Imagine COMMUNICATIONS™

Installation and Operation Manual

CMN-41™
Compact Video and Audio Monitor

October 2010

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CMN-41

Compact Video and Audio Monitor

Installation and Operation Manual

Revision B

October 2010

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About This Manual

This manual details the features, installation procedures, operational procedures, and specifications of the CMN-41 and CMN-41L compact video and audio monitor.

About This Manual provides an overview of this installation and operation manual, describes manual conventions, and tells you where to look for specific information. This section also gives you important information on unpacking and shipping your product.

Intended Audience

This manual is written for engineers, technicians, and operators responsible for the installation, setup, and/or operation of the CMN-41 and CMN-41L compact video and audio monitor.

Finding Specific Information

Table P-1 shows the location of specific information in this manual.

Table P-1 Finding Specific Information in this Guide

If you are looking for	Go to
Alarm descriptions	Page 127
Back panel information	Page 20
Browser interface	Page 139
Connecting	Page 20
Control panels	Page 15
Customer Service information	Page 16
Display types	Page 39
Ethernet setup and configuration	Page 20
External control	Page 139
Features	Page 10
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Table P-1 Finding Specific Information in this Guide *(Continued)*

If you are looking for	Go to
IP configuration utility	Page 23
Mounting the unit in a DRT-4 case	Page 18
Options	Page 10
Pinouts	Page 155
Setup menus	Page 97
Specifications	Page 145
Troubleshooting	Page 143
User accounts	Page 141
Video formats supported	Page 11

Manual Information

This section provides information about the revision history of the manual, writing conventions used for ease of understanding as well as for navigation throughout the document, and information about obtaining other product manuals.

Revision History

Table P-2 Manual Revision History

Edition	Date	Revision History
—	September 2009	Initial release
A	April 2010	Added information about CMN-41L
B	October 2010	Minor corrections to headphone specifications and LTC/GPI D-Sub connector

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Writing Conventions

To enhance your understanding, the authors of this manual have adhered to the following text conventions:

Table P-3 Manual Style and Writing Conventions

Term or Convention	Description
Bold	Indicates dialog boxes, property sheets, fields, buttons, check boxes, list boxes, combo boxes, menus, submenus, windows, lists, and selection names
Italics	Indicates email addresses, the names of books or publications, and the first instances of new terms and specialized words that need emphasis
CAPS	Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, or DELETE
`Code`	Indicates variables or command-line entries, such as a DOS entry or something you type into a field
> or →	Indicates the direction of navigation through a hierarchy of menus and windows
hyperlink	Indicates a jump to another location within the electronic document or elsewhere
Internet address	Indicates a jump to a website or URL
	Indicates important information that helps to avoid and troubleshoot problems
To perform a procedure	Indicates the introduction to a procedure or series of procedural steps

Obtaining Documents

The installation and operation manuals for most Harris BCD products are included on your Documentation and Product Resources DVD as individual Adobe Acrobat PDF files. Most of the software applications contained on the DVD include Online Help (electronic documents integrated into their respective software applications). While working in the application, you can open the Online Help and print out individual topics. The most up-to-date documentation and software is always available on our website.

Unpacking/Shipping Information

This product was carefully inspected, tested, and calibrated before shipment to ensure years of stable and trouble free service.

Unpacking a Product

1. Check equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Contact your dealer if any item on the packing list is missing.

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4 Contact the carrier if any item is damaged.

5 Remove all packaging material from the product and its associated components before you install the unit.

Product Servicing

CMN-41 and CMN-41L modules are not designed for field servicing. All hardware upgrades, modifications, or repairs require you to return the modules to the Customer Service center. For more information see ***CMN-41 Service and Support*** on page 16.

Returning a Product

In the unlikely event that your product fails to operate properly, please contact Customer Service to obtain a Return Authorization (RA) number, and then send the unit back for servicing.

Keep at least one set of original packaging, in the event that you need to return a product for servicing. If the original packaging is not available, you can purchase replacement packaging at a modest cost or supply your own packaging as long as it meets the following criteria:

- Withstands the weight of the product
- Holds the product rigid within the packaging
- Leaves at least two inches of space between the product and the container
- Protects the corners of the product

Ship products back to us for servicing prepaid and, if possible, in the original packaging material. If the product is still within the warranty period, we will return the product prepaid after servicing. For more information see ***CMN-41 Service and Support*** on page 16.

Operator's Safety Summary

WARNING: These instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform this installation or any servicing unless you are qualified to do so. Refer all servicing to qualified service personnel.

Ensuring Safety

- The unit should not be exposed to dripping or splashing, and no objects filled with liquids, such as vases, shall be placed on the unit.
- When the unit is to be permanently cabled, connect the protective ground conductor before making any other connections.
- Operate built in units only when they are properly fitted into the system.
- For permanently cabled units without built in fuses, automatic switches, or similar protective facilities, the AC supply line must be fitted with fuses rated to the units.
- Before switching on the unit, ensure that the operating voltage set at the unit matches the line voltage, if appropriate. If a different operating voltage is to be set, use a fuse with the appropriate rating. Refer to the Installation Instructions.

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- Units of Protection Class I with an AC supply cable and plug that can be disconnected must be operated only from a power socket with protective ground contact:
  - Do not use an extension cable–it can render the protective ground connection ineffective.
  - Do not intentionally interrupt the protective ground conductor.
  - Do not break the protective ground conductor inside or outside the unit or loosen the protective ground connection; such actions can cause the unit to become electrically hazardous.

- Before opening the unit, isolate it from the AC supply. Then, ensure that
  - Adjustments, part replacements, maintenance, and repairs are carried out by qualified personnel only.
  - Safety regulations and rules are observed to prevent accidents.
  - Only original parts are used to replace parts relevant to safety (for example, the power on/off switches, power transformers, and fuses).

- Replaceable fuses can be hazardous when live. Before replacing a fuse, disconnect the AC power source.
- Use caution when cleaning the equipment; isopropyl alcohol or similar solvents can damage or remove the labels.
- Observe any additional safety instructions specified in this manual.

Explanation of Symbols

These symbols may appear on Harris equipment:

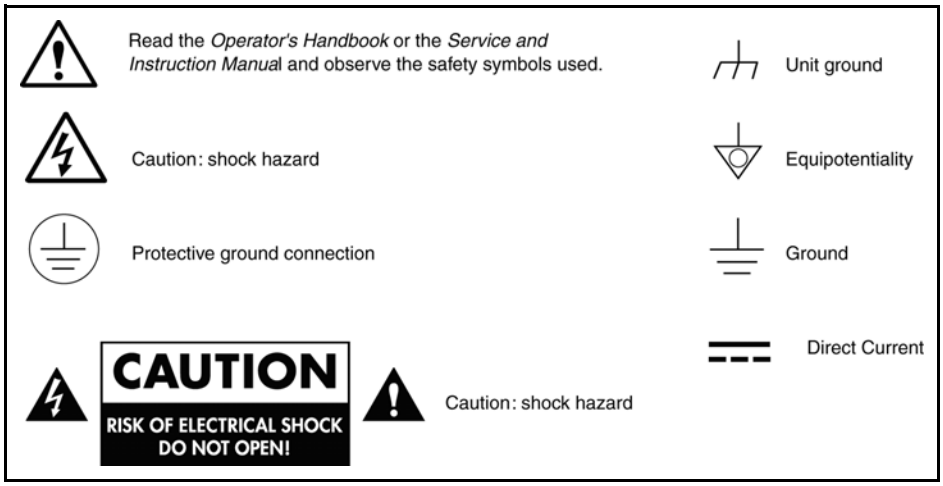

Figure P-1 Safety Symbols Appearing on Harris Equipment

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This product manual uses the following safety terms and symbols to identify certain conditions or practices.

Table P-4 Safety Terms and Symbols Appearing in the Product Manual

Symbol	Description
	WARNING: Identifies conditions or practices that can result in personal injury or loss of life — high voltage is present. Uninsulated dangerous voltage within the product's enclosure may be sufficient to constitute a risk of electric shock to persons.
	CAUTION: Identifies conditions or practices that can result in damage to the equipment or other property. Important operating and maintenance (servicing) instructions are included in the literature accompanying the product.

Certification Labels and Symbol Locations

On Harris equipment, certification labels and symbols are located on the back panel, rear chassis sides, or bottom rear of the chassis. On smaller space-restricted units, most labels and symbols can be found on the bottom rear of the chassis.

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Directives and Compliances

This section provides information concerning Harris Corporation compliance with EU Directive 2002/95/EC and EU Directive 2002/96/EC.

Restriction on Hazardous Substances (RoHS) Directive

Directive 2002/95/EC — commonly known as the *European Union (EU) Restriction on Hazardous Substances (RoHS)* — sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive, which took effect on July 1, 2006, refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

In accordance with this EU Directive, products sold in the European Union will be fully RoHS-compliant and "lead-free." Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Equipment that complies with the EU directive will be marked with a RoHS-compliant symbol, as shown in **Figure P-2**.

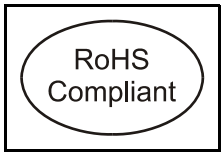

Figure P-2 RoHS Compliance Symbol

Waste from Electrical and Electronic Equipment (WEEE) Directive

The *European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE)* deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. As of August 13, 2005, producers or users are required to recycle electrical and electronic equipment at end of its useful life, and must not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, companies selling electric or electronic devices in the EU will affix labels indicating that such products must be properly recycled. Contact your local Sales representative for information on returning these products for recycling. Equipment that complies with the EU directive will be marked with a WEEE-compliant symbol, as shown in **Figure P-3**.

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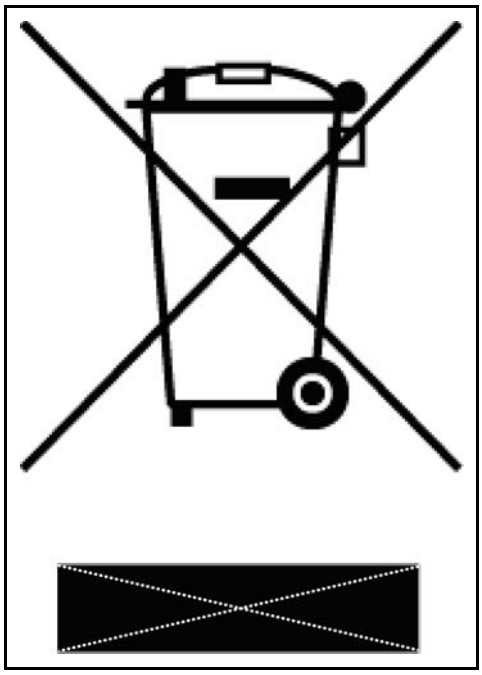

Figure P-3 WEEE Compliance Symbol

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1 Introduction

The Harris CMN-41 compact video and audio monitoring unit is the most advanced, versatile, and intuitive monitoring instrument available today. The CMN-41 is available for HD-SDI/SD-SDI (which can be upgraded to 3 Gb/s capability in two SDI inputs). With 100% digital signal processing technology, the CMN-41 provides an accurate and stable user customizable display of waveform, vector, gamut, audio, picture, relative timing, and alarm status functions in full-screen views. In addition, the CMN-41 provides overlay display capabilities for vector, waveform, and picture-in-picture (PIP) functions. The CMN-41 also provides a Quad screen display capability for audio or alarm, picture, vector or gamut, and waveform or relative timing. Quick setup and parameter changes are possible with direct access to display functions and screen location, 99 presets, context-sensitive shortcut menus, and an intuitive navigation system.

The CMN-41 features extensive audio and video alarm capabilities, including peak level reporting. All real-time signal alarms have user adjustable limits, time stamps from LTC or DVITC and an internal clock. Remote interfaces include 10/100Base-T Ethernet and plug and-play USB port (supporting storage and recall of presets and frame-capture transfer). The CMN-41 instruments are digital instruments with all-digital architecture; therefore, no periodic calibration is required.

The CMN-41L has the same features as the CMN-41, except for the front panel controls. The CMN-41L is designed to be controlled from a PC using a web browser or an optional RCU-CMS remote control unit.

Except where noted, the term "CMN-41" is used in this manual to refer to both CMN-41 and CMN-41L units.

The CMN-41 seamlessly integrates into any broadcast, post-production, camera maintenance, satellite or cable facility, and is the ultimate choice for quality control, troubleshooting, or compliance checking applications.

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Product Features

The CMN-41 includes the following standard and optional features.

Standard Features

- Two active loop-thru 3Gb/s-SDI/HD-SDI/SD-SDI video inputs with auto detection (version dependent)
- One AES input
- Passive looping external reference to support blackburst and tri-level sync
- 5x oversampling for enhanced audio True Peak detection
- All AES and embedded audio inputs are sample rate converted to 48 kHz
- Twelve-button numeric keypad
- Headphone jack
- Customizable function display screen location, multiple displays via overlay
- Alarms with Peak Level Report
- USB port for data transfer and software updates
- XGA, high resolution output for external display (DVI-D)
- Patented Video Relative Timing display
- Patented Gamut display
- 99 user presets
- Illuminated controls and indicators
- Ethernet
- Applicable standards: SMPTE 125M-1995, SMPTE 259M-1997, SMPTE 274M-2005, SMPTE 276M, SMPTE 292M-1998, SMPTE 296M-2001, SMPTE 352M-2002, SMPTE 372M-2002, SMPTE 424M-2006, SMPTE 425M-2006, SMPTE RP 178-2004, SMPTE RP 198-1998, SMPTE RP 219-2002

Optional Features

Table 1-1 CMN-41 Optional Features and Descriptions

Option	Description
TVM-WRTY2	Warranty option; adds three years to the standard two-year warranty
CMN-41	Supports SD-SDI and HD-SDI video
CMN-41L	Supports SD-SDI and HD-SDI video; controlled from a PC using a web browser or an optional RCU-CMS remote control unit
CMN-41-S	Supports SD-SDI video
CMN-41L-S	Supports SD-SDI video for CMN-41L
CMN-41-3GB	Supports SD-SDI, HD-SDI, and 3Gb/s-SDI video
CMN-41L-3GB	Supports SD-SDI, HD-SDI, and 3Gb/s-SDI video for CMN-41L
CMN-S2H-F	Field upgrade for CMN-41-S to support HD-SDI video
CMN-S23GB-F	Field upgrade for CMN-41-S to support HD-SDI and 3Gb/s-SDI video

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Table 1-1 CMN-41 Optional Features and Descriptions *(Continued)*

Option	Description
CMN-H23GB-F	Field upgrade for CMN-41 to support 3Gb/s-SDI
BLK-4	Blank panel for DRT-4
DRT-4	Double rack mount case
RCU-CMS	Remote control unit option ■ Provides remote control panel for desk top applications, including Ethernet connection software for setup of the RCU and IP addresses of connected units ■ Provides connections for up to 32 independent units

Video Formats Supported

The CMN-41 supports the following video formats:

• = *Supported standards and formats*

Table 1-2 Options and Supported Video Formats

Video Formats	CMN Models					
	CMN-41	CMN-41L	CMN-41-S	CMN-41L-S	CMN-41-3GB	CMN-41L-3GB
DVB-ASI and SMPTE-310						
Analog Composite						
SD-SDI	•	•	•	•	•	•
HD-SDI	•	•			•	•
3 Gb/s-SDI					•	•
Dual Link - YCbCr 10 Bit 4:4:4					•	•
Dual Link – RGB and RGB+A, 10 Bit 4:4:4. and 4:4:4:4					•	•
Dual Link – YCbCr and RGB, 12 Bit 4:4:4					•	•

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Table 1-3 3 Gb/s Formats

Format	10 bit 4:2:2 YCbCr	10 bit 4:4:4 YCbCr	10 bit 4:4:4:4 YCbCr+A	10 bit 4:4:4 RGB	10 bit 4:4:4:4 RGB+A	12 bit 4:2:2 YCbCr	12 bit 4:4:4 YCbCr	12 bit 4:4:4 RGB
1080i								
1080i/60		•	•	•	•	•	•	•
1080i/59.94		•	•	•	•	•	•	•
1080i/50		•	•	•	•	•	•	•
1080p								
1080p/60	•							
1080p/59.94	•							
1080p/50	•							
1080p/30		•	•	•	•	•	•	•
1080p/29.97		•	•	•	•	•	•	•
1080p/25		•	•	•	•	•	•	•
1080p/24		•	•	•	•	•	•	•
1080p/23.98		•	•	•	•	•	•	•
1080psF/30		•	•	•	•	•	•	•
1080psF/29.97		•	•	•	•	•	•	•
1080psF/25		•	•	•	•	•	•	•
1080psF/24		•	•	•	•	•	•	•
1080psF/23.98		•	•	•	•	•	•	•
720p								
720p/60		•	•	•	•			
720p/59.94		•	•	•	•			
720p/50		•	•	•	•			
720p/30		•	•	•	•			
720p/29.97		•	•	•	•			
720p/24		•	•	•	•			
720p/23.98		•	•	•	•			

Both Level A and Level B 3 Gb/s formats are supported. When a 3 Gb/s Level A signal is detected, the standard is shown with the letter "A" appended to the format (1080p/59.94 A). When a 3 Gb/s Level B signal is detected, the standard is shown with the letter "B" appended to the format (1080p/59.94 B).

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Table 1-4 Dual Link Formats

Format	10 bit 4:2:2 YCbCr	10 bit 4:4:4 YCbCr	10 bit 4:4:4:4 YCbCr+A	10 bit 4:4:4 RGB	10 bit 4:4:4:4 RGB+A	12 bit 4:2:2 YCbCr	12 bit 4:4:4 YCbCr	12 bit 4:4:4 RGB
1080i								
1080i/60		•	•	•	•	•	•	•
1080i/59.94		•	•	•	•	•	•	•
1080i/50		•	•	•	•	•	•	•
1080p								
1080p/60	•							
1080p/59.94	•							
1080p/50	•							
1080p/30		•	•	•	•	•	•	•
1080p/29.97		•	•	•	•	•	•	•
1080p/25		•	•	•	•	•	•	•
1080p/24		•	•	•	•	•	•	•
1080p/23.98		•	•	•	•	•	•	•
1080psF/30		•	•	•	•	•	•	•
1080psF/29.97		•	•	•	•	•	•	•
1080psF/25		•	•	•	•	•	•	•
1080psF/24		•	•	•	•	•	•	•
1080psF/23.98		•	•	•	•	•	•	•

Table 1-5 HD Formats

	10 bit 4:2:2 YCbCr
1080i	
1080I/60	•
1080I/59.94	•
1080I/50	•
1080p	
1080P/30	•
1080P/29.97	•
1080P/25	•
1080P/24	•
1080P/23.98	•
720p	
720p/60	•

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Table 1-5 HD Formats

720p/59.94	•
720p/50	•
720p/30	•
720p/29.97	•
720p/24	•
720p/23.98	•
Segmented Frame	
1080P/30sF	•
1080P/29.97sF	•
1080P/25sF	•
1080P/24sF	•
1080P/23.98sF	•

Table 1-6 SD Formats

	10 bit 4:2:2 YCbCr
525/59.94	•
625/50	•

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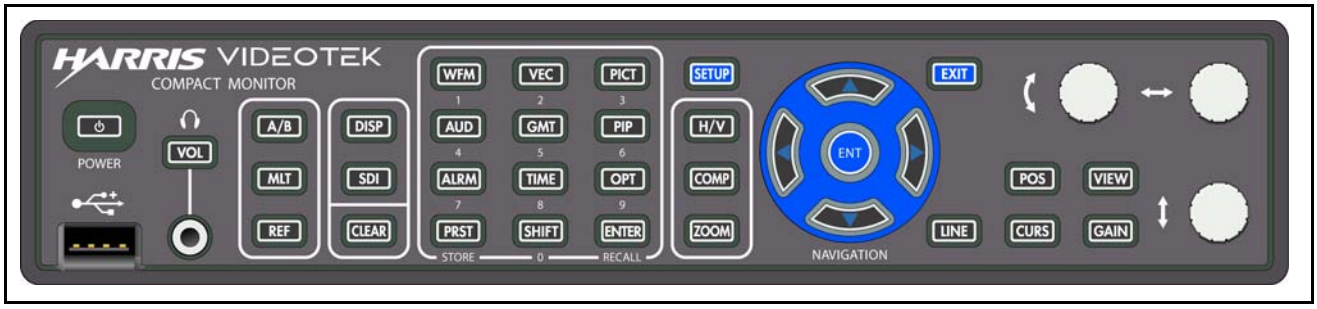
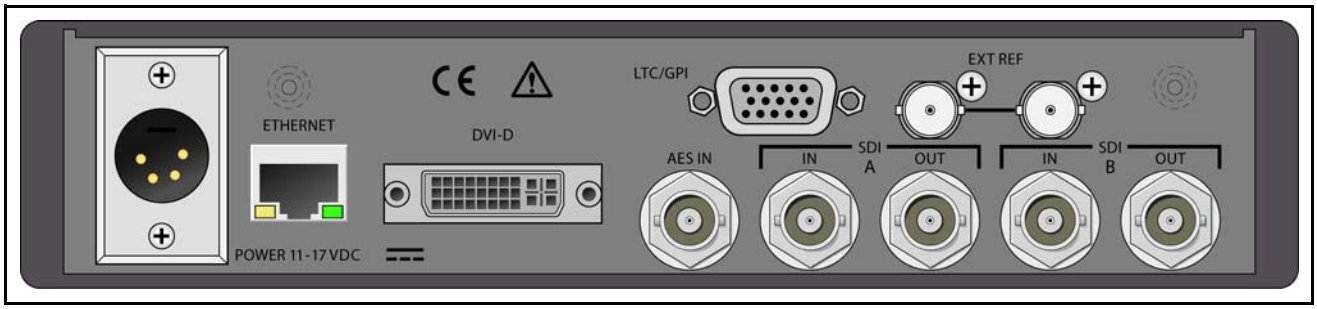
Front Panel and Back Panel Views

Figure 1-1 shows the front and back panel views of the CMN-41 and CMN-41L. See **Table 3-1** on page 32 for descriptions of the front panel components. See **Table 3-2** on page 35 for descriptions of the web-based panel control components for the CMN-41L. See **Table 2-2** on page 20 for descriptions of the back panel components.



CMN-41 Front Panel

CMN-41L Front Panel



CMN-41/CMN-41L Back Panel

Figure 1-1 CMN-41/CMN-41L Front and Back Panels

*The CMN-41L is controlled by using either a web-based control panel or an optional RCU-CMS remote control unit. See page 35 for more information on the web-based control panel. See the **RCU-CMN Installation and Operation Manual** for more information on the remote control unit.*

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Safety

See the ***Operator's Safety Summary*** on page 4 for a list of important safety instructions.

Carefully observe all safety alert symbols for dangers, warnings, and cautions. They alert installers and operators of possible dangers or important information contained in this manual.

Keep in mind, though, that warnings alone do not eliminate hazards, nor are they a substitute for safe operating techniques and proper accident prevention measures.

CMN-41 Service and Support

For service and support, telephone the Harris Customer Service Department at **1-888-534-8246**. If the problem cannot be resolved over the telephone and the instrument must be shipped to Harris for service or repair:

- Obtain a Return Authorization (RA) number from the Harris Customer Service Department.
- Attach a tag to the unit with the following information:
  - Your company name, address, and telephone number
  - The name of the contact person at your company
  - The RA number
  - The unit serial number
  - An explanation of the problem
- To prevent shipping damage, pack the unit the same way Harris had packed it. If possible, use the original packing materials in the original shipping container.
- Ship the unit to the following location:

  Harris Corporation
  Videotek Test and Measurement
  243 Shoemaker Road
  Pottstown, PA 19464-6433

  Attn: RA *xxxx* (where *xxxx* is the RA number)

  Email: BCDService@harris.com

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2 Installation

Installation Procedures

Inspecting the Shipment

Before installing the CMN-41, inspect the box and the contents. Report any damage to the shipper, and then telephone the Harris Corporation Customer Service Department (see ***CMN-41 Service and Support*** on page 16).

Refer to the enclosed packing sheet for the latest list of items that are supplied with the unit.

The box contains the following:

- One CMN-41 rasterizer
- One ***CMN-41 Installation and Operation Manual*** on CD
- One 75Ω terminator
- One detachable power cord
- One power supply assembly
- One breakout connector (for LTC/GPI)

Save the box and packing material for any future shipping requirements.

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Rack Mounting the CMN-41

When selecting the permanent mounting location for the CMN-41, make sure that the flow of air to the ventilation holes on the top and sides of the chassis is not obstructed.

Rack mounting the CMN-41 is illustrated in **Figure 2-1** for the DRT-4 rack mount case. **Table 2-1** lists the parts required to rack mount the CMN-41 into the DRT-4 rack mount case.

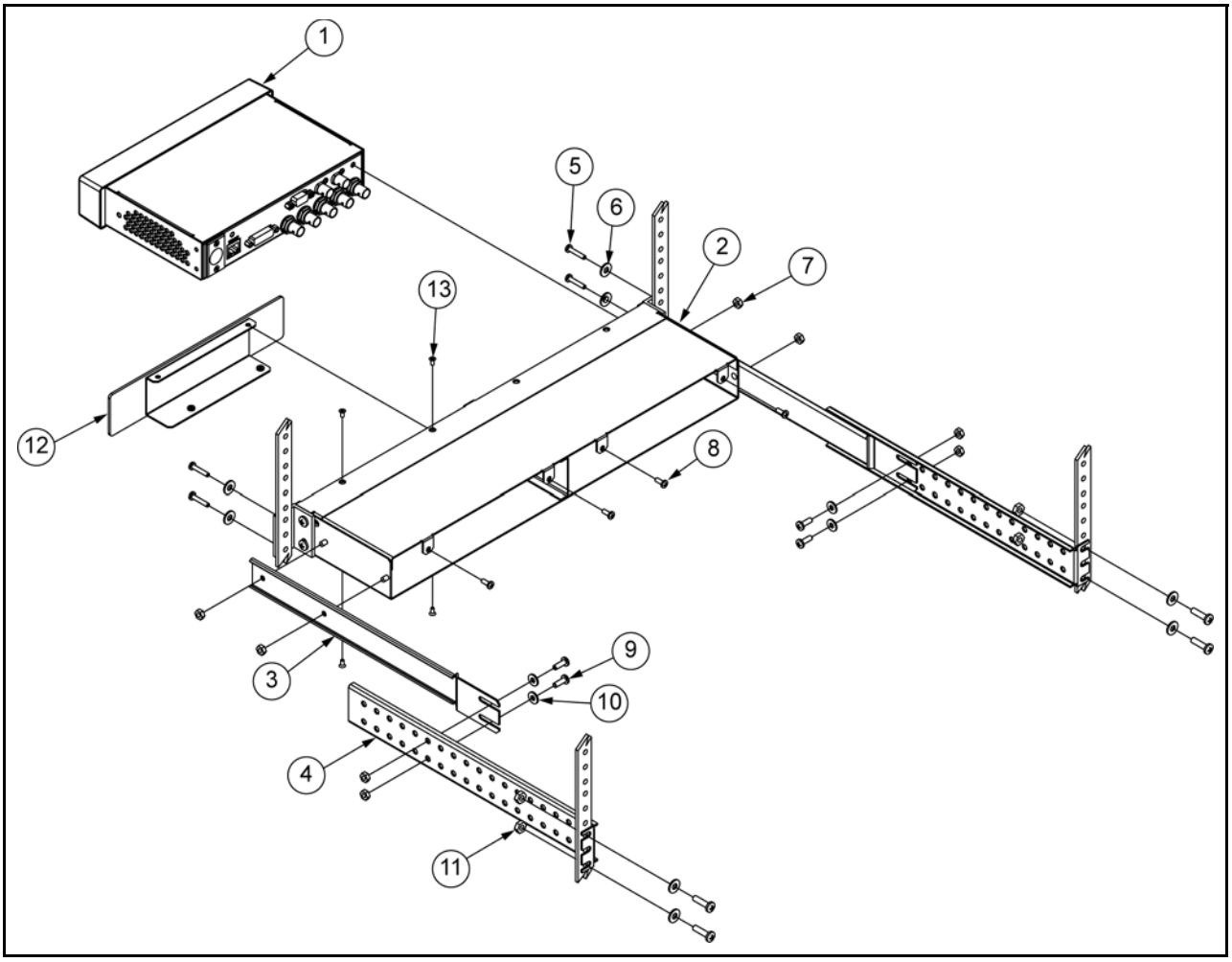

Figure 2-1 Mounting the CMN-41 in a Rack Using the DRT-4

*Although only one CMN-41 unit is shown in **Figure 2-1**, two CMN-41 units may be mounted into a DRT 4 rack case.*

Table 2-1 Parts for Rack Mounting the CMN-41 Using the DRT-4

Key	Item Number	Qty	Description
1	-	A/R	CMN-41 unit
2	866080	1	DRT-4 rack tray
3	832072	2	Metal extension mount
4	832070	2	Metal extension bracket
5	831030	8	#10-32×¾-in. Phillips head screws

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Table 2-1 Parts for Rack Mounting the CMN-41 Using the DRT-4 *(Continued)*

Key	Item Number	Qty	Description
6	831019	4	Nylon washer, rack mount
7	831119	8	#8-32 kep nuts
8	831131	4	#8-32×3/8-in. Phillips head screws (CMN mtg)
9	831064	4	#8-32×½-in. Phillips head screws
10	831118	8	#10 flat washers
11	831030	4	#10-32×¾-in. Phillips head screws
	866073		FP BLK-4 (optional cover plate)
12	832131	1	DRT-4 metal blank panel
13	831136	4	#4-40×¼ self-tapping Phillips head screws

1. Install the extension bracket mounts (ITEM 3) to both sides of the chassis (ITEM 2) using four #8-32 kep nuts (ITEM 7)
2. Install the assembled unit in a rack using #10-32×¾-in Phillips head screws (ITEM 5) and washers (ITEM 6) through the chassis front mounting ears, as shown.
3. Hold the extension bracket (ITEM 4) in place on each side of the chassis, and loosely install #8-32×½-in. Phillips head screws (ITEM 9), #10 flat washers (ITEM 10), and #8-32 kep nuts (ITEM 7) into the holes that align with the slots in the metal extension mount (ITEM 3).
4. Install the #10-32×¾-in. Phillips head screws (ITEM 5), #10 flat washers (ITEM 10), and #10-32×¾-in. Phillips head screws (ITEM 11) through the rack rails and the appropriate slots in the back of the metal extension bracket (ITEM 4), and then tighten them.
5. Tighten the remaining hardware that joins the bracket pairs (ITEM 3 and ITEM 4).
6. Using 3/8-in. Phillips head screws (ITEM 8), secure the CMN-41 unit to the back of the DRT-4 rack case.
7. If desired, install the optional BLK-4 cover plate:
   - Slide the metal cover plate (ITEM 12) into the desired side of the DRT-4 rack.
   - Using 4 self tapping screws (ITEM 13), secure the cover plate into the DRC-3 rack.
8. The installation is complete.

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Connecting the CMN-41

The back panel connectors are illustrated in **Figure 2-2**, and the function of each connector is described in **Figure 2-2**.

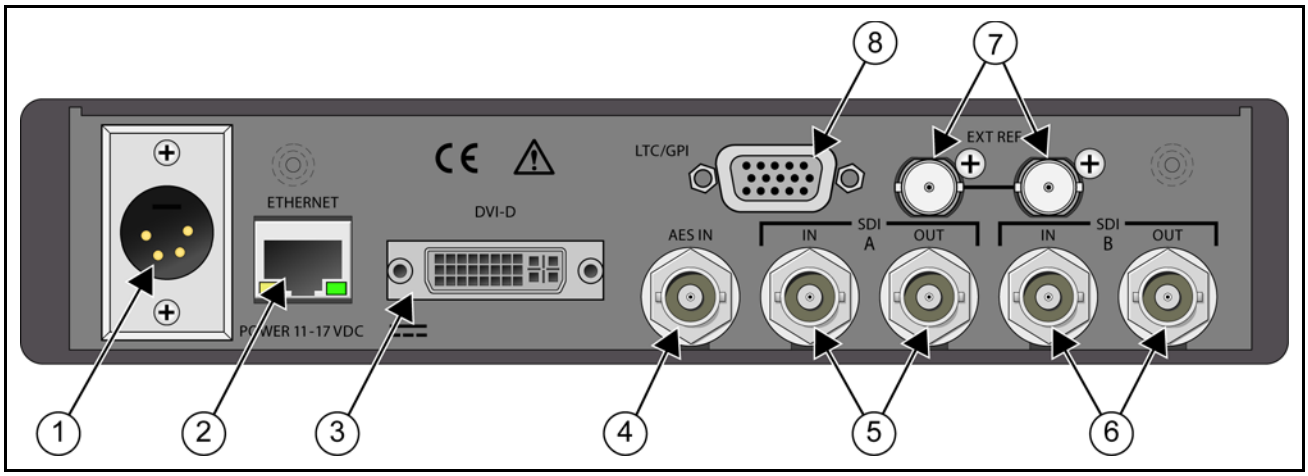

Figure 2-2 CMN-41 Back Panel Connectors

Table 2-2 Description of Back Panel Connectors

Key	Label	Description
1	PWR 11-17VDC	Power connector
2	ETHERNET	RJ45, female, 10/100Base-T Ethernet connector*
3	DVI-D	DVI connector for external monitor
4	AES IN	AES input BNC connector
5	SDI A	Input and output BNC connectors for SDI A
6	SDI B	Input and output BNC connectors for SDI B
7	EXT REF	External reference input and loop through
8	LTC/GPI	15 pin, high-density, female, D sub connector for LTC/ GPI/TALLY input[1]

[1] See ***Pinouts*** on page 155 for the connections.

Ethernet Setup

The Ethernet default settings for the CMN-41 are as follows:
IP: 192.168.0.100
Subnet Mask: 255.255.255.0
Gateway: 0.0.0.0

1 Prior to performing the CMN-41 network configuration, obtain TCP/IP addresses from the system administrator or the Internet service provider (ISP). These addresses are a static IP address (unless using Dynamic Host Configuration Protocol [DHCP]), a subnet mask, and an optional gateway IP.

Be sure to record all addresses in the spaces provided below. The gateway address is not needed unless the CMN-41 is routed to an outside network.

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Record the addresses:

CMN-41 interface static IP address	
CMN-41 interface subnet mask	
Gateway IP address	

2 Identify a host PC to configure and test the CMN-41.

3 Choose a dedicated PC connection or network connection method:

- For a dedicated PC connection, connect the host PC with a network card to the "ENET" connector on the back panel of the CMN-41, using a CAT5 crossover cable (not included). See **Figure 2-3**.

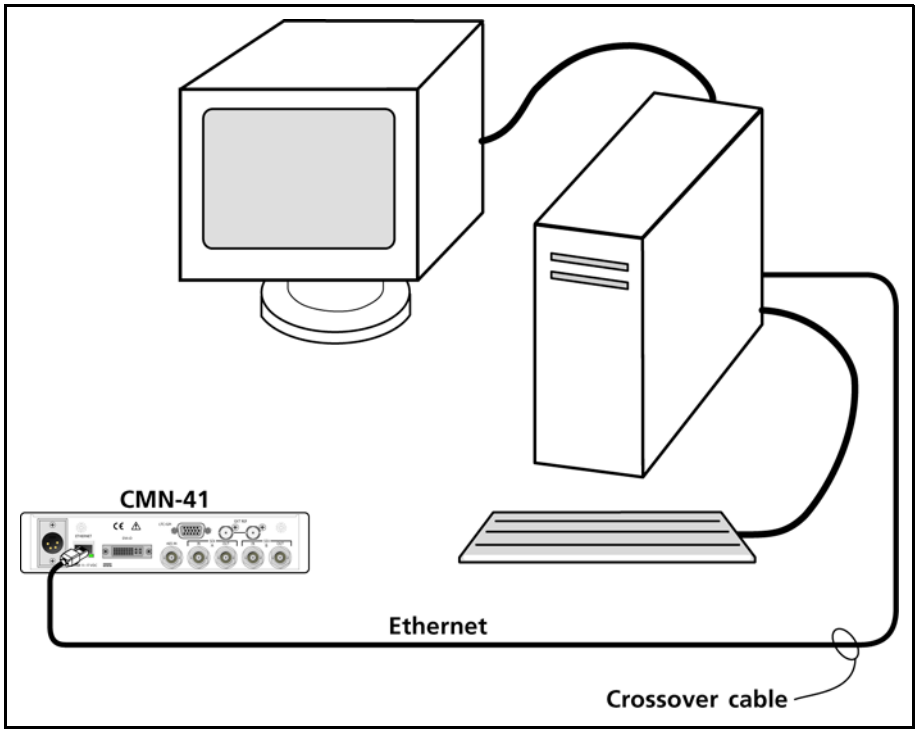

Figure 2-3 CMN-41 Dedicated PC Connection

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- For a network connection, connect the network hub to the back panel of the CMN-41 using a CAT5 network cable (not included). See **Figure 2-4**.

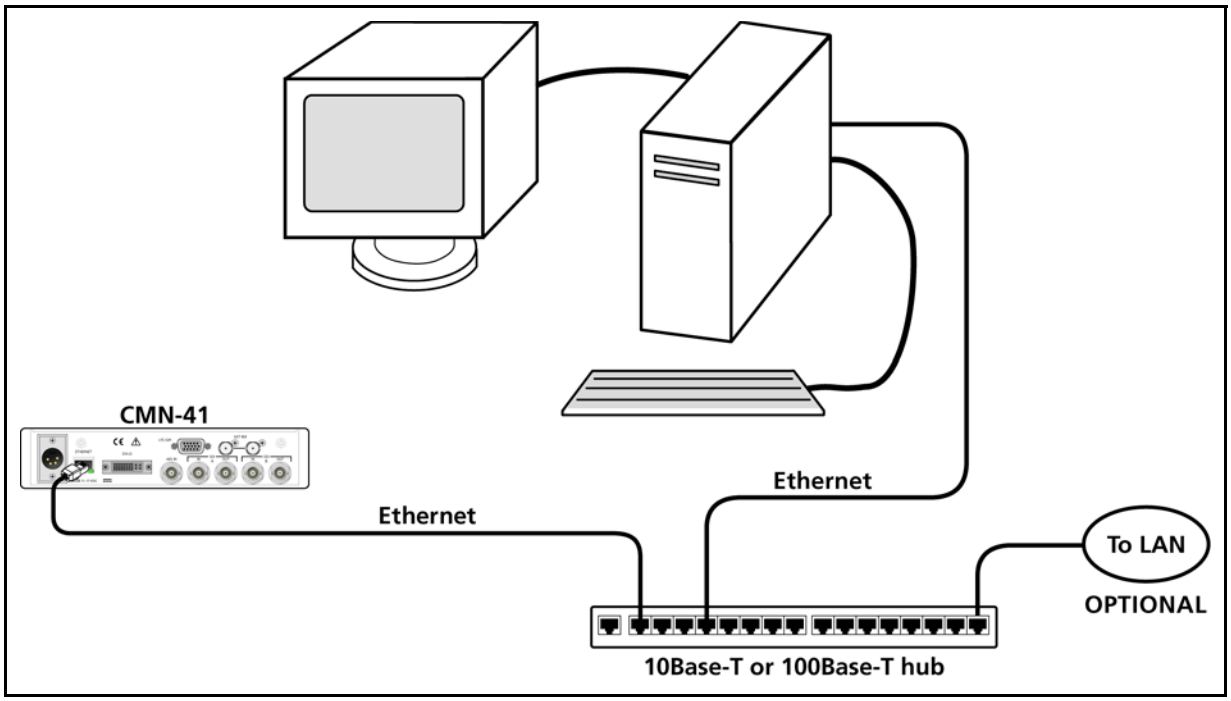

Figure 2-4 CMN-41 Network PC Connection

4 Set up an Ethernet configuration for the CMN-41[1] as follows:

a Press the **SETUP** button on the CMN-41 front panel.

b Press the Up/Down arrow button to highlight the Unit Configuration Setup menu, and then press the **ENTER** button to enter the submenu.

c Press the Up/Down arrow button until the **IP CONFIGURATION** selection option is highlighted.

d Press the **ENTER** button or Left/Right arrow button to enter the Ethernet Config selection option.

e If using DHCP:

- Press the Left/Right arrow button to highlight **DHCP**.
- Press the Up/Down arrow button to toggle the state to **ON**.
- Press the Left/Right arrow button to highlight **ACCEPT**, and then press the **ENTER** button.

