

**WVR6100 and WVR7100  
Waveform Rasterizers  
Quick Start User Manual**

Copyright © Tektronix, Inc. All rights reserved. Licensed software products are owned by Tektronix or its subsidiaries or suppliers, and are protected by national copyright laws and international treaty provisions.

Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supercedes that in all previously published material. Specifications and price change privileges reserved.

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

Manufactured under license from Dolby Laboratories

*Dolby, Pro Logic*, and the double-D symbol are trademarks of Dolby Laboratories.

## **Contacting Tektronix**

Tektronix, Inc.  
14200 SW Karl Braun Drive  
P.O. Box 500  
Beaverton, OR 97077  
USA

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

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

## Warranty 2

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such 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. Parts, modules and replacement products used by Tektronix for warranty work may be new or reconditioned to like new performance. All replaced parts, modules and products become the property of Tektronix.

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.

**THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THE PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.**



# Table of Contents

General Safety Summary	v
To Avoid Fire or Personal Injury	v
Symbols and Terms	v
Environmental Considerations	vii
Product End-of-Life Handling	vii
Restriction of Hazardous Substances	vii
Preface	ix
Key Features	ix
Documentation	x
Conventions Used in this Manual	x
Before Installation	1
Check Package Contents	1
Standard Accessories	1
Optional Accessories	2
Options	2
Installation	3
Rackmount Installation	3
Mounting the Slide Tracks	3
Rack Adjustments	4
Installing the Instrument	5
Removing the Instrument	6
Rack Slide Maintenance	6
Connecting a Display	6
Connecting Power and Powering On/Off	7
AC Power Requirements	7
Incoming Inspection	7
Basic Turn On and Self Test	7
Front Panel Test	8
XGA and Extended Diagnostics Test	10
Fan Test	11
Installing in a Video System	12
To install for monitoring the video bit stream of a serial receiver	12
To install monitoring serial digital signals around a routing switcher	13
Line Termination	13
Compatibility of BNC Center Pins	13
Connecting to Monitors and Projectors Issues	14
How to Operate Your Instrument	15
Getting Acquainted	15
To Control the Display:	15
To Determine Status At-a-Glance	17
Status Bar Icons	18
Front-Panel Controls	18
Three Levels of Control	18
Scope of Controls	19
Layout and Usage	19
Rear-Panel Controls	20

Power Requirements .....	20
Video Input Connectors .....	20
AES A/B Connectors .....	21
Analog Input/Output Connector .....	22
XGA Connector and Pin Out .....	24
Remote Connector and Pin Out .....	24
Ethernet Connector .....	25
To Select a Measurement .....	26
To Set Measurement Parameters .....	26
To Select Among Inputs .....	28
To Set Gain and/or Sweep .....	29
To Use Presets .....	30
To Measure Waveforms with Cursors .....	31
To Freeze the Display .....	32
To Set Line Select Mode .....	35
To Configure Your Instrument .....	36
To Use Online Help .....	37
To Connect to a Network .....	38
To Connect Directly to a PC .....	40
List of Measurements and their Pop-up Menus .....	41
Waveform Display .....	41
Vector Display .....	42
Timing Display .....	44
Picture Display .....	47
Audio Display .....	48
LTC Waveform Display .....	52
Gamut Display .....	53
Status Display .....	54
Timing a Studio .....	56
To Use the Traditional Method .....	56
To Use the Timing-Display Method .....	57
To use the Timing display to time a signal to a reference: .....	58
To Time Multiple Inputs to a Router .....	59
To time the inputs to a router: .....	59
Checking Chroma/Luma Delay (Lightning Display) .....	61
Checking Gamut .....	63
Setting up for Gamut Checks .....	63
Checking RGB Gamut .....	65
Checking Composite Gamut .....	67
Checking Luma Gamut .....	68
To Automate Gamut Checks .....	68
To Adjust Gamut Limits .....	70
Monitoring Audio .....	71
Configuring Audio Inputs .....	71
Selecting the Audio Input .....	73
Checking Audio Level & Phase .....	74
Checking Surround Sound .....	77
Monitoring Dolby-Based Surround Sound .....	80
Configuring Dolby Inputs .....	80
Displaying Dolby Inputs .....	86
Viewing Dolby Metadata .....	87
Basic listening modes .....	88
Pro Logic listening modes .....	88
Channel Mode vs. Listening Modes .....	89

---

Audio Bar Mapping vs. Dolby E Metadata Program Configuration .....	91
Monitoring Closed Captioning (CC) and Safe Area Compliance .....	92
To Monitor Closed Captioning .....	92
To Monitor for Safe Area Compliance .....	95
Cloning Setups (Presets) .....	98
Web Browser vs. Java Applet vs. Java Application .....	98
From a Web Browser .....	98
From the Java Application .....	99
Using Alarms .....	104
Configuring Alarms .....	104
Possible Alarm Responses .....	105
To Monitor Alarms .....	108
Remote Communication .....	109
Using a Web Browser .....	109
Using the Java Applet .....	110
Using the WVR RFP Remote Front Panel .....	115
Cable Description .....	115
To Upgrade the Waveform Rasterizer Firmware .....	117
PC System Requirements .....	117
Before You Begin .....	117
Installing the Firmware .....	119
Upgrading Multiple Instruments .....	121
Verifying the Upgrade .....	122
Index .....	123





# 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.** Connect the probe output to the measurement instrument before connecting the probe to the circuit under test. Disconnect the probe input and the probe ground from the circuit under test before disconnecting the probe from the measurement instrument.

**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.

**Power Disconnect.** The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

**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:



CAUTION  
Refer to Manual



WARNING  
High Voltage



Protective Ground  
(Earth) Terminal

## Environmental Considerations

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

### Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

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



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

**Battery Recycling.** This product may contain a Nickel Cadmium (NiCd) or lithium ion (Li-ion) rechargeable battery, which must be recycled or disposed of properly. Please properly dispose of or recycle the battery according to local government regulations.

### Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive. This product is known to contain lead, cadmium, mercury, and hexavalent chromium.



## Preface

This manual describes installation and operation of the WVR6100 and WVR7100 Waveform Rasterizers. These instruments rasterize serial digital video and composite video signals (depending on installed options) for an XGA display, providing a new standard of display quality and flexibility. Basic operations and concepts are presented in this manual. For more detailed information, see the online help on your waveform rasterizer.

---

**NOTE.** *This manual supports and describes the WVR7100 and WVR6100 rasterizers that shipped with System-software version 2 and later. Earlier WVR7100 rasterizers shipped with System-software version 1 and may have included audio options based on audio hardware that is not currently shipped. Use this manual with earlier instruments only if you have upgraded to the new software, and then either upgraded to a new audio option or have no audio option installed. Otherwise, use the earlier manual that shipped with your earlier instrument.*

---

## Key Features

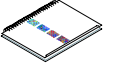


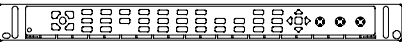




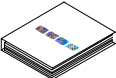
The WVR6100 and WVR7100 use digital processing to ensure accurate, stable, and repeatable measurements, and to provide a powerful monitoring solution for broadcasting, production, and post-production environments. The WVR7100 base instrument monitors HD SDI inputs only; the WVR6100 base instrument monitors SD SDI inputs only. Either instrument can be ordered with options that add monitoring of analog composite inputs, of multiple-channel audio, and of Dolby E and/or Dolby Digital (A-3). The WVR7100 can also be ordered with an option to monitor SD SDI inputs. See *Options* on page 2 for information on options.

Key WVR6100 and WVR7100 features include:

- FlexVu, a four-tiled, high-resolution, XGA display that enables you to quickly check the integrity of the signal, can present four views of the signal simultaneously to monitor many aspects of the signal at the same time
- A menu-driven user interface that requires fewer keystrokes for the most common operations and five instrument Presets for save and quick recall of commonly used configurations
- Support for digital and analog applications (the later when equipped with optional composite-analog monitoring)
- Fully Digital Processing for accurate, repeatable, drift-free operation that surpasses traditional analog designs
- Measurements and displays that help check performance and solve problems faster, such as:
  - Traditional waveform displays, both overlay and parade, and Vector display, both traditional and Lightning
  - Gamut monitoring, including Arrowhead, Diamond, and Split Diamond
  - Timing and LTC Waveform Displays
  - Audio support and options for viewing and monitoring AES, analog, and embedded audio and Dolby signals.
  - Audio support includes viewing and monitoring of both levels of normal channel pairs or of surround channels and of phase relationships of normal channel pairs or of a user-specified pairings of channel inputs in a Lissajous display.
  - Surround Sound Display of audio signals
  - Gain, sweep, and magnification controls
  - Configurable alarms and error logging

- Exclusive Status screens for content status at a glance
- Support for decode and display of CC standards (EIA 608-Line 21, EIA-608-ANC, and EIA-608 (708), with caption text and V-chip information overlaid on picture (monitor mode) or in Status, Alarm, or Error screens as appropriate.
- Searches for missing (incorrectly inserted) closed captioning
- Support for standard and custom Safe Graticules for Picture displays for monitoring for incorrect placements of graphics, logos. Two Safe Area graticules and Safe Title graticules are supported
- Full remote control for complete installation flexibility

## Documentation

Item	Purpose	Location
<i>WVR6100 and WVR7100 Waveform Rasterizer Quick Start User Manual</i>	Installation and high-level operational overview. (This manual.)	 +  +  WWW.Tektronix.com
<i>WVR6100 and WVR7100 Waveform Rasterizer Online Help</i>	In depth operation and UI help	
<i>WVR6100 and WVR7100 Waveform Rasterizer Performance Verification and Specifications</i>	Procedure for checking performance and list of specifications	 +  WWW.Tektronix.com
<i>WVR &amp; WFM Series Programmer Manual</i>	Programmers command reference for controlling the instrument	 +  WWW.Tektronix.com
<i>WVR6100 and WVR7100 Waveform Rasterizer Service Manual</i>	Optional manual supporting module-level servicing of the instrument	

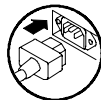
## Conventions Used in this Manual

The following icons are used throughout this manual.

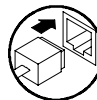
Sequence Step



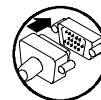
Connect power



Network



XGA



## Before Installation

### Check Package Contents

Unpack the instrument, and check that you received all items listed as *Standard Accessories*. Recommended accessories, instrument options, and upgrades are also listed in this section. Check the Tektronix Website ([www.tektronix.com](http://www.tektronix.com)) for the most current information.

### Standard Accessories

#### Documents

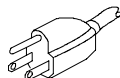
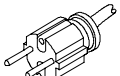
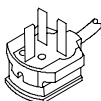

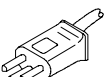
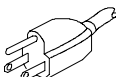

The following documents are standard accessories:

- *WVR6100 and WVR7100 Waveform Rasterizers Quick Start User Manual*, Tektronix part number 071-1588-XX
- *WVR6100 and WVR7100 Waveform Rasterizers Release Notes*, Tektronix part number 061-4295-XX
- *WVR6100 and WVR7100 Waveform Rasterizers Documents CD*, Tektronix part number 020-2612-00

#### Power Cords

The WVR6100 and WVR7100 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.

#### Power cord identification

Plug configuration	Normal usage	Option number
	North America 120 V	A0 (Standard)
	Universal Euro	A1
	United Kingdom	A2
	Australia	A3
	Switzerland	A5
	Japan	A6
	China	A10

## Optional Accessories

- *WVR6100 and WVR7100 Waveform Rasterizers Service Manual*, Tektronix part number 071-1589-XX.
- Analog/Audio Breakout Cable Assembly, Tektronix part number 012-1688-00.

## Options

The WVR7100 ships with support for monitoring high definition (HD) serial digital signals. You can add SD support only to the WVR7100 instrument:

- Option SD— instrument ships with support added for monitoring standard definition (SD) serial digital signals
- WVR7UP-SD— order this kit to add Option SD to a upgrade previously purchased instrument

You can add any or all of the following support options to either the WVR6100 or WVR7100 instrument::

- Option CPS—adds support for monitoring composite analog signals
- Option DS—adds support for Digital audio monitoring in embedded and AES/EBU inputs
- WVR6UP-DS or WVR7UP-DS—order this kit to upgrade a previously purchased instrument to Option DS
- Option AD—adds support for Analog audio and Digital audio monitoring in embedded and AES/EBU inputs
- WVR6UP-AD or WVR7UP-AD—order this kit to upgrade a previously purchased instrument to Option AD
- Option DD—adds support for Dolby Digital (AC-3) decode and Analog and Digital audio monitoring in embedded and AES/EBU inputs
- WVR6UP-DD or WVR7UP-DD—order this kit to to upgrade a previously purchased instrument to Option DD
- Option DDE—adds support for Dolby E decode, Dolby Digital (AC-3) decode, and Analog/Digital audio monitoring in embedded and AES/EBU inputs
- WVR6UP-DDE or WVR7UP-DDE—order this kit to upgrade a previously purchased instrument to Option DDE

You can add any or all of the following service options to the WVR6100 or WVR7100 instruments:

- Option C3—Calibration Service 3 Years
- Option C5—Calibration Service 5 Years
- Option D1—Calibration Data Report
- Option D3—Calibration Data Report 3 Years (when ordered with option C3)
- Option D5—Calibration Data Report 3 Years (when ordered with option C5)
- Option R3—Repair Service 3 Years (including the period under warranty)
- Option R5—Repair Service 5 Years (including period under warranty)



## Installation

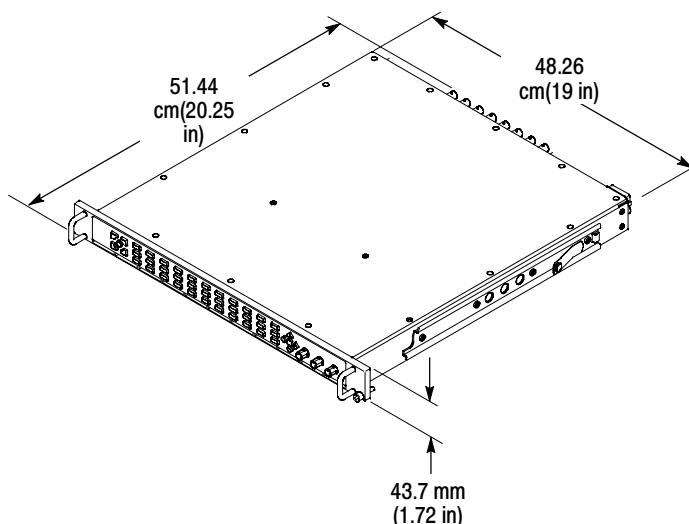
This section provides instructions for installing the waveform rasterizer into a standard instrumentation rack for both the standard configuration and when configured with the remote front panel option. At installation time, save the shipping carton and packing materials (including the anti-static bag)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

### Rackmount Installation

The waveform rasterizer ships with hardware for rackmounting and fits in a standard 19-inch rack. Requirements of the rack follow:

- Spacing between the front rails must be at least 17-<sup>3</sup>/<sub>4</sub> inches.
- Front-to-rear rail spacing must be between 15-<sup>1</sup>/<sub>2</sub> and 28 inches.
- Six inches of clearance between the instrument rear panel and any rear cabinet panel for connector space and to provide adequate air circulation.

Instrument dimensions are shown at right.

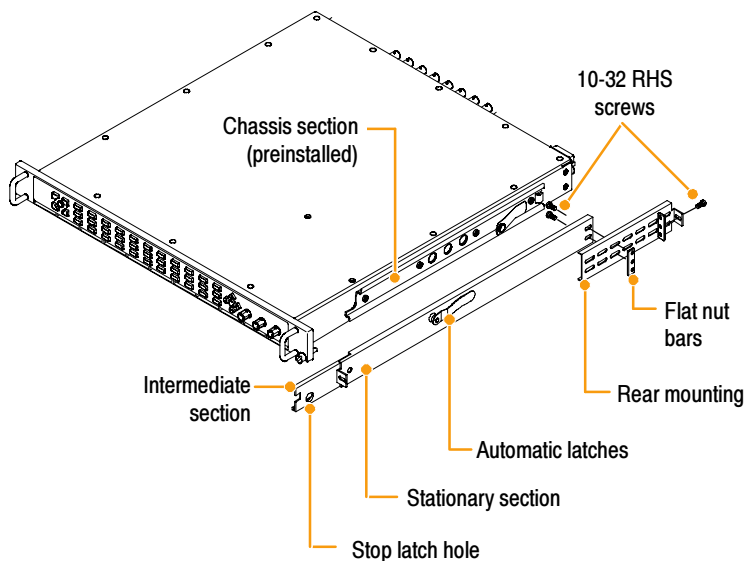


### Mounting the Slide Tracks

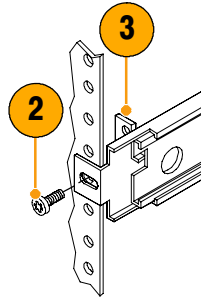
The procedure covers rear rail mounting details for both deep and shallow racks.

1. Mount the rails using the enclosed hardware as shown at right.

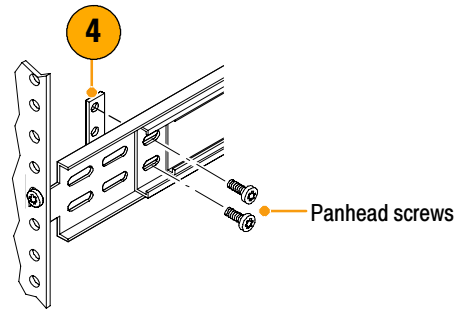
**NOTE:** Right hand and left hand stationary section is designated by the RH and the LH marked on the rails. Stop latch holes should be towards the bottom when slides are in place. (The right hand rail is shown.)



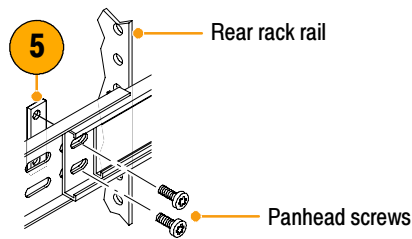
2. Screw-mount to the front rail as shown.
3. Install Bar nut if the front rail mounting hole is not tapped.



4. For a deep configuration, rear mount as shown. Make sure that the stationary sections are horizontally aligned, level, and parallel.



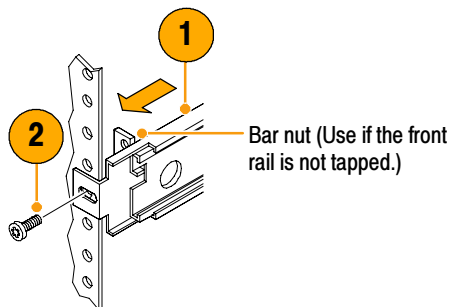
5. Alternately, for a shallow configuration, rear mount as shown. Make sure that the stationary sections are horizontally aligned, level, and parallel.



## Rack Adjustments

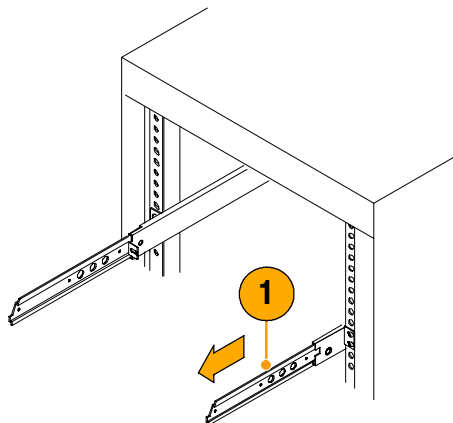
If, after installation, the slide tracks bind, adjust the tracks as follows.

1. 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.
2. Retighten the screws and check the tracks for smooth operation by sliding the instrument in and out of the rack several times.

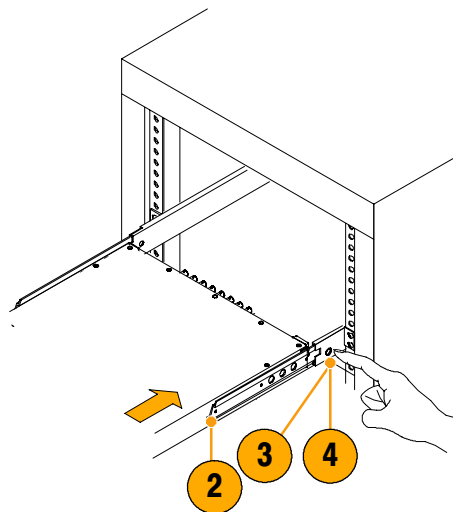


## Installing the Instrument

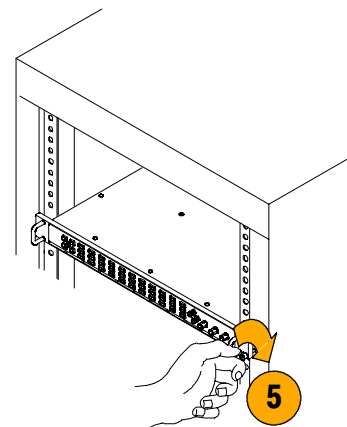
1. Pull the slide-out track section to the fully extended position.



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. Press the stop latches again, and push the instrument fully into the rack.

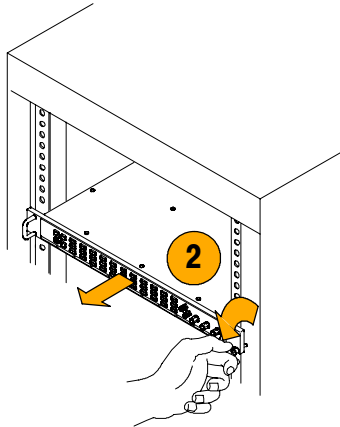


5. Tighten the front-panel retaining screws.

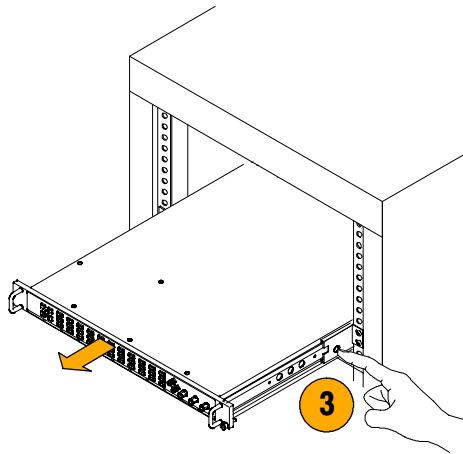


## Removing the Instrument

1. Before removing the instrument, be sure to disconnect all cabling.
2. Loosen retaining screw and pull instrument outward until the stop latches snap into the holes.



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



## Rack Slide Maintenance

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

## Connecting a Display

First, loosen the front-panel knurled retaining screw. See step 2 on page 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.

The WVR6100 and WVR7100 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. To select the display type, display the CONFIG menu, select Display Setting, and then Picture Refresh Mode. Select CRT or Interlaced for Monitors and LCD for LCD displays. Push the HELP button after selecting Picture Refresh Mode for information about these settings.

## Connecting Power and Powering On/Off

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 for the power cord options.

The typical power draw is 50 W. Refer to the *Specifications and Performance Verification* on the *Documents CD* for additional information on power and environmental requirements.

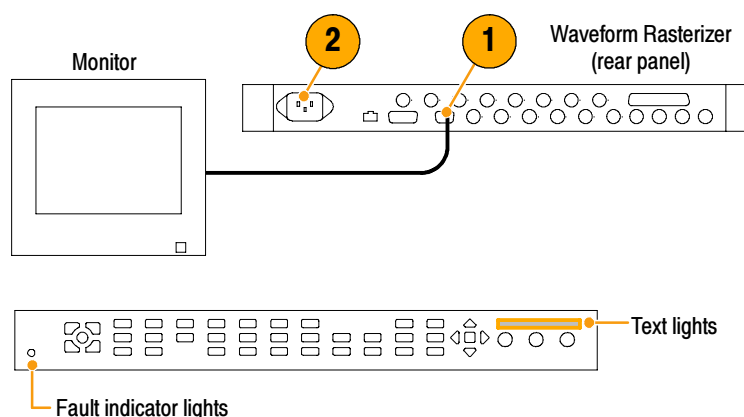
Connect the supplied power cord to the rear-panel power connector. There is no power switch on the waveform rasterizer, so the instrument will turn on as soon as you apply power.

## Incoming Inspection

At your option, you can complete the following incoming inspection procedures. These procedures require no equipment aside from a display, to check functionality. They are not a performance verification; that is included in the document Performance Verification and Specification Technical Reference found on the CD that shipped with this instrument.

### Basic Turn On and Self Test

1. Connect a XGA monitor to 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, the text over the three knobs, and the **Fault** indicator should all 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 monitor.



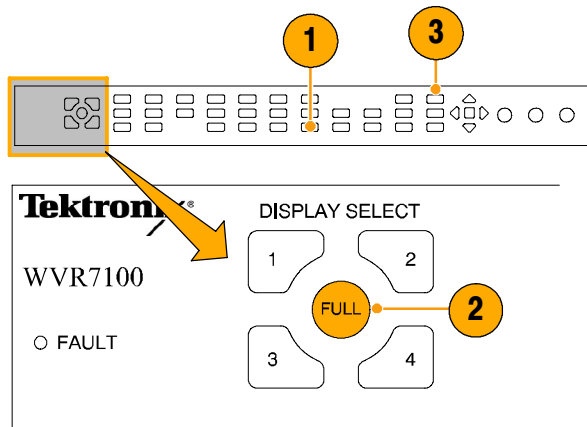
7. Verify that all self tests pass. Any failures will be shown in Red. The results of the Power on diagnostics are erased from the screen, but you can view them by selecting **CONFIG > Utilities > View Diagnostics Log**. Part of the log is shown right.
8. After the diagnostics are finished, the instrument state will be restored. When the progress indicator in the lower-right part of the screen is finished, the instrument has finished initializing.

Pass	DSP 2 Composite Check	Pass 1 of 1
Pass	Cmpst DAC Comm	Pass 1 of 1
Pass	Timecode Decoder comm	Pass
Pass	SDI Deserializer Comm	Pass 1 of 1
Pass	SDI CPLD Comm	Pass 1 of 1
Pass	DSP FPGA B Comm	Pass 1 of 1

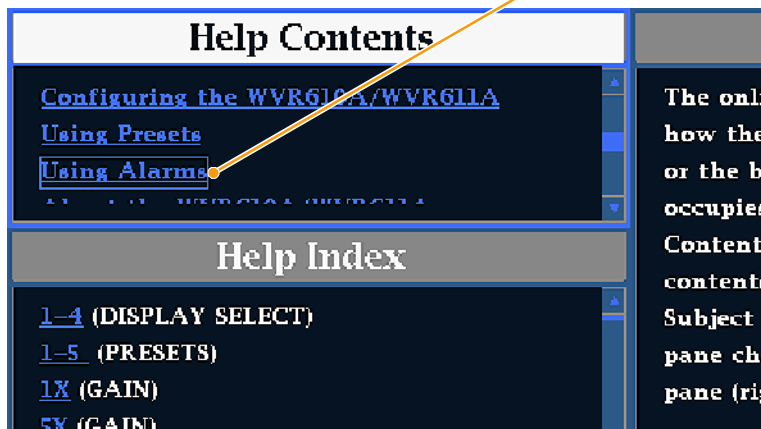
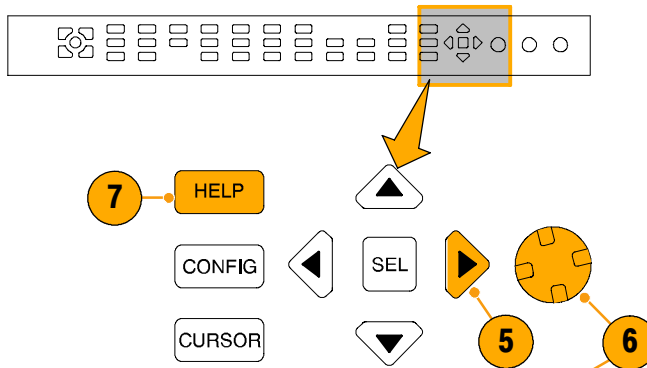
### Front Panel Test

1. Press **FACTORY** to restore the factory preset. Wait for the process to complete as indicated by the progress indicator.
2. Press **FULL** to make the active tile be full screen.
3. Press **HELP** to display the help screens.
4. Press all the other buttons.

Each one should flash as you press it. Most buttons bring up help text for that button in the help screen. (Some buttons, such as the presets, bring up the same information.) The HELP and the four arrow and the SEL keys do not bring up help text since they traverse the help panes and content.

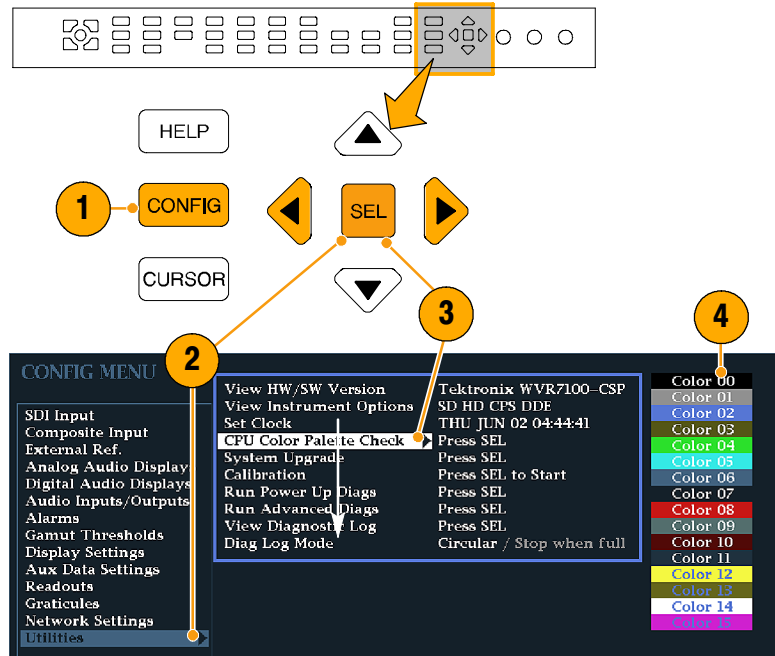


5. Press the right arrow key until the **Help Contents** pane in the upper-left corner is highlighted.
6. Turn the **GENERAL** knob and verify the selector box moves up and down the list.
7. Press **HELP** to exit help.

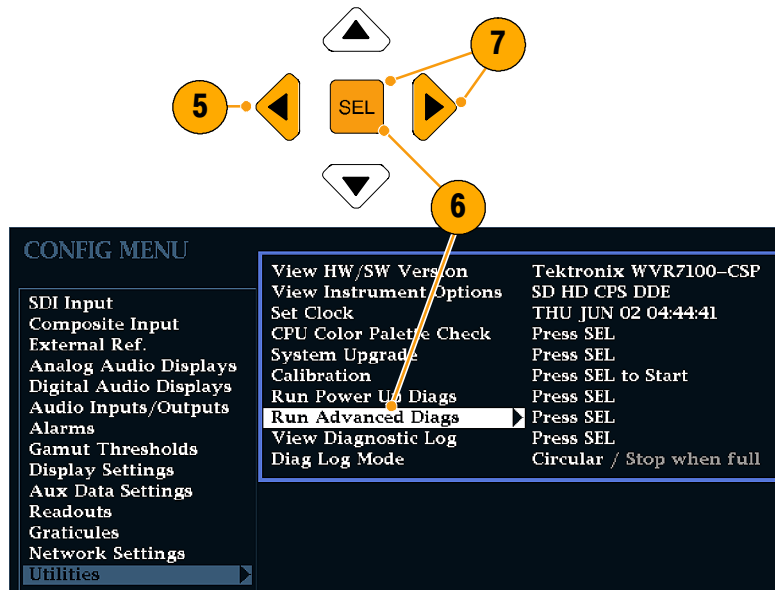


## XGA and Extended Diagnostics Test

1. Press **CONFIG** to display the CONFIG menu.
2. Select **Utilities**, and then press **SEL**.
3. Select **CPU Color Palette Check**, and 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** sub-menu.
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 frequencies shown are within 10 kHz, and that rates shown are within 0.1  $\mu$ s, of the nominal values listed at right.
  - QDR Clock = 25.175 MHz
  - VGA clock = 64.000 MHz
  - Audio PLL1 = 12.288 MHz
  - Audio PLL2 = 12.288 MHz
  - Hsync rate : Width = 2.2  $\mu$ s
  - Vsync rate : Width = 63  $\mu$ s
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 (labeled Channel A:, Processor Video:, and Composite Video:, and appearing at the bottom of the screen) are as follows:
  - All three tests show both a red and a green bar in each bit location.
  - The Processors Video test shows 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 reboot the unit for 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. Record Pass or Fail for Fan Test in the test record.

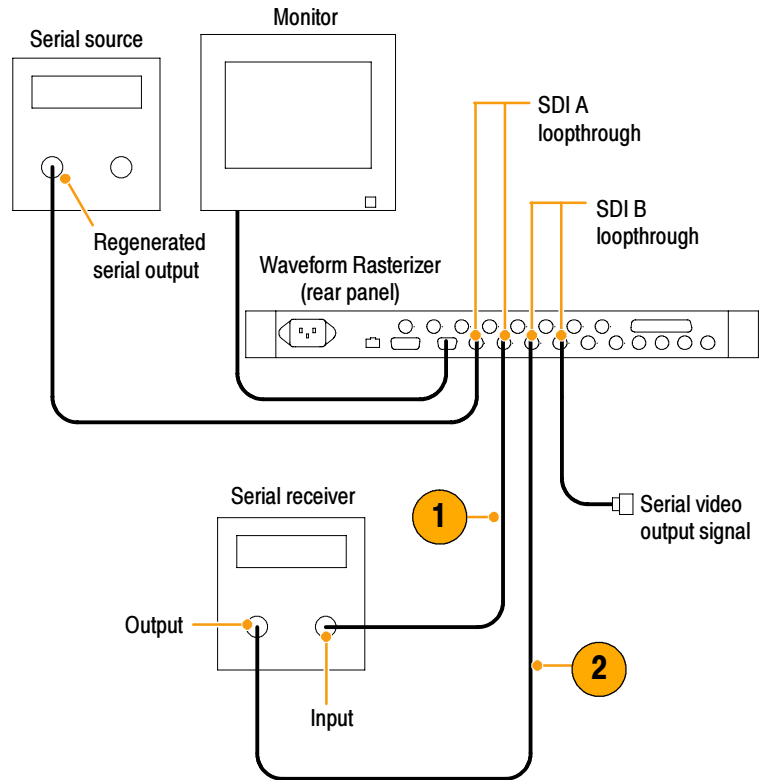
## Installing in a Video System

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 waveform rasterizer.

### To install for monitoring the video bit stream of a serial receiver

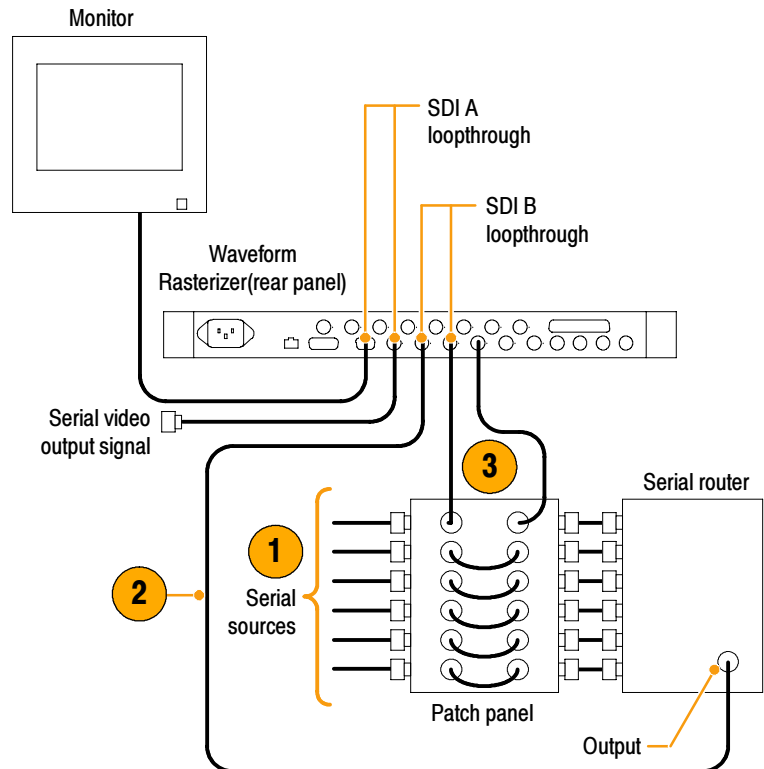
1. Route the incoming serial signal through one of the waveform rasterizer loop-through inputs.
2. Connect the output of the serial receiver to the other loop-through input, so you can compare the incoming signal and the regenerated output signal.

**NOTE.** See the Specifications on the WVR6100 and WVR7100 Documents CD for maximum cable lengths allowed.



### To install monitoring serial digital signals around a routing switcher

1. Connect your serial sources through a patch panel to a serial router.
2. Connect the output of the serial router to a SDI loop through input for comparison.
3. Connect the other SDI loop-through input to the patch panel to jumper the signal that you want to compare to signal connected in step 2.



### 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 terminator must be installed on one side of the loop-through connector. The termination must be 75  $\Omega$  and DC coupled (good return loss extends to DC). Return loss should exceed 25 dB from 10 kHz to 270 MHz for Standard Definition SD, should exceed 25 dB from 10 kHz to 1.5 GHz for High Definition SDI, and should exceed 40 dB from DC to 6 MHz for composite. An appropriate terminator would be Canare part number BCP-TA. It is a 75 Ohm 1%, BNC, 26 dB return loss to 2 GHz, End of Line terminator.

### Compatibility of BNC Center Pins

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

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

### **Connecting to Monitors and Projectors Issues**

Some monitors or projectors may have trouble adapting to the XGA output from the waveform rasterizer. This is because there may not be any significant signal in all four corners of the raster, so the monitor cannot find the edges of the active area. To overcome this, select Status in all four tiles of the waveform rasterizer display, and then cycle the power on the monitor to force it to reconfigure. If necessary, adjust the horizontal and vertical position and size to optimize the image, and set the Picture Refresh Rate to match the monitor. (See *Connecting a Display* on page 6.)

# How to Operate Your Instrument

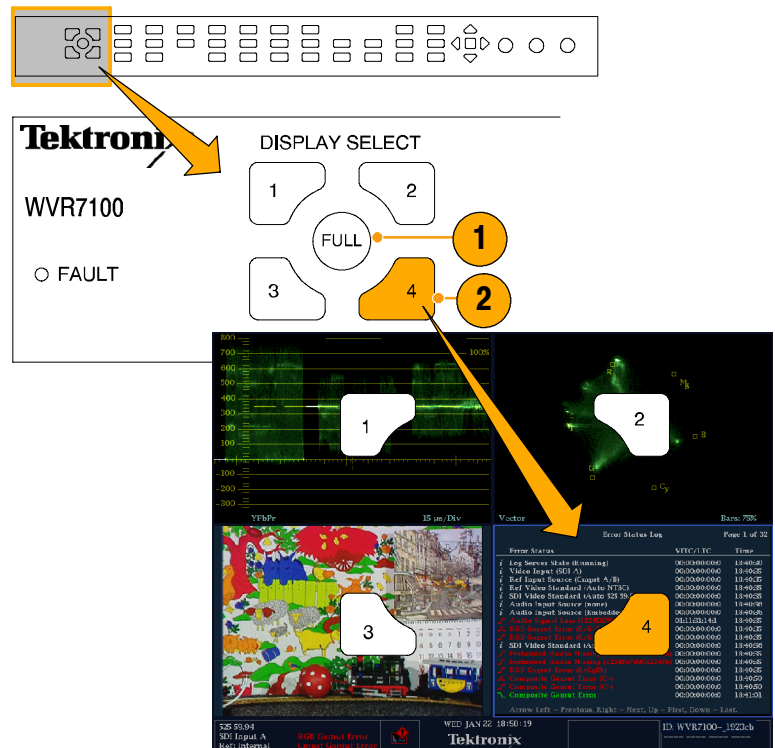
## Getting Acquainted

The waveform rasterizer uses 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. To enable the tiles to function independently, most of the controls only affect one tile at a time.

