommended as power sources. The power source frequency is 50 or 60 Hz. The operating voltage range is continuous from 100 to 240 VAC.

Video Input Connectors

There are two SDI and two Composite (WVR611A only) loop-through connectors on the rear panel.

SDI A Loop-through. A passive loop-through component serial digital input, compensated for 75 Ω.

SDI B Loop-through. A passive loop-through component serial digital input, compensated for 75 Ω.

Composite A Loop-through. A passive loop-through composite analog input, compensated for 75 Ω. (WVR611A only)

Composite B Loop-through. A passive loop-through composite analog input, compensated for 75 Ω. (WVR611A only)

Ref Loop-through. A passive loop-through synchronization input, compensated for 75 Ω. The input signal can be analog black burst or analog composite video.

AES A/B Connectors

The BNC connectors labeled AES A /AES B support AES audio inputs (based on the audio option installed). The AES B connectors can be configured to output embedded audio from the Configuration menu. See Table 2-9.

Table 2-9: AES Connectors

Connector	Input /output	Channel supported
AES A 1-2 In	Input	AES channels 1 and 2
AES A 3-4 In	Input	AES channels 3 and 4
AES A 5-6 In	Input	AES channels 5 and 6
AES A 7-8 In	Input	AES channels 7 and 8
AES B 1-2 I/O	Input / Output	AES channels 1 and 2, or when configured from the Configuration menu, AES output of embedded audio channels
AES B 3-4 I/O	Input / Output	AES channels 3 and 4, or when configured from the Configuration menu, AES output of embedded audio channels
AES B 5-6 I/O	Input / Output	AES channels 5 and 6, or when configured from the Configuration menu, AES output of embedded audio channels
AES B 7-8 I/O	Input / Output	AES channels 7 and 8, or when configured from the Configuration menu, AES output of embedded audio channels

Analog Input/Output Connector

The Analog I/O connector is used to input and output analog signals. The Analog I/O connector is a 37-pin, D-subminiature connector. Table 2–10 lists the function of each pin in the connector.

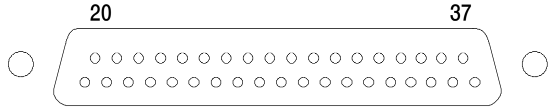


Figure 2-35: Analog I/O connector pin diagram

CAUTION. *Use care when connecting the Analog Audio Output. Refer to Appendix A (Specifications) Table A–25, to ensure Audio Load and Output Power meet specifications. Exceeding Analog Audio Output Power may result in damage to the instrument.*

Table 2-10: Analog I/O connector pin-out

Pin	Pin name	Description
1	ANALOG_INPUT_LP0_A	Balanced differential analog audio input: Left, positive, Pair 0, Line A
2	ANALOG_INPUT_LP0_B	Balanced differential analog audio input: Left, positive, Pair 0, Line B
3	ANALOG_INPUT_RP0_A	Balanced differential analog audio input: Right, positive, Pair 0, Line A
4	ANALOG_INPUT_RP0_B	Balanced differential analog audio input: Right, positive, Pair 0, Line B
5	ANALOG_INPUT_LP1_A	Balanced differential analog audio input: Left, positive, Pair 1, Line A
6	ANALOG_INPUT_LP1_B	Balanced differential analog audio input: Left, positive, Pair 1, Line B
7	ANALOG_INPUT_RP1_A	Balanced differential analog audio input: Right, positive, Pair 1, Line A
8	ANALOG_INPUT_RP1_B	Balanced differential analog audio input: Right, positive, Pair 1, Line B
9	ANALOG_INPUT_LP2_A	Balanced differential analog audio input: Left, positive, Pair 2, Line A
10	ANALOG_INPUT_LP2_B	Balanced differential analog audio input: Left, positive, Pair 2, Line B
11	ANALOG_INPUT_RP2_A	Balanced differential analog audio input: Right, negative, Pair 2, Line A
12	ANALOG_INPUT_RP2_B	Balanced differential analog audio input: Right, positive, Pair 2, Line B
13	GND	
14	ANA_OUT_LP0	Balanced differential analog audio output: Left, positive, Pair 0
15	ANA_OUT_RP0	Balanced differential analog audio output: Right, positive, Pair 0
16	ANA_OUT_LP1	Balanced differential analog audio output: Left, positive, Pair 1
17	ANA_OUT_RP1	Balanced differential analog audio output: Right, positive, Pair 1
18	ANA_OUT_LP2	Balanced differential analog audio output: Left, positive, Pair 2
19	ANA_OUT_RP2	Balanced differential analog audio output: Right, positive, Pair 2
20	ANALOG_INPUT_LN0_A	Balanced differential analog audio input: Left, negative, Pair 0, Line A

Table 2-10: Analog I/O connector pin-out (Cont.)

Pin	Pin name	Description
21	ANALOG_INPUT_LN0_B	Balanced differential analog audio input: Left, negative, Pair 0, Line B
22	ANALOG_INPUT_RN0_A	Balanced differential analog audio input: Right, negative, Pair 0, Line A
23	ANALOG_INPUT_RN0_B	Balanced differential analog audio input: Right, negative, Pair 0, Line B
24	ANALOG_INPUT_LN1_A	Balanced differential analog audio input: Left, negative, Pair 1, Line A
25	ANALOG_INPUT_LN1_B	Balanced differential analog audio input: Left, negative, Pair 1, Line B
26	ANALOG_INPUT_RN1_A	Balanced differential analog audio input: Right, negative, Pair 1, Line A
27	ANALOG_INPUT_RN1_B	Balanced differential analog audio input: Right, negative, Pair 1, Line B
28	ANALOG_INPUT_LN2_A	Balanced differential analog audio input: Left, negative, Pair 2, Line A
29	ANALOG_INPUT_LN2_B	Balanced differential analog audio input: Left, negative, Pair 2, Line B
30	ANALOG_INPUT_RN2_A	Balanced differential analog audio input: Right, negative, Pair 2, Line A
31	ANALOG_INPUT_RN2_B	Balanced differential analog audio input: Right, negative, Pair 2, Line B
32	ANA_OUT_LN0	Balanced differential analog audio output: Left, negative, Pair 0
33	ANA_OUT_RN0	Balanced differential analog audio output: Right, negative, Pair 0
34	ANA_OUT_LN1	Balanced differential analog audio output: Left, negative, Pair 1
35	ANA_OUT_RN1	Balanced differential analog audio output: Right, negative, Pair 1
36	ANA_OUT_LN2	Balanced differential analog audio output: Left, negative, Pair 2
37	ANA_OUT_RN2	Balanced differential analog audio output: Right, negative, Pair 2

Connecting Signals. When connecting audio signals to the Analog Input connectors, you can use either balanced or unbalanced signals. If you connect unbalanced signals to the inputs, you do not have to ground the unused lead (grounding the unused lead can reduce noise).

When connecting the Analog Output connectors, you can connect them as balanced or unbalanced. However, if you connect the balanced outputs to an unbalanced input, you must ground the unused lead. You can ground either lead.

***NOTE**. Note that grounding the unused lead does not attenuate the output but it does halve the clipping level. Therefore, you must attenuate the output by at least 6 dB to avoid clipping. The output signal level in unbalanced mode is double the signal level in balanced mode.*

Units that have both analog and digital capability can have AES or embedded inputs converted to analog and then routed to the six balanced outputs.

XGA Output Connector

This is the display output. The display resolution is 1024 x 768, in 16 colors. The output is compatible with standard analog PC monitors, either CRT or LCD-based. The REMOTE connector is a 15-pin D-type connector with socket contacts. See Figure 2–36.

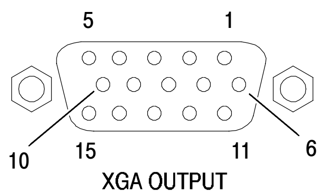


Figure 2-36: XGA output connector pin diagram

Table 2-11: XGA connector pin-out

Pin	Description	Notes
1	Red Video	
2	Green Video	
3	Blue Video	
4	Not connected	
5	Ground	
6	Red Ground	
7	Green Ground	
8	Blue Ground	
9	+5 V	For monitor EEPROM
10	Not Connected	
11	Not Connected	
12	ID Bit	Supports I^2C polling
13	Horizontal Sync	
14	Vertical Sync	
15	ID Clock	

Ground Closure

The REMOTE connector interface uses ground closures for remote control and indicating to external equipment when alarms have occurred. The input of LTC is through the REMOTE connector. The REMOTE connector is a 15-pin D-type connector with socket contacts. See Figure 2–37 and Table 2–12.

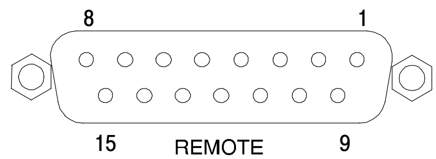


Figure 2-37: REMOTE connector pin diagram

Table 2-12: REMOTE connector pin-out

Pin	Description	Direction	Notes
1	Reserved for future use	--	
2	GND		
3	Reserved for future use	--	
4	Reserved for future use	--	
5	Preset 1	IN	Recall Preset 1
6	GND		
7	+Time Code	IN	LTC (longitudinal time code) input.
8	-Time Code	IN	
9	Output	OUT	This line goes to ground when asserted. It is asserted when an alarm occurs, if enabled.
10	Reserved for future use	--	
11	Reserved for future use	--	
12	Reserved for future use	--	
13	Preset 2	IN	Recall front-panel presets. Asserting one of the Preset signals causes the associated front-panel preset to be applied to the waveform rasterizer. Assert a pin by connecting it to ground.
14	Preset 3	IN	
15	Preset 4	IN	

Ethernet Connector

The waveform rasterizer provides a 10/100 BaseT Ethernet interface. The Ethernet connector is a standard RJ-45 connector. See Figure 2–38.

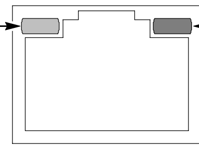


Figure 2-38: RJ-45 Ethernet connector

The connector includes two LEDs for indicating status. See Table 2–13.

Table 2-13: Ethernet connector LEDs

LED color	Meaning
Green	Connection is active
Yellow	ON = 100 Mb transmission rate OFF = 10 Mb transmission rate

Table 2–14 provides a pin-out for the RJ-45 connector.

Table 2-14: Ethernet connector pin-out

Pin	Pin name	Description
1	TX_D1+	Transceive Data+
2	TX_D1-	Transceive Data-
3	RX_D2+	Receive Data+
4	BI_D3+	Bi-directional Data+
5	BI_D3-	Bi-directional Data-
6	RX_D2-	Receive Data-
7	BI_D4+	Bi-directional Data+
8	BI_D4-	Bi-directional Data-

Changing Instrument Settings

Use the Configuration menu to adjust instrument settings that are not specific to a tile. The Configuration menu settings are instrument settings that you will generally set when you first install the waveform rasterizer, and then change only occasionally afterward.

SDI Input Settings

The SDI Input settings specify how SDI inputs are displayed. See Table 2–15.

To change the SDI Input settings:

1. Press **CONFIG** to display the Configuration menu.
2. Select **SDI Input** to display the submenu.
3. Press the right-arrow key to change the menu focus to the **SDI Input** submenu.
4. Select the desired setting and change the setting as needed.
5. After changing the setting, press **CONFIG** to remove the Configuration menu.

Table 2-15: SDI input settings

Setting	Choices / Range
Input Format	Auto / 525 / 625
Strip EAV/SAV/ANC	On / Off
Chroma	Offset / Align
NTSC Setup	0% / 7.5%

Input Format

Specifies the format of the input signal. **Auto** allows the input to automatically detect the input format, or it can be configured to run only in 525 or 625 line mode. The manual mode (525 or 625) may be useful for signals with errors.

Strip EAV/SAV/ANC

Determines whether the EAV and SAV timing references or the ancillary data, such as audio, are visible in the Waveform display. Since these data values are not band limited, they usually ring when displayed through the video waveform filters.

Chroma Determines the vertical position of the color difference signals. If you select Align, the chroma zero levels are aligned with the luminance zero level. The color difference signals will extend below luma, but Gain will expand around the zero levels. If you select Offset a 350 mV positive offset is added to the PbPr channels. This does not affect the transcoded RGB display or the picture monitor output signal.

NTSC Setup Specifies how the SDI–>Composite and Arrowhead display will be setup.

Composite Input Settings

The Composite Input settings specify how composite inputs are displayed. See Table 2–16.

To change the Composite Input settings:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Composite Input**.
3. Use the navigation keys to change the menu focus to the submenu.
4. Select the desired setting and change the setting as needed.
5. After changing the setting, press **CONFIG** to remove the Configuration menu.

Table 2-16: Composite input settings

Setting	Choices / Range
Input Format	Auto / NTSC / PAL
DC Restore	Fast / Slow /Off
NTSC Setup	On / Off
PAL Vector	Normal / V+

Input Format Specifies the format of the input composite signal. In Auto, the waveform rasterizer automatically detects the correct format. This setting is useful when you occasionally changes the input format. If you always monitor the same signal format, you can specify NTSC or PAL.

DC Restore

Applies a voltage to the signal to keep one point on the waveform at a fixed DC level. This makes taking measurements easier when the DC level of the waveform shifts due to changes in signal content. Setting choices are Fast, Slow, and Off.

- Select **Off** when you wish to see the DC offset in the signal. Off cancels the operation of the DC Restore circuitry.
- Select **Slow** when you wish to remove DC offset from the signal but you still want to see hum.
- Select **Fast** when you want to remove the effects of hum and offset from the signal.

NTSC Setup

The NTSC Setup setting optimizes the operation of the WVR610A & WVR611A for NTSC signals with and without set up. For example, this setting changes the scaling of the vector bar targets.

PAL Vector

When V+ is chosen, the phase reference of the –V lines is inverted, then shown as an overlay on the +V lines to provide a comparison display.

External Reference Setting

The External Reference setting specifies the allowed formats of the signal on the EXT REF IN connector. See Table 2–17.

To change the External Reference settings:

1. Press **CONFIG** to display the Configuration menu.
2. Use the **GENERAL** knob or the up/down arrow keys to select **External Ref**.
3. Use the navigation keys to change the menu focus to the External Ref submenu.
4. Select the Lock to Standard setting and change the setting as needed.
5. After changing the setting, press **CONFIG** to remove the Configuration menu.

Table 2-17: External reference settings

Setting	Choices
Lock to Standard	Auto / NTSC / PAL

Lock to Standard Sets the external reference format. In **Auto**, the waveform rasterizer automatically detects the correct format. This setting is useful when you occasionally change the input format for the external reference signal. If you always use the same external reference signal format, you can specify **NTSC** or **PAL**.

Audio Display Settings

The Audio Display submenu provides access to parameters that control meter ballistics, various meter characteristics such as Peak Hold Time, the number of consecutive samples required to trigger various alarms, and other settings. Table 2–18 lists the settings for audio displays.

To change the audio display settings:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Audio Displays**. Use the right-key to change to menu focus to the Audio Displays submenu.
3. Select the desired setting and change the setting as desired.
4. After changing the setting, press **CONFIG** to remove the Configuration menu.

Table 2-18: Audio display settings

Setting	Values
Ballistics	True Peak / PPM Type 1 / PPM Type 2 / VU Default: True Peak
Peak Hold Time	Range: 0 to 10 seconds Default: 2 seconds
Peak Hold Segment	On / Off Default: On
Set 0dB Mark To:	Top of Scale / Peak Program Level / Test Level Default: Peak Program Level
Peak Program Level	0 to -30 dB Default: -8 dB
Test Level	0 to -30 dB Default: -18 dB

Table 2-18: Audio display settings (Cont.)

Setting	Values
Meter Scaling	Normal (Default) Custom Height: 10 to 90 dB (Default: 70 dB) Custom Offset: -20 to 0 dB (Default: 0 dB)
# Samples for Clip	Range: 0 to 100 Default: 1
# Sample for Mute	Range: 0 to 100 Default: 10 consecutive
Silence Level	Range: -70 to -40 dB Default: -60 dB
Duration for Silence	Range: 0 to 60 seconds Default: 10 seconds
Over Level	Range: -20 to 0 dB Default: -8 dB
Duration for Over	Range: 0 to 30 seconds Default: 1 second
Error Hold Time	Range: 0 to 30 seconds Default: 2 seconds
Ignore Validity Bit	On / Off Default: Off
Correlation Meter Speed	Range: 1 to 30 Default: 8
Lissajous AGC	On / Off Default: On

Ballistics

Specifies the response characteristics of the level meters. Choices are True Peak, PPM (Peak Program Meter) Type 1 and Type 2, and VU.

- **True Peak** – Show actual signal peaks regardless of their duration. Rise times are essentially instantaneous. Fall time is like PPM Type 2, and requires 2.8 seconds to fall 20 dB. The in-bar peak indicator will persist at the peak level for the "Peak Hold Time". When True Peak ballistics are selected, the display designation is **True Peak Ballistics**.

- **PPM Type 1**– Response equivalent to IEC Type I (essentially the same as DIN 45406 and Nordic N–9). The PPM Type 1 has a slightly faster attack time and a faster return time than Type 2, requiring 1.7 seconds to fall 20 dB as opposed to 2.8 seconds for Type II. When PPM Type 1 ballistics are selected, the display designation is **PPM Type 1 Ballistics**.

- **PPM Type 2–**Response equivalent to IEC Type II (the same as defined in IEEE Std 152–1991). The PPM Type 2 has a slightly slower attack time and a slower return time than Type 1, requiring 2.8 seconds to fall 20 dB as opposed to 1.7 seconds for Type 1. When PPM Type 2 ballistics are selected, the display designation is **PPM Type 2 Ballistics**.
- **VU –** A VU meter as defined by IEEE Std. 152-1991, but with an extended dB-linear scale. The meter bars will also contain true peak indicators when VU is selected. The display designation of this setting is **VU Ballistics**.

Peak Hold Time

Specifies the number of seconds that the True Peak Indicator remains at the most recent peak level.

Peak Hold Segment

Switches the Peak Hold Indicator on or off.

Set 0 dB Mark To

Numbers the meter scale relative to Top of Scale or to one of the two user-adjustable levels. When the zero mark is set to either Peak Program or Test level, the scale units are dBr, relative to the 0 dB level; units above the selected 0 dB mark are positive, while units below it are negative.

Peak Program Level

Sets the maximum desired level for monitored programs relative to digital full scale. The meter bars change to red above the Peak Program Level.

Test Level

Sets as the test or "line up" level for your system relative to digital full scale. The meter bars change to yellow between the Test and Peak Program Levels.

Meter Scaling

Sets the scaling for the level meters. Meter scaling can be set to Normal or Custom; the Custom setting has two parameters: Custom Height and Custom Offset. At the Normal setting, the meter scale is set to a 70 dB range, with the actual values at the top and bottom of the meter depending on the setting for *Set 0dB Mark to:*. When you select either custom setting, both are enabled. When using Custom Height, the range of the meters can be set from 10 – 90 dB. When using Custom Offset, you are setting the location of a "window" on the bar, where the size of the window is set by the Custom Height setting. The Custom Offset setting, in effect, moves the window up and down the range of the level meter.

Samples for Clip

Specifies the number of consecutive Full Scale samples that must occur for a clip indication to appear. Setting the number of samples to "0" disables the alarm.

 # Samples for Mute

Specifies the number of consecutive “0” samples that must occur for a mute indication to appear. Setting the number of samples to “0” disables the alarm.

Silence Level

Sets the audio level below which the signal is considered silent. This value is used to trigger an on-screen indicator and alarms.

Duration for Silence

Specifies how long the audio level must be below the *Silence Level* before an alarm is triggered. Setting the duration to “0” seconds disables the alarm.

Over Level

Specifies the audio level above which the signal is considered “over”. This setting is used to trigger on-screen indicators and alarms.

Duration for Over

Specifies how long the audio level must be above the *Over Level* before an alarm will be triggered.

Error Hold Time

Specifies the length of time the in-bar error messages are displayed after the error has been removed.

Ignore Validity Bit

Determines how the waveform rasterizer reacts to a high (value 1) validity bit in the input data. In AES3-1992 digital audio, a high validity bit indicates that the sample word is not suitable for conversion to audio. When this setting is set to the factory default of **Off**, the waveform rasterizer will ignore any sample accompanied by a high validity bit, display a “V BIT” flag on the meter display and report invalid samples on the session report. When set to **On**, invalid sample reporting will be turned Off, and the waveform rasterizer will treat all samples as valid.

Correlation Meter Speed

Determines how quickly the meter reacts to changes in phase relationship. The meter reading is actually an average of correlation over time and this setting determines how many samples are used to calculate the average. Lower settings result in a faster meter response. Experiment to find the setting that best fits your needs. The default setting is 8, which is 1.5 seconds.

Lissajous AGC

When On, allows the Lissajous or Phase display to change gain and keep the display well scaled. When Off, puts the display in fixed gain mode with the Peak Program level at the perimeter of the active area.

***NOTE**. The audio pop-up menu allows selection of input and allows the optional phase display to be added to the audio tile.*

Audio Inputs/Outputs

There are two CONFIG submenus for audio: **Audio Inputs / Outputs** and **Audio Displays**. Audio Inputs/Outputs controls which audio input is active. Audio inputs and outputs must be configured before they can be used. Audio Displays controls general audio configuration settings for parameters such as meter ballistics. See *Audio Display Settings* on page 2-38.

Control of which audio input is active is located in the AUDIO pop-up menu.

To set up audio inputs/outputs, first each input group should be configured. Then if desired, a “Video to Audio Map” can be defined so that as you change video inputs the audio source you want will be selected automatically. Finally, any desired ”Analog Audio Out Mapping” can be configured.

For units with digital audio capability, there are four AES pair inputs in the “A” bank and four in the “B” bank. Four pairs of audio signals can also be extracted (de-embedded) from the active serial video input. The “B” input bank can be configured as an output for the extracted audio. When in this mode the B input bank is not available as an input source.

For units with analog audio capability, there are six balanced inputs in the “A” bank and six in the “B” bank. There are also six balanced outputs.

Units that have both analog and digital capability can convert AES or embedded inputs to analog and route to the six balanced outputs.

Audio Inputs/Outputs Parameters

Table 2-19 lists the configuration options for the audio inputs and outputs.

Table 2-19: Audio Inputs and Outputs

Input	First choice	Second choice
AES A	Bar Format	Pairs / Surround
	Input to Bar Map	
	Analog Out Map	
AES B	Config Port As	Input / Output
	Bar Format	Pairs / Surround
	Input to Bar Map	
	Analog Out Map	
Analog A	Bar Format	Pairs / Surround
	Input to Bar Map	
	Analog Out Map	
Analog B	Bar Format	Pairs / Surround

Table 2-19: Audio Inputs and Outputs (Cont.)

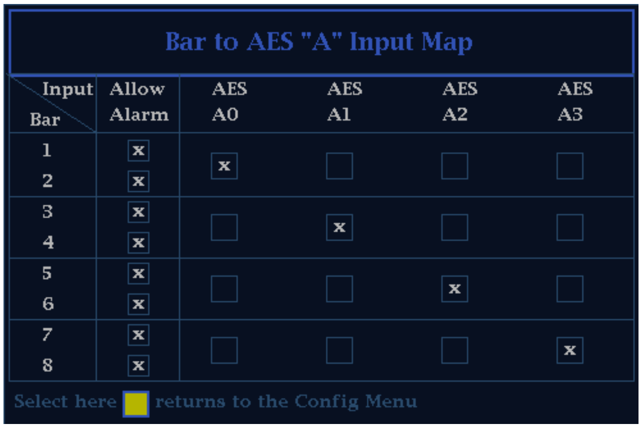
Input	First choice	Second choice
	Input to Bar Map	
	Analog Out Map	
Embedded A	Bar Format	Pairs / Surround
	Input to Bar Map	
	Analog Out Map	
Embedded B	Bar Format	Pairs / Surround
	Input to Bar Map	
	Analog Out Map	
Video to Audio Mapping	SDI A	AES A /AES B / Analog A / Analog B / Embedded / None
	SDI B	AES A /AES B / Analog A / Analog B / Embedded / None
	Cmpst A	AES A /AES B / Analog A / Analog B / None
	Cmpst B	AES A /AES B / Analog A / Analog B / None
Attenuate Audio Output	Press SEL to change	

AES A/B, Analog A/B, Embedded A/B

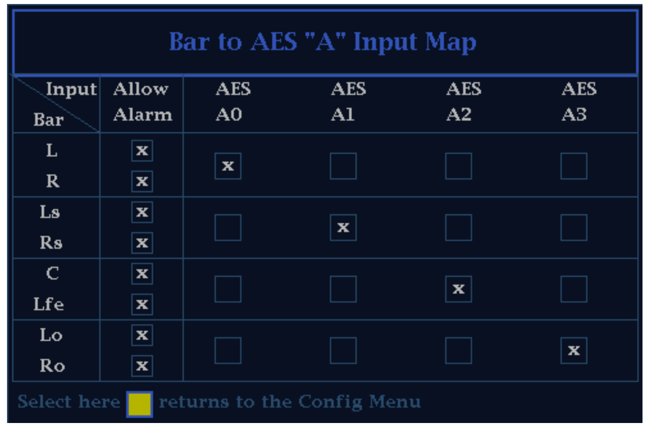
These selections enable you to specify the parameters that affect the audio inputs.

Bar Format. Specifies the format used for the bars (level meters) in the Audio display. When Pairs is selected, the bars are labeled with numbers, 1–8. When Surround is selected, the bars are labeled with surround channel designators: L (left), C (center), R (right), Ls (left-surround), Rs (right-surround), lfe (low-frequency effects), Lo (Left total for stereo equivalent), and Ro (Right total for stereo equivalent). Note that the Lo and Ro channels are inputs, they are not derived from the other channels. See Figure 2–39.

Input to Bar Map. Enables you to map the AES pair inputs to the desired level bar in the Audio tile. Press **SEL** to display the input to bar mapping window. See Figure 2–39. Use the checkboxes (press the arrow-keys to move the selection and press **SEL** to mark a checkbox) to specify which audio input source is displayed in which bar in the Audio window. Note that the labels for the bars change depending on the Bar Format setting. See Figure 2–39



Bar labels when Bar Format is set to Pairs



Bar labels when Bar Format is set to Surround

Figure 2-39: Mapping inputs to bars

Analog Out Map. Enables you to route audio inputs to the analog audio outputs by specifying which level meter bar is mapped to which analog output. See Figure 2–40.

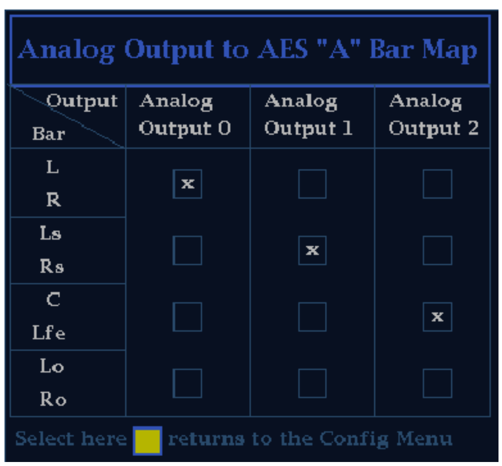


Figure 2-40: Analog out map

Video to Audio Mapping

Associates each of the video inputs with any one of the available audio inputs. For example, if you are select the SDI A video input, you can choose to associate the AES A audio input with it.

Configuring Audio Inputs

To set up an audio input:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Audio Inputs/Outputs** to display the submenu.
3. Select the input to be configured. See Figure 2–41.

Figure 2-41: Configuring audio inputs

4. For the selected input, select from **Surround** for 5.1 or 7.1 type display or **Pairs** for a stereo, plus SAP and discrete channels type installation.
5. For that input select **Input Bar Map** and specify which input pair should be displayed in each bar pair. See Figure 2–42.

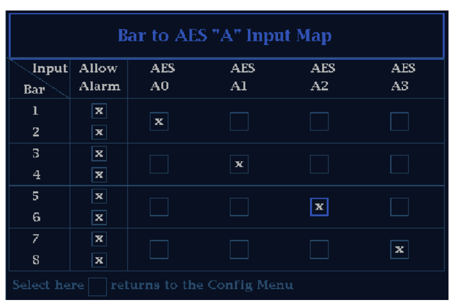


Figure 2-42: Bar to input mapping

6. In the input bar map selector box, you can also select which inputs will be capable of generating alarms.
7. Finally, select the Output Map to specify which input be routed to each analog output. See Figure 2–43.

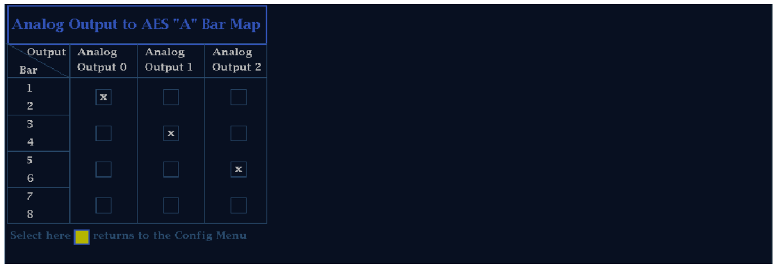


Figure 2-43: Mapping analog output

8. Repeat for other audio inputs as needed for your application.

Configure Video to Audio Mapping

To set up the mapping for Audio follows Video Mode:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Video to Audio Map** to display the submenu.
3. Select a video input, then select the audio input that you want to be active when this video input is active. See Figure 2-44.

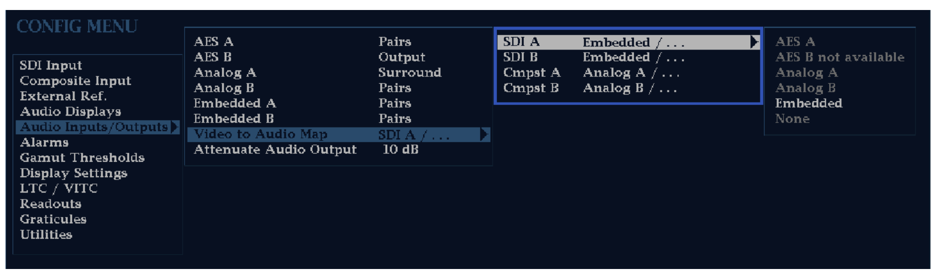


Figure 2-44: Video to audio mapping

4. Repeat for the other video inputs as needed for your application.

Attenuate Audio Output

The Attenuate Audio Output function enables you to attenuate the audio output signal from 0–120 dB. This function is useful if you are connecting unbalanced audio outputs to balanced inputs or you need to adjust the signal level (volume) of the output signal.

CAUTION. *Output Attenuation is necessary when the input audio is abnormally high (that is, greater than –10 dBFS on average or the RMS level exceeds +14dBu). Exceeding these levels for lengthy periods could result in damage to the instrument. Please refer to Appendix A, Table A–25 for further details.*

Setting Up AES B Connectors as Outputs

The AES B connectors can be configured as inputs or outputs. When configured as outputs, the only signal that can be the source to output is the audio that has been de-embedded from the SDI input. The de-embedding is always done from the active input, so if you switch SDI inputs, the audio source will change, and if select a composite input, then the AES B outputs will go silent.

The AES B outputs follow the currently active de-embedded channels as displayed in the audio level bars. So if bar pairs 1,2 and 3,4 are the only ones active, then AES B connectors 1,2 and 3,4 will be the only pairs active as well.

Only one BNC may source the audio from a given de-embedded channel. If the same de-embedded channel is displayed on multiple bar pairs, then only the BNC corresponding to the lowest numbered bar pair will be active.

To set up the AES B connectors as outputs:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Audio Inputs/Outputs**.
3. Select **AES B** from the submenu.
4. Select **Config Port As:**.
5. Press **SEL** to select **Output**. See Figure 2–45.

Figure 2-45: Configuring AES B as an output

6. Press **CONFIG** to remove the Configuration menu.

***NOTE**. If AES B will be used as an output, do not bother to set it up as an input and do not select it in the Audio follows Video mode.*

If AES B is used to output de-embedded audio, the first BNC will have the signal displayed in the first pair of bars. The second BNC will have the signal displayed in the second set of bars and so on. This mapping is not configurable.

Gamut Thresholds Menu

The **Gamut Thresholds** menu enables you to specify the signal levels at which errors and alarms are triggered. See Table 2-20.

To change the **Gamut Threshold** settings:

1. Press **CONFIG** until the menu appears.
2. Use the **GENERAL** knob or the up/down arrow keys to select **Gamut Thresholds**.
3. Use the navigation keys to change the menu focus to the Gamut Thresholds submenu.
4. Select the desired setting and change the setting as needed.
5. After changing the setting, press **CONFIG** to remove the Configuration menu.

Table 2-20: Gamut thresholds

Setting	Choices / Range
Diamond High	Range: 630 mV - 756 mV Default: 721 mV
Diamond Low	Range: -50 mV - +35 mV Default: -21 mV
Diamond Area	Range: 0 - 10% Default: 0%
Reset Diamond Defaults	Press SEL to reset
Arrowhead NTSC Max	Range: 90 - 120 IRE Default: 120 IRE
Arrowhead PAL Max	Range: 630 mV - 950 mV Default: 930 mV

Table 2-20: Gamut thresholds (Cont.)

Setting	Choices / Range
Arrowhead Area	Range: 0 – 10% Default: 0%
Reset Arrowhead NTSC Defaults	Press SEL to reset
Reset Arrowhead PAL Defaults	Press SEL to reset

Diamond High

Sets the level above which RGB components are considered too large and out of gamut.

Diamond Low

Specifies that signals below this level on a Diamond display will trigger an error/alarm.

Diamond Area

Specifies the percentage of the total image pixels (up to 10%) that can be outside the current gamut limits, yet not be reported as a gamut error.

Reset Diamond Defaults

Resets the gamut thresholds for Diamond displays to the factory default.

Arrowhead NTSC Max

Specifies that signals above this level on an Arrowhead NTSC display will trigger an error or alarm.

Arrowhead PAL Max

Specifies that signals above this level on an Arrowhead PAL display will trigger an error or alarm.

Arrowhead Area

Specifies the percentage of the total image pixels (up to 10%) that can be outside the current gamut limits, yet not be reported as a gamut error.

Reset Arrowhead NTSC Defaults

Resets level to factory default for Arrowhead NTSC display.

Reset Arrowhead PAL Defaults

Resets level to factory default for Arrowhead PAL display.

Display Settings Menu

The Display Settings menu allows you to specify various display colors, intensities, and modes for the VGA display. See Table 2–21.

To change the **Display Settings**:

1. Press **CONFIG** to display the Configuration menu.
2. Use the **GENERAL** knob or the up/down arrow keys to select **Display Settings**.
3. Use the right-arrow key to change the menu focus to the submenu.
4. Select the desired setting and change the setting as needed.
5. After changing the setting, press **CONFIG** to remove the Configuration menu.

Table 2-21: Display settings

Setting	Choices / Range
Readout Intensity	0 - 100% Default: 50%
Waveform Intensity	-50 - +50 Default: 0
Waveform Color	White / Green
Graticule Intensity	0 - 100% Default: 50%
Graticule Color	Gold / Blue / Red
Picture Brightness	20 - 100%
Picture Refresh Mode	Interlace / CRT / LCD
VGA Output	0-1.0v / 0-0.7v
Picture Brightup on RGB Gamut Error	On / Off
Picture Brightup on Cmpst Gamut Error	On / Off
Panel Backlight	On / Off
Panel Backlight Intensity	1 - 10

Readout Intensity

Sets the display intensity of on-screen readouts.

Waveform Intensity

Sets the display intensity of the waveform. You can set this to higher values to better see low incidence signals, but it may saturate more frequent signals.

Waveform Color Sets the color of the waveform. When set to green, you can see a wider range of signals since high incidence signals will be displayed in white while most signals will be displayed in green.

Graticule Intensity Sets the display intensity of the graticule.

Graticule Color Sets the color of the graticule.

Picture Brightness Sets the brightness of the picture display.

Picture Refresh Mode The Picture Refresh Mode allows you to optimize the picture mode display for different types of monitors and applications. The three possible values for this configuration item are:

Interlace. <B>Interlace</B> mode runs the picture very close to how it would run on a standard video monitor. Each field is displayed for that field's normal time. This is useful if you want to see the picture with a minimum of processing.

CRT. CRT mode holds the previous field at reduced intensity to make the picture be more uniform and brighter. While this introduces minor motion artifacts it greatly reduces flicker.

LCD. LCD mode holds all of the previous field along with the current field. This introduces some motion artifacts but is necessary to prevent problems on most LCD monitors and projectors. This mode also increases the brightness significantly.

The default mode is **CRT**. If you change to other modes, you may need to adjust the Picture Brightness configuration parameter to optimize the image.

VGA Output Sets the voltage output level for the VGA display.

Picture Brightup on RGB Gamut Error Specifies whether or not the picture display shows a cross-hatch pattern on areas of the picture where RGB gamut errors occur.

Picture Brightup on Cmpst Gamut Error Specifies whether or not the picture display shows a cross-hatch pattern on areas of the picture where composite gamut errors occur.

Panel Backlight The Panel Backlight setting enables you to illuminate the front-panel buttons that are not selected (the illumination setting for selected buttons cannot be changed).

There are two controls for the front-panel backlight. One control turns the backlight on and off (Panel Backlight) and the other control sets the intensity or brightness of the backlight (Panel Backlight Intensity).

Panel Backlight Intensity

Sets the intensity of the front-panel button backlight. This feature is especially useful in low-light situations so you can see buttons that are not selected.

LTC / VITC Menu

The **LTC / VITC** menu enables you to specify which time code is used for logging and whether or not it is displayed in the Status Bar. See Table 2–22.

Table 2-22: LTC / VITC settings

Setting	Description	Choices / Range
Display if Present	Specifies which time code is used for logging and displayed in the Status bar readout	VITC / LTC / Off

Readouts Menu

The **Readouts** menu enables you to turn various display readouts on or off. See Table 2–23.

To change the **Readouts** settings:

1. Press and hold the **CONFIG** button until the menu appears.
2. Use the **GENERAL** knob or the up/down arrow keys to select **Readouts**.
3. Use the navigation keys to change the menu focus to the Readouts submenu.
4. Select the desired setting and change the setting as needed.
5. After changing the setting, press **CONFIG** to remove the Configuration menu.