The IP Address is retrieved from the DHCP server and placed under the appropriate submenu.

f If not using DHCP:

- Press the Left/Right arrow button to select **IP ADDRESS**.
- Press the Up/Down arrow button to change the value selected, and then press the Left/Right arrow button to highlight the next value.
- Repeat for the remainder of the IP address, subnet mask, and gateway. To avoid conflicts, the static IP address, subnet mask, and gateway should be obtained from the system administrator.

[1] For the CMN-41, you may set up Ethernet configuration either via the front panel or via the Harris Device IP Configuration Utility. For the CMN-41L you must use the Harris Device IP Configuration Utility. See ***Using the IP Configuration Utility*** on page 23 for more information.

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g Press the Left/Right arrow button to highlight **ACCEPT**, and then press **ENTER** to accept the entered values.

h Press the **EXIT** button to exit the submenu.

Using the IP Configuration Utility

The Harris Device IP Configuration Utility is used to set the IP network settings of your Harris device(s). This utility is used to set the network settings for the CMN-41,CMN-41L, and the RCU-CMS. This utility is also used to manage the IP list in the RCU-CMS that directs the RCU connection to the CMN-41 and other compatible Harris products.

You must use the IP configuration utility when setting up the CMN-41L. Use of the IP configuration utility is optional for the CMN-41.

Installing the Utility

1. Place the CD that came with your device into a drive of the PC.
2. Using Microsoft® Windows® Explorer[1], open the **DEVIPCONFIG** folder, and then double-click **setup.exe**.

   If your PC does not have the required version of Microsoft .NET Framework, the Preparing to Install dialog box opens, as shown in **Figure 2-5**. (Note that when .NET has been installed, the installer will automatically go to the next dialog box.)

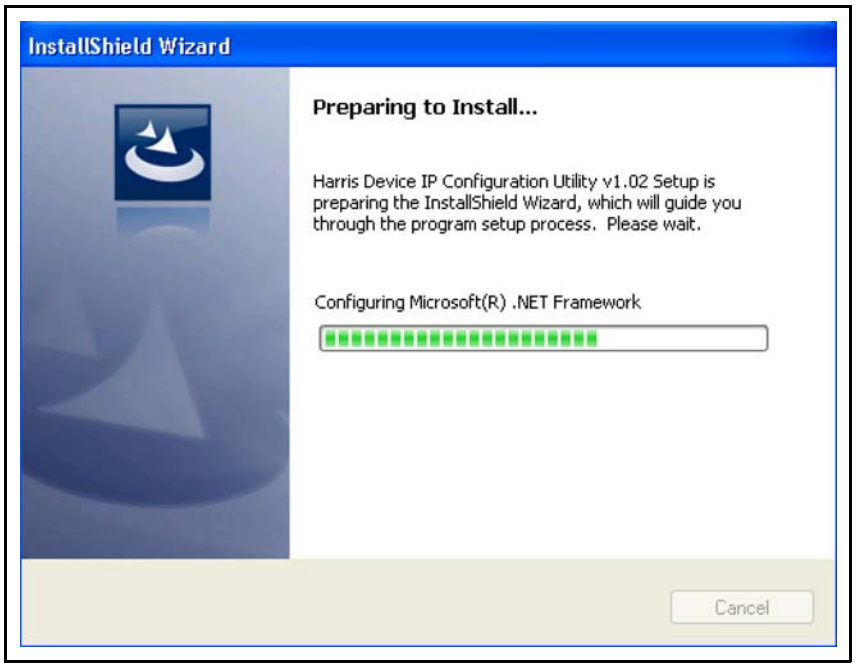

Figure 2-5 Preparing to Install Dialog Box

Otherwise, the Installation Wizard Welcome dialog box opens, as shown in **Figure 2-6**.

[1] Windows, Windows Explorer, and Internet Explorer are trademarks or registered trademarks of Microsoft Corporation or its subsidiaries in the United States and other countries.

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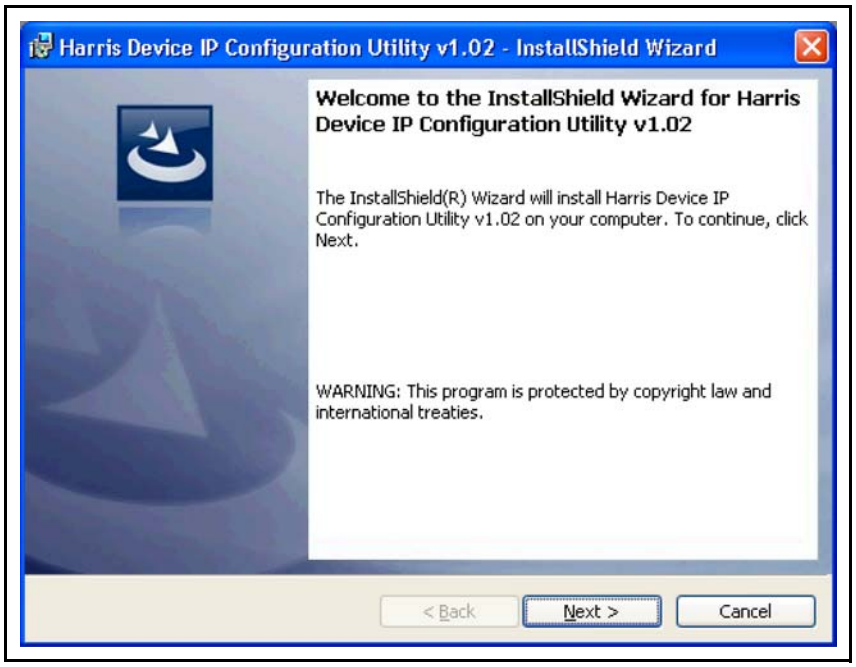

Figure 2-6 Installation Wizard Welcome Dialog Box

3 Click **Next**.
The Destination Folder dialog box (**Figure 2-7**) opens.

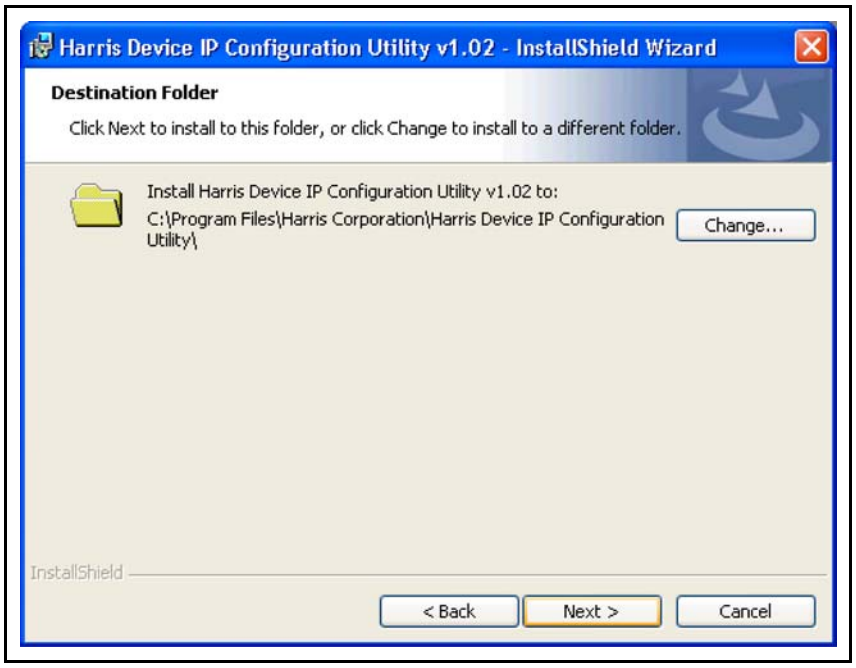

Figure 2-7 Destination Folder Dialog Box

4 Click **Next**.
The Ready to Install dialog box (**Figure 2-8**) opens.

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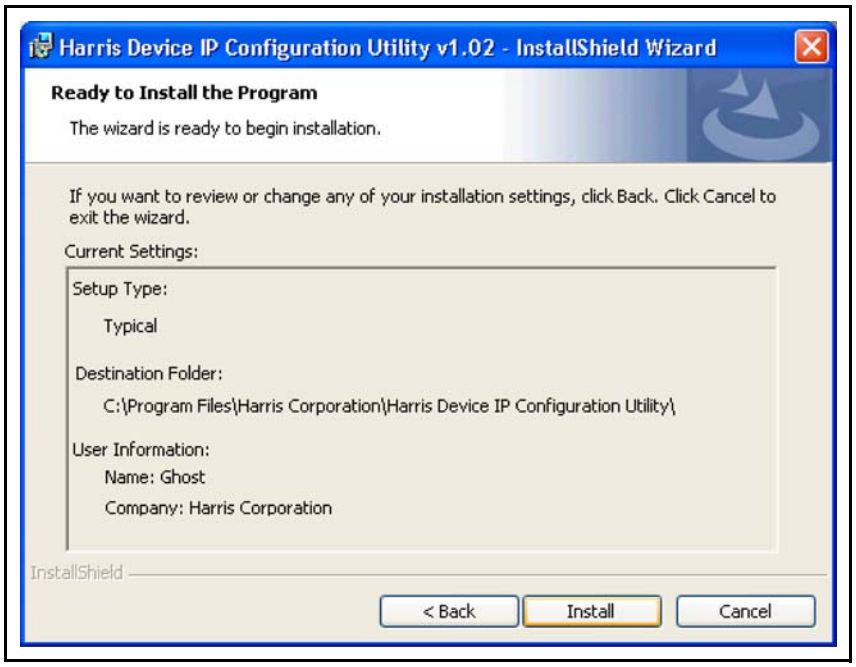

Figure 2-8 Ready to Install Dialog Box

5 Click **Install**.

As part of the installation, WinPcap will be installed on your PC. This allows the utility to communicate with your device. The WinPcap installer is self-contained and has its own sequence of installer windows. If WinPcap is already installed, you will be asked whether you want to install over the existing installation (see **Figure 2-9**).

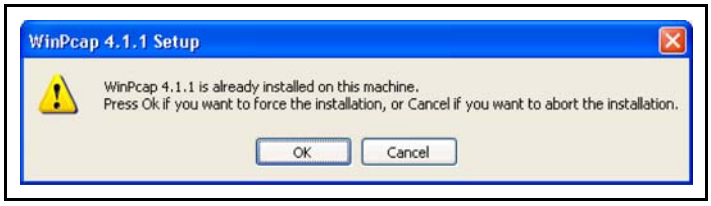

Figure 2-9 Setup Configuration Information Message

Answer **Yes** unless you are sure the version indicated is installed.

If you answer with **Yes** or WinPcap is not present on your PC, the WinPcap Installer Splash Screen dialog box (**Figure 2-10**) opens.

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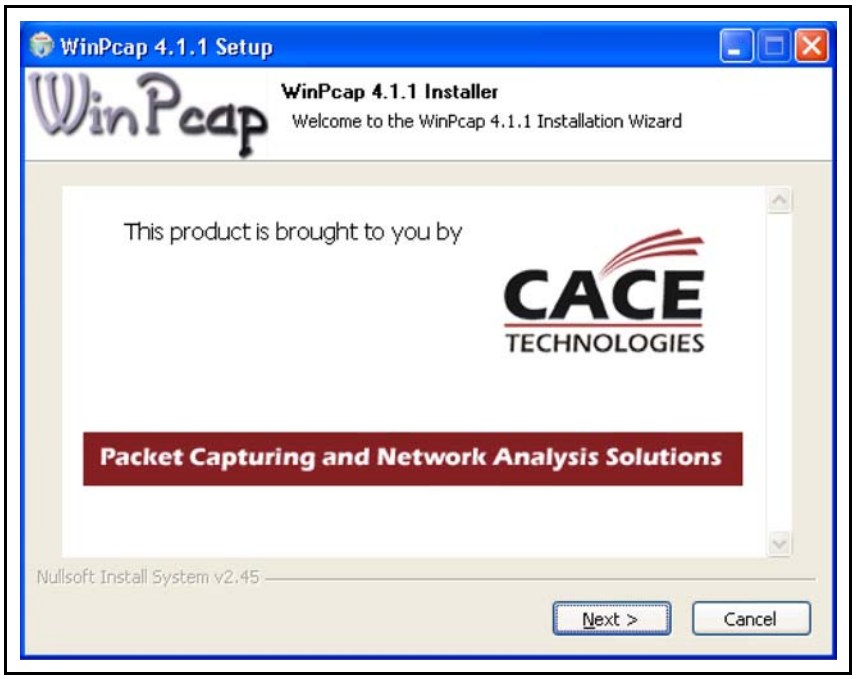

Figure 2-10 Installer Splash Screen

6 Click **Next**.
The Setup Welcome dialog box (**Figure 2-11**) opens.

Figure 2-11 Setup Welcome Dialog Box

7 Click **Next**.
The License Agreement dialog box (**Figure 2-12**) opens.

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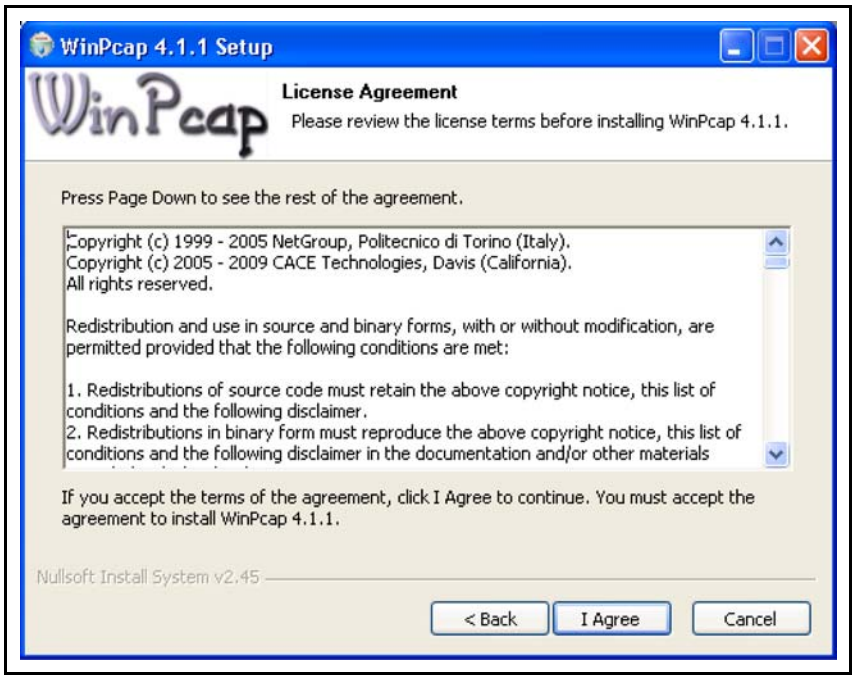

Figure 2-12 License Agreement Dialog Box

8 Click **I Agree**.
The Installation Options dialog box (**Figure 2-13**) opens.

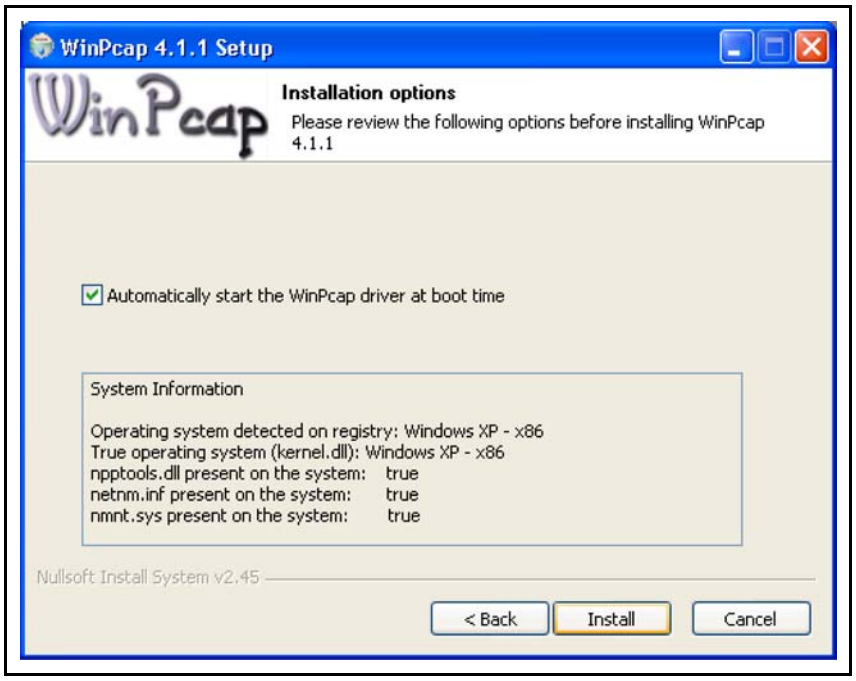

Figure 2-13 Installation Options Dialog Box

Leave the **Automatically start the WinPcap driver at boot time** option checked. This allows the utility to access the driver from any Windows user, even if the user does not have administrative privilege. If you uncheck this option, the driver will not be loaded until the utility is run and may not be successful if the user does not have administrative privileges.

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9 Click **Install**.
The WinPcap Setup Completion dialog box (**Figure 2-14**) opens.

Figure 2-14 WinPcap Setup Completion Dialog Box

10 Click **Finish**.
The Installation Completed dialog box (**Figure 2-15**) opens.

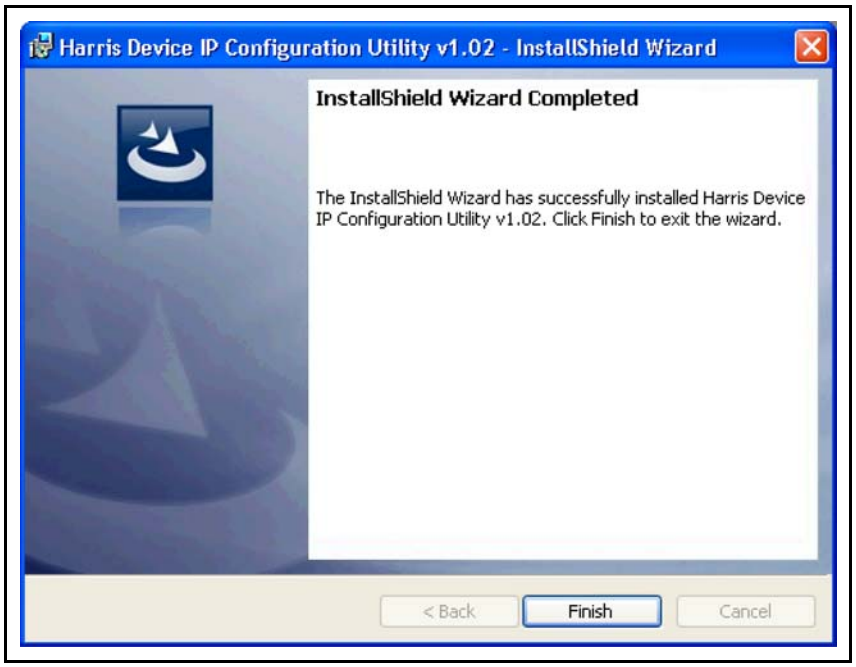

Figure 2-15 Installation Completed Dialog Box

11 Click **Finish**.
The installation is now complete.

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Using the Utility

Once installed, the IP configuration utility is ready to use.

1 Locate the **Harris Corporation** group in the Windows program list.

2 Navigate to the **Harris Device IP Configuration Utility** group, and then select the **Launch DevIPConfig.exe** shortcut.

The IP configuration utility main dialog box opens:

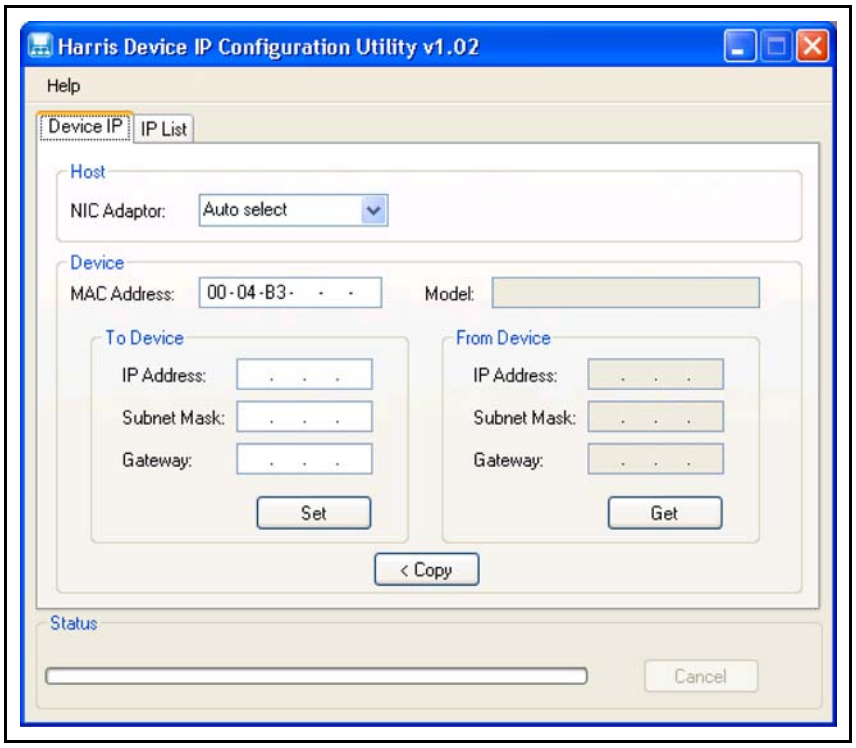

Figure 2-16 IP Configuration Utility Main Dialog Box

Leave the **NIC Adaptor** field set to **Auto select** unless you know which adaptor in your PC is connected to the Harris device.

3 To establish a connection, the MAC address of your Harris device must be entered in the **MAC Address** field. Your device's MAC address is located in the following places:

- In the main title bar

  When delivered from the factory, the CMN-41 displays the MAC address in the main title bar. Once IP configuration has been performed, this behavior can be changed through the device's Unit Configuration Display Setup menu (see page 119 for more information) so it may not be located there when reconfiguring the IP address after the initial installation. However, the MAC address is always displayed in the main title bar for a few seconds after powering up the device, regardless of the menu setting.

- In the About Display Screen (see page 125 for more information)

  This will only be useful if the IP address is already known, since you must connect to the device using the Web RCU or RCU-CMS to use the menu to view the About Display Screen.

- On a label applied to the top of the device

The first three segments of the MAC address already appear in the **MAC address** field. Only the last three segments need to be entered.

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4 Click **Get** (located in the **From Device** group of the main dialog box).

The utility collects all of the IP configuration information and displays it in the **From Device** group.

5 Click **Copy** to copy the fields from the **From Device** group to the **To Device** group.

*You can skip steps 4 and 5 if you are going to enter new information into the **To Device** fields. These steps are intended to make changing existing information easier since data entry can start with the existing information.*

You are now ready to configure the device's IP information. This information should be obtained from your IT group or personnel responsible for your network. It consists of an IP address, a subnet mask, and possibly a gateway. Ensure that the IP address you have obtained is unique and is a static IP address. Enter the IP information into the appropriate fields of the **To Device** group. If a gateway is not needed, leave the **Gateway** field blank. When you have entered the IP information into the **To Device** fields, click **Set** in the **To Device** group.

Your device's IP configuration is now set. For more information on how to use the utility, see the on-line help found in the **Help > Help** menu of the main dialog box or pressing the keyboard's F1 key.

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3 General Information

Terms

The following terms are used in this section:

- **Display**: The output at the DVI connector
- **Full**: Full-screen display of the selected input
- **MLT**: Quad screen or Overlay multi-mode operational state (selectable by setup menu)

Controlling the CMN-41

Pressing and holding certain buttons will activate menus for additional functionality. See ***Table 3-1*** *for more information.*

The CMN-41 is controlled in these ways:

- **Quick Controls**: Controls on the front panel that adjust parameters that are frequently used. See ***Front Panel Controls*** on page 32 for more information about front panel controls.
- **Menu Settings**: Shortcut menus within a function that are used to control the parameters for the individual function.
- **Global Setup Menu Settings**: Setup menu parameters that affect the entire unit (not function-specific). The Setup menu is accessed by pressing the **SETUP** button.
- **Web Interface Control**: A PC, using a web browser, connects to the CMN-41 using the Ethernet IP address.
- **Optional RCU-CMS**: The RCU-CMS connects to the CMN-41 using the Ethernet IP address.

The CMN-41L can only be controlled using the web interface control or the optional RCU-CMS.

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Front Panel Controls

The front panel controls are illustrated in **Figure 3-1**.

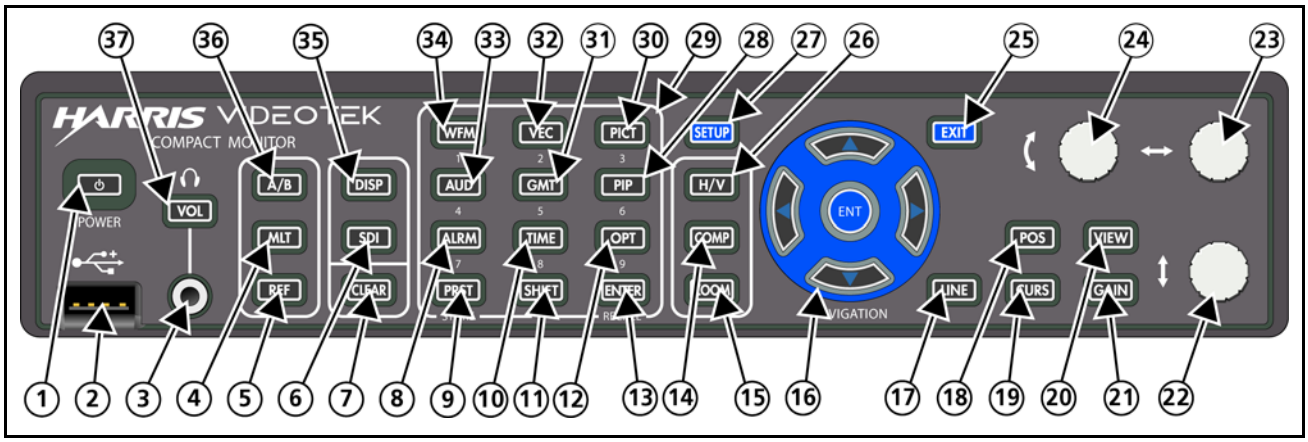

Figure 3-1 CMN-41 Front Panel Controls

Most buttons and text are in a low-tally (low illumination) state; under certain conditions, however, some buttons and text reach a high-tally (high illumination) state, as described in **Table 3-1**. The high and low tally illumination levels can be set in the High Tally and Low Tally selection options of the Unit Configuration Front Panel setup menu selection option. The CMN-41L does not have front panel controls; therefore, the unit is always on when power is applied.

Multiple buttons may be high tally at the same time. The last control selected is the active control.

Table 3-1 CMN-41 Front Panel Controls

Key	Label	Description
1	POWER	■ Power switch button; press and release to turn unit power on ■ Press and hold to turn unit power off
2		USB port
3		Headphone jack
4	MLT	■ Multi-display or Overlay button; press and release to toggle between a full-display and a multi-display screen ■ Press and hold to access the MLT Setup menu
5	REF	External Reference selection button; press and release to toggle between internal and external reference
6	SDI	■ Data button; press and release to freeze data ■ Once data is frozen, press and release to toggle between live and frozen mode
7	CLEAR	■ Clear Display selection button; press and release to clear a display ■ Press and hold to access the Clear Setup menu

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Table 3-1 CMN-41 Front Panel Controls *(Continued)*

Key	Label	Description
8	ALRM	■ Alarm selection button; press and release to switch to Alarm mode ■ Press and hold to access the Alarm Setup menus
9	PRST	Preset selection button; press and release to enable Preset selection
10	TIME	■ Timing selection button; press and release to switch to Timing mode ■ Press and hold to access the Timing Setup menu
11	SHIFT	Shift selection button; press and release to use numeric keypad for direct parameter entry
12	OPT	■ Option selection button; press and release for the LTC or REF waveform displays ■ Press and hold to access the OPT menu
13	ENTER	Press and release to accept the contents of displayed dialog boxes
14	COMP	Component selection button; press and release to cycle through individual waveform components
15	ZOOM	Zoom selection button; press and release for zoom selections
16	Navigation	Use to navigate menus and select selection options (see page 97 for an explanation of how to operate the navigation items)
17	LINE	Line selection button; press and release to activate Line Selection mode
18	POS	Position selection button; press and release to enable controls to horizontally or vertically adjust the contents of a WFM, LTC, or REF waveform display
19	CURS	Cursor selection button; press and release to select cursor functionality for a waveform or vector display
20	VIEW	View Adjust selection button; press and release to enable controls to scale or adjust the position of an active display
21	GAIN	Gain Control selection button; press and release to activate Gain controls
22	Up/Down arrow knob	Use to move the waveform display
23	Left/Right arrow knob	Use to move the waveform display
24	Curved arrow knob	Use for vector, cursor, and output audio level
25	EXIT	Exit selection button; press and release to leave menu function selections
26	H/V	Horizontal/vertical sweep selection button; press and release to toggle between waveform horizontal and vertical sweep

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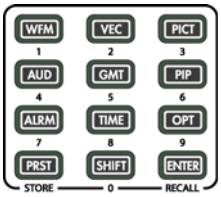
Table 3-1 CMN-41 Front Panel Controls *(Continued)*

Key	Label	Description
27	SETUP	■ Setup button; press and release to access Setup mode ■ Press and release to exit the displayed Setup menu
28	PIP	Picture-in-picture selection button; press and release for a thumbnail display of the current picture available with the selected input
29		■ Press to select, store, or delete a selection in the Preset memory bank ■ Press to enter numeric values for certain parameters (the Shift button will be high tally to indicate that the numeric keypad is available for direct parameter entry)
30	PICT	■ Picture selection button; press and release for a picture display ■ Press and hold to access the Picture Setup menu
31	GMT	■ Gamut selection button; press and release for a gamut display ■ Press and hold to access the Gamut Setup menu
32	VEC	■ Vector selection button; press and release for a vector display ■ Press and hold to access the Vector Setup menu
33	AUD	■ Audio selection button; press and release for an audio display ■ Press and hold to access the Audio Setup menu
34	WFM	■ Waveform selection button; press and release for a waveform display ■ Press and hold to access the Waveform Setup menu
35	DISP	■ Display button; press and release to freeze a display ■ Once a display is frozen, press and release to toggle between live and frozen mode
36	A/B	SDI input button, press to toggle between SDI input A and B
37	VOL	■ Volume selection button; press and release to activate the curved knob to adjust headphone audio volume ■ Press and hold to access the audio channel selection matrix

CMN-41L Control Panels

The CMN-41L is designed to be controlled from a PC using a web browser or an optional RCU-CMS remote control unit. The CMN-41L is illustrated in **Figure 1-1** on page 15.

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Web-Based Panel Controls

The web-based panel controls are illustrated in **Figure 3-2**. See **Chapter 7, *External Control*** on page 139 for information on how to access the web-based controls.

Web-based controls are accessible from a computer that has Java™ Standard Edition Version 6, Update 17 or later installed. (Java can be downloaded at www.java.com.)

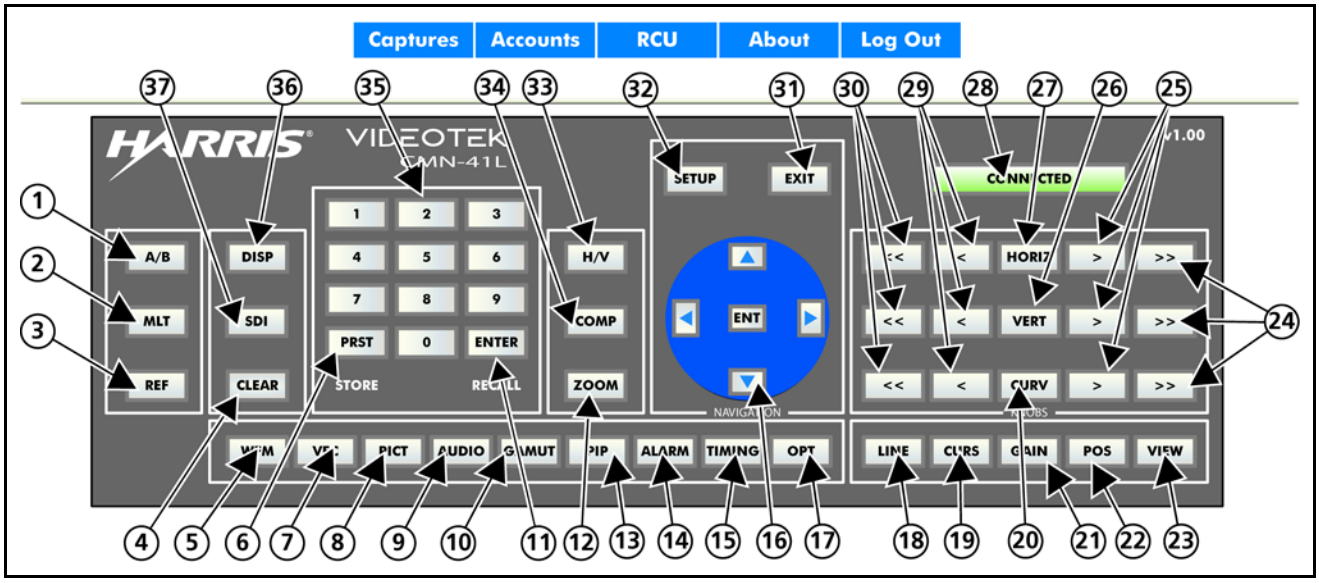

Figure 3-2 CMN-41 Web-Based Panel Controls

Most buttons and text are in a low-tally (grey outline) state; under certain conditions, however, some buttons and text reach a high-tally (blue outline) state, as described in **Table 3-2**. If a function is not operational, the associated button appears greyed.

Multiple buttons may be high tally at the same time. The last control selected is the active control.
To invoke a button sequence that requires simultaneous button presses, press and hold the PC keyboard's CTRL key and click the desired Web RCU buttons.

Table 3-2 CMN-41 Web-Based Panel Controls

Key	Label	Description
1	A/B	SDI input button, click to toggle between SDI input A and B
2	MLT	Multi-display button; click to toggle between a full-display and a multi-display screen or press and hold to access the MLT Setup menu
3	REF	External Reference selection button; click to toggle between internal and external reference
4	CLEAR	Clear Display selection button; click to clear a display or press and hold to access the Clear Setup menu
5	WFM	Waveform selection button; click for a waveform display or press and hold to access the Waveform Setup menu
6	PRST/ STORE	■ Preset selection button; click to enable Preset selection ■ When used in conjunction with the **DISP** button, stores images in the Index of Captures page

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Table 3-2 CMN-41 Web-Based Panel Controls *(Continued)*

Key	Label	Description
7	VEC	Vector selection button; click for a vector display or press and hold to access the Vector Setup menu
8	PICT	Picture selection button; click for a picture display or press and hold to access the Picture Setup menu
9	AUDIO	Audio selection button; click for an audio display or press and hold to access the Audio Setup menu
10	GAMUT	Gamut selection button; click for a gamut display or press and hold to access the Gamut Setup menu
11	ENTER/ RECALL	Click to accept the contents of displayed dialog boxes When used in conjunction with the **DISP** button, recalls images from the Index of Captures page
12	ZOOM	Zoom selection button; click for zoom selections
13	PIP	Picture-in-picture selection button; click for a thumbnail display of the current picture available with the selected input
14	ALARM	Alarm selection button; click to switch to Alarm mode or press and hold to access the Alarm Setup menus
15	TIMING	Timing selection button; click to switch to Timing mode or press and hold to access the Timing Setup menu
16	Navigation	Use to navigate menus and select menu changes (see page 97 for an explanation of how to operate the navigation items)
17	OPT	Option selection button; click for a LTC or Reference waveform display or press and hold to access the OPT Setup menu
18	LINE	Line selection button; click to activate Line Selection mode
19	CURS	Cursor selection button; click to select cursor functionality for a waveform or vector display
20	CURV	Use for vector, cursor, and output audio level
21	GAIN	Gain Control selection button; use in conjunction with **HORIZ** and **VERT** arrow buttons to adjust the gain in the waveform and vector displays
22	POS	Position selection button; use in conjunction with **HORIZ** and **VERT** arrow buttons to move selected display up or down
23	VIEW	View Adjust selection button; click to enable controls to scale or adjust the position of an active display in Overlay mode or PIP
24	>>	Use to increase active control in increments of 10
25	>	Use to increase active control in increments of 1
26	VERT	Use in conjunction with arrow buttons to move selected waveform display up or down
27	HORIZ	Use in conjunction with arrow buttons to move selected waveform display right or left

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Table 3-2 CMN-41 Web-Based Panel Controls *(Continued)*

Key	Label	Description
28	CONNECTION STATUS	Indicates whether the web-based control panel is actively connected to the CMN-41 unit If the Web RCU is disconnected, reconnect by refreshing the page using your Web browser's Refresh function; alternatively, leave the Web RCU page and select the RCU menu bar link again
29	<	Use to decrease active control in increments of 1
30	<<	Use to decrease active control in increments of 10
31	EXIT	Exit selection button; click to leave certain menu function selections
32	SETUP	Setup button; click to access Setup mode
33	H/V	Horizontal/vertical sweep selection button; click to toggle between waveform horizontal and vertical sweep
34	COMP	Component selection button; click to cycle through individual waveform components
35	Numeric entry buttons	■ Press to select, store, or delete a selection in the Preset memory bank ■ Press to enter numeric values for certain parameters (the button bank will be high tally to indicate that the numeric keypad is available for direct parameter entry)
36	DISP	■ Display button; click to freeze a display ■ Once a display is frozen, click to toggle between live and frozen mode
37	SDI	■ Data button; press and release to freeze data ■ Once data is frozen, press and release to toggle between live and frozen mode

Remote Control Panel Controls

The optional RCU-CMS provides remote control operation of VMM-4SNY, CMN-41, CMN-91, and CMN-MV units. The RCU-CMS is connected to a unit via an Ethernet cable. A desktop application is used to set up the IP addresses of the RCU-CMS and the other units.

Please see the ***RCU-CMS Installation and Operation Manual*** for detailed information on the installation, configuration, and operation of the remote control panel.

Setting Up Sleep Mode

To set up Sleep mode

Choose the UNIT CONFIGURATION → DISPLAY SETUP → SLEEP MODE selection option. This menu allows the selection of how much time has to pass without any button presses in order for the unit to enter Sleep mode.

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When entering Sleep mode, the instrument will turn off all LEDs and the display. The instrument is still active (that is, alarms still triggered, and so forth). When exiting Sleep mode, the instrument returns to an illuminated state.

Selecting Inputs

To select input A or B

Press the **A/B** button. (Input A is the default selection.) When an input is selected, pressing the input button again will change to the new input from the previous input. High tally indicates input A is selected.

Display Selections

The CMN-41 unit screen display shows data in either a full screen mode, quad screen mode (4 display panes), or overlay mode (2 or 3 display panes). The screen display always contains the Main Title Bar, the display, and the status bar.

To toggle between display selection types

Press the **MLT** button. **MLT** is high tally when selected.

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Full Screen Display

A diagram of the full-screen display is shown in **Figure 3-3** and is described in **Table 3-3**. The Full Screen display mode shows a full-screen representation of a waveform, picture, alarm, vector, gamut, audio, or timing display for a single input at a time. Descriptions of these display types start on page 47.