### To Control the Display:

1. To switch to tiled mode, toggle the FULL button until it is unlit and there are four displays shown.
2. To select a tile to control, push one of the numbered tile buttons.

Note that the button you select lights and that a light-blue outline surrounds the tile. Both the lit button and the light-blue outline indicate the active, selected tile. Tile 4 is shown selected here.

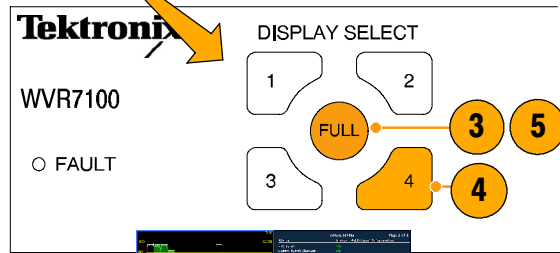
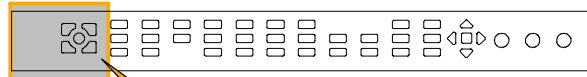


- To display the selected tile full screen, toggle the FULL button until it is lit and the selected tile fills the screen.

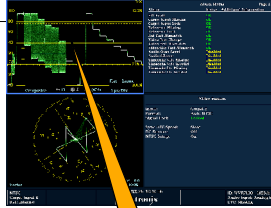
In a full display, the displayed tile is always selected.

- To select another tile, just push its button. The tile you select will replace the previously selected tile, displaying full screen.

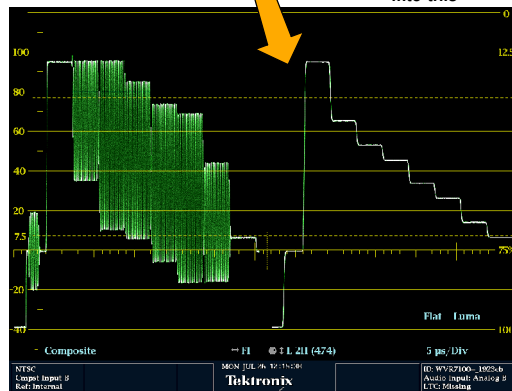
- Push the FULL button again to toggle to the four-tile display.



From this...

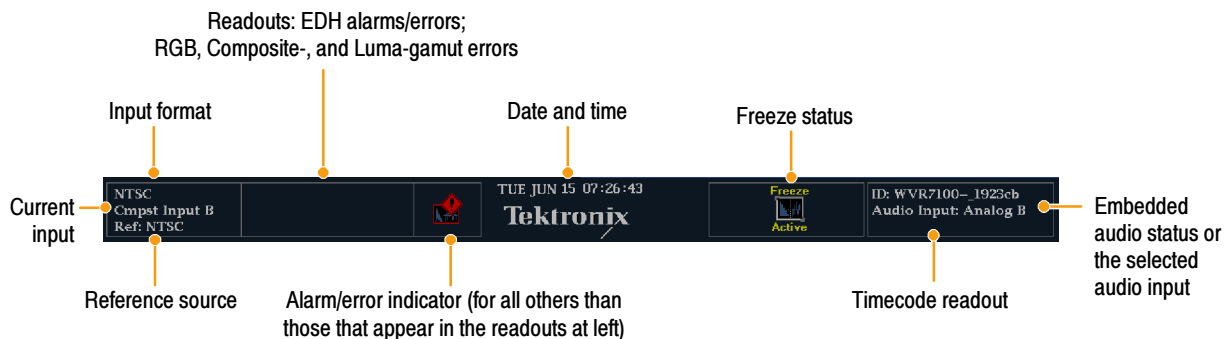


...to this



## To Determine Status At-a-Glance

The Status Bar, located at the bottom of the waveform rasterizer display, shows information on the status of instrument and of the monitored signal. The various elements detailed below describe the conditions that you can see at a glance in the Status Bar.



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 <sup>1</sup>	A one-line area that is visible if RGB gamut errors are present.
Composite Gamut Error <sup>1</sup>	A one-line area that is visible if Composite gamut (Arrowhead) errors are present.
Luma Gamut Errors	A one-line area that is visible if Luma errors are present.
Alarm/Error Indicator	An icon visible when alarms of types other than those in the four readouts just listed occur.
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 Status	A 16-character string indicating the selected audio input or the embedded audio channel status, when embedded audio is the selected input. In the latter case, each character shows the status of a specific channel: - for not present and <b>P</b> for present.
Timecode Readout	A readout showing the selected time-code value
Reference Source	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). Also indicates if the current input is not in Auto mode and is unlocked.

<sup>1</sup> Because RGB and Composite Gamut messages appear on the same line in the display, if both RGB and Composite Gamut errors are present at the same time, the message "RGB and Cmpst Gamut" will appear.

## Status Bar Icons

### Display Icons



### Description

Warning - Appears when an error or an alarm that is mapped to the user interface triggers.



Alarms Muted - Appears when the alarms are 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 are disabled from the Configuration menu.



Freeze Active - Appears when the tiles are frozen.

## Front-Panel Controls

---

**NOTE.** Some of the controls that this section covers may not be present on your rasterizer, depending on which options are installed. For a list of the options that are installed on your product, press the CONFIG button. In the CONFIG menu, select the Utilities submenu. The View Instruments Options entry lists the installed options for your instrument.

---

### Three Levels of Control

You control the waveform rasterizer on three levels:

- **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). To display a pop-up menu, press and hold the desired MEASURE SELECT or DISPLAY SELECT button for about a second.
- **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.

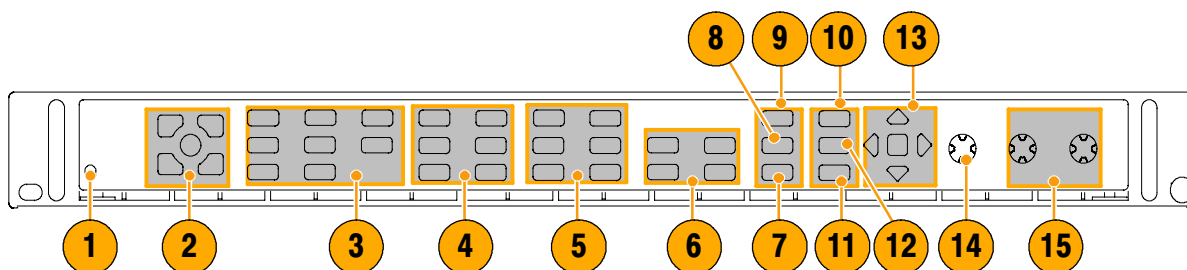


## Scope of Controls

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, it is tile specific. (Exceptions are the Input buttons, and all audio features, both of which are global.) If control is configured by the CONFIG menu, selections are usually global.

## Layout and Usage

The front panel elements are shown below, referenced to the usage procedures that explain their operation.



Index	Control Element or Group	Usage Procedures
1	FAULT (alarm) light	None. Indicates a hardware problem requiring servicing
2	Tile-selector and tile buttons	<i>To Control the Display</i> on page 15
3	Measurement buttons	<i>To Select a Measurement</i> on page 26 <i>To Set Measurement Parameters</i> on page 26
4	Gain and Sweep Buttons	<i>To Set Gain and/or Sweep</i> on page 29
5	Preset Buttons	<i>To Use Presets</i> on page 30
6	Input Selection Buttons <sup>1</sup>	<i>To Select Among Inputs</i> on page 28
7	Line Select button	<i>To Set Line Select Mode</i> on page 35
8	Ext REF	<i>To Time a Studio</i> on page 56
9	Freeze button	<i>To Freeze the Display</i> on page 32
10	Help button	<i>To Use Online Help</i> on page 37
11	Cursors button	<i>To Measure Waveforms with Cursors</i> on page 31
12	Configuration menu button	<i>To Configure Your Instrument</i> on page 36
13	Up/Down/Left/Right Arrow keys and Sel Button	Demonstrated in <i>To Set Measurement Parameters</i> on page 26
14	General Knob	Demonstrated in <i>To Select/Adjust a Parameter</i> on page 36
15	Vertical and Horizontal Knobs	None. Use to position waveforms when displayed in tiles or full screen.

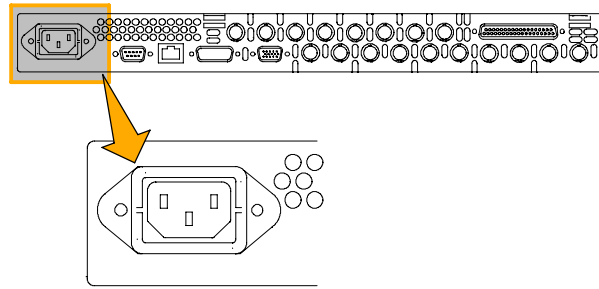
<sup>1</sup> Composite buttons present for Option CPS-equipped instruments only.

## Rear-Panel Controls

### Power Requirements

- A single-phase power source with one current-carrying conductor at or near earth-ground (the neutral conductor).
- A power source frequency is 50 or 60 Hz, and a operating voltage range is from 100 to 240 VAC, continuous.
- Systems with both current-carrying conductors live with respect to ground (such as phase-to-phase in multiphase systems) are not recommended as power sources.

**NOTE.** Only the line conductor is fused for over-current protection. The fuse is internal.



### Video Input Connectors

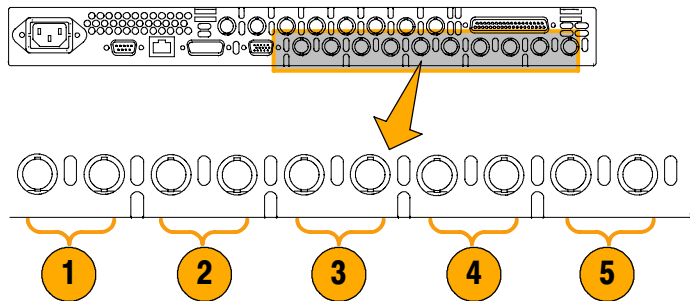
All are passive, loop-through inputs, compensated for 75 Ω

1. **SDI A Loop-through.** The A component serial digital input<sup>1</sup>
2. **SDI B Loop-through.** The B component serial digital input<sup>1</sup>
3. **Ref Loop-through.** A synchronization input. The input signal can be analog black burst or analog composite video.
4. **Composite A Loop-through.** The A composite analog input<sup>2</sup>
5. **Composite B Loop-through.** The B composite analog input<sup>2</sup>

<sup>1</sup> WVR7100 instruments: Accept HD inputs only unless Option SD-equipped. Option SD-equipped instruments accept and automatically detect both HD and SD signals.

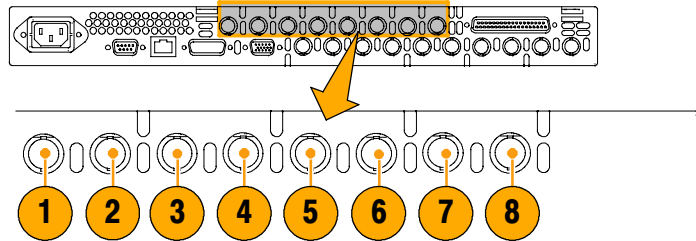
WVR6100 instruments: Accept SD inputs only and cannot accept HD signals.

<sup>2</sup> Input not present unless instrument is Option CPS-equipped.



### AES A/B Connectors




These BNC connectors support AES audio inputs based on the audio options installed. (Options are listed on page 2.)



### Connector Label

1. AES A 1-2 In
2. AES A 3-4 In
3. AES A 5-6 In
4. AES A 7-8 In
5. AES B 1-2 I/O<sup>1</sup>
6. AES B 3-4 I/O<sup>1</sup>
7. AES B 5-6 I/O<sup>1</sup>
8. AES B 7-8 I/O<sup>1</sup>

### Connector Label Key:

AES A	1-2	In
AES B	3-4	I/O
	5-6	
	7-8	
		
A or B	Channels supported	Input or Input/Output

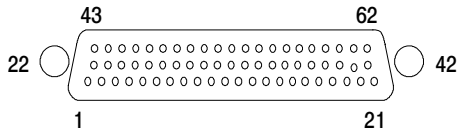
<sup>1</sup> The AES B connectors can output AES audio (from Analog, Digital, or Dolby) when configured from the Configuration menu.

## Analog Input/Output Connector

The Analog I/O connector is used to input and output analog signals. The Analog I/O connector is a 62-pin, D-subminiature connector. Pin out and pin names follow.



**CAUTION.** Use care when connecting the Analog Audio Output. Refer to the instrument Specifications, to ensure Audio Load and Output Power meet specifications. Exceeding Analog Audio Output Power may result in damage to the instrument.



### Key:

ANALOG_INPUT	<u>  </u> A	1	<u>  </u> N
ANALOG_OUTPUT	<u>  </u> B	2	<u>  </u> P
		3..	
		..8	
}		}	}
Balanced differential analog audio input or output		Input A Input B	Chan 1 Chan 2 Chan 3.. Chan ..8
			N=Negative P= Positive

Pin	Pin name	Pin	Pin name
1	ANALOG_INPUT_A1_P	2	ANALOG_INPUT_B1_P
3	ANALOG_INPUT_A2_P	4	ANALOG_INPUT_B2_P
5	ANALOG_INPUT_A3_P	6	ANALOG_INPUT_B3_P
7	ANALOG_INPUT_A4_P	8	ANALOG_INPUT_B4_P
9	ANALOG_INPUT_A5_P	10	ANALOG_INPUT_B5_P
11	ANALOG_INPUT_A6_P	12	ANALOG_INPUT_B6_P
13	GND (Ground)		
14	ANALOG_OUTPUT_1_P	15	ANALOG_OUTPUT_2_P
16	ANALOG_OUTPUT_3_P	17	ANALOG_OUTPUT_4_P
18	ANALOG_OUTPUT_5_P	19	ANALOG_OUTPUT_6_P
20	ANALOG_OUTPUT_7_P	21	ANALOG_OUTPUT_8_P
22	ANALOG_INPUT_A1_N	23	ANALOG_INPUT_B1_N
24	ANALOG_INPUT_A2_N	25	ANALOG_INPUT_B2_N
26	ANALOG_INPUT_A3_N	27	ANALOG_INPUT_B3_N
28	ANALOG_INPUT_A4_N	29	ANALOG_INPUT_B4_N
30	ANALOG_INPUT_A5_N	31	ANALOG_INPUT_B5_N
32	ANALOG_INPUT_A6_N	33	ANALOG_INPUT_B6_N
34	GND	35	ANALOG_OUTPUT_1_N

Pin	Pin name	Pin	Pin name
36	ANALOG_OUTPUT_2_N	37	ANALOG_OUTPUT_3_N
38	ANALOG_OUTPUT_4_N	39	ANALOG_OUTPUT_5_N
40	ANALOG_OUTPUT_6_N	41	ANALOG_OUTPUT_7_N
42	ANALOG_OUTPUT_8_N	43	NC
44	NC	45	NC
46	NC	47	NC
48	NC	49	NC
50	NC	51	NC
52	NC	53	NC
54	NC	55	NC
56	NC	57	NC
58	NC	59	NC
60	NC	61	NC
62	NC		

**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 should connect the unbalanced output hot lead to the balanced input positive pin and the unbalanced cold lead to the balanced input negative pin.

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, but using the negative output and grounding the positive output will effectively invert the phase.

---

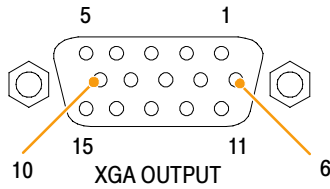
**NOTE.** Note that grounding the unused lead does not attenuate the output but it does halve the clipping level. Therefore, you must attenuate the output by at least 6 dB to avoid clipping. The output signal level in unbalanced mode is double the signal level in balanced mode.

---

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

### XGA Connector and Pin Out

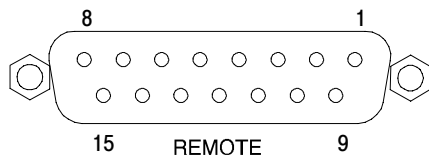
This is the display output. The display resolution is 1024 x 768, in 16 colors. The output is compatible with standard analog PC monitors, either CRT or LCD-based. The REMOTE connector is a 15-pin D-type connector with socket contacts.



Pin	Pin name
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 (I <sup>2</sup> C polling is not supported)
13	Horizontal Sync
14	Vertical Sync
15	ID Clock

### Remote Connector and Pin Out

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.



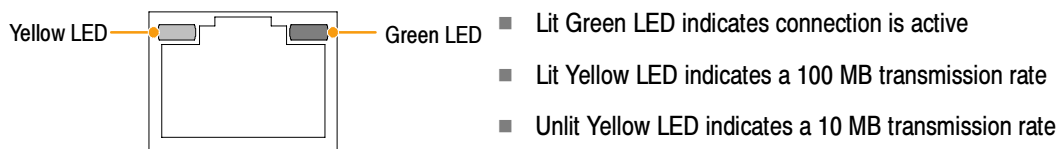
Pin	Pin name
1	Reserved for future use
2	GRD
3	Reserved for future use
4	Reserved for future use
5	Recall Preset 1
6	GRD
7	+Time Code (IN) (Logitudinal Time Code inputs)
8	-Time Code (IN) (Logitudinal Time Code inputs)
9	Output (Goes to GRD if alarm asserted and if enabled)

10	Reserved for future use
11	Reserved for future use
12	Reserved for future use
13	Recall Preset 2 (IN) <sup>1</sup>
14	Recall Preset 3 (IN) <sup>1</sup>
15	Recall Preset 4 (IN) <sup>1</sup>

<sup>1</sup> Asserting one of the Preset signals causes the associated front-panel preset to be applied to the rasterizer. Assert a pin by connecting it to ground.

## Ethernet Connector

The waveform rasterizer provides a 10/100 BaseT Ethernet interface. The Ethernet connector is a standard RJ-45 connector.



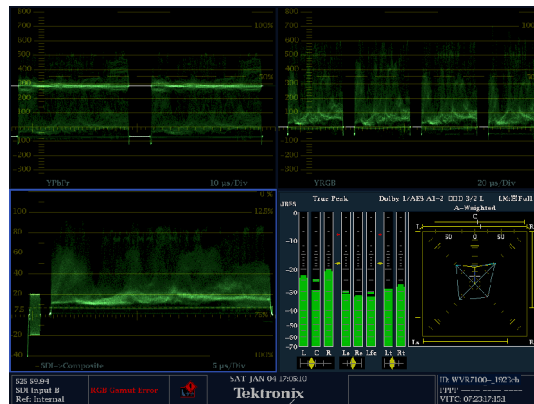
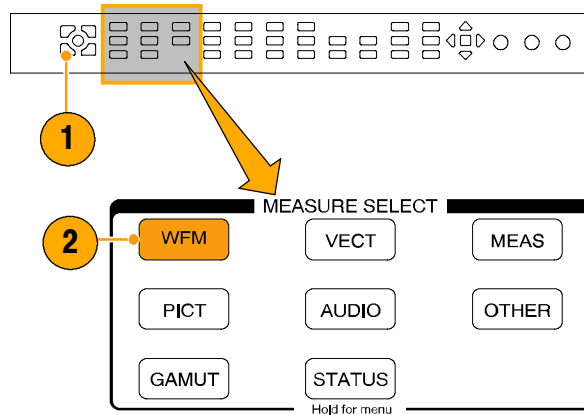
## To Select a Measurement

After you have selected a tile, you can choose what to display in it. Measurement/Display type is independent for each tile.

1. Select a tile as instructed in *To Control the Display* on page 15.
2. Push a button corresponding to the measurement that you want to display in the selected tile:
  - WFM - described on page 41
  - PICT - described on page 47
  - GAMUT - described on page 53
  - VECT - described on page 42
  - AUDIO - described on page 48
  - STATUS - described on page 54
  - MEAS - described on page 44
  - OTHER - (LTC display) described on page 52
3. Repeat steps 1 and 2 until you have selected measurement displays for all tiles that you wish to define.
4. To display the same measurements in more than one tile, select each tile in sequence, and then choose the same measurement for each one.

The display at right shows the display with WFM selected for three tiles.

**NOTE.** Audio is the only measurement that can be displayed in only one tile at a time.



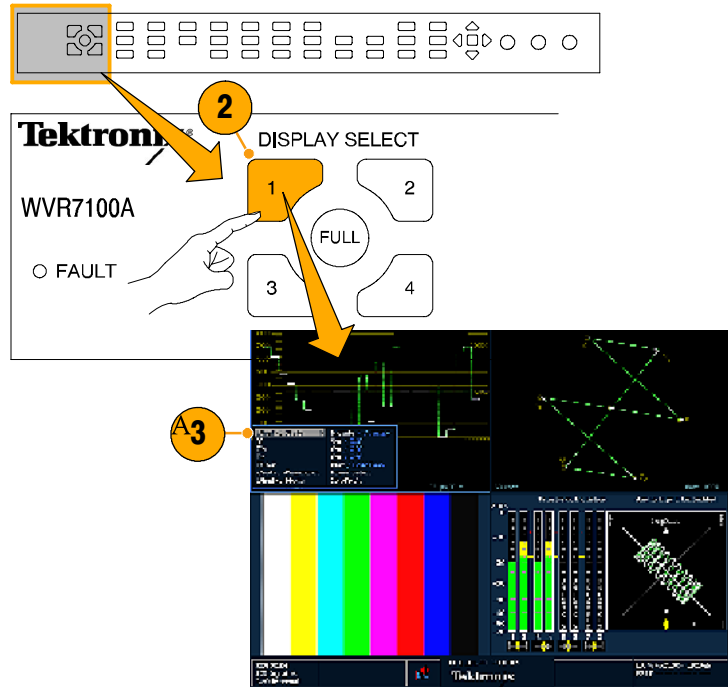
## To Set Measurement Parameters

You can set up the measurements that you display using 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.

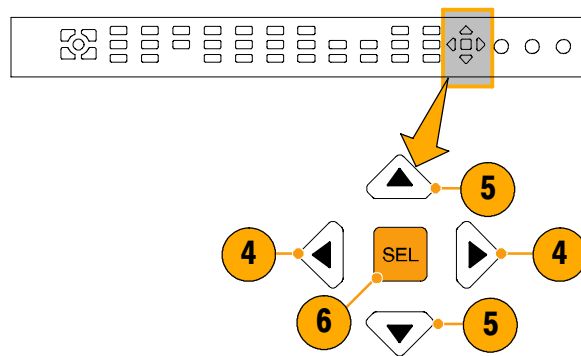
The pop-up menu will appear when called (see procedure that follows), unless it is not appropriate for the current setting of the waveform rasterizer (for example, trying to display the Gamut menu when viewing a composite input signal).



1. Display the measurement in one of the four tiles as explained in *To Select a Measurement* on page 26.
2. Push and hold the tile button for the measurement that you displayed in step 1.
3. When the menu pops up, navigate it and make your selections as described in the steps that follow.

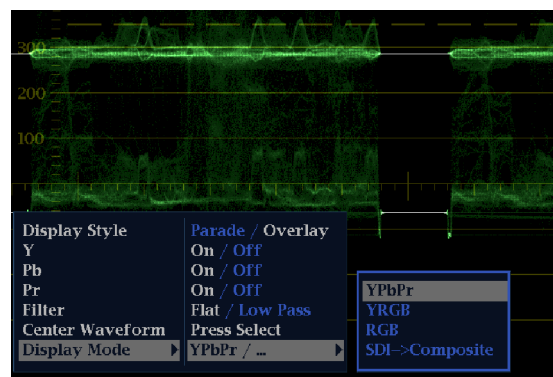


4. Use the right and left keys to traverse between menu panels. The instrument surrounds the panel selected with a blue border.
5. Use the up and down arrow keys to select parameters in a menu.
6. Press **SEL** to set the selected parameter.



The WFM pop-up menu with display mode set to YPbPr is shown.

**NOTE.** The selections in a pop-up menu can change depending on settings.

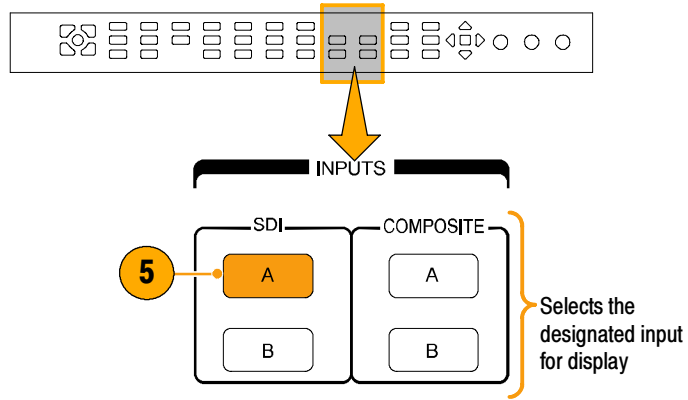


## To Select Among Inputs

You can connect SDI (Serial Digital Interface) signals and select them for display. Depending on the rasterizer model and options installed, you can also connect high-definition component, standard-definition component, and analog composite signals.

### To select a component input

1. Connect any digital component video signals to the A and B SDI inputs at the rear panel:
  - WVR7100: If Option SD is installed, the instrument automatically detects whether input is HD or SD; otherwise connect HD signals only.
  - WVR6100: Connect SD signal only.
2. Connect any analog composite signals to the A or B Composite inputs at the rear panel. (On Option CPS equipped instruments only.)
3. Terminate the loop through input properly at the rear panel for any inputs that you connected.
4. Press the button corresponding to the input that you want (SDI Input A shown in example).
5. Select a tile and measurement in which to display the input.

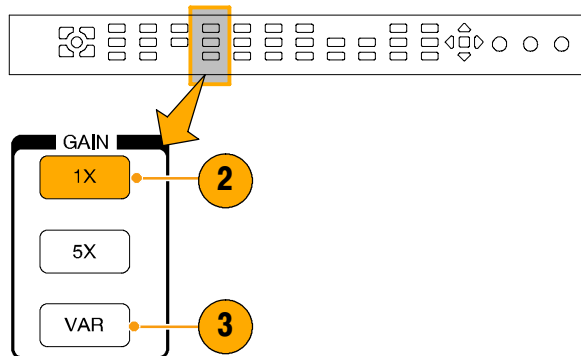


## To Set Gain and/or Sweep

Each tile maintains its own settings independent of the other tiles. These settings include 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. As the procedure below indicates, GAIN and SWEEP do not apply to all display types.

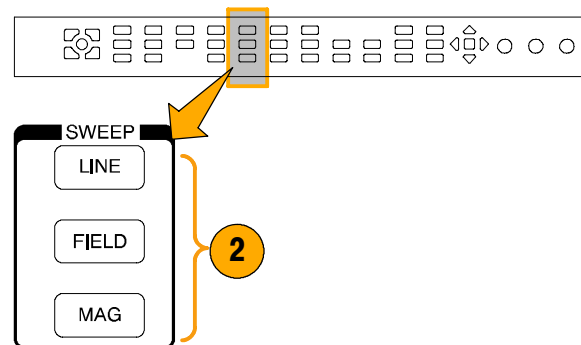
### To set Gain:

1. Select a tile and a measurement (see *To Select a Measurement* on page 26 if you need help).
2. If GAIN is selectable, one of the GAIN buttons will be lit; otherwise select a measurement that supports GAIN selection, such as WFM. Push the button for the GAIN setting that you want.
3. If you push VAR(iable), set the gain that you want using the GENERAL knob.



### To set Sweep:

1. If SWEEP is selectable, one of the SWEEP buttons will be lit; otherwise select another measurement that supports SWEEP selection, such as WFM.
2. Push the button for the SWEEP setting that you want.
  - LINE—Sets the active tile to the current Line rate sweep or 2 Line sweep
  - FIELD—Sets the active tile to the current Field rate sweep or 2 Field sweep
  - MAG—Sets the active tile to Variable Gain. Gain is set using the GENERAL knob.
3. Repeat steps 1 and 2 until you've selected measurement displays for all tiles that you wish to define.



## To Use Presets

Presets let you save up to five custom setups for later recall. You can also recall a factory predefined setup.

### To recall the factory preset

1. Push the FACTORY button.

The front panel setup will revert to default factory settings.

### To save as setup to a preset

2. Set up the instrument as you want it.
3. Push and hold the button of the numbered preset in which to store the current instrument setup. (Preset 1 shown.)

The setup will be stored for later recall.

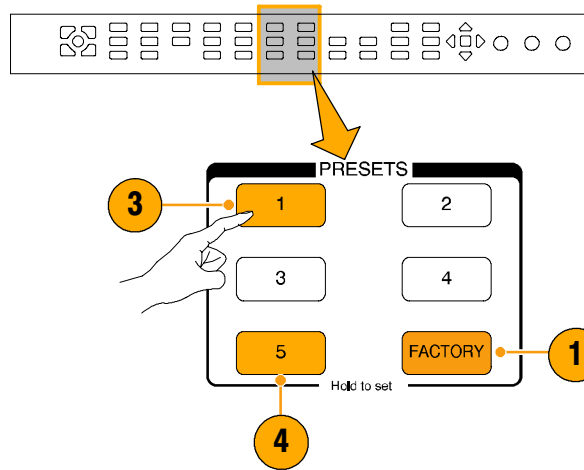
### To recall an existing preset

4. Push the numbered button for the preset you wish to recall.

The front panel setup will switch to the saved preset corresponding to the button pressed.

### To clone a setup between rasterizers

You can store a preset as a file on a PC and upload it to the same or another rasterizer. See *Cloning Setups (Presets)* on page 98.

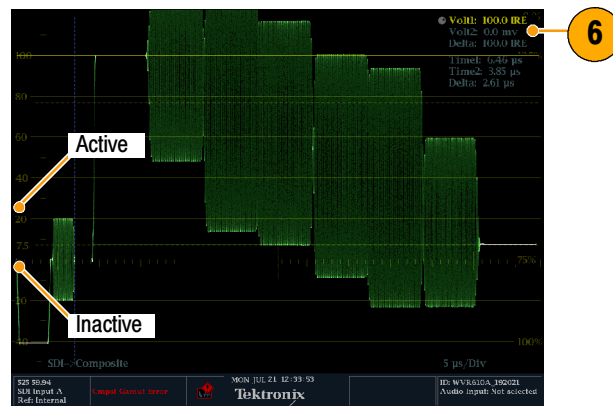
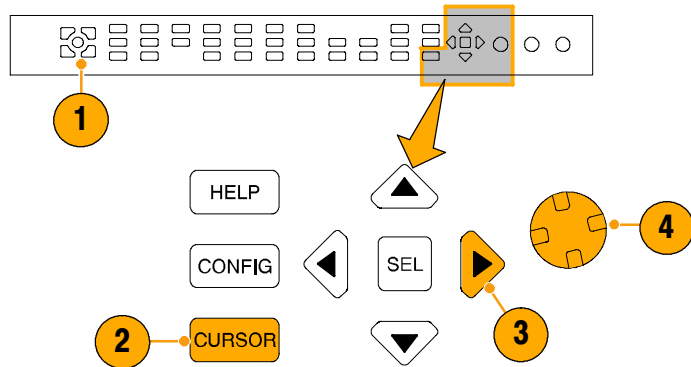


## To Measure Waveforms with Cursors

Cursors enable you to measure time or voltage on a waveform. Cursors appear only in a tile set to Waveform mode. If the active tile is not in Waveform mode, then an error message is displayed.

### To display and adjust cursors

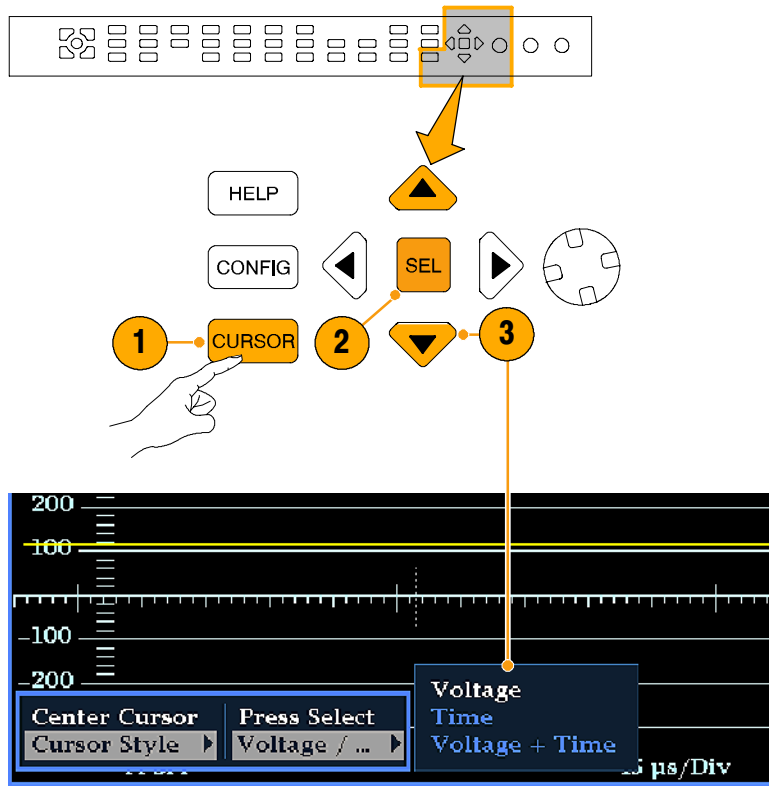
1. Choose a tile that is currently displaying a waveform.
  2. Push the CURSOR button to display the cursors on the selected tile. (Pushing CURSOR again turns cursors off.)
  3. Push the arrow keys to select the active cursor:
    - If Voltage OR Time cursors are displayed, press any arrow key to select active cursor.
    - If Voltage AND Time cursors are displayed for the voltage cursors, press either the up or down arrow key, and for time cursors, press either the left or right arrow key to change the active cursor.
  4. Turn the general knob to adjust the selected cursor on the waveform. Active cursor readout appears in yellow with knob icon.
- Tip.** To quickly center the active cursor on screen, press and hold the SEL button.
5. Repeat steps 3 and 4 to adjust the other cursor.
  6. Read the cursor measurement in the Cursors readout.



### To switch among cursor types

1. Press and hold **CURSOR** to display the Cursor pop-up menu.
2. Select **Cursor Style**, and press **SEL** to change the focus to the submenu.

3. Select the desired cursor type using the up/down arrow keys. The three styles of cursors available are:
  - **Voltage** - display the voltage level at each cursor and the voltage difference between the two cursors.
  - **Time** - display the position of each cursor relative to the start of the sweep and the difference between the two cursors.
  - **Voltage + Time** - displays both the Voltage and Time cursors.



### Usage Tips

If you use other functions, such as Line Select, while cursors are active, the knob will be assigned to those other functions. Press **CURSOR** to transfer the knob control back to cursors.

You can display independent cursors in all four tiles at the same time, although you will only be able to change the cursors in the active tile.

Cursors track the live trace, so they may not be correctly registered on a frozen trace.

## To Freeze the Display

Pushing the **FREEZE** button captures the current image for traces (waveform, gamut, and vector), picture, status, and audio measurements, if selected. Freeze is useful for comparing sources or for capturing transient events. Press **FREEZE** to capture a display you wish to keep or show to someone else. In this application, the **Frozen Only** display mode may be best. For comparing sources, the **Frozen + Live** display mode is useful. To use this feature, select one source, press **FREEZE** to capture an image, then select the second source and compare.

Not all displays react identically to freeze. WFM displays capture a trace. For text displays, such as Status, pressing **FREEZE** halts updates to the display. This allows you to view the different status displays without numbers or status readouts changing. The waveform rasterizer continues to log error status in the background while the display is frozen.

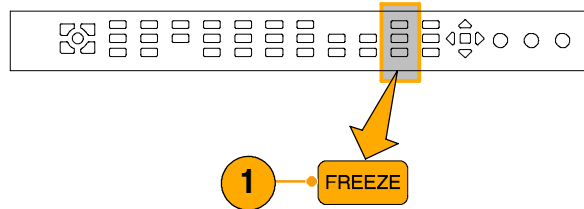
**FREEZE** works in both tile and full-screen modes, but frozen images do not change from tile to full or full to tile. That is, if you freeze a trace in tile mode, the frozen image will not be shown if you go to full-screen mode. The frozen image will still

be available if you go back to tile mode. Likewise, if you freeze a Waveform image in a tile and then switch the tile to another measurement such as Vector, the frozen waveform image will be hidden. If you then change the tile back to Waveform, the frozen image will reappear.

For waveform displays, the frozen image is shown in a different color to distinguish it from the live image.

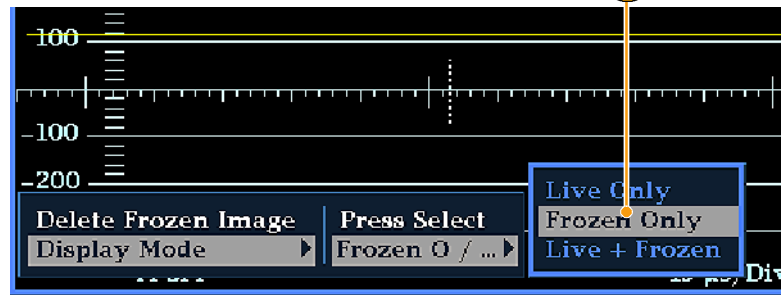
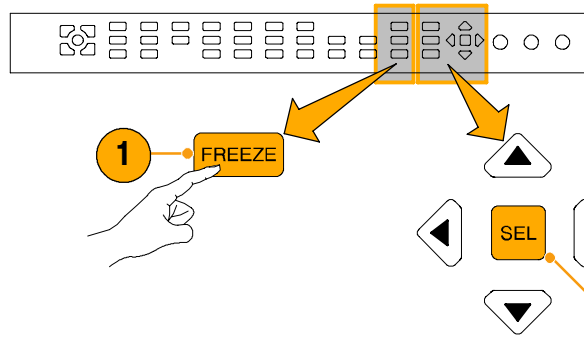
**To halt display update:**

1. Push the FREEZE button. For most displays, updates stop.



**To select the FREEZE display mode:**

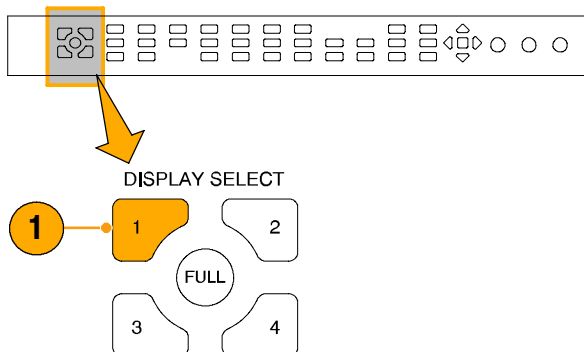
1. Push and hold **FREEZE** to display the pop-up menu.
2. Use the navigation keys to select the desired mode, and then press **SEL** to set the FREEZE display mode:
  - **Live Only** allows you to keep a frozen image, but not display it.
  - **Frozen Only** allows you to see artifacts in the frozen trace more easily.
  - **Live + Frozen** allows comparisons and matching. (STATUS and AUDIO displays do not support this mode.)



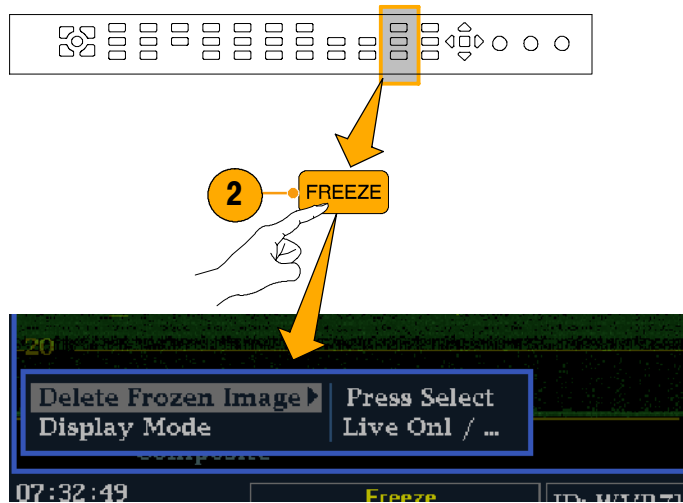
**NOTE.** The display mode chosen is specific to the tile selected, and can be set independently.