Table 2-23: Readouts settings

Setting	Choices / Range
Waveform	On / Off
Vector	On / Off

Table 2-23: Readouts settings (Cont.)

Setting	Choices / Range
Picture	On / Off
Gamut	On / Off

Waveform Specifies whether or not readouts are visible in the Waveform display.

Vector Specifies whether or not readouts appear in the Vector display.

Picture Specifies whether or not readouts appear in the Picture display.

Gamut Specifies whether or not readouts appear in the Gamut display.

Graticules Menu

The Graticules submenu enables you to specify the graticule display style associated with different displays based on the input signal. See Table 2–24.

Table 2-24: Graticule settings

Setting	Choices / Range
SDI Vector I/Q Axis	On / Off
Cmpst Waveform Graticule Units	Auto / mV

SDI Vector I/Q Axis Turns the display of the I/Q axis in the Vector display on or off for SDI input signals.

Cmpst Waveform Graticule Units Sets the Waveform display graticule units for Composite input signals.

Utilities Menu

The Utilities submenu provides settings for several non-measurement related waveform rasterizer parameters. See Table 2–25.

To change the **Utilities** settings:

1. Press and hold the **CONFIG** button until the menu appears.

2. Use the **GENERAL** knob or the up/down arrow keys to select **Utility**.
3. Use the navigation keys to change the menu focus to the Utility submenu.
4. Select the desired setting and change the setting as needed.
5. After changing the setting, press **CONFIG** to remove the Configuration menu.

Table 2-25: Utilities settings

Setting	Choices / Range
View HW / SW Version	View Only
IP Config Mode	Manual / DHCP
IP Address	xxx.xxx.xxx.xxx
Subnet Mask	xxx.xxx.xxx.xxx
Gateway Address	xxx.xxx.xxx.xxx
View MAC Address	xx:xx:xx:xx:xx:xx
Set Clock	Time : Date
Instrument Name	15-character alphanumeric string
CPU Color Palette	View Only
System Upgrade	Press SEL
Calibration	Press SEL to Start
Run Power Up Diags	Press SEL
Run Advanced Diags	Press SEL
View Diagnostic Log	Press SEL
Diag Log Mode	Circular / Stop when full

View HW/SW Version

This settings lists the version number for several hardware and software subsystems.

To view the list of hardware and software versions:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Utilities** and press the right-arrow to change the menu focus to the submenu.
3. Select **View HW/SW Version**. The version numbers will appear in the submenu listing to the right. See Figure 2–46.

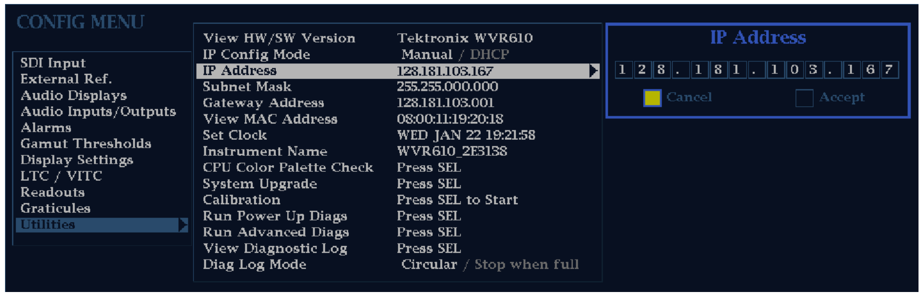


Figure 2-46: Viewing hw/sw version numbers

IP Config Mode

Specifies how the WVR610A & WVR611A network address is determined. Network addresses can be assigned either automatically or manually. If your network uses DHCP (Dynamic Host Configuration Protocol) to assign addresses, then the address will be assigned dynamically to the WVR610A & WVR611A. If your network does not use DHCP, you will have to manually enter the address for the WVR610A & WVR611A. To get an address, talk to your LAN administrator.

To set the IP Config Mode:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Utilities** and press the right-arrow key to change the menu focus to the submenu.
3. Select **IP Config Mode**.
4. Press **SEL** to set the mode to **Manual** or **DHCP** as required.
5. If the IP Config Mode is set to Manual, set the IP Address.
6. Press **CONFIG** to remove the Configuration menu.

IP Address

The IP (Internet Protocol) address is the network address of the WVR610A & WVR611A. If you plan to use your WVR610A & WVR611A on a network (for example, for using the web interface), you may need to set this address depending on how your network assigns addresses. If your network does not use automatic address allocation (DHCP), you will need to set this address. To get an address, talk to your LAN administrator.

To set the IP Address:

1. Press **CONFIG** to display the Configuration menu.

2. Select **Utilities** and press the right-arrow key to change the menu focus to the submenu.
3. Verify the **IP Config Mode** is set to **Manual**.
4. Select **IP Address** and press the right-arrow key to change the menu focus to the submenu. See Figure 2-47.

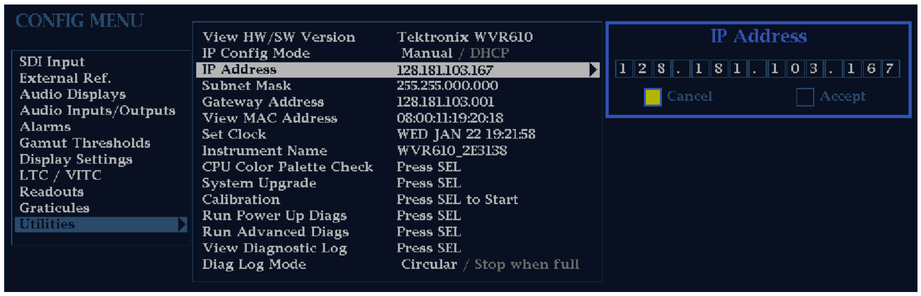


Figure 2-47: Setting IP address

5. Use the left/right arrow keys to move the highlight to each box in the address. Use the up/down arrow keys to change the number in each box as required.
6. Work your way through each box in the address, setting the number as required.
7. To accept your changes, move the highlight to the **Accept** box and press **SEL**.
8. If you wish to cancel the changes you have made, move the highlight to the **Cancel** box and press **SEL**.

Subnet Mask

The Subnet Mask is part of the network address of the WVR610A & WVR611A. If you plan to use your WVR610A & WVR611A on a network (for example, for using the web interface), you may need to set this parameter depending on how your network assigns addresses. If your network does not use automatic address allocation (DHCP), you will need to set this parameter. To get the correct subnet mask, talk to your LAN administrator.

To set the Subnet Mask:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Utilities** and press the right-arrow key to change the menu focus to the submenu.
3. Verify the **IP Config Mode** is set to **Manual**.

4. Select **Subnet Mask** and press the right-arrow key to change the menu focus to the submenu.

5. To change the Subnet Mask, select the **Change** box using the left/right arrow keys. Once **Change** is selected, use the up/down arrow keys to scroll through the list of available masks. See Figure 2-48.

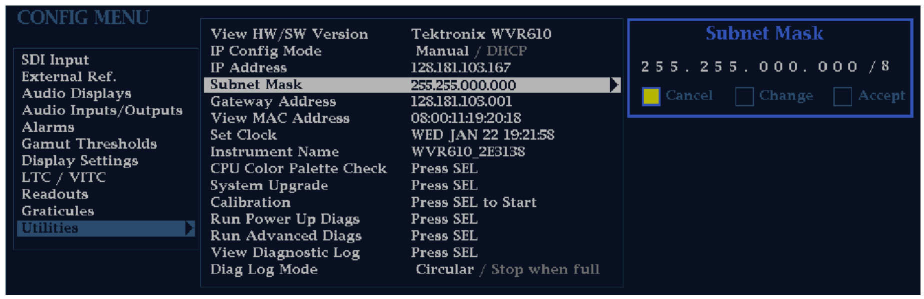


Figure 2-48: Setting subnet mask

6. After you have selected the correct Subnet Mask, use the right-arrow key to select **Accept**. Once **Accept** is highlighted, press **SEL** to accept the change.

7. If you decide not the change the Subnet Mask, move the highlight to the **Cancel** box and press **SEL**.

Gateway Address

The Gateway Address is the network address of a node that serves as an entrance to another network. To find out what the Gateway address is for your network, talk to your LAN administrator.

To set the Gateway Address:

1. Press **CONFIG** to display the Configuration menu.

2. Select **Utilities** and press the right-arrow key to change the menu focus to the submenu.

3. Select **Gateway Address** and press the right-arrow key to change the menu focus to the submenu.

4. Use the left/right arrow keys to move the highlight to each box in the address. Use the up/down arrow keys to change the number in each box as required.

5. Work your way through each box in the address, setting the number as required.

6. To accept your changes, move the highlight to the **Accept** box and press **SEL**.

7. If you wish to cancel the changes you have made, move the highlight to the **Cancel** box and press **SEL**.

View MAC Address

The **View MAC Address** parameter allows you to see the MAC (Media Access Control) address assigned to the instrument. This is a unique address used to identify the instrument.

To view the MAC address:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Utilities** and press the right-arrow to change the menu focus to the submenu.
3. The MAC address appears to the right of **View MAC Address**.

Set Clock

This setting allows you to set the real-time clock in the WVR610A/WVR611A.

To set the clock:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Utilities** and press the right-arrow key to change the menu focus to the submenu.
3. Select **Set Clock** and press the right-arrow key to change the menu focus to the submenu.
4. Use the left/right arrow keys to move the highlight to each box in the time and date fields. Use the up/down arrow keys to change the value in each box as required.

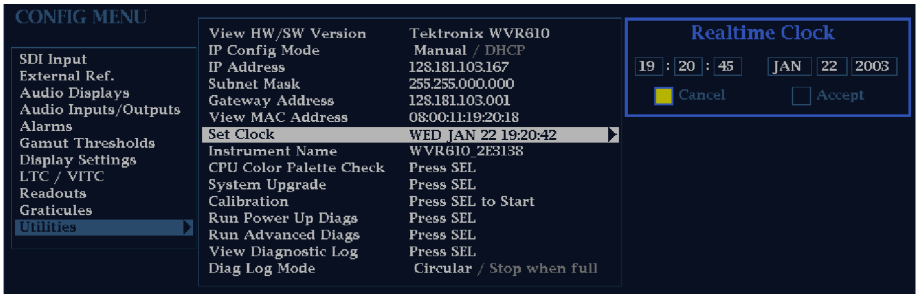


Figure 2-49: Setting the internal clock

5. Work your way through each box in the time and date fields, setting the value as required.

6. To accept your changes, move the highlight to the **Accept** box and press **SEL**.
7. If you wish to cancel the changes you have made, move the highlight to the **Cancel** box and press **SEL**.

Instrument Name

The WVR610A & WVR611A allows you to name the instrument for identification across a network. The instrument name is a 15-character string made up of alphanumeric text. The available characters are 0–9, a–z, A–Z, – , _ , and blank.

To change the instrument name:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Utilities** and press the right-arrow key to change the menu focus to the submenu.
3. Select **Instrument Name** and press the right-arrow key to change the menu focus to the submenu.
4. Use the left/right arrow keys to move the highlight to each box. Use the up/down arrow keys to change the character in each box as required. Press **SEL** to toggle between uppercase and lowercase characters.

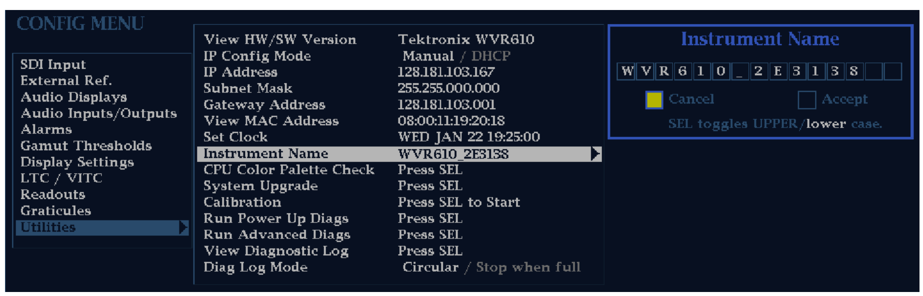


Figure 2-50: Setting the instrument name

5. To accept the name you have entered, move the highlight to the **Accept** box and press **SEL**.
6. If you wish to cancel the changes you have made, move the highlight to the **Cancel** box and press **SEL**.

CPU Color Palette Check

This setting in the Config menu enables a service technician to easily verify that the display color circuitry is operating correctly.

To display the CPU Color Palette:

1. Press **CONFIG** to display the Config menu.
2. Select **Utilities** and press the right-arrow key to change the menu focus to the submenu.
3. Select **CPU Color Palette Check**.
4. Press **SEL** to display the color palette. See Figure 2-51.
5. Press CONFIG to remove the Config menu.

Figure 2-51: CPU color palette

System Upgrade

The **System Upgrade** selection is used to upgrade the system software of the WVR610A & WVR611A. The upgrade is performed access an Ethernet network using a PC to transfer the new software to the WVR610A & WVR611A. For the procedure to upgrade the system firmware, refer to *Appendix D, Upgrading the Waveform Rasterizer Firmware.*

Calibration

This selection is used to calibrate the waveform rasterizer composite and analog audio inputs. Calibration requires the use of additional pieces of test equipment. Information about required equipment and the procedure for performing a calibration is provided in the *WVR610A & WVR611A Waveform Rasterizers Service Manual,* Tektronix part number 071-1243-xx.

Run Power Up Diags

The waveform rasterizer provides diagnostic routines that you can run if you believe your instrument is not behaving correctly. You can run two levels of diagnostics. The Power Up Diags are the diagnostic routines that are run when power is applied to the waveform rasterizer. The Advanced Diags is a more thorough set of diagnostics that you can run if the waveform rasterizer passes the

Power Up Diags but you believe there is still a problem with the waveform rasterizer.

To run the power-up diagnostics:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Utilities** and press the right-arrow to change the menu focus to the submenu.
3. Select **Run Power Up Diags**. Press **SEL** to display the Power-up Diagnostics screen.
4. To run the diagnostics, use the right-arrow key to select **Run Diagnostics**. Press **SEL** to start. See Figure 2-52.

Figure 2-52: Power-up diagnostics passed

5. To exit the Power-up Diagnostics screen, use the right-arrow key to select **Exit** and press **SEL**.

If your waveform rasterizer does not pass the power-up diagnostics, see the *WVR610A & WVR611A Waveform Rasterizers Service Manual* for information on troubleshooting. If you wish to return the waveform rasterizer to Tektronix for servicing, see page xv for information on how to contact Tektronix.

Run Advanced Diags

If your waveform rasterizer passes the power-up diagnostics but you still feel it may not be operating properly, you can run the Advanced Diagnostics. Note that the waveform rasterizer must be rebooted to run the Advanced Diagnostics.

To run the Advanced Diagnostics:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Utilities** and press the right-arrow to change the menu focus to the submenu.
3. Select **Run Advanced Diags**. Press **SEL** to begin the Advanced Diagnostics. This displays the screen show in Figure 2-53.

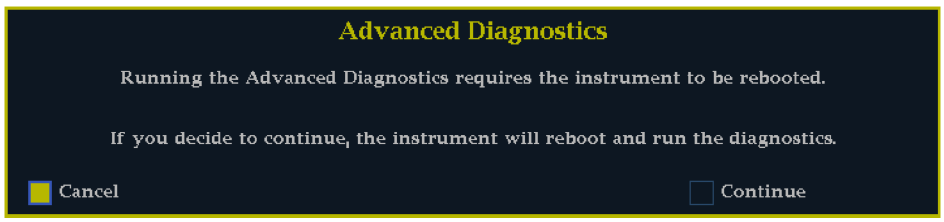


Figure 2-53: Advanced diagnostics dialog box

4. To continue with the Advanced Diagnostics, use the right-arrow key to select **Continue** and press **SEL**.

After the Advanced Diagnostics have been completed, you will see a screen that lists a series of tests and other values. The display will indicate that the tests either Passed or Failed.

If your waveform rasterizer does not pass the Advanced Diagnostics, see the *WVR610A & WVR611A Waveform Rasterizers Service Manual* for information on troubleshooting. If you wish to return the waveform rasterizer to Tektronix for servicing, see page xv for information on how to contact Tektronix.

Viewing the Diagnostic Log

You can display the results of previous diagnostics runs if they have been saved.

To display the diagnostic log:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Utilities** and press the right-arrow to change the menu focus to the submenu.
3. Select **View Diagnostic Log**. Press **SEL** to display the log. This displays a screen similar to Figure 2-54.

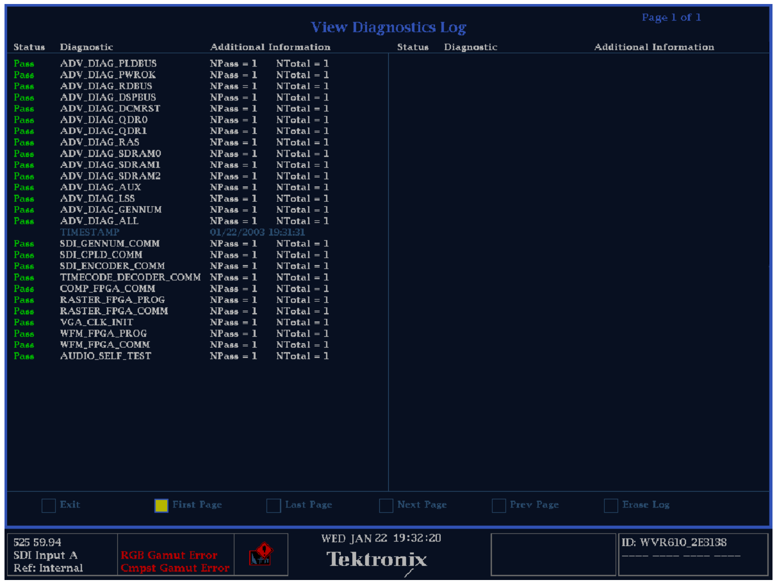


Figure 2-54: Diagnostics log

The Diagnostic Log can contain many pages of information depending on how long it has been since the log was erased and how many times diagnostics have been run.

To view different pages in the Diagnostic Log:

- Use the right-arrow key to select the page you wish to view. Press **SEL** to view the selected page.

You can view the first page, last page, previous page or the next page. The number of pages in the diagnostics log is shown at the top-right corner of the diagnostics log screen.

Table 2–26 describes the contents of the columns that appear in the diagnostics log.

Table 2-26: Diagnostic log contents

Column heading	Description
Status	Either Pass or Fail.
Diagnostic	The name of the diagnostic routine.
Additional Information	Details about the diagnostic routine; entries are: NPass – Number of passes NTotal – Number of times the routine was run

To erase all the entries in the Diagnostic Log:

1. Use the right-arrow key to select **Erase** at the bottom of the diagnostics log screen.
2. Press **SEL** to erase the contents of the diagnostics log.

Setting the Diag Log Mode

The Diagnostics Log can contain only a limited number of entries. You can specify how the waveform rasterizer deals with a full diagnostics log by setting the **Diag Log Mode** in the Config menu. The choices for Diag Log Mode are:

- **Circular –** When set to Circular, the diagnostics log starts overwriting the oldest entries in the log once it is full. In Circular mode, the diagnostics log will add entries indefinitely.
- **Stop when full –** When set to Stop when full, the waveform rasterizer stops adding entries to the diagnostics log when it is full.

To set the Diag Log mode:

1. Press **CONFIG** to display the CONFIG menu.
2. Select **Utilities** from the menu**.**
3. Press the right-arrow key to change the menu focus to the submenu.
4. Press **Diag Log Mode** from the submenu.
5. Press **SEL** to change the setting between **Circular** and **Stop when full**.
6. Press **CONFIG** to remove the menu.

Reference

Displaying and Monitoring Video

Monitoring a Waveform

Monitoring a waveform can mean looking at voltage versus time with the Waveform mode or it can mean looking at one of the x-y displays such as Vector or Diamond. Monitoring a waveform can also mean to set-up alarms to trigger if the signal exceeds certain thresholds.

To monitor a waveform with a waveform display:

1. Press a button from the **MEASURE SELECT** area to put the desired measurement into the active tile. See Figure 3-1.
2. Examine the display to see if the signal exceeds any of the limits appropriate for the given application.

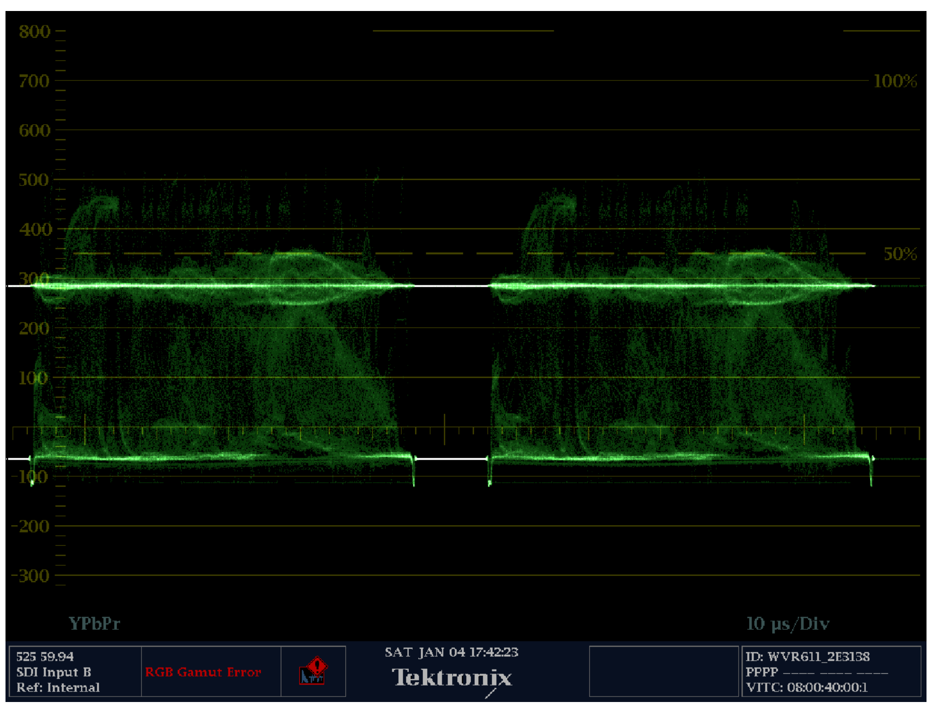


Figure 3-1: Waveform mode

To monitor a waveform using alarms:

1. Configure the alarms to report if one of the available tests exceeds it limits. (For details on configuring alarms, see *Configuring Alarms and Viewing Status* on page 3–33.)

2. Configure the alarm threshold to the limits appropriate for the given application.

Checking Black Level

Black level is the voltage at the low end of the active video range that corresponds to “black”signals.

If the black level is set too high, then blacks will appear gray and washed out. If the black level is set too low, then some low-luminance details of the image may be lost or “crushed.” It is also important for all the components to match or the black images will appear to have a false color. See *Shading a Camera* on page 3–9

For most video formats, the black level is at 0 volts. For NTSC, there is a 7.5 IRE setup that defines the black level. Note that for composite signals it is acceptable for chroma components to go below black.

To check black level:

1. Select the tile where you wish to display the signal.

2. Press **WFM** to select the Waveform display.

3. If the selected input is a composite signal, press and hold **WFM** to display the Waveform menu. Select **Filter > Luma** to apply the Luma filter.

4. Verify that the black level is at 7.5 IRE for NTSC, 53.88 mV for PAL, and 0 for SDI.

***NOTE**. You can use* WFM > Display Style > Parade *mode for this measurement on component signals. It is possible to monitor gain on live material, but it is better to use a known signal such as a camera alignment chart or the color bars on a tape leader to set the gain.*

Selecting a Line for Viewing

In Line Select mode, you can select one line of the video signal to display and measure. You can use Line Select to isolate the characteristics of one portion of the image.

Line Select modifies many of the displays in the WVR610A & WVR611A. For example, in the Waveform display, instead of seeing a waveform that is representative of the entire video frame, the waveform displayed will be the video signal of a single line. The same is true of the Vector, Lightning, and Gamut displays. Line Select stays active as you change between measurement modes. This enables you to select a line in Picture mode, and then go to Waveform, Vector, Diamond, or other modes and view the same line.

To display a specific line in a field:

1. Select the tile where you wish to display the signal.
2. Press **WFM** to select the Waveform display.
3. Press **LINE SEL** to enable line select mode.
4. Use the left-right arrow keys to select the field: **F1**, **F2**, **F3**, up to **F8** (depending on the video standard), or **All**. See Figure 3-2.
5. Use the GENERAL knob or the up-down arrow keys to select the line you wish to display.

***NOTE**. The line select can only be active in one tile at a time. You can change the measurement in that tile and stay in line select. You can also see the line that is currently selected in the picture mode in another tile.*

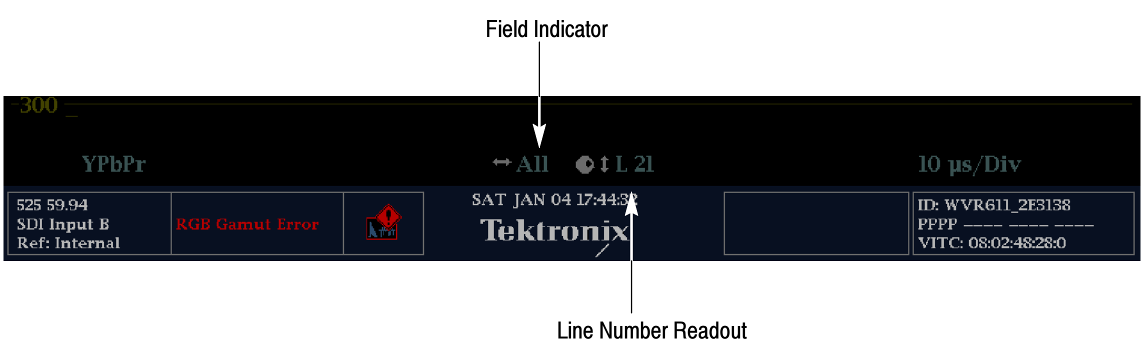


Figure 3-2: Selecting a line for display

How Line Number is Displayed

The line number display consists of two elements: the field indicator and the line number. The line number can be displayed two ways depending on the field selected for display. The field indicator can take the values F1 (field 1), F2 (field 2), F3 (field 3) F4 (field 4), and All.

For NTSC signals, when F1 is selected, the line number varies from **L 1** (Line 1) to **L 262**. When F2 is selected, the line number display varies from **1 (263)** to **263 (525)**. The number in parentheses following the line number is the line number within the frame. Thus, 1 (263) indicates you have selected the first line in field 2, which is the 263rd line in the frame. If F4 is selected, the line number varies from **1 (787)** to **263 (1050)**.

For PAL signals, when F1 is selected, the line number varies from **L 1** (Line 1) to **L 313.5**. When F2 is selected, the line number display varies from **313.5** to **625**. The number in parentheses following the line number is the line number within the frame. Thus, 1 (263) indicates you have selected the first line in field 2, which is the 263rd line in the frame. If F4 is selected, the line number varies from **1 (788)** to **263 (1200)**.

Measuring Rise Times

Rise time is usually measured from 10% to 90% amplitude of a positive going transition. To measure rise time you need a test signal to have a known stimulus to the system under test. The signal can be full field or inserted as a VITS.

Measuring rise time is an important way to check the performance of sources and signal degradation by cabling. To measure rise times:

1. Select the active tile and set it to Waveform mode by pressing **WFM**. Press **LINE** to set the display to a one line sweep.
2. Press **VAR** and then adjust Vertical Gain to set the rising edge to be measured so it is ten divisions tall.
3. Use the horizontal position knob to place the rising edge in the center of the screen.
4. Press **MAG** to expand the horizontal scale to 200 ns/div.
5. Use the **VERTICAL** knob to position the trace so the bottom of the waveform is one major division below the reference line. (The 10% level of the transition should be on the reference line.)
6. Use the **HORIZONTAL** knob to position the trace so that the rising edge of the trace passes through a major division mark on the reference line.
7. Reposition the trace vertically so the top of the transition is one major division above the reference line. (The 90% level of the transition is now on the reference line.) *Do not change the horizontal position.*

8. Measure the rise time from the 10% starting point located in Step 5 to the 90% point where the rising edge now crosses the reference line. See Figure 3-3.

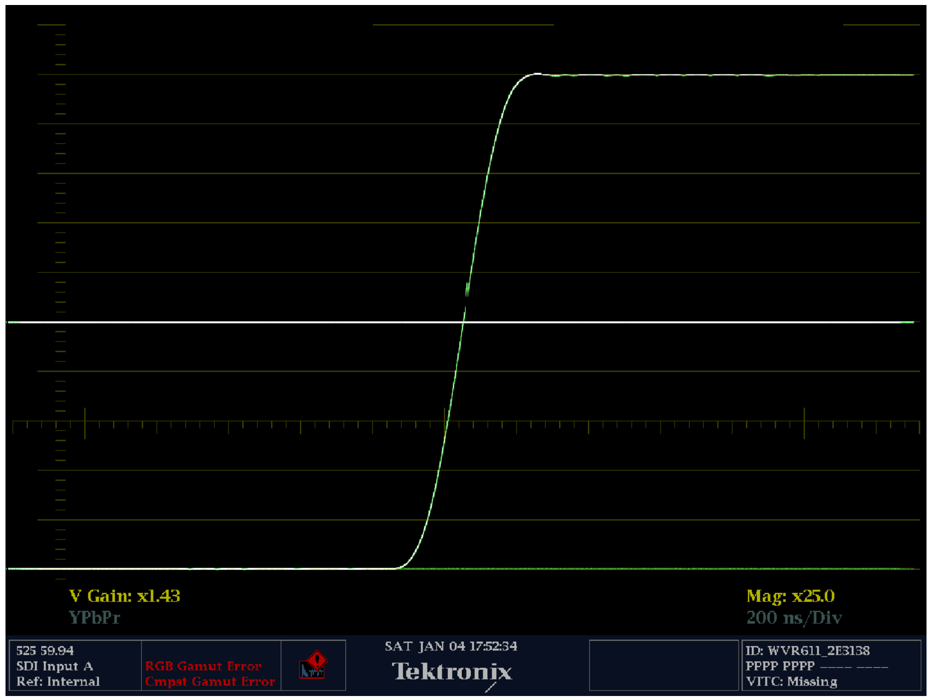


Figure 3-3: Measuring rise time

If it is not convenient to expand the transition vertically to ten major units, you can make a good approximation of rise time by estimating the 10% and 90% levels when positioning the top and bottom of the waveform near the reference line. (With a 5-division transition, for example, position the waveform bottom at one-half division below the reference line, which puts the 10% point on the reference line; then position the waveform top at one-half division above the reference line, which puts the 90% point on the reference line.)

Ensuring Regulatory Compliance

Each composite video standard has parameters which all broadcasts must meet. To measure all of these parameters is a large job that may be more suited to an automated measurement set such as a Tektronix VM700T, however a reasonable subset can be checked with a waveform rasterizer.

For regulatory purposes, these values are measured on the output of a demodulator that is driven from the off-air signal. These measurements can also be used inside the facility to check internal signal fidelity. These measurements can be performed on live signals, however they are easier to perform on a VITS, if one is present.

The exact limits for each parameter is specified by the individual standard, example values used here should not be mistaken as correct for all situations.

Parameters that are often checked for compliance:

- Luma Amplitude
- Peak Amplitude
- Sync Amplitude
- Burst Amplitude
- Black Level / Setup
- Proportion of sync to luma amplitude
- Sync Width
- Blanking Width

To check Luma Amplitude:

1. Press **WFM** to set the active tile to Waveform mode.
2. Choose a one or two line sweep.
3. Press and hold the **WFM** button to display the pop-up menu. Select **Filter > Luma** to apply the Luma filter.
4. Compare the maximum level to the specification, that is 100 IRE for NTSC and 700 mv for PAL.

To check Peak Amplitude:

1. Press **WFM** to set the active tile to Waveform mode.
2. Choose a one or two line sweep.
3. Press and hold the **WFM** button to display the pop-up menu. Select **Filter > Flat** to apply the Flat filter.
4. Compare the maximum level to the specification, that is 120 IRE for NTSC and 934 mv for PAL.

To check Sync Amplitude:

1. Press **WFM** to set the active tile to Waveform mode.
2. Choose a one or two line sweep.

3. Press and hold the **WFM** button to display the pop-up menu. Select **Filter** > **Flat** to apply the Flat filter.
4. Compare the level to the specification, that is 40 IRE for NTSC and 300 mv for PAL.

To check Burst Amplitude:

1. Press **WFM** to set the active tile to Waveform mode.
2. Choose a two line sweep.
3. Press and hold the **WFM** button to display the pop-up menu. Select **Filter** > **Flat** to apply the Flat filter or **Filter > Chroma** to apply the Chroma filter.
4. Compare the level to the specification, that is 40 IRE for NTSC and 300 mv for PAL.

To check Black Level and Setup:

1. Press **WFM** to set the active tile to Waveform mode.
2. Choose a one or two line sweep.
3. Press and hold the **WFM** button to display the pop-up menu. Select **Filter** > **Luma** to apply the Luma filter.
4. For PAL or NTSC without setup, verify the minimum level during active video is at 0 V.
5. For NTSC with setup, verify the minimum level during active video is at 7.5 IRE.

Check proportion of Sync to Luma Amplitude:

1. Press **WFM** to set the active tile to Waveform mode.
2. Choose a one or two line sweep.
3. Press and hold the **WFM** button to display the pop-up menu. Select **Filter** > **Flat** to apply the Flat filter.
4. Use variable gain and vertical position and adjust the waveform to span from the sync tip graticule line to the max luma graticule line.
5. If the blanking is not close to the zero or set-up graticule line, then the ratio or proportion is incorrect.

To check Sync Width:

1. Press **WFM** to set the active tile to Waveform mode.

2. Choose a two line sweep.
3. Press and hold the **WFM** button to display the pop-up menu. Select **Filter > Flat** to apply the Flat filter.
4. Use vertical position and adjust the waveform so the 50% point of sync is on the center graticule.
5. Use the graticule to measure the sync width.

To check Blanking Width:

1. Press **WFM** to set the active tile to Waveform mode.
2. Choose a two line sweep.
3. Press and hold the **WFM** button to display the pop-up menu. Select **Filter > Flat** to apply the Flat filter.
4. Use vertical position and adjust the waveform so the 50% point of the active video transition is on the center graticule.
5. Use the graticule to measure the blanking width.

Matching Sources

To Match Sources means to adjust the components of the sources so that a picture from each will look the same. For example, if you have two cameras pointed at the same scene, then you probably want them to look the same as you switch between them.

There are several waveform rasterizer display modes that can be used to match sources:

Vector mode. This mode is good for matching hue and saturation but it does not show luminance, so it is not a complete solution.

RGB waveform mode. This mode is easy to understand but not good for gamma or if controls maintain constant luminance.

Composite waveform mode. This mode is good for looking at luminance and saturation, but it does not show hue, so it is not a complete solution.

Diamond mode. A proprietary Tektronix display mode that shows luminance and color information well. Diamond mode is especially good for gamma.

Picture mode. The ultimate authority as to what looks right, but hard to know what you need to adjust to match the sources.

For all the modes, the procedure is about the same:

1. Display the first signal.
2. Note the location of the waveform features on the screen.
3. Switch to the second source.
4. Adjust the second source until it matches the first.
5. Switch back and forth between the two sources to verify they have the same signal.

***NOTE**. You can use several of the suggested measurements in different tiles at the same time. This will help you understand when one is more useful than the other. For example, if vector and composite waveform are used at the same time, then the complete luma and chroma space can be seen.*

Shading a Camera

Shading or balancing a camera means to adjust it to have equal red, green and blue output in a given lighting situation.

The WVR610A & WVR611A support multiple ways of shading a camera. Three of these methods are discussed below. For analog inputs, only one of these is available. For all methods, a monochrome target such as a chip chart is assumed to be in front of the camera.

- Subcarrier nulling on a composite representation
- Setting blanking and peak level on an RGB representation
- Setting a straight line through the origin and peaks on the Diamond display

The **Subcarrier Nulling** method is the only one of these three methods that can be used to balance a composite camera, although it can also be used for digital component cameras by selecting a composite representation of the digital signal in the Waveform pop-up menu.

Since the target is monochrome, there should be no subcarrier on the active part of the waveform. So this method entails changing the camera controls to eliminate any chroma.

The RGB method is very straight forward. Simply adjust the offset and gain for each color so the video signal runs from 0 and 700 mV. The difficulty is getting the gamma and knee points matched.

The third method uses the Tektronix proprietary Diamond display. This display mode is available by selecting **Gamut – Gamut display type**. In this display, the chip chart should show as a vertical line through the origin and the top and bottom of the diamond. If not, then change the gain and offset controls on the individual colors to bring it in. If the line is not straight, then adjust the gamma controls.

NOTE*. Depending on how the camera head or color corrector controls work, one or another of these methods may be much easier. For controls that maintain a constant luminance, the diamond method is usually easiest.*

You can use more than one method at a time, displaying each method in different tiles. This will help you understand when one is more useful than the other.

Timing a Studio

Timing a studio involves adjusting the references going to different sources so that their output feeds have the same timing when they arrive a common point, such as a production switcher. For digital systems the timing typically only needs to be close, because most switchers have some tolerance to timing errors. For analog composite systems, the timing may need to be matched within a small part of a subcarrier cycle to prevent hue shifts when switching between sources.

The WVR610A & WVR611A support multiple methods and techniques of timing a studio. All of these methods require an external reference to the waveform rasterizers.

The methods and techniques are:

- Comparing horizontal and vertical timing with Waveform Displays
- Using Vector for fine timing on composite signals
- Using the new Tektronix Timing display

The traditional method of comparing horizontal and vertical timing is made easier by the flexible tiles of the WVR610A & WVR611A.