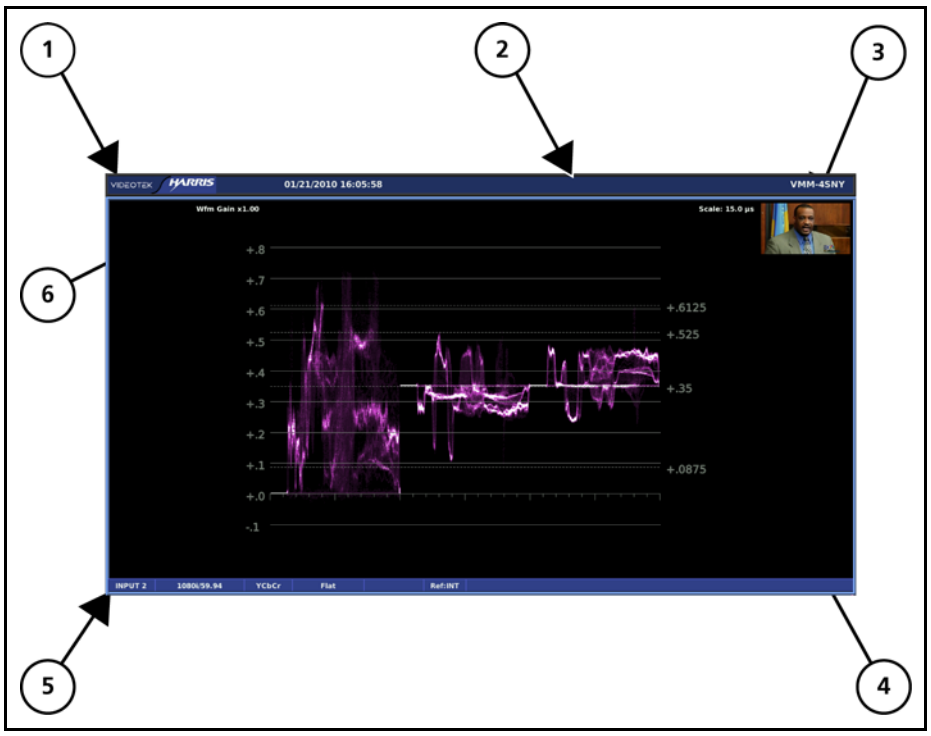

Figure 3-3 Full-Screen Display with PIP Enabled

Table 3-3 Description of Full-Screen Display

Key	Description
1	Main title bar
2	Display icon area
3	PIP display (optional)
4	Full screen display
5	Full screen status bar
6	Specific elements of function display

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Quad Display

A diagram of the quad display is shown in **Figure 3-4** and is described in **Table 3-4**. The quad screen display mode shows display representations of a waveform or timing; picture; vector or gamut; audio or alarms; for one input at a time. Descriptions of these display types start on page 47.

Quad display mode is selected in the MLT setup menu (see page 115).

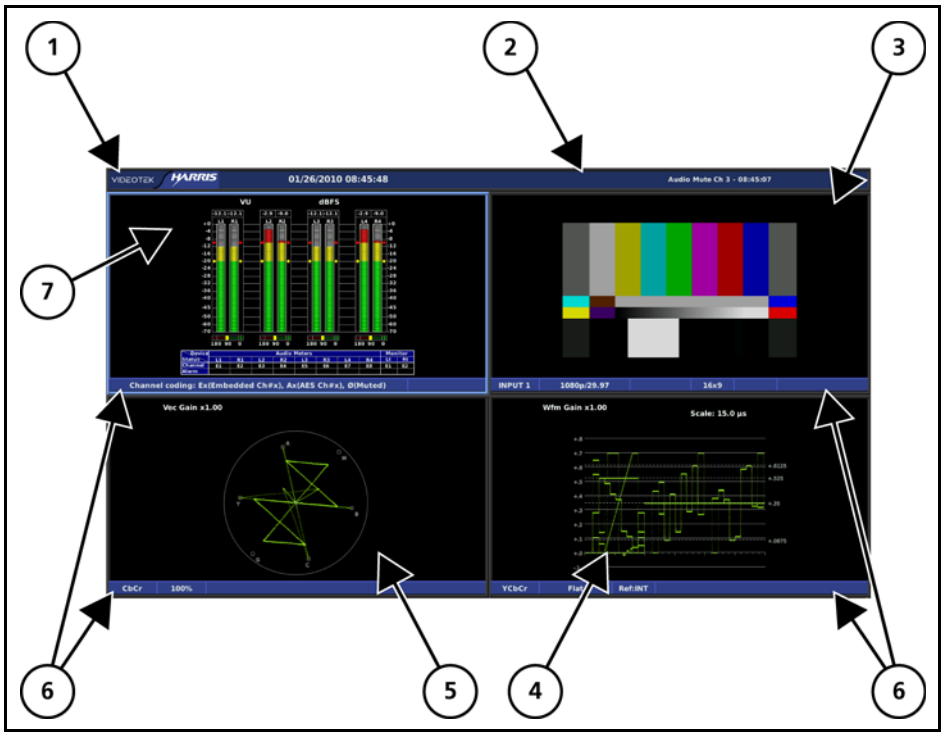

Figure 3-4 Quad Display

Table 3-4 Description of Quad Display

Key	Description
1	Main title bar
2	Display icon area
3	Picture display
4	Waveform display (can be replaced by the Timing display[1])
5	Vector display (can be replaced by the Gamut display[1])
6	Pane status bars
7	Audio display (can be replaced by the Alarm display[1])

[1] Refer to the appropriate display description for more information. Descriptions of these display types start on page 47.

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Overlay Display

A diagram of the overlay display is shown in **Figure 3-5** and described in **Table 3-5**. Overlay mode is a combination of the waveform, vector, and (if desired) picture-in-picture (PIP) displays. Descriptions of these display types start on page 47.

Overlay screen mode is selected in the MLT setup menu (see page 115).

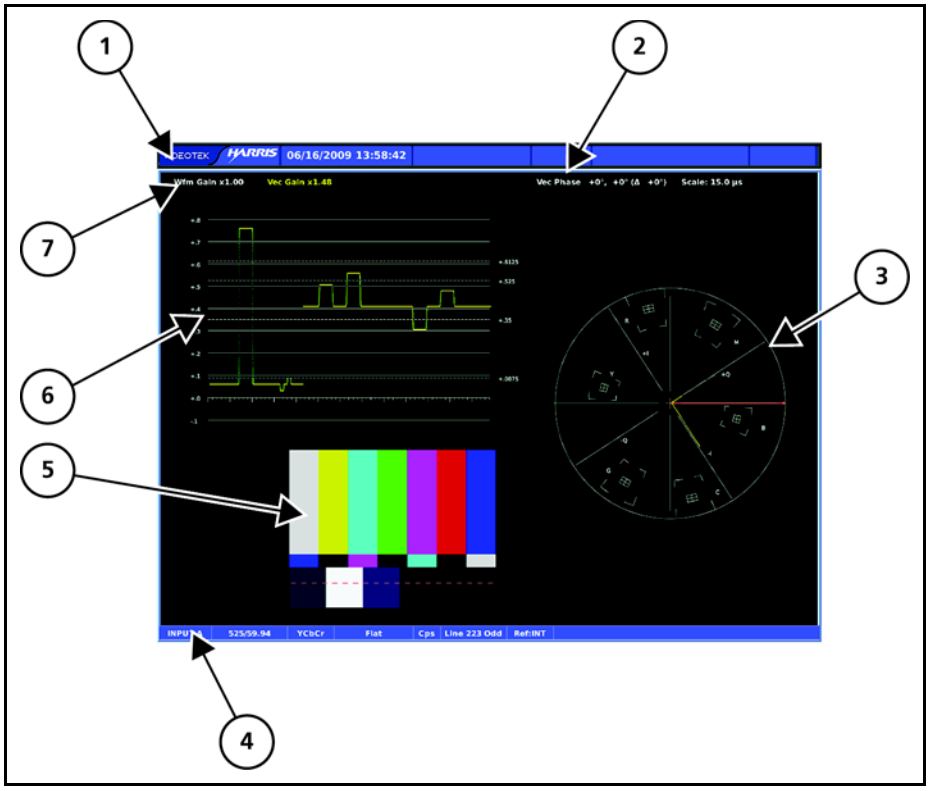

Figure 3-5 Overlay Display

Table 3-5 Description of Overlay Display

Key	Description
1	Main title bar
2	Display icon area
3	Vector display
4	Overlay status bar
5	PIP display
6	Waveform display
7	Units for waveform display

Each component in the Overlay display can be adjusted individually. Use the appropriate function button (that is, WFM, VEC, or PIP) to select the display to be adjusted. Refer to the appropriate function description sections for more information.

To move a selected display component

Make sure the **VIEW** button is in high tally.

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To move the selected display to the desired location on the screen
Use the Up/Down and Left/Right arrow knobs.

To scale the size of the selected display
Use the curved arrow knob.

Main Title Bar

The main title bar is displayed at the top of the screen, and contains the Company name, date and time, icon indictors, most current alarm (alarm background color is yellow when active), and the model name.

Icons

Icons appear in the main title bar and are shown in a specified order (left to right). **Table 3-6** shows the icons and the condition for the appearance:

Table 3-6 Description of Icons

Icon	Condition
	External USB device connected
	Alarm condition active
	DISP or SDI data is frozen in memory. If a display is captured and in memory, DISP overlays the icon. If SDI is captured and in memory, SDI overlays the icon. If both DISP and SDI are captured and in memory, DISP and SDI overlay the icon.

Status Bar

A status bar is located at the bottom of each display. The status bar displays information based on the function selected and configuration applied. See the specific function section (Waveform, Vector, Gamut, Picture, PIP, Audio, Alarm, Timing, and Option) for more detailed information on the status bar that is displayed.

Selecting an Internal or External Reference

To toggle between internal and external reference

Press and release the **REF** button.

Selecting a Function

To directly select specific functions for the display
Press the appropriate function button. Specific functions include Waveform, Vector, Gamut, Picture, Picture-in-Picture, Audio, Alarm, Timing, and Option.

The different function operations are described in detail in **Chapter 4**.

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When a button is pressed that cannot be used with a selected function (Waveform, Vector, and so forth), the message FUNCTION NOT ALLOWED briefly appears over the center of the screen.

Accessing and Navigating the Setup Menu

To access the global Setup menu

Press the **SETUP** button.

To directly access specific function setup menus

Press and hold the corresponding function button.

To display the pertinent Setup menu

Press and hold the function button.

To navigate the Setup menu

Use the navigation buttons. The navigation buttons are described in **Table 5-1** on page 97.

For more information on the global Setup menu, see **Chapter 5, *Setup Menu Functions***.

Capturing a Display

The **DISP** button is used to capture an image of the current monitor display. The **DISP** button is high tally when a capture is performed or recalled. The captured image can be saved and transferred to an external device via a USB flash drive or an Ethernet connection. The Import/Export Setup menu is used to transfer the image to a USB device. A web browser is used to transfer an image using the Ethernet interface. The captured image is saved as a PNG (Portable Network Graphics) formatted file.

Only the Ethernet connection and Web browser can be used for image transfer on the CMN-41L.

To capture a display

Press the **DISP** button.

Only one captured frame can be cached in the unit at a time. The frame remains cached until the frame is cleared.

To toggle between the captured frame and the live frame

- Make sure the frame is frozen and the **DISP** button is high tally.
- Press the **DISP** button.

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Storing a Captured Display

To save a captured frame to internal memory

While the captured frame is shown, press the **STORE** button.

In addition, the **EXPORT** selection option can be used to transfer the display capture to a USB device via the File Navigator dialog box, or the web browser interface can be used to access the display capture. For more information on the File Navigator dialog box, see page 116. For more information on the web browser interface, see page 139.

Recalling a Captured Display

To recall a captured frame

While the captured frame is shown, press the **RECALL** button. This recalls the captured frame from internal memory via the File Navigator dialog box. For more information on the File Navigator dialog box, see page 116.

Clearing a Captured Display

To clear a frozen frame

While the captured frame is shown, press the **CLEAR** button. Once the frozen frame is cleared, a new frame capture can be performed.

Capturing Display Data

The CMN-41 can hold frame-captured information in internal memory. The **SDI** button is high tally when a capture is performed or recalled.

To capture display data

Press the **SDI** button.

The **SDI** button is high tally when information is captured. Only one captured data can be cached in the unit at a time. The data remains cached until the data is cleared.

The SDI capture is used for detailed study of one frame of the incoming video signal. The following displays can be examined when a SDI capture is displayed; waveform, picture, vector, gamut and alarms. All menu items affecting the listed displays can be manipulated while a SDI capture is displayed. Video alarms limits can be adjusted with the results visible in the alarm pane.

The information in the Audio and Timing Displays should not be used when captured SDI data is displayed.

To toggle between displaying the captured data and the live data

Make sure the data is frozen and the **SDI** button is high tally, and then press the **SDI** button.

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When selecting a different function, the **SDI** button will change according to the current configuration of that frame (that is, if the captured data in the cache is displayed or not displayed). When returning to a function that already contains and displays the cached captured data, the **SDI** button reaches a high tally state.

To deselect SDI

Press the **SDI** or the **CLEAR** button.

Storing Captured Data

To save the captured data to internal memory

While captured data is shown, press the **STORE** button.

In addition, the EXPORT selection option can be used to transfer the captured data to a USB device via the File Navigator dialog box, or the web browser interface can be used to access the display capture. For more information on the File Navigator dialog box, see page 116. For more information on the web browser interface, see page 139.

Recalling Captured Data

To recall captured data

Make sure the captured data is shown, and then press the **RECALL** button. This recalls the captured data from internal memory via the File Navigator dialog box. For more information on the File Navigator dialog box, see page 116.

Clearing Captured Data

To clear the frozen information in the frame

Press the **CLEAR** button. Once the frozen data is cleared from the frame, a new data capture can be performed.

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4 Operation

In the CMN-41, certain buttons function differently, depending on the parameters selected. Once the function is determined, more detailed settings can be configured. This section focuses on the operation of the CMN-41 according to the selected display. See **Figure 3-1** on page 32 for information about the location of the buttons described in this section. See **Chapter 3** for general information on how the CMN-41 operates.

Waveform Display

To access the Waveform display

Press and release the **WFM** function button. The waveform graticule scales, units of measure, and critical amplitude limits change according to the video format displayed.

To access the Waveform Setup menu selection options

Press and hold the **WFM** function button.

To clear the Waveform Setup menu

Press the **SETUP** or the **EXIT** button.

Table 4-1 shows the units of measure that appear for a video format. **Table 4-2** lists the critical amplitude limits, which are indicated on the screen by special dashed lines for the video formats that can be displayed.

Table 4-1 Video Formats and Units of Measure

Video Format	Unit of Measure
High Definition and Standard Definition 525 and 625	Volts or Percent (Selectable)
High Definition 59.94 or 60, or Standard Definition 525 displayed as composite (NTSC)	IRE
High Definition 50 or Standard Definition 625 displayed as composite (PAL)	Units or Volts (Selectable)

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Table 4-2 Video Formats and Critical Amplitude Limits

Video Format	Critical Amplitude Limits
High Definition and Standard Definition	0.6125 V = upper 75% chroma limit 0.525 V = 75% luminance limit 0.350 V = 50% point; black for color difference channels 0.0875 V = lower 75% chroma limit
Standard Definition 525 as Composite (NTSC)	7.5 IRE - black level

A waveform display is shown in **Figure 4-1** and described in **Table 4-3**. The figure shows the location for the various waveform display fields.

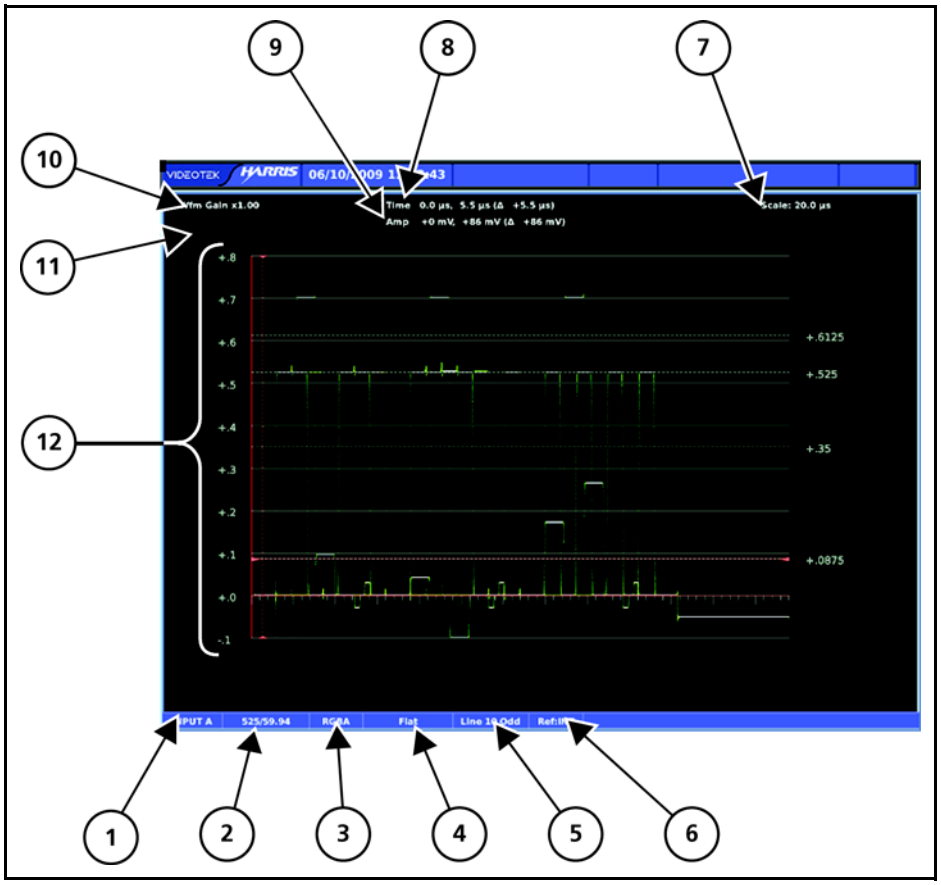

Figure 4-1 Waveform Display Diagram

Table 4-3 Description of Waveform Display Diagram

Field Identifier	Field information	Nomenclature
1	Input	Displays selected input (A or B)
2	Standard	Displays the Line Rate/Frame Rate; this is selected in the Video Setup menu

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Table 4-3 Description of Waveform Display Diagram *(Continued)*

Field Identifier	Field information	Nomenclature
3	Format	Displayed as YCbCr, RGB, YRGB, or Composite; this can be selected in the Display/Format selection options of the Waveform Setup menu
4	Filter	For component displayed as Flat, Low Pass, or Bowtie For composite displayed as Flat, Low Pass, Chroma, or Flat and Low Pass This can be selected in the Composite or Component Filter selection options of the Waveform Setup menu
5	Line select information	Shown as Line number with the ODD or EVEN field (odd or even field will only show for interlaced Video Formats)
6	Reference	Displays the reference as INT, EXT (toggled by pressing the REF button)
7	Scale	Indicates the major graticule indications for time
8	Time cursor readout	Displays the time cursor as TIME and the selected numerical value followed by the unit of measure (µs)
9	Amplitude cursor readout	Displays the amplitude cursor as AMP and the selected numerical value, followed by the unit of measure (mV, units, or IRE)
10	Gain	Displays the selected gain; Gain ranges are x0.5 to x15.0
11	Zoom	Displays Zoom when enabled; blank when Zoom is disabled
12	WFM graticule	Shows the WFM RGB, YCbCr, or Composite graticule; the graticule is dependent upon the Video format, Zoom, and scale selections

Graticules are configured by selecting the Video Input Format along with the appropriate Waveform Setup scale adjustment (Units, %, or Volts). The scales can also change when the **ZOOM** button is pressed.

Figure 4-2 to **Figure 4-4** illustrate some waveform graticules with the critical amplitude limits for the video formats that can be displayed by the CMN-41. The critical amplitude limits are indicated on the screen by special dashed lines.

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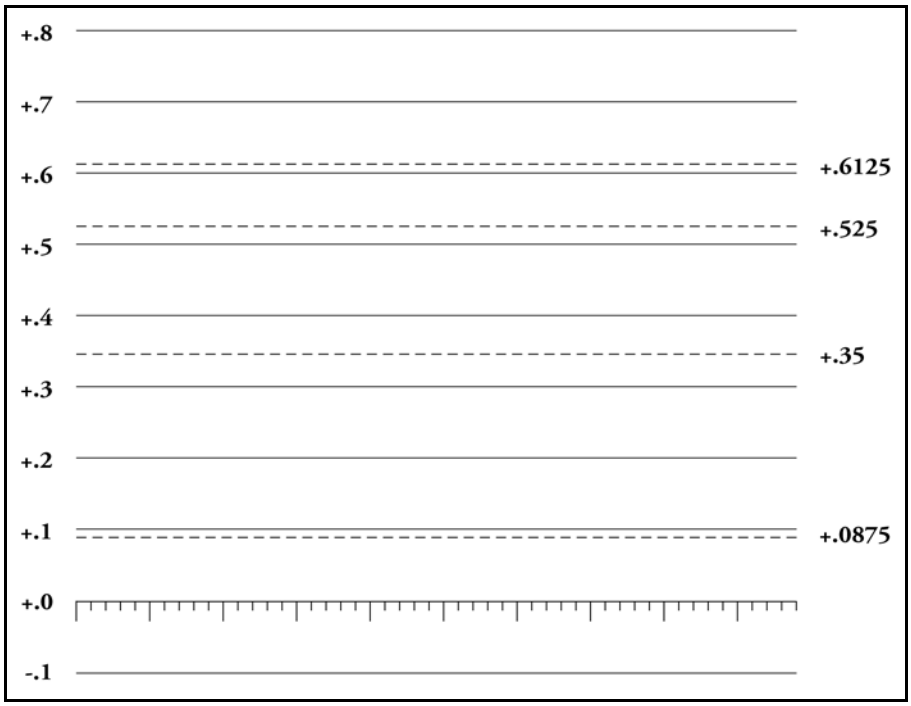

Figure 4-2 RGB and YCbCr Graticule

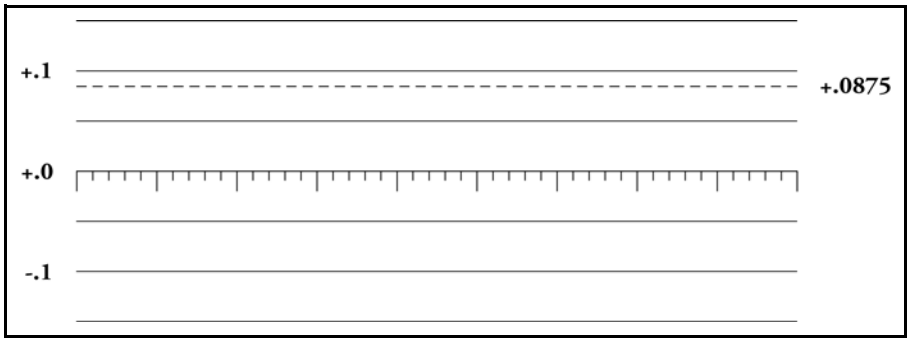

Figure 4-3 RGB and YCbCr Zoom 0 mV Graticule

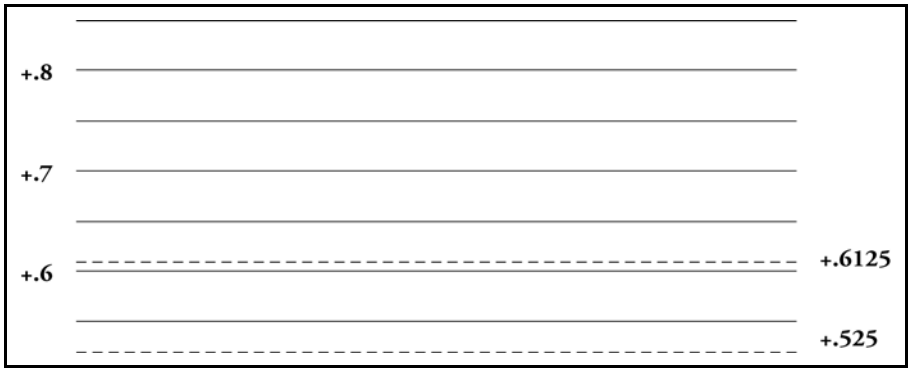

Figure 4-4 RGB and YCbCr Zoom 700 mV Graticule

Waveform Front Panel Selections

The following buttons directly affect the waveform display.

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Moving the Waveform

To move the Waveform display relative to the graticule

Select the **POS** button, and then use the Left and Right arrow knob (for horizontal movement) and the Up and Down arrow knob (for vertical movement). Press each knob to return to the default position.

To move the waveform in the particular direction

Scroll the Left/Right (horizontal direction) or Up/Down (vertical direction) arrow knob.

Centering the Waveform

To center the waveform

Press the Left/Right or Up/Down arrow knobs.

Selecting Horizontal or Vertical Sweep

To select one of the horizontal sweep modes

Press the **H/V** button.

To toggle between horizontal and vertical sweep modes

Press the **H/V** button.

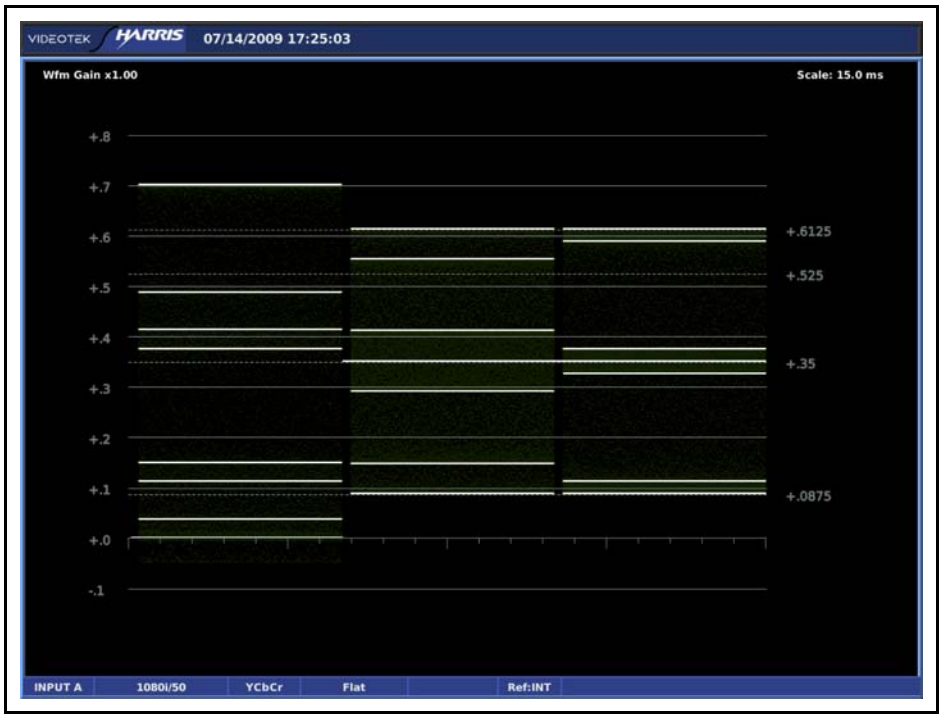

Figure 4-5 Sample H/V Display

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Setting the Vertical and Horizontal Amplification Range

Gain is used to set the range of the vertical and horizontal amplification in the video signal. The standard gain in the video signal is x1.

The CMN-41 can be used to set the gain amplification in the video signal using the **GAIN** button. The vertical gain setting appears in the upper left portion of the waveform display, as shown in **Figure 4-6**. The horizontal gain setting appears in the upper-right portion of the waveform display.

Vertical Amplification

To scroll through the gain selection range

Press and release the **GAIN** button, and then use the Up/Down arrow knob.

To select a preset gain selection

Press the Up/Down arrow knob. Preset gain selections are x0.5, x1.0, x2.5, x5.0.

Horizontal Amplification

To cycle through the horizontal gain sequence

Press and release the **GAIN** button, and then press the Left/Right arrow knob. Horizontal gain sequence selections are x1.0, x5.0, x10.0, and back to x1.0. When vertical sweep is selected, the gain sequence changes to x1.0, x5.0, and x25.0.

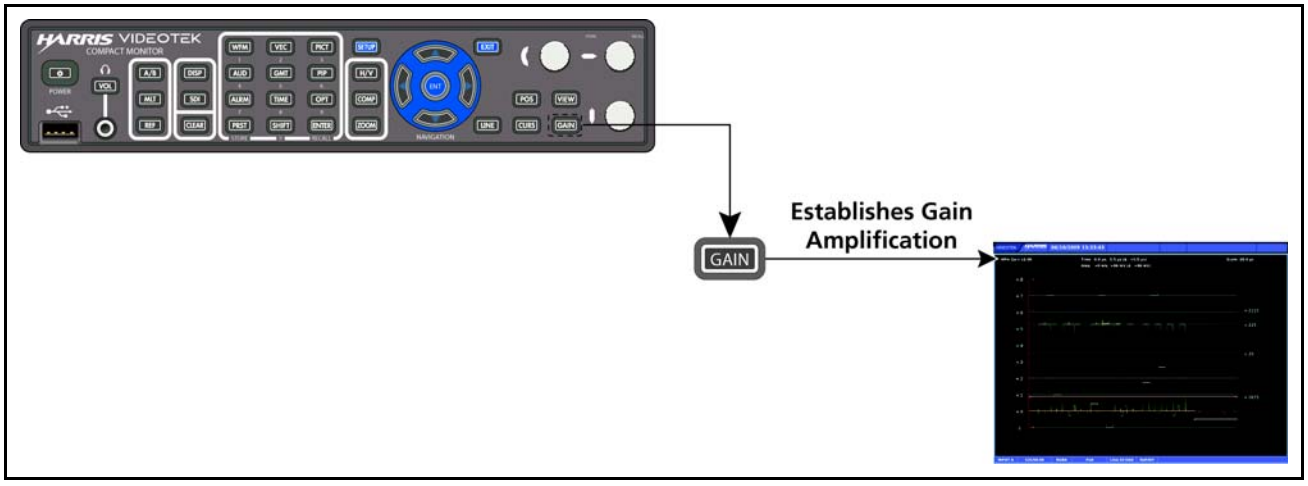

Figure 4-6 Establishing the Gain

Selecting Components

To step through single or multiple components in a signal

Press and release the **COMP** button.

When multiple components are selected, use the H/V button to toggle between 1H and 1V. With only one component selected, press the H/V button to toggle between 1H and 1V, or 2H and 2V.

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Selecting Display Options

To cycle through display options

Press and release the **ZOOM** button.

Zoom display options are as follows:

- ZOOM positioned on the 0 IRE, 0 mV, or 0% graticule line
- ZOOM positioned on the 100 IRE or 700 mV, or 100% graticule line
- Normal view

At each Zoom position, the graticule scale and waveform displays expand to provide more resolution around the zoom point.

Placing the Waveform Display in Line Select Mode

To enable the monitoring of a single line of a video signal

Press and release the **LINE** button.

To view a line in Line Select mode

1 Press the **LINE** button to place the selected waveform display in Line Select mode. At the bottom-center of the display, the Line number and the Odd or Even field appear, as shown in **Figure 4-7**.

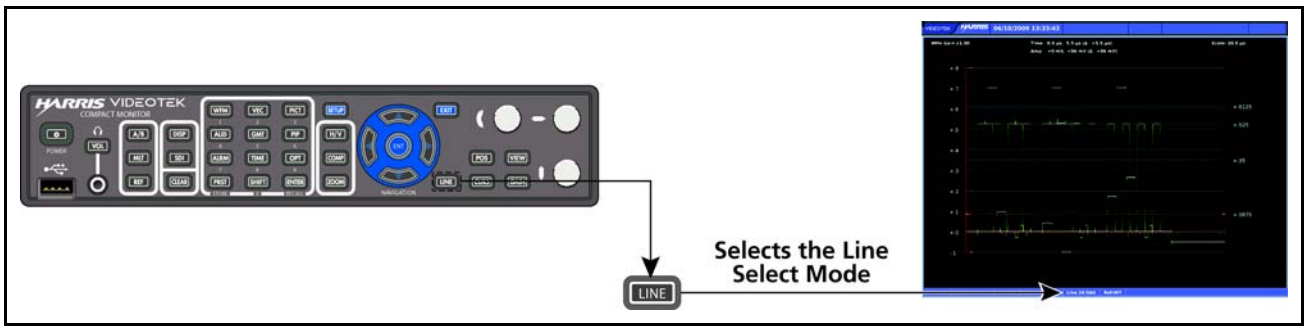

Figure 4-7 Establishing Line Select

In a Progressive (p) format, odd and even selections are not available.

2 Press the Up/Down arrow knob to alternate between Odd and Even fields.

3 Rotate the Up/Down arrow knob to select the line to be displayed, or press the **SHIFT** function button to use the numeric keypad to enter the line number.

Waveform Cursor Selections

Cursor indications are available for precise measurement of waveform voltage and waveform time. The cursor indications appear at the top of the display. The Time Cursor indication is identified as TIME, and the Amplitude Cursor indication is identified as AMP, as shown in **Figure 4-8**.

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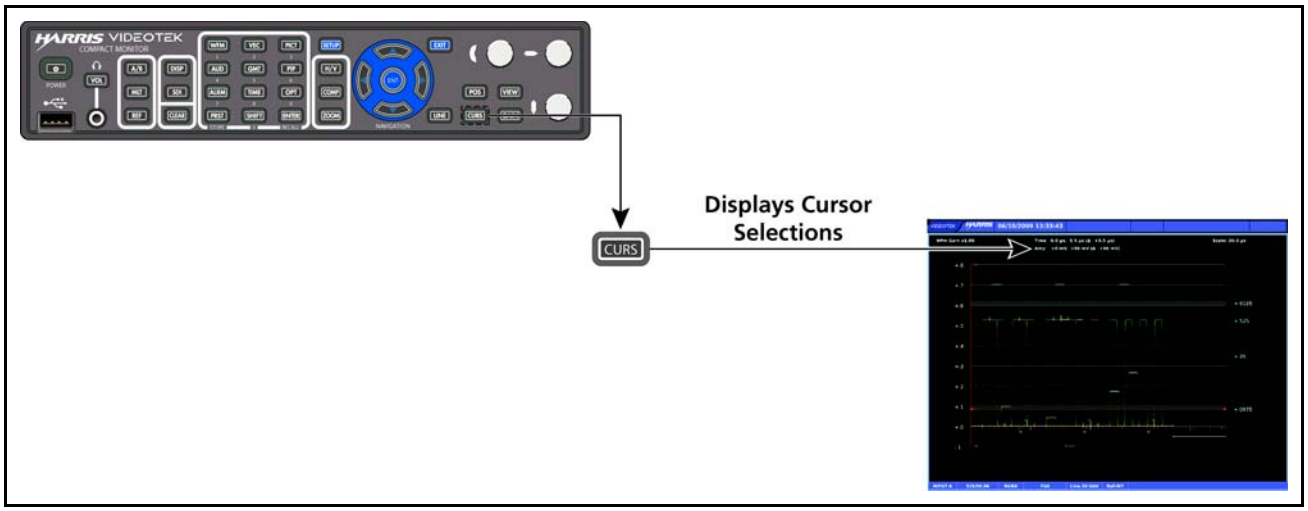

Figure 4-8 Establishing Cursor Select

To enable the time and amplitude cursor indications

- Press and release the **CURS** button.
- Press the **CURS** button again to disable the cursor indications.

To select the TIME cursor

- Press the Left/Right arrow knob to select the REF cursor.
- Press the arrow knob again to select the DELTA cursor.
- Press the arrow knob again to select both cursors.

To select the AMP cursor

- Press the Up/Down arrow knob to select the REF cursor.
- Press the arrow knob again to select the DELTA cursor.
- Press the arrow knob again to select both cursors.

In all cases, the TIME and AMP numeric readout at the top of the display indicates the difference between the REF and DELTA cursors. The active cursor (REF, DELTA, or both) is shown with small arrows at both ends of the cursor.

To exit the cursor function while leaving the cursors active

Press the **WFM** button or select another mode in the display (that is, LINE, GAIN, or POS).

Waveform Setup Menu

To access the Waveform Setup menu

Press and hold the **WFM** function button. For more information on the Waveform Setup menu, see page 103.

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Vector Display

A vector display is shown in **Figure 4-9** and described in **Table 4-4**. This illustrates the general location for the various vector fields.

To access the vector display

Press and release the **VEC** function button.

To access the Vector Setup menu selection options

Press and hold the **VEC** function button.

To clear the Vector Setup menu

Press the **SETUP** or the **EXIT** button.

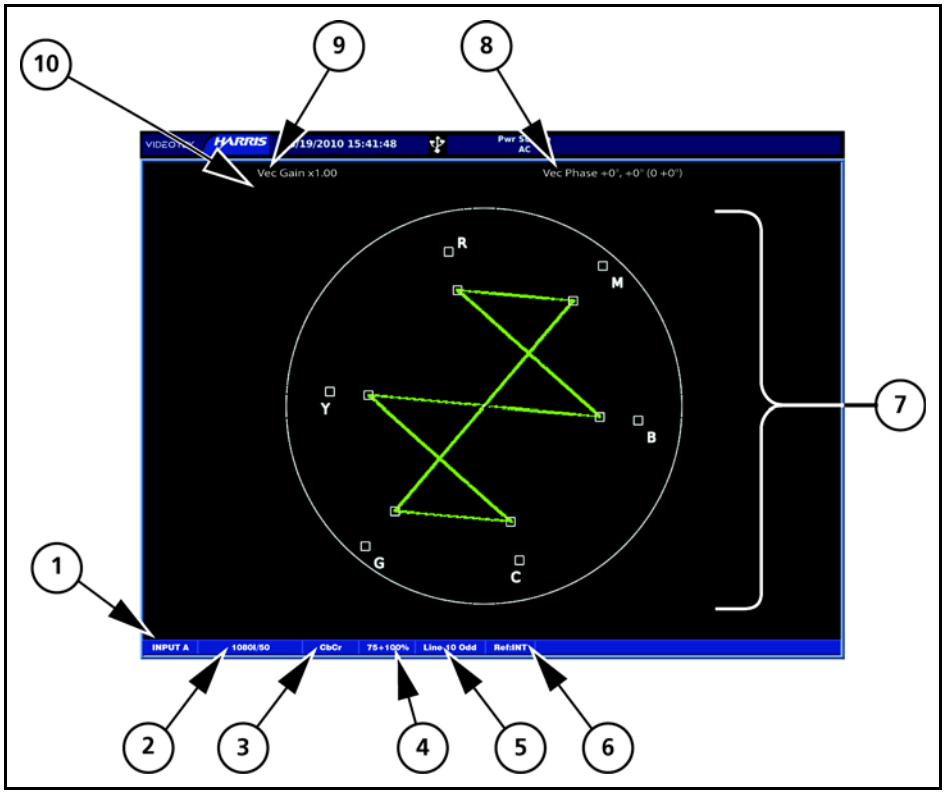

Figure 4-9 Vector Display Diagram

Table 4-4 Description of Vector Display Diagram

Field Identifier	Field Information	Nomenclature
1	Input	Displays selected input (A or B)
2	Standard	Shown as line rate/frame rate; this can be selected in the Video Setup menu
3	Format	Displayed as CbCr; this can be selected in the Vector Setup menu

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Table 4-4 Description of Vector Display Diagram *(Continued)*

Field Identifier	Field Information	Nomenclature
4	Vector Standard	Displayed as 75%, 100%, or 75% + 100%; this is set in Standard selection option of the Vector Setup menu
5	Line select information	Shown as Line and the number with the Odd or Even field (Odd or even Field will only show for certain video formats)
6	Reference	Displays the reference as INT, EXT (toggled by pressing the **REF** button)
7	Vector graticule	Shown as Vector graticule
8	Phase cursor readout	Displays phase cursor as VEC PHASE and number in degrees
9	Gain	Displays the selected gain; gain ranges are x0.5 to x15.0
10	Zoom	Shown as Zoom (when enabled); blank when disabled

To configure graticules

Select the video input format along with the appropriate vector setup standard.