**To delete the FREEZE display:**

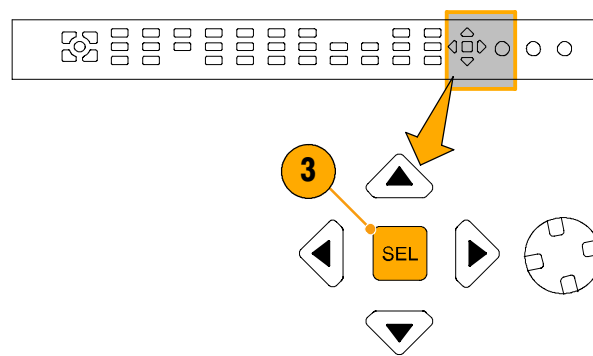
1. Select the display tile for the frozen display that you want to delete.



2. Push and hold **FREEZE** to display the pop-up menu. **Delete Frozen Image** will be already selected.



3. Press **SEL** to delete the frozen image. The pop-up menu is automatically removed from the display when the frozen image is deleted.



### Usage Tips

FREEZE can be configured to act on only the active tile or on all tiles. To change the FREEZE from Active Tile to All Tiles, you must go to the *Display Settings* Configuration menu.

Cursors track the live trace, so they may not be correctly registered on a frozen trace. If you change parameters such as position, sweep rate, or gain, then the cursors may not be accurate relative to a frozen trace.



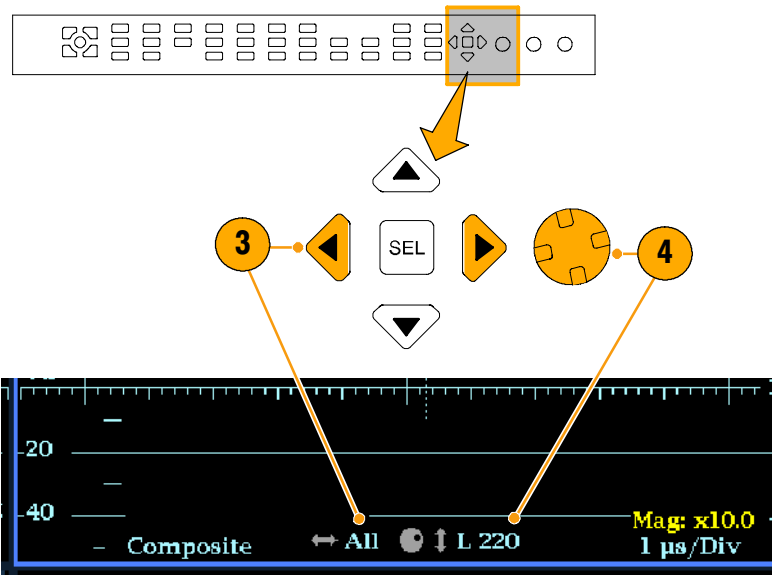
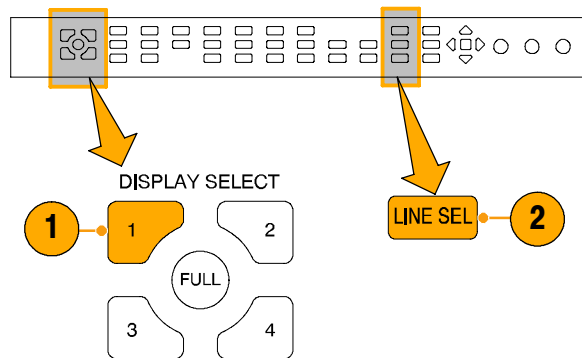
## To Set Line Select Mode

### To Toggle Line Select Mode

1. Select the tile containing the display for which you want to set Line Select Mode.

**NOTE.** Line Select Mode can only be active on one tile at a time, but the line select brightup cursor does appear in other tiles, and moves as you select lines in the active tile.

2. Push **LINE SEL** to toggle Line Select Mode on or off. When on, the tile displays the selected line information only. The Line selection menu appears at the bottom of the selected tile.
3. Press the left or right arrow key to select F1 (field 1), F2 (field 2), F3 (field 3), F4 (field 4), or All
4. Turn the **GENERAL** knob to select the line you want to view.



## To Configure Your Instrument

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 change a setting, you must highlight the desired setting:

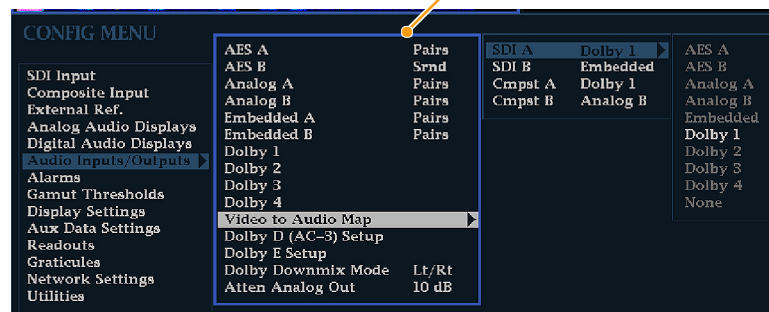
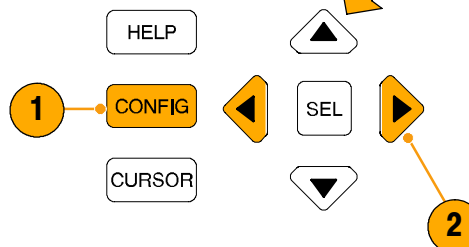
### To Traverse the Menu Panes:

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

The Configuration menu is displayed on the top or bottom half of the screen opposite the active tile.

2. Use the left/right arrow keys to move the selection back and forth among panels.

The selected, active pane is boxed by a blue line.



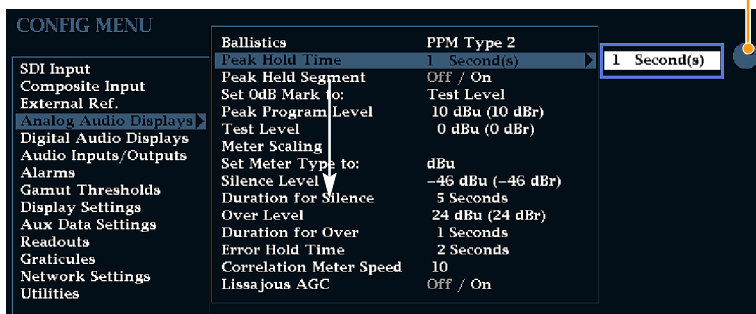
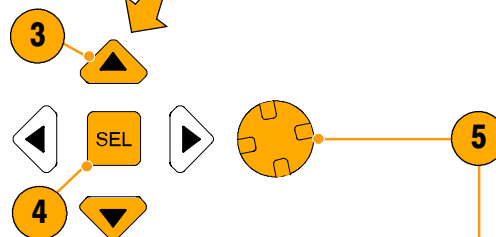
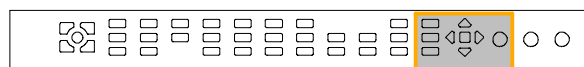
### To Select/Adjust a Parameter:

3. Use the up/down arrow keys (or the General knob) to move the selection up and down the menu entries in the selected pane.

The selected, active menu item is highlighted by a white menu bar; the selected item in unselected menus highlighted by a blue menu bar.

4. Push the SEL key (or right-arrow key) to toggle between parameter settings. For example, if Peak Held Segment was highlighted at right, pushing SEL toggles between On and Off settings.

5. If the menu item selected results in the knob icon appearing in the menu, use the General knob to adjust the selected parameter.



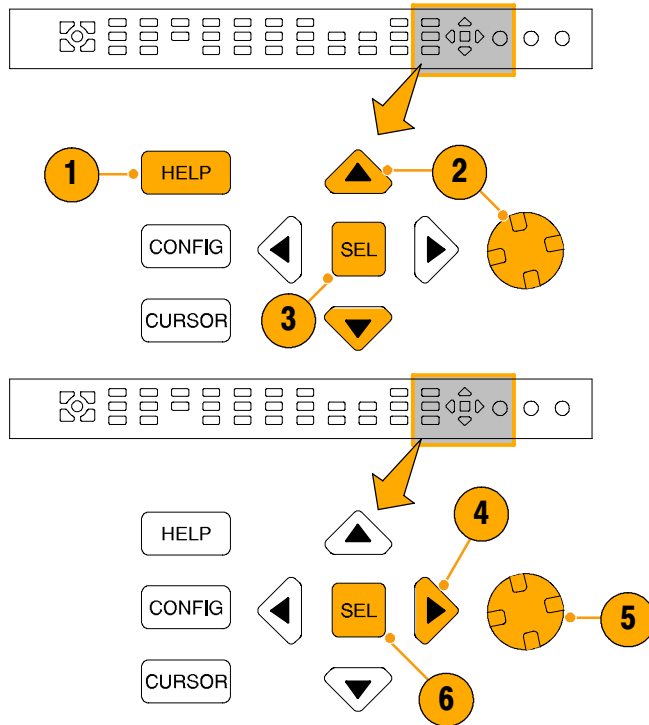
## To Use Online Help

The WVR6100 and WVR7100 online help is both a quick reference to instrument operation, and the exclusive reference for the details of instrument operation. The online help is:

- context-sensitive, where the topic displayed depends on what is displayed in the active tile when the online help is selected, or what control is operated after help is selected, and ...
- navigatable, with the Contents and Topic Selector panes, along with Links within the topics, providing access to topics.

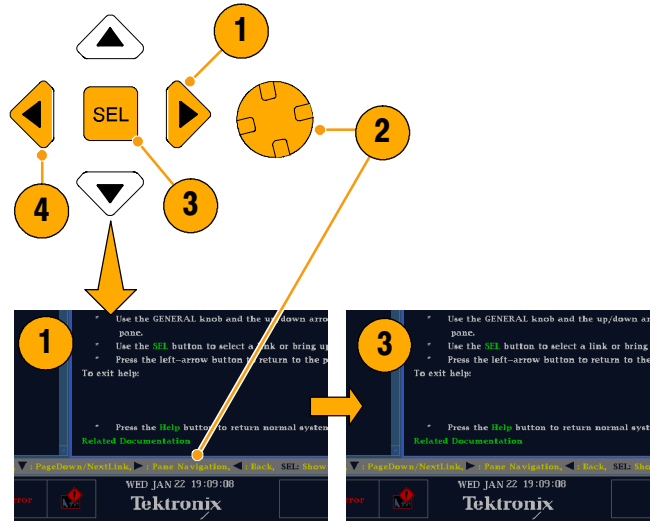
### To display and navigate online help:

1. Press **HELP**.
2. Use the **GENERAL** knob or the up / down arrow keys to highlight a entry in the Contents (entries never change).
3. Press **SEL** to select the the highlighted category.
4. Press the right-arrow key to move selection to the Topic Selector pane (entries change with the selection made in steps 2 and 3).
5. Use the **GENERAL** knob and the up / down arrow keys to select among the topics listed for the heading selected in step 2.
6. Press **SEL** to display the selected topic.



### To follow a link within a help topic

1. Press the right-arrow key to move selection to the Topic pane
2. Highlight a link using the GENERAL knob or the up / down arrow key.
3. Press **SEL** to jump to the linked-to topic.
4. Press the left-arrow key to go back to the previous topic.

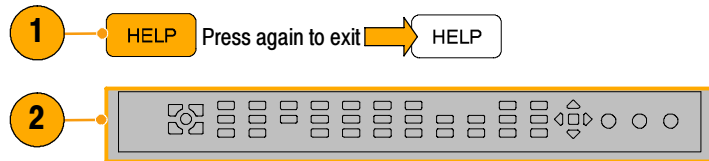


### To get context sensitive help:

1. When you want help on the control or setting you are using now, press **HELP**.

If you displayed a menu in the active tile, and select a menu setting, help on that setting displays.

2. Now operate (press, select, turn) a control that you need help with. The help topic pane displays help on the control you used.



### To exit the online help:

1. Press **HELP** to extinguish the button.

**NOTE.** You can also access online help on a computer networked to the rasterizer. See Remote Communication on page 109 for information on using the Web Browser or from the Web Java Applet.

## To Connect to a Network

The following topics cover configuring the IP settings, so that you can use the waveform rasterizer over a network, and configuring SNMP, which is required if you are using commands to control the waveform rasterizer.

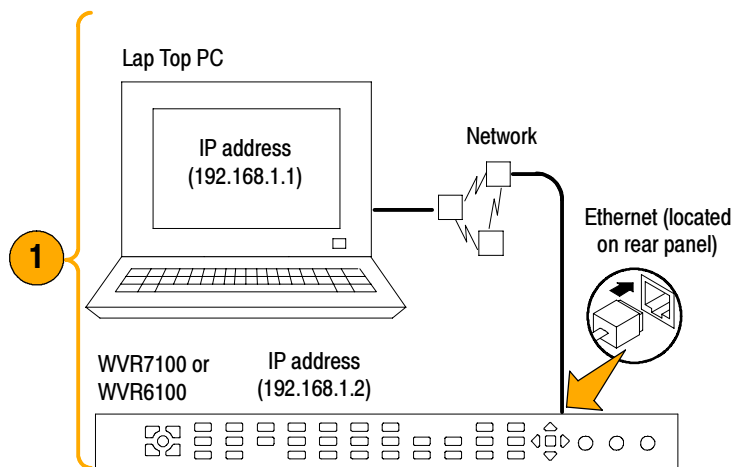
### Connection and IP Settings

To allow network access to the instrument, you need set the IP address. Network addresses can be assigned either automatically or manually. If your network does not use DHCP, you will have to manually enter the address for the instrument. To get an address, talk to your LAN administrator.

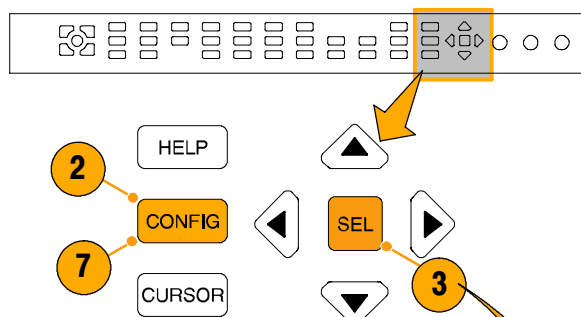
1. Connect your waveform rasterizer to a network and access it with a remote PC.

Set up the rasterizer as described in the steps that follow.

**NOTE.** You may want to connect directly between your PC and the instrument. See To Connect Directly to a PC on page 40.



2. Press **CONFIG** to display the Configuration menu.
3. Select **Network Settings > Web Enable**. Press **SEL** to select **On**.
4. Set the IP Config Mode to Manual or DHCP, depending on your network set-up.



5. If you can't use DHCP, you will have to set the subnet mask and gateway address network parameters in this menu; see your LAN administrator for required values. (Be sure to use compatible addresses between the PC and the rasterizer.) You may also set the instrument name and view the MAC Address.

IP Config Mode	Manual / DHCP
IP Address	128.181.102.182
Subnet Mask	255.255.255.000
Gateway Address	128.181.102.001
View MAC Address	08:00:11:19:3:cb
Instrument Name	WVR7100-1923cb
SNMP Enable	Off / On
SNMP Public Community	public
SNMP Private Community	private
SNMP Trap Enable	Off / On
SNMP Trap Address 1	000.000.000.000
SNMP Trap Address 2	000.000.000.000
SNMP Trap Address 3	000.000.000.000
SNMP Trap Address 4	000.000.000.000
Web Enable	Off / On
Web Password	FoldCat

6. If the password is set, note it. You will be prompted for it when you connect to the rasterizer.

**NOTE.** For help with entering or changing the password, select **Web Password**, and press the **HELP** button.

7. Press **CONFIG** to close the Configuration menu.

## SNMP Setup

If you intend to use SNMP commands to control the instrument (SNMP control is primarily intended for access via automation systems), you need to setup SNMP parameters.

**NOTE.** The WFM Series Waveform Monitors wfm\_mon.mib and the WVR7100.mib can be downloaded from the instrument web page. See step 10 on page 110, of Using the Web Browser in this manual.

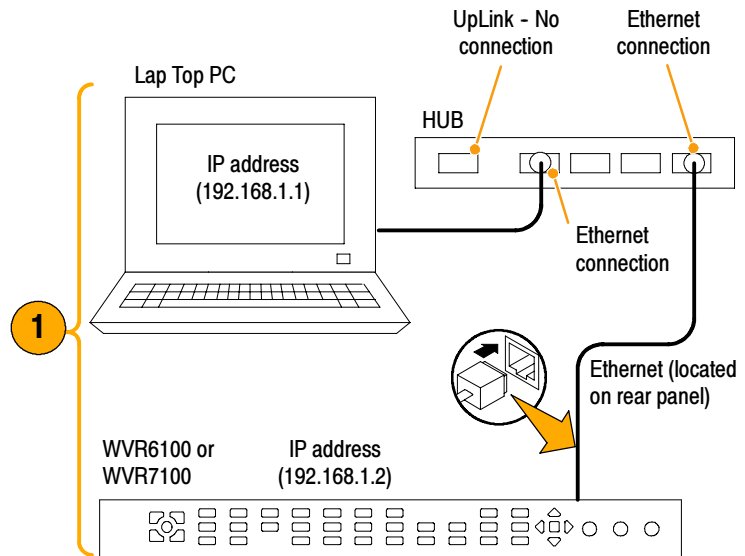
The procedure to set SNMP settings is similar to that shown above for IP settings; the parameters that can be set follow:

SNMP Enable	This entry in the Network Settings portion of the Configuration menu allows you to turn on or off the remote access via SNMP.
SNMP Trap Enable	This menu entry allows you to turn on or off the traps that are sent out via SNMP.
SNMP Trap Address	This menu entry allows you to set IP addresses to which SNMP traps are sent. SNMP Traps can be sent to up to four addresses when error conditions are detected.  <b>NOTE.</b> A value of all zeroes for the address will disable that trap output.
Private Community String	This menu entry allows you to set the Private Community string. This string is effectively a password. Without this string, SNMP commands cannot change values in the instrument.  <b>NOTE.</b> The Private String is necessary for SNMP access to write changes into the instrument, the Public string can be used for accesses to read information from the instrument.
Public Community String	This menu entry allows you to set the Public Community string. This string is effectively a password. Without this string, SNMP commands read values from the instrument.  <b>NOTE.</b> The Public String is necessary for SNMP access to read values from the instrument. The Private string must be used for SNMP access to write information to the instrument.

## To Connect Directly to a PC

A common configuration is to connect the rasterizer directly to a PC.

1. Connect your waveform rasterizer to a PC through HUB as shown. A standard Cross-Over cable can be substituted for the HUB.
2. Set up the rasterizer as described in steps 2 through 7 on page 39, choosing Manual IP mode and setting the IP address manually. Be sure to set an address that is compatible with the setting of your PC.
3. SNMP setup, if used, is the same as described under *SNMP Setup* on page 39.



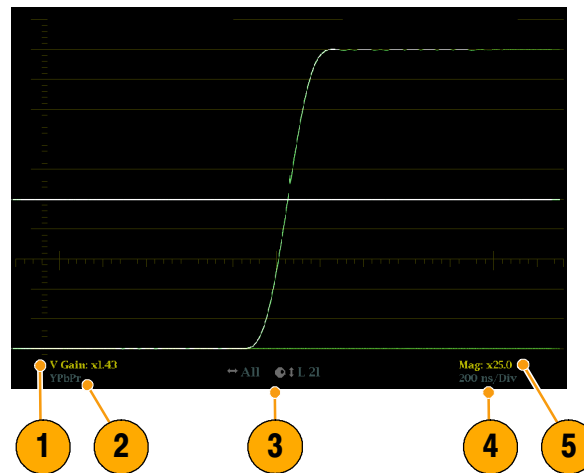
## List of Measurements and their Pop-up Menus

### Waveform Display

The WFM button displays the Waveform (WFM) display, which is the familiar voltage versus time 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. You can also control whether EAV, SAV, and ANC data is included in the display in the CONFIG menu.

#### Waveform Display Elements:

1. Is blank when vertical gain is X1; otherwise indicates V Gain is x5 or variable.
2. Lists the currently displayed waveform color-space. Dashes (--) indicate components not displayed.
3. Lists the currently selected field and line (when in Line Select mode).
4. List the current sweep rate for tile.
5. List the Mag rate if MAG is on.



#### Waveform Pop-up menu and settings

The Waveform pop-up menu enables you to choose the display style and display mode used in the active tile (SDI inputs only), select a filter to apply to the input signal, or center the waveform in the display.

To display the Waveform pop-up menu:

- Press and hold **WFM** to display the pop-up menu.

To choose a display mode use the menu to select among the following the choices (only available while displaying SDI inputs) :

- **YPbPr** - Displays the input as Luma (Y) and color difference (Pb, Pr) components.
- **YRGB** - Displays the input as Luma (Y), Red (R), Green (G), and Blue (B) components.
- **RGB** - Displays the input as Red (R), Green (G), and Blue (B) components.
- **SDI -> Composite** - Displays the SDI input as if it has been encoded into composite. The sync and burst in this mode are synthetic and convey no information about signal quality.

When viewing 525-line SDI input as a composite waveform while using line select mode, both burst phases may appear when you would expect to see only one. This is because the line selection in SDI Mode is an odd/even selection, while composite signals are normally viewed with a one-of-four or one-of-eight line selection.

To choose how the signal components are displayed in the active tile, use the Display Style menu setting (SDI inputs only) to select:

- **Parade** style - has all the components shown one beside the other like cars in a parade.
- **Overlay** style - has all the components drawn at the same location so that they appear one on top of the other.

The Waveform pop-up menu **Filter** selection allows you to select filters to be applied to the video. This is useful to isolate a specific characteristic of the input. For example, to measure amplitude you may want to use a Luma or Low pass filter to remove the high frequency components.

To choose a filter ( filters available depend on display type, SDI or Composite), select one of the following filters from the Waveform menu:

- **Flat**<sup>1,2</sup> - Display with the full available bandwidth.
- **Luma**<sup>2</sup> or **Low Pass**<sup>1</sup> - Display only the low-frequency portion of the signal.
- **Chroma**<sup>2</sup> - Display only the portion of the signal with frequencies near the color sub-carrier. For Composite inputs only.
- **Flat + Luma**<sup>2</sup> - A combination of a Flat and a Luma waveform from a Composite input; it shows two waveforms in parade configuration.

<sup>1</sup> Available for SDI displays, such as RGB mode.

<sup>2</sup> Available for Composite displays.

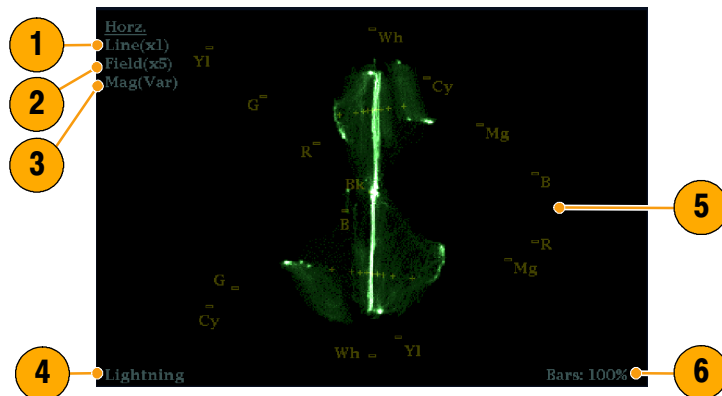
To cancel any horizontal or vertical position adjustments and restore the trace to the default position, select **Center Waveform** and press **SEL**. For a tile in WFM mode, this puts the baseline at the zero graticule.

## Vector Display

The VECT button calls up the Vector display, which provides for selection between two plots of the R-Y and B-Y color signals, Vector or Lightning.

### Display Elements:

1. **Line.** Pressing the LINE button sets the horizontal gain to 1X.
2. **Field.** Pressing the FIELD button sets the horizontal gain to 5X.
3. **Mag.** Pressing the MAG button enables you to adjust the horizontal gain using the GENERAL knob.
4. **Display Type.** The selected display, either Lightning or Vector.
5. **Bar Target Setting.** The bar target setting, either 75% or 100%.
6. **Phase.** Appears in Composite Vector display only.





## Vector Pop-up Menu

The Vector pop-up menu enables you to specify the display type (SDI inputs only), to set the bar targets, and to center the waveform in the display.

To display the Vector pop-up menu:

- Press and hold **VECT** to display the pop-up menu.

To choose the display type (SDI inputs only), use the pop-up menu to choose either:

- **Vector** - The Vector display shows a plot of the R-Y signal on the vertical axis and the B-Y signal on the horizontal axis. This display is useful for looking at hue and saturation of the colors, but does not show luminance information.
- **Lightning** - The Lightning display shows the same color signals as in vector, but they are plotted versus luminance. One color difference signal is plotted 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. This is a Tektronix proprietary display and is for SDI signals only.

To select which scaling should be used in the active tile for either the Vector or Lightning display, use the menu to select 75% or 100% scaling.

To cancel any horizontal or vertical position adjustments and restore the trace to the default position, use the up/down arrow keys to select **Center Waveform** in the menu. Then:

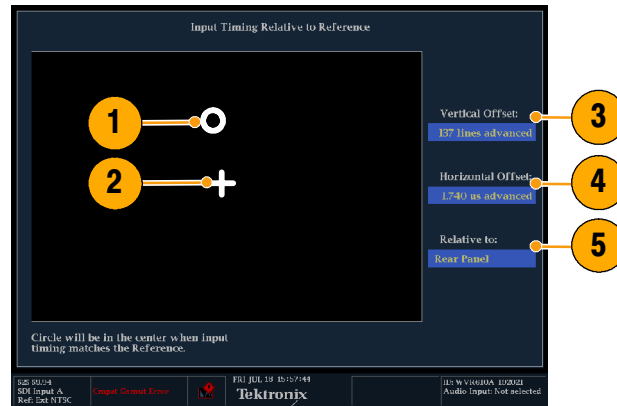
- For a Lightning display, press **SEL** to center the waveform. The trace is set back to the center of the tile.
- For a Vector display, press the right-arrow key to select the color you want to locate at the center of the display.

## Timing Display

Pressing the MEAS button displays a Tektronix proprietary display that 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 signals.

### Display Elements:

- 1. Input Signal Indicator:** A single<sup>1</sup> circle representing timing of input signal relative to the reference.
- 2. Reference Indicator:** A cross-hair indicator centered in the display represents the reference signal.
- 3. Vertical Offset:** The timing difference between the reference and input signal.
- 4. Horizontal Offset:** The timing difference between the reference and input signal.
- 5. Relative to:** Indicates the chosen zero point for the timing display.<sup>2</sup>



<sup>1</sup> More complex timing relationships display multiple circles. See *Timing Displays for Simple Versus Complex Timing* on page 45.

<sup>2</sup> Rear Panel is the default setting, where offset is shown as zero when the input and reference are at the same timing at the rear panel of the waveform rasterizer. If you select *Saved Offset*, you can save the timing from one signal, and then display the timing relative to that saved offset.

### Measure Pop-up Menu

The Measure pop-up menu enables you to save a timing setting for comparison with another signal and specify the zero point of the timing display.

To display the Measure pop-up menu:

- Press and hold **MEAS** to display the pop-up menu.

To save the timing of the current input as an offset to the timing display, use the **Save Offset** menu entry. The current timing becomes the zero point for the saved offset mode of the timing display. This applies to both the cross-hair target in the middle of the display and the numeric readouts.

---

**NOTE.** You cannot save the timing offset if either the input or reference is missing or unlocked. You also cannot save a reference when in internal mode. Saving an offset in these conditions would lead to misleading results so it is not allowed by the instrument. A warning message will appear on the screen if you attempt to save the offset when it is not allowed.

---

Save Offset allows you to measure the timing between inputs or to match multiple signals. To select the definition for the zero timing offset, use the **Relative To:** menu entry to select one of the following:

- **Rear Panel** which means the timing offset will be shown as zero when the two signals are timed down at the rear of the waveform rasterizer.
- **Saved Offset** which means that the timing will be shown as zero offset when the input signal matches the timing of the signal that was present when the offset was saved using the Save Offset menu entry.

This selection changes both the numeric readouts and the target in the middle of the timing display.

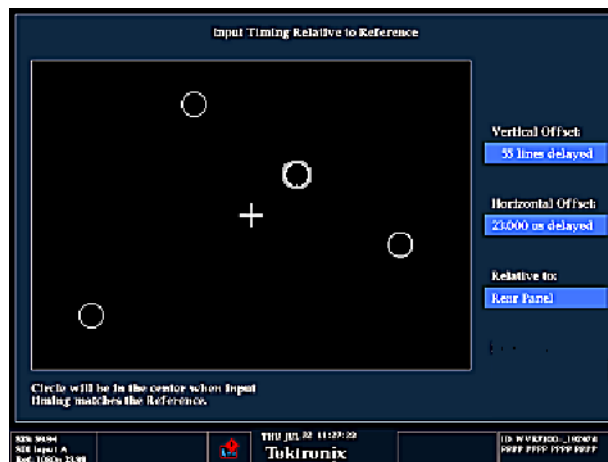
## Timing Displays for Simple Versus Complex Timing

The number of circles, with each representing a time offset, varies with the complexity of the timing between the reference and input signals. If you are timing input signals with rates that are integer multiples of the reference rates, the instrument can measure the timing deterministically and displays the relationship as one circle (offset) relative to the cross-hair (reference as is shown).

Such cases include timing an NTSC input (multiplier of 1) or a 525 SDI input whose frame time is 33.36ms (multiplier of 2), against an NTSC reference, which has a frame time of 66.73 ms.

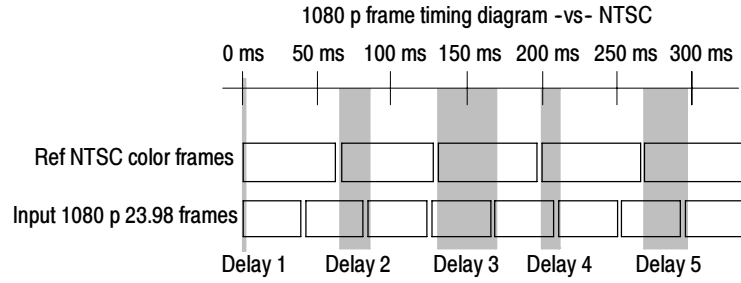
If you time input rates that are *not* integer multiples of the reference rates, the instrument cannot measure the timing deterministically, so it displays the relationships as several circles. Each circle represents a possible timing offset measurement relative to the reference cross-hair. Display emphasis is given to the circle that times closest to zero offset and the numerical readouts track this pair.

Nondeterministic cases include timing of slow rate inputs against fast frame-rate references or when timing video against film rates.



For a case where multiple relationships would display, consider an input of 1080p/23.98 Hz with a reference of NTSC/59.94 Hz:

- The different rates result in timing relationships between the signals that repeat once for every four fields of the input and five frames of the reference (shown right).
- Because this allows for five possible ways to measure timing between these two signals, the timing display shows four circles, with emphasis and readouts as previously described (shown above).

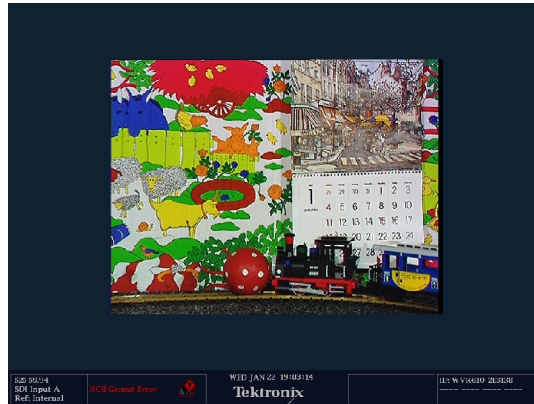


## Picture Display

Pressing the PICT button calls up the Picture display, which lets you see the picture generated by the video signal. You can choose to display the picture with or without a Picture Frame, VChip, Closed Captioning (CC), and Safe Area Graticules.

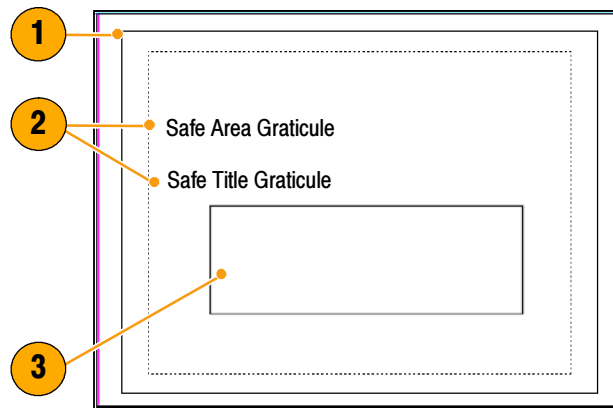
### Display Characteristics:

- In full-screen mode (shown), there is no cropping.
- Pictures are decimated horizontally or vertically to achieve the correct aspect ratio. This decimation may cause some artifacts. This behavior may be evident on a sweep signal.
- Also see the online help for the Picture Aspect Ratio for related information.
- Display may be set to include Closed Captioning text overlaid on the picture (see below).



### VChip, CC-Display, and Safe Area Graticule Characteristics<sup>1</sup>:

1. **VChip Area:** Displays detected VChip ratings from any of these systems: MPAA (US), TV (US), Canadian English, and Canadian French. VChip information is labeled CA (Content Advisory).
2. **Safe Graticules:** Up to two Area and up to two title graticules selectable for SMPTE, BBC, or ARIB B-4 standards safe area graticules. Custom graticules with adjustable areas may also be specified.
3. **Closed Caption Text Area:** Displays closed captioning, configurable to decode to the following Closed Caption standards:
  - For Composite: EIA-608-line-21
  - For SD: EIA-608-line-21, EIA-608-ANC, and EIA-608 (708)
  - For HD: EIA-608-ANC, EIA-608 (708)



<sup>1</sup> Also see *Monitoring Closed Captioning (CC) and Safe Area Compliance* on page 92.

## PICT Pop-up Menu

The Picture pop-up menu enables you to optionally display elements of the video signal outside the active video, turn on display of Close-Caption (CC) text overlaid on the picture, and turn on up to four save area graticules, and otherwise control the PICT display.

To display the PICT pop-up menu, press and hold **PICT** until the pop-up menu appears.

To see only the active video portion of the signal, use the menu to switch **Picture Frame** to **On**; to see elements of the signal outside the active video, switch **Picture Frame** to **OFF** to view user data, embedded audio, and elements in the vertical interval.

---

**NOTE.** You can see signal elements outside the active video only when the PICT display is set to **FULL**. You will not be able to see sync signal elements on Composite signals.

---

To view CC text overlaid on the display, use the menu to switch **Display Closed Captions** to **ON**.

To select the CC service used to display closed captions, use the menu to set EIA-608 CC Service to a CC or text channel.

---

**NOTE.** If you set a PICT display for additional tiles, each one affords independent control of the CC setup. You can turn it on for one tile and leave it on for another, or you can set it to display differently from one tile to another. Conversely, CC configuration set in the **CONFIG** menu applies globally to all tiles set to PICT.

---

---

**NOTE.** To set the global configuration for CC decoding, use the **Aux Data Settings** submenu of the **CONFIG** menu. You can set the CC transport type, select services, and other global parameters. See **To Monitor Closed Captioning** on page 92 for more information.

---

When monitoring to ensure that branding or other elements do not overlay essential text or video action, use the PICT menu to select a Safe Action and Safe Title graticule. The Safe Action Area is the maximum image area within which all significant action should be contained, while the Safe Title Area is the maximum image area within which all significant titles should be contained. You can select standard or custom safe area graticules.

To display safe area graticules overlaid on the display, use the menu to switch up to four Safe Area graticules settings to **ON**.

---

**NOTE.** Select and/or define these graticules globally in the **Graticules** submenu of the **CONFIG** menu. You can set the **Safe Graticule Standard** and define dimensions and offsets for custom **Safe Graticules**. See **To Monitor for Safe Area Compliance** on page 95 for more information.

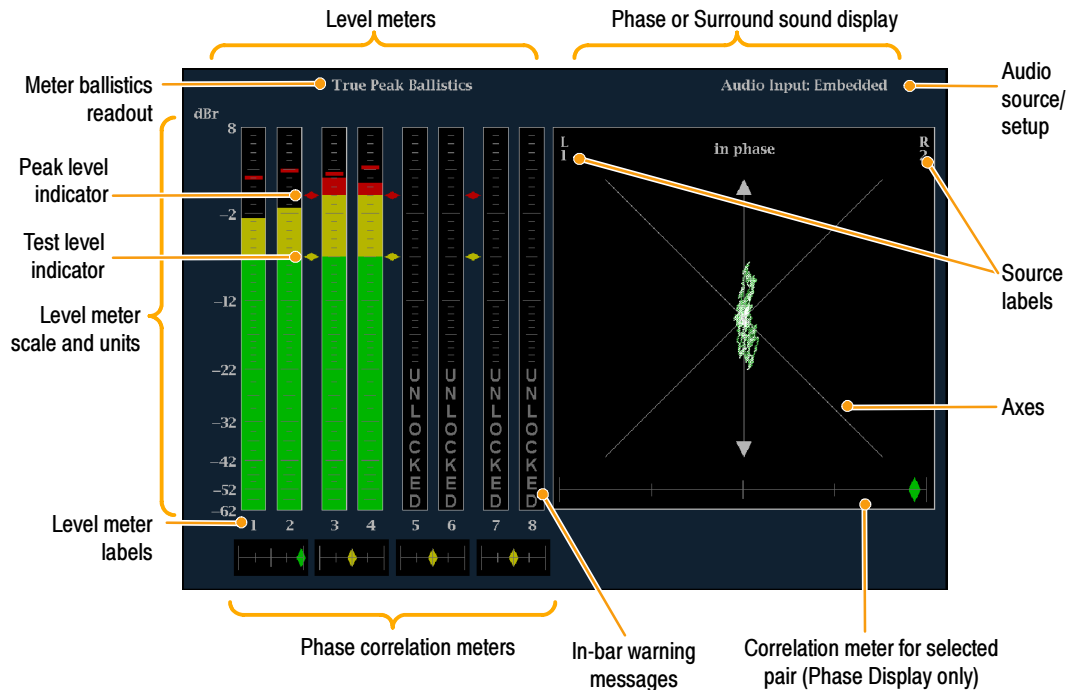
---

## Audio Display

Pressing the **AUDIO** button brings up the 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. If the Dolby Digital (option DD) or Dolby E (option DDE) option is installed, you can display Surround Sound in the right part of the Audio Tile, instead of the phase plot. See the figure that follows.

## Display Elements



## Element Descriptions

Element	Description
Level meters	Can include Dolby channels 9 and 10 if Dolby options are present.
Phase or Surround display	Selects between the Phase display, where the phase of a selected pair of channels is plotted against an XY or sound-stage plot, and the Surround Display, where all the channels levels display in positions matching their place in a surround-sound listening environment.
Audio source/setup	Displays selected audio input and related setup information, such as Listening Mode when in Surround display.
Level meter labels	Identifies the signal in each meter bar. The labels vary according to whether the audio sources to the level meter bars are normal channel pairs, surround channels, or Dolby sources (the Dolby source labels include Dolby type).
Level meter ballistics read-outs	Displays the selected dynamic response characteristic.
Axes	Shows the orientation of the two audio signals when displaying phase; shows the orientation and amplitudes of the sound field when displaying surround sound. (Axes are selectable for an XY or Soundstage plot.)

Element	Description
Phase correlation meters	Displays the phase correlation between the two-channel bars under which it appears. The meter of the pair selected for the Phase display also appears in the Phase display.
Test level and Peak program level indicators	Indicate, as diamond-shaped markers between the level bars, 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 units are in dB relative to full scale (dBFS) for digital inputs and dB relative to 0.775 Volts (dBu) for analog inputs. The 0 dB mark is digital Full scale for digital inputs and 0 dBu for analog inputs. You may also set the 0 dB mark to either the Peak Program level or the Test level.