Using the Traditional Method

To time a studio using the traditional method:

1. Press **EXT** to select External Reference mode.
2. Apply the first input to the active channel of the waveform rasterizer.
3. Press **LINE** to put the active tile in line mode, choose an appropriate waveform mode.
4. Use the **HORIZONTAL** knob to center the sync edge or the SAV pulse.
5. Press **MAG** to increase the timing resolution.
6. Select another tile and press **FIELD** to place the tile in field mode, choose an appropriate waveform mode.
7. Use the **HORIZONTAL** knob to center the vertical interval.
8. Press **MAG** to increase the timing resolution.
9. Line up the waveform at the graticule baseline.
10. Apply an input that needs to match timing with the first input.
11. Adjust the timing offset of the black generator to match the timing to the saved baseline.
12. Repeat steps 10 and 11 for any other required signals.

In this procedure, other tiles can be used to set fine timing and check color frame alignment on composite signals. Alternatively, the other two tiles could be used for line and field rate displays without mag active to show the location of significantly mis-timed signals.

Using the Timing Display

The WVR610A & WVR611A Timing display is significantly easier to use than the traditional method. The Timing measurement draws a cross in the middle of its display rectangle. The cross represents the timing of the reference signal. The input signal is plotted as a circle. When the two signals occur at the same time, the cross and the circle will be aligned.

There are also numeric readouts of delay in terms of lines of vertical delay and microseconds of horizontal delay. These allow precise measurement of the timing offset between the two signals.

The definition of when two signals are coincident is easy to understand for two analog signals, but it is more difficult when the reference is analog composite and the input is serial digital.

In the digital input case there is no standard for what timing relationship is considered to have “zero timing offset.” SMPTE168 gives some guidance for the vertical alignment, but the horizontal alignment is not defined.

For the purpose of defining the timing display, the serial digital signal is converted to analog, then the digital signal timing is adjusted such that the resulting analog signal is coincident with the reference. The serial to analog converter used has about 3 μs of conversion delay.

This timing relationship between digital input and reference is also compatible with waveform mode. That is, if you change from internal to external reference, the displayed waveform will not shift position.

To use the Timing display to time a studio:

1. Press **EXT** to select External Reference mode.
2. Apply the first input to the active channel of the waveform rasterizer.
3. Press **MEAS** to select the Timing display.
4. Adjust the timing offset of the black generator to match the timing to the external Reference.

Repeat step 4 for any other required signals.

***NOTE**. As you adjust timing, the circle representing the input timing may jump occasionally. This because the color frame detection circuit can be temporarily disrupted as the signal shifts. The jump is often a multiple of the field time. The circle will settle back to the correct location in a second or so.*

Investigating a Flaw in a Picture

If you want to see the video signal that produces one portion of an image, then use the line select function. Line select restricts the active tile so it displays only one line of the video image. When you use line select, the selected line will also be highlighted on the picture display. This makes it easy to zero in on any part of the signal.

To use line select to investigate a portion of a picture:

1. Press **PICT** to select picture mode for one tile.
2. Select Waveform, Vector, or a Gamut display in a second tile.
3. Press **LINE SEL**.

   The active tile set in step 2 will now be in line select mode.
4. Press **CURSOR** to display the Picture Cursor Line pop-up menu. Press **SEL** to select **On** in the pop-up menu.

5. Use the **GENERAL** knob to put the highlight cursor on the area of interest in the picture. See Figure 3-4.

6. Examine the tile, set up in step 2, to see the signal that creates the selected line of the picture.

***NOTE**. Only one tile may be in line select at a time.*

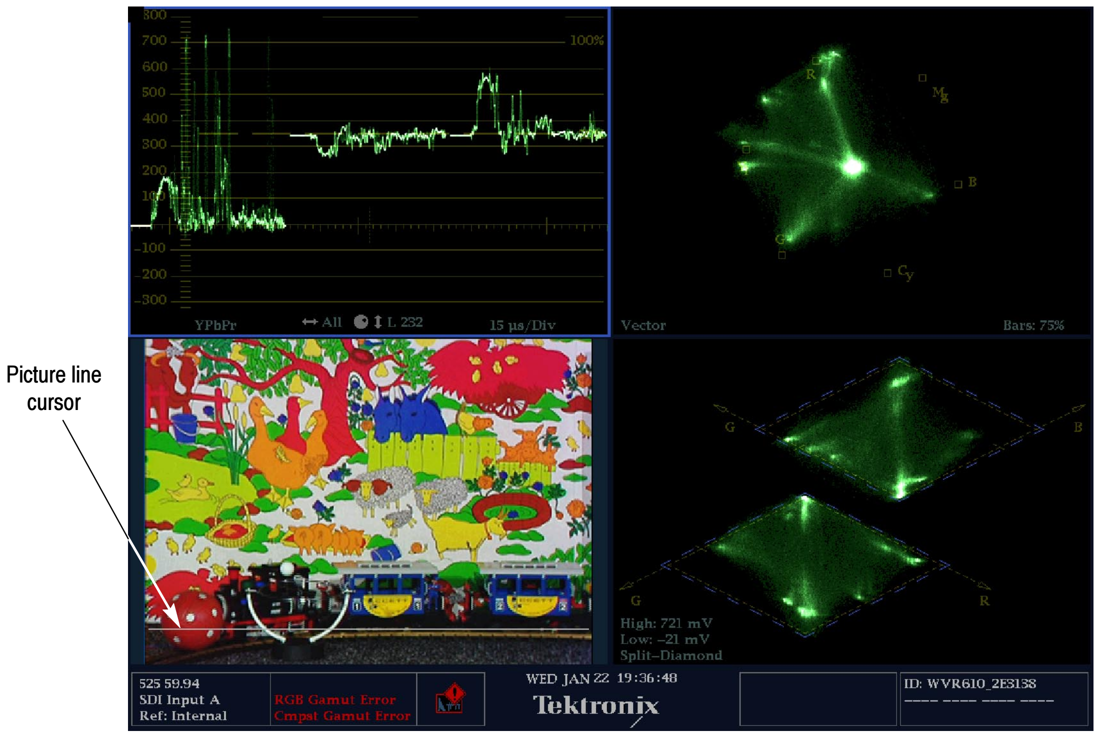


Figure 3-4: Investigating a line in a picture

Checking VITS

To display a VITS (Vertical Interval Test Signal), you need to know into which field and line the signal was inserted. Once you know what line the signal was inserted into, you can display the line using LINE SEL.

To display the VITS on a specific line:

1. Select the tile where you wish to display the signal.

2. Press **WFM** to select the Waveform display.

3. Press **LINE** (to the right of the INPUT buttons) to enable line select mode.
4. Use the left-right arrow keys to select the desired field. See Figure 3–2 on page 3–3.
5. Use the GENERAL knob or the up-down arrow keys to select the line you wish to display.

Verifying Closed-captioning Presence

You can verify the presence of closed captioning by viewing line 21 of field 1 (and usually field 2) .

To display line 21 in field 1:

1. Select the tile where you wish to display the signal.
2. Press **WFM** to select the Waveform display.
3. Press **LINE SEL** to enable line select mode.
4. Use the left-right arrow keys to select field F1.
5. Use the **GENERAL** knob or the up-down arrow keys to select line 21. See Figure 3–5.
6. Examine the signal for the presence of the closed-captioning signal.

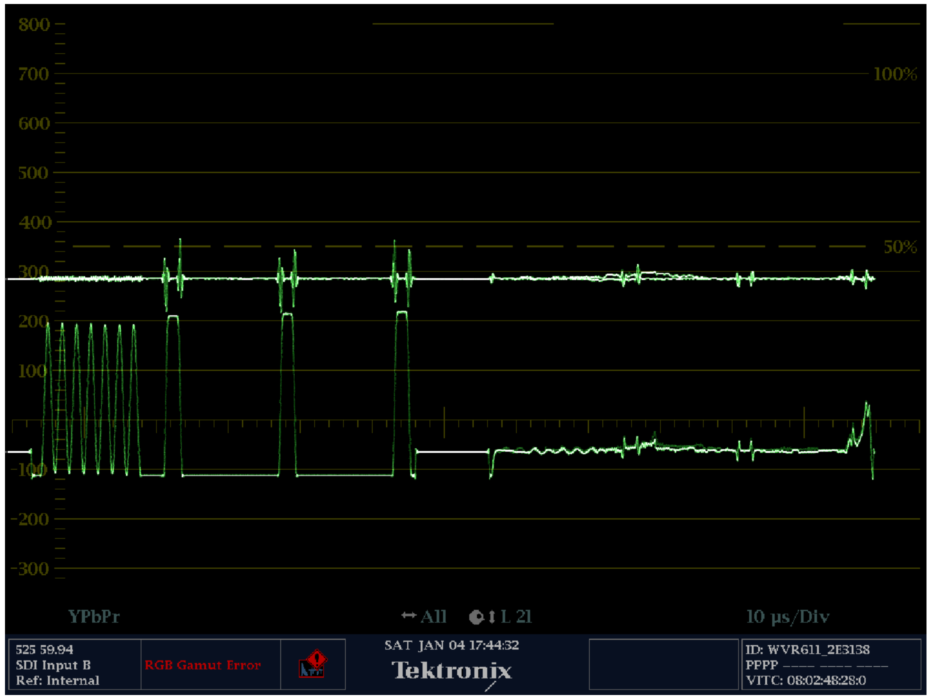


Figure 3-5: Verifying closed captioning presence

Checking Gamut

Signals that are legal and valid in one signal representation may not be valid in another representation. Specifically, signals which are legal in the Digital YCbCr representation may not be legal if transcoded to RGB or encoded to NTSC / PAL. Any signal that fails this test is considered out of gamut.

The WVR610A & WVR611A support multiple displays and alarms to allow detecting out of gamut signals. The flexible tile display allows you to simultaneously view several of the gamut measurements to learn which is most appropriate for a given application.

The displays are:

- Diamond for checking that SDI signals conform to legal RGB gamut space
- Split Diamond separates the upper and lower diamonds to show excursions below black, otherwise it is identical to the Diamond display
- Arrowhead for checking if an SDI signal is legal for composite color space
- Composite Waveform modes for checking both SDI and composite signals for legality in composite color space

Diamond, Split Diamond, and Arrowhead have adjustable thresholds. If the signal goes outside the area defined by the thresholds, the signal is out of gamut. If these limits are exceeded then the waveform rasterizer can generate alarms if configured to do so.

For composite waveforms, the legal limit is simply the maximum level allowed for the combination of luma and chroma. This limit depends on application. For example, a recording on a tape may be able to handle a larger signal than if driving into a transmitter.

Diamond Display

The Diamond display is very effective at showing the relationship between the R, G, and B signal video signals. The waveform monitor converts the Y, $P_{b,}$ and P_r components recovered from the serial signal to R, G, and B to form the Diamond display. Figure 3-6 shows how the Diamond plot is developed.

Ultimately all color video signals are coded as RGB for display on a picture monitor. To predictably display all three components, they must lie between peak white, 700 mV, and black, 0 V. Picture monitors handle excursions outside the standard range (gamut) in different ways.

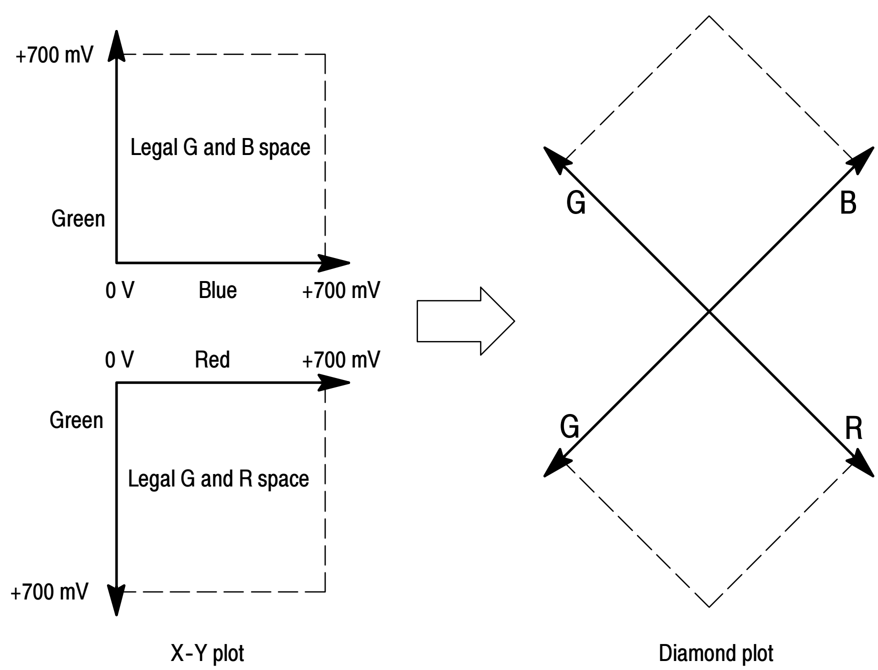


Figure 3-6: Construction of the Diamond display

Checking RGB Gamut. For a signal to be in gamut, all signal vectors must lie within the G-B and G-R diamonds. Conversely, if a vector extends outside the diamond, it is out of gamut. The direction of an excursion out of gamut indicates which signal is excessive. Errors in green amplitude affect both diamonds equally, while blue amplitude errors affect only the top diamond and red errors affect only the bottom diamond. See Figure 3-7.

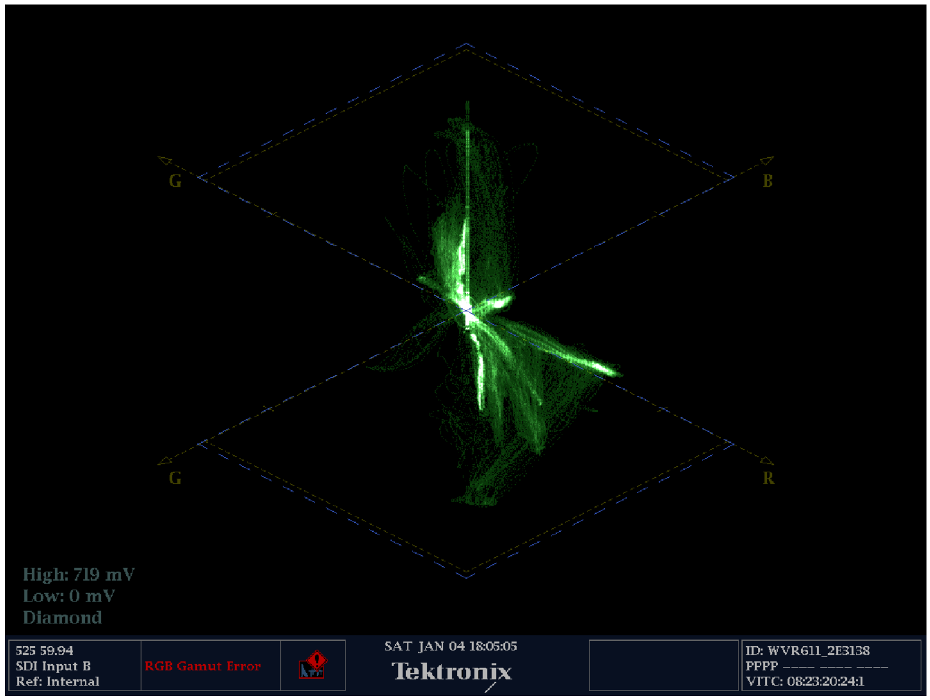


Figure 3-7: Diamond display showing out of gamut signal

You can set an alarm to indicate when the signal exceeds the RGB gamut. For information on setting the gamut alarm, refer to *Configuring Alarms and Viewing Status* on page 3-33.

The intensity of a vector indicates its duration. A momentary out-of-gamut condition appears as a faint trace. Long duration violations show as a bright trace. Figure 3-8 gives some sample out-of-gamut signals on the Diamond display.

As with the lightning display, bending of the transitions indicates timing delays. When a color bar signal is applied, the vertical axis becomes an indicator of delay errors.

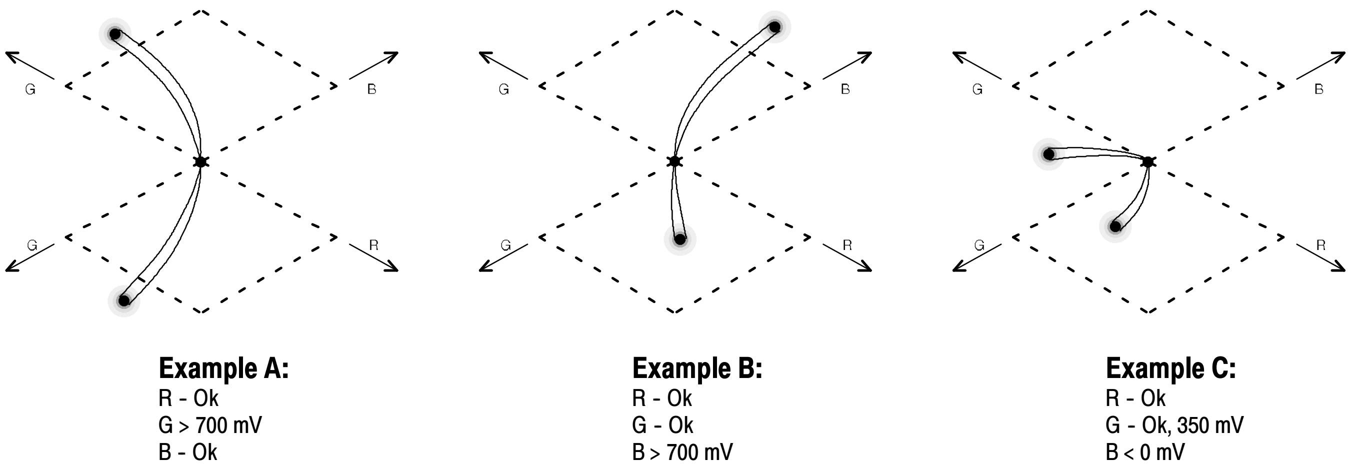


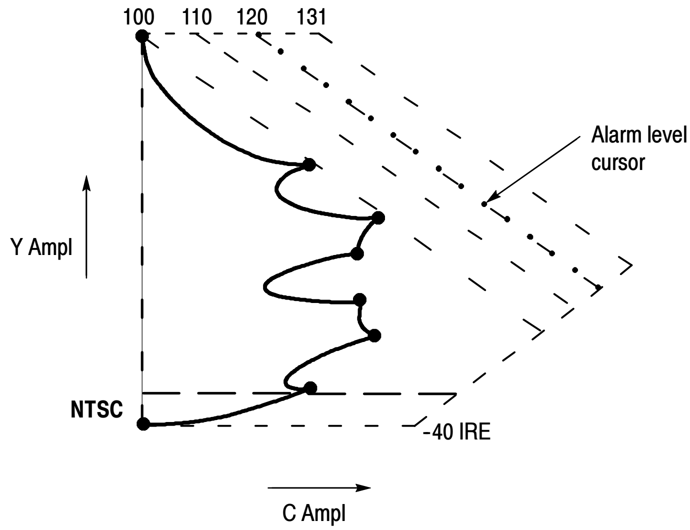
Figure 3-8: Out-of-gamut signals on a Diamond display

On the Diamond Display, monochrome signals appear as vertical lines. Nonlinear component processing, such as from a gamma corrector that alters white balance, can cause deviations along the vertical axis.

Arrowhead Gamut

The Arrowhead gamut display plots luminance (Y) against chrominance (C) to check if the composite signal adheres to standard gamut. Figure 3-9 shows NTSC and PAL Arrowhead displays (75% Color bars) and indicates the values of the graticule lines. The arrow-head shape of the graticule results from overlaying the standard limits for luminance and luminance plus peak chrominance.

NTSC display



PAL display

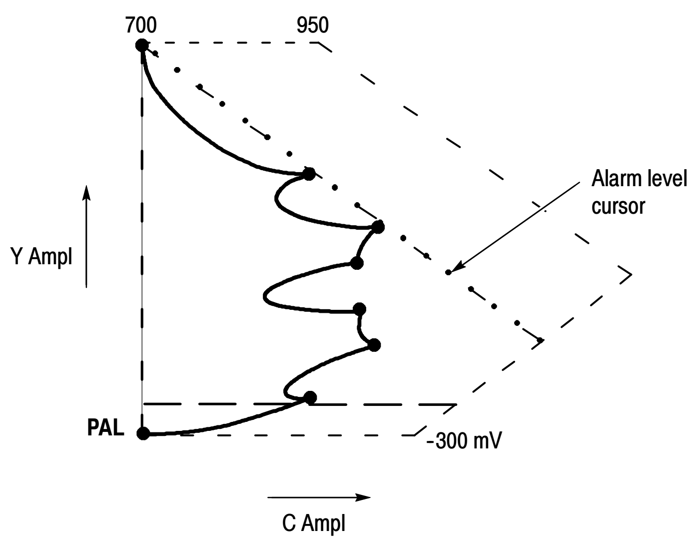


Figure 3-9: NTSC and PAL Arrowhead gamut displays

Signals exceeding the luminance amplitude gamut extend above the top horizontal limit (top electronic graticule line). Signals exceeding the luminance plus peak chrominance amplitude gamut extend beyond the upper and lower diagonal limits. The bottom horizontal line shows the minimum allowed luminance level of 7.5 IRE for NTSC and 0 mV for PAL. See Figure 3-9. Figure 3-10 shows an Arrowhead display.

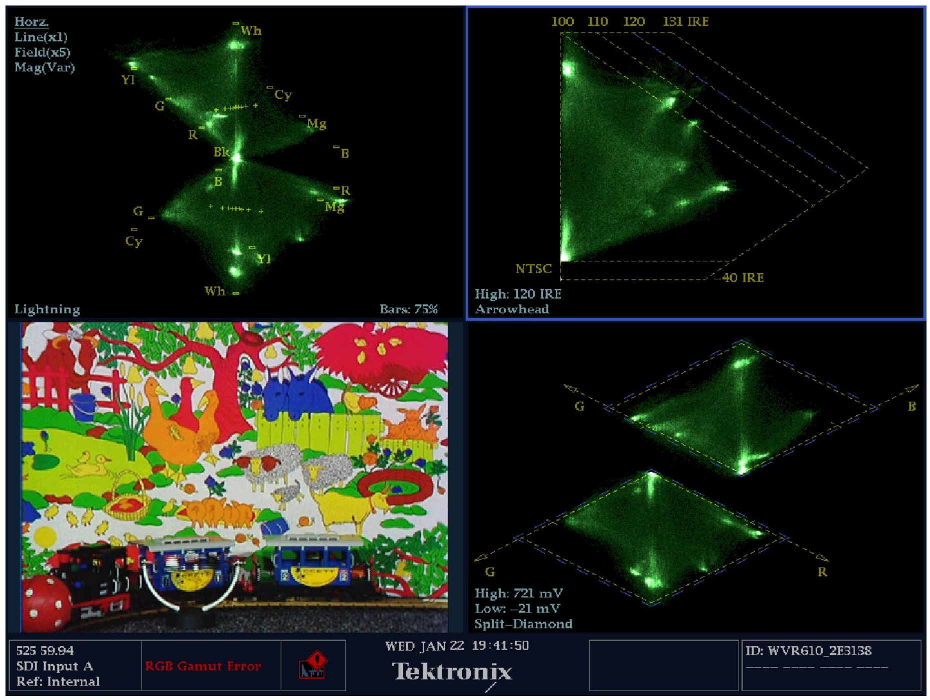


Figure 3-10: Arrowhead display

Checking Composite Gamut. The Arrowhead display provides an automated check on adherence to composite gamut standards with the Alarm feature discussed in *ConfiguringAlarms and Viewing Status* on page 3-33. To perform an automated gamut check, enable alarm reporting in **CONFIG > ALARMS > SDI INPUTS > Composite Gamut**. When enabled, the alarm alerts you whenever the signal exceeds the limit.

Another useful Arrowhead function is a measure of how well the active video signal is using the dynamic range of video channel. A properly adjusted signal should be centered in the arrowhead graticule and have transitions that approach all the limits.

Checking Frequency Response

Checking Frequency Response ensures that your video signal has the same gain at all frequencies. To perform this test you need a signal with a known frequency distribution, this typically means a test signal, either full field or set up as a VITS.

There are four basic signals you can use to test frequency response:

- Sweep
- Multi-burst
- Multi-pulse
- Pulse and Bar

Sweep is a signal that starts at a low frequency and smoothly increases to a high frequency. Apply the sweep signal to the system under test then use Waveform mode to look at the envelope of the signal. It should be flat at the top and bottom. If the envelope is smaller at some frequencies, then it indicates a roll-off in frequency response.

Multi-burst is similar to sweep except it has packets of discrete frequencies. Typical signals can have packets of 0.5, 1, 2, 3, 4 and 5 MHz. Use the same procedure as for sweep to evaluate the attenuation at each packet's frequency.

Multi-Pulse is a series of pulses each filled with a burst. The frequency of the burst increases across the line. If there is a roll-off in frequency response, the bottom of the burst cycles will not get down to the baseline. Conversely, if there is peaking, the burst cycles will extend past the baseline. Multi-pulse also indicates the presence of group delay by an "S" shape in the bottom of the burst cycles.

Pulse and Bar is one short pulse and one long bar on the same video line. Ideally, the pulse and the bar should be the same amplitude. If they are not the same amplitude, then it indicates a frequency response error since the pulse has higher frequency components than the bar. The pulse can also indicate phase distortion if it has excess ringing, or group delay errors if the ringing is asymmetric around the pulse.

Selecting and Monitoring Audio

The WVR610A & WVR611A provide several methods to monitor audio signals. You can measure levels, monitor phase, and display phase correlation. You can specify meter ballistics and scales, set the Test and Peak Program indicator levels, and specify how phase is displayed.

NOTE. *With audio option DA, the waveform rasterizer can monitor AES, analog and Embedded audio. Option AN can only monitor analog audio and option DG can only monitor AES and embedded audio.*

Selecting the Audio Input

You select the audio input to be monitored from the front-panel AUDIO button pop-up menu.

NOTE. *The Audio display can appear in only one tile at a time.*

To select the audio input monitor:

1. Press **AUDIO** to set the active tile to audio mode.
2. Press and hold the **AUDIO** button to display the pop-up menu. See Figure 3–11.

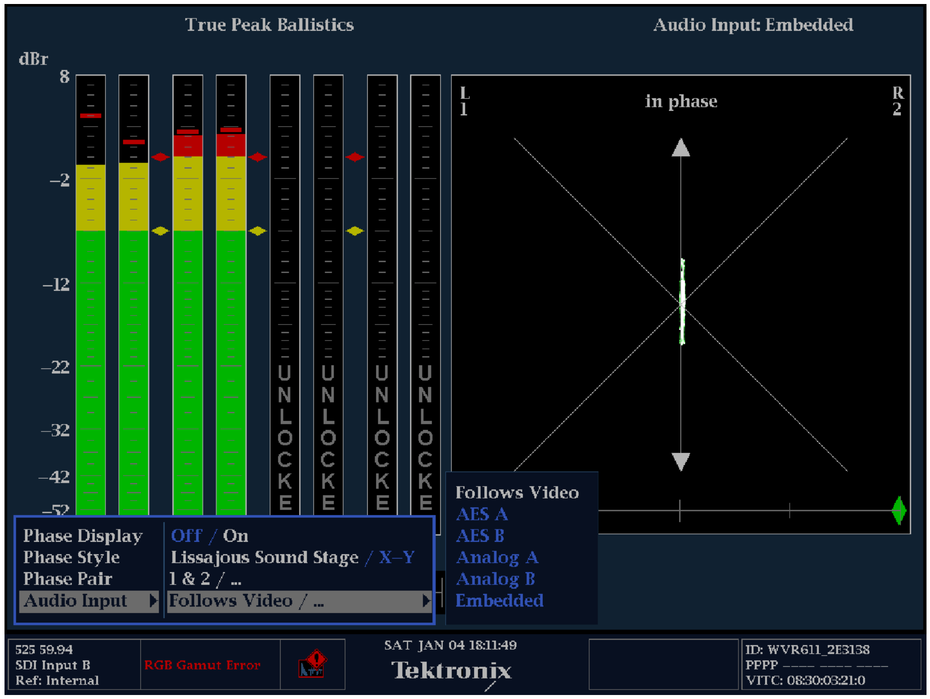


Figure 3-11: Audio pop-up menu

3. Select **Audio Input**.

4. Select the following audio input options: Follows Video, AES A, AES B, Analog A, Analog B, or Embedded (the available selections depend on the installed audio option).

NOTE. *Selection of Follows Video uses the audio to video mapping in the Configuration menu.*

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5. To activate the input selected, press **SEL**.

Checking Audio Level

The waveform rasterizer level meters are vertical bar graphs where the height of the bar indicates the amplitude of the audio program in the corresponding input channel. You can change the input and turn on and off the Phase display from the audio pop-up menu. Other meter characteristics such as ballistics, scale units, and program/test levels are configured through the Configuration menu.

To check audio level:

1. Press the **AUDIO** button to set the active tile to audio mode.

   The level meter bars are displayed. These bars indicate the current audio levels according to the selected meter ballistics. See Figure 3–12.

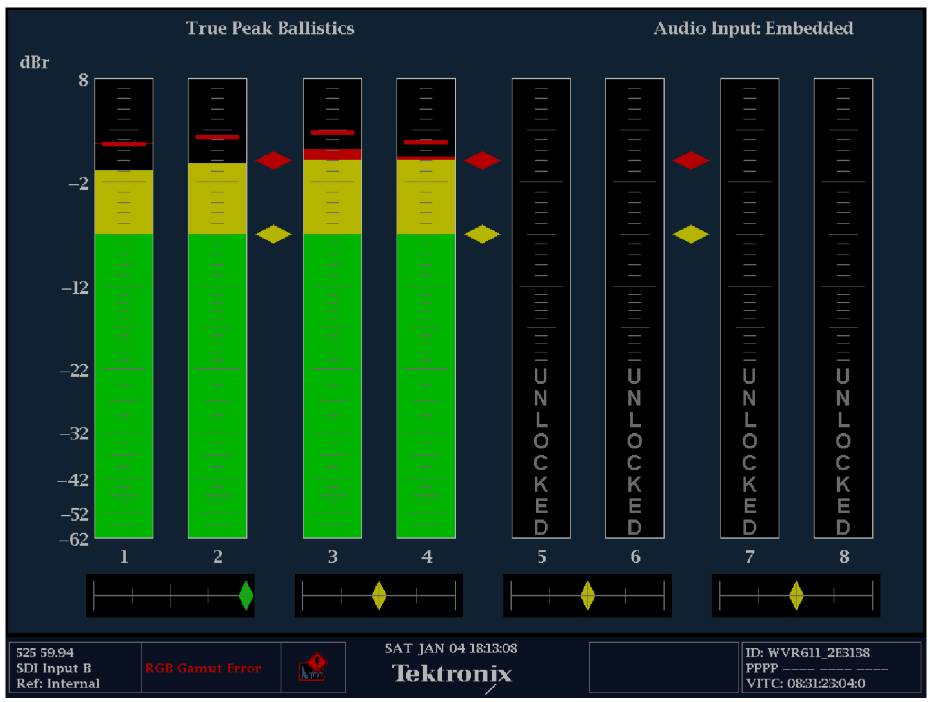


Figure 3-12: Audio level meters

The graphical level meter displays three colors:

- Green– Indicates portions of the level meters below the test level.
- Yellow– Indicates portions of the level meters between the test and peak program level.
- Red– Indicates portions of the level meters above the peak program level.

Checking Audio Phase

The WVR610A & WVR611A, with optional audio, can display phase of one input pair with a Lissajous pattern display, and it can display relative phase on all four pairs of inputs with correlation meters.

To check audio phase:

1. Select the tile where you wish to display the audio phase.
2. Press the **AUDIO** button.
3. Press and hold the **AUDIO** button to display the pop-up menu.
4. Select **Phase Display**. Press **SEL** or the right-arrow key to turn the phase display on.
5. Select the Phase Style and the Phase Pair from the pop-up menu. See Figure 3-13.

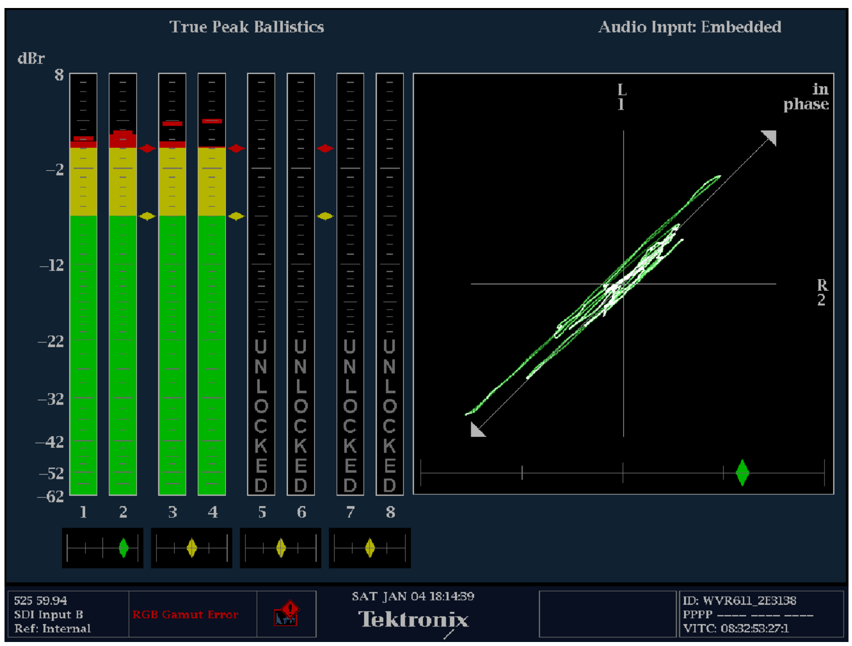


Figure 3-13: Audio phase display

Lissajous Display

The Lissajous or phase portion of the audio display is a plot of one channel against another on an orthogonal pair of axes. You can set the instrument for either soundstage or X-Y orientation of the Lissajous pattern.

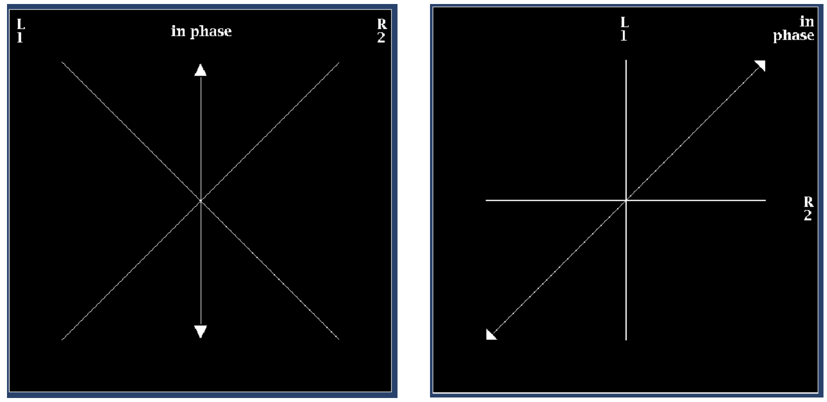


Figure 3-14: Audio phase displays

The Soundstage representation has the two channels plotted at 45 degree angles with the mono combination appearing on the vertical axis. The soundstage orientation is more like a left – right image in a studio.

The X-Y orientation plots left channel data along the vertical axis and right channel data on the horizontal axis, emulating the conventional X-Y display of an oscilloscope.

Correlation Meters

The Correlation meters display the extent to which two channels move together. This can be considered their mono compatibility. These meters are located under the appropriate bars and one is duplicated under the phase display.
See Figure 3–15 on page 3–28.

- When signals are correlated the diamond will be green, and it will move to the right side.
- If the signal is uncorrelated then the indicator will tend to stay in the middle.
- Finally if the signals are anti-correlated – that is one goes up when the other goes down – then the correlation meter indicator will be red and go to the left end.

The more correlated or uncorrelated the signals are, the farther the indicator will be from the center.

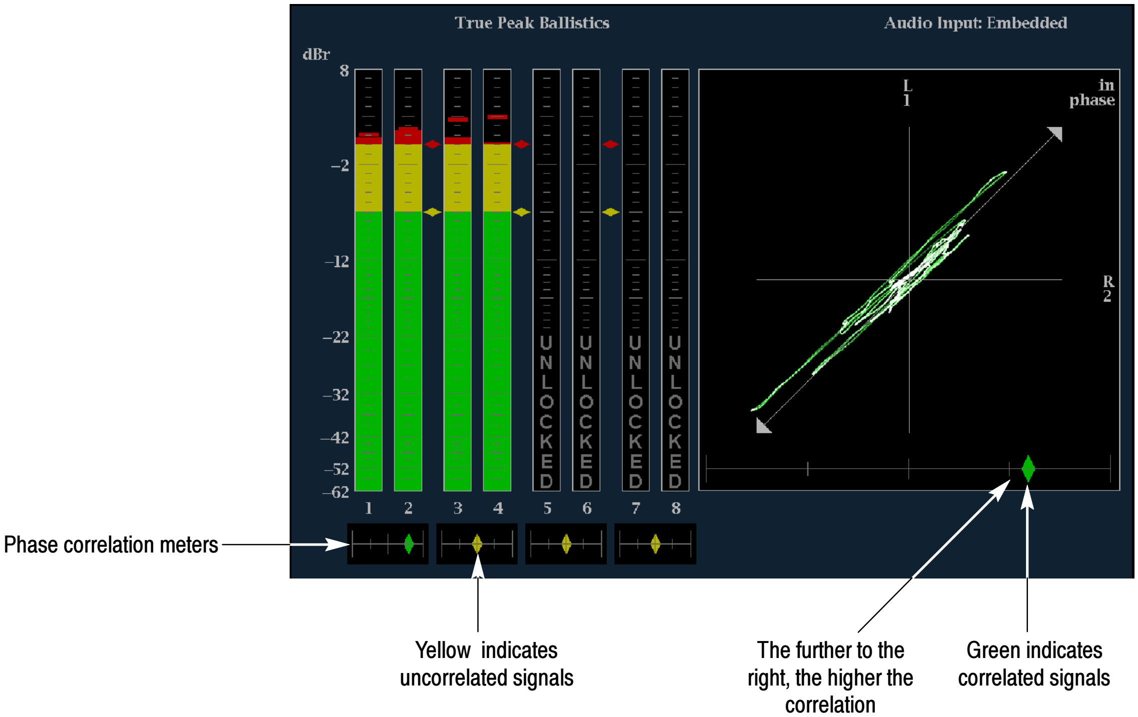


Figure 3-15: Audio phase display

The response time of the correlation meters can be set from the CONFIG menu. The choices are shown in Table 3–1.