Some graticule scales are illustrated in **Figure 4-10** to **Figure 4-17**.

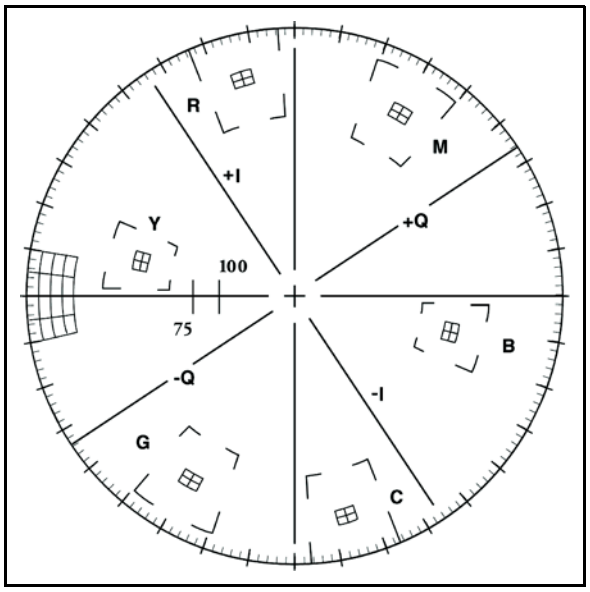

Figure 4-10 Vector NTSC Graticule

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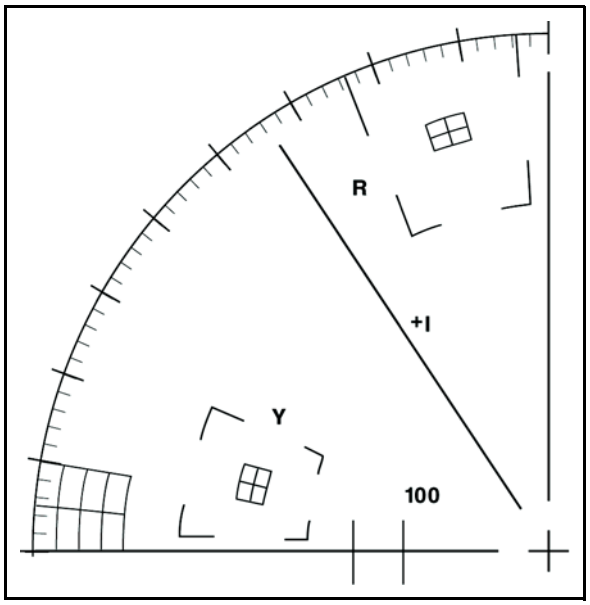

Figure 4-11 Vector NTSC Zoom Upper Left

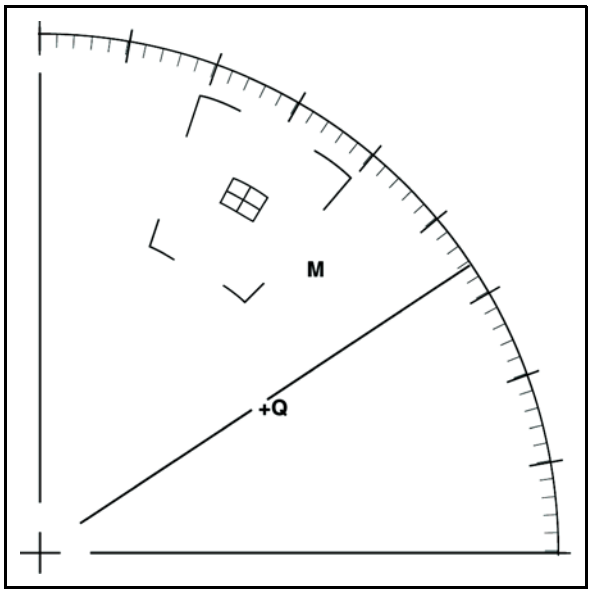

Figure 4-12 Vector NTSC Zoom Upper Right

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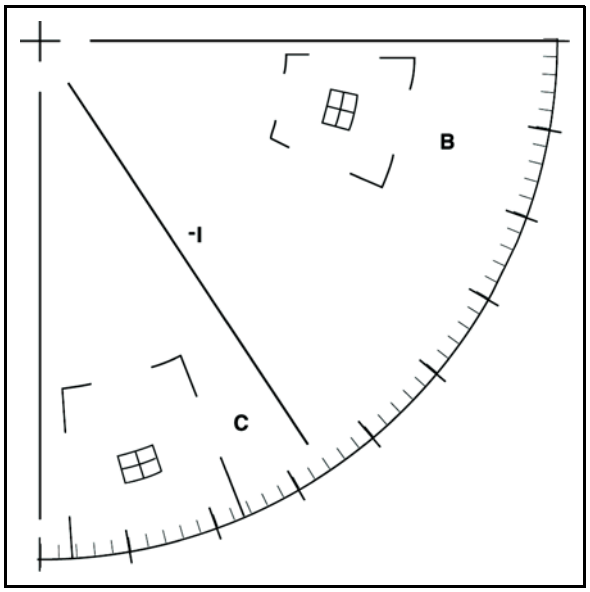

Figure 4-13 Vector NTSC Zoom Lower Right

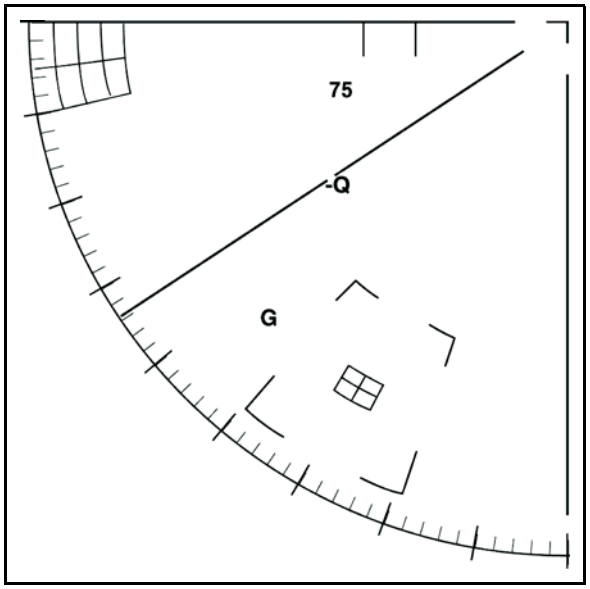

Figure 4-14 Vector NTSC Zoom Lower Left

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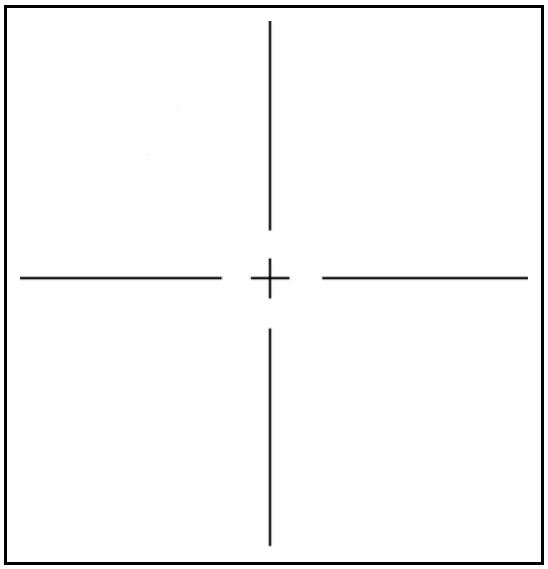

Figure 4-15 Vector PAL Zoom Center

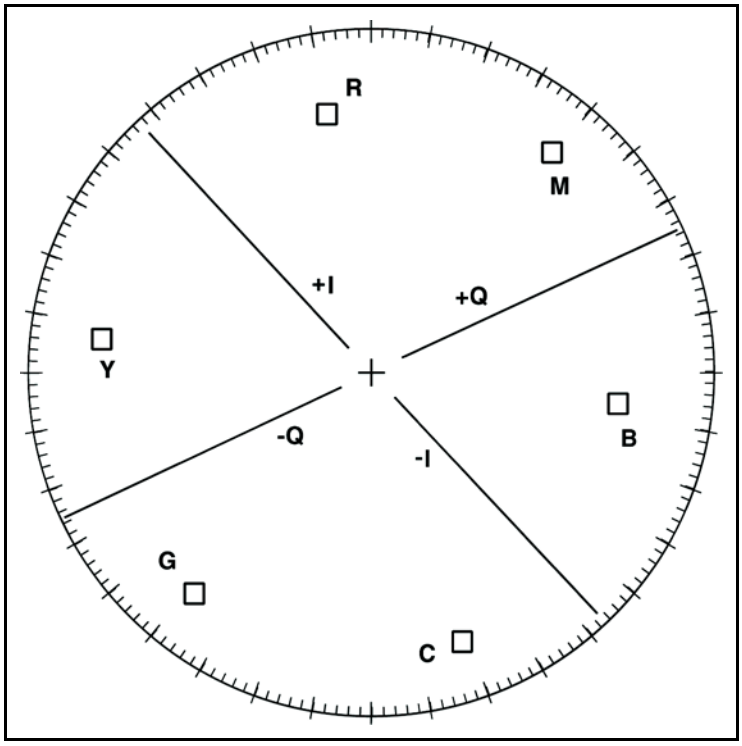

Figure 4-16 Vector SD with I/Q

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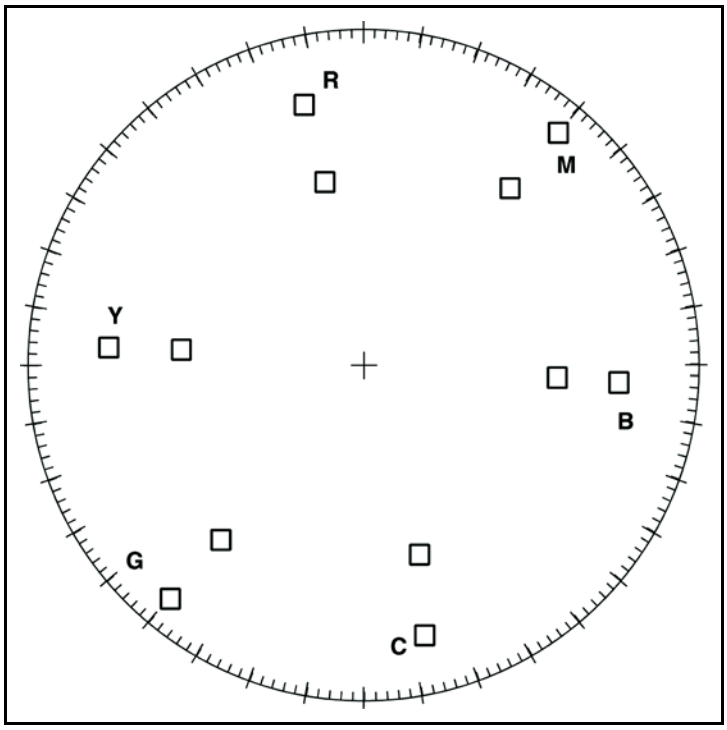

Figure 4-17 Vector HD 75% + 100% Graticule

Vector Front Panel Selections

The following buttons directly affect the vector display.

Setting the Vector Gain

Gain is used to set the range of the amplification in the video signal. The standard gain in the vector is x1.0. The CMN-41 can be used to set the gain amplification in the video signal using the Gain button. The gain setting appears in the upper left portion of the vector display, as shown in **Figure 4-18**.

To scroll through the gain selection range

Press and release the **GAIN** button, and then use the Up/Down arrow knob.

To select one of the preset gain selections

Press the Up/Down arrow knob. Preset gain selections are x0.5, x1.0, x2.5, x5.0.

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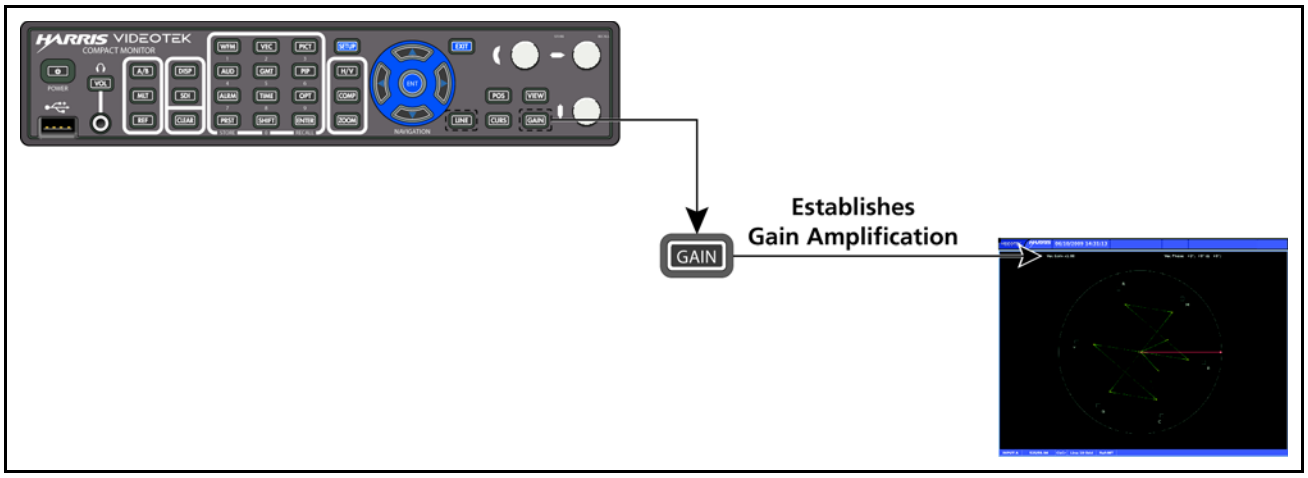

Figure 4-18 Establishing the Vector Gain

Setting Display Options

To cycle through display options

Press and release the **ZOOM** button.

Zoom display options are

- Expand the center
- Expand the upper left quadrant
- Expand the upper right quadrant
- Expand the lower right quadrant
- Expand the lower left quadrant
- Normal view

Vector Zoom is helpful when an increased resolution of phase or saturation is required.

Placing the Vector Display in Line Select Mode

To enable monitoring of a single line of a video signal

Press the **LINE** button. This enables Line Select to monitor individual areas of the entire image.

To view a line in Line Select mode

1 Press the **LINE** button to place the selected vector display in Line Select mode. At the bottom-center of the display, the Line number and the Odd or Even field appear, as shown in **Figure 4-19**.

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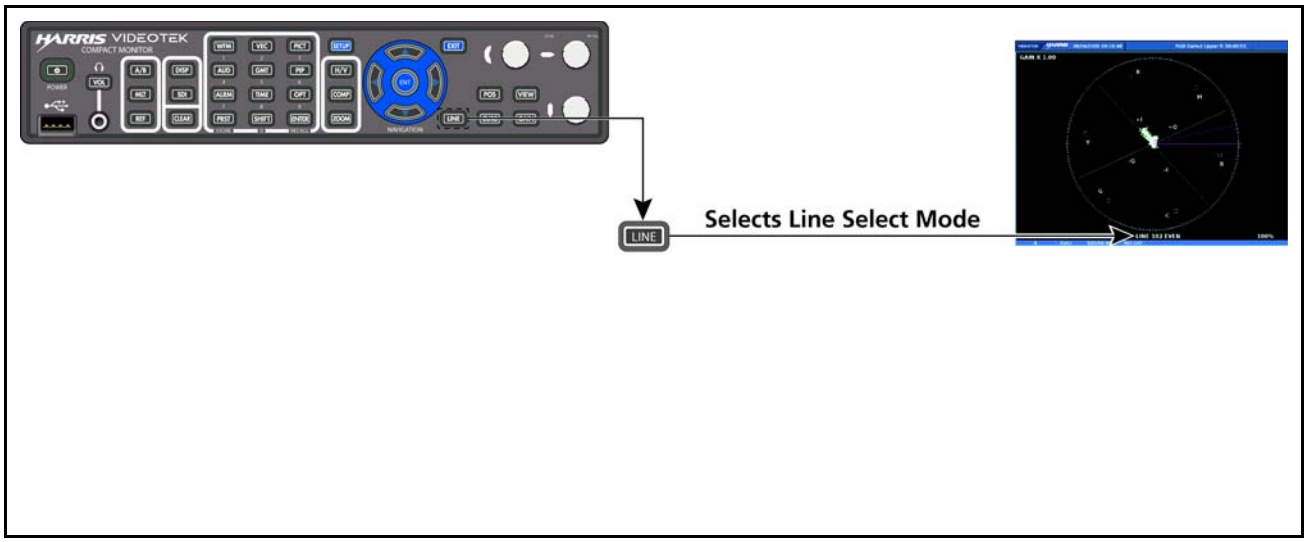

Figure 4-19 Establishing Line Select

In a Progressive (p) format, odd and even selection is not available.

2 Press the Up/Down arrow knob to alternate between Odd and Even fields.

3 Rotate the Up/Down arrow knob to select the line to be displayed, or press the **SHIFT** function button to use the numeric keypad to enter the line number.

Vector Cursor Selections

Cursors are available for precise measurement of vector phase (in degrees).

To enable the cursors for the selected display

CURS

Press the **CURS** button. The Phase Cursor indications are shown in **Figure 4-20**.

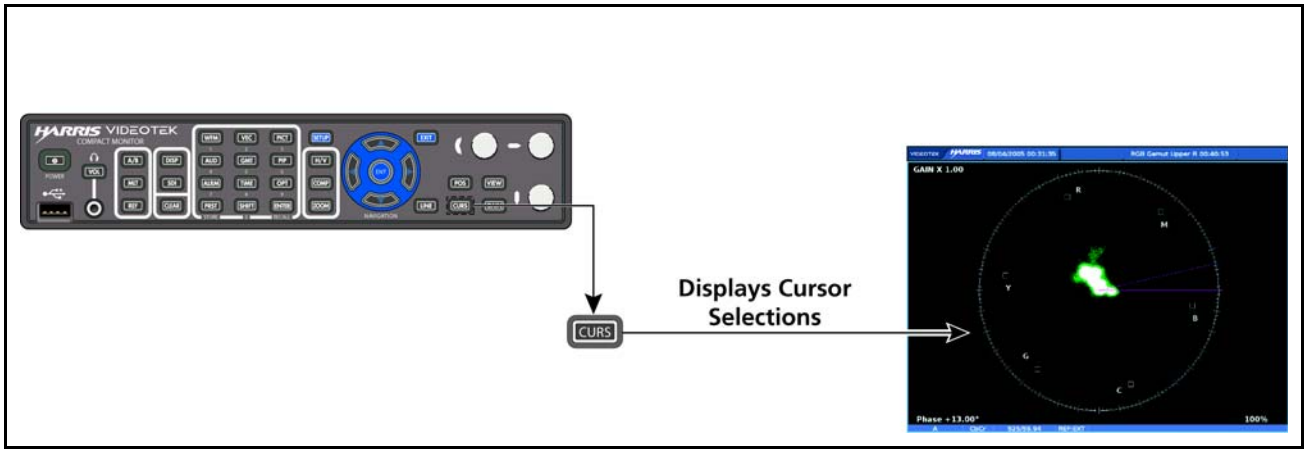

Figure 4-20 Establishing Cursor Select

To enable the Phase cursors

- Press and release the **CURS** button.
- Press the **CURS** button again to disable the cursor information.

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When the cursor is selected, the Phase indication appears at the top of the display. Next to the Phase indication is a numeric readout that indicates the difference between the REF and DELTA lines. The active cursor (REF, DELTA, or both) is shown with small arrows at the outer end of the line.

To select a cursor line for control

1. Press the curved arrow knob to select the REF or DELTA line to control. The REF line is the solid line, and the DELTA line is the dotted line.
2. Rotate the curved arrow knob to move the REF or DELTA line to the desired location.
3. Press the curved arrow knob for the next cursor. Rotate the knob to move the cursor to the desired location.
4. Press the curved arrow knob a third time to control both the REF and DELTA lines.
5. Repeat as necessary.

Once the cursors are no longer necessary, press and release the **CURS** button to disable the Phase cursor selection.

To exit the cursor function while leaving the cursor active

Press the **VEC** function button or select another mode (that is, LINE, GAIN, or POS).

Vector Setup Menu

To access the Vector Setup menu

Press and hold the **VEC** function button. For more information on the Vector Setup menu, see page 105.

Gamut Display

A constant setback in video production is the difference between the allowable ranges of dissimilar component and composite color spaces. Combinations of values that are within the range of a color-difference component video system produce signal amplitudes outside the ranges when the signal is transcoded to composite or RGB color space.

The gamut displays show RGB limits or composite video limits. A gamut display diagram is shown in **Figure 4-21** and described in **Table 4-5**. The diagram illustrates the general location for the various gamut fields.

To access the gamut display

Press and release the **GMT** function button.

To access the Gamut Setup menu selection options

Press and hold the **GMT** function button.

To clear the Gamut Setup menu

Press the **SETUP** or the **EXIT** button.

Both gamut displays illustrate what colors are causing illegal excursions and whether these digressions are above or below the allowable limits. The inputs are shown as an encoded display with gamut alarms. The displays show RGB and composite video limits.

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Vector excursion marks are shown in the gamut display. The excursion marks help to visualize the minimum/maximum value of a 100% color bar signal. The position of the excursion marks depend on the selected Video Format selection from the Video Setup menu.

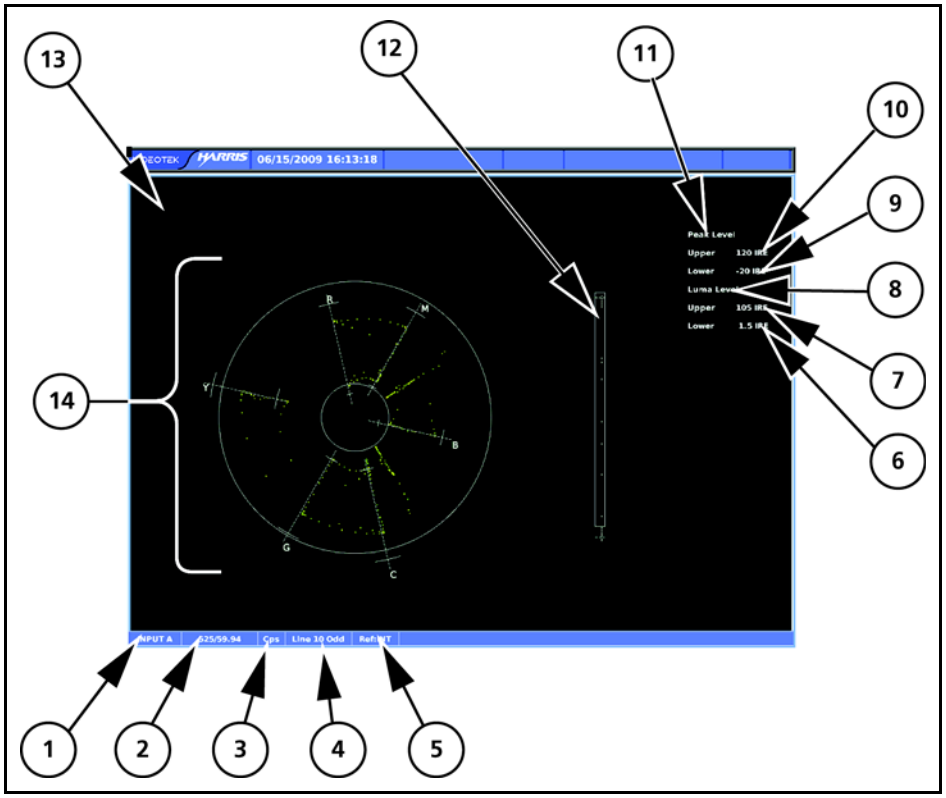

Figure 4-21 Gamut Display Diagram

Table 4-5 Description of Gamut Display Diagram

Field Identifier	Field Information	Nomenclature
1	Input	Displays selected input (A or B)
2	Standard	Displays the Line Rate/Frame Rate (1080i/59.94); this is selected in the Video Setup menu
3	Format	Displayed as Composite and RGB; this can be selected in the Gamut Setup menu
4	Line select information	Shown as Line and the number with the Odd or Even field (when applicable)
5	Reference	Displays the reference as INT, EXT (toggled by pressing the REF button)
6	Lower luma alarm limit (Composite only)	Displayed as Lower = xxx yy; xxx is the Luma lower threshold setting and yy is determined by the format (IRE for NTSC and Units or mV for PAL)
7	Upper luma alarm limit (Composite only)	Displayed as Upper = xxx yy; xxx is the Luma upper threshold setting and yy is determined by the format (IRE for NTSC and Units or mV for PAL)

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Table 4-5 Description of Gamut Display Diagram *(Continued)*

Field Identifier	Field Information	Nomenclature
8	Luma alarm limit	Displays Luma when Composite is selected; this field is blank when Single Color or RGB is selected
9	Lower chroma alarm limit	Displayed as Lower = xxx yy ■ For RGB xxx is the RGB Gamut lower threshold setting, and yy as mV ■ For Composite, xxx is the Peak lower threshold setting ■ In Composite, yy is determined by the format (IRE for NTSC and Units or mV for PAL)
10	Upper chroma alarm limit	Displayed as Upper = xxx yy ■ For RGB, xxx is the RGB Gamut upper threshold setting and yy is shown as mV ■ For Composite, xxx is the Peak upper threshold setting In Composite, yy is determined by the format (IRE for NTSC and Units or mV for PAL)
11	Chroma alarm limits	Displayed as RGB (for RGB or Single Color) and PEAK (for Composite)
12	Luma/Mono bar graticule	Shows the Luma/Mono bar graticule
13	Zoom	Zoom when enabled; blank when disabled
14	Gamut Graticule	Composite or RGB Gamut graticule

Composite Gamut

The graticule for the composite gamut vector, as shown in **Figure 4-22** and described in **Table 4-6**, is two concentric circles with other identifiers. When setting the upper and lower limits, the upper and lower gamut rings represent the values set from the threshold values of the appropriate format.

The outer circle (the upper gamut alarm limit) represents the highest allowable amplitude in standard composite units (that is, IRE for NTSC and units for PAL). The inner circle (the lower gamut alarm limit) represents the lowest allowable amplitude. The rings turn red when the alarm is enabled and the values exceed the threshold setting.

To move the gamut rings

Set the ALARMS → VIDEO → GAMUT → PEAK GAMUT UPPER (or LOWER) → THRESHOLD 525/59.94 or THRESHOLD 625/50 selection option.

To move the luma bar limits

Set the ALARMS → VIDEO → GAMUT → LUM GAMUT UPPER (or LOWER) → THRESHOLD 525/59.94 or THRESHOLD 625/50 selection option.

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The other identifiers are radials that extend at the angle of the designated color. These six lines follow the same displacement as the vector display. Note that since the PAL display is derived solely from component information, there are not two phases for PAL signals. The +V phase is used (making the vectors look similar to NTSC).

There is an alarm persistence of two seconds associated with any alarm indication. After an alarm has cleared, two seconds will pass before the gamut alarm indicator returns to normal.

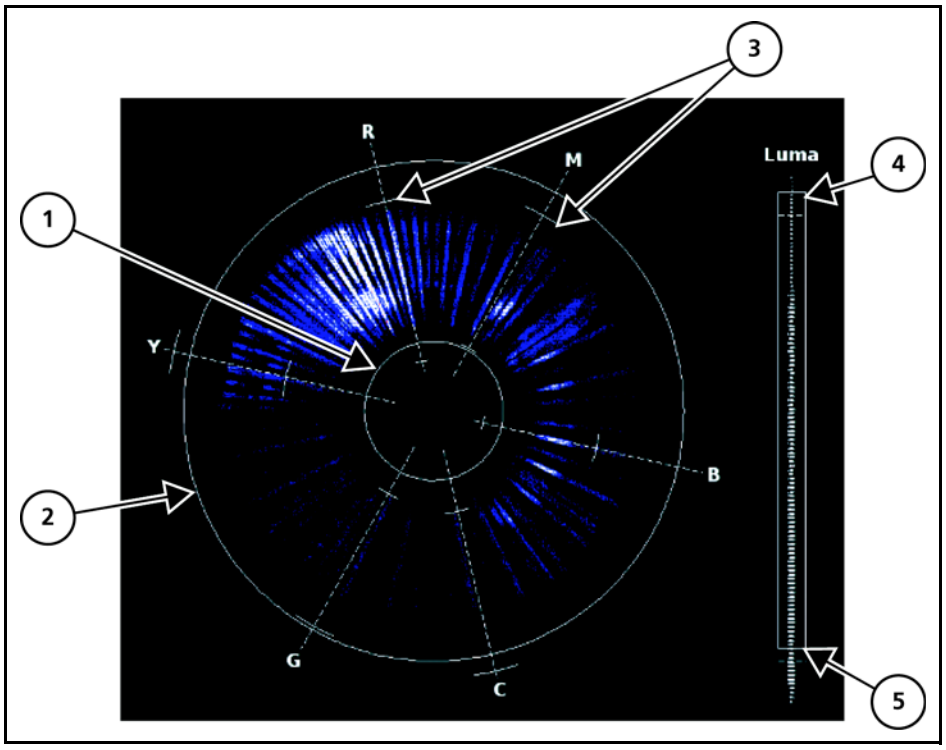

Figure 4-22 Composite Gamut Vector Display Graticule Markings

Table 4-6 Description of Composite Gamut Indicators

Key	Indicator	Description
1	Lower Gamut Ring	The lower gamut ring indicates the Gamut alarm Peak Lower limit. When the Gamut alarm is enabled and the Peak Lower limit is exceeded, the lower gamut ring turns red.
2	Upper Gamut Ring	The upper gamut ring indicates the gamut alarm peak upper limit. When the gamut alarm peak upper limit is exceeded, the upper gamut ring turns red.
3	Vector Excursion Mark	The excursion marks help to visualize the minimum/ maximum value of 100% color bars.

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Table 4-6 Description of Composite Gamut Indicators *(Continued)*

Key	Indicator	Description
4	Luma Upper Limit Line	The luma upper limit line indicates the gamut alarm luma upper limit. When the gamut alarm is enabled, and the luma upper limit is exceeded, the luma upper limit line and LUMA turn red.
5	Luma Lower Limit Line	The luma lower limit line indicates the gamut alarm luma lower limit. When the gamut alarm is enabled, and the luma lower limit is exceeded, the luma lower limit line and LUMA turn red.

RGB Gamut Display

When setting the upper and lower limits, the upper and lower gamut rings represent the threshold values.

To move the gamut rings

Set the ALARMS → VIDEO → GAMUT → RGB GAMUT UPPER (or LOWER) → THRESHOLD selection option.

The RGB Gamut Display, shown in **Figure 4-23** and described in **Table 4-7**, is similar to the Composite Gamut Display. The RGB Gamut vector displays video amplitudes (which are in mV) in a polar format to represent color information. The rings turn red when the alarm is enabled and the values exceed the threshold setting.

Each R, G, and B pixel is plotted using amplitude and phase. The amplitude is derived from the R, G, B component. The phase is derived from the CB CR information of the digital signal. The pixels can be plotted as a single color or as each component color (see **Table 5-9** on page 106). Unlike the composite Gamut vector, which plots two points per pixel, the RGB Gamut vector plots three points. Also, signals with no color content are displayed on a separate bar graph labeled Mono.

The RGB graticule is nearly identical to the composite graticule. The only differences are

- Amplitudes are displayed in mV rather than IRE or UNITS.
- The radials representing color vectors are 60° apart since they are displayed in a component color space.
- Mono bar graph is for monochrome.

There is an alarm persistence of two seconds associated with any alarm indication. After an alarm has cleared, two seconds will pass before the gamut indicator returns to normal.

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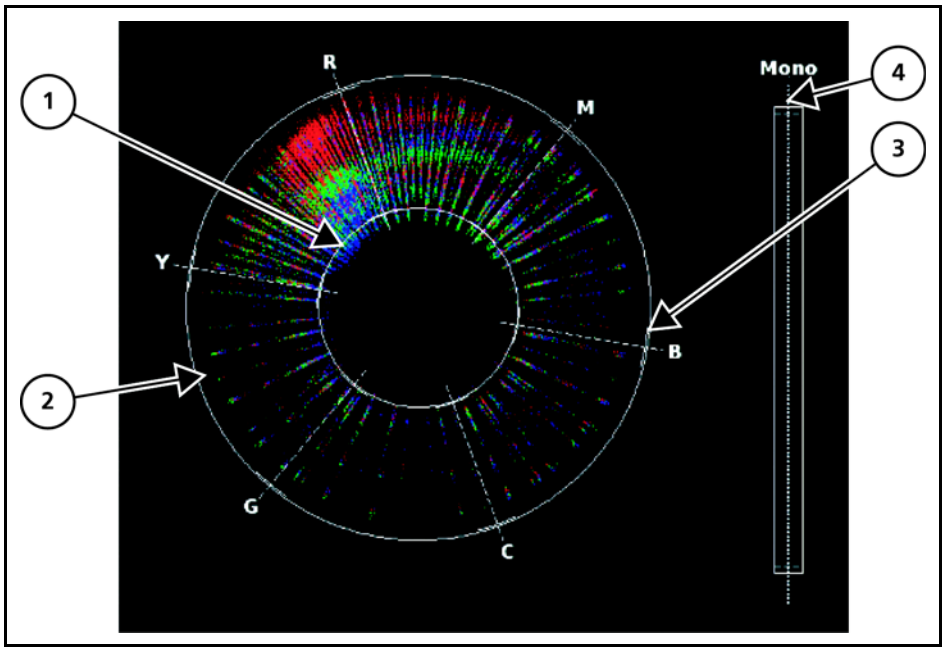

Figure 4-23 Component (RGB) Gamut Vector Display Graticule Markings

Table 4-7 Description of RGB Gamut Indicators

Key	Indicator	Description
1	Lower Gamut Ring	The lower gamut ring indicates the RGB Gamut alarm Lower limit. When the RGB Gamut alarm is enabled and the Lower limit is exceeded, the lower gamut ring turns red.
2	Upper Gamut Ring	The upper gamut ring indicates the RGB Gamut alarm Upper limit. When the RGB Gamut alarm is enabled, and the Upper limit is exceeded, the upper gamut ring turns red.
3	Vector Excursion Mark	The excursion marks help to visualize the minimum/maximum values of 100% color bars.
4	Mono	Mono indicates the monochrome level of the RGB signal. There is no alarm associated with Mono.

Placing the Gamut Display in Line Select Mode

To enable monitoring of a single line of a video signal

Press the **LINE** button. This enables Line Select to monitor individual lines of the entire image.

To view a line in Line Select mode

1 Press the **LINE** button to place the selected Gamut display in Line Select mode. At the bottom of the display, the Line number and Odd or Even field appear, as shown in **Figure 4-24**.

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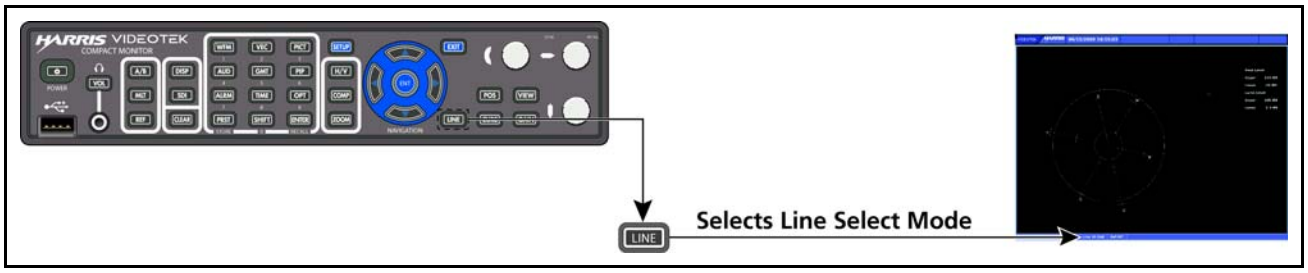

Figure 4-24 Establishing Line Select

In a Progressive (p) format, Odd and Even selections are not available.

2 Press the Up/Down arrow knob to alternate between the Odd and Even fields for interlaced formats.

3 Rotate the Up/Down arrow knob to select the line to be displayed.

Setting Display Options

To cycle through the displays of the Composite or RGB gamut graticule

ZOOM

Press and release the **ZOOM** button.

Graticule display views include the following:

- Expand the center
- Expand the upper left quadrant
- Expand the upper right quadrant
- Expand the lower right quadrant
- Expand the lower left quadrant
- Normal view

Gamut Setup Menu

To access the Gamut Setup menu

Press and hold the **GMT** function button. For more information on the global Gamut Setup menu, see page 106.

Picture Display

PICT

The Picture Display is used to show the picture of the selected input. Press and release the **PICT** function button to display the picture. A Picture display diagram is shown in **Figure 4-25** and described in **Table 4-8**. Only one picture can be displayed.

To access the Picture Setup menu

Press and hold the **PICT** button.

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To clear the Picture Setup menu

Press the **SETUP** or the **EXIT** button.

*Pictures can be used as thumbnails. For more information, see **Picture Setup Menu** on page 107.*

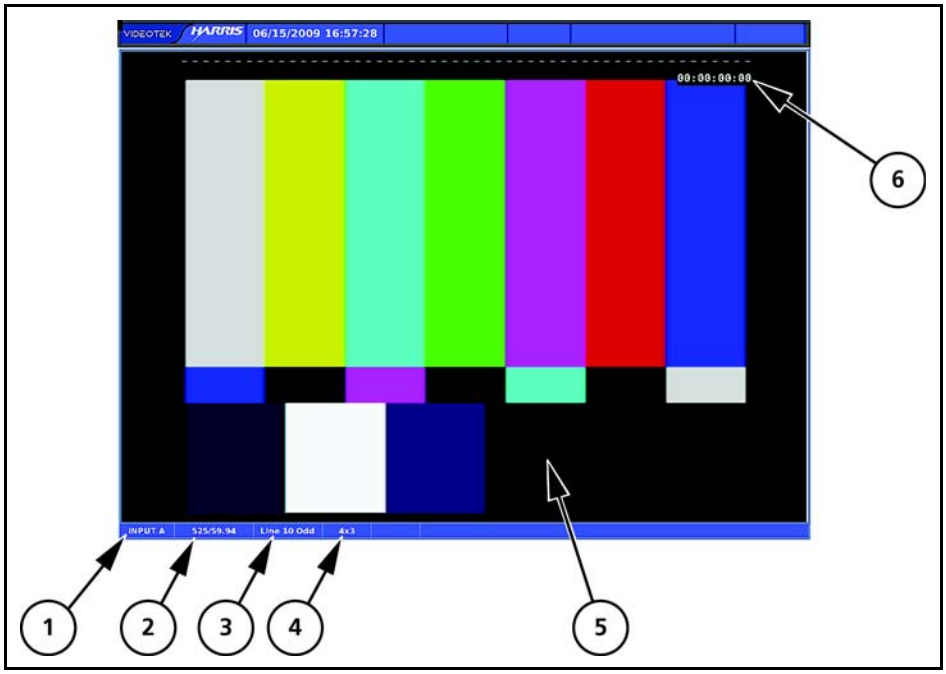

Figure 4-25 Picture Display Diagram

Table 4-8 Description of Picture Display Diagram

Field Identifier	Field Information	Nomenclature
1	Input	Displays selected input (A or B)
2	Standard	Displays the line rate/frame rate; select the Standard in the Video Setup menu
3	Line select information	Shown as Line and the number with the Odd or Even field (when applicable)
4	Aspect ratio	Displays the selected aspect ratio; select the aspect ratio in the Unit Configuration Setup → Display Setup selection option
5	Picture	Displays a picture of selected video input
6	Timecode	Displays location of the timecode information when timecode is enabled

The picture display changes according to the aspect ratio and anamorphic selections in the global Setup menu. A picture display diagram, shown as the left drawing in **Figure 4-26**, shows the 4:3 display with a 16:9 source. Also, the picture to the right in **Figure 4-26** shows a 4:3 display with a 4:3 source.