---

**NOTE.** *The surround display is described on page 78*

---

## Legacy Level Bars

Regarding the Level Bars in the Audio display, earlier-generation rasterizers shipped with audio boards that had different default mappings of the input channel pairs to the level bars. These rasterizers used a default arbitrary assignment; the current rasterizer assignment matches the order specified by the standard SMPTE 320M, reversing the assignments of the second and third pair of channels compared to earlier rasterizers.

If you apply set ups or presets that depend on the previous default assignments to current rasterizers that employ the current default assignments, you will need to modify those presets to use the new assignments. Alternatively, you could swap the inputs at the back of the rasterizer. You can also change the input to bar mapping in the CONFIG menu to any order that you want (see *Configuring Audio Inputs* on page 71).

## Above-bar Warning Messages

The waveform rasterizer displays 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 has been at or above the specified Over Level for a time exceeding the Duration for Over setting.

## In-bar Warning Messages

The waveform rasterizer displays 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 exceeds the # Samples for Mute setting.

**SILENCE.** The signal has been at or below the specified Silence Level for a time exceeding the Duration for Silence setting.

**DISABLED.** Indicates that an audio bar is not active. This message is mainly seen with a Dolby Digital source when a listening mode is selected with a reduced number of channels.

**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.

**NO AUDIO.** Indicates that an AES or embedded input has the Non audio bit set.

**NOT PRESENT.** Indicates that an audio bar is not present in the current audio input. This can be present if a Dolby Digital input has a coding mode indicating a reduced number of channels.

**DOLBY D.** Indicates an AES or embedded input is Dolby Digital.

**DOLBY E.** Indicates an AES or embedded input is DOLBY E.

## Audio Pop-up Menu

The Audio pop-up menu enables you to select the audio input source and specify whether a phase display or a surround-sound displays appears in a subtitle to the right of the level meter display.

To display the Audio pop-up menu:

- Press and hold **AUDIO** to display the pop-up menu.

To select the source for the Audio display, select **Audio Input** in the menu and set a source. The number of available sources depends on which audio option is installed. Choosing any given input will make that audio the monitored signal regardless of which video input is active. Alternatively, you can choose **Follows video** to enable the mapping that allows changing the audio source as the video input selection is changed.

---

**NOTE.** Use the *CONFIG* menu to select the mapping of input to bar, the meter type, and the Follows video mapping of audio to video.

---

To add a 2-channel phase display to the audio tile, set **Aux Display** to **Phase Display** in the Audio pop-up menu. A phase display is also called a “Lissajous” display.

To choose the plot style of the Phase Display, select between the following two entries in the pop-up menu:

- **Sound Stage** has axes rotated at a 45 degrees.
- **X-Y** has axes that are horizontal and vertical.

To choose the pair of inputs that is displayed in the phase display, select **Phase Pair** and set a value. You can also select **Custom**, and then specify individual channels for the input pair, using the Phase Channel A and Phase Channel B entries.

To add a multi-channel surround sound display to the audio tile, set **Aux Display** to **Surround Sound** in the Audio pop-up menu. You can also enable either or both of the following entries (see page 77 for instructions):

- **Dominance Indicator.** When on, indicates the location of the dominate sound in the surround sound image using a cross-hairs pointer.
- **Surround Filter.** When set to Linear, results in a non-weighted response; when set to A-weighted, results in a response that more closely matches that of the human ear.

---

**NOTE.** The Audio Surround Sound display is courtesy of Radio-Technische Werkstaetten GmbH & Co. KG (RTW) of Cologne, Germany.

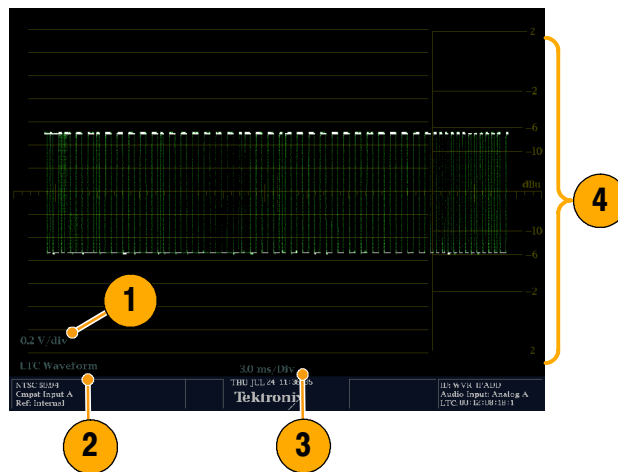
---

## LTC Waveform Display

Pressing the OTHER button brings up a display of an LTC waveform when one is present. This enables you to check the LTC amplitude and noise, and verify LTC is locked to the video. The display has two vertical scales, one in Volts and the other in dBu.

### Display Elements:

1. **Vertical Scale (V):** The vertical display scale in volts.
2. **Time Code:** when displayed, indicates that the LTC itime code that is locked to the video.
3. **Horizontal Scale:** The horizontal display scale.
4. **Vertical Scale (dBu):** The vertical display scale in dBu.



### OTHER (LTC) Pop-up Menu

The Other pop-up menu provides access to the Center Waveform function. The Center Waveform function is used to cancel any horizontal or vertical position adjustments and restore the trace to the default position.

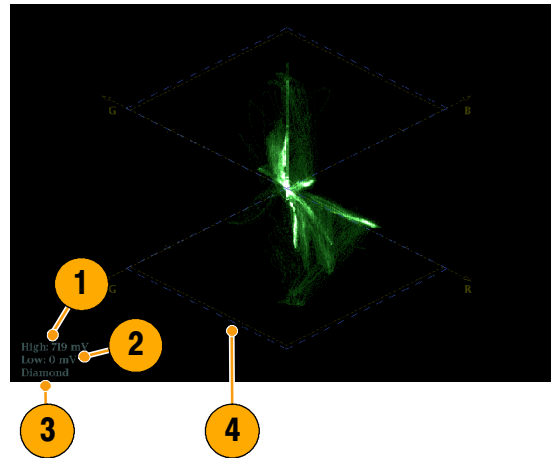
To display the Other pop-up menu, press and hold the OTHER button, and then press SEL to center the waveform.

## Gamut Display

Pressing the GAMUT button calls up the Gamut Display. The Gamut display provides three proprietary Tektronix display types 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.

### Display Elements:

1. **High threshold:** shows the currently specified high threshold (Diamond High or Arrowhead Max).
2. **Low threshold:** shows the currently specified low threshold (Diamond Low).
3. **Gamut display type:** shows the selected Gamut display type - Diamond, Split Diamond, or Arrowhead.
4. **Threshold indicators:** indicates the the threshold settings using blue dashed lines.



### GAMUT Pop-up Menu

The GAMUT pop-up menu allows you to select the type of gamut display shown in the active tile.

To display the Gamut pop-up menu:

- Press and hold **GAMUT**.

To change the display type in the GAMUT display, use the pop-up menu to select from the following displays:

- **Diamond** shows Gamut violations of the SDI input if translated to RGB color space.
- **Split Diamond** offsets the two halves of the Diamond to allow you to better see negative RGB Gamut errors.
- **Arrowhead** shows Gamut violations of the SDI input if it were translated to the Composite domain.

## Status Display

Pressing the STATUS button calls up the Status display, which provides several views of signal status. Status displays are text displays that show signal status. 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.

### Status display types available:

- 1. Video Session**—When Video Session is selected, you can control the session settings.
- 2. Audio Session**—When the Audio Session is selected, you can also control the session settings.
- 3. Auxiliary Data Status**—When selected, you can view closed-caption and V-chip related status and mute related alarms.
- 4. Dolby Status**—When Dolby Status is selected, you can view Dolby metadata for the currently monitored audio source. You can also select the Dolby E program supplying the status for Option DDE equipped instruments.
- 5. Error Log**—When Error Log is selected, the pop-up menu enables you to control the error logging settings.
- 6. Alarm Status**—When Alarm Status is selected, you can view current alarm status.

**NOTE.** Press the HELP button and then press the STATUS button to explore help topics on these status types.

The screenshot shows a multi-panel status display. The top-left panel is 'Video Session' with settings like 'Input: Cmpmt A', 'Format: Auto NTSC', and 'Signal Lock: Locked'. The top-right panel is 'Audio Session' showing 'Audio Input: Dolby 1', 'Signal Loss', and a table of channel levels. The bottom-left panel is 'Auxiliary Data Status' showing 'Closed Caption Type: EIA-608-Line 21 (VBI) Easy' and 'Transmission Signal: 0000'. The bottom-right panel is 'Dolby Audio Status' showing 'Dolby Format: Dolby D 32-bit' and various audio parameters. A 'Tektronix' logo is visible at the bottom center.

The screenshot shows two panels. The left panel is 'Error Status Log' with columns for 'Error Status', 'Timecode', 'Date', and 'Time'. It lists various errors like 'Audio Mute', 'Dolby Error (No audio)', and 'CC Service Missing'. The right panel is 'Alarm Status' with columns for 'Alarm', 'Status', and 'Additional Information'. It lists alarms like 'HW Fault', 'Cmpmt Input Missing', and 'Audio Signal Loss'. A 'Tektronix' logo is visible at the bottom center.

### STATUS Pop-up Menu

The STATUS pop-up menu enables you to mute alarms, to select the type of display that appears in the status screen, and to set options related to the selected display type.

To display the STATUS menu, press and hold the STATUS button.

## STATUS Colors

The STATUS display messages and values appear in different colors to help indicate signal status:

<b>Color</b>	<b>Description</b>
White	Identifies informational items and represents changes in the instrument state
Green	Indicates error conditions that have cleared
Yellow	Indicates a warning condition, which is a condition that might require attention but does not meet the requirements of an error condition
Red	Indicates signal information that has been found to be in an ongoing error state
Gray	Indicates alarm status state of an unenabled alarm

## Timing a Studio

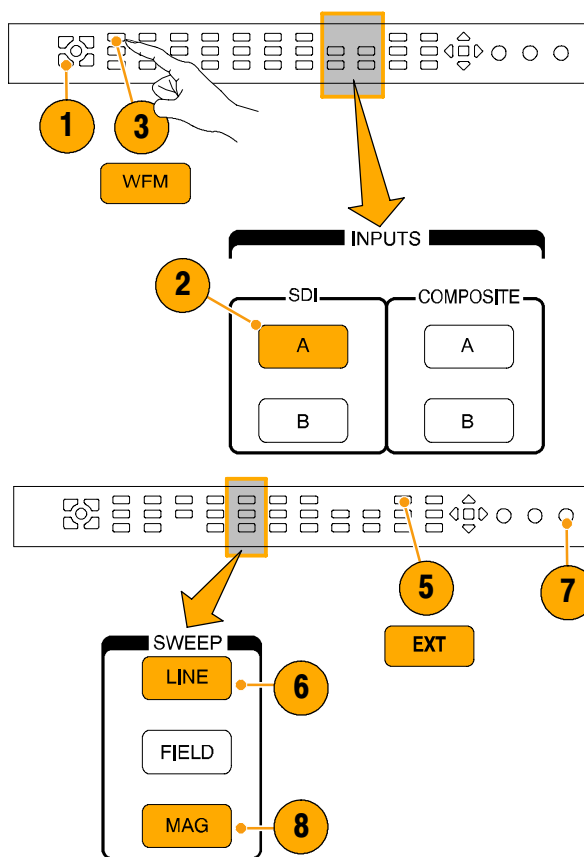
Timing a studio involves adjusting the references going to different sources so that their output feeds have the same timing when they arrive a common point, such as a production switcher. For digital systems, the timing typically only needs to be close, because most switchers have some tolerance to 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 waveform rasterizer supports multiple methods and techniques of timing a studio. All of these methods require an external reference to the waveform rasterizers. The methods and techniques follow.

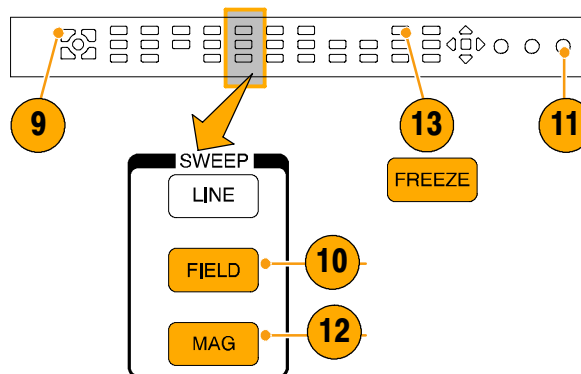
### To Use the Traditional Method

This instrument makes the traditional method of comparing Horizontal and Vertical timing easier by providing flexible tiles and the FREEZE function. To time a studio using the traditional method, you store an input as a baseline and compare signals that you time against the baseline.

1. Select a tile in which to time the active input. Select WFM.
2. Apply the first input signal to the appropriate input, terminate it properly, and select it. (See *Line Termination* on page 13 for termination information.)
3. Push and hold WFM. Select a display mode from the Pop up menu that is appropriate to the signal that you input.
4. Apply the house reference signal to the external reference input, terminating it properly.
5. Press **EXT** to select External Reference mode. (Connected to the house reference.)
6. Put the selected tile in line mode.
7. Use the **HORIZONTAL** knob to center the sync edge or the SAV pulse. (If using the SAV pulse, turn off Striping EAV/SAV/ANC in the SDI Input settings of the CONFIG Menu.)
8. Press **MAG** to increase the timing resolution.



9. Select a second tile.
10. Press **FIELD** to put a second tile in field mode, choose an appropriate waveform mode.
11. Use the **HORIZONTAL** knob to center the vertical interval.
12. Press **MAG** to increase the timing resolution.
13. Press **FREEZE** save the waveform as a baseline.
14. Apply an input that needs to match timing of the first input.
15. Adjust the timing offset of the signal being timed to match the timing to the saved baseline.
16. Repeat steps 14 and 15 for any other required signals.



**NOTE.** Use the Cursors as markers or to measure timing differences between sources.

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.

## To Use the Timing-Display Method

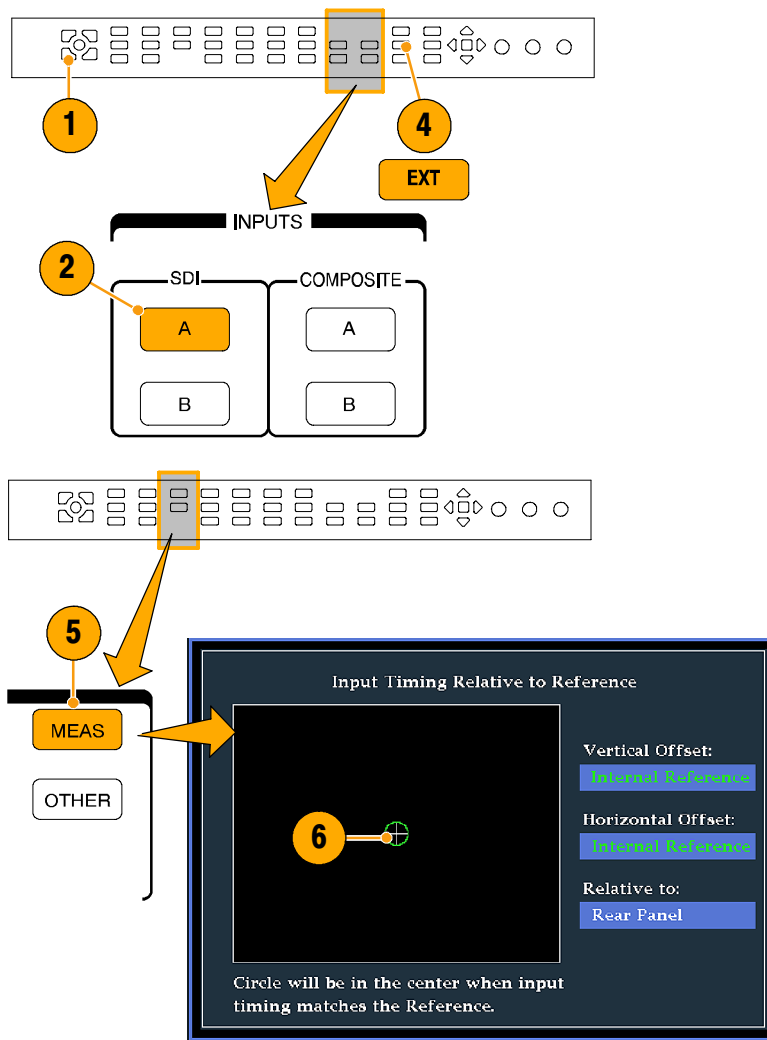
The Tektronix proprietary Timing Display (patent pending) provides a quicker, easier to use measure of the timing of an input relative to the external reference:

- The rectangular display automatically scales to match the input signal. For progressive signals the display represents one field, for interlace signals the display represents one frame, and for composite inputs the display represents one color frame.
- The cross-hair in the center represents zero offset, and the circle represents the timing of the input signal. Lines of advance or delay are shown as vertical displacement, while timing errors of less than one line are shown as horizontal displacement. If the input is at the same time as the reference, then the circle will be centered on the cross-hair.
- The timing offset is also shown numerically as lines and micro-seconds of advance or delay in the boxes at the right side of the display.
- For input and reference signals with closely related frame rates, there is only one timing relationship, so a single circle is shown on the display to indicate the timing offset of the input signal.
- For input and reference combinations with more complex relationships, multiple circles are displayed to indicate all the possible interpretations of the timing offset, with the one that is closest to zero shown with emphasis. The numerical readouts will correspond to the timing indicator circle with the emphasis.

- The Relative to: box indicates the chosen zero point for the timing display. The default is Rear Panel. In this mode, the offset is zero when the input and reference are at the same timing at the rear panel of the waveform rasterizer. The other choice is Saved Offset. In this mode, you can save the timing from one signal and then display the timing relative to that saved offset.

**To use the Timing display to time a signal to a reference:**

1. Select a tile in which to time the active input.
  2. Apply the input signal to be timed to the appropriate input, terminate it properly, and select it. (See *Line Termination* on page 13 for termination information.)
  3. Apply the house reference signal to the external reference input, terminating it properly.
  4. Press **EXT** to select External Reference mode.
  5. Press **MEAS** to select the Timing display for the tile selected in step 1.
  6. If only one circle is displayed, adjust the timing offset of the black generator to match the timing to the external reference. Adjust for a perfect coincidence of the circle around the reference target (circle turns green at coincidence) and null values of the vertical and horizontal timing readouts.
  7. If multiple circles are displayed, the timing is complex, and you must choose the one you want. The measurement that is closest to zero offset is displayed with emphasis and appears in the readouts.
- NOTE.** For discussion on complex timing displays, see *Timing Displays for Simple Versus Complex Timing* on page 45 for more information on this display and its elements.
8. Repeat step 6 or 7 for any other signals.





**NOTE.** As you adjust timing, the circle representing the input timing may jump occasionally. This is 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.

## Usage Notes

- The resolution of the timing display for Composite and SD signals is one 27 MHz clock cycle or 37 ns. For HD signals, it is one clock at 74.25 MHz, which equates to about 13.5 ns. To get the greater accuracy needed for a composite signal, first use the timing display to get close, then use a vector display for the final burst phase alignment. Since the waveform rasterizer can display both the timing display and a vector display simultaneously (each in its own tile), this process can still be easy and quick.
- For composite signals the definition of time aligned is obvious but for an SDI input relative to an analog reference the situation is more complex. For the timing display, the definition of zero offset on an SDI input uses the methodology described in SMPTE RP168. This method specifies the SDI signal will be converted to analog. The converted analog signal is then compared to the analog reference. For the conversion, a D/A converter with delay of about three microseconds is used.
- In the relative to rear panel mode, this three microsecond conversion delay is accounted for in the displayed offset. In the Relative to Saved Offset mode, it has no effect.

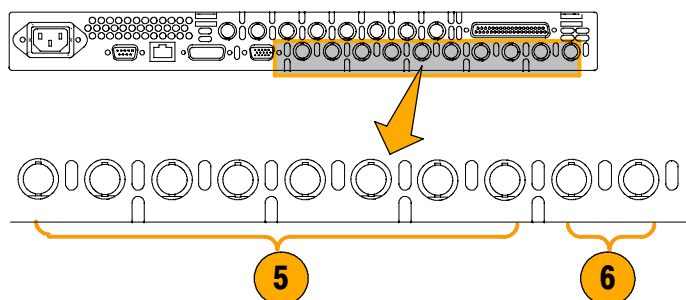
## To Time Multiple Inputs to a Router

You can also use the Relative to: function to set the offset between a master signal and a reference signal as the zero-point reference for time-down applications. The **Relative to:** box indicates the chosen zero point for the timing display:

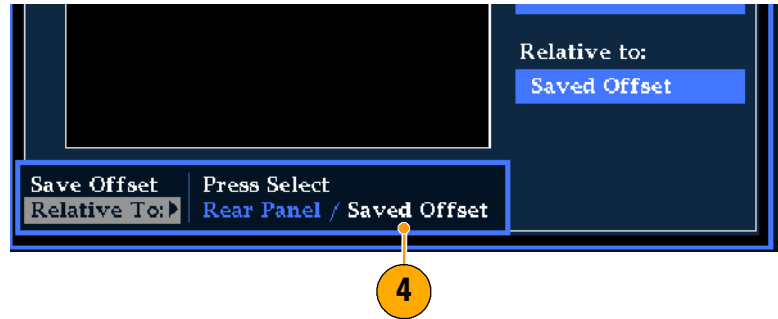
- **Rear Panel.** In this mode (default), the offset is zero when the measured signal input and reference are at the same timing at the reference at the instrument rear panel. This setting was used in the Timing Display Method procedure.
- **Saved Offset.** In this mode, you can save the timing from a master signal relative to the reference as the zero point offset. Then route other inputs and measure relative to this saved offset.

### To time the inputs to a router:

1. Perform steps 1 through 5 of the procedure starting on page 58, with the qualifications described in steps 2 and 3 that follow.
2. Route the signal you want as the master to the appropriate input, SDI or Composite, and terminate properly.
3. Route the reference signal to the reference input and terminate appropriately.



4. Save<sup>1</sup> the timing offset for the master input (**MEAS > Save Offset > Press Select**) and select **Relative to: Saved Offset** mode from the pop-up menu.
5. Now select other inputs to the router to be connected to the waveform rasterizer. For each input the relative timing will be displayed.
6. Adjust the timing offset at the master sync source to time down the inputs to the router to match the master.



<sup>1</sup> You cannot save the timing offset if either the input or reference is missing or unlocked. You also cannot save a reference when in internal mode. Saving an offset in these conditions would lead to misleading results so it is not allowed by the instrument. A warning message will appear on the screen if you attempt to save the offset when it is not allowed.

## Usage Notes

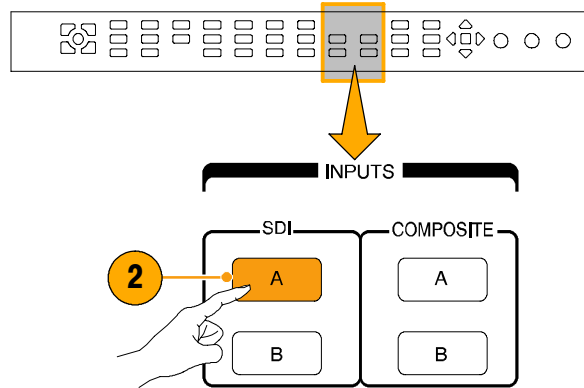
- The resolution of the timing display is one 27 MHz clock cycle or 37 ns, for Composite and SD video. To get the greater accuracy needed for a composite signal, first use the timing display to get close, and then use a vector display for the final burst phase alignment. Since these two displays can be present simultaneously in separate tiles, this process is still easy and quick.
- For composite signals, the definition of time aligned is straight forward, but for an SDI input relative to an analog reference, the situation is more complex. For the timing display, the definition of zero offset on an SDI input assumes the SDI signal will be converted to composite. The converted composite signal is then compared to the analog reference. For the conversion, a half-band filter with a 33 clock-cycle delay and an analog reconstruction filter are assumed. This conversion introduces a delay of about 3  $\mu$ s.
- In the **Relative to: Rear Panel** mode, this 3  $\mu$ s conversion delay is removed from the measured offset before the display is generated. In the **Relative to: Saved Offset** mode, it has no effect.
- This timing relationship between input and reference is also compatible with the waveform mode. That is, if you have zero timing on the Timing display and change from internal to external reference, the displayed waveform will not shift position.
- When timing analog composite signals, adjust system phase with the Vector display. The Vector display is described on page 42.

**NOTE.** If you have an input and reference combination that requires multiple timing indicator circles, then it can be misleading to compare timing offsets between multiple inputs. Because the timing display chooses the smallest of the possible timing offsets, if a large timing difference exists between two inputs, then they may not be matched. This problem will also occur using traditional timing methods unless one uses something similar to the SMPTE318 10 field flag to identify a specific sub-multiple of the reference.

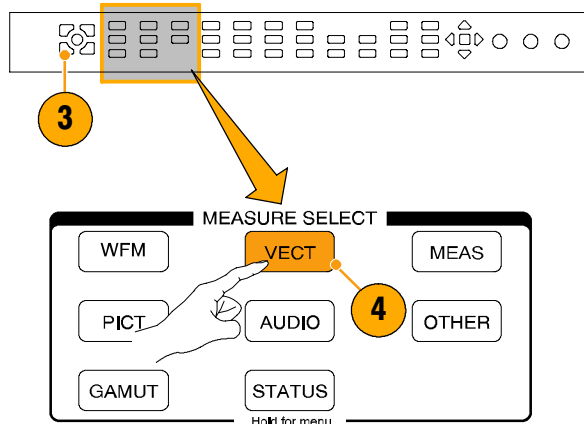
## Checking Chroma/Luma Delay (Lightning Display)

The Lightning display can be used for interchannel timing measurement. If the color-difference signal is not coincident with luma, the transitions between the color dots will deviate from the center mark of a delay scale. The amount deviated represents the relative signal delay between luma and color-difference signal.

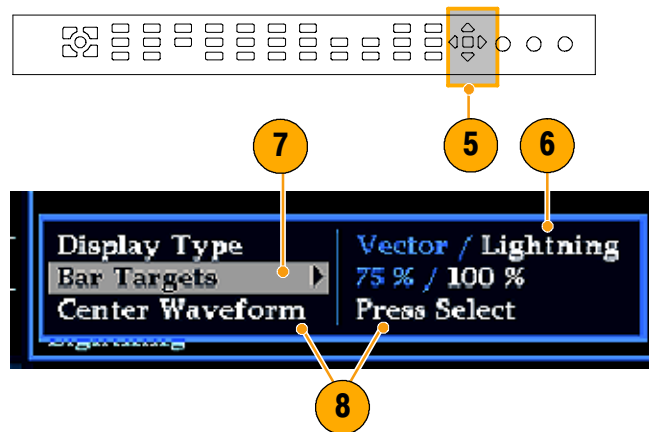
1. Connect a signal containing color bar information, terminating the signal properly (see *Line Termination* on page 13 for termination information).
2. Select the input corresponding to the signal connected.



3. Select a tile.
4. Press and hold the VECT button to display the signal in a tile and pop up the Vector menu.



5. Use the Selection Keys and Button to set the menu in the steps that follow.
6. If Display Type is Vector, select Lightning in the menu.
7. Set Bar Targets to match your input signal.
8. Select Center Waveform, and press SEL if you want center your waveform.
9. Press the VECT button to close the menu.

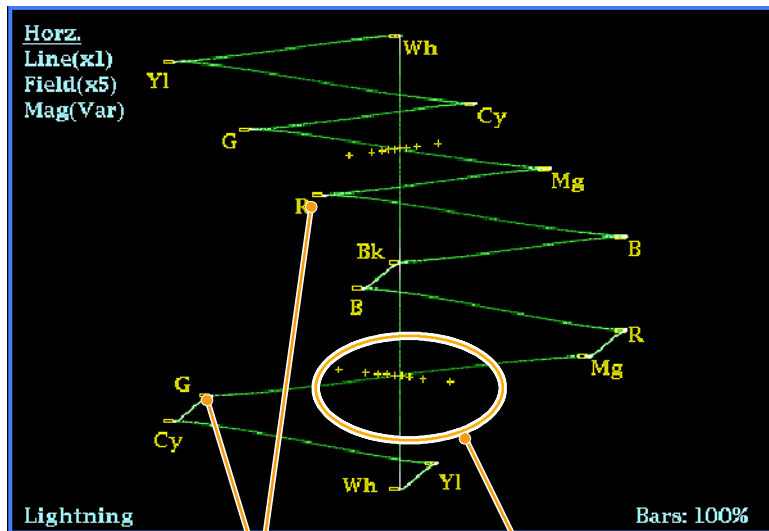


10. Determine where transitions intersect the delay scales and derive the timing error in nanoseconds, as deflected from center mark:

Deflection	SD	HD
0 marks	0 ns	0ns
+/-1 mark	20 ns	2 ns
+/-2 marks	40 ns	5 ns
+/-3 marks <sup>1</sup>	74 ns	13.5 ns
+/-4 marks <sup>2</sup>	148 ns	27 ns

- 1 1 Luma sample
- 2 1 Chroma sample

- The center mark of the nine marks spanning each green-magenta transition is the zero error point.
- Alignment to a mark towards black means the color-difference signal lags with respect to luma.
- Alignment to a mark towards white means the color-difference signal leads the luma signal.
- The upper half of the display measures the Pb to Y timing; the bottom half measures the Pr to Y timing.



Green-to-Magenta transitions      Delay scale

## Checking Gamut

Signals that are legal and valid in one signal representation may not be legal 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.

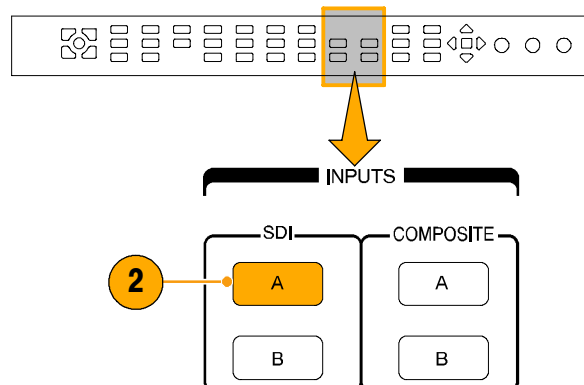
The waveform rasterizer supports multiple displays and alarms to allow detecting out of gamut signals. The flexible tile display allows you to simultaneously view several of the gamut measurements to learn which is most appropriate for a given application. The displays are:

- 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

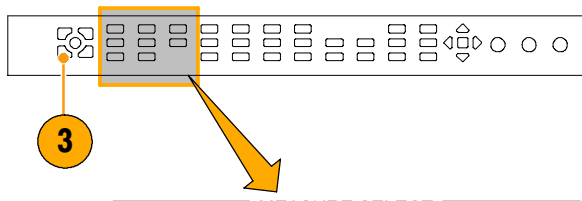
Diamond, Split Diamond, and Arrowhead have adjustable thresholds. If the signal goes outside the area defined by the thresholds, the signal is out of gamut. If these limits are exceeded then the waveform rasterizer can generate alarms if configured to do so. For composite waveforms, the legal limit is simply the maximum level allowed for the combination of luma and chroma. This limit depends on the application. For example, a video tape machine may be able to record and play out signals with higher luma and chroma components than a transmitter..

## Setting up for Gamut Checks

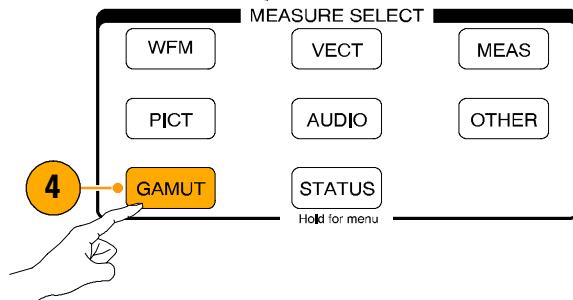
1. Connect a video signal and terminate it properly.
2. Select the input corresponding to the signal connected.



3. Select a tile.

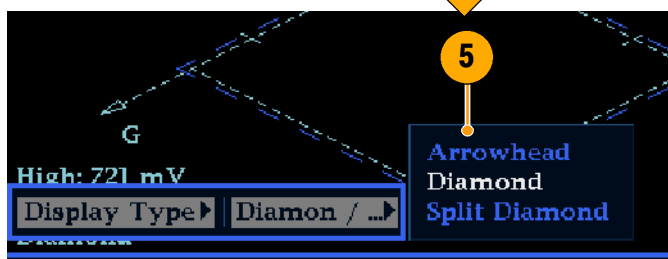


4. Press and hold the GAMUT button to display the signal in a tile and pop up the GAMUT menu.

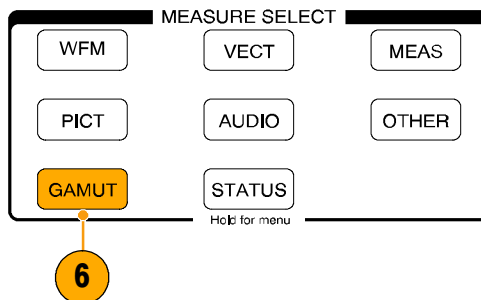


5. Use the Arrow Keys and SEL Button to set the menu to one of these three gamut displays:

- Diamond- use to detect, isolate, and correct RGB component gamut errors.
- Split Diamond- use to reveal hard-to-find black gamut errors.
- Arrowhead - use to detect composite gamut errors, without employing a composite encoder.



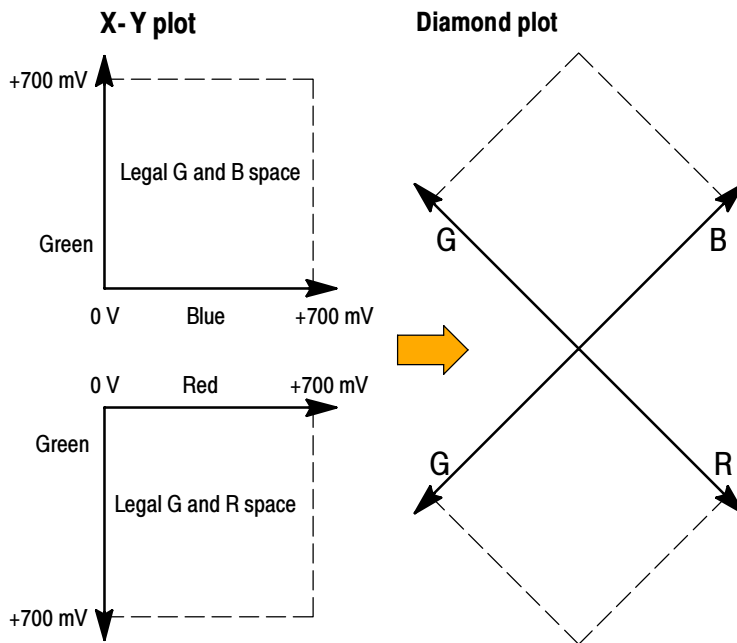
6. Press the GAMUT button to close the menu.



## Checking RGB Gamut

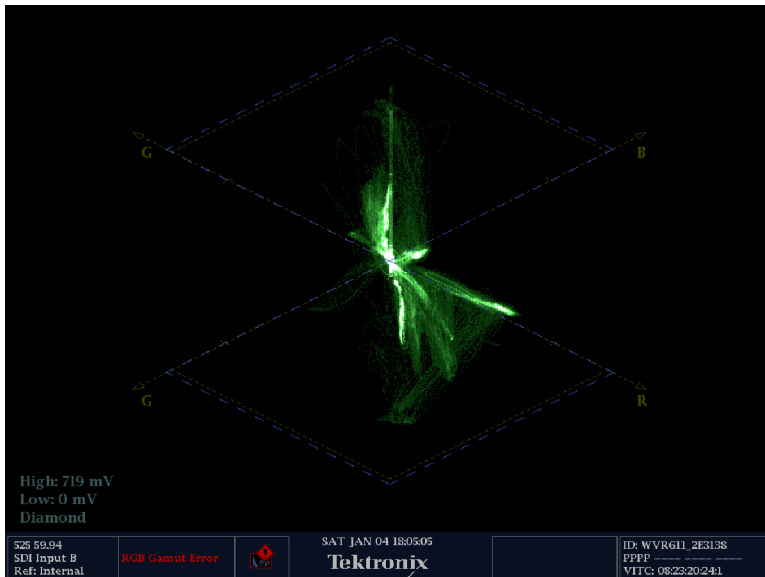
The Diamond display effectively shows how the R, G, and B signals relate, making it a good tool for detecting gamut errors. The waveform rasterizer converts the  $Y$ ,  $P_b$ , and  $P_r$  components recovered from the serial signal to R, G, and B to form the Diamond display. To predictably display all three components, they must lie between peak white, 700 mV, and black, 0 V.

For a signal to be in gamut, all signal vectors must lie within the G-B and G-R diamonds. Conversely, if a signal 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.



1. Perform the Checking Gamut procedure that starts on page 63, selecting Diamond in step 5.
2. Compare the signal to the display to determine out of gamut components, noting the following:
  - 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.

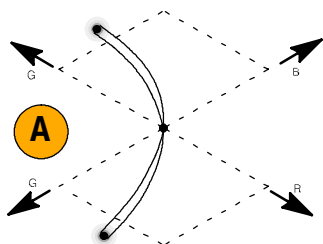
See the following step for some sample out-of-gamut signals.



3. Consider the following examples when evaluating for out of gamut components:

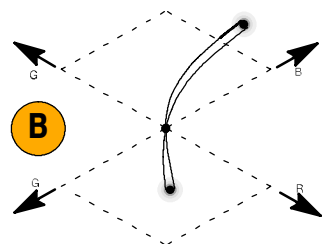
**A Example A:**

R - Ok  
G > 700 mV  
B - Ok



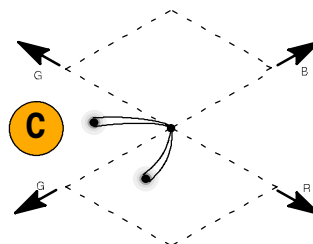
**B Example B:**

R - Ok  
G - Ok  
B > 700 mV



**C Example C:**

R - Ok  
G - Ok, 350 mV  
B < 0 mV



### Usage Notes

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.

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.

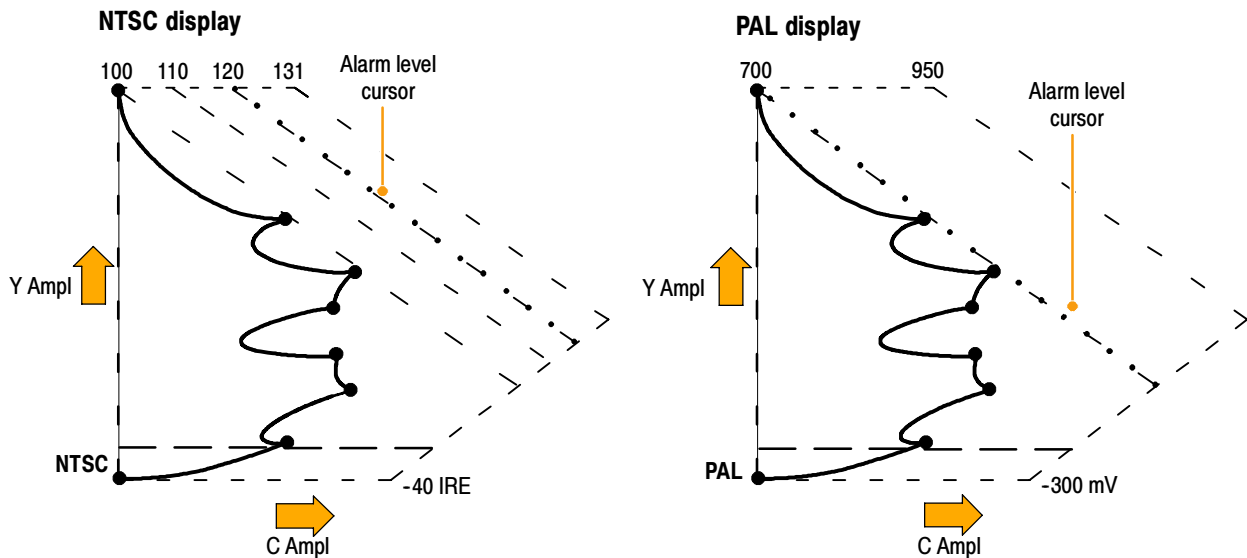
To isolate gamut bright-ups, try the following:

- Use LINE SEL to select individual lines
- Use PICT to examine the rasterizer signal
- Use Arrowhead % setting (CONFIG menu, Gamut Thresholds section) to specify a percentage of the screen for which to ignore for gamut violations.