Table 3-1: Correlation meter response times

Speed setting	Response averaging time (s)		Speed setting	Response averaging time (s)
1	0.0167		11	3.0
2	0.0333		12	3.5
3	0.0667		13	4.0
4	0.1333		14	4.5
5	0.2667		15	5.0
6	0.5333		16	5.5
7	1.0		17	6.0
8 (default)	1.5		18	6.5
9	2.0		19	7.0
10	2.5		20	7.5

Using Presets

Presets refer to saved instrument settings. Using presets saves you time because you only need to press a single button to change a range of waveform rasterizer settings to meet a specific measurement need. Presets are created and recalled using the numbered buttons located under PRESETS on the front panel or using the web interface.

There are a couple of advantages to saving presets on a PC using the web interface. One is that the preset is a named file which can make it easier to recall the purpose of the preset. A second advantage is that the number of presets that can be saved on a PC is, for practical purposes, unlimited.

Creating Presets

You can create Presets either from the front panel of the WVR610A & WVR611A or from the Web Interface software.

From the Front Panel

To create a Preset on a WVR610A & WVR611A:

1. Set up the waveform rasterizer exactly as you wish to have it configured. This includes setting the contents of each tile and the audio and video settings.
2. After you have configured the waveform rasterizer, press and hold one of the numbered buttons located under PRESETS for more than two seconds.

When settings have been assigned to a Preset button, a notification appears informing you that **Preset X has been saved**.

The FACTORY Preset settings cannot be changed.

From the Remote Interface

Using the Remote Interface software you can save the Presets on the WVR610A & WVR611A.

To create a Preset using the Remote Interface software:

1. Set up the waveform rasterizer exactly as you wish to have it configured. This includes setting the contents of each tile and the audio and video settings.
2. In the Remote Interface Java applet, select **File > Save as Preset**. See Figure 3-16.

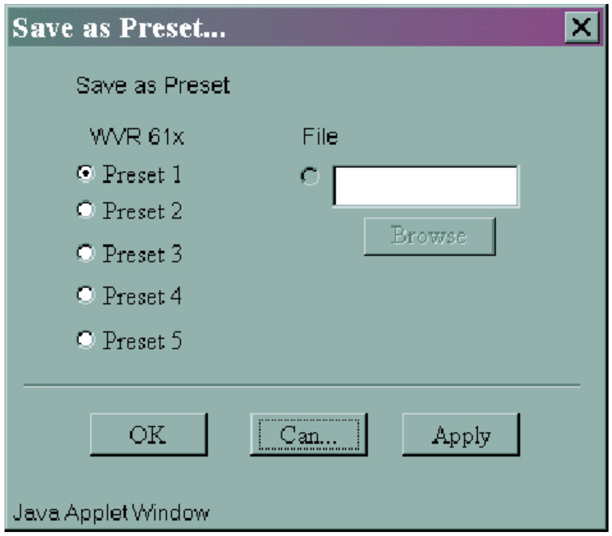


Figure 3-16: Saving a preset using the Remote Interface software

3. To save the preset:

a. On the waveform rasterizer: click one of the Presets and then click **OK**.

b. From the web interface: click the button next to the text entry box, enter the filename in the text entry box and then click **OK**.

Recalling Presets

To recall a Preset from the waveform rasterizer front panel:

CAUTION. *Be careful not to hold a Preset button for more than a second or it will overwrite the existing Preset with the current instrument settings.*

- Press and release the button of the desired Preset.

To recall a Preset using the Remote Interface software:

1. Select **File > Restore Settings...**. This displays the dialog shown in Figure 3-17.

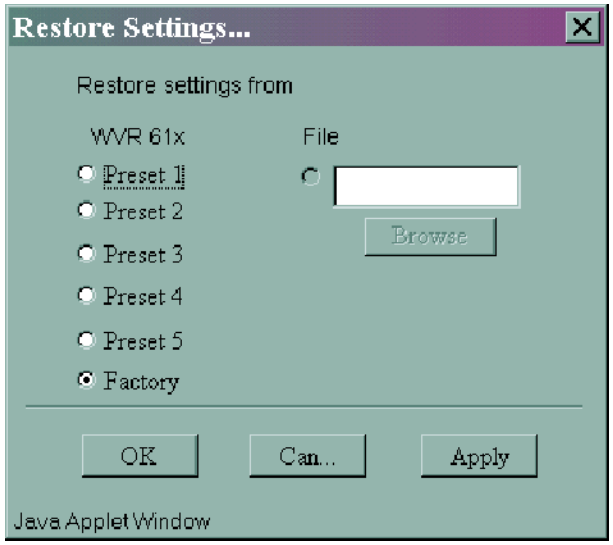


Figure 3-17: Recalling presets using the web interface software

2. To recall the preset, click the button next to the desired Preset and click **OK**. if you wish to recall a Preset but you are not sure which one you wish to recall, you can click **Apply**. This recalls the selected Preset but keeps the Restore Settings window displayed so you can recall another Preset more easily if needed.

Recalling the Factory Defaults

To recall factory default settings:

- Press and release the **FACTORY** button.

Pressing the FACTORY button resets the waveform rasterizer to the factory default settings. For details on default settings, see *Specifications* on page A-1.

Contents of a Preset

All instrument settings except those set in the Utilities submenu of the CONFIG menu are saved in a Preset. Settings that are not saved are those such as the clock setting, IP configuration and network address.

The following is an overview of the settings saved in a Preset:

- Measurement assigned to each tile

- Tile specific settings
- Input selection
- SDI Input settings
- Composite Input settings
- External Reference settings
- Audio Displays settings
- Audio Inputs/Outputs settings
- Alarm settings
- Gamut Thresholds
- Display Settings
- Readout setting
- Graticule settings

Configuring Alarms and Viewing Status

Alarms allow you to configure the WVR610A & WVR611A to automatically measure or monitor parameters and report when they exceed limits. The parameters may be signal related, such as gamut on the video signal or silence on audio, or they can be instrument related such as a fan failure.

Because the alarms in the waveform rasterizer are so flexible, they must be configured to meet the needs of most installations. Alarms can be displayed on-screen as one of the options under the STATUS button.

Alarms can be reported by a variety of methods. Many alarms have thresholds that can be adjusted to customize the behavior for a given application. Some of the alarm reporting can be temporarily muted to reduce confusion when multiple problems exist.

There is an Enable Alarms function that allows all alarms to be disabled.

Enabling and Disabling Alarms

Alarms are configured in the **CONFIG > Alarms** menu. In the Alarms menu, you enable and disable alarms, specify which alarms are monitored, and what action should be taken when an alarm is triggered.

To configure alarms:

1. Press the **CONFIG** button and select **Alarms**. See Figure 3-18.

Figure 3-18: Alarms menu

2. To change Alarms settings, use the **GENERAL** knob or right-arrow key to change the menu focus to the Alarms menu.

Enabling and Disabling Alarms

To enable or disable alarms:

1. From the CONFIG menu, select **Alarms**.
2. From the Alarms menu, select **Enable Alarms**.
3. Press **SEL** to select **On** to enable alarms or **Off** to disable alarms.

   Note that when you disable alarms, *Alarms Disabled* appears in the Status bar.

4. Press **CONFIG** to remove the CONFIG menu.

Alarm Conditions That Can Be Monitored

The waveform rasterizer can monitor up to 27 alarm conditions (depending on the model and installed options), which are organized into several groups: SDI Input, Composite Input, General, General Audio, AES and Embedded, and Embedded Audio Specific. See Table 3–2.

Table 3-2: Alarms

Alarm group	Alarms
SDI Input	SDI Input Missing SDI Input Unlocked EDH Alarm RGB Gamut Composite Gamut
Composite Input	Input Missing Input Unlocked
General	External Reference Missing External Reference Unlocked LTC Invalid LTC Missing VITC Invalid VITC Missing Hardware Fault
General Audio	Audio Clip Audio Mute Over Alarm Silence

Table 3-2: Alarms (Cont.)

Alarm group	Alarms
AES and Embedded	Signal Lock Professional CRC Validity Bit Parity
Embedded Audio Specific	Audio Stream Missing Checksum Buffer Full Buffer Empty Parity

SDI Input

SDI alarms indicate problems with SDI input signals. The SDI Input alarms that can be monitored are:

SDI Input Missing. Indicates that an SDI input signal has not been detected at the selected input.

SDI Input Unlocked. Indicates that the waveform rasterizer cannot lock to the selected SDI input signal.

EDH Alarm. Indicates when the EDH has detected an error.

RGB Gamut. Indicates when the input signal contains colors that violate the currently set limits for RGB gamut, which are specified by the Diamond Thresholds.

Composite Gamut. Indicates an input signal containing colors that violate the currently set limits for composite gamut, which are specified by the Arrowhead Thresholds.

Composite Input

Composite input alarms indicate problems with composite input signals. The alarms that can be monitored are:

Input Missing. Indicates a composite input signal has not been detected at the selected input.

Input Unlocked. Indicates that the waveform rasterizer cannot lock to the input signal on the selected input.

General

General alarms indicate a signal is missing or there has been a hardware failure. A hardware failure alarm indicates a potential instrument failure. The General alarms that can be monitored are:

External Reference Missing. Indicates that no external reference signal is being detected.

External Reference Unlocked. Indicates that the waveform rasterizer cannot lock to the external reference signal. This is usually due to a wrong or unsupported standard.

LTC Invalid. Indicates that the LTC was lost for one frame but has reappeared.

LTC Missing. Indicates that the LTC is not being detected.

VITC Invalid. Indicates that the VITC disappeared for one frame but has reappeared.

VITC Missing. Indicates that a break or discontinuity in the VITC has occurred.

Hardware Fault. Indicates that there has been a hardware failure. If this alarm occurs, power down the instrument and contact your local Tektronix service representative.

General Audio

The General Audio alarms that can be monitored are:

Audio Clip. Indicates that an audio clip error has occurred. This occurs when the audio signal consists of all “ones.”

Audio Mute. Indicates that an audio mute error has occurred. This occurs when the audio signal consists of all “zeroes.”

Over Alarm. Indicates that the audio level has exceeded that level at which the signal is considered “over” and the time it has been over has exceeded the specified Duration for Over setting.

Silence Alarm. Indicates that the audio level has dropped below the level at which the signal is considered “silent” and the time it has been silent has exceeded the time specified by the Duration for Silence setting.

AES and Embedded

The AES and Embedded alarms that can be monitored are:

Signal Lock. Indicates that the waveform rasterizer is not locked to an incoming signal on the indicated input channel. Data cannot be decoded; all data and all other errors are ignored. This message appears when no input signal is present.

Professional CRC. If there is a Professional Channel Status CRC error, it will appear in the Alarm Status Log.

Validity Bit. Indicates that the Validity bit is set high for one or more data samples. In the AES/EBU standard, a set validity bit indicates that the sample is not suitable for conversion to audio.

Parity. Indicates that the incoming subframe does not have even parity as specified by the applicable digital audio standards. The data sample is unreliable and is ignored.

Embedded Audio Specific

The Embedded Audio Specific alarms that can be monitored are:

Audio Stream Missing. Indicates that there is no audio stream detected in the selected input signal.

Checksum. Indicates that an error occurred in the data which resulted in an invalid checksum.

Buffer Full. Indicates that the buffers in the de-embedder are full. When this occurs, audio discontinuities result. This is usually caused by a serial source that is outside the allowed time base range.

Buffer Empty. Indicates that the buffers in the de-embedder are empty. When this occurs, audio discontinuities result. This is usually caused by a serial source that is outside the allowed time base range.

Parity. Indicates that the incoming subframe does not have even parity as specified by the applicable digital audio standards. The data sample is unreliable and is ignored.

Setting Up Alarm Reporting Options

The WVR610A & WVR611A allow you to specify how alarm conditions are reported. You can specify whether or not an alarm indicator is displayed on-screen, if an alarm is logged, if an audible beep is sounded, if an SNMP trap is sent out on the network, if a ground closure is triggered, and if a pop-up notifier is displayed.

Alarms in each group can be set up using a mask or individually. The reporting options are the same for all alarms. See Table 3–3 for a description of alarm reporting options.

Setting Alarms by Group

To change the alarm reporting options for each alarm group:

1. From the Alarms menu, select the desired alarm group.
2. Press **SEL** to display the alarm reporting options. See Figure 3–19.

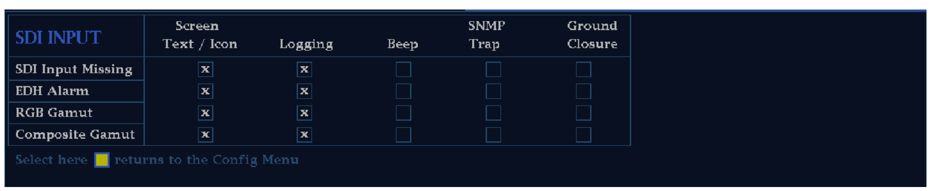


Figure 3-19: Setting alarm reporting options

3. Use the arrow keys to highlight the checkbox for the reporting option you wish to change. Press the right or left-arrow key to move the highlight horizontally. Press the up/down-arrow keys to move the highlight vertically.
4. After highlighting the checkbox for the reporting option you wish to change, press **SEL** to change the setting. A setting is enabled when the box is filled with an **X**.
5. When you have completed your changes, move the highlight to **Select here returns to the Config Menu**. Press **SEL** to return to the Alarms menu.
6. After changing the setting, press **CONFIG** to remove the CONFIG menu.

Setting Alarms by Mask

You can set the alarm reporting options for all alarm groups to be the same by using the Set all Alarms to this mask menu entry. This enables you to set the alarm reporting options for all groups by setting the options in just one place.

To set the alarm reporting options for all alarm groups to the same settings:

1. From the Alarms menu, select **Set all Alarms to this mask**.

2. Press **SEL** to display the alarm reporting options. See Figure 3-20.

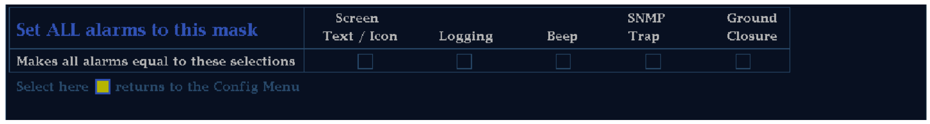


Figure 3-20: Setting alarm reporting options for all alarm groups

3. Use the arrow keys to highlight the checkbox for the reporting option you wish to change. Press the right or left-arrow key to move the highlight horizontally. Press the up/down-arrow keys to move the highlight vertically.
4. After highlighting the checkbox for the reporting option you wish to change, press **SEL** to change the setting. A setting is enabled when the box is filled with an **X**.
5. When you have completed your changes, move the highlight to **Select here returns to the Config Menu**. Press **SEL** to return to the Alarms menu.
6. After changing the setting, press **CONFIG** to remove the CONFIG menu.

Available Alarm Reporting Options

Table 3-3 lists the available alarm reporting options.

Table 3-3: Alarm reporting options

Setting	Choices
Screen Text/Icon	Selected / Deselected
Logging	Selected / Deselected
Beep	Selected / Deselected
SNMP Trap	Selected / Deselected
Ground Closure	Selected / Deselected

Screen Text/Icon

Displays text and an icon on-screen when an alarm has occurred. Alarms are viewed in the **STATUS** display. The color of the alarm indicator depends on the current status of the alarm.

Logging

Logging stores errors in a file (Error/Alarm log) that includes time stamp, error name, error signal source and additional info specific to the error. The log file is not saved on power-down. An indicator is displayed on-screen when logging is enabled.

Beep Sounds an audio beep when an error/alarm has occurred. The audio beep can be muted without being turned off, by using the Mute Alarms function in the STATUS pop-up menu.

SNMP Trap The instrument sends an SNMP trap to the SNMP manager

Ground Closure An output that can be used to drive a light or audible alarm. All alarms are "OR'ed" together so that if any alarm is triggered, the output is driven to ground.

Muting Alarms You can turn off several of the alarm reporting methods without disabling the alarms by using Mute Alarms in the STATUS pop-up menu. When Mute Alarms is On, the Beep, SNMP Trap, and Ground Closure options are switched off. This enables you to continue to log errors and see visual alarm indicators without audible alarms.

1. Select a tile in which to display the Status screen.
2. Press and hold the **STATUS** button to display the STATUS pop-up menu.
3. Select **Mute Alarms** from the pop-up menu**.**
4. Press **SEL** to select **On**.
5. Press **STATUS** again to remove the pop-up menu.

When Alarms are muted, the text "Alarms Muted" appears in the Status bar.

Viewing Alarm Status

To view Alarm Status:

1. Select the tile where you want the Alarm Status displayed.
2. Press the **STATUS** button. If the Alarm Status page is not displayed, press and hold the **STATUS** button to display the STATUS menu. See Figure 3–21.
3. Select **Display Type** from the menu**.**
4. Press the right-arrow key to change the menu focus to the **Display Type** submenu.
5. Select **Alarm Status**.
6. Press **STATUS** again to remove the menu.

7. If the status page is longer than a single page (see the upper-right corner of the display), you can scroll through the alarm listing by using the GENERAL knob or the up-down arrow keys.

NOTE. *The Alarm Status displayed is only for the currently selected video and audio inputs.*

Figure 3-21: Selecting the alarm status display

Elements of the Display

There are three columns in the Alarm Status display: Alarm, Status, and Additional Information.

The **Alarms** column lists the alarms that have been triggered. This is a history of alarms, it includes alarms that occurred in the past as well as alarms currently being triggered.

The **Status** readouts use both text and color to indicate the current state of the error. Text is used to indicate whether or not an error occurred. Color is used to indicate the current status of an error.

The Status readout text is either OK or ERROR. If the text is **OK**, that means that the alarm is not being triggered or has not occurred within the last five seconds. **ERROR** means that an alarm is occurring or has occurred within the last five seconds.

The meaning of the color for Status readouts is:

- **Yellow**: Indicates that the alarm occurred within the last five seconds but has cleared.
- **Red**: Indicates an ongoing error.

The Additional Information column provides explanatory information. For example, if an Audio Signal Loss alarm is triggered, the text **123--678** may appear under Additional Information. These numbers indicate the audio channels mapped to level meter bars 1, 2, 3, 6, 7, and 8 triggered the alarm.

***NOTE**. Different tiles can be set to display different screens under the Status button. You can display up to four Status screens at the same time.*

Displaying Errors

You view errors in the Error Log which is displayed in the Status window. See Figure 3-22.

Figure 3-22: Error log display

To view the Error Log:

1. Select the tile where you want the Error Log displayed.
2. Press the **STATUS** button. If the Error Log page is not displayed, press and hold the **STATUS** button to display the STATUS menu.
3. Select **Display Type** from the menu.
4. Press the right-arrow key to change the menu focus to the Display Type submenu.
5. Select **Error Log**.
6. Press **STATUS** again to remove the menu.
7. If the log is longer than a single page (see the upper-right corner of the display), you can scroll through the log by using the GENERAL knob or the up-down arrow keys.

***NOTE**. The Error Log displayed is only for the currently selected video and audio inputs.*

Elements of the Display

There are three columns in the Error Log display: Error Status, VITC/LTC, and Time.

The **Error Status** column lists the errors that have occurred and changes in the instrument state. This is a history of errors and settings changes.

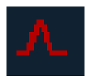
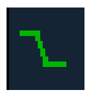
Entries for audio errors will include a string of numbers. The numbers indicate the level meter bar that triggered the error. For example, you might see **Audio Signal Loss (123456--)** displayed. This string indicates that the signals mapped to level meter bars 1–6 are missing. (For information on Input to Bar Maps, see page 2–42).

Entries in the Error Status column appear in color to indicate the current state of the entry. The colors of the entries are as follows:

- **White**: Identifies items that are informational. These represent changes in the instrument state. For example, you might see **Log Server State (Running)** displayed. This entry indicates that error logging was started at the indicated time.
- **Green**: Identifies that an error has cleared.
- **Red**: Identifies that an error is triggered.

The Error Status Log also displays icon next to the entries to provide a quick indication of the type of entry. See Table 3-4.

Table 3-4: Error status log icons

Icon	Description
	Identifies entries that are informational in nature. The entry does not represent an error, but usually changes in instrument state, such as a change in the video input source.
	A red-colored icon that indicates the start of an ongoing error.
	A red-colored icon that identifies a transient error.
	A green-colored icon that indicates an when error has cleared.

The **VITC/LTC** column shows the time, according the VITC or LTC in the signal, that the error occurred, and in the case of ongoing errors, the VITC/LTC at which the error first occurred.

The **Time** column show the time, according to the internal clock, that the error occurred.

Displaying Video Session Status

The waveform rasterizer maintains a history, or log, of video alarms. The **Video Session** display type in the STATUS menu shows this history. The Video Session display contains a number of statistics that show the alarms that have been triggered since the last time the logging was reset. See Figure 3-23.

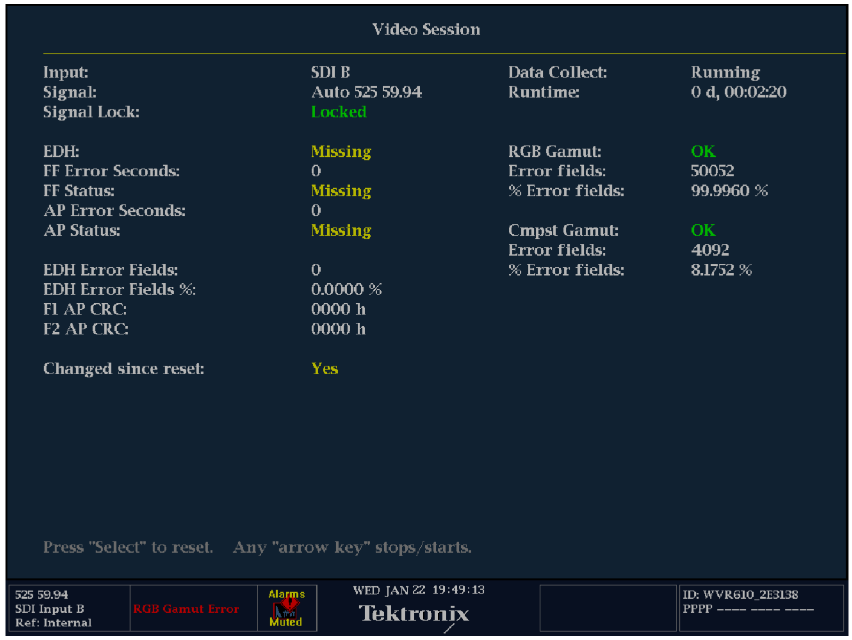


Figure 3-23: Video session status display for an SDI input

To display the Video Session status:

1. Select the tile where you want the Video Session displayed.
2. Press the **STATUS** button. If the **Video Session** page is not displayed, press and hold the **STATUS** button to display the STATUS menu.
3. Select **Display Type** from the menu.
4. Press the right-arrow key to change the menu focus to the **Display Type** submenu.
5. Select **Video Session**.
6. Press **STATUS** again to remove the menu.

Resetting Video Session Statistics

The statistics on the Video Session page continue to accumulate until you manually restart the data collection or cycle the power on the instrument.

***NOTE**. The Audio Session and Video Session display are tied to each other. If you reset the statistics for either one, it resets the statistics for the other also.*

To reset the Video Session statistics from the STATUS pop-up menu:

1. Press and hold the **STATUS** button to display the STATUS menu.

While the STATUS pop-up menu is displayed, the word **Paused** appears in the upper left-hand corner of the tile. While the pop-up menu is displayed, the statistics in the tile are not updated. Even though the update of the display is paused, internally the statistics continue to be updated. If you remove the pop-up without making any change, the displayed statistics will be updated immediately.

2. Select **Sessions Reset**.
3. Press **SEL** to reset the session statistics.

An alternate way to reset the Video Session statistics is to press **SEL**.

Stopping and Restarting Video Session Updating

You can stop the update of the statistics display without clearing the accumulated statistics.

***NOTE**. The Audio Session and Video Session displays are tied to each other. If you start or stop the statistics for either one, it stops or starts the statistics for the other also.*

To stop the update of Video Session statistics:

1. Press and hold the **STATUS** button to display the STATUS menu.

   While the STATUS pop-up menu is displayed, the word **Paused** appears in the upper left-hand corner of the tile. While the pop-up menu is displayed, the statistics in the tile are not updated. Even though the update of the display is paused, internally the statistics continue to be updated. If you remove the pop-up without making any change, the displayed statistics will be updated immediately.

2. Select **Sessions Stop**.
3. Press **SEL** to stop updating the sessions statistics.

To restart the update of Video Session statistics:

1. Press and hold the **STATUS** button to display the STATUS menu.
2. Select **Sessions Start**.
3. Press SEL to start updating the sessions statistics.

An alternate way to stop and start the Video Session statistics is to press one of the arrow keys.

Video Session Display for SDI Inputs

This section describes each of the elements of the Video Session display when SDI A or B is the selected input.

There are three sections to the display: miscellaneous information, EDH status, and Gamut status. The miscellaneous information section displays information about the signal and the session. The EDH status (Error Detection and Handling) section displays the EDH status, and the Gamut status section displays the gamut status. See Figure 3-24.

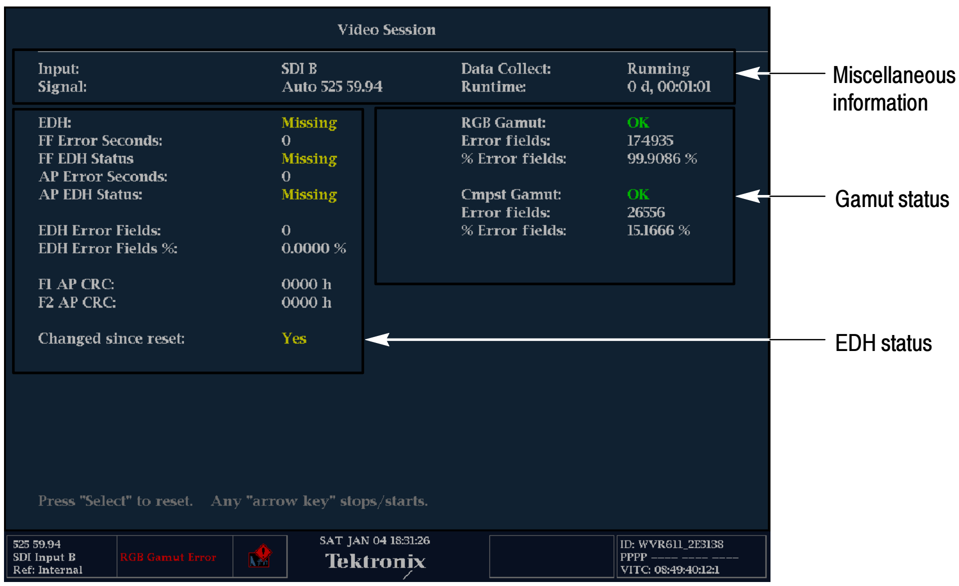


Figure 3-24: Sections of video session display

Miscellaneous Section

The following information appears in the Miscellaneous section of the Video Session display:

Input. Shows the selected input source: SDI A or SDI B.

Signal. Displays the format of the input signal in the following order: number of lines, scan type and field rate.

Signal Lock. Indicates whether or not the waveform rasterizer is locked to the selected input.

Data Collect. Displays the state of error gathering. Possible states are:

- **Running –** Indicates errors are being gathered and displayed on the status page.
- **Stopped –** Indicates errors are not being gathered. The status page is not being updated.
- **Resetting –** Appears briefly after **SEL** has been pressed to reset the statistics.

Runtime. Indicates the time since the last reset occurred. Time is displayed as “DD, HH:MM:SS”, where DD is the number of days, HH is the number of hours, MM is the number of minutes, and SS is the number of seconds.

EDH Section

The following information appears in the EDH section of the Video Session display:

EDH. Displays the current condition of the EDH packet (for full details on EDH, see SMPTE RP165). The possible values are:

- **Valid –** Indicates the EDH packet is present and that the embedded CRC value matches the calculated CRC value.
- **Invalid –** Indicates the EDH packet is present but there is no CRC value embedded or that it is corrupted.
- **Missing –** Indicates that the EDH packet is missing, which probably means that the EDH packet was not inserted by the source.
- **Error –** Indicates that an EDH packet is present, but the embedded CRC value does not match the calculated CRC value, and thus a transmission error has occurred. The Error indicator is displayed for one second after an error occurs.

FF Error Seconds. Displays the number of seconds containing at least one error detected in either the active or blanking portion (Full Field) of the video signal.

FF Status. Displays the Full Field status of the video signal. Status can be:

- **Valid –** Indicates the embedded CRC value matches the calculated CRC value.
- **Invalid –** Indicates the no CRC value was embedded or that it is corrupted.
- **Missing –** Indicates that the EDH packet is missing, which probably means that the EDH packet was not inserted by the source.

- **Error –** Indicates that the embedded CRC value does not match the calculated CRC value, and thus a transmission error has occurred. The Error indicator is displayed for one second after an error occurs.

AP Error Seconds. Displays the number of seconds containing at least one error detected only in the active picture (AP) portion of the video signal.

AP Status. Displays the status of the Active Picture portion of the video signal. Status can be:

- **Valid –** Indicates the embedded CRC value matches the calculated CRC value.
- **Invalid –** Indicates the no CRC value was embedded or that it is corrupted.
- **Missing –** Indicates that the EDH packet is missing, which probably means that the EDH packet was not inserted by the source.
- **Error –** Indicates that the embedded CRC value does not match the calculated CRC value, and thus a transmission error has occurred. The Error indicator is displayed for one second after an error occurs.

EDH Error Fields. The number of fields that contained an error since the last reset.

EDH Error Fields %. A calculated number listing the percentage of fields that contained at least one EDH error since the last reset.

F1 AP CRC. A display of the active picture CRC value for field one. (This value is sampled once a second.)

F2 AP CRC. A display of the active picture CRC value for field two. (This value is sampled once a second.)

Changed since reset. Indicates if either the F1 or F2 AP CRC values have changed since the last reset. This useful for detecting errors on static images that do not have EDH.

RGB Section

The following information appears in the RGB section of the Video Session display:

RGB Gamut. Evaluates the SDI input signal against the thresholds set for the Diamond display in CONFIG > Gamut Thresholds submenu. If an error occurs, **Error** is displayed for one second after a violation is detected.

Error Fields. The number of fields that contain at least one EDH error since the last reset.

% Error Fields. A calculated number showing the percentage of all fields that contained at least one RGB error since the last reset.

Cmpst Gamut. Evaluates the SDI input signal against the thresholds set for the Arrowhead display in CONFIG > Gamut Thresholds submenu. If an error occurs, **Error** is displayed for one second after a violation is detected.

Error Fields. The number of fields that contain at least one error since the last reset.

% Error Fields. A calculated number showing the percentage of all fields that contained at least one Composite error since the last reset.

There is one other readout that appears on the display, but it only appears when you press FREEZE.

Freeze. Indicates errors are being gathered, but are not being displayed on the Status page. This state is useful for looking at EDH (Error Detection and Handling) CRC (Cyclic Redundancy Check) values on live video.

Video Session Display for Composite Inputs

This section describes each of the elements of the Video Session display when CMPST A or B is the selected input. See Figure 3-25.

Figure 3-25: Video session status display for a CMPST input

Input. The selected input source: CMPST A or CMPST B.

Format. Displays the format of the input signal, either PAL or NTSC.

Signal Lock. Indicates whether the signal is locked or unlocked.

Sync AFC Speed. Displays the Sync AFC Speed setting: Fast or Slow.

DC Restore. Displays the DC Restore setting: Fast, Slow, or Off.

NTSC Setup. Displays the NTSC Setup setting: Off or On.

Check Audio Status

You can check audio status in three ways, by looking at the Audio Session display, the Alarm Status display or the Error Log. The three ways provide different views of the audio status.

Audio Session. The Audio Session display shows which audio alarms that have been triggered since the last reset of the error log with additonal information about the signal level. See Table 3-5. The Audio Session displays error information by channel. It displays how many times errors have occurred but not when they occurred.

Alarm Status. The Alarm Status display provides an instaneous view of all enabled alarms, not just audio alarms. The Alarm Status page indicates whether or not an error or alarm is *currently* triggered. It does not indicate how many times an error has occurred or when it occurred.

Error Log. The Error Log display provides a chronological list of all the errors and alarms that have occurred since the error log was reset. While the error log displays exactly when an event occurred (using VITC/LTC when present and clock time) it does not provide a statistical view of the recorded errors or alarms (that is, the number of times an error has been triggered).

Audio Session Display

The Audio Session display is a historical readout of the audio status. The period covered by the Audio Session display is the time since the last reset.

To check the history of audio status:

1. Press the **STATUS** button to set the active tile to the status mode.
2. Press and hold the **STATUS** button to display the menu.
3. Set the Display Type to **Audio Session**. See Figure 3-26.

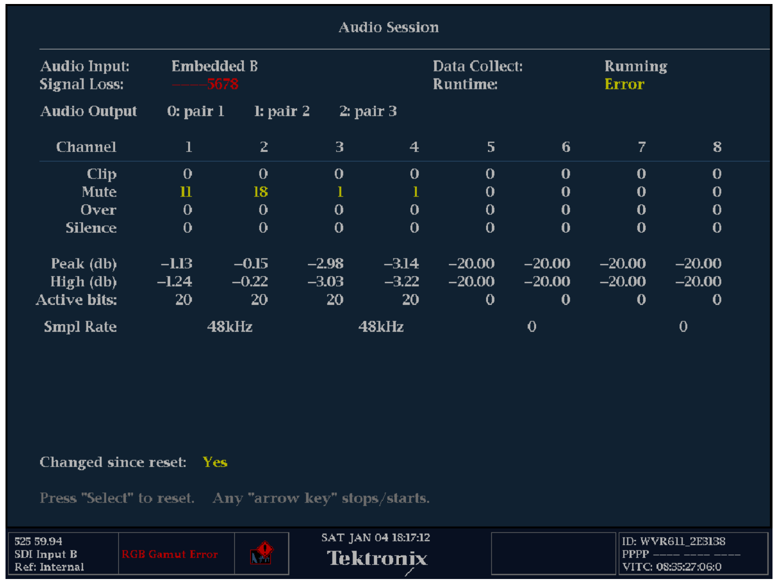


Figure 3-26: Audio session display

Elements of the Audio Session Display

The following paragraphs describe each of the elements of the Audio Session display.

The center portion of the display shows the alarms that have been triggered by channel. It also displays additional measurements and data by channel. Table 3-5 details the readouts that appear in the Audio Session display.

Table 3-5: Audio session readouts

Readout	Description
Audio Input	The audio source.
Data Collect	Indicates if logging is running, stopped, or frozen.
Signal Loss	Indicates the level meter bars (1-8) that have triggered a signal loss alarm. Dashes indicate no alarm has been triggered.
Runtime	The elapsed time since the last time the session was restarted.
Audio Output	Identifies which level meter bar pair has been mapped to which Analog Output.
Clip	The number of CLIPs detected during the session[1].
Mute	The number of MUTEs detected during the session[2].
Over	The number of OVERs detected during the session.
Silence	The number of SILENCEs detected during the session.
Peak (dB)	The True Peak signal level measured on the channel.

Table 3-5: Audio session readouts (Cont.)

Readout	Description
High (dB)	The highest signal level measured by the signal level meter. The level meter response is based on the Ballistics setting. If ballistics is set to True Peak, this readout will be the same as the Peak readout.
Active bits	The number of active bits in the channel.
Smpl Rate	The sample rate of the channel pair.
Changed since reset -	Either Yes or No. Indicates whether an error has occurred since the last reset

[1] **The number of Audio Clips reported is directly affected by the #Samples for Clip setting in the CONFIG > Audio Displays submenu. See page 2-38.**

[2] **The number of Audio Mutes reported is directly affected by the #Samples for Mute setting in the CONFIG > Audio Displays submenu. See page 2-38.**

The values for the Clip and Mute readouts appear in color to indicate status. The colors of the reported values are as follows:

- **Yellow**: Indicates that the alarm occurred within the last five seconds but has cleared.
- **Red**: Indicates an ongoing error.

The Clip and Mute parameters are only displayed for digital audio feeds. Silence and Over are available for both digital and analog feeds.

Resetting the Audio Session Statistics

The statistics on the Audio Session page continue to accumulate until you manually clear and restart the data collection or cycle the power on the instrument.

***NOTE**. The Audio Session and Video Session display are tied to each other. If you reset the statistics for either one, it resets the statistics for the other also.*

To reset the Audio Session statistics:

1. Press and hold the **STATUS** button to display the STATUS menu.
2. Select **Sessions Reset**.
3. Press **SEL** to reset the sessions statistics.

An alternate way to reset the Audio Session statistics is to press **SEL**.

Stopping and Restarting Audio Session Updating

You can stop the update of the statistics display without clearing the accumulated statistics.

***NOTE**. The Audio Session and Video Session displays are tied to each other. If you start or stop the statistics for either one, it stops or starts the statistics for the other also.*

To stop the update of Audio Session statistics:

1. Press and hold the **STATUS** button to display the STATUS menu.

   While the STATUS pop-up menu is displayed, the word **Paused** appears in the upper left-hand corner of the tile. While the pop-up menu is displayed, the statistics in the tile are not updated. Even though the update of the display is paused, internally the statistics continue to be updated. If you remove the pop-up without making any change, the displayed statistics will be updated immediately.

2. Select **Sessions Stop**.
3. Press **SEL** to stop updating the sessions statistics.

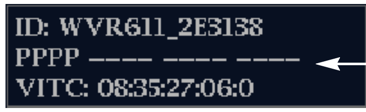
To restart the update of Audio Session statistics:

1. Press and hold the **STATUS** button to display the STATUS menu.
2. Select **Sessions Start**.
3. Press SEL to start updating the sessions statistics.

An alternate way to stop and start the Audio Session statistics is to press one of the arrow keys.