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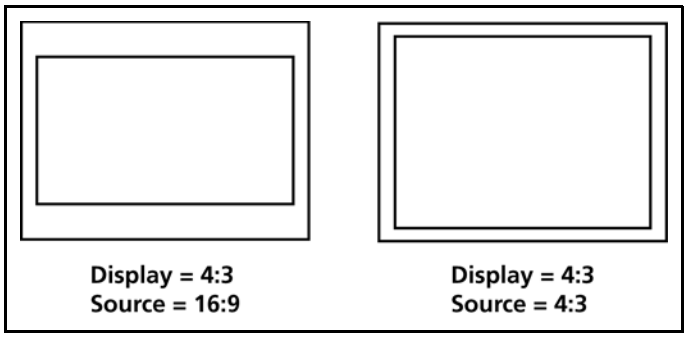

Figure 4-26 Aspect Ratio Source Diagram

Placing the Picture in Line Select Mode

To enable Line Select mode

Press the **LINE** button to place the selected Picture display in Line Select mode.

1 A cursor appears on the selected line, as shown in **Figure 4-27**.

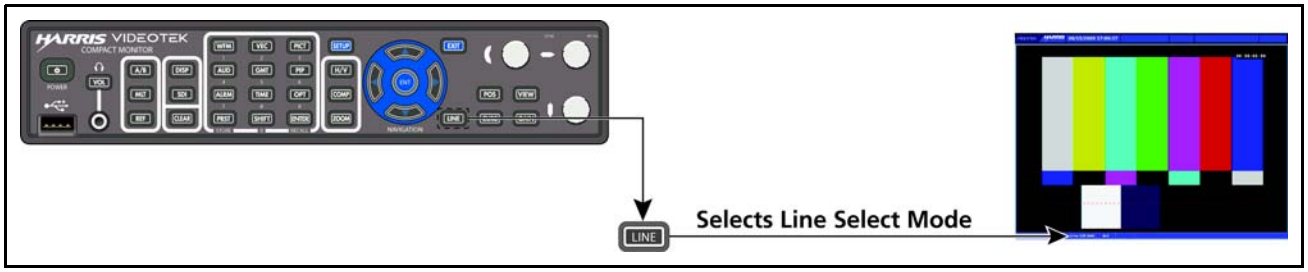

Figure 4-27 Establishing Line Select

In a Progressive (p) format, Odd and Even selections are not available.

2 Press the Up/Down arrow knob to alternate between the Odd and Even fields for interlaced formats.

3 Rotate the Up/Down arrow knob to select the line to be displayed.

Picture Setup Menu

To access the Picture Setup menu

Press and hold the **PICT** function button. For more information on the global Picture Setup menu, see page 107.

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PIP Display

The Picture-In-Picture (PIP) function shows a "thumbnail" of the selected input's picture display, with the selected function display information appearing in the background. The PIP function is available with the waveform, vector, gamut, audio, alarm, time, and options functions.

To enable the picture-in-picture display

While in the active display, press and release the **PIP** function button.

PIP display is not available when quad screen display mode is selected.

Figure 4-28 shows the PIP function enabled in Overlay Display mode, along with the waveform and vector displays.

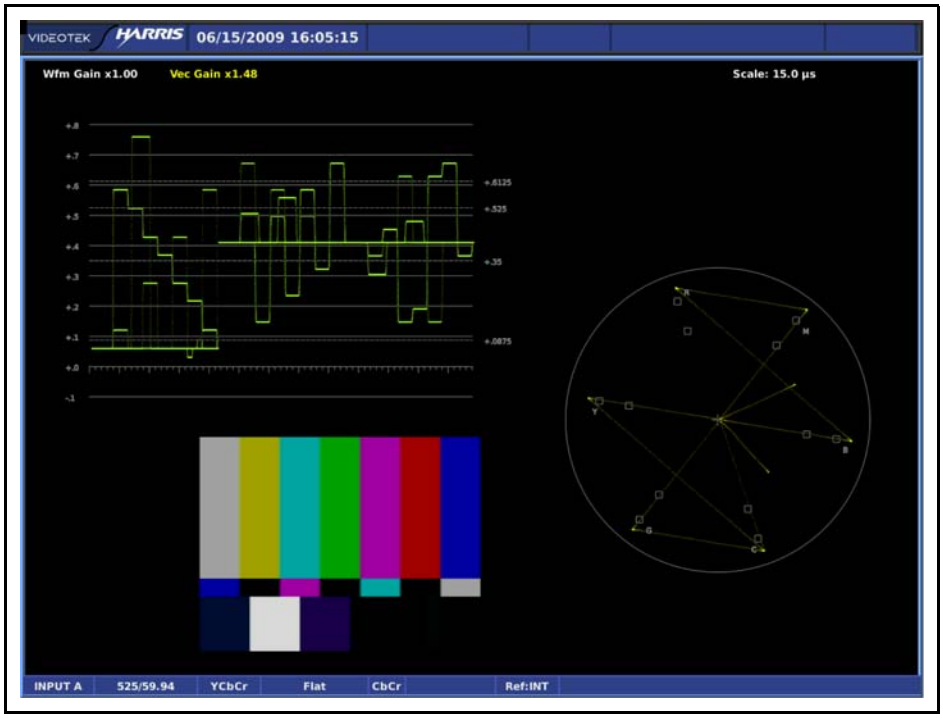

Figure 4-28 Sample PIP Display

Moving a PIP

To move a PIP

Make sure the **PIP** function button and the **VIEW** button are in high tally. Use the Up/Down and Left/Right arrow knobs to reposition the PIP on the display.

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Scaling a PIP

To scale a PIP display's size

Make sure the **PIP** function button and the **VIEW** button are in high tally. Use the curved arrow knob to resize the PIP on the display.

Removing a PIP

To remove a PIP from the display

Make sure the **PIP** function button is in high tally, and then press the **PIP** function button.

The display disappears from the screen.

Audio Display

The CMN-41 accepts one AES/EBU and up to four groups of embedded audio inputs. Any two input channels can be selected to be monitored on the headphone output.

To access the audio display

Press and release the **AUD** function button.

Headphone monitoring is not available on the CMN-41L.

To access Audio Setup menu selection options

Press and hold the **AUD** function button.

Configure the audio display type and parameters using the AUDIO → CHANNEL selection options. Audio can be displayed as one of the following:

- One two-channel bar graph with one Lissajous and one Phase bar
- Two two-channel bar graphs (for a total of four channels) with two Lissajous and two Phase bars
- Three two-channel bar graphs (for a total of six channels) with three Phase bars or CineSound 5.1 with two Phase bars
- Four two-channel bar graphs (for a total of eight channels) with four Phase bars or CineSound 5.1+AUX, 6.1, or 7.1 with up to three phase bars
- Eight two-channel bar graphs (for a total of sixteen channels) with eight Phase bars

Lissajous can be selected as Soundstage or X-Y displays.

Input assignments, scaling, input levels, and response can also be modified using the Audio Setup menu.

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Audio Scales

The Vertical audio graticule scales change according to the selections made in the AUDIO → METER SETUP → SCALE selection options. The Scale selection options are as follows:

- Type I
- Type IIA
- Type IIB
- Type I + 8
- Nordic
- DIN 45406
- dBFS
- Zero Ref dBFS
- Custom dBFS
- Custom dB

Vertical Audio Displays

Vertical Audio display diagrams are shown in **Figure 4-29** to **Figure 4-33**, and described in **Table 4-9** to **Table 4-13**. The Vertical audio graticule scales change according to the scale selections made in the Setup menu.

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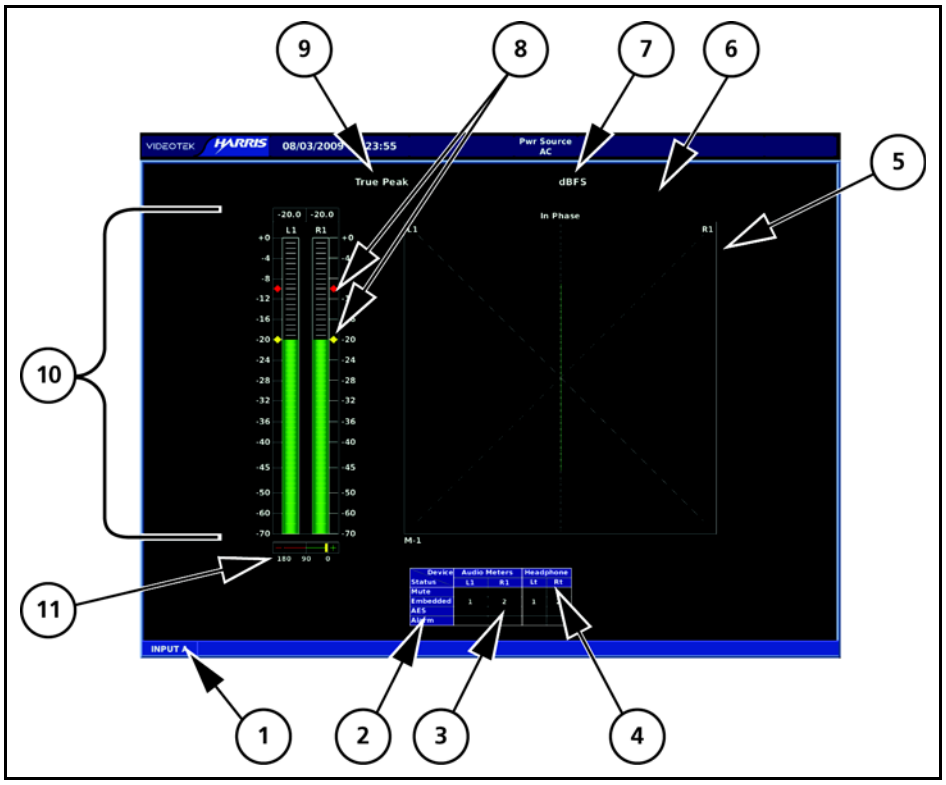

Figure 4-29 Two Bar Graph Display with Lissajous Diagram

Table 4-9 Two Bar Graph Display with Lissajous Diagram

Field Identifier	Field Information	Nomenclature
1	Input	Displays selected input (A or B)
2	Status	Displays audio type as Mute, AES, or Embedded
		Displays audio clip or mute alarm indicators
3	Channel Number	Shown as 1-16 (AES is 1-2 and Embedded is 1-16)
4	Device	Displays labels for lissajous, bar graphs, and headphone outputs
5	Lissajous Display	Lissajous of bar graph 1 with labels for R, L, and the number of the meter being monitored (for example, M-1)
6	Zoom	Zoom when enabled; blank when disabled
7	Scale Selection	Displays the selected meter scale: Type I, Type IIa, Type IIb, Type I + 8, Nordic, DIN 45406, dBFS, Zero REF dBFS, Custom dB, and Custom dBFS
8	Level Markers	Shows peak levels for the signal; this can be adjusted in the Audio Meter Setup selection options

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Table 4-9 Two Bar Graph Display with Lissajous Diagram *(Continued)*

Field Identifier	Field Information	Nomenclature
9	Meter Response	Displays the selected meter response: VU, Peak, True Peak, VU + Peak, VU + True Peak, Custom
10	Audio Graticule (with meter labels)	Shown as stereo pairs (L1, R1), SMPTE 320M, or custom label
11	Phase Bar	Phase Meter of bar graph 1

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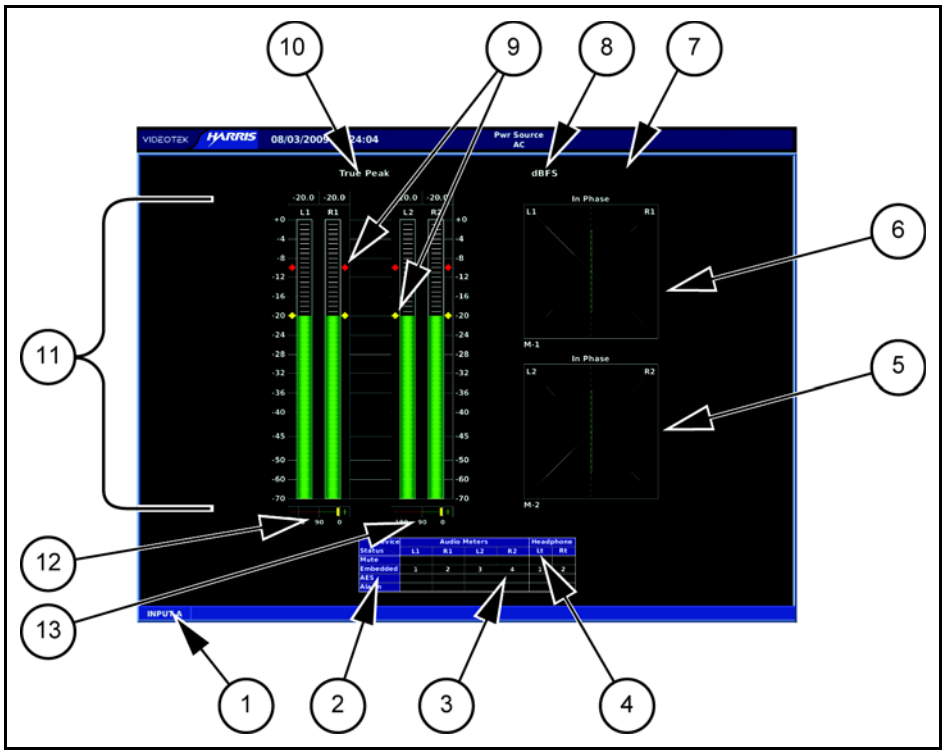

Figure 4-30 Four Bar Graph with Lissajous Display Diagram

Table 4-10 Four Bar Graph with Lissajous Display Diagram

Field Identifier	Field Information	Nomenclature
1	Input	Displays selected input (A or B)
2	Status	Displays audio type as Mute, AES, or Embedded Displays audio clip or mute alarm indicators
3	Channel Number	Shown as 1-16 (AES is 1-2 and Embedded is 1-16)
4	Device	Displays labels for lissajous, bar graphs, and headphone outputs
5	Lissajous Display (2)	Lissajous of bar graph 2 with labels for R, L, and the number of the meter being monitored (for example, M-2)
6	Lissajous Display (1)	Lissajous of bar graph 1 with labels for R, L, and the number of the meter being monitored (for example, M-1)
7	Zoom	Zoom (when enabled); blank when disabled
8	Scale Selection	Displays the selected meter scale: Type I, Type IIa, Type IIb, Type I + 8, Nordic, DIN 45406, dBFS, Zero REF dBFS, Custom dB, and Custom dBFS
9	Level Markers	Shows peak and reference levels for the signal; this can be adjusted in the Audio Meter Setup selection options

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Table 4-10 Four Bar Graph with Lissajous Display Diagram *(Continued)*

Field Identifier	Field Information	Nomenclature
10	Meter Response	Displays selected meter response: VU, Peak, True Peak, VU + Peak, VU + True Peak, Custom
11	Audio Graticule (with meter labels)	Shown as L1, R1, L2, and R2 (or Custom label)
12	Phase Bar (1)	Phase Meter of bar graph 1
13	Phase Bar (2)	Phase Meter of bar graph 2

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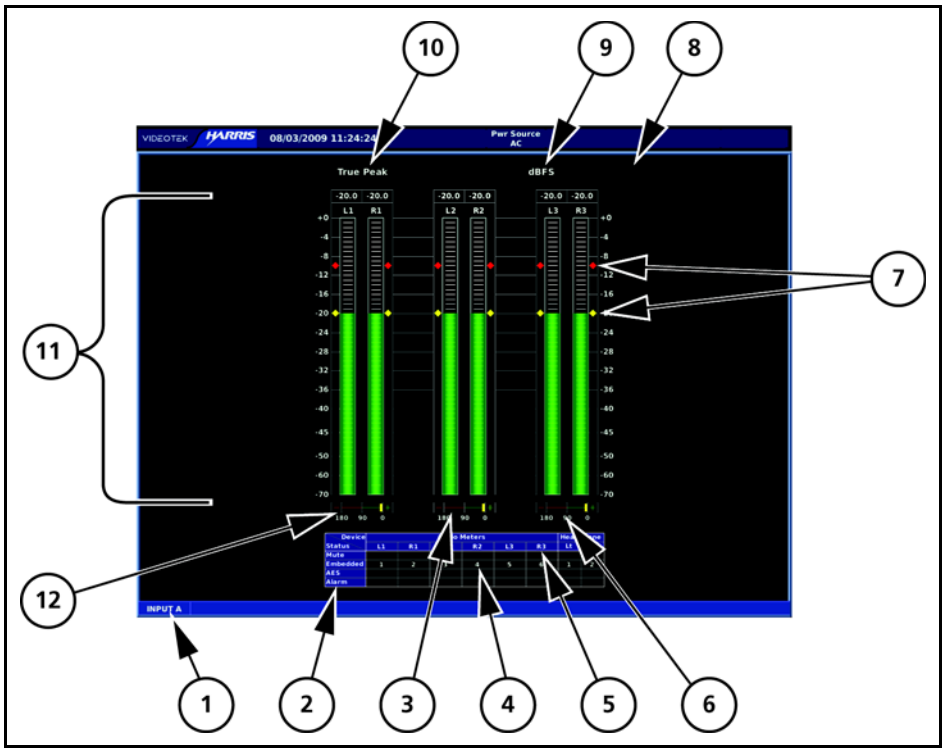

Figure 4-31 Six Bar Graph Display Diagram

Table 4-11 Six Bar Graph Display Diagram

Field Identifier	Field Information	Nomenclature
1	Input	Displays selected input (A or B)
2	Status	Displays audio type as Mute, AES, or Embedded
		Displays audio clip or mute alarm indicators
3	Phase Bar (2)	Phase Meter of bar graph 2
4	Channel Number	Shown as 1-16 (AES is 1-2 and Embedded is 1-16)
5	Device	Displays labels for lissajous, bar graphs, and headphone outputs
6	Phase Bar (3)	Phase Meter of bar graph 3
7	Level Markers	Shows peak and reference levels for the signal; this can be adjusted in the Audio Meter Setup selection options
8	Zoom	Zoom (when enabled); blank when disabled
9	Scale Selection	Displays the selected meter scale: Type I, Type IIa, Type IIb, Type I + 8, Nordic, DIN 45406, dBFS, Zero REF dBFS, Custom dB, and Custom dBFS

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Table 4-11 Six Bar Graph Display Diagram *(Continued)*

Field Identifier	Field Information	Nomenclature
10	Meter Response	Displays the selected meter response: VU, Peak, True Peak, VU + Peak, VU + True Peak, Custom
11	Audio Graticule (with meter labels)	Shown as L1, R1, L2, R2, L3, and R3 (or Custom label)
12	Phase Bar (1)	Phase Meter of bar graph 1

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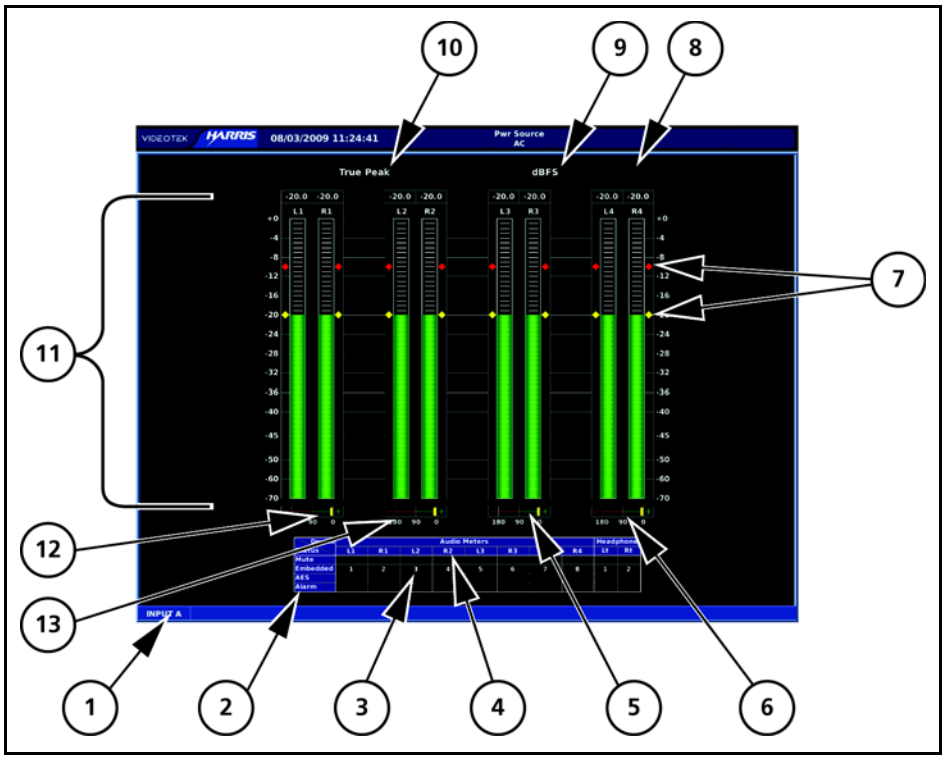

Figure 4-32 Eight Bar Graph Display Diagram

Table 4-12 Eight Bar Graph Display Diagram

Field Identifier	Field Information	Nomenclature
1	Input	Displays selected input (A or B)
2	Status	Displays audio type as Mute, AES, or Embedded
		Displays audio clip or mute alarm indicators
3	Channel Number	Shown as 1-16 (AES is 1-2 and Embedded is 1-16)
4	Device	Displays labels for lissajous, bar graphs, and headphone outputs
5	Phase Bar (3)	Phase Meter of bar graph 3
6	Phase Bar (4)	Phase Meter of bar graph 4
7	Level Markers	Shows peak and reference levels for the signal; this can be adjusted in the Audio Meter Setup selection options
8	Zoom	Zoom when enabled; blank when disabled
9	Scale Selection	Displays the selected meter scale: Type I, Type IIa, Type IIb, Type I + 8, Nordic, DIN 45406, dBFS, Zero REF dBFS, Custom dB, and Custom dBFS
10	Meter Response	Displays selected meter response: VU, Peak, True Peak, VU + Peak, VU + True Peak, Custom

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Table 4-12 Eight Bar Graph Display Diagram *(Continued)*

Field Identifier	Field Information	Nomenclature
11	Audio Graticule (with meter labels)	Shown as L1, R1, L2, R2, L3, R3, L4, and R4 (or Custom label)
12	Phase Bar (1)	Phase Meter of bar graph 1
13	Phase Bar (2)	Phase Meter of bar graph 2

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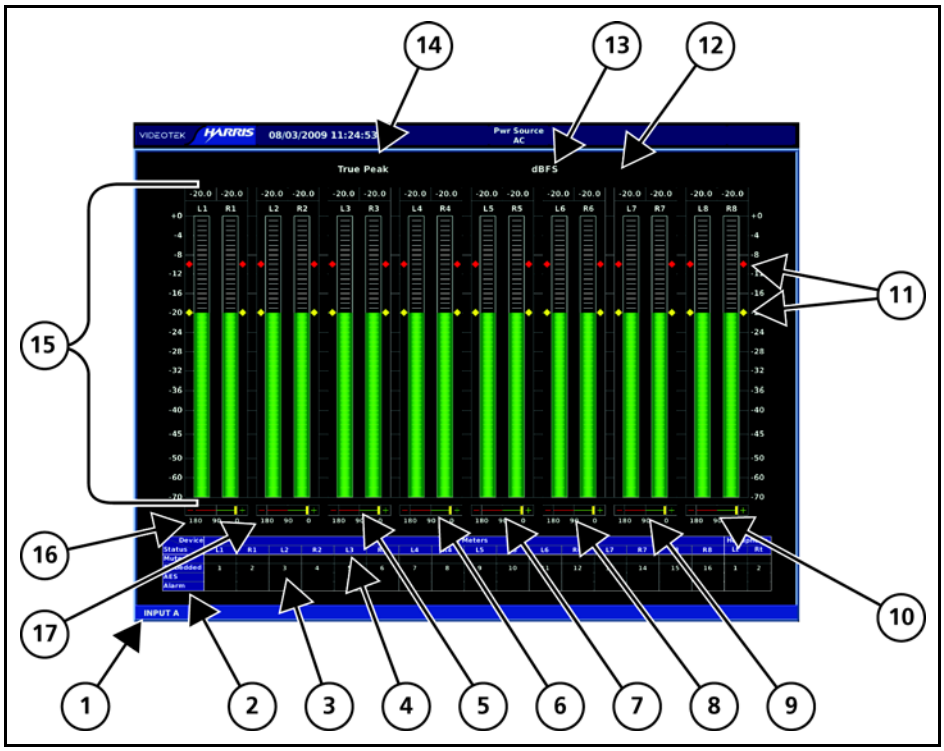

Figure 4-33 Sixteen Bar Graph Display Diagram

Table 4-13 Sixteen Bar Graph Display Diagram

Field Identifier	Field Information	Nomenclature
1	Input	Displays selected input (A or B)
2	Status	Displays audio type as Mute, AES, or Embedded
		Displays audio clip or mute alarm indicators
3	Channel Number	Shown as 1-16 (AES is 1-2 and Embedded is 1-16)
4	Device	Displays labels for lissajous, bar graphs, and headphone outputs
5	Phase Bar (3)	Phase Meter of bar graph 3
6	Phase Bar (4)	Phase Meter of bar graph 4
7	Phase Bar (5)	Phase Meter of bar graph 5
8	Phase Bar (6)	Phase Meter of bar graph 6
9	Phase Bar (7)	Phase Meter of bar graph 7
10	Phase Bar (8)	Phase Meter of bar graph 8
11	Level Markers	Shows peak and reference levels for the signal; this can be adjusted in the Audio Meter Setup selection options
12	Zoom	Zoom when enabled; blank when disabled
13	Scale Selection	Displays the selected meter scale: Type I, Type IIa, Type IIb, Type I + 8, Nordic, DIN 45406, dBFS, Zero REF dBFS, Custom dB, and Custom dBFS

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Table 4-13 Sixteen Bar Graph Display Diagram *(Continued)*

Field Identifier	Field Information	Nomenclature
14	Meter Response	Displays selected meter response: VU, Peak, True Peak, VU + Peak, VU + True Peak, Custom
15	Audio Graticule (with meter labels)	Shown as L1, R1, L2, R2, L3, R3, L4, R4, L5, R5, L6, R6, L7, R7, L8, or R8 (or Custom label)
16	Phase Bar (1)	Phase Meter of bar graph 1
17	Phase Bar (2)	Phase Meter of bar graph 2

Expanding the Audio Display

To access the audio zoom feature
Press the **ZOOM** button. The range of the zoom is dependent on the selections made in the ZOOM CENTER and ZOOM RANGE menu.

To access the ZOOM CENTER and ZOOM RANGE menu
Press and hold the **ZOOM** button.

- ZOOM CENTER: Adjustable from +20 dB to -60 dB in 1 dB steps. The default is the Reference Level setting. The zoom center adjustment is restricted by Audio Scale, Reference Level, and Zoom Range selections.
- ZOOM RANGE: Adjustable from 4 dB to 20 dB in 2 dB steps. The default is 10 dB. The Zoom Range adjustment is restricted by Audio Scale, Reference Level, and Zoom Center selections.

Zoom must be enabled to view the new adjustments.

Audio Mapping

The Audio Mapping matrix is used to assign any audio input to a meter and/or headphone output. See page 101 for more information.

Audio Setup Menu

To access the global Audio Setup menu
Press and hold the **AUD** button. For more information on the global Audio Setup menu, see page 110.

Alarm Display

To access the alarm display
Press and release the **ALRM** function button.

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To access the Alarm Setup menu

Press and hold the **ALRM** function button.

The default alarm display is the Alarm Log. For information on individual alarms, see **Chapter 6, *Alarm Descriptions***.

Alarm Log Display

The Alarm Log display lists all the alarms, the date, time, time code, duration, and peak value. The alarm list begins with the most recent alarm and can hold a maximum of 100 alarms.

The Alarm Log display is the default alarm display. The Alarm Status display is accessed via the Alarm Setup menu.

An Alarm Log display diagram is shown in **Figure 4-34** and described in **Table 4-14**. The diagram illustrates the general location for the various alarm fields.

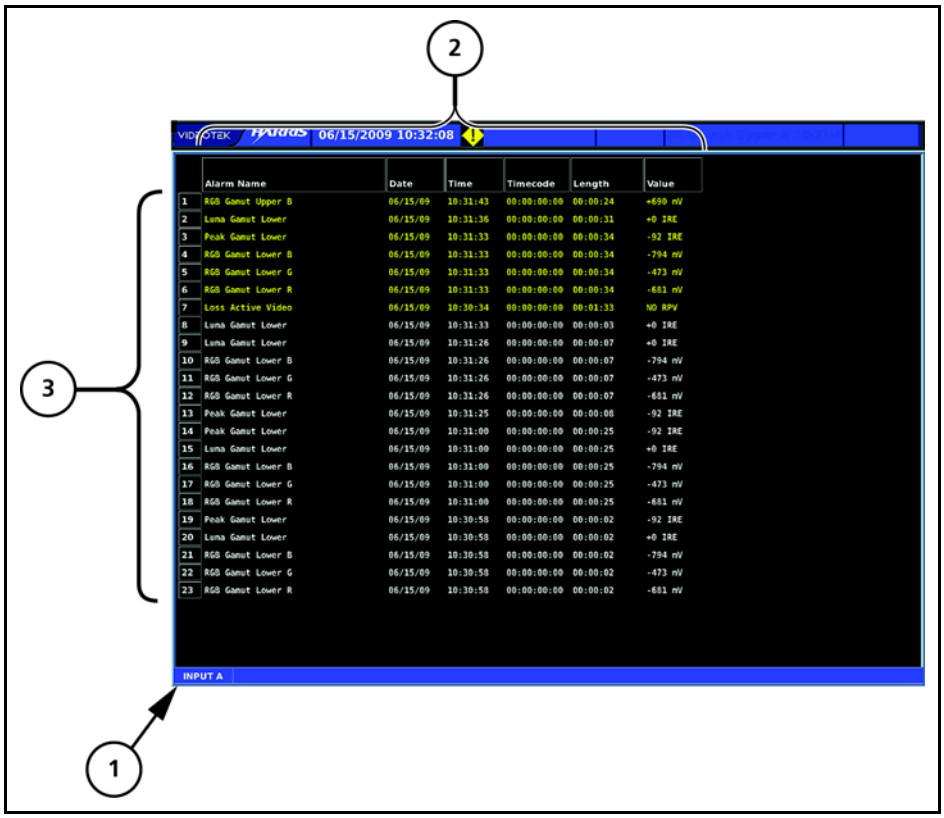

Figure 4-34 Alarm Log Display Diagram

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Table 4-14 Description of Alarm Log Display Diagram

Field Identifier	Field Information	Nomenclature
1	Input	Displays selected input (A or B)
2	Column Labels	Displays the labels # (for the number in the alarm list), ALARM NAME, DATE, TIME, TIMECODE, LENGTH (Duration), and PEAK VALUE[1]
3	Alarm List	Displays the list of alarms from the most recent alarm to the last recorded alarm (a maximum of 100 alarms can be logged)

[1] Certain alarm parameters do not have a level measurement that can report a peak value. This is indicated when NO RPV (No Report Peak Value) appears in the PEAK VALUE column.

When an alarm is first registered, it appears on the alarm display and is highlighted in yellow. If the alarm is short term (that is, two seconds or less), the alarm text is not highlighted after approximately two seconds. If the alarm continues longer than two seconds, the text remains yellow and the alarm duration is incremented. When the next alarm occurs, the previous alarm moves down one position.

The CMN-41 unit has enough memory for 100 alarms per input. When 100 different alarm events have occurred, alarm number 100 is dropped and the most recent alarm is tagged as 01.

To scroll through the alarm list
Use the Up/Down navigation buttons.

To erase the current group of alarms
Press the **CLEAR** button.

A GPI output dry contact closure can be used to alert other devices when an alarm occurs.

To set up the GPI
Use the UNIT CONFIGURATION → GPIO selection option (page 120).

Alarm Status Display

The Alarm Status screen lists all the alarms, the state of each alarm setting, the current alarm limit selection (if applicable), the current alarm duration (if applicable), and the Accumulated alarm column.

To access the Alarm Setup menu
Press and hold the **ALRM** function button.

To access the alarm status display
Use the Alarm setup menu.

To scroll to the Alarm Status selection option
Use the Up/Down navigation buttons.

To select the Alarm Status display
Press the **ENT** navigation button.

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An alarm status display diagram is shown in **Figure 4-35**. The diagram illustrates the general location for the various alarm status display fields.

Figure 4-35 Alarm Status Display Diagram

The alarm status screen contains detailed information concerning alarm status indicators. This information is separated into columns sorted by alarm name, whether or not the alarm is enabled, lower and upper limits, thresholds, duration, and total number of alarms. The alarm name text can appear in a colored state. The colored states are:

- White: indicates alarm is not enabled.
- Green: indicates alarm is enabled and not exceeding alarm limits.
- Red: indicates the alarm is enabled and exceeding an alarm limits.

There is a two-second persistence for any alarm name color change.

To scroll through the Alarm Status list

Use the Up/Down navigation buttons.

Video Alarms

To access the Alarms Setup menu

Press and hold the **ALRM** button. If necessary, use the Up/Down navigation arrows to select the Video Alarms selection option.

To show the available Video Alarm selection options

Press the **ENT** navigation button.

For more information on the global Video Alarms Setup menu, see page 128.

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Audio Alarms

To access the Alarms Setup menu
Press and hold the **ALRM** button to access the Alarms Setup menu. If necessary, use the Up/Down navigation arrows to select the Audio Alarms selection option.

To show the available Audio Alarm selection options
Press the **ENT** navigation button.

For more information on the global Audio Alarms Setup menu, see page 131.

Time Code Alarms

To access the Alarms Setup menu
Press and hold the **ALRM** button. If necessary, use the Up/Down navigation arrows to select the Time Code Alarms selection option.

To show the available Time Code Alarm selection options
Press the **ENT** navigation button.

For more information on the global Time Code Alarms Setup menu, see page 134.

GPI Alarms

Up to four general purpose interface alarms can be enabled.

To access the Alarms Setup menu
Press and hold the **ALRM** button. If necessary, use the Up/Down navigation arrows to select the GPI Alarms selection option.

To show the available GPI Alarm selection options
Press the **ENT** navigation button.

For more information on the global GPI Alarms Setup menu, see page 136.

Timing Display

A Timing display diagram is shown in **Figure 4-36** and described in **Table 4-15**. The diagram illustrates the general location for the various Timing display fields.

To access the Timing display

Press and release the **TIME** function button.

To access the Timing Setup menu
Press and hold the **TIME** button.

To clear the Timing Setup menu
Press the **SETUP** or the **EXIT** button.

Relative timing of the inputs is compliant with SMPTE RP168.

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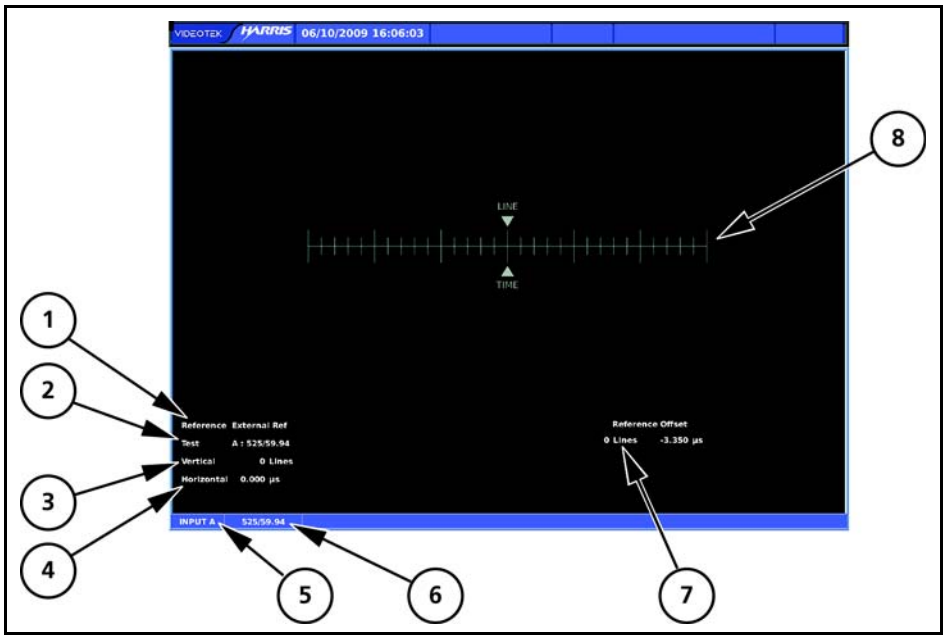

Figure 4-36 Timing Display Diagram

Table 4-15 Description of Timing Display Diagram

Field Identifier	Field Information	Nomenclature
1	Selected reference	Displays the selected reference as REF: X where X is ExtREF or LTC; the REF is selected in the Timing Setup menu; also indicates reference format
2	Test	Indicates the input that is being measured against the selected reference in Field Identifier 1; also displays the input's line rate/frame rate (shown in **Figure 4-36** as 525/59.94); selected in the Video Setup menu
3	VERT (Vertical)	The offset line in full-video lines between the reference and the displayed video Displays the Vertical Error Measurement as VERT: xxx Line(s), where xxx is the measured difference between the reference and the test input alignment of the vertical timing (sync/TRS) in lines
4	HORZ (Horizontal)	The offset time in microseconds between the reference and the displayed video Displays the Horizontal Error Measurement as HORZ: yy.yyy µs, where yy.yyy is the measured difference between the reference and the test input alignment of the horizontal timing (sync/TRS) Horizontal can be yellow at 0 µs. It displays the minimum scale resolution at 1 µ and the minimum timing resolution at 0.037 µs for HD (High Definition) and 0.74 µs for SD (Standard Definition).

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Table 4-15 Description of Timing Display Diagram *(Continued)*

Field Identifier	Field Information	Nomenclature
5	Input	Displays selected input (A or B)
6	Standard	Displays the line rate/frame rate; select the Standard in the Video Setup menu
7	REF OFFSET	Displays that the zero point of the timing measurements are offset from the REF selection by xx lines yy.yyy µs
8	Timing Graticule	Shows the timing graticules, cursors, and labels

When a signal is processed, there is the potential for it to be delayed with respect to a reference signal. The timing display is used to indicate when a video input is deviating in time from the reference. See ***Timing Setup Menu*** on page 114 for more information on reference selection.

The reference input indicator (REF), located in the center of the timing display, indicates the reference timing point for the type of signal being monitored. REF is green when the line and µs (microseconds) cursors are all aligned. As the signal falls out of timing alignment, the line and the µs cursors change color when it moves from REF. When this occurs, the REF turns red. Each hash mark represents a vertical line (top scale) and 1 µs (bottom scale). Once the line or µs cursors are at the edge of the display, arrows will appear to the right or left of the timing line.

The Timing Display alignment accuracy is ±280 ns.