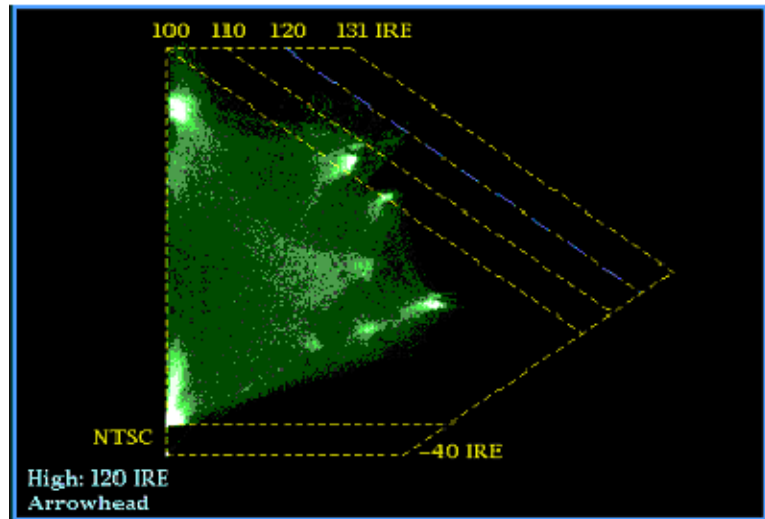


## Checking Composite Gamut

The Arrowhead gamut display plots luminance (Y) against chrominance (C) to check if the composite signal adheres to standard gamut. 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.



1. Perform the *Checking Gamut* procedure on page 63, selecting Arrowhead in step 5.
2. Compare the signal to the display to determine out of gamut composite components, noting the following:
  - 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.



### Usage Notes

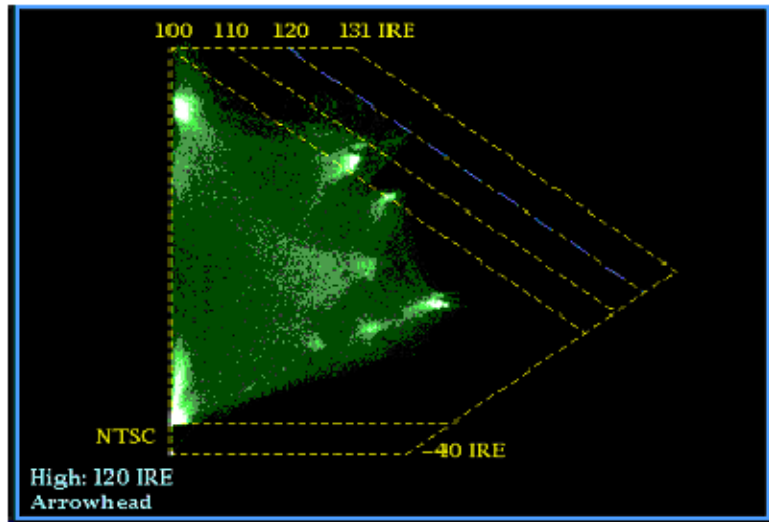
- To adjust the IRE level limits, do the procedure *To Adjust Gamut Limits* on page 70.
- To automate this check, do the procedure *To Automate Gamut Checks* on page 68.

## Checking Luma Gamut

Luma limit thresholds can be configured for identifying luma exceeding threshold limits. They apply to both the incoming SDI and to the arrowhead representation of the SDI input as a composite signal. By defining these levels in percent, they automatically account for the presence or absence of setup.

The thresholds are affected by your choice of set-up or no set-up for the Arrowhead display.

1. Perform the *Checking Gamut* procedure on page 63, selecting Arrowhead in step 5.
2. Compare the signal to display to determine out of gamut luminance. Note the following:
  - The adjustable thresholds are indicated by the dark blue horizontal graticule lines.
  - The thresholds are defined in terms of percent of full scale.
  - The range for the Upper limit is 90% to 108%.
  - The range to the Lower Limit is -6% to +5%.

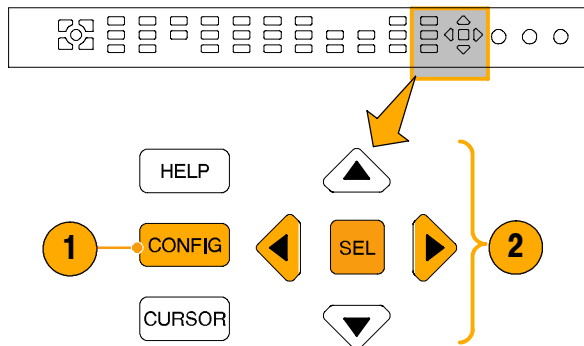


Another useful Arrowhead function is a measure of how well the active video signal is using the dynamic range of video channel. A properly adjusted signal should be centered in the arrowhead graticule and have transitions that approach all the limits.

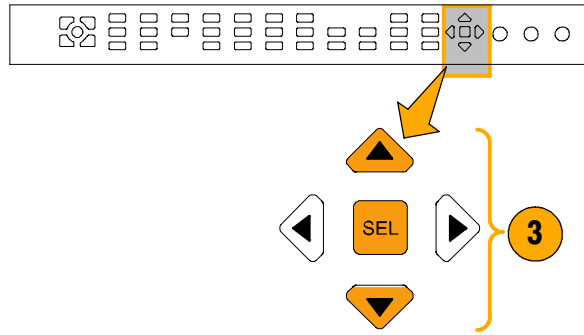
## To Automate Gamut Checks

You can use alarms to automatically monitor for out of gamut conditions:

1. Press the CONFIG button to display the Configuration menu.
2. Use the left/right arrow keys and SEL button to select Alarms, and then Video Content.



- Use the up/down arrow keys to move to each the alarm that you want to set. Press SEL button to toggle the alarm on (X) or off.



- When you have configured the Alarms as you want them, move to the Select here... box and select it.

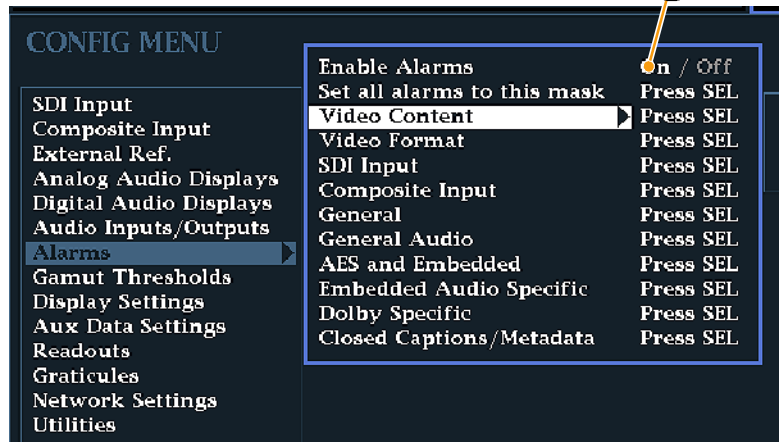
VIDCONTENT	Screen Text / Icon	Logging	Beep	SNMP Trap	Ground Closure
RGB Gamut	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Composite Gamut	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Luma Gamut	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Select here returns to the Config Menu

4

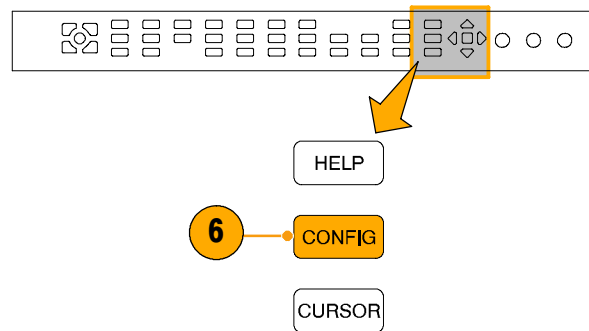
- Check that Enable Alarms is set to On in the Alarms menu before leaving the Alarms menu.

**Note.** For information on Alarms, press the HELP button while Alarms is selected in the CONFIG menu.



5

- Press CONFIG to exit menu.

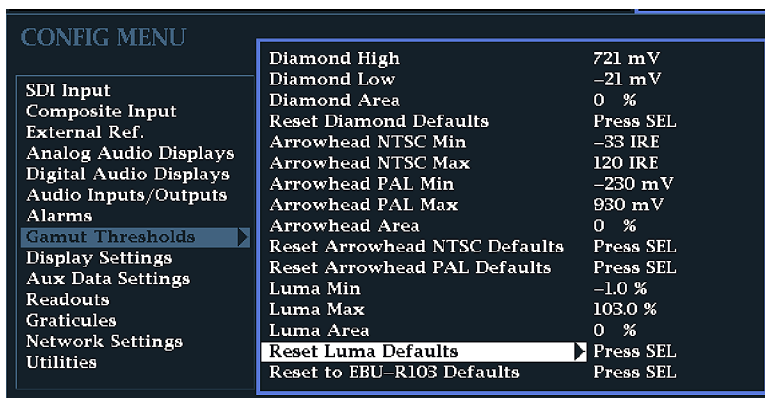
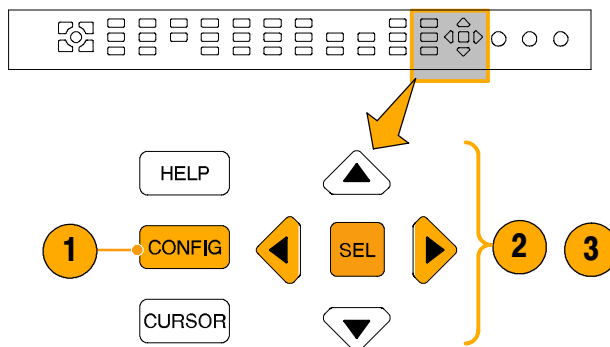


6

## To Adjust Gamut Limits

1. Press the CONFIG button to display the Configuration menu.
2. Use the left/right arrow keys and SEL button to select Gamut Thresholds.
3. Press SEL button to enter the sub-menu, and use arrow keys and SEL button (and General knob, when indicated) to select and set the various thresholds as you want them.

Note that you can also reset thresholds to defaults.



## Monitoring Audio

The waveform rasterizer provides several methods to monitor audio signals. You can measure levels, monitor phase, display phase correlation, and monitor surround-sound audio. You can specify meter ballistics and scales, set the Test and Peak Program indicator levels, and specify how phase is displayed.

**NOTE.** The audio monitoring features described in this chapter require that appropriate audio options be installed. For example, Option DS adds support for only Digital audio monitoring in embedded and AES/EBU inputs, while a Option AD equipped instrument can monitor both Analog and Digital audio in these inputs.

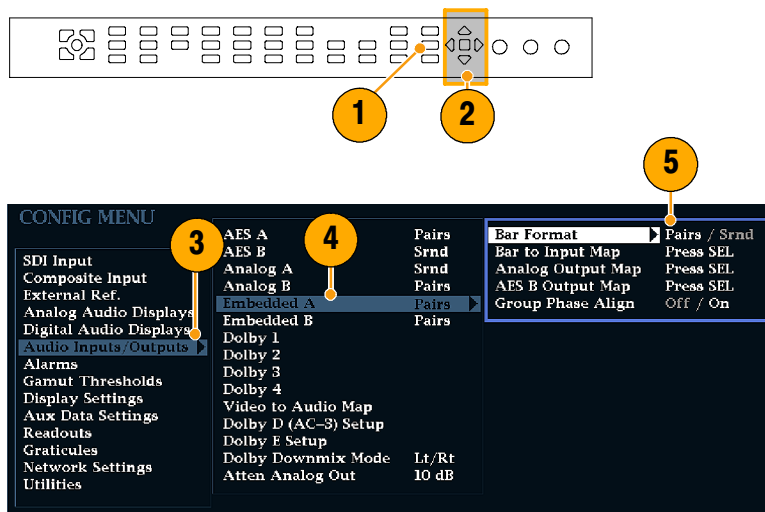
- For a list of the audio options available and the audio monitoring capabilities they provide, see Options on page 2. Note that the options listed with a prefix WVR6UP- (for the WVR6100 options) or WVR7UP- (for the WVR7100 options) support upgrades to previously purchased instruments.
- For a list of the options that are installed on your product, press the CONFIG button. In the CONFIG menu, select the Utilities submenu. The View Instruments Options entry lists the installed options for your instrument.

## Configuring Audio Inputs

The rasterizer audio inputs may need to be configured in the CONFIG menu before you use them (they come set to FACTORY defaults, which you can restore using the FACTORY front-panel button). Do this procedure (or at least check that the configuration is as you want it) before doing the procedures starting on page 73. Your setup here determines, in part, which audio-signal characteristics are displayed.

### To set up an Audio Input

1. Press the CONFIG button to display the CONFIG menu.
2. Use the Arrow keys and Sel Button to set the menu in the steps that follow.
3. Select **Audio Inputs/Outputs**.
4. Select the input to be configured.
5. Select from **Srnd (Surround)** for a 5.1- or 5.1 + 2-type display or **Pairs** for a stereo-with-SAP-and-discrete-channels-type installation.



6. Select **Bar to Input Map**, and specify which input pair should be displayed in each bar pair.
7. Specify which inputs will be allowed to generate alarms.
8. Select the box to return to the CONFIG menu.

Input Bar	Allow Alarm	Embedded 1 & 2	Embedded 3 & 4	Embedded 5 & 6	Embedded 7 & 8	Embedded 9 & 10	Embedded 11 & 12	Embedded 13 & 14	Embedded 15 & 16
L	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ls	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lfe	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lo	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ro	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Select here  returns to the Config Menu

9. Select the **Analog Output Map** in the CONFIG menu.
10. Specify which inputs (if any) are routed to the analog outputs.
11. Select the box to return to the CONFIG menu.
12. Repeat steps 4 - 11 for other audio inputs as needed.

Output Bar	Analog 1 & 2	Analog 3 & 4	Analog 5 & 6	Analog 7 & 8
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Phase Pair	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Select here  returns to the Config Menu

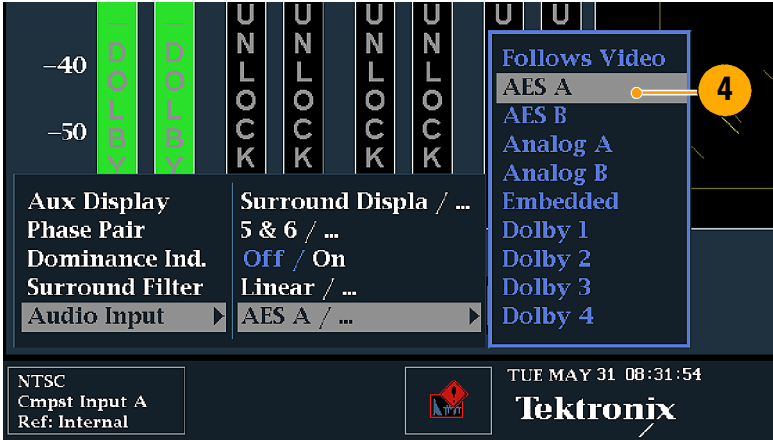
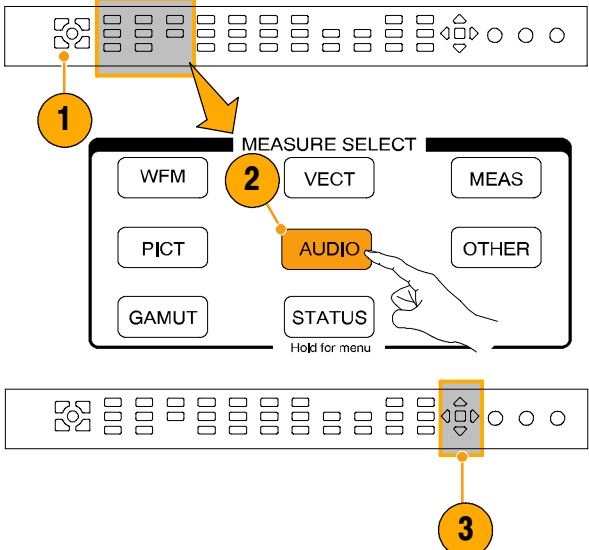
# Selecting the Audio Input

You select the audio input to be monitored from the front-panel AUDIO button pop-up menu. Note that the Audio display can appear in only one tile at a time.

- 1. Select a tile.
- 2. Press and hold the Audio button to open the Audio display in a tile and pop up the Audio menu.
- 3. Use the Arrow Keys and SEL Button to set the menu in the steps that follow.
- 4. Select **Audio Input**, and then select one of the audio input options shown.

**NOTE.** The available selections depend on the installed audio option. Selecting Follows Video selects the audio to video mapping set in the Configuration menu.

**NOTE.** If you need to configure the input that you have selected, see Configuring Audio Inputs on page 71.



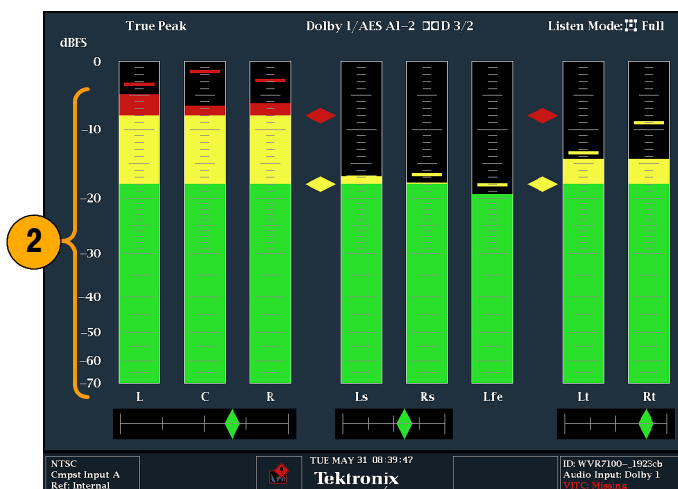
## Checking Audio Level & Phase

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.

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

### To Check Level

1. Open the audio monitor in a tile and select an input as described in *Selecting the Audio Input* on page 73.
2. Check the level meter bars for current audio levels, which are displayed according to the selected meter ballistics. Each bar displays three colors:
  - Green—Indicates audio levels below the test level.
  - Yellow—Indicates audio levels between the test and peak program level.
  - Red—Indicates audio levels above the peak program level.



### To Check Phase

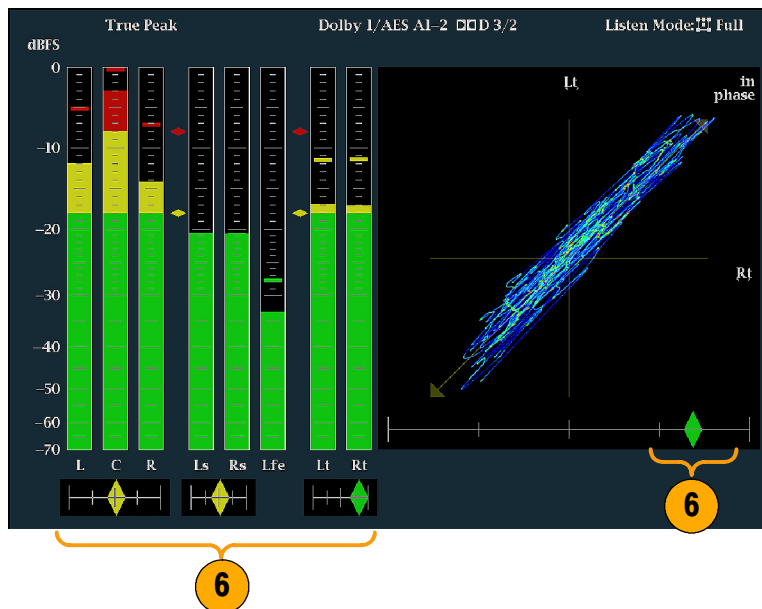
1. Open the audio monitor in a tile as described in *Selecting the Audio Input* on page 73. Use the Selection Keys and Button to set the menu in the steps that follow.
2. Select **Aux Display**, and then select **Phase Display** to turn it on.
3. Select the **Phase Style**. Choose either a **Soundstage** or **X-Y** orientation for the Lissajous signal. (See *Usage Notes* on page 75.)
4. Select the Phase Pair to be displayed. Or select **Custom**, and select independent channels using the Phase Channel A and Phase Channel B entries.
5. Set the Audio Input to match the signal that you are checking.





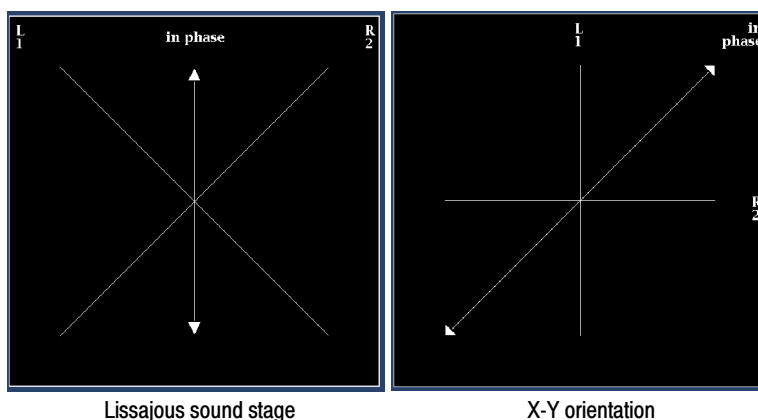
**6.** Check for Phase correlation of the signals, noting the following:

- Phase correlation meters are located under the appropriate bars and one is duplicated under the phase display.
- For correlated signals, the diamond will be green, and it will move to the right side.
- For uncorrelated signals, the indicator will be yellow and tend to stay in the middle.
- For anticorrelated signals (one goes up when the other goes down), the indicator will be red and move to the left side.



**Usage Notes**

- The Lissajous or phase display is a plot of one channel against another on an orthogonal pair of axes.
- Soundstage plots the two channels at 45 degree angles, with the mono combination appearing on the vertical axis—more like a left-right image in a studio.
- X-Y plots left-channel data on the vertical axis and right channel data on the horizontal axis, emulating the X-Y display of an oscilloscope.



- The response time of the correlation meters can be set from the CONFIG menu. The choices follow.

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

<b>Speed setting</b>	<b>Response averaging time (s)</b>	<b>Speed setting</b>	<b>Response averaging time (s)</b>
9	2.0	19	7.0
10	2.5	20	7.5

## Checking Surround Sound

The waveform rasterizer can also display the surround sound listening environment.

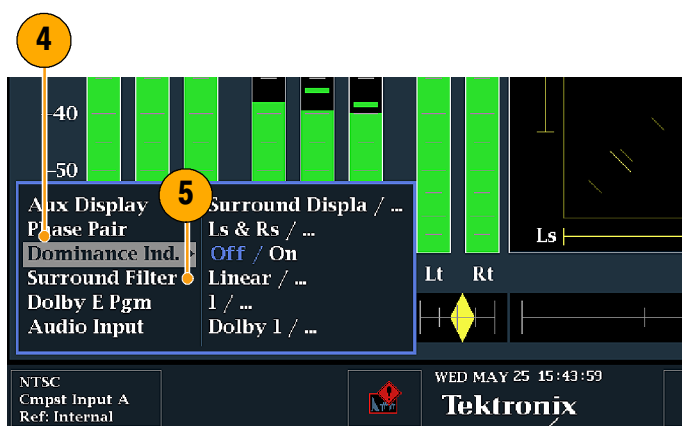
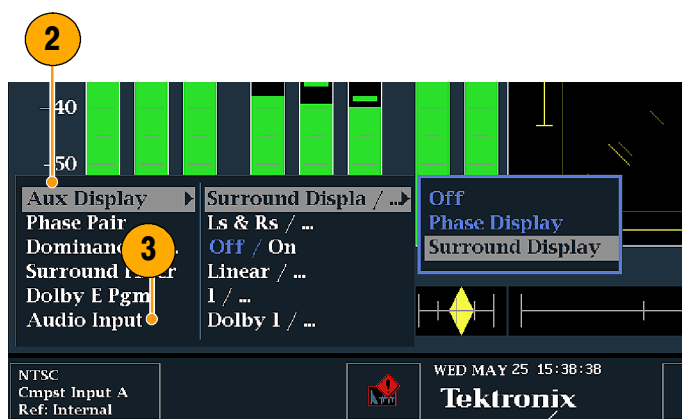
### To Check Surround Sound

1. Open the audio display in a tile and select the input containing the surround audio as was described in *Selecting the Audio Input* on page 73.
2. Select **Aux Display**, and then select **Surround Sound Display**. Press **SEL** or the right-arrow key to turn the phase display on.
3. Set the Audio Input to match the signal that you are checking.

**Note.** If you want the level bars labeled with their surround sound channel names instead of channel numbers, see *Configuring Audio inputs* on page 71, and select **Srnd** (Surround) in step 5 of that procedure.

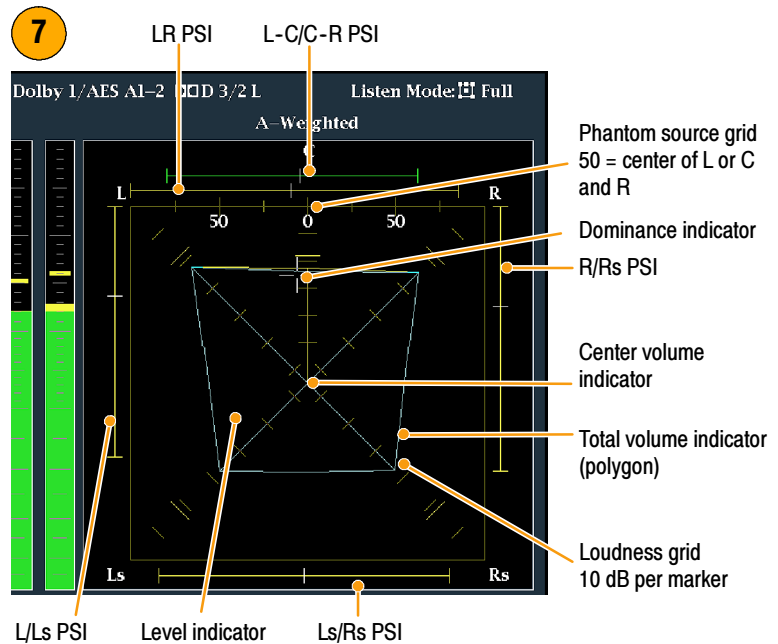
Also, you may want to set the Dolby Listening mode. See the section *Monitoring DolbyBased Surround Sound*, starting on page 80.

4. Set the surround **Dominance indicator** to **ON** or **OFF**.
5. Set the **Surround Filter** to the type preferred. A-Weighting biases the response towards that of human hearing.
6. Use the level bar display to monitor level control as described in *Check Levels* on page 74 .



7. Use the surround display to monitor relative loudness of the individual elements rendered in a surround-sound listening environment. Check the surround sound display for performance parameters and indicators shown right. The indicators are described under usage notes below.

**Note:** The Audio Surround Sound display is courtesy of Radio-Technische Werkstaetten GmbH & Co. KG (RTW) of Cologne, Germany.



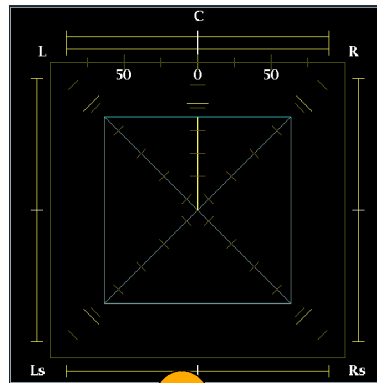
## Surround Display Elements

- The Level Indicators—indicates the audio level balance among the left (L), right (R), left-surround (Ls), and right-surround (Rs) channels as cyan lines on the Loudness Grid.
- The Loudness Grid—the ruled scale, radiating from the center, on which the level indicators register their audio level and balance. The scale has tic marks at 10 dB intervals. An additional tic mark indicates the -18 dB level. The -18 dB and -20 dB levels are typically used for aligning audio levels.
- Total Volume Indicator—the cyan polygon formed by connecting the level indicator end points, showing the total sound volume of the L, R, Ls, and Rs channels. Each connecting line will bend away from the center if the two signals have a positive correlation, will bend towards the center if the signals have a negative correlation, and will not bend if the signals are uncorrelated.
- The Center Volume indicator—displays the sound volume of the center channel as a vertical yellow bar between the L and R channels, and connects the ends of the L, C, and R audio level indicators with straight lines.
- Channel-Pair Phantom Sound Indicators (PSIs)—located on each side of the Surround Sound display, indicate the location of potential phantom sound sources formed by adjacent channels. The white tic marks on these moving bar indicators show the phantom source locations. The bar length indicates the correlation between the adjacent channels. A short-to-medium length green bar indicates positive correlation between the channels, forming a localized phantom sound source located at the white tic mark. The bar grows to full length and changes color to yellow as the correlation moves to zero, indicating a wide, non-localized sound image. The bar changes color to red for adjacent channels with significant negative correlation. For negative correlations, the ends of the PSI for the L and R channels will continue to grow at a 45° angle while the other PSIs remain at full length.
- Center-Pairs Phantom Sound Indicator—a fifth PSI at the top of the display shows potential phantom sources formed by the LC channel pair and the CR channel pair. If the L, R, and C channels all have the same signal level, the white tic mark on the bar will appear directly above the C level indicator. The white tic mark will move right or left depending on the relative balance between the three channels. A short bar to the left of the white tic mark indicates a positive correlation between L and C. The bar will grow as the correlation decreases. Like the L-R PSI, the bar will continue to

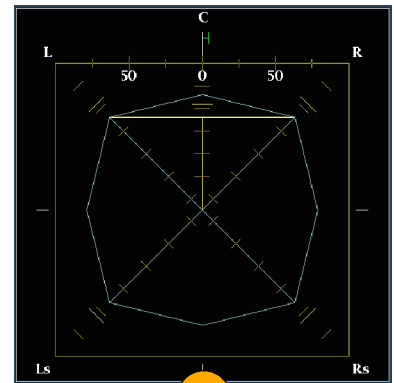
grow at a  $45^\circ$  angle for negative signal correlations. The bar to the right of the white tic mark behaves in the same way, depending on the C-R correlation. This PSI indicator uses the same color coding as the other PSI indicators.

The following displays are examples of how the surround sound waveform appears for some typical signal types.

1. Uncorrelated signals; same level in the L, C, R, Ls, and Rs channels.
2. Sine wave test tone; same level in the L, C, R, Ls, and Rs channels. All signals are in phase, creating phantom sources between the adjacent channels.
3. Same as 2, with the exception that Channel L is out of phase.
4. Surround sound program with strong center channel presence.
5. Surround sound program with weak center channel presence.
6. Monaural signal in channels Ls and Rs, creating a phantom source in the center, as in a 3-1 surround sound system.

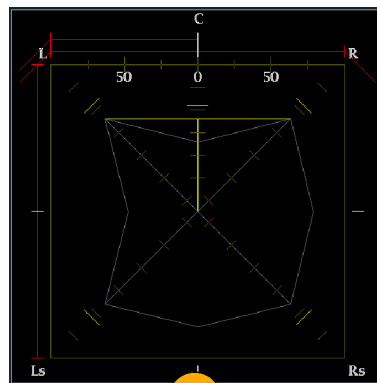


1

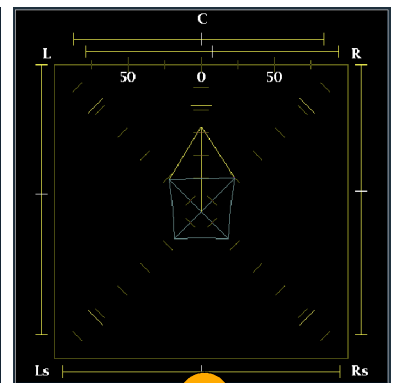


2

3. Same as 2, with the exception that Channel L is out of phase.
4. Surround sound program with strong center channel presence.

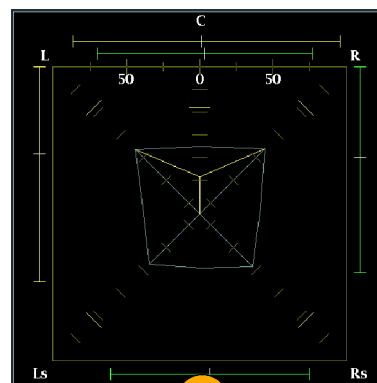


3

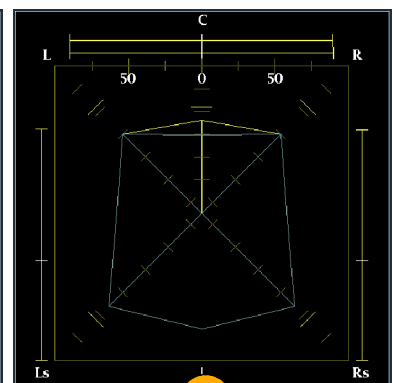


4

5. Surround sound program with weak center channel presence.
6. Monaural signal in channels Ls and Rs, creating a phantom source in the center, as in a 3-1 surround sound system.



5



6

## Monitoring Dolby-Based Surround Sound

When equipped with the proper options (see *NOTE*, below), the waveform rasterizer can decode and monitor audio signals that are based on Dolby digital surround sound formats. These formats are Dolby D (AC-3) compression, designed for distribution, and/or Dolby E compression, designed for production. You can specify and configure the Dolby input sources, measure signal levels and monitor phase between Dolby components, and display these relations in the AUDIO display.

**NOTE.** The audio monitoring features described in this chapter require that either Option DD or Option DDE be installed, depending on the feature.

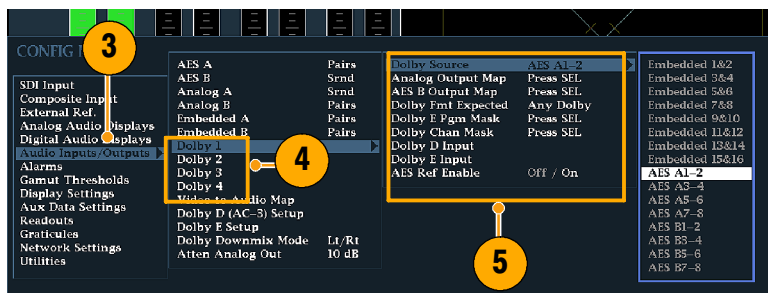
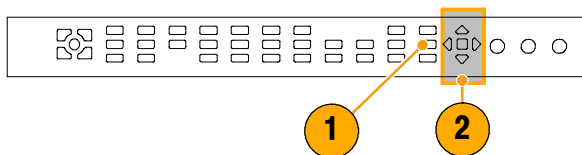
- For a list of the audio options available and the audio monitoring capabilities they provide, see Options on page 2. Note that the options listed with a prefix WVR6UP- (for the WVR6100 options) or WVR7UP- (for the WVR7100 options) support upgrades for previously purchased instruments.
- For a list of the options that are installed on your product, press the CONFIG button, and select View Instrument Options in the Utilities menu.

## Configuring Dolby Inputs

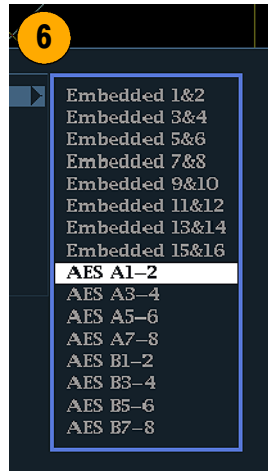
Like other inputs, the Dolby inputs that you select and monitor from the Audio Display may need to be configured before you use them (they come set to FACTORY defaults, which you can restore using the FACTORY front-panel button). Do this procedure (or at least check that the configuration is as you want it) before doing the procedures that follow starting on page 86. Your setup here determines, in part, the Dolby audio-signal characteristics that are displayed.

### To set up Dolby Input Parameters

1. Press the **CONFIG** button to display the Configuration menu.
2. Use the Selection Keys and **SEL** Button to set the menu in the steps that follow.
3. Select **Audio Inputs/Outputs**.
4. Select the Dolby Input that you want to configure (one of Dolby 1 - Dolby 4).
5. The Dolby parameters for the selected Dolby Input are now displayed; select each parameter in turn and set up as described in the following steps.



- 6. Select **Dolby Source**, and choose the embedded or AES input signal pair as the signal source to be decoded for the Dolby input selected in step 4.

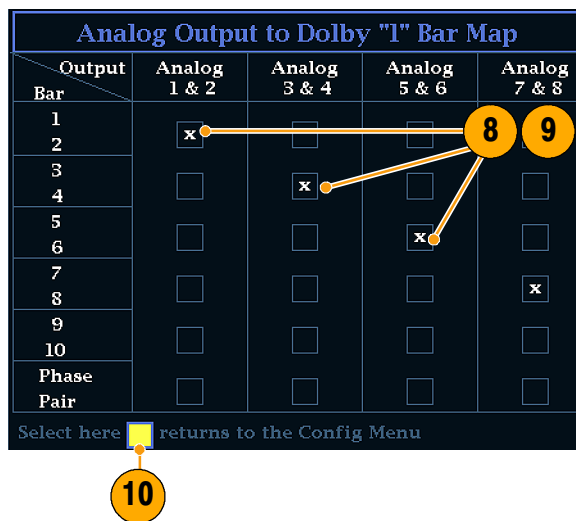


- 7. Select **Dolby Fmt (Format) Expected**, and choose the format condition that, when missing, triggers the Dolby Format Alarm.



**Note.** The rasterizer auto-selects and decodes the Dolby Format, depending on the Dolby option installed.

- 8. **Option DDE only:** Select **Analog Output Map** and specify which inputs (if any) are routed to the analog outputs in the map that appears. (Map shown right.)

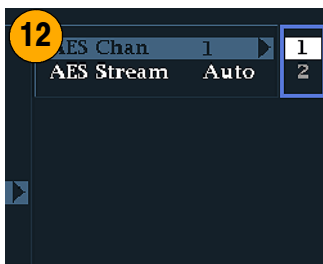


- 9. **Option DDE only:** Select the **AES B Output Map**, and assign specific bar pairs to the AES B outputs in the map that appears. (The AES B bank must be configured as outputs.) (Map similar to that shown right.)

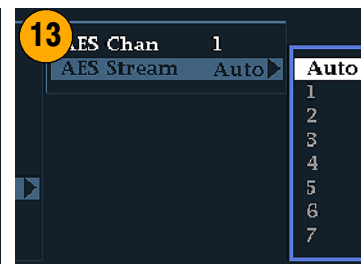
**Note.** When a Dolby input is active, channel labels (L, R, Ls, and so on) appear in addition to the channel numbers.

- 10. Select box to close maps.
- 11. **Option DD only:** Select and configure the **Output Map** (not shown) to assign a specific bar pair to the Analog and Digital Outputs. (The outputs are limited to a single pair.)

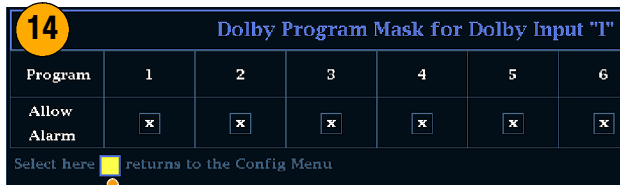
- 12. **Option DDE only:** Select **Dolby D Input**, and select the AES channel for Dolby content in which the subframes carry two Dolby streams (in Dolby Professional 16-bit mode).