Embedded Audio Status. The WVR610A & WVR611A with audio option DG or DA can monitor audio embedded in the serial digital video ancillary data packets. For any 4-channel pairs, the WVR610A & WVR611A can display bars, Phase (Lissajous), and check for alarms. On all 8 channel pairs, the WVR610A & WVR611A can monitor for presence.

When the selected audio input is “Embedded”, a string of characters are displayed in the right corner of the status bar. The 16-character string denotes the status of each embedded audio channel. Each character shows the status of a specific channel. The characters displayed are as shown in Figure 3–27.



Embedded status readout

Figure 3-27: Embedded audio status display

Table 3–6 describes the readouts for embedded audio status.

Table 3-6: Embedded audio status bar readouts

Displayed character	Description
P	Denotes that the channel is present
-	Denotes that the channel are not present

For other audio inputs, a readout indicating analog or AES will be present.

Displaying Audio Status

To get a instaneous view of the audio status, use the Alarm Status display in the STATUS menu. Note that in addition to audio errors, the Alarm Status display shows all alarms that have been triggered.

To display audio alarm status:

1. Press the **STATUS** button to set the active tile to the Status mode.
2. Press and hold the **STATUS** button to display the pop-up menu.
3. Set the Display Type to **Alarm Status**. See Figure 3–28.

Figure 3-28: Alarm display showing audio errors

Elements of the Display

There are three columns in the Alarm Status display: Alarm, Status, and Additional Information.

The **Alarms** column lists the all the types of alarms that can be detected. For each alarm type, errors will be reported if any reporting method is enabled in CONFIG > Alarms menu. If no reporting method is enabled, that alarm type will show "Disabled" on the Alarm Status page.

The Status readout text is either OK or ERROR. If the text is **OK**, that means that the alarm is not being triggered or has not been triggered within the last five seconds. **ERROR** means that an alarm is occurring or has occurred within the last five seconds.

The meaning of the color for Status readouts is:

- **Yellow**: Indicates that the alarm occurred within the last five seconds but has cleared.
- **Red**: Indicates an ongoing error.

The Additional Information column provides explanatory information. For example, if an Audio Signal Loss alarm is triggered, the text **123--678** may appear under Additional Information. These numbers indicate the audio channels mapped to level meter bars 1, 2, 3, 6, 7, and 8 triggered the alarm.

NOTE. *Different tiles can be set to display different screens under the Status button. You can display up to four Status screens at the same time.*

Error Log

To see when audio alarms were triggered, use the Error Log display in the STATUS menu. Note that in addition to audio alarms, the Error Log display shows all alarms that have been triggered.

To view audio errors on the Error Log display:

1. Press the **STATUS** button to set the active tile to the Status mode.
2. Press and hold the **STATUS** button to display the pop-up menu.
3. Set the **Display Type** to **Error Log**. See Figure 3-29.

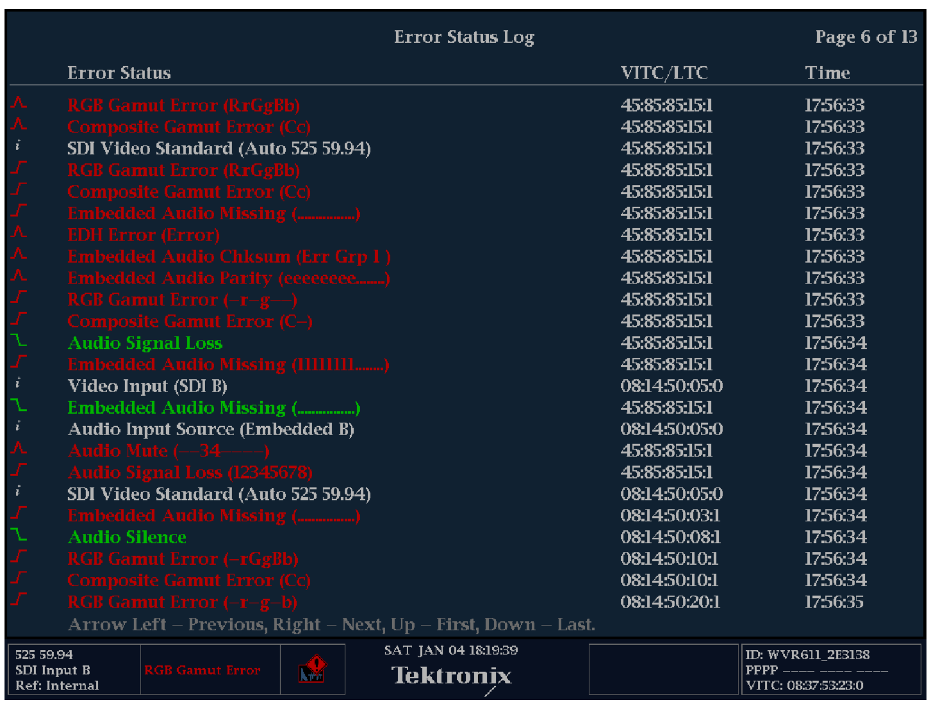


Figure 3-29: Error log displaying audio errors

Elements of the Display

There are three columns in the Error Status display: Error Status, VITC/LTC, and Time.

The **Error Status** column lists the errors that have occurred and changes in the instrument state. This is a history of errors and settings changes.

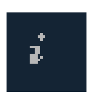
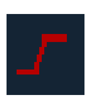
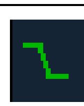
Entries for audio errors will include a string of numbers. The numbers indicate the level meter bar that triggered the error. For example, you might see **Audio Signal Loss (123456--)** displayed. This string indicates that the signals mapped to level meter bars 1–6 are missing. (For information on Input to Bar Maps, see page 2–42).

Entries in the Error Status column appear in color to indicate the current state of the entry. The colors of the entries are as follows:

- **White**: Identifies items that are informational. These represent changes in the instrument state. For example, you might see **Log Server State (Running)** displayed. This entry indicates that error logging was started at the indicated time.
- **Red**: Identifies errors that are ongoing.
- **Green**: Identifies errors that occurred in the past but are no longer occurring. For errors entries that appear in green, you can always find a corresponding preceeding error in red.

The Error Status Log also displays icon next to the entries to provide a quick indication of the type of entry. See Table 3–7.

Table 3-7: Error status log icons

Icon	Description
	A white-colored icon that identifies entries that are informational in nature. The entry does not represent an error, but usually changes in instrument state, such as a change in the video input source.
	A red-colored icon that identifies the start of an ongoing (continuous) error.
	A red-colored icon that identifies a transient error.
	A green-colored icon that identifies an error that occurred in the past but has now cleared.

The **VITC/LTC** column shows the time, according the VITC or LTC in the signal, that the error occurred. In the case of ongoing errors, the VITC/LTC column shows the time at which the error first occurred. In the case of errors that have cleared, the VITC/LTC column shows the time at which the error cleared.

The **Time** column show the time, according to the internal clock, that the error occurred.

Controlling Error Logging

The waveform rasterizer can log errors to a internal file, providing you with a history of recorded errors. See Figure 3-30. This file can be downloaded to your PC for analysis using the web interface. You can turn logging on or off and you can reset the log file to clear it of all entries. The error log can hold up to 10,000 entries or about 513 "pages" of entries. When the error log fills, entries continue to be added to the end of the log as entries are deleted from the beginning of the log.

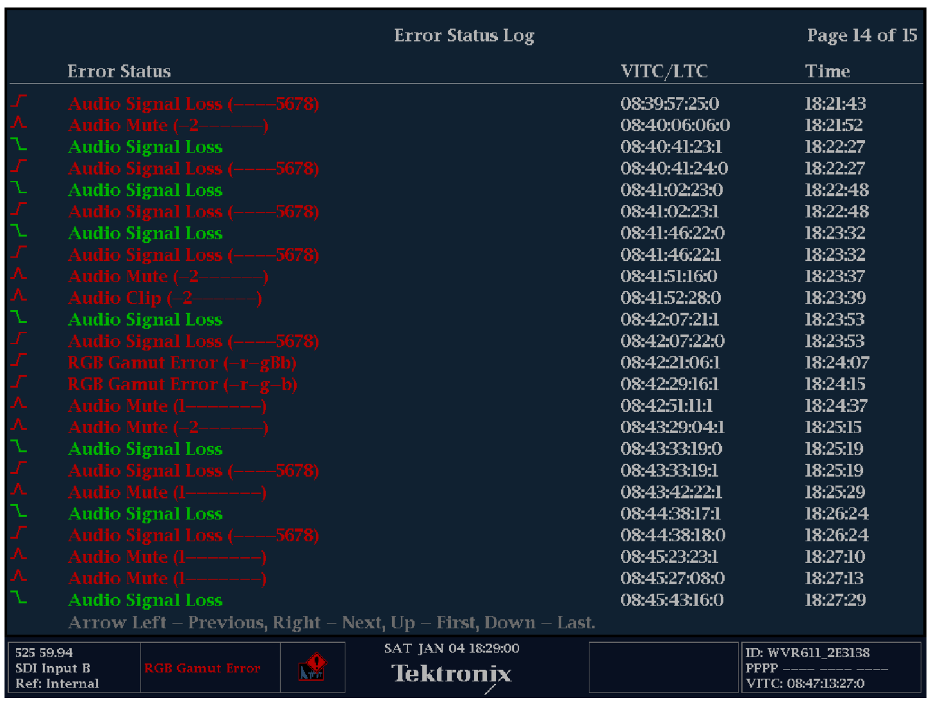


Figure 3-30: Error status log

Displaying Pages of the Error Log

Because the error log is a history of errors, you will want to page through the listing of errors to determine when an error first occurred. To change the page of the error log that is displayed, press the arrow keys.

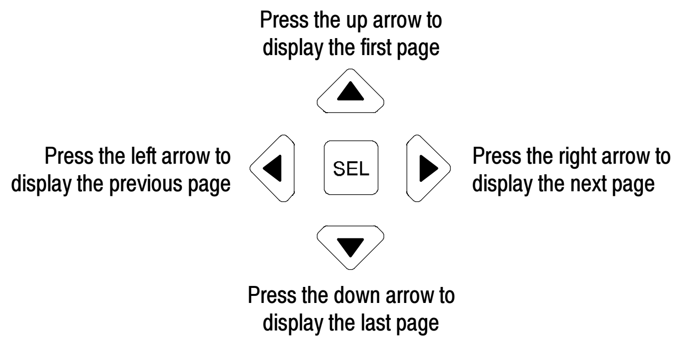


Figure 3-31: Use the arrow keys to navigate the error log

Activating Logging

To activate logging:

1. Press and hold the **STATUS** button to display the STATUS menu.
2. Select **Logging Active**. See Figure 3-32.
3. Press **SEL** or the right-arrow key to select **On**.
4. Press **STATUS** again to remove the menu.

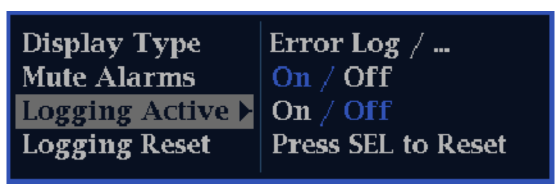


Figure 3-32: Activating logging

Resetting the Log File

To reset or clear the log of all entries:

1. Press and hold the **STATUS** button to display the STATUS menu.
2. Select **Logging Reset.** See Figure 3-32.
3. Press **SEL** to reset the log.
4. Press **STATUS** again to remove the menu.

***NOTE**. The error log is lost if power is removed from the waveform rasterizer.*

Appendices

Appendix A: Specifications

The tables in this appendix list the specifications for the Tektronix WVR610A & WVR611A Waveform Rasterizers. Items listed in the Performance Requirement column are generally quantitative, and are either tested by the *Performance Verification* procedure in the Service Manual or are guaranteed by design. Items listed in the Reference Information column are useful operating parameters that have typical values; information in this column is not guaranteed.

The specifications listed in the Electrical Specifications portion of these tables apply over an ambient temperature range of +0 °C to +50 °C. The rated accuracies are valid when the instrument is calibrated in an ambient temperature range of +20 °C to +30 °C.

Electrical Specifications

Table A-1: SDI Input waveform vertical characteristics

Characteristic	Performance requirement	Reference information
Displayed Vertical Gain Accuracy	At X1, ±0.5% Gain of 700 mV full scale mode At X5, ±0.2% Gain of 700 mV full scale mode	YPbPr signal from a 4:2:2 digital signal generator as measure in YPbPr mode. Limited by display resolution, measured using Graticules or Cursors. Any one of the three channels.
Variable Gain Range, Typical	0.25X to 10X	
Frequency Response		
Luminance Channel (Y)	to 5.75 MHz, ±0.5%	RGB monochrome identical to Y channel.
Chrominance Channels (Pb, Pr)	to 2.75 MHz, ±0.5%	
Transient Response		
Preshoot	≤ 0.3% peak (2T5 bar)	
Overshoot	≤ 0.3% peak (2T5 bar)	
Sine-Squared Bars	≤ 0.3% peak (2T5 bar)	
Ringing		
Sine-Squared Bars	≤ 0.8% peak-peak (2T5 bar)	Pulse-to-bar ration 0.99:1 to 1.01:1 on appropriate Sine-squared or Blackman 2T pulse.
Tilt, Typical		
Field Rate	< 0.1%	

Table A-1: SDI Input waveform vertical characteristics (Cont.)

Characteristic	Performance requirement	Reference information
Line Rate	< 0.1%	
Off Screen Recovery, Typical	< 0.1% variation in baseline of a 5 MHz modulated pulse when positioned anywhere on screen	X1, X5 or any variable gain setting
RGB Transcoder Accuracy		± 0.1%
Bit Integrity		Accurately shows both 8 and 10-bit signals

Table A-2: Serial digital video (SDI inputs A and B) interface physical layer characteristics

Characteristic	Performance requirement	Reference information
Formats Supported		270 Mb/s component. Complies with SMPTE 259M and CCIR 656.
Input Level	800 mV peak-to-peak ± 10%	Input voltages outside this range may cause reduced receiver performance.
Input Type		Passive loopthrough 75 Ω, compensated
Return Loss	≥ 25 dB from 1 to 270 MHz, power on ≥ 15 dB from 1 to 270 MHz, power off	
Insertion Loss (Loopthrough)		≤ 1.2 dB to 270 MHz Checked indirectly via return loss and equalization range
Loopthrough Isolation	≥ 50 dB to 300 MHz	
Serial Receiver Equalization Range	Proper operation with up to 23.0 dB loss at 135 MHz using coaxial cable having a $1/\sqrt{F}$ loss characteristics. 800 mV launch amplitude per SMPTE 259M.	230 meters using Belden 8281 coaxial cable, typically 300 meters
Input Time Base Range	270 Mbits/s ± 50ppm	Many functions continue to operate to a wider range, typically 1000 ppm.

Table A-3: Composite analog input waveform vertical characteristics

Characteristic	Performance requirement	Reference information
Displayed Vertical Gain Accuracy	± 1% all Gain settings	Measured using graticules
Variable Gain Range, Typical	0.25X to 10.0X	
Frequency Response	flat to 5.75 MHz, ± 1%	

Table A-3: Composite analog input waveform vertical characteristics (Cont.)

Characteristic	Performance requirement	Reference information
Delay Variation over Frequency	± 10 ns to 5.75 MHz	
Transient Response		Measured using Sine-squared 2T4 pulse and bar
Pulse-to-Bar Ratio	0.99:1 to 1.01:1	
Pre-shoot	≤ 1%	
Overshoot	≤ 1%	
Ringing	≤ 1%	
Tilt, Typical		
Field Rate	< 0.5%	
Line Rate	< 0.5%	
Off Screen Recovery, Typical		< 0.5% variation in baseline of a Chroma modulated pulse when positioned anywhere on screen X1, X5 or any variable gain setting

Table A-4: Composite analog inputs A and B physical layer characteristics

Characteristic	Performance requirement	Reference information
Formats Supported	NTSC, NTSC no setup, and PAL, I, B, Q, G. Complies with RS170A and ITU-R BT.471	Manual or auto detect of input standard
Internal Reference	Proper horizontal and vertical synchronization with a composite signal of appropriate line and field rate.	
Input Dynamic Range, typical		± 6 dB
Video Maximum Operating Amplitude, typical		-1.8 V to +2.2 V dc + peak ac (all inputs)
Maximum Absolute Video Input Amplitude		-8.5 V to +8.5 V dc + peak ac
Input Type	Passive loopthrough 75 Ω, compensated	
DC Input Impedance		20 kΩ
Return Loss	≥ 40 dB to 6 MHz, power on	Typically > 46 dB to 6 MHz, power on, > 35 dB to 6 MHz, power off for standard amplitude video
Video Input Cross-talk Between Channels		≥ 60 dB to 6 MHz
Loopthrough Isolation		≥ 70 dB to 6 MHz

Table A-4: Composite analog inputs A and B physical layer characteristics (Cont.)

Characteristic	Performance requirement	Reference information
DC Offset with Restore Off		≤ 20 mV typical, Measured in full screen mode at X5 vertical gain
DC Restore Modes	Fast, Slow and Off modes	Slow has a typical bandwidth of 10 Hz, Fast has a typical bandwidth of 500 Hz.
DC Restore Offset Error	≤ 2 mV	Registration between back porch and 0 V graticule
DC Offset Between Inputs	≤ 7 mV	
DC Restore 50 and 60 Hz Attenuation, typical	Fast Mode > 95% attenuation Slow Mode < 10% attenuation Off Mode	
Blanking Shift with 10 to 90% APL Change		≤ 1 IRE (7 mV PAL)
Blanking Shift with Presence and Absence of Burst		≤ 1 IRE (7 mV PAL) Typically 3 mV
Lock Range	± 50 ppm	Remains locked
Lock in Presence of Hum		± 1 V peak-to-peak On 0 dB signal, remains locked
Lock in Presence of White Noise		Signal/Noise ratio of 32 dB 5 MHz bandwidth on black burst, remains locked
Color Framing	Correct color framing detected for signals having < 45° SCH Phase Error and burst is present	
Error Reporting		Should report CPU-readable error conditions, for example, no input present, unlocked, etc.
Clamp Range		Can correct signals with backporch within 1 V of ground.

Table A-5: External reference characteristics

Characteristic	Performance requirement	Reference information
Formats Supported	NTSC and PAL complies with RS170A and ITU-R BT.471.	Proper horizontal and vertical synchronization with a composite signal of appropriate line field rate.
Input Dynamic Range, Typical		± 6 dB
Absolute Maximum Input Voltage, Nominal		± 8.5 V DC plus Peak AC
Input Type		Passive loopthrough 75 Ω, compensated
DC Input Impedance, Nominal	20 kΩ	
Return Loss	≥ 40 dB to 6 MHz, power on	Typically > 46 dB to 6 MHz, power on, > 35 dB to 6 MHz, power off for standard amplitude video
Timing Shift with 10 to 90% APL Change	≤ 0.5 ns	
Timing Shift with Hum	≤ 20 ns with 0 dB hum	
Lock Range	±50 ppm, remains locked	
Lock in Presence of Hum		±1.0 V peak-to-peak, on 0 dB signal, remains locked
Lock in Presence of White Noise		Signal/Noise ratio of 32 dB, 5 MHz bandwidth on black burst, remains locked
Color Framing	Correct color framing detected for signals having <45° SCH Phase Error and burst is present	
Error Reporting		Should report CPU-readable error conditions, for example, no input present, unlocked, etc.
Zero Timing Offset	For correctly timed input, should see minimal shift on the WFM display between internal and external mode.	For vertical timing conform to SMPTE168 – 2002. That is the lines with the start of the broad pulses are aligned. For Horizontal timing, zero delay analog signals have coincident syncs. For digital signals timing is such that if convert to analog via a WFM601a then resultant analog signal is coincident with the reference.

Table A-6: Waveform sweep (horizontal)characteristics

Characteristic	Performance requirement	Reference information
Sweep Timing Accuracy	± 0.1%	All Sweep and Mag modes, limited by display resolution, measured using graticules or cursors. Guaranteed by digital design. Input time base within ± 10 PPM.
Sweep Linearity	± 0.1%	Guaranteed by digital design.
Sweep Rates, Normal		
1 Line	5 µs/division	Numbers shown for overlay, parade modes are scaled appropriately.
2 Line	10 µs/division	
1 Field	1.5 ms/division for 60 Hz signals, 2 ms/division for 50 Hz signals	1 Field displays one full field, including field rate sync. 2 Field displays two full fields and the field rate sync between them.
2 Field	3 ms/division for 60 Hz signals, 4 ms/division for 50 Hz signals	
Sweep Rates, Mag		
1 Line	0.2 µs/division	Mag occurs around center of sweep
2 Line	1 µs/division	2 line and 2 field Mag modes optimized to display blanking intervals.
3 Line	1 µs/division	
4 Line	1 µs/division	
1 Field	75 µs/division for 60 Hz signals, 100 µs/division for 50 Hz signals	
2 Field	150 µs/division for 60 Hz signals, 200 µs/division for 50 Hz signals	
3 Field	75 µs/division for 60 Hz signals, 300 µs/division for 50 Hz signals	
4 Field	150 µs/division for 60 Hz signals, 400 µs/division for 50 Hz signals	
Horizontal Position Range, Nominal		Any portion of the synchronized sweep can be positioned on screen in all sweep modes. Any portion of the sweep can be set to the middle of the screen in non-mag mode.

Table A-7: Waveform mode filter characteristics

Characteristic	Performance requirement	Reference information
Low Pass Filter Gain, Component Only	1 ±0.1% relative to flat gain	
Low Pass Filter Frequency Response, Component Only	≤ 3 dB attenuation at 800 kHz ≥ 32 dB attenuation at 3 MHz	Filter meets STD-205.
Luma Filter Gain, Composite Only	1 ±0.1% relative to flat gain at 50 kHz	
Luma Filter Response, Composite Only	≤ 3 dB attenuation at 800 kHz ≥ 40 dB attenuation at F_{sc}	Same as component low pass filter. Filter meets STD-205.
Chroma Filter Gain, Composite Only		1 ±0.1% relative to flat gain.
Chroma Filter Response, Composite Only	3 dB bandwidth is 3.3 MHz for PAL, and 2.4 MHz for NTSC. Both are ±0.3 MHz.	
Chroma Filter Attenuation at 2X F_{SC}, Composite Only	≥ 25 dB	Typically 28 dB for NTSC, 53 dB for PAL

Table A-8: Component vector mode

Characteristic	Performance requirement	Reference information
Vector Display	P_B is displayed on horizontal axis and P_R is displayed on vertical axis	
Vector Position Behavior	Graticules and waveform move together with position controls. Range sufficient to put any bar target in center of screen at all gains.	
Variable Gain Behavior	Variable affect waveform amplitude relative to graticules.	
Displayed Horizontal and Vertical Gain Accuracy	X1 Gain ±0.5% X5 Gain ±0.2%	Limited by display resolution, measured using graticules.
Display to Graticule Registration	Centered in target, ±0.25 box diameter at 1X gain, ±0.1 box diameter at 5X gain.	Boxes are 2% targets.
Bandwidth, typical		800 kHz, meets STD-205.

Table A-9: Composite vector mode characteristics

Characteristic	Performance requirement	Reference information
Displayed Horizontal and Vertical Gain Accuracy	X1 Gain ±1% X5 Gain ±1%	
Display to Graticule Registration	Centered in target, ±0.5 box diameter with the color bar black/white display dot centered in target.	Boxes are 2% targets.
Vector Display		B-Y is displayed on horizontal axis and R-Y is displayed on vertical axis
Horizontal to Vertical Bandwidth Matching		$<2°$ at 500 kHz and 2 MHz
Composite Vector Dot Reference		Shows “true” zero subcarrier reference
R-Y B-Y Axis Orthogonality		0.1°. Implemented digitally.
Bandwidth, typical		500 kHz

Table A-10: Lightning and Diamond modes display

Characteristic	Performance requirement	Reference information
Displayed Horizontal and Vertical Gain Accuracy	Gain ±0.5%	Limited by display resolution, measured using graticules.
Diamond	GBR Deflection axis indicated.	
Lightning	Y is displayed vertically. P_B is displayed horizontally on top half of display. P_R is displayed horizontally on bottom half of display.	
Lightning Timing Marks		As deflected from center, the 1st tic mark is an error of 20 ns, 2nd tic mark is 40 ns, 3rd tic mark is 74 ns (1 luma sample) and 4th tic mark is 148 ns (1 chroma sample). Deflection calibrated for color bars with 200 ns luma rise time, and 400 ns chroma rise time. If the transition bends in toward black, the color-difference signal is delayed with respect to luma. If the transition bends out toward white, the color-difference signal is leading the luma signal.

Table A-11: RGB gamut error indication (Diamond displays)

Characteristic	Performance requirement	Reference information
Detection Level	Adjustable thresholds: Upper: 650 to 756 mV Lower: -70 to +35 mV Default is nominally 103% of legal RGB Upper: 721 mV Lower: -21 mV	
Detection Level Accuracy	±5 mV	
Colorimetry		According to CCIR601.

Table A-12: Arrowhead mode (NTSC/PAL composite limit display of component input mode)

Characteristic	Performance requirement	Reference information
Signal to Graticule Accuracy (PAL values in parenthesis)	±1%, 100 IRE (700 mV) and 131 IRE (900 mV)	
Composite Limit Cursor Accuracy (PAL values in parenthesis)	2% at 100, 110, 120, and 131 IRE (700 and 900 mV)	
Detection Level	Adjustable thresholds, 1% steps.	Out of limit signals are displayed as Red on the out-of-limit portion of the Arrowhead display.
Composite Limit Detection Level Accuracy (PAL values in parenthesis)		Detection level ±7 mV, 90 to 135% in 1% steps

Table A-13: Program error alarms and "Background Measurement Alarms"

Characteristic	Performance requirement	Reference information
Alarm Coverage		Alarms only reported on active input
Alarm Log Depth		10,000 Alarm entries. Data is volatile; it is lost on power down.
Alarm Log Time Stamping	Time of day and selectable LTC or VITC.	

Table A-13: Program error alarms and "Background Measurement Alarms" (Cont.)

Characteristic	Performance requirement	Reference information
Alarm Notification		All alarms can be configured to be reported to any or all of the following: XGA display icon or text, beeper, SNMP, ground closure alarm output, web-based user interface, alarm log.
SDI Alarms		
EDH Error	Active picture and full field. Field rate resolution.	Uses CRC system. System is known as EDH (Error Detection and Handling) in industry literature. Complies with SMPTE RP 165.
Signal Loss	Reports absence of video signal for the currently selected input.	
RGB and Composite Gamut Errors		User adjustable thresholds. Alarm point may also be displayed in picture mode via bright-up near the location of the error.
Audio Alarms		
Audio Level Alarms		Warns that an audio channel is at mute, clip, silence, or over after a user-definable period of time. Mute and Clip are defined as minimum and maximum digital codes. Silence and Over are levels that can be set by the user.
Audio Error		Warns that an Audio CRC Error has occurred. Does not apply to analog audio inputs.
Audio Unlocked		Warns that an Audio AES clock is not present or out of frequency range.
Composite Video Alarms		
Signal Loss Alarm		Reports absence of video signal for the currently selected input and External Reference if it is enabled.
LTC and VITC		Warns that a break or discontinuity has occurred.

Table A-14: Miscellaneous measurements and displays

Characteristic	Performance requirement	Reference information
Embedded Audio		Identifies the presence and activity of up to 16 channels of embedded digital audio.
EDH Error Statistics		Displays asynchronous errored seconds. Active picture and full field statistics are separately compiled.
SDI Video Format		Indicates whether the signal is 525 lines or 625 lines.
Composite Video Format		Indicates whether the signal is NTSC or PAL. “Forced Format” mode overrides.
VITC		On screen readout of the VITC of the selected video input. Also displayed in the error logging information. Complies with SMPTE 12M.
LTC		On screen readout of the LTC on GC Remote Connector. Also displayed in the error logging information. Complies with SMPTE 12M.

Table A-15: Picture display mode

Characteristic	Performance requirement	Reference information
Modes		Color Only, internally referenced with 60 Hz refresh.
Full-screen Mode	Under scan image with and without blanking displayed	Close to 1 pixel per input sample but interpolated as needed to get correct aspect ratio. Composite picture with blanking displayed does not show sync and burst but does show vertical interval signals such as VITS, teletext and closed caption.

Table A-16: Measure display

Characteristic	Performance requirement	Reference information
Input Timing Relative to External Reference		Display of Vertical and Horizontal timing offset.
Timing Display Zero Definition		For vertical timing conform to SMPTE168 - 2002. For Horizontal timing, zero delay analog signals have coincident syncs. For digital signals, timing is such that if converted to analog via a WFM601a then the resultant analog signal is coincident with the reference. Timing zero is equivalent to nominal zero delay on TG700. Also agrees with timing that has minimal shift on the waveform display when going from internal to external. Vertical timing as per SMPTE168 specifies that the first lines that contain broad pulses are aligned.

Table A-17: Other display

Characteristic	Performance requirement	Reference information
LTC Waveform	Displays voltage versus time waveform of LTC input.	Timing derived from currently selected video timing. Mutually exclusive to Stair Step mode.
LTC Waveform Vertical Accuracy, Typical		±5%
LTC Waveform DC Offset, Typical		±100 mV
LTC Waveform Time Base, Typical		3 ms/division for NTSC, 4 ms/div for PAL Runs in 2-field sweep mode only, triggered by field one to allow verifying audio to video synchronization.

Table A-18: Audio bar displays

Characteristic	Performance requirement	Reference information
Modes		User can configure the response dynamics (ballistics), reference levels, peak hold, offset, and scale of the meters to suite the monitoring needs of their installation or situation. Each pair has a phase correlation meter.
8 Channel		Any four channel pairs with phase correlation meters. Only six channels active with analog audio input.
Surround		Left, Right, Center, Lfe, Left surround, Right surround meters, and an extra channel pair. Phase correlation meters between the two left-right pairs and the extra pair.
Audio Sources		Monitors the signal levels and stereo phase of AES/EBU digital audio, digital audio embedded in serial digital video and analog audio inputs.
Level Meter Resolution		0.056 dB steps on 30 dB scale, from full scale to -20 dB FS. 0.20 dB steps on 0 to-70 dB scale, for signals above -240 dB FS, tiled display.
Correlation Meter Speed	User selectable from 1 to 20. Factory default set to 8.	Speed 1 averages over 0.0167 s. Speed 2 averages over 0.0333 s. Speed 3 averages over 0.0667 s. Speed 4 averages over 0.133 s. Speed 5 averages over 0.267 s. Speed 6 averages over 0.533 s. Speed 7 averages over 1.0 s. Speed 8 averages over 1.5 s. Speed 9 averages over 2.0 s. Speed 10 averages over 2.5 s. Speed 11 averages over 3.0 s. Speed 12 averages over 3.5 s. Speed 13 averages over 4.0 s. Speed 14 averages over 4.5 s. Speed 15 averages over 5.0 s. Speed 16 averages over 5.5 s. Speed 17 averages over 6.0 s. Speed 18 averages over 6.5 s. Speed 19 averages over 7.0 s. Speed 20 averages over 7.5 s.
Metering Ballistics		Selectable from True Peak, PPM Type 1, PPM Type 2, and Extended VU.

Table A-18: Audio bar displays (Cont.)

Characteristic	Performance requirement	Reference information
Peak Program Meter		
PPM Type 1		Equivalent to IEC 60268-10 Type I, DIN 45406, and Nordic N-9
PPM Type 2		Equivalent to IEEE Std. 152-1991 and IEC 60268-10 Type II
True Peak		PPM decay characteristics, no attack delay. Shows actual signal peaks regardless of duration. This is the factory default ballistic.
Extended VU		A VU meter as defined in IEEE Std. 152-1991 but an extended dB-linear scale.
Peak Hold	Hold adjustable from 1 to 10 seconds, default is 2 seconds.	Indicated Peaks held for selected time.
Clip Indication Delay Count		Consecutive FS samples for Clip indication, user selectable Off or 1 to 100. Factory default set to 1.
Mute Indication Delay Count		Consecutive ”0” samples for Mute indication, user selectable Off or 1 to 100. Factory default set to 10.
Clip/Mute Hold Time		User selectable from 1 to 30 seconds. Factory default set to 2.
Silence Indication Threshold		Audio level below which the signal is considered “silent”. Used to trigger on-screen indication and alarms.
Silence Indication Delay		Off or 1 to 60 seconds selectable. Indication and alarm will not be asserted until threshold has been exceeded for the set number of seconds. Factory default is set to 10.
Over Indication Threshold		Audio level above which the signal will be considered “over”. Used to trigger on-screen indication and alarms.
Over Indication Delay		Off or 1 to 30 seconds selectable. Indication and alarm will not be asserted until threshold has been exceeded for the set number of seconds. Factory default is set to 10.

Table A-18: Audio bar displays (Cont.)

Characteristic	Performance requirement	Reference information
Adjustable Peak Program Level (dBFS)		Range: 0 to -30 dB. Peak program level is the level (relative to digital full scale) that you choose as the maximum desired level for monitored programs. The meter bars change to red between the Peak program level.
Adjustable Test Level (dBFS)		Range: 0 to -30 dB. Test level is the level (relative to digital full scale) that you choose as the test or “line up” level for your system. The meter bars change to yellow between the Test and Peak program levels.
Set 0 dB Mark	Selectable from Top of Scale, Peak Program Level, or Test Level.	Use this item to number the meter scale relative to top of scale or to one of the two user-adjustable levels. When the zero mark is et to either Peak program or Test level, the scale units are dBr, relative to the 0 dB level; units above the selected 0 dB mark are positive, while units below it are negative.

Table A-19: Audio bar and lissajous displays

Characteristic	Performance requirement	Reference information
Description		In combination with Bar mode can have Lissajous in one tile.
Automatic Gain Control	Gain control can be on or off.	AGC time constant: 0.5 sec to expand display after a 0 to -40 level transition, 0.05 sec to reduce gain after a -40 to 0 dB level transition.
Manual Scaling		When AGC is off, level at perimeter of display follows Program level on Bar display.

Table A-20: Audio text displays

Characteristic	Performance requirement	Reference information
Session Log (audio and video)		List of Significant audio events with time stamps. Depending on input may include Clips, mutes, Silence, over.

Table A-21: AES audio inputs

Characteristic	Performance requirement	Reference information
Inputs		2 sets with 8 channels each, 24-bit. Meets requirements of AES 3-ID.
Input Connector		BNC, terminated, unbalanced.
Input Impedance		75Ω
Return Loss		> 25 dB relative to 75Ω, from 0.1 to 6 MHz, typically better than 25 dB to 12 MHz. Input A has passive terms and so are the same with power on or off. Input B has active terms that go to a higher impedance with the power off.
Input Amplitude Range		0.2 V to 2 V peak-to-peak
Input Sample Rate		32 kHz, 44.1 kHz, 48 kHz, and 96 kHz
Input Lock Range		> ±5%. This means that exceeding 5%, the instrument may search again for a new lock point. Typically stays locked to 12.5%

Table A-21: AES audio inputs (Cont.)

Characteristic	Performance requirement	Reference information
Level Meter Accuracy over Frequency	0.2 dB from 20 Hz to 20 kHz 0 to -40 dBFS sine-wave, Peak Ballistic mode. Except for within 5 Hz of some submultiples of the sampling frequency for 32, 44.1 and 48 kHz input. 96 kHz inputs follows the 48 kHz exceptions since it is not upsampled. For example: 1/7th of rate -0.25 dB (for 48 kHz this is 6.857 kHz + 5 Hz) 1/6th of rate -0.3 dB (for 48 kHz this is 8 kHz + 5 Hz) 1/5th of rate -0.5 dB (for 48 kHz this is 9.6 kHz + 5 Hz) 1/4th of rate -0.7 dB (for 48 kHz this is 12 kHz + 5 Hz) 2/7th of rate -0.25 dB (for 48 kHz this is 13.714 kHz + 5 Hz) 1/3rd of rate -1.3 dB (for 48 kHz this is 16 kHz + 5 Hz) 4/10th of rate -0.5 dB (for 48 kHz this is 19.2 kHz + 5 Hz)	Worst case examples are shown, other rates with minor exceptions exist. Note that all exceptions are above 6 kHz so on impact accuracy on harmonics of normal audio content.
Audio Levels	Bars display signals up to 0 dBFS.	Must not exceed max power specification on analog outputs. Configure output attenuation if necessary.

Table A-22: AES audio outputs

Characteristic	Performance requirement	Reference information
Source		From embedded audio only.
Number of Outputs		Up to 8 channels
Output Format		Stereo Output, 48 kHz, 20 bit, Meets requirements of SMPTE 276M-1995 (AES 3-ID)
Output Connector		BNC, terminated, unbalanced.
Output Impedance		75Ω

Table A-22: AES audio outputs (Cont.)

Characteristic	Performance requirement	Reference information
Return Loss		> 25 dB relative to 75Ω, from 0.1 to 6 MHz. Tested in Input mode.
Output Amplitude Range		0.9 V to 1.1 V peak-to-peak into 75Ω
Output Sample Rate		Locked to embedded sample rate (nominally 48 kHz).
Output Jitter, Typical		3.5 ns with 700 Hz high pass as per AES specification AES3 rev 1997 specification is 4.1 ns for 48 kHz audio.
Rise and Fall Times, Typical		37 ns 10 to 90% as per AES3

Table A-23: Embedded audio extraction and monitoring on status bar

Characteristic	Performance requirement	Reference information
Embedded Audio Formatting		Extract 20-bit audio formatted according to SMPTE 272M. 24-bit embedded audio is not supported (no AUX bits are extracted) only the 20 most significant bits will be extracted. Supports SMPTE 272M Operation Level B only (48 kHz audio sampling rate synchronized with video).
Channel Numbering		Channel number per SMPTE 272M (1 through 16) will be correctly shown on all displays.
ANC Data Extraction		Only audio data is extracted, other ANC data is ignored.
Number of Channels Monitored for Presence		16 channels are monitored for presence.
Audio Levels	Bars display signals up to 0dBFS.	Must not exceed max power specification on analog outputs. Configure output attenuation if necessary.