SDI Input and External Reference Formats Supported

Table 4-16 SDI Input and External Reference Formats Supported
• = Supported

SDI Input Format	External Reference Format																		
	NTSC	PAL	1080i60 (p30sf)	1080i59.94 (p29.97sf)	1080i50 (p25sf)	1080p30	1080p29.97	1080p25	1080p24	1080p23.98	1080p24sf	1080p23.98sf	720p60	720p59.94	720p50	720p30	720p29.97	720p24	720p23.98
525/59.94	•			•			•												
625/50		•			•			•											
1080i60(p30sf)			•			•													
1080i59.94(p29.97sf)	•			•			•												
1080i50(p25sf)		•			•			•											
1080p60																			
1080p59.94	•			•										•					

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Table 4-16 SDI Input and External Reference Formats Supported *(Continued)*
• = Supported

SDI Input Format	External Reference Format																		
	NTSC	PAL	1080i60 (p30sf)	1080i59.94 (p29.97sf)	1080i50 (p25sf)	1080p30	1080p29.97	1080p25	1080p24	1080p23.98	1080p24sf	1080p23.98sf	720p60	720p59.94	720p50	720p30	720p29.97	720p24	720p23.98
1080p50		•			•			•											
1080p30			•			•										•			
1080p29.97	•			•			•										•		
1080p25		•			•			•											
1080p24									•		•							•	
1080p23.98										•		•							•
1080p24sf									•		•								
1080p23.98sf										•		•							
720p60			•			•							•			•			
720p59.94	•			•			•							•			•		
720p50		•			•			•							•				
720p30			•			•							•			•			
720p29.97	•			•			•							•			•		
720p24									•		•							•	
720p23.98										•		•							•

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Things to Remember When Using the Timing Display

1. The Timing Display measures the elapsed time between the vertical syncs of two inputs. The elapsed time is expressed in units of microseconds and lines of the selected input video, not of the reference.
2. When referencing a standard definition video input to an external tri-level reference input, the line number indication in the timing display represents standard definition video lines. If the relative timing is adjusted in high definition video lines, it may take an adjustment of two or more lines before the line number changes in the timing display. This is due to the high definition video lines, which are shorter than the standard definition video lines represented by the timing display.
3. When referencing a high definition video input to an external composite (BB) reference input, the line number indication in the timing display represents high definition video lines. If the relative timing is adjusted in standard definition video lines, a single video line adjustment will cause a change of two or more lines in the timing display. This is due to the standard definition video lines, which are longer than the high definition video lines represented by the timing display.
4. The information of the Timing Display should not be used when captured SDI freeze data is displayed.

Timing Setup Menu

To access the Timing Setup menu
Press and hold the **TIME** function button. For more information on the global Timing Setup menu, see page 114.

Option Display Selections

The Option display shows a waveform display of the LTC or external reference inputs.

Only one option display can be shown at a time.

OPT can only be displayed when in full screen display mode.

To select the external reference or LTC waveform display
Press and release the **OPT** button.

To access the Option Setup menu
Press and hold the **OPT** function button.

To clear the Option Setup menu
Press the **SETUP** or the **EXIT** button.

Moving the Waveform

To move the Waveform display relative to the graticule
Select the **POS** button, and then use the Left/Right arrow knob (for horizontal movement) and the Up/Down knob (for vertical movement).

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To move the waveform in a particular direction

Scroll the Left/Right (horizontal direction) or Up/Down (vertical direction) arrow knob.

Centering the Waveform

To center the waveform horizontally

Press the Left/Right arrow knobs.

To center the waveform vertically

Press the Up/Down arrow knobs.

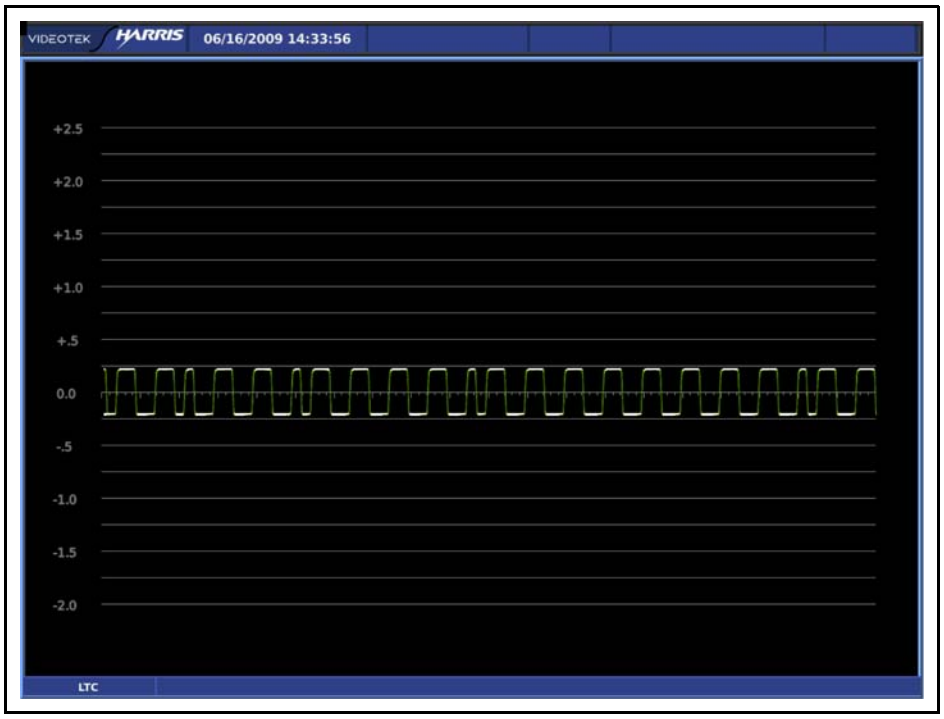

Figure 4-37 LTC Display Diagram

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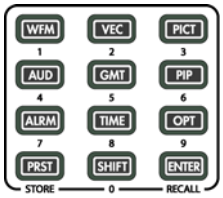
Figure 4-38 External Reference Display Diagram

Preset Display Selections



Presets are used to store menu configurations and display settings. A total of 99 presets can be stored in the CMN-41.

Selecting Presets

To access the bank of presets

Press and release the **PRST** function button. A dialog box appears on the display screen, which shows the Preset number.

To select a preset

Press and release the **PRST** function button, and then press selection button 1 to 99 (or scroll through the available list using the curved arrow knob).

Storing Presets

To store a preset

1 Press the **PRST** button to bring up the Presets dialog box.

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2 Press selection button **1** to **99** (or scroll through the available list using the curved arrow knob).

3 Press the **PRST (STORE)** button to store a new Preset.

Overwriting Existing Presets

To overwrite a preset

1 Press the **PRST** button to bring up the Presets dialog box.

2 Press selection button **1** to **99** (or scroll through the available list using the curved arrow knob) to make the desired selection.

3 Press the **PRST** button to overwrite an existing Preset.

Recalling Presets

Information must be stored in a preset location before being recalled.

To recall a preset

1 Press the **PRST** function button to bring up the Presets dialog box.

2 Press selection button **1** to **99** (or scroll through the available list using the curved arrow knob) to make the desired selection.

3 Press the **ENTER (RECALL)** button.

If a preset does not exist for the selected number, nothing happens.

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5 Setup Menu Functions

Navigating the Setup Menu

The setup position knobs and navigation buttons are described in **Table 5-1**. See **Figure 3-1** on page 32 for the location of these knobs and buttons.

To access the global Setup menu

Press the **SETUP** button.

To navigate the Setup menu

Use the setup position knobs or the **SETUP**, **UP**, **DOWN**, **LEFT**, **RIGHT**, **ENT**, and **EXIT** buttons.

Table 5-1 Setup Position Knobs and Navigation Button Functions

Button/Knob	Function
	Press to exit the Setup menu.
	Press to enter or exit the Setup menu.
	Press to select a menu item, or open a menu or submenu.
	Press to move up in a menu or submenu tree.
	Press to move right to the next submenu.
	Press to move out of a submenu.
	Press to move down in a menu or submenu.

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Table 5-1 Setup Position Knobs and Navigation Button Functions *(Continued)*

Button/Knob	Function
	Rotate to set numeric values for certain parameters. Press to set parameter to default value.
	Press to use the numeric keypad for direct parameter entry. The Shift button will be high tally to indicate that the numeric keypad is available for direct parameter entry.

Setup Menus and Alarm Tables

The following tables make up the global setup menu. An asterisk (*) is shown next to the default menu selections. The Setup menu items are listed in **Table 5-2** with their corresponding Table and Description location pages.

Table 5-2 Setup Menu Tables

Selection	Page
About	Page 125
Alarms	Alarm setup tables and corresponding descriptions appear in **Chapter 6**.
Audio	Page 110
Audio mapping	Page 101
Clear	Page 118
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[1] CMN-41 only

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Video Setup Menu

The Video Setup selections are used to automatically or manually select the video format reference standard for the SDI input. The format selection determines the unit of measure and the critical amplitude limits for the input.

Menu Selections

Table 5-3 Video Setup Menu

Selection Option	Selection Option
Auto Detect*	
1080i	
1080i Frame Rate	60
	59.94*
	50
1080p	
1080p Frame Rate	60
	59.94*
	50
	30
	29.97
	25
	24
	23.98
1080psF	
1080psF Frame Rate	30sF
	29.97sF*
	25sF
	24sF
	23.98sF
720p	
720p Frame Rate	60
	59.94*
	50
	30
	29.97
	24
	23.98

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Table 5-3 Video Setup Menu *(Continued)*

Selection Option	Selection Option
625/50	
525/59.94	
Structure	Auto Detect*
	10 bit YCBCR 4:2:2
	10 bit YCBCR 4:4:4
	10 bit RGB 4:4:4
	12 bit YCBCR 4:4:4
	12 bit RGB 4:4:4
	12 bit YCBCR 4:2:2

Menu Selection Descriptions

- **Auto Detect**: This selection is used to automatically detect the format of the input signal. This is the default setting.
- **1080i**: This selection is used force the unit into 1080 interlaced video mode.
- **1080i Frame Rate**: This selection is used to set up the 1080i frame rate. Selection options are 60, 59.94, and 50. The default setting is 59.94.
- **1080p**: This selection is used to force the unit into 1080 progressive video mode.
- **1080p Frame Rate**: This selection is used to set up the 1080p frame rate. Selection options are 60, 59.94, 50, 30, 29.97, 25, 24, and 23.98. The default setting is 59.94.
- **1080psF**: This selection is used to force the unit into 1080 progressive segmented frame video mode.
- **1080psF Frame Rate**: This selection is used to set up the 1080psF frame rate. Selection options are 30sF, 29.97sF, 25sF, 24sF, and 23.98sF. The default setting is 29.97sF.
- **720p**: This selection is used to force the unit into 720 progressive video mode.
- **720p Frame Rate**: This selection is used to set up the 720p frame rate. Selection options are 60, 59.94, 50, 30, 29.97, 24, and 23.98. The default setting is 59.94.
- **625/50**: This selection is used force the unit into video frames with 625 line/50 Hz video mode.
- **525/59.94**: This selection is used force the unit into frames with 525 line/(60*1000/1001) Hz video mode.
- **Structure**: This selection is used to configure the signal handling path to a 10-bit or 12-bit RGB or YCbCr sampling structure. 12-bit modes are not available with formats 1080p/60, 1080p/59.94, and 1080p/50. 4:4:4 and 4:2:2 are the format rates selected with the 10-bit and 12-bit sampling structures. 4:2:2 is only available with 12-bit YCbCr. The selections are as follows.
  - **Auto Detect**: The sampling structure is determined from the Video Payload Identifier. If there is no detected VPI, a 10-bit YCBCR sampling structure will be assumed. This is the default setting.
  - **10 bit YCBCR 4:2:2**: The signal handling path will be configured for a 10-bit YCBCR mode of operation.
  - **10-bit YCBCR 4:4:4**: The signal handling path will be configured for a 10-bit YCBCR mode of operation. This selection is only available for dual link and 3 Gb/s HD.

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- **10-bit RGB 4:4:4**: The signal handling path will be configured for a 10-bit RGB mode of operation. This selection is only available for dual link and 3 Gb/s HD.
- **12-bit YCBCR 4:4:4**: The signal handling path will be configured for a 12-bit YCBCR mode of operation. This selection is only available for 3Gb/s HD.
- **12-bit RGB 4:4:4**: The signal handling path will be configured for a 12-bit RGB mode of operation. This selection is only available for dual link and 3 Gb/s HD.
- **12-bit YCBCR 4:2:2**: The signal handling path will be configured for a 12-bit YCBCR mode of operation. This selection is only available for dual link and 3 Gb/s HD.

Audio Mapping Matrix Menu

The Audio Mapping matrix is used to assign the input to the meter display or headphone output.

Menu Selections

Table 5-4 Audio Mapping Menu

Selection Option
Matrix Screen

Menu Selection Descriptions

When the Audio Mapping setup option is selected, a matrix screen for Mute, Embedded, and AES opens (see **Figure 5-1**).

To scroll through the column selections

Use the Right/Left arrow knobs or buttons.

To scroll through individual cell selections

Use the Up/Down arrow knobs or buttons.

To assign an input to a meter

Press the **ENT** button. Different audio types (AES or Embedded) can be assigned to a meter output.

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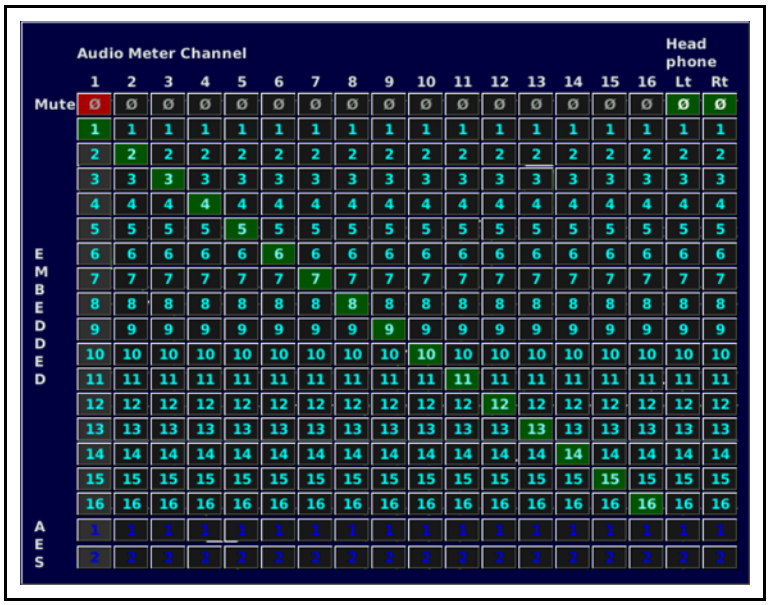

Figure 5-1 Audio Mapping Matrix Display

Time Code Source Setup Menu

The Time Code Source setup menu is used to determine the Time Code Source for each format. The CMN-41 can read Longitudinal Time Code and Digital Vertical Interval Time Code based on the format selected.

Menu Selections

Table 5-5 Time Code Source Setup Menu

Selection Option	Selection Option
LTC*	
ANC LTC	
ANC DIVTC 0	
ANC DVITC 1	
DVITC	
DVITC Line 525	Line 10 to 30 (line 14*)
DVITC Line 625	Line 6 to 30 (line 14*)

Menu Selection Descriptions

- **LTC**: Longitudinal Time Code. This is the default setting.
- **ANC LTC**: Ancillary Longitudinal Time Code
- **ANC DVITC 0**: Ancillary Digital Vertical Interval Time Code 0
- **ANC DVITC 1**: Ancillary Digital Vertical Interval Time Code 1

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- **DVITC**: Digital Vertical Interval Time Code

  DVITC is monitored on selected lines. After DVITC is selected, adjust the line selection in the DVITC LINE 525 or DVITC LINE 625 submenus to the selected line. The range for DVITC LINE 525 is adjustable from Line 10 to 30, and DVITC LINE 625 is adjustable from line 6 to 30.

For more information on displaying time code see page 108.

Waveform Setup Menu

The Waveform Setup menu is used to set the display, format, filter, overlay, blanking method, error highlighting, graticule, intensity, contrast, persistence, and attack selections for a waveform display.

Menu Selections

Table 5-6 Waveform Setup Menu

Selection Option	Selection Option	Selection Option
Display/Format	YCbCr*	
	RGB	
	Composite	
	YCbCr + alpha	
	RGB + alpha	
	YRGB	
Component Filter	Flat*	
	Low pass	
	Bowtie	
Composite Filter	Flat*	
	Low pass	
	Chroma	
	Flat and low pass	
Component Overlay		
Blanking	Blank All*	
	Show SAV/EAV	
	Show All	
Error Highlighting		

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Table 5-6 Waveform Setup Menu *(Continued)*

Selection Option	Selection Option	Selection Option
Graticule	Digital Waveform Graticule	Volts*
		Percent
	NTSC Pedestal*	
	PAL Waveform Scale	Volts*
		Units
Intensity	0% to 100% (72%*)	
Contrast	0% to 100% (31%*)	
Persistence	0% to Infinite (0%*)	
Attack	1% to Maximum (6%*)	

Menu Selection Descriptions

- **Display Format**: This selection allows a choice of display formats: YCbCr (default), RGB, Composite, YCbCr + Alpha, RGB + Alpha, and YRGB. **Table 5-7** lists the relationships between the input and display formats.

Table 5-7 Input and Display Format Relationship

Input Format	YCbCr	RGB	Composite	YCbCr + Alpha (10 bit only)	RGB + Alpha (10 bit only)	YRGB
3Gb/s	Yes	Yes	Yes	Yes	Yes	Yes
HD	Yes	Yes	Yes	Yes	Yes	Yes
SD	Yes	Yes	Yes	No	No	Yes

- **Component Filter**: Component filters are used when the waveform display format is set to YCbCr or RGB. Filter selections are Flat, Low Pass, and Bowtie.
  - **Flat**: No filtering (default)
  - **Low Pass**: Selects the Low Pass filter
  - **Bowtie**: Checks the timing relationships between the digital components (a bowtie test signal is required)
- **Composite Filter**: Composite filters are used when the waveform display format is set to Composite. Filter selections are Flat, Low pass, Chroma, and Flat and Low Pass.
  - **Flat**: No filtering (default)
  - **Low Pass**: Selects the Low Pass filter
  - **Chroma**: Selects the Chroma filter
  - **Flat and Low Pass**: Selects Flat and Low Pass filtering
- **Component Overlay**: When Component Overlay is selected for a single input, the components of the input signal are displayed over each other (that is, R over G over B in an RGB signal).
- **Blanking**: The blanking selections are Blank All, EAV/SAV, and Show All.
  - **Blank All** displays only the active video of the input signal (default).
  - **Show EAV/SAV** displays the active video and the EAV/SAV headers of the input signal.

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- **Show All** displays the ancillary data, EAV/SAV, and active video.

- **Error Highlighting**: Error highlighting changes the color of the portion of the waveform that exceeds the alarm settings. The default setting is OFF. The highlighting is dependent upon the format and gamut settings selected. The following are rules to consider:
  - Composite format with Flat filter follows the alarm settings for Gamut Peak upper and lower. It follows the threshold settings for the alarm, even when it is not enabled.
  - Composite format with Low Pass filter follows the Luma Upper and Lower thresholds.
  - Component format with RGB filter will follow the RGB gamut.
  - No highlighting in YCbCr.
- **Graticule**: This selection is used to select the unit of measurement in percent or volts for the Digital Waveform Graticule, and in volts or units for the PAL Waveform Scale.
- **NTSC Pedestal**: This selection adds setup to the Composite display (default).
- **Intensity**: This selection is used to raise or lower the brightness of the displayed waveform. The range of intensity is 0% to 100%. The default waveform intensity is 72%.
- **Contrast**: This selection is used to adjust the overall difference between the lightest and darkest colors of the waveform. The range of contrast is 0% to 100%. The default waveform contrast is 31%.
- **Persistence**: This selection is used to determine how long a data point (pixel) in the waveform remains on the display. The range of persistence is 0% to Infinite. The default waveform persistence is 0%.
- **Attack**: Attack is the initial intensity that the data point (pixel) appears in the display. The range of attack is 1% to Maximum. The default waveform attack is 6%.

Vector Setup Menu

The Vector Setup menu is used to set the standard, IQ lines, scale to composite, intensity, contrast, persistence, and attack selections for the vector display.

Menu Selections

Table 5-8 Vector Setup Menu

Selection Option	Selection Option
Standard	75%
	100%*
	75% + 100%
I/Q Lines	
Scale to Composite	
Intensity	0% to 100% (86%*)

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Table 5-8 Vector Setup Menu *(Continued)*

Selection Option	Selection Option
Contrast	0% to 100% (55%*)
Persistence	0% to Infinite (0%*)
Attack	1% to Maximum (10%*)

Menu Selection Descriptions

- **Standard**: Standard is used to set the marks on the vector display. The marks on the vector help to visualize the minimum/maximum value of a video signal. The position of the excursion marks are 75% or 100% (default) for SD and HD. The HD standard also can be selected as 75% and 100% simultaneously.
- **I/Q Lines**: This selection is used to turn the I and Q marker lines on the Vector Display OFF and ON. The default condition is OFF.
- **Scale to Composite**: The Scaled to Composite menu can be used to scale the SD or HD vector to reflect a composite format. The default condition is OFF.
- **Intensity**: This selection is used to raise or lower the brightness of the displayed vector. The range of intensity is 0% to 100%. The default selection is 86%.
- **Contrast**: This selection is used to adjust the overall difference between the lightest and darkest colors of the vector. The range of contrast is 0% to 100%. The default selection is 55%.
- **Persistence**: This selection is used to determine how long a data point (pixel) in the vector remains on the display. The range of persistence is 0% to Infinite. The default selection is 0%.
- **Attack**: This selection is used to determine the initial intensity that the data point (pixel) appears in the display. The range of Attack is 1% to Maximum. The default selection is 10%.

Gamut Setup Menu

The Gamut Setup menu is used to change a gamut's color plots, Data Error Persistence, Intensity, Contrast, and Persistence.

Menu Selections

Table 5-9 Gamut Setup Menu

Selection Option	Selection Option
Single color	
RGB*	
Composite	
Data Error Persistence	0% to Infinite (0%*)
Intensity	0% to 100% (86%*)
Contrast	0% to 100% (55%*)
Persistence	0% to Infinite (0%*)

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Menu Selection Descriptions

- **Single Color, RGB, Composite** (Color Plot): These selections are used to set the color for plotting RGB pixels. The pixels can be one single color or RGB (red, green, or blue). Multiple colors help to indicate which color of the RGB signal moves beyond the inner and outer parameters of the gamut graticule. The default selection is RGB.
- **Data Error Persistence**: This selection is used to determine how long a point of data beyond the inner and outer parameters of the gamut graticule. The range of persistence is 0% to Infinite. The default selection is 0%.
- **Intensity**: This selection is used to raise or lower the brightness of the displayed gamut. The range of intensity is 0% to 100%. The default selection is 86%.
- **Contrast**: This selection is used to adjust the overall difference between the lightest and darkest colors of the gamut. The range of contrast is 0% to 100%. The default selection is 55%.
- **Persistence**: This selection is used to determine how long a data point (pixel) in the Gamut remains on the display. The range of Persistence is 0% to Infinite. The default selection is 0%.

Picture Setup Menu

The Picture Setup menu is used to set the markers, time code, brightness, contrast, color, VBI mask, native, delay, and gamut error highlighting selections for the Picture display.

Menu Selections

Table 5-10 Picture Setup Menu

Selection Option	Selection Option	Selection Option
Markers	Center	
	Safe Title (Corners)	
	Safe Title (Box)	
	Safe Action (Corners)	
	Safe Action (Box)	
	Clean Aperture (Corners)	
	Clean Aperture (Box)	
	Custom (Corners)	
	Custom (Box)	
	Custom Position	1% to 49% (20%*)
	Custom Length	3% to 47 (5%*)
Anamorphic*		
Time Code	Enable	
	Show LTC	

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Table 5-10 Picture Setup Menu *(Continued)*

Selection Option	Selection Option	Selection Option
	Position	Top*
		Center
		Bottom
Brightness	0% to 100% (50%*)	
Contrast	0% to 200% (100%*)	
Color	Green*	
	Blue*	
	Red*	
VBI Mask		
Native		
Delay	Enable	
	H Position	1 pixel to ___ pixels (format-dependent)
	V Position	1 line to ___ lines (format-dependent)
Gamut Error Highlighting		

Menu Selection Descriptions

- **Markers**: There are several markers available to be indicated in a picture.
  - **Center** is equal to 50% of the picture height and 50% of the picture width.
  - **Safe Title** is equal to 80% of the picture height and 80% of the picture width.
  - **Safe Action** is equal to 90% of the picture height and 90% of the picture width.
  - **Clean Aperture** shows the limits for the active pixel area. Brackets appear on the picture or a box surrounds the picture to show these limits. The center marker identifies the location of the center of the picture.
  - **Custom** (**Corners**) and **Custom** (**Box**) allows the setup of customized markers for a picture display.
  - **Custom Position** is used in conjunction with the **Custom Corners and Custom Box** selections. It allows the adjustment of the custom corner or box size.
  - **Custom Length** is used in conjunction with the **Custom Corners** selection. It allows the adjustment of the corner lengths.

- **Anamorphic**: This selection is used to correct the anamorphic display. Setting the menu selection to ON changes the actual source aspect ratio to an aspect ratio that fills the screen (for example, SD squeezed horizontally 16×9 to 4×3 DVD source). The anamorphic selection is not available in 16×9 source aspect ratio.
- **Time Code**: This selection is used to display the time code; that is, the time that is associated with each video frame. Time Code is keyed over the picture on the right side. Adjacent to the Time Code, the LTC/DVITC is keyed over the picture on the right side when Show LTC is selected. (Show LTC cannot be activated unless ENABLE is selected.) The Position selection is used for the vertical placement of the time code at the top, center, and bottom (beyond safe action areas).

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- **Brightness**: This selection is used to make the picture brightness lighter or darker. The brightness range is from 0% (for the darkest picture) to 100% (for the brightest picture). The default picture brightness is 50%.
- **Contrast**: This selection is used to increase the overall difference between the lightest and darkest colors. The contrast range is from 0% (for no difference between the lightest and darkest colors) to 100% (for the most amount of difference between the lightest and darkest colors). The default picture contrast is 100%.
- **Color**: This selection is used to change the picture color gun selection. When all three colors are deselected, the picture display changes to monochrome.
  - **Green**: Green is a setup feature that is used to show the green color component of the input video. Use the Green feature to set the Saturation and Hue by matching the intensity of all green bars when a SMPTE split field color bar signal is applied.
  - **Blue**: Blue is a setup feature that is used to show the blue color component of the input video. Use the Blue feature to set the Saturation and Hue by matching the intensity of all blue bars when a SMPTE split field color bar signal is applied.
  - **Red**: Red is a setup feature that is used to show the red color component of the input video. Use the Red feature to set the Saturation and Hue by matching the intensity of all red bars when a SMPTE split field color bar signal is applied.
- **VBI Mask**: The VBI (Vertical Blanking Interval) Mask selection is used to mask non-active lines. With VBI Mask set to ON, only active lines will be shown on the picture portion of the display.
- **Native**: When this selection is enabled, it displays the SD picture as a one-for-one pixel mapping. When Native mode is not checked, the SD picture fills the screen.

The Native mode menu item only appears when an SD format is detected or selected.

- **Delay**: This selection is used to view the horizontal and vertical blanking areas of the video signal. Delay enables and disables the delay mode. Delay Position displays the amount of vertical and horizontal delay. Using the Delay position, turn the Up/Down and Right/Left knobs to position the picture. The Delay feature is not affected by the Native mode selection.
- **Gamut Error Highlighting**: When Gamut Error Highlighting is selected in the Picture setup menu, a grid pattern appears over the picture display highlighting gamut errors. Gamut highlighting is determined by the gamut threshold settings in the ALARMS → VIDEO ALARMS → GAMUT selection.

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Audio Setup Menu

The Audio Setup menu is used to set the audio selections.

Menu Selections

Table 5-11 Audio Setup Menu

Selection Option	Selection Option	Selection Option	Selection Option
2 Channels			
4 Channels			
6 Channels	Vertical*		
	CineSound		
8 Channels*	Vertical		
	CineSound 5.1 + AUX*		
	CineSound 6.1		
	CineSound 7.1		
16 Channels			
Meter Setup	Reference Level	-22 dBFS to -8 dBFS (-20 dBFS*)	
	Peak Program Level	Type I	+1 dB to +11 dB (+8 dB*)
		Type IIa	+1 dB to +11 dB (+8 dB*)
		Type IIb	+1 dB to +11 dB (+8 dB*)
		Type I + 8	+1 dB to +19 dB (+8 dB*)
		Nordic	+1 dB to +11 dB (+6 dB*)
		DIN 45406	+1 dB to +13 dB (+8 dB*)
		dBFS	+1 dB to +21 dB (+10 dB*)
		Zero Ref dBFS	+1 dB to +21 dB (+8 dB*)
		Custom dBFS	+1 dB to +21 dB (+10 dB*)
		Custom dB	+1 dB to +21 dB (+9 dB*)
	Scale	Type I	
		Type IIa	
		Type IIb	
		Type I + 8	
		Nordic	
		DIN 45406	
		dBFS*	
		Zero Ref dBFS	

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Table 5-11 Audio Setup Menu *(Continued)*

Selection Option	Selection Option	Selection Option	Selection Option
		Custom dBFS	
		Custom dB	
		Custom dBFS Top	0 dBFS to -20 dBFS (0 dBFS*)
		Custom dBFS Bottom	-40 dBFS to -90 dBFS (-40 dBFS*)
		Custom dB Top	0 dB to 20 dB (10 dB*)
		Custom dB Bottom	-20 dB to -70 dB (-30 dB*)
	Zoom	Center at Reference Level*	
		Center at dB Level	-60 dB to +20 dB (0 dB*)
		Zoom Range	4 dB to 20 dB (10 dB*)
	Peak Hold Time	Off*	
		1 to 10 seconds	
		Infinite	
	Meter Labels	Stereo Pairs*	
		SMPTE 320M	
		Custom	
		Custom Labels 1-8	Channel (1-8) Use arrow keys to edit and change characters
		Custom Labels 9-16	Channel (9-16) Use arrow keys to edit and change characters
	LFE Offset	-10 dB	
		None*	
	CineSound Direction	Outward*	
		Inward	
	Audio Markers	Enable	
		Position	-50 to +12 dB (0 dB*)
Meter Response	VU*		
	Peak		
	True Peak		
	VU + Peak		
	VU + True Peak		
	Custom		
	Custom Attack	0 to 20 ms (0 ms*)	
	Custom Decay	0.3 to 5.0 seconds (1.5 seconds*)	

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Table 5-11 Audio Setup Menu *(Continued)*

Selection Option	Selection Option	Selection Option	Selection Option
Lissajous Setup	Persistence	0% to Infinite (0%*)	
	Attack	1% to Maximum (50%*)	
	Automatic Gain Control		
	Plot	Soundstage*	
		X-Y	
Configure Phase Bar(s)	Polarity	Normal*	
		Reverse	
	Damping	Slow	
		1 to 10 (5*)	
		Fast	
AES Validity Bit			
Status Readout			

Menu Selection Descriptions

- **2 Channels**: This selection allows the display of one 2-channel bar graph with one lissajous and one phase bar.
- **4 Channels**: This selection allows the display of two 2-channel bar graphs (for a total of four channels) with two lissajous and two phase bars.
- **6 Channels**: This selection allows the display of three 2-channel bar graphs (for a total of six channels) with three phase bars, or CineSound 5.1 with two phase bars
- **8 Channels**: This selection allows the display of four 2-channel bar graphs (for a total of eight channels) with eight phase bars; CineSound 5.1 with two phase bars; CineSound 6.1 with two phase bars, or CineSound 7.1 with three phase bars
- **16 Channels**: This selection allows the display of eight 2-channel bar graphs (for a total of 16 channels) with eight phase bars
- **Meter Setup**: This selection is used to select the response, ballistics, and other meter features.
  - **Ref Level**: This selection is used to set the reference level on the meters for a digital signal. The range is from -8 dBFS to -22 dBFS. The default selection is -20 dBFS. Content below this setting is green. Content above this setting is yellow.
  - **Peak Program Level**: This selection is used to adjust the position of the peak marker on an Audio meter display. Value is the number of dB above the reference level. Content above this value is red.
  - **Scale**: This selection is used to determine the type of scale that appears on the Audio meter display. Custom dBFS and Custom dB can customize the top and bottom of the dBFS or dB scales.
  - **Zoom**: This selection is used to set the Zoom modes. Selections are Center at Reference Level, Center at dB level, and Zoom Range. The Center at dB level has a range from -60 dB to +20 dB; the default selection is 0 dB. The Zoom range is from 4 dB to 20 dB; the default selection is 10 dB.
  - **Peak Hold Time**: This selection is a user-selectable duration value of Off, 1 to 10 seconds, or Infinite. The duration only applies to the hold time of the PEAK value, not the attack or decay time. The default selection is Off.

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- **Meter Labels**: This selection menu is used to select the audio mapping scheme for the selected input. Only the Vertical Bar Meter labels can be customized. When the CineSound display is selected, the audio inputs follow a SMPTE 320M mapping scheme. For vertical meters only, the SMPTE 320M meter label-mapping scheme can be changed to a stereo pair-mapping scheme or Custom Labels.
- **LFE Offset**: This selection adjusts the LFE by -10 dB when enabled. LFE Offset only occurs when CineSound is displayed.
- **CineSound Direction**: This selection is used to reverse the default meter movement for the CineSound display. The default selection for the CineSound direction is from the center outward. Select INWARD to reverse the meter movement.
- **Audio Markers**: This selection is used to place adjustable markers in the audio meters. Adjustable markers can be placed in audio meters to show specific critical levels.

- **Meter Response**: This selection is used to display the selected meter response. Options are VU, Peak, True Peak, VU + Peak, VU + True Peak, Loudness, Custom, Custom Attack, and Custom Decay. The default selection is VU.
- **Lissajous Setup**: This selection is used to set up the display amplitude and phase relationships between two input signals. Options are Persistence, Attack, AGC, and Plot.
  - **Persistence**: This selection is used to determine how long a data point (pixel) remains on the display. The range of Persistence is 0% to Infinite. The default selection is 0%.
  - **Attack**: This selection is the initial intensity that the data point (pixel) appears in the display. The range of Attack is 1% to Maximum. The default selection is 50%.
  - **Automatic Gain Control**: This selection is used to keep the display visible from very small levels to very high levels.
  - **Plot**: This selection is used to select one of two types of Lissajous displays. The soundstage selection displays a Lissajous that is rotated so that the in-phase signals appear on the vertical axis and out of phase signals appear on the horizontal axis. X-Y displays a Lissajous with the left channel mapped to the vertical axis, and the right channel mapped to the horizontal axis.

- **Configure Phase Bar(s)**: Phase bars are used to monitor the instantaneous phase relationship between two channels of audio. On a vertical audio display the "+" marking indicates a phase difference of 0°, and the "-" marking indicates a phase difference of 180°. A properly phased stereo pair produces a phase pointer that moves within the green zone, whereas a reversed channel produces a pointer that moves within the red zone.
  - **Polarity**: This selection is used to set the phase bar polarity to Normal or Reverse. The default selection is Normal.
  - **Damping**: The effect of higher damping in a phase meter is to show an averaged rather than a peak value of phase. This selection is used to set the phase bar damping to Fast, 1 to 10, or Slow. The default selection is 5.

- **AES Validity Bit**: The AES Validity Bit is used to detect pulse code modulation (PCM) audio or non PCM audio. Non-PCM audio can include Dolby or other digital data.

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Timing Setup Menu

The Timing Setup menu is used to set the offset of the reference to the signal.

Menu Selections

Table 5-12 Timing Setup Menu

Selection Option	Selection Option
Reference	External Ref*
	LTC
Factory*	
Offset	
Set Zero Ref	

Menu Selection Descriptions

- **Reference**: This selection is used to set the reference source.
  - **External REF**: This selection uses the blackburst or tri-level signal connected to the External Reference input.
  - **LTC**: This selection is us used to set the reference to Longitudinal Time Code.
- **Factory**: This selection is used to set the factory reference to 0. When FACTORY is selected, the OFFSET field does not appear on the screen.
- **Offset**: This selection enables and displays the Offset field. The reference offset is not applied until SET ZERO REF is selected.
- **Set Zero Ref**: This selection is used to apply the current offset setting as the zero reference point.

OPT Setup Menu

The OPT, or Options, setup menu is used to select Longitudinal Time Code (LTC) or Reference Waveform.

Menu Selections

Table 5-13 OPT Setup Menu

Selection Option
LTC*
Reference Waveform

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MLT Setup Menu

The MLT Setup menu is used to select whether a four-quadrant or overlay display is selected. The default selection is Quadrant display. Additional selections for the Overlay display include Intensity, Contrast, Persistence and Attack.

Menu Selections

Table 5-14 MLT Setup Menu

Selection Option	Selection Option	Selection Option
Quadrant Display*		
Overlay Display		
Overlay Settings	Intensity	0% to 100% (72%*)
	Contrast	0% to 100% (31%*)
	Persistence	0% to Infinite (0%*)
	Attack	1% to Maximum (6%*)

Menu Selection Descriptions

- **Quadrant Display**: This selection is used to display a four-quadrant screen. The default Quadrant screen includes Audio, Picture, Vector and Waveform displays.
- **Overlay Display**: This selection is used to choose an Overlay display mode including Waveform and Vector displays. As an option, a PIP display can be enabled, using the PIP key.
- **Overlay Settings**
  - **Intensity**: This selection is used to raise or lower the brightness of the displayed waveform and vector. The range of intensity is 0% to 100%. The default selection is 72%.
  - **Contrast**: This selection is used to adjust the overall difference between the lightest and darkest colors of the displayed waveform and vector. The range of contrast is 0% to 100%. The default selection is 31%.
  - **Persistence**: This selection is used to determine how long a data point (pixel) in the displayed waveform and vector remains on the display. The range of persistence is 0% to Infinite. The default selection is 0%.
  - **Attack**: Attack is the initial intensity that the data point (pixel) appears in the display. The range of attack is 1% to Maximum. The default selection is 6%.

Alarms Setup Menu

For information on alarm setup and descriptions, see **Chapter 6**.

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Import/Export Setup Menu

The Import/Export Setup menu is used to allow import and export of display captures stored on a USB device.

The Import/Export setup menus is available for CMN-41 units only.

The File Navigation screen appears only when a USB drive is attached to the CMN-41 unit. See ***File Navigator*** *on page 116 for more information.*

Menu Selections

Table 5-15 Import/Export Setup Menu

Selection Option
File Navigator Screen

Menu Selection Descriptions

- **Import**: This selection is used to retrieve display captures saved to a USB device via the File Navigator dialog box. For more information on the File Navigator dialog box, see page 116.
- **Export**: This selection is used to save display captures to a USB device via the File Navigator dialog box. For more information on the File Navigator dialog box, see page 116.

File Navigator

The File Navigator dialog box does not appear if a USB removable drive is not connected to the USB port on the unit.

The File Navigator dialog box, shown in **Figure 5-2**, is used to control the presets and frame captures for the CMN-41. Any stored preset or frame capture can be stored onto the USB removable drive. In addition, any preset or frame capture stored on the USB drive can be stored in the CMN-41's internal memory.

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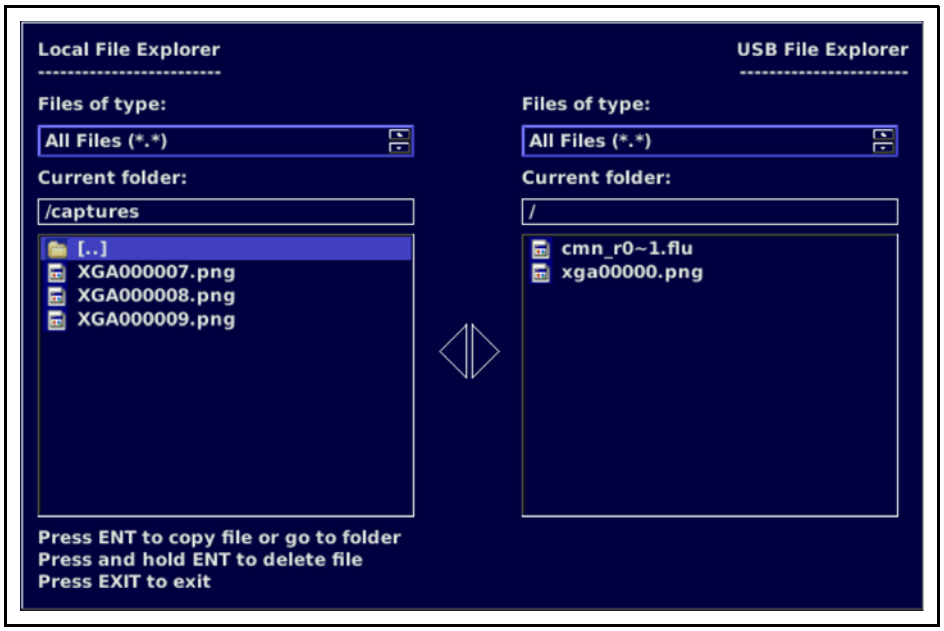

Figure 5-2 File Navigator Dialog Box

Local File Explorer

The left column of the File Navigator dialog box, labeled as Local File Explorer, shows what is available to be transferred to the USB drive. The stored presets are located in the PRESETS folder, and the frame captures are located in the CAPTURES folder.