- 13. **Option DDE only:** Select **Dolby D Input**, and select the stream for Dolby Content in which there can be multiple Dolby Digital streams embedded.



14. **Option DDE only: Select Dolby E Pgm (Program) Mask**, and navigate to each box for each program. Press the SEL key to toggle to Allow Alarm (X) or not (blank).



15. Select this box to close the map.



16. **Select Dolby Chan Mask**, and choose which Dolby channels (L, R, C, Lfe, and so on) can trigger alarms based on the decoded content.



17. Select the box to close the map.



18. **Option DDE only: Select Dolby E Input**, and select the program from which the downmix is derived.

**Note.** Although 8 programs are listed, the number active depends on the Dolby E Program Configuration detected in the metadata of the Dolby input. See *Audio Bar Mapping vs. Dolby E Metadata Program Configuration* on page 91.



19. Set **AES Ref Enable** to **On** or **Off**. If on, and the Dolby Source is set to an AES input, the rasterizer triggers the AES Frame Sync Alarm if the AES input is not locked to the AES reference.

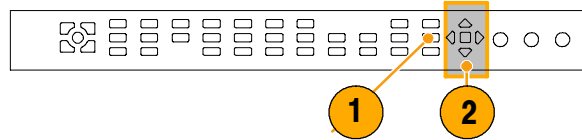


20. Repeat steps 4 - 19 for other Dolby inputs as needed.

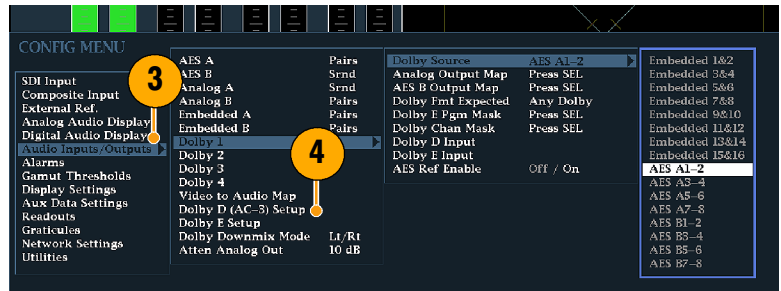


**To set up Dolby Global Parameters:**

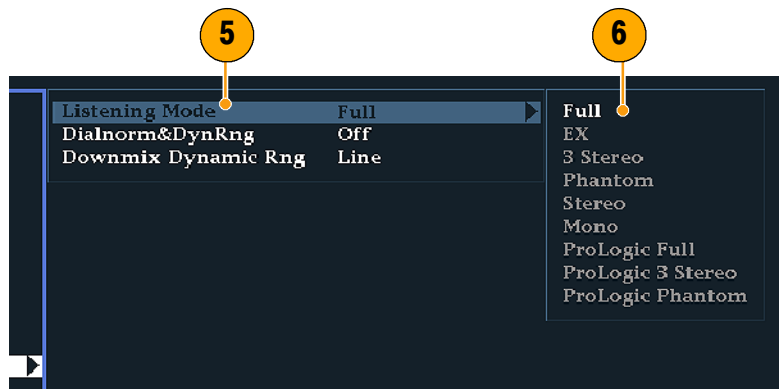
Do the following steps to set parameters that apply to all four Dolby inputs:



1. Press the CONFIG button to display the Configuration menu.
2. Use the Selection Keys and Sel Button to set the menu in the steps that follow.
3. Select **Audio Inputs/Outputs**.
4. **Option DDE only:** Select **Dolby D (AC-3) Setup**, and make the following settings. The settings will apply to the input when Dolby D is detected for Dolby inputs.

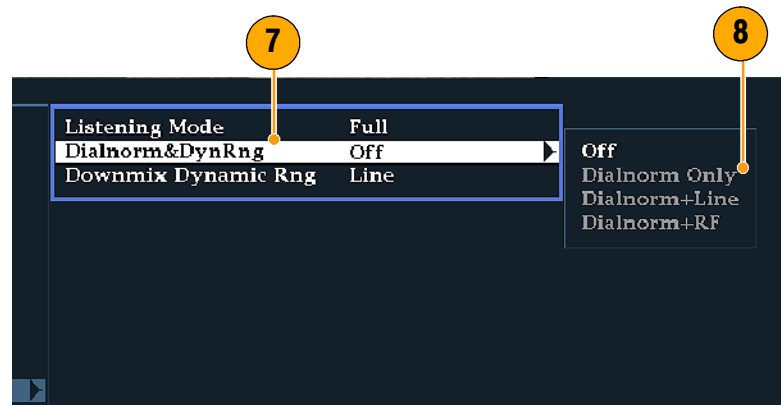


5. **Option DDE only:** Select the **Dolby D Listening Mode**, which controls how the Dolby sound channels map to the level bars and surround-sound elements in the Audio Display and outputs.
6. **Option DDE only:** Choose **Full** or a mode to downmix to. See page 88 for mode descriptions and page 89 for a list of Channel modes vs. Listening modes.

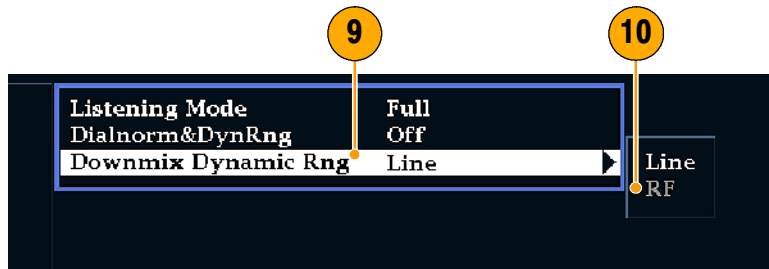


Note. Dolby content of the signal at the Dolby input must be sufficient to downmix to the mode selected or the setting has no effect.

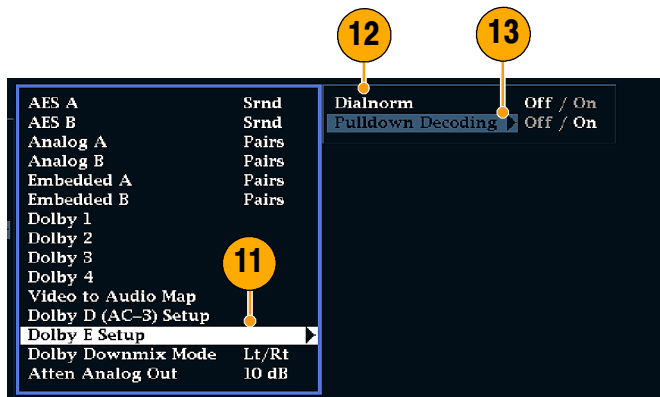
7. **Option DDE only:** Select **Dialnorm&DynRng**.
8. **Option DDE only:** Select **Off** or choose **Dialnorm Only**, **Dialnorm+RF**, or **Dialnorm+Line**. RF and Line are modes of Dynamic Range Control (compression) factors that are applied when decoding Dolby content for monitoring or output. (Option DD always is in Dialnorm+Line mode.)



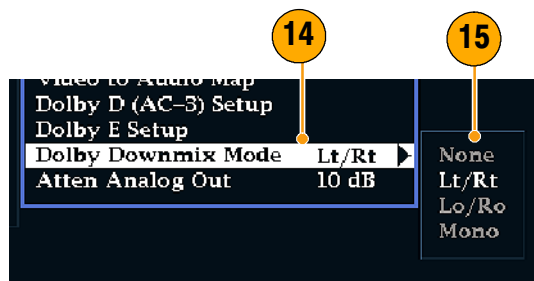
- 9. **Option DDE only:** Select **Downmix Dynamic Rng.**
- 10. **Option DDE only:** Toggle to **Line** or **RF.** These Dynamic Range Control (compression) factors are applied when downmixing to the various Dolby D Listening Modes.



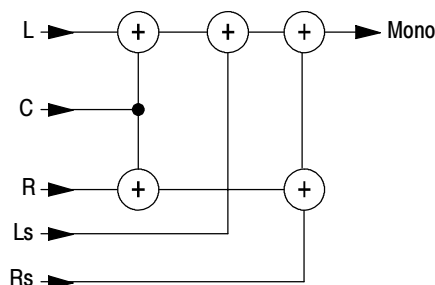
- 11. Select **Dolby E Setup.** The settings you make will apply to the input when Dolby E content is detected for the Dolby input selected.
- 12. Select **Dialnorm** and toggle to **On** or **OFF.** When On, the dialog normalization is applied to the audio bars and the analog and digital outputs.
- 13. Select **Pulldown Decoding** and toggle to **On** or **OFF.** When On, pulldown decoding is applied to the audio bars and the analog and digital outputs.



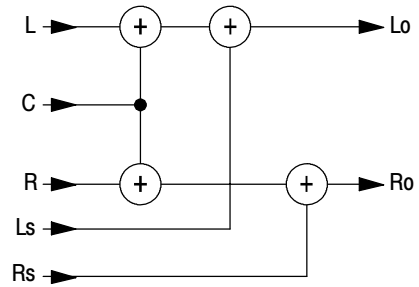
- 14. **Option DDE only:** Select **Dolby Downmix Mode.** Each downmix mode combines multiple separate audio channels into a mix that provides compatibility for users with only mono or stereo systems, or with older analog surround sound systems.



- 15. Choose one of the following modes to display as two bars in the Audio Display (Option DD is always in Lt/Rt mode.):
  - Select **None** to get no downmix.
  - Select **Mono** to get the downmix shown right.

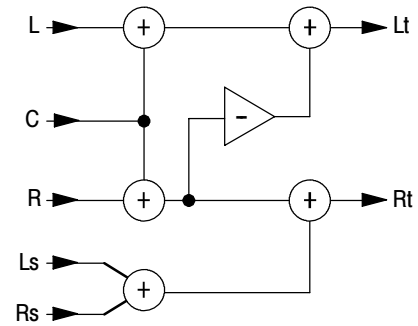


- Select Lo/Ro (Left-only/Right only) to get a standard stereo downmix.



- Select Lt/Rt (Left-total/Right-total) to get a Dolby Pro-Logic compatible stereo mix.

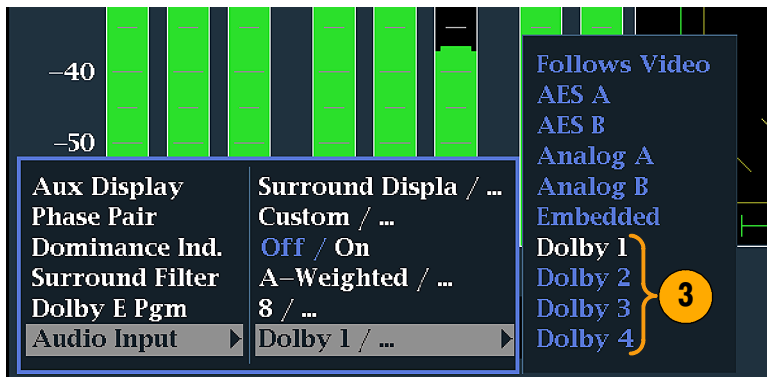
**16.** Press the CONFIG button to dismiss the CONFIG menu.



## Displaying Dolby Inputs

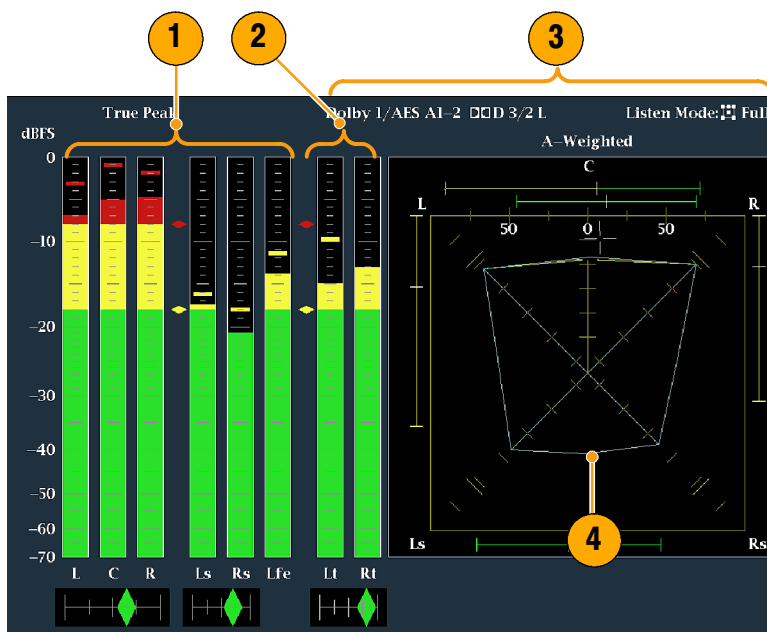
After you have configured a Dolby input (see *Configuring Dolby Inputs* on page 80, you can display its levels and other characteristics in the AUDIO Display.

1. Open the audio monitor in a tile as described in *Selecting the Audio Input* on page 73.
2. Press and hold the Audio button to pop up the Audio menu.
3. Select Audio Input, and select one of Dolby 1 through Dolby 4.



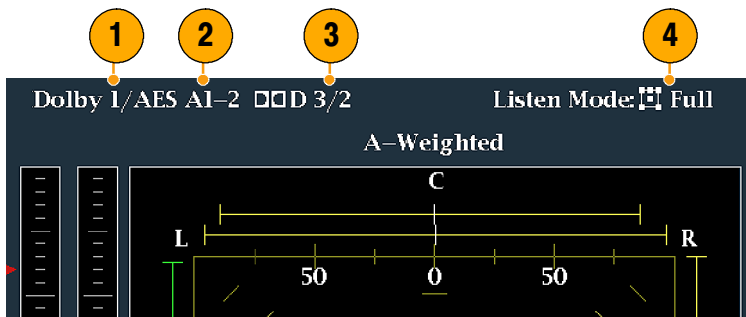
The audio display for monitoring Dolby is shown right.

1. Level bars for Dolby channels. Listening Mode selected determines channels/bars shown.
2. Levels bars for the selected Dolby Downmix mode.
3. Dolby setup information. See *Dolby Display Readout* below.
4. Dolby Listening environment display. See *Surround Display Elements* on page 78.



### Dolby Display Readout

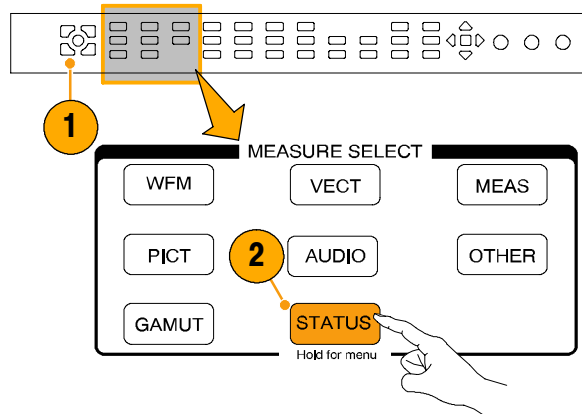
1. The selected Dolby Input.
2. The selected Dolby Source for the input.
3. The Coding (Channel) Mode
4. The Listening Mode setting



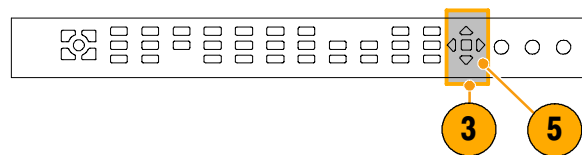
## Viewing Dolby Metadata

The Dolby-option equipped waveform rasterizer can decode and display in a Dolby Audio Status screen the metadata parameters present in the Dolby D or Dolby E bitstream that you select. To display the data for the currently selected input, do the following procedure:

1. Select a tile.
2. Press and hold the **STATUS** button to open the Status display in a tile and pop up the Status menu.



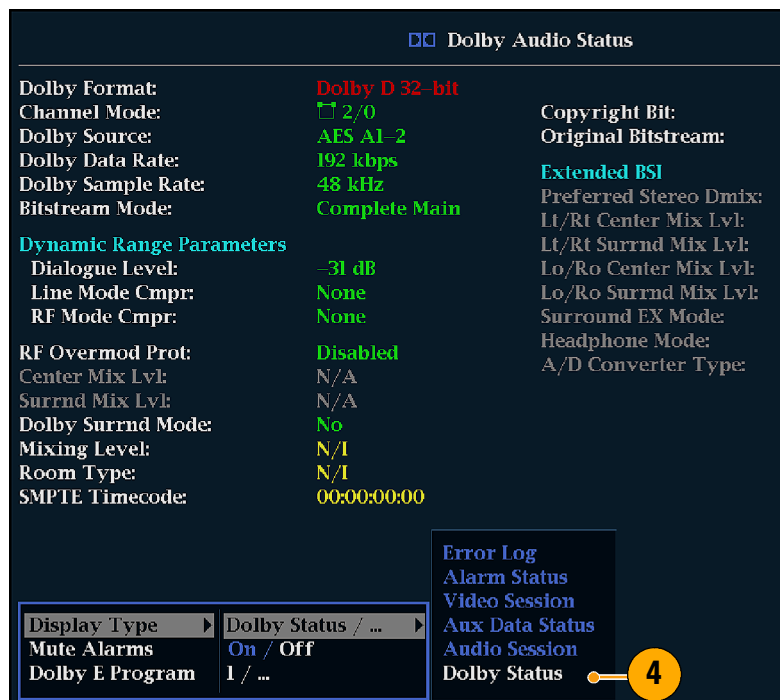
3. Use the Selection Keys and **SEL** Button to set the menu in the steps that follow.



4. Select **Display Type**, and then select **Dolby Status** as shown. Note the following:

- A Dolby option must be installed for Dolby Audio Status to display.
- The Dolby format will match that of the selected input.

5. To activate the display type selected, press **SEL**.



## Usage Notes

- The rasterizer determines the downmix based on your selection (see step 14 on page 84) and using several parameters within the Dolby metadata. For example, if the Dolby Audio Status screen (see step 4 on page 87) shows Extended Bitstream information indicating that the preferred downmix is Lt/Rt, the center channel is attenuated by -3dB and the surround channels attenuated by -6dB before they are combined into the stereo downmix.
- The listening modes (see step 5 on page 83 ) can be used to monitor any multichannel Dolby Digital audio program with a user-selectable number of channels. You can select among several basic and Pro Logic listening modes, the descriptions of which follow. Depending on the Channel Mode, these listening modes affect the content displayed on the Audio Display level bars (see *Channel Modes vs. Listening Modes* table on page 89).

### Basic listening modes

**EX** – is to be used if the two surround channels have been matrix encoded with a back channel. If the EX listening mode is selected and there are two surround channels present, the bar display will add two back channels, Lb and Rb, to create a 7.1 channel display.

**Full** – does not modify the number of channels indicated by the channel mode in either the display or the outputs.

**3 Stereo** – can be used to monitor the Dolby Digital signal with only the left, center and right channels. In this mode, if there are surround channels present, they are mixed into the left and right channels with the surround mix level attenuation.

**Phantom** – if the center channel is present it gets attenuated with the center mix level value and then added into the left and right channels.

**Stereo** – always creates a Lo/Ro downmix using the center and surround mix levels contained in the metadata. The Lfe is disabled.

**Mono** – Mono mode will always mix down to a single center channel usually by creating a Lo/Ro downmix and adding Lo to Ro. The Lfe is disabled.

### Pro Logic listening modes

Pro Logic listening modes perform different functions depending on what the source material is. If the source is a Dolby Digital stream with three or more channels, then a surround compatible Lt/Rt downmix is created and then decoded into a selectable number of channels. If the source is a 2/0 Dolby Digital stream, then these Pro Logic modes will do a Pro Logic decode to produce the number of channels requested by the listening mode. If the source is PCM, then a full Pro Logic decode is provided regardless of the specific Pro Logic mode selected.

**Pro Logic Full** – will create a Lt/Rt downmix of any input with three or more channels. This Lt/Rt downmix will then be Pro Logic decoded to produce a LCRS output where the surround channel is reduced 3dB and reproduced in both the Ls and Rs bars.

A 2/0 encoded Dolby stream will be assumed to be Pro Logic encoded already and will be Pro Logic decoded to produce a LCRS output. Again, the surround channel is reduced 3dB and reproduced in both the Ls and Rs bars.

Any PCM input will be decoded the same as a 2/0 Dolby Digital input.

**Pro Logic 3 Stereo** - will create a Lt/Rt downmix of any input with three or more channels. This Lt/Rt downmix will then use Pro Logic decoding to produce a center channel and provide LCR bars.

A 2/0 encoded Dolby stream will be assumed to be Pro Logic encoded already and will be Pro Logic decoded to produce a LCR output.

Any PCM input will be decoded to provide LCRS channels where the surround channel is reduced 3dB and reproduced in both the Ls and Rs bars.

**Pro Logic Phantom** - will create a Lt/Rt downmix of any input with three or more channels. This Lt/Rt downmix will then use Pro Logic decoding to produce a surround channel and provide LCS surround channels. This surround channel is reduced 3dB and reproduced in both the Ls and Rs bars.

A 2/0 encoded Dolby stream will be assumed to be Pro Logic encoded already and will be Pro Logic decoded to produce a LRS output. Again, the surround channel is reduced 3dB and reproduced in both the Ls and Rs bars.

Any PCM input will be decoded to provide LCRS channels where the surround channel is reduced 3dB and reproduced in both the Ls and Rs bars.

## Channel Mode vs. Listening Modes

Channel Mode	Listening Mode	Main Channel Output Function
3/2	EX	All 3/2 channels + EX decode of back surround
	Full	All 3/2 channels
	3 Stereo	3 Stereo downmix of 3/2 channels
	Phantom	Phantom downmix of 3/2 channels
	Stereo	Lo/Ro downmix
	Mono	Lo+Ro
	PL Full	LCRS from Lt/Rt downmix
	PL 3 Stereo	3 Stereo from Lt/Rt
	PL Phantom	Phantom from Lt/Rt
	2/2	EX
Full		All 2/2 channels
3 Stereo		Default to Stereo mode
Phantom		Default to Full mode
Stereo		Lo/Ro downmix
Mono		Lo+Ro
PL Full		LCRS from Lt/Rt downmix
PL 3 Stereo		3 Stereo from Lt/Rt
PL Phantom		Phantom from Lt/Rt
3/1		EX
	Full	All 3/1 channels
	3 Stereo	S mixed into L and R with smix coefficient
	Phantom	C mixed into L and R with cmix coefficient
	Stereo	Lo/Ro downmix
	Mono	Lo+Ro
	PL Full	LCRS from Lt/Rt downmix
	PL 3 Stereo	3 Stereo from Lt/Rt
	PL Phantom	Phantom from Lt/Rt
	2/1	EX

<b>Channel Mode</b>	<b>Listening Mode</b>	<b>Main Channel Output Function</b>
	Full	All 2/1 channels
	3 Stereo	S mixed into L and R with smix coefficient
	Phantom	Default to Full mode
	Stereo	Lo/Ro downmix
	Mono	Lo+Ro
	PL Full	LCRS from Lt/Rt downmix
	PL 3 Stereo	3 Stereo from Lt/Rt
	PL Phantom	Phantom from Lt/Rt
3/0	EX	Default to 3 Stereo mode
	Full	Default to 3 Stereo mode
	3 Stereo	All 3/0 channels
	Phantom	C mixed into L and R with cmix coefficient
	Stereo	Lo/Ro downmix
	Mono	Lo+Ro
	PL Full	LCRS from Lt/Rt downmix
	PL 3 Stereo	3 Stereo from Lt/Rt
	PL Phantom	Phantom from Lt/Rt
2/0	EX	Default to Stereo mode
	Full	Default to Stereo mode
	3 Stereo	Default to Stereo mode
	Phantom	Default to Stereo mode
	Stereo	2/0 channels
	Mono	L+R
	PL Full	LCRS from 2/0 channels
	PL 3 Stereo	3 Stereo from 2/0 channels
	PL Phantom	Phantom from 2/0 channels
1/0	EX	Default to Mono mode
	Full	Default to Mono mode
	3 Stereo	Default to Mono mode
	Phantom	Default to Mono mode
	Stereo	Default to Mono mode
	Mono	Mono center channel output
	PL Full	Default to Mono mode
	PL 3 Stereo	Default to Mono mode
	PL Phantom	Default to Mono mode



## Audio Bar Mapping vs. Dolby E Metadata Program Configuration

For option DDE equipped rasterizers that are decoding Dolby E audio, the bars in the Audio Display are mapped as follows. The mapping derives from the Dolby E Program Configuration detected in the metadata of the Dolby input. If you select a Downmix Pgm (Program) (see step 18 on page 82), the two downmix level bars in the Audio Display reflect that program selection.

Dolby E Program Configuration	Audio Bar Mapping <sup>1</sup>	Number of Programs Available
5.1 + 2	L, C, R, Ls, Rs, L <sub>FE</sub> L1, R1	2
5.1 + 2x1	L, C, R, Ls, Rs, L <sub>FE</sub> M2, M3	3
4 + 4	L1, C1, R1, S, L2, R2, C2, S	2
4 + 2 + 2	L1, C1, R1, S, L1, R1, L2, R2	3
4 + 2 + 2x1	L1, C1, R1, S, L1, R1, M1, M2	4
4 + 4x1	L1, C1, R1, S, M2 M3 M4, M5	5
2 + 2 + 2 + 2	L1, R1, L2, R2, L3, R3, L4, R4	4
2 + 2 + 2 + 2x1	L1, R1, L2, R2, L3, R3, M4, M5	6
2 + 2 + 4x1	L1, R1, L2, R2, M3, M4, M5, M6	6
2 + 6x1	L1, R1, M2, M3, M4, M5, M6, M7	7
8x1 = 1+1+1+1+1+1+1+1	M1, M2, M3, M4, M5, M6, M7, M8	8
5.1	L, C, R, Ls, Rs, L <sub>FE</sub>	1
4 + 2	L1, C1, R1, S, L2, R2	2
4 + 2x1	L1, C1, R1, S, M2, M3	3
2 + 2 + 2	L1, R1, L2, R2, L3, R3	3
2 + 2 + 2x1	L1, R1, L2, R2, M3, M4	4
2 + 4x1	L1, R1, M2, M3, M4, M5	5
6x1	M1, M2, M3, M4, M5, M6	6
4	L1, C1, R1, S	1
2 + 2x1	L1, R1, M2, M3	3
4x1	M1, M2, M3, M4	4
7.1	L, C, R, Ls, Rs, L <sub>FE</sub> , Lb, Rb	1
7.1 Screen	L, C, R, Ls, Rs, L <sub>FE</sub> , Le, Re	1

<sup>1</sup> L = Left, R = Right, C = Center, M = Mono, S = Surround  
e = extra (Le and Re and Ex encoded channels), b = back  
L<sub>FE</sub> = Low Frequency Effects

## Monitoring Closed Captioning (CC) and Safe Area Compliance

The waveform rasterizer can monitor for any CC data, including VChip ratings, present in the selected signal and display the data overlaid on the PICT display. EIA-608-Line21 (VBI), EIA-608 (ANC), and EIA-608 (708) closed caption transports are supported.

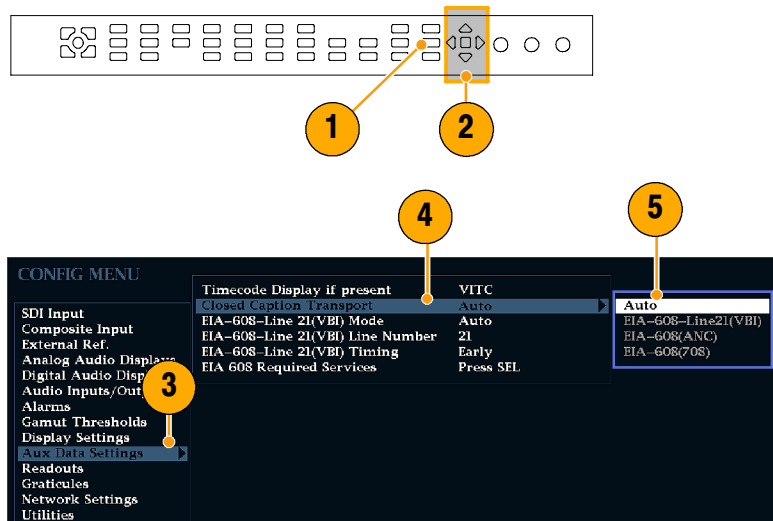
The waveform rasterizer can also display Safe Action and Safe Title graticules to let you monitor for incorrect placements of graphics, logos, and other branding elements, to ensure that they do not obscure text or essential action. SMPTE, ITU, and ARIB TR-B.4 standards are supported.

### To Monitor Closed Captioning

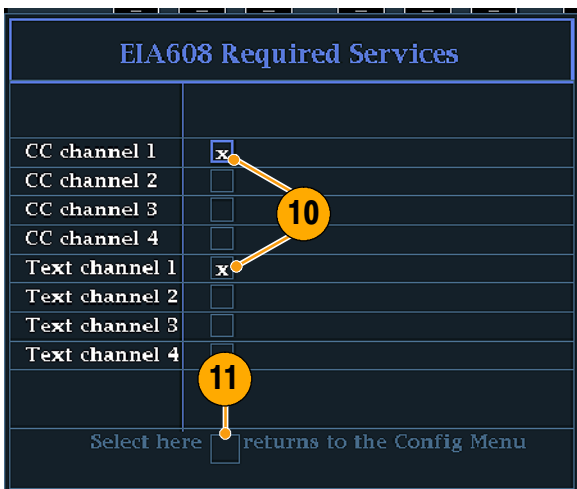
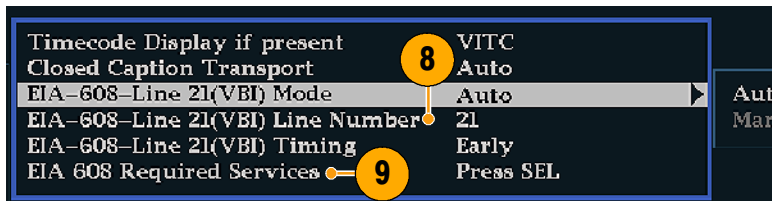
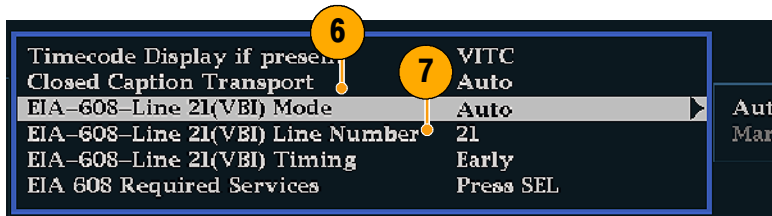
#### To Configure Closed Captioning

Before using Closed Captions, configure them from the CONFIG menu:

1. Press the **CONFIG** button to display the Configuration menu.
2. Use the Selection Keys and **SEL** Button to set the menu in the steps that follow.
3. Select **Aux Data Settings**.
4. Select **Closed Caption Transport**.
5. Select one of the CC stream types, or select **AUTO** to search for closed caption streams in the following order and present the text of the first stream type detected:
  - For Composite: EIA-608-line-21
  - For SD: EIA-608-line-21, 608-ANC, EIA-608 (708)
  - For HD: EIA-608-ANC, EIA-608 (708)

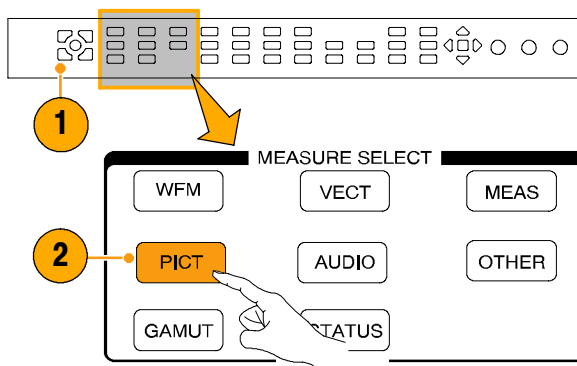


6. Select **EIA-608-Line 21(VBI) Mode**, and choose **Manual** if you want to choose the EIA 608 Transport directly (see step 7) or **Auto** if you want the rasterizer to select it automatically.
7. Select **EIA-608-Line 21(VBI) Line Number**, and choose which EIA 608 Transport is assumed when displaying closed captioning. (Manual must be Mode set in step 6.)
8. Select **EIA-608-Line 21(VBI) Timing** and choose **Normal**. You can also choose **Early** or **Late**, if the signal is mistimed slightly.
9. Select **EIA 608 Required Services** (press **SEL** button).
10. Select which service types trigger alarms when they are missing from the EIA-608 stream.
11. Select this box to return to the CONFIG menu.
12. Press the **CONFIG** button to close the CONFIG menu.

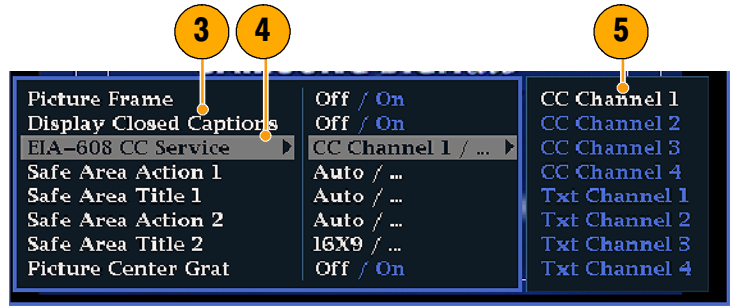


### To Display Closed Captioning

1. Select a tile.
2. Press and hold the **PICT** button to display the pop-up menu.

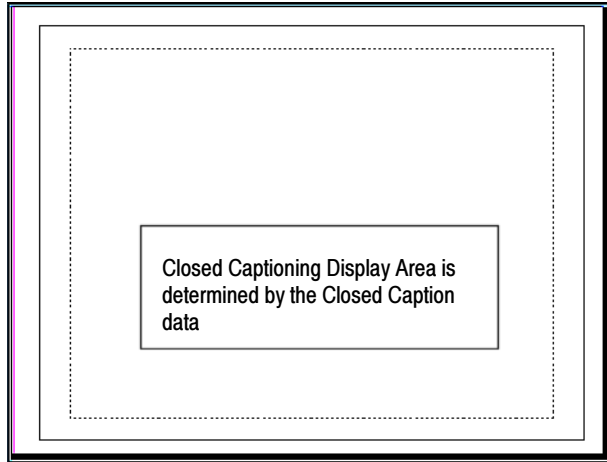


3. Select **Display Closed Captions**, and toggle it to **On**.
4. Select **EIA-608 CC Service**.
5. Choose one of CC channels 1-4 or text channels 1-4.



The PICT display includes Closed Captioning in the area designated by the Closed Caption data.

6. Press the **PICT** button again to dismiss the the pop-up menu.



### Usage Notes

- PICT displays in individual tiles allow their EIA-608 CC Service to be selected independently.
- CC text is not captured with the Picture image when using Freeze.
- CC setups are also stored when saved with Presets and restored on power up.
- The CC alarms are available in the CONFIG Alarms menu under Closed Captions/Metadata.

## To Monitor for Safe Area Compliance

To display graticules for monitoring for incorrect placements of nonessential elements relative to essential ones, set global settings in the CONFIG menu, and turn on up to four Safe Area graticules, each with independent settings, in the PICT menu.

### To Configure Safe Area Graticules

Before using Safe Area Graticules, configure them from the CONFIG menu:

1. Press the **CONFIG** button to display the Configuration menu.
2. Use the Selection Keys and **SEL** Button to set the menu in the steps that follow.
3. Select **Graticules**, and then select **Safe Area Graticule Standard**.
4. Choose from the **SMPTE**, **ITU**, or **ARIB TR-B.4** standards.

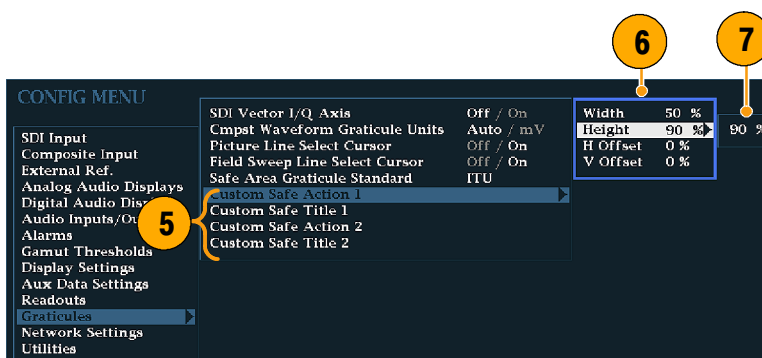
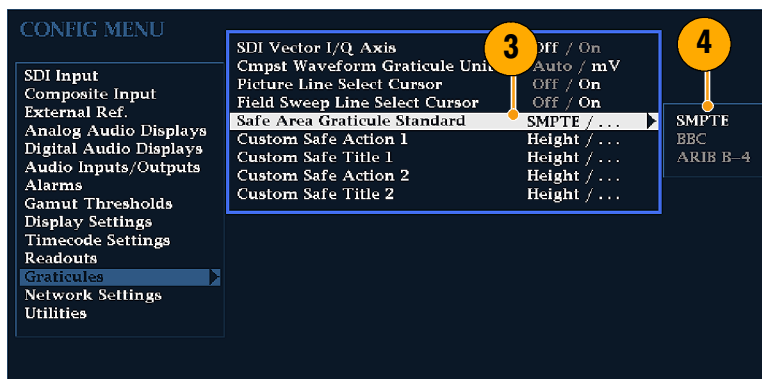
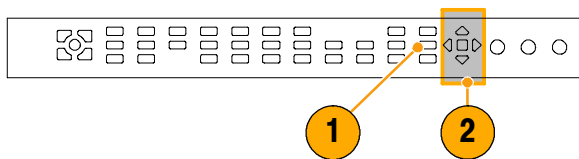
The selection you choose will be the graticule used when **AUTO** is chosen for any of the four Safe Area Graticules, accessed in the PICT menu.

5. If you want, set the Height, Width, and Offsets of the title and action areas for Custom Safe Graticules 1 and 2. First select the title or action to change.
6. Then select the parameter.
7. Then set the percentage level for each of the parameters.

Parameters are set as a percentage of screen height or width, and you can watch the graticules update on screen as you vary them.

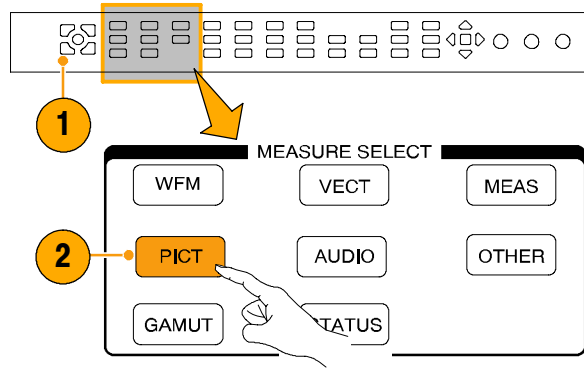
The custom parameters you set will be used when **Custom\_1** or **Custom\_2** is chosen for any of the four Safe Area Graticules accessed in the PICT menu.