Table A-24: Analog audio inputs

Characteristic	Performance requirement	Reference information
Number of Channels		Provides up to two sets of six channels of professional, balanced, differential inputs, 12 channels total.
Input Connector		Balanced, unterminated connector on rear panel. Use 37 pin, 2 row, DSUB connector.
Level Meter Accuracy over Frequency	0.5 dB from 20 Hz to 20 kHz 0 to -40 dBFS sine-wave, Peak Ballistic mode. Except for within 5 Hz of some submultiples of the sampling frequency for 32, 44.1 and 48 kHz input. 96 kHz inputs follows the 48 kHz exceptions since it is not upsampled. For example: 1/7th of rate -0.75 dB (for 48 kHz this is 6.857 kHz + 5 Hz) 1/6th of rate -0.8 dB (for 48 kHz this is 8 kHz + 5 Hz) 1/5th of rate -1.0 dB (for 48 kHz this is 9.6 kHz + 5 Hz) 1/4th of rate -1.2 dB (for 48 kHz this is 12 kHz + 5 Hz) 2/7th of rate -0.75 dB (for 48 kHz this is 13.714 kHz + 5 Hz) 1/3rd of rate -1.8 dB (for 48 kHz this is 16 kHz + 5 Hz) 4/10th of rate -1.0 dB (for 48 kHz this is 19.2 kHz + 5 Hz)	Worst case examples are shown, other rates with minor exceptions exist. Note that all exceptions are above 6 kHz so on impact accuracy on harmonics of normal audio content.
Cross Talk		$\leq$80 dB, typically $\leq$100 dB from 20 Hz to 20 kHz. Defined as the displayed bar level in any channel that results from a Full scale signal on a different input pair in that input.
Maximum Input Levels	+24 dBu referenced to level Meter Accuracy over Frequency above.	Must not exceed max power specification on analog outputs. Configure output attenuation if necessary.
Resolution Sampling, Nominal		24 bits at 48 kHz

Table A-24: Analog audio inputs (Cont.)

Characteristic	Performance requirement	Reference information
Maximum Input Levels, Typical		35 kΩ
Off Isolation		≤ 80 dB, from 20Hz to 20 kHz. Unused input driven from <600 ohm source impedance Defined as the displayed bar level that results from a Full scale signal on any pair of the unused input.

Table A-25: Analog audio outputs

Characteristic	Performance requirement	Reference information
Audio Modes		Balanced: Provide a full-scale output of 24 dBu and is intended for professional balanced applications. Unbalanced: Intended to drive the unbal-anced inputs of consumer amplifiers in which case one side of the line must be grounded.
Audio Sources		The channels routed to the line outputs can include: Embedded audio source AES audio source Analog audio source
Number of Channels		Provides up to 6 channels.
Output Connections		Balanced, unterminated connector located on rear panel. Use 37 pin, 2 row, DSUB connector. Ground negative output to support unbal-anced mode.

Table A-25: Analog audio outputs (Cont.)

Characteristic	Performance requirement	Reference information
Maximum Output Levels		Balanced: +24 dBu ±0.5 dB Unbalanced: -10 dBV ±0.5 dB When grounding one output to achieve unbalanced mode, the other output will be driven to a larger amplitude. You can reduce the output level by adjusting attenuation in the Configuration menu. Do not exceed maximum rated power for either mode.
Input to Output Gain		0 dB to -120 dB in 0.5 dB steps.
Digital Input to Analog Output Gain Accuracy Over Frequency	±0.5 dB, 20 Hz to 20 kHz, 0 to -40 dBFS, 20 or 24 bit input.	
Analog Input to Analog Output Gain Accuracy Over Frequency	±1 dB, 20 Hz to 20 kHz, 24 dBu to -16 dBu	
Output Impedance, Nominal		50Ω Intended to drive 600 Ω load. Drivers are capable of driving a minimum load impedance of 300 Ω but may overheat. Do not exceed maximum rated power.
Digital Input to Analog Output Distortion (THD + N), Typical		< 0.02%, From full scale to -30 dBFS , 20 Hz to 20 kHz
Analog Input to Analog Output Distortion (THD + N), Typical		< 0.05%, From full scale to -30 dBFS , 20 Hz to 20 kHz
Analog or Digital Input to Analog Output Crosstalk, Typical		< -82 dB, 20 Hz to 20 kHz 24 dBu or 0 dBFS input < -100 dB, 20 Hz to 2 kHz 24 dBu or 0 dBFS input
Output Power Capability, Typical		Capable of continuously driving a -10 dBFS sine wave into 600 Ω or -13 dB into 300 Ω. This output level is equivalent is 25 mW RMS in the load per output pair. Live audio may reach full voltage level as long as the duty cycle is such that the RMS power is less than 25 mW averaged over any 10 second period. Exceeding this limit at high ambient temperature may cause the output circuit to overheat and damage the instrument.

Table A-26: Ground closure Remote/LTC input

Characteristic	Performance requirement	Reference information
LTC Input Connector		Balanced, unterminated via rear panel GC remote connector.
LTC Input Impedance		> 10 kΩ
LTC Signal Characteristics		Longitudinal Time Code per IEC Publication 461.
LTC Signal Amplitude Range		0.2 to 5.0 Vp-p balanced differential or single-ended
Ground Closure Input Signaling		TTL thresholds, 5 V maximum input, -0.5 V minimum input. Pull low to assert. Instrument has an internal 10 kΩ pull-up resistor on each input.
Ground Closure Output Characteristics		Open collector output, 30 V maximum, 100 mA maximum, 300 mW maximum.

Table A-27: Ethernet

Characteristic	Performance requirement	Reference information
SNMP		For instrument control and feedback of status. Complies with SNMP version 2.
IP Address Mode		Supports manual and DHCP
Connector	RJ-45 LAN connector supporting 10/100 BaseT.	

Table A-28: XGA Picture monitor output

Characteristic	Performance requirement	Reference information
Amplitude		Can switch between 1 V and 0.7 V.
Resolution		1024 x 768. Timings are typical.

Table A-29: General

Characteristic	Performance requirement	Reference information
Presets		Five user presets and a factory default preset.
Real Time Clock		Time settable by user, used for logging time stamps.
Field Upgradable Software and FPGA		All code except for boot flash can be upgraded.
Battery Life and Retention Time		5 years worst case, 10 years typical.
Low Light Illumination		“OFF” leds optionally illuminated at user selectable level from 1 to 10%.
Preset Parameters		All instrument settings except those under CONFIG > Utilities are saved as part of the Preset.
System Log		Stores diagnostic messages, accessed via CONFIG menu.
Line Select Function		Any one tile can be in line select for waveform, vector, arrowhead, diamond, or lightning.
Line Select Bright-up		Selected line appears as a bright line on picture. Can be disabled in CONFIG menu.
Line Select Range		Any line in SDI-525 (1 to 525), SDI-625 (1 to 625), NTSC (1 to 1050), PAL (1 to 2500). Fields greater than 1 display the line number in the field and the line number in the frame or color frame.
Acoustic Noise Level, Typical		Front 33 dB(A), Rear 35 dB(A), Side 31 dB(A) for standing location at 25 deg C ambient Front 34 dB(A), Rear 36 dB(A), Side 32 dB(A) for sitting location at 25 deg C ambient Measured as per ISO7779. Unit placed on desk, measure in operator location. Fan speed and noise increase at higher temperature.

Table A-30: Power supply

Characteristic	Performance requirement	Reference information
Electrical Rating	100 - 240 VAC ±10%, 50/60 Hz, 100 W maximum	Continuous range from 90 - 264 VAC.
Supply Type		Single phase.
Supply Connection		Detachable cord set with lock.
Power Consumption, Typical		< 90 VA (50 Watts)
Fuse	UL/IEC127 F3.15A H, 250 VAC (5 x 20 mm)	Not operator replaceable.

Physical Specifications

Table A-31: Physical characteristics

Characteristic	Standard
Dimensions	
Height	1.72 inches (43.7 millimeters)
Width	19 inches (482.6 millimeters) measured at front trim
Depth	20.25 inches (514.4 millimeters) including rack handles and BNCs
Weight	
Net	8.75 pounds (4 kilograms)
Shipping	15.7 pounds (7.2 kilograms) approximate

Table A-32: Environmental performance

Category	Standards or description
Temperature	Operating: 0 to +50 °C Non-operating: -40 to +75 °C
Humidity	Proper operation from 5% to 93% Relative Humidity. Do not operate with visible moisture on the circuit boards. Exceeds Mil-PRF-28800F for a class 5 product.

Table A-32: Environmental performance (Cont.)

Category	Standards or description
Vibration	Tektronix Class 5 Random Vibration Operating Test: For Laboratory / Benchtop Products (instrument meets brief operatioinal performance checks at these levels): Power Spectral Density of: 0.00015 g^2/Hz from 5 to 350 Hz, -3 dB/octave from 350 to 500 Hz. 0.000105 g^2/Hz at 500 Hz. Overal level of 0.27 GRMS, 10 minutes per axis. Tektronix Class 5 Random Vibration Non-operating Test: For Laboratory / Benchtop Products: Power Spectral Density of: 0.0175 g^2/Hz from 5 to 100 Hz, -3 dB/octave from 100 to 200 Hz. 0.00875 g^2/Hz from 200 to 350 Hz, -3 dB/octave from 350 to 500 Hz.. 0.006132 g^2/Hz at 500 Hz. Overall level of 2.28 GRMS, 10 minutes per axis. Meets Mil-PRF-28800F for a Class 3 product.
Mechanical Shock	Non-operating: 50 g, halfsine, 11 ms duration, 3 shocks per surface (18 total).
Transportation	TEK Std 062-9537-00 Meets International Safe Transit Association Test Procedure 1A, April 1996, Category II for Vibration, Impact (24 inch drop), and Compression.
Altitude	Operating: Up to 3000 meters (10,061 feet). Non-operating: Up to 12,192 meters (40,000 feet).

Certifications and Compliances

Table A-33: Certifications and compliances

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:	
	EN 55103	Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use.[1]
	Environment	E2 - commercial and light industrial
	Part 1 Emission	
	EN 55022	Class B radiated and conducted emissions
	EN 55103-1, Annex A	Radiated magnetic field emissions
	EN 55103-1, Annex B	Inrush current; I peak = 4.82 amps
	EN-55103-1, Annex E	Conducted emissions, signal/control ports
	Part 2 Immunity	
	IEC 61000-4-2	Electrostatic discharge immunity
	IEC 61000-4-3	RF electromagnetic field immunity
	IEC 61000-4-4	Electrical fast transient / burst immunity
	IEC 61000-4-5	Power line surge immunity
	IEC 61000-4-6	Conducted RF Immunity
	IEC 61000-4-11	Voltage dips and interruptions immunity
	EN 55103-2, Annex A	Radiated magnetic field immunity
	EN 55103-2, Annex B	Balanced ports common mode immunity
	EN 61000-3-2	AC power line harmonic emissions
Australia / New Zealand Declaration of Conformity - EMC	Complies with EMC provision of Radiocommunications Act per the following standard(s):	
	AS/NZS 2064.1/2	Industrial, Scientific, and Medical Equipment: 1992
FCC Compliance	Emissions comply with FCC Code of Federal Regulations 47, Part 15, Subpart B, Class A Limits.	
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 73/23/EEC, amended by 93/68/EEC	
	EN 61010-1/A2:1995	Safety requirements for electrical equipment for measurement control and laboratory use.
U.S. Nationally Recognized Testing Laboratory Listing	UL3111-1	Standard for electrical measuring and test equipment.
Canadian Certification	CAN/CSA C22.2 No. 1010.1	Safety requirements for electrical equipment for measurement, control, and laboratory use.

[1] **Use only high-quality shielded cables.**

Table A-33: Certifications and compliances (cont.)

Category	Standards or description	
Additional Compliance	IEC61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use.
	ISA S82.02.01:1999	Safety standard for electrical and electronic test, measuring, controlling, and related equipment.
Installation (Overvoltage) Category Descriptions	Terminals on this product may have different installation (overvoltage) 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	Pollution Degree 2	
Pollution Degree Descriptions	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 1	No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.
	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.
	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.
	Pollution Degree 4	Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.
Equipment type	Test and Measurement	
Safety Class	Class I	
Overvoltage Category	CAT II	

Appendix B: Using the Remote Interface

The WVR610A & WVR611A can be accessed two ways over an Ethernet network: using just a Web browser or by running a Java applet. Using only a Web browser, you can save screen captures, download presets, and download the error log. If you install Java on your PC, you can use a Java applet to change the waveform rasterizer settings, display the waveform rasterizer screen, save screen captures, upload presets, and download the error log. The Java applet provides a menu bar and a virtual front panel that gives you complete control over instrument settings from a remote PC.

Using a Web Browser

You can connect to the waveform rasterizer and perform simple operations without installing any software and using just a Web browser. See Figure B-1. To use a Web browser to connect to a WVR610A & WVR611A, the waveform rasterizer must be connected to an IP network via Ethernet. You will need to set the IP Config Mode, IP Address, Subnet Mask, and possibly the Gateway Address depending on your network configuration. For information on how to set these parameters, begin with *IP Config Mode* on page 2-55.

To connect to the waveform rasterizer using a Web browser:

- Start your Web browser and type the network address of the waveform rasterizer into the URL entry box like this:
  - **http://123.123.123.123/**

See Figure B-1.

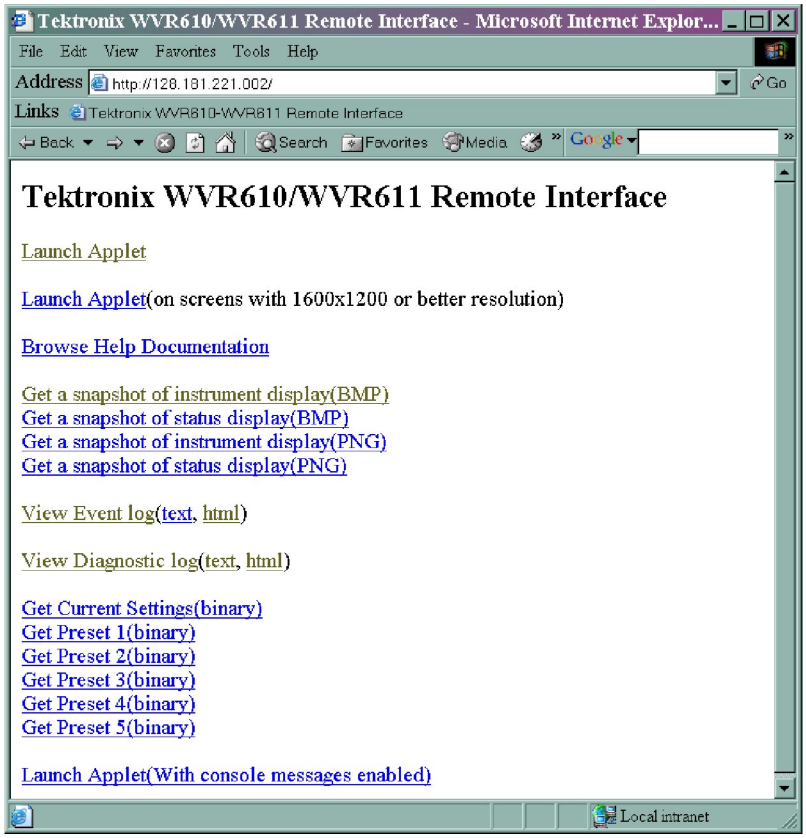


Figure B-1: Accessing the remote interface with a Web browser

The following table describes the function of each of the links displayed in the Web browser window.

Table B-1: Web browser interface functions

Selection	Description
Launch Applet	Starts Java applet
Browse Help Documentation	Display waveform rasterizer online help
Get a snapshot of instrument display (BMP)	Create a screen capture of the full display, save the file in BMP format
Get a snapshot of status display (BMP)	Create a screen capture of just the status bar, save the file in BMP format
Get a snapshot of instrument display (PNG)	Create a screen capture of the full display, save the file in PNG format
View Event Log	Download and display the Error Log as tab-delimited text or an HTML table.

Table B-1: Web browser interface functions (Cont.)

Selection	Description
View Diagnostic Log	Download and display the Diagnostic Log as tab-delimited text or an HTML table
Get a snapshot of status display (PNG)	Perform a screen capture of just the status bar, save the file in PNG format
Get Error log (Tab delimited text)	Download the error log in tab-delimited format
Get Current Settings (binary)	Download instrument settings to a file in binary format
Get Preset 1 (binary)	Download Preset 1 to a file in binary format
Get Preset 2 (binary)	Download Preset 2 to a file in binary format
Get Preset 3 (binary)	Download Preset 3 to a file in binary format
Get Preset 4 (binary)	Download Preset 4 to a file in binary format
Get Preset 5 (binary)	Download Preset 5 to a file in binary format

Using the Java Applet

The Java applet version of the Remote Interface provides menus and a virtual front panel for the WVR610A & WVR611A. Using the Java applet, you can change any setting on the waveform rasterizer. You can download and upload Presets. You can also view waveform rasterizer display and have it refreshed automatically.

Installing Java

To use the Remote Interface Java applet, you must install the Java Runtime Environment.

To run the Remote Interface Java applet, you must have Version 1.41 (or later) of the Java Run-Time Environment (JRE) from Sun Microsystems installed on your PC. To download the JRE (Java Run-Time Environment) plug-in from Sun Microsystems, go to the following URL and download the appropriate code:

http://java.sun.com/j2se/1.4/

Once you download the executable file, launch the installation software and follow the instructions.

Launching the Applet

When you launch the Java applet, it is downloaded from the waveform rasterizer and launched. There is no software installation required to use the applet (other than the Java Run-Time Environment noted previously).

To launch the Java applet:

1. Launch your Web browser and type the network address of the waveform rasterizer into the URL entry box like this:

   http://123.123.123.123/

   Once you type the network address of the waveform rasterizer, press Return to access the Remote Interface.

2. Once the Remote Interface appears, select **Launch Applet**.

The Java applet will be launched and the screen shown in Figure B-2 will appear.

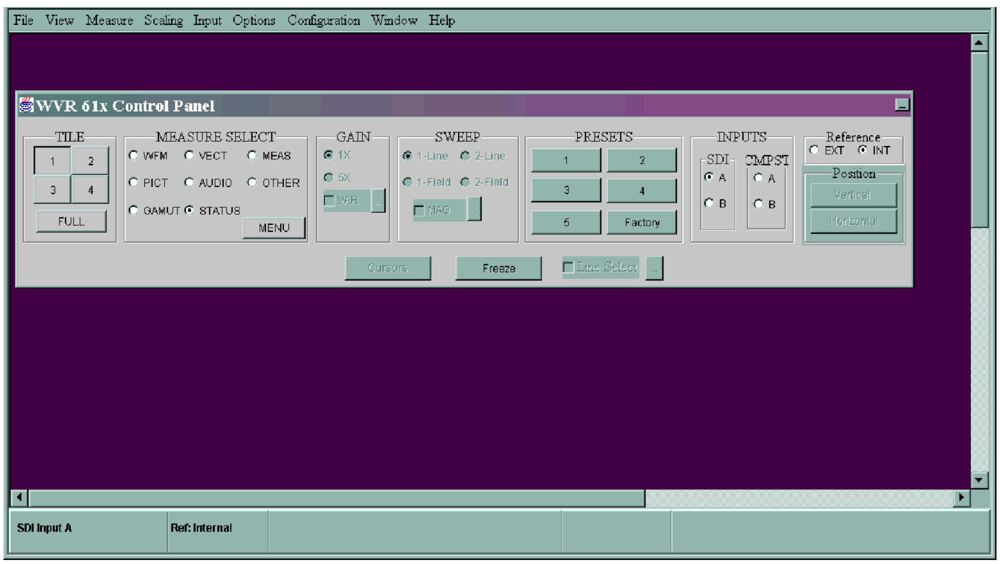


Figure B-2: Java applet

Controlling the waveform rasterizer from the Java applet is much like using the actual instrument. To perform a button press on the waveform rasterizer, click on the same button on the Control Panel. Accessing the Configuration menu is performed by using menus rather than a front-panel button.

Elements of the Java Applet Interface

The Remote Interface window contains a menu bar and a status bar. See Figure B-3. The menu bar provides quick access to functions that are not available from the front panel. The status bar serves the same function as the status bar on the waveform rasterizer display.

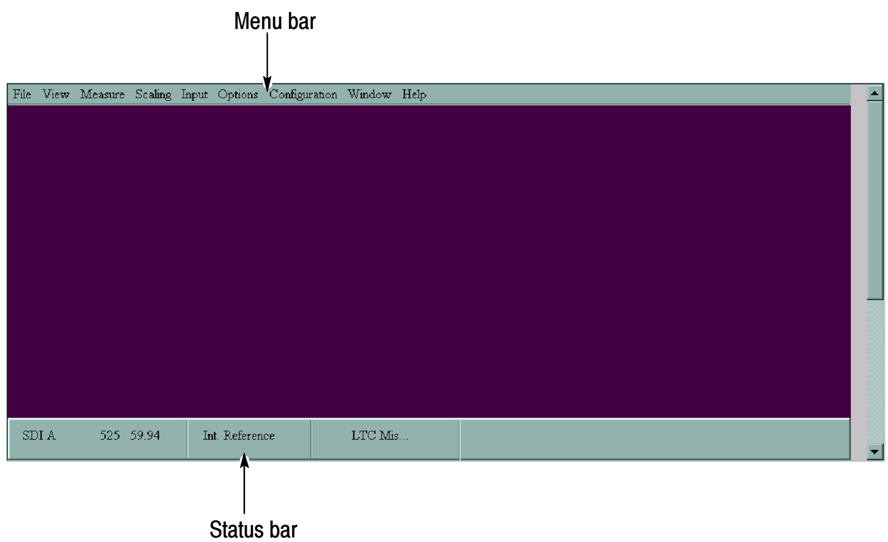


Figure B-3: Java applet window

The Java applet window displays two other windows, the Control Panel and the Waveform Display. The Control Panel is a virtual front panel for the waveform rasterizer. You make selections on the Control Panel by clicking on buttons or selecting option buttons. See Figure B-4.

Displaying the Control Panel Window

To display the Control Panel window:

- Select **View > Control Panel**.

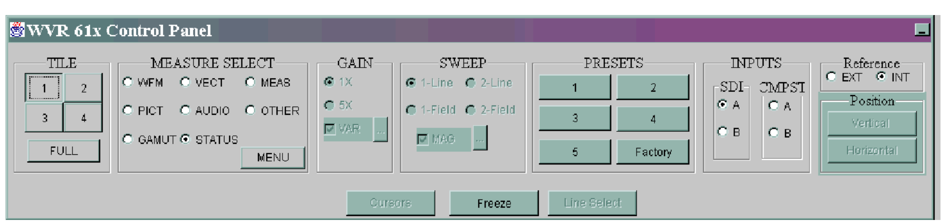


Figure B-4: Control panel

The Waveform Display window provides a display of the waveform rasterizer screen. You do not need to display the Waveform Display window to control the waveform rasterizer. See Figure B-5.

Displaying the Waveform Display Window

To display the Waveform Display window:

- Select **View > Waveform Display**.

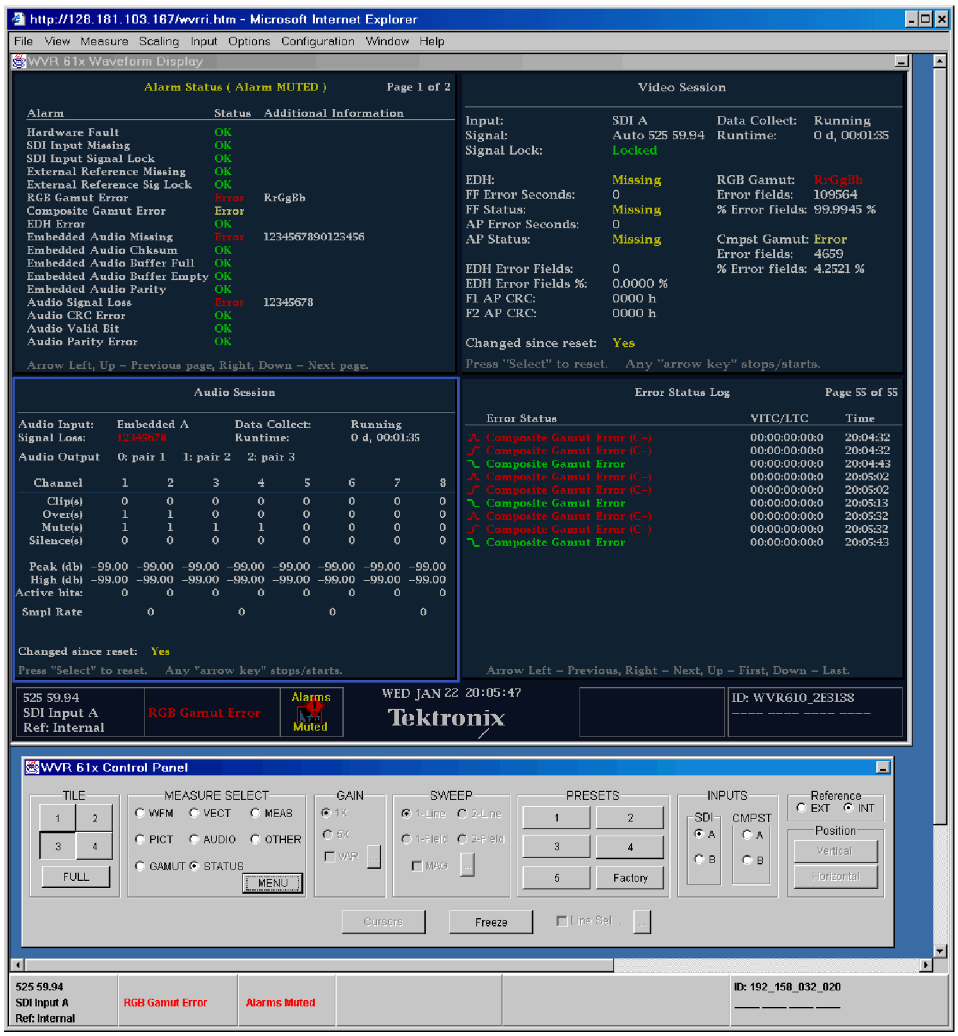


Figure B-5: Waveform display window

The Waveform Display window is *not* refreshed continuously. The default refresh rate is once every 10 minutes (6000 seconds). To change the Waveform Display refresh rate:

1. Select **View > Refresh Rate**. This displays the **Refresh Window Display** window.
2. Adjust the refresh rate to the desired period.
3. Click **OK** to save the new rate.

You can also display the waveform rasterizer online help from the Java Applet. Select **Help > Help...** This opens a new browser window and displays the online help. See Figure B–6.

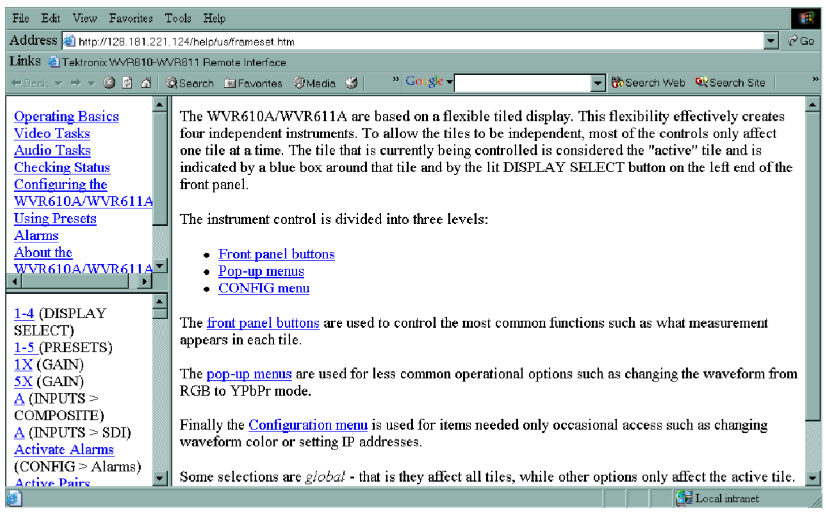


Figure B-6: Displaying online help

Elements of the Menu Bar

Table B–2 lists each of the Remote Interface menus and the commands within the menus.

Table B-2: Remote interface menus

Menu	Commands	Description
File	Restore Settings	Upload stored presets to the waveform rasterizer
	Save as Preset	Save current waveform rasterizer settings in a file
	Exit	
View	Active Tile	Changes the active tile
	Full Screen	Changes display to Full screen mode

Table B-2: Remote interface menus (Cont.)

Menu	Commands	Description
	Freeze	Halts updates to the active tile
	Control Panel	Toggles the display of the Control Panel window on and off
	Waveform Display	Toggles the Waveform Display window on and off
	Refresh	Updates the Waveform Display
	Refresh Rate	Specifies how often the Waveform Display should be automatically updated
Measure	Measurement	Sets the contents of the Active Tile
	Error Log Settings	
	Mute Alarms	Mutes alarms
	Logging Active	Indicates whether or not logging is active
	Reset Log	Clears contents of the error log
Scaling	Vertical Position	Displays a window to enable you to adjust the vertical position
	Horizontal Position	Displays a window to enable you to adjust the horizontal position
	Gain	Enables you to set the Gain to 1X, 5X, or set the variable gain
	Sweep	Enables you to set the sweep mode to One Line, Two Line, One Field, or Two Field
	Mag	Magnifies the Active Tile sweep rate
Input	SDI A	Selects the SDI A input
	SDI B	Selects the SDI B input
	Cmpst A	Selects the CMPST A input
	Cmpst B	Selects the CMPST B input
	Ext. Ref.	Selects the external reference source for composite video
Options	Line Select	Enables Line Select mode
	Cursors	Enables and disables Cursors
Configuration	SDI Input	Displays the SDI Input Configuration menu window
	Composite Input	Displays the Composite Input Configuration menu window
	External Reference	Displays the External Reference Configuration menu window
	Audio Displays	Displays the Audio Displays Configuration menu window

Table B-2: Remote interface menus (Cont.)

Menu	Commands	Description
	Audio Inputs/Outputs	Displays the Audio Inputs/Outputs Configuration menu window
	Alarms	Displays the Alarms Configuration menu window
	Gamut Thresholds	Displays the Gamut Thresholds Configuration menu window
	Display Settings	Displays the Display Settings Configuration menu window
	Graticules	Displays the Graticules Configuration menu window
	LTC/VITC	Displays the LTC/VITC Configuration menu window
	Readouts	Displays the Readouts Configuration menu window
	Utilities	Displays the Utilities Configuration menu window
Window	Control Panel	Moves the Control Panel window to the front if it is covered by the Waveform Display
	Waveform Display	Moves the Waveform Display window to the front if it is covered by the Control Panel
Help	Help	Displays the waveform rasterizer online help
	About	Displays version information about the Java applet

Adjusting Variable Settings

There are several variable settings on the waveform rasterizer, such as vertical and horizontal position or gain. Each of these settings can be adjusted from the Remote Interface. When you select a variable setting for adjustment, the Remote Interface displays a small window with a slider that you use to adjust the value.

For example, to adjust the vertical position of a waveform:

1. Select **Scaling > Vertical Position**. The Remote Interface displays the Vertical Position window. See Figure B-7.

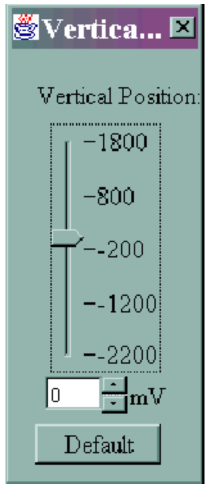


Figure B-7: Adjusting vertical position

2. To adjust the vertical position, slide the indicator to the desired position or enter a specific voltage offset in the window.

   The changed value is sent to the waveform rasterizer as soon as you release the mouse button.

Displaying Pop-up Menus

Displaying pop-up menus for the MEASURE SELECT buttons is accomplished by clicking a button rather than pressing and holding a button as it is on the physical instrument.

To display a pop-up menu for a MEASURE SELECT button:

1. Select the measurement for which you wish to display the pop-up menu.

2. Click the **MENU** button. See Figure B–8 and Figure B–9.

Figure B-8: Displaying pop-up menus

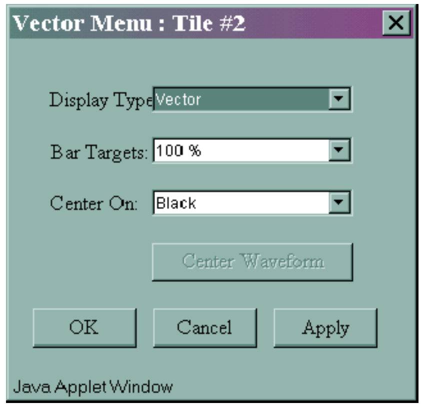


Figure B-9: The vector pop-up menu

Appendix C: WVR610A & WVR611A Waveform Rasterizers MIB

The WVR610A & WVR611A provide remote instrument control using SNMP over a TCP/IP network. The WVR610A & WVR611A utilize two MIBs, one is specific to the WVR610A & WVR611A and the second is a “general purpose” MIB that is shared by several Tektronix video waveform monitors. Both MIBs can be downloaded from the Tektronix web site: www.tektronix.com.

This chapter describes the elements of the two MIBs used by the WVR610A & WVR611A. The two MIBs are:

- **wvr61x.mib** is specific to the WVR610A & WVR611A
- **wfm_mon.mib** is common to Tektronix video waveform monitors.

wvr61x MIB Definitions

The following imports are included:

Module-Identity, Object-Type, enterprises from SNMPv2-SMI

DisplayString from SNMPv2-TC

Module-Compliance, Object Groups from SNMPv2-Conf

Object Descriptions

Descriptions for Group and Table are as follows:

tek	OBJECT IDENTIFIER ::= { enterprises 128 }
tvt	OBJECT IDENTIFIER ::= { tek 5 }
tvtproducts	OBJECT IDENTIFIER ::= { tvt 1 }
tvtmibs	OBJECT IDENTIFIER ::= { tvt 2 }

The MIB module tables describe the control statements for the WVR610A & WVR611A Waveform Rasterizers. The management information base tables begin with the MIB Definitions

Group Descriptions

Descriptions for Groups are as follows:

comp	OBJECT IDENTIFIER ::= { wvr61x 1 }
diag	OBJECT IDENTIFIER ::= { wvr61x 2 }
mfg	OBJECT IDENTIFIER ::= { wvr61x 10 }

Table C-1: Composite calibration group

Object identifier	Object type
comp OBJECT IDENTIFIER ::= { wvr61x 1)	
compDcRestore	
SYNTAX	Integer [off (0), slow (1), fast (2)]
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	DC restore function of composite input
::= { comp 1 }	

Table C-2: wvr61x specific diagnostics group

Object identifier	Object type
diag OBJECT IDENTIFIER ::= { wvr61x 2)	
adjustType	
SYNTAX	INTEGER (0..1)
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Composite adjustment type (0 - adjust, 1 - white adjust). This is used as INDEX in the table.
::= { diag 1 }	
calChannelNum	
SYNTAX	INTEGER (0..5)
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Audio calibration channel number
::= { diag 2 }	
adjustTable	
SYNTAX	SEQUENCE OF AdjustEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Table for adjust
::= { diag 3 }	

Table C-2: wvr61x specific diagnostics group (Cont.)

Object identifier	Object type
adjustEntry	
SYNTAX	AdjustEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	A row in the adjust table
INDEX	{ adjustType }
::= { adjustTable 1 }	
AdjustEntry ::= SEQUENCE { adjust INTEGER }	
adjust	
SYNTAX	integer - end(0), start-with_preset(2), start-no-preset(3), save(4), load(5)]
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Instrument adjustment data control
::= { adjustEntry 1 }	
compAdjZeroVal	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Composite waveform zero position adjustment value
::= { diag 4 }	
compAdjWhiteVal	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Composite waveform white adjustment value (values from -9 to 9 are not allowed)
::= { diag 5 }	
compAdjFreq	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current

Table C-2: wvr61x specific diagnostics group (Cont.)

Object identifier	Object type
DESCRIPTION ::= { diag 6 }	Composite frequency peaking adjustment value
ltcAdjAmp SYNTAX MAX-ACCESS STATUS DESCRIPTION ::= { diag 7 }	 RealString read-write current LTC waveform gain adjustment value
audInAdjTable SYNTAX MAX-ACCESS STATUS DESCRIPTION ::= { diag 8 }	 Sequence of AudInAdjEntry not-accessible current Table for audio input adjustment
audInAdjEntry SYNTAX MAX-ACCESS STATUS DESCRIPTION INDEX ::= { audInAdjTable 1 }	 AudInAdjEntry not-accessible current A row in the audio input adjustment table { calChannelNum }
AudInAdjEntry ::= SEQUENCE { aduInputAdjAmp INTEGER }	
audInputAdjAmp SYNTAX MAX-ACCESS STATUS DESCRIPTION ::= { audInAdjEntry 1 }	 [calibration-failed(-1,) calibration-unknown(0), calibration-busy(1), calibration-done(2)] read-write current Analog audio meter gain adjustment value

audSelfTest
SYNTAX
 	
MAX-ACCESS
	
	Integer {
	self-test-error(-1),
	self-test-ok(0)
	}
	read-write

Table C-2: wvr61x specific diagnostics group (Cont.)