To move between folders and files

Use the navigation buttons.

To enter a folder

Press the **ENT** button.

USB File Explorer

The right column of the File Navigator dialog box, labeled as USB File Explorer, shows what is stored on the USB memory device. The stored presets and captures on the USB drive are shown in this column.

To copy a file to the USB drive or internal memory

- Select a preset or capture
- Press the **ENT** button.

To delete a file

Press and hold the **ENT** button to delete the file.

To exit the File Navigator dialog box

Press the **EXIT** button.

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Clear Setup Menu

The Clear Setup menu is associated with all unit operations that allow an instantaneous clear of the active function.

Menu Selections

Table 5-16 Clear Setup Menu

Selection Option
DISP Captures
SDI Captures
Audio Peak Hold
Alarm Log
Alarm Error Count
Timing Zero Reference
Persistence

Menu Selection Descriptions

- **DISP Captures**: This selection is used to clear a display capture from the CMN-41 unit's memory.
- **SDI Captures**: This selection is used to clear an SDI capture from the CMN-41 unit's memory.
- **Audio Peak Hold**: This selection is used to clear the peak audio hold.
- **Alarm Log**: This selection is used to clear the alarm log.
- **Alarm Error Count**: This selection is used to clear an alarm status.
- **Timing Zero Reference**: This selection used to clear the timing zero reference.
- **Persistence**: This selection is used to clear the waveform, vector, or gamut infinite persistence.

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Unit Configuration Setup Menu

Menu Selections

Table 5-17 Unit Configuration Setup Menu

Selection Option	Selection Option	Selection Option	Selection Option
Display Setup	Input Color	Blue	
		Green	
		Cyan	
		Red	
		Magenta	
		Brown	
		Gray	
		Dark Gray	
		Light Blue	
		Light Green*	
		Light Cyan	
		Light Red	
		Light Magenta	
		Yellow	
		White	
	Graticule Color	Blue	
		Green	
		Cyan	
		Red	
		Magenta	
		Brown	
		Gray	
		Dark Gray	
		Light Blue	
		Light Green	
		Light Cyan	
		Light Red	
		Light Magenta	
		Yellow	
		White*	

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Table 5-17 Unit Configuration Setup Menu *(Continued)*

Selection Option	Selection Option	Selection Option	Selection Option
	Cursor Color	Blue	
		Green	
		Cyan	
		Red	
		Magenta	
		Brown	
		Gray	
		Dark Gray	
		Light Blue	
		Light Green	
		Light Cyan	
		Light Red*	
		Light Magenta	
		Yellow	
		White	
	Aspect Ratio	4:3*	
		16:9	
		16:10	
	Sleep Mode	Off to 60 Minutes	
	Monochrome Display		
Graticule Intensity	0 to 100% (50%*)		
Cursor Intensity	0 to 100%*		
Front Panel	High Tally	35 to 100% (80%*)	
	Low Tally	0 to 10% (5%*)	
GPIO	Input Function	Input 1	Select A
			Select B
			User GPI Alarm 1
			No Action*
		Input 2	Select A
			Select B
			User GPI Alarm 2
			No Action*

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Table 5-17 Unit Configuration Setup Menu *(Continued)*

Selection Option	Selection Option	Selection Option	Selection Option
		Input 3	Recall Preset 1
			Recall Preset 2
			User GPI Alarm 3
			No Action*
		Input 4	Recall Preset 3
			Recall Preset 4
			User GPI Alarm 4
			No Action*
	Output Function	Polarity	Normally Open*
			Normally Closed
		Setup	Follow Input A
			Follow Input B
			Follow Alarms*
IP Configuration[1]	Ethernet Config Screen		
Identifier[2]	Display Mac Address		
	Display IP Address		
	Display Unit Name		
	Unit Name	Unit Name Config Screen	
System Time	Time Setup Screen		
Show Clock*			
Flash Update From USB[1]	File Navigator Screen		
Feature Upgrade From USB[1]	File Navigator Screen		

[1] CMN-41 only
[2] CMN-41L only

Menu Selection Descriptions

- **Display Setup**: The Display Setup selections are used to configure the display colors, aspect ratio, sleep mode, screen saver, and monochrome display.
  - **Input Color**: This selection is used to select the color for the waveform and vector displays. Color selections are blue, green, cyan, red, magenta, brown, gray, dark gray, light blue, light green, light cyan, light red, light magenta, yellow, and white. The default selection is light green. Use the curved arrow knob to scroll through the available color selections.
  - **Graticule Color**: This selection is used to select the color for the graticule display items. Color selections are blue, green, cyan, red, magenta, brown, gray, dark gray, light blue, light green, light cyan, light red, light magenta, yellow, and white. The default selection is white. Use the curved arrow knob to scroll through the available color selections (you will see the colors change on the display screen).

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- **Cursor Color**: This selection is used to select the color for the cursor display items. Color selections are blue, green, cyan, red, magenta, brown, gray, dark gray, light blue, light green, light cyan, light red, light magenta, yellow, and white. The default selection is light red. Use the curved arrow knob to scroll through the available color selections (you will see the colors change on the display screen).
- **Aspect Ratio**: This selection is used to indicate to the CMN-41 instrument the format of the monitor that is utilizing the signal from the DVI OUT port. The menu selection should always match the actual aspect ratio of the monitor. When the aspect ratio is correctly set, the vector display graticule will appear round instead of oval.
- **Sleep Mode**: This selection is used to turn off all LEDs and the display after there is no activity for the specified duration. In Sleep mode the CMN-41 is still active (that is, alarms still triggered, etc.) The time it takes for Sleep mode to activate can range from 1 to 60 minutes.
- **Monochrome Display**: This selection is used to provide a black-and-white display output.

- **Graticule Intensity**: This selection is used to raise or lower the brightness of the displayed graticule. The range of graticule intensity is 1% to 100%. The default selection is 50%.
- **Cursor Intensity**: This selection is used to raise or lower the brightness of the displayed cursor. The range cursor intensity is 1% to 100%. The default selection is 100%.
- **Front Panel**: This selection is used to raise or lower the brightness levels of the front panel function buttons, and to select the intensity of the display background.
  - **High Tally**: This selection is used to set the brightness of the High Tally state. The brightness of the high tally state is determined by the contrast and brightness of the low tally state. The range of button contrast is 35% to 100%. The default selection is 80%.
  - **Low Tally**: This selection allows for setting the brightness of the buttons in a low tally state. The range of brightness is 0% to 10%. The default selection is 5%.

- **GPIO**: The GPIO selections are described below
  - **Input Function**: This selection is used to configure the GPIs. There are selectable functions to allow external control of the unit or to show an onscreen alarm.
  - **Output Function**: This selection is used to determine the GPO Polarity and GPO Setup for each input.
    - **GPO Polarity**

      There is one output GPI that is associated with a list of alarms. All GPO alarm activation selections are set to the default OFF until the alarm is enabled. When an alarm is enabled, the GPO functions according to the GPO Polarity setting (Normally Open, Normally Closed). The default polarity is Normally Open.
      - **Normally Open**: The contact closure on the GPO board is normally open. When the contact closure closes, the GPO alarm is activated.

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- **Normally Closed**: The contact closure on the GPO board is normally closed. When the contact closure opens, the GPO is activated.

- **GPO Setup**

  The GPO Setup is used to select what input or alarm the GPO follows. If an alarm occurs on an input associated with the GPO, the GPO will change its polarity setting. If Follow Alarms is selected, the GPO will change its polarity setting whenever an alarm occurs on any input.

- **IP Configuration** (CMN-41 only): The IP configuration selection is used to configure the CMN-41 for Ethernet communication. The Ethernet interface provides a high-speed communication link to the third party applications (such as SNMP) over standard LAN and Internet networks. The interface conforms to industry Ethernet standards:
  - Connection via a standard RJ45 socket
  - Automatic detection and switching between 10Base-T and 100Base-T
  - TCP/IP stack is fully compliant with RFC2500, "Internet Official Protocol Standards"
  - Fully compliant with IEEE 802.3 Ethernet standard

  The interface can accept a static IP address, or it can obtain an IP address dynamically from a DHCP server. The IP Address, Subnet Mask, Gateway Address, DHCP enable, and Port are programmable from the unit's Ethernet Setup menu. The settings are performed in the IP Configuration screen.
  - **DHCP**: The Dynamic Host Configuration Protocol (DHCP) function is used to have the CMN-41 automatically configure an IP Address, Subnet Mask, and Gateway every time the unit is powered on. The IP Address is dynamic and could change each time the CMN-41 is powered on. DHCP Enable is set to OFF by default.
  - **IP Address**: The IP Address is used to select a static IP address (unless DHCP will be used). The IP address must not be the same address as another instrument or PC on the network. Network conflicts will occur if two devices have the same IP address. See the System Administrator to determine a static IP address that will avoid conflicts.
  - **Subnet Mask**: The Subnet Mask is used to configure the Subnet Mask on a network if DHCP is not enabled. If DHCP is not used to automatically detect the Subnet Mask on a network, the Subnet Mask must be manually configured. Unlike the IP address, the Subnet Mask must be the same Subnet Mask as the network Subnet Mask. See the System Administrator to determine the Subnet Mask.
  - **Gateway**: The Gateway is the network address that provides access to an outside network. Use the Gateway submenu to configure the Gateway on a network if DHCP is not enabled. If DHCP is not used to automatically detect the Gateway on a network, the Gateway must be manually configured. Unlike the IP address, the Gateway must be the same Gateway address as the network Gateway address. See the System Administrator to determine the Gateway address.

DevIPConfig must be used to setup the IP configuration of a CMN-41L. See ***Using the IP Configuration Utility*** *on page 23 for more information on this process.*

- **Identifier** (CMN-41L only): This selection is used to display on-screen identifying information for the CMN-41L. Selections include the following:
  - **Display MAC Address**: This selection is used to display the MAC address for the CMN-41L.
  - **Display IP Address**: This selection is used to display the static IP address for the CMN-41L.

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- **Display Unit Name**: This selection is used to display the name of the CMN-41L unit. The displayed information changes, depending on the name entered into the Unit Name dialog box. See **Figure 5-3** on page 124.
- **Unit Name**: This selection is used to enter the name of the unit. When this selection is chosen, the Unit Name dialog box opens. The Unit Name dialog box is used to set the on-screen name for the CMN-41L.

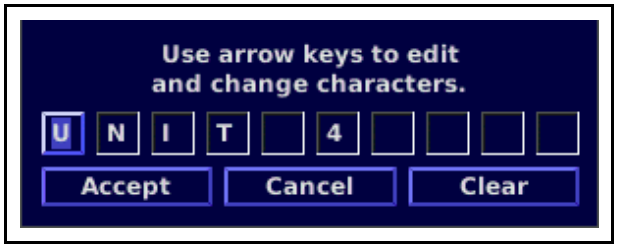

Figure 5-3 Unit Name Dialog Box

Use the up and down navigation arrow buttons to change the selection of each alphanumeric character box. Use the left and right navigation buttons to move between the character boxes, **ACCEPT**, **CANCEL**, and **CLEAR** buttons. Once the name is entered, click the **ACCEPT** button to save the settings.

- **System Time**: This selection allows the setup of the clock display's date and time.
- **Show Clock**: This selection allows the display of the system clock.
- **Flash Update from USB**: This selection is used in coordination with a USB memory stick to update the unit.
  - **a** Attach the USB stick into the unit.
  - **b** Select **Flash Update from USB** in the Unit Configuration setup menu.
  - **c** Use the File Navigator to select the FLU file.
  - **d** Press the **ENT** button to proceed into flash update mode. Flash update status is shown on the front panel screen.

    When complete, "FLASH UPDATE COMPLETE" appears on the screen.
  - **e** Cycle the power to continue normal operation.

Presets are lost when performing a flash update. Ensure that the presets are saved on USB before flashing.
This menu item will not appear if a USB memory device is not installed.
This menu item will not appear on a CMN-41L unit.

- **Feature Upgrade from USB**: This selection is used in coordination with a USB memory stick containing the feature file for the device to update the unit.
  - **a** Attach the USB stick into the unit.
  - **b** Select **Feature Update from USB** in the Unit Configuration setup menu.
  - **c** Use the File Navigator to select the update file.
  - **d** Press the **ENT** button to proceed into feature upgrade mode.

  When complete, the screen blanks and the unit reboots.
  - **e** In the Unit Configuration setup menu, select **ABOUT** to verify the option was installed successfully.

The serial number on the device must match the serial number on the feature file. The message "INSERT USB DEVICE WITH FEATURE UPGRADE" appears when the serial number of the device does not match the serial number on the feature file.
This menu item does not appear on a CMN-41L unit.

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About Menu

This selection allows the display of the About screen (see **Figure 5-4**).

Menu Selections

Table 5-18 About Menu

Selection Option	Selection Option
About	About display screen

Menu Selection Descriptions

The About screen contains the model, serial number, module, device, and version.

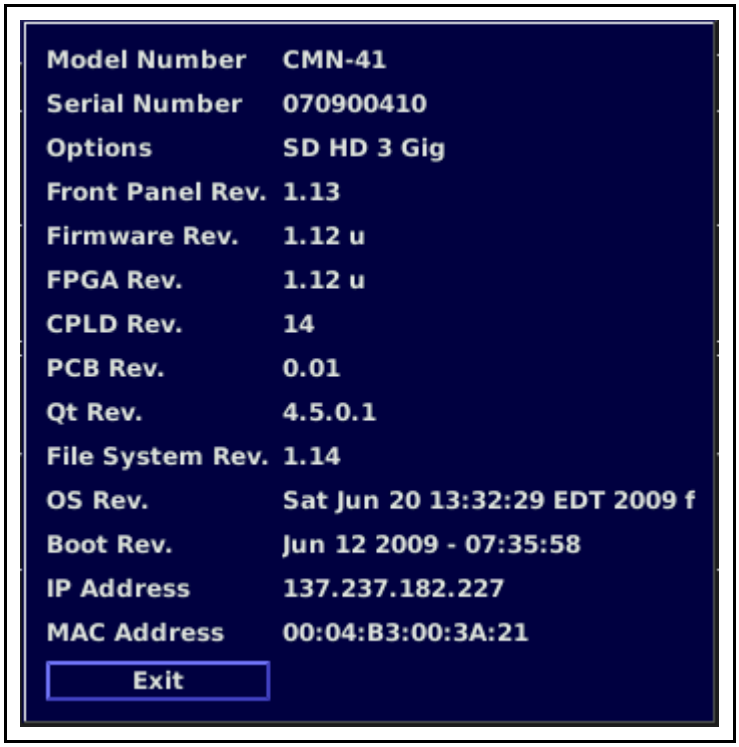

Figure 5-4 About Display Screen

CMN-41L units do not report a Front Panel revision.

To exit the About display screen

Press the **EXIT** navigation button.

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6 Alarm Descriptions

The CMN-41 alarms monitor video and audio signals, time code errors, and GPI errors.

Limits are selected in the Setup menu by choosing a value using the curved arrow knob or the Up/Down navigation buttons.

Sensitivity and Duration are two general terms used in the alarm menus.

- Sensitivity is set by Consecutive Errored Samples (CES). When setting amplitude limits, a noise spike can exceed the limit while the video amplitude can be within the limit. With the CES set to a low number, a spike is detected and an alarm is displayed. Set the CES to a higher number to ignore the fast spike. Each CES occurs at 37ns intervals for SD and 13.5ns for HD. Use this as a guideline to select the appropriate CES value.

  Not all alarms have CES associated with them; in such cases, use the duration to increase or decrease the general sensitivity.
- Duration is used to determine how long an error must persist before it is reported. Set the duration to 0 to cause an error to be displayed as soon as the CES value is met.

Alarm Setup Menus

The Alarm Setup menu items, along with their corresponding Table and Description page locations are listed in **Table 6-1**. An asterisk (*) is shown next to the default menu selections.

Table 6-1 Alarms Setup Menu

Selection	Page
Video alarm setup	Page 128
Audio alarm setup	Page 131
Time code alarm setup	Page 134
GPI alarm setup	Page 136

See page 97 for information on how to navigate through the Setup menus.

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Video Alarms Setup Menu

Menu Selections

Table 6-2 Video Alarms Setup Menu

Selection	Selection Option	Selection Option	Selection Option
Format Change			
Payload Identifier Mismatch			
Loss of Carrier	Enable		
	Duration	0 to 60 seconds (2 seconds*)	
Loss of Reference	Enable		
	Duration	0 to 60 seconds (2 seconds*)	
Loss of Active Video	Enable		
	Threshold	0 to 350 mV (300 mV*)	
	Sensitivity	2* to 20 CES	
	Duration	0 to 60 seconds (2 seconds*)	
Loss of Payload Identifier	Enable		
	Duration	0 to 60 seconds (2 seconds*)	
Gamut	RGB Gamut Upper	Enable	
		Threshold	650 to 750 mV (710 mV*)
		Sensitivity	1 to 20 CES (15 CES*)
		Duration	0 to 60 seconds (2 seconds*)
	RGB Gamut Lower	Enable	
		Threshold	-50 to 50 mV (-10 mV*)
		Sensitivity	1 to 20 CES (15 CES*)
		Duration	0 to 60 seconds (2 seconds*)
	Luminance Gamut Upper	Enable	
		Threshold 525/59.94	90 to 108 IRE (105 IRE*)
		Threshold 625/50	92 to 109 Units setting (107 Units*)
		Sensitivity	1 to 20 CES (15 CES*)
		Duration	0 to 60 seconds (2 seconds*)

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Table 6-2 Video Alarms Setup Menu *(Continued)*

Selection	Selection Option	Selection Option	Selection Option
	Luminance Gamut Lower	Enable	
		Threshold 525/59.94	1.5* to 20 IRE
		Threshold 625/50	-7 to 20 Units setting (-4 Units*)
		Sensitivity	1 to 20 CES (15 CES*)
		Duration	0 to 60 seconds (2 seconds*)
	Peak Gamut Upper	Enable	
		Threshold 525/59.94	50 to 140 IRE (120 IRE*)
		Threshold 625/50	51 to 143 Units + mV setting (123 Units*)
		Sensitivity	1 to 20 CES (15 CES*)
		Duration	0 to 60 seconds (2 seconds*)
	Peak Gamut Lower	Enable	
		Threshold 525/59.94	-40 to 0 IRE (-20 IRE*)
		Threshold 625/50	-40 to 0 Units + mV setting (-20 Units*)
		Sensitivity	1 to 20 CES (15 CES*)
		Duration	0 to 60 seconds (2 seconds*)
CRC-HD	Enable		
	Duration	0 to 60 seconds (2 seconds*)	
EDH-SD	Enable		
	Duration	0 to 60 seconds (2 seconds*)	
Letterbox-SD	Enable Top Border		
	Top Border 525/59.94	Line 21* to Line 139	
	Top Border 625/50	Line 19* to Line 159	
	Enable Bottom Border		
	Bottom Border 525/59.94	Line 140* Line to 262	
	Bottom Border 625/50	Line 160* to Line 312	
	Threshold	10 to 350 mV (286 mV*)	
	Duration	0 to 60 seconds(2 seconds*)	
Pillarbox-HD	Enable Left Border		
	Left Border	Pixel 1* to 860	

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Table 6-2 Video Alarms Setup Menu *(Continued)*

Selection	Selection Option	Selection Option	Selection Option
	Enable Right Border		
	Right Border	Pixel 861 to 1920*	
	Threshold	10 to 350 mV (286 mV*)	
	Duration	0 to 60 seconds (2 seconds*)	
Picture Shift	Enable		
	Threshold	0 to 350 mV (2 mV*)	
	Vertical	1 to 200 lines (2 lines*)	
	Horizontal	1 to 300 pixels (2 pixels*)	
Timing	Enable		
	Lines	0 to 50 lines (1 line*)	
	Microseconds	1 to 64 s (1 s*)	
	Duration	0 to 60 seconds (2 seconds*)	

Menu Selection Descriptions

- **Format Change**: The Format Change alarm is used to indicate that the incoming video format has changed.
- **Payload ID Mismatch**: The Payload Identifier Mismatch alarm is used to indicate that the payload indicated in a SMPTE 352M ancillary data packet does not match the detected input format such as HD/SD and frame rate.
- **Loss of Carrier**: The Loss of Carrier alarm occurs when there is no Timing Reference Signal (TRS) detected.
- **Loss of Reference**: The Loss of Reference alarm occurs when no sync signal is detected in the external reference for a period in excess of the duration setting. (For more information necessary to select the appropriate external reference, see page 114.)
- **Loss of Active Video**: The Loss of Active Video occurs when active video falls below the adjustable threshold for a period in excess of the duration setting.
- **Loss of Payload ID**: The Loss of Payload ID alarm is used to indicate when the SMPTE 352M Video Payload ID ancillary data packet is not detected in the received data stream for a period in excess of the duration setting.
- **Gamut**: Gamut alarms are used to indicate when components of an RGB, Luma, or peak signal fall outside upper or lower preset limits.
  - **RGB Gamut Upper/Lower**: The RGB Upper and Lower alarm occurs when any component of the transcoded RGB signal falls outside the upper or lower limits for a period in excess of the duration setting. The Sensitivity can be increased to provide immunity to fast transcoding spikes.
  - **Luminance Gamut Upper/Lower**: The Luminance Upper and Lower alarms scan the composite encoded signal derived from the selected digital input. The alarms occur when the luminance video falls outside the adjustable limits for a period in excess of the duration setting. The Sensitivity can be increased to provide immunity to fast noise spikes.

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- **Peak Gamut Upper/Lower**: The Peak Upper and Lower alarms scan the composite encoded signal derived from the selected digital input. The alarm occurs when the peak video falls outside the adjustable limits for a period in excess of the duration setting. The Sensitivity can be increased to provide immunity to fast noise spikes.

- **CRC-HD**: The CRC-HD alarm occurs when the internally calculated CRC value is different from the received CRC value.
- **EDH-SD**: Per SMPTE RP 165 1994; the EDH-SD alarm occurs when one or more errors are detected for a period in excess of the duration setting.
- **Letterbox-SD**: The Letterbox is the top and bottom border surrounding the active video. The top border is defined as having video below the threshold on the set line and having video above on the following line. The bottom border is defined as having video above the threshold on the previous line and video below the threshold on the set line. The Letterbox-SD alarm is activated when either the top line or the bottom line deviates from the user settings (Standard Definition only).
- **Pillarbox-HD**: The PillarBox is the border to the right and left of the active video. The "End of Left Border" and "Start of Right Border" defines the set points when the video is below the threshold. If the video is outside of the threshold and CES values for the specified duration, the Pillarbox-HD alarm occurs (High Definition only).
- **Picture Shift**: The Picture Shift alarm activates when the luma portion of the video does not exceed the amplitude threshold along any of the four borders of active video. The "Left/Right" and "Top/Bottom" border settings define the tolerance of the Picture Shift alarm. If one or more pixels are above the threshold for each of the four tolerance borders, no alarm will be declared. For interlaced video formats Picture Shift checks the first field only. For example, if a signal is 525/59.94 SDI video format, where "Left/Right" is set to 20 pixels, "Top/Bottom" is set to 4 lines, the threshold is set to 2 mV, and the "Duration" is set to 2 seconds, the alarm will be activated if pixels 1 through 20 or 701 through 720, or lines 1 through 4, or 240 through 244 of active video do not exceed the 2 mV threshold and exceeds the duration of 2 seconds.
- **Timing**: The Timing Alarm occurs when the Time and Line range(s) are exceeded for a period in excess of the duration setting.Audio Alarms Setup Menu

Menu Selections

Table 6-3 Audio Alarms Setup Menu

Selection	Selection Option	Selection Option
Peak Audio	Enable Channel 1 • • Enable Channel 16	
	Level	-30 to 0 dBFS (-10 dBFS*)
	Duration	0 to 60 seconds (2 seconds*)
Phase	Enable Pair 1 • • Enable Pair 8	
	Value	0 degrees to 178 degrees*
	Duration	0 to 60 seconds (2 seconds*)

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Table 6-3 Audio Alarms Setup Menu *(Continued)*

Selection	Selection Option	Selection Option
Loss of Sound	Enable Channel 1 • • Enable Channel 16	
	Level	-60* to 0 dBFS
	Duration	0 to 60 seconds (2 seconds*)
Loss of AES Data	Enable	
	Duration	0 to 60 seconds (2 seconds*)
Loss of Embedded Data	Enable Group 1 Pair 1	
	Enable Group 1 Pair 2	
	Enable Group 2 Pair 1	
	Enable Group 2 Pair 2	
	Enable Group 3 Pair 1	
	Enable Group 3 Pair 2	
	Enable Group 4 Pair 1	
	Enable Group 4 Pair 2	
	Duration	0 to 60 seconds (2 seconds*)
Continuous Tone	Enable Channel 1 • • Enable Channel 16	
	Threshold	1* to 20 dB
	Duration	0 to 60 seconds (2 seconds*)
Audio Clip	Enable Channel 1 • • Enable Channel 16	
	Sensitivity	1 to 100 CES (50 CES*)
	Duration	0 to 60 seconds (2 seconds*)
Audio Mute	Enable Channel 1 • • Enable Channel 16	
	Sensitivity	1 to 100 CES (50 CES*)
	Duration	0 to 60 seconds (2 seconds*)

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Table 6-3 Audio Alarms Setup Menu *(Continued)*

Selection	Selection Option	Selection Option
AES/EBU V-Bit	Enable	
	Duration	0 to 60 seconds (2 seconds*)
Embedded V-Bit Data	Enable Group 1 Pair 1	
	Enable Group 1 Pair 2	
	Enable Group 2 Pair 1	
	Enable Group 2 Pair 2	
	Enable Group 3 Pair 1	
	Enable Group 3 Pair 2	
	Enable Group 4 Pair 1	
	Enable Group 4 Pair 2	
	Duration	0 to 60 seconds (2 seconds*)
Low Audio	Enable Channel 1 • • Enable Channel 16	
	Level	-60* to 0 dBFS
	Duration	0 to 60 seconds (2 seconds*)
BCH	Enable	
	Duration	0 to 60 seconds (2 seconds*)

Menu Selection Descriptions

- **Peak Audio**: The Peak Audio alarm occurs when the peak audio level exceeds the adjustable limit for a period in excess of the duration setting. The limit can be set from -30 dBFS to 0 dBFS, in 1 dB increments.
- **Phase**: The Phase alarm occurs when the phase difference between any audio pair (L and R) exceeds an adjustable range for a period in excess of the duration setting. The range is 0 to 178 degrees, in 1 degree increments. The range is a global setting. If eight channels (four pairs) are displayed, the setting is valid for all pairs.
- **Loss of Sound**: The Loss of Sound alarm occurs when the peak amplitude falls below an adjustable limit for a period in excess of the duration setting. This alarm is valid for the displayed input (AES/EBU or embedded). The audio range is -60 dBFS to 0 dBFS, in 1 dB increments. The range point is global and is independent of the scale type or input format.
- **Loss of AES Data**: The Loss of AES Data alarm monitors the AES/EBU data stream. The alarm occurs when a loss of data is detected for a period in excess of the duration setting.
- **Loss of Embedded Data**: The Loss of Embedded Data alarm monitors the Embedded data stream. The alarm occurs when a loss of embedded data is detected for a period in excess of the duration setting.

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- **Continuous Tone**: The Continuous Tone alarm occurs when a continuous sound level is present for a period in excess of the duration setting.
- **Audio Clip**: The Audio Clip alarm occurs when the digital audio is at a maximum level for a period in excess of the duration setting. The Audio Clip indicator appears in the table below the audio meters when an Audio Clip alarm occurs. For the CMN-41, the accuracy of the audio clip alarm is 0.1 dB.
- **Audio Mute**: The Audio Mute alarm occurs when the audio sample is "0" for a period in excess of the duration settings. The Audio Mute indicator appears in the table below the audio meters when an Audio Mute alarm occurs.
- **AES/EBU V-Bit**: The V-Bit alarm occurs when the V-Bit is detected as "1" in the audio AES source for the specified duration.
- **Embedded V-Bit Data**: The Embedded V-Bit alarm occurs when the V-Bit is detected as "1" in the embedded audio source for the specified duration.
- **Low Audio**: The Low Audio alarm occurs when the peak audio sample does not exceed the adjustable digital level for a period of time in excess of the duration setting. The peak audio sample is an absolute measurement of the audio sample and represents the true audio peak. It is not averaged over time, and can be enabled per channel.
- **BCH**: The BCH alarm occurs when errors are detected in an HD embedded audio packet

Time Code Alarms Setup Menu

Menu Selections

Table 6-4 Time Code Alarms Setup Menu

Selection Option	Selection Option	Selection Option
LTC Loss of Time Code	Enable	
	Duration	0 to 600 seconds (240 seconds*)
LTC Time Code Level	Enable	
	Range	0.2 to 1.8 volts (0.5 volts*)
	Duration	0 to 600 seconds (240 seconds*)
LTC Time Code Framing	Enable	
	Range	1.5 to 10.5* lines
	Duration	0 to 600 seconds (240 seconds*)
LTC Time Code Continuity		
LTC/DVITC Compare	Enable	
	Threshold	1* to 30 frames
	Duration	0 to 600 seconds (240 seconds*)

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Table 6-4 Time Code Alarms Setup Menu

Selection Option	Selection Option	Selection Option
DVITC Loss of Time Code	Enable	
	Duration	0 to 600 seconds (240 seconds*)
D-VITC Line	Enable	
	Line Number - 525/59.94	Line 10 to Line 30 (Line 14*)
	Line 625 - 625/50	Line 6 to Line 30 lines (Line 14*)
	Duration	0 to 600 seconds (240 seconds*)
D-VITC Continuity		
D-VITC CRC	Enable	
	Duration	0 to 600 seconds (240 seconds*)

Menu Selection Descriptions

- **LTC Loss of Time Code**: The Loss of Time Code alarm occurs when the peak to peak level of the LTC input signal falls below an adjustable limit for a period in excess of the duration setting.
- **LTC Time Code Level**: The Time Code Level alarm occurs when the peak to peak level of the LTC input signal falls outside the user defined range limits for a period in excess of the duration setting.
- **LTC Time Code Framing**: The Time Code Framing alarm occurs when the alignment of the start of LTC (ANSI/SMPTE 12M 1999) exceeds the range limit for a period in excess of the duration setting.
- **LTC Time Code Continuity**: The Time Code Continuity alarm occurs when a break or interruption in the time code count occurs.
- **LTC/DVITC Compare**: The LTC/DVITC alarm occurs when LTC and DVITC are compared and differ beyond the threshold (1 to 30 frames) selection for a period in excess of the duration setting.
- **DVITC Loss of Time Code**: The DVITC Loss of Time Code alarm occurs when no DVITC Time Code in the video signal is detected for a period in excess of the duration setting.
- **D-VITC Line**: The D-VITC Line alarm is used to select the line number on which the D-VITC time code is detected for the "D-VITC Continuity" and "D-VITC CRC" fields. When time code is not detected on the selected line number, the alarm activates.
- **D-VITC Continuity**: The D-VITC Continuity alarm occurs when a break or interruption in the digital vertical interval time code (VITC) frames occur for a period in excess of the duration setting.
- **D-VITC CRC**: The D-VITC CRC alarm occurs when the cyclic redundancy check (CRC) within the digital vertical interval time code field does not correlate with the calculated CRC for a period in excess of the duration setting.

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GPI Alarms Setup Menu

Menu Selections

Table 6-5 GPI Alarms Setup Menu

Selection Option	Selection Option
GPI 1 Alarm	Enable*
	Disable
GPI 2 Alarm	Enable*
	Disable
GPI 3 Alarm	Enable*
	Disable
GPI 4 Alarm	Enable*
	Disable

Menu Selection Descriptions

The input GPIs have selectable functions. There are selectable functions to allow external control of the unit or to show an onscreen alarm.

Alarm Log

The Alarm Log selection enables the Alarm Log display. The Alarm Log display lists all the alarms, the date, time, time code, duration, and peak value. The alarm list begins with the most recent alarm and can hold a maximum of 100 alarms.

An Alarm Log display diagram is shown in **Figure 4-34** on page 85 and described in **Table 4-14** on page 86. The diagram illustrates the general location for the various alarm fields.

When an alarm is first registered, it appears on the Alarm Log display and is highlighted in yellow. If the alarm is short term (that is, two seconds or less), the alarm text is not highlighted after approximately two seconds. If the alarm continues longer than two seconds, the text remains yellow and the alarm duration is incremented. When the next alarm occurs, the previous alarm moves down one position.

Alarm Status

The alarm status screen contains detailed information concerning alarm status indicators. This information is separated into columns sorted by alarm name, whether or not the alarm is enabled, lower and upper limits, thresholds, and duration, and total number of alarms. The alarm name text can appear in a colored state. The colored states are as follows:

- **White**: indicates alarm is not enabled.
- **Green**: indicates alarm is enabled and not exceeding alarm limits.
- **Red**: indicates the alarm is enabled and exceeding an alarm limits.

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There is a two-second persistence for any Alarm Name color change.

Use the same navigation buttons to scroll through the alarm status list as for the alarm log list (see page 86).

An alarm status display diagram is shown in **Figure 4-35** on page 87. The diagram illustrates the general location for the various alarm status display fields.

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7 External Control

Microsoft® Internet Explorer version 6 or later is the recommended browser.

Browser Interface

The website for each unit is accessed by pointing the web browser at the CMN-41 IP address. Before the default web screen appears, a user ID and password must be entered.

- User ID: **admin**
- Password: **Harris**

*The user ID **admin** is the default user ID and **Harris** is the default password. These are set at the factory but can be changed by the user via the Accounts web page. Keep in mind, though that once the user ID and password have been changed, the only way to reset the unit to the default user ID and its default password is to send the unit back to the factory for repairs.*

Once the user ID and password have been entered, the web page appears, showing a list of captures that have been stored in the CMN-41's internal memory. Use the web page to view the files or save them to disk. A sample web page is shown in **Figure 7-1**.

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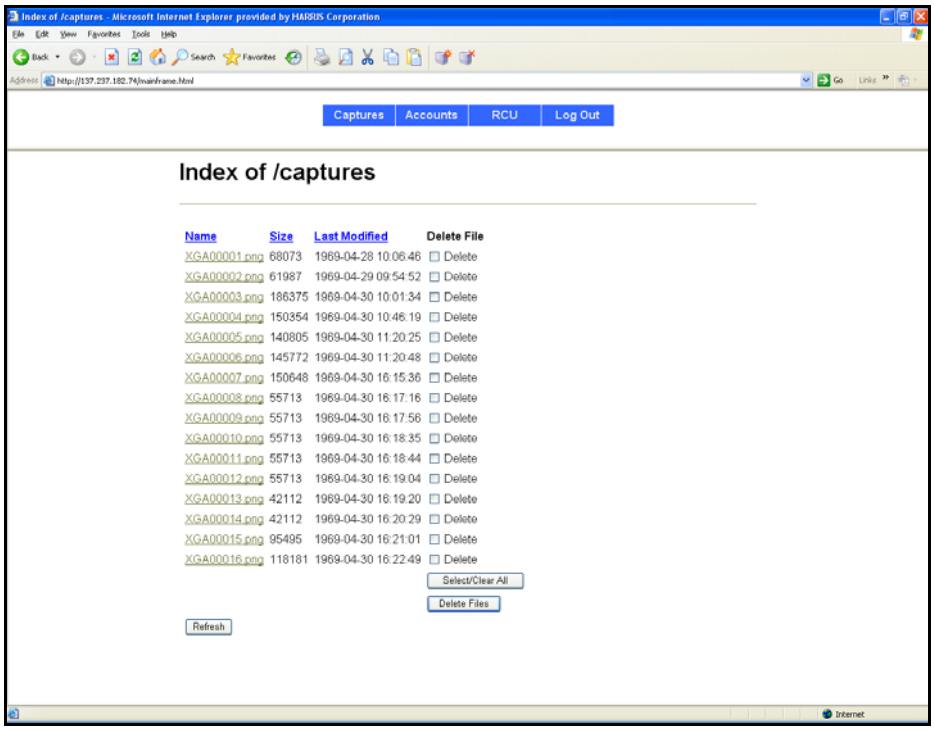

Figure 7-1 Sample Web Remote Display

Accessing the Web-Based Control Panel

RCU

Access the web browser as described on page 139. Once the Index of Captures/Web Remote Display page opens, click the **RCU** button to access the web-based control panel.

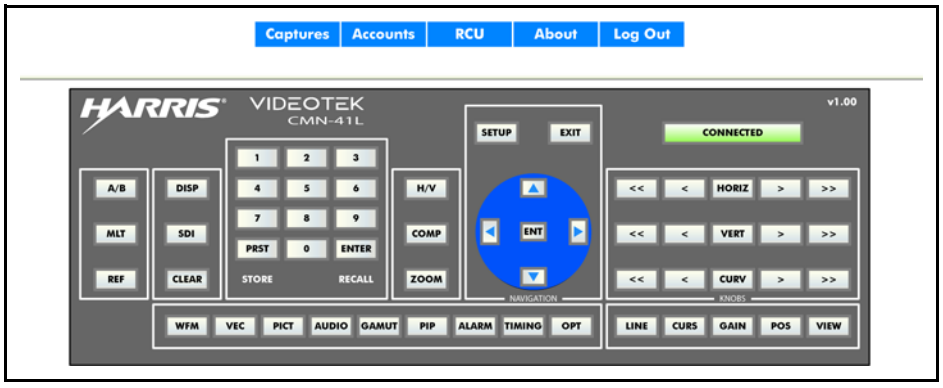

Figure 7-2 Web-Based Control Panel

The CMN-41 unit allows access to one controller at a time. If the unit receives a request for another Web RCU (or RCU-CMS) session while previously established control session (Web RCU or RCU-CMS) exists, the request will be granted after the previously established session is terminated.
A Web RCU session that was terminated due to conflict with another control session can be re-established by repeating the logon procedure.

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Accessing the Index of Captures

Captures

Click the **CAPTURES** button on the web-based control panel to access the Index of Captures page.

Managing User Accounts

Accounts

The CMN-41 allows user accounts to be added or edited at the User, System, or Administrator levels. Both User and System level accounts are allowed general control of the unit.

Only operators at the Administrator level can manage accounts.

Adding Accounts

To add a new user account

1 Click the **Accounts** button on the web-based control panel.
The Accounts Display page opens.

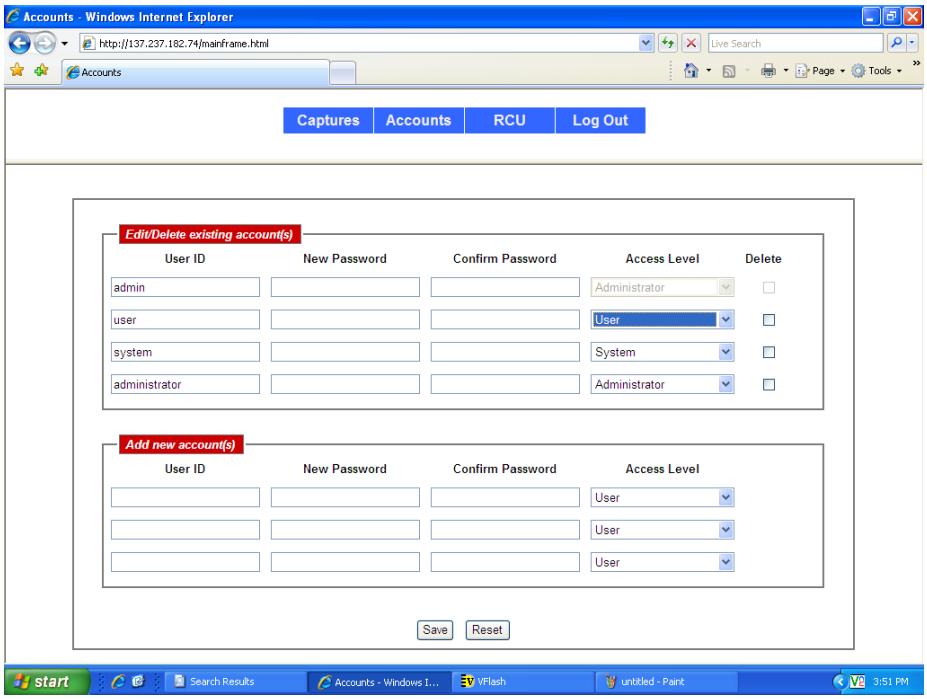

Figure 7-3 Accounts Display Page

2 In the **Add new account(s)** box, enter the following information:

- A unique identifier for the new account in the User ID text box.
- A password for the new account (confirm the password by entering it again in the **Confirm Password** text box).
- An access level of User, System, or Administrator from the **Access Level** drop-down list box.