8. Press the **CONFIG** button again to close the CONFIG menu.

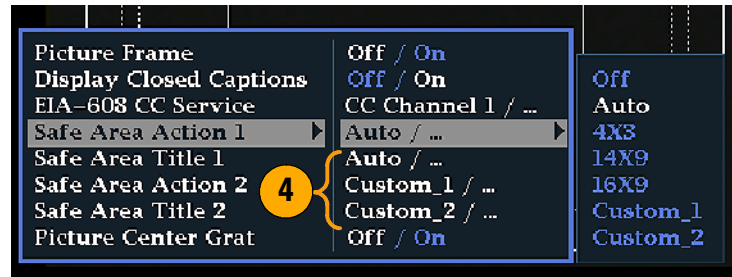


### To Display Safe Area Graticules

1. Select a tile.
2. Press and hold the **PICT** button to display the pop-up menu.
3. Select Safe Area Action 1.

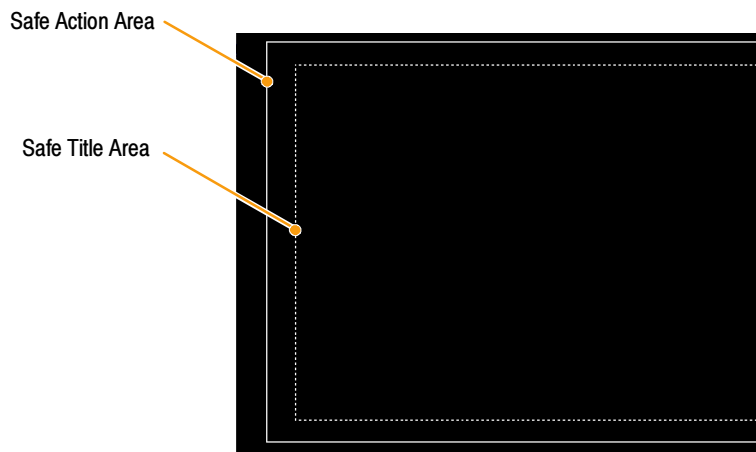


4. Select one of the following choices:
  - **Auto** to let the rasterizer automatically select the size and offsets of the safe area.
  - **4x3, 14x9, or 16x9** to set the safe area size and offsets appropriate for these aspect ratios based on the selected standard.
  - **Custom\_1 or Custom\_2** to set the safe area size and offsets to match the custom settings in the Graticles CONFIG menu. See step 5 on page 95.
5. Repeat step 4 for each Safe Area selections.
6. Press the **PICT** button again to dismiss the the pop-up menu.



## Usage Notes

- The Safe Action Area denotes the maximum image area within which all significant action should be contained; the Safe Title Area denotes the maximum image area within which all significant titles should be contained.
- Safe Area Graticules can globally be configured to comply to accepted standards in the CONFIG menu.
- Custom selections for vertical and horizontal size and offset of the Save Areas can be set in the CONFIG menu.



## Cloning Setups (Presets)

Given the complexity of SDI and other Video signals, waveform rasterizer setups can become complex as you tailor them to monitoring the parameters you want. To save set up time and ensure consistency, you can save waveform rasterizer setups as presets in the rasterizer. For the same reasons, you might also want to clone setups to use in setting up other waveform rasterizers. Saving and recalling of presets in the same instrument is covered in *To Use Presets* on page 30. This section deals with using presets to clone setups.

## Web Browser vs. Java Applet vs. Java Application

The Java Application provides a complete cloning solution. From the Java Application, you can:

- Save the current rasterizer setup to a <filename>.PRS file.
- Restore the <filename>.PRS file to the same rasterizer or to a different rasterizer, overwriting the current setup of the target rasterizer.
- Select up to all five of Presets 1 - 5 and save them into a single <filename>.PRE file.
- Restore the <filename>.PRE file to the same rasterizer or to a different rasterizer, overwriting any stored Presets on the target rasterizer that conflict with the new presets. If a Preset was not stored in the file, uploading the PRE file leaves it unaffected on the target.

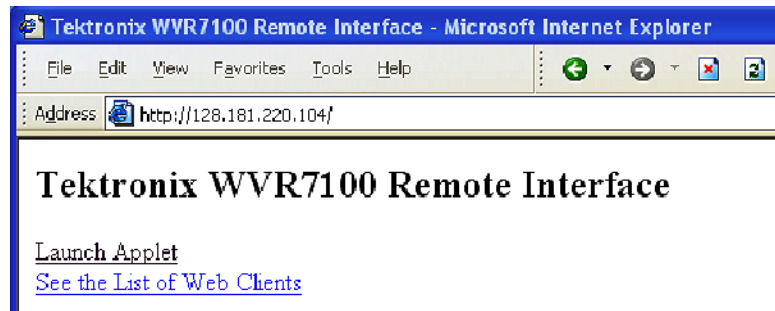
The Web browser provides only first capability of those just listed for the Java Application. The Java Applet, as opposed to the Java Application, cannot save settings to, or restore them from, a file.

## From a Web Browser

The Web browser affords a quick way to capture individual Presets for later upload to other rasterizers (or the same rasterizer). Saved files are \*.PRS files, and can only be uploaded to the rasterizer as an overwrite to the current instrument setup, not to Preset 1 - Preset 5, and *only* by using the Java Application (see *From the Java Application* on page 99).

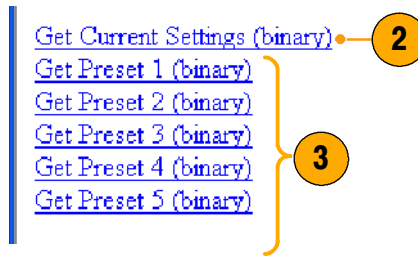
### Saving to a file

1. Connect to the networked waveform rasterizer from your networked PC using your PC resident Web browser. See *Using a Web Browser* on page 109 if you need instructions.



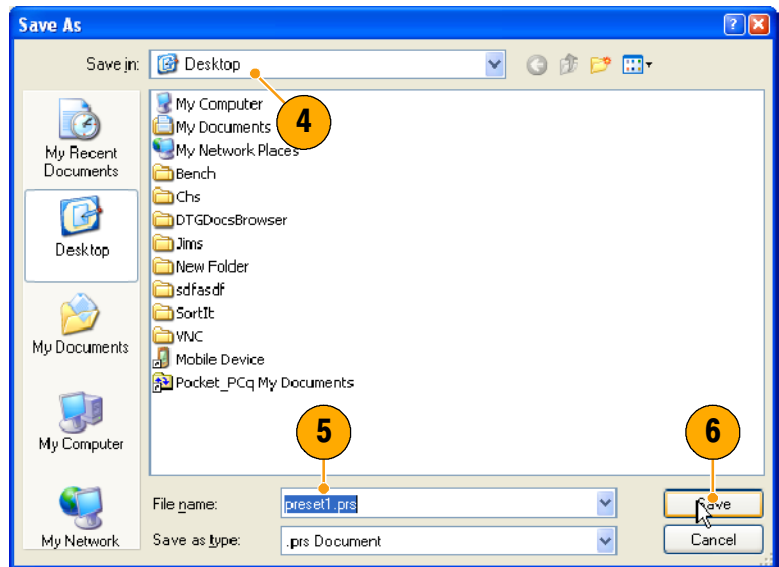


2. Click to save a copy of the current settings of the networked rasterizer to a local file.
3. Click any of Preset 1 - Preset 5 to save a copy of that Preset from the networked rasterizer to a local file.



4. In the Save As dialog box that displays, navigate to the location in which you want to save the Preset.
5. Rename the file if desired.
6. Click the **Save** button to save the Preset in a file.

To recall a Preset that you have stored to a file, you must use the Java Application. (See *From the Java Application* on page 99.)



## From the Java Application

You can save and upload rasterizer Presets to files from the Java Application. This application provides the only way to later upload to other rasterizers (or to the same rasterizer); the Web browser and the Java Applet cannot upload Presets.

### Java Application Requirements

If you install Java on your PC, you can launch a Java applet to control the waveform rasterizer. The Java Applet requires:

- A computer running on any platform that supports Java version 1.4.1 or later, including Windows NT/2000/XP, Linux, Unix, and Mac OS X.
- Java Standard Runtime Environment version 1.4.1 or later. The Java runtime must already be installed on your system in order to use the Java application.
- The Java application package (wvr7100.zip) from the Tektronix Web site, installed on the computer.
- The waveform rasterizer, networked or otherwise connected for remote control from the computer.

Once you download the archive file, extract the installation and open the Readme file. The readme file explains installation on the various platforms supported. When you have completed installation, do the procedure steps that follow.

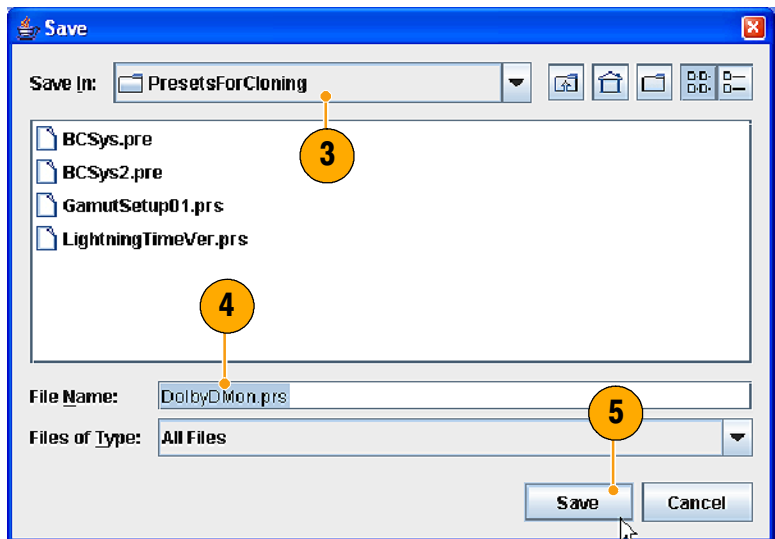
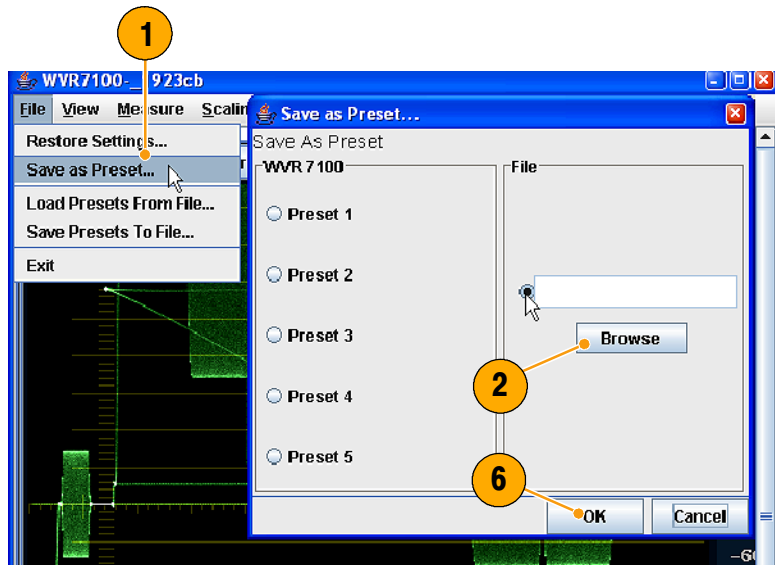
### Launching the Java Application

1. On your networked computer, click the shortcut or link to the application. See the Readme file that came with the application download, if you need more information.
2. In the IP Address box that appears, enter the IP address of your networked waveform rasterizer. To determine your IP address or configure the rasterizer, see page 109.
3. Enter the rasterizer password, if one is set. Inspect the Web Password entry in **Network Settings** in the CONFIG menu if you need to get the password.



### Saving the current setup to a file

1. To save the current rasterizer setup, select **Save as Preset...** in the File menu.
2. Click **Browse** to open the Save dialog box. Click to check button and enter a path and name for the target file. Or you can:
  - click to check the File button and enter the full path and name for the target file.
  - save the current setup to any of the onboard Rasterizer Presets 1 - 5 listed in the Save As Preset dialog box.
3. Navigate to the directory in which you want to store the settings file.
4. Enter a descriptive name for the target file. Use the suffix .PRS for the setup file.
5. Click **Save**.
6. Click **OK** in the Save as Preset dialog box.
7. Click **OK** to dismiss the Confirmation message that appears.

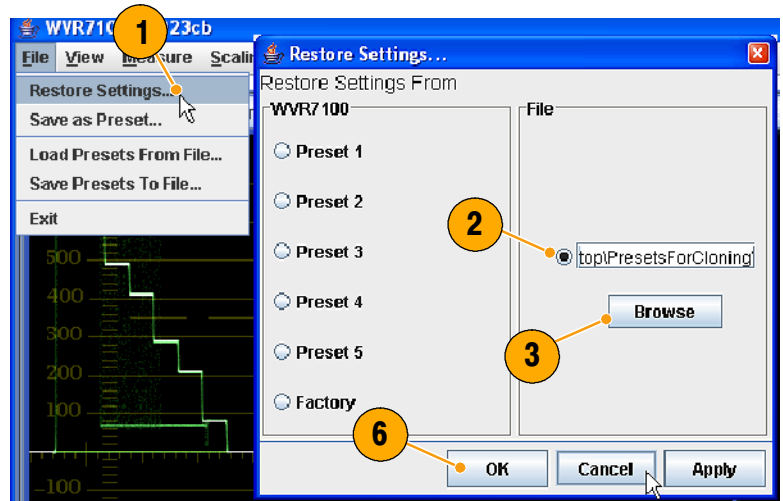


## Recalling settings from a file

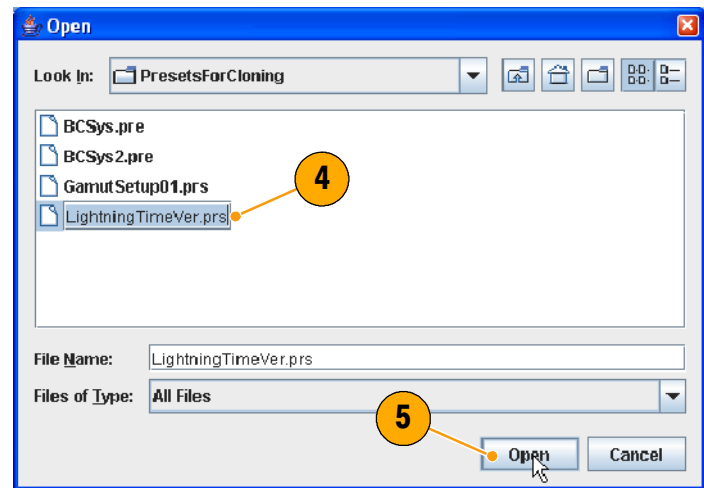
1. Select **Restore Settings...** in the File menu.

**Note.** Settings, when recalled from a .PRS file, always replace the current setup, so save the current setup to a Preset if you want to preserve it.

2. Click the File selection button.
3. Click **Browse** to display the Open dialog box.

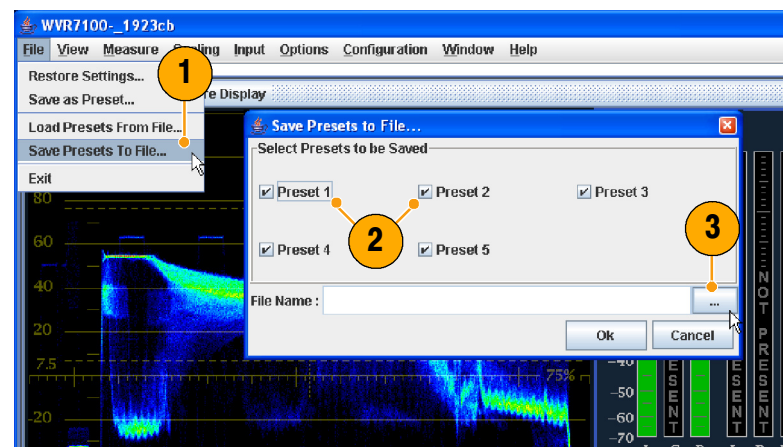


4. Navigate to the file to be restored and select it.
5. Click **Open**.
6. Click **OK** in the Restore Settings dialog box.

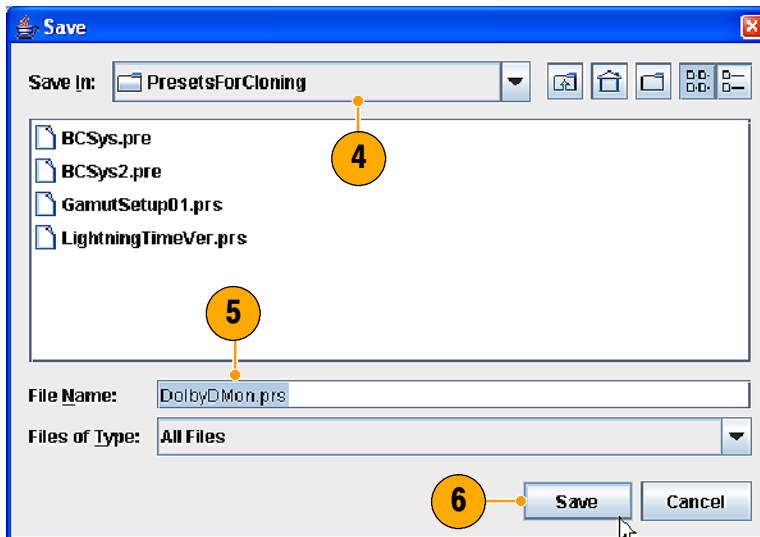


## Saving all Presets to a file

1. To save the rasterizer Presets (Preset 1-5) into a single file, **Save Presets to File...** in the File menu.
2. Click to check the boxes for all Presets that you want to save.
3. Click ... to open the Save dialog box.

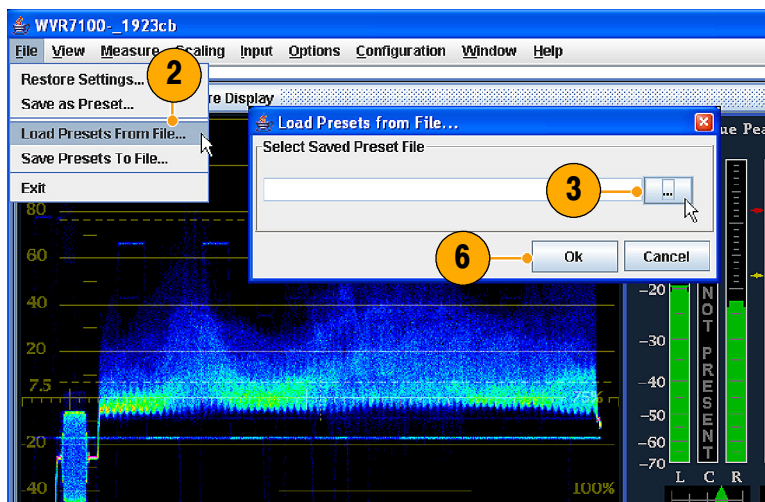


4. Navigate to the directory in which to store the settings file.
5. Enter a descriptive name for the file, and click **Save**. Use the suffix .PRE for the setup file.
6. Click **Save** in the Save Presets to File dialog box.
7. Click **OK** to dismiss the Confirmation message that appears.



### Recalling Presets from a file

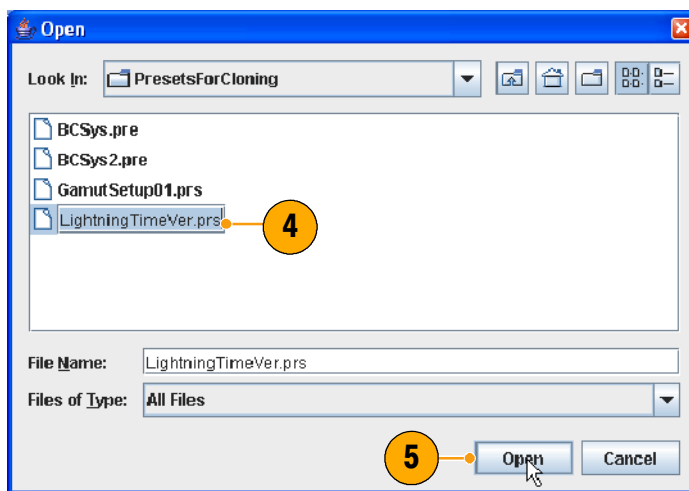
1. If cloning the saved presets to another rasterizer, close and relaunch the Java Application, entering the IP of that rasterizer. See *Launching the Java Application* on page 1.
2. Select **Load Presets From File** in the File menu.
3. Click the ... button to display the Open dialog box.



4. Navigate to the file to be restored and select it.
5. Click **Open**.

**Caution.** The next step will restore to the same Preset locations on the rasterizer that they were saved from when stored to file. This will overwrite any existing setups in those locations.

6. Click **OK** in the Load Presets from File dialog box.
7. Repeat this procedure to clone setups to other rasterizers as needed.



## Usage Notes

When saving Presets as files for later cloning to other rasterizers, take note of the following:

- Option configuration mismatch between Clone source Preset and the target result in some different setup parameters. The target accepts only the common setup parameters; parameters unsupported by the target are ignored; parameters not supported in the source remain unchanged in the target.
- Model mismatch (WVR6100 vs. WVR7100) between Clone source Preset and the target result in some different setup parameters. The target accepts only the common parameters setup parameters; parameters unsupported by the target are ignored; parameters not supported in the source remain unchanged in the target.
- Rasterizers with early versions of firmware have some default settings that do not match those of rasterizers that shipped with this manual. If the source Preset contains settings left at defaults for an earlier firmware version, they will be set to defaults in the target, but to the defaults for the later firmware version.

## Using Alarms

The rasterizer alarms automatically monitor parameters and report when they exceed limits. The procedures that follow describe how to configure response types for individual alarms, how to enable them, and how to monitor them.

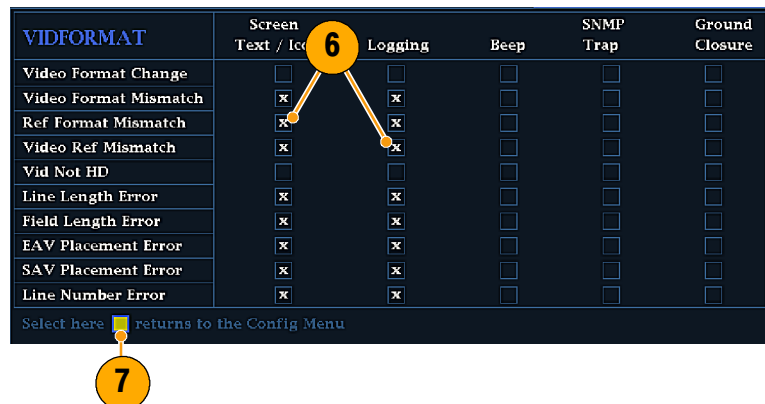
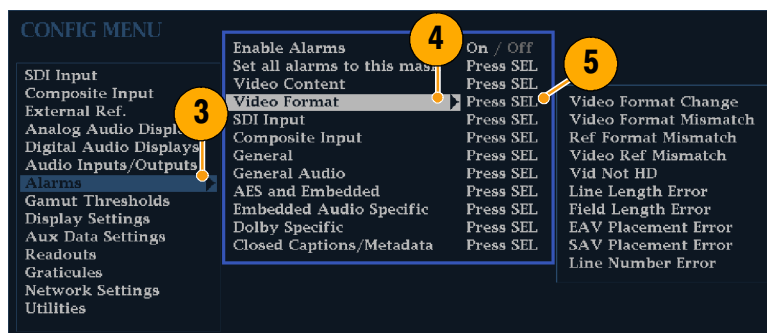
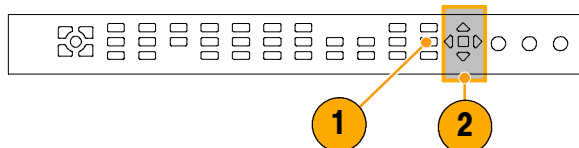
## Configuring Alarms

The rasterizer alarms may need to be configured in the CONFIG menu before you use them (they come set to FACTORY defaults, which you can restore using the FACTORY front-panel button). Do this procedure (or at least check that the alarms are configured as you want them) before doing the procedures that start on page 73. You select alarms in the following categories and select which error conditions you will monitor and how you will be notified in the event of an error:

- Video Content
- Video Format
- SDI Input
- Composite Input
- General
- General Audio
- AES and Embedded
- Embedded-Audio-Specific
- Dolby-Specific
- Closed Caption

## To Set Allowed Alarm Responses

1. Press the **CONFIG** button to display the Configuration menu.
2. Use the Selection Keys and Sel Button to set the menu in the steps that follow.
3. Select Alarms.
4. Navigate to the alarm category that you want to configure; for example, **Video Content** alarms is highlighted.
5. Note the alarms of the category you select appear to the right as you highlight the alarm category. Press **SEL** to display a table for setting the allowed responses for each individual alarm.
6. For each alarm listed in the table, select the box to place (or remove) an X in the box under each response that you want enabled (or disabled) for that alarm. See *Possible Alarm Responses*.
7. Navigate to highlight the **Select here** returns box, and press the **SEL** button to return to the CONFIG menu.
8. Repeat steps 4 - 7 to configure as many types of alarms as you want.



## Possible Alarm Responses

For each available alarm, you can select up to four of the responses listed. *Note that if you do not select a notification method for an error, you will not be notified if that error occurs.*

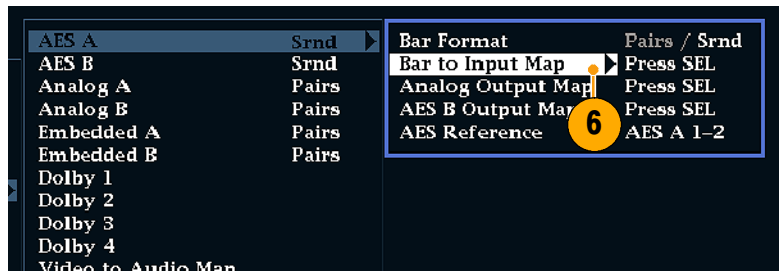
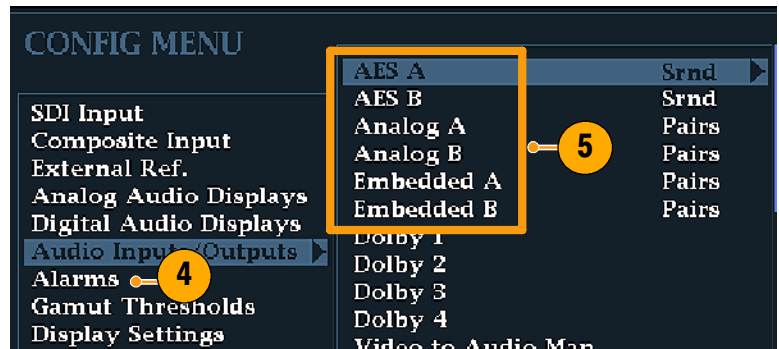
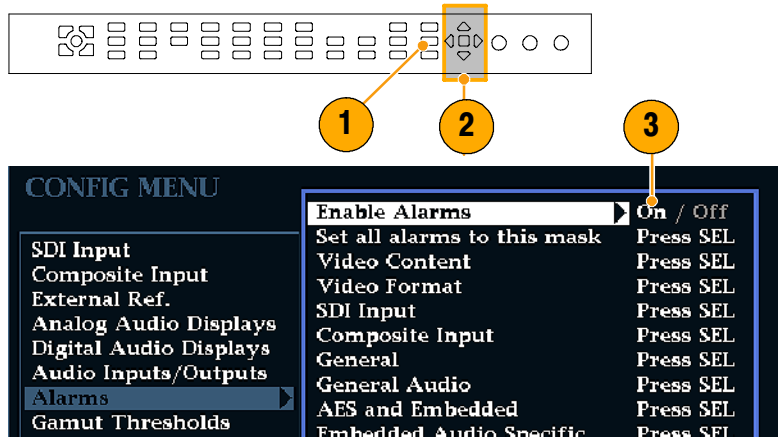
- **Screen Text/Icon.** An icon appears at the bottom of the current display. This notification method is disabled when the Configure menu is open.
- **Logging.** The instrument makes an entry in the Event Log. Refer to *Status Display* on page 54 for more information.
- **Beep.** The instrument makes an audible alarm.
- **SNMP Trap.** The instrument sends an SNMP trap out the Ethernet port for a remote notification that an alarm condition occurred. You must enable and configure the instrument for SNMP control using the Communications submenu of the Configure menu before SNMP traps can be sent. Refer to the *WFM700 Series MIB Reference* on the CD-ROM for more information about using SNMP alarm notifications.
- **Ground Closure.** The instrument sends a signal out the Remote port for a remote notification that an alarm condition occurred. You must enable the Remote Control Port in the Communications submenu of the Configure menu before notifications can be sent.

**NOTE.** To monitor alarm status, see To Monitor Alarms on page 108.

### To Enable Alarms

The channels for which you enable alarms here trigger the alarm responses that you defined in *To Set Allowed Alarm Response* on page 105.

1. Press the **CONFIG** button to display the Configuration menu.
2. Use the Selection Keys and Sel Button to set the menu in the steps that follow.
3. To globally enable all alarms, select **Enable Alarms** and toggle it to **On**. This turns on all alarms that are individually enabled, and provides a quick way to switch them on and off without changing their individual settings (see step 4).
4. Additionally, for Audio inputs, you must enable alarms individually for their channels. To start, select **Audio Inputs/Outputs** in the CONFIG menu.
5. Select each input shown in the box to individually enable its alarms. AES A is shown selected.
6. For each of the AES, Analog, and Embedded inputs, select **Bar to Input Map**, and press the **SEL** button to display the **Bar to Input map**.





- Navigate to each box for each alarm that you want to allow. Press the **SEL** button to enable it (X) or disable it (blank) for each channel displayed.
- Select the box, and press the **SEL** button to return to the CONFIG menu.

Input Bar	Allow Alarm	AES A 1-2	AES A 3-4	AES A 5-6	AES A 7-8
L	X	X			
R	X				
C	X		X		
Lfe	X				
Ls	X			X	
Rs	X				
Lo	X				X
Ro	X				

Select here returns to the Config Menu

- For Dolby 1 - 4, you must also enable alarms individually.
- Select the **Dolby Fmt Expected**, **Dolby E Pgm Mask** and/or **Dolby Chan** and configure them as you want.

Whether these selections are available depend on Dolby options installed; see the procedure *To set up Dolby Input Parameters*, starting on page 80, for instructions on configuring the alarms for the Dolby inputs.

AES A	Srmd	Dolby Source	AES A1-2
AES B	Srmd	Analog Output Map	Press SEL
Analog A	Pairs	AES B Output Map	Press SEL
Analog B	Pairs	Dolby Fmt Expected	Any Dolby
Embedded A	Pairs	Dolby E Pgm Mask	Press SEL
Embedded B	Pairs	Dolby Chan Mask	Press SEL
Dolby 1		Dolby D Input	
Dolby 2		Dolby E Input	
Dolby 3		AES Ref Enable	On
Dolby 4			

### To Set Limits or Qualifications

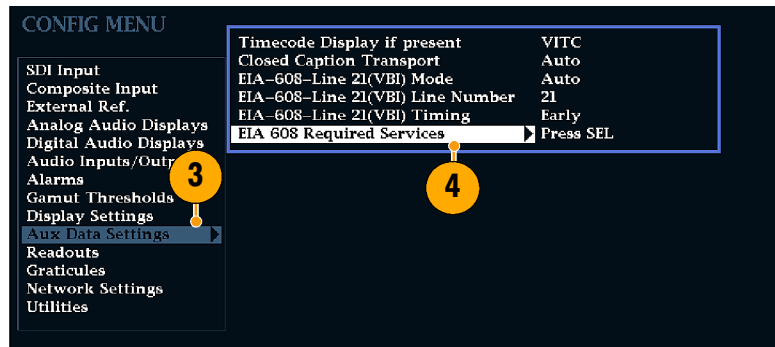
Some alarms also require setting a threshold or condition that triggers the alarm.

- Select in turn **Analog Audio Display**, **Digital Audio Display**.
- For each selection in step 1, set the following alarm levels that trigger an alarm when exceeded:

- # Samples for Clip: number of consecutive samples at the all-high level
- # Samples for Mute: number of consecutive all-zero samples
- Silence Level: The level below which audio is considered not present.

SDI Input	Ballistics	True Peak	2 Second(s)
Composite Input	Peak Hold Time	On / Off	
External Ref	Peak Held Segment	dBFS	
Analog Audio Displays	Set 0dB Mark to:	-8 dBFS	
Digital Audio Displays	Peak Program Level	-18 dBFS	
Audio Inputs/Outputs	Test Level		
Alarms	# Samples for Clip	10 Consecutive	10 Consecutive
Gamut Thresholds	# Samples for Mute	10 Consecutive	
Display Settings	Silence Level	-70 dBFS	
Aux Data Settings	Duration for Silence	5 Seconds	
Readouts	Over Level	0 dBFS	
Graticules	Duration for Over	1 Seconds	
Network Settings	Error Hold Time	2 Seconds	
Utilities	Ignore Validity Bit	On / Off	
	Correlation Meter Speed	10	
	Lissajous AGC	Off / On	

- Duration of Silence: The length of audio silence time allowed
  - Over Level: the “too loud” audio level
  - Duration for Over: The length of time limit for the too loud audio
3. For Closed Caption related alarms, select **Aux Data Settings**.
4. Select EIA608 Required Services, and select the CC channels and/or Text channels that you want to trigger the CC Services Missing Alarm.



## To Monitor Alarms

- To quickly check if any error condition exists, look for either the screen alarm icon or the screen alarm text. These are described under *Status Bar Icons*, on page 18, and *Status at a Glance*, on page 17.
- To increase visibility of alarms, select audible response (Beep) or the Ground Closure output response. The latter can be used to drive a light or audible alarm when one or more alarms are triggered. See *To Set Allowed Alarm Responses* on page 105.
- To check the condition of specific alarms, press the Status button. In the Status pop-up menu, select Alarm Status. Note the following status:
  - Disabled (gray): Alarm is disabled.
  - OK (green): Alarm triggered but now OK for at least 5 seconds.
  - Error (yellow): Alarm condition cleared for less than 5 seconds
  - Error (red): Alarm triggered now.
- To monitor for alarms remotely, monitor for SNMP traps over the Ethernet port. You must enable and configure the instrument for SNMP control using the Network Settings CONFIG menu before SNMP traps can be sent. See *SNMP Setup* on page 39.

## Remote Communication

Remote communications that are covered include those that:

- occur over an Ethernet network through a Web browser
- occur over an Ethernet network through a Java applet
- occur over a cable using the optional Remote Front Pane
- download previously saved setups (Presets) and error logs, and how to print them

### Using a Web Browser

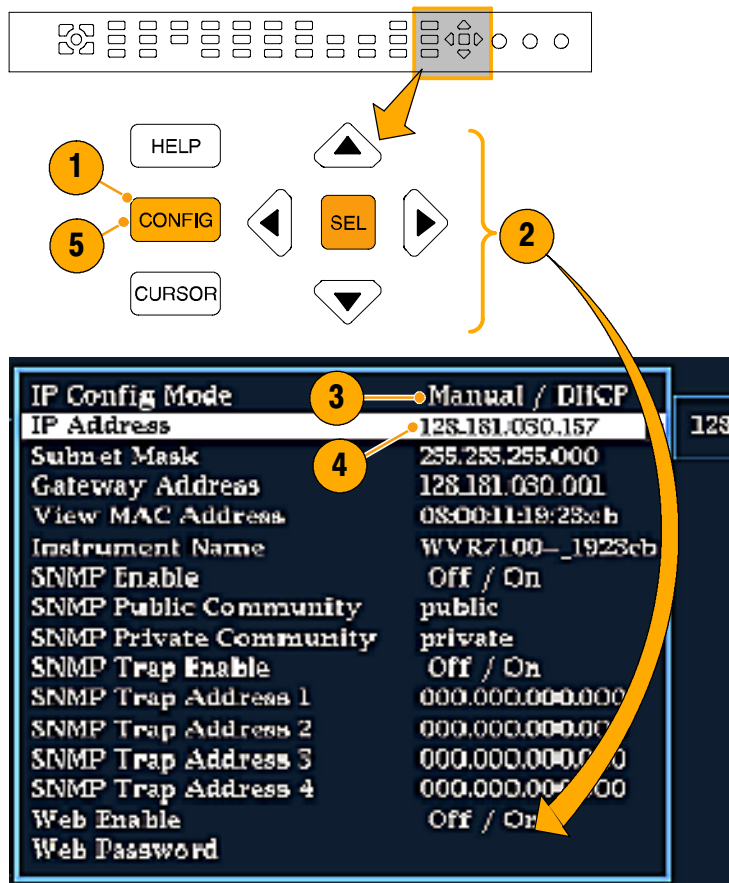
You can connect to the waveform rasterizer and perform simple operations without installing any software and using just a Web browser. To use a Web browser to connect to a waveform rasterizer, the waveform rasterizer must be connected to an IP network via Ethernet. You will need to set the IP Config Mode, IP Address, Subnet Mask, and possibly the Gateway Address, to meet your network-configuration requirements.

Using only a Web browser, you can save screen captures, download presets, and download the error log. To connect to the waveform rasterizer using a Web browser:

1. Press **CONFIG** to display the Configuration menu.
2. Select **Network Settings > Web Enable**. Press **SEL** to select **On**.
3. Set the IP Config Mode to Manual or DHCP, depending in your network set-up.
4. Note the IP Address for use in step 6.

**NOTE.** You may have to set other network parameters in this menu; see your LAN administrator if required.

5. Press **CONFIG** to close the Configuration menu.

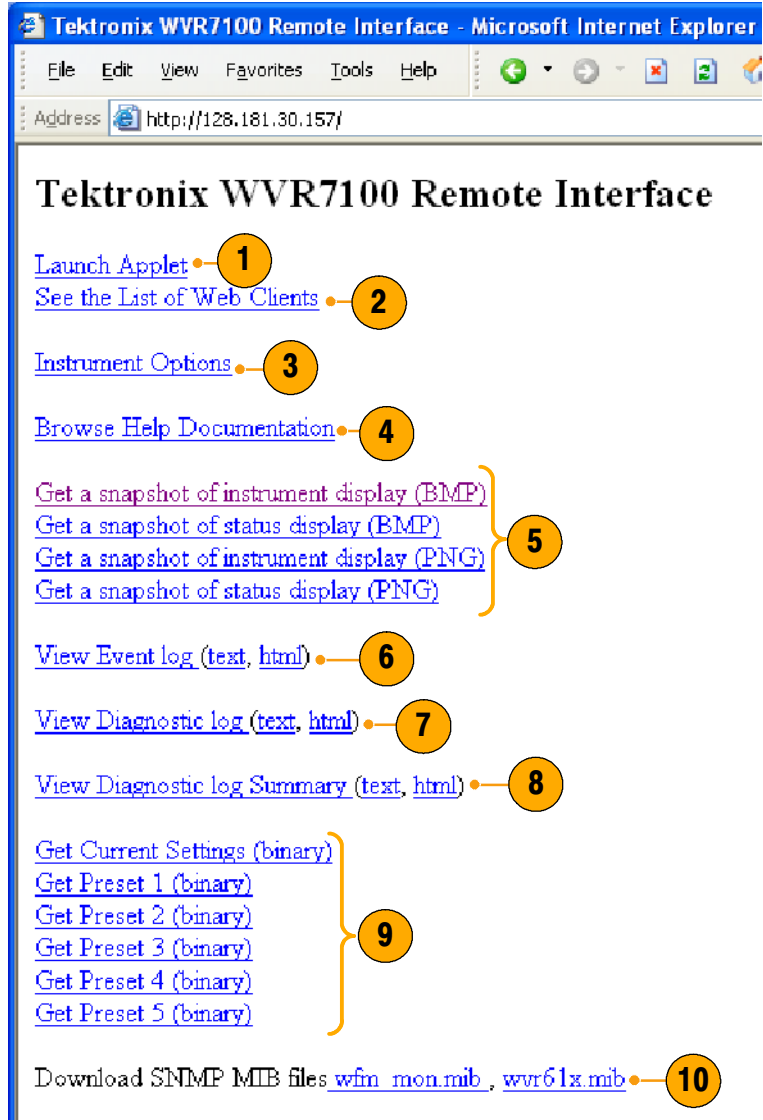
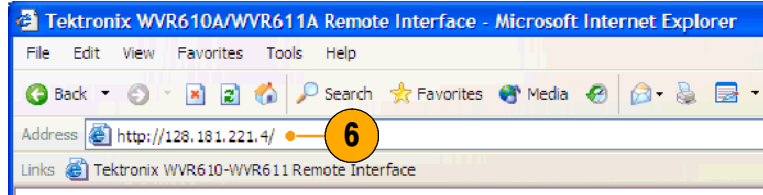


6. Start your Web browser and type the network address of the waveform rasterizer (from step 4) into the URL entry box like this:

http://123.123.123.123/1

Do any of the following steps as desired:

1. Click to start the Java applet (see next procedure).
2. Click to display a list of web clients (by network address) currently logged into the waveform rasterizer.
3. Click to display which options this instrument is equipped with.
4. Display waveform rasterizer online help.
5. Capture the full or status bar displays in BMP or PNG formats. Retrieves the capture for saving to a file.
6. Download and display the Error Log as tab-delimited text or an HTML table.
7. Download and display the Diagnostic Log as tab-delimited text or an HTML table.
8. Download instrument settings to a file in binary format.
9. Download Preset <N> to a file in binary format, where <N> is any of 1 - 5.
10. Download each of the MIB files in ASCII format.



<sup>1</sup> Many web browsers do not correctly interpret IP addresses with leading zeros. If the IP address shown in the Configuration menu contains leading zeros as in 124.161.038.151, remove the "0" when entering it into the address line of the browser. For example, 124.161.038.151 should be entered as 124.161.38.151.

## Using the Java Applet

To further extend your control from a remote PC, launch the Java applet from the Web browser to change the waveform rasterizer settings, display and refresh the waveform rasterizer screen, save screen captures, download and upload presets, and download the error log. The Java applet provides a menu bar and a virtual front panel that gives you complete remote control over instrument settings.

Note that the Web interface operation is optimized for screen resolutions of 1024 x 768 or higher. Operation on computers with lower resolution requires scroll-bar use to see the entire interface.

## Java Applet Requirements

If you install Java on your PC, you can launch a Java applet to control the waveform rasterizer. The Java Applet requires:

- 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, download the appropriate code from the URL: <http://java.sun.com/j2se/1.4/>

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

- Microsoft Internet Explorer 5.0 or later running on a Windows PC.
- Netscape on Apple Linux or on UNIX machines.

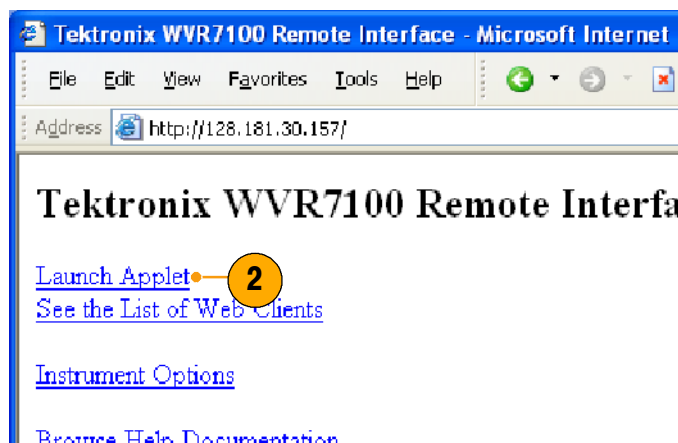
**NOTE.** If you need remote operation on other platforms, use the Java Application, which stands-alone and provides all of the features of the Java applet. The Java Application can be run on any platform that supports Java version 1.4.1 or later, including Windows NT/2000/XP, Linux, Unix, and Mac OS X. The Java application, unlike the Java applet, does not run within a web browser and, thus, is not subject to the various browser limitations. You can download the Java application package from the Tektronix web site. Look for WVR Remote Software Package in the download section of the Video Test Product pages.

The Java Application can be used to download instruments Presets to a remote file and upload from the remote file to the instrument.

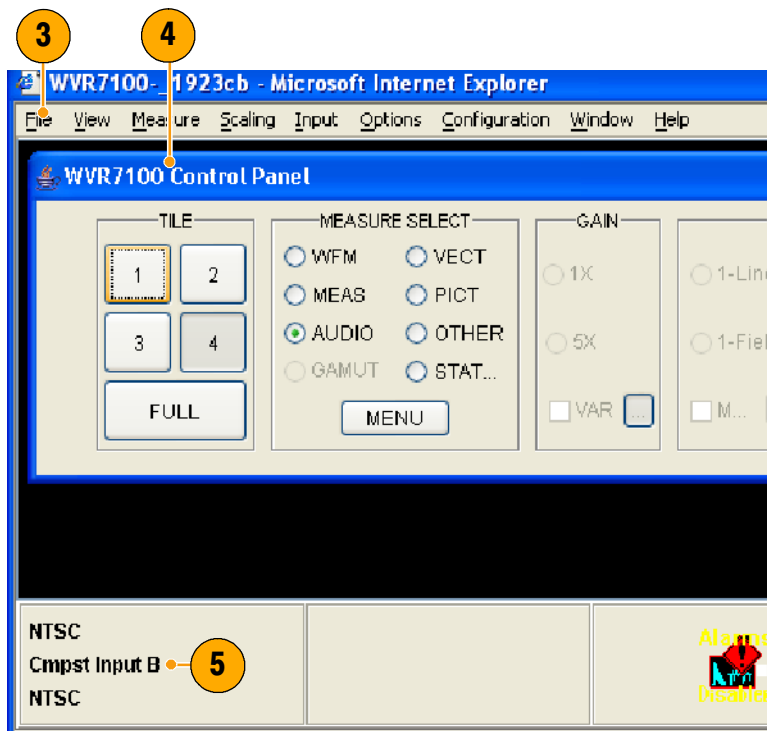
## Launching the Applet

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). The waveform rasterizer supports up to three remote clients (screen updates become slower with each client added).

1. Launch the Web browser as described under *Using a Web Browser*, starting on page 109.
2. Once the Remote Interface appears, select **Launch Applet**. The Java applet will be launched (shown below).



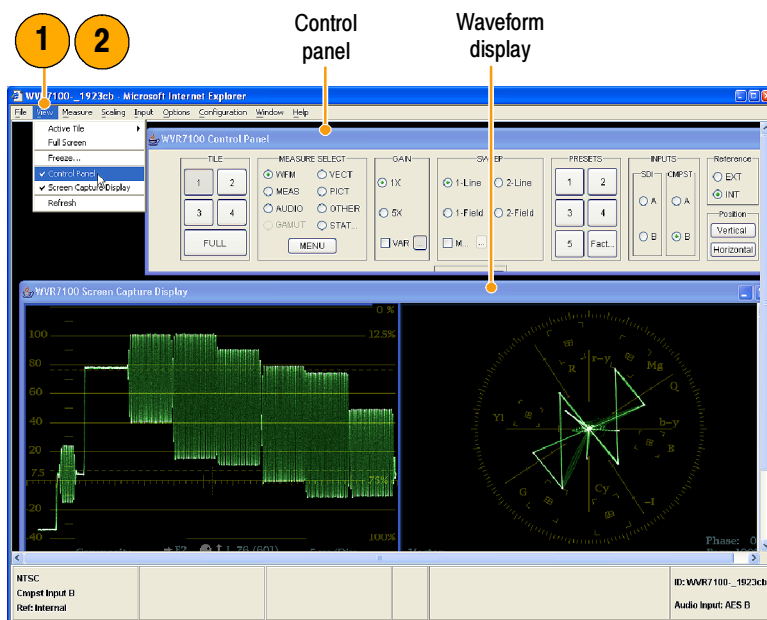
3. Use the menu bar of the Java applet window to quickly access functions that are not available from the front panel. Also, access the Configuration menu by using these menus rather than a front-panel button.
4. For front panel functions, click the virtual front-panel controls to remotely press most instrument front panel controls.
5. Read the status bar the same way as you would when it is displayed directly from the instrument display. (See *To Determine Status At-a-Glance* on page 17.



### Selecting Displays

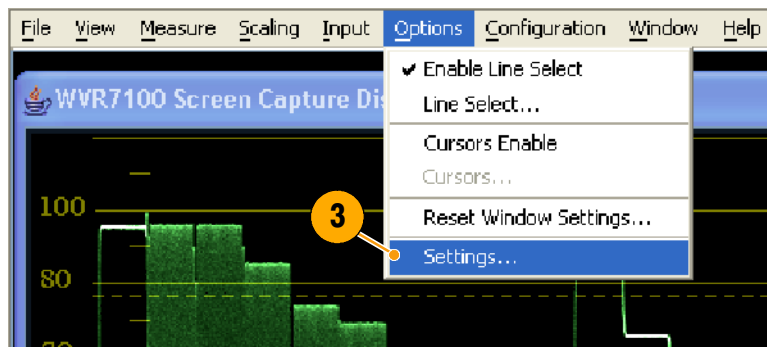
1. To turn the display of the virtual front panel on or off, click **View > Control Panel**.
2. To turn the display of the Waveform Display Window on or off, click **View > Waveform Display**.

**NOTE.** The displays can be turned on or off independently of each other. Here they are both shown displayed in the applet window.



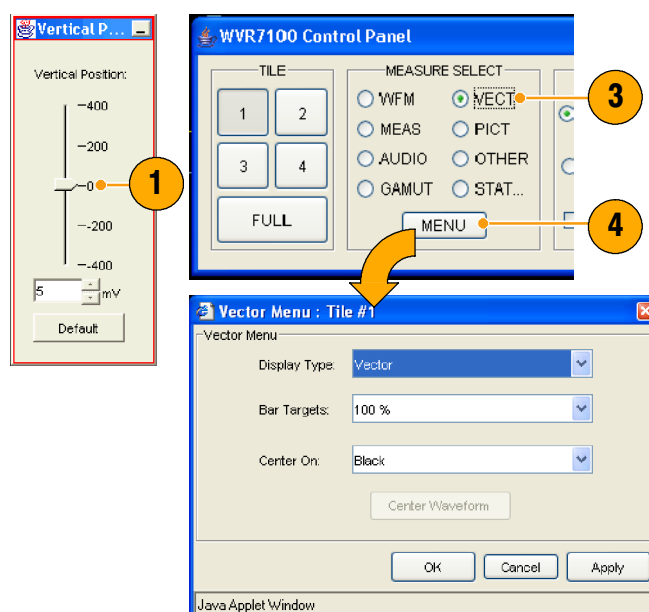
3. To change the refresh rates (defaults are every 10 seconds), do the following:
  - First select Options > Settings.
  - Adjust the refresh rates to the desired periods in the **Settings** pop up.
  - Click **OK** to save the new rates.

**NOTE.** You can also display the waveform rasterizer online help from the Java Applet. Select **Help > Help...** to open online help in a new browser window.



### Operating Notes

1. When adjusting variable settings, such as vertical and horizontal position or gain, the Remote Interface displays a small window with a slider that you use to adjust the value.
2. For example, to adjust the vertical position of a waveform: Select **Scaling > Vertical Position** and adjust as desired.
3. To allow for display of pop-up menus for each MEASURE SELECT button, the Remote Interface provides a menu button: select the measurement for which you want to display the pop-up menu.
4. Click the **MENU** button.



## Usage Notes

The Remote Interface Control Panel differs from the instrument front panel in that it provides a menu. The menu provides many controls some of which duplicate functions directly available from the Control Panel. See the list that follows.

Menu	Commands	Description
File	Restore Settings	Restores instrument-stored setup that you select (one of Preset 1 through Preset 5 or Factory) to the waveform rasterizer
	Save as Preset	Saves the current waveform rasterizer settings as as setup in the instrument (select any one of Preset 1 through Preset 5)
	Load Presets From File	This selection is disabled in the Java Applet. In the Java Application (see NOTE on page 111), this selection restores the presets (1 through 5) to the waveform rasterizer from any previously saved presets file that you select
	Save Presets To File	This selection is disabled in the Java Applet. In the Java Application (see NOTE on page 111), this selection saves the waveform rasterizer presets 1 through 5 in a remote file.
	Exit	Closes the Java applet
View	Active Tile	Changes the active tile
	Full Screen	Changes display to Full screen mode
	Freeze...	Captures the current image for most of the possible displays in the waveform rasterizer.
	Control Panel	Toggles the display of the Control Panel window on and off
	Screen Capture Display	Toggles the Waveform Display window on and off
	Refresh	Updates the Waveform Display
Measure	Various control items	Contents of this menu varies with the selection in the waveform rasterizer Control Panel (WFM, MEAS, AUDIO, GAMUT, VECT, PICT, OTHER, or STATUS).
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	Inputs and Reference	The settings displayed below <b>Input</b> correspond to the controls in the Inputs and Ref groupings on the control panel.
Options	Line Select & Cursors commands	These menu entries below <b>Options</b> duplicate operation of the Line Select and Cursors controls on the Control Panel.
	Refresh Rate	Specifies how often the Waveform Display should be automatically updated
Configuration	Various controls not available on the front panel	The menu entries below <b>Configuration</b> duplicate most of the setups available by display the Configuration menu using the CONFIG button on the instrument front panel.



Menu	Commands	Description
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

## Using the WVR RFP Remote Front Panel

The WVR RFP Remote Front Panel is available to permit remote control of the rasterizer. The WVR RFP overrides the main front panel, requiring that all control be through the remote front panel. The WVR RFP connects to the rasterizer through a cable. This cable may be up to 100 ft. long (a 25 ft. cable ships with the WVR RFP).

- To configure the WVR RFP, follow the installation instructions that ship with the WVR RFP product.
- To use the RFP module, use it as you would the integral front panel of a instrument. In other words, all operating procedures in this manual and the instrument online help apply to operation from the WVR RFP as well as the integral front panel.
- When the WVR RFP is connected, the rasterizer front panel becomes inactive. (The Fault LED may still operate on the instrument front panel, but you should rely on the Fault LED on the RFP module, not the rasterizer.)

---

**NOTE.** You must cycle power to initialize operation from the RFP module. In general, anytime you connect the RFP module to the instrument, power it down, connect the RFP module, and then power up the instrument.

---

## Cable Description

The requirements for cables that may be used with this WVR RFP module follow:

- Connectors (each end): 9-pin D-SUB, male, with jackscrews
- Cable: nine conductors, 26 gauge or heavier, shielded
- Construction: Pins 1-9 of each connector wired to corresponding pins of the alternate connector (connect pin 1 to pin 1, and so on). Shield or drain wire bonded to metal shell at each end.
- Maximum length: 100 ft.



# To Upgrade the Waveform Rasterizer Firmware

System Upgrade (CONFIG> Utilities > System Upgrade) is used to upgrade the system software of the WVR6100 and WVR7100 Waveform Rasterizers. The upgrade is performed across an Ethernet network using a PC to transfer the new software to the waveform rasterizer.

## PC System Requirements

The data-transfer utility for upgrading the waveform rasterizer runs on these PC systems: Windows 98, Windows NT 4.0, Windows ME, Windows 2000, and Windows XP.

The data-transfer utility also requires Winsock 2.0, an ethernet interface, and 10 MB of free disk space be present on the PC system.

## Before You Begin

Before performing *Installing the Firmware* on page 119, read about possible fault conditions and their remedies, and about how the waveform rasterizer uses button animation to signal upgrade progress and events.

### FAULT Recovery and Cautions

- The boot monitor will assert a FAULT after an unsuccessful firmware update operation. The failure of the firmware update can be caused by a network communication error, time out or a corrupt firmware package. When it detects a firmware update error, the instrument returns to the ready state (tile buttons flashing).

In this event, you can try to resend the firmware data to the instrument. In the case of repeated failures, check to make sure that you have the correct firmware release for the instrument.

- The boot monitor might also detect errors in the DHCP software which can result from repeatedly switching between factory and DHCP network settings. The FAULT light remains lit and the instrument fails to obtain an address from a DHCP server.

In this event, reboot the instrument by pressing one of the MEASURE SELECT buttons or by removing power from the instrument. When the instrument reboots, hold down the **FULL** button to return the instrument to the firmware update mode.

- When using DHCP, there is a small possibility that the waveform rasterizer will be assigned a different address when the software update mode is activated. ( If the unit is not off or disconnected from the network very long, then typically the waveform rasterizer will get the same address as it had previously.)

In this event, you may need to abort the update (see CAUTION that follows), go the Config menu and get the current IP address, and use that address in the update process. If this does not work the first time, you may need to try again or use the manual IP address mode. Or, alternatively, you can temporarily set the IP address to the default value (192.168.1.1) once it is in upgrade mode by pressing **SEL**, and use that address in the upgrade procedure. After the upgrade is completed, the original IP address will be restored.



**CAUTION.** Once the instrument has started to erase internal flash memory (VECT button lit), **DO NOT** remove power from the instrument. If you do so, the instrument will only boot in the firmware update mode until new firmware has been loaded into the instrument flash memory. Therefore, use the MEASURE select buttons to abort a firmware update. Remove power from the instrument only as a last resort.

- The instrument will automatically switch to factory default if DHCP discovery fails. Press the **SEL** button to restart DHCP discovery.

---

**NOTE.** *FAULTS will not be logged into the diagnostic log because the boot monitor is running, not the main instrument software.*

---

## Button Animation During Upgrade

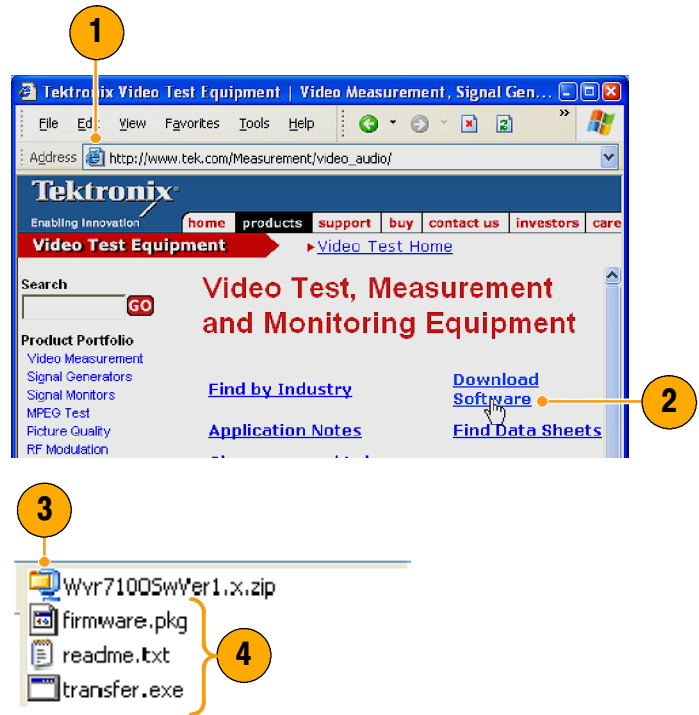
Button indication	State	Description
■ Flashing DISPLAY SELECT buttons	Ready	Instrument is ready to receive firmware data and is waiting for a connection from the PC host
■ Flashing arrow buttons	DHCP discovery	Instrument is negotiating for an IP address from a DHCP server
■ SEL button lit	Factory IP configuration	Instrument is configured with factory default IP address of 192.168.1.1
■ Arrow and SEL not lit	Manual IP configuration	Instrument is configured with manual IP configuration
■ Arrow buttons lit, SEL not lit	DHCP configuration	Instrument has received an IP address from a DHCP server
■ WFM button lit	Receiving firmware	Instrument is receiving firmware data
■ VECT button lit	Erasing flash memory	Instrument is erasing internal flash memory
■ MEAS button lit	Programming flash memory	Instrument is programming internal flash memory
■ 1X button lit	Verifying flash memory	Instrument is verifying programming of internal flash memory

## Installing the Firmware

To install new firmware in a waveform rasterizer:

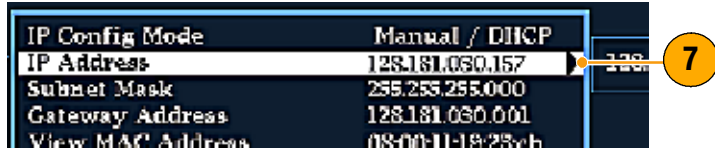
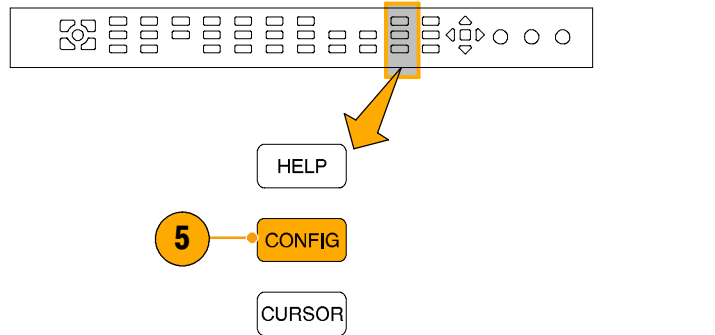
### Download the Firmware Package

1. To download the latest version of the waveform rasterizer firmware, navigate to the Tektronix website at the [http://www.tek.com/Measurement/video\\_audio](http://www.tek.com/Measurement/video_audio).
2. Click on the *Download Software* link, select the *Video Test*, and search on WVR to locate the waveform rasterizer firmware-upgrade package and download it.
3. Click the downloaded self-extracting archive to extract the archived files into a directory of your choice.
4. Files extracted are: *transfer.exe* firmware.pkg, and *readme.txt*.



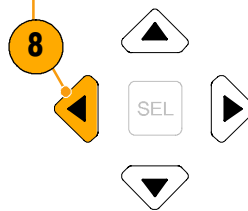
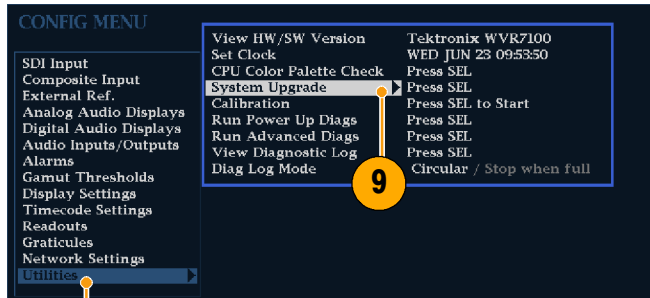
### Check and Record the IP Address

5. Press **CONFIG** to display the Configuration menu.
6. Select **Network Settings** to display the Network Setting Menu.
7. Write down the number listed for **IP Address** in the menu.

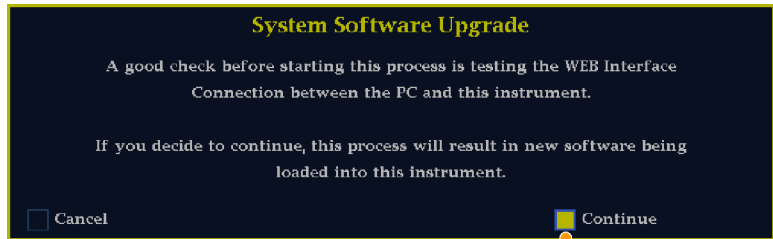


### Enter System Upgrade Mode

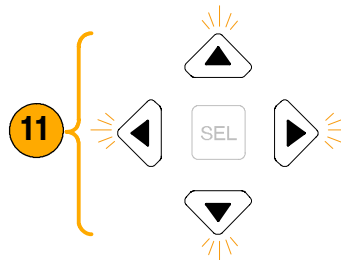
8. On the waveform rasterizer, press the left-arrow key to return to the main CONFIG menu and select **Utilities**.
9. Highlight **System Upgrade**, and press **SEL**. This displays the System Software Upgrade window.
10. To continue with the upgrade, press the right-arrow key to select **Continue** and press **SEL**.



The monitor display goes to black and the DISPLAY SELECT keys flash in sequence.

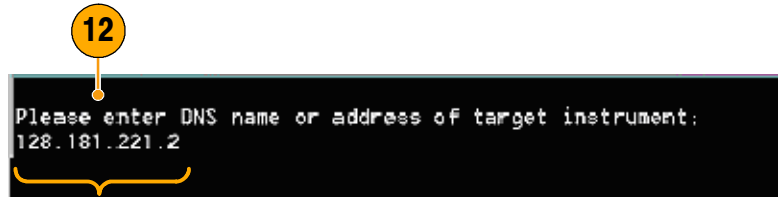


11. If the arrow keys also flash, the waveform rasterizer is in DHCP mode. *Wait until the arrow keys stop flashing before proceeding.*



## Run the Upgrade

12. On the PC, double-click the **transfer.exe** file to launch the transfer program. This displays the window shown in part at right.



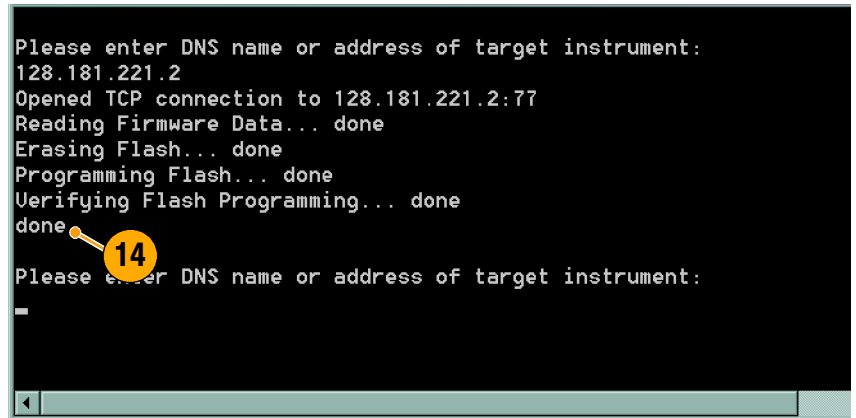
13. Type the network address (for example: 128.181.221.002) or DNS name of the waveform rasterizer you wish to update, and then press Enter. This starts the firmware upgrade process.

13

**NOTE.** To stop the firmware update, you can press any **MEASURE** button on the front-panel of the waveform rasterizer before the words **Erasing Flash...** appear in the transfer utility window.

14. The transfer utility displays **done** when the software upgrade completes.

When the software upgrade completes, the waveform rasterizer will reboot.



15. To update another waveform rasterizer, begin at step 5 and skip step 12. 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 one session, one at a time, if you've determined their addresses. To upgrade, 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
```

**NOTE.** You can also place the waveform rasterizer into the upgrade mode by pressing the **FULL** button while applying power to the instrument.

## Verifying the Upgrade

After you have completed the firmware upgrade, the instrument will reboot and come up in an operational mode.

To verify the functional performance of your instrument, perform the Incoming Inspection procedures starting on page 7.

---

**NOTE.** See the *Readme.txt* file that is included with the firmware-upgrade package to determine whether all of the current Configuration menu and instrument-mode settings are preserved through upgrading.

---



# Index

## A

Accessories  
 Documents, 1  
 Optional, 2  
 Power cords, 1  
 standard, 1  
 Active tile, 15  
 AES , Output map for Dolby , 81  
 AES connectors, 21  
 Alarm  
 Categories of, 104  
 Allowed responses, 105  
 Alarm Status, Status pop-up menu, 54  
 Alarms  
 Configuring and using, 104  
 Enabled globally and individually, 106  
 Remote monitoring of, 108  
 Status display, 108  
 To enable, 106  
 To enable Dolby-related, 107  
 To monitor, 108  
 To set allowed responses, 105  
 To set limits or qualify, 107  
 Analog audio, connecting, 23  
 Analog Input/Output connector, 22  
 Applications, Checking Chroma/Luma delay, 61  
 Arrowhead, Gamut pop-up menu, 53  
 Arrowhead display, 63  
 composite gamut, 67  
 Audio  
 Above-bar warnings, 50  
 AUDIO button, 48  
 Checking surround sound, 77  
 Configuring and monitoring, 71  
 Configuring and monitoring Dolby, 80  
 Configuring inputs, 71  
 Display, 48  
 Display, elements of, 49  
 In-bar warnings, 49, 50  
 Legacy level-bar defaults, 50  
 Level meters, 49  
 Optional breakout cable, 2  
 Options, 2  
 Pop-up menu, 51  
 Selecting an input, 73  
 audio input, selecting, 73  
 Audio Inputs  
 Allow alarms for, 72  
 Check level, 74  
 Check phase, 74

Configure for pairs or surround, 71  
 Map bars to input, 72  
 Specify mapping to analog outputs, 72  
 audio level, checking, 71, 74, 77, 80, 104  
 audio phase, checking, 74  
 Audio Session, Status pop-up menu, 54  
 Aux Data, Status pop-up menu, 54

## B

Bar Targets, Vector pop-up menu, 43  
 Basic operation, 15

## C

Calibration, Service options, 2  
 Center Waveform  
 Other pop-up menu, 52  
 Vector pop-up menu, 43, 48  
 Waveform pop-up menu, 42  
 Checking Surround Sound, Task description, 77  
 Chroma, Waveform pop-up menu, 42  
 Chroma/Luma delay, 61  
 Cloning Setups (Presets), Task description, 98  
 Closed Caption, Display, characteristics of, 47  
 Display  
 Status bar icons, 18  
 To control, 15  
 Safe Area Graticules, Display characteristics of, 47  
 Closed Captioning, Configuring and monitoring , 92  
 Closed Captions  
 To compensate for transport timing, 93  
 To Display, 93  
 To manually set the transport, 93  
 To select a CC service channel, 94  
 To select services that trigger alarms, 93  
 To select the transport, 92  
 To set the transport selection mode, 93  
 Color code, Status display, 55  
 Composite gamut, Diamond display, 67  
 Composite Input connectors, 20  
 Configuration menu, 36  
 Display, Connecting, 6  
 Connecting AC power, 7

Connecting signals, Line termination, 13  
 Connecting to monitors/projectors, Issues with, 14  
 Connector, Compatibility, 13  
 Connector(s)  
 AES, 21  
 Analog Input/Output, 22  
 Ethernet, 25  
 Power, 20  
 Remote, 24  
 Video input, 20  
 XGA, 24  
 CURSOR pop-up menu, 32  
 Cursors  
 Displaying, 31  
 How to use, 31

## D

Delete Frozen Image, FREEZE pop-up menu, 33  
 Diamond, Gamut pop-up menu, 53  
 Diamond Display, construction of the diamond graticule, 65  
 Diamond display, 63  
 checking RGB Gamut, 65  
 RGB gamut, 65  
 Display connector. *See* XGA output connector  
 DISPLAY SELECT buttons, 15  
 Documentation  
 Conventions used in, x  
 Purposes of, x  
 Dolby  
 Downmix mode, 88  
 Level meters, 49  
 Analog Output Map, Dolby, 81  
 Dolby audio  
 Configure global parameters, 83  
 Display, 86  
 Display Readout, 86  
 To configure expected format alarm, 81  
 Select the downmix mode, 84  
 To configure AES B Output map, 81  
 To configure Analog Output Map, 81  
 To configure input, 80  
 To configure source, 81  
 To display a Dolby input, 86  
 To configure Output map (Option DD only), 81  
 To select listening mode, 83

- To specify Dolby D content channel, 81
- To specify Dolby E program, 82
- To specify Dolby D stream, 81
- To specify Dolby E channel mask (alarms), 82
- To specify Dolby E downmix program, 82
- To turn on the AES Ref Frame Sync alarm, 82
- View metadata, 87
- Dolby D audio, Set dial normalization and dynamic range compression, 83
- Dolby E audio, Set dial normalization and pulldown coding, 84
- Dolby Status, Status pop-up menu, 54
- Dominance Indicator, To display, 77

## E

- Error Log, Status pop-up menu, 54
- Errors, Status indicators, 17
- Ethernet connector , 25

## F

- Factory defaults, How to set, 30
- Features, List of key, ix
- Filter, Waveform pop-up menu, 42
- Flat, Waveform pop-up menu, 42
- Flat + Luma, Waveform pop-up menu, 42
- Flexview, Defined, ix
- Follows video, Audio pop-up menu, 51
- Freeze, Using capture the display, 32
- FREEZE button, 32
- Freeze pop-up menu, 33
- Front-panel controls
  - Layout and index to usage procedures, 19
  - Levels of, 18
  - Scope of, 19
- Frozen Only, Freeze pop-up menu, 33

## G

- Gain
  - How to select, 29
  - How to set, 29
- Gamut
  - Display, 53
  - Display, elements of, 53
  - GAMUT button, 53
  - Pop-up menu, 53

- gamut
  - Arrowhead display, 67
  - checking, 63
  - Diamond display, 65
- GAMUT button, 53
- Gamut display
  - checking RGB gamut, 65
  - composite Arrowhead display, 67
- General Alarms, configure, 104
- Ground closure connector, 24

## H

- Hardware installation, 3–6
- Horizontal Offset, Timing display, 44
- How to...
  - Check surround sound, 77
  - Clone Setups (Presets), 98
  - Configure and monitor audio, 71
  - Configure and monitor Dolby, 80
  - Configure and use alarms, 104
  - configure your instrument, 36
  - connect to a network, 38, 40
  - control the display, 15
  - Determine status, 17
  - freeze the display, 32
  - measure waveforms with cursors, 31
  - Monitor alarms, 108
  - monitor Closed Captioning, 92
  - operate your waveform rasterizer, 15
  - select a measurement, 26
  - select an input, 28
  - set gain and sweep, 29
  - set line select mode, 35
  - set measurement parameters, 26
  - set to factory default settings, 30
  - Time a studio, 56
  - use online help, 37
  - use presets, 30

## I

- Incoming inspection, 7
- Inputs
  - How to select, 28
  - SDI, WV7100 vs. WV6100, 28
- Inspection, Incoming, 7
- Installation
  - BNC connector compatibility, 13
  - Connecting a display, 6
  - Connecting power, 7
  - In a serial video system, 12

- Instructions, 3–14
- Line-termination requirements, 13
- Rackmount, 3
- Removing from rack, 6
- Shipping package contents, 1
- IP settings, 38

## J

- Java applet
  - accessing remote interface, 110
  - Limitation of, 98
- Java Application
  - Obtaining package, 99
  - Requirements, 99
  - Clone Setups (Presets), 98
  - Launching, 100
  - Recalling a file of Presets, 102
  - Recalling Presets from a file, 101
  - Saving all Presets, 101
  - Saving Presets to a file, 100

## L

- Lightning, Vector pop-up menu, 42
- Lightning display, 61
- limits, gamut, 63
- Line Select mode, how to set, 35
- Lissajous display, 75
- Lissajous Snd Stage, Audio pop-up menu, 51
- Lissajous Sound Stage, Phase Style, 75
- Listening Mode
  - Table of settings, 89
  - To select, 83
- Listening Modes, Descriptions of, 88
- Live + Frozen Only, Freeze pop-up menu, 33
- Luma, Waveform pop-up menu, 42
- Luma/Chroma delay, 61

## M

- Manuals
  - Conventions used in, x
  - Purposes of, x
- MEAS button, 44
- Measure
  - Display, 44
  - Display, elements of, 44
  - How to, with cursors, 31
  - MEAS button, 44
  - Pop-up menu, 44

- Measurement
    - How to select, 26
    - How to set parameters, 26
    - Relative to:, 44
    - Save Offset, 44
  - Mechanical installation, 3
  - Menu, CONFIG, 36
  - Monitor/Projector connection, Problems with, 14
  - Monitoring Audio, Task description, 71
  - Monitoring CC and Safe Area Compliance, Task description, 92
  - Monitoring Dolby Audio, Task description, 80
- N**
- Network
    - Connect to, 38, 40
    - IP settings, 38
    - SNMP settings, 39
- O**
- Online help, 37
    - Displaying, 37
    - How to use, 37
    - Navigating, 37
  - Operation
    - Basic, 15
    - Control levels (types), 18
    - Verification, 7
  - Optional accessories, 2
  - Options, 2
    - Power cords, 1
  - LTC, Display, 52
  - Other
    - Display, elements of, 52
    - OTHER button, 52
    - Pop-up menu, 52
  - Other button, 52
  - Overlay, Waveform pop-up menu, 42
- P**
- Parade, Waveform pop-up menu, 42
  - Part numbers, User Manual, 1
  - Phase (audio)
    - Choose channel pair, 74
    - Correlation meter response times, 75
    - Correlation meters, 50
    - Custom channel pair, 74, 75
    - Display, 49
    - Select display style, 74
  - Phase Display, Audio pop-up menu, 51
  - Phase Pair, Audio pop-up menu, 51, 52
  - Surround Sound
    - Radio-Technische Werkstaetten GmbH & Co, 52
    - Display, 49
  - Phase Style, Audio pop-up menu, 51
  - PICT button, 47
  - Picture
    - Display, 47
    - PICT button, 47
    - Picture pop-up menu, 48
    - Pop-up menu, 48
  - Picture Frame, 47
  - Pop-up menus, 26
    - Audio, 51
    - Cursors, 32
    - Freeze, 33
    - Gamut, 53
    - Measure, 44
    - Other, 52
    - Picture, 48
    - Status, 54
    - Vector, 43
    - Waveform, 41
  - Power, Connector, 20
  - Power cord options, 1
  - Power
    - AC requirements, 7
    - Connecting, 7
    - Switch (none required), 7
  - Presets
    - accessing from a Web browser, 98, 99
    - Cloning to other rasterizers, 98
    - How to clone between rasterizers, 98
    - How to save and recall, 30
  - Product description, ix
- R**
- Rackmount
    - Adjustments, 4
    - Slide maintenance, 6
  - Rackmount installation, 3
  - Rear Panel, Measure pop-up menu, 45
  - Rear-panel controls, Layout and description, 20
  - Recall, Settings (presets), 30
  - Recalling a file of Presets, 102
  - Recalling Presets from a file, Java Application, 101
  - Reference, input connector, 20
  - Relative to:, Measure pop-up menu, 44
  - Remote connector , 24
  - Remote Interface, 109
  - Repair, Service options, 2
  - RGB, Waveform pop-up menu, 41
  - RGB gamut, Diamond display, 65
- S**
- Safe Area
    - To monitor for compliance, 95
    - To set custom parameters, 95
  - Safe Area Graticules
    - Description of, 97
    - To display, 96
    - To choose a standard, 95
  - Save
    - Measure pop-up menu, 44
    - Settings (presets), 30
  - Saving All Presets , 101
  - Saving Presets to a File
    - Using the Java Application, 100
    - Using the Web browser, 98
  - SDI -> Composite, Waveform pop-up menu, 41
  - SDI input connectors, 20
  - selecting audio input, 73
  - Service, Options, 2
  - Signal connection, Line-termination requirements, 13
  - SNMP settings, 39
  - Split Diamond, Gamut pop-up menu, 53
  - Split Diamond display, 63
  - Documents, Included, 1
  - Standard accessories, 1
    - Documents, 1
    - Power cord, 1
  - Status
    - Color code, 55
    - Determining, 17
    - Display, 54
    - Display, types of, 54, 55
    - GAMUT button, 54
    - Pop-up menu, 54
  - STATUS button, 54
  - Surround sound
    - Displaying and checking, 77
    - To select the display, 77
  - Surround Filter, To set, 77
  - Surround Sound
    - Display elements of, 78
    - Signal display examples , 79
    - To check performance, 78
  - System Upgrade, Utilities, 117

**T**

Termination, Requirements for, 13

Tile

Mode, how to enter, 15

To select a, 15

Time, Cursor pop-up menu, 32

Timing, Chroma/Luma delay, 61

Timing a studio

Router inputs, 59

Task description, 56

Timing-display method, 57

Traditional method, 56

Timing display, 57

Tektronix, 44

**U**

Using Alarms, Task description, 104

**V**

VECT button, 42

Vector

Display, 42, 61

Display, elements of, 42

Pop-up menu, 43

VECT button, 42

Vector pop-up menu, 42

Vector pop-up menu

Bar Targets, 43

Center Waveform, 43, 48

Verification, Basic functional, 7

Vertical Offset, Timing display, 44

Video, Options, 2

Video input connectors, 20

Video Session, Status pop-up menu, 54

Voltage, Cursor pop-up menu, 32

Voltage + Time, Cursor pop-up menu,  
32

**W**

Warnings

Above level bars , 50

In level bars , 50

Waveform

Pop-up menu, 41

Center Waveform, 42

Display, 41

Display, characteristics of, 47

Display, elements of, 41

Filter, 42

Chroma, 42

Flat, 42

Flat + Luma, 42

Low Pass, 42

Luma, 42

Overlay, 42

Parade, 42

RGB, 41

SDI -> Composite, 41

WFM button, 41

YPbPr, 41

YRGB, 41

web browser, accessing remote inter-  
face, 109

WFM button, 41

**X**

X-Y

Audio pop-up menu, 51

Phase Style, 75, 86, 97

XGA Output connector, 24

**Y**

YPbPr, Waveform pop-up menu, 41

YRGB, Waveform pop-up menu, 41