Object identifier	Object type
STATUS	current
DESCRIPTION	Audio hardware self-test
::= {diag 9 }	
audTone	

SYNTAX	Integer {
	tone-off(0),
	tone-100hz(1),
	tone-1khz(2),
	tone-18khz(3)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	State of the audio tone generator
::= { diag 10 }	

Waveform Monitor MIB Definitions

The following imports are included:

Module-Identity, Object-Type, Notification-type, enterprises from SNMPv2-SMI

DisplayString from SNMPv2-TC

Module-Compliance, Object Groups from SNMPv2-Conf

Object Descriptions

Descriptions for Group and Table are as follows:

tek	OBJECT IDENTIFIER ::= { enterprises 128 }
tvt	OBJECT IDENTIFIER ::= { tek 5 }
tvtproducts	OBJECT IDENTIFIER ::= { tvt 1 }
tvtmibs	OBJECT IDENTIFIER ::= { tvt 2 }

The MIB module tables describe the control statements for the WVR610A & WVR611A Waveform Rasterizers. The management information base tables begin with the MIB Definitions

Group Descriptions

Descriptions for Groups are as follows:

gen	OBJECT IDENTIFIER ::= { wfm-mon 1 }
input	OBJECT IDENTIFIER ::= { wfm-mon 2 }
print	OBJECT IDENTIFIER ::= { wfm-mon 3 }
audioDisp	OBJECT IDENTIFIER ::= { wfm-mon 4 }
wfm	OBJECT IDENTIFIER ::= { wfm-mon 5 }
vec	OBJECT IDENTIFIER ::= { wfm-mon 6 }
arr	OBJECT IDENTIFIER ::= { wfm-mon 7 }
lgt	OBJECT IDENTIFIER ::= { wfm-mon 8 }
dmd	OBJECT IDENTIFIER ::= { wfm-mon 9 }
pict	OBJECT IDENTIFIER ::= { wfm-mon 10 }
sdistat	OBJECT IDENTIFIER ::= { wfm-mon 11 }
preset	OBJECT IDENTIFIER ::= { wfm-mon 12 }
gamut	OBJECT IDENTIFIER ::= { wfm-mon 13 }
eye	OBJECT IDENTIFIER ::= { wfm-mon 14 }
jitter	OBJECT IDENTIFIER ::= { wfm-mon 15 }
logstat	OBJECT IDENTIFIER ::= { wfm-mon 16 }
audio	OBJECT IDENTIFIER ::= { wfm-mon 17 }
audiolo	OBJECT IDENTIFIER ::= { wfm-mon 18 }
traps	OBJECT IDENTIFIER ::= { wfm-mon 19 }
alarm	OBJECT IDENTIFIER ::= { wfm-mon 20 }

Table C-3: Wfm-mon General group

Object identifier	Object type
ipAddress	
SYNTAX	DisplayString
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	IP address of the instrument
::= { gen 1 }	
subNetMask	
SYNTAX	DisplayString
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	subnet mask of the instrument
::= { gen 2 }	

Table C-3: Wfm-mon General group (Cont.)

Object identifier	Object type
swVersion	
SYNTAX	DisplayString
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Software version and creation date
::= { gen 3 }	
fpgaVersions	
SYNTAX	DisplayString
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	FPGA versions (Composite FPGA, SDI Waveform FPGA, SDI CPLD, Raster FPGA
::= { gen 4 }	
fpVersion	
SYNTAX	displayString
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Hardware and Software version of front panel
::= { gen 5 }	
instId	
SYNTAX	DisplayString
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Instrument identification (product type)
::= { gen 6 }	
displayModeTable	
SYNTAX	SEQUENCE OF DisplayModeEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Table for display modes
::= { gen 7 }	
displayModeEntry	
SYNTAX	DisplayModeEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	A row in the displayMode table
INDEX	{ currTile}

Table C-3: Wfm-mon General group (Cont.)

Object identifier	Object type
::= { displayModeTable 1 }	
DisplayModeEntry ::= SEQUENCE { displayMode INTEGER }	
displayMode	

SYNTAX	integer {
	none(0),
	wfm(1),
	vec(2),
	lightning(3),
	picture(4),
	arrowhead(5),
	diamond(6),
	status-log(7),
	audio(8),
	ltc(9),
	timeref(10),
	status-alarm(11),
	status-video(12),
	status-audio(13)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Display mode in selected tile
::= { displayModeEntry 1 }	

Table C-4: Wfm-mon Input group

Object identifier	Object type
videoIn	
SYNTAX	Integer (sdi-A(0), sdi-B(1), cpst-A(2), cpst-B(3) none(4))
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Current input source
::= { input 1 }	

Table C-4: Wfm-mon Input group (Cont.)

Object identifier	Object type
sdiInStd	
SYNTAX	Integer (auto(0), std-525(1), std-625(2))
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	SDI input standard
::= { input 2 }	
compInStd	
SYNTAX	Integer (auto(0), ntsc(1), ntsc-ns(2) pal(3))
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Composite input standard
::= { input 3 }	
refSrc	

SYNTAX	Integer {
	internal(0),
	external(1)
	}

MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Current reference source (Internal/External)
::= { input 4 }	

Table C-4: Wfm-mon Input group (Cont.)

Object identifier	Object type
refInStd	

SYNTAX	Integer {
	auto(0),
	ntsc(1),
	pal(2),
	std-1080i-59-94(3),
	std-1080i-60(4),
	std-720p-59-94(5),
	std-1080p-23-97(6),
	std-1080p-24(7)
	}

MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	External reference input standard
::= { input 5 }	
refLocked	

SYNTAX	Integer {
	locked(0),
	unlocked(1)
	}

MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Reference input status - locked/unlocked
::= { input 6 }	
currTile	

SYNTAX	Integer {
	tile1(0),
	tile2(1),
	tile3(2),
	tile4(3)
	}

MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Currently selected tile. This is used as index in tables.
::= { input 7 }	

Table C-4: Wfm-mon Input group (Cont.)

Object identifier	Object type
sdiSetup	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Turn on/off pseudo composite setup
::= { input 8 }	
gratIntensity	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Graticule intensity
::= { input 9 }	
rdOutIntensity	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Readout intensity
::= { input 10 }	
gratColor	

SYNTAX	Integer {
	gold(0),
	blue(1),
	red(2)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Graticule color
::= { input 11 }	

Table C-4: Wfm-mon Input group (Cont.)

Object identifier	Object type
rdOutColor	

SYNTAX	Integer {
	gold(0),
	blue(1),
	red(2)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Readout color
::= { input 13 }	
wfmColor	

SYNTAX	Integer {
	green(0),
	white(1
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveformcolor
::= { input 13 }	
wfmIntensity	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform intensity
::= { input 14 }	
lineSelect	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Select line number
::= { input 15 }	

Table C-4: Wfm-mon Input group (Cont.)

Object identifier	Object type
fieldSelect	
SYNTAX	Integer { all(0), f1(1), f2(2), f3(3), f4(4), f5(5), f6(6), f7(7), f8(8),
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Select fields (0 means all fields)
::= { input 16 }	
fullScreen	

SYNTAX	Integer {
	tile-none(0),
	tile-1(1),
	tile2(2),
	tile3(3),
	tile4(4)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Select a tile to display it in full-screen mode. (Select tile-none to display tiles in tile mode)
::= { input 17 }	
timeOfDay	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	time of day value
::= { input 18 }	
activeTimeCode	
SYNTAX	DisplayString
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Active time code value
::= { input 19 }	

Table C-4: Wfm-mon Input group (Cont.)

Object identifier	Object type
timeCodeSrc	

SYNTAX	Integer {
	none(0),
	ltc(1),
	vitc(2)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Active time code source (LTC/VITC)
::= { input 20 }	
ltcPresent	

SYNTAX	Integer {
	false(0),
	true(1)
	}

MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	LTC source is present or not
::= { input 21 }	
vitcPresent	

SYNTAX	Integer {
	false(0),
	true(1)
	}

MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	VITC source is present or not
::= { input 22 }	
timeCodePresent	

SYNTAX	Integer {
	false(0),
	true(1)
	}

MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	time code is present or not (VITC/LTC)
::= { input 23 }	

Table C-4: Wfm-mon Input group (Cont.)

Object identifier	Object type
lineSelectEnable	

SYNTAX	Integer {
	off(0),
	tile1(1),
	tile2(2),
	tile3(3),
	tile4(4)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Enable line select for the specified tile
::= { input 24 }	

Table C-5: Wfm-mon printing related group

Object identifier	Object type
printIpAddress	
SYNTAX	Octet String
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	IP address of the network printer being used for printing
::= { print 1 }	
printIfType	

SYNTAX	Integer {
	network(0),
	usb(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Printer interface selected for printing (network or USB)
::= { print 2 }	

Table C-5: Wfm-mon printing related group (Cont.)

Object identifier	Object type
printPaperSz	

SYNTAX	Integer {
	a4(0),
	letter(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Paper size being used on the printer (A4 or Letter)
::= { print 3 }	
printOrientn	

SYNTAX	Integer {
	landscape(0),
	portrait(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Print orientation on the print (landscape or portrait)
::= { print 4 }	
printFmt	

SYNTAX	Integer {
	postscript(0),
	pcl(1)
	}

MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Print format on the printer (Postscript or Pcl)
::= { print 5 }	
printToFile	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Print to a file instead of printing on a printer
::= { print 6 }	

Table C-5: Wfm-mon printing related group (Cont.)

Object identifier	Object type
printFileName	
SYNTAX	Octet String (Size (1..16))
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Name of the file into which instrument will print (in case print-to-file mode selected)
::= { print 7 }	
printStart	

SYNTAX	Integer {
	start(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Start printing on the selected printer (write-only)
::= { print 8 }	

Table C-6: Wfm-mon Audio Display group

Object identifier	Object type
audInput	

SYNTAX	Integer {
	analogA(1),
	analogB(2),
	aesA(3),
	aesB(4),
	embedded(5),
	follows-video(6)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Current Audio Input Type
::= { audioDisp 1 }	

Table C-6: Wfm-mon Audio Display group (Cont.)

Object identifier	Object type
audCurOutput	
SYNTAX	DisplayString
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Currently selected analog outputs
::= { audioDisp 2 }	
audOutLvl	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Audio output level
::= { audioDisp 3 }	
audBallistic	

SYNTAX	Integer {
	turePeak(0),
	ppm(1),
	vu(2)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	True peak, PPM or VU meter ballistics
::= { audioDisp 4 }	
audPkHold	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Hold time for peak level indicator (in seconds)
::= { audDisp 5 }	
audErrorHoldTm	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Hold time for clip and mute indicators (in seconds)
::= { audioDisp 6 }	

Table C-6: Wfm-mon Audio Display group (Cont.)

Object identifier	Object type
audClipTh	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Clip duration threshold (in samples)
::= { audioDisp 7 }	
audioClipCount	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Clip count
::= { audioDisp 8 }	
audioMuteTh	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Digital mute duration threshold (in samples)
::= { audioDisp 9 }	
audioMuteCount	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Digital mute count
::= { audioDisp 10 }	
audioOverLvl	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Threshold level for over-volume (in dB)
::= { audioDisp 11 }	
audOverTm	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Over volume duration threshold (in seconds)
::= { audioDisp 12 }	

Table C-6: Wfm-mon Audio Display group (Cont.)

Object identifier	Object type
audSilenceLvl	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Silence level (in dB)
::= { audioDisp 13 }	
audSilenceTm	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Silence duration threshold (in seconds)
::= { audioDisp 14 }	
audProgLvl	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Peak program level (in dB)
::= { audioDisp 15 }	
audTestLvl	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Test level (in dB)
::= { audDisp 16 }	
audCorrMtrSpd	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Time factor for the audio correlation meter
::= { audioDisp 17 }	
audActBits	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Active bits in the audio input stream as reported in the AES status block
::= { audioDisp 18 }	

Table C-6: Wfm-mon Audio Display group (Cont.)

Object identifier	Object type
audAesActBits	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Active bits in the audio input stream as reported in the AES status block
::= { audioDisp 19 }	
audSampleRt	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Sample rate of an AES input stream
::= { audioDisp 20 }	
audLvlMtrScale	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Audio level meter scale (dB)
::= { audioDisp 21 }	
audZeroDbMark	

SYNTAX	Integer {
	dBFS(0),
	peak-level(1),
	test-level(2)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Zero dB mark at one of the three settings: dB full scale, peak program level, or test level
::= { audioDisp 22 }	
audMeterNum	
SYNTAX	Integer {0..7}
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Audio level meter number
::= { audioDisp 23 }	

Table C-6: Wfm-mon Audio Display group (Cont.)

Object identifier	Object type
audLvlTable	
SYNTAX	SEQUENCE OF AudLvlEntry
MAX-ACCESS	non-accessible
STATUS	current
DESCRIPTION	Table for audio level for different meters
::= { audioDisp 24 }	
audLvlEntry	
SYNTAX	AudLvlEntry
MAX-ACCESS	non-accessible
STATUS	current
DESCRIPTION	A row in the audio level table
INDEX	{ audMeterNum }
::= { audLvlTable 1 }	
AudLvlEntry ::= SEQUENCE { audLevel INTEGER }	
audLevel	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Audio level in .01 dBFS (multiply by 100 to get dBFS
::= { audLvlEntry 1 }	
audIgnoreValidBit	
SYNTAX	Integer { off(0), on(1) }
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Enable/disable detection of valid bit in ASE status block
::= { audDisp 25 }	

Table C-6: Wfm-mon Audio Display group (Cont.)

Object identifier	Object type
audPkHoldSeg	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Status of audio peak held segment
::= { audioDisp 26 }	
audLvlMtrScale	

SYNTAX	Integer {
	normal(0),
	custom(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Audio meter scale display mode (in UI)
::= { audioDisp 27 }	
audLvlMtrHeight	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Audio meter scale top when it is in custom mode (in UI)
::= { audioDisp 28 }	
audLvlMtrOffset	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Audio meter scale offset when it is in custom mode (in UI)
::= { audioDisp 29 }	

Table C-6: Wfm-mon Audio Display group (Cont.)

Object identifier	Object type
audLissAGC	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Audio lissajous AGC
::= { audioDisp 30 }	
audMtHold	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Hold time for clip and mute indicators (in seconds)
::= { audioDisp 31 }	

Table C-7: Wfm-mon waveform mode group

Object identifier	Object type
wfmTable	
SYNTAX	SEQUENCE OF WfmEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Table for waveform display mode
::= { wfm 1 }	
wfmEntry	
SYNTAX	WfmEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	A row in the waveform table
INDEX	{ currTile }
::= { wfmTable 1 }	

Table C-7: Wfm-mon waveform mode group (Cont.)

Object identifier	Object type

WfmEntry ::= SEQUENCE {
wfmMode INTEGER,
wfmFilterCpst INTEGER,
wfmFilterYcbcr INTEGER,
wfmFilterRgb INTEGER,
wfmFilterYrgb INTEGER,
wfmColorSpace INTEGER,
wfmChromaOffset INTEGER,
wfmYCbCrChanEnable DisplayString,
wfmYRGBChanEnable DisplayString,
wfmRGBChanEnable DisplayString,
wfmSweepMode INTEGER,
wfmGainMode INTEGER,
wfmVarGainEnable INTEGER,
wfmVarGain DisplayString,
wfmCursorH INTEGER,
wfmCursorV INTEGER,
wfmCursorH1Pos DisplayString,
wfmCursorH2Pos DisplayString,
wfmCursorV1Pos DisplayString,
wfmCursorV2Pos DisplayString,
wfmCursorHDelta DisplayString,
wfmCursorVDelta DisplayString,
wfmHorPos DisplayString,
wfmVertPos DisplayString,
wfmHMag INTEGER
}	

wfmMode	

SYNTAX	Integer {
	parade(0),
	overlay(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform display mode
::= { wfmEntry 1 }	

Table C-7: Wfm-mon waveform mode group (Cont.)

Object identifier	Object type
wfmFilterCpst	

SYNTAX	Integer {
	flat(0),
	luma(1),
	chroma(2),
	flat-luma(3)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform filter for Composite (or psuedo-composite) color space
::= { wfmEntry 2 }	
wfmFilterYcbcr	

SYNTAX	Integer {
	flat(0),
	lowpass(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform filter for YCbCr color space
::= { wfmEntry 3 }	
wfmFilterRgb	

SYNTAX	Integer {
	flat(0),
	lowpass(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform filter for RGB color space
::= { wfmEntry 4}	
wfmFilterYrgb	

SYNTAX	Integer {
	flat(0),
	lowpass(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform filter for YRGB color space
::= { wfmEntry 5 }	

Table C-7: Wfm-mon waveform mode group (Cont.)

Object identifier	Object type
wfmColorSpace	

SYNTAX	Integer {
	none(0),
	composite(1)
	ycbcr(2),
	rgb(3),
	yrgb(4)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform color space
::= { wfmEntry 6 }	
wfmChromaOffset	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform chroma offset
::= { wfmEntry 7 }	
wfmYCbCrChanEnable	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform components enabled in YRGB color space. Possible values - Y, Cb, Cr, YCb, YCr, CbCr, YCbCr
::= { wfmEntry 8 }	
wfmYRGBChanEnable	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform components enabled in YRGB color space. Possible values - Y, R, G, B, YR, YG, YB, RG, RB, GB, YRG, YRB, YGB, RGB, YRGB
::= { wfmEntry 9 }	

Table C-7: Wfm-mon waveform mode group (Cont.)

Object identifier	Object type
wfmRGBChanEnable	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform components enabled in YRGB color space. Possible values - R, G, B, RG, GB, RB, RGB
::= { wfmEntry 10 }	
wfmSweepMode	

SYNTAX	Integer {
	h1(1),
	h2(2),
	f1(3),
	f2(4)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform sweep mode
::= { wfmEntry 11 }	
wfmGainMode	

SYNTAX	Integer {
	gain-x1(0),
	gain-x5(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform fixed gain
::= { wfmEntry 12 }	
wfmVarGainEnable	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Enable/disable waveform variable gain
::= { wfmEntry 13 }	

Table C-7: Wfm-mon waveform mode group (Cont.)

Object identifier	Object type
wfmVarGain	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform variable gain (0.25 to 10)
::= { wfmEntry 14 }	
wfmCursorH	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Enable/disable waveform horizontal (time) cursors
::= { wfmEntry 15 }	
wfmCursorV	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Enable/disable waveform vertical (voltage) cursors
::= { wfmEntry 16 }	
wfmCursorH1Pos	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Position of the first horizontal cursor in the waveform display
::= { wfmEntry 17 }	

Table C-7: Wfm-mon waveform mode group (Cont.)

Object identifier	Object type
wfmCursorH2Pos	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Position of the second horizontal cursor in the waveform display
::= { wfmEntry 18 }	
wfmCursorV1Pos	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Position of the first vertical cursor in the waveform display
::= { wfmEntry 19 }	
wfmCursorV2Pos	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Position of the second vertical cursor in the waveform display
::= { wfmEntry 20 }	
wfmCursorHDelta	
SYNTAX	DisplayString
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Distance between horizontal cursors
::= { wfmEntry 21 }	
wfmCursorVDelta	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Distance between vertical cursors
::= { wfmEntry 22 }	

Table C-7: Wfm-mon waveform mode group (Cont.)

Object identifier	Object type
wfmHorPos	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform horizontal position (-1 to 1)
::= { wfmEntry 23 }	
wfmVertPos	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform vertical position (-1000.0 mV to 700.0 mV)
::= { wfmEntry 24 }	
wfmHMag	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Waveform horizontal magnification (Off/On)
::= { wfmEntry 25 }	

Table C-8: Wfm-mon vector mode group

Object identifier	Object type
vecPhase	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Vector Phase, for composite input only (0.0 to 360.0 degrees)
::= { vec 1 }	

Table C-8: Wfm-mon vector mode group (Cont.)

Object identifier	Object type
vecTable	
SYNTAX	SEQUENCE OF VecEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Table for vector display mode
::= { vec 2 }	
vecEntry	
SYNTAX	VecEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	A row in the vector table
INDEX	{ currTile }
::= { vecTable 1 }	

VecEntry ::= SEQUENCE {
vecMode INTEGER,
vecHorPos DisplayString,
vecVertPos DisplayString,
vecTargets INTEGER,
vecGain INTEGER,
vecVarGainEnable INTEGER,
vecVarGain DisplayString,
vecIqAxis INTEGER,
vecCenter INTEGER,
}	

vecMode	

SYNTAX	Integer {
	normal(0),
	rose(1),
	sch(2)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Vector display mode
::= { vecEntry 1 }	
vecHorPos	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Vector horizontal position (–400.0 mV to 400.0 mV)
::= { vecEntry 2 }	

Table C-8: Wfm-mon vector mode group (Cont.)

Object identifier	Object type
vecVertPos	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Vector vertical position (–400.0 mV to 400.0 mV)
::= { vecEntry 3 }	
vecTargets	

SYNTAX	Integer {
	bar-75-percent(0),
	bar-100-percent(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Vector bar targets (75% or 100%)
::= { vecEntry 4 }	
vecGain	

SYNTAX	Integer {
	gain-x1(0),
	gain-x5(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Vector fixed gain
::= { vecEntry 5 }	
vecVarGainEnable	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Enable/disable vector variable gain
::= { vecEntry 6 }	
vecVarGain	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Vector variable gain (0.25 to 14)
::= { vecEntry 7 }	

Table C-8: Wfm-mon vector mode group (Cont.)

Object identifier	Object type
vecIqAxis	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Display vector IQ axes (if on, IQ axes are displayed)
::= { vecEntry 8 }	
vecCenter	

SYNTAX	Integer {
	on-black(0)
	on-red(1),
	on-magenta(2),
	on-yellow(3),
	on-blue(4),
	on-green(5),
	on-cyan(6)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Vector center
::= { vecEntry 9 }	

Table C-9: Wfm-mon arrowhead group

Object identifier	Object type
arrTable	
SYNTAX	SEQUENCE OF ArrEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Table for arrowhead display mode
::= { arr 1 }	

Table C-9: Wfm-mon arrowhead group (Cont.)

Object identifier	Object type
arrEntry	
SYNTAX	ArrEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	A row in the arrowhead table
INDEX	{ currTile }
::= { arrTable 1 }	
ArrEntry ::= SEQUENCE { arrMode INTEGER }	
arrMode	

SYNTAX	iteger {
	normal(0),
	setup(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Arrowhead display mode
::= { arrEntry 1 }	
arrFmt	

SYNTAX	Integer {
	none(0),
	ntsc(1),
	pal(2),
	auto(3)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Arrowhead video format
::= { arr 2 }	

Table C-10: Wfm-mon lightning group

Object identifier	Object type
lgtTable	
SYNTAX	SEQUENCE OF LgtEntry
MAX-ACCESS	not accessible
STATUS	current
DESCRIPTION	Table for lightning display mode
::= { lgt 1 }	
lgtEntry	
SYNTAX	LgtEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	A row in the lightning table
::= { vec 2 }	
LgtEntry ::= SEQUENCE {	
lgtHorPos	DisplayString,
lgtVertPos	DisplayString,
lgtHorGain	INTEGER,
lgtVertGain	INTEGER,
lgtVarHGainEnable	INTEGER,
lgtVarHorGain	DisplayString,
lgtVarVGainEnable	INTEGER,
lgtVarVertGain	DisplayString
}	
lgtHorPos	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Lightning horizontal position (–400.0 mV to 400.0 mV)
::= { lgtEntry 1 }	
lgtVertPos	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Lightning vertical position (–700.0 mV to 700.0 mV)
::= { lgtEntry 2 }	

Table C-10: Wfm-mon lightning group (Cont.)

Object identifier	Object type
lgtHorGain	

SYNTAX	Integer {
	gain-x1(0),
	gain-x5(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Lightning fixed horizontal gain
::= { lgtEntry 3 }	
lgtVertGain	

SYNTAX	Integer {
	gain-x1(0),
	gain-x5(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Lightning fixed vertical gain
::= { lgtEntry 4 }	
lgtVarHGainEnable	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Enable/disable lightning horizontal variable gain
::= { lgtEntry 5 }	
lgtVarHorGain	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Lightning variable horizontal (chroma) gain (0.25 to 14)
::= { lgtEntry 6 }	

Table C-10: Wfm-mon lightning group (Cont.)

Object identifier	Object type
lgtVarVGainEnable	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Enable/disable lightning vertical variable gain
::= { lgtEntry 7 }	
lgtVarVertGain	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Lightning variable vertical (luma) gain (0.25 to 14)
::= { lgtEntry 8 }	

Table C-11: Wfm-mon diamond group

Object identifier	Object type
dmdThrHigh	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Upper threshold (mV)
::= { dmd 1 }	
dmdThrLow	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Lower threshold (mV)
::= { dmd 2 }	

Table C-11: Wfm-mon diamond group (Cont.)

Object identifier	Object type
dmdThrArea	
SYNTAX	Integer (0..10)
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Diamond threshold area (%)
::= { dmd 3 }	
dmdTable	
SYNTAX	SEQUENCE OF DmdEntry
MAX-ACCESS	not accessible
STATUS	current
DESCRIPTION	Table for diamond display mode
::= { dmd 4 }	
dmdEntry	
SYNTAX	DmdEntry
MAX-ACCESS	not accessible
STATUS	current
DESCRIPTION	A row in the diamond table
INDEX	{ currTile }
::= { dmdTable 1 }	
DmdEntry ::= SEQUENCE { dmdMode INTEGER }	
dmdMode	

SYNTAX	Integer {
	diamond(0),
	split-diamond(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Diamond display mode (Diamond/Split-diamond)
::= { dmdEntry 1 }	

Table C-12: Wfm-mon picture mode group

Object identifier	Object type
pictTable	
SYNTAX	SEQUENCE OF PictEntry
MAX-ACCESS	not accessible
STATUS	current
DESCRIPTION	Table for picture display mode
::= { pict 1 }	
pictEntry	
SYNTAX	PictEntry
MAX-ACCESS	not accessible
STATUS	current
DESCRIPTION	A row in the picture table
INDEX	{ currTile }
::= { pictTable 1 }	
PictEntry ::= SEQUENCE { pictMode INTEGER }	
pictMode	

SYNTAX	Integer {
	normal(0),
	v-shift(1),
	h-shift(2),
	pulse-cross(3)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Picture mode
::= { pictEntry 1 }	

Table C-13: Wfm-mon SDI EDH status group

Object identifier	Object type
sdiF1Crc	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	SDI Field 1 active picture CRC value
::= { sdistat 1 }	

Table C-13: Wfm-mon SDI EDH status group (Cont.)

Object identifier	Object type
sdiF2Crc	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	SDI Field 2 active picture CRC value
INDEX	{ currTile }
::= { sdistat 2 }	
sdiFfEdhErr	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Number of seconds with EDH error in Full Field
::= { sdistat 3 }	
sdiApEdhErr	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Number of seconds with EDH error in Active Picture
::= { sdistat 4 }	
sdiEdhReset	

SYNTAX	Integer {
	edh-reset(0),
	edh-stop(1),
	edh-run(2)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Reset EDH error count to zero or start/stop EDH
::= { sdistat 5 }	
sdiEdhErrField	
SYNTAX	Integer
MAX-ACCESS	read-only
STATUS	current
DESCRIPTION	Number of fields with EDH errors since last reset
::= { sdistat 6 }	

Table C-14: Wfm-mon presets group

Object identifier	Object type
presetLoad	

SYNTAX	Integer {
	factory-preset(0),
	preset1(1),
	preset2(2),
	preset3(3),
	preset4(4),
	preset5(5),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Recall a preset (0 - factory default, 1/2/3/4/5 - user presets)
::= { preset 1 }	
presetSave	

SYNTAX	Integer {
	preset1(1),
	preset2(2),
	preset3(3),
	preset4(4),
	preset5(5),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Save the current settings as one of the user presets (1 to 5). This is write-only.
INDEX	{ currTile }
::= { preset 2 }	

Table C-15: Wfm-mon gamut group

Object identifier	Object type
arrNtscThrHigh	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Upper threshold of NTSC composite signal (IRE units)
::= { gamut 1 }	

Table C-15: Wfm-mon gamut group (Cont.)

Object identifier	Object type
arrPalThrHigh	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Upper threshold of PAL composite signal (mV)
::= { gamut 2 }	
arrPalThrLow	
SYNTAX	Integer
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Lower threshold of PAL composite signal (mV)
::= { gamut 3 }	
arrThrArea	
SYNTAX	Integer {0..10}
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Arrowhead threshold area (%)
::= { gamut 4 }	

Table C-16: Wfm-mon log status group

Object identifier	Object type
logClear	

SYNTAX	Integer {
	clear(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Clear the status log. This is write-only.
::= { logstat 1 }	

Table C-16: Wfm-mon log status group (Cont.)

Object identifier	Object type
logActive	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Logging of alarms – on/off
::= { logstat 2 }	
logPage	

SYNTAX	Integer {
	first(1),
	last(2),
	prev(3),
	next(4)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Go to the specified page of the log. This is write-only.
::= { logstat 3 }	

Table C-17: Wfm-mon audio group

Object identifier	Object type
audTable	
SYNTAX	SEQUENCE OF AudEntry
MAX-ACCESS	not accessible
STATUS	current
DESCRIPTION	Table for audio mode
::= { audio 1 }	

Table C-17: Wfm-mon audio group (Cont.)

Object identifier	Object type
audEntry	
SYNTAX	AudEntry
MAX-ACCESS	not accessible
STATUS	current
DESCRIPTION	A row in the audio table
INDEX	{ currTile }
::= { audTable 1 }	

AudEntry ::= SEQUENCE {
audPhaseDisplay INTEGER
audPhaseStyle INTEGER
audPhasePair INTEGER
}	

audPhaseDisplay	

SYNTAX	Integer {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Audio phase display - on/off
::= { audEntry 2 }	
audPhaseStyle	

SYNTAX	Integer {
	sound-stage(0),
	xy(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Audio phase style -SoundStage Lissajous or xyLissajous
::= { audEntry 3 }	

Table C-17: Wfm-mon audio group (Cont.)

Object identifier	Object type
audPhasePair	

SYNTAX	Integer {
	pair1-2(0),
	pair3-4(1),
	pair5-6(2),
	pair7-8(3),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Audio channel pair to monitor in phase display
::= { audEntry 4 }	

Table C-18: Wfm-mon audio input/output group

Object identifier	Object type
audAESportBout	

SYNTAX	INTEGER {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Set AES port B output active when embedded audio is the active audio source
::= { audioIo 1 }	
audAna-A-Format	
SYNTAX	INTEGER { pairs(0), surround(1)}
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Meter format for Analog Input A
::= { audioIo 2 }	

Table C-18: Wfm-mon audio input/output group (Cont.)

Object identifier	Object type
audAna-B-Format	

SYNTAX	INTEGER {
	pairs(0),
	surround(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Meter format for Analog Input B
::= { audioIo 3 }	
audAES-A-Format	

SYNTAX	INTEGER {
	pairs(0),
	surround(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Meter format for AES Input A
::= { audioIo 4 }	
audAES-B-Format	

SYNTAX	INTEGER {
	pairs(0),
	surround (1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Meter format for AES Input B
::= { audioIo 5 }	
audEmbed-A-Format	

SYNTAX	INTEGER {
	pairs(0),
	surround (1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Meter format for Embedded Input A
::= { audioIo 6 }	

Table C-18: Wfm-mon audio input/output group (Cont.)

Object identifier	Object type
audEmbed-B-Format	

SYNTAX	INTEGER {
	pairs (0),
	surround (1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Meter format for Embedded Input B
::= { audioIo 7 }	
levelMeters	

SYNTAX	INTEGER {
	barPair1(0),
	barPair2(1),
	barPair3(2),
	barPair4(3)
	}

MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Level meter pair number. This is used as index in table.
::= { audioIo 8 }	
audBarInTable	
SYNTAX	SEQUENCE OF AudBarInEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Table for Bar to Audio source input map
::= { audioIo 9 }	
audBarInEntry	
SYNTAX	AudBarInEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	A row in the audBarInTable
INDEX	{ levelMeters }
::= { audBarInTable 1 }	

Table C-18: Wfm-mon audio input/output group (Cont.)

Object identifier	Object type

AudBarInEntry
::= { SEQUENCE {
audAES-A-BarInput INTEGER,
AudAES-B-BarInput INTEGER,
audEmbed-A-BarInput INTEGER,
audEmbed-B-BarInput INTEGER
}	

audAES-A-BarInput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	pair4(4),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Bar to Audio AES A input map
::= { audBarInEntry 1 }	
audAES-B-BarInput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	pair4(4),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Bar to Audio AES B input map
::= { audBarInEntry 2 }	

Table C-18: Wfm-mon audio input/output group (Cont.)

Object identifier	Object type
audEmbed-A-BarInput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	pair4(4),
	pair5(5),
	pair6(6),
	pair7(7),
	pair8(8),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Bar to Audio Embedded A input map
::= { audBarInEntry 3 }	
audEmbed-B-BarInput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	pair4(4),
	pair5(5),
	pair6(6),
	pair7(7),
	pair8(8),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Bar to Audio Embedded B input map
::= { audBarInEntry 4 }	
analogLevelMeters	

SYNTAX	INTEGER {
	barPair1(0),
	barPair2(1),
	barPair3(2),
	}

MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Level meter pair number for analog. This is used as index in table.
::= { audioIo 10 }	

Table C-18: Wfm-mon audio input/output group (Cont.)

Object identifier	Object type
analogBarInTable	
SYNTAX	SEQUENCE OF analogBarInEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Table for Bar to Audio Analog source input map
::= { audioIo 11 }	
analogBarInEntry	
SYNTAX	AnalogBarInEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	A row in the analogBarInTable
INDEX	{ analogLevelMeters }
::= { analogBarInTable 1 }	
AnalogBarInEntry	

::= SEQUENCE {
audAna-A-BarInput INTEGER,
audAna-B-BarInput INTEGER
}	

audAna-A-BarInput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Bar to Audio Analog A input map
::= { analogBarInEntry 1 }	
audAna-B-BarInput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Bar to Audio Analog B input map
::= { analogBarInEntry 2 }	

Table C-18: Wfm-mon audio input/output group (Cont.)

Object identifier	Object type
analogOutputs	

SYNTAX	INTEGER {
	output1(0),
	output2(1),
	output3(2),
	}

MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Analog output number. This is used as index in table
::= { audioIo 12 }	
audBarOutTable	
SYNTAX	SEQUENCE OF AudBarOutEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	Table for Audio output to bar map
::= { audioIo 13 }	
audBarOutEntry	
SYNTAX	AudBarOutEntry
MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	A row in the audBarOutTable
INDEX	{ analogOutputs }
::= { audBarOutTable 1 }	
AudBarOutEntry	

::= { SEQUENCE {
audAES-A-BarOutput INTEGER,
audAES-B-BarOutput INTEGER,
audAna-A-BarOutput INTEGER,
audAna-B-BarOutput INTEGER,
audEmbed-A-BarOutput INTEGER,
audEmbed-B-BarOutput INTEGER
}	

Table C-18: Wfm-mon audio input/output group (Cont.)

Object identifier	Object type
audAES-A-BarOutput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	pair4(4),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Analog output to AES A Bar map
::= { audBarOutEntry 1 }	
audAES-B-BarOutput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	pair4(4),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Analog output to AES B Bar map
::= { audBarOutEntry 2 }	
audAna-A-BarOutput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Analog output to Analog A Bar map
::= { audBarOutEntry 3 }	

Table C-18: Wfm-mon audio input/output group (Cont.)

Object identifier	Object type
audAna-B-BarOutput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Analog output to Analog B Bar map
::= { audBarOutEntry 4 }	
audEmbed-A-BarOutput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	pair4(4),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Analog output to Embedded A Bar map
::= { audBarOutEntry 5 }	
audEmbed-B-BarOutput	

SYNTAX	INTEGER {
	none(0),
	pair1(1),
	pair2(2),
	pair3(3),
	pair4(4),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Analog output to Embedded B Bar map
::= { audBarOutEntry 6 }	

Table C-18: Wfm-mon audio input/output group (Cont.)

Object identifier	Object type
audVidMap-SDI-A	

SYNTAX	INTEGER {
	none(0),
	aesA(1),
	aesB(2),
	analogA(3),
	analogB(4),
	embedded(5),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Video to Audio Map for SDI A
::= { audioIo 14 }	
audVidMap-SDI-B	

SYNTAX	INTEGER {
	none(0),
	aesA(1),
	aesB(2),
	analogA(3),
	analogB(4),
	embedded(5),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Video to Audio Map for SDI B
::= { audioIo 15 }	
audVidMap-Cmpst-A	

SYNTAX	INTEGER {
	none(0),
	aesA(1),
	aesB(2),
	analogA(3),
	analogB(4),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Video to Audio Map for Composite A
::= { audioIo 16 }	

Table C-18: Wfm-mon audio input/output group (Cont.)

Object identifier	Object type
audVidMap-Cmpst-B	

SYNTAX	INTEGER {
	none(0),
	aesA(1),
	aesB(2),
	analogA(3),
	analogB(4),
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Video to Audio Map for Composite B
::= { audioIo 17 }	

Table C-19: Wfm-mon traps group

Object identifier	Object type
trapDestn	
SYNTAX	OCTET STRING
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Destination IP Address for Traps
::= { traps 1 }	
trapReport	

SYNTAX	INTEGER {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Enable/Disable trap reporting
::= { traps 2 }	
sdiSigLossTrap	
STATUS	current
DESCRIPTION	Change in the presence of SDI Input Signal
::= { trapPrefix 1 }	
sdiEdhTrap	
STATUS	current
DESCRIPTION	EDH Errors
::= { trapPrefix 2 }	
sdiFFCrcTrap	
STATUS	current
DESCRIPTION	EDH Errors in Full Field
::= { trapPrefix 3 }	
sdiAPCrcTrap	
STATUS	current
DESCRIPTION	EDH Errors in Active Picture
::= { trapPrefix 4 }	
sdiAesChksumTrap	
STATUS	current
DESCRIPTION	AES audio checksum errors
::= { trapPrefix 5 }	

Table C-19: Wfm-mon traps group (Cont.)

Object identifier	Object type
sdiAesFullTrap	
STATUS	current
DESCRIPTION	AES audio extraction buffer FULL errors
::= { trapPrefix 6 }	
sdiAesEmptyTrap	
STATUS	current
DESCRIPTION	AES audio extraction buffer EMPTY errors
::= { trapPrefix 7 }	
sdiAudioMissTrap	
STATUS	current
DESCRIPTION	Embedded audio channel missing errors
::= { trapPrefix 8 }	
sdiAudioPrtyTrap	
STATUS	current
DESCRIPTION	Embedded audio channel parity errors
::= { trapPrefix 9 }	
cpstSigLossTrap	
STATUS	current
DESCRIPTION	Composite Input Signal missing
::= { trapPrefix 10 }	
refMissTrap	
STATUS	current
DESCRIPTION	Reference Input missing
::= { trapPrefix 11 }	
audSigLockTrap	
STATUS	current
DESCRIPTION	Change in the presence of a signal on one or more audio input pairs
::= { trapPrefix 12 }	
audCrcTrap	
STATUS	current
DESCRIPTION	CRC errors on one or more AES audio inputs
::= { trapPrefix 13 }	

Table C-19: Wfm-mon traps group (Cont.)