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3 Click **Save** to accept the new account, or click **Reset** to clear the previously entered information and start again.

Editing Accounts

To edit password and access level information

1 Click the **Accounts** button on the web-based control panel.

The Accounts Display page opens.

2 In the **Edit/Delete existing account(s)** box, locate the unique identifier in the User ID text box for the account to be edited.

3 Change one or more of the following fields as appropriate:

- Change a password for the existing account by entering a new password in the **New Password** text box.

  Confirm the password by entering it again in the **Confirm Password** text box.
- Change the user access level by making a different selection at the **Access Level** drop-down list box.

4 Click **Save** to accept the account changes, or click **Reset** to restore the original information and start again.

Deleting Accounts

To delete a user account

1 Click the **Accounts** button on the web-based control panel.

The Accounts Display page opens.

2 In the **Edit/Delete existing account(s)** box, locate the unique identifier in the User ID text box for the account to be deleted.

3 Click the **Delete** check box to the right of the account to be deleted.

4 Click **Save**.

The account is deleted.

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8 Troubleshooting

CAUTION: These instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform this installation or any servicing unless you are qualified to do so. Refer all servicing to qualified service personnel.

When power is applied to the unit, the display shows the startup screen for about 45 seconds.

Initial Checks

If the CMN-41 is not functioning properly, first verify the following:

- The CMN-41 is connected to a power source (11-17 VDC).
- All cables are correctly connected (see ***Connecting the CMN-41*** on page 20).

Initial difficulties with operation or display can be due to improper setup. Review the Setup menus (see ***Setup Menu Functions*** on page 97) to ensure that the proper adjustments have been made for the signal requirements.

Restarting

If a problem persists after the cables are correctly connected and the unit is set up, restart the unit by doing the following:

1. Push and hold the **SETUP** button, Up/Down knob, and Left/Right knob for a minimum of five seconds until the SYSTEM RESET message appears on the display.
2. Press and hold the **ENT** button to reset the unit's configuration. All front panel and Setup menu selections will be reset to the factory default settings.
3. Press and hold the **PRST** button to restart the unit.

   The unit will reboot. All front panel and Setup menu selections will be reset to the factory default settings.

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Problems, Causes, and Solutions

Table 8-1 CMN-41: Problems, Causes, and Solutions

Problem/Symptom	Possible Cause	Solution or Explanation
Unit does not turn on when power button is pressed.	No AC power is present.	Connect the AC power.
No display on external XGA monitor	The monitor is not plugged in or powered up.	Check to see that the monitor is plugged in and powered up.
Display on External XGA monitor is not centered	The XGA monitor is not correctly adjusted.	Use the monitor controls to center the display.
Waveform not locked when External Reference (Ref:EXT) is selected	The video signal is too low in amplitude or the sync edge is too noisy.	Verify that the External Reference signal is of sufficient amplitude.
	EXT REF is selected but there is no reference input, or the External Reference is non synchronous.	Select Internal Reference (INT REF) and/or verify that the External Reference signal is synchronous.
No sound on headphone output	The headphone volume is set too low or the output is set to "Mute" in the Audio Mapping Matrix.	Adjust the headphone volume or select the proper channel to be monitored in the Audio Mapping Matrix.
Audio level reading too low	The input reference level is not correctly set.	Use the setup menu to check the input reference level setting.
Picture width not correct	The aspect ratio is not set correctly.	Change aspect ratio in the setup menu.
No communications on Ethernet port	The IP address is incorrect.	Provide the correct IP address in setup menu.
	Incorrect Ethernet cable	For a direct connection, use a crossover cable. For a network connection, use a standard Ethernet cable.

If the problem still exists after troubleshooting the CMN-41, see ***CMN-41 Service and Support*** on page 16 for further instructions.

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9 Specifications

Specifications are subject to change without notice.

Inputs

Table 9-1 3 Gb/s-SDI Input Specifications

Item	Specification
Input type	2 active looping inputs
Input connector type	BNC female
Input impedance	75Ω nominal
Signal source amplitude	800 mV nominal
Signal source DC offset	± 0.5 V
Input return loss	≤ -10 dB, 1.485 GHz - 2.97 GHz
Cable EQ	80 M Belden 1694A

Table 9-2 HD-SDI Input Specifications

Item	Specification
Input type	2 active looping inputs
Input connector type	BNC female
Input impedance	75Ω nominal
Signal source amplitude	800 mV nominal
Signal source DC offset	± 0.5 V
Input return loss	≤ -15 dB 270 MHz-1.485 GHz
Cable EQ	≥ 100 M Belden 8281

Table 9-3 SD-SDI Input Specifications

Item	Specification
Input type	2 active looping inputs
Input connector type	BNC female
Input impedance	75Ω nominal
Signal source amplitude	800 mV nominal

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Table 9-3 SD-SDI Input Specifications *(Continued)*

Item	Specification
Signal source DC offset	± 0.5 V
Input return loss	≤ -25 dB 5 MHz-270 MHz
Cable EQ	≥ 300 M Belden 8281

Table 9-4 External Reference Input Specifications

Item	Specification
Input connector type	BNC female
Input type	1 input, passive looping
Input impedance	75Ω nominal
Blackburst input amplitude (external reference)	
NTSC	Sync and burst 286 mV nominal
PAL	Sync and burst 300 mV nominal
Blackburst input amplitude tolerance	6 dB
Tri-level sync amplitude	600 mV p-p
Tri-level sync amplitude tolerance	± 3 dB
Return loss	≤ -40 dB 100 kHz to 5 MHz

Table 9-5 Digital Audio Input Specifications

Item	Specification
Audio formats	AES/EBU, embedded audio
AES input connector type	1 BNC female
AES input impedance	75Ω nominal
AES input return loss	≥ 25dB, 0.1MHz to 6MHz (Unbalanced)
AES input level	0.2 to 2.0 V
AES input sample rate *Audio inputs are sample rate converted to 48 kHz.*	■ 32 kHz ■ 44.1 kHz ■ 48 kHz ■ 88.2 kHz ■ 96 kHz
Meter accuracy over frequency	±0.1 dB from 20 Hz to 19 kHz with 0 to -40 dBFS sine wave input, except for within 7 Hz of some submultiples of the 240 kHz oversampling frequency.

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Outputs

Table 9-6 3 Gb/s-SDI, HD-SDI, SD-SDI, Output Specifications

Item	Specification
Output impedance	75Ω
Output return loss	≤ -15 dB,5 MHz to 1.485 GHz ≤ -10 dB, 1.485 GHz to 3 GHz
Output signal level	800 mV ±10%
Output DC offset	0.0 V ± 0.5 V

Table 9-7 DVI Output Specifications

Item	Specification
Output connector	DVI-I connector supporting DVI-D
Output resolution	1024×768 (XGA)
Digital levels	Per DDWG DVI rev 1
Pixel rate	65 Mp/s
Display accuracy	■ ± 1% waveform
	■ ± 1° vector
	■ ± 37 ns timing digital

Table 9-8 Analog Monitoring Output Specifications (Headphone)

Item	Specification
Number / connector	One stereo output, one 3.5 mm (1/8 in.) headphone jack
Load impedance	16Ω nominal
Maximum output level	30 mW RMS
Total harmonic distortion + noise (THD+N)	≤-65 dB

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Controls

Table 9-9 Control Specifications

Item	Specification
GPI	Four total with two input and two preset recall selections or individually user configured as alarm input
GPO	One alarm, user configured
Connector	15-pin HD (high density) D-sub, female
Input impedance	10 k returned to +3.3 VDC
Alarm output	Relay closure
Maximum relay current	100 mA @ 50 VDC
Peripheral interface	USB 2.0 supporting storage devices, and keyboard
Connector	USB 2.0, Type A, female

Displays

Table 9-10 Display Specifications

Item	Specification
General	A full-screen display for viewing an input as picture, waveform, vector, audio, alarm status, or timing
Waveform	Composite; YCbCr or RGB, parade/overlay of like formats
Sweep time base	■ 1H or 2H with x1, x5, and x10 horizontal magnification ■ 1V or 2V with x1, x5, and x25 horizontal magnification
Waveform accuracy	≤ ±0.5%
Vector	Cb vs. Cr for HD or SD
Vector accuracy	≤ 1°
Gamut	Encoded or RGB gamut displays with upper and lower limit selection
Audio	2, 4, 6, 8, or 16 channels displayed simultaneously

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Waveform Display Characteristics

Table 9-11 Waveform Display Characteristics - External Reference and LTC

Item	Specification
Waveform amplitude accuracy	±5%
Waveform frequency response	25 Hz to 4.5MHz within ±5% of amplitude at 50 kHz

Time Code

Table 9-12 Time Code Specifications

Item	Specification
Input	■ LTC via back panel connector ■ Ancillary Time Code (HD only) ■ DVITC extracted from SD inputs
Display	Displayed directly

SDI Freeze

Table 9-13 SDI Freeze

Item	Specification
Freeze-capable displays	■ Waveform ■ Vector ■ Picture
Waveform and vector frozen displays	■ Display frozen ■ Display live
Picture displays	■ Display frozen ■ Display live
Frozen waveform control	The following can be altered on a frozen waveform: ■ Field select (odd or even) ■ H Mag ■ V Mag ■ H Pos ■ V Pos ■ All sweep and filter settings

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Gamut Display

Table 9-14 Gamut Display Specifications

Item	Specification
Monitored parameters	■ Composite gamut (positive and negative chroma packet excursions about luma levels) ■ RGB gamut
Display type	■ Polar; Angle of display always represents hue (as in a vectorscope) ■ Composite display amplitude plots luma plus half of saturation and luma minus half of saturation, with magnitude in IRE or units; concentric circles represent minimum and maximum ranges ■ Component display plots R, G, and B amplitudes, with magnitude in mV; concentric circles represent minimum and maximum ranges

Magnification

Table 9-15 Magnification Specifications

Item	Specification
Waveform sweep gain selection	x1, x5, and x10; pressing the horizontal knob will cycle through x1, x5, and x10 horizontal magnification
Waveform step gain selection	x0.5, x1.0, x2.5, and x5.0; pressing the vertical knob will cycle through x0.5, x1.0, x2.5, and x5.0 vertical magnification
Waveform gain	Variable from x0.50 to x15.00 in 0.01 steps
Vector gain	Variable: x0.50 to x15.00 in 0.01 steps

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Communication Interfaces

Table 9-16 Communication Interfaces

Item	Specification
Ethernet	1 Ethernet port RJ-45 10/100 Base-T connector
USB	1 USB 2.0 host port
LTC/GPIO	1 LTC/GPIO connector 15 female pin D-sub

Ethernet

Table 9-17 Ethernet Specifications

Item	Specification
Standard	10/100 Base-T conforms to IEEE802.3
Connector	RJ-45
Performance metric	Transfer a captured frame to a PC in 30 seconds, dedicated LAN

Power Requirements

Table 9-18 Power Requirements

Item	Specification
Power connector	15 VDC nominal 11 VDC minimum, 17 VDC maximum
Power consumption	20 W nominal
Over-voltage protection	±50 VDC nominal

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Mechanical

Table 9-19 Mechanical Specifications

Item	Specification
Height	1.75 in. (4.45 cm)
Width	8.5 in. (21.59 cm)
Depth	6.98 in. (17.73 cm)
Weight	1.9 lb (0.862 kg)

Environmental

Table 9-20 Environmental Specifications

Item	Specification
Operating temperature	0° to +45°C
Storage temperature	-30 to +65 C
Humidity (non condensing)	■ Operating: 20% to 80% ■ Non-operating: 5% to 90%
Transportation	24 in. (9.5 cm) impact drop survivable in original factory packaging

Accessories

Table 9-21 Standard Accessories

Item	Specification
Standard accessories	■ ***CMN-41 Installation and Operation Manual*** on CD ■ Breakout connector for LTC/GPI ■ One power cord ■ One power supply assembly

Table 9-22 Optional Accessories

Item	Specification
TVM-WRTY2	Full extended warranty plan: Adds three years to the standard two-year warranty
CMN-41	Supports SD-SDI and HD-SDI video
CMN-41L	Supports SD-SDI and HD-SDI video; controlled from a PC using a web browser or an optional RCU-CMS remote control unit
CMN-41-S	Supports SD-SDI video

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Table 9-22 Optional Accessories *(Continued)*

Item	Specification
CMN-41-3GB	Supports SD-SDI, HD-SDI, and 3Gb/s SDI video
CMN-S2H-F	Field upgrade for CMN-41-S to support HD-SDI video
CMN-S23GB-F	Field upgrade for CMN-41-S to support HD-SDI and 3Gb/s-SDI video
CMN-H23GB-F	Field upgrade for CMN-41 to support 3Gb/s-SDI
BLK-4	Blank panel for DRT-4
DRT-4	Double rack mount case
RCU-CMS	Remote control unit option ■ Provides remote control panel for desk top applications, including Ethernet connection software for setup of the RCU and IP addresses of connected units ■ Provides connections for up to 32 independent units

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A Pinouts

DVI-D Out Connector

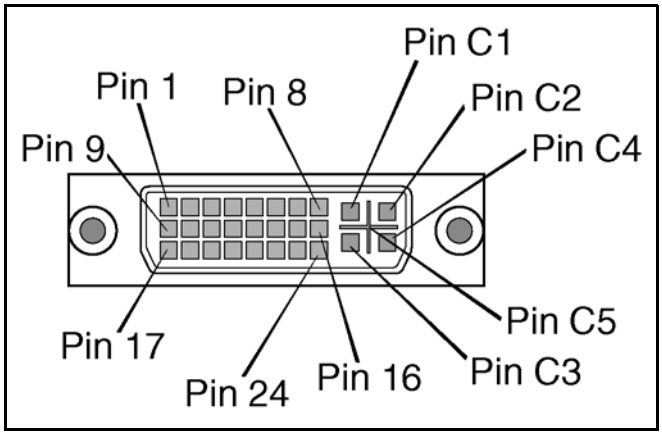

Figure A-1 DVI-D Out Connector

This DVI-D connector is only compatible with digital monitors. Analog outputs are not used.

Table A-1 Pinouts for DVI-D Out Connector

Pinout	Signal	Pinout	Signal
1	TMDS data 2-	16	Hot plug detect
2	TMDS data 2+	17	TMDS data 0-
3	TMDS data 2/4 shield	18	TMDS data 0+
4	TMDS data 4-	19	TMDS data 0/5 shield
5	TMDS data 4+	20	TMDS data 5-
6	DDC clock	21	TMDS data 5+
7	DDC data	22	TMDS clock shield
8	Not used	23	TMDS clock+
9	TMDS data 1-	24	TMDS clock-
10	TMDS data 1+	C1	Not used
11	TMDS data 1/3 shield	C2	Not used
12	TMDS data 3-	C3	Not used

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Table A-1 Pinouts for DVI-D Out Connector *(Continued)*

Pinout	Signal	Pinout	Signal
13	TMDS data 3+	C4	Not used
14	+5v power	C5	Not used
15	Ground (return for +5v, hsync, and vsync)		

LTC/GPI D-Sub Connector

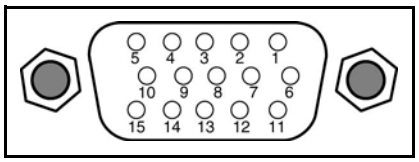

Figure A-2 LTC/GPI 15-Pin, Female, D-Sub Connector

Table A-2 Pinouts for LTC/GPI Connector

Pinout	Signal	Pinout	Signal
1	ERROR SUM	9	LTC GND
2	GPI IN 1	10	LTC+
3	GPI IN 2	11	LTC-
4	GPI IN 3	12	N/C
5	GPI IN 4	13	GND
6	ERROR SUM RETURN	14	N/C
7	GND	15	GND
8	GND		

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Ethernet RJ45 Connector

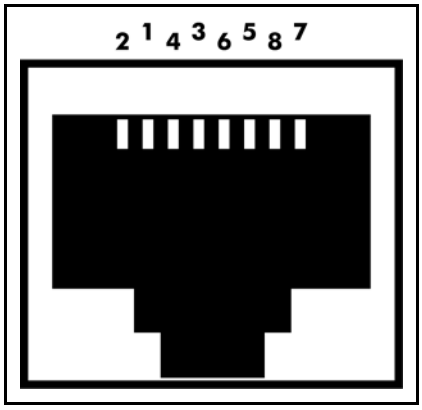

Figure A-3 Ethernet RJ45 Connector

Table A-3 Ethernet RJ45 Connector Pinouts

Pinout	Signal	Pinout	Signal
1	TX+	5	N.C.
2	TX-	6	RX-
3	RX+	7	N.C.
4	N.C.	8	N.C.

USB Connector

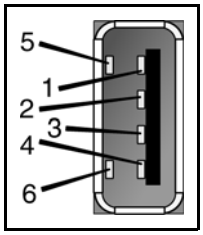

Figure A-4 USB Connector

Table A-4 USB Connector Pinouts

Pinout	Signal	Pinout	Signal
1	VCC	4	GND
2	Data -	5	GND
3	Data +	6	GND

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Power Connector

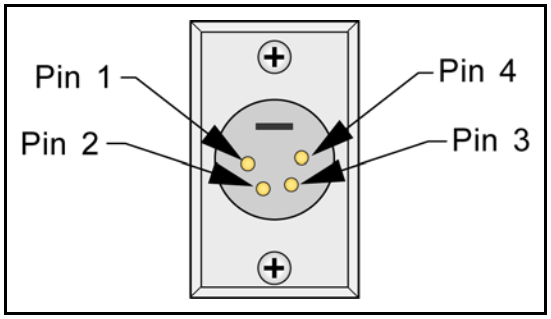

Figure A-5 Power Connector

Table A-5 Power Connector Pinouts

Pinout	Signal	Pinout	Signal
1	GND	3	N.C.
2	N.C.	4	Power

The USB connector is not present on CMN-41L units.

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C Glossary

601. An international standard (ITU-R BT.601) for component digital television. It defines the sampling systems, matrix values, and filter characteristics for digital television.

8 VSB. Vestigial sideband modulation with 8 discrete amplitude levels.

16 VSB. Vestigial sideband modulation with 16 discrete amplitude levels.

Advanced Television Systems Committee (ATSC). The parent organization that developed, tested and described the form and function of the US digital television formats.

AES/EBU. A digital audio standard established jointly by the Audio Engineering Society (AES) and the European Broadcasting Union (EBU).

Artifacts. Unwanted visible effects in the picture created by disturbances in the transmission or image processing, such as edge crawl or "hanging dots" in analog pictures, or "pixilation" in digital pictures.

Aspect Ratio. The ratio of horizontal to vertical dimensions. A square has an aspect of 1:1 since the horizontal and vertical measurements are always equal. Current television screen aspect ratios are 4:3 and 16:9.

Asynchronous Serial Interface (ASI). A transmission method adopted by the DVB, and called DVB-ASI. The transmission method allows for the transport of varying data payloads in a constant data stream. The DVB-ASI transport stream rate is 270 Mb/s.

Audio Breakaway. Routing video and accompanying audio in separate signal paths.

Audio-Follow. Routing video and accompanying audio together in the same signal path.

Auto Trans. Automatic transition; the execution of a single wipe or fade from current picture to another picture by way of an automatic device.

Bandwidth. The range of frequencies used to transmit information such as picture and sound.

Baseband Video. An unmodulated video signal.

Black. Also color black, blackburst. A composite color video signal that has the composite sync, reference burst, and a black video signal.

Blanking Processor. A circuit which removes sync, burst and blanking from the program video and then replaces it with sync, burst and blanking from the reference input. The process ensures constant sync and burst levels on program video.

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Border. An electronically-generated picture member which is used in wipes to separate the two video sources used in the wipe. It is of even thickness and has color produced by the matte generator.

Broadcast Legal. Encoding video signal parameters to conform to prescribed limits for broadcast. Encoding rules vary by NTSC, PAL, country and broadcast facility.

BTSC. Broadcast Television Standards Committee. A US standard for stereo audio encoding in NTSC broadcast television.

CAV. Component Analog Video

CDP. Caption Distribution Packet

CES. Consecutive Errored Samples

Composite Video. A single video signal that includes all color video and timing information. A composite signal includes luminance, chrominance, blanking pulses, sync pulses and color burst information.

Chrominance. The color portion of a video signal that represents the saturation and hue. Black, gray and white have no chrominance; color signals have both chrominance and luminance.

CH. Chroma

Chrominance/Luminance Delay. A measurement that indicates the amount to which chrominance and luminance are aligned with respect to each other. A low C/L delay figure can minimize the effects of ghosts or color offset on the received picture.

C/L Delay. Chrominance/Luminance Delay

Clipping. The electronic process of shearing off the peaks of either the white or black excursions of a video signal for limiting purposes. Clipping is often performed prior to modulation to limit the signal.

CMRR. Common Mode Rejection Ratio

Color Burst. The portion of a color video signal which contains a short sample of the color subcarrier. It is used as a color synchronization signal to establish a reference for the color information following it and is used by a color monitor to decode the color portion of a video signal. The color burst acts as both amplitude and phase reference for color hue and intensity. The color oscillator of a color television receiver is phase locked to the color burst.

Composite Sync. A signal consisting of horizontal sync pulses, vertical sync pulses and equalizing pulses only.

CRC. Cyclical Redundancy Check

Crosspoint. An electronic switch, usually controlled by a button on the panel. Control logic will allow for only one crosspoint, for each bus, to be switched "ON" on at a time.

D/A. Conversion of digital to analog signals.

DA. Distribution Amplifier

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Data Element. An item of data as represented before encoding and after decoding.

Decoded Stream. The decoded reconstruction of a compressed bit stream.

Decibel (dB). A logarithmic measure of the ratio between two powers, voltages, currents, sound intensities, etc. Signal-to-noise ratios are expressed in decibels.

Default. A factory preset value or condition.

Demodulator. A receiver, such as for television broadcast, cable, and closed circuit applications. A TV demodulator receives and processes off-air or cable RF signals and provides baseband video and audio outputs.

DHCP. Dynamic Host Configuration Protocol

Differential Gain. A measurement that specifies how much the chrominance gain is affected by the luminance level. Expressed as a percentage showing the largest amplitude change between any two levels, it indicates how much color saturation variance occurs when the luminance level changes.

Differential Phase. A peak-to-peak measurement that specifies the extent to which the chrominance phase is affected by the luminance level. Expressed in degrees of subcarrier phase, it indicates how much hue shift occurs with luminance level changes.

Digital Video Broadcasting (DVB). A specific project office of the European Broadcast Union. This group has produced a set of digital broadcasting standards.

DSK. Down Stream Key, a keyer which is electronically located after (or down stream from) all other functions of a switcher. The key resulting will appear to be on top of all other pictures from the switcher.

DVITC, D-VITC. Digital Vertical Interval Time Code. Timecode information stored on specific lines in the vertical blanking interval of a television signal.

EAV. End of Active Video in component digital systems.

EBU. European Broadcasting Union

Editor. A device or system which controls video tape recorders, video switchers, and other related devices in order to electronically splice segments of recorded video into a finished production.

EDH. Error Detection and Handling. A recommended practice defined in SMPTE RP 165. A system to generate and then detect video data errors in serial digital video systems.

Effects Keyer. A keyer which is electronically located in the mix/wipe generator portion of a switcher. The resulting key would appear under the down stream key.

EIA Rack Space or Unit. A specific size as designated by the Electronics Industry Association. The rack unit is 19 inches wide, and is 1.75 inches tall. A device which requires 3 EIA rack units is 19 inches wide and 5.25 inches (3x1.75 = 5.25) tall.

Elementary Stream (ES). A generic term for one of the coded video, audio or other variable length bit streams which are packetized to form MPEG-2 transport streams. Consists of compressed data from a single source (audio, video, data, etc.). One elementary stream is carried in a sequence of PES packets with one and only one stream ID.

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Embedded Audio. Digital audio information multiplexed onto a serial digital data stream. Up to sixteen channels can be multiplexed on a single stream of 601 video, minimizing cabling and routing requirement.

ENG. Electronic News Gathering

Encoded Clip Softness. In the encoded legalization process, "softness," as applied to encoded clips, refers to the processing of the video at the point of the clip. The clips are applied in YCbCr color space. The clip point is either an immediate limit (no softness) or will have a range of values leading to the clip point, all reduced to smooth the clip point to a less immediate limit (softness).

Encoded Legalization. Limiting of the luminance and color difference signals such that, once encoded into a composite video signal, the resultant encoded video does not violate the maximum or minimum signal levels as defined by the specific encoding rules. NTSC and PAL video plus various users of these types of video have many varied rules for maximum and minimum encoding limits. Encoded legalization usually calculates first the encoded luminance value and then the corresponding chroma value to make legalization judgements.

Encoded Video. A combined single video signal that is constructed from either separate GRB or luminance and two color difference video signals. NTSC, PAL, and SECAM are all examples of encoded video.

Envelope Detection. An RF signal detection technique that does not respond to phase variations in the carrier signal, enabling measurement of a transmitter's incidental phase. When used together with synchronous detection, envelope detection helps isolate either video and/or RF as the causes of phase distortion.

External Key Input. This is an alternate source for key cut. This is usually a separate external input to a switcher

Fade-thru-Black. A production technique which is a two step process. The first step will fade the program video to black. The second step will fade from black to the video selected on the preview bus. This is usually used in major scene transitions.

Fade-to-Black. A production technique which simply fades the program video to black and program audio to silent. This is used to end programs and to escape from embarrassing pictures or sounds.

Field. A picture or picture portion which is produced within one cycle of vertical synchronization. In interlaced systems, a full picture or frame requires two consecutive fields.

FM Trap. A circuit designed to minimize potential interference from strong FM signals in receiving equipment, such as a TV demodulator. For example, an FM trap can attenuate signals between 88-108 MHz to reduce interference on NTSC television channel 6.

Frame. A single full resolution picture as viewed in either a video or film system. In the case of interlaced video, two consecutive fields provide all of the information of one frame. In non-interlaced systems, one cycle of vertical synchronization produces a frame. A 60 Hz interlaced system, produces 30 frames of video in one second. A 60 Hz progressive (or non-interlaced) system, produces 60 frames of video in one second. Common frame rates are 24 (film) 25, 29.97, 30, 50, 59.94 and 60.

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Frame Synchronizer. An electronic device that synchronizes two or more video signals. Using one input as a reference, it locks a second signal to the reference.

Frame Store. An electronic method of capturing and storing a single frame of video.

Gamma. This term applies to the linearity of the change from black to white. Gamma controls adjust the gray or 50% point of the video either up or down, with the effect of changing the gray level of the video.

Gamut. The whole or total of whatever is being addressed. In color space, gamut refers to all colors which are included in a particularly defined color group, such as 601 gamut.

Genlock (Generator Lock). A method of synchronization involving the generation of a video signal that is time and phase locked with another signal.

GPI. General Purpose Interface

Headend. In a cable TV system, the facilities where program sources (satellite, terrestrial, VTR, local) are received and remodulated for distribution through a cable plant.

High Definition Television (HDTV). High definition television has a resolution of approximately twice that of conventional television in both the horizontal (H) and vertical (V) dimensions and a picture aspect ratio (H to V) of 16:9.

High Level. A range of allowed picture parameters defined by the MPEG-2 video coding specification which corresponds to high definition television.

HRC. Harmonically-Related Carrier

Hue. Color tint

ICPM. Incidental Carrier Phase Modulation. A measurement of picture carrier phase distortion (affected by the video signal level) that occurs in the transmitter.

Installation Categories. Categories of measurements that occur on circuits attached or not attached to a live electrical supply outlet. Installation Categories are as follows:

- Category I is for measurements that occur on circuits not attached to a live electrical supply outlet (115/230 VAC). The voltages come from secondary power sources. The secondary power source includes circuits energized by low-voltage sources and electronics such as batteries.
- Category II is for measurements that occur on circuits attached to a live electrical supply outlet (115/230 VAC).
- Category III is for measurements that occur on equipment permanently connected to the building. The distribution level equipment are usually fixed installations and circuit breakers.
- Category IV is for measurements that occur at the main electrical power supply.

IP. Internet Protocol

IRC. Incrementally-Related Carrier

I.R.E. Refers to the Institute of Radio Engineers, and is used as a unit of measurement. In NTSC television, 1 volt of signal equals 140 IRE units.

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ISP. Internet Service Provider

Jitter. A deformation of a signal affected by poor synchronization.

Key. An effect in television where a selected portion of background video is removed and replaced with another video.

Key Cut. In a key effect, this is the video which designates the portion of background video which is removed.

Key Fill. In a key effect, this is the video which is used to replace the portion of background video which was removed. This may be the same video as the Key Cut video.

Key Invert. In a key effect, this is an electronic action which reverses the polarity of the key cut signal. It makes black appear as white, and white appear as black.

Key Mask. In a key effect, it uses a wipe pattern from the wipe pattern generator to restrict the key cut from removing video in a portion of the screen. This requires the use of the wipe pattern generator and the Mask/Preset Size controls.

Key Source. Another term which is the same as key cut.

Legalization. The modification of serial digital video to conform to analog color space rules, as required by users.

LCD. Liquid Crystal Display

LED. Light-Emitting Diode

LFE. Low Frequency Effects

Lissajous. A display of the amplitude and phase relationships between two input signals.

LS. Left Surround

LTC. Longitudinal Time Code, A SMPTE timecode standard usually recorded onto the linear audio track of a VTR.

Luminance. The degree of brightness (black and white portion of the video signal) at any given point in the video image. A video signal is comprised of luminance, chrominance and sync. If luminance is high, the picture is bright and if low the picture is dark. Changing the chrominance does not affect the brightness of the picture.

Main Level. A range of allowed picture parameters defined by the MPEG-2 video coding specification with maximum resolution equivalent to standard definition television.

Main Profile. A subset of the syntax of the MPEG-2 video coding specification that is supported over a large range of applications. Applications include, MP@HL (Main profile at high level) and MP@ML (Main profile at main level).

Mask/Preset Size. Uses the wipe pattern generator in the keyer portion of the effects generator. This is used to adjust the size of a preset pattern or for adjusting the size of a mask to block a portion of the key cut (source) from use in the keyer.

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Matte Generator. An internal generator which can make any color, is used for border color and may be used for key fill. It is identical to the Color Background Generator, but simply used in other areas of the switcher.

Mbps. Megabits Per Second

mV. Millivolts

M/E. Mix/Effects System

MP@HL. Main profile at high level

MP@ML. Main profile at main level

MPEG. Refers to standards developed by the ISO/IEC JTC1/SC29 WG11, Moving Picture Experts Group.

MPEG-2. Refers to ISO/IEC standards 13818-1 (Systems), 13818-2 (Video), 13818-3 (Audio), and 13818-4 (Compliance).

Multi-Level Effects. Applies to any effects generator which can do more than one effect at a time. Typically, a multi level switcher can produce a Key and a Background transition in the same effects generator at one time.

NTSC. National Television Systems Committee, the color television system used in the United States, Canada, Mexico and Japan.

NVRAM. Nonvolatile RAM

Packet Identifier (PID). A unique integer value used to associate elementary streams of a program in a single or multi-program transport stream.

Packet. A packet consists of a header followed by a number of contiguous bytes from an elementary data stream. It is a layer in the system coding syntax.

Packetized Elementary Stream (PES). The data structure used to carry elementary stream data. The packets consist of a header followed by payload data, and a stream is a series of packets which form an elementary stream and have a single stream identification.

PAL. Phase Alternation Line; the standard color television system in many European and other countries.

Passive Looping. Video and audio signals routed through components, even if power is removed. Signals are not amplified or processed, maintaining transparency.

Pedestal Level. An offset used in a video system to separate the active video from the blanking level by maintaining the black level above the blanking level by a small amount.

Pixel. A Picture cell or Picture element representing one sample of picture information, such as an individual sample of R, G, B, luminance or chrominance.

Pollution Degree. A measurement of the foreign materials such as conductive dust, gas, and moisture between the internal areas of the product and the outside environment. Pollution Degrees are 1,2 3, and 4.

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- Pollution Degree 1 describes conditions where no pollution occurs or only dry, nonconductive pollution occurs. This is normal for equipment located in clean rooms. The pollution classified under Pollution Degree 1 has no environmental influence.
- Pollution Degree 2 describes conditions where dry, nonconductive pollution occurs. This is normal in an office environment. Temporary conductivity caused by condensation may occur when the unit is not in service.
- Pollution Degree 3 describes conditions where conductive pollution occurs, or dry, nonconductive pollution occurs due to condensation. Rooms that cannot maintain the moisture or temperature fall into this category. The location can only protect from outside weather conditions such as direct sunlight, rain, snow, and wind. Industrial areas can fall under Pollution Degree 3.
- Pollution Degree 4 describes pollution that generates persistent conductivity through conductive dust, rain, or snow. Pollution Degree 4 is for outdoor locations.

Preset. Refers to establishing any condition prior to use on the Program output. This term is used in reference to wipe patterns and is often interchanged with Preview.

Preview. The video output channel used to view the intended Program results prior to the execution of the next transition.

PRO Audio. A transmitted audio channel for talent cueing via Interrupt Foldback (IFB) to ENG vans and remote applications. Some demodulators support PRO audio monitoring.

Program. A transport stream combination of a video stream and one or more audio and data streams associated with that video stream. In analog terms, "Program" refers to the Base Band video and audio produced by the final output of a switcher.

Program Association Table (PAT). A list of all programs that are in the ATSC data stream.

Program Map Table (PMT). A listing of all elementary streams that comprise a complete (television) program.

Program Clock Reference (PCR). This is a time reference signal that is placed in MPEG streams for the purpose of time coordinating various data streams.

Program and System Information Protocol (PSIP). Information sent out as part of an ATSC transport stream which lists all of the video, audio, data and program information contained in the stream. This is the "TV guide" for a given stream.

Progressive Scanning. Also non-interlaced. A system of video scanning where lines of a picture are transmitted consecutively, such as with VGA monitor displays.

Push-push Toggle Switch. An electro-mechanical device which, when pushed, alternates the condition of the switch. Push once, it's off, push again, it's on.

Quadrature Output. An output in a television demodulator used for measuring Incidental Carrier Phase Modulation (ICPM) in a transmitter.

QPSK. Quadrature Phase Shift Keying, typically used by satellite downlinks.

QAM. Quadrature Amplitude Modulation, the technique used by cable TV systems (64-QAM and 256-QAM) to remodulate signals for distribution in a cable plant.

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GRB Legalization. Limiting of luminance and color difference video signals such that, once transcoded into GRB component video signals, the resultant video does not violate the maximum or minimum signal levels as defined by component video level rules. Typically, the maximum value for R, G, or B is 700 mV, and the absolute minimum value for any of these signals is 0 mV.

Reclocking. The process of regenerating digital data with a clock recovered from the input data.

Resolution. A measure of the finest detail that can be seen, or resolved, in a reproduced image.

RS. Right Surround

RS-422. Recommended Standard number 422, an E.I.A. standard which describes a type of data interchange. Television products use this standard as its communication format between the electronics frame and editors, control panel and computers. An RS-422 line may be extended up to 1,000 feet (304m).

Sampling. Process by which an analog signal is sampled to convert the analog signal to digital.

SAP. Secondary Audio Program, used in television broadcast for second language broadcasting, simulcasting, and separate audio programming.

Saturation. Color intensity

SAW Filter. Surface Acoustic Wave filter

Segment Error Rate (SER). A calculated average of uncorrected transport stream packets vs. total packets as accumulated over a designated period of time.

Signal to Noise Ratio -Analog (SNR). A measurement of the noise level in a signal expressed in dB (decibels) as a ratio of between the audio or video signal's maximum peak-to-peak signal voltage and the measured voltage of noise present when the signal is removed. Higher SNR figures indicate that any noise introduced by system components will not be perceived in the picture and sound output signals.

Signal to Noise Ratio-8VSB (SNR). As applies to 8VSB transmissions, this is a calculated average power of the ideal signal divided by the actual demodulated signal power.

SMPTE. Society of Motion Picture and Television Engineers

Standard Definition Television (SDTV). This term is used to signify a digital television system in which the quality is approximately equivalent to that of NTSC. This equivalent quality may be achieved from pictures originated at the 4:2:2 level of ITU-R BT.601 and subjected to processing as part of the bit rate compression. The results should be such that when judged across a representative sample of program material, subjective equivalence with NTSC is achieved. The displayed picture may be either the traditional 4:3 or the wide-screen 16:9 aspect ratio.

STL. Studio Transmitter Link

Synchronous Detection. A common detection technique used in television demodulators that removes quadrature distortion, enabling comparison of transmitter output with video input signal.

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S-Video. Also Y/C. Transmits luminance and color portions separately via multiple wires, thus avoiding the color encoding process and resulting loss of picture quality.

Tally. A system used to light lamps and indicate usage. Most production switchers have an internal tally system to indicate selected functions, and which selected functions are currently involved with Program.

TCP. Transmission Control Protocol

Telecine. A device used to convert film to video; movie film is digitally sampled and converted to video frame by frame in real-time.

TCXO. Temperature Compensated Crystal Oscillator

THD. Total Harmonic Distortion

Transport Stream-ATSC (TS). Consists of the following: (1) Packets: 188 bytes - fixed length with descriptive data, (2) Carries several programs, (3) has a PID which identifies the type of TS packet (video, audio, other), and (4) carries descriptive information about the program.

UHF. Ultra High Frequency

Unity Gain. An electronic term indicating that a signal will be neither amplified or attenuated. One volt of signal level in results in one volt of signal level out.

Vector. A measure that has two individual properties: magnitude and direction.

Vector Clip. A special encoded clip version that limits only the Cb and Cr input video signals and does not affect (nor is it affected by) the luminance component. This color-only clip limits the maximum vector excursions as viewed in an encoded state and is intended for users who wish to prevent encoded vectors from ever exceeding the perimeter circle of an encoded vector display.

VHF. Very High Frequency

VITC. Vertical Interval Time Code, a method for recording on to video tape the timecode address for each video frame inserted in the vertical interval.

Waveform. A visual representation of a signal in the shape of a wave that plots amplitude versus time.

White Level. The brightest part of a video signal, corresponding to approximately 1.0 Volt.

White Balance. An electronic process used to calibrate the picture for accurate color display in different lighting conditions.

Wipe. A special effect in which two pictures from different video sources are displayed on one screen. Production switchers and special effects generators provide numerous wipe patterns varying from simple horizontal and vertical wipes to multi-shaped, multi-colored arrangements.

XGA. High resolution 1024×768 non-interlaced (progressive) display monitor

XVGA. Extended Video Graphics Adapter

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YPbPr. CAV format composed of luminance (Y) and two color difference signals (Pb and Pr)

Y/C. Also S-video. Describes the separation of video signal luminance and chrominance components.

Zero Carrier Pulse (chopper). In a TV demodulator, removes the carrier in the vertical interval for a short period, enabling depth of field measurement.

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