Object identifier	Object type
audValidTrap STATUS DESCRIPTION ::= { trapPrefix 14 }	 current Incorrectly set VALID bit on one or more AES audio inputs
audParityTrap STATUS DESCRIPTION ::= { trapPrefix 15 }	 current Parity errors on one or more AES audio inputs
audSlipTrap STATUS DESCRIPTION ::= { trapPrefix 16 }	 current Slipped samples on one or more AES audio inputs
audLowSigTrap STATUS DESCRIPTION ::= { trapPrefix 17 }	 current Low signal amplitudes on one or more AES audio inputs
audBiPhaseTrap STATUS DESCRIPTION ::= { trapPrefix 18 }	 current Biphase errors on one or more AES audio inputs
audClipTrap STATUS DESCRIPTION ::= { trapPrefix 19 }	 current Signal clipping on one or more of the audio inputs channels
audOverTrap STATUS DESCRIPTION ::= { trapPrefix 20 }	 current Signals that are over the volume threshold for one or more of the audio inputs channels
audMuteTrap STATUS DESCRIPTION ::= { trapPrefix 21 }	 current Digital mutes on one or more of the audio inputs channels

Table C-19: Wfm-mon traps group (Cont.)

Object identifier	Object type
audSilenceTrap	
STATUS	current
DESCRIPTION	Extended period of silence on one or more of the audio input channels
::= { trapPrefix 22 }	
ltcVitcMissTrap	
STATUS	current
DESCRIPTION	LTC/VITC code missing
::= { trapPrefix 23 }	

Table C-20: Wfm-mon alarms group

Object identifier	Object type
alarmMute	

SYNTAX	INTEGER {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Suspend sending alarms to Beep, SNMP, Ground closure and Pop-up
::= { alarm 1 }	
alarmEnable	

SYNTAX	INTEGER {
	off(0),
	on(1)
	}

MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	Enable/Disable SDI input missing alarms
::= { alarm 2 }	
sdiSigLoss	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	SDI_ALARM_SIG_LOSS alarm notification vector status
::= { alarm 3 }	
sdiBadEdh	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	SDI_ALARM_EDH alarm notification vector status
::= { alarm 4 }	

Table C-20: Wfm-mon alarms group (Cont.)

Object identifier	Object type
compSigLoss	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	COMP_ALARM_SIG_LOSS alarm notification vector status
::= { alarm 5 }	
refMissing	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	COMP_ALARM_REF_LOSS alarm notification vector status
::= { alarm 6 }	
ltcMissing	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	TIMECODE_ALARM_LTC_MISSING alarm notification vector status
::= { alarm 7 }	
vitcMissing	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	TIMECODE_ALARM_VITC_MISSING alarm notification vector status
::= { alarm 8 }	
audioClip	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	AUDIO_ALARM_CLIP alarm notification vector status
::= { alarm 9 }	

Table C-20: Wfm-mon alarms group (Cont.)

Object identifier	Object type
audioMute	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	AUDIO_ALARM_MUTE alarm notification vector status
::= { alarm 10 }	
audioOver	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	AUDIO_ALARM_OVER alarm notification vector status
::= { alarm 11 }	
audioSilence	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	AUDIO_ALARM_SILENCE alarm notification vector status
::= { alarm 12 }	
audSigLock	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	AUDIO_ALARM_SIGNAL_LOCK alarm notification vector status
::= { alarm 13 }	
audioCrc	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	AUDIO_ALARM_CRC alarm notification vector status
::= { alarm 14 }	

Table C-20: Wfm-mon alarms group (Cont.)

Object identifier	Object type
audValidBit	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	AUDIO_ALARM_VALID alarm notification vector status
::= { alarm 15 }	
audParity	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	AUDIO_ALARM_PARITY alarm notification vector status
::= { alarm 16 }	
audConfidence	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	AUDIO_ALARM_CONFIDENCE alarm notification vector status
::= { alarm 17 }	
audCodeViolation	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	AUDIO_ALARM_BIPHASE alarm notification vector status
::= { alarm 18 }	
eAudStreamMissing	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	SDI_ALARM_AUDIO_MISSING alarm notification vector status
::= { alarm 19 }	

Table C-20: Wfm-mon alarms group (Cont.)

Object identifier	Object type
eAudStreamChksum	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	SDI_ALARM_AES_CHKSUM alarm notification vector status
::= { alarm 20 }	
eAudStreamParity	
SYNTAX	DisplayString
MAX-ACCESS	read-write
STATUS	current
DESCRIPTION	SDI_ALARM_AUDIO_PARITY alarm notification vector status
::= { alarm 21 }	

Appendix D: Updating the Waveform Rasterizer Firmware

System Upgrade (CONFIG> Utilities > System Upgrade) is used to upgrade the system software of the WVR610A & WVR611A. The upgrade is performed across an Ethernet network using a PC to transfer the new software to the WVR610A & WVR611A.

The firmware upgrade process involves the following steps:

- Downloading the firmware package ZIP-file from the Tektronix website.
- Initiating the update mode on the waveform rasterizer.
- Unzipping the firmware package and using the enclosed data-transfer utility to send the new firmware data to the instrument you are upgrading.
- Verifying the operation of the instrument after the firmware upgrade.

PC System Requirements

Before you download the WVR610A & WVR611A firmware-upgrade package, verify that your PC meets these requirements.

The data-transfer utility for upgrading the WVR610A & WVR611A runs on the following PC systems:

- Windows 98
- Windows NT 4.0
- Windows 2000
- Windows ME systems
- Windows XP

Additionally, your PC requires the following minimum system-requirements to load and operate the data-transfer utility used to upgrade the waveform rasterizer:

- Winsock 2.0
- Ethernet interface
- 10 MB of free disk space

Firmware Package Download

You can download the latest version of the WVR610A & WVR611A firmware from the Tektronix website at the following URL:

```
http://www.tek.com/Measurement/video_audio
```

From there, follow the links to *Software & Drivers*, and then to *Video Test* to locate the waveform rasterizer firmware-upgrade package.

When you download the upgrade package, you will receive a self-extracting ZIP file containing the following files:

- transfer.exe (data-transfer utility program)
- firmware.pkg (waveform rasterizer firmware-upgrade data file)
- readme.txt (release notes)

Preparing for the System Upgrade

Once you have downloaded a system upgrade package, unzip the file. Next, write down the network address of the waveform rasterizer you plan to upgrade.

Installing the Firmware

To install new firmware in a waveform rasterizer:

1. On the waveform rasterizer, press **CONFIG** to display the Config menu.
2. Select **Utilities** and press the right-arrow key to change the menu focus to the submenu.
3. Select **System Upgrade** and press **SEL**. This displays the System Software Upgrade window. See Figure D-1.

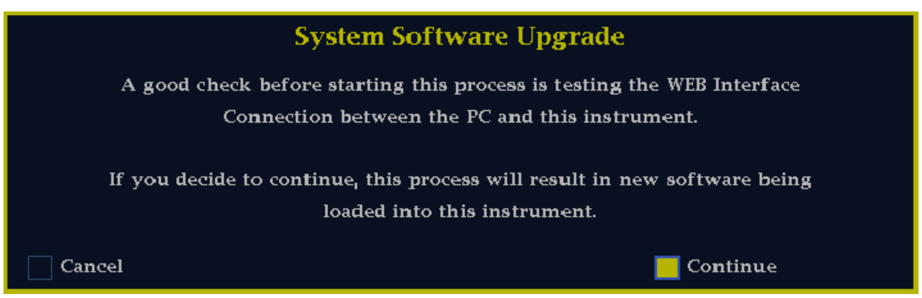


Figure D-1: Select continue to begin the firmware upgrade process

4. To continue with the upgrade, press the right-arrow key to select **Continue** and press **SEL**.

NOTE. *You can also place the waveform rasterizer into the upgrade mode by pressing the FULL button while applying power to the instrument.*

This places the waveform rasterizer into the upgrade mode. The monitor display will go to black and the DISPLAY SELECT keys will flash in sequence. If the instrument is in DHCP mode, the arrow keys will also flash.

NOTE. *If the waveform rasterizer is in DHCP mode, wait until the arrow keys stop flashing before proceeding.*

If you don't recall the IP address of the waveform rasterizer, you can temporarily set the IP address to the default value (192.168.1.1) once it is in upgrade mode by pressing **SEL**. After the upgrade is completed, the original IP address will be restored.

5. On the PC, double-click the **transfer.exe** file to launch the transfer program. This displays the window shown in Figure D–2.

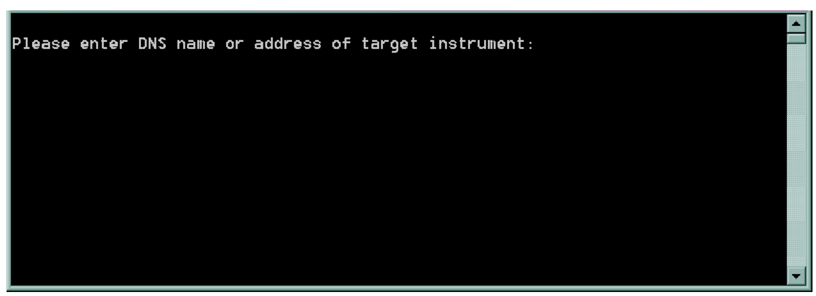


Figure D-2: Transfer utility window

6. Type the network address (for example: 198.181.221.123) or DNS name of the waveform rasterizer you wish to update, and then press Enter. This starts the firmware upgrade process.

To stop the firmware update, you can press any MEASURE button on the front-panel of the waveform rasterizer before the transfer utility begins erasing the flash ROM. Once the words **Erasing Flash...** appear in the transfer utility window, you cannot stop the update.

As the firmware upgrade begins, the buttons on the waveform rasterizer will stop flashing. Next, buttons on the waveform rasterizer will illuminate to indicate the progress of the software upgrade.

- As each stage completes, the following buttons illuminate in sequence WFM, VECT, MEAS, and 1X.
- While each stage progresses, the middle row of buttons (PICT, AUDIO, OTHER, 5X and so forth) illuminates.
- When CONFIG illuminates, the stage in process has completed.

7. The transfer utility displays **done** when the software upgrade completes. See Figure D-3.

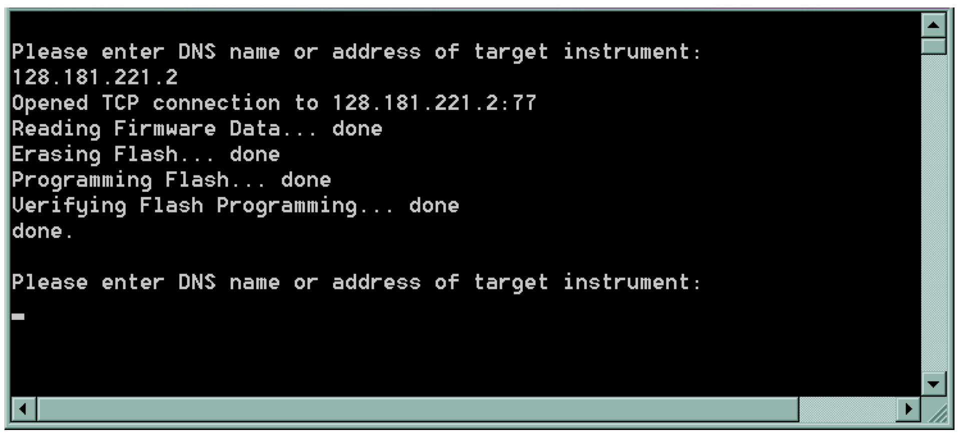


Figure D-3: Done appears when the software upgrade completes

When the software upgrade completes, the waveform rasterizer will reboot.

8. To update another waveform rasterizer, begin at step 1 and skip step 5. If you won't be updating another waveform rasterizer, press **Enter** to exit the transfer utility.

Upgrading Multiple Instruments

You can upgrade several instruments in in one session, one at a time. To do this, use the Windows Command Prompt. Enter the following line in a Command Prompt window (substituting the addresses of your machines):

```
transfer.exe 192.181.115.1 192.181.115.2 192.181.115.3
```

Separate the addresses with a space.

Alternatively, you can use file redirection to input the IP addresses to the transfer.exe utility. To do this, create a text file containing a carriage-return delimited list of IP addresses or DNS names for the instruments to be updated. If you created a text file named HOSTS.TXT, you would enter the following command to update a group of instruments:

```
transfer.exe < HOSTS.TXT
```

Verifying the Upgrade

After you have completed the firmware upgrade, the instrument will reboot and come up in an operational mode.

NOTE. *When you perform a firmware upgrade, the Readme.txt file that is included with the firmware-upgrade package will document whether all of the current Configuration menu and instrument-mode settings are preserved.*

To verify the functional performance of your instrument, perform the procedures located in *Appendix E: Incoming Inspection*.

Appendix E: Incoming Inspection

Use this procedure to check the basic functionality of a Tektronix WVR610A or WVR611A waveform rasterizer. The checks are arranged by model and option so that you can choose the sections that are appropriate for your instrument. The last two sections are for less critical waveform rasterizer features: the ground closure and Ethernet ports. You need only test these if you intend to use them. In general, you should test in the order presented, since later tests may depend upon items checked in the earlier tests.

List of Tests

Table E-1: Incoming inspection tests

Page	Description	Instrument/Option Covered
E-3	Basic Turn On and Self Test	All
E-3	Front Panel Test	All
E-4	XGA Output and Extended Diagnostics Test	All
E-5	Fan Test	All
E-5	SDI Input	All
E-6	External Reference Input	All
E-6	Composite Input	WVR611A
E-7	Analog Audio Input	Option AN and DA
E-7	Analog Audio Output	Option AN and DA
E-7	Digital Audio Input	Option DG and DA
E-9	Digital Audio Output	Option DG and DA
E-10	LTC Decode and Waveform	All
E-11	Ground Closure Input/Output	All
E-12	Ethernet Test	All

Required Equipment

Necessary Equipment:

- XGA monitor and cable
- Two 75 Ω terminations
- High quality 75 Ω BNC cables
- Analog audio breakout cable, Tektronix part number 012-1658-00 or equivalent (Option AN and DA only)
- AC power source 100 to 240 volts at 1 amps
- SDI with embedded audio and composite signal source – Tektronix TG2000 with BG1, AVG1, and DVG1 (AVG1 only needed for WVR611 units, embedded audio only needed for Audio Option DA and DG)
- AES Audio Signal Generator with 48kHz, 24 bit word length signals. Examples: Rohde & Schwarz UPL06, Tektronix AM700 and AM70.
- AES Audio Signal Analyzer. Examples: Rohde & Schwarz UPL06, Tektronix AM700.
- Analog Audio Signal Generator. Examples: Rohde & Schwarz UPL06, Tektronix AM700.
- Video Test Signals:
  - SDI 525 10-bit shallow ramp
  - SDI 525 100% sweep
  - NTSC black
  - NTSC SMPTE bars
- 15-pin, 2-row DSUB male connector and cable to mate with the ground closure port
- Voltmeter – Fluke 87 or equivalent
- Ethernet cable and Computer to test Ethernet connection
- LTC Generator – Horita TG-50 or equivalent

Basic Turn On and Self Test

1. Connect a XGA monitor to the connector on the rear of the waveform rasterizer.
2. Connect the AC line cord to the rear of the instrument and to a 100 to 240 VAC source. There is no power switch on the waveform rasterizer, so the instrument will turn on as soon as you apply power.
3. Look at the front panel immediately after you apply power. All the buttons should be lit, the text over the three knobs should also be lit, and the **Fault** indicator should light up.
4. After a couple of seconds, the lights in the buttons and text will turn off.
5. After about 15 seconds the fault light should turn off.
6. Also after about 15 seconds, the Power on diagnostic page should appear on the XGA monitor.
7. Verify that all self tests pass. Any failures will be shown in Red. The results of the Power on diagnostics are erased from the screen, but you can view them the results by selecting **CONFIG > Utilities > View Diagnostics Log**.
8. After the diagnostics are finished, the instrument state will be restored. When the progress indicator in the lower-right part of the screen is finished, the instrument has finished initializing.

Front Panel Test

1. Press **FACTORY** to restore the factory preset. Wait for the process to complete as indicated by the progress indicator.
2. Connect the DVG1 output to the **SDI A** input. Terminate the SDI loop-through.
3. Press **FULL** to make the active tile be full screen.
4. Press **HELP** to display the help screens.
5. Press all the other buttons.

   Each one should flash as you press it. Most buttons should bring up help text for that button in the right pane of the help screen. Some buttons, such as the presets, all bring up the same information so you may need to alternate between preset buttons and another button to see the text change. The HELP and navigation keys (the four arrow keys and the SEL key) do not bring up help text since they are used to traverse the help panes and content.

6. Press the right arrow key until the **Help Contents** pane in the upper-left corner is highlighted.
7. Turn the **GENERAL** knob and verify the selector box moves up and down the list.
8. Press **HELP** to exit help.
9. Turn the **HORIZONTAL** and **VERTICAL** knobs and verify the waveform moves appropriately.

XGA and Extended Diagnostics Test

1. Press **CONFIG** to display the CONFIG menu.
2. Select **Utilities** and then press **SEL**.
3. Select **CPU Color Palette Test** then press **SEL**.
4. Verify that 16 distinct colors are displayed. This tests the XGA data path from the CPU.
5. Press the left arrow key to change the menu focus back to the **Utilities** submenu.
6. Select **Run Advanced Diags** and then press **SEL**.
7. Use the right-arrow key to highlight the **Continue** box and then press **SEL** to run the test.
8. Verify the XGA DAC is working by looking at the White and Red steps at the top of the screen, and at the Green and Blue ramps at the bottom of the screen. They should not have steps but should instead have a smooth transition from dark to light.
9. Verify the following frequencies are within 10 kHz of the nominal value listed below:
   a. SDI Clock = 27.000 MHz
   b. VGA clock = 64.000 MHz
   c. Audio PLL = 12.288 MHz
   d. Analog Pix = 27.000 MHz (WVR611A only)

e. Hsync rate : Width = 19 : 3 μs

f. Vsync rate : Width = 16737 : 64 μs

g. Lissajous Frequencies – Liss[0,1] = 19.8 MHz–20.1 MHz (only if audio option installed)

10. Verify that all the tests in the middle section of the screen have a green **Pass** status.

11. Verify that the bus bit activity tests (SDI PIX and VGA PIX) at the bottom of the screen show both a red and a green bar in each bit location. The VGA PIX line (XGA bus) should show 8 bits from the CPU, a space, then Hsync, a space, Vsync, a space and then the blank line. It is normal for the V sync bit to blink occasionally.

12. Press **SEL** or cycle the power to re-boot the unit in normal operation.

Fan Test

If the fault light in the lower left corner of the front panel is not on (Red), then the fans are running. You should also be able to hear them and feel air coming out the back of the instrument. At low temperatures the fans will turn slowly and be very quiet.

SDI Input – Check Bit Integrity

1. Apply a 10-bit 525 shallow ramp to the SDI A port. Install a termination on the other side of the loop through.
2. Press **FACTORY** to restore the factory preset.
3. Press and hold **WFM** to bring up the WFM pop-up menu.
4. Use the arrow keys to select the Pr and Pb waveforms and turn them off.
5. Press the **5X** gain button.
6. Press the **VAR** gain button and then use the GENERAL knob to increase the gain to 10X.
7. Press **FULL** to expand the tile to full screen.
8. Count the steps in the waveform. There should be 11 to 13 even vertical steps in each major division (10 mV). The steps should always step upward in a monotonic ramp.
9. Press **VAR** to switch variable gain off and press **1X** to get back to normal gain.

10. Change the input signal to a 100% sweep.
11. Verify the sine waves are uniform and do not have steps. Also verify the amplitude is 700 mV.
12. If desired, move the input and termination to input B, select input B from the front panel and repeat steps 5 through 11.

External Reference

1. Press **FACTORY** to restore the factory preset.
2. Apply a 525 SDI signal to SDI A from the TG2000 DVG1 module. Install a termination on the loopthrough.
3. Apply an NTSC signal to the External Reference Port from the TG2000 BG1 module. Install a termination on the loopthrough.
4. Select **EXT REF** on the waveform rasterizer front panel.
5. The status bar in the lower left-hand corner of the display should display **Ref: Ext NTSC**.
6. Press the display select **4** button, then **WFM**, then **FIELD**.
7. Verify that both WFM tiles are stable.
8. Remove the NTSC signal from the reference input.
9. Both WFM tiles should “unlock” and scroll.
10. The status bar in the lower left-hand corner of the display should display **Ref: Ext. Missing**.

Composite Input

1. Press **FACTORY** to restore the factory preset.
2. Apply an NTSC SMPTE bar signal from the TG2000 AVG1 module to the Composite A port. Install a termination on the loop through.
3. Select the **CMPST A** input from the front panel.
4. Observe the WFM in tile 1, the signal should be aligned with the zero graticule.
5. Observe the Vector in tile 2, the burst should be aligned with the burst marker that extends to the left of the vector center.

6. Observe the picture in tile 3. It should be stable and show the color bar signal.
7. If desired, move the input and termination to input B and repeat steps 3 – 6.

Analog Audio Input

1. Press **FACTORY** to restore the factory preset.
2. Set the analog audio generator to output a 1 kHz, 18dBu sine wave.
3. Press and hold the display select button **4** to display the AUDIO pop-up menu.
4. In the Audio Input submenu, select **Analog A**.
5. Using the audio breakout cable or equivalent, connect the first Line A input pair to the analog audio generator and verify that the output level of the generator is indicated on the audio bars with a –6 dBFS signal.
6. Repeat step 5 for the second and third line A input pair.
7. Bring up the AUDIO pop-up menu again and select **Analog B** in the Audio Input submenu.
8. Repeat step 5 for all three Line B input pairs.

Analog Audio Output

1. Press **FACTORY** to restore the factory preset.
2. Press and hold the display select button **4** to display the AUDIO pop-up menu.
3. In the Audio Input submenu, select **Analog A**.
4. Using the audio breakout cable or equivalent, connect the first Line A input pair to the analog audio generator and verify that the output level of the generator is indicated on the audio bars with a –6 dBFS signal.
5. Press **CONFIG** to display the CONFIG menu.
6. In the **Audio Inputs/Outputs** submenu, set **Attenuate Audio Output** to 0 dB (press SEL and use the GENERAL knob to adjust the value, then press SEL again when you have set the value).
7. While in the **Audio Inputs/Outputs** submenu, select **Analog A** and from the submenu select **Analog Out Map**. Press **SEL** to display the **Analog Output to Analog "A" Bar Map**.

8. Put an **X** in the first bar pair position for Analog Output 0, Analog Output 1, and Analog Output 2.
9. Press **CONFIG** to exit the CONFIG menu.
10. Connect the first analog output pair on the breakout cable to the second line A input pair.
11. Verify on the level meter bars that the second set of bars is within 1 dB of the first set of bars.
12. Connect the second analog output pair on the breakout cable to the second line A input pair.
13. Verify on the level meter bars, that the second set of bars is within 1 dB of the first set of bars.
14. Connect the third analog output pair on the breakout cable to the second line A input pair.
15. Verify on the level meter bars, that the second set of bars is within 1 dB of the first set of bars.

Digital Audio Input

1. Press **FACTORY** to restore the factory preset.
2. Set the digital audio generator to output a 1 kHz, –6dBFS sine wave.
3. Press and hold the display select button **4** to display the AUDIO pop-up menu.
4. In the **Audio Input** submenu, select **AES A**.
5. Connect the output of the digital audio generator to the AES A 1-2 input.
6. Verify that the first set of level meter bars indicates –6 dBFS.
7. Repeat steps 5 and 6 for AES A 3-4, AES A 5-6, and AES A 7-8.
8. Press and hold the display select button **4** to display the AUDIO pop-up menu.
9. In the Audio Input submenu, select **AES B** (make sure it is configured as an input in the CONFIG menu).
10. Connect the output of the digital audio generator to the AES B 1-2 input.
11. Verify that the first set of level meter bars indicates –6 dBFS.
12. Repeat steps 10 and 11 for AES B 3-4, AES B 5-6, and AES B 7-8.

13. Set the SD signal generator for the following signal output:
    a. 525 format color bars
    b. Embedded audio: 2 groups starting with group 1
    c. Set the audio channels as follows:
        i. Channel 1: 50 Hz, –35 dB
        ii. Channel 2: 100 Hz, –30 dB
        iii. Channel 3: 150 Hz, –25 dB
        iv. Channel 4: 200 Hz, –20 dB
        v. Channel 5: 250 Hz, –15 dB
        vi. Channel 6: 300 Hz, –10 dB
        vii. Channel 7: 400 Hz, –5 dB
        viii. Channel 8: 500 Hz, 0 dB
14. Connect the output of the SD signal generator with embedded audio to the port A SDI input.
15. Press and hold the display select button **4** to display the AUDIO pop-up menu.
16. In the Audio Input submenu, select **Embedded**.
17. Verify that the level meter bars have a stair step pattern from –35 dB on channel 1 to 0 dB on channel 8.
18. Bring up the audio tile pop-up and set the phase pair to 1 & 2.
19. Go through the other phase pairs (3 & 4, 5 & 6, 7 & 8) and verify that the phase display changes in each one.

Digital Audio Output

1. Press **FACTORY** to restore the factory preset.
2. If you have just finished testing the Digital Audio Inputs, proceed to step 3, otherwise do steps 13-17 of the Digital Audio Input test.
3. Press **CONFIG** to display the CONFIG menu.
4. Select **Audio Inputs/Outputs**.
5. Under the AES B submenu, configure the port as an **Output**.

6. Press **CONFIG** to close the menu.
7. Connect the AES B 1-2 output to the Audio Signal Analyzer input.
8. Verify on the analyzer that the signal levels are at –35 dB for the left channel and –30 dB for the right.
9. Connect the AES B 3-4 output to the Audio Signal Analyzer input.
10. Verify on the analyzer that the signal levels are at –25 dB for the left channel and –20 dB for the right.
11. Connect the AES B 5-6 output to the Audio Signal Analyzer input.
12. Verify on the analyzer that the signal levels are at –15 dB for the left channel and –10 dB for the right.
13. Connect the AES B 7-8 output to the Audio Signal Analyzer input.
14. Verify on the analyzer that the signal levels are at –5 dB for the left channel and 0 dB for the right.

LTC Decode and Waveform Test

1. Press **FACTORY** to restore the factory preset.
2. Connect the LTC generator to pins 7 and 8 of the remote connector. This will require making a custom cable assembly.
3. Connect the TG2000 DVG1 SDI output to the SDI A input. Terminate the loopthrough.
4. Connect the TG2000 composite output to the video input of the Timecode generator.
5. Select any NTSC signal for the AVG1.
6. Select any 525 signal for the DVG1.
7. Press CONFIG and select **LTC/VITC**.
8. Use the navigation keys to set the timecode source to be **LTC**.
9. Press **Other** to display the LTC waveform.
10. The LTC waveform should be displayed in the active tile. The amplitude will depend on the source. The sync packet should remain at a constant horizontal location on the sweep.
11. In the lower-right corner of the screen, the time from the LTC input should be shown.

Ground Closure Remote

1. Connect an SDI signal to SDI input A and terminate the loopthrough.
2. Press **FACTORY** to restore the factory preset.
3. Press **PICT** to display a picture in tile 1.
4. Press and hold the PRESET 1 button until the message **Preset #1 was saved** is displayed in the active tile. You will need to hold the button for 1 to 2 seconds.
5. Press **FACTORY** again.
6. On a 15-pin DSUB connector, solder wires or strip back insulation to gain access to pins 2, 5, and 9.
7. Connect the DSUB connector to the ground closure remote connector on the waveform rasterizer.
8. Short pins 2 and 5 together on the remote cable.
9. Preset 1 should be restored so that a picture is displayed in tile1.
10. Connect the voltmeter to pins 2 and 9 of the DSUB connector.
11. Verify the voltage is about 4.7 V. This indicates the output is not asserted.
12. Press **CONFIG** to display the CONFIG menu. Select **Alarms** and then select **SDI Input**.
13. Use the arrow keys to get to the top right corner of the SDI Input error check box, and press **SEL** to put an "X" in the box for the **Ground Closure** column and the **SDI Input Missing** row. This instructs the waveform rasterizer to assert the ground closure if the SDI input is not present.
14. The voltmeter should still read about 4.7 V on pin 9.
15. Remove the input signal from SDI A connector on the rear panel.
16. The voltmeter should now read a low voltage, below 0.5 V.

Ethernet Test

1. Connect an Ethernet cable from the rear of the unit to a computer with a Web browser.
2. Press **FACTORY** to restore the factory preset.
3. Press **CONFIG** and then select **Utilities**.
4. Under the Utilities submenu, configure the **IP Config Mode** and **IP Address** to be compatible with the computer.
5. From the computer, enter the IP address of the waveform rasterizer into the Web browser address line (for example, http://192.182.256.23).
6. You should see a Web page that lists several options for accessing the waveform rasterizer from the PC. If this happens, then the Ethernet function is working.

Appendix F: User Maintenance

This appendix contains procedures for cleaning the instrument and performing preventive maintenance on the waveform rasterizer.

Cleaning

General Care

Protect the instrument from adverse weather conditions. The instrument is not waterproof.

CAUTION. *To avoid damage to the instrument, do not expose it to sprays, liquids, or solvents.*

Do not use chemical cleaning agents; they may damage the instrument. Avoid chemicals that contain acetone, benzene, toluene, xylene, or similar solvents, because they may damage the plastic.

WARNING. *Remove the power cord before cleaning the instrument.*

Cleaning the Exterior

Remove the power cord before cleaning the instrument. Clean the exterior surfaces of the instrument with 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 abrasive compounds on any part of the instrument.

CAUTION. *Do not allow moisture inside the instrument. During exterior cleaning, use only enough solution to dampen the cloth or swab.*

Preventive Maintenance

Preventive maintenance mainly consists of periodic cleaning. Periodic cleaning reduces instrument breakdown and increases reliability. Clean the instrument as needed, based on the operating environment. Dirty conditions may require more frequent cleaning than computer-room conditions.

Glossary

Glossary

Accuracy
The closeness of the indicated value to the true value.

Ancillary Data
Data supporting the video signal or program. Time multiplexed into the video signal during the horizontal and/or vertical blanking intervals. Ancillary data may be sent between the EAV and SAV packets in horizontal blanking and in larger blocks during vertical blanking. Ancillary data may include checksums, multi-channel digital audio, and other data.

Ballistics
The response characteristics of a meter. In other words, how quickly does a meter respond to a change in signal level. In the waveform rasterizer you can set the audio display ballistics to True Peak, PPM, and VU.

Bandwidth
The range of frequencies over which signal amplitude remains constant (within some limit) as it is passed through a system.

Baseband
Refers to a signal that is not yet a modulated carrier.

Brightup
A change in the display that occurs on specified conditions. For example, you can set the picture display to "brightup" on an RGB gamut error. Areas that are outside the acceptable gamut are displayed as a crosshatch pattern.

Color Difference Signals
Signals used by color television systems to convey color information in such a way that the signals go to zero when there is no color in the picture. R-Y, B-Y, I, and Q are all color difference signals for the NTSC system; U and V are color difference signals for the PAL system. The component system color difference signal are Y, P_B, P_R as specified by SMPTE and CCIR standards.

Color Gamut
The area between minimum and maximum reproducible limits for elements of the color difference or RGB signals.

Component Video
Video which exists in the form of three separate signals, all of which are required in order to completely specify the color picture. For example, R, G, and B; or Y, R-Y, and B-Y.

Composite Video
A single video signal containing all of the necessary information to reproduce a color picture. Composite video is created by adding quadrature

amplitude modulated R–Y and B–Y to the luminance signal for NTSC systems or U and V to the luminance signal for PAL systems.

DC Restorer
A circuit that automatically adjusts the level of the video signal to keep a selected point on the signal at a fixed DC level.

CRC
Cyclic Redundancy Check. A CRC calculation is performed on a data set and the result is compared to a checksum. If there is a difference, then an error occurred.

dB (Decibel)
A logarithmic unit used to describe signal ratios. For voltages, dB = 20 Log_{10} (V_1/V_2).

dBFS
A signal ratio referenced to Full Scale. Full scale refers to the maximum level possible without clipping.

DHCP
Acronym for Dynamic Host Configuration Protocol. A network management protocol for dynamically assigning Internet Protocol (IP) network addresses to a machine from a central server. DHCP is based on the less advanced Bootstrap protocol.

Diamond Display
An X-Y display for RGB signals that defines the valid gamut limits in the form of two diamonds.

Distortion
See harmonic distortion.

EAV
Acronym for End of Active Video in component digital systems. One of two (EAV and SAV) timing reference packets.

EDH
Error detection and handling. Supports the standard SMPTE RP-165, which defines a technique for recognizing inaccuracies in the serial digital signal.

Frame
Contains all the information required for a complete picture. For interlaced scan systems, there are two fields in a frame.

Gamma

A measure that compares the contrast in the original and reproduced television picture. Since CRT picture monitors have a nonlinear relationship between the input voltage and brightness, the signal must be correspondingly enhanced to nullify the nonlinear distortion. Gamma correction is always done at the source (camera) in television systems: the R, G, and B signals are converted to $R^{1}/_{V}$, $G^{1}/_{V}$, and $B^{1}/_{V}$. Values of about 2.2 are typically used for gamma.

Gamut

See Color Gamut.

GBR

See RGB.

Graticule

The scale used to quantify the displayed signal on a waveform monitor or vectorscope.

Harmonic Distortion

Signal distortion caused by non-linearities in a system. System non-linearities produce multiples of a single frequency signal applied to the the system. Harmonic distortion is evident when a pure sine wave applied to a system produces harmonic content at multiples of the sine wave frequency at the output.

Hue

The property of color that allows us to distinguish between colors such as red, yellow, purple, etc.

Lightning Display

A display, for use with SMPTE specified color difference signals (Y, P_B, P_R), that plots the two color difference signals against luminance to create a display similar in appearance to a lightning bolt.

Linear Distortion

Refers to distortions that are independent of signal amplitude.

Lissajous figure

An X–Y plot in which the signals applied to both axes are sinusoidal functions. For a stable display the signals must be harmonics. Lissajous figures are useful for determining phase and harmonic relationships.

LSB

Least Significant Bit. The lowest weighted bit or signal line.

LTC

Acronym for Longitudinal Time Code. A time code recorded on a videotape in the form of an audio signal. See also *VITC*.

Luminance

The signal (Y) which represents brightness or the amount of light in the picture. Luminance is the only signal required for black and white pictures. For color systems, it is obtained as a weighted sum of the R, G, and B signals.

MIB

Acronym for Management Information Base. A database used by an SNMP agent.

MSB

Most Significant Bit. The highest weighted bit or signal line.

Nonlinear Distortion

Refers to distortions that are amplitude-dependent.

NTSC

National Television System Committee. The organization that developed the television standard currently in use in the United States, Canada, and Japan. Now generally used to refer to that standard.

NTSC Setup

In NTSC systems, video black is typically 7.5 IRE above the blanking level. This is 7.5 IRE level is referred to as the black setup level or simply setup or NTSC setup.

PAL

Phase Alternate Line. Refers to one of the television systems used in Europe and many other parts of the world. The phase of one of the color difference signals alternates from line to line to help cancel out phase errors.

Pb

A color difference signal used in component video systems. It is derived by subtracting the B (blue) signal from Y.

Pr

A color difference signal used in component video systems. It is derived by subtracting the R (red) signal from Y.

PPM

PPM is an acronym for Peak Program Meter.

Receiver Equalization

Refers to recovering the data signal after cable loss. The signal is boosted to its original standard amplitude. Gain at high frequencies is boosted to regain a flat response.

RF
Radio Frequency. In television applications, RF generally refers to the television signal after the picture carrier modulation process.

RGB
Red, Green, and Blue. Also referred to as GBR in SMPTE specifications. The three primary colors used in color television's additive color reproduction system. These are the three color signals generated by the camera and used by the picture monitor to produce a picture.

R-Y
One of the color difference signals obtained by subtracting luminance (Y) from the red camera signal.

Saturation
The property of color which relates to the amount of white light in the color. Highly saturated colors are vivid, while less saturated colors have more white mixed in and, therefore, appear pastel. For example, red is highly saturated, while pink is the same hue, but less saturated.

In signal terms, saturation is determined by the ratio between luminance level and chrominance amplitude. A vectorscope does not display saturation; the length of the vectors represents chrominance amplitude. In order to verify that the saturation of the colors in a color bar signal is correct, you must check luminance amplitudes with a waveform monitor in addition to observing the vectors.

SAV
Acronym for Start of Active Video in component digital systems. One of two (EAV and SAV) timing reference packets.

SCH
SCH (SubCarrier to Horizontal) Phase refers to the timing relationship between the 50% point of the leading edge of sync and the zero crossings of the reference subcarrier. Errors are expressed in degrees.

SNMP
Acronym for Simple Network Management Protocol. A network managment system that is used for remote instrument control.

Termination
In order to accurately send a signal through a transmission line, there must be an impedance at the end which matches the impedance of the source and of the line itself. Without termination, amplitude errors and reflections will result. Video is a 75 Ω system, so a 75 Ω termination must be put at the end of the signal path.

True Peak
Audio display ballistic.

U
The B–Y signal after a weighting factor of 0.493 has been applied. The weighting is necessary to reduce peak modulation in the composite signal.

V
The R–Y signal after a weighting factor of 0.877 has been applied. The weighting is necessary to reduce peak modulation in the composite signal.

VITC
Acronym for Vertical Interval Time Code. A method of recording a time code on a video tape. See also *LTC*.

VU
Acronym for Volume Unit.

Vectorscope
A specialized oscilloscope which demodulates the video signal and presents a display of R–Y versus B–Y in NTSC systems (or V versus U in PAL systems). The angle and magnitude of the displayed vectors are respectively related to hue and saturation.

Vertical Interval
The synchronizing information that appears between fields and signals the picture monitor to return to the top of the screen to begin another vertical scan.

Y
See Luminance.